



**M Y N A H<sup>SM</sup>**

## **B Braun Series 2 Driver Programmable Serial Interface Card**

### **USER MANUAL**

**Rev. P1.10**

**December 15, 2003**

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# 1 INTRODUCTION

## 1.1 Scope

This document is the User Manual for the B Braun 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 B Braun protocol).

The section *Document Format* briefly describes the contents of each section of this manual. *System Specifications* outlines hardware and software requirements for the B Braun Driver (P1.10) firmware.

## 1.2 Document Format

This document is organized as follows:

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



### 1.3 System Specifications

The following table lists the minimum system requirements for the B Braun Driver:

**Table 1: System Specifications**

<b>Firmware</b>	B Braun Driver Firmware (P1.10)
<b>Protocol Compatibility</b>	B Braun Protocol, as documented in the protocol Bulletin. Supported protocol is DFC2-SW 3.0.
<b>Software Requirements</b>	DeltaV System Software (Release 6.3 or later) installed on a hardware-appropriate Windows NT workstation configured as a ProfessionalPlus for DeltaV  Serial Interface Port License (VE4102)
<b>Minimum DeltaV Hardware Requirements</b>	DeltaV Serial Module, Series 2 only  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 B Braun 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 B Braun devices, only RS-422/RS-485 Full Duplex can be used. The electrical connection and communication settings must be configured properly to ensure accurate communication between the PSIC and B Braun devices. These are described in Section 4.1.

The primary functions of the driver are listed below:

- Performs data and message handling between DeltaV and B Braun device.
- This driver runs in Master mode only. In this mode, the driver sends read/write commands to the B Braun device, checks validity of responses received, and updates the corresponding DeltaV PSIC registers.

Each PSIC, when loaded with the B Braun Driver, is capable of communicating with B Braun devices over one or both of its two ports, depending upon your application. More than one B Braun device can be hooked up to a single port. The actual number of devices depends on how many datasets are used for each unit. If only one dataset is used per unit, then 16 units can be configured on a port.

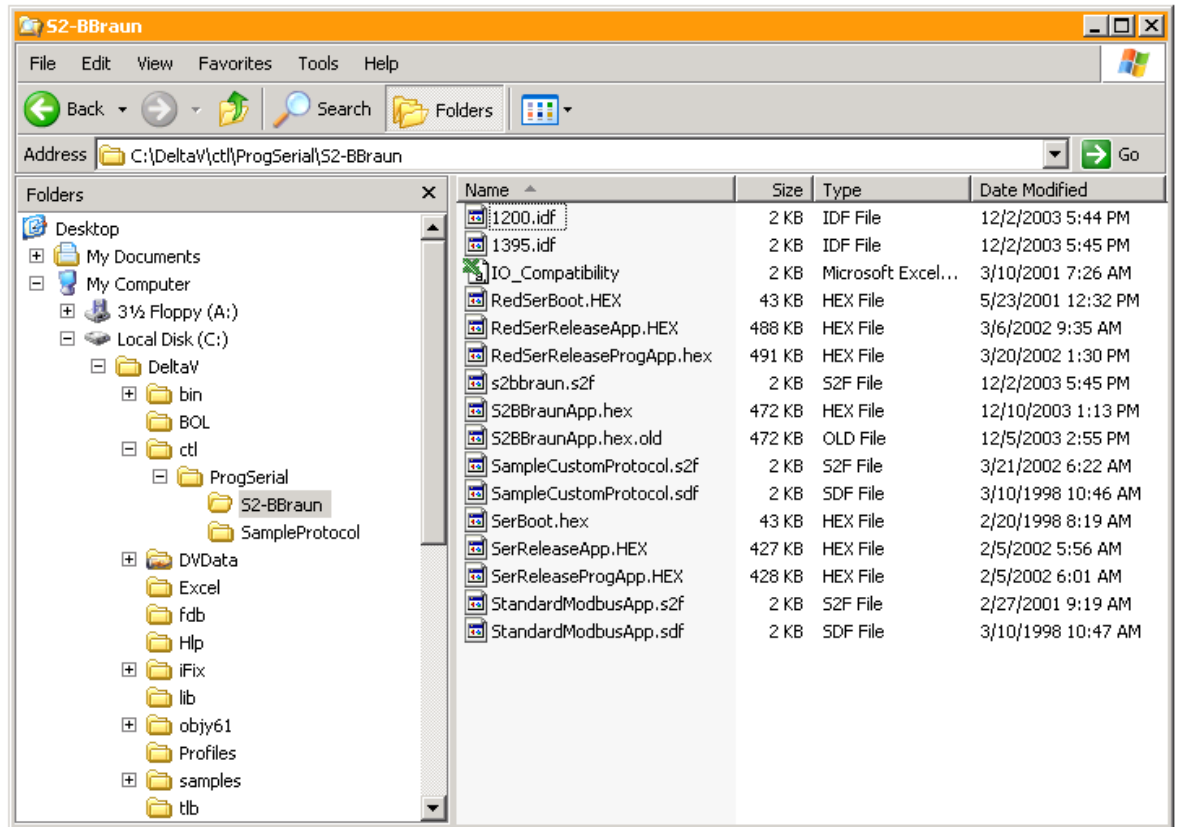


### 3 Downloading the firmware

The DeltaV Controller upgrade utility is used to flash the Serial Card with the distributed firmware. The firmware distribution software comprises 15 files, distributed on a CD. These files must be copied to the DeltaV directory on your ProPlus Workstation. Note that you will have to create the \S2-BBraun subdirectory. The path is:

**\DeltaV\ctl\ProgSerial\S2-BBraun**

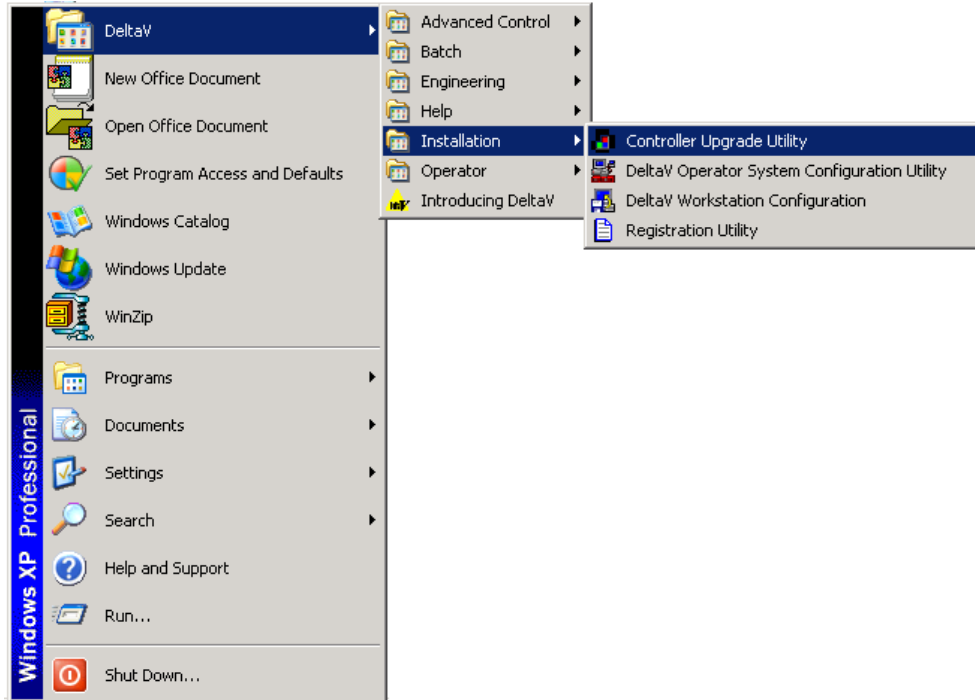
The following shows a completed copy operation:



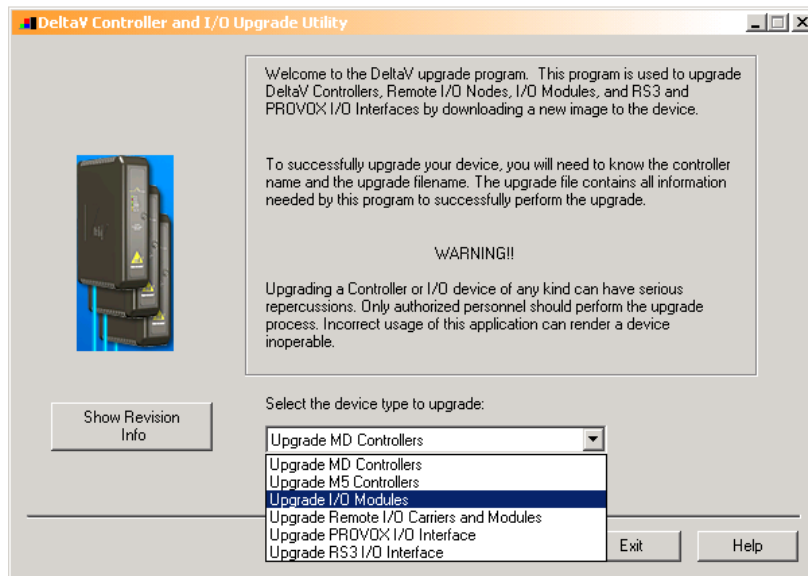
After copy completion, you are ready to program (or upgrade) the Programmable Serial Card with the supplied custom driver software. The steps are as follows:

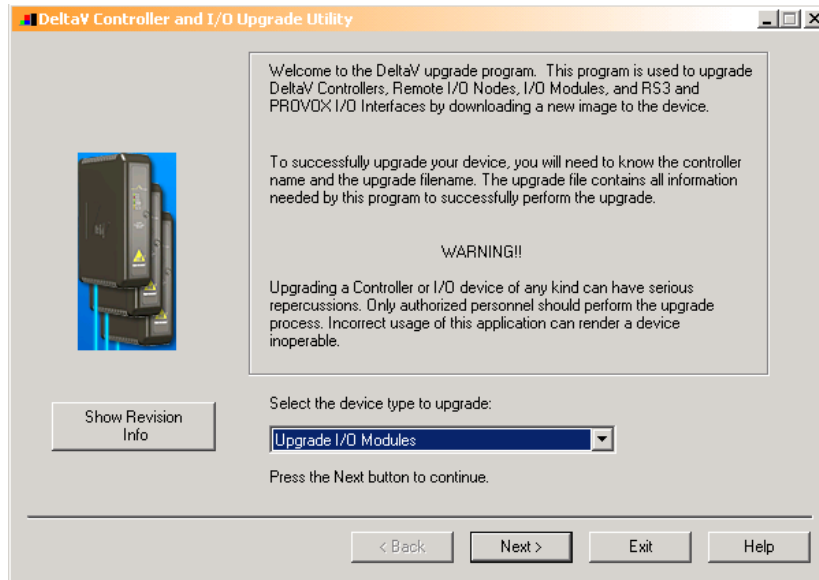


1. Click on the Start button and select DeltaV-> Installation-> Controller Upgrade Utility as shown below:

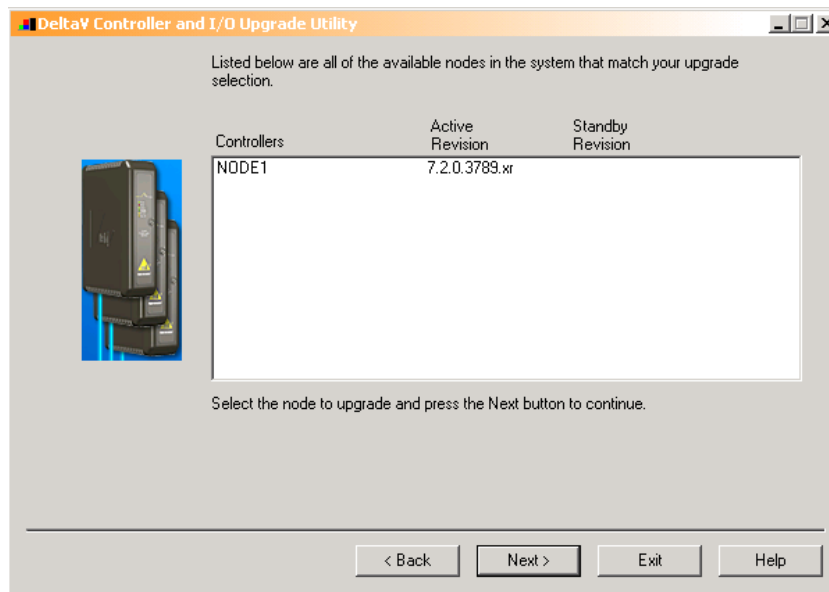


and the following dialog will appear:



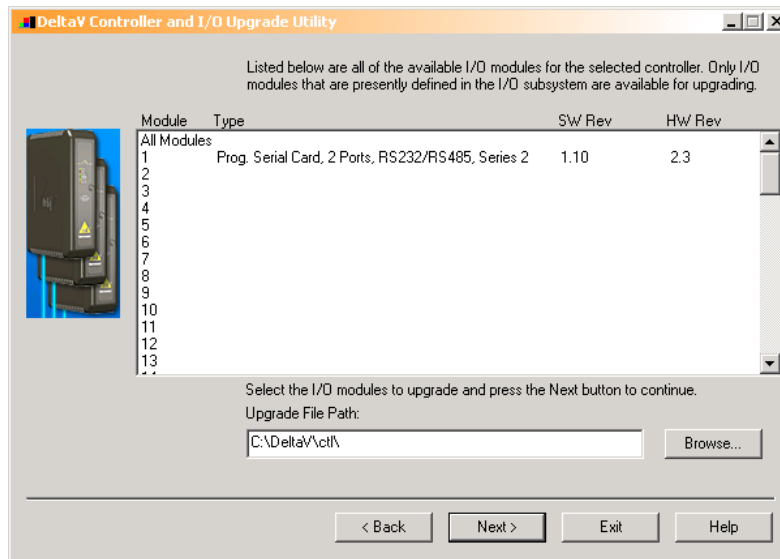


2. Select the Upgrade I/O Modules option as shown above, and then click Next.



3. The above dialog will appear, listing all the available Controllers in your network.

4. From this dialog, select the appropriate Controller and then Click Next. The dialog with all configured I/O modules will appear as shown below. Your list will be different.

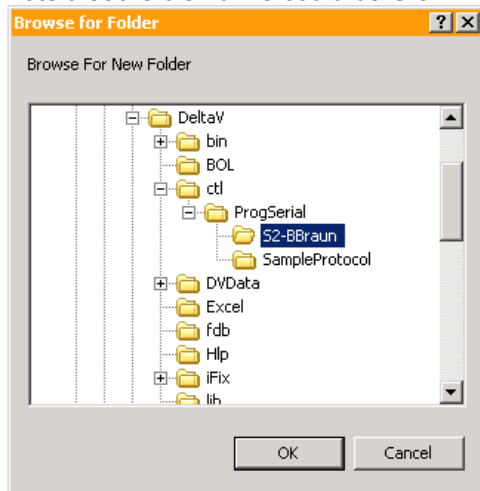


**Note:**

The first time a standard Serial card is upgraded to the B Braun firmware, perform Steps 5 and 6; then go to step 9.

When upgrading an existing Programmable Serial Card, the above dialog will appear. Skip Steps 5 and 6; then proceed to Step 7.

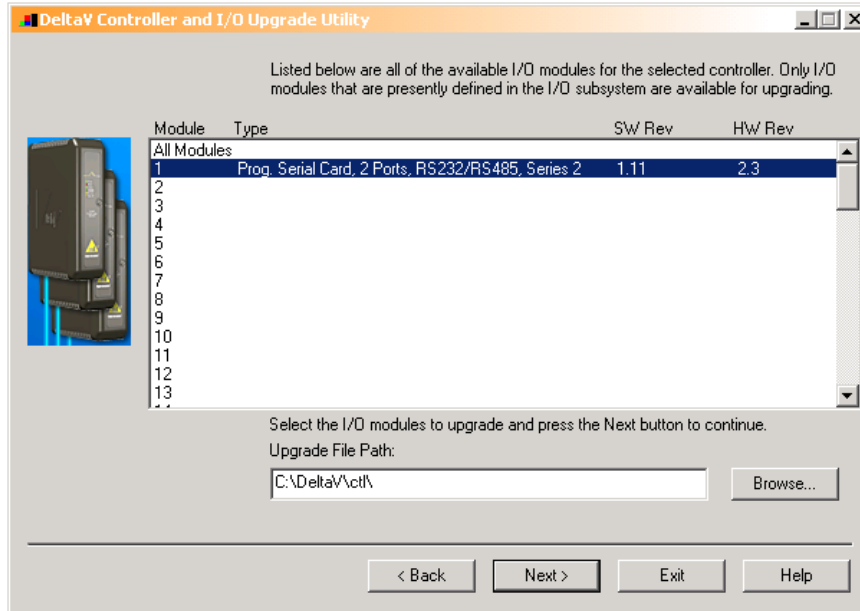
5. Click the Browse button and select the DeltaV path as shown below, and then click ok. Note that the disk drive could be C or D.



6. Select the Serial module 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.



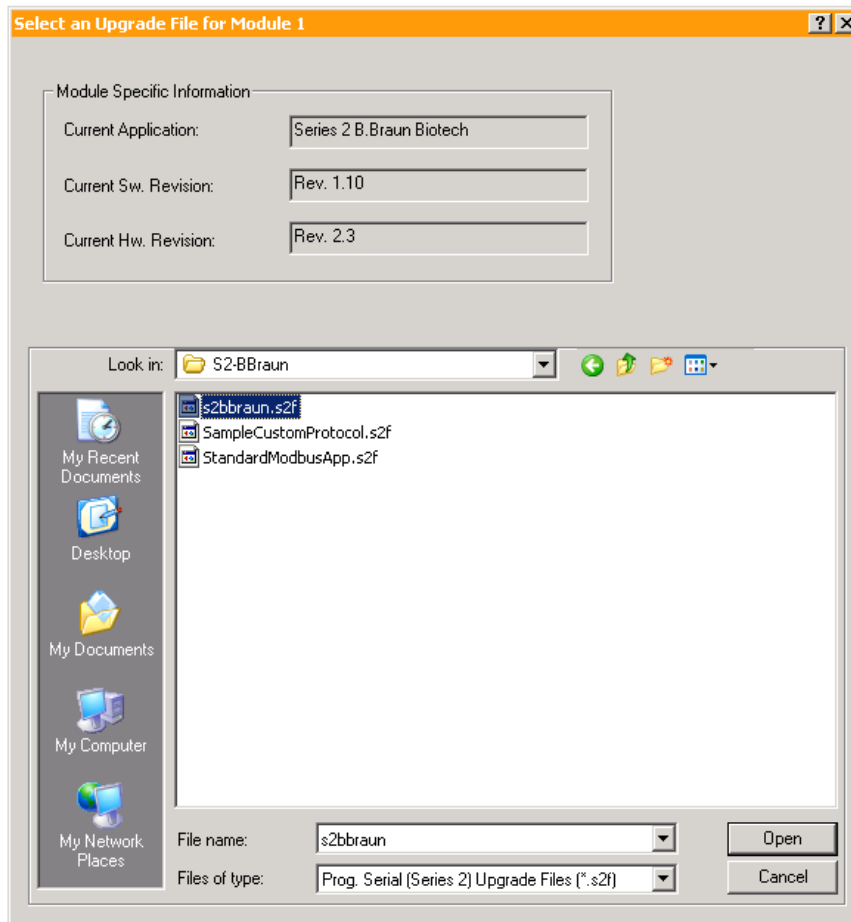
For example, we will select I/O Module 1. This will give you a dialog, from which you will select the file path to where the driver software is located. This path will be:

**\\DeltaVctl\ProgSerial\S2-BBraun**

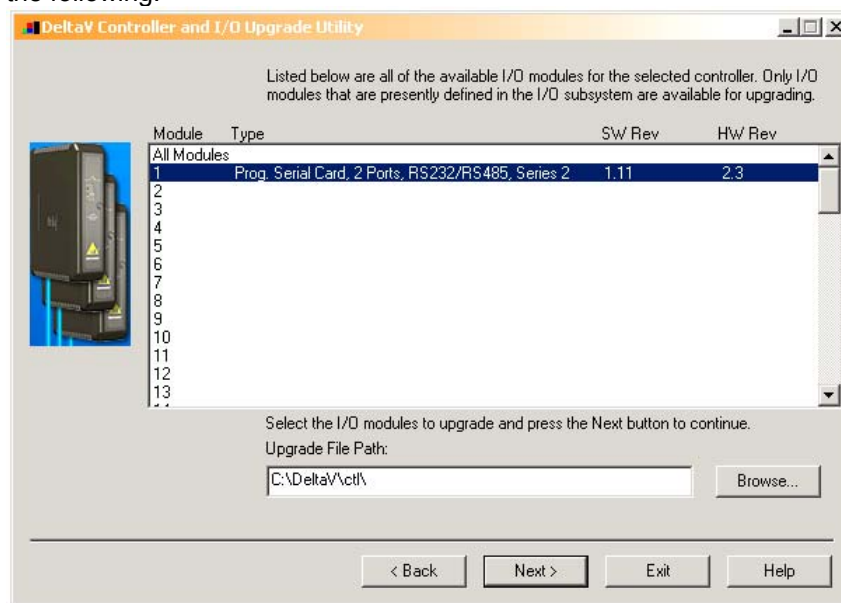
Once you are in the specified directory, you will need to select the following file:

**S2BBraun.S2F**

This is shown in the following dialog.

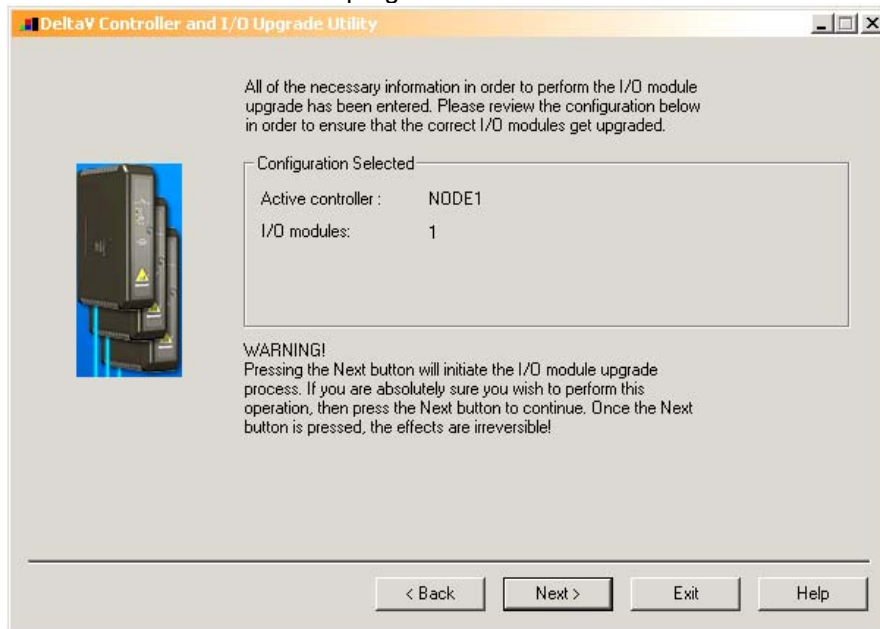


8. After selecting the .S2F file, Click on Open. This dialog will close and you will be back to the following:

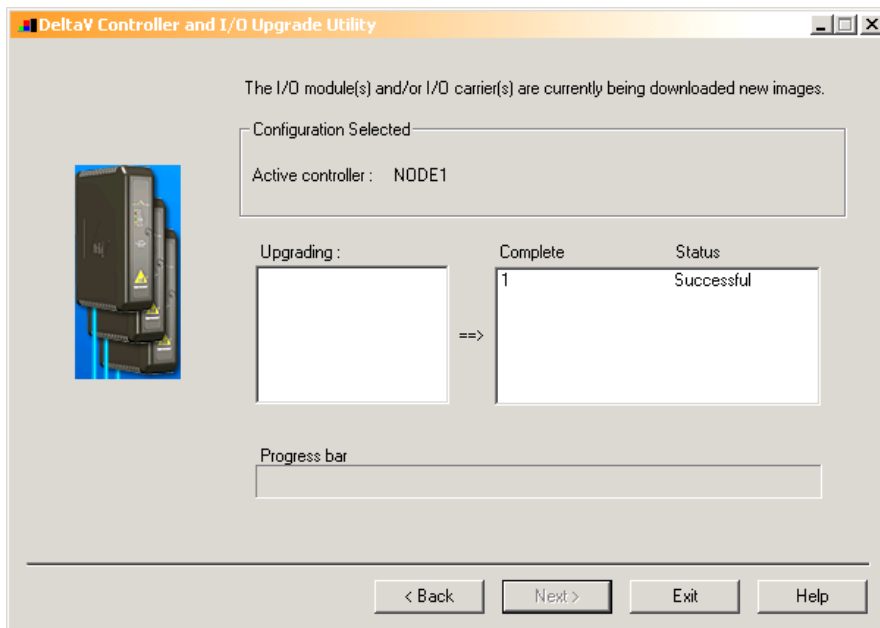




9. In this dialog, Click Next again. You will get the following dialog, confirming the Controller and I/O Module to program.



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



This completes the I/O Module upgrade process.

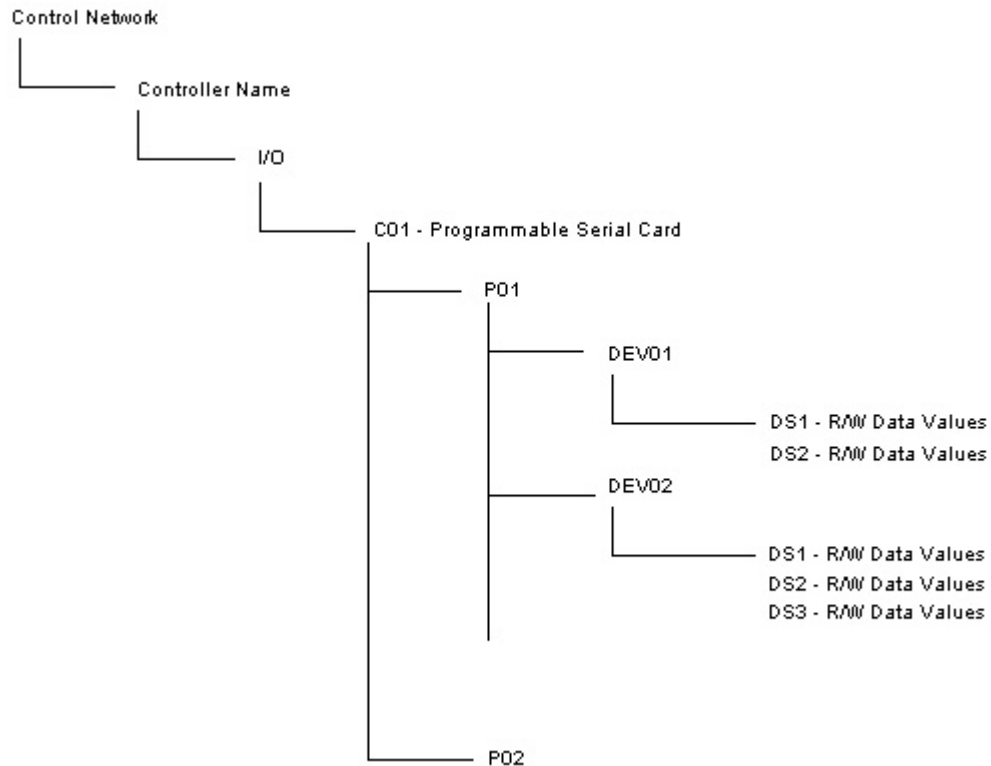


## 4 CONFIGURATION INFORMATION

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). For B Braun, select RS-422/485 Full Duplex.

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.



A total of 16 datasets can be configured under each port. The datasets are divided over the configured devices. A dataset represents register data read from the B Braun device, or written to a device. Output datasets can also be configured with read back.

The B Braun driver is compatible with the DFC2-SW 3.0 firmware supported by Biostat B, C, D Micro-DCU. The driver supports the following commands:



<b>Parameter of the SubSystem</b>	<b>Group</b>	<b>PSIC -&gt; SubSystem</b>	<b>SubSystem -&gt; PSIC</b>
Process Values	PV	Read Command	Read Response
Controller Setpoint	CS	Read/Write Command	Read/Write Response
Controller Mode	CM	Read/Write Command	Read/Write Response

Each group (PV, CS, or CM) occupies one (1) dataset in the PSIC dataset structure. Note that a PSIC has 2 ports, with 16 datasets each. For a given B Braun device, you can configure the PSIC to communicate with any single group, or with all three groups.

If a single group is configured, then only one dataset is consumed for that device. If all three groups are configured, then three datasets will be consumed. This leaves a balance of 13 datasets to be used for other devices. Consequently, if all devices are configured with only one group, then you can have a maximum of 16 devices attached to each port.



### 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-422/485 Full Duplex (4 wire). Lastly, select the Baud rate, Parity, Data bits and Stop bits parameters; these must match the device settings. Typically for B Braun, these are 9600, Even parity, 8 bits and 1 stop bit.

### 4.2 Device Configuration

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

### 4.3 Dataset Configuration

Datasets contain the field values read from a device or DeltaV values being written to a device. Each dataset will read or write data of one type. This is described in Table 1 below.

#### 4.3.1 Data Direction:

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

#### 4.3.2 Output Mode:

Two output modes are available in the DeltaV PSIC: Block Output (0) and Single Value Output (1). In block mode, any register change in the dataset will trigger the entire dataset to be written to the device. In single value mode, only the changed register is written out.

Table 2: B Braun Data Direction

Dataset Number	BBraun Group Type	Dataset Direction
1	PV	Input
2	CS	Output with Readback
3	CM	Output with Readback

#### 4.3.3 DeltaV Data Type:

Configure the following data types:

Table 3: B Braun Register Types

Parameter of the SubSystem	DeltaV Data Type
Process Values	Floating Point w/Status
Controller Setpoint	Floating Point w/Status
Controller Mode	8-bit UINT w/Status



#### 4.3.4 DeviceDataType

The DeviceDataType determines which B Braun command is being sent. This is described in the following table:

**Table 4: B Braun Register Type Codes**

Group	Device Data Type	Command
PV	1	Process Value
CS	2	Controller
CM	3	Controller

#### 4.3.5 Data Start Address and Number of Values

The Start Address for each dataset should be configured 0 always. The numbers of values for each type are as follows:

**Table 5: B Braun Number of Values**

Dataset Number	Bbraun Group Type	Number of Values
1	PV	50
2	CS	16
3	CM	16

#### 4.3.6 Special Data 1-5

Not used.



## 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 Radio Modem Modbus 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	2.3 (or later)
SwRev	Software Revision	P1.10 (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**

RS-422 Standard

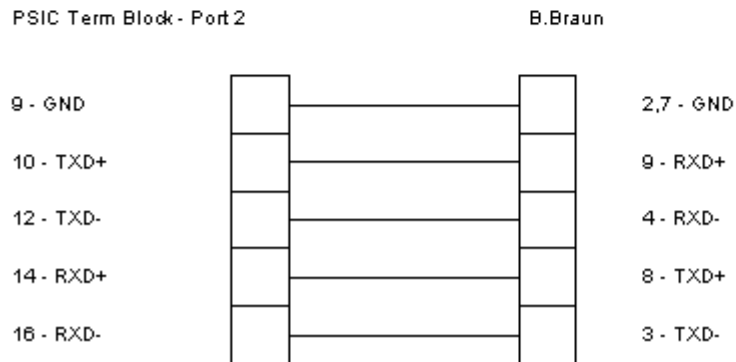
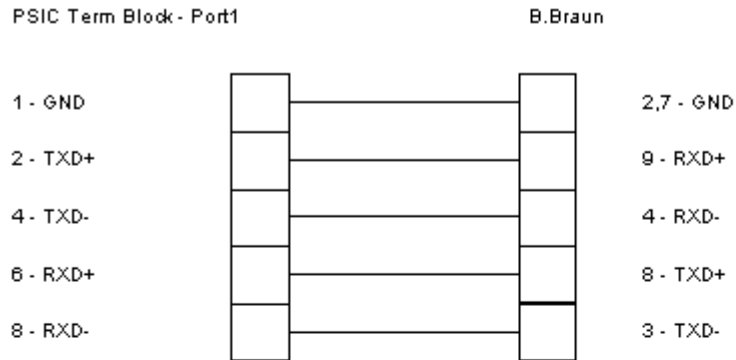
1	Port 1 – Ground
2	Port 1 – Transmit Data (TxD+)
3	Unused
4	Port 1 – Transmit Data (TxD-)
5	Unused
6	Port 1 – Receive Data (RxD+)
7	Unused
8	Port 1 – Receive Data (RxD-)
9	Port 2 - Ground
10	Port 2 – Transmit Data (TxD+)
11	Unused
12	Port 2 – Transmit Data (TxD-)
13	Unused
14	Port 2 – Receive Data (RxD+)
15	Unused
16	Port 2 – Receive Data (RxD-)

For additional detail, please refer to DeltaV Books Online.



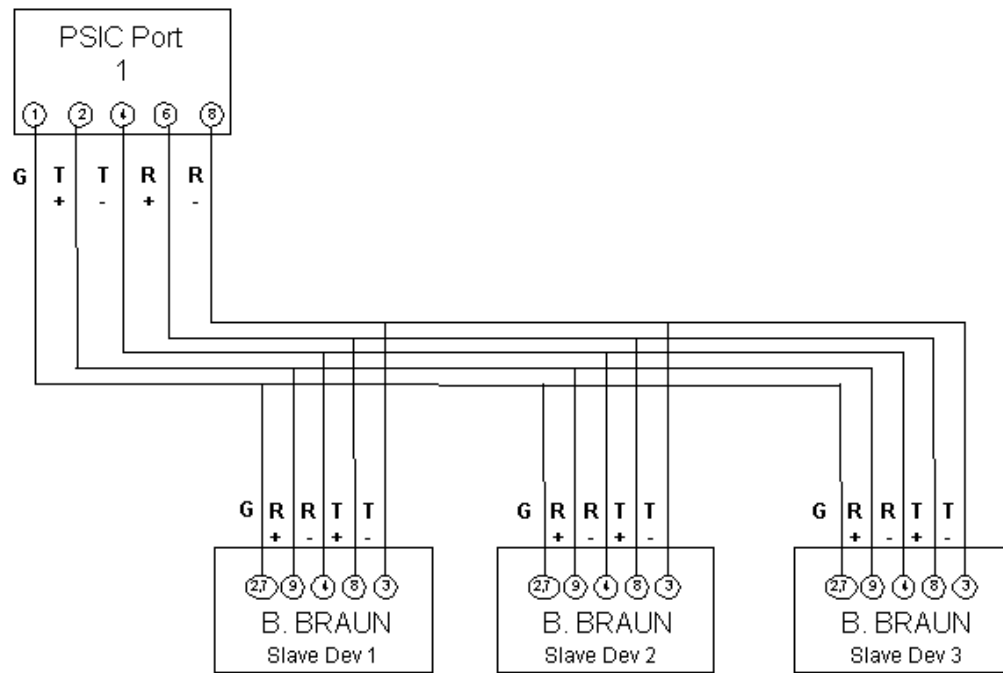
## 6.2 Wiring Connections

B Braun devices communicate using RS-422/485 Full Duplex (4-wire). The cable pinout for point-to-point communications is as follows:





The RS-422/485 Full Duplex cable pinout for multi-dropped communications is as follows:



### Multi-dropped B Braun devices



## **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 address is:

[support@mynah.com](mailto:support@mynah.com)

Thank you for using DeltaV.