



M Y N A HSM

Programmable Serial Interface Card Driver Mettler Toledo SevenMulti

USER MANUAL

Rev. P1.56

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1 INTRODUCTION

1.1 Scope

This document is the User Manual for the Mettler Toledo SevenMulti 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 SevenMulti devices.

The section *Document Format* briefly describes the contents of each section of this manual. *System Specifications* outlines hardware and software requirements for the SevenMulti Driver 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 SevenMulti Driver.
Flashing Firmware	Describes flashing procedures for the SevenMulti 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 PSIC and the SevenMulti Device. Also describes the cable pin assignments for RS232 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 SevenMulti Driver:

Table 1: System Specifications

Firmware	SevenMulti Driver Firmware v1.55 or later
Protocol Compatibility	Communications with the SevenMulti are based on the following document: Mettler Toledo SevenMulti Command Set Reference Manual
Software Requirements	DeltaV System Software (Release 4.2 or later) installed on a hardware-appropriate Windows workstation configured as a ProfessionalPlus for DeltaV Serial Interface Port License (VE4102) if required.
Minimum DeltaV Hardware Requirements	DeltaV Series 2 Serial Module, Hardware Rev 1.1r or later DeltaV M3, M5, M5+, MD, MD Plus or MX Controller, Power Supply and 8 wide controller carrier
Other Optional Hardware	The MT has an RS232 serial interface port which can be directly connected to the DeltaV Serial card. This is limited to 50 feet of serial cable or less, however. Optionally, to gain distance and to multi-drop multiple SevenMulti devices from a single serial port, the user may use a Technman Control-It 5258, which is an addressable RS485/RS232 converter. The DeltaV serial card port would be configured as RS485, and connected to the 5258, which then connects to the SevenMulti. In this way, more than one 5258 converters can be multi-dropped from the serial port, with each converter connected to a single SevenMulti device.



2 THEORY OF OPERATION

DeltaV comprises an I/O sub-system, in which the PSIC is one type of card. The purpose of the PSIC is to serially integrate third-party devices, allowing data to be read into and written out from DeltaV. Each PSIC has 2 communication ports that can be configured as Master or Slave, using RS-232, RS-485 (Half Duplex), or RS-422 (Full Duplex). Various communications parameters, such as baud rate, are configurable.

The SevenMulti devices communicate using RS232 only. Furthermore, there is no unique identifying address. Use of the addressable RS485/RS232 converter provides the required unique address so that multiple SevenMulti devices can be multi-dropped from the same serial port in the PSIC. One RS485/RS232 converter is used for each SevenMulti. Dip switches are used to configure the converter address. Please refer to the Technman Control-It 5258 product manual for additional wiring and configuration details.

The driver capacity is limited to a maximum of eight (8) SevenMulti devices per port, where each SevenMulti is uniquely identified by the attached 5258 converter. Each SevenMulti is assigned two datasets which contain the run time data.

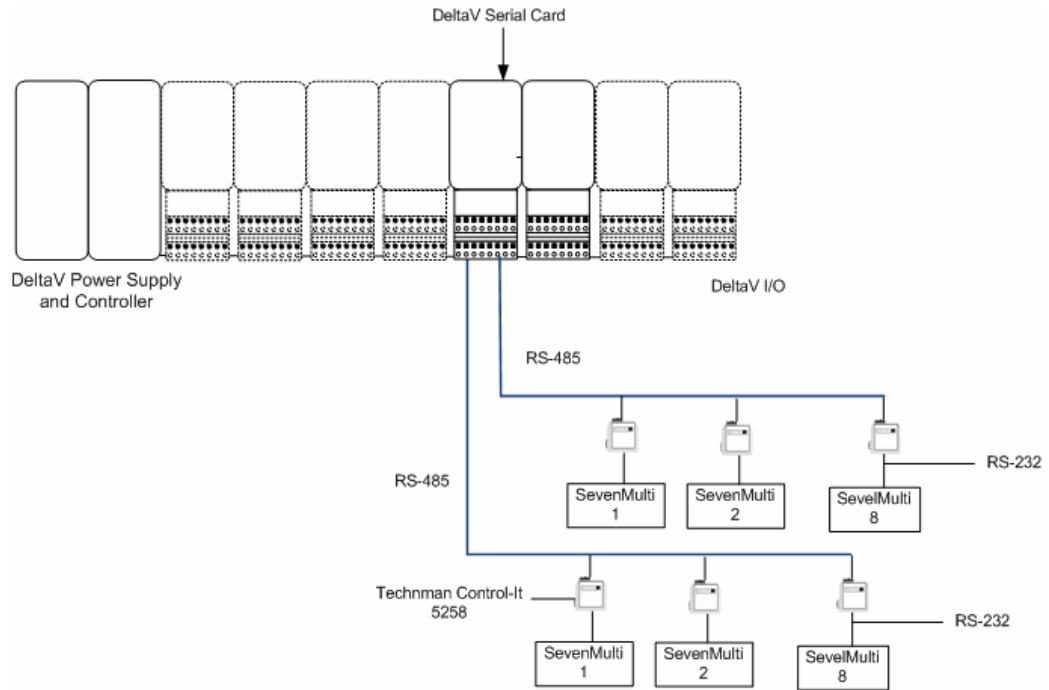
The SevenMulti has two channels, Right and Left, numbered 0 and 1 respectively. There are several modes of operation: (1) pH Mode; (2) mV Mode; (3) RelmV Mode; (4) ION Mode; (5) ISFET pH Mode; (6) ISFET mV Mode; (7) ISFET RelmV Mode; (8) Conductivity Mode; (9) TDS Mode; (10) Sal Mode; and (11) Restivity Mode. Out of these modes, only Modes 1 and 8 are supported by the driver.

The PSIC driver functions only in Master mode, while the SevenMulti devices function as the communications Slave. On power-up, the PSIC driver receives its configuration from the DeltaV Controller. As part of its normal, continuous scan, the driver sets the mode to pH and Conductivity and then reads the data available in the SevenMulti's Right and Left channels. The data is retrieved from the response messages and reported up to the DeltaV Controller in dataset registers.

A register in the first dataset of a given SevenMulti is used to control the scan. Users can write a 0 into this register to prevent the driver from scanning the device. Writing a 1 enables the scan. This functionality is important and used when performing measurements so that there are no communications errors propagated into DeltaV when the device is in left or right channel mode. Note that the scan is offline by default when the PSIC is downloaded or installed.



The physical architecture will be as follows:



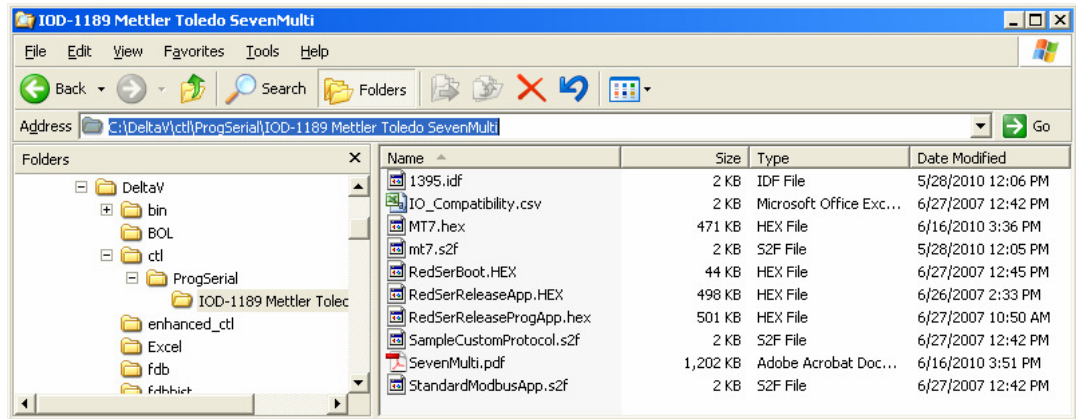


3 Flashing the firmware

The driver software distribution contains 10 files. These files must be copied to the DeltaV directory on your ProPlus Workstation. The path is:

\DeltaV\ctl\ProgSerial\IOD-1189 Mettler Toledo SevenMulti

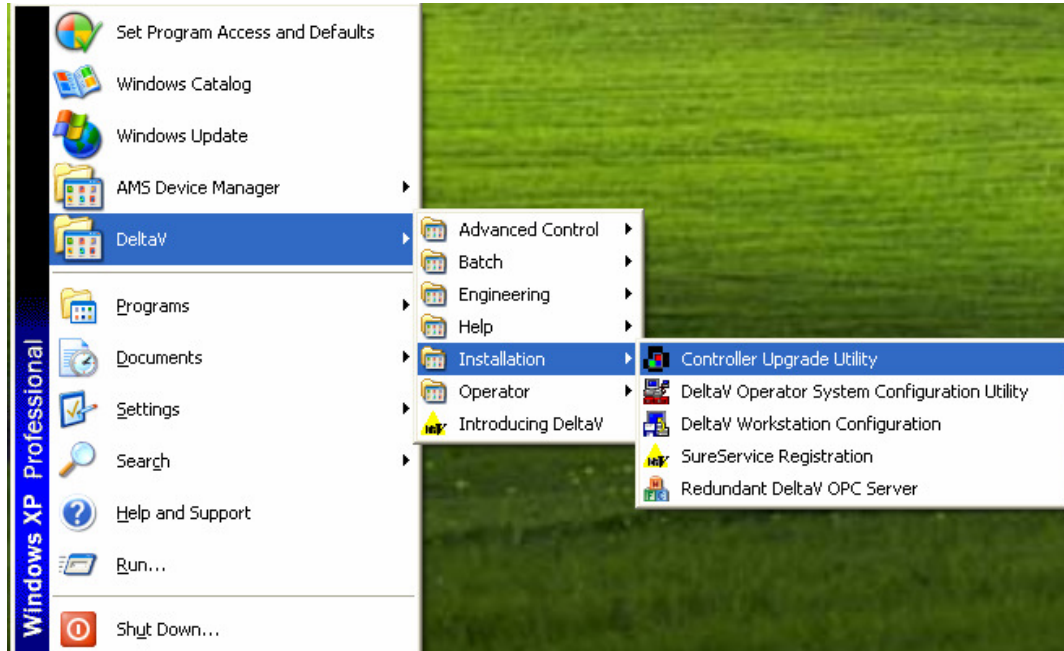
Note that you will have to create this subdirectory. The following shows a completed copy operation:



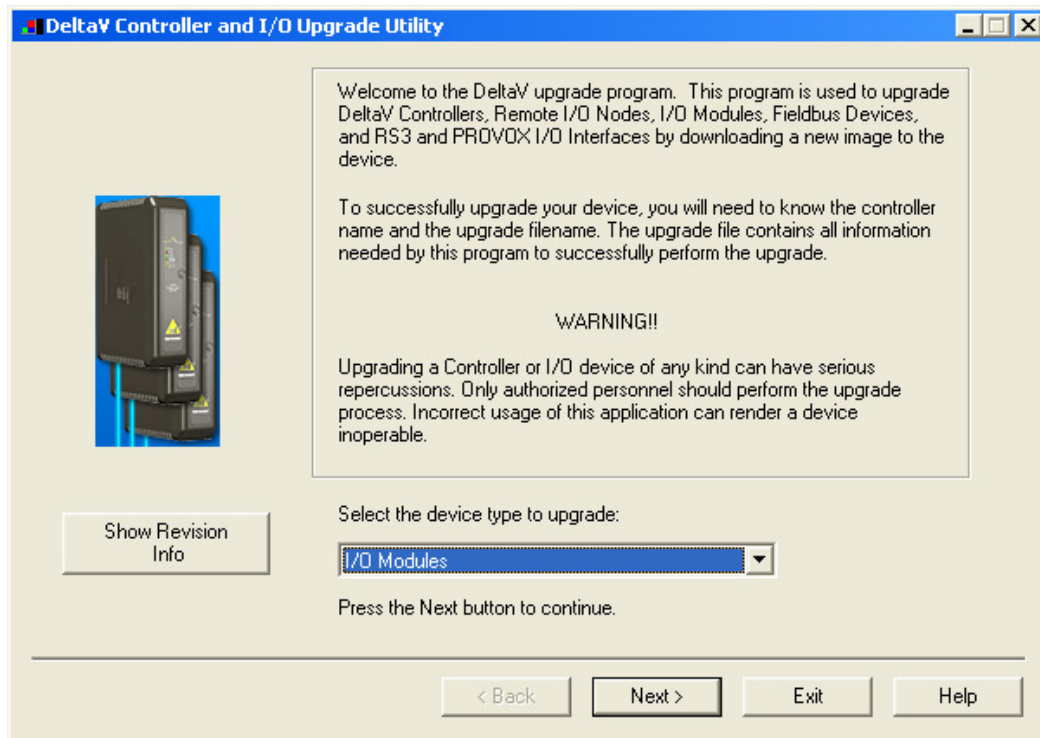
After copy completion, you are ready to program (or upgrade) the Programmable Serial Card with the supplied custom driver software. The steps are as follows:

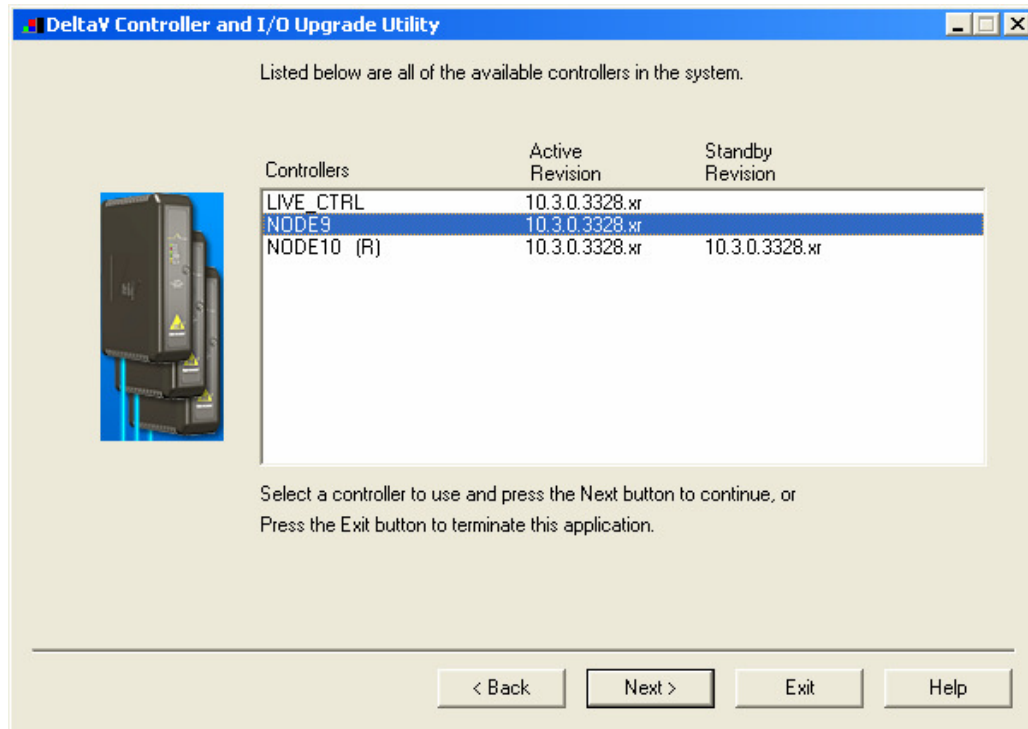


1. Click on the Start button and select DeltaV-> Installation-> Controller Upgrade Utility as shown below, and the following dialog will appear:



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

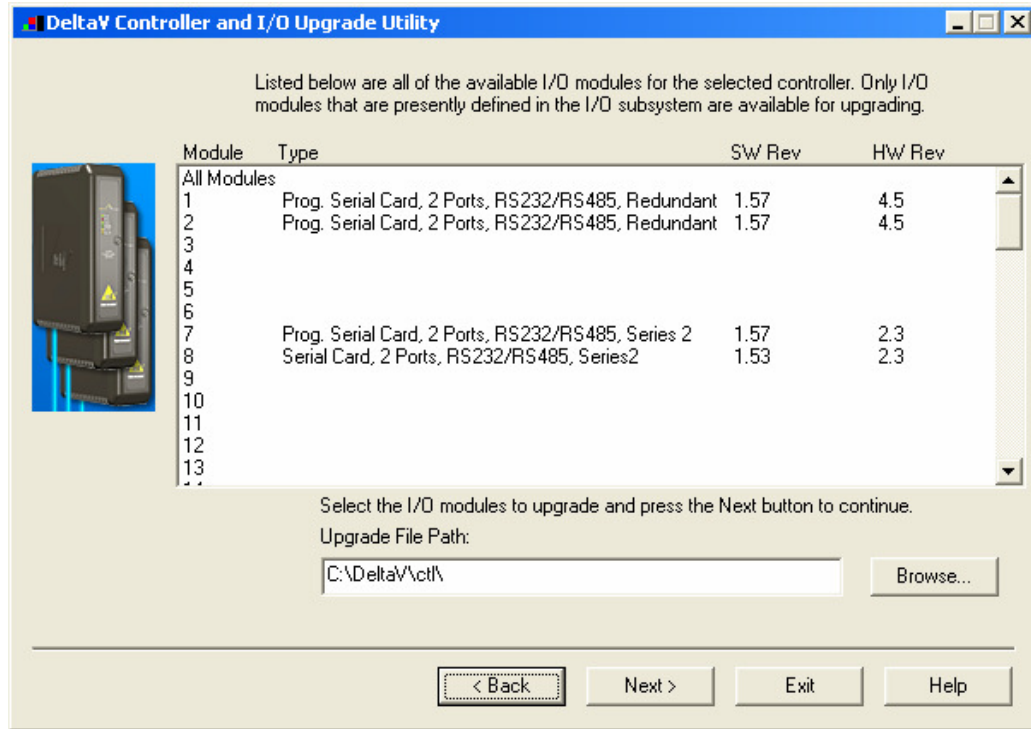




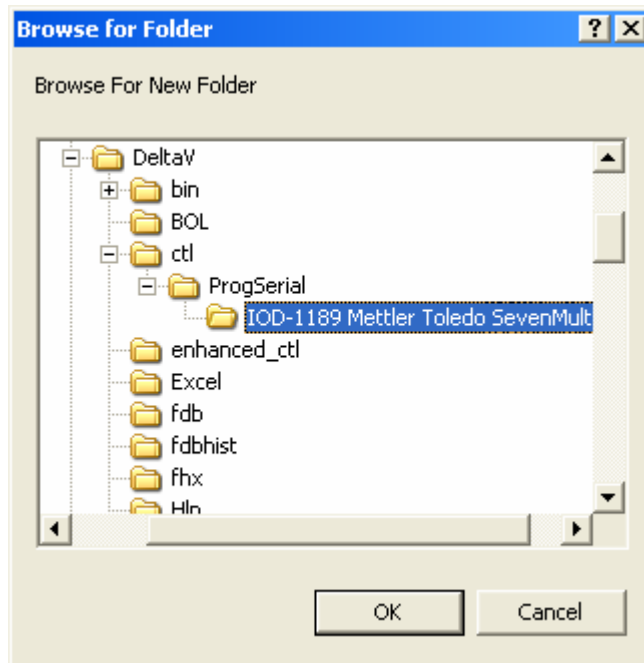
3. The above dialog will appear, listing all the available Controllers in your network. From this dialog, select the appropriate Controller and then Click Next.

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 SevenMulti Driver, the dialog will be as shown below (card 8). When upgrading an existing Programmable Serial Card, skip Steps 5 and 6, and go to Step 7.

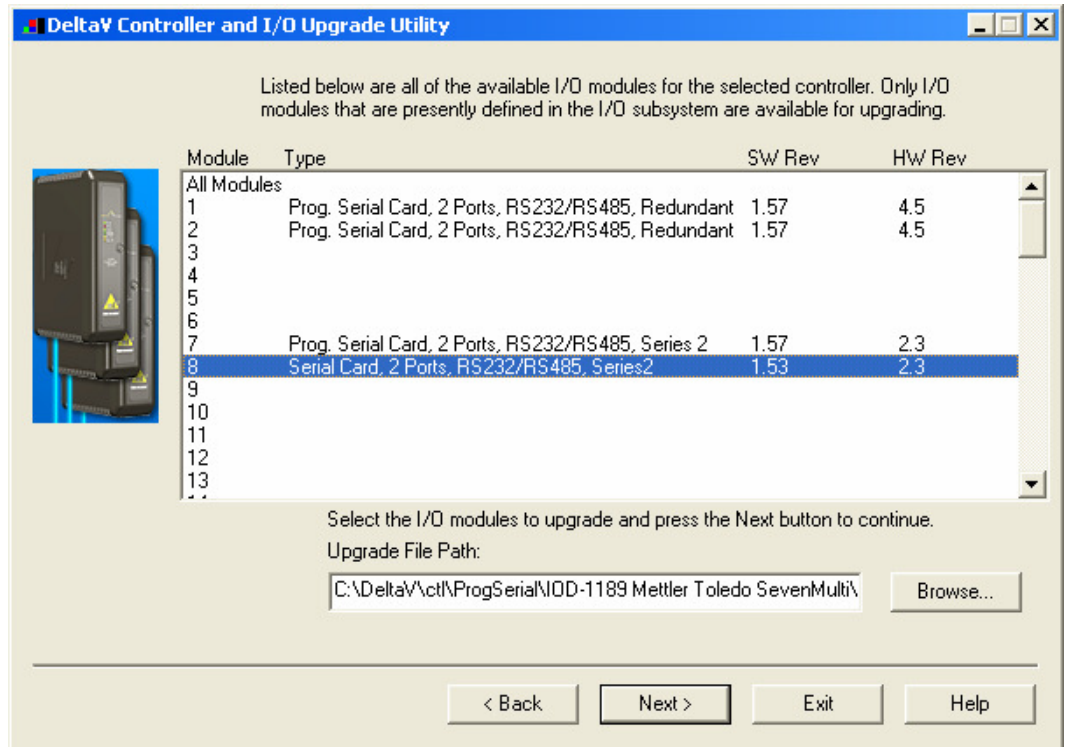


5. Click the Browse button and select the DeltaV path as shown below, and then click Ok. Note that the disk drive could be C or D.



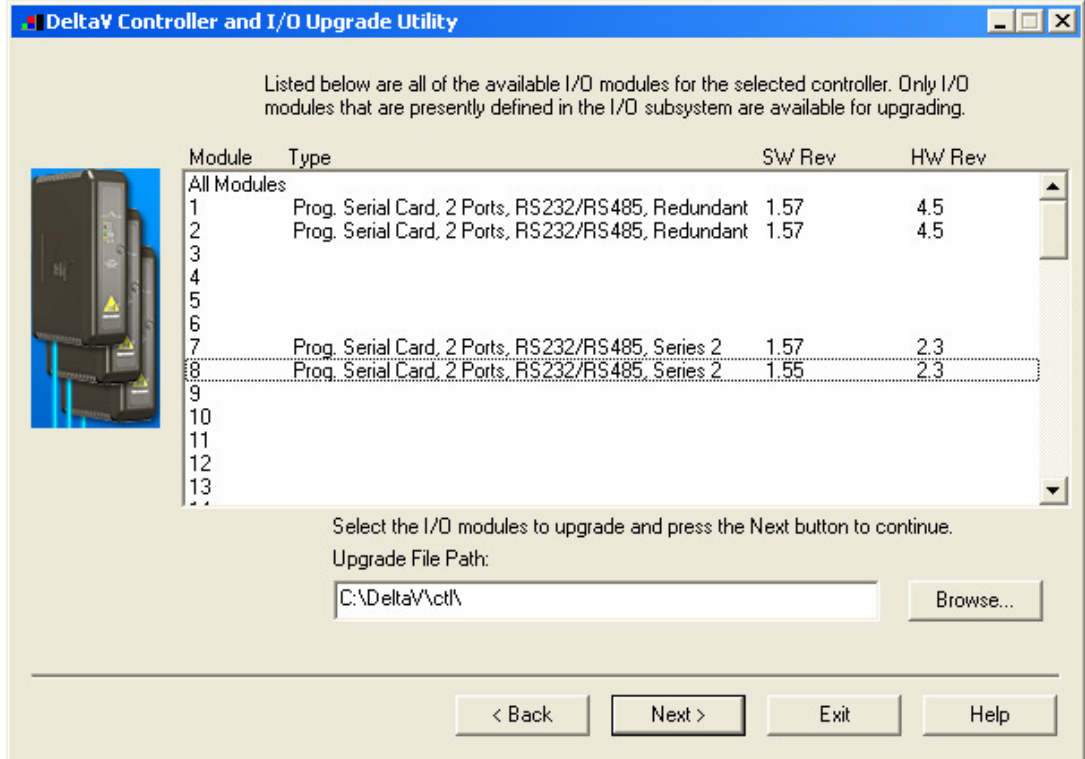


6. Select the I/O module again as shown below and then click Next. Go to Step 9.





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.



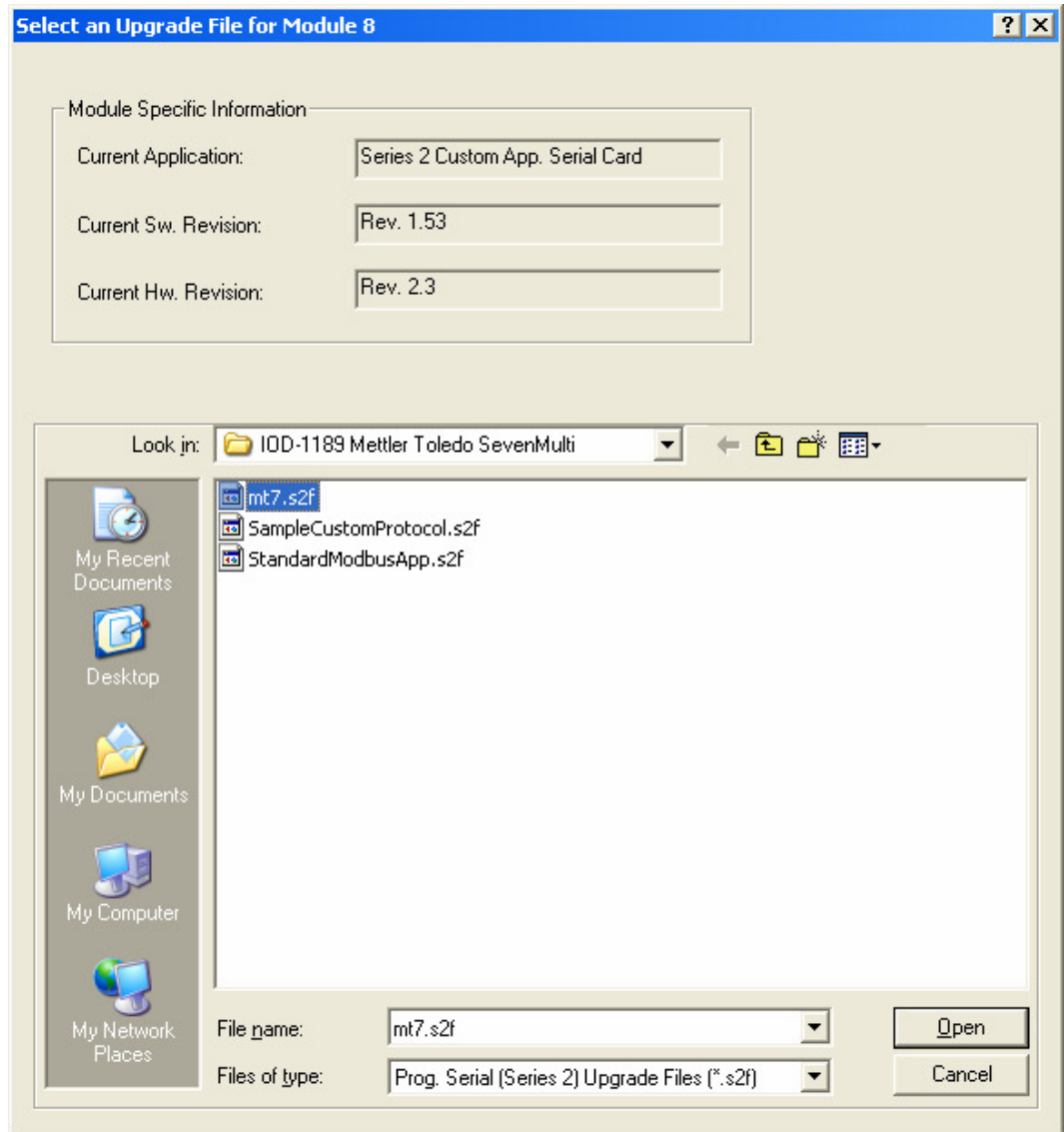
For example, we will select I/O Module 8. This will give you a dialog, from which you will select the file path to where the driver software is located. This path will be:

\\DeltaVctl\ProgSerial\IOD-1189 Mettler Toledo SevenMulti

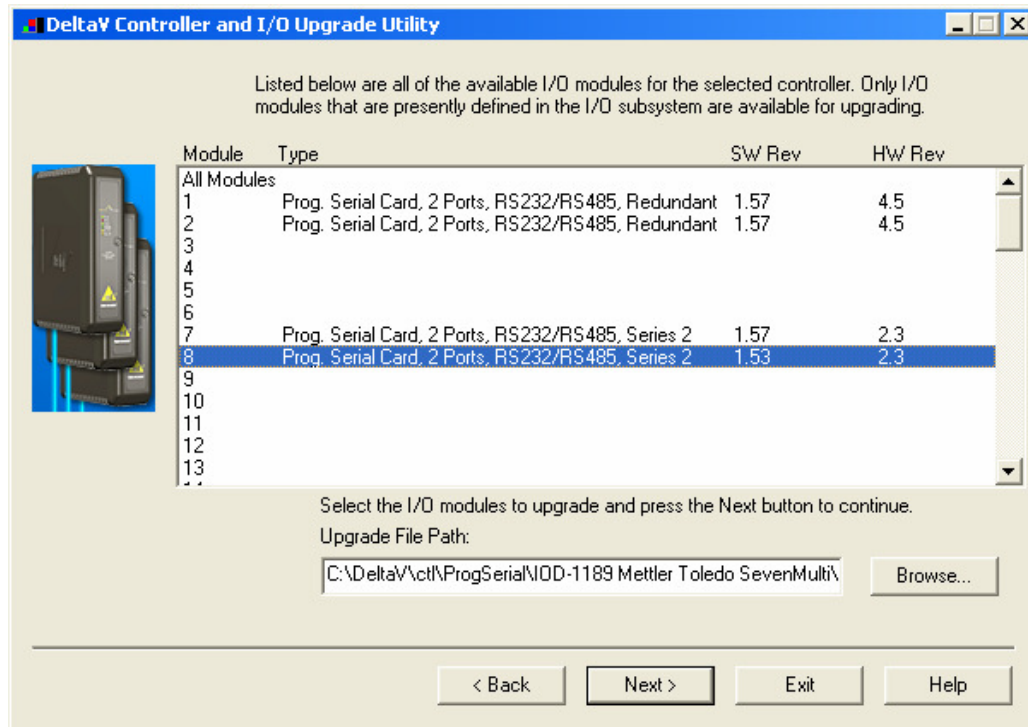
Once you are in the specified directory, you will need to select the following file:

MT7.S2F

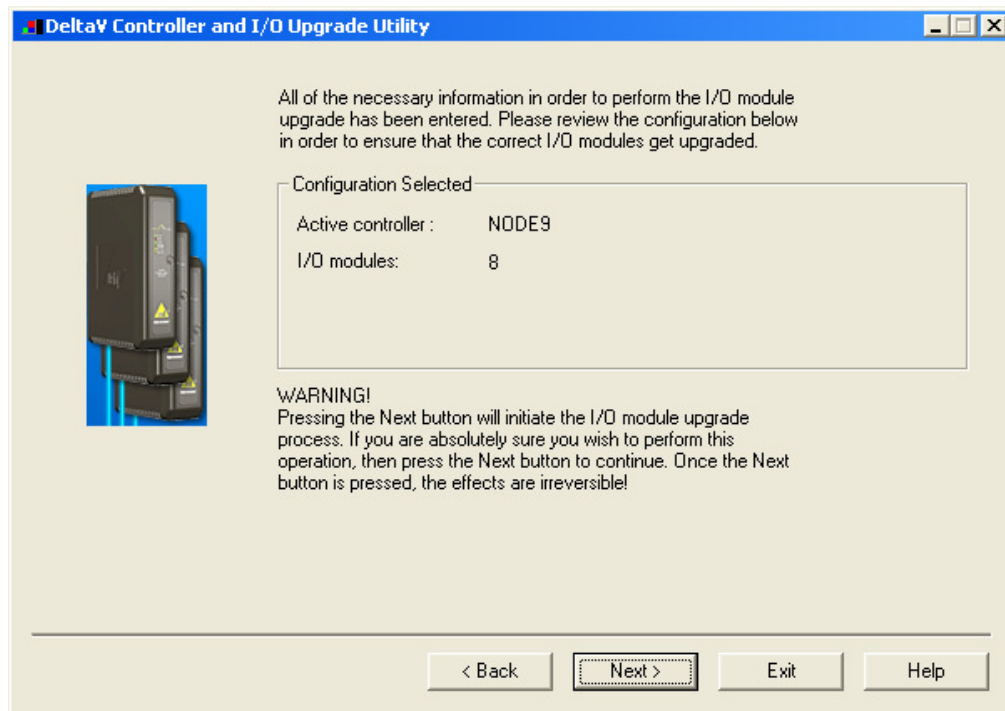
This is shown in the following dialog.



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

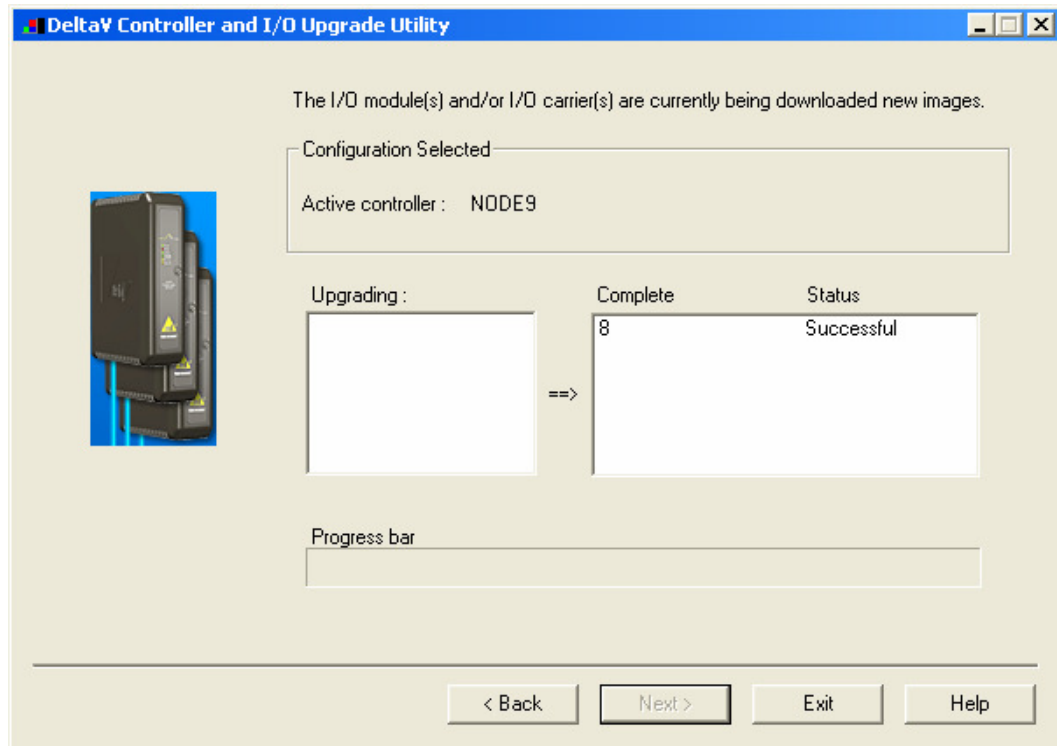


9. In this dialog, Click Next again. You will get the following dialog, confirming the Controller and I/O Module to program.





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



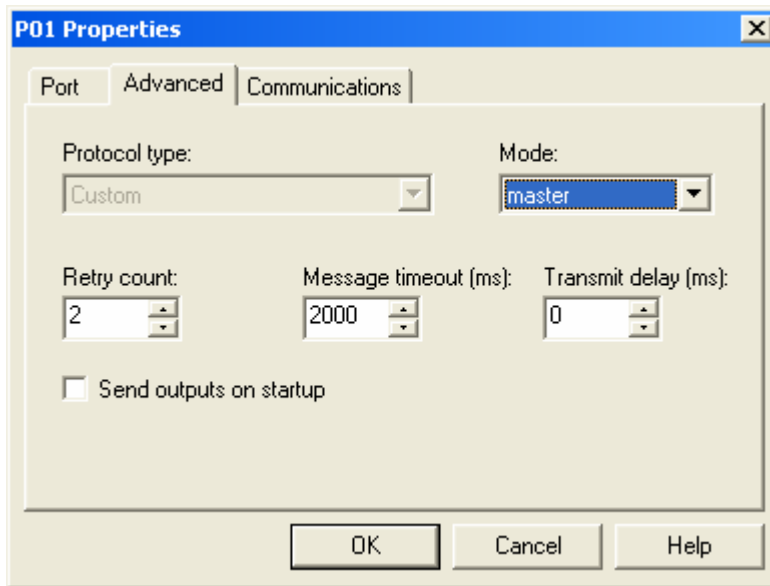
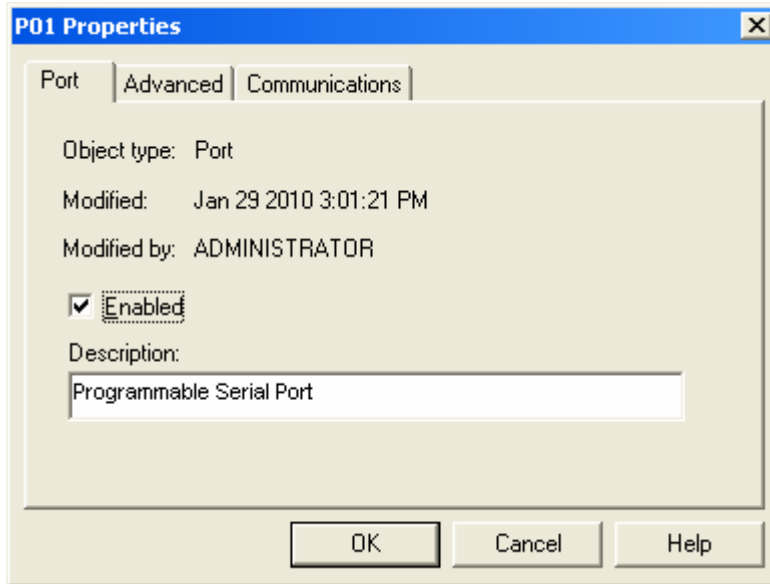
11. This completes the I/O Module upgrade process.

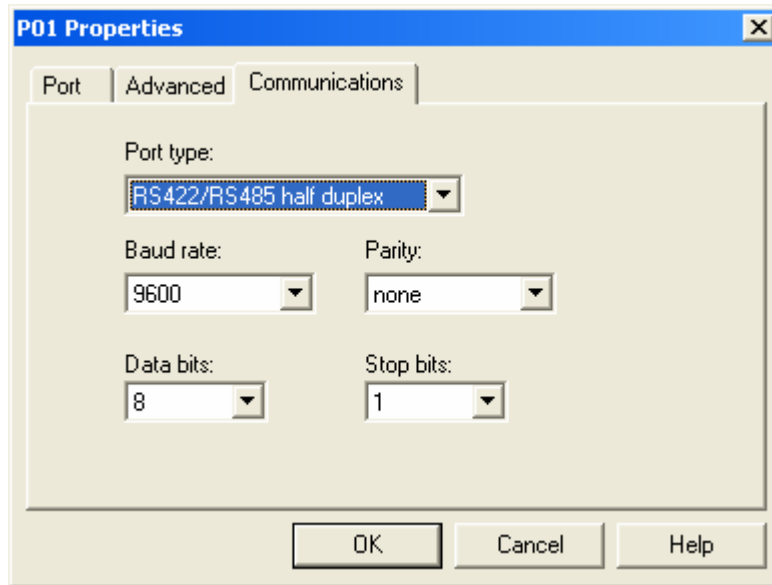


4 CONFIGURATION INFORMATION

4.1 Port Configuration

First, enable the port. Then click on the Advanced Tab and select Master. Next, click on the Communications Tab and specify the Port type. The Port type will be RS232 when using a direct point-to-point connection to a single SevenMulti device. The Port type will be RS-422/485 Half Duplex (2 wire) when using the Technman Control-IT 5258 converter. Lastly, select the Baud rate, Parity, Data bits and Stop bits parameters; these must match the SevenMulti configuration. The following screen shots show the configuration:

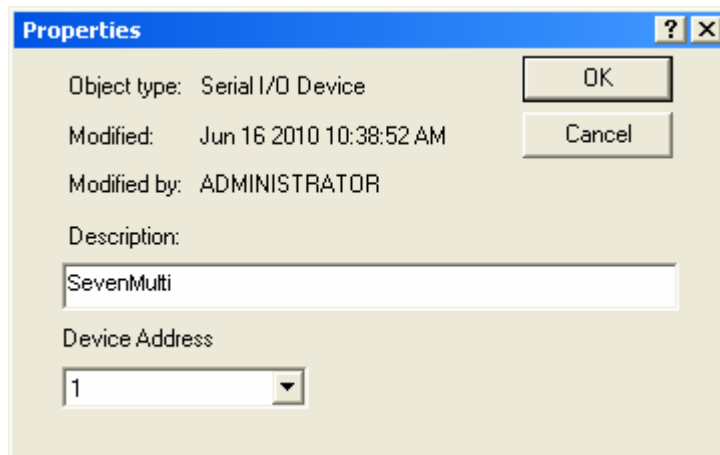




4.2 Device Configuration

Specify a device corresponding to each connected SevenMulti device. The device address must match the connected 5258 converter. A maximum of eight SevenMulti devices may be configured under a single PSIC port.

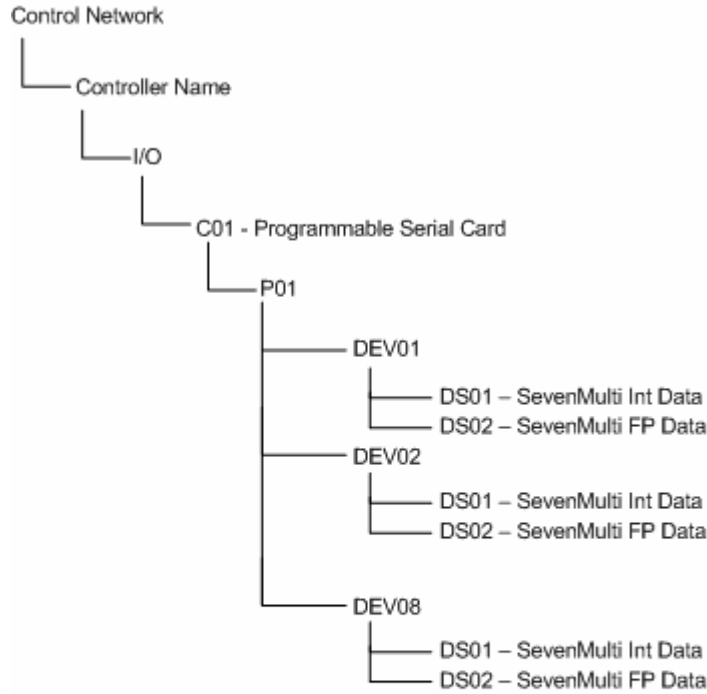
Note: The device address is used by the driver to enable the 5258 converter, and should match the dip-switches on the 5258.





4.3 Dataset Configuration

A fixed dataset architecture is used to receive the data, where each configured device is assigned a single dataset.





4.3.1 Dataset 1 Configuration:

Configure the dataset as follows:

Direction	Output with Readback
DeltaV Data Type	16-bit UINT w/status
Device Data Type	0
Start Address	0
Number of Values	32
Special Data 1	16384 or 32768. See description below.
Special Data 2	0
Special Data 3	0
Special Data 4	0
Special Data 5	0

When using the Technman Control-It 5258 to multi-drop SevenMulti devices, the first datasets Special Data 1 register of each configured device must be configured as follows:

16384	If the Technman Control-It 5258 is configured (via dip switches) for STX as the enabling message, then configure 16384 into Special Data 1.
32768	If the Technman Control-It 5258 is configured (via dip switches) for HeAdEr as the enabling message, then configure 32768 into Special Data 1.



The data values read from the SevenMulti are stored in this dataset. The values are grouped by channel 0 or 1.

Value Description	Channel 0 Register	Channel 1 Register
Scan Control 0 =Offline; 1=Online	R1	
pH Units code	R2	R22
mV Units code	R3	R23
Reserved		
Reserved		
Reserved		
Temp. Units code	R7	R27
Ref. Temp. Units code	R8	R28
Temp. Comp. Units code	R9	R29
Conductivity Units code	R10	R30
Reserved		
ATC/MTC	R12	R32

Scan Control

Note that on serial card power up, register R1 is 0. Hence the driver is offline by default. A Control Module must be created in DeltaV to place the driver in online mode. The procedure is as follows:

1. Write a 1 into R1 to place driver in Online mode. The driver will respond by changing the value to 101, indicating that the online command is acknowledged and the driver is online. Only the selected SevenMulti scan is online. Other SevenMulti's are controlled by their individual scan flags.
2. Write a 0 into R1 to place driver in Offline mode, The driver will respond by changing the value to 100, indicating that the offline command is acknowledged and the driver is offline. Only the selected SevenMulti scan is offline.
3. In online mode, the driver cycles through pH, mV and Conductivity measurement reads for both right and left channels.

Units Codes

1	pH	12	g/l
2	mV	13	Ppt
3	Rel.mV	14	Psu
4	mmol/l	15	Ω.cm
5	mol/l	16	MΩ.cm
6	Ppm	17	C
7	Mg/l	18	/cm
8	%	19	%/C
9	uS/cm	20	ml
10	mS/cm	21	mV/px
11	S/cm	22	mV/pH
		23	F



4.3.2 Dataset 2 Configuration:

Configure the dataset as follows:

Direction	Input
DeltaV Data Type	Floating Point w/status
Device Data Type	1
Start Address	0
Number of Values	29
Special Data 1	0
Special Data 2	0
Special Data 3	0
Special Data 4	0
Special Data 5	0

The data values read from the SevenMulti are stored in this dataset. The values are grouped by channel 0 or 1.

Value Description	Channel 0 Register	Channel 1 Register
pH	R1	R21
mV	R2	R22
Reserved		
Reserved		
Reserved		
Temperature	R6	R26
Ref. Temperature	R7	R27
Temp. Comp.	R8	R28
Conductivity		R29



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 SevenMulti 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)
SwRev	Software Revision	P1.55 (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.



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- 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.
- Verify that there are no errors at the dataset level.

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.

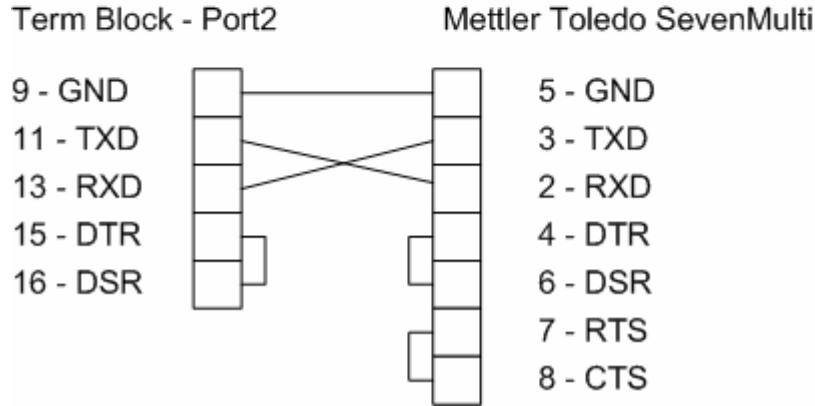
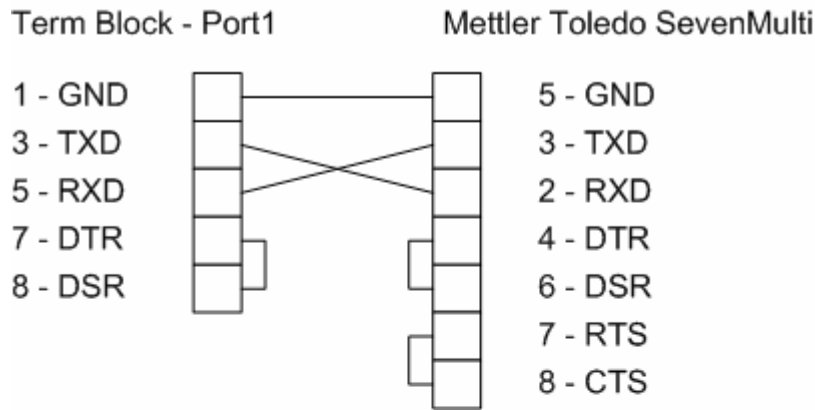


6 Connecting DeltaV PSIC to the SevenMulti

The electrical interface between DeltaV and field devices conforms to the RS-232 and RS-422/485 standards.

6.1 Direct Connection using RS232

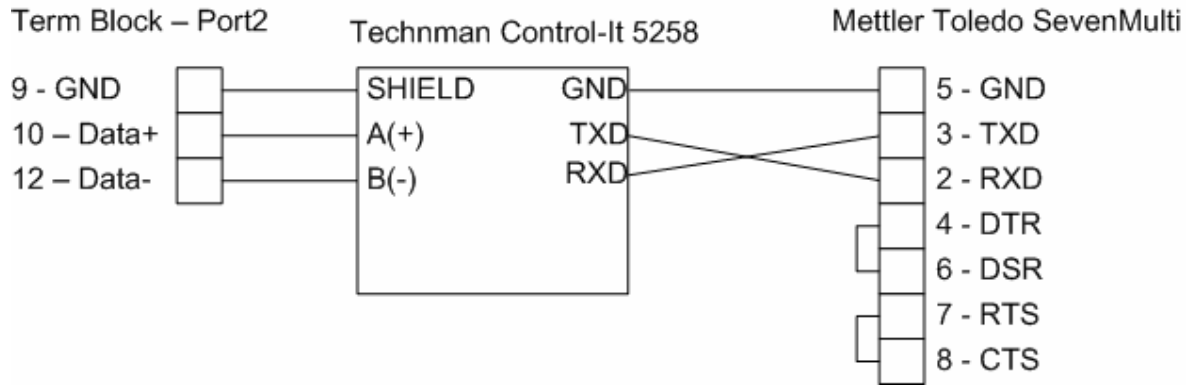
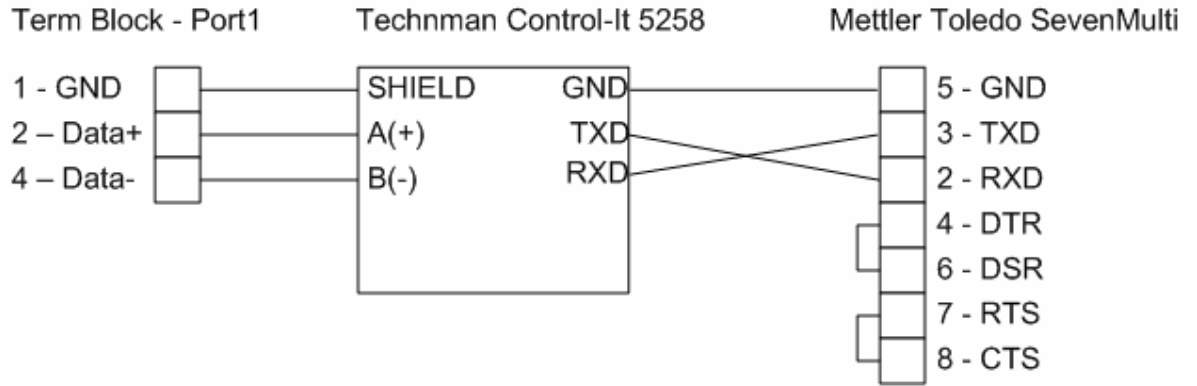
The following diagram shows the cable pinout to use.





6.2 Connection using RS485 via Technman Control-It 5258

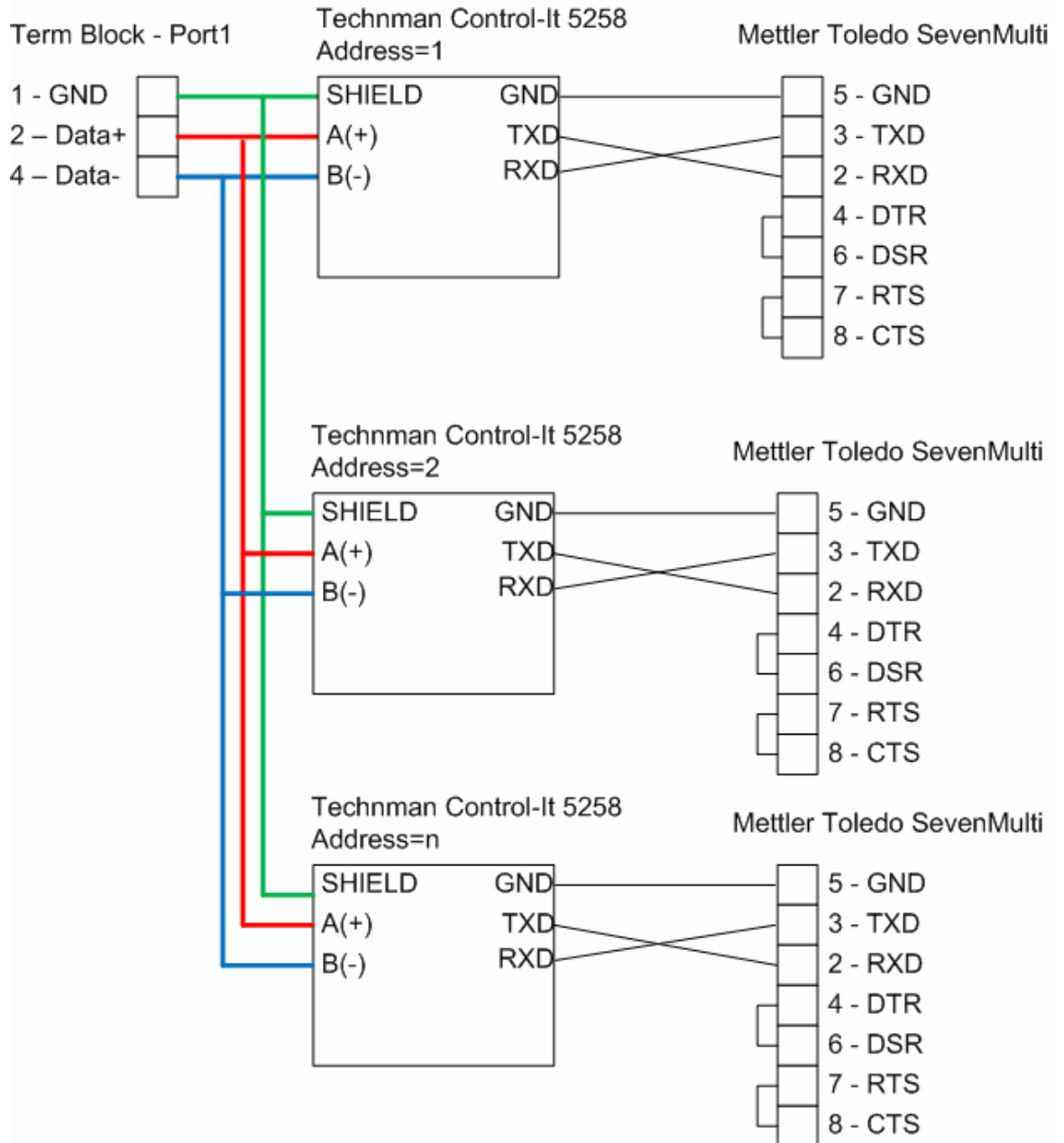
The following diagram shows the cable pinout to use.





6.3 Connecting Multiple SevenMulti's using RS485 via Technman Control-It 5258

The following diagram shows the cable pinout to use.





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.

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

support@mynah.com

Thank you for using DeltaV.

8 Revision History

Revision Number	Checked By	Approved By	Date	Description
1.55	NFW	NFW	May, 2010	Internal Release
1.56	NFW	NFW	July, 2010	Added mechanism to allow DeltaV user to command the driver to be in online or offline mode. The SevenMulti is scanned only in online mode.