Mettler Toledo Driver for DeltaV Programmable Serial Interface Card Series 2

USER MANUAL

Rev. P1.11

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1 INTRODUCTION

1.1 Scope

This document is the User Manual for the Mettler Toledo Weigh Scale serial communication driver firmware for the Emerson DeltaV Control System; it provides information required to install, configure, and maintain the Mettler Toledo driver firmware on the DeltaV Series 2 Programmable Serial Interface Card (PSIC). The reader should be familiar with Emerson's DeltaV controller system and the Mettler Toledo Equipment. Specific Mettler Toledo Weigh Scales supported are Lynx, Jaguar, Puma, Cougar, and ID3sTx.

The section *Document Format* briefly describes the contents of each section of this manual. *System Specifications* outlines hardware and software requirements for the Mettler Toledo Driver (P1.11) firmware. *Related Documents* lists other documents used to prepare this manual.

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 Mettler Toledo Weigh Scale Driver.
Downloading Firmware	Describes downloading procedures for the Mettler Toledo Driver firmware on to the DeltaV PSIC.
PSIC Configuration	Describes procedures and guidelines for configuring the DeltaV PSIC.
Driver Communications	Describes Mettler Toledo commands used and DeltaV Registers containing Weight data.
Operational Check	Provides tips and assistance to ensure PSIC is properly setup and configured.
DeltaV - Mettler Toledo Electrical Interface	Describes the electrical interface between DeltaV and the Mettler Toledo Weigh Scale. Also describes the pin assignments for RS-232 communications.
Technical Support	Describes who to call if you need assistance.

1.3 System Specifications

The following table lists the minimum hardware requirements for the Mettler Toledo Weigh Scale Driver:

Table 1: System Specifications

Firmware	Mettler Toledo Driver Firmware (P1.11)
Protocol Compatibility	Mettler Toledo Protocol as defined in the documents listed below: 1. Cougar Terminal User's Guide, Appendix 2: Continuous Mode Output for Cougar Terminals with Standard Software. 2. Puma Terminal Technical Manual and Users Guide, Appendix 2: Serial Output Formats and Appendix 4: Host Mode Serial Interface. 3. M 8141 Installation and Operation Manual, Section 5.9, Host Interface.
Software Requirements	DeltaV System Software (Release 4.2 or later) installed on a hardware-appropriate Windows NT workstation configured as a ProPlus for DeltaV Serial Interface Port License (VE4102)
Minimum Hardware Requirements	FRSI DeltaV PSIC 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 Mettler Toledo devices

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 Mettler Toledo protocol before operation.

The RS-232 communication settings must be configured properly to ensure accurate communication between the PSIC and Mettler Toledo devices. RS-422/485 may be used if the Mettler Toledo devices support this electrical standard.

This driver functions either as a master or a slave. In master mode, the PSIC continuously sends weight and status read commands to the connected scale devices. The received responses are reported to DeltaV via dataset registers. When a user command is detected (commands are listed below), that command is sent out to the scale. The corresponding response Ack or Nak is reported back to the dataset.

In slave mode, this driver communicates with the Mettler Toledo Weigh Scales by simply receiving the continuous output of the scales. This output contains the weight and status information which is reported to DeltaV via dataset registers.

In general, the primary functions of the driver are listed below:

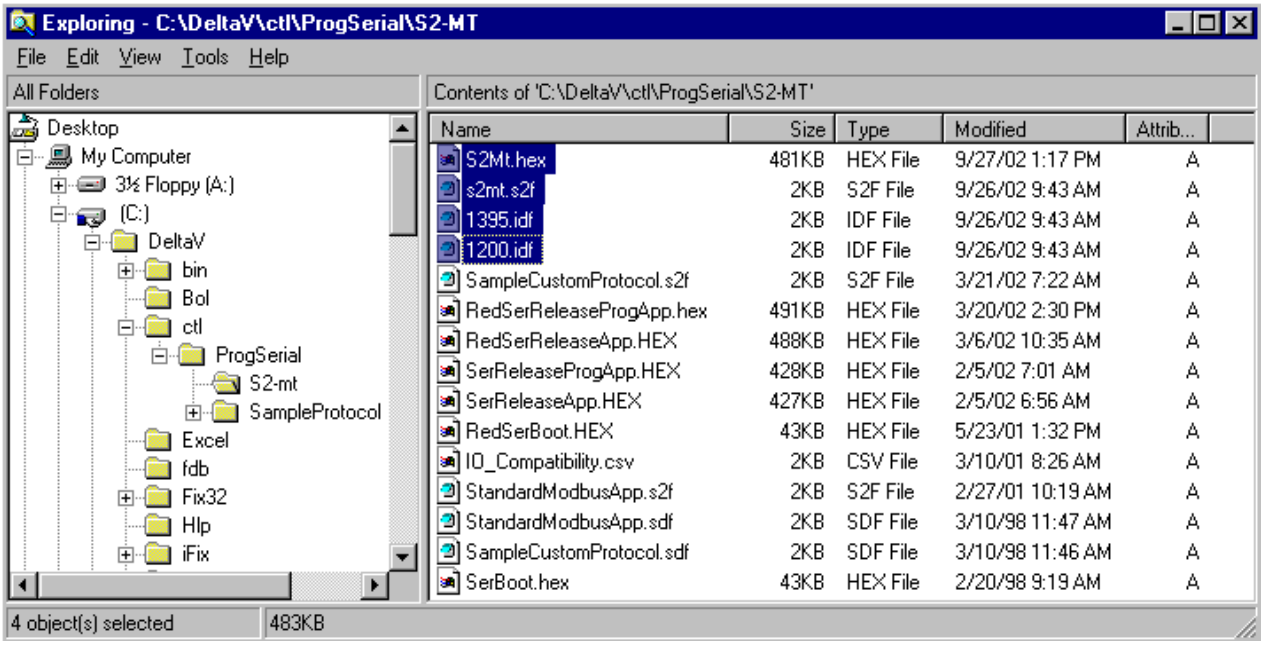
- Performs data and message handling between DeltaV and Mettler Toledo devices.
- Checks validity of messages received from the Mettler Toledo devices.
- Processes reply information and updates the corresponding dataset registers
- Update dataset register status and data block status to indicate the communication state.

3 Downloading the firmware

The driver software comprises 4 files, distributed on a mini-CD. These files must be copied to the DeltaV directory (you must create the directory first) on your ProPlus Workstation. The path is:

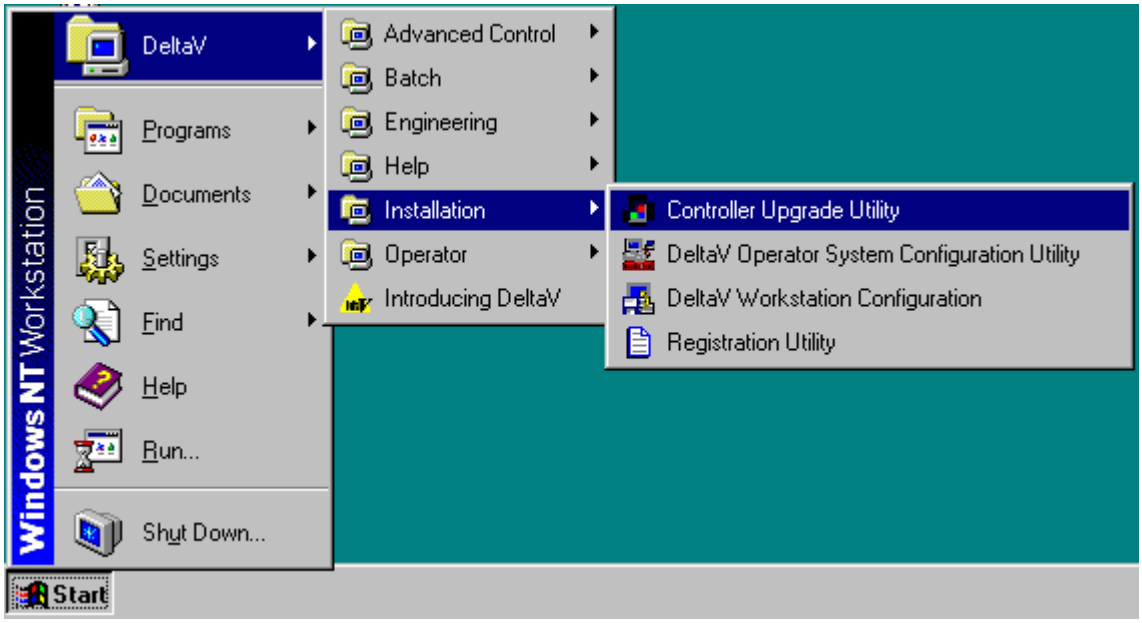
\DeltaV\ctl\ProgSerial\S2-MT

The following shows a completed copy operation:

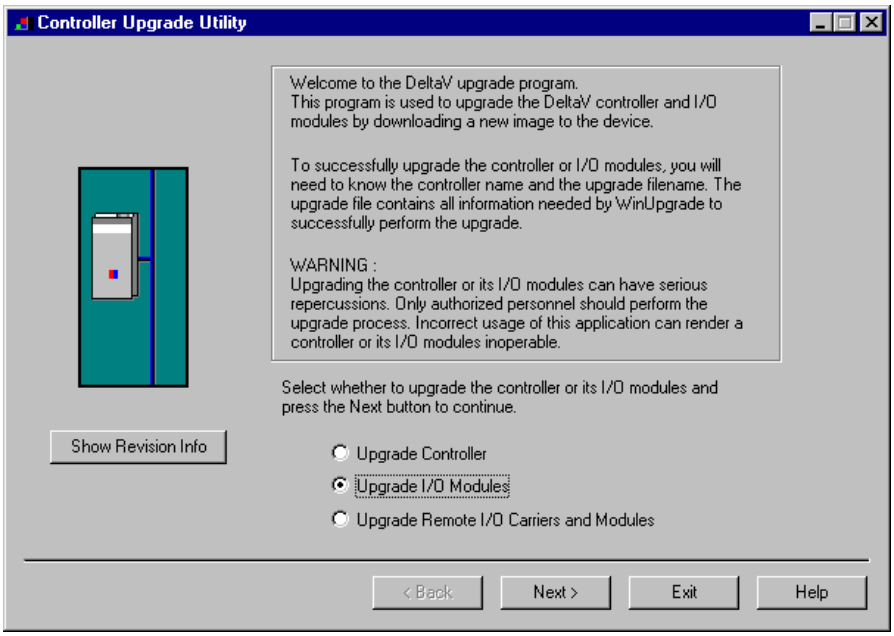


After copy completion, you are ready to program (or upgrade) the Programmable Serial Card with the supplied custom driver software. The steps are as follows:

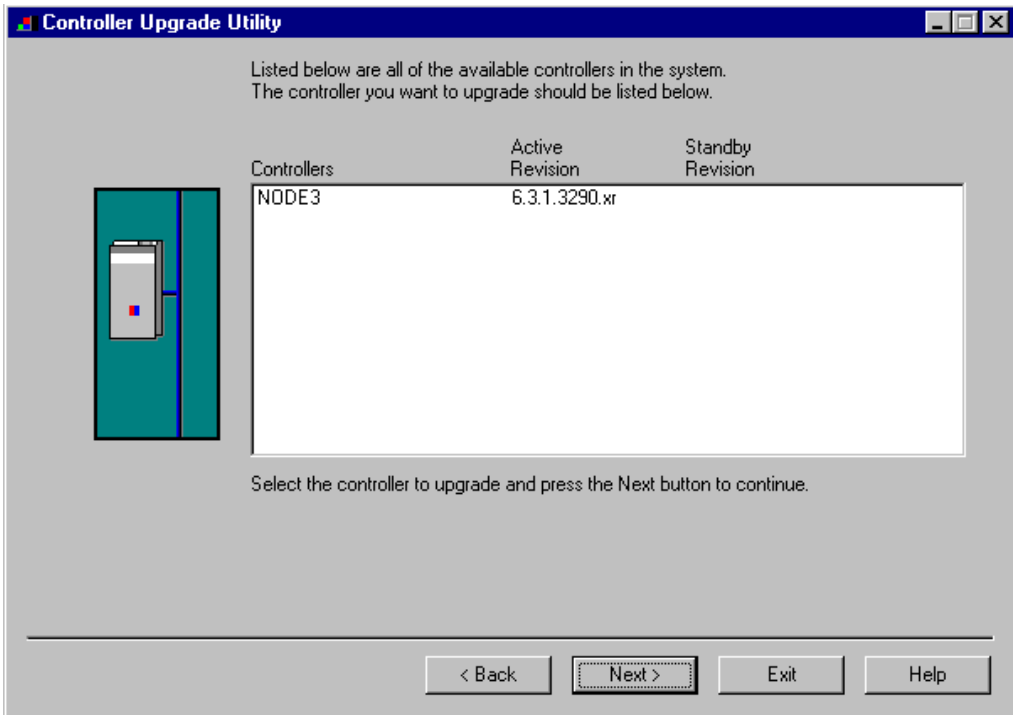
1. Click on the Start button and select DeltaV, Installation, Controller Upgrade Utility as shown below.



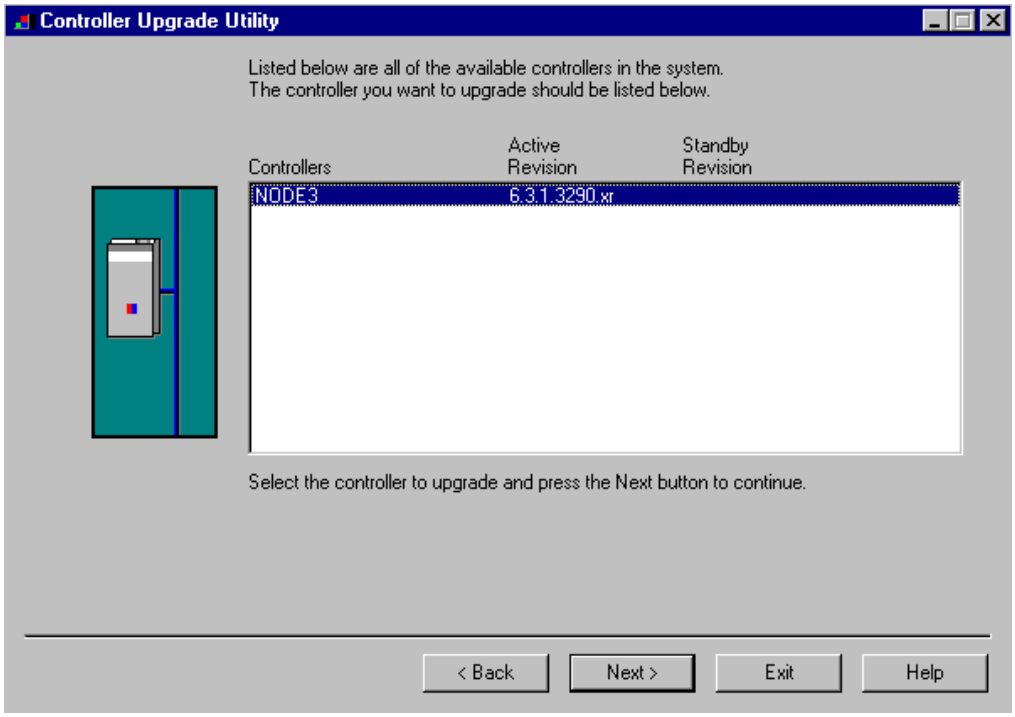
The following dialog will appear:



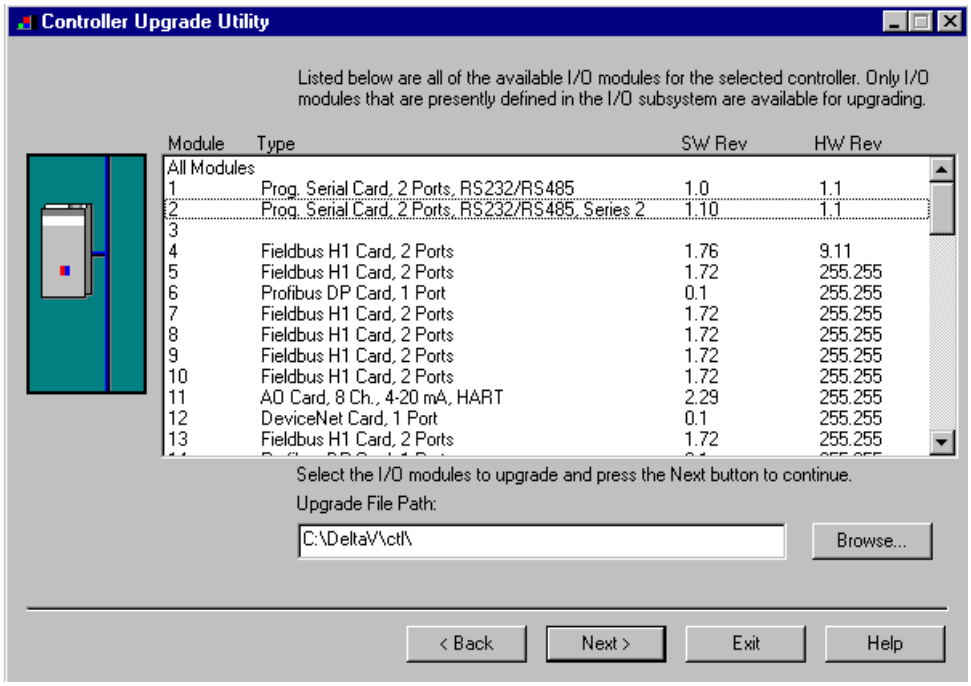
Click on the Upgrade I/O Modules radio button as shown, and then click Next.



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



After you Click Next, 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.

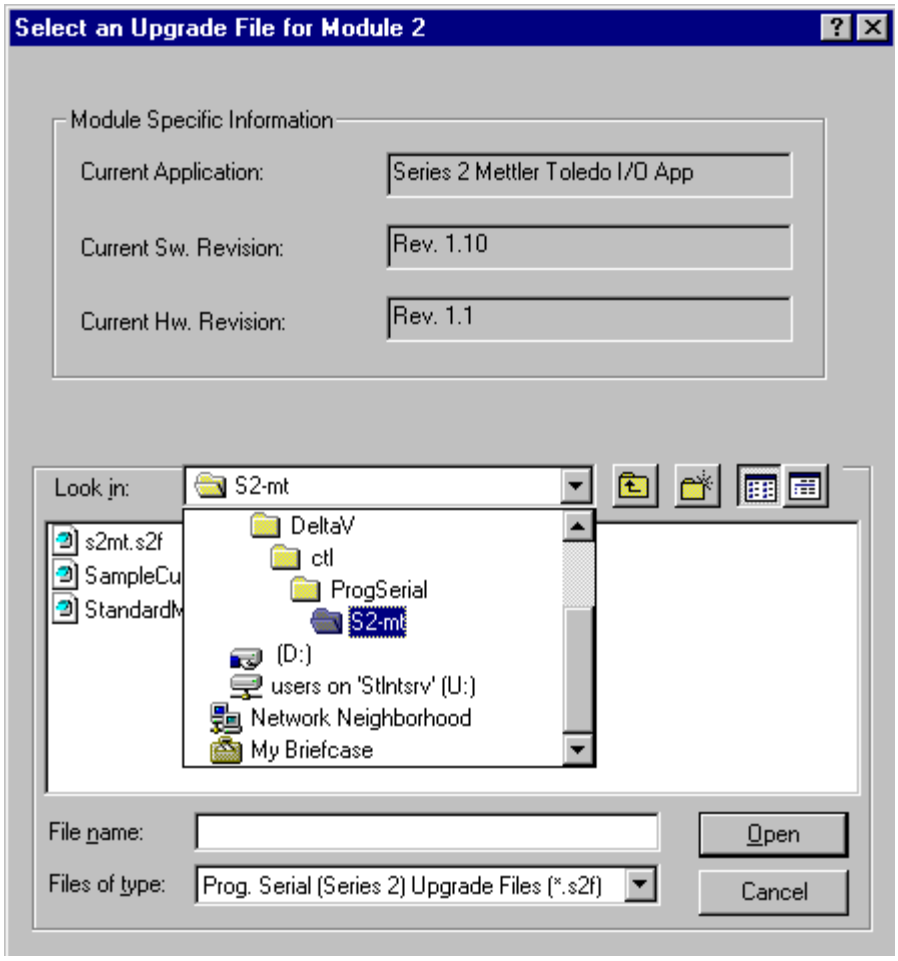


From this dialog, select the Programmable Serial Card I/O Module in the list. For example, we will select I/O Module 2. This will give you the following dialog, from which you will select the file path to where the driver software is located. This will be:

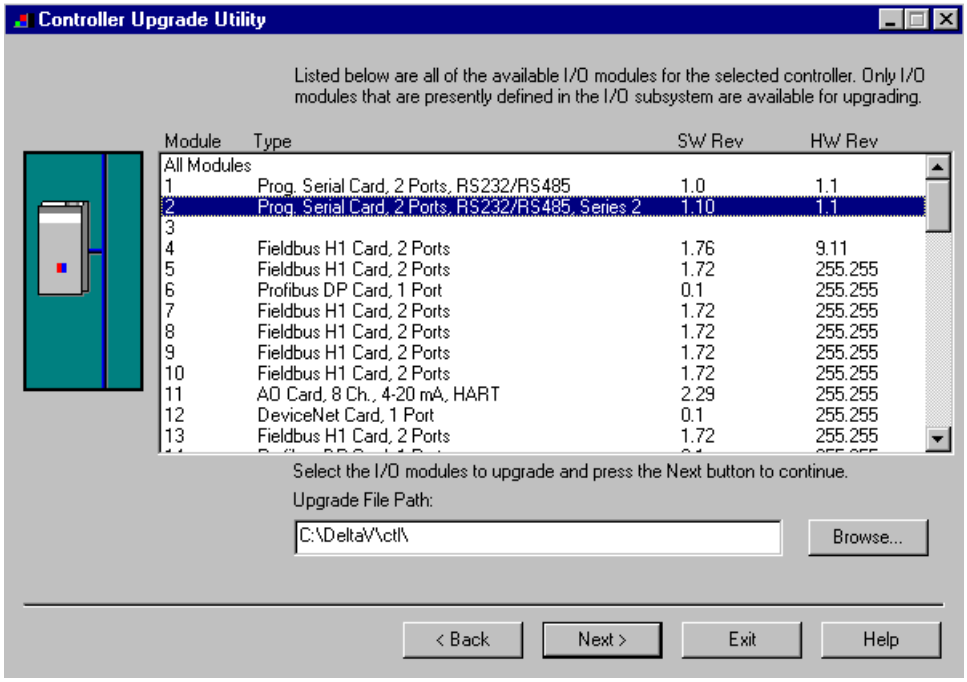
\DeltaV\ctl\ProgSerial\S2-MT

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

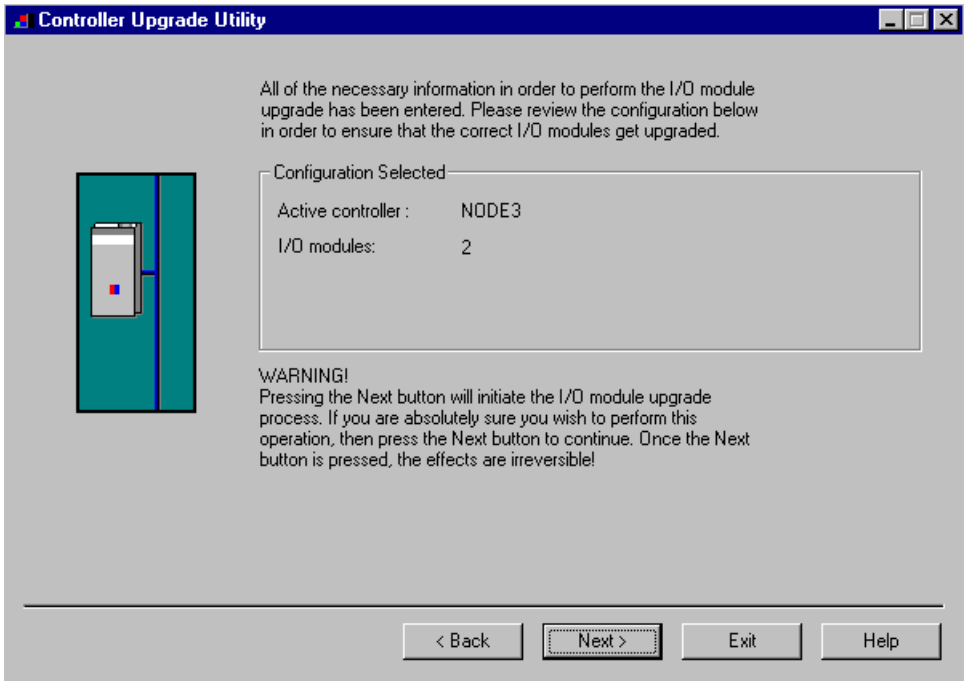
S2MT.S2F



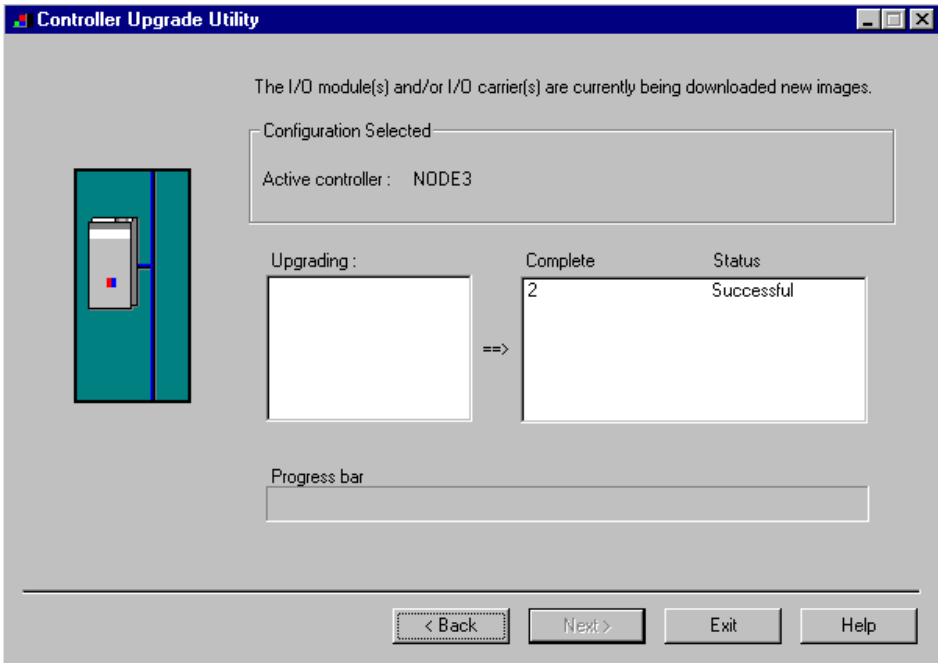
After selecting the .S2F file, Click on Open. This dialog will close and you will be back to the following:



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



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 and the Mettler Toledo Weigh Scale to obtain proper communication.

4.1 Device And Dataset Configuration

The following paragraphs discuss some attributes in the device and dataset configuration:

4.1.1 Device Address:

In Master mode, you can configure a maximum of 8 devices, each representing a weigh scale connected to a PSIC port. Note that you can multi-drop these 8 devices only if this is supported by the devices. Furthermore, if the multi-dropped devices are directly attached to the PSIC, then you must use RS-422/485. Alternatively, you can use RS-232 only if an intermediate converter device is being used which converts RS-232 to RS-422/485, or RS-232 to Fiber Optic.

Each device configured will by definition use 2 datasets. The device address attribute is located in the device configuration box under port. The device address is used as part of the commands sent out to the weigh scales. Under user configuration control, the device address for the weigh scales may be a dataset register value. In this case, the commands will use the dynamically specified address in communications.

In Master mode, communications can be either Toledo or Masstron.

In Slave mode, configure only one device. The device address is not used internally by the PSIC driver, but can be set to match the weigh scale address.

4.1.2 Output Mode:

Two output modes are available in the DeltaV PSIC: block output (0) and single output (1). This value is a don't care for the driver. Leave this value at its default setting.

4.1.3 DeltaV Data Type:

Each weigh scale uses 2 datasets. Dataset 1 must use DeltaV data type Floating point with status. Dataset 2 may be configured as DeltaV data type 8 bit uint w/ status or 16 bit uint w/ status. There are no other datasets defined for a device.

4.1.4 DeviceDataType

In Slave mode configure the Device Data Type as 0 for both datasets.

In Master mode, the Device Data Type value in dataset 1 determines the communication method used, i.e., Toledo or Masstron. By default, a value of 0 indicates Toledo. Configure this value to a 1 to use Masstron communications. Configure the Device Data Type as 0 for the second dataset.

4.1.5 Data Start Address and Number of Values

In Slave mode use the following values for the dataset data start address:

Port	Device	Dataset	Start Address	Values
1	1	1	0	4
1	1	2	50	7
2	1	1	0	4
2	1	2	50	7

In Master mode use the following values for the dataset data start address:

Port	Device	Dataset	Start Address	Values
1	1	1	0	21
1	1	2	0	22
1	2	1	0	21
1	2	2	0	22
1	3	1	0	21
1	3	2	0	22
1	4	1	0	21
1	4	2	0	22
1	5	1	0	21
1	5	2	0	22
1	6	1	0	21
1	6	2	0	22
1	7	1	0	21
1	7	2	0	22
1	8	1	0	21
1	8	2	0	22

4.1.6 Special Data 1-5

Under the Special data tab, only the Special data 1 field is used as a bit mask with values as follows:

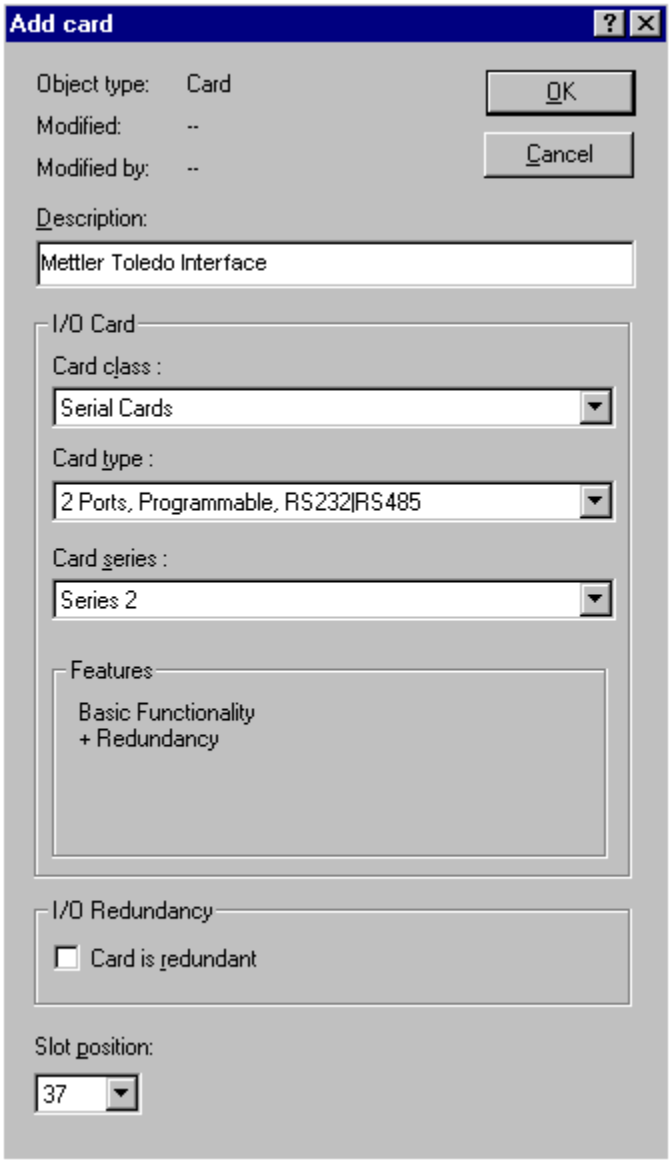
Field Value	Bit	Usage
1	0	If this bit is set, the driver does not perform checksum verification on received messages. You can disable checksum generation in the Weigh Scale unit.
2	1	If this bit is set, the driver calculates the Gross or Net values based on data in the message. For example, if the message weight data has Net and Tare, the driver calculates Gross. Or if the message weight data has Gross and Tare, the driver calculates Net. If this bit is clear, the driver only receives the indicated Gross or Net values. Note: This field is used only in Slave mode.
4	2	If this bit is set, then this device does not use the configured device address. Instead, the user selects and writes the device number to be used into dataset 2, register 15.

A value of 7 indicates all 3 bits are set.

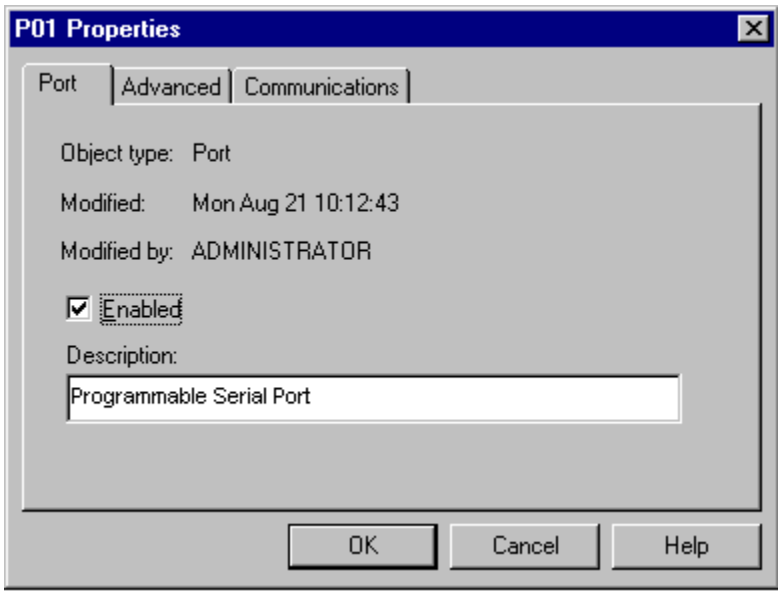
4.2 Dataset Configuration Display

To have the Programmable Serial Card communicate with the Weigh Scale, follow these steps:

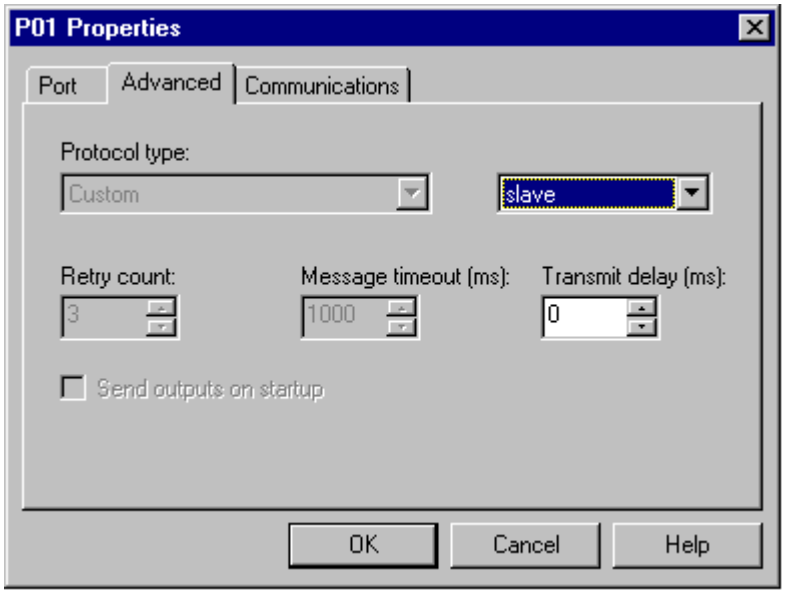
1. In DeltaV, configure the serial card. This will create a Programmable Serial Card and define 2 ports under it, P01 and P02. Do not select I/O Redundancy.



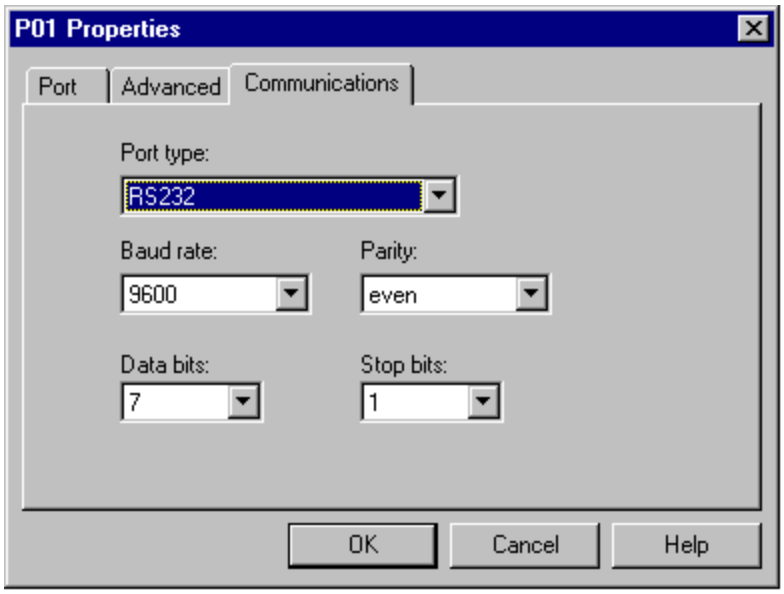
2. Right mouse click on Port 1. The following dialog will appear.



3. Click on the Enabled checkbox to enable the Port. Next select the Advanced tab. The following dialog will appear.

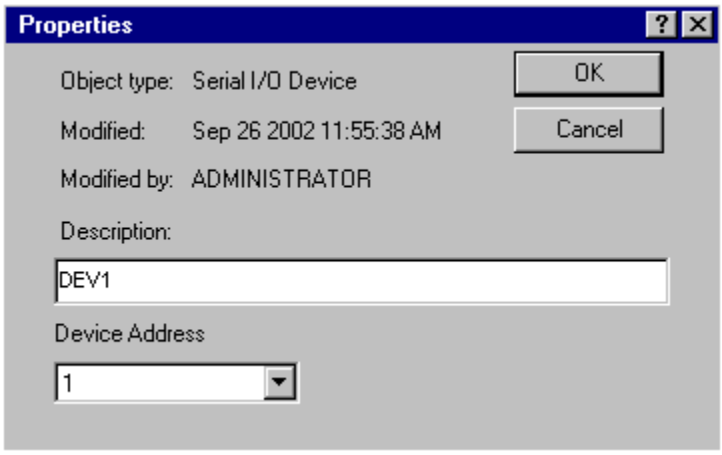


4. In this dialog, select communications parameters as shown. The DeltaV Serial port will be Master or Slave. In this example, the port is configured as Slave. Next click the Communications tab. The following dialog will appear.



5. Specify the Port type. The Port type will be RS-232 or RS-422/485 depending on the Weigh Scale. If scales are being multi-dropped directly, you must use RS-422/485. The Baud Rate, Parity, Data bits and Stop bits parameters must match the Weigh Scale configuration. Select the appropriate parameters and then click OK

6. Configure a Serial Device under the Port by doing a Right Mouse click and selecting New Serial Device. The following dialog will appear:

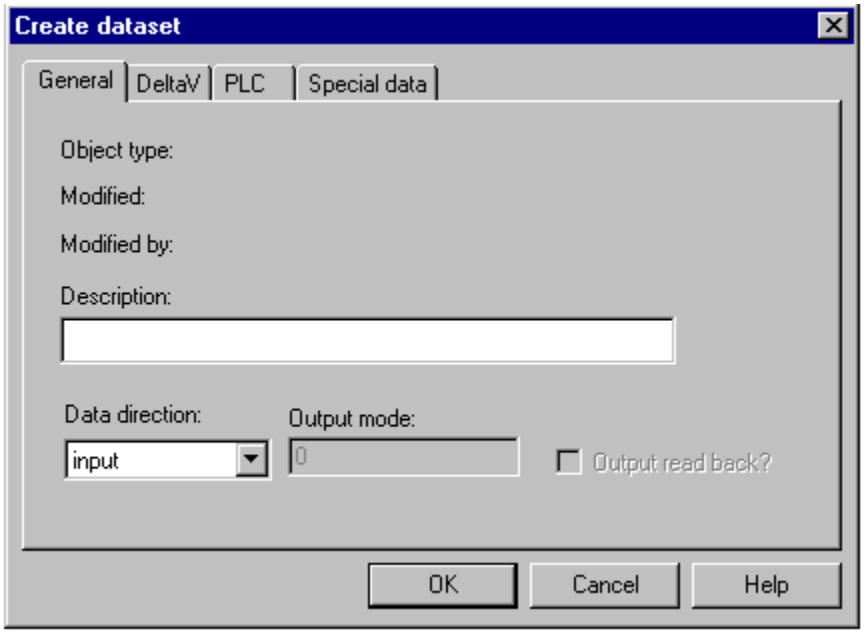


7. Specify the device address and description. In Slave mode, the device address is not used by the driver but can be defined as the Weigh Scale address. In Master mode, the device address uniquely identifies each scale connected to a port. Then click OK. This will add the serial device. Only one device per port is supported.

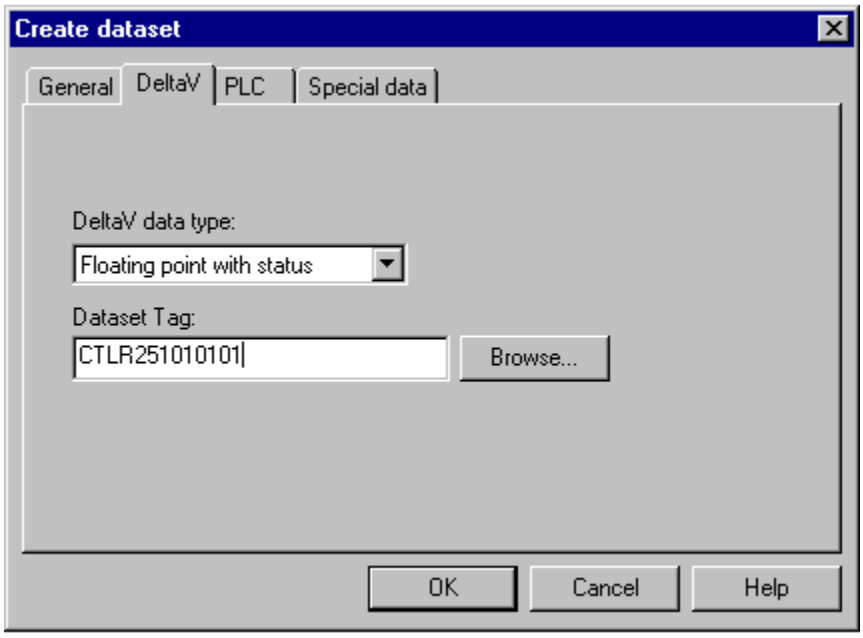
8. Next, configure datasets in the Serial Device. For this application, each device must have 2 datasets under it. In Slave mode, both datasets will be of type Input. Dataset 1 will have 4 values of type Floating point with status. Dataset 2 will have 7 values of type 8 bit Unsigned Int with status.

In Master mode, both datasets will be of type Output. Dataset 1 will have 21 values of type Floating point with status. Dataset 2 will have 22 values of type 8 bit Unsigned Int with status or 16 bit Unsigned Int with status.

To add a new dataset, right mouse click on the Serial Device and select New dataset. The following dialog will appear.

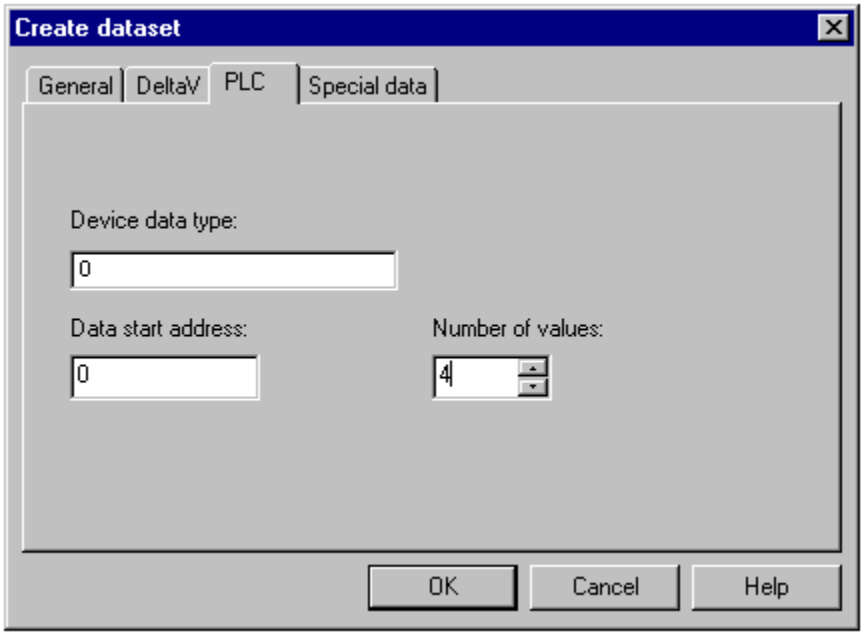


9. Configure the data direction to be input. Next click on the DeltaV tab. The following dialog will appear.



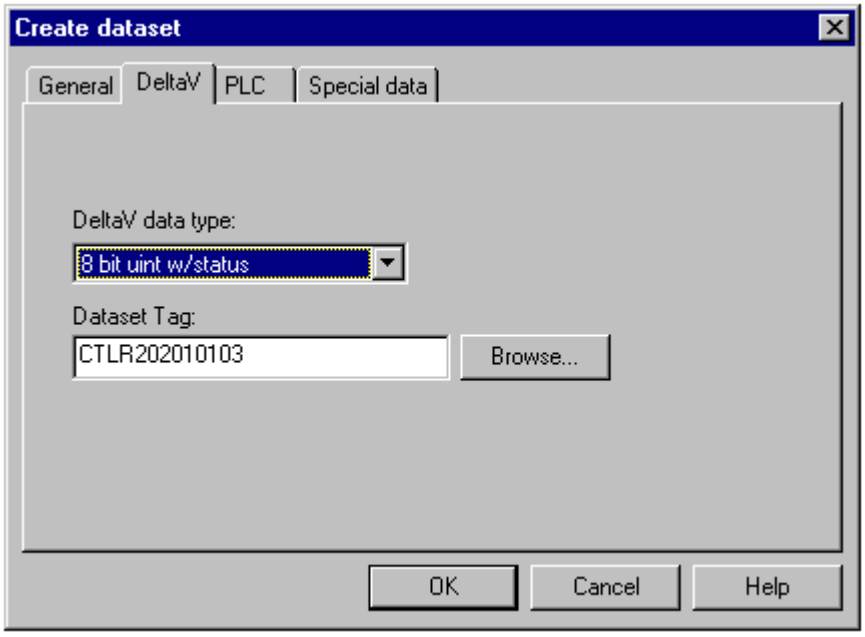
10. In this dialog, configure the data type needed for DeltaV. You can see the available types by clicking on the drop down list. Remember for this application, the dataset data type is Floating point.

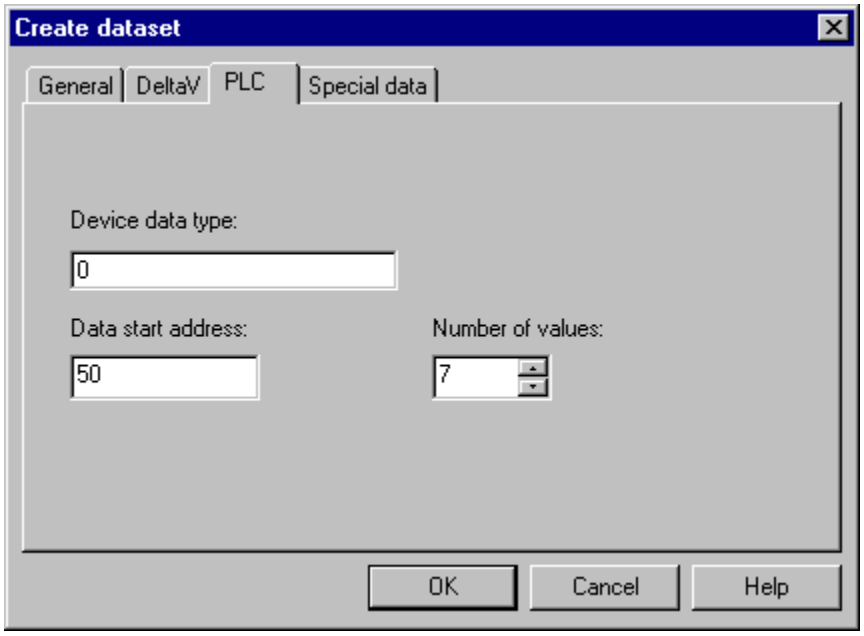
11. Next click the PLC tab. The following dialog will appear.



Select the parameters as shown above for Slave mode. In Master mode, the Number of values will be 21. The Device Data Type will be 0 for Toledo and 1 for Masstron.

For dataset 2, select the parameters as shown below.





Configure the values as shown above for Slave mode. In Master mode, the Data start address will always be 0, and the Number of values will be 22. Device Data Type will always be 0 for Slave and Master modes.

4.3 Serial Driver Communications

4.3.1 Slave Mode

The driver will continuously communicate with the Weigh Scales. This is known as the "Continuous" Mode of the Weigh Scales (or Toledo Continuous).

Note: While setting up the Weigh Scale unit, select Continuous Mode output to occur at a user defined frequency. For periodic outputs from the Weigh Scale, the Serial card software has been tested to handle messages with a minimum interval of 10ms. Typically however, a message interval of 1 second provides sufficient throughput. Do not select Continuous Output with a frequency of A/D Sync.

For this application, the Serial Card does not send any commands to the Weigh Scale. The Serial Card simply receives the data packets, parses them out and makes the data available to DeltaV in the configured registers.

If there are communication errors, these are reported up to DeltaV. Errors are of two types:

1. Physical communication problems;
2. Status information received from the Weigh Scale.

Each weigh scale will always have only the following registers configured:

Data Name	Data Type	Assigned Register
Gross Weight	Floating Point	Dataset1-R1
Net Weight	Floating Point	Dataset1-R2
Tare Weight	Floating Point	Dataset1-R3
Unused	Unused	Dataset1-R4
Gross Weight Units	Unsigned Integer 8	Dataset2-R1 1 – LBS 2 – KGS
Net Weight Units	Unsigned Integer 8	Dataset2-R2 1 – LBS 2 – KGS
Tare Weight Status	Unsigned Integer 8	Dataset2-R3 Not Used
Status SB1	Unsigned Integer 8	Dataset2-R4 See Below
Status SB2	Unsigned Integer 8	Dataset2-R5 See Below
Status SB3	Unsigned Integer 8	Dataset2-R6 See Below
Error Code	Unsigned Integer 8	Dataset2-R7 See Below

The Status byte SB1 will be a bit mask defined as follows:

Status Bit	Value	Description
0	1	Position of Decimal Point
1	2	Position of Decimal Point
2	4	Position of Decimal Point
3	8	Rounding
4	16	Rounding
5	32	Not used
6	64	Print Demand
7	128	Not Used

Position of Decimal Point will be determined as follows. The driver will move the decimal point as indicated.

2	1	0	Indicated Position
0	0	0	XXXX00.
0	0	1	XXXXX0.
0	1	0	XXXXXX.
0	1	1	XXXXX.X
1	0	0	XXXX.XX
1	0	1	XXX.XXX
1	1	0	XX.XXXX

Rounding of the weight (as described below) is strictly for status. The driver will not perform this function. It is assumed that the weigh scale has already rounded the values.

4	3	Rounding
0	1	1
1	0	2
1	1	5

The Status byte SB2 will be a bit mask defined as follows:

Status Bit	Value	Description
0	1	1=Net; 0=Gross
1	2	Sign 1=Negative; 0=Positive
2	4	1=Out of Range
3	8	1=Motion
4	16	0=LB; 1=KG
5	32	Always=1
6	64	1=In Power Up
7	128	Not Used

The Status byte SB3 will be a bit mask defined as follows:

Status Bit	Value	Description
0	1	Units
1	2	Units
2	4	Units
3	8	1=Print Request
4	16	1=Expand Data X 10
5	32	Always=1
6	64	Hand Tare (Metric Only)
7	128	Not Used

Units will be determined as follows.

2	1	0	Indicated Units
0	0	0	LB or KG selected by SB2-bit 4
0	0	1	Grams
0	1	0	Metric Tons
0	1	1	Ounces
1	0	0	Troy Ounces
1	0	1	Penny Weight
1	1	0	Tons
1	1	1	Custom Units

The Error Code byte represents errors detected in the received messages. Most of these errors could be a result of mismatched communication parameters. These are defined as follows:

Error Code	Description
101	Invalid start of message detected. For continuous mode (RS-232), this should be a <STX>. Instead some other character was received.
102	Invalid or incomplete message received.
103	Invalid checksum received.

4.3.2 Master Mode

The driver will continuously send commands to read the weight and status from the Weigh Scales. The weight data read is for Net, Gross, Tare and Display. If there are communication errors, these are reported up to DeltaV. Each weigh scale will always have only the following registers configured:

Dataset 1 Assignments

Data Name	Assigned Register	Type
Net Weight	R1	Read from Scale
Gross Weight	R2	Read from Scale
Tare Weight	R3	Read from Scale
Over Capacity Weight	R4	Read from Scale
Hand Tare Weight	R5	Read from Scale
Under Capacity Weight	R6	Read from Scale
Unused	R7-R10	
Tare Value	R11	Written to Scale
SP1	R12	Read/Write
SP2	R13	Read/Write
SP3	R14	Read/Write
SP4	R15	Read/Write
SP1 Preact/Dribble	R16	Read/Write
SP2 Preact/Dribble	R17	Read/Write
SP3 Preact/Dribble	R18	Read/Write
SP4 Preact/Dribble	R19	Read/Write
SP1 Tolerance 1	R20	Read/Write
SP2 Tolerance 2	R21	Read/Write

Dataset 2 Assignments

Data Name	Assigned Register	Type
Net Units	R1	Read from Scale
Gross Units	R2	Read from Scale
Tare Units	R3	Read from Scale
Over Capacity Units	R4	Read from Scale
Hare Tare Units	R5	Read from Scale
Under Capacity Units	R6	Read from Scale
Status Byte 1	R7	Read from Scale
Status Byte 2	R8	Read from Scale
Status Byte 3	R9	Read from Scale
Status Byte 4	R10	Read from Scale
Status Byte 5	R11	Read from Scale
Status Byte 6	R12	Read from Scale
Unused	R13	
Scale Bypass	R14	User Supplied
Device ID	R15	User supplied
Unused	R16-R19	
Command	R20	Written to Scale
Command Parameter	R21	Written to Scale
Command Status	R22	Internal

The following Toledo commands are supported.

Command	Description	Parameters	Additional Information
5	Auto Tare	0	
6	Keyboard Tare	1	Tare Value (DS1, R11) is sent out
7	Digital Zero	0	
10	SP Read	1	SP # in command parameter register (DS2, R21) to read. SP # must be between 0 and 9
20	SP Write	2	SP # in command parameter register (DS2, R21) to written. SP # must be between 0 and 9. SP value is in RS1, R12-R21
30	Mode	0	Set Mode to Net
31	Mode	0	Set Mode to KG
32	Mode	0	[+]Set Mode to Net
33	Mode	0	[+]Set Mode to Gross
40	KB Lock	0	Lock Keyboard of scale
41	KB Unlock	0	Unlock Keyboard of scale

SP #	Description
0	SP 1
1	SP 2
2	SP 3
3	SP 4
4	SP 1 Preact/Dribble
5	SP 2 Preact/Dribble
6	SP 3 Preact/Dribble
7	SP 4 Preact/Dribble
8	SP 1 Tolerance 1
9	SP 2 Tolerance 2

[+]Some scales do not support these Modes. In these cases, the scale responds with a Nak.

The following Masstron commands are supported.

Command	Description	Additional Information
1	Clear	Clear to gross Mode
2	Tare	Tare off the display weight
3	Zero	Zero the scales

The Status byte SB1 will be a bit mask defined as follows:

2	1	0	Indicated Position
0	0	0	XXXX00.
0	0	1	XXXXX0.
0	1	0	XXXXXX.
0	1	1	XXXXX.X
1	0	0	XXXX.XX
1	0	1	XXX.XXX
1	1	0	XX.XXXX

Rounding of the weight (as described below) is strictly for status. The driver will not perform this function. It is assumed that the weigh scale has already rounded the values.

4	3	Rounding
0	1	1
1	0	2
1	1	5

The Status byte SB2 will be a bit mask defined as follows:

Status Bit	Value	Description
0	1	1=Net; 0=Gross
1	2	1=LB; 0=KG/Alt
2	4	1=Alternate units programmed for non zero value
3	8	Always 0
4	16	Always 0
5	32	Always 0
6	64	1=Tare Enabled; 0=Tare disabled
7	128	Parity bit

The Status byte SB3 will be a bit mask defined as follows:

Status Bit	Value	Description
0	1	Always 0
1	2	Always 0
2	4	1=Motion
3	8	1=Center of Zero
4	16	Always 0
5	32	1=Over Capacity
6	64	1=LB/KG switching enabled
7	128	Parity bit

The Status byte SB4 will be a bit mask defined as follows:

Status Bit	Value	Description
0	1	1=Negative Weight
1	2	Always 0
2	4	1=Keyboard Tare entered
3	8	Always 0
4	16	Always 0
5	32	1=Keyboard locked out
6	64	1=Expanded mode Enabled
7	128	Parity bit

The Status byte SB5 will be a bit mask defined as follows:

Status Bit	Value	Description
0	1	Always 0
1	2	Always 0
2	4	Always 0
3	8	1=Power up
4	16	1=SP enabled
5	32	Always 0
6	64	Always 0
7	128	Parity bit

The Status byte SB6 will be a bit mask defined as follows:

Status Bit	Value	Description
0	1	0=SP1 feed on
1	2	0=SP2 feed on
2	4	0=SP3/SP1 fast feed on
3	8	0=SP4/SP2 fast feed on
4	16	0=SP1/Zero Tolerance 1 feed on
5	32	0=SP2/Zero Tolerance 2 feed on
6	64	Always 0
7	128	Parity bit

4.4 Steps for User Commands

1. For commands which do not require any parameters, simply write the command number into the Command Register (DS2, R20).

2. For commands which require parameters, write the parameter values first. Then write the command number.

3. The command execution will begin. The driver will determine if the command is valid. If an invalid command is found, the command register will be set to 0 and the command status will have the value 254.

4. The driver will then check for valid parameter numbers. If an invalid parameter number is found, the command register will be set to 0, and the command status will have the value 253.

5. If no errors are found, the driver will format the command and send it to the weigh scale.

6. If the command completes successfully, the command status will be set to 0 and the command register will be set to the command number plus 100.

7. If the scale returns a Nak, the command status will be set to 255.

8. In Master mode, you can bypass the scale scan. This is useful if you hookup temporary scales to the serial card. Such scales are typically also given a user defined ID. Bypassing a scale allows you to physically remove a scale without adversely affecting the scan time for other permanent scales. Set the scale bypass register (R14) of second dataset to 1 for bypass, 0 for normal scan.

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 Mettler Toledo 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 Mettler Toledo driver installed.

The following information will be displayed:

:	:	:	
HwRev	Hardware Revision	1.1	(or later)
SwRev	Software Revision	P1.0	(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 Mettler Toledo 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 Mettler Toledo Weigh Scale and the PSIC. For input data, the values should be changed in the Mettler Toledo and verified that the new data are correctly reported.

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 Mettler Toledo 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 - Mettler Toledo Electrical Interface

The electrical interface between DeltaV and the Mettler Toledo devices conforms to the RS-232 protocol. The RS-232 cable connecting Mettler Toledo and the DeltaV PSIC should not exceed 50 feet as specified by the EIA standard for RS-232 protocol. Section 6.1 shows the pin assignments for the PSIC serial terminal block for RS-232 protocol.

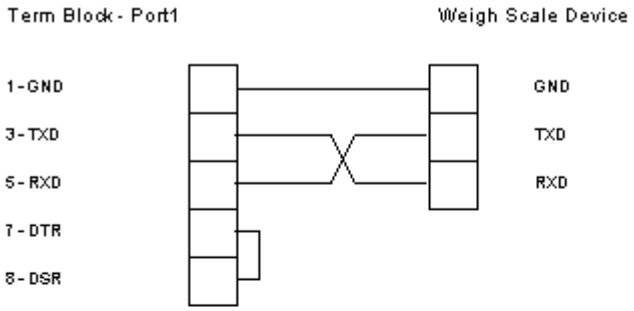
6.1 RS-232 Pin Assignments for DeltaV PSIC

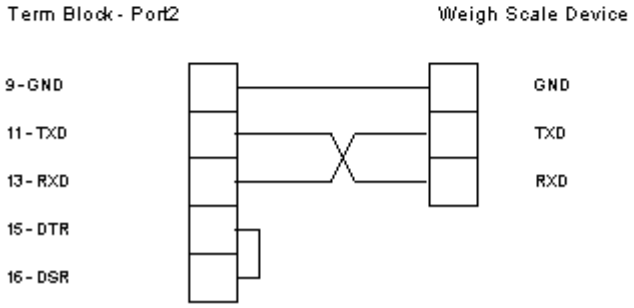
Terminal Number	Signal Description
1	Port 1 - Isolated Ground (GND)
2	Unused
3	Port 1 - Transmit Data (TXD)
4	Unused
5	Port 1 - Receive Data (RXD)
6	Unused
7	Port 1 - Data Terminal Ready (DTR)
8	Port 1 - Dataset Ready (DSR)
9	Port 2 - Isolated Ground (GND)
10	Unused
11	Port 2 - Transmit Data (TXD)
12	Unused
13	Port 2 - Receive Data (RXD)
14	Unused
15	Port 2 - Data Terminal Ready (DTR)
16	Port 2 - Dataset Ready (DSR)

6.2 Wiring Connections for RS-232 Communications

Five terminals need to be connected between the PSIC and the Mettler Toledo port. Pins 3 (TXD) and 5 (RXD) need to be crossed so that the Mettler Toledo TXD is connected to PSIC RXD, and the Mettler Toledo RXD is connected to PSIC TXD. Pins 7 (DTR) and 8 (DSR) also need to be crossed in the same manner between the PSIC and the Mettler Toledo.

In general, the following RS-232 cable pinout can be used.





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

Thank you for using DeltaV.