

# M-series Serial Interface Series 2



The DeltaV™ Serial Interface provides a connection between the DeltaV system and other devices.

- Provides seamless information interface
- Plug-and-play ease of use
- Extends the life of existing equipment
- 1:1 redundancy for Serial Interface I/O cards
- Autosense of redundant I/O
- Automatic switchover

## Introduction

The Serial Interface provides a connection between the DeltaV™ system and devices that support a serial protocol, such as Modbus or Allen Bradley's Data Highway Plus.

The Serial Interface is supplied with Modbus software drivers pre-loaded. Plug your Serial Interface into any available slot in the I/O interface carrier, connect the

third-party device, power up and play. Like all DeltaV I/O, the Serial Interface may be added online while the rest of the controller and I/O is powered up and in use.

DeltaV Serial Interface I/O has a high level of reliability, providing the process availability required for most applications. In certain situations, process availability can be increased through the use of Serial Interface I/O redundancy.

## Benefits

**Provides Seamless Information interface.** Using the Serial Interface with the DeltaV system, you gain an extended view of your entire plant. All serial information is readily available for display at the Operator Interface.

When connected to a PLC, DeltaV software may pass supervisory information to the PLC facilitating the coordination of control strategies across systems.

**Plug-and-play Ease of Use.** Plug-and-play installation saves money. The Serial Interface works just like other DeltaV I/O interfaces. It fits into any available slot on the controller I/O carrier. There are no dipswitches. *Just plug it in!*

The DeltaV controller auto-senses the Serial Interface and presents the configuration options. Online help makes this interface a snap to configure. After a simple point-and-click configuration exercise, your integrated solution is up and running.

**Extends the Life of Existing Equipment.** Enhance existing capabilities—don't replace them. Many plants have a variety of devices already installed. With the Serial Interface you are able to effectively interface a DeltaV system with existing PLCs or other serial devices. This means that you can layer the state-of-the-art process control offered by a DeltaV system on to the devices you already have in place.

**1:1 Redundancy for Serial I/O Cards.** You can add redundancy to an existing system, providing the slave device supports redundant serial ports. DeltaV redundant I/O uses the same Series 2 I/O cards as non-redundant I/O. This allows you to leverage your investment in installed I/O and in I/O spares. No additional configuration is required.

**Autosense of Redundancy.** The DeltaV system autosenses redundant I/O, which greatly simplifies the task of adding redundancy to the system. The redundant pair of cards is treated as one card in the system tools.

**Automatic Switchover.** Should a primary I/O card fail, the system automatically switches to the “standby” card without user intervention. The operator is given clear notification of a switchover at the operator display.

## Product Description

The Serial Interface consists of a serial card and a terminal block. The card contains two serial communications ports that support RS232 and RS422/485 half duplex, or RS422/485 full duplex signals. These ports are individually configurable and support data rates up to 115 KBaud.

The card has the common DeltaV form factor, allowing it to be plugged into any available slot in the I/O interface carrier. The card is clearly labeled with the interface type. LEDs, located on the front of the card, show the power, error, and port status of the interface at a glance.

The standard Modbus protocol includes the Serial Interface, the Modbus RTU, and ASCII communications protocol as defined in the Modicon Modbus Protocol Reference Manual dated March 1992 (PI-MBUS-300 REV D). Each Serial Interface port may be configured as either a master or slave device.

The serial card supports the following features using the Modbus protocol:

- Reading input data from Modbus coils, input status, holding registers and normal input registers.
- Writing output data to coils and holding registers.
- Output data can be written in single coil, register mode, or complete data set mode. This output mode is a configurable parameter.
- Input data can be read in as a complete data set, providing the best performance.

The serial card supports the input and/or output of 16 different data sets per serial port, for a total of 32 data sets per Serial Interface.

Serial dataset registers can be referenced directly in control modules as analog or discrete I/O providing fast easy data exchange with the serial device. Direct module-to-Dataset/register references are recommended for control signals.

Alternatively, users can read multiple registers from a Dataset into a single “marshalling” module at the cost of a single DST. Marshalling modules provide a cost effective way to integrate serial data from analyzers and other data sources. Serial dataset registers can also be passed as SCADA values directly to Workstations and Continuous Historians without consuming DST's.

Both Modbus RTU and Modbus ASCII communications modes are supported by standard Modbus protocol.



*M-series Serial with Terminal Block.*

### Redundancy Made Easy

The Redundant Serial Interface consists of a pair of serial cards and a redundant terminal block. The cards each contain two serial communications ports that support RS422/485 half duplex (in either single slave or multi-drop configurations), or RS422/485 full duplex (in single slave configuration only), as well as RS232. These ports are individually configurable and support data rates up to 115 KBaud.

The active and standby serial cards are each connected to serial ports on the slave device using the redundant terminal block. Verify with the device supplier for its ability to support redundant Modbus serial communications.

When a fault is detected, the system automatically switches to the backup serial card. Events that can cause a switchover include:

- Hardware failure within the active card
- Communications failure (including field cable and slave port problems) between the active card and the controller
- Removal of the active card from the carrier

A switchover may also be initiated from control logic. This allows additional watchdog logic to monitor multiple slave devices for communication faults not detected by the Serial Interface. A manual switchover can be initiated from diagnostics explorer.

The controller scans each card of a redundant pair. Incremental controller loading is a function of the number of redundant cards. In addition, the redundant cards have dedicated communication between the pair through the terminal block, and the backup card monitors the health of the active card. The reliability rating of the passive terminal block is greater than the high reliability of the I/O cards.

The redundant pair can be manually configured or Autosensed. A redundant pair is referenced by the odd-numbered address, which infers the second card is to the right of this card. The redundant terminal block couples the two cards as one redundant pair that when Autosensed, the DeltaV system automatically recognizes the redundant pair of cards and assigns a device signal tag (DST) to the channels on the primary card (Odd numbered card).

Switchover time for redundant I/O is minimal, and the process will be undisturbed. Output channel behavior on switch over can be configured to resend outputs on a switchover. This can be coupled with Output Read back to ensure the output channels are driven to the desired state upon switchover.

An alarm on the integrity error for the primary card notifies the operator of a switchover. The backup card is also monitored for integrity alarms. The system automatically commissions and downloads a replacement standby card. In safe areas, failed cards can be replaced under power. In hazardous areas, appropriate installation procedures must be followed.

### Other Protocols Supported

The DeltaV serial module can support other serial driver protocols downloaded directly into the serial card. Custom drivers available from Emerson for the DeltaV serial card include:

- Allen-Bradley Data Highway Plus
- Mettler Weight Scale
- Enhanced Modbus
- Sartorius Weight Scale

## Hardware Specifications

| Specifications for Serial Interface I/O Card  |  |
|---|--|
| Number of Serial Ports                        | 2  |
| Number of Data Sets per Serial Interface Card | 32 (16 per port)   |
| Port Types                                    | RS232, RS422/485 half duplex, RS 422/485 full duplex   |
| Isolation                                     | Each port is isolated from the system and from the other. These ports must be externally grounded.                       |
| Communication Specifications                  |  |
| Baud Rate                                     | 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200   |
| Parity  | Even, Odd, None  |
| Data Bits                                     | 7 or 8   |
| Stop Bits                                     | 1 or 2   |
| Retry Count                                   | 0 – 255  |
| Message Time Out                              | 100 – 25,500 msec. (100 msec. Increments)  |
| Transmit Delay                                | 0 – 25,500 msec. (100 msec. Increments)  |
| Send Outputs on Startup                       | In the DeltaV™ Explorer, the user is able to indicate whether or not outputs should be sent on interface initialization. |
| Environmental Specifications                  |  |
| Operating Temperature*                        | -40 to 70°C (-40 to 158°F)   |
| Storage Temperature                           | -40 to 85°C (-40 to 185°F)   |
| Relative Humidity                             | 5 to 95%, non-condensing   |
| Airborne Contaminants                         | ISA-S71.04-1985 Airborne Contaminants Class G3   |
| Protection Rating                             | IP 20  |
| Shock   | 10 g ½-sine wave for 11 ms   |
| Vibration                                     | 3 mm peak-to-peak from 5 to 13 Hz;<br>0.5 g from 13 to 150 Hz  |

\*Operating any electronics at the higher end of its temperature range for long periods of time will shorten its expected lifetime, see **Effects of Heat and Airflow Inside an Enclosure White Paper** for more information.

## Certifications

The following certifications are available for M-series Serial Interface Card:

### CE

- EMC-EN 61326-1

### FM

- FM 3600
- FM 3611

### CSA

- CSA C22.2 No. 213-M1987
- CSA C22.2 No. 1010-1

### ATEX

- EN60079-0
- EN60079-15

### IEC-Ex

- IEC60079-0
- IEC60079-15

### Marine Certifications: IACS E10

- ABS Certificate of Design Assessment
- DNV Marine Certificate

## Hazardous Area/Locations

M-series Serial Interface Cards can be installed and used based on the following Standards (see actual certificates for exact product markings for each product):

### FM (USA)

- Class I, Division 2, Groups A, B, C, D, T4

### cFM (Canada)

- Class I, Division 2, Groups A, B, C, D, T4

### ATEX

- II 3G Ex nA IIC T4 Gc

### IEC-Ex

- II 3G Ex nA IIC T4 Gc

Regarding the Installation instructions please refer to the following Documents:

|   |         |
|---|---------|
| Class 1 Division 2 Installation Instructions DeltaV™ M-series | 12P1293 |
| Zone 2 Installation Instructions DeltaV M-series              | 12P2046 |

## Ordering Information

| Description  | Model Number |
|--|--------------|
| M-series Serial Interface Card, 2-ports<br>(includes 1 Interface Card and a simplex Terminal Block)              | VE4206P2*    |
| Redundant M-series Serial Interface Card, 2-ports<br>(includes 2 Interface Cards and a redundant Terminal Block) | VE4236P2*    |

\*Product is supported in DeltaV™ v11.3.1 and later. If needed for prior DeltaV versions, please request KJ3241X1-BA2.  
The DeltaV Serial Interface Redundancy Cards ship from the factory with Modbus drivers pre-installed.

## Custom Driver Ordering Information

| Description                        | Model Number |
|------------------------------------|--------------|
| Allen-Bradley DF1 Simplex Driver   | IOD-1123XIL  |
| Allen-Bradley DF1 Redundant Driver | IOD-1124XIL  |
| Mettler Toledo Weigh Scales Driver | IOD-1128XIL  |
| Enhanced Modbus Driver             | IOD-1134XIL  |
| Sartorius Weigh Scale Driver       | IOD-1140XIL  |
| Modbus One Port 32 Datasets        | IOD-1184XIL  |
| Redundant Enhanced Modbus Driver   | IOD-1185XIL  |

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