DeltaV™ M-series Traditional I/O



The DeltaV™ I/O Subsystem is Easy to Install and Maintain.

- Decreases capital equipment costs
- Decreases installation time and expense
- Increases productivity
- Increases process availability

Introduction

Traditional I/O is a modular subsystem that offers flexibility during installation. It's designed to be installed in the field, near your devices. Traditional I/O is equipped with function and field wiring protection keys to ensure that the correct I/O card is always plugged into the corresponding terminal block. Modularity, protection keys, and plug-and-play capabilities make DeltaV™ Traditional I/O a smart choice for your process control system.

Benefits

Decreases Capital Equipment Costs

Full System Modularity: The Traditional I/O subsystem was designed with your investment in mind. All components are fully modular and may be installable under power. You add I/O interface carriers and I/O interfaces in groups of 4, 8, 16, or 32 channels as you need them. The modular design enables you to purchase the exact amount of I/O cards, 8-wide or 4-wide carriers, power/ controllers, and 2-wide carriers you need and add more DeltaV I/O as your system grows.

Product Description

The Traditional I/O Subsystem Includes:

- I/O interface carrier (a DIN rail surface mounted) on which all I/O related components are installed
- Bulk AC to 24V DC power supply for field devices
- An I/O interface consisting of an I/O card and an I/O terminal block
- A variety of analog and discrete I/O cards enclosed in a common form factor that easily plugs into the I/O interface carrier
- A variety of I/O terminal blocks mounted on the I/O interface carrier that can be pre-wired before I/O card installation

I/O Cards

A variety of analog and discrete I/O cards are available to meet your specific requirements. The following cards support simplex or redundant installation:

- AI 4-20 mA HART 8 channels
- AO-4-20 mA HART 8 channels
- DI, 24V DC Dry Contact, 8 channels
- DO 24V DC High-Side, 8 channels



A Traditional I/O Card Easily Plugs into an I/O Carrier.

- AI (Plus) 4-20 mA HART, 16 channels
- AO (Plus) 4-20 mA HART, 16 channels
- DI (Plus) 24V DC, Dry Contact, 32 channels
- DO (Plus) 24V DC, High-Side, 32 channels

The following I/O cards are supported in simplex format to meet your field wiring needs:

- RTD, 8-channels
- Thermocouple, 8 channels
- Millivolt, 8 channels
- DI, High Density, 32 channels
- DI 24V DC Isolated, 8 channels
- Multi-Function, 4 channels (Isolated DI)
- Sequence of Event, 16 channels (DI 24 V DC)
- DI 120V AC Low Side Detection, 8 channels
- DI 120V AC Isolated, 8 channels
- DO 24V DC Isolated, 8 channels
- DO 120/230V AC High-Side, 8 channels
- DO 120/230 Isolated, 8 channels

All I/O cards are enclosed in a common form factor that plugs into the I/O interface carrier. The housing is clearly labeled with the enclosed I/O card type. All cards have power and internal error indicators. Eight-channel cards have clearly visible channel status LEDs.

All cards meet ISA G3 corrosion specifications by the careful selection of superior electronic components and the use of conformal coating.

Pulse Counters are available on most DI cards. The supported maximum frequency varies from 0.1 Hz on AC signals to 75 or 120 Hz on 24V DC inputs. For higher pulse counts, up to 50 KHz, use the Multi-Function card's high speed pulse input.

The DeltaV system provides control module level time stamping for log events and alarms. For greater event resolution, the 16-channel Sequence-of-Events DI card can provide signal driven events to a resolution of +/- 0.25 ms per card, or within 1 ms per controller. Please refer to the **Sequence of Events** PDS for more information on Sequence-of-Event data collection and system options for this feature.

I/O Card Redundancy

Redundant I/O cards are available for critical applications. The same card can be used in simplex or redundant applications. When installed on a two-wide redundant terminal block, the cards are recognized as a redundant pair by the controller. The controller scans each card and determines which card is acting as the active interface. When a fault is detected, the system automatically switches to the standby I/O card.

DeltaV Control modules reference simplex and redundant I/O channels identically and there is no special configuration required to take advantage of redundancy.

Switchover of a redundant I/O card is completed within two scans of the I/O bus. Make-before-break contacts ensure digital field instruments remain powered and the process is undisturbed. Analog output signals are briefly driven by both cards for < 5 ms during switchover of the card.

Hardware Alerts automatically report hardware integrity errors for both the primary and secondary cards. Any event that causes a switchover is also reported automatically through the system hardware alerts and is logged in the Event Chronicle.

Events that can cause a switchover include:

- Hardware failure within the active card.
- Communications failure between the active card and the controller.
- Detection of a fault in the field wiring.

A switchover may also be initiated from the diagnostics explorer, and the health and status of both cards and their channels are available in the diagnostics explorer.

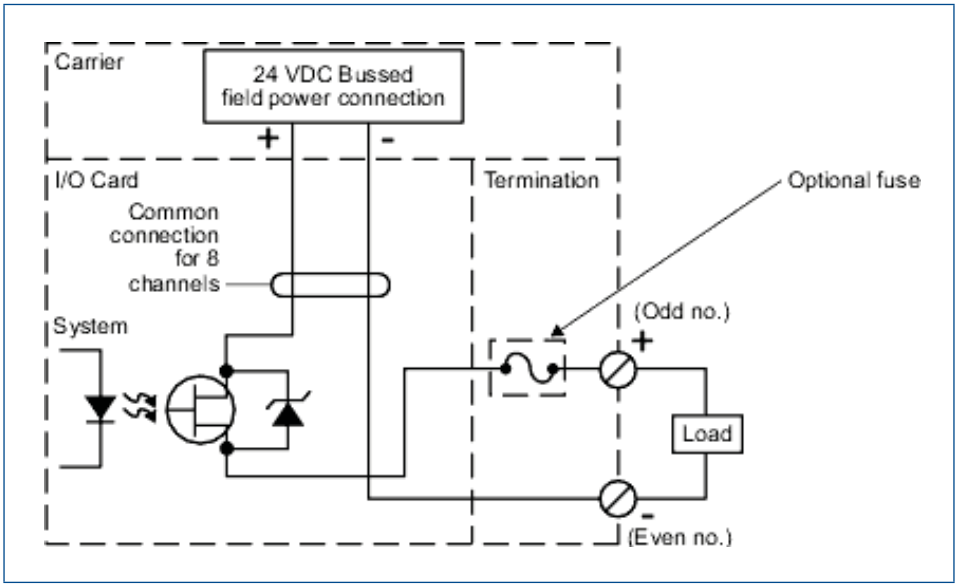
The system automatically commissions a new standby card. In safe areas, failed cards can be replaced under power. In hazardous areas, appropriate installation procedures must be followed.

Hardware Specifications

Common Environmental Specifications for all I/O Interfaces	
Category	**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 Conformal coating
Protection Rating	IP 20
Shock	10 g ½-sine wave for 11 ms
Vibration	1 mm peak-to-peak from 5 to 16 Hz; 0.5 g from 16 to 150 Hz
Dimensions	H 10.7 cm (4.2 in.) W 4.1 cm (1.6 in.) Depth 10.5 cm (4.1 in.)

*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.

Specifications for DO Card, 8-channel, 24V DC, High-Side	
Number of Channels	Eight
Isolation	Each channel is optically isolated from the system and factory tested to 1500V DC
Output Range	2V DC to 60V DC
Output Rating	1.0 A continuous per channel; 3.0 A maximum per I/O Interface
Off State Leakage	1.2 mA maximum
LocalBus Current (12V DC nominal) per Card	100 mA typical, 150 mA maximum
Field Circuit Power per Card	3.0 A at 24V DC per I/O Interface
Configurable Channel Types	**Output**
Discrete Output	Output stays in last state submitted by the controller
Momentary Output	Output is active for a pre-configured time period (100 ms to 100 s)
Continuous Pulse Output	Output is active as a percentage of a pre-configured base time period (100 ms to 100 s). Resolution = 5 ms
Optional Fuse	2.0 A



Simplified Circuit and Connection Diagram for DO Card, 8-channel, 24V DC, High-Side.

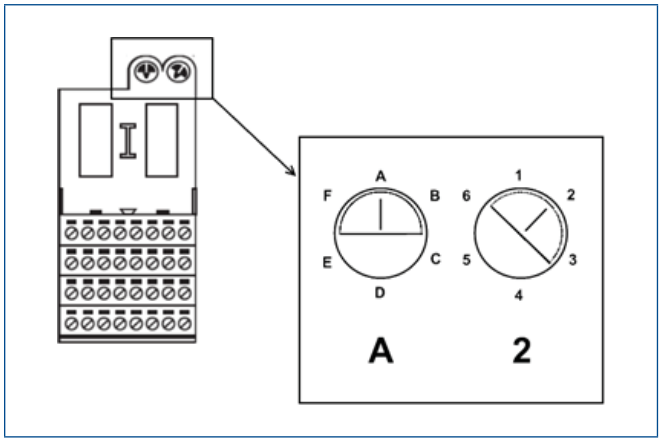
I/O Terminal Blocks

A variety of I/O terminal blocks are available to meet specific functionality and environmental requirements of the installation. The I/O interface is a combination of the I/O card and the I/O terminal block. Each I/O interface is uniquely keyed so that once installed in a carrier slot with a terminal block, that terminal block will only accept a replacement card.



8-channel Standard Terminal Block.

The keying mechanism consists of two keying posts that rotate and lock into the terminal block base. Each post has 6 positions: A-F and 1-6. Each card is assigned a unique key, which is marked on the side of the I/O card:



Terminal Block Keying Example.

The keys prevent installation of an incorrect card, and the graphical information on the card makes it easy to determine if a keyed slot will accept a particular card.

There are different I/O terminal blocks available to meet the wiring needs of field signals:

- 8-Channel terminal block
- Fused 8-Channel terminal block
- AI 8-Channel terminal block
- 2-wire AI Plus 16-Channel terminal block
- 4-wire AI Plus 16-Channel terminal block
- AO Plus 16-Channel terminal block
- DI 32-Channel terminal block
- DI Plus 32-Channel terminal block
- DO Plus 32-Channel terminal block
- RTD/Resistance terminal block
- Thermocouple terminal block

The following redundant I/O terminal blocks are available on some I/O interfaces, allowing a pair of cards to be installed as a redundant pair:

- Redundant AI 8-Channel terminal block
- Redundant AI Plus 16-Channel terminal block
- Redundant AO 8-Channel terminal block
- Redundant AO Plus 16-Channel terminal block
- Redundant Discrete 8-Channel terminal block
- Redundant DI Plus 32-Channel terminal block
- Redundant DO Plus 32-Channel terminal block

The table on the following page lists the compatible terminal blocks for each card, along with the cards unique key positions. The first terminal block listed is the recommended terminal block.

I/O Card	I/O Card Keying	Traditional I/O Terminal Blocks	Mass Termination Blocks
PCI, 4-Channel	C6	32-Channel terminal block	NA
SOE, 16-Channel, 24V DC	C5	32-Channel terminal block	40-pin Mass termination block
DO, 8-Channel, 24V DC, High-Side	B6	I/O terminal block Fused terminal block	10-pin Mass termination block 16-pin Mass termination block
DO, 8-Channel, 24V DC, Isolated	B5	I/O terminal block Fused terminal block	16-pin Mass termination block
DO Plus, 32-Channel, 24V DC High-Side	B4	32-Channel DO terminal block for Series 2 Plus Redundant 32-Channel DO terminal block for Series 2 Plus	40-pin DO Mass termination block for Series 2 Plus Redundant 40-pin DO Mass termination block for Series 2 Plus
DI, 8-Channel, 120V AC, Dry Contact	E1	I/O terminal block Fused terminal block	NA
DI, 8-Channel, 120V AC, Isolated	E4	I/O terminal block Fused terminal block	NA
DO, 8-Channel, 120V AC/ w230V AC, High-Side	F1	I/O terminal block Fused terminal block	NA
DO, 8-Channel, 120V AC/ 230V AC, Isolated	F4	I/O terminal block Fused terminal block	NA

System Compatibility

M-series traditional I/O hardware requires:

- MQ, MX or PK controllers
- M-series horizontal or VerticalPlus carriers

S-series and M-series controllers can be installed on the same DeltaV Area Control Network in v11.3.1 and beyond. Control modules can be assigned to any controller and inter-controller references are fully supported.

The following traditional I/O Plus cards require v13.3.1 or higher Software:

- AI Plus, 4-20 mA HART, 16 Channels
- AO Plus, 4-20 mA HART, 16 Channels
- DI Plus, 32-channel, 24V DC Dry contact
- DO Plus, 32-channel, 24V DC High-Side

Termination Fault Detection is a feature that only works within the following cards:

- DI Plus, 32-channel, 24V DC Dry contact
- DO Plus, 32-channel, 24V DC High-Side

when used with the redundant 40-pin Mass DI or DO Terminal Block combined with the M-series Mass Connection Solutions or P+F HiC IS barriers and termination boards for DeltaV DCS.

All other approved third party mass termination products may be used with both non Plus S-series and M-series I/O interfaces.

M-series traditional I/O horizontal carriers are not physically compatible with S-series horizontal controller carriers. Install M-series I/O interfaces with M-series controllers and S-series I/O interfaces with S-series controllers.

Certifications

The following certifications are available for M-series Traditional I/O (see actual certificates for exact certifications for each product):

- **CE**

  EMC: EN 61326-1

- **FM**

  FM 3600

  FM 3611

- **CSA**

  CSA C22.2 No. 213

  CSA C22.2 No. 1010-1

- **ATEX**

  EN60079-0

  IEC60079-7

  EN60079-15

- **IEC-Ex**

  IEC60079-0

  IEC60079-7

  IEC60079-15

- **Marine Certifications:** IACS E10

  ABS Certificate of Design Assessment

  DNV Marine Certificate

Hazardous Area/Location

M-series Traditional I/O 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 ec IIC T4 Gc

  II 3G Ex ec [ic] IIC T4 Gc

  II 3G Ex nA nC IIC T4 Gc

- **IEC-Ex**

  II 3G Ex ec IIC T4 Gc

  II 3G Ex ec ic IIC T4 Gc

  II 3G Ex nA nC 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

Discrete Output Cards and Termination Blocks	
Description	**Model Number**
Discrete Output Card: 8 Channels 24V DC, Isolated	
Standard I/O Termination Block	VE4002S1T1B1
Fused I/O Termination Block	VE4002S1T1B2
16-Pin Mass Termination Block	VE4002S1T1B3
Discrete Output Card: 8 Channels 24V DC, High-Side	
Standard I/O Termination Block	VE4002S1T2B1
Redundant Standard I/O Termination Block	VE4032S1T2B1
Fused I/O Termination Block	VE4002S1T2B2
16-Pin Mass Termination Block	VE4002S1T2B3
10-Pin Mass Termination Block	VE4002S1T2B4
Discrete Output Plus Card: 32 Channels, 24 V DC, High-Side	
32-Channel DO Terminal Block for Series 2 Plus	VE4002S2T2B8
Redundant 32-Channel DO Terminal Block for Series 2 Plus	VE4032S2T2B8
40-pin DO Mass Termination Block for Series 2 Plus (to be used with DeltaV Signal Conditioning Cards for PLC-5 DO, or P+F HiC IS barriers and terminal boards for DeltaV DCS)	VE4002S1T2B8
40-pin DO Mass Termination Block for Series 2 Plus including 4 x 8-channel DO Mass Connection Boards*	VE4052S1T2B8
Redundant 40-pin DO Mass Termination Block for Series 2 Plus (to be used with DeltaV Signal Conditioning Cards for PLC-5 DO, or P+F HiC IS barriers and terminal boards for DeltaV DCS)	VE4032S1T2B8
Redundant 40-pin DO Mass Termination Block for Series 2 Plus including 4 x 8-channel DO Mass Connection Boards*	VE4082S1T2B8
Discrete Output Card: 8 Channels 115/230V AC, Isolated	
Standard I/O Termination Block	VE4002S2T1B1
Fused I/O Termination Block	VE4002S2T1B2
Discrete Output Card: 8 Channels 115/230V AC, High-Side	
Standard I/O Termination Block	VE4002S2T2B1
Fused I/O Termination Block	VE4002S2T2B2

*For more details on the Mass Connection Boards and connection cables, please refer to the **M-series Mass Connection Solutions** PDS.

Spare Part Ordering Information

Spare Parts	
Description	**Model Number**
250V 2A Fuse for Fused Terminal Block; Box of 20	KJ4010X1-BC1
I/O Module Hold-down Screw; Box of 20	KJ4010X1-BP2

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