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.

Reduced System Footprint: The DeltaV system's state-of-the-art form factor design of the I/O components enables you to mount the I/O interface carrier in a junction box in the field so you significantly reduce the footprint of your equipment and increase valuable control room space for other uses.

Installation: Save on wiring expenses by installing Classic Instrumentation in the field, near the actual field devices. Mounting the controller with the I/O further reduces your wiring expenditures by eliminating the need for long runs of multi-cores. The integrated design of the Traditional I/O subsystem can eliminate the need for marshalling panels. This saves you even more in your total capital costs.

The provision of in-line fuses and bussed power saves on installation costs compared with external fuses and power distribution.

Decreases Installation Time and Expense

Plug-and-play Installation Saves Money: All Traditional I/O components plug into the I/O interface carrier. You can install the I/O interface carriers to manage anticipated growth and postpone the I/O interfaces until you're ready to install your additional field devices.

Phased Installation Saves Time: As soon as you mount the I/O interface carrier, you're ready to begin installing the field devices. I/O terminal blocks plug directly onto the I/O interface carrier. There is no need to have the I/O cards installed.

Keys: Traditional I/O interfaces and terminal blocks have I/O function keys. These keys ensure that the correct I/O card is always plugged into the corresponding terminal block. It's incredibly easy to use and gives you time to do more.

This design enables you to initially install Traditional I/O quickly and efficiently. When you need to replace an I/O card, the function key design ensures that you will always install it correctly. This keying system provides a safety measure by preventing the wrong I/O interface's being installed.



Traditional I/O Terminal Block.

Increases Productivity

Real-time, Online Equipment Additions: Online addition of new I/O interfaces means your process does not get interrupted. As new equipment is added, the DeltaV Explorer acknowledges it and assigns it basic configuration.

Increases Process Availability

1:1 Redundancy for Traditional and HART I/O Cards: 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 needed when using a redundant channel. The redundant terminal blocks provide the same field wiring connections as simplex blocks, so there is no extra wiring needed.

Autosense of Redundancy: DeltaV 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 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.

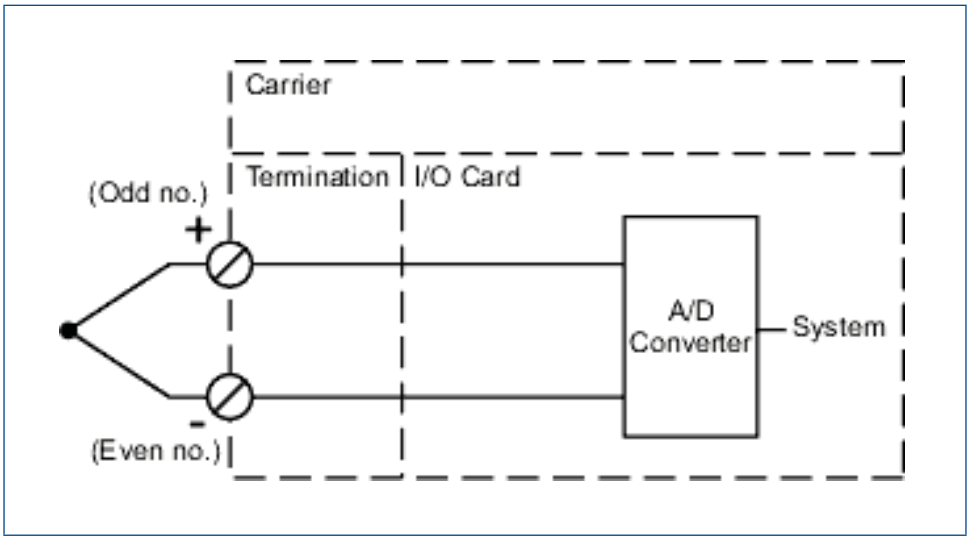
Pulse Counters are available on most DI cards. The supported maximum frequency varies from 0.1 Hz on AC signals to 75 or 120 Hz on 24V DC inputs. For higher pulse counts, up to 50 KHz, use the Multi-Function card's high speed pulse input.

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.

Specifications for Thermocouple/mV Input Card, 8-channel	
Channels per Card	Eight
Sensor Types Thermocouple mV	B, E, J, K, N, R, S, T, uncharacterized Low level voltage source
Sensor Ranges	See table next page
Repeatability	0.05% of span
A/D Resolution	16-bit
Calibration	None required
Units	°C, °F
Cold Junction Compensation (Not available on mV channels)	Local: Integrally mounted in terminal block External: Configure one channel as external cold junction compensation for remaining inputs
Isolation	Each channel is optically isolated from the system and factory tested to 1500V DC ■ Channels 1, 2, 3, and 4 are isolated from channels 5, 6, 7, and 8 (verified by 1500V DC factory test) ■ Thermocouples attached to channels 1, 2, 3, and 4 are not electrically isolated and should be within + 0.7V DC of each other ■ Thermocouples attached to channels 5, 6, 7, and 8 are not electrically isolated and should be within + 0.7V DC of each other
Common Mode Rejection	120 dB at DC/50/60 Hz
Common Mode Impedance	> 10 mega ohms
Normal Mode Rejection	60 dB at 60 Hz
LocalBus Current (12V DC nominal)	210 mA
Open Sensor Detection	Yes (< 70 nA)
Open Sensor Detection Time	10 seconds

Thermocouple Sensor Type Specifications					
Sensor Type	**Full Scale**	**Operating Range**	**25°C Reference Accuracy**	**Temperature Drift**	**Resolution**
Uncharacterized (no linearization, no cold junction compensation.)	-100 to 100 mV	-100 to 100 mV	0.1 mV	± 0.002 mV/°C	~0.003mV
B	250 to 1810°C	500 to 1810°C	± 2.4°C	± 0.056°C/°C	~0.18°C
E	-200 to 1000°C	-200 to 1000°C	± 0.6°C	± 0.008°C/°C	~0.07°C
J	-210 to 1200°C	-190 to 1200°C	± 0.8°C	± 0.011°C/°C	~0.05°C
K	-270 to 1372°C	-200 to 1372°C	± 0.5°C	± 0.016°C/°C	~0.18°C
N	-270 to 1300°C	-190 to 1300°C	± 1.0°C	± 0.007°C/°C	~0.10°C
R	-50 to 1768°C	-50 to 1768°C	± 2.1°C	± 0.013°C/°C	~0.14°C
S	-50 to 1768°C	-40 to 1768°C	± 2.2°C	± 0.067°C/°C	~0.24°C
T	-270 to 400°C	-200 to 400°C	± 0.7°C	± 0.001°C/°C	~0.04°C

RTD, ohms Sensor Type Specifications					
Sensor Type	**Full Scale**	**Operating Range**	**25°C Reference Accuracy**	**Temperature Drift**	**Resolution**
Low-level Voltage Source	-100 to 100 mV	-100 to 100 mV	0.1 mV	0.002 mV/°C	~0.003 mV°



Simplified Circuit Diagram of Thermocouple/mV card, 8 Channels.

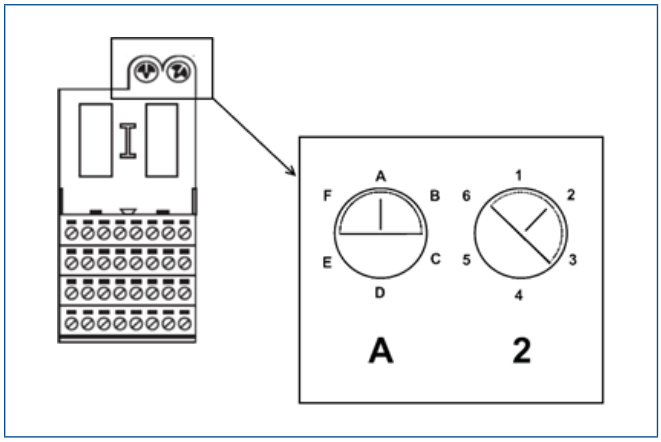
I/O Terminal Blocks

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.

In addition to standard signal wiring, some cards may also be ordered with Mass Terminal blocks that allow these cards to be connected to the M-series Mass Connection Solutions or third party wiring solutions from Phoenix or if IS Barriers are required from Pepperl and Fuchs, mounted in an adjacent cabinet to meet special signal conditioning or for optimizing field wiring solutions. Please refer to the Alliance Program website for details on approved third-party products.

- 10-pin Mass Termination Block (simplex only)
- 16-pin Mass Termination Block (simplex only)
- 24-pin Mass Termination Block (simplex only)
- 40-pin Mass Termination Block (simplex and redundant)
- 48-pin Mass Termination Block (simplex and redundant)

Traditional I/O and Terminal Block Compatibility

I/O Card	I/O Card Keying	Traditional I/O Terminal Blocks	Mass Termination Blocks
AI, 8-Channel, 4–20 mA, HART	A1	I/O terminal block Fused I/O terminal block 4-wire I/O terminal block	16-pin Mass termination block (Supports 2-wire Devices) 24-pin Mass termination block (Supports 4-wire Devices)
AI Plus, 16-Channel, 4-20 mA, HART	A6	16-Channel 2-Wire AI terminal block for Series 2 Plus 16-Channel 4-Wire AI terminal block for Series 2 Plus Redundant 2- & 4-Wire terminal block	48-pin AI Mass termination block for Series 2 Plus Redundant 48-pin AI Mass termination block for Series 2 Plus
AO, 8-Channel, 4–20 mA, HART	A4	I/O terminal block Fused terminal block	16-pin Mass termination block
AO Plus, 16-Channel, 4-20 mA, HART	A5	16-Channel AO terminal block for Series 2 Plus Redundant 16-Channel AO terminal block for Series 2 Plus	48-pin AO Mass termination block for Series 2 Plus Redundant 48-pin AO Mass termination block for Series 2 Plus
Thermocouple, mV	C1	I/O terminal block Cold Junction Compensated (CJC) terminal block	NA
RTD, 8-Channel	C3	Resistant Temperature Device (RTD) terminal block	NA
DI, 8-Channel, 24V DC, Dry Contact	B1	I/O terminal block Fused terminal block	16-pin Mass termination block
DI, 8-Channel, 24V DC, Isolated	B2	I/O terminal block Fused terminal block	16-pin Mass termination block
DI, 32-Channel, 24V DC, Dry Contact	B3	32-Channel terminal block	40-pin Mass termination block
DI Plus, 32-Channel, 24V DC, Dry Contact	E3	32-Channel DI terminal block for Series 2 Plus Redundant 32-Channel DI terminal block for Series 2 Plus	40-pin DI Mass termination block for Series 2 Plus Redundant 40-pin DI Mass termination block for Series 2 Plus

Ordering Information

Analog Input Cards and Termination Blocks	
Description	**Model Number**
8 Channels 4-20 mA, HART	
Standard I/O Termination Block	VE4003S2B1**
Redundant Standard I/O Termination Block	VE4033S2B1**
Fused I/O Termination Block	VE4003S2B2**
4-wire I/O Termination Block	VE4003S2B3**
16-Pin Mass Termination Block	VE4003S2B4**
24-Pin Mass Termination Block	VE4003S2B5**
16 Channels 4-20 ma, HART, Plus Card	
16-Channel 2-Wire AI Terminal Block for Series 2 Plus	VE4003S2B9
16-Channel 4-Wire AI Terminal Block for Series 2 Plus	VE4003S2B10
Redundant 16-Channel 2- & 4-Wire AI Terminal Block for Series 2 Plus	VE4033S2B10
48-pin AI Mass Termination Block for Series 2 Plus (to be used with DeltaV™ Signal Conditioning Cards for PLC-5 AI, or P+F HiC IS barriers and terminal boards for DeltaV DCS)	VE4003S2B11
48-pin AI Mass Termination Block for Series 2 Plus including 16-channel Analog Mass Connection Boards*	VE4053S2B11
Redundant 48-pin AI Mass Termination Block for Series 2 Plus (to be used with DeltaV Signal Conditioning Cards for PLC-5 AI, or P+F HiC IS barriers and terminal boards for DeltaV DCS)	VE4033S2B11
Redundant 48-pin AI Mass Termination Block for Series 2 Plus including 16-channel Analog Mass Connection Boards*	VE4083S2B11
8 Channels Thermocouple, mV	
Standard I/O Termination Block	VE4003S4B1
Cold Junction Compensated (CJC) Termination Block	VE4003S5B1
Analog Input Card: 8 Channels RTD	
Resistant Temperature Device (RTD) Termination Block	VE4003S6B1

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

**Supported on DeltaV v10.3.1 and later. If card will be used on earlier DeltaV versions, please request KJ3222X1-BA2.