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.[1] 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 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 marshaling 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.

Traditional I/O terminal block.

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.

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.

[1] *Refer to Zone 2 installation instructions (12P2046) and/or Class 1 Division 2 installation instructions (12P1293) for details.*

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 24 VDC 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.

A Traditional I/O card easily plugs into an I/O carrier

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, 24 VDC Dry Contact, 8-channels
- DO 24 VDC High Side, 8-channels

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

- AI 4-20 mA HART 16 channels
- AI Isolated, 4 channels
- RTD, 8-channels
- Thermocouple, 8- channels
- Millivolt, 8-channels
- DI, High Density, 32-channels
- DI 24 VDC Isolated, 8-channels
- Multi-Function, 4 channels (Isolated DI)
- Sequence of Event, 16 channels (DI 24 VDC)
- DI 120 VAC Low Side Detection, 8-channels
- DI 120 VAC Isolated , 8-channels
- DO, High Density, 32-channels
- DO 24 VDC Isolated, 8-channels
- DO 120/230 VAC 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 24 VDC inputs. For higher pulse counts up to 50 KHz, use the Multi-Function card's high speed pulse input.

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.

DeltaV 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.

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, NEMA 12
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.)

Analog Input I/O Cards

Specifications for HART AI-Card, 8 channel, 4 to 20 mA	
Number of channels	8
Isolation	Each channel is optically isolated from the system and factory tested to 1500 VDC.
Nominal signal range (span)	4 to 20 mA
Full signal range	1 to 22.5 mA, with over range checking
LocalBus current (12 VDC nominal) per card	120 mA typical, 150 mA maximum
Field circuit power per card	300 mA maximum at 24 VDC (±10%)
Accuracy over temperature range	0.1% of span
Resolution	16 bits
Repeatability	0.05% of span
Roll off frequency	-3 dB at 2.7 Hz; -20.5 dB at ½ the sampling frequency
Calibration	None required
Optional fuse	2.0 A
Communications support	HART pass-through request/response HART variable reporting Field device status reporting
Hart Scan Time	600 – 800 ms (typical) per enabled channel
Field wiring	2-wire—non-incendive[2] 4-wire—non-arcing 2-wire—–nL or ic 4-wire—-nA

[2] Non-incendive field circuits are designed such that under normal operating conditions energy is limited.

Specifications for HART AI-Card 16 Channel, 4 to 20 mA	
Number of channels	16
Isolation	Each channel is optically isolated from the system and factory tested to 1500 VDC.
Nominal signal range (span)	4 to 20 mA
Full signal range	2 to 22 mA, with over range checking
LocalBus current (12 VDC nominal) per Card	85 mA typical, 150 mA maximum
Field circuit power per Card	600 mA maximum at 24 VDC
Accuracy over temperature range	0.2% of span
Resolution	16 bits
Repeatability	0.05% of span
Roll off frequency	-3 dB at 2.7 Hz; -20.5 dB at ½ the sampling frequency
Calibration	None required
Optional fuse	None
Communications support	HART pass-through request/response HART variable reporting Field device status reporting
Hart Scan Time	600 – 800 ms (typical) per enabled channel
Field wiring	2-wire—non-incendive[3] 4-wire—non-arcing 2-wire—–nL or ic 4-wire—-nA

[3] Non-incendive field circuits are designed such that under normal operating conditions energy is limited.

Specifications for RTD Input Card, 8 channel	
RTD channels per card	8
Sensor types	2 wire, 3 wire, or 4 wire
Sensor Configuration	Resistance, Pt100, Pt200, Pt500, Ni120, Cu10, User Defined
Full Scale signal range	See Table next page
Accuracy	See Table next page
Repeatability	0.05% of span
A/D Resolution	16 bit
Calibration	None required
Units	Degrees C, Degrees F
Sensor excitation current	100 µA
Common mode rejection	120 dB at 50/60 Hz
Common mode impedance	> 10 megohms
Roll off Frequency	-3db at 3 Hz, -25 db at 30 Hz
LocalBus current (12 VDC nominal)	160 mA
Open sensor detection time	1 second
Open mV Lead detection time	15 second

RTD, ohms Sensor Type Specifications					
Sensor Type	**Full Scale**	**Operating Range**	**25° Reference Accuracy**	**Temperature Drift**	**Resolution**
Resistance	0 to 2,000 Ω	0 to 2,000 Ω	± 6.2 Ω	± 0.112 Ω/°C	~0.02 Ω
Pt100	-200 to 850°C	-200 to 850°C	± 0.5° C	± 0.018° C/°C	~0.05° C
Pt200	-200 to 850°C	-200 to 850°C	± 0.5° C	± 0.012° C/°C	~0.05° C
Pt500	-200 to 850°C	-200 to 850°C	± 3.5° C	± 0.063° C/°C	~0.18° C
Ni120	-70 to 300°C	70 to 300°C	± 0.2° C	± 0.006° C/°C	~0.02° C
Cu10	-30 to 140°C	-30 to 140°C	± 2.0° C	± 0.157° C/°C	~0.23° C
User Defined*	0 to 1000 Ω	0 to 1000 Ω	± 0.4 Ω	± 0.009 Ω/°C	~0.05 Ω

* The Callendar-Van Dusen linearization equation can be used with user defined Pt RTDs.
Refer to Recommended I/O Practices in DeltaV Books online for usage information.

Specifications for Thermocouple/mV Input Card, 8 channel	
Channels per card	8
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	Degrees C Degrees 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 1500 VDC. Channels 1, 2, 3, and 4 are isolated from channels 5, 6, 7, and 8 (verified by 1500 VDC factory test). Thermocouples attached to channels 1, 2, 3, and 4 are not electrically isolated and should be within ± 0.7 VDC of each other. Thermocouples attached to channels 5, 6, 7, and 8 are not electrically isolated and should be within ± 0.7 VDC of each other.
Common mode rejection	120 dB at DC/50/60 Hz
Common mode impedance	> 10 megohms
Normal mode rejection	60 dB at 60 Hz
Roll off frequency Thermocouple mV	-3 dB at 3 Hz, -25 dB at 30 Hz –100 dB at 50/60 Hz, -200 dB at ½ the sample frequency -25 dB at 50/60 Hz, -20 dB at ½ the sample frequency
LocalBus current (12 VDC nominal)	210 mA
Open sensor detection	Yes (< 70 nA)
Open sensor detection time	10 second

Thermocouple Sensor Type Specifications					
Sensor Type	Full Scale	Operating Range	25° 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

mV Sensor Type Specifications					
Sensor Type	**Full Scale**	**Operating Range**	**25° 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°

Specifications for Isolated Input Card,4 channel[4]	
Number of channels	4
Isolation CAN/CSA-C22.2 No.1010.1-92[5]	Installation Cat II, Pollution degree 2 Channel to system - 600 VAC double insulation. Each channel is optically isolated from the system and factory tested to 5000 VDC. Channel to channel - 600 V basic insulation. Each channel is optically isolated from each other and factory tested to 3100 VDC.
Dielectric strength	Channel to system - 3700 V RMS Channel to channel - 2200 V RMS
ADC Resolution	16 bit
-3dB Filter Frequency	2.7 Hz
DC/50/60 Hz Common Mode Rejection	120 dB
Input Impedance	10 Megaohms
Thermocouple Sensor Types	B, E, J, K, N, R, S, T, Uncharacterized
RTD Sensor Types	PT100, PT200, Ni120, Cu10, Resistance/User Defined
mV and V ranges	Refer to following tables.
Input type mix	Independently configurable
Ambient temperature	-40° to 70°C
Calibration	None required
Mounting	Assigned slot of I/O carrier
LocalBus power rating	12 VDC, 350 mA, no field power required

Isolated Input Card, Thermocouple and MilliVolt Input Specifications

Item	Specification
Linearization error	±0.003% full scale
Cold Junction Compensation Accuracy	±1.0°C
Cold Junction Compensation types	Off, local, remote
Cold Junction Compensation range	-40 to 85°C
Temperature scale	ITS90
Open circuit detection (Thermocouple only)	0.4 µA DC
Detection time	1 second

[4] DeltaV version 7.3 is required for this card.
[5] **Warning**: When hazardous live voltages are present on a channel, adjacent channel wiring must be inaccessible.

Isolated Input Thermocouple Sensor Type Specifications					
Sensor Types	25°C Reference Accuracy	Temperature Drift	Nominal Resolution	Full Scale	Operating Range
B	± 1.2°C	± 0.116°C/ °C	0.09°C	250 to 1810°C	500 to 1810°C
E	± 0.5°C	± 0.004°C/ °C	0.05°C	-200 to 1000°C	-200 to 1000°C
J	± 0.6°C	± 0.005°C/ °C	0.06°C	-210 to 1200°C	-190 to 1200°C
K	± 0.5°C	± 013°C/ °C	0.05°C	-270 to 1372°C	-140 to 1372°C
N	± 1.0°C	± 015°C/ °C	0.05°C	-270 to 1300°C	-190 to 1300°C
R	± 1.7°C	± 083°C/ °C	0.06°C	-50 to 1768°C	0 to 1768°C
S	± 1.8°C	± 095°C/ °C	0.08°C	-50 to 1768°C	0 to 1768°C
T	± 0.7°C	± 025°C/ °C	0.04°C	-270 to 400°C	-200 to 400°C
Uncharacterized no linearization or CJC	± 0.05 mV	± 0.0003 mV/ °C	0.0031 mV	-100 to 100 mV	-100 to 100 mV

Isolated Input Millivolt Input Range Specifications				
Sensor Type	**Input Ranges**	**25 C° Reference Accuracy**	**Temperature Drift**	**Maximum Resolution**
20 mV Source	±20 mV	±0.02 mV	±0.001 mV/**°C**	0.0008 mV
50 mV Source	±50 mV	±0.03 mV	±0.0005 mV/**°C**	0.0017 mV
100mV Source	±100 mV	±0.05 mV	±0.0003 mV/**°C**	0.0031 mV

Isolated Input Card, RTD, ohms Input Specifications

Item	Specification
Measurement configurations	2, 3, and 4 wire
Excitation current	100 µA DC
Temperature scale	ITS90
Open sensor detection time	1 second
Short circuit detection time	1 second
Pt 100 and Pt 200 alpha	0.00385

Isolated Input Card, RTD, ohms Input Range Specifications

Sensor Type	25°C Reference Accuracy	Temperature Drift	Resolution	Sensor Input Range
Pt100	± 0.5°C	± 0.018 °C/°C	0.05 °C	-200 to 850 °C
Pt200	± 0.5°C	± 0.012 °C/°C	0.05 °C	-200 to 850 °C
Ni120	± 0.2°C	± 0.006 °C/°C	0.02 °C	-70 to 300 °C
Cu10	± 2.0°C	± 0.076 °C/°C	0.23 °C	-30 to 140 °C
Resistance	± 0.5 ohms	± 0.018 ohms/°C	0.02 ohms	1 to 1000 ohms
User Defined*	± 0.4 ohms	± 0.009 ohms/°C	~0.05 ohms	0 to 1000 ohms

* The Callendar-Van Dusen linearization equation can be used with user defined Pt RTDs. Refer to Recommended I/O Practices in DeltaV Books online for usage information.

Isolated Input Card, Voltage Input Range Specifications

Sensor Type	Sensor Range	25°C Reference Accuracy	Temperature Drift	Maximum Resolution
0 - 5 V	0 - 5 V	± 0.005 V	± 0.0002 V/°C	0.00009 V
0 - 10 V	0 - 10 V	± 0.010 V	± 0.0004 V/°C	0.00016 V
1 - 5 V	1 - 5 V	± 0.0005 V	± 0.0002 V/°C	0.00009 V
1 V	+/- 1 V	± 0.0025 V	± 0.0002 V/°C	0.00015 V
5 V	+/- 5 V	± 0.005 V	± 0.0002 V/°C	0.00017 V
10 V	+/- 10 V	± 0.010 V	± 0.0004 V/°C	0.0003 V

Analog Output I/O Cards

Specifications for HART AO Card, 8 channel, 4 to 20 mA	
Number of channels	8
Isolation	Each channel is optically isolated from the system and factory tested to 1500 VDC.
Nominal signal range (span)	4 to 20 mA
Full signal range	1 to 23 mA
LocalBus current (12 VDC nominal) per card	100 mA typical, 150 mA maximum
Field circuit power per card	300 mA maximum @ 24 VDC (+/-10%)
Accuracy over temperature range	0.25% of span
Resolution	12 bits
Output compliance	20 mA at 21.6 VDC supply into 700 Ω load
Calibration	Information stored on card.
Optional fuse	2.0 A
Field wiring	2-wire—non-incendive 2-wire—nL

Discrete Input I/O Cards

Specifications for DI Card, 8 channel, 24 VDC, Dry Contact	
Number of channels	8
Isolation	Each channel is optically isolated from the system and factory tested to 1500 VDC.
Detection level for On	> 2.2 mA
Detection level for Off	< 1 mA
Input Impedance	5 KΩ (approximate)
LocalBus current (12 VDC nominal) per card	75 mA typical, 100 mA maximum
Field circuit power per card	40 mA at 24 VDC
Optional fuse	2.0 A
Field wiring	2-wire—non-incendive -2-wire—nL

Specifications for DI Card, 8 channel, 24 VDC, Isolated	
Number of channels	8
Isolation	Each channel is optically isolated from the system and from each other and factory tested to 1500 VDC.
Detection level for On	> 10 VDC
Detection level for Off	< 5 VDC
Input Impedance	5 mA at 24 V
LocalBus current (12 VDC nominal) per card	75 mA typical, 100 mA maximum
Field circuit power per card	None
Optional fuse	2.0 A
Field wiring	2-wire—non-arcing 2-wire—nA

Specifications for DI Card, 32 channel, 24 VDC, Dry Contact	
Number of channels	32
Isolation	Each channel is optically isolated from the system and factory tested to 1500 VDC.
Detection level for On	> 2 mA
Detection level for Off	< 0.25 mA
Input Impedance	5K ohm (approximate)
LocalBus current (12 VDC nominal) per card	50 mA typical, 75 mA maximum
Field circuit power per card	150 mA at 24 VDC
Return	Uses common return
Terminal block	32-screw termination block
Field wiring	2-wire—non-arcing[6] 2-wire—nA[7]

Specifications for DI Card, 8 channel, 120 VAC, Isolated	
Number of channels	8
Isolation	Each channel is optically isolated from the system at 250 VAC and from other channels at 250 VAC.
Detection level for On	84 to 130 VAC
Detection level for Off	0 to 34 VAC
Input load (contact cleaning)	2 mA at 120 VAC
Input Impedance	60 KΩ
LocalBus current (12 VDC nominal) per card	75 mA typical, 100 mA maximum
Field circuit power per card	None
Optional fuse	2.0 A
Field wiring	2-wire—non-arcing

[6] Non-arcing field circuits are designed so that ignition does not occur during normal operation.
[7] Non-sparking circuits (-nA) are designed to minimize the risk of occurrence of arcs, sparks, or hot spots capable of creating ignition hazards during normal operation. Normal operation excludes the removal or insertion of field wiring with circuits energized.

Specifications for DI Card, 8 channel, 120 VAC, Dry Contact	
Number of channels	8
Isolation	Each channel is optically isolated from the system at 250 VAC
Detection level for On	> 1.4 mA
Detection level for Off	< 0.56 mA
Input Impedance	60 KΩ
LocalBus current (12 VDC nominal) per card	75 mA typical, 100 mA maximum
Field circuit power per card	15 mA at 120 VAC
Optional fuse	2.0 A
Field wiring	2-wire—non-arcing

Specifications for PCI Card, 4 channel, 24 VDC, Dry Contact	
Number of channels	4
Detection level for ON (min.)	>4.8 VDC (>5 mA)
Detection level for OFF (max.)	<1.0 VDC (< 1 mA)
Input Impedance	25 mA at 24 VDC (960 Ohms)
Input accuracy	0.1% reading (over 0.1 Hz to 50 kHz)
Resolution	+/- 1 pulse
Minimum pulse width	10 μS
Maximum input voltage	24 VDC +20%
Resolution counter	32 BITS
Input frequency	Sine wave 10 Hz to 50kHz Square wave 0.1 Hz to 50 kHz
Wetting Voltage	24 VDC
LocalBus current (12 VDC nominal)	150 mA maximum
Field circuit power per card	25 mA at 24 VDC (1 A resettable fuse)
Isolation	Each channel is optically isolated from the system at 250 VAC and from other channels at 100 VAC.
Field wiring	2-wire—non-arcing

Specifications for SOE Card, 16 channel, 24 VDC, Dry Contact

Number of channels	16
Detection level for On	> 2 mA
Detection level for Off	< 0.25 mA
Input Impedance	5K ohm (approximate)
Wetting Voltage	24 VDC
Channel Scan Rate	0.25 msec for all 16 channels
Time Stamp Accuracy (for SOE enabled channels only)8	0.25 msec from same card 1 msec from same controller
LocalBus current (12 VDC nominal)	75 mA typical, 100 mA maximum
Field circuit power per card	75 mA at 24 VDC
Isolation	Each channel is optically isolated from the system and factory tested to 1500 VDC.
Field wiring	2-wire—non-arcing

[8] Refer to Sequence of Event Product Data Sheet for more information on System capabilities and Sequence of Event data collection.

Discrete Output I/O Cards

Specifications for DO Card, 8 channel, 24 VDC, Isolated	
Number of channels	8
Isolation	Each channel is optically isolated from the system and from each other and factory tested to 1500 VDC.
Output range	2 VDC to 60 VDC
Output rating	1.0 A
Off state leakage	1.2 mA maximum
LocalBus current (12 VDC nominal) per card	100 mA typical, 150 mA maximum
Field circuit power per card	None
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
Field wiring	2-wire—non-arcing 2-wire—nA

Specifications for DO Card, 8 channel, 24 VDC, High Side	
Number of channels	8
Isolation	Each channel is optically isolated from the system and factory tested to 1500 VDC.
Output range	2 VDC to 60 VDC
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 (12 VDC nominal) per card	100 mA typical, 150 mA maximum
Field circuit power per card	3.0 A at 24 VDC 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
Field wiring	2-wire—non-arcing 2-wire—nA

Specifications for DO Card, 32 channel, 24 VDC, High Side	
Number of channels	32
Isolation	Each channel is optically isolated from the system and factory tested to 1500 VDC.
Output range	24 VDC ± 10%
Output rating	100 mA per channel
Off-state leakage	0.1 mA maximum
LocalBus current (12 VDC nominal) per card	100 mA typical, 150 mA maximum
Field circuit power per card	3.2 A at 24 VDC per I/O interface
Return	Uses common return
Terminal block	32-screw termination block
Field wiring	2-wire—non-arcing 2-wire—-nA

Specifications for DO Card, 8 channel, 120/230 VAC, Isolated	
Number of channels	8
Isolation	Each channel is optically isolated from system at 250 VAC and from other channels at 250 VAC
Output range	20 to 250 VAC
Output rating	1.0 A continuous per channel; 2.0 A maximum per card up to 60 C° (140 F°) 3.0 A maximum per card up to 50 C° (122 F°)
Off state leakage	2 mA maximum at 120 VAC 4 mA maximum at 230 VAC
LocalBus current (12 VDC nominal) per card	100 mA typical,150 mA maximum
Field circuit power per card	None
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
Field wiring	2-wire—non-arcing

Specifications for DO Card, 8 channel, 120/230 VAC, High Side[9]	
Number of channels	8
Isolation	Each channel is optically isolated from the system at 250 VAC
Output range	20 to 250 VAC
Output rating	1.0 A continuous per channel; 2.0 A maximum per card up to 60 C° (140 F°) 3.0 A maximum per card up to 50 C° (122 F°)
Off state leakage	2 mA maximum at 120 VAC 4 mA maximum at 230 VAC
LocalBus current (12 VDC nominal) per card	100 mA typical, 150 mA maximum
Field circuit power per card	3.0 A at 120 VAC or 230 VAC
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
Field wiring	2-wire—T4 non-arcing

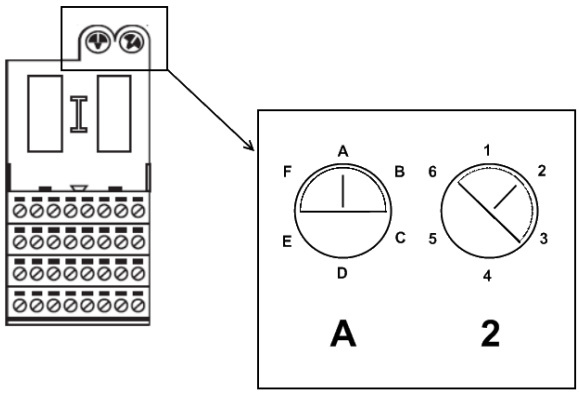
I/O Terminal Blocks

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.

[9] *High-side means the output signal is switched on the positive leg. Switching on the positive leg avoids current in field wiring when there is no output signal.*

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 8 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
- AI 16-channel Terminal Block
- 4-wire AI 16-channel Terminal Block
- Discrete 32-Channel Terminal Block
- Isolated Input 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 AO 8-Channel Terminal Block
- Redundant Discrete 8-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 Termination blocks that allow these cards to be connected to M-Series Mass Connection Solution or to third party wiring solution, mounted in an adjacent cabinet in order to meet special signal conditioning or for optimizing field wiring solutions. Please refer to the PDS M-series Mass Connection Solution or to the Alliance Program website for details on approved 3rd party products.

- 10-pin Mass Termination Block
- 16-pin Mass Termination Block
- 24-pin Mass Termination Block
- 40-pin Mass Termination Block

Traditional I/O and terminal block compatibility:

I/O Card	I/O Card Keying	Traditional I/O Terminal Blocks	Mass Terminal 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, 16-channel, 4-20 mA HART (Simplex mode)	A2	AI 16-Channel Terminal Block 4-wire AI 16-Channel Terminal Block	NA
AO, 8-channel,4–20 mA, HART	A4	I/O Terminal Block Fused Terminal Block	16-pin Mass Termination Block
Thermocouple, mV	C1	I/O Terminal Block Cold Junction Compensated (CJC) Termination Block	NA
RTD, 8-channel	C3	Resistant Temperature Device (RTD) Termination Block	NA
Isolated Input Card	C2	Isolated Input Terminal Block	NA
DI, 8-channel, 24 VDC, dry contact	B1	I/O Terminal Block Fused Terminal Block	16-pin Mass Termination Block
DI, 8-channel, 24 VDC, Isolated	B2	I/O Terminal Block Fused Terminal Block	16-pin Mass Termination Block
DI, 32-channel, 24 VDC dry contact	B3	32-Channel Terminal Block	40-pin Mass Termination Block
PCI, 4-channel	C6	32-Channel Terminal Block	NA
SOE, 16-channel,24 VDC	C5	32-Channel Terminal Block	40-pin Mass Termination Block
DO, 8-channel, 24 VDC, High Side	B6	I/O Terminal Block Fused Terminal Block	10-pin Mass Termination Block 16-pin Mass Termination Block
DO, 8-channel, 24 VDC, isolated	B5	I/O Terminal Block Fused Terminal Block	16-pin Mass Termination Block
DO, 32-channel, 24 VDC high-side	B4	32-Channel Terminal Block	40-pin Mass Termination Block
DI, 8-channel, 120 VAC, dry contact	E1	I/O Terminal Block Fused Terminal Block	NA
DI, 8-channel, 120 VAC, isolated	E4	I/O Terminal Block Fused Terminal Block	NA
DO, 8-channel, 120 VAC/ 230 VAC, high side	F1	I/O Terminal Block Fused Terminal Block	NA
DO, 8-channel, 120 VAC/ 230 VAC, isolated	F4	I/O Terminal Block Fused Terminal Block	NA

Certifications

The following certifications are available for M-series Traditional I/O:

- **CE:**

  - EMC- EN 61326-3-1:2006
  - LVD: Directive 2006/95/EC Aug 2007

- **FM:**

  - FM 3600, Dec. 2011
  - FM 3611, Dec. 2004
  - FM 3810, Jan 2005
  - ANSI/ISA 60079-0, Oct 2009
  - ANSI/ISA 60079-15, Jul 2009

- **CSA:**

  - CSA C22.2 No. 213-M1987, 1987 (Reaffirmed 2008)
  - CSA C22.2 No. 61010-1, 2004 (Reaffirmed 2009)
    CAN/CSA-E60079-0, 2007
  - CAN/CSA-E60079-15, March 2002 (Reaffirmed 2006)

- **ATEX:**

  - ATEX 94/9/EC
  - EN60079-0: 2009
  - EN60079-15:2005
  - EN60079-15:2010

- **IEC-Ex:**

  - IEC60079-0:2007
  - IEC60079-15:2005
  - IEC60079-15:2010

- **Marine Certifications:**

  IACS E10:2006 Rev.5 Control, Protection & Safety; DNV 2.4:2006

  - ABS Certificate of Design Assessment
  - Bureau Veritas Certificate
  - DNV Marine Certificate
  - Lloyds Register

- **GOST Hazardous Area certification Zone 2 (Russian)**

  - РОСС US.ГБ05.В03564

Certifications

M-series Traditional I/O Cards will be submitted for the following certifications:

- **EAC Hazardous Area certification Zone 2 (Russian, Belarus, Kazakhstan)**

Hazardous Area/Location:

M-series Traditional I/O Cards can be installed and used based on the following Standards:

- **FM (USA):**

Installation and Field Circuits:
Class I, Division 2, Groups A, B, C, D, T4

- **cFM (Canada):**

Installation and Field Circuits:
Class I, Division 2, Groups A, B, C, D, T4

- **ATEX:**

Installation and Field Circuits:

Ex nA IIC T4 Gc
Ex nA [nL] IIC T4 Gc
Ex nA [ic] IIC T4 Gc
Ex nA nC IIC T4 Gc

- **IEC-Ex:**

Installation and Field Circuits:
Ex nA IIC T4 Gc
Ex nA nL IIC T4 Gc
Ex nA ic IIC T4 Gc
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

Additional Field Circuit Certification Information

DC Voltage Traditional I/O Card Description	Class I Division II Non Incendive	Zone 2 Ex nL Certified	Zone 2 Ex ic Certified	Zone 2 Ex nA Certified
AI, 8 Channels 4-20 mA, HART	✓	✓	✓	✓
AI, 16 Channels 4-20 mA, HART	✓	✓	✓	✓
RTD/Resistance, 8 Channels	✓	✓	–	✓
TC/mV, 8 Channels	✓	✓	✓	✓
TC/mV/V/RTD Isolated, 4 Channels	✓	✓	–	✓
AO, 8 Channels 4-20 mA, HART	✓	✓	–	✓
DI, 8 Channels, 24VDC, Dry Contact	✓	✓	–	✓
DI, 8 Channels, 24VDC, Isolated	–	–	–	✓
DI, 32 Channels, 24 VDC, Dry Contact	–	–	–	✓
PCI, 4 Channels, 24 VDC Dry Contact	–	–	–	✓
SOE, 16 Channels, 24 VDC, Dry Contact	–	–	–	✓
DO, 8 Channels 24VDC, High-Side	–	–	–	✓
DO, 8 Channels 24VDC, Isolated	–	–	–	✓
DO, 32 Channels, 24VDC, High-Side	–	–	–	✓
AC Voltage Traditional I/O Card Description	**Class I Division II Non Incendive**	**Zone 2 Ex nL Certified**	**Zone 2 Ex ic Certified**	**Zone 2 Ex nA Certified**
DI, 8 Channels, 120VAC, Isolated	–	–	–	–
DI, 8 Channels, 120VAC, Dry Contact	–	–	–	–
DO, 8 Channels 120/230VAC, Isolated	–	–	–	–
DO, 8 Channels 120/230VAC, High-Side	–	–	–	–

System Compatibility

- M-series Traditional I/O cards are not physically compatible with S-series controller carriers

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	
Standard I/O Termination Block	VE4003S2B6
4-wire I/O Termination Block	VE4003S2B7
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
Isolated Input Card	
Isolated Input terminal Block	VE4003S7B1

Analog Output Cards and Termination Blocks	
Description	**Model Number**
Analog Output Card: 8 Channels 4-20 mA, HART	
Standard I/O Termination Block	VE4005S2B1
Redundant Standard I/O Termination Block	VE4035S2B1
Fused I/O Termination Block	VE4005S2B2
16-Pin Mass Termination Block	VE4005S2B3

Discrete Input Cards and Termination Blocks	
Description	**Model Number**
Discrete Input Card: 8 Channels, 24Vdc, Isolated	
Standard I/O Termination Block	VE4001S2T1B1
Fused I/O Termination Block	VE4001S2T1B2
16-Pin Mass Termination Block	VE4001S2T1B3
Discrete Input Card: 8 Channels, 24Vdc, Dry Contact	
Standard I/O Termination Block	VE4001S2T2B1
Redundant Standard I/O Termination Block	VE4031S2T2B1
Fused I/O Termination Block	VE4001S2T2B2
16-Pin Mass Termination Block	VE4001S2T2B3
Discrete Input Card: 32 Channels, 24 Vdc, Dry Contact	
Standard Termination Block	VE4001S2T2B4
40-pin Mass Termination Block	VE4001S2T2B5
40-pin Mass Termination Block and 2 x **16 Channel DI MASS CONNECTION BOARDs***	VE4051S2T2B5
Discrete Input Card: 8 Channels, 120Vac, Isolated	
Standard I/O Termination Block	VE4001S3T1B1
Fused I/O Termination Block	VE4001S3T1B2
Discrete Input Card: 8 Channels, 120Vac, Dry Contact	
Standard I/O Termination Block	VE4001S3T2B1
Fused I/O Termination Block	VE4001S3T2B2
Pulse Count Input Card: 4-Channels, 24 Vdc, Dry Contact	
Discrete 32 Channel Terminal Block	VE4015
Sequence of Event Input Card: 16 Channels, 24 Vdc Dry Contact	
Discrete 32-Channel Terminal Block	VE4001S5T2B4
40-pin Mass Terminal Block	VE4001S5T2B5

* For more Details on the DI Mass Connection Board and Connection cables, please refere to the PDS M-series Mass Connection Solution

Discrete Output Cards and Termination Blocks	
Description	**Model Number**
Discrete Output Card: 8 Channels 24Vdc, Isolated	
Standard I/O Termination Block	VE4002S1T1B1
Fused I/O Termination Block	VE4002S1T1B2
16-Pin Mass Termination Block	VE4002S1T1B3
Discrete Output Card: 8 Channels 24Vdc, 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 Card, 32 Channels, 24Vdc, High Side	
Standard I/O Termination Block	VE4002S1T2B5
40-Pin Mass Termination Block	VE4002S1T2B6
40-pin Mass Termination Block and 2 x **16 Channel DO MASS CONNECTION BOARDs***	VE4052S1T2B6
Discrete Output Card: 8 Channels 115/230Vac, Isolated	
Standard I/O Termination Block	VE4002S2T1B1
Fused I/O Termination Block	VE4002S2T1B2
Discrete Output Card: 8 Channels 115/230Vac, High Side	
Standard I/O Termination Block	VE4002S2T2B1
Fused I/O Termination Block	VE4002S2T2B2

* For more Details on the DO Mass Connection Board and Connection cables, please refere to the PDS M-series Mass Connection Solution

Spare part ordering Information

Spare Parts	
Description	**Model Number**
250V 2A Fuse for Fused Terminal Block; Box of 20	KJ4010X1-BC1

To locate a sales office near you, visit our website at:
www.EmersonProcess.com/DeltaV
Or call us at:
Asia Pacific: 65.6777.8211
Europe, Middle East: 41.41.768.6111
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