

# 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.

- AI Isolated, 4 channels
- 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.

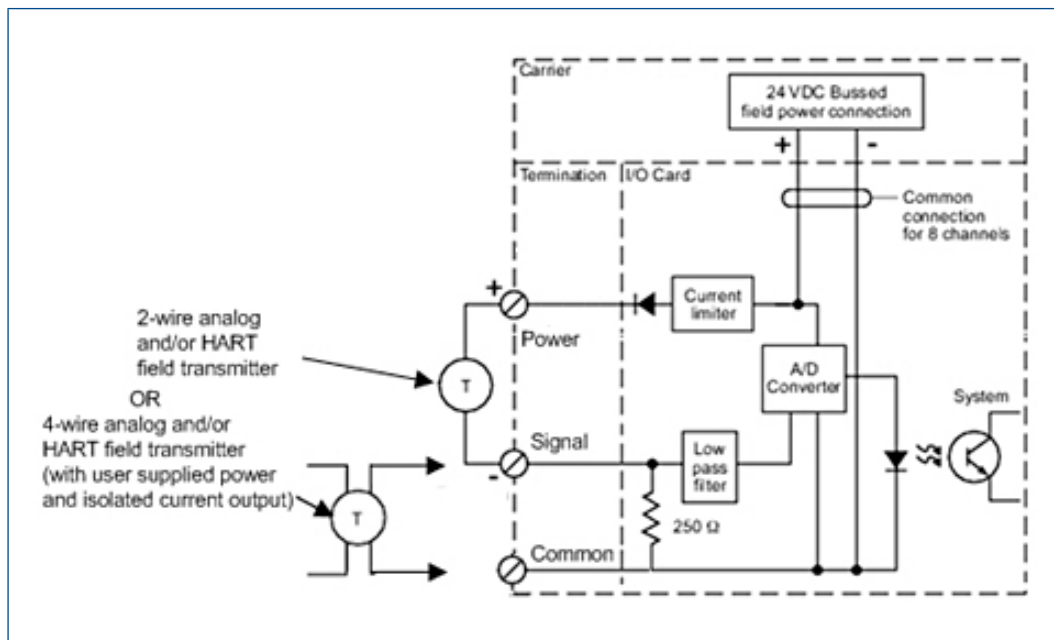
## Hardware Specifications

| 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<br>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;<br>0.5 g from 16 to 150 Hz        |
| Dimensions   | H 10.7 cm (4.2 in.)<br>W 4.1 cm (1.6 in.)<br>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.

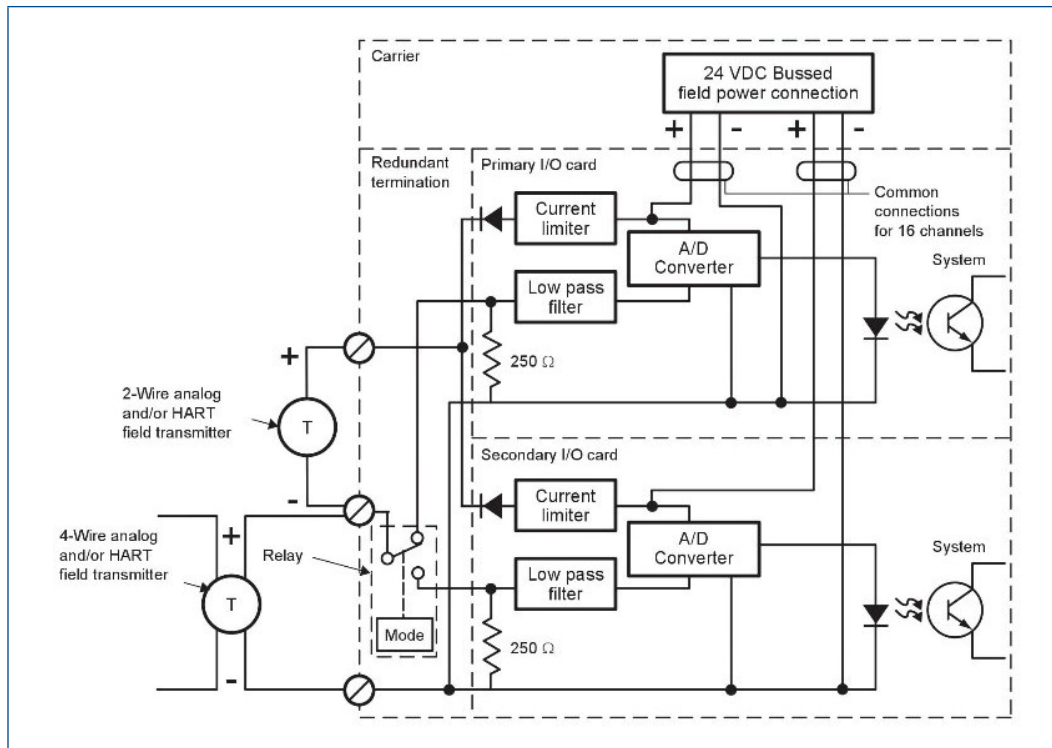
## Analog Input I/O Cards

| Specifications for HART AI-Card, 8-channel, 4 to 20 mA |  |
|--|--|
| Number of Channels                                     | Eight  |
| Isolation  | Each channel is optically isolated from the system and factory tested to 1500V DC.                         |
| Nominal Signal Range (span)                            | 4 to 20 mA   |
| Full Signal Range                                      | 1 to 22.5 mA, with over range checking   |
| LocalBus Current (12V DC nominal) per Card             | Simplex: 120 mA typical, 150 mA maximum<br>Redundant: 175 mA typical, 250 mA maximum (per card)            |
| Field Circuit Power per Card                           | 300 mA maximum at 24V DC (+10%)  |
| Accuracy Over Temperature Range                        | 0.1% of span   |
| Resolution   | 16-bits A/D converter  |
| 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 for AMS Device Manager Field device variable and status reporting for control functions. |
| Hart Scan Time   | 600 – 800 ms (typical) per enabled channel   |



Simplified circuit and connection diagram for simplex AI card, 8-channel, 4 to 20 mA, HART.

| Specifications for AI (Plus) Card, 16-channel, 4 to 20 mA, HART |  |
|---|--|
| Number of Channels  | 16   |
| Input Sensor Types  | 4 to 20 mA (span), 2-wire  |
| Full Signal Range   | 2 to 22 mA, with over range checking   |
| Transmitter Power   | 13.5 V minimum at 20 mA (max current limited at 29 mA)   |
| Accuracy Over Temperature Range                                 | 0.2% of span   |
| Repeatability   | 0.05% of span  |
| Resolution  | 16-bit A/D converter   |
| Roll-off Frequency (Anti-aliasing)                              | -3 dB at 2.7 Hz; -20.5 dB at 20 Hz   |
| Calibration   | None required  |
| Local Bus Current per Card (12V DC nominal)                     | Simplex: 85 mA typical, 150 mA maximum<br>Redundant: 110 mA typical, 200 mA maximum                    |
| Field Circuit Power per Card                                    | 500 mA maximum @ 24V DC (+/-10%)   |
| Isolation   | Each channel is optically isolated from the system and factory tested to 1000V DC.                     |
| HART Communications Support                                     | HART pass-through for AMS Device Manager.<br>HART variable and status reporting for control functions. |
| Hart Scan Time  | 600 – 800 mS (typical) per enabled channel   |

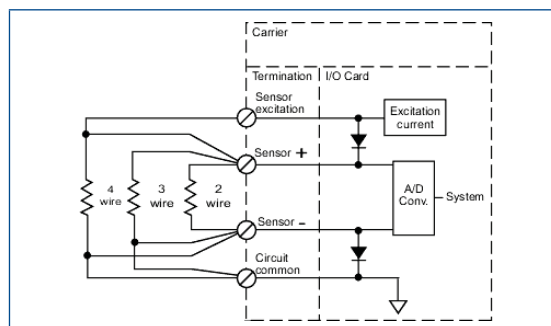


Simplified circuit and connection diagram for redundant AI Plus card, 16-channel, 4 to 20 mA, HART.

| Specifications for RTD Input Card, 8-channel |  |
|--|--|
| RTD Channels per Card                        | Eight  |
| 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 below  |
| Accuracy                                     | See Table below  |
| Repeatability                                | 0.05% of span  |
| A/D Resolution                               | 16-bit   |
| Calibration                                  | None required  |
| Units  | °C, °F   |
| Sensor Excitation Current                    | 100 $\mu$ A  |
| Common Mode Rejection                        | 120 dB at 50/60 Hz   |
| Common Mode Impedance                        | > 10 mega ohms   |
| LocalBus Current (12V DC nominal)            | 160 mA   |
| Open Sensor Detection Time                   | 1 second   |
| Open mV Lead Detection Time                  | 15 seconds   |

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

\*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.



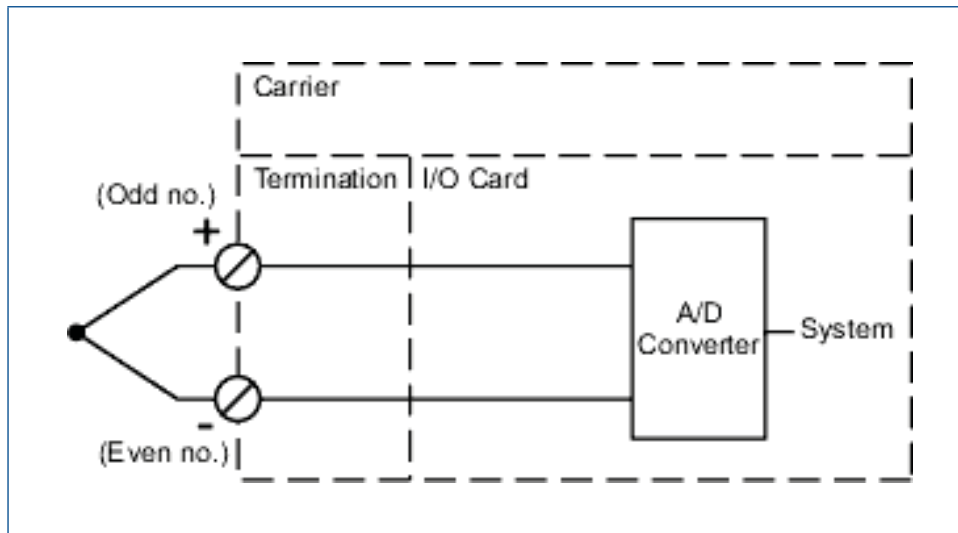
Simplified circuit diagram for RTD Input card, 8 channels.

| 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<br>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<br>(Not available on mV channels) | Local: Integrally mounted in terminal block<br>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.<br>Channels 1, 2, 3, and 4 are isolated from channels 5, 6, 7, and 8 (verified by 1500V DC factory test).<br>Thermocouples attached to channels 1, 2, 3, and 4 are not electrically isolated and should be within + 0.7V DC of each other.<br>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.

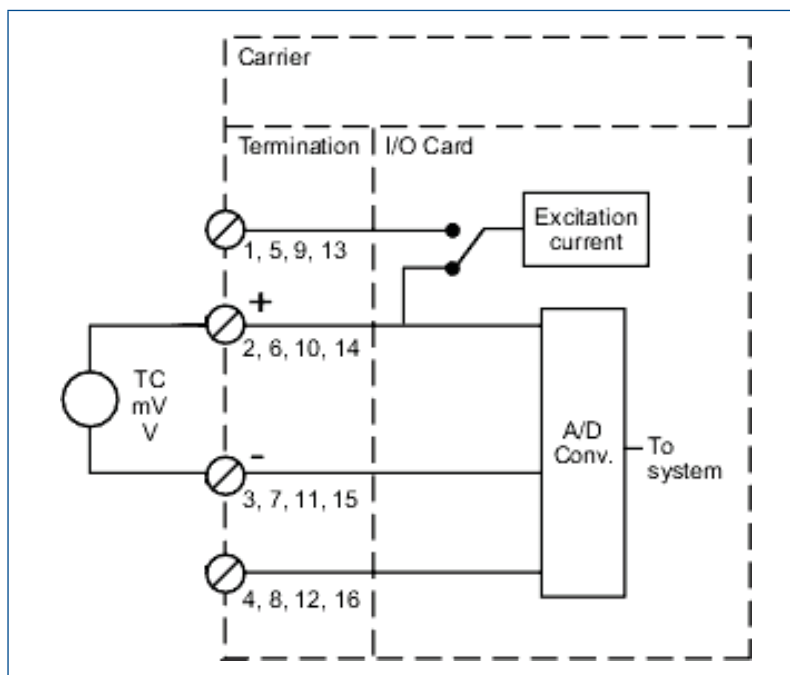
| Specifications for Isolated Input Card, 4-channel |  |
|---|--|
| Number of Channels                                | 4  |
| Isolation CAN/CSA-C22.2 No.1010.1-92              | Installation Cat II, Pollution degree 2<br>Channel-to-system - 600V AC double insulation.<br>Each channel is optically isolated from the system and factory tested to 5000V DC.<br>Channel-to-channel - 600V basic insulation.<br>Each channel is optically isolated from each other and factory tested to 3100V DC. |
| Dielectric Strength                               | Channel-to-system - 3700V RMS<br>Channel-to-channel - 2200V 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                             | 12V DC, 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           |

| Thermocouple Sensor Type Specifications |                         |                   |                    |                |                 |
|---|-------------------------|-------------------|--------------------|----------------|-----------------|
| Sensor Type                             | 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                  | ±0.013°C/°C       | 0.05°C             | -270 to 1372°C | -140 to 1372°C  |
| N                                       | ±1.0°C                  | ±0.015°C/°C       | 0.05°C             | -270 to 1300°C | -190 to 1300°C  |
| R                                       | ±1.7°C                  | ±0.083°C/°C       | 0.06°C             | -50 to 1768°C  | 0 to 1768°C     |
| S                                       | ±1.8°C                  | ±0.095°C/°C       | 0.08°C             | -50 to 1768°C  | 0 to 1768°C     |
| T                                       | ±0.7°C                  | ±0.025°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          |



Simplified circuit diagram of Isolated Input card, Thermocouple, mV, V, 4 channels.

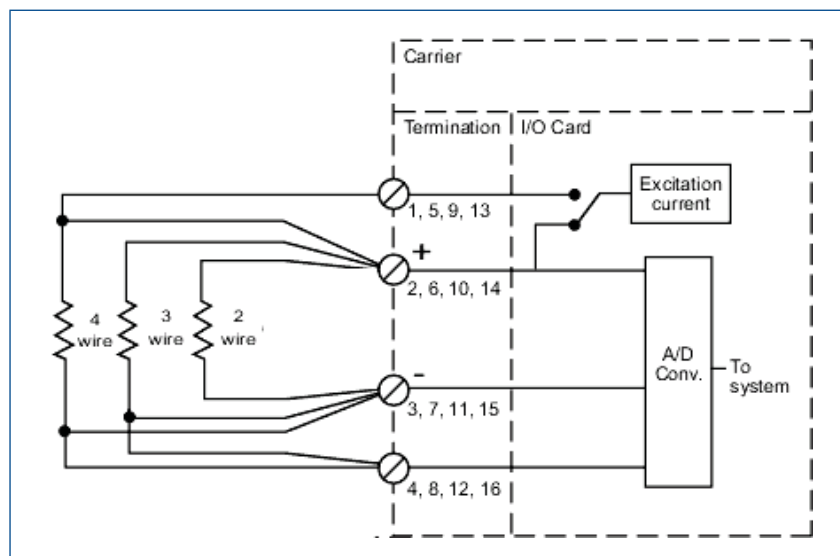
### Isolated Input Card, RTD, ohms Input Specifications

| Item                         | Specification    |
|------------------------------|------------------|
| Measurement Configurations   | 2, 3, and 4 wire |
| Excitation Current           | 100 $\mu$ A DC   |
| Temperature Scale            | ITS90            |
| Open Sensor Detection Time   | 1 second         |
| Short Circuit Detection Time | 1 second         |
| Pt 100 and Pt 200 Alpha      | 0.00385          |
| Detection Time               | 1 second         |

### Isolated Input Card, RTD, ohms Input Specifications

| Sensor Type   | 25°C Reference Accuracy | Temperature Drift                        | Resolution           | Sensor Input Range          |
|---------------|-------------------------|--|----------------------|-----------------------------|
| Pt100         | $\pm 0.5^\circ\text{C}$ | $\pm 0.018^\circ\text{C}/^\circ\text{C}$ | $0.05^\circ\text{C}$ | -200 to $850^\circ\text{C}$ |
| Pt200         | $\pm 0.5^\circ\text{C}$ | $\pm 0.012^\circ\text{C}/^\circ\text{C}$ | $0.05^\circ\text{C}$ | -200 to $850^\circ\text{C}$ |
| Ni120         | $\pm 0.2^\circ\text{C}$ | $\pm 0.006^\circ\text{C}/^\circ\text{C}$ | $0.02^\circ\text{C}$ | -70 to $300^\circ\text{C}$  |
| Cu10          | $\pm 2.0^\circ\text{C}$ | $\pm 0.076^\circ\text{C}/^\circ\text{C}$ | $0.23^\circ\text{C}$ | -30 to $140^\circ\text{C}$  |
| Resistance    | $\pm 0.5$ ohms          | $\pm 0.018$ ohms/ $^\circ\text{C}$       | 0.02 ohms            | 1 to 1000 ohms              |
| User Defined* | $\pm 0.4$ ohms          | $\pm 0.009$ ohms/ $^\circ\text{C}$       | $\sim 0.05$ 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.



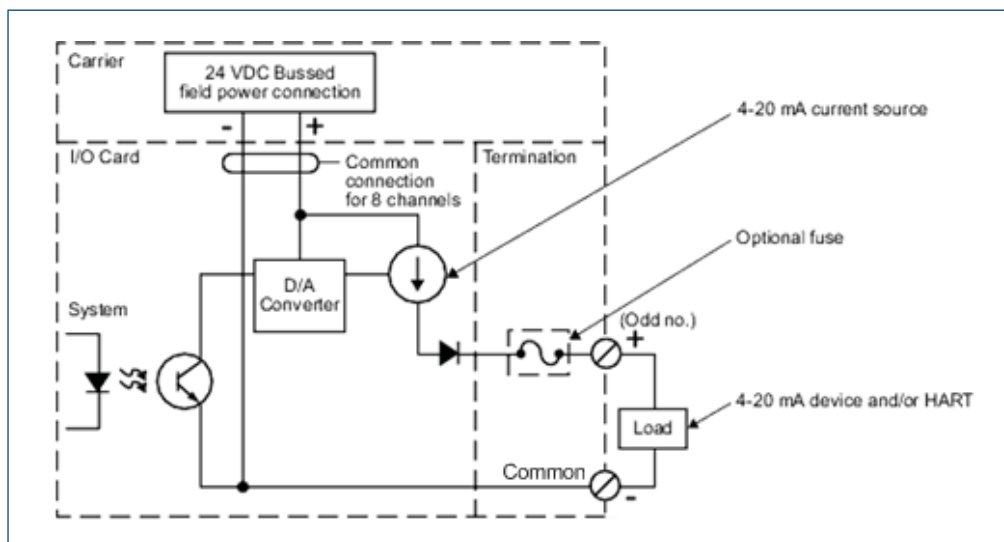
Simplified circuit diagram of Isolated Input card, RTD, 4 channels.

### Isolated Input Card, Voltage Input Range Specifications

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

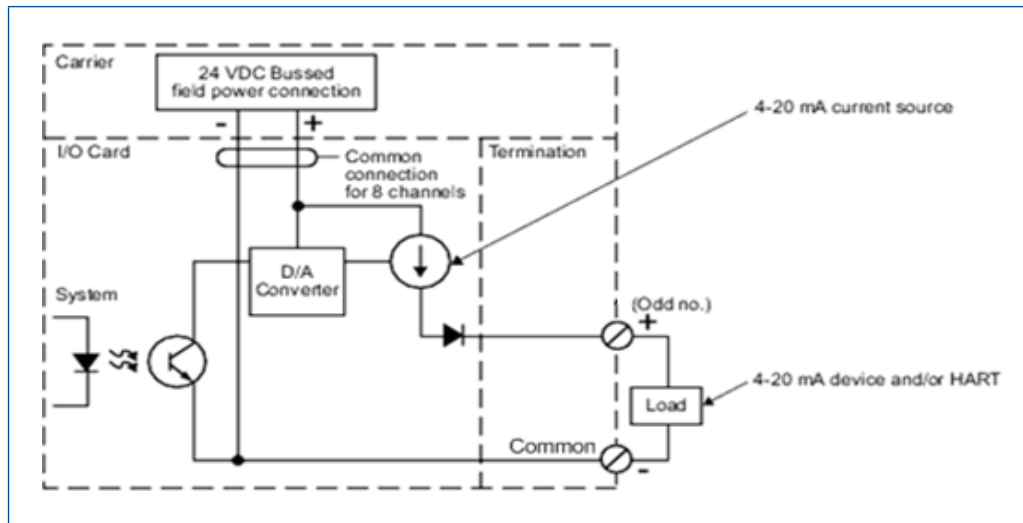
### Analog Output I/O Cards

| Item                                       | Specification  |
|--|--|
| Number of Channels                         | Eight  |
| Isolation                                  | Each channel is optically isolated from the system and factory tested to 1500V DC. |
| Nominal Signal Range (span)                | 4 to 20 mA   |
| Full Signal Range                          | 1 to 23 mA   |
| LocalBus Current (12V DC nominal) per Card | 100 mA typical, 150 mA maximum   |
| Field Circuit Power per Card               | 300 mA maximum @ 24V DC (+/-10%)   |
| Accuracy Over Temperature Range            | 0.25% of span  |
| Resolution                                 | 12-bit   |
| Output Compliance                          | 20 mA at 21.6V DC supply into 700 ohms load  |
| Calibration                                | Information stored on card.  |
| Optional Fuse                              | 2.0 A  |



Simplified circuit and connection diagram for simplex AO card, 8-channel, 4 to 20 mA, HART.

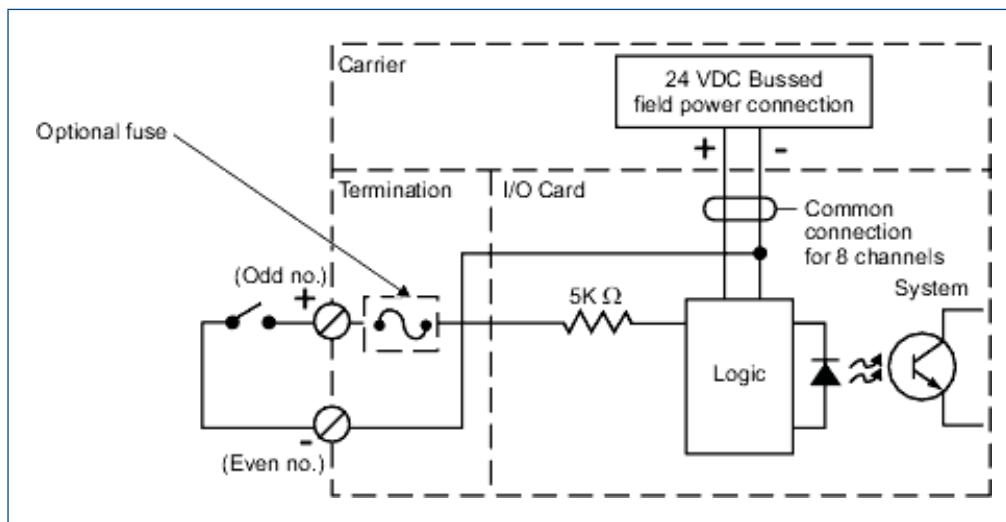
| Specifications for AO (Plus) Card, 16-Channel, 4 to 20 mA, HART |  |
|---|--|
| Number of Channels  | 16   |
| Device Types  | 4 to 20 mA   |
| Full Signal Range   | 1 to 23 mA   |
| Accuracy Over Temperature Range                                 | 0.25% of span  |
| Resolution  | 14-bit A/D converter   |
| Calibration   | None required  |
| Local Bus Current per Card (12V DC nominal)                     | Simplex: 85 mA typical, 150 mA maximum.<br>Redundant: 110 mA typical, 260 mA maximum.                  |
| Field Circuit Power per Card                                    | 400 mA maximum @ 24V DC (+/-10%)   |
| Isolation   | Each channel is optically isolated from the system and factory tested to 1000V DC.                     |
| HART Communications Support                                     | HART pass-through for AMS Device Manager.<br>HART variable and status reporting for control functions. |
| Hart Scan Time  | 600 – 800 mS (typical) per enabled channel   |



*Simplified circuit and connection diagram for simplex AO (Plus) card, 16-channel, 4 to 20 mA, HART.*

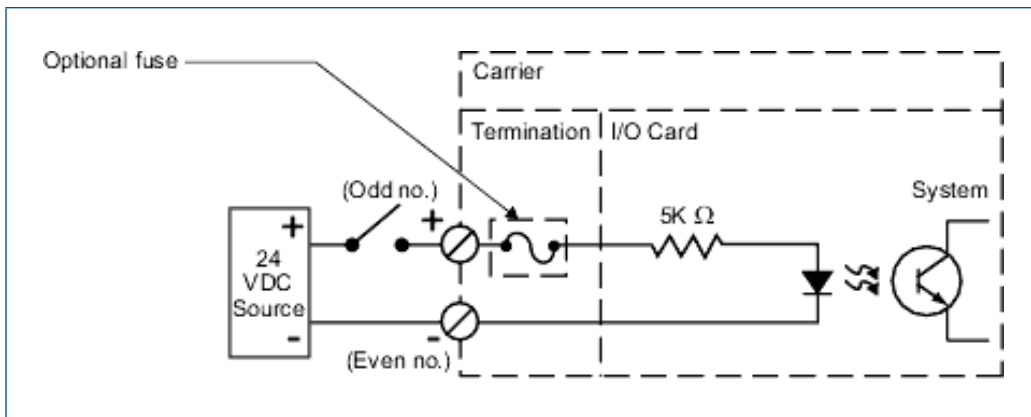
## Discrete Input I/O Cards

| Specifications for DI Card, 8-channel, 24V DC, Dry Contact                                |  |
|---|--|
| Number of Channels  | Eight  |
| Input Compatibility   | Dry Contact (known to operate with many NAMUR sensors)                             |
| Detection Level for On  | >2.2 mA  |
| Detection Level for Off   | <1 mA  |
| Input Impedance   | 5 K $\Omega$ (approximate)   |
| Wetting Voltage   | 15 Volts   |
| Fault Detection Capable   | Field resistor pack (known to operate with many NAMUR sensors)                     |
| Configurable Channel Types:   | Input  |
| <ul style="list-style-type: none"> <li>■ Discrete Input</li> <li>■ Pulse Count</li> </ul> | Dry contact or discrete state sensor changing <2 Hz.<br>Pulse train<br><75 Hz      |
| Local Bus current (12V DC nominal) per Card   | Simplex: 75 mA typical, 100 mA maximum<br>Redundant: 90 mA typical, 150 mA maximum |
| Field Circuit Power per Card  | 100 mA at 24V DC ( $\pm 10\%$ )  |
| Isolation   | Each channel is optically isolated from the system and factory tested to 1500V DC. |
| Optional Fuse   | 2.0 A (Terminal block option)  |



*Simplified circuit and connection diagram for DI card, 8-channel, 24V DC, Dry Contact.*

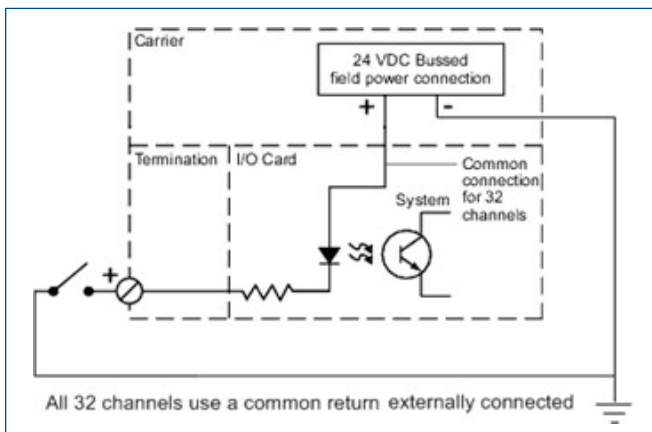
| Specifications for DI Card, 8-channel, 24V DC, Isolated |  |
|---|--|
| Number of Channels                                      | Eight  |
| Isolation   | Each channel is optically isolated from the system and from each other and factory tested to 1500V DC. |
| Detection Level for On                                  | >10V DC  |
| Detection Level for Off                                 | <5V DC   |
| Input Impedance   | 5 mA at 24V  |
| LocalBus Current (12V DC nominal) per Card              | 75 mA typical, 100 mA maximum  |
| Field Circuit Power per Card                            | None   |
| Optional Fuse   | 2.0 A  |



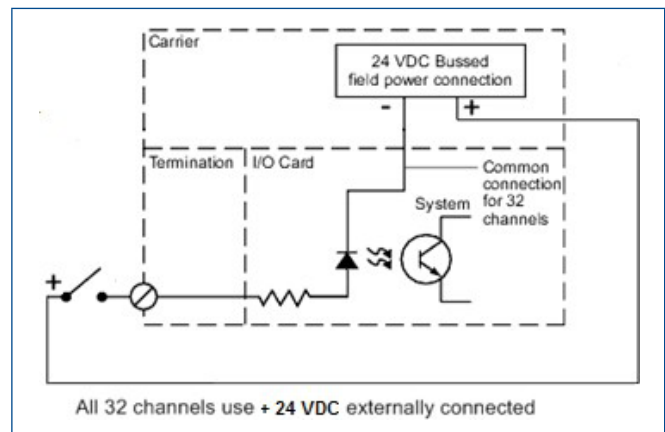
*Simplified circuit and connection diagram for DI card, 8-channel, 24V DC, Isolated.*



| Specifications for DI Card, 32-channel, 24V DC, Dry Contact        |  |
|--|--|
| Number of Channels   | 32   |
| Isolation  | Each channel is optically isolated from the system and factory tested to 1500V DC. |
| Detection Level for On   | >2 mA  |
| Detection Level for Off  | <0.25 mA   |
| Input Impedance  | 5K ohm (approximate)   |
| LocalBus Current (12V DC nominal) per Card                         | 50 mA typical, 75 mA maximum   |
| Field Circuit Power per Card                                       | 150 mA at 24V DC   |
| Return   | Uses common return   |
| Terminal Block   | 32-screw termination block   |
| Specifications for DI (Plus) Card, 32-channel, 24V DC, Dry Contact |  |
| Number of Channels   | 32   |
| Detection Level for On   | >2 mA  |
| Detection Level for Off  | <0.25 mA   |
| Input Impedance  | 5K ohm (approximate)   |
| Wetting Voltage  | 24V DC   |
| Local Bus Current (12V DC Nominal)                                 | 50 mA typical, 75 mA maximum   |
| Field Circuit Power per Card                                       | 150 mA maximum @ 24V DC (+20%/-15%)  |
| Isolation  | Each channel is optically isolated from the system and factory tested to 1500V DC. |

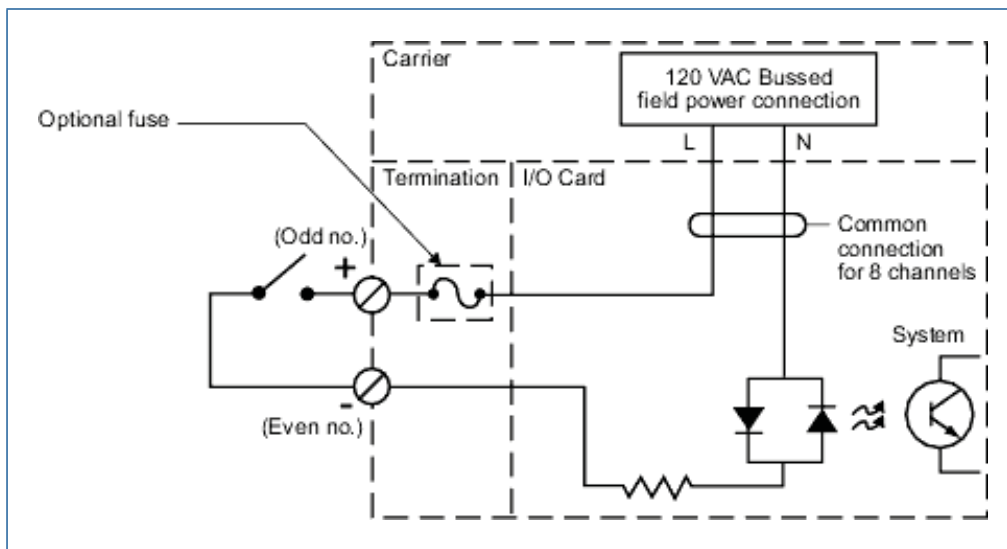


Simplified circuit and connection diagram for DI Card, 32-channel, 24V DC, Dry contact.



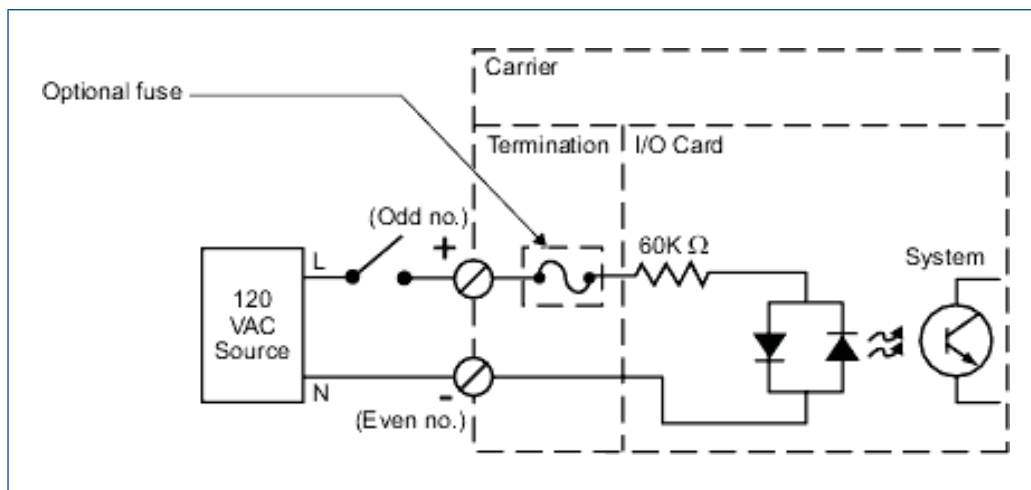
Simplified circuit and connection diagram for simplex DI Plus Card, 32-channel, 24V DC, Dry contact.

| Specifications for DI Card, 8-channel, 120V AC, Dry Contact |   |
|---|---|
| Number of Channels  | Eight   |
| Isolation   | Each channel is optically isolated from the system at 250V AC |
| Detection Level for On                                      | >1.4 mA   |
| Detection Level for Off                                     | <0.56 mA  |
| Input Impedance   | 60 KΩ   |
| LocalBus Current (12V DC nominal) per Card                  | 75 mA typical, 100 mA maximum                                 |
| Field Circuit Power per Card                                | 15 mA at 120V AC  |
| Optional Fuse   | 2.0 A   |



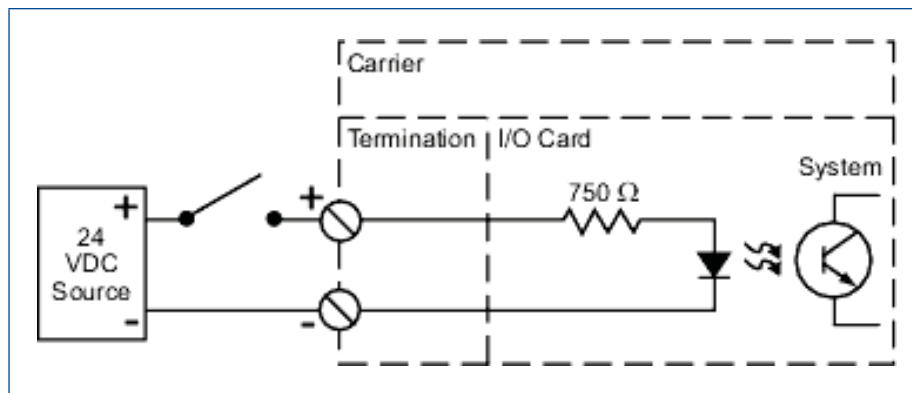
Simplified circuit and connection diagram for DI card, 8-channel, 120V AC, Dry Contact.

| Specifications for DI Card, 8-channel, 120V AC, Isolated |   |
|--|---|
| Number of Channels                                       | Eight   |
| Isolation  | Each channel is optically isolated from the system at 250V AC and from other channels at 250V AC. |
| Detection Level for On                                   | 84 to 130V AC   |
| Detection Level for Off                                  | 0 to 34V AC   |
| Input Load (contact cleaning)                            | 2 mA at 120V AC   |
| Input Impedance  | 60 K $\Omega$   |
| LocalBus Current (12V DC nominal) per Card               | 75 mA typical, 100 mA maximum   |
| Field Circuit Power per Card                             | None  |
| Optional Fuse  | 2.0 A   |



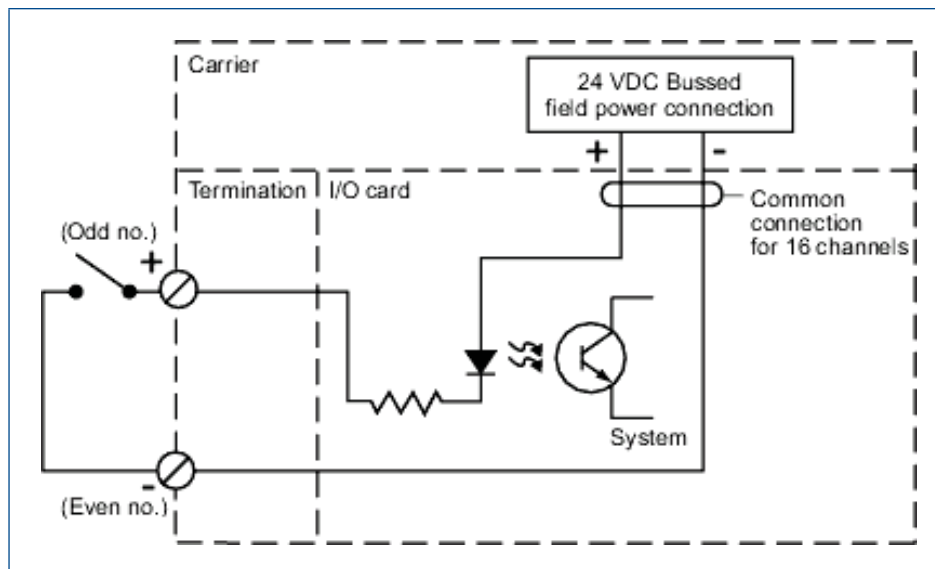
*Simplified circuit and connection diagram for DI card, 8-channel, 120V AC, Isolated.*

| Specifications for PCI Card, 4-channel, 24V DC, Dry Contact |   |
|---|---|
| Number of Channels  | Four  |
| Detection Level for ON (min.)                               | >4.8V DC (>5 mA)  |
| Detection Level for OFF (max.)                              | <1.0V DC (<1 mA)  |
| Input Impedance   | 25 mA at 24V DC (960 Ohms)  |
| Input Accuracy  | 0.1% reading (over 0.1 Hz to 50 kHz)  |
| Resolution  | +/- 1 pulse   |
| Minimum Pulse Width   | 10 $\mu$ S  |
| Maximum Input Voltage                                       | 24V DC +20%   |
| Resolution Counter  | 32-bit  |
| Input Frequency   | Sine wave 10 Hz to 50kHz<br>Square wave 0.1 Hz to 50 kHz  |
| Wetting Voltage   | 24V DC  |
| LocalBus Current (12V DC nominal)                           | 150 mA maximum  |
| Field Circuit Power per Card                                | 25 mA at 24V DC (1 A resettable fuse)   |
| Isolation   | Each channel is optically isolated from the system at 250V AC and from other channels at 100V AC. |



Simplified circuit and connection diagram for PCI card, 4 channel, 24V DC, Isolated.

| Specifications for SOE Card, 16-channel, 24V DC, 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  | 24V DC   |
| Channel Scan Rate  | 0.25 msec for all 16 channels  |
| Time Stamp Accuracy (for SOE enabled channels only)*         | 0.25 msec from same card<br>1 msec from same controller                            |
| LocalBus Current (12V DC nominal)                            | 75 mA typical, 100 mA maximum  |
| Field Circuit Power per Card                                 | 75 mA at 24V DC  |
| Isolation  | Each channel is optically isolated from the system and factory tested to 1500V DC. |

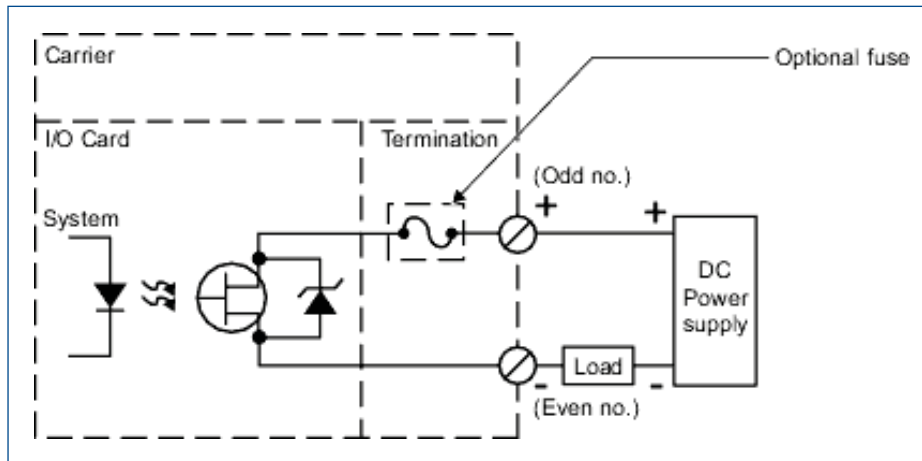


Simplified circuit and connection diagram for SOE card, 16-channel, 24V DC, Dry contact.

\*Refer to Sequence of Event Product Data Sheet for more information on System capabilities and Sequence of Event data collection.

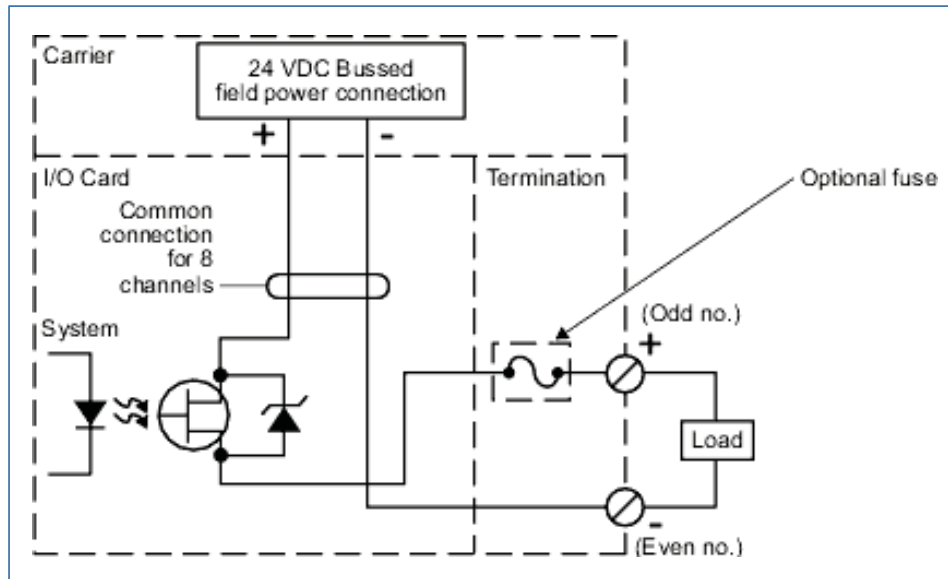
## Discrete Output I/O Cards

| Specifications for DO Card, 8-channel, 24V DC, Isolated |  |
|---|--|
| Number of Channels                                      | Eight  |
| Isolation   | Each channel is optically isolated from the system and from each other and factory tested to 1500V DC.     |
| Output Range  | 2V DC to 60V DC  |
| Output Rating   | 1.0 A  |
| 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                            | 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 |



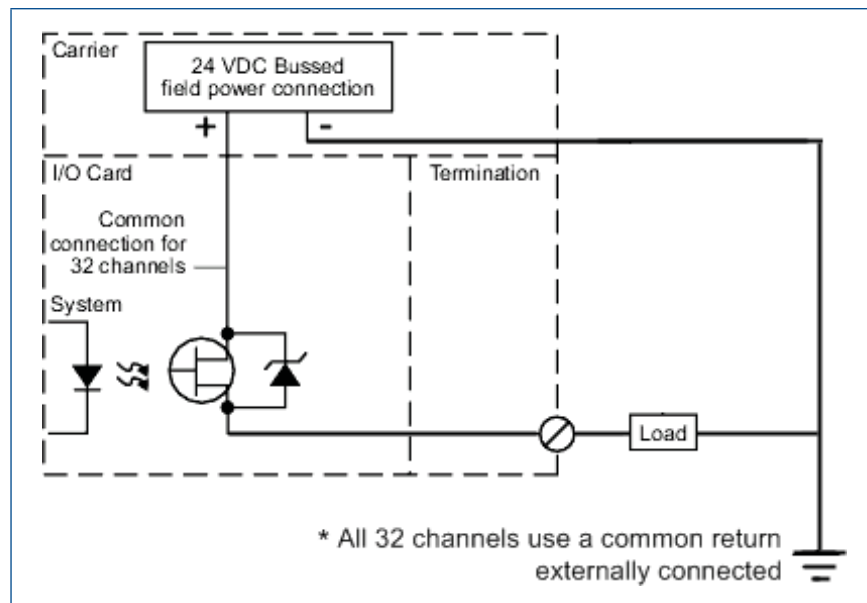
Simplified circuit and connection diagram for DO card, 8-channel, 24V DC, Isolated.

| 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;<br>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.

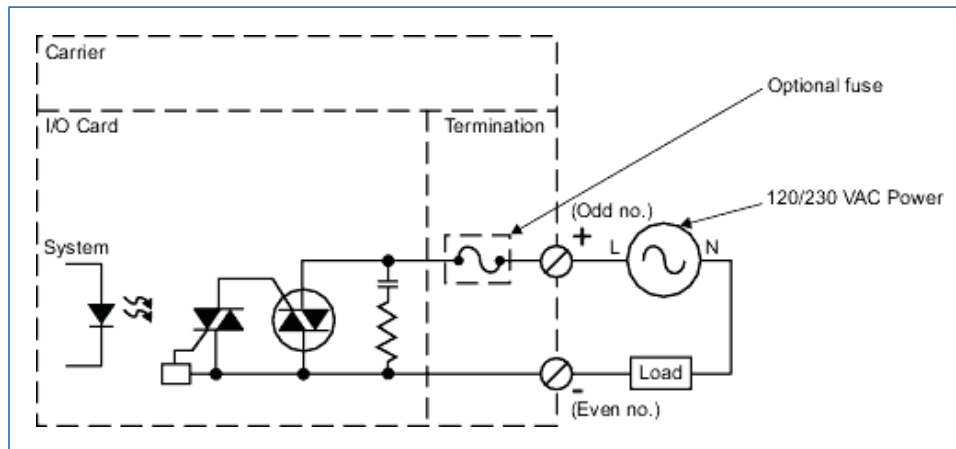
| Specifications for DO (plus) Card, 32-channel, 24V DC, High-Side |  |
|--|--|
| Number of Channels   | 32   |
| Output Rating  | 100 mA per channel   |
| Output Range   | 24V DC $\pm$ 10%   |
| Off-State Leakage  | 0.1 mA maximum   |
| Local Bus Current (12V DC Nominal)                               | 100 mA typical, 150 mA maximum   |
| Field Circuit Power per Card                                     | 3.2 A @ 24V DC (+20%/-15%)   |
| Isolation  | Each channel is optically isolated from the system and factory tested to 1500V DC. |



Simplified circuit and connection diagram for simplex DO (Plus) Card, 32-channel, 24V DC, High-Side.

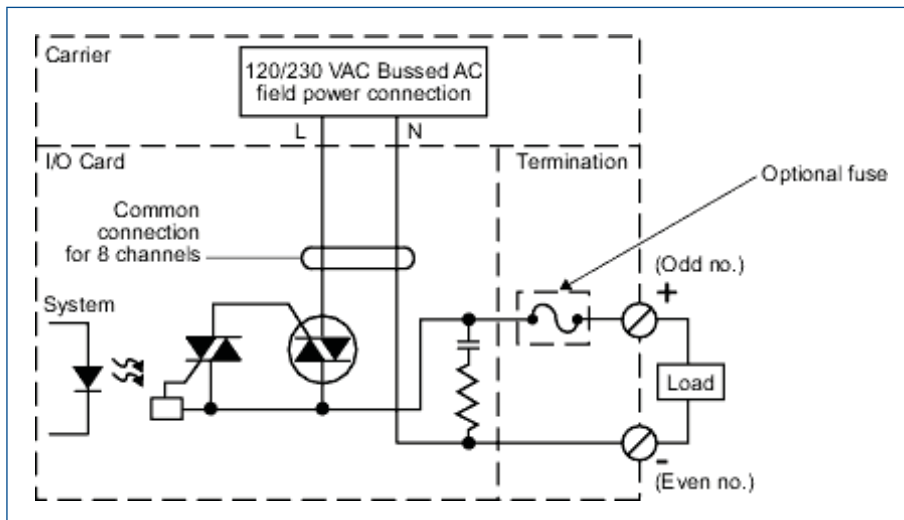


| Specifications for DO Card, 8-channel, 120/230V AC, Isolated |   |
|--|---|
| Number of Channels   | Eight   |
| Isolation  | Each channel is optically isolated from system at 250V AC and from other channels at 250V AC                            |
| Output Range   | 20 to 250V AC   |
| Output Rating  | 1.0 A continuous per channel;<br>2.0 A maximum per card up to 60°C (140°F)<br>3.0 A maximum per card up to 50°C (122°F) |
| Off State Leakage  | 2 mA maximum at 120V AC<br>4 mA maximum at 230V AC  |
| LocalBus Current (12V DC 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   |



Simplified circuit and connection diagram for DO card, 8-channel, 120/230V AC, Isolated.

| Specifications for DO Card, 8-channel, 120/230V AC, High-Side |  |
|---|--|
| Number of Channels  | Eight  |
| Isolation   | Each channel is optically isolated from the system at 250V AC  |
| Output Range  | 20 to 250V AC  |
| Output Rating   | 1.0 A continuous per channel<br>2.0 A maximum per card up to 60°C (140°F)<br>3.0 A maximum per card up to 50°C (122°F) |
| Off State Leakage   | 2 mA maximum at 120V AC<br>4 mA maximum at 230V AC   |
| LocalBus Current (12V DC nominal) per Card                    | 100 mA typical, 150 mA maximum   |
| Field Circuit Power per Card                                  | 3.0 A at 120V AC or 230V AC  |
| 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, 120/230V AC, High-Side.

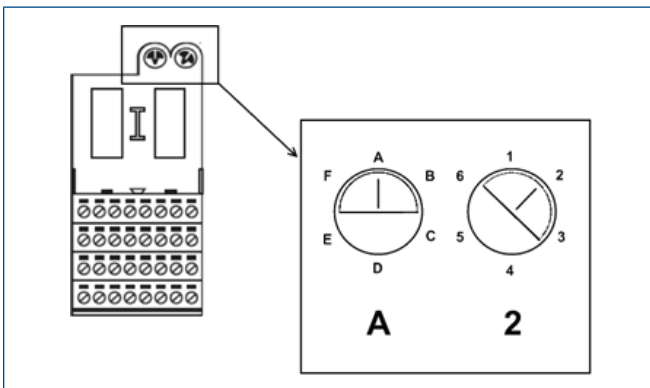
## I/O Terminal Blocks

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
- 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 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<br>Fused I/O terminal block<br>4-wire I/O terminal block  | 16-pin Mass termination block (Supports 2-wire Devices)<br>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<br>16-Channel 4-Wire AI terminal block for Series 2 Plus<br>Redundant 2- & 4-Wire terminal block | 48-pin AI Mass termination block for Series 2 Plus<br>Redundant 48-pin AI Mass termination block for Series 2 Plus |
| AO, 8-Channel, 4–20 mA, HART             | A4              | I/O terminal block<br>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<br>Redundant 16-Channel AO terminal block for Series 2 Plus   | 48-pin AO Mass termination block for Series 2 Plus<br>Redundant 48-pin AO Mass termination block for Series 2 Plus |
| Thermocouple, mV                         | C1              | I/O terminal block<br>Cold Junction Compensated (CJC) terminal block   | NA   |
| RTD, 8-Channel                           | C3              | Resistant Temperature Device (RTD) terminal block  | NA   |
| Isolated Input Card                      | C2              | Isolated Input terminal block  | NA   |
| DI, 8-Channel, 24V DC, Dry Contact       | B1              | I/O terminal block<br>Fused terminal block   | 16-pin Mass termination block  |
| DI, 8-Channel, 24V DC, Isolated          | B2              | I/O terminal block<br>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<br>Redundant 32-Channel DI terminal block for Series 2 Plus   | 40-pin DI Mass termination block for Series 2 Plus<br>Redundant 40-pin DI Mass termination block for Series 2 Plus |
| 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<br>Fused terminal block   | 10-pin Mass termination block<br>16-pin Mass termination block   |

| I/O Card                                   | I/O Card Keying | Traditional I/O Terminal Blocks  | Mass Termination Blocks  |
|--|-----------------|--|--|
| DO, 8-Channel, 24V DC, Isolated            | B5              | I/O terminal block<br>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<br>Redundant 32-Channel DO terminal block for Series 2 Plus | 40-pin DO Mass termination block for Series 2 Plus<br>Redundant 40-pin DO Mass termination block for Series 2 Plus |
| DI, 8-Channel, 120V AC, Dry Contact        | E1              | I/O terminal block<br>Fused terminal block   | NA   |
| DI, 8-Channel, 120V AC, Isolated           | E4              | I/O terminal block<br>Fused terminal block   | NA   |
| DO, 8-Channel, 120V AC/ 230V AC, High-Side | F1              | I/O terminal block<br>Fused terminal block   | NA   |
| DO, 8-Channel, 120V AC/ 230V AC, Isolated  | F4              | I/O terminal block<br>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:*

|   |                |
|---|----------------|
| <i>Class 1 Division 2 Installation Instructions DeltaV M-series</i> | <i>12P1293</i> |
| <i>Zone 2 Installation Instructions DeltaV M-series</i>             | <i>12P2046</i> |

## Ordering Information

| Analog Input Cards and Termination Blocks   |               |
|---|---------------|
| Description   | Model Number  |
| <b>8 Channels 4-20 mA, HART</b>   |               |
| 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 ** |
| <b>16 Channels 4-20 ma, HART, Plus Card</b>   |               |
| 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   |
| <b>8 Channels Thermocouple, mV</b>  |               |
| Standard I/O Termination Block  | VE4003S4B1    |
| Cold Junction Compensated (CJC) Termination Block   | VE4003S5B1    |
| <b>Analog Input Card: 8 Channels RTD</b>  |               |
| Resistant Temperature Device (RTD) Termination Block  | VE4003S6B1    |
| <b>Isolated Input Card</b>  |               |
| Isolated Input Terminal Block   | VE4003S7B1    |

\*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.

| Analog Output Cards and Termination Blocks  |               |
|---|---------------|
| Description   | Model Number  |
| <b>8 Channels 4-20 mA, HART</b>   |               |
| 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 ** |
| <b>16 Channels 4-20 mA, HART, Plus Card</b>   |               |
| 16-Channel AO Terminal Block for Series 2 Plus  | VE4005S2B4    |
| Redundant 16-Channel AO Terminal Block for Series 2 Plus  | VE4035S2B4    |
| 48-pin AO Mass Termination Block for Series 2 Plus<br>(to be used with P+F HiC IS barriers and termination boards for DeltaV DCS)           | VE4005S2B5    |
| 48-pin AO Mass Termination Block for Series 2 Plus including 16-channel Analog Mass Connection Boards*                                      | VE4055S2B5    |
| Redundant 48-pin AO Mass Termination Block for Series 2 Plus<br>(to be used with P+F HiC IS barriers and termination boards for DeltaV DCS) | VE4035S2B5    |
| Redundant 48-pin AO Mass Termination Block for Series 2 Plus including 16-channel Analog Mass Connection Boards*                            | VE4085S2B5    |

\*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 KJ3221X1-BA2.



| <b>Discrete Input Cards and Termination Blocks</b>  |                     |
|---|---------------------|
| <b>Description</b>  | <b>Model Number</b> |
| <b>Discrete Input Card: 8 Channels, 24V DC, Isolated</b>  |                     |
| Standard I/O Termination Block  | VE4001S2T1B1        |
| Fused I/O Termination Block   | VE4001S2T1B2        |
| 16-Pin Mass Termination Block   | VE4001S2T1B3        |
| <b>Discrete Input Card: 8 Channels, 24V DC, Dry Contact</b>   |                     |
| 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        |
| <b>Discrete Input Card: 32 Channels, 24V DC, Dry Contact</b>  |                     |
| Standard Termination Block  | VE4001S2T2B4        |
| 40-pin Mass Termination Block   | VE4001S2T2B5        |
| <b>Discrete Input Plus Card: 32 Channels, 24V DC, Dry Contact</b>   |                     |
| 32-Channel DI Terminal Block for Series 2 Plus  | VE4001S2T2B6        |
| Redundant 32-Channel DI Terminal Block for Series 2 Plus  | VE4031S2T2B6        |
| 40-pin DI Mass Termination Block for Series 2 Plus (to be used with DeltaV Signal Conditioning Cards for PLC-5 DI, or P+F HiC IS barriers and terminal boards for DeltaV DCS)           | VE4001S2T2B7        |
| 40-pin DI Mass Termination Block for Series 2 Plus including 2 x 16-channel DI Plus Mass Connection Boards*   | VE4051S2T2B7        |
| Redundant 40-pin DI Mass Termination Block for Series 2 Plus (to be used with DeltaV Signal Conditioning Cards for PLC-5 DI, or P+F HiC IS barriers and terminal boards for DeltaV DCS) | VE4031S2T2B7        |
| Redundant 40-pin DI Mass Termination Block for Series 2 Plus including 2 x 16-channel DI Plus Mass Connection Boards*   | VE4081S2T2B7        |
| <b>Discrete Input Card: 8 Channels, 120V AC, Isolated</b>   |                     |
| Standard I/O Termination Block  | VE4001S3T1B1        |
| Fused I/O Termination Block   | VE4001S3T1B2        |
| <b>Discrete Input Card: 8 Channels, 120V AC, Dry Contact</b>  |                     |
| Standard I/O Termination Block  | VE4001S3T2B1        |
| Fused I/O Termination Block   | VE4001S3T2B2        |
| <b>Pulse Count Input Card: 4-Channels, 24V DC, Dry Contact</b>  |                     |
| Discrete 32 Channel Terminal Block  | VE4015              |
| <b>Sequence of Event Input Card: 16 Channels, 24V DC Dry Contact</b>  |                     |
| Discrete 32-Channel Terminal Block  | VE4001S5T2B4        |
| 40-pin Mass Terminal Block  | VE4001S5T2B5        |

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

| Discrete Output Cards and Termination Blocks  |              |
|---|--------------|
| Description   | Model Number |
| <b>Discrete Output Card: 8 Channels 24V DC, Isolated</b>  |              |
| Standard I/O Termination Block  | VE4002S1T1B1 |
| Fused I/O Termination Block   | VE4002S1T1B2 |
| 16-Pin Mass Termination Block   | VE4002S1T1B3 |
| <b>Discrete Output Card: 8 Channels 24V DC, High-Side</b>   |              |
| 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 |
| <b>Discrete Output Plus Card: 32 Channels, 24 V DC, High-Side</b>   |              |
| 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 |
| <b>Discrete Output Card: 8 Channels 115/230V AC, Isolated</b>   |              |
| Standard I/O Termination Block  | VE4002S2T1B1 |
| Fused I/O Termination Block   | VE4002S2T1B2 |
| <b>Discrete Output Card: 8 Channels 115/230V AC, High-Side</b>  |              |
| 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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