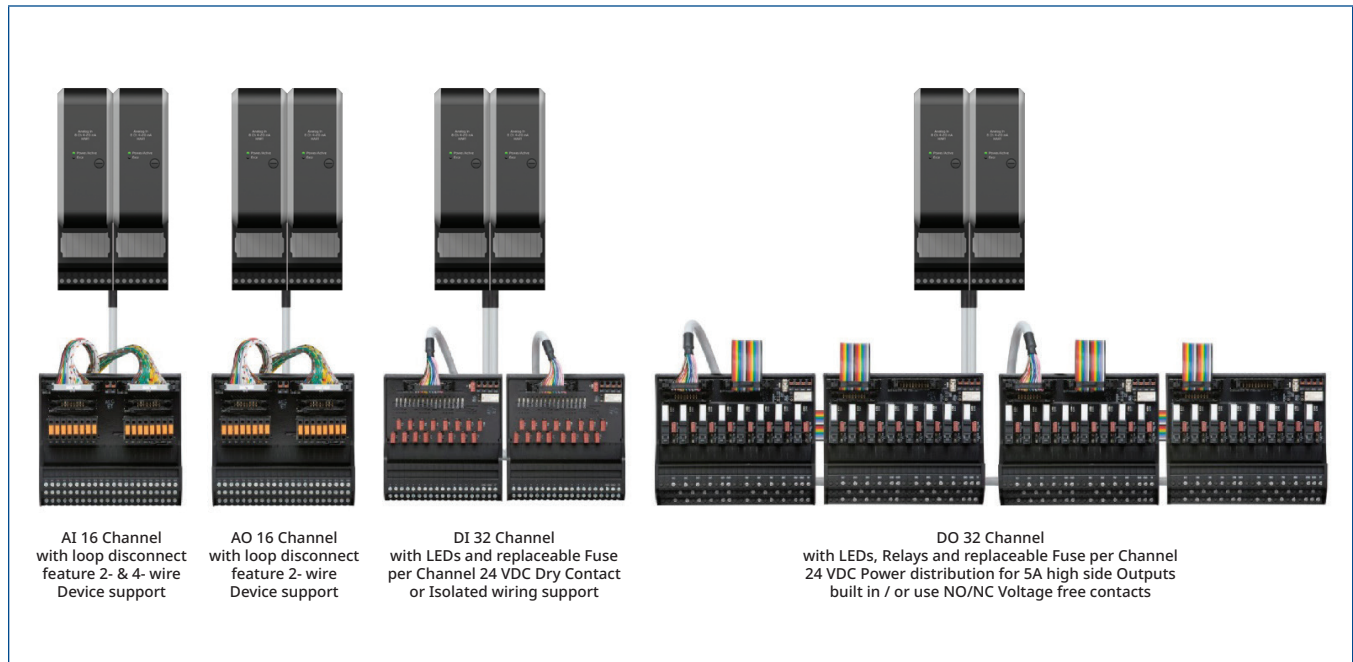


# M-series Mass Connection Solutions



- Fast, easy and error-free cabinet wiring
- Modular design, improves reliability
- Lowers overall termination footprint
- Significant labor and work reduction
- Loop disconnect feature for analog signals
- LED's and replaceable fuses for discrete signals
- Termination Fault Detection between discrete traditional I/O cards and Mass Connection Board signals

## Introduction

The DeltaV™ M-series Mass Connection Solution provides fast, easy, and reliable connection from field devices to DeltaV simplex and redundant, high-density traditional I/O cards, while providing several wiring options.

The modular design of the Mass Connection Boards further helps to lower the overall termination footprint due to flexible mounting capabilities.

Ribbon cable connectors will be used to connect the Mass Connection Boards easily to simplex or redundant, high-density traditional I/O cards, where loop and termination fault diagnostic information are available.

## Benefits

**Fast and easy way to connect terminals.** The DeltaV simplex and redundant high-density traditional I/O cards can be easily wired to the Mass Connection Boards within seconds.

No tools are necessary to connect the ribbon cables, so you can significantly reduce labor costs by eliminating additional cabinet wiring.

**Modular design, improved reliability.** The modular designed Mass Connection Boards are more reliable than other traditional solutions, by splitting the signals up, to a max of 16 signals.

**Optimization of space.** The DeltaV M-series Mass Connection Solution offers significant space advantages by integrating all needed cabinet wiring components on one board.

**Significant labor work reduction.** No need for cross wiring between I/O cards and Mass Connection Boards anymore, due to flexible 1:1 ribbon cable-based connectivity.

**Significant cost reduction.** Due to the fact that off-the-shelf ribbon cables can be used inside a cabinet with a maximum length of 3m, significant cost reductions can be achieved.

In some cases, longer cables are needed for connections between two cabinets. 6m long Standard Round Ribbon Cables can be ordered to be used with the Mass Connection Solution.

**Loop Disconnect features for all signal types.** For each signal type, a loop disconnect feature is available on the Mass Connection Boards.

On the AI/AO Mass Connection Boards, this is realized using a specific knife edge disconnect setup with 2mm test holes, in this way maintenance or calibration work can be performed without disturbing the 4-20 mA loop-based signal.

Loop disconnect on the DI/DO Mass Connection Boards is realized using replaceable fuses. In this way, loop power to the field can be easily disconnected, during maintenance activities.

**Termination Fault Detection.** With the discrete Mass Connection Boards, power or cable failures can now be detected by DeltaV Diagnostics when used with the Series 2 Plus Cards. Also, there are two fault terminals on the DI and DO boards that can be tied to a DI Dry Contact channel that would indicate when the board lost 24V DC power.

**Terminal Markers.** Each channel can be marked with a terminal marker for quick identification. See Related 3rd Party Products ordering information below.

## Product Description

### AI/AO Plus Mass Connection Board



The AI/AO Plus Mass Connection Board connects to the M-series Series 2 Plus (simplex or redundant) AI, 16 Channel and AO, 16 Channel cards by using either two ribbon cables with 24-pin connectors or the 48-pin special Round Ribbon Cables, which are required if the distance is longer than 3m.

Up to 16 Analog, 4-20 mA HART® based field devices can be connected to the AI/AO Plus Mass Connection Boards by screw terminals. 2- and 4- wire devices are supported on a channel-by-channel basis.

For each channel, a loop disconnect feature with 2mm test holes is implemented. In this way, maintenance or calibration work can be performed at any time, without disturbing the 4-20 mA loop-based signal.

Please refer to the Cross Reference List for your application.

### DI Plus Mass Connection Board



The DI Plus Mass Connection Solution (set of two 16 Channel Boards) connects to the simplex or redundant M-series Series 2 Plus DI, 32 Channel, 24V DC, Dry Contact cards by using either two ribbon cables with 20-pin connectors or two of the 20-pin standard Round Ribbon Cables, which are required if the distance is longer than 3m.

Up to 16, 24V DC based discrete input signals can be connected to each of the DI Plus Mass Connection Boards by screw terminals. Dry Contact or 24V DC Isolated field signals are supported by the 2- row screw architecture.

Yellow LEDs are providing status indication for each channel, while the replaceable fuses can be used to disconnect loop power to the field, during maintenance activities.

A Termination Fault Detection feature is built into each of the DI Plus Mass Connection Boards which allows the M-series Series 2 Plus DI, 32 Channel, 24V DC, Dry Contact cards to detect power or cable failures on the board.

The M-series Series 2 Plus DI, 32 Channel, 24V DC, Dry Contact card does have two new parameters in the Explorer view, one for each cable connection. When these parameters are turned on, DeltaV Diagnostics will mark the status of affected signals accordingly.

Please refer to the Cross Reference List for your application.

### DO Mass Connection Board



The DO Mass Connection Solution (set of four 8 Channel boards) connects to the simplex or redundant M-series Series 2 Plus DO and the simplex Series 2 DO, 32 Channel, 24V DC, High-Side cards by using either two ribbon cables with 20-pin connectors or two of the 20-pin standard Round Ribbon Cables, which are required if the distance is longer than 3m. Two DO Mass Connection Boards need to be daisy chained to get to 16 channels, which can be connected back to the DO card. A short ribbon cable (0.5m) with 20-pin connectors can be used for that purpose.

Up to 8 field devices can be connected to each of the DO Mass Connection Boards by screw terminals. Either +24V DC high-side relay outputs or voltage free relay contacts can be used, depending on the position of the channel fuse.

Yellow LEDs are providing status Indication for each channel, while the replaceable fuses can be used to disconnect loop power to the field, during maintenance activities.

A Termination Fault Detection feature is built into each of the DO Plus Mass Connection Boards which allows the M-series Series 2 Plus DO, 32 Channel, High-Side cards to detect power or cable failures on the board. There is a jumper on the board to be able to turn this feature off, in case rewiring needs to be performed while the process is running.

The M-series Series 2 Plus DO, 32 Channel, 24V DC, High- Side card does have two new parameters in the Explorer view, one for each cable connection. When these parameters are turned on, DeltaV Diagnostics will mark the status of affected signals accordingly.

Please refer to the Cross Reference List for your application.

6m Standard Round Ribbon Cables



The 6m long Standard Round Ribbon Cable is recommended for distances longer than 3m. (20-pin DI/DO shown above)



The 6m long 48-pin – Special Round Ribbon Cable is recommended to be used with analog signals for distances longer than 3m.

Cross Reference List

Description	Ordering Information	VE40X3S2B11	VE40X5S2B5	VE40X1S2T2B7	VE40X2S1T2B8	Set consists of
AI Plus Mass Connection Solution	—	✓	—	—	—	1 item
AO Plus Mass Connection Solution	—	—	✓	—	—	1 item
AI/AO 48-pin Round Ribbon Cable 6m	VE4000L6P48**	✓	✓	—	—	1 item
DI Plus Mass Connection Solution	—	—	—	✓	—	2 items
DO Mass Connection Solution	—	—	—	—	✓	4 items
DI/DO 20-pin Round Ribbon Cable 6m	VE4000L6P20**	—	—	✓	✓	2 items
If the X gets replaced by a: 0 = your order will contain a simplex Card <b>without</b> a Mass Connection Solution* 3 = your order will contain a redundant Card set <b>without</b> a Mass Connection Solution* 5 = your order will contain a simplex Card <b>with</b> the correct Mass Connection Solution* 8 = your order will contain a redundant Card set <b>with</b> the correct Mass Connection Solution*						

\*If applicable.

\*\*Round Ribbon Cables are **not** included in the bundles and needs to be ordered separately.

## Hardware Specification

Common Environmental Specifications for Mass Connection Boards	
Category	Specifications
Operating Temperature*	-20 to +70°C**
Storage Temperature	-40 to +85°C
Relative Humidity	5 to 95% Non-Condensing
Airborne Contaminates	ISA-S71.04-1985 Airborne Contaminants Class G3 Conformal coating
Protection Rating	IP 20
Shock	10g, 1/2 sine wave for 11 milliseconds
Vibration	1mm Peak-to-Peak from 2 to 13.2 Hz, 0.7g from 13.2 to 150 Hz

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

\*\*See temperature derating on DO Mass Connection Boards in specification below.

Specifications for AI/AO Plus Mass Connection Boards	
Category	Specifications
Channel Type	4-20 mA HART
Number of Channels	16
Dimensions	Depth: 109.78mm; Height: 60.52mm; Width: 118.06mm

Specifications for DI Plus Mass Connection Boards	
Category	Specifications
Channel Type	24V DC Dry Contact, or 24V DC Isolated
Number of Channels	16
Isolation	The field wiring connections are optically isolated from the DI Card circuits and factory
Detection Level for ON	> 2 mA @ 24V DC
Detection Level for OFF	< 0.25 mA @ 24V DC
Source Impedance	5 K $\Omega$
Source Voltage	+24V DC Input Power, recommend external fuse at power source
Field Circuit Power	+24V DC +/- 10% 1 A maximum per board, 160 mA maximum per channel
Dimensions	Depth: 110.05mm; Height: 44.1mm; Width: 102.82mm

Specifications for DO Mass Connection Boards	
Category	Specifications
Channel Type	Isolated Relay Contact or 24V DC high-side
Number of Channels	8
Output Channel Options and Ratings	Isolated Relay Contacts – 250V AC/24V DC maximum@ 5 A* maximum per channel +24V DC High-Side @ 5 A* maximum per channel, 10 A maximum per board
Isolation	Isolated Relay Contacts – Isolated at 250V AC and factory tested to 3600V DC (channel-to-system and channel-to-channel)
	+24V DC High-Side – Isolated at 250V AC and factory tested to 3600V DC (channel-to-system). No channel-to-channel isolation
Relay Max. switching current	5 A for 30V DC; 5 A for 250V AC
Optional Power for +24V DC High Side Outputs	+24V DC +/- 10% @ 10 A maximum
Dimensions	Depth: 109.75mm; Height: 60.52mm; Width: 133.3mm

\*De-rate to 3 A per channel when operating above 60°C ambient.

Common Environmental / Specifications for Round Ribbon Cables	
Category	Specifications
Operating Temperature*	-20 to +70°C
Storage Temperature	-20 to +70°C
Relative Humidity	5 to 95% Non-Condensing
Airborne Contaminates	ISA-S71.04-1985 Airborne Contaminants Class G3 Conformal coating
Protection Rating	IP 20
Available Cable Lengths	6m (Note: Various other lengths are available from Phoenix Contact, see the table at the end of this document)
Wires / Pairs per Cable	48-pin AI/AO (50/25) or 20-pin DI/DO (20/10)
Wire Gauge	0.14mm <sup>2</sup> / 26 AWG

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

## Certifications

The following certifications are available for M-series Mass Connection Solution (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. 61010-1

- **ATEX**

EN 60079-0

EN 60079-7

- **IEC-Ex**

EN 60079-0

EN 60079-7

- **Marine Certifications:** IACS E10

ABS Certificate of Design Assessment

DNV Marine Certificate (pending)

## Hazardous Area/Location

M-series Mass Connection Solution 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 nC IIC T4 Gc

- **IEC-Ex**

II 3G Ex ec 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)

## Ordering Information

Description	Model Number
AI/AO Mass Connection Solution (one board)	— *
AI/AO 48-pin Round Ribbon Cable (6m, one Cable)	VE4000L6P48
DI Plus Mass Connection Solution (two boards as a set)	— *
DO Mass Connection Solution (four boards as a set)	— *
DI/DO 20-pin Round Ribbon Cable (6m, two as a set)	VE4000L6P20

\*M-series Traditional I/O Cards and Mass Connection Solutions can only be ordered in a set, please refer to the PDS M-series Traditional I/O to find the correct ordering number for the set.

## Spare Part Ordering Information

Description	Model Number
AI/AO Plus Mass Connection Board	KJ4007X1-BD1
DI Plus Mass Connection Board	KJ4007X1-BB1
DO Mass Connection Board	KJ4007X1-BC1
DI Mass Connection Board Fuse – Main 125V AC/1 A, pack of 10 fuses	KJ4007X1-DB1
DI Mass Connection Board Fuse – Channel 125V AC/160 mA, pack of 10 fuses	KJ4007X1-DA1
DO Mass Connection Board Fuse – Main 125V AC/10 A, pack of 10 fuses	KJ4007X1-DD1
DO Mass Connection Board Fuse – Channel 250V AC/5 A, pack of 10 fuses	KJ4007X1-DC1



## Related 3rd Party Products

Description	Phoenix Contact Part Number	
	Part Number	Part Type
20-pin Round Ribbon Cable 0.5m	2296391	FLK 20/EZ-DR/ 50KONFEK
20-pin Round Ribbon Cable 1.0m	2296401	FLK 20/EZ-DR/ 100KONFEK
20-pin Round Ribbon Cable 1.5m	2296472	FLK 20/EZ-DR/ 150KONFEK
20-pin Round Ribbon Cable 2.0m	2296485	FLK 20/EZ-DR/ 200KONFEK
20-pin Round Ribbon Cable 3.0m	2296498	FLK 20/EZ-DR/ 300KONFEK
20-pin Round Ribbon Cable 4.0m	2296508	FLK 20/EZ-DR/ 400KONFEK
20-pin Round Ribbon Cable 8.0m	2296524	FLK 20/EZ-DR/ 800KONFEK
20-pin Round Ribbon Cable 10.0m	2296537	FLK 20/EZ-DR/1000KONFEK
48-pin Round Ribbon Cable xm	—	CABLE-50/2FLK24/2FLK24/ xM/S
Phoenix Contact white unlabeled snap type marker	0818069*	UC-TM 10
24 VDC relays used on DO Mass Connection Board	2961105	REL-MR-24DC/21

\*Other types of markers are available from Phoenix Contact.

Note: The 2-pole small black jumpers utilized on the DO Mass Connection Board in the "Base/Expansion" and "Relay Bypass" positions can be purchased from any electronics parts supplier: specify Mill-Max P/N 999-11-210-10-000.

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