ATEX Instruction Sheet
Part Number: ATEX134
Publish date: November, 2013

AI, 8-Channel, 4-20 mA, HART Series 2 Redundant Card

KJ3222X1-BA1 AI, 8-Channel, 4-20 mA, HART Series 2 Redundant Card

Hazardous Atmosphere

II 3 G

Ex nA IIC Gc (4-Wire)
Ex nA [nL] IIC Gc (2-Wire)
Ex nA [ic] IIC Gc (2-Wire)
FM13ATEX0034U
IECEx FMG 13.0015U

Power Specifications

LocalBus power rating	12 VDC at 150 mA
Bussed field power rating	24 VDC at 300 mA
Field circuit rating	24 VDC at 30 mA

Environmental Specifications

Ambient Temperature	-40 to 70° C
Shock	10g ½ Sinewave for 11 msec
Vibration	1mm Peak to Peak from 5 to 16Hz; 0.5g from 16 to 150Hz
Airborne Contaminants	ISA-S71.04 –1985 Airborne Contaminants Class G3
Relative Humidity	5 to 95% Non-Condensing IP 20 Rating
Terminal block key position	A1

Note: Refer to the product label for serial number and location and date of manufacture. Refer also to the wiring diagram on the left side of the card.

Warning: This product has specific instructions for installation, removal and operation in hazardous areas. Refer to document 12P2046 *"DeltaV ™ Scalable Process System Zone 2 Installation Instructions".* Other installation instructions are available in the *"Installing Your DeltaV Automation System"* manual.

Removal and Insertion

Field power supplied to this device, either at the field terminal or as bussed field power through the carrier, must be removed before removing or connecting the device.

This unit may be removed or inserted while system power is energized under the following conditions: (**Note** Only one unit at a time may be removed with system power energized.)

- When used with KJ1501X1-BC1 System Dual DC/DC Power Supply operating on 24 VDC or 12 VDC input power. The primary circuit wiring inductance for input power must be less than 23 uH, or a certified supply with an open circuit voltage, Ui of 12.6 VDC and an Lo of less than 23 uH (including wire inductance).

An I/O loop assessment must be completed on all energy-limited nodes.

A terminal block fuse may NOT be removed with field power energized for non-sparking circuits.

Maintenance and Adjustment

This unit contains no user serviceable parts and should not be disassembled for any reason. Calibration is not required.

Other Safety Approvals

FM APPROVED CL. I Div. 2 GP.A,B,C,D HAZ.LOC. TEMP. Rating T4 CE LR87534

EMERSON. Process Management

I/O Card Redundancy

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

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

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

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

Events that can cause a switchover include:

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

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

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

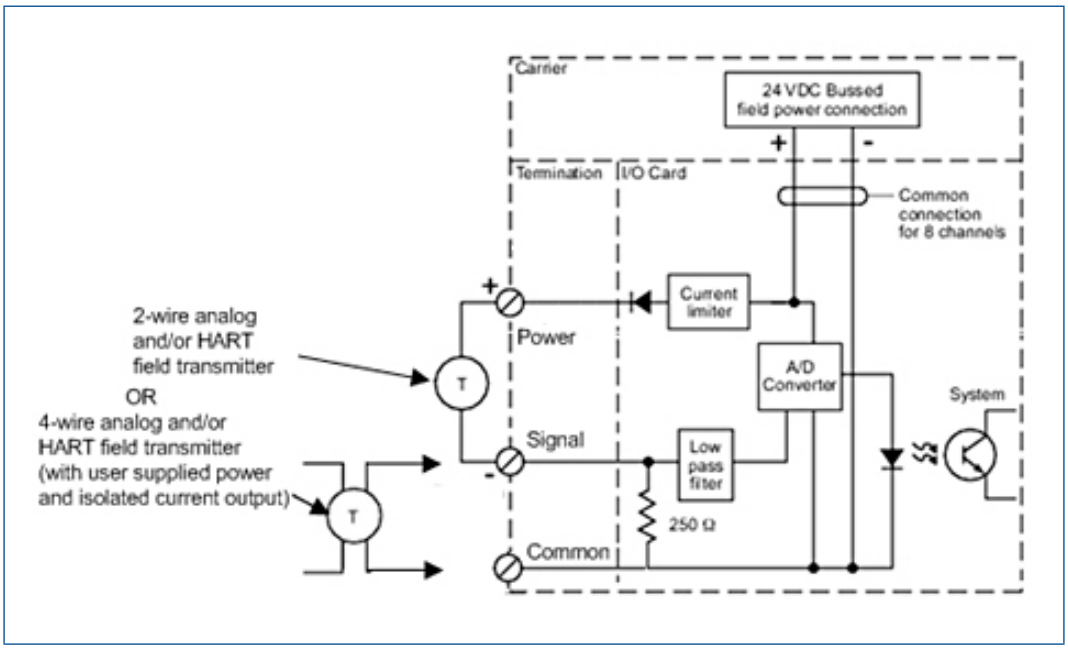
Hardware Specifications

Common Environmental Specifications for all I/O Interfaces	
Category	**Specifications**
Operating Temperature*	-40 to 70°C (-40 to 158°F)
Storage Temperature	-40 to 85°C (-40 to 185°F)
Relative Humidity	5 to 95%, non-condensing
Airborne Contaminants	ISA-S71.04-1985 Airborne Contaminants Class G3 Conformal coating
Protection Rating	IP 20
Shock	10 g ½-sine wave for 11 ms
Vibration	1 mm peak-to-peak from 5 to 16 Hz; 0.5 g from 16 to 150 Hz
Dimensions	H 10.7 cm (4.2 in.) W 4.1 cm (1.6 in.) Depth 10.5 cm (4.1 in.)

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

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 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.

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

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

Traditional I/O and Terminal Block Compatibility

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

Certifications

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

- **CE**

  EMC: EN 61326-1

- **FM**

  FM 3600

  FM 3611

- **CSA**

  CSA C22.2 No. 213

  CSA C22.2 No. 1010-1

- **ATEX**

  EN60079-0

  IEC60079-7

  EN60079-15

- **IEC-Ex**

  IEC60079-0

  IEC60079-7

  IEC60079-15

- **Marine Certifications:** IACS E10

  ABS Certificate of Design Assessment

  DNV Marine Certificate

Hazardous Area/Location

M-series Traditional I/O Cards can be installed and used based on the following standards (see actual certificates for exact product markings for each product):

- **FM (USA)**

  Class I, Division 2, Groups A, B, C, D, T4

- **cFM (Canada)**

  Class I, Division 2, Groups A, B, C, D, T4

- **ATEX**

  II 3G Ex ec IIC T4 Gc

  II 3G Ex ec [ic] IIC T4 Gc

  II 3G Ex nA nC IIC T4 Gc

- **IEC-Ex**

  II 3G Ex ec IIC T4 Gc

  II 3G Ex ec ic IIC T4 Gc

  II 3G Ex nA nC IIC T4 Gc

Regarding the Installation instructions please refer to the following Documents:

Class 1 Division 2 Installation Instructions DeltaV™ M-series	12P1293
Zone 2 Installation Instructions DeltaV M-series	12P2046

Ordering Information

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

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

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

Model	Ref. Fig. 1	Description	Removal or Insertion with System Power Energized	Key Pos.	Field Circuit Class For Definitions please refer to Item 10.
KJ3222X1 - BA1	G	Analog Input Card with HART, Series-2 2-Wire	YES[1]	A 1	Energy limited field circuits Uo = 28.7V, Io = 33mA, Po = 607mW Co=.17uF, Lo=11mH
		Analog Input Card with HART, Series-2 4-Wire	YES[1,2]		NON-SPARKING
KJ3222X1 - EA1	C	Redundant Analog Input Terminal Block	N/A		N/A
KJ3223X1 - BA1	G	Analog Input, 16-Channel 4-20mA, 2-Wire with HART, Series-2	YES[1]	A 2	Energy limited field circuits Uo = 28.7V, Io = 33mA, Po = 607mW Co=.17uF, Lo=11mH
KJ3223X1 - EA1	C	16-Channel Analog Terminal Block	N/A1		N/A
KJ3224X1 - BA1	G	Thermocouple Card 8 Channel, Series-2	YES[1]	C 1	Energy limited field circuits Uo = 5.5, Io = 0.3mA/Ch, 0.3 mA/Card Po = 0.8mW Co=1000µF, Lo=1000mH
KJ3224X1 - EA1	C	Series-2 Thermocouple Terminal Block	N/A		N/A
KJ3225X1 - BA1	G	RTD Card 8 Channel, Series-2	YES[1]	C 1	Energy limited field circuits Uo = 5.5, Io = 0.6mA/Ch, 4.8 mA/Card Po = 0.4mW Co=1000µF, Lo=1000mH
KJ3231X1 - BA1	H	Isolated Analog Input Card, Series-2	NO	C 2	Energy limited field circuits Uo = 5.5, Io = 0.3mA/Ch, 0.3 mA/Card Po = 0.8mW Co=1000µF, Lo=1000mH
KJ3231X1 - EA1	C	Isolated Terminal Block	N/A		N/A
KJ3241X1 - BA1	H	Serial Interface Card, Series-2	NO	D 4	NON-SPARKING
KJ3241X1 - EA1	C	Redundant Serial Interface Terminal Block	N/A		N/A
KJ3242X1 - BA1	H	Fieldbus H1 Card, Series-2	NO	D 6	Energy limited field circuits Ui = 40, Ii = 165 mA, Ci = 0.022 uF, Li = 480 uH Pi = 520mW (Groups A, B, C, D) [3] Ui = 40, Ii = 225 mA, Ci = 0.022 uF, Li = 480 uH (Groups A, B) [3]
		When used with KJ3242X1-GA1 Term. Block			NON-SPARKING
		When used with KJ3242X1-HA1 Term. Block			NON-SPARKING
KJ3242X1 - GA1	C	Simplex H1 Terminal Block	N/A	D 6	NON-SPARKING
KJ3242X1 - HA1	C	Redundant H1 Terminal Block	N/A	D 6	NON-SPARKING
KJ3242X1 - EA1	C	Simplex Fieldbus H1 Terminal Block	N/A	D 6	N/A
KJ3242X1 - FA1	C	Redundant Fieldbus H1 Terminal Block	N/A	D 6	N/A
KJ3243X1 - BA1	H	Profibus DP Card Series 2	NO	D 3	NON-SPARKING
KJ3243X1 - BB1	H	Redundant Profibus DP Card, Series 2	NO	D 3	NON-SPARKING
KJ3243X1 -EA1	C	Redundant Profibus Terminal Block	N/A	D 3	NON-SPARKING
KJ3244X1 - BA1	H	DeviceNet Card Series 2	NO	D 5	NON-SPARKING
KJ3245X1 - BA1	H	AS-i Card, Series 2 (-25°C to +70°C)	NO	D1	NON-SPARKING
KJ4001X1 - BA2	A	2 wide Carrier	NO	N/A	N/A
KJ4001X1 - BA3	A	2 wide Carrier	NO	N/A	N/A
KJ4001X1 - BB1	B	8-Wide I/O Interface Carrier	NO	N/A	N/A
KJ4001X1 - BE1	B	8-Wide I/O Interface Carrier with Shield Bar	NO	N/A	N/A
KJ4001X1 - BH1	A	2-Wide Power Carrier	NO	N/A	N/A
KJ4001X1 - CA1	C	I/O Terminal Block	N/A		N/A
KJ4001X1 - CB1	C	Fused I/O Terminal Block	N/A		N/A
KJ4001X1 - CC1	C	4- Wire I/O Terminal Block	N/A	A 1	N/A
KJ4001X1 - CD1	C	Mass Termination 10 Pin Assembly	N/A	B 6	N/A
KJ4001X1 - CE1	C	Mass Termination 16 Pin Assembly	N/A	A 1	N/A
KJ4001X1 - CF1	C	Mass Termination 24 Pin Assembly	N/A	A 1	N/A