



# Certificate of Compliance

**Certificate:** 70209632

**Master Contract:** 274452

**Project:** 80035974

**Date Issued:** October 21, 2020

**Issued to:** KEM Kueppers Elektromechanik GmbH  
Liebigstraße  
85757 Karlsfeld,  
Germany

**Attention:** Mr. David Sperber

*The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.*



**Issued by:** *H. Gambell*  
Hannah Gambell

## PRODUCTS

**CLASS 2258 04** - PROCESS CONTROL EQUIPMENT - Intrinsically Safe, Entity - For Hazardous Locations

**CLASS 2258 84** - PROCESS CONTROL EQUIPMENT - Intrinsically Safe, Entity - For Hazardous Locations - Certified to US Standards

### Canadian Marking:

**Ex db eb ia [ia Ga] IIC T6 Gb**

**Ex tb [ia Da] IIIC T85°C**

### US marking:

**Class I, II, III, Div1, Groups A, B, C, D, E, F, G**

**Class I, Zone 1 AEx db eb ia [ia Ga] IIC T6 Gb**

**Zone 21 AEx tb [ia Da] IIIC T85°C**

Coriolis Mass Flowmeter Digital Transmitter - TRICOR model TCD9x00-a-bcde-fgh-iii Transmitter; Ambient temperature -40°C to +60°C. Enclosure Type 4X, IP67.

The TRICOR TCD9x00-a-bcde-fgh-iii Transmitter is intended to be powered via a 20 Vdc to 90 Vdc (11 W) or 250 Vac (30 VA) power supply connected to the following terminals:

<b>Power Supply</b> Terminals: L (1) and N (2)	Um	=	264 V
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The TRICOR TCD9200-a-bcde-fgh-iii is intended for direct connection to the TRICOR Sensors via a 4-pin flameproof connection or flameproof cable gland and cable. The four-wire connection to the remote TRICOR Sensor with DSL from the TRICOR TCD9200-a-bcde-fgh-iii Transmitter is intrinsically safe [Ex ia Ga] and provides both power and serial communications. This four-wire connection has the following safety description:

SSL Interface	Circuit type	Active IIC	Active IIB
M12 Connector - Pins 1 to 4	Uo	17.42 V	
	Io	459 mA	
	Po	2.0 W	
	Ci	840 pF	
	Co	338 nF	1.96 $\mu$ F
	Li	4 $\mu$ H	
	Lo	134 $\mu$ H	675 $\mu$ H
	Lo /Ro	17.8 $\mu$ H/ $\Omega$	

The STRICOR TCD9100-a-bcde-fgh-iii or TCD9220-a-bcde-fgh-iii is alternatively intended for a connection via a suitable-certified flameproof adaptor to other separately-certified sensor types. The 10 wire connection in the adaptor to the remote Sensor from the TRICOR TCD9x00-a-bcde-fgh-iii is intrinsically safe and provides signal wires to the driver, pickups and temperature sensors.

	Circuit type	IIC parameters	IIB parameters
<b>Driver, ia</b>	Uo	11.7 V	
	Io	59.1 mA	
	Po	171 mW	
	Co	1.54 $\mu$ F	10.3 $\mu$ F
	Lo	10.2 mH	40.7 mH
<b>Pickup 1, ia</b>	Uo	5.85 V	
	Io	8.69 mA	
	Po	12.71 mW	
	Ls	1 $\mu$ H	
	Co	43 $\mu$ F	1000 $\mu$ F
	Lo	470.829 mH	1.9 H
<b>Pickup 2, ia</b>	Uo	5.85V	
	Io	8.69 mA	
	Po	12.71 mW	
	Ls	1 $\mu$ H	
	Co	43 $\mu$ F	1000 $\mu$ F
	Lo	470.82 mH	1.883H
<b>Temp, ia</b>	Uo	11.7V	
	Io	2.2mA	
	Po	6.4 mW	
	Co	1.54 $\mu$ F	10.3 $\mu$ F
	Lo	7.69 H	29.38 H



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The TRICOR TCD9x00-a-bcde-fgh-iii transmits the measurements back to the safe area via the following intrinsically field connections:

<b>HART (Active)</b>  Terminal: Ca+ (4) and C (5)	Circuit type	Active IIC	Active IIB
	Uo	28 V	
	Io	85 mA	
	Po	0.584 W	
	Co	72 nF	639 nF
	Lo	1.64 mH	16.4 mH

<b>HART (Passive)</b>  Terminals: C (5) and Cp- (6)	Circuit type	Passive IIC	Passive IIB
	Ui	30 V	N/A
	Ii	100 mA	N/A
	Pi	1 W	N/A
	Ci	15.8 nF	N/A
	Li	36 µH	N/A

<b>IO (Channel 2)</b>  Active Terminal: IO2+ (8) and IO2 (9)  Passive Terminal: IO2 (9) and IO2-(10)	Circuit type	Active IIC	Passive	Active IIB	Passive IIB
	Uo	28 V	N/A	N/A	
	Io	87 mA	N/A	N/A	
	Po	0.601 W	N/A	N/A	
	Co	78 nF	61 nF	645 nF	
	Lo	1.46 mH	3.6 mH	15.7 mH	
	Ui	N/A	30 V		
	Ii	N/A	100 mA		
	Pi	N/A	1 W		
	Ci	N/A	7.3 nF		
	Li	N/A	36 µH		

<b>IO (Channel 3)</b>  Active Terminal: IO3 + (11) and IO3 (12) Passive Terminal: IO3 (12) and IO3 – (13) Relay Terminal: NC (11), C(12) and NO (13)	Circuit type	Active IIC	Passive IIC	Relay	Active IIB	Passive IIB
	Uo	28 V	N/A	N/A		
	Io	87 mA	N/A	N/A		
	Po	0.601 W				
	Co	78 nF	61 nF	59 nF	645 nF	
	Lo	1.46 mH	3.6 mH	3.4 mH	15.7 mH	
	Ui	N/A	30V	30 V		
	Ii	N/A	100 mA	100 mA		
	Pi	N/A	1 W	1W		
	Ci	4.2 nF	7.3 nF	7.3 nF		
Li	34 µH	36 µH	36 µH			



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<b>IO (Channel 4)</b>	Circuit type	Active IIC	Passive IIC	Relay	Active IIB	Passive IIB
Active Terminal: IO4+(14) and IO4 (15)	Uo	28 V	N/A	N/A		
	Io	87 mA	N/A	N/A		
	Po	0.601 W	N/A	N/A		
Passive Terminal: IO4 (15) and IO4- (16)	Co	78 nF	61 nF	59 nF	645 nF	
	Lo	1.46 mH	3.6 mH	3.4 mH	15.7 mH	
	Ui	N/A	30V	30 V		
Relay Terminal: NC (14), C (15) and NO (16)	Ii	N/A	100 mA	100 mA		
	Pi	N/A	1 W	1W		
	Ci	4.2 nF	7.3 nF	7.3 nF		
	Li	34 μH	36 μH	36 μH		

<b>Modbus</b>	Modbus input, ia IIC	Modbus output, ia IIC	Modbus output, ia IIB
Terminal (4) and (5)	Ui =4.2V	Uo = 4.2 V	Uo = 4.2 V
	Ii = 149 mA	Io = 117.8 mA	Io = 117.8 mA
	Pi =156 mW	Po =124 mW	Po =124 mW
	Ci < 500 pF	Co = 420 μF	Co = 1000 μF
	Li < 50 μH	Lo = 2.51 mH	Lo = 10.198 mH

<b>Profibus</b>	Profibus: Application with linear barrier (IIB and IIC)	Application according to FISCO (IIB and IIC)
Terminal (4) and (5)	Ui =30 V	Ui = 17.5 V
	Ii = 380 mA	Ii = 380 mA
		Pi = 5.32W
	Ci = 258 pF	Ci = 258 pF
	Li = 2.3 μH	Li = 2.3 μH

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**Conditions of Acceptability:**

Hazloc- Conditions of Acceptability:

- i Maximum safe area voltage must not exceed 250V
- ii The TRICOR TCD9x00-a-bcde-fgh-iii shall only be electrically powered / connected to an overvoltage category II or better circuit as defined in IEC 60664-1 and required by Annex F of CAN/CSA-C22.2 No. 60079-11/ UL 60079-11.
- iii. The quoted entity parameters of Co and Lo are applicable for the distributed capacitance and inductance in cables. Where there is circuit capacitance or inductance in the connected equipment (represented by Ci and Li) that both total more than 1% of quoted Co and Lo then the Co and Lo of the connected equipment shall not exceed 50% of the quoted Co and Lo values.
- iv The maximum dust layer shall be no greater than 5mm (T5 85°C).
- v The apparatus housing shall be connected to the potential equalising conductor in the hazardous area.
- vi The maximum allowable process fluid temperatures with respect to the marked temperature class and maximum surface temperature for the device in the following maximum ambient temperatures are:

Ta/°C	Maximum Process Temperature /°C			
	T6	T5	T4	T3
60	80	80	80	80
55	85	100	110	110
50	85	100	135	140
45	85	100	135	170
40	85	100	135	200
35	85	100	135	200
30	85	100	135	200

Ordloc - Conditions of Acceptability:

- i If at any time there is a conflict between the system safety provisions and any relevant local (national or regional) requirements, the local requirements always take precedence.



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TCD9xx0-a-bcde-fgh-iii

	T	C	D	9	x	0	0	-	a	-	b	c	d	e	-	f	g	h	-	iii
<b>Product group &amp; family</b>																				
<b>Flow rate</b>				04	05	06	07													
				9	1	0	0													
				9	2	0	0													
				9	2	2	0													
<b>HOUSING</b>																				<b>08</b>
TCD 9100 - Direct meter mount electronics, 1/2" NPT																				T
TCD 9200 - Remote Display + Link Modul, 1/2" NPT																				R
TCD 9220 - Remote electronics with Display, 1/2" NPT																				S
TCD 9100 - Direct meter mount electronics, M20x1.5																				K
TCD 9200 - Remote Display + Link Modul, M20x1.5																				I
TCD 9220 - Remote electronics with Display, M20x1.5																				O
<b>Interface (Ch1)</b>																				<b>09</b>
Current Output 4-20 mA HART active (Ex)																				H
Current Output 4-20 mA HART passive (Ex)																				I
Profibus PA (Ex/Non-Ex)																				J
Modbus RTU (Ex)																				M
<b>Supply voltage</b>																				<b>10</b>
																				B
<b>Plug-In I/O-Card (CH2.. CH4)</b>																				<b>11</b>
None																				A
(Ex-active) Signal I/O, Signal I/O, none																				G
(Ex-active) Signal I/O, Signal I/O, Signal I/O																				H
(Ex-active) Signal I/O, Signal I/O, Relay																				I
(Ex-passive) Signal I/O, None, None																				J
(Ex-passive) Signal I/O, Signal I/O, none																				K
(Ex-passive) Signal I/O, Signal I/O, Signal I/O																				L
(Ex-passive) Signal I/O, Signal I/O, Relay																				M
<b>Type and Length of Cable</b>																				<b>12</b>
not Ex-relevant																				*
<b>Ex Protection</b>																				<b>13</b>
ATEX/IECEX: Ex-Zone 1: Group IIC, T*																				E
CSA (US): Class I, Div. 1: Gp. A-D - CSA (US): Class I, Zone 1, IIC T*																				x
CSA/ATEX/IECEX/EAC Ex, Zone 1: Group IIC, T*																				E
CSA (Can): Ex-Zone 1: Group IIC, T*																				x
																				1
																				E
																				x
																				3
																				E
																				x
																				4
<b>Customer Specific, Software, Display</b>																				
not Ex-relevant																				***



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**CLASS 2258 84** - PROCESS CONTROL EQUIPMENT - Intrinsically Safe, Entity - - For Hazardous Locations - Certified to US Standards

Canadian Marking:

**Ex db eb ia [ia Ga] IIC T3-T6 Gb**  
**Ex tb [ia Da] IIC T85°C**

US marking:

**Class I, II, III, Division 1, Groups A, B, C, D, E, F, G**  
**Class I, Zone 1, AEx db eb ia [ia Ga] IIC T3-T6 Gb**  
**Zone 21, AEx tb [ia Da] IIC T85°C**

Coriolis Digital Mass Flowmeter –TRICOR model TCMQabcd-\*\*\*\*-\*\*\*\*-\*-\*efghij-\*\*\*-\*\*\* (remote configuration equal option h = R or I and Compact configuration equal option h = T or K). Ambient temperature - 40°C to 60°C (see note below). Enclosure Type 4X, IP67. MWP = 10000 kPa (100 bar, 1450 psi).

The TRICOR TCMQabcd-\*\*\*\*-\*\*\*\*-\*-\*efghij-\*\*\*-\*\*\* is a two chamber (Electronics and Terminal) flameproof ‘Ex d’ and increased safety ‘Ex e’ transmitter enclosure mounted on top of a flameproof ‘Ex d’ sensor enclosure. The TRICOR Sensor is powered directly by the TRICOR TCD Transmitter via a glass to metal bushing fitted within the interconnecting pedestal. The transmitter electronics flameproof chamber is fitted with various electronics modules and has a display and window fitted to one end. The transmitter terminal increased safety chamber is fitted with user terminals that allow for direct connection of an external power supply and intrinsically safe field circuits. These field connections are electrically routed to the electronics chamber via a single internal flameproof bushing.

The TRICOR TCD Transmitter is intended to be powered via an 20 Vdc to 90 Vdc (11 W) or 250 Vac (30 VA) power supply connected to the following terminals:

<b>Power Supply</b> Terminals: L (1) and N (2)	Um	=	264 V
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The TRICOR TCD Transmitter is intended for direct connection to the TRICOR TCMQ Sensor via a 4-pin flameproof connection or flameproof cable gland and cable. The four-wire connection to the remote TRICOR TCMQ Sensor with DSL from the TRICOR TCD Transmitter is intrinsically safe [Ex ia Ga] and provides both power and serial communications. This four-wire connection has the following safety description:

SSL Interface	Circuit type	Active IIC	Active IIB
M12 Connector - Pins 1 to 4	Uo	17.42 V	
	Io	459 mA	
	Po	2.0 W	
	Ci	840 pF	
	Co	338 nF	1.96 µF
	Li	4 µH	
	Lo	134 µH	675 µH
	Lo /Ro	17.8 µH/Ω	



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The TRICOR TCD transmits the measurements taken by the TRICOR TCMQ Sensor back to the safe area via the following intrinsically field connections:

<b>HART (Active)</b>  Terminal: Ca+ (4) and C (5)	Circuit type	Active IIC	Active IIB
	Uo	28 V	
	Io	85 mA	
	Po	0.584 W	
	Co	72 nF	639 nF
	Lo	1.64 mH	16.4 mH

<b>HART (Passive)</b>  Terminals: C (5) and Cp- (6)	Circuit type	Passive IIC	Passive IIB
	Ui	30 V	N/A
	Ii	100 mA	N/A
	Pi	1 W	N/A
	Ci	15.8 nF	N/A
	Li	36 µH	N/A

<b>IO (Channel 2)</b>  Active Terminal: IO2+ (8) and IO2 (9)  Passive Terminal: IO2 (9) and IO2-(10)	Circuit	Active IIC	Passive IIC	Active	Passive
	Uo	28 V	N/A	N/A	
	Io	87 mA	N/A	N/A	
	Po	0.601 W	N/A	N/A	
	Co	78 nF	61 nF	645 nF	
	Lo	1.46 mH	3.6 mH	15.7 mH	
	Ui	N/A	30 V		
	Ii	N/A	100 mA		
	Pi	N/A	1 W		
	Ci	N/A	7.3 nF		
	Li	N/A	36 µH		

<b>IO (Channel 3)</b>  Active Terminal: IO3 + (11) and IO3 (12)  Passive Terminal: IO3 (12) and IO3 -(13)  Relay Terminal: NC (11), C(12) and NO (13)	Circuit type	Active IIC	Passive IIC	Relay	Active IIB	Passive IIB
	Uo	28 V	N/A	N/A		
	Io	87 mA	N/A	N/A		
	Po	0.61 W				
	Co	78 nF	61 nF	59 nF	645 nF	
	Lo	1.46 mH	3.6 mH	3.4 mH	15.7 mH	
	Ui	N/A	30V	30 V		
	Ii	N/A	100 mA	100 mA		
	Pi	N/A	1 W	1W		
	Ci	4.2 nF	7.3 nF	7.3 nF		
	Li	34 µH	36 µH	36 µH		





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<b>IO (Channel 4)</b>	<b>Circuit type</b>	<b>Active IIC</b>	<b>Passive IIC</b>	<b>Relay</b>	<b>Active IIB</b>	<b>Passive IIB</b>
Active Terminal: IO4+(14) and IO4 (15)	Uo	28 V	N/A	N/A		
	Io	87 mA	N/A	N/A		
Passive Terminal: IO4 (15) and IO4- (16)	Po	0.61 W	N/A	N/A		
	Co	78 nF	61 nF	59 nF	645 nF	
	Lo	1.46 mH	3.6 mH	3.4 mH	15.7 mH	
Relay Terminal: NC (14), C (15) and NO (16)	Ui	N/A	30V	30 V		
	Ii	N/A	100 mA	100 mA		
	Pi	N/A	1 W	1W		
	Ci	4.2 nF	7.3 nF	7.3 nF		
	Li	34 μH	36 μH	36 μH		

<b>Modbus</b>	<b>Modbus input, ia IIC</b>	<b>Modbus output, ia</b>	<b>Modbus output, ia</b>
Terminal (4) and (5)	Ui =4.2V	Uo = 4.2 V	Uo = 4.2 V
	Ii = 149 mA	Io = 117.8 mA	Io = 117.8 mA
	Pi =156 mW	Po =124 mW	Po =124 mW
	Ci < 500 pF	Co = 420 μF	Co = 1000 μF
	Li < 50 μH	Lo = 2.56 mH	Lo = 10.198 mH

<b>Profibus</b>	<b>Profibus: Application with linear barrier (IIB and IIC)</b>	<b>Application according to FISCO (IIB and IIC)</b>
Terminal (4) and (5)	Ui =30 V	Ui = 17.5 V
	Ii = 380 mA	Ii = 380 mA
		Pi = 5.32 W
	Ci = 258 pF	Ci = 258 pF
	Li = 2.3 μH	Li = 2.3 μH



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**Conditions of Acceptability:**

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- ii The TRICOR TCMQabcd-\*\*\*\*-\*\*\*\*-\*\_\*efghij-\*\*\*-\*\*\*\* shall only be electrically powered / connected to an overvoltage category II or better circuit as defined in IEC 60664-1 and required by Annex F of CAN/CSA-C22.2 No. 60079-11/ UL 60079-11.
- iii. The quoted entity parameters of Co and Lo are applicable for the distributed capacitance and inductance in cables. Where there is circuit capacitance or inductance in the connected equipment (represented by Ci and Li) that both total more than 1% of quoted Co and Lo then the Co and Lo of the connected equipment shall not exceed 50% of the quoted Co and Lo values.
- iv The maximum dust layer shall be no greater than 5mm (T5 85°C).
- v The apparatus housing shall be connected to the potential equalising conductor in the hazardous area.
- vi The maximum allowable process fluid temperatures with respect to the marked temperature class and maximum surface temperature for the device in the following maximum ambient temperatures are:

Ta/°C	Maximum Process Temperature /°C			
	T6	T5	T4	T3
60	80	80	80	80
55	85	100	110	110
50	85	100	135	140
45	85	100	135	170
40	85	100	135	200
35	85	100	135	200
30	85	100	135	200

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### APPLICABLE REQUIREMENTS

CAN/CSA-C22.2 No. 0-10 <i>August 2011</i>	General requirements — Canadian Electrical Code, Part II
CAN/CSA-C22.2 No. 60079-1:16	Explosive atmospheres – Part 1: Equipment protection by flameproof enclosures “d”
CAN/CSA-C22.2 No. 60079-0:19	Explosive atmospheres – Part 0: Equipment – General requirements
CAN/CSA-C22.2 No. 60079-7:16	Explosive atmospheres – Part 7: Equipment protection by increased safety “e”
CAN/CSA-C22.2 No. 60079-11:14	Explosive atmospheres – Part 11: Equipment protection by intrinsic safety “i”
CAN/CSA-C22.2 No. 60079-31:15	Explosive atmospheres – Part 31: Equipment dust ignition protection by enclosure “t”
ANSI/UL 61010-1-2016	Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use — Part 1: General Requirements
ANSI/UL 60079-0-2019	Explosive atmospheres – Part 0: Equipment – General requirements
ANSI/UL 60079-1-2015	Explosive Atmospheres – Part 1: Equipment Protection by Flameproof Enclosures “d”
ANSI/UL 60079-7:2017	Explosive Atmospheres – Part 7: Equipment protection by increased safety “e”
ANSI/UL 60079-11-2014 <i>Sixth Edition</i> )	Explosive Atmospheres – Part 11: Equipment Protection by Intrinsic Safety “i”
ANSI/ISA-60079-31:2013	Explosive Atmospheres – Part 31: Equipment Dust Ignition Protection by Enclosure “t”
FM 3615:2006*	Explosion proof Electrical Equipment General Requirements
FM 3600:1998*	Electrical Equipment For Use in Hazardous (classified) Locations- General Requirements
FM 3810:2005*	Electrical Equipment For Measurement, Control and Laboratory Use

\* Used for US divisions marking only.

### MARKINGS

The manufacturer is required to apply the following markings:

- Products shall be marked with the markings specified by the particular product standard.
- Products certified for Canada shall have all Caution and Warning markings in both English and French.

Additional bilingual markings not covered by the product standard(s) may be required by the Authorities Having Jurisdiction. It is the responsibility of the manufacturer to provide and apply these additional markings, where applicable, in accordance with the requirements of those authorities.

The products listed are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US (indicating that products have been manufactured to the requirements of both Canadian and U.S. Standards) or with adjacent indicator 'US' for US only or without either indicator for Canada only.

The following markings are provided on a CSA Accepted (Class 7923.01) or UL Recognized to Canadian requirements (PGJ18), and UL Recognized (PGJ12) or CSA Accepted to US Standards (Class 7923.81) adhesive




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nameplate, used with the printer and ribbon specified in the Listing, and is suitable for indoor and outdoor use on stainless steel, at a maximum service temperature of 100°C or higher. Nameplate is affixed to the side of the stainless steel sensor housing.

- Manufacturer's name: KEM Kueppers Elektromechanik GmbH", or CSA Master Contract Number 274452, adjacent to the CSA Mark in lieu of manufacturer's name.
- Model Order Code: As specified in the PRODUCTS section, above.
- Electrical ratings: As specified in the PRODUCTS section, above.
- Ambient temperature rating: As specified in the PRODUCTS section, above.
- Manufacturing date in MMY format, or serial number, traceable to year and month of manufacture.
- Enclosure ratings: "Type 4X".
- Ingress Protection rating: "IP67".
- The CSA Mark with or without "C" and "US" indicators, as shown on the Certificate of Conformity.
- The designation "Exia", adjacent to the CSA mark.
- The 2 digit year and CSA certificate number, separated by a decimal point "19.70209632", adjacent to the CSA mark.
- Hazardous Location protection method designation.
- Specification for Maximum Working Pressure: As specified in the PRODUCTS section, above.

Additionally, the following markings shall be provided on the equipment in a permanent manner:

- Terminal Designations adjacent to each field wiring terminal.
- The designation "GND", and/or ISO 60417, Symbol 5019 , adjacent to the equipment ground (protective conductor) terminal.
- The following words, or suitable equivalent:
  - "OPEN CIRCUIT BEFORE REMOVING COVER" or "KEEP COVER TIGHT WHILE CIRCUITS ARE ALIVE", or "WARNING – DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT".

*Note - Jurisdictions in Canada may require these markings to also be provided in French language. It is the responsibility of the manufacturer to provide bilingual marking, where applicable, in accordance with the requirements of the Provincial Regulatory Authorities. It is the responsibility of the manufacturer to determine this requirement and have bilingual wording added to the "Markings".*

**Nameplate adhesive label material approval information:**

See above.