



Certificate of Compliance

Certificate: 2534011

Master Contract: 220043

Project: 70119722

Date Issued: 2017-04-27

Issued to: AW-Lake Company
2440 W Corporate Preserve Dr.
Suite #600
Oak Creek, Wisconsin 53154
USA

Attention: Chris Husson

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:

Jens Ensminger

PRODUCTS

CLASS - C225802 - PROCESS CONTROL EQUIPMENT -For Hazardous Locations-

CLASS - C225882 - PROCESS CONTROL EQUIPMENT -For Hazardous Locations - Certified to US Standards

Class I, Division 1 and 2, Groups C and D: T4

Coriolis Flow Meter model Tricor TCE80** / TCMz****, Explosionproof Compact version only.
Rated: 100 to 240 Vac, 50/60 Hz, 6W or 24 Vdc, 4W. Type 4X.

Type Code:

Coriolis Flow Meter type Tricor TCE80** / TCMz**** comprising:

- Transmitter unit type TCE80**-C-****-Ex1-** respectively:
- one of the following Transducer units, per Intrinsic Safety connections:



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Type

- TCMz0325-**-****-C***-Ex1-**
- TCMz0450-**-****-C***-Ex1-**
- TCMz0650-**-****-C***-Ex1-**
- TCMz1550-**-****-C***-Ex1-**
- TCMz3100-**-****-C***-Ex1-**
- TCMz5500-**-****-C***-Ex1-**
- TCMz7900-**-****-C***-Ex1-**
- TCMz28K-**-****-C***-Ex1-**
- TCMz65K-**-****-C***-Ex1-**

Where:

z = Blank (Standard Calibration) or H (High Pressure Gas Application Calibration).

Transmitter Unit Tricor type series TCE80-C-****-Ex1-**, type code:**

- TCE800n-C-bcde-Ex1-xx: Reduced driver power electronics designed for Transducer type TCMz0325-**-****-C***-Ex1-**: to type TCMz7900-**-****-C***-Ex1-**:
- TCE801n-C-bcde-Ex1-xx: Enhanced driver power electronics designed for Transducer type TCMz28k-**-****-C***-Ex1-**: to TCMz230k-**-****-C***-Ex1-** (See Notes 3 and 4.):
- TCE802n-C-bcde-Ex1-xx: Enhanced driver power electronics providing adjustable amplification factor designed for Transducer type TCMz28k-**-****-C***-Ex1-**: to TCMz230k-**-****-C***-Ex1-** (See Notes 3 and 4.):

Where:

- n = 0... 9 Hardware and Software options not affecting Ex-relevant parameters
- a = W Wall-mountable flameproof enclosure; screwed cable gland
 L Panel-mountable housing designed (for installation in the safe area only)
 C Compact mounted flameproof enclosure
- b = A-Z Interface (details see manual)
- c = B Power supply DC 24 V and AC 100 V... 240 V
 D Power supply DC 24 V
 M Power supply AC 100 V ... 240 V
- d = A-Z Hardware- and Software-options not affecting Ex-relevant parameters
- e = A-Z Cable length with reference to model TCE80**-C-****-Ex1-**
- xx = 00 – 99 Special versions, due to application; not affecting Ex-relevant parameters
- z = Blank (Standard Calibration) or H (High Pressure Gas Application Calibration).

Transducer Unit Tricor type series TCMz**-**-****-C***-Ex1-**, per Intrinsic Safety Connections; type code:**

Type	Flow rate
TCMz0325-ab-cdef-Chik-Ex1-xx	≤ 300 kg/h
TCMz0450-ab-cdef-Chik-Ex1-xx	≤ 650 kg/h



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Type	Flow rate
TCMz0650- ab-cdef-Chik-Ex1-xx	≤ 600 kg/h
TCMz1550- ab-cdef-Chik-Ex1-xx	≤ 1,500 kg/h
TCMz3100- ab-cdef-Chik-Ex1-xx	≤ 3,000 kg/h
TCMz5500- ab-cdef-Chik-Ex1-xx	≤ 5,500 kg/h
TCMz7900- ab-cdef-Chik-Ex1-xx	≤ 7,900 kg/h
TCMz28k- ab-cdef-Chik-Ex1-xx	≤ 28,000 kg/h
TCMz65k- ab-cdef-Chik-Ex1-xx	≤ 65,000 kg/h

Where:

a to f: mechanical details, g to k: electrical parameters

- ab = AA-ZZ Size and shape of process connection (details: see manual)
- c = A-Z Temperature range
- d = A-Z Pressure range (details: see manual)
- e = A-Z Accuracy (details: see manual)
- f = A-Z Mounting length (details: see manual)
- g = A Terminal box (for IS connection to transmitter)
- C Compact version (details: see manual)
- h = A-Z Non-IS interface (details: see manual)
- Z Not provided
- i = D Power supply DC 24 V; non-IS
- M Power supply AC 100 V... 240 V; non-IS
- Z Not provided
- k = A-Z Hardware- and Software-options not affecting Ex-relevant parameters
- xx = 00 – 99 Special versions, due to application; not affecting Ex-relevant parameters
- z = Blank (Standard Calibration) or H (High Pressure Gas Application Calibration).

Notes: (referring to position g, h, i)

1. Separate transducer: only option A possible at position 'g'; (position 'h' and 'i': power supply and interface not provided; marked therefore with Z)
2. Compact version: only option C possible at position 'g', position 'h' and 'i' all listed options available.
3. The 230k is not available in a Compact version.
4. The 28k and 65k transducers must be used with the V22 main board and V15 barrier board. The 230k transducer must be used with the V23 main board and V16 barrier board.
5. Note that this section of the report (**2258 02/82**) is for the Compact version only, which has an explosion-proof transmitter integrally connected to the transducer, and *internal* IS connections to the transducer.
6. “Ex1” can be replaced with “Ex3” in the TCE and TCM model codes as follows TCE80**-C-****-Ex3-** and TCMz****-**-****-C***-Ex3-**.

Ratings:

1. Transmitter assembled into Explosionproof enclosure

1.1 Non-IS circuits



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Parameter / Circuit	Voltage U _n	Voltage U _m	Terminals
Power supply (AC)) ¹ exclusive-or Power supply (DC)) ¹	230 V 24 V	AC 250 V AC 250 V	91 (N), 90 (L), 52 (PE) 50 (+24 V), 51 (GND), 52 PE)
Digital-input	24V	AC 250 V	7 (CTL IN), 8 (GND)
Digital output	24V	AC 250 V	5 (F-OUT), 6 (CTL OUT)

Remark: Relay-SPDT-contact not provided)¹ according to model

2. For the Coriolis C-Flow Meter type Tricor TCE80 / TCMz****, respectively, the following ambient temperature range applies:**

Model	Type	Ambient temperature range	Process temperature range	Temperature code
Flameproof enclosure	TCE80**-C-****-Ex1-**	- 40 °C ≤ T _a ≤ 70°C	not applicable	T4
Transducer compact version	TCMz****-**-****-C****-Ex1-**	- 40 °C ≤ T _a ≤ 70°C	-40 °C ≤ T ≤ 70°C	T4

Remark: 'x' see full-scale type code

Class I, Division 1 and 2, Groups A, B, C and D: T4

Coriolis Flow Meter model Tricor TCE80** / TCMz****, Explosionproof Compact version only.
 Rated: 100 to 240 Vac, 50/60 Hz, 6W or 24 Vdc, 4W. Type 4X.

Type Code:

Coriolis Flow Meter type Tricor TCE80** / TCMz**** comprising:

- Transmitter unit type TCE80**-C-****-Ex1-** respectively:
- one of the following Transducer units, per Intrinsic Safety connections:

Type

- TCMz0325-**-****-C****-Ex1-**
- TCMz0450-**-****-C****-Ex1-**
- TCMz0650-**-****-C****-Ex1-**
- TCMz1550-**-****-C****-Ex1-**
- TCMz3100-**-****-C****-Ex1-**
- TCMz5500-**-****-C****-Ex1-**
- TCMz7900-**-****-C****-Ex1-**

Where:

z = Blank (Standard Calibration) or H (High Pressure Gas Application Calibration).



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Transmitter Unit Tricor type series TCE80-C-****-Ex1-**; type code:**

TCE800n-C-bcde-Ex1-xx: Reduced driver power electronics designed for Transducer type TCMz0325-**-****-C***-Ex1-**: to type TCMz7900-**-****-C***-Ex1-**;

Where:

- n = 0... 9 Hardware and Software options not affecting Ex-relevant parameters
- a = W Wall-mountable flameproof enclosure; screwed cable gland
- L Panel-mountable housing designed (for installation in the safe area only)
- C Compact mounted flameproof enclosure
- b = A-Z Interface (details see manual)
- c = B Power supply DC 24 V and AC 100 V... 240 V
- D Power supply DC 24 V
- M Power supply AC 100 V ... 240 V
- d = A-Z Hardware- and Software-options not affecting Ex-relevant parameters
- e = A-Z Cable length with reference to model TCE80**-C-****-Ex1-**
- xx = 00 – 99 Special versions, due to application; not affecting Ex-relevant parameters
- z = Blank (Standard Calibration) or H (High Pressure Gas Application Calibration).

Transducer Unit Tricor type series TCMz**-**-****-C***-Ex1-**, per Intrinsic Safety Connections; type code:**

Type	Flow rate
TCMz0325-ab-cdef-Chik-Ex1-xx	≤ 300 kg/h
TCMz0450- ab-cdef-Chik-Ex1-xx	≤ 650 kg/h
TCMz0650- ab-cdef-Chik-Ex1-xx	≤ 600 kg/h
TCMz1550- ab-cdef-Chik-Ex1-xx	≤ 1,500 kg/h
TCMz3100- ab-cdef-Chik-Ex1-xx	≤ 3,000 kg/h
TCMz5500- ab-cdef-Chik-Ex1-xx	≤ 5,500 kg/h
TCMz7900- ab-cdef-Chik-Ex1-xx	≤ 7,900 kg/h

Where:

a to f: mechanical details, g to k: electrical parameters

- ab = AA-ZZ Size and shape of process connection (details: see manual)
- c = A-Z Temperature range
- d = A-Z Pressure range (details: see manual)
- e = A-Z Accuracy (details: see manual)
- f = A-Z Mounting length (details: see manual)
- g = A Terminal box (for IS connection to transmitter)
- C Compact version (details: see manual)
- h = A-Z Non-IS interface (details: see manual)
- Z Not provided
- i = D Power supply DC 24 V; non-IS



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- M Power supply AC 100 V... 240 V; non-IS
- Z Not provided
- k = A-Z Hardware- and Software-options not affecting Ex-relevant parameters
- xx = 00 – 99 Special versions, due to application; not affecting Ex-relevant parameters
- z = Blank (Standard Calibration) or H (High Pressure Gas Application Calibration).

Notes: (referring to position g, h, i)

1. Separate transducer: only option A possible at position 'g'; (position 'h' and 'i': power supply and interface not provided; marked therefore with Z)
2. Compact version: only option C possible at position 'g', position 'h' and 'i' all listed options available.
3. Note that this section of the report (**2258 02/82**) is for the Compact version only, which has an explosion-proof transmitter integrally connected to the transducer, and *internal* IS connections to the transducer.
4. “Ex1” can be replaced with “Ex3” in the TCE and TCM model codes as follows TCE80**-C-****-**Ex3**-** and TCMz****-**-****-C***-**Ex3**-**.

Ratings:

1. Transmitter assembled into Explosionproof enclosure

1.1 Non-IS circuits

Parameter / Circuit	Voltage U _n	Voltage U _m	Terminals
Power supply (AC)) ¹	230 V	AC 250 V	91 (N), 90 (L), 52 (PE)
exclusive-or Power supply (DC)) ¹	24 V	AC 250 V	50 (+24 V), 51 (GND), 52 PE)
Digital-input	24V	AC 250 V	7 (CTL IN), 8 (GND)
Digital output	24V	AC 250 V	5 (F-OUT), 6 (CTL OUT)

Remark: Relay-SPDT-contact not provided)¹ according to model

2. For the Coriolis C-Flow Meter type Tricor TCE80 / TCMz****, respectively, the following ambient temperature range applies:**

Model	Type	Ambient temperature range	Process temperature range	Temperature code
Flameproof enclosure	TCE80**-C-****-Ex1-**	- 40 °C ≤ T _a ≤ 70°C	not applicable	T4
Transducer compact version	TCMz****-**-****-C***-Ex1-**	- 40 °C ≤ T _a ≤ 70°C	-40 °C ≤ T ≤ 70°C	T4

Remark: 'x' see full-scale type code

CLASS 2258 03 PROCESS CONTROL EQUIPMENT – Intrinsically Safe and Non Incendive Systems – For Hazardous Locations

CLASS 2258 83 PROCESS CONTROL EQUIPMENT – Intrinsically Safe and Non-Incendive Systems – For Hazardous Locations – Certified to U.S. Standards



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Class I, Division 1 and 2, Groups C and D: T4

Coriolis Flow Meter model Tricor TCE80** / TCMz****. Rated: 100 to 240 Vac, 50/60 Hz, 6W or 24 Vdc, 4W. Install per drawing TCM_E80_E_EN_160520_E004.

Type Code:

Coriolis Flow Meter type Tricor TCE80** / TCMz**** comprising:

- Transmitter unit type TCE80**-*_****-Ex1-** respectively:
- one of the following Transducer units, per Intrinsic Safety connections:

Type

- TCMz0325-**-****-****-Ex1-**
- TCMz0450-**-****-****-Ex1-**
- TCMz0650-**-****-****-Ex1-**
- TCMz1550-**-****-****-Ex1-**
- TCMz3100-**-****-****-Ex1-**
- TCMz5500-**-****-****-Ex1-**
- TCMz7900-**-****-****-Ex1-**
- TCMz28K-**-****-****-Ex1-**
- TCMz65K-**-****-****-Ex1-**
- TCMz230K-**-****-****-Ex1-**

Where:

z = Blank (Standard Calibration) or H (High Pressure Gas Application Calibration).

Transmitter Unit Tricor type series TCE80-*_****-Ex1-**; type code:**

TCE800n-a-bcde-Ex1-xx: Reduced driver power electronics designed for Transducer type TCMz0325-**-****-****-Ex1-**: to type TCMz7900-**-****-****-Ex1-**;

TCE801n-a-bcde-Ex1-xx: Enhanced driver power electronics designed for Transducer type TCMz28k-**-****-****-Ex1-**: to TCMz230k-**-****-****-Ex1-** (See Notes 3 and 4.):

TCE802n-a-bcde-Ex1-xx: Enhanced driver power electronics providing adjustable amplification factor designed for Transducer type TCMz28k-**-****-****-Ex1-**: to TCMz230k-**-****-****-Ex1-** (See Notes 3 and 4.):

- n = 0... 9 Hardware and Software options not affecting Ex-relevant parameters
- a = W Wall-mountable flameproof enclosure; screwed cable gland
- L Panel-mountable housing designed (for installation in the safe area only)
- C Compact mounted flameproof enclosure
- b = A-Z Interface (details see manual)
- c = B Power supply DC 24 V and AC 100 V... 240 V
- D Power supply DC 24 V
- M Power supply AC 100 V ... 240 V
- d = A-Z Hardware- and Software-options not affecting Ex-relevant parameters



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e = A-Z Cable length with reference to model TCE80**-C-****-Ex1-**
 xx = 00 – 99 Special versions, due to application; not affecting Ex-relevant parameters
 z = Blank (Standard Calibration) or H (High Pressure Gas Application Calibration).

Transducer Unit Tricor type series TCMz**-**-****-****-Ex1-**, per Intrinsic Safety Connections;
 type code:**

Type	Flow rate
TCMz0325-ab-cdef-ghik-Ex1-xx	≤ 300 kg/h
TCMz0450- ab-cdef-ghik-Ex1-xx	≤ 450 kg/h
TCMz0650- ab-cdef-ghik-Ex1-xx	≤ 600 kg/h
TCMz1550- ab-cdef-ghik-Ex1-xx	≤ 1,500 kg/h
TCMz3100- ab-cdef-ghik-Ex1-xx	≤ 3,000 kg/h
TCMz5500- ab-cdef-ghik-Ex1-xx	≤ 5,500 kg/h
TCMz7900- ab-cdef-ghik-Ex1-xx	≤ 7,900 kg/h
TCMz28k- ab-cdef-ghik-Ex1-xx	≤ 28,000 kg/h
TCMz65k- ab-cdef-ghik-Ex1-xx	≤ 65,000 kg/h
TCMz230k- ab-cdef-ghik-Ex1-xx	≤ 230,000 kg/h

Where:

a to f: mechanical details, g to k: electrical parameters

ab = AA-ZZ Size and shape of process connection (details: see manual)
 c = A-Z Temperature range
 d = A-Z Pressure range (details: see manual)
 e = A-Z Accuracy (details: see manual)
 f = A-Z Mounting length (details: see manual)
 g = A Terminal box aluminium (for IS connection to transmitter)
 H Terminal box stainless steel (for IS connection to transmitter)
 C Compact version (details: see manual)
 h = A-Z Non-IS interface (details: see manual)
 Z Not provided
 i = D Power supply DC 24 V; non-IS
 M Power supply AC 100 V... 240 V; non-IS
 Z Not provided
 k = A-Z Hardware- and Software-options not affecting Ex-relevant parameters
 xx = 00 – 99 Special versions, due to application; not affecting Ex-relevant parameters
 z = Blank (Standard Calibration) or H (High Pressure Gas Application Calibration).

Notes: (referring to position g, h, i)

1. Separate transducer: only option A possible at position 'g'; (position 'h' and 'i': power supply and interface not provided; marked therefore with Z)
2. Compact version: only option C possible at position 'g', position 'h' and 'i' all listed options available.
3. The 230k is not available in a Compact version.

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4. The 28k and 65k transducers must be used with the V22 main board and V15 barrier board. The 230k transducer must be used with the V23 main board and V16 barrier board.
5. "Ex1" can be replaced with "Ex3" in the TCE and TCM model codes as follows TCE80**-C-****-Ex3-** and TCMz****-**-****-C***-Ex3-**.

Ratings:

1. Transmitter assembled into Panel mountable housing (for installation in the safe area only)

1.1 Non-IS circuits

Parameters / circuit	Voltage U _n	Voltage U _m	Terminals
Power supply (AC)	230 V	AC 250 V	91 (N), 90 (L), 52 (PE)
or optionally Power supply (DC)	24 V	AC 250 V	50 (+24 V), 51 (GND), 52 PE)
Relay-SPDT-contact	30 V	AC 250 V	40, 41, 42
RS485 interface	3.3 V	DC 30 V	22 (+), 21 (-), 20 (GND)
Foundation Fieldbus	24 V	DC 30 V	32 (FF+), 31 (FF-), 20 (GND)
Analogue output(4-20 mA)	24 V	DC 30 V	1 (I1+), 2 (I1-), 3 (I2+), 4 (I2-)
Analogue input (4-20 mA) option	24 V	DC 30 V	1 (I1+), 2 (I1-)
Digital-input	24 V	AC 250 V	7 (CTL IN), 8 (GND)
Digital output	24 V	AC 250 V	5 (F-OUT), 6 (CTL OUT)

1.2 IS circuits designed for interconnection to transducers (probes)

Parameter	Circuit			
	Driver		Sensor	Temperature sensor
Voltage U _o	DC 16.4 V	DC 9.4 V	DC 2 V	DC 10.5 V
Current I _o	382 mA	219 mA	17 mA	45 mA
Power P _o	1.56 W	515 mW		
Characteristics	Linear	linear	trapezoidal	trapezoidal
Connection	9-pol-Sub D connector			
Probe type	*CMz28K-x) ¹ *CMz65K-x) ¹ *CMz230K-x) ¹	*CMz0300-x) ¹ * CMz0450-x) ¹ *CMz0600-x) ¹ *CMz1500-x) ¹ *CMz3000-x) ¹ *CMz7900-x) ¹	(all models)	
Type of protection	Groups CD (Ex ia IIB)	Groups ABCD (Ex ia IIC)	Groups ABCD (Ex ia IIC / IIB)	

Remark:)¹ "*" replaced by 'K' or 'T'; 'x' see full-scale type code

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Where:

z = Blank (Standard Calibration) or H (High Pressure Gas Application Calibration).

2. Transmitter assembled into Explosionproof enclosure

2.1 Non-IS circuits

Parameter / Circuit	Voltage U _n	Voltage U _m	Terminals
Power supply (AC)) ¹ exclusive-or	230 V	AC 250 V	91 (N), 90 (L), 52 (PE)
Power supply (DC)) ¹	24 V	AC 250 V	50 (+24 V), 51 (GND), 52 PE)
RS485 interface	3.3V	DC 30 V	22 (+), 21 (-), 20 (GND)
Foundation Fieldbus	24V	DC 30 V	32 (FF+), 31 (FF-), 20 (GND)
Analogue output (4-20 mA)	24V	DC 30 V	1 (I1+), 2 (I1-), 3 (I2+), 4 (I2-)
Analogue input (4-20 mA) option	24 V	DC 30 V	1 (I1+), 2 (I1-)
Digital-input	24V	AC 250 V	7 (CTL IN), 8 (GND)
Digital output	24V	AC 250 V	5 (F-OUT), 6 (CTL OUT)

Remark: Relay-SPDT-contact not provided)¹ according to model

2.2 IS circuits designed for interconnection to transducers (probes)

Parameter	Circuit			
	Driver		Sensor	Temperature sensor
Voltage U _o	DC 16.4 V	DC 9.4 V	DC 2 V	DC 10.5 V
Current I _o	382 mA	219 mA	17 mA	45 mA
Power P _o	1.56 W	515 mW		
Characteristics	linear	linear	trapezoidal	trapezoidal
Connection facility	LEMO FAG.2B.308 (TCMz****_**_****-E***-Ex1-**, compact)) ² cable with open leads (KCE80**-WE-**-Ex1, wall mountable housing) cable with open leads TCE80**-E-****-Ex1-**, wall mountable housing) direct wiring (KCM****-EF/EFH/EM/EMH/E*(H)-**-**-**-Ex1, compact)) ²			
Probe type	*CMz28K-x) ¹ *CMz65K-x) ¹ *CMz230K-x) ¹	*CMz0300-x) ¹ * CMz0450-x) ¹ *CMz0600-x) ¹ *CMz1500-x) ¹ *CMz3000-x) ¹ *CMz7900-x) ¹	(all models)	
Type of protection	Groups CD (Ex ia IIB)	Groups ABCD (Ex ia IIC)	Groups ABCD (Ex ia IIC / IIB)	

Remarks:)¹ '*' replaced by 'K' or 'T'; 'x' see full-scale type code

)² compact version: Transmitter and Transducer Unit form a mechanical unit marked with KCM / TCMz

Where:



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z = Blank (Standard Calibration) or H (High Pressure Gas Application Calibration).

3. Intrinsically safe transducers (probes)

Parameter	Circuit			
	Driver		Sensor	Temperature sensor
Voltage U_i	DC 16.4 V	DC 9.4 V	DC 2 V	DC 10.5 V
Current I_i	382 mA	219 mA	17 mA	45 mA
Power P_i	1.56 W	515 mW		
Characteristics	linear	linear	trapezoidal	trapezoidal
Connection facility	screwed terminals (KCM****-0-**-**-2-Ex1, external) screwed terminals (KCM****-1-**-**-2-Ex1, external) screwed terminals (TCMz****-**-****-AZZ*-Ex1, external) LEMO HEG.2B.308 (TCMz****-**-****-E***-Ex1, compact) direct wiring (KCM****-EF/EFH/EM/EMH/E*(H)-**-**-**-Ex1, compact)			
Probe type	*CMz28K-x) ¹ *CMz65K-x) ¹ *CMz230K-x) ¹	*CMz0300-x) ¹ *CMz0450-x) ¹ *CMz0600-x) ¹ *CMz1500-x) ¹ *CMz3000-x) ¹ *CMz7900-x) ¹	(all models)	
Type of protection	Groups CD (Ex ia IIB)	Groups ABCD (Ex ia IIC)	Groups ABCD (Ex ia IIC / IIB)	

Remark:)¹ '*' replaced by 'K' or 'T'; 'x' see full-scale type code

Where:

z = Blank (Standard Calibration) or H (High Pressure Gas Application Calibration).

4. For the Coriolis C-Flow Meter type Tricor TCE80 / TCMz****, respectively, the following ambient temperature range applies:**

Model	Type	Ambient temperature range	Process temperature range	Temperature code
Panel mountable housing	TCE80**-L-****-Ex1-**-	$0\text{ }^{\circ}\text{C} \leq T_a \leq 60\text{ }^{\circ}\text{C}$	not applicable	not applicable
Flameproof enclosure	TCE80**-W-****-Ex1-**- or TCE80**-C-****-Ex1-**-	$-40\text{ }^{\circ}\text{C} \leq T_a \leq 70\text{ }^{\circ}\text{C}$	not applicable	T4
Transducer compact version	TCMz****-**-****- C***-Ex1-**-	$-40\text{ }^{\circ}\text{C} \leq T_a \leq 70\text{ }^{\circ}\text{C}$	$-40\text{ }^{\circ}\text{C} \leq T \leq 70\text{ }^{\circ}\text{C}$	T4
External transducer	TCMz****-**-****- A***-Ex1-**-	$-40\text{ }^{\circ}\text{C} \leq T_a \leq 70\text{ }^{\circ}\text{C}$	$-100\text{ }^{\circ}\text{C} \leq T \leq 70\text{ }^{\circ}\text{C}$	T4
			$-100\text{ }^{\circ}\text{C} \leq T \leq 135\text{ }^{\circ}\text{C}$	T3
			$-100\text{ }^{\circ}\text{C} \leq T \leq 210\text{ }^{\circ}\text{C}$	T2



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Remark: 'x' see full-scale type code

Special conditions for safe use:

1. Panel mountable housing, Transmitter Unit type TCE80**-L-****-Ex1-**
 - 1.1. The Transmitter Units shall be installed in the safe area only.
 - 1.2. The installation of Transmitter Units shall be carried out in such a way that the clearances of bare conductive parts of intrinsically safe circuits to grounded metal parts of the enclosure are at least 3 mm, and bare conductive parts of non-intrinsically safe circuits of other apparatus are located in a distance of at least 50 mm away from terminals for external intrinsically safe circuits, or are separated from them by a partition wall according to clause 6.2.1 of ANSI/UL 60079-11 Ed. 5.
2. Explosionproof enclosure, Transmitter Unit type TCE80**-W-****-Ex1-**
 - 2.1. The Transmitter Units shall be installed in the appropriate Hazardous Location.
 - 2.2. The installation of the Transmitter units shall be carried out in accordance with the local authorities having jurisdiction.
 - 2.3. The installation of Transmitter Units shall be carried out in such a way that the clearances of bare conductive parts of intrinsically safe circuits to grounded metal parts of the enclosure are at least 3 mm, and bare conductive parts of non-intrinsically safe circuits of other apparatus are located in a distance of at least 50 mm away from terminals for external intrinsically safe circuits, or are separated from them by a partition wall according to clause 6.2.1 of ANSI/UL 60079-11 Ed. 5.

Class I, Division 1 and 2, Groups A, B, C and D: T4

Coriolis Flow Meter model Tricor TCE80** / TCMz****. Rated: 100 to 240 Vac, 50/60 Hz, 6W or 24 Vdc, 4W.
Install per drawing TCM_E80_E_EN_160520_E004.

Type Code:

Coriolis Flow Meter type Tricor TCE80** / TCMz**** comprising:

- Transmitter unit type TCE80**-L-****-Ex1-** respectively:
- one of the following Transducer units, per Intrinsic Safety connections:
Type
 - TCMz0325-**-****-****-Ex1-**
 - TCMz0450-**-****-****-Ex1-**
 - TCMz0650-**-****-****-Ex1-**
 - TCMz1550-**-****-****-Ex1-**
 - TCMz3100-**-****-****-Ex1-**
 - TCMz5500-**-****-****-Ex1-**
 - TCMz7900-**-****-****-Ex1-**

Where:

z = Blank (Standard Calibration) or H (High Pressure Gas Application Calibration).

Transmitter Unit Tricor type series TCE80-L-****-Ex1-**; type code:**



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TCE800n-a-bcde-Ex1-xx: Reduced driver power electronics designed for Transducer type TCMz0325-**-****-****-Ex1-**; to type TCMz7900-**-****-****-Ex1-**:

- n = 0... 9 Hardware and Software options not affecting Ex-relevant parameters
- a = W Wall-mountable flameproof enclosure; screwed cable gland
- L Panel-mountable housing designed (for installation in the safe area only)
- C Compact mounted flameproof enclosure
- b = A-Z Interface (details see manual)
- c = B Power supply DC 24 V and AC 100 V... 240 V
- D Power supply DC 24 V
- M Power supply AC 100 V ... 240 V
- d = A-Z Hardware- and Software-options not affecting Ex-relevant parameters
- e = A-Z Cable length with reference to model TCE80**-C-****-Ex1-**
- xx = 00 – 99 Special versions, due to application; not affecting Ex-relevant parameters
- z = Blank (Standard Calibration) or H (High Pressure Gas Application Calibration).

Transducer Unit Tricor type series TCMz**-**-****-****-Ex1-**, per Intrinsic Safety Connections; type code:**

Type	Flow rate
TCMz0325-ab-cdef-ghik-Ex1-xx	≤ 300 kg/h
TCMz0450- ab-cdef-ghik-Ex1-xx	≤ 450 kg/h
TCMz0650- ab-cdef-ghik-Ex1-xx	≤ 600 kg/h
TCMz1550- ab-cdef-ghik-Ex1-xx	≤ 1,500 kg/h
TCMz3100- ab-cdef-ghik-Ex1-xx	≤ 3,000 kg/h
TCMz5500- ab-cdef-ghik-Ex1-xx	≤ 5,500 kg/h
TCMz7900- ab-cdef-ghik-Ex1-xx	≤ 7,900 kg/h

Where:

a to f: mechanical details, g to k: electrical parameters

- ab = AA-ZZ Size and shape of process connection (details: see manual)
- c = A-Z Temperature range
- d = A-Z Pressure range (details: see manual)
- e = A-Z Accuracy (details: see manual)
- f = A-Z Mounting length (details: see manual)
- g = A Terminal box aluminium (for IS connection to transmitter)
- H Terminal box stainless steel (for IS connection to transmitter)
- C Compact version (details: see manual)
- h = A-Z Non-IS interface (details: see manual)
- Z Not provided
- i = D Power supply DC 24 V; non-IS
- M Power supply AC 100 V... 240 V; non-IS
- Z Not provided
- k = A-Z Hardware- and Software-options not affecting Ex-relevant parameters
- xx = 00 – 99 Special versions, due to application; not affecting Ex-relevant parameters



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z = Blank (Standard Calibration) or H (High Pressure Gas Application Calibration).

Notes: (referring to position g, h, i)

1. Separate transducer: only option A possible at position 'g'; (position 'h' and 'i': power supply and interface not provided; marked therefore with Z)
2. Compact version: only option C possible at position 'g', position 'h' and 'i' all listed options available.
3. "Ex1" can be replaced with "Ex3" in the TCE and TCM model codes as follows TCE80**-C-****-**Ex3**-** and TCMz****-**-****-C****-**Ex3**-**.

Ratings:

1. Transmitter assembled into Panel mountable housing (for installation in the safe area only)

1.1 Non-IS circuits

Parameters / circuit	Voltage U _n	Voltage U _m	Terminals
Power supply (AC) or optionally Power supply (DC)	230 V 24 V	AC 250 V AC 250 V	91 (N), 90 (L), 52 (PE) 50 (+24 V), 51 (GND), 52 PE)
Relay-SPDT-contact	30 V	AC 250 V	40, 41, 42
RS485 interface	3.3 V	DC 30 V	22 (+), 21 (-), 20 (GND)
Foundation Fieldbus	24 V	DC 30 V	32 (FF+), 31 (FF-), 20 (GND)
Analogue output(4-20 mA)	24 V	DC 30 V	1 (I1+), 2 (I1-), 3 (I2+), 4 (I2-)
Analogue input (4-20 mA) option	24 V	DC 30 V	1 (I1+), 2 (I1-)
Digital-input	24 V	AC 250 V	7 (CTL IN), 8 (GND)
Digital output	24 V	AC 250 V	5 (F-OUT), 6 (CTL OUT)

1.2 IS circuits designed for interconnection to transducers (probes)

Parameter	Circuit			
	Driver		Sensor	Temperature sensor
Voltage U _o	DC 16.4 V	DC 9.4 V	DC 2 V	DC 10.5 V
Current I _o	382 mA	219 mA	17 mA	45 mA
Power P _o	1.56 W	515 mW		
Characteristics	linear	linear	trapezoidal	trapezoidal
Connection	9-pol-Sub D connector			
Probe type	Not applicable to Groups ABCD Listing *CMz28K-x) ¹ *CMz65K-x) ¹ *CMz230K-x) ¹	*CMz0300-x) ¹ * CMz0450-x) ¹ *CMz0600-x) ¹ *CMz1500-x) ¹ *CMz3000-x) ¹ *CMz7900-x) ¹	(all models)	



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Type of protection	Groups CD (Ex ia IIB)	Groups ABCD (Ex ia IIC)	Groups ABCD (Ex ia IIC / IIB)
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Remark:)¹ "*" replaced by 'K' or 'T'; 'x' see full-scale type code

Where:

z = Blank (Standard Calibration) or H (High Pressure Gas Application Calibration).

2. Transmitter assembled into Explosionproof enclosure

2.1 Non-IS circuits

Parameter / Circuit	Voltage U _n	Voltage U _m	Terminals
Power supply (AC)) ¹	230 V	AC 250 V	91 (N), 90 (L), 52 (PE)
exclusive-or Power supply (DC)) ¹	24 V	AC 250 V	50 (+24 V), 51 (GND), 52 PE)
RS485 interface	3.3V	DC 30 V	22 (+), 21 (-), 20 (GND)
Foundation Fieldbus	24V	DC 30 V	32 (FF+), 31 (FF-), 20 (GND)
Analogue output (4-20 mA)	24V	DC 30 V	1 (I1+), 2 (I1-), 3 (I2+), 4 (I2-)
Analogue input (4-20 mA) option	24 V	DC 30 V	1 (I1+), 2 (I1-)
Digital-input	24V	AC 250 V	7 (CTL IN), 8 (GND)
Digital output	24V	AC 250 V	5 (F-OUT), 6 (CTL OUT)

Remark: Relay-SPDT-contact not provided)¹ according to model

2.2 IS circuits designed for interconnection to transducers (probes)

Parameter	Circuit			
	Driver		Sensor	Temperature sensor
Voltage U _o	DC 16.4 V	DC 9.4 V	DC 2 V	DC 10.5 V
Current I _o	382 mA	219 mA	17 mA	45 mA
Power P _o	1.56 W	515 mW		
Characteristics	linear	linear	trapezoidal	trapezoidal
Connection facility	LEMO FAG.2B.308 (TCMz****-**-*****-E****-Ex1-**, compact)) ² cable with open leads (KCE80**-WE-*-**-Ex1, wall mountable housing) cable with open leads TCE80**-E-*****-Ex1-**, wall mountable housing) direct wiring (KCM****-EF/EFH/EM/EMH/E*(H)-**-**-**-Ex1, compact)) ²			
Probe type	Not applicable to Groups ABCD Listing *CMz28K-x) ¹ *CMz65K-x) ¹ *CMz230K-x) ¹	*CMz0300-x) ¹ *CMz0450-x) ¹ *CMz0600-x) ¹ *CMz1500-x) ¹ *CMz3000-x) ¹ *CMz7900-x) ¹	(all models)	
Type of protection	Groups CD (Ex ia IIB)	Groups ABCD (Ex ia IIC)	Groups ABCD (Ex ia IIC / IIB)	

Remarks:)¹ "*" replaced by 'K' or 'T'; 'x' see full-scale type code



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)² compact version: Transmitter and Transducer Unit form a mechanical unit marked with KCM / TCMz

Where:

z = Blank (Standard Calibration) or H (High Pressure Gas Application Calibration).

3. Intrinsically safe transducers (probes)

Parameter	Circuit			
	Driver		Sensor	Temperature sensor
Voltage U _i	DC 16.4 V	DC 9.4 V	DC 2 V	DC 10.5 V
Current I _i	382 mA	219 mA	17 mA	45 mA
Power P _i	1.56 W	515 mW		
Characteristics	linear	linear	trapezoidal	trapezoidal
Connection facility	screwed terminals (KCM****-0-**-**-2-Ex1, external) screwed terminals (KCM****-1-**-**-2-Ex1, external) screwed terminals (TCMz****-**-**-AZZ*-Ex1, external) LEMO HEG.2B.308 (TCMz****-**-**-E***-Ex1, compact) direct wiring (KCM****-EF/EFH/EM/EMH/E*(H)-**-**-Ex1, compact)			
Probe type	Not applicable to Groups ABCD Listing *CMz28K-x) ¹ *CMz65K-x) ¹ *CMz230K-x) ¹	*CMz0300-x) ¹ * CMz0450-x) ¹ *CMz0600-x) ¹ *CMz1500-x) ¹ *CMz3000-x) ¹ *CMz7900-x) ¹		(all models)
Type of protection	Groups CD (Ex ia IIB)	Groups ABCD (Ex ia IIC)		Groups ABCD (Ex ia IIC / IIB)

Remark:)¹ '*' replaced by 'K' or 'T'; 'x" see full-scale type code

Where:

z = Blank (Standard Calibration) or H (High Pressure Gas Application Calibration).

4. For the Coriolis C-Flow Meter type Tricor TCE80** / TCMz****, respectively, the following ambient temperature range applies:

Model	Type	Ambient temperature range	Process temperature range	Temperature code
Panel mountable housing	TCE80**-L-****-Ex1-**	0 °C ≤ T _a ≤ 60°C	not applicable	not applicable
Flameproof enclosure	TCE80**-W-****-Ex1-** or TCE80**-C-****-Ex1-**	- 40 °C ≤ T _a ≤ 70°C	not applicable	T4



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Transducer compact version	TCMz****_**_****_ C****-Ex1-**	- 40 °C ≤ T _a ≤ 70°C	-40 °C ≤ T ≤ 70°C	T4
External transducer	TCMz****_**_****_ A****-Ex1-**	- 40 °C ≤ T _a ≤ 70°C	-100 °C ≤ T ≤ 70°C	T4
			-100 °C ≤ T ≤ 135°C	T3
			-100 °C ≤ T ≤ 210°C	T2

Remark: 'x' see full-scale type code
 Where:

z = Blank (Standard Calibration) or H (High Pressure Gas Application Calibration).

Special conditions for safe use:

1. Panel mountable housing, Transmitter Unit type TCE80**-L-****-Ex1-**
 - 1.1. The Transmitter Units shall be installed in the safe area only.
 - 1.2. The installation of Transmitter Units shall be carried out in such a way that the clearances of bare conductive parts of intrinsically safe circuits to grounded metal parts of the enclosure are at least 3 mm, and bare conductive parts of non-intrinsically safe circuits of other apparatus are located in a distance of at least 50 mm away from terminals for external intrinsically safe circuits, or are separated from them by a partition wall according to clause 6.2.1 of ANSI/UL 60079-11 Ed. 5.
2. Explosionproof enclosure, Transmitter Unit type TCE80**-W-****-Ex1-**
 - 2.1. The Transmitter Units shall be installed in the appropriate Hazardous Location.
 - 2.2. The installation of the Transmitter units shall be carried out in accordance with the local authorities having jurisdiction.
 - 2.3. The installation of Transmitter Units shall be carried out in such a way that the clearances of bare conductive parts of intrinsically safe circuits to grounded metal parts of the enclosure are at least 3 mm, and bare conductive parts of non-intrinsically safe circuits of other apparatus are located in a distance of at least 50 mm away from terminals for external intrinsically safe circuits, or are separated from them by a partition wall according to clause 6.2.1 of ANSI/UL 60079-11 Ed. 5.

APPLICABLE REQUIREMENTS

CSA-C22.2 No. 0-10	General requirements — Canadian Electrical Code, Part II
CSA C22.2 No. 30-M1986	Explosion-Proof Enclosures for Use in Class I Hazardous Locations
CSA C22.2 No. 142-M1987	Process Control Equipment
CSA C22.2 No. 157-92	Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations.
CSA-C22.2 No. 94.1-07	Enclosures for Electrical Equipment, Non-Environmental Considerations
CSA C22.2 No. 94.2-07	Enclosures for Electrical Equipment, Environmental Considerations
CSA-C22.2 No. 213-M1987	Non-Incendive Electrical Equipment for Use in Class I, Division 2 Hazardous (Classified) Locations
ANSI/UL 913 Ed. 7	Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
ANSI/UL 916 Ed. 4	Energy Management Equipment
ANSI/UL 60079-0 Ed. 5	Explosive atmospheres – Part 0: Equipment – General requirements



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ANSI/UL 60079-11 Ed. 5	Explosive Atmospheres – Part 11: Equipment Protection by Intrinsic Safety “i”
ANSI/UL 50-2007 Ed. 12	Enclosures for Electrical Equipment, Non-Environmental Considerations
ANSI/UL 50E-2007 Ed. 1	Enclosures for Electrical Equipment, Environmental Considerations
ANSI/UL 12.12.01-2013	Non-Incendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Division 1 and 2 Hazardous (Classified) Locations
FMRC 3615 – 2006	Explosionproof Electrical Equipment General Requirements



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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.

Transmitter assembled into Explosionproof enclosure and Intrinsically safe transducers

The following markings are provided one of the following ways and affixed to the transducer housing and explosion proof transmitter housing.

- Laser engraved directly into the housing
 - Welding a laser engraved stainless steel label onto the housing
 - Gluing and riveting a colored anodized and laser engraved aluminum label onto the housing
 - Laser engraved metallic tag attached to the equipment via a permanent chain
- Manufacturer's name: "AW-Lake Company", or CSA Master Contract Number "220043", adjacent to the CSA Mark in lieu of manufacturer's name.
 - Model number: 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: As specified in the PRODUCTS section, above.
 - The CSA Mark with or without "C" and "US" indicators, as shown on the Certificate of Conformity.
 - Hazardous Location designation: As specified in the PRODUCTS section, above (may be abbreviated).
 - Temperature code: As specified in the PRODUCTS section, above.

For the Transmitter assembled into an explosionproof enclosure and the compact version, in addition to the markings above.

- The following words:
 - "[Ex ia]"
 - "Associated Equipment"
 - "WARNING: Substitution of components may impair intrinsic safety."
 - "Install per manual, drawing number TCM_E80_E_EN_160520_E004."
 - "Maximum non-hazardous voltage not to exceed 250 V."
 - "OPEN CIRCUIT BEFORE REMOVING COVER" or "KEEP COVER TIGHT WHILE CIRCUITS ARE ALIVE".
 - "CONDUIT SEAL IS REQUIRED WITHIN 18 INCHES"



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For the Transducer only, in addition to the markings above.

- The following words:
 - “Exia”.
 - “Intrinsically Safe”
 - “WARNING: Substitution of components may impair intrinsic safety.”
 - “WARNING: To prevent ignition of flammable or combustible atmospheres, read, understand, and adhere to the manufacturer’s live maintenance procedures.”
 - “Install per manual, drawing number TCM_E80_E_EN_160520_E004.”

Transmitter assembled into Panel mountable housing (for installation in the safe area only)

The following markings are provided on a permanent adhesive label manufactured by TESA, designated Type 6930, which is suitable for indoor or outdoor use, at a service temperature range of -30°C to 125°C. Nameplate is affixed to the panel mounted transmitter housing.

- Manufacturer’s name: "AW-Lake Company", or CSA Master Contract Number “220043”, adjacent to the CSA Mark in lieu of manufacturer’s name.
- Model number: 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.
- The CSA Mark with or without “C” and “US” indicators, as shown on the Certificate of Conformity.
- The following words:
 - “[Ex ia]”.
 - “Associated Equipment”
 - “WARNING: Substitution of components may impair intrinsic safety.”
 - “Install per manual, drawing number TCM_E80_E_EN_160520_E004.”
 - “Maximum non-hazardous voltage not to exceed 250 V.”



Supplement to Certificate of Compliance

Certificate: 2534011

Master Contract: 220043

The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

Project	Date	Description
70119722	2017-04-27	Variation to report 2534011 to include two alternative bushings and update of control drawing TCM_E80_E_EN_160520_E004.
70096749	2016-11-14	Evaluation to update report 2534011 to optionally permit existing circuit boards to be coated with Polybutadiene Urethane. Additional funds to be requested for any testing determined required. This quote does not include an update of the standards to the latest edition (Include Expedite Fee). Assumes simple paperwork update.
70010056	2015-06-25	Evaluation to update report 2534011 to add Class 1, Division 2, Groups ABCD for Coriolis Flow Meter model Tricor TCE80** / TCM****.
70025892	2015-06-22	Evaluation for update of report 2534011 of the TCE80 Series Liquid Flow Monitor systems to include 4 new Connector options for the sensor cable, per detailed review/evaluation of new connection systems, with no testing required. Additional funds to be requested if testing determined required. Quote assumes: 1. the XP Assembly maintained as the same Bartec line bushing (already called out in the report) is continued to be used; and new connection systems are only on the I.S. cabling, 2. All new components considered critical (The connectors, shrink sleeving, conformal coating, Base Plate (IP65), ...) are suitable certified for the application.
70009481	2015-01-20	Evaluation to update report 2534011 to add models TCM-230K, TCM-450 and TCM-100. Additional funds to be requested for any testing determined required.
70015108	2014-12-19	Evaluation to update report 2534011 to add Class 1, Division A, Groups A & B for existing Coriolis Flow Meter model Tricor TCE80** Series; Smaller Meter models: TCM0325, TCM0650, TCM1550, TCM3100. TCM5500 and TCM7900 that are already shown with Intrinsic Safety for Groups A & B and the addition of TCM0450/TCMH0450 meter. Note: Project includes a re-organizing of the XP/IS listing for class number 2258-03/-83 to clear call out the Group ABCD versions vs the Groups CD versions.
2636200	2013-07-26	Update to report 2534011 to include classes 2258 02 and 2258 82.
2534011	2013-02-12	Original cCSAus certification of a Coriolis Flow Meter model Tricor TCE80** / TCM**** for Class I, Div. 1, Groups C & D: T4.