

EN
English

**Safety information for electrical
equipment for potentially explosive areas
in accordance with Factory Mutual
Standards and Canadian Standards
Association
Mass Flowmeter**



Mass Flowmeter CoriolisMaster FCM2000

Safety information for electrical equipment for potentially explosive areas in accordance with
Factory Mutual Standards and Canadian Standards Association - EN

SM/FCM2000/FM/CSA-EN

10.2011

Rev. B

Original instruction

Manufacturer:

ABB Automation Products GmbH

Dransfelder Straße 2
D-37079 Göttingen
Germany
Tel.: +49 551 905-534
Fax: +49 551 905-555

Customer service center

Phone: +49 180 5 222 580
Fax: +49 621 381 931-29031
automation.service@de.abb.com

© Copyright 2011 by ABB Automation Products GmbH
Subject to changes without notice

This document is protected by copyright. It assists the user in safe and efficient operation of the device. The contents of this document, whether whole or in part, may not be copied or reproduced without prior approval by the copyright holder.


Important (Notice)

This document forms an integral part of the following manuals:

- Operating instructions D184B111Uxx
- Commissioning instructions CI/FCM2000

1	Safety	3
1.1	Operator liability	3
1.2	Technical limit values	3
1.3	Safety information for electrical installation.....	3
1.4	Plates and symbols	4
1.4.1	Safety-/ warning symbols, note symbols.....	4
1.5	Name plate	5
2	Device designs	6
2.1	FM device overview (PID: 3036514).....	6
3	Mounting	7
3.1	Installing the field-mount housing.....	7
3.2	Cable entries	7
3.3	M12 PROFIBUS cable plug	7
3.4	Electrical connection	8
3.5	Process sealing	9
4	Ex relevant specifications	10
4.1	Data relating to MC2x operation	10
4.1.1	General information.....	10
4.1.2	Temperature data.....	10
4.2	Data relating to MS2x operation.....	11
4.2.1	General information.....	11
4.2.2	Temperature data.....	11
4.3	Electrical data.....	12
4.3.1	Electrical data relating to Div. 1	12
4.3.2	Electrical data relating to Div. 2	14
5	Commissioning	15
5.1	Preliminary checks prior to start-up.....	15
5.2	Changing the type of protection	16
6	Maintenance	17
6.1	General information.....	17
7	Appendix	18
7.1	Installation drawing MDM10-A0281	18
7.2	Installation drawing MDM10-A0291	20
7.3	Additional documents	22
7.4	Approvals and certifications	22

1 Safety

1.1 Operator liability

The operators must strictly observe the applicable national regulations with regards to installation, function tests, repairs, and maintenance of electrical devices (e.g., NEC, CEC).

1.2 Technical limit values

Particular attention must be paid to the limit values listed in the sections relating to "ex relevant specifications":

- The data for the signal inputs and outputs of the transmitter
- The permissible temperature data and limit values

1.3 Safety information for electrical installation

Never attempt electrical connection unless the power supply is switched off.

Ground the flowmeter sensor and transmitter housing. Make sure there is no risk of explosion.

1.4 Plates and symbols

1.4.1 Safety-/ warning symbols, note symbols



DANGER – <Serious damage to health / risk to life>

This symbol in conjunction with the signal word "Danger" indicates an imminent danger. Failure to observe this safety information will result in death or severe injury.



DANGER – <Serious damage to health / risk to life>

This symbol in conjunction with the signal word "Danger" indicates an imminent electrical hazard. Failure to observe this safety information will result in death or severe injury.



WARNING – <Bodily injury>

This symbol in conjunction with the signal word "Warning" indicates a possibly dangerous situation. Failure to observe this safety information may result in death or severe injury.



WARNING – <Bodily injury>

This symbol in conjunction with the signal word "Warning" indicates a potential electrical hazard. Failure to observe this safety information may result in death or severe injury.



CAUTION – <Minor injury>

This symbol in conjunction with the signal word "Caution" indicates a possibly dangerous situation. Failure to observe this safety information may result in minor or moderate injury. This may also be used for property damage warnings.



NOTICE – <Property damage>!

The symbol indicates a potentially damaging situation.

Failure to observe this safety information may result in damage to or destruction of the product and/or other system components.



IMPORTANT (NOTE)

This symbol indicates operator tips, particularly useful information, or important information about the product or its further uses. It does not indicate a dangerous or damaging situation.

1.5 Name plate

Transmitter with FM approval

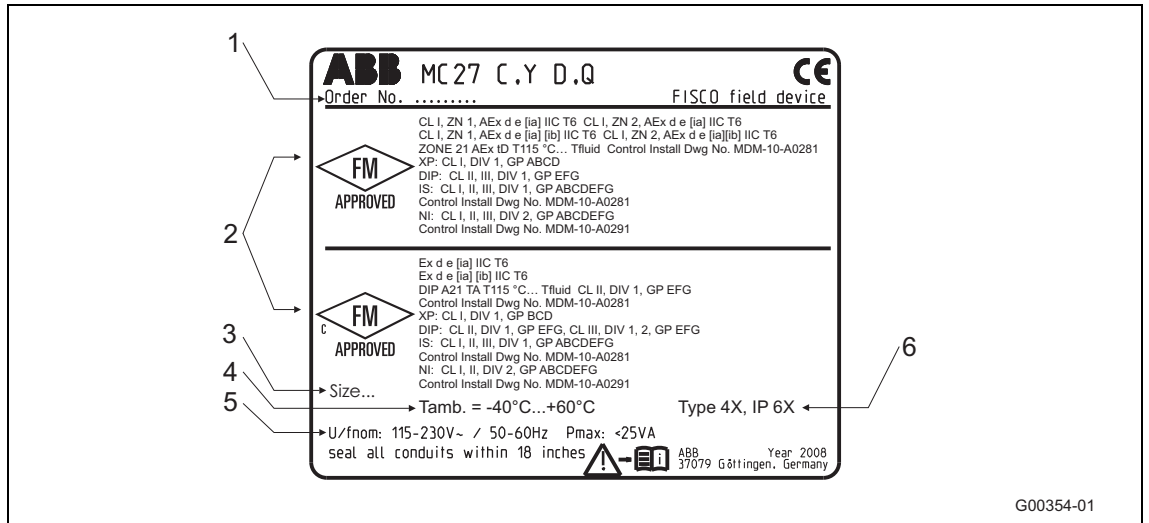


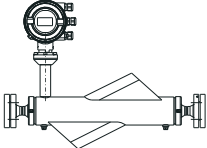
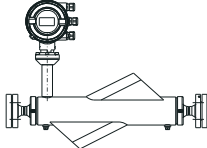
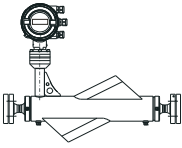
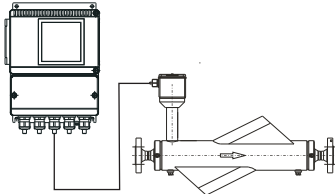
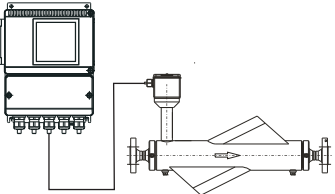
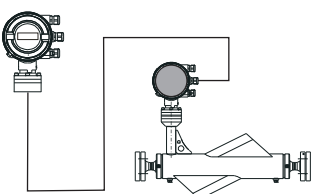
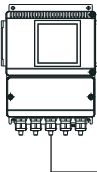
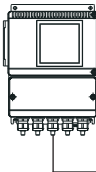
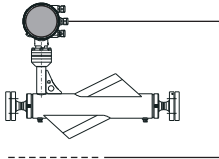
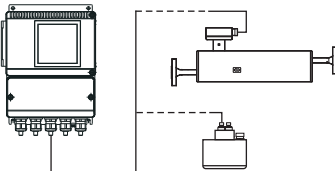
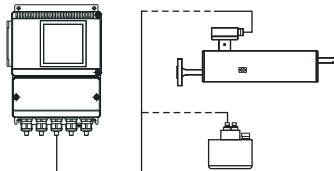
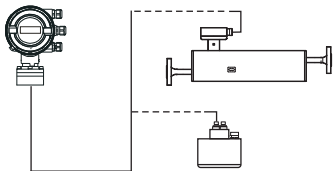
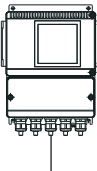
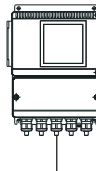
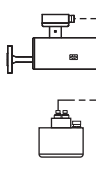


Fig. 1

- 1 Order no.
- 2 FM approval
- 3 Nominal diameter
- 4 Ambient temperature
- 5 Supply power and maximum power consumption
- 6 Ingress protection

2 Device designs

2.1 FM device overview (PID: 3036514)

	Standard/non-Ex	Class I Div. 2		Class I Div. 1			
							
MC2x	Type 1. Integral mount design - Standard/non-Ex - Class I Div. 2 - Class I Div. 1	MC23 T, X		MC23 O, V, P, W		MC27 C, Y, D, Q	
						 Housing: XP	
	Type 2. Remote mount design Transmitter and flowmeter sensor - Standard/non-Ex - Class I Div. 2 - Class I Div. 1	ME21 T, X	MC21 T, X	ME21 O, V, P, W	MC21 O, V, P, W	ME26 C, Y, D, Q	MC26 C, Y, D, Q
							
	Type 3. Remote mount design Transmitter - Standard/non-Ex - Class I Div. 2 Flowmeter sensor - Class I Div. 1	ME21 T, X		ME21 O, V, P, W		MC26 C, Y, D, Q	
							
MS2x	Type 4. Remote mount design (small nominal diameters) Transmitter - Standard/non-Ex - Class I Div. 1 Flowmeter sensor - Class I Div. 2 - Class I Div. 1	ME22/23 T, X...	MS21 T, X	ME22/23 O, V, P, W	MS21 O, V, P, W	ME27/28 C, Y, D, Q	MS26 C, Y, D, Q
							
	Type 5. Remote mount design (small nominal diameters) Flowmeter sensor - Class I Div. 1	ME24/25 T, X ...		ME24/25 O, V, P, W		MS26 C, Y, D, Q	
							

G00899

Fig. 2: FCM2000 overview

3 Mounting

3.1 Installing the field-mount housing

In the case of devices designed for attachment to a wall, observe the following points:

- Make sure that the installation site is sufficiently robust.
- Attach the device securely at the planned installation site.



Important (Notice)

- The necessary installation material is not supplied and must be selected in accordance with the installation site chosen.
- For additional information concerning weight, arrangement and the diameter of the fixing holes, see the data sheet.



Attention - Potential damage to parts due to direct sunlight!

When selecting the installation site, ensure that the housing will not be exposed to direct sunlight. The ambient temperature limits must be observed. If direct sunlight cannot be avoided, an appropriate form of sun protection must be installed.

For FNICO or FISCO installations, the number of devices must be limited as per the applicable standard.

3.2 Cable entries

The devices are supplied either with cable glands or with 1/2" NPT threads; you specify which you require in the order number. The cable glands supplied are ATEX-/IECEx-certified. In order to achieve the required tightness, the outer cable diameter must be between 5 mm (0.2") and 9 mm (0.35").



Important (Notice)

Devices certified in accordance with FM or CSA are only ever supplied with 1/2" NPT threads without glands.

However, it is also possible to supply devices certified in accordance with ATEX or IECEx that feature 1/2" NPT threads without glands. In such cases, the user is responsible for ensuring that the cable piping/glands are installed in accordance with the relevant national standards (e.g., NEC, CEC, ATEX 137, IEC 60079-14, etc.).

3.3 M12 PROFIBUS cable plug



Warning! Risk of explosion!

The M12 plug is not approved for use with combustible dusts. In Zone 2, the plug may only be operated with energy-limited circuits (nL) such as FNICO.

3.4 Electrical connection



Important (Notice)

The housing for the transmitter and flowmeter sensor must be connected to the potential equalization PA. The operator must ensure that when connecting the protective conductor (PE) no potential differences can occur between protective conductor and potential equalization (PA).

FM-compliant installation work must be carried out in accordance with "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" (ANSI/ISA RP 12.6) and the "National Electric Code®" (ANSI/NFPA 70 Sections 504 and 505).

A temperature of 70 °C (158 °F) at the cable entry is assumed for the Ex calculations. Therefore, the cables used for the supply power and the signal inputs and outputs must have a minimum specification of 70 °C (158 °F).

According to NEC standards, the separate ground connection between flowmeter sensor and transmitter can be established as follows:

1. Strip the signal cable insulation by 100 ... 120 mm (3.94 ... 4.72 inch).
2. Fan out the braided shield (1) that runs through the signal cable to a length of 10 ... 15 mm (0.39 ... 0.59 inch). Twist the disentangled wires of the braided shield so that they form one strand.
3. Slide the green/yellow protective tubing over the strand, leaving 10 mm (0.39 inch) protruding from the end (if necessary, shorten the protective tubing).
4. Press on the ring-type terminal (2) supplied.
5. Connect to the grounding connection (3).

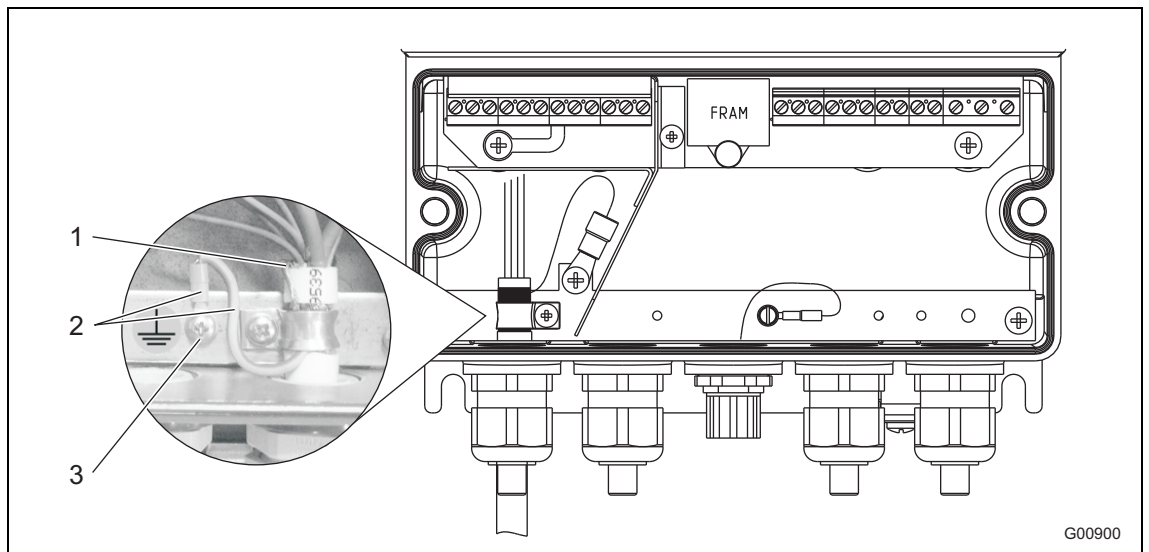


Fig. 3

3.5 Process sealing



Important (Notice)- Devices with “Process sealing”

North American Requirements for Process Sealing between Electrical Systems and Flammable or Combustible Process Fluids. Equipment for use in Canada, Class II, Groups E, F and G shall be limited to a maximum surface temperature of 165°C (329 °F). Seal all conduits within 18 inches (457.20 mm).

The flow meters from ABB are designed for the world wide industrial market and are suitable to measure among others flammable and combustible process fluids and are installed within a process pipe.

Among others the instruments are connected to an electrical system via a conduit system which is able to allow the migration of process fluids directly into the electrical system.

To avoid the migration of process fluids the instruments has a process seal which meet the requirements of ANSI/ISA 12.27.01.

The Coriolis Flowmeters are designed as a “single seal device”.

In accordance to the requirements of ANSI/ISA 12.27.01 the existing operating rates of temperature, pressure and liner types have to reduce to the following limits:

Flange or tube Material	Sizes	Usable Operating Temperature	Pressure result
All materials of the existing model number	DN20 ... 150 (1/2" ... 6")	-50 °C ... 170 °C (-58 °F ... 338 °F)	PN100 / Class 600

Ex relevant specifications

4 Ex relevant specifications

4.1 Data relating to MC2x operation

4.1.1 General information

Type of protection	Ex designation
Explosion-proof	XP-IS/I, II, III/1/BCD/T* TA=*; type NEMA 4x
Dust-ignition-proof	DIP/II, III/1 EFG/T* TA=*; type NEMA 4x
Intrinsically safe	IS/I, II, III/1/BCDEFG/T* TA = *; type NEMA 4x
Non-incendive	NI/I, II, III/2/ABCDFG/T* TA = *; type NEMA 4x

(T* = see FM temperature classes)

In the case of the remote mount design, the signal cable between the flowmeter sensor and the transmitter must measure at least 5 m (16.4 ft).

Ambient and process conditions	
T _{amb}	-20 ... 60 °C (-4 ... 140 °F)
T _{amb, optional}	-40 ... 60 °C (-40 ... 140 °F) (only with devices featuring integral mount design)
T _{Medium}	-50 ... 200 °C (-58 ... 392 °F)
Protection class	IP 65, IP 67 and NEMA 4x/type 4x

Specific FM coding applies, depending on the design of the flowmeter sensor (integral mount or remote mount design) For detailed information, please refer to the section titled 2.1 "FM device overview (PID: 3036514)".

4.1.2 Temperature data

Types: MC26, MC27 in Class I Div. 1

Temperature class	Ambient temperature		
	≤40 °C (≤104 °F)	≤50 °C (≤122 °F)	≤60 °C (≤140 °F)
	Maximum permissible fluid temperature		
T1	200 °C (392 °F)	200 °C (392 °F)	200 °C (392 °F)
T2	200 °C (392 °F)	200 °C (392 °F)	200 °C (392 °F)
T3	185 °C (365 °F)	180 °C (356 °F)	180 °C (356 °F)
T4	125 °C (257 °F)	120 °C (248 °F)	120 °C (248 °F)
T5	85 °C (185 °F)	85 °C (185 °F)	75 °C (167 °F)
T6	65 °C (149 °F)	65 °C (149 °F)	60 °C (140 °F)

Types: MC21, MC23 in Class I Div. 2

Temperature class	Ambient temperature		
	≤40 °C (≤104 °F)	≤50 °C (≤122 °F)	≤60 °C (≤140 °F)
	Maximum permissible fluid temperature		
T1	200 °C (392 °F)	200 °C (392 °F)	180 °C (356 °F)
T2	200 °C (392 °F)	200 °C (392 °F)	180 °C (356 °F)
T3	180 °C (356 °F)	180 °C (356 °F)	180 °C (356 °F)
T4	115 °C (239 °F)	115 °C (239 °F)	115 °C (239 °F)
T5	80 °C (176 °F)	80 °C (176 °F)	75 °C (167 °F)
T6	60 °C (140 °F)	60 °C (140 °F)	60 °C (140 °F)

4.2 Data relating to MS2x operation

4.2.1 General information

Type of protection	Ex designation
Explosion-proof	XP-IS/I, II, III/1/BCD/T* TA=*; type NEMA 4x
Dust-ignition-proof	DIP/II, III/1 EFG/T* TA=*; type NEMA 4x
Intrinsically safe	IS/I, II, III/1/BCDEFG/T* TA = *; type NEMA 4x
Non-incendive	NI/I, II, III/2/ABCDFG/T* TA = *; type NEMA 4x

(T* = see FM temperature classes)

In the case of the remote mount design, the signal cable between the flowmeter sensor and the transmitter must measure at least 5 m (16.4 ft).

Ambient and process conditions	
T _{amb}	-20 ... 50 °C (-4 ... 122 °F)
T _{Medium}	-50 ... 180 °C (-58 ... 356 °F)
Protection class	IP 65, IP 67 and NEMA 4x/type 4x

Specific FM coding applies, depending on the design of the flowmeter sensor (integral mount or remote mount design) For detailed information, please refer to the section titled 2.1 "FM device overview (PID: 3036514)".

4.2.2 Temperature data

Type: MS2 in Class I Div. 1 or Class I Div. 2

Temperature class	Ambient temperature
	-20 ... 50 °C (-4 ... 122 °F)
	Maximum permissible fluid temperature
T1	180 °C (356 °F)
T2	180 °C (356 °F)
T3	180 °C (356 °F)
T4	125 °C (257 °F)
T5	80 °C (176 °F)
T6	-

Ex relevant specifications

4.3 Electrical data

Overview of the different output options

	Class I Div. 2	Class I Div. 1
I Output option A/B in the order number	<ul style="list-style-type: none"> - Current output 1: active - Current output 2: passive - Pulse output: active/passive, switchable - Contact input and output: passive 	<ul style="list-style-type: none"> - Current output 1: active - Current output 2: passive - Pulse output: active/passive, switchable - Contact input and output: passive
II Output option D in the order number		<ul style="list-style-type: none"> - Current output 1: passive - Current output 2: passive - Pulse output: active/passive, switchable - Contact input and output: passive
III Output option X and communication option 3, 5, or 7 in the order number	<ul style="list-style-type: none"> - Fieldbus communication (PROFIBUS PA/FOUNDATION Fieldbus) 	<ul style="list-style-type: none"> - Fieldbus communication (PROFIBUS PA/FOUNDATION Fieldbus)

4.3.1 Electrical data relating to Div. 1

Version I: Active/Passive current outputs

Types: ME26/27/28, MC27 fieldbus: Active HART

Inputs and outputs	Type of protection IS					
	V _{max_o} [V]	I _{max_o} [mA]	P _o [mW]	C _o [nF]	C _{o PA} [nF]	L _o [mH]
Current output 1 active Terminal 31/32	20	100	500	217	0	3,8
	V _{Max} [V]	I _{Max} [mA]	P _i [mW]	C _i [nF]	C _{i PA} [nF]	L _i [mH]
	60	100	500	2,4	2,4	0,17
Current output 2 passive Terminal 33/34	30	100	760	2,4	2,4	0,17
Digital output Terminal 41/42	15	30	115	2,4	2,4	0,17
Digital input Terminal 81/82	30	60	500	2,4	2,4	0,17
Pulse output Terminal 51/52	15	30	115	2,4	2,4	0,17

All inputs and outputs are electrically isolated from each other and from the supply power. Only current outputs 1 and 2 are not electrically isolated from one another.

Version II: Passive/Passive current outputs
Types: ME26/27/28, MC27 fieldbus: Passive HART

Inputs and outputs	Type of protection IS					
	V _{max} [V]	I _{max} [mA]	P _i [mW]	C _i [nF]	C _{i PA} [nF]	L _i [mH]
Current output 1 passive Terminal 31/32	60	300	2000	0,47	0,47	0,17
Current output 2 passive Terminal 33/34	60	300	2000	0,47	0,47	0,17
Digital output Terminal 41/42	60	300	2000	0,47	0,47	0,17
Digital input Terminal 81/82	60	300	2000	0,47	0,47	0,17
Pulse output Terminal 51/52	60	300	2000	0,47	0,47	0,17

All inputs and outputs are electrically isolated from each other and from the supply power.

Version III: Fieldbus communication
Types: ME26/27/28, MC27 fieldbus: PA/FF

Inputs and outputs	Type of protection IS FISCO						Type of protection IS					
	V _{Max} [V]	I _{Max} [mA]	P _i [mW]	C _i [nF]	C _{i PA} [nF]	L _i [mH]	V _{Max} [V]	I _{Max} [mA]	P _i [mW]	C _i [nF]	C _{i PA} [nF]	L _i [mH]
Passive fieldbus Terminal 97/98	60	380	5320	0	0	0,17	60	380	5320	0	0	0,17

The output and supply power are electrically isolated.

Special connection conditions:

The output circuits are designed in such a way that they can be connected to both intrinsically-safe and non-intrinsically-safe circuits. It is not permitted to combine intrinsically safe and non-intrinsically safe circuits. On intrinsically safe circuits, equipotential bonding must be in place along the entire length of the cable used for the current outputs.

The rated voltage of the non-intrinsically safe circuits is $U_M = 60$ V.

Provided that rated voltage $U_M = 60$ V is not exceeded if connections are established to non-intrinsically safe external circuits, intrinsic safety is still guaranteed.

If the installation is changed from type of protection "non-intrinsically safe" to "intrinsically safe" or vice versa, the device must be checked in accordance with the instructions contained in section 5.2 "Changing the type of protection".

i

Important (Notice)

The housing for the transmitter and flowmeter sensor must be connected to the potential equalization PA. The operator must ensure that when connecting the protective conductor (PE) no potential differences can occur between protective conductor and potential equalization (PA).

Ex relevant specifications

4.3.2 Electrical data relating to Div. 2

Version I: Active/Passive current outputs

Types: ME21/24/25, MC23 fieldbus: HART

Inputs and outputs	Type of protection NI	
	V _{max_o} [V]	I _{max_o} [mA]
Current output 1 Terminal 31/32	30	30
Current output 2 passive Terminal 33/34	30	30
Digital output Terminal 41/42	30	65
Digital input Terminal 81/82	30	10
Pulse output Terminal 51/52	30	65

All inputs and outputs are electrically isolated from each other and from the supply power.

Version III: Fieldbus communication

Types: ME21/24/25, MC23 fieldbus: PA/FF

Inputs and outputs	Type of protection NI FNICO						Type of protection NI					
	V _{max} [V]	I _{max} [mA]	P _i [mW]	C _i [nF]	C _{i PA} [nF]	L _i [mH]	V _{max} [V]	I _{max} [mA]	P _i [mW]	C _i [nF]	C _{i PA} [nF]	L _i [mH]
Passive fieldbus Terminal 97/98	60	500	7000	0	0	0,17	60	500	7000	0	0	0,17

The output and supply power are electrically isolated.



Important (Notice)

The housing for the transmitter and flowmeter sensor must be connected to the potential equalization PA. The operator must ensure that when connecting the protective conductor (PE) no potential differences can occur between protective conductor and potential equalization (PA).

5 Commissioning

5.1 Preliminary checks prior to start-up

Before installing the flowmeter sensor, check whether it has been damaged due to improper transport. All claims for damages must be submitted to the shipper without delay and before installation. You must comply with the installation conditions.



Warning - General risks!

In potentially explosive atmospheres, installation, commissioning, maintenance, and servicing must only be performed by properly trained personnel. Commissioning is performed once the flowmeter has been installed and connected up electrically. The supply power must be switched off.



Risk of explosion!

When the housing cover is open, explosion protection ceases to apply. Before opening the housing, disconnect all connection cables from the power supply and wait for at least 20 minutes.



Warning – Electrical voltage risk!

When the housing is open, EMC protection is impaired and there is no longer any protection against accidental contact. Before opening the housing, disconnect all the device's connection cables from the power supply.



Warning - General risks!

The installation must be checked prior to commissioning to ensure that it meets the following requirements:

- The sensor and transmitter must be grounded in accordance with the applicable international standards.
- The connecting cables and connections must be adequate for the anticipated current intensities and must meet the requirements of the IEC 227 and IEC 245 standards.
- For installations inside buildings, the supply power must be protected by an appropriate circuit breaker, which must be located in the vicinity of the flowmeter and labeled accordingly.
- The flowmeter sensor must be connected to the transmitter by means of the signal cable supplied by ABB Automation Products; no other cable may be used for this purpose.
- To ensure safe operation it is imperative that the information in this manual is observed.
- FM-compliant installation work must be carried out in accordance with "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" (ANSI/ISA RP 12.6) and the "National Electric Code"® (ANSI/NFPA 70 Sections 504 and 505).
- When the housing is open, there is no longer any EMC protection or protection against accidental contact.
- The surface temperature of the flowmeter sensor may exceed 70 °C (158 °F), depending on the fluid temperature.
- In the case of a Class I Div. 1 installation, the connecting cable supplied and used between the sensor and the transmitter must be at least 5 m (16.4 ft) long.



Warning - General risks!

It is essential that the temperature classes as per the approvals contained in the section titled 4 "Ex relevant specifications" are observed.

5.2 Changing the type of protection

Models MC27, ME26, ME27, and ME28 can be operated with various types of protection:

- When connected to an intrinsically safe circuit in Div. 1, operated as an intrinsically safe device (IS)
- When connected to a non-intrinsically safe circuit in Div. 1, operated as a device with an explosionproof enclosure (XP)
- When connected to a non-intrinsically safe circuit in Div. 2, operated as a non-incendive device (NI)

If a device which is already operational is required to provide a different type of protection, the following measures must be implemented/insulation checks must be performed in accordance with applicable standards.

1st application	2nd application	Measures
XP, $U_{\max} = 60 \text{ V}$	IS ¹⁾	<ul style="list-style-type: none"> • $500 \text{ V}_{AC/1\text{min}}$ or $500 \times 1.414 = 710 \text{ V}_{DC/1\text{min}}$. Test between terminals 31/32, 33/34, 41/42, 51/52, 81/82, and/or 97/98 and terminals 31, 32, 33, 34, 41, 42, 51, 52, 81, 82, 97, 98, and the housing. When this test is performed, no voltage flashover is permitted in or on the device. • Visual inspection, particularly of the electronic circuit boards • Visual inspection: No damage or explosion can be detected.
	NI	<ul style="list-style-type: none"> • $500 \text{ V}_{AC/1 \text{ min}}$ or $500 \times 1.414 = 710 \text{ V}_{DC/1 \text{ min}}$ test between terminals 31/32, 33/34, 41/42, 51/52, 81/82, and/or 97/98 and terminals 31, 32, 33, 34, 41, 42, 51, 52, 81, 82, 97, 98, and the housing. When this test is performed, no voltage flashover is permitted in or on the device. • Visual inspection, particularly of the electronic circuit boards • Visual inspection: No damage or explosion can be detected.
IS	XP	<ul style="list-style-type: none"> • Visual inspection: No damage to the threads (cover, 1/2" NPT cable glands)
	NI	<ul style="list-style-type: none"> • No special measures
NI, $U_{\max} = 60 \text{ V}$	IS	<ul style="list-style-type: none"> • $500 \text{ V}_{AC/1 \text{ min}}$ or $500 \times 1.414 = 710 \text{ V}_{DC/1 \text{ min}}$ test between terminals 31/32, 33/34, 41/42, 51/52, 81/82, and/or 97/98 and terminals 31, 32, 33, 34, 41, 42, 51, 52, 81, 82, 97, 98, and the housing. When this test is performed, no voltage flashover is permitted in or on the device. • Visual inspection, particularly of the electronic circuit boards • Visual inspection: No damage or explosion can be detected.
	XP	<ul style="list-style-type: none"> • Visual inspection: No damage to the threads (cover, 1/2" NPT cable glands)



Important (Notice)

Whatever the application, devices with transmitter type ME23/28 must be connected and installed in the same way as in Div. 1.

The electrical connection between the flowmeter sensor and transmitter must be established in accordance with the information provided in the associated operating instructions (D184B111Uxx).

6 Maintenance

6.1 General information

Repair and maintenance activities may only be performed by authorized customer service personnel.

When replacing or repairing individual components, original spare parts must be used.

**Risk of explosion!**

When the housing cover is open, the explosion protection is suspended.

Before opening the housing switch off the power to all connection lines and wait at least 20 minutes.

**Warning – Electrical voltage risk!**

When the housing is open, EMC protection is impaired and protection against contact is suspended.

Before opening the housing, switch off power to all connecting cables for the device.

**Attention - Potential damage to parts**

The electronic components of the printed circuit board can be damaged by static electricity (observe ESD guidelines).

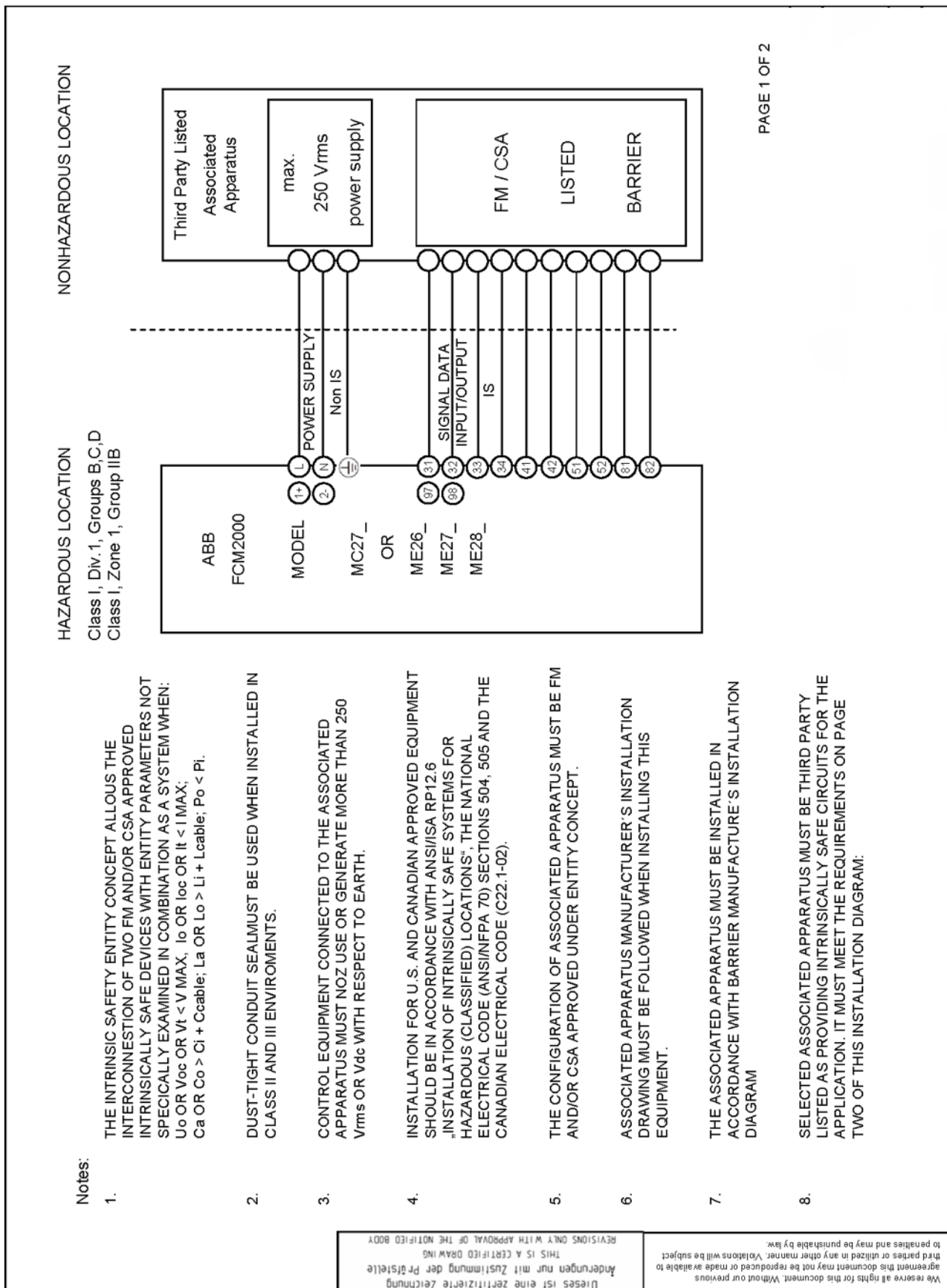
Make sure that the static electricity in your body is discharged before touching electronic components.

**Important (Notice)**

Users must also observe the information in the operating and commissioning instruction for the device.

7 Appendix

7.1 Installation drawing MDM10-A0281



PAGE 1 OF 2

Notes:

1. THE INTRINSIC SAFETY ENTITY CONCEPT ALLOWS THE INTERCONNECTION OF TWO FM AND/OR CSA APPROVED INTRINSICALLY SAFE DEVICES WITH ENTITY PARAMETERS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM WHEN: U_o OR V_{oc} OR V_i < V_{MAX} , I_o OR I_{sc} OR I_t < I_{MAX} ; C_a OR C_o > C_i + C_{cable} ; L_a OR L_o > L_i + L_{cable} ; P_o < P_i .
2. DUST-TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND III ENVIRONMENTS.
3. CONTROL EQUIPMENT CONNECTED TO THE ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms OR Vdc WITH RESPECT TO EARTH.
4. INSTALLATION FOR U.S. AND CANADIAN APPROVED EQUIPMENT SHOULD BE IN ACCORDANCE WITH ANSI/ISA RP12.6 "INSTALLATION OF INTRINSICALLY SAFE SYSTEMS FOR HAZARDOUS (CLASSIFIED) LOCATIONS". THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70) SECTIONS 504, 505 AND THE CANADIAN ELECTRICAL CODE (C22.1-02).
5. THE CONFIGURATION OF ASSOCIATED APPARATUS MUST BE FM AND/OR CSA APPROVED UNDER ENTITY CONCEPT.
6. ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.
7. THE ASSOCIATED APPARATUS MUST BE INSTALLED IN ACCORDANCE WITH BARRIER MANUFACTURER'S INSTALLATION DIAGRAM
8. SELECTED ASSOCIATED APPARATUS MUST BE THIRD PARTY LISTED AS PROVIDING INTRINSICALLY SAFE CIRCUITS FOR THE APPLICATION. IT MUST MEET THE REQUIREMENTS ON PAGE TWO OF THIS INSTALLATION DIAGRAM.

Dieses ist eine zertifizierte Zeichnung Änderungen nur mit Zustimmung der Prüfstelle THIS IS A CERTIFIED DRAWING REVISIONS ONLY WITH APPROVAL OF THE NOTIFIED BODY

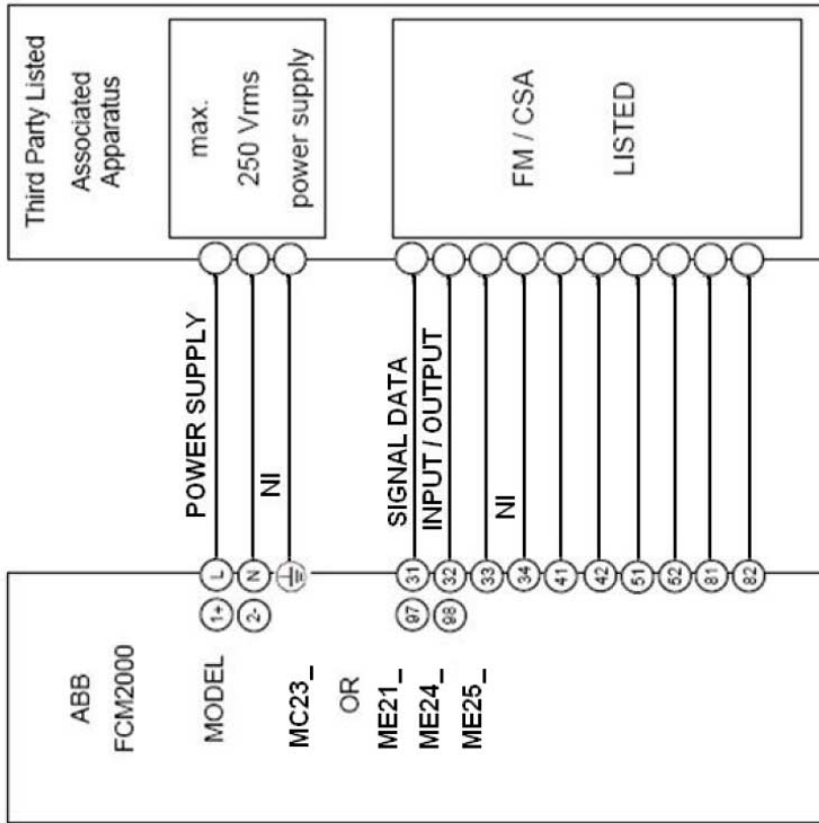
We reserve all rights for this document. Without our previous agreement this document may not be reproduced or made available to third parties or utilized in any other manner. Violations will be subject to penalties and may be punishable by law.

7.2 Installation drawing MDM10-A0291

Page 1 of 2

Notes:

1. CONTROL EQUIPMENT CONNECTED TO THE ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms OR Vdc WITH RESPECT TO EARTH.
2. INSTALLATION FOR U.S. AND CANADIAN APPROVED EQUIPMENT SHOULD BE IN ACCORDANCE WITH ANSI/ISA 82.02.1-1999 SAFETY STANDARD FOR ELECTRICAL AND ELECTRONIC TEST, MEASURING, CONTROLLING AND RELATED EQUIPMENT -GENERAL REQUIREMENTS-
3. THE CONFIGURATION ASSOCIATED APPARATUS MUST BE FM AND/OR CSA APPROVED UNDER ENTITY CONCEPT.
4. ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT









Fieldbus PA/FF ME21, 24, 25 MC 23	Ex n FNICO					EX nL NI				
	V MAX [V]	I MAX [mA]	Pi [mW] J	Ci [nF]	Li [nH]	V MAX [V]	I MAX [mA]	Pi [mW] J	Ci [nF]	Li [nH]
Current 1 passive Terminal 97/98	60	500	7000	0	170	60	500	7000	0	170

HART Communication ME21, 24, 25 MC 23	Ex n NI	
	V MAX [V]	I MAX [mA]
Current 1 Terminal 31/32	30	30
Current 2 passive Terminal 33/34	30	30
Contact Output Terminal 41/42	30	65
Contact Input Terminal 81/82	30	10
Pulse Output Terminal 51/52	30	65

7.3 Additional documents

- Data sheet (D184S068Uxx)
- Operating instructions (D184B111Uxx)
- Commissioning instructions (CI/FCM2000-xx)
- Interface description for devices with HART communication (D184B108U07 / 08)
- Interface description for devices with PROFIBUS PA communication (D184B093U33 / 34)
- Interface description for devices with FOUNDATION Fieldbus communication (D184B093U35 / 36)

7.4 Approvals and certifications

CE mark		<p>The version of the device in your possession meets the requirements of the following European directives:</p> <ul style="list-style-type: none"> - EMC Directive 2004/108/EC - Low Voltage Directive 2006/95/EC - Pressure Equipment Directive (PED) 97/23/EC <p>Pressure equipment does <u>not</u> feature a CE mark indicating PED compliance on the factory tag if the following conditions prevail:</p> <ul style="list-style-type: none"> - The maximum permissible pressure (PS) is less than 0.5 bar. - Due to insignificant pressure risks (nominal size \leq DN 25/1"), no approval procedures are required.
Explosion protection	  	<p>Designation relating to intended use in potentially explosive atmospheres in compliance with:</p> <ul style="list-style-type: none"> - ATEX Directive (marking in addition to CE marking) - IEC standards - cFM_{US} Approvals for Canada and United States

**Important (Notice)**

All documentation, declarations of conformity, and certificates are available in ABB's download area.

www.abb.com/flow

ABB has Sales & Customer Support expertise in over 100 countries worldwide.

www.abb.com/flow

The Company's policy is one of continuous product improvement and the right is reserved to modify the information contained herein without notice.

Printed in the Fed. Rep. of Germany (10.2011)

© ABB 2011

3KXF411003R4801



ABB Limited

Oldends Lane, Stonehouse
Gloucestershire, GL10 3TA
UK

Tel: +44 (0)1453 826661
Fax: +44 (0)1453 829671

ABB Inc.

125 E. County Line Road
Warminster, PA 18974
USA

Tel: +1 215 674 6000
Fax: +1 215 674 7183

ABB Automation Products GmbH

Dransfelder Str. 2
37079 Goettingen
Germany

Tel: +49 551 905-534
Fax: +49 551 905-555