Data Sheet DS/FCM2000-EN Rev. P

CoriolisMaster FCM2000
Coriolis mass flowmeter

4-wire Compact Design
Digital Signal Processor
Transmitter Technology

Measurement made easy



Coriolis Mass Flowmeters are used for high precision measurement of mass flow and density. The fluid need not be electrically conductive

No moving parts, no wear, no maintenance

Ex design acc. to ATEX, IECEx / cFMus [USA]

Transmitter with DSP technology

— The latest digital filter technology assures detection of even the weakest sensor signals

Simultaneous measurement of mass flow, volume flow, density, temperature and concentration

Type-tested acc. to NAMUR

Options

— Concentration measurement

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1 Overview of flowmeter and transmitter designs

	MS2	
	 G00315	
	Standard	
Flowmeter sensor		
Model number	MS2	
	DN	PN
Flange DIN 2501/EN 1092-1	10 / 15	40 / 100
Flange ASME B16.5	1/2“	CL 150 ... CL 600
Threaded pipe connection conforming to DIN 11851	DN 10 (3/8")	
Tri-Clamp	DIN 32676 (ISO 2852) DN 10 (3/8")	
"G" threaded pipe connection	1/4“	
NPT threaded pipe connection	1/4“	
Accuracy of mass flowrate	0.15 % / 0.25 % / 0.4“	
Accuracy of density	0.01 kg/l	
Accuracy of temperature	1 K	
Materials in contact with fluid	Stainless steel 1.4435 (316L), Hastelloy C-22	
Ingress protection acc. to EN 60529	IP 67	
Fluid temperature (see Section 3/4 of the data sheet, Section 10 of the operating instructions)	-50 ... 180 °C (-55 ... 356 °F)	
Approvals		
Explosion protection conforming to ATEX, IECEx (KEM 08 ATEX 0150X/0151X), (IECEx KEM08 00.0034X)	Zone 1 (ATEX only)	
Explosion protection conforming to cFMus (PID: 3036514)	Cl1 Div1 und Cl1 Div2	
Other approvals for potentially explosive areas	Please contact our sales organization	
Transmitter		
Model number	ME2_	
Housing	Separate, field-mount housing	
Cable length	10 m (32 ft.)	
Supply power	100 ... 230 V AC, 24 V AC/DC	
Current output 1	Active: 0/4 ... 20 mA or passive: 4 ... 20 mA	
Current output 2	Passive: 4 ... 20 mA	
Pulse output	Active (non-Ex) or passive	
Ext. output switch-off	Yes	
Ext. totalizer reset	Yes	
Forward/reverse flow metering	Yes	
Communication	HART protocol	
Empty pipe detection	Yes, based on preconfigured density alarm < 0.5 kg/l	
Self-monitoring, diagnostics	Yes	
On-site display/totalization	Yes	
Field optimized flow/density	Yes	
Ingress protection acc. to EN 60529	ME2: IP 65/67, NEMA 4X	

1.1 ATEX and IECEx device overview

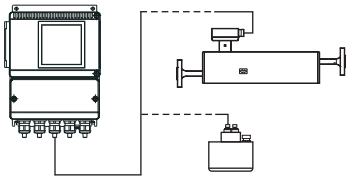
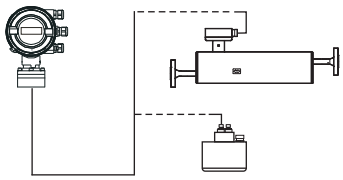
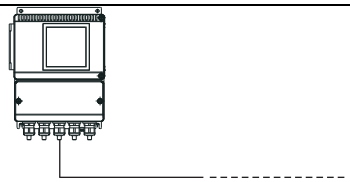
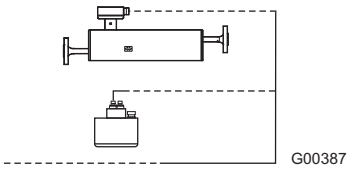
	Standard/Non-Ex		Zone 1/21	
Type	**ME22 A, U ...**	**MS21 A, U**	**ME27/28 B, E**	**MS26 B, E**
			Ex	
1. Remote mount design (small nominal diameters) Transmitter and flowmeter sensor − Standard/non-Ex − Ex Zone 2/21, 22 − Ex Zone 1/21				
Type	**ME24/25 A, U ...**		**MS26 B, E**	
			Ex	
2. Remote mount design (small nominal diameters) Transmitter − Standard/non-Ex − Ex Zone 2/21, 22 Flowmeter sensor − Ex Zone 1/21			 G00387	

Fig. 1: FCM2000 overview

1.2 FM device overview (PID: 3036514)

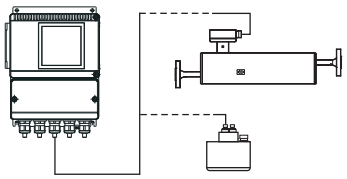
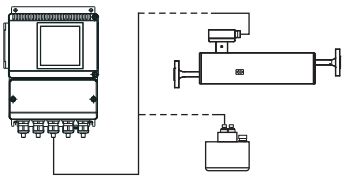
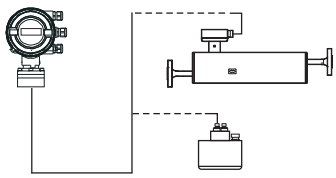
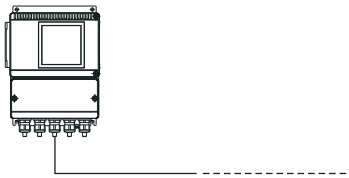
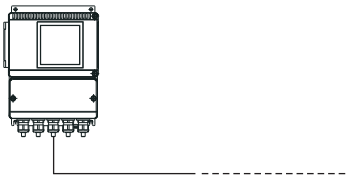
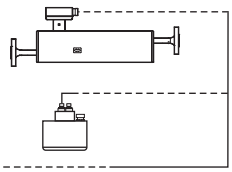
		Standard/non-Ex		Class I Div. 2		Class I Div. 1	
				FM C US APPROVED		FM C US APPROVED	
MS2x	**Type**	**ME22/23 T, X...**	**MS21 T, X**	**ME22/23 O, V, P, W**	**MS21 O, V, P, W**	**ME27/28 C, Y, D, Q**	**MS26 C, Y, D, Q**
	1. Remote mount design (small nominal diameters) Transmitter − Standard/non-Ex − Class I Div. 1 Flowmeter sensor − Class I Div. 2 − Class I Div. 1						
		ME24/25 T, X ...		**ME24/25 O, V, P, W**		**MS26 C, Y, D, Q**	
	2. Remote mount design (small nominal diameters) Flowmeter sensor − Class I Div. 1					 G00899	

Fig. 2: FCM2000 overview

2 General information

The FCM2000 is ABB's economical and uncomplicated mass flowmeter, featuring the new DSP transmitter, either integrated in the flowmeter or mounted separately from it. The compact unit reduces installation and cabling expenditure. Flowrate information can be viewed directly at the meter site and the meter can be installed in systems in an even more space-saving manner than is currently possible.

The FCM2000 operates according to the Coriolis principle. The design offers the following benefits:

- Space-saving, rugged design.
- Two separate current outputs for measuring mass or volume flowrate, density, or temperature, as well as one pulse output.
- Contact inputs and outputs.
- HART protocol.
- Ex approval: The user can select the "i" or "e" type of protection for the output circuits; the type chosen will depend on the circuits which are connected. The type of protection can be changed after installation has been completed. The contact outputs can be configured as NAMUR outputs by the user.
- Permissible fluid temperature up to 180 °C (356 °F), CIP-enabled
- Illuminated, 2-line display with data entered using a magnet stick and without opening the housing.
- Certified acc. to EHEDG.

Mass transmitter with digital signal processor (DSP)

The transmitter for the FCM2000 incorporates a digital signal processor (DSP) that enables high-precision mass flow and density measurements to be made. The Coriolis sensor signals are immediately converted into digital data without any intermediate analog steps.

Excellent long-term stability and reliability together with fast signal processing are achieved with the new DSP transmitter.

Self-diagnostic functions for the flowmeter sensor and the transmitter, in combination with absolute zero stability, are benefits you can count on to ensure accurate measurements are taken.

The FCM2000 transmitter is particularly well suited for use in the following cases:

- When mass flowrate is to be metered to the highest degree of accuracy.
- When the fluid density is to be determined.
- When the components of a recipe are to be mixed together.
- When metering non-conductive fluids or highly viscous, solid-loaded liquids, for example.
- In batch filling systems.

2.1 Installation Requirements

2.1.1 General information

Inspection

Before installing the flowmeter sensor, check for physical damage due to possible improper handling during shipment. All claims for damage are to be made promptly to the shipper.

Installation Requirements / System Sizing Information

The FCM2000 is suitable for both indoor and outdoor installations. The standard instrument meets the requirements of Protection Class IP 67. The primary is bidirectional and can be installed in any orientation. It is important to ensure that the meter pipes are always completely filled with fluid.
The corrosion resistance of the fluid wetted materials must be evaluated.

The following points are to be considered during installation:
The preferred flow direction is indicated by the arrow on the flowmeter sensor. Flow in this direction will be indicated as positive (a forward/reverse flow calibration is available as on option).

Installation position

The FCM2000 operates in any orientation. The optimal installation orientation is vertical with the flow upwards.

Supports

In order to support the weight of the flowmeter sensor and to ensure reliable measurements when adverse external effects exist (e. g., vibrations), the primary should be installed in rigid pipelines. Two supports or hangers should be installed symmetrically and stress free in close proximity to the in- and outlet process connections.

Shut Off Devices

To conduct a system zero adjustment, shut off devices are required in the pipeline:

- in horizontal installation at the outlet,
- in vertical installation at the inlet.

When possible, shut off devices should be installed both up- and downstream from the flowmeter sensor.

Inlet Straight Sections

The mass meter does not require any flow conditioning inlet straight sections. Care should be exercised to ensure that any valves, gates, sight glasses, etc., do not cavitate and are not set into vibration by the flowmeter sensor.

2.1.2 Installation notes FCM2000-MS2

Installing the flowmeter sensor DN 1.5 (1/16")

Horizontal installation is recommended. If vertical installation is required, a flow direction from below to above is recommended for better elimination of air bubbles. In order for air to be removed from the flowmeter sensor, the flow speed in the flowmeter sensor must be at least 1 m/s. If the fluid contains solid particles, especially in conjunction with too little flow, a level installation location of the flowmeter sensor and positioning of the input flange completely on top is recommended so that the particles can be more easily flushed out. In order to avoid a partial emptying of the flowmeter sensor, a sufficient back pressure must be present at the unit (min. 0.1 … 0.2 bar/(1.45...2.9 psi)).

- Install the flowmeter sensor in a vibration-free manner to a wall or a steel frame.
- Position the flowmeter sensor at a low location in the system in order to avoid a negative pressure in the flowmeter sensor, that could lead to air or gas separation in the fluid.
- Ensure that the flowmeter sensor is not run empty (in the normal operation) as this can lead to inaccurate measurements.

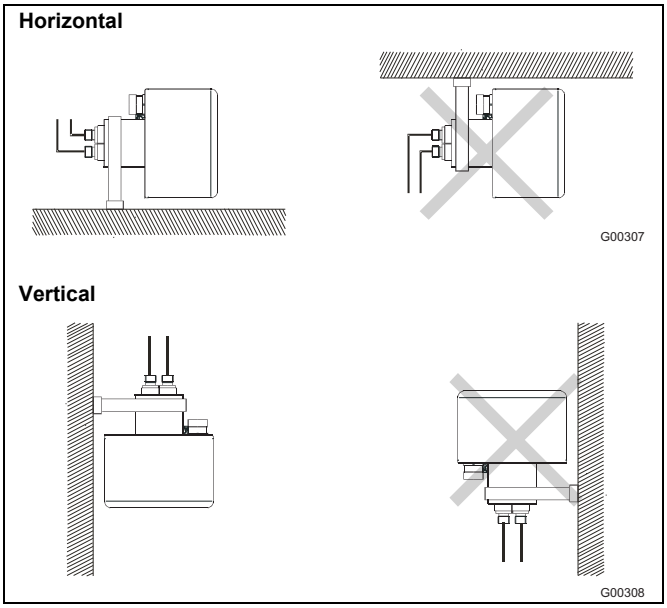


Fig. 3

High temperature version

In the high temperature design the multi-connection plug is separated from the sensor housing by a pipe. Thereby the plug can still be accessed even when the sensor is insulated.

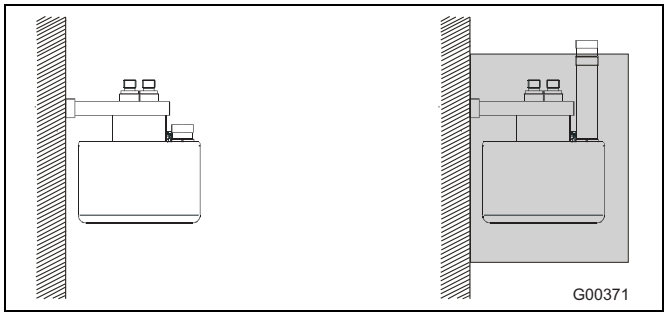


Fig. 4: Installation DN 1.5 (1/16") – vertical

Important

If there are large differences between the fluid and ambient temperature the sensor must be insulated, to prevent two phase flow and accuracy effects. This is especially important for low flowrates.

The sensor must **always** be completely filled with homogeneous liquid or a single phase gas, otherwise the accuracy could be adversely affected.

For air/gas in volatile fluids horizontal installations are recommended.

The mounting bracket included with the shipment should always be used. The bracket should be secured to a wall or a steel framework (vibration free and mechanically stable).

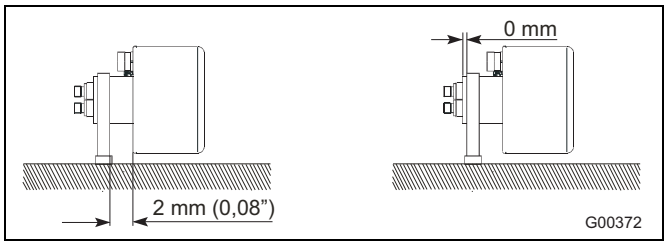


Fig. 5: Installation DN 1.5 (1/16") – horizontal

Angle multi-connection plug, horizontal

To achieve optimum performance, the multi-connection plug is to be installed as shown in the figure. The multi-connection plug can be rotated within the angle noted.

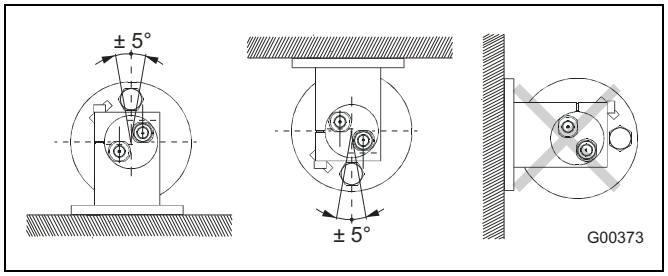


Fig. 6: Angle multi-connection plug – horizontal

Angle multi-connection plug, vertical

A specific orientation of the connection box is not prescribed for vertical installations, although the rotation of the sensor may not exceed the value shown.

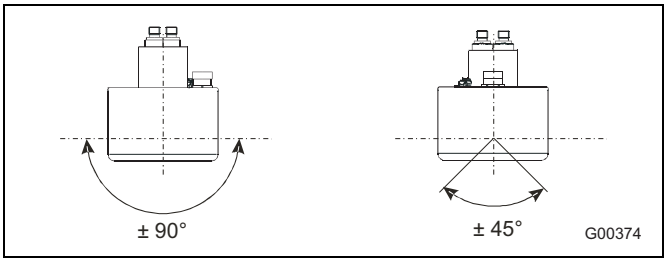


Fig. 7: Angle multi-connection plug – vertical

Installing flowmeter sensor DN3/DN6 (1/10 / 1/4")

A horizontal installation position is recommended for light flow, since air bubbles are easier to remove in this position. If the liquid is volatile or contains solid particles, vertical installation is not recommended.

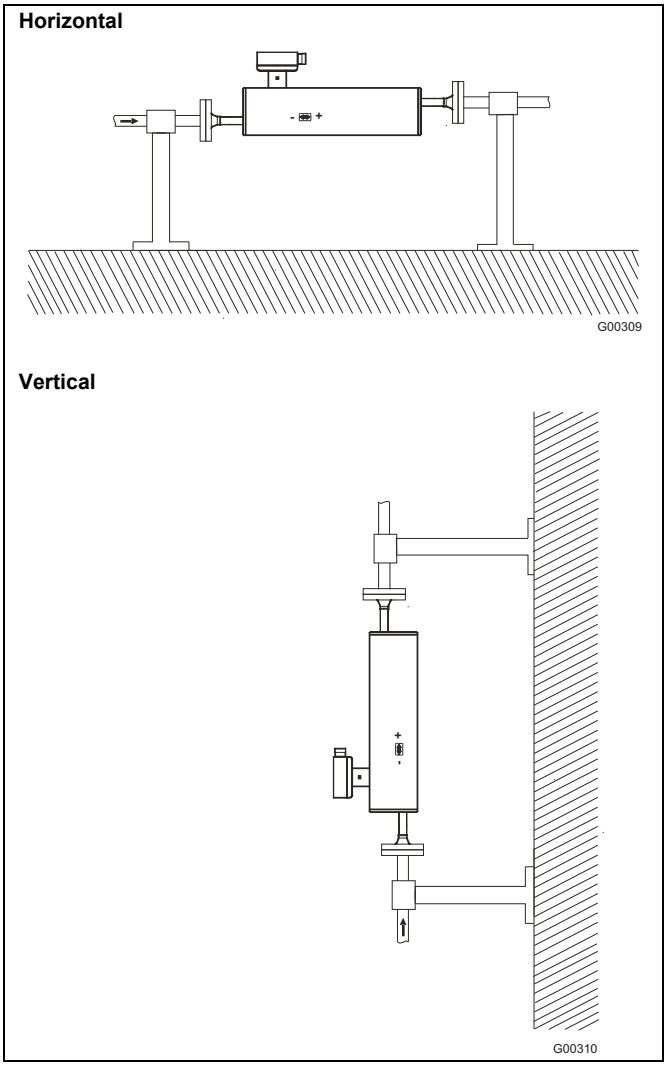


Fig. 8

3 Model FCM2000-MS2

3.1 Specifications

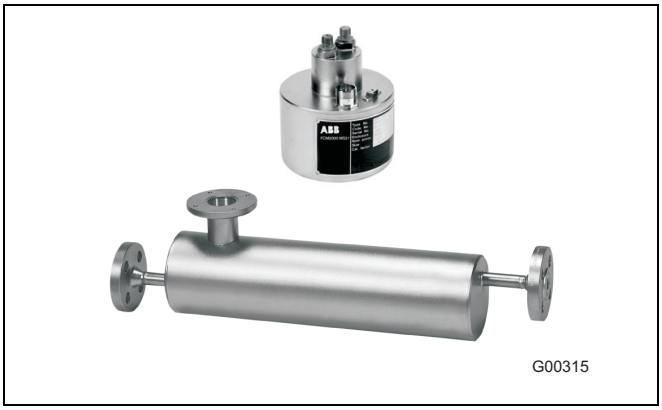


Fig. 9: FCM2000-MS2 flowmeter sensor

Nominal sizes
"S" (DN 1.5); "T" (DN 3); "U" (DN 6)

Measuring ranges for flowrate

Nominal size		Max. measuring range [Qmax] in [kg/h]
"S"	**DN 1.5 (1/16")**	0 ... 65
"T"	**DN 3 (1/10")**	0 ... 250
"U"	**DN 6 (1/4")**	0 ... 1000

Protection class: IP 65

Measured value deviation for flowrate
± 0.4 % of flow rate ± 0.02 % of Q_{max}
± 0.25 % of flow rate ± 0.02 % of Q_{max}
± 0.15 % of flow rate ± 0.01 % of Q_{max}
(deviation from rate + zero error)

Reproducibility of flowrate
0.1 % of flow rate for nom. deviation ± 0.15 %
0.15 % of flow rate for nom. deviation ± 0.25 % and 0.4 %

Measuring range for density
0.5 ... 3.5 kg/dm^3

Measured value deviation for density
Standard calibration ± 10 g/l
Temperature range 0 ... 100 °C (32 ... 212 °F)
Expanded density calibration available upon request

Measured value deviation for temperature
-50 ... 180 °C (-58 ... 356 °F) < 1 °K (1.8 °F)

Reference conditions

Calibration fluid
Water 25 °C (77 °F) (+ 5 K/- 5 K)
Pressure 0.5 ... 6 bar (7.3 ... 87.0 psi)

Ambient temperature
-40 … 60 °C (-40 … 140 °F)

Supply power
Line voltage as per name plate U_N ± 1 %

Warm-up phase
30 minutes

Installation according to this specification
No visible gas phase
No external mechanical or hydraulic disturbances, particularly cavitation

Output calibration
Pulse output

Effect of the analog output on the measurement accuracy
Similar to pulse output ± 0.1 % of measured value

Materials and additional specifications

Sensor materials
Parts in contact with fluid
1.4435/316L
Housing 1.4404

Fluid temperature
Standard:
-50 ... 180 °C (-58 ... 356 °F): DN 3 (1/10"), DN 6 (1/4")
-50 ... 125 °C (-58 ... 257 °F): DN 1.5 (1/16")
-50 ... 180 °C (-58 ... 356 °F): DN 1.5 (1/16") (optional)
For information about the design for operation in potentially explosive areas, refer to the corresponding chapter.

Ambient temperature
-20 ... 50 °C (-4 ... 122 °F)
For information about the design for operation in potentially explosive areas, refer to the corresponding chapter.

Process connections
G1/4" ISO 228-1
1/4" NPT ASME B1.201
Flange DIN/ASME for DN 6 (1/4")
Threaded pipe connection conforming to DIN 11851 for DN 6 (1/4")
Tri-Clamp conforming to DIN 32676 (ISO 2852) for DN 6 (1/4")
The max. permissible operating pressure is determined by the respective process connection, the fluid temperature, the screws, and the gasket material.

Pressure rating
Flange PN 40, PN 100, Cl 150, Cl 600
Thread G 1/4", 1/4" NPT, PN 100 ... PN 410 (for each option)

Installation
For more detailed instructions regarding installation, refer to the operating instructions.

Pressure loss curves

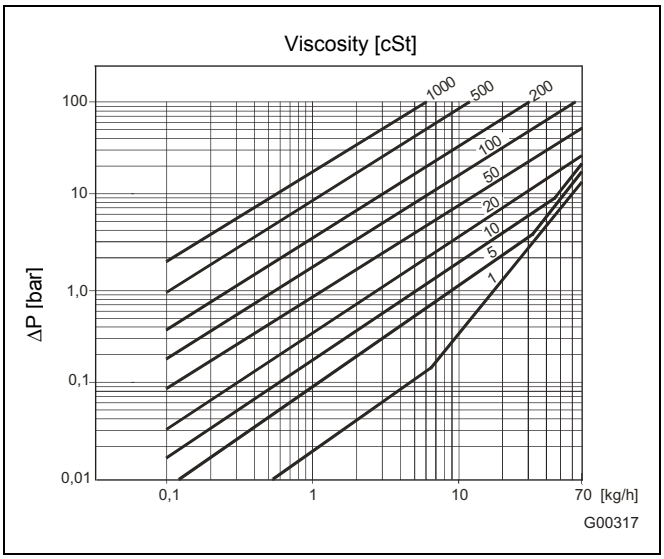


Fig. 10: Pressure losses MS21, DN 1.5 (1/16")

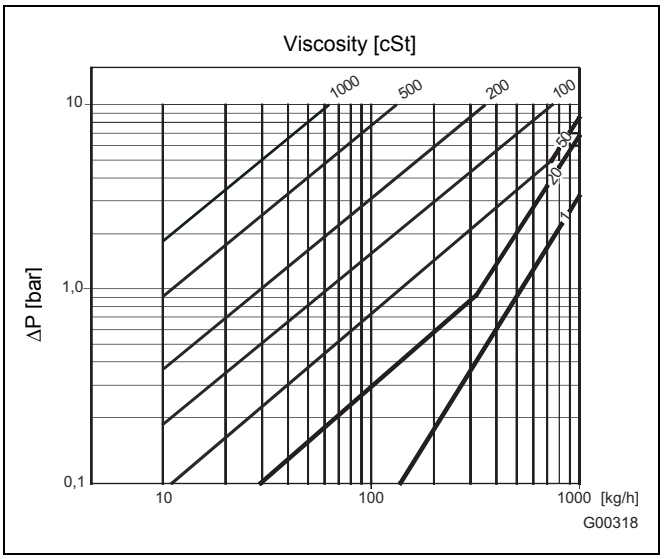


Fig. 12: Pressure losses MS21, DN 6 (1/4")

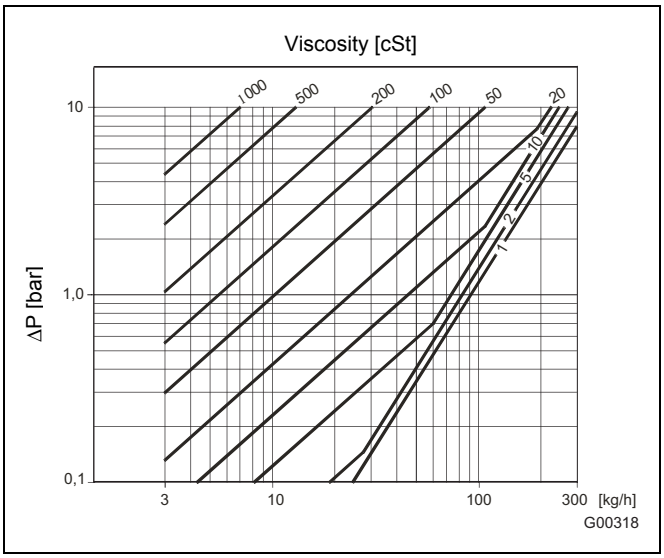


Fig. 11: Pressure losses MS21, DN 3 (1/10")

3.2 Dimensions

3.2.1 Design MS21

Remote design DN 3 ... DN 6 (1/10 ... 1/4“)

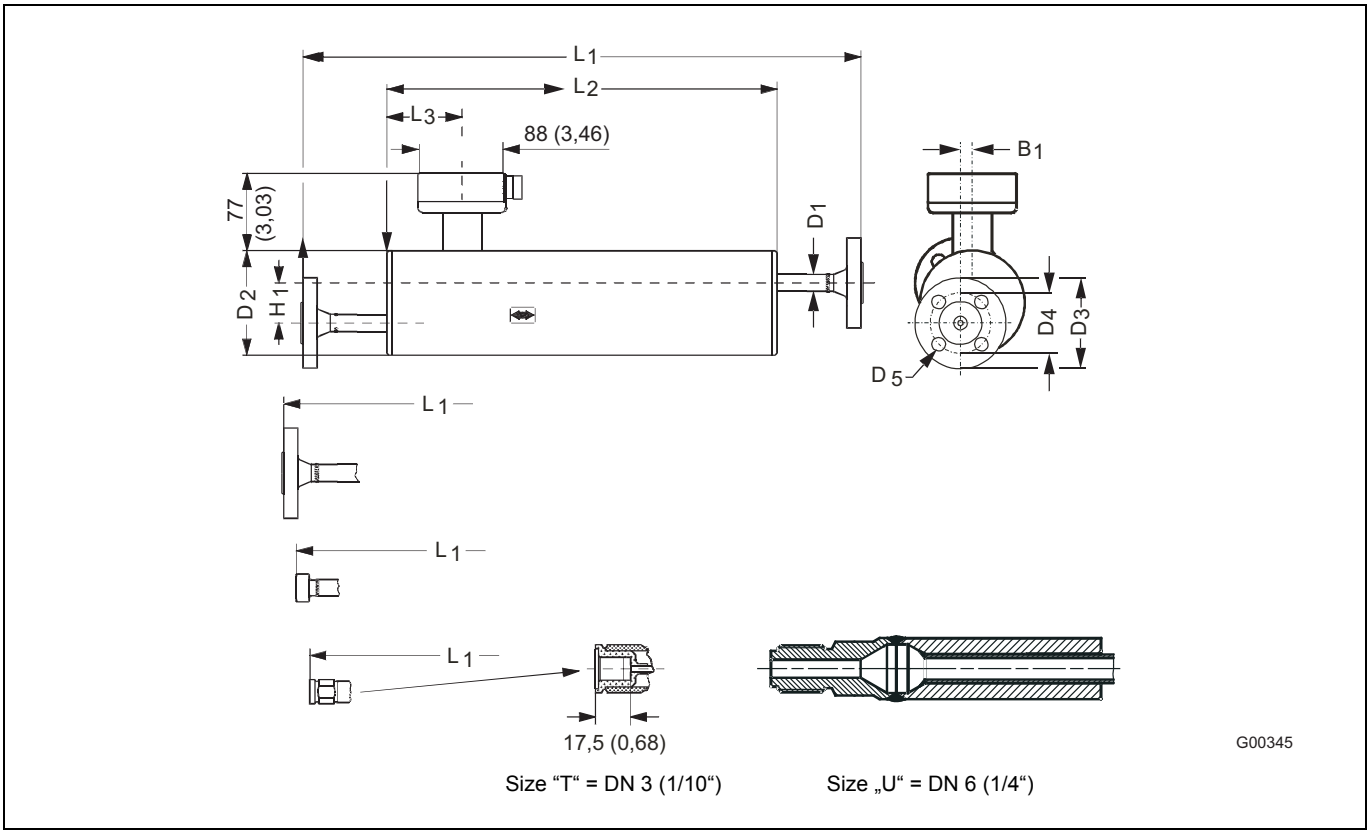


Fig. 13: Dimensions in mm (inch)

Nom. size DN	Connections			L1	L2	L3	H1	B1	D1	D2	D3	D4	D5	Weight appr. kg (lb)
	Type	**Pressure PN**	**Size**											
3 (1/10“)	Threaded connector ISO 228/1-G 1/4	100	1/4“	400 (15.75)	280 (11.02)	75.0 (2.44)	60 (2.36)	0	21.3 (0.84)	104 (4.09)	–	–	–	4 (8.8)
	Threaded connection ANSI/ASME B1.20.1-1/4" NPT	100	1/4“	400 (15.75)	280 (11.02)	75.0 (2.44)	60 (2.36)	0	21.3 (0.84)	104 (4.09)				
6 (1/4“)	Flange DIN 2635	40	DN 10	560 (22.05)	390 (11.02)	62.0 (2.44)	40 (1.57)	12 (0.47)	17.0 (0.67)	104 (4.09)	90.0 (3.54)	60.0 (2.36)	14.0 (0.55)	8 (17.6)
	Flange DIN 2637	100 (64)	DN 10	580 (22.83)	390 (11.02)	62.0 (2.44)	40 (1.57)	12 (0.47)	17.0 (0.67)	104 (4.09)				
	Flange DIN 2635	40	DN 15	638 (25.12)	390 (11.02)	62.0 (2.44)	40 (1.57)	12 (0.47)	17.0 (0.67)	104 (4.09)				
	Flange DIN 2637	100 (64)	DN 15	654 (25.75)	390 (11.02)	62.0 (2.44)	40 (1.57)	12 (0.47)	17.0 (0.67)	104 (4.09)				
	Flange ANSI / ASME B 16.5	Class 150	1/2“	624 (24.57)	390 (15.35)	62.0 (2.44)	40 (1.57)	12 (0.47)	17.0 (0.67)	104 (4.09)	88.9 (3.50)	60.5 (2.38)	15.7 (0.62)	
	Flange ANSI / ASME B 16.5	Class 600	1/2“	646 (25.43)	390 (15.35)	62.0 (2.44)	40 (1.57)	12 (0.47)	17.0 (0.67)	104 (4.09)				
	Flange ANSI / ASME B 16.5	Class 150	3/4“	670 (26.38)	390 (15.35)	62.0 (2.44)	40 (1.57)	12 (0.47)	17.0 (0.67)	104 (4.09)				
	Flange ANSI / ASME B 16.5	Class 600	3/4“	693 (27.28)	390 (15.35)	62.0 (2.44)	40 (1.57)	12 (0.47)	17.0 (0.67)	104 (4.09)				
	Screwed connection DIN 11851	40	DN 10	532 (20.94)	390 (15.35)	62.0 (2.44)	40 (1.57)	12 (0.47)	17.0 (0.67)	104 (4.09)	–	–	–	
	Screwed connection DIN 11851	40	DN 15	570 (22.44)	390 (15.35)	62.0 (2.44)	40 (1.57)	12 (0.47)	17.0 (0.67)	104 (4.09)				
	Tri-clamp, DIN 32676 (ISO 2852)	16	25 mm	570 (22.44)	390 (15.35)	62.0 (2.44)	40 (1.57)	12 (0.47)	17.0 (0.67)	104 (4.09)				
	Clamp, ISO 2853	16	25 mm	573 (22.56)	390 (15.35)	62.0 (2.44)	40 (1.57)	12 (0.47)	17.0 (0.67)	104 (4.09)				
	Threaded connector ISO 228/1-G 1/4	100	1/4“	562 (22.13)	390 (15.35)	62.0 (2.44)	40 (1.57)	12 (0.47)	17.0 (0.67)	104 (4.09)	–	–	–	
	Threaded connection ANSI/ ASME B 1.20.1-1/4" NPT	100	1/4“	562 (22.13)	390 (15.35)	62.0 (2.44)	40 (1.57)	12 (0.47)	17.0 (0.67)	104 (4.09)	–	–	–	
	Threaded connection ISO 228/1-G 1/4	EN1.4435 PN 265 EN2.4602 PN 410	1/4“	562 (22.13)	390 (15.35)	62.0 (2.44)	40 (1.57)	12 (0.47)	17.0 (0.67)	104 (4.09)				
	Threaded connection ANSI/ ASME B 1.20.1-1/4" NPT	EN1.4435 PN 265 EN2.4602 PN 410	1/4“	562 (22.13)	390 (15.35)	62.0 (2.44)	40 (1.57)	12 (0.47)	17.0 (0.67)	104 (4.09)				

Measurements in mm (inch)

Remote design, DN 1.5 (1/16“)

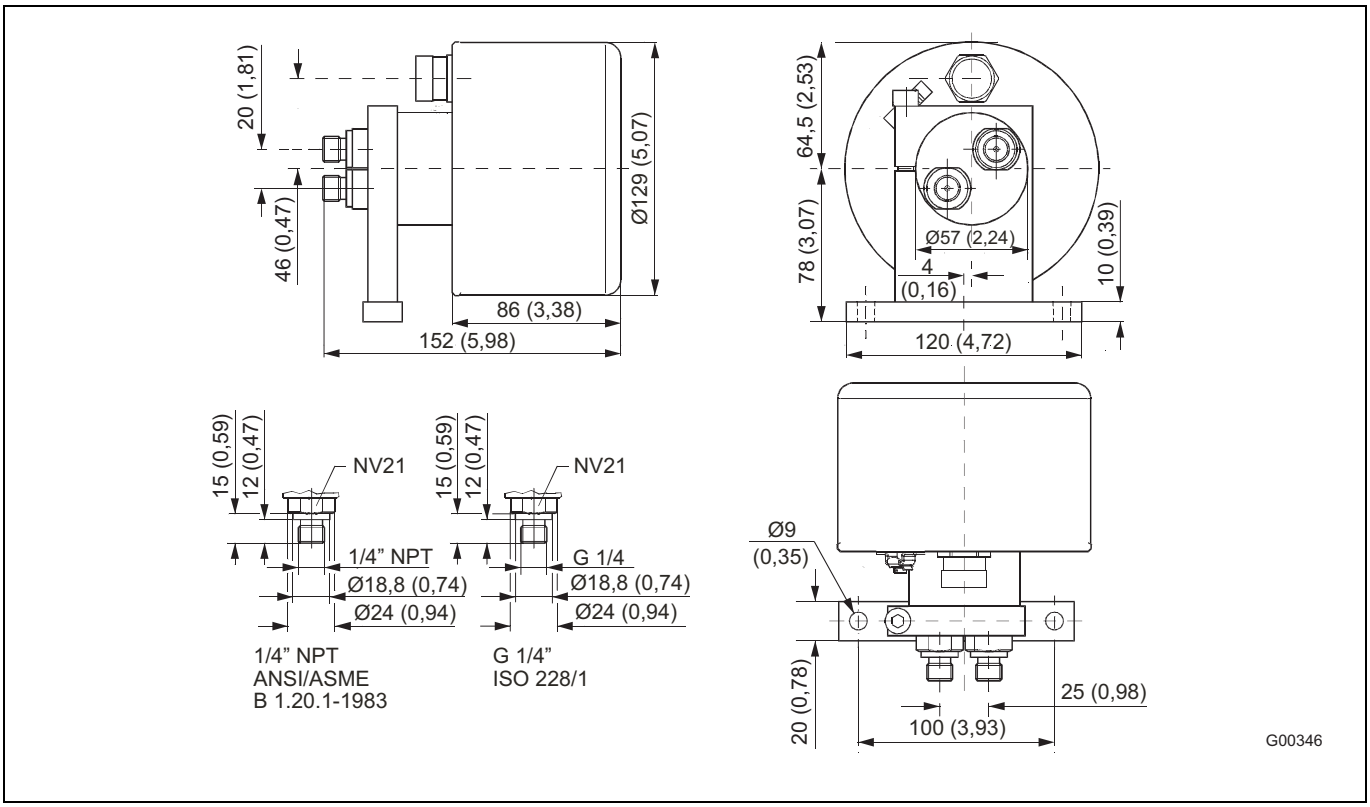


Fig. 14: Dimensions in mm (inch)

3.3 Ordering information

Remote mount sensor, DN 1.5 ... DN 6 (1/10 ... 1/4")

		Main order number														Additional order no.
Version number		1 - 3	4	5	6	7	8	9	10	11	12	13	14	15	16	
CoriolisMaster mass flowmeter	**FCM2000**	**MS2**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	X	X	X	X	
Design																
Remote mount flowmeter sensor, non-Ex or FM Div. 2			**1**													
Remote mount flowmeter sensor, ATEX Zone 1, FM Div. 1			6													
Application																
Standard/plug			1)	A												
ATEX Zone 1/plug			2)	B												
FMus Class I, Div. 1, Zone 1/plug			2)	C												
FMus Class I, Div. 2, Zone 2/plug			1)	O												
cFM Class I, Div. 1, Zone 1/NPT 1/2 in.			2)	D												
cFM Class I, Div. 2, Zone 2/NPT 1/2 in.			1)	P												
Certificates																
Standard					**1**											
Material certificate 3.1 to EN 10204					2											
Material certificate 3.1 to EN 10204 and pressure test to AD-2000					3											
Meter tube material																
Stainless steel AISI 316L (1.4435)						**3**										
Hastelloy C-22 (2.4602)						4										
Measuring range/Size/DN nominal																
0 ... 65 kg/h (0 ... 140 lbs/h)/"S"/DN 1.5 (1/17 in.)							**S**									
0 ... 250 kg/h (0 ... 550 lbs/h)/"T"/DN 3 (1/10 in.)							T									
0 ... 1,000 kg/h (0 ... 2,200 lbs/h)/"U"/DN 6 (1/4 in.)							U									
Temperature version																
Max. 125 °C (257 °F) (DN 1.5 [1/17 in.] only)								**1**								
Max. 180 °C (356 °F) (DN 3 [1/10 in.] and DN 6 [1/4 in.] only)							3)	2								
Process connection type																
G 1/4 in. ISO 228-1/PN 100									**A**							
1/4 in. NPT, ANSI/ASME B 1.20.1/PN 100									B							
Flange EN 1092-1 DN 10/PN 40 (DN 6 [1/4 in.] only)									C							
Flange EN 1092-1 DN 15/PN 40									P							
Flange EN 1092-1 DN 10/PN 100									Q							
Flange EN 1092-1 DN 15/PN 100									R							
Flange 1/2 in. /ASME Class 150 (DN 6 [1/4 in.] only)									I							
Flange 3/4 in. /ASME Class 150									U							
Flange 1/2 in. /ASME Class 600								4)	V							
Flange 3/4 in. /ASME Class 600									W							
DN 10 conforming to DIN 11851/PN 40 (DN 6 [1/4 in.] only)									M							
DN 15 conforming to DIN 11851/PN 40 (DN 6 [1/4 in.] only)									N							
Tri-Clamp 25 mm, ISO 2852/PN 16									J							
Housing design																
Standard									5)	**1**						
PN 230 (316L)									6)	2						
PN 350 (HC22)									7)	3						
PN 365 (HC22)									8)	4						
PN 265									9)	5						
PN 410									9)	6						
Heating/Cooling																
None											**0**					
Heating connection flange DN 15										10)	1					
Heating connection flange 1/2 in. ASME										10)	2					

Continued on next page

1) For MS21 only.
2) For MS26 only.
3) For size "S" on request.
4) With plug at flowmeter sensor.
5) See "Process connection type" for details.
6) With sizes "S", "T" only.
7) With size "T" only.
8) With size "S" only.
9) With size "U" only.
10) With sizes "T", "U" only

		Main order number													Additional order no.
	Version number	1 - 3	4	5	6	7	8	9	10	11	12	13	14	15	16	
CoriolisMaster mass flowmeter	**FCM2000**	**MS2**	X	X	X	X	X	X	X	X	X	**X**	**X**	**X**		**XX**
Calibration																
0.40 % / 10 g/l forward												**A**				
0.25 % / 10 g/l forward												B				
0.15 % / 10 g/l forward												C				
0.40 % / 10 g/l forward/reverse												G				
0.25 % / 10 g/l forward/reverse												H				
0.15 % / 10 g/l forward/reverse												I				
Name plate																
German												11)	G			
English													**E**			
Design level																
(Specified by ABB)														**X**		
Signal cable length																
5 m (16 ft.)														4)	**1**	
10 m (33 ft.)														4)	2	
25 m (82 ft.)														4)	3	
50 m (164 ft.)														4)	4	
10 m (33 ft.) (with ME27/ME28 only)														4)	5	

Language of documentation	
German	M1
English	M5
Western Europe/Scandinavia language package (languages: DA, ES, FR, IT, NL, PT, FI, SV)	MW
Eastern Europe language package (languages: EL, CS, ET, LV, LT, HU, HR, PL, SK, SL, RO, BG)	ME
Other	MZ

4) With plug at flowmeter sensor.
11) Only for non-Ex versions

4 Transmitter

4.1 Specifications

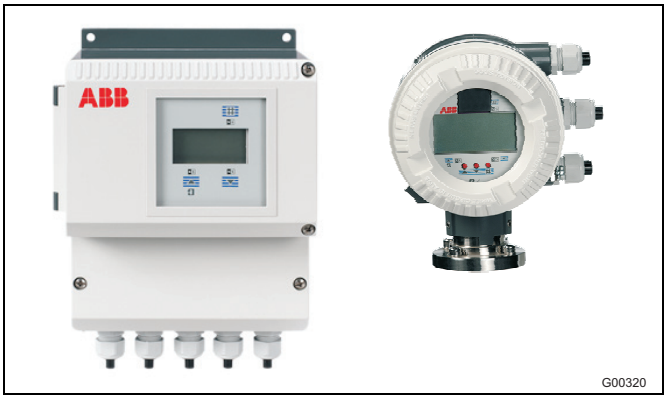


Fig. 15: FCM2000-ME2 transmitter, field-mount housing

Measuring range
Freely configurable between 0.01 Q_{max} and 1 Q_{max}

Ingress protection
IP 65/IP 67, NEMA 4X

Electrical connections
Cable gland M20 x 1.5 or 1/2" NPT
Max. signal cable length for remote mount design 50 m (longer lengths available upon request)

Supply power
Supply voltage
100 ... 230 V AC (tolerance -15 % and +10 %), 47 ... 63 Hz
20.4 ... 26.4 V AC, 47 ... 63 Hz
20.4 ... 31.2 V DC
Ripple: ≤ 5 %

Power consumption
S ≤ 25 VA

Response time
As jump function 0 ... 99 % (corr. to 5 τ) ≥ 1 s

Ambient temperature
-40 ... 60 °C (-40 ... 140 °F)
At operation below -20 °C (-4 °F), the display can no longer be read and the electronic unit should be operated with as few vibrations as possible. Complete operational reliability is achieved at temperatures above -20 °C (-4 °F).

Design
Field-mount housing and compact transmitter unit as alloy casting, varnished
Mid-section: RAL 7012, dark gray
Cover: RAL 9002, light gray
Paint coat: 80 ... 120 µm thick

Forward/reverse flow metering
Signals are shown on the display by direction arrows and by the optocoupler for ext. signaling.

Display
The graphic display has 2 lines and features an LED backlight. Both lines are freely configurable to display the mass flowrate, volume flowrate, density, or temperature. Flow count, 7-digit with overflow counter and physical unit for mass or volume.
When the four mounting screws are loosened, the display can be installed in 4 positions. This ensures optimal readability.

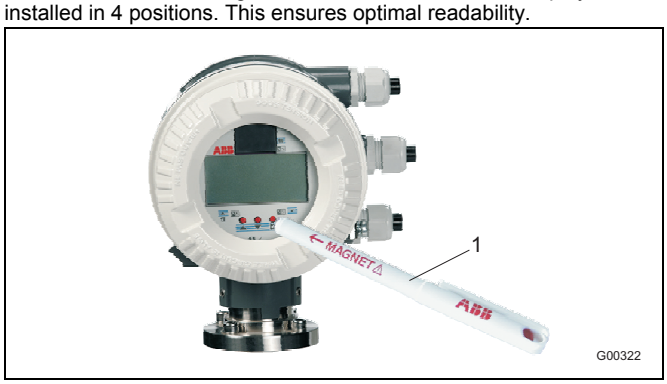


Fig. 16: Magnet stick operation
1 Magnet stick (The magnet stick can be used for parameterization in the compact unit or the field-mount housing when the housing cover is closed.)

Parameter adjustment
Data can also be entered in various languages using the three control buttons on the transmitter.
The transmitter housing can be rotated approx. 180° in each direction. The display can be installed in 4 positions to ensure optimal readability. As well as allowing you to select the 1st and 2nd display lines, multiplex mode can be used to display the following: flow indicators in %, physical unit, or bar graph; totalizer status; forward or reverse flow; and TAG no.

Data backup
Via FRAM, all data over 10 years old is stored without supply power in the event of shut-off or failure of the line voltage. Additional security is provided by another FRAM in the transmitter, through data exchange or data storage for process information.
Hardware and software identification acc. to NAMUR recommendation NE53.

Important
The unit complies with NAMUR recommendations NE21 and NE43, "Electromagnetic compatibility of equipment for process and lab control technology", as well as EMC Directive 2004/108/EC (EN 61326) and Low-Voltage Directive 2006/95/EC (EN 61010-1).

4.2 Concentration measurement DensiMass

This software calculates on the basis of predefined density-temperature-concentration matrices the present concentration of a 2 phase liquid. In this software the following matrices are predefined:

- Concentration of sodium hydroxyde in water
- Concentration of alcohol in water
- Concentration of sugar (BRIX)
- Concentration of Corn Starch
- Concentration of Wheat starch

The user can additionally enter up to 2 variable matrices with up to 100 values for concentration computation.

Calculation of accuracy

The accuracy of the concentration computation depends foremost on the quality of the matrix data. As density and temperature measurement is the input for the calculation both accuracies define the accuracy of the concentration measurement.

Example:

Density 0 % alcohol in water (20 °C [68 °F])		998.23 g/l
Density 100 % alcohol in water (20 °C [68 °F])		789.30 g/l
100 %	=	208.93 g/l
0.48 %	=	1 g/l
2.40 %	=	5 g/l

The chosen accuracy class of the density measurement effects the accuracy of the concentration measurement directly.

Please also see the manual OI/FCM2000 attached to your meter and also available at www.abb.com/flow.

4.3 Inputs/outputs

Active current output (0/4 ... 20 mA)

Current output 1
0/4 ... 20 mA, selectable
Load: 0 Ω ≤ R_B ≤ 560 Ω
Terminals: 31/32
Measurement uncertainty < 0.1 % of rate
For output of mass flowrate, volume flowrate, density, and temperature.
Freely configurable in the software.

Passive current output (4 ... 20 mA)

Current output 1 or 2
Output current 4 ... 20 mA
Load: 0 Ω ≤ R_B ≤ 600 Ω
Source voltage: 12 V ≤ Uq ≤ 30 V
Terminals: 33/34
Measurement uncertainty < 0.1 % of rate
For output of mass flowrate, volume flowrate, density, and temperature.

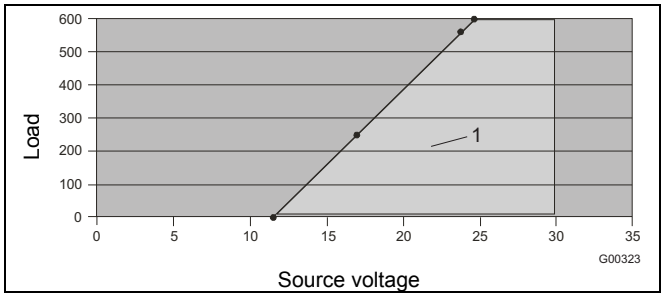


Fig. 17: Permissible source voltage as a function of the load resistance, where I_{max} = 22 mA

1 Permissible range

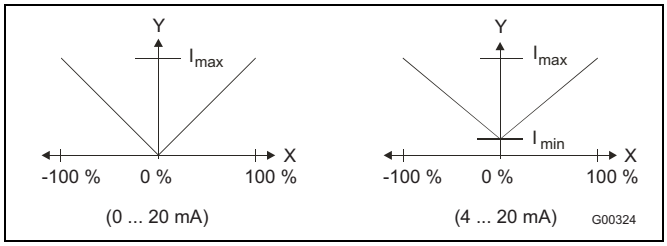


Fig. 18

Important
Failure information acc. to NAMUR recommendation NE43.

Scaled pulse output
Scaled pulse output (max. 5 kHz) with adjustable pulse factor between 0.001 ... 1,000 pulses per selected engineering unit. The pulse width is configurable from 0.1 ... 2,000 ms. The output is electrically isolated from current outputs 1 and 2.

Design	Passive	Active
Terminals	51, 52	51, 52
Operating voltage Operating current	16 V ≤ U_{CEH} ≤ 30 V DC 0 V ≤ U_{CEL} ≤ 2 V 0 mA ≤ I_{CEH} ≤ 0.2 mA 2 mA ≤ I_{CEL} ≤ 220 mA	16 V ≤ U ≤ 30 V DC Load ≥ 150 Ohm fmax = 5 kHz
	When using a mechanical totalizer, pulse widths ≥ 30 ms and fmax ≤ 3 Hz are recommended	
fmax	5 kHz	5 kHz
Pulse width	0.1 ms ... 2,000 ms	0.1 ms ... 2,000 ms

Contact output
The following functions can be assigned in the software:
System monitoring: normally open or normally closed contact
Forward/reverse flow indication: closed for forward flow
Max/min alarm: normally open or normally closed contact
Terminals: 41, 42
"Closed" 0 V ≤ U_{CEL} ≤ 2 V
2 mA ≤ I_{CEL} ≤ 220 mA
"Open" 16 V ≤ U_{CEH} ≤ 30 V
0 mA ≤ I_{CEH} ≤ 0.2 mA

Contact input
The following functions can be assigned in the software:
Ext. output switch-off. When the meter tube empties, all output signals can be turned off.
Ext. totalizer reset. The internal totalizers can be reset from an external contact.
Terminals: 81/82
"On" 16 V ≤ U_{KL} ≤ 30 V
"Off" 0 V ≤ U_{KL} ≤ 2 V
Internal resistance: R_i = 2 kΩ

All inputs/outputs are electrically isolated from one another.

4.4 Digital Communication

The transmitter offers the following options for digital communication:

4.4.1 HART protocol

The unit is registered with the HART Communication Foundation.

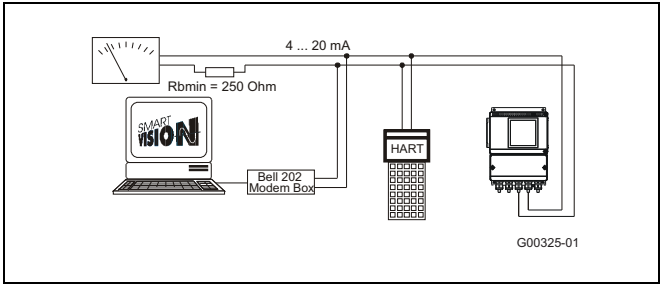


Fig. 19: Communication via HART protocol

HART protocol	
Configuration	Directly on the unit Software DSV401 (+ HART-DTM)
Transmission	FSK modulation on current output 4 ... 20 mA acc. to Bell 202 standard
Max. signal amplitude	1.2 mA_{ss}
Load of current output	Min. 250 Ω, max. = 560 Ω (ignition-proof: max. 300 Ω)
Cable	
Cable	AWG 24 twisted
Max. cable length	1,500 m (4,921 ft.)
Baud rate	1,200 baud
Display	Log. 1: 1,200 Hz Log. 0: 2,200 Hz

For additional information, see the separate interface description.

System integration
Communication (configuration, parameterization) can be performed with the DTM (Device Type Manager) available for the unit (software version B.10 and higher) and the corresponding framework applications as per FDT 0.98 or 1.2 (DSV401 R2). If you require integration into different tools/systems (e.g., AMS or Siemens S7), this is available upon request. DSV401 communication tool for HART, free 90-day test version also available upon request. DTMs are included in DSV401.

4.5 Electrical connections

4.5.1 Interconnection Examples for Peripherals

DC outputs (incl. HART)

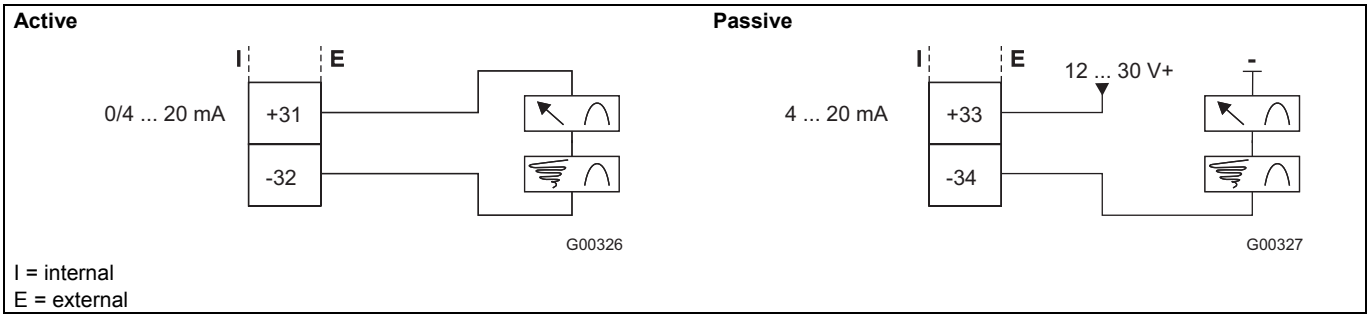


Fig. 20: Current output 1 active/passive

Switch output

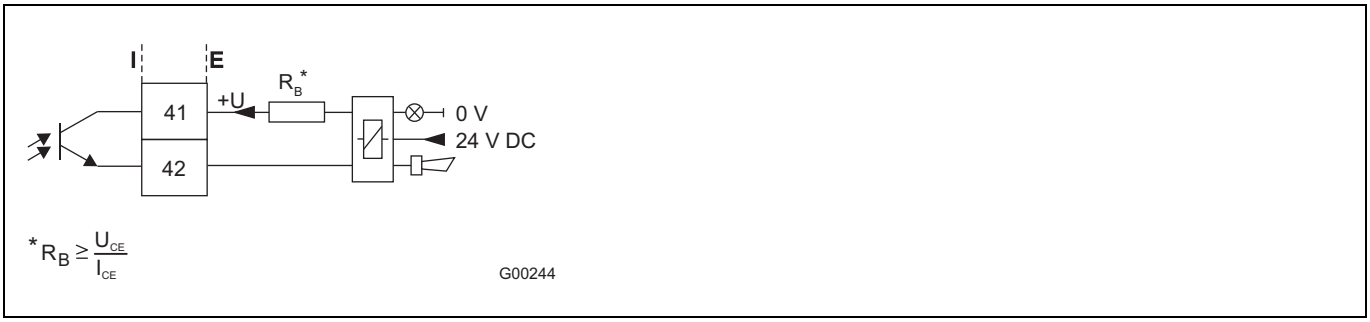


Fig. 21: Switch output for system monitoring, Max.-Min. alarm for empty tube or forward/reverse signal

Switch input

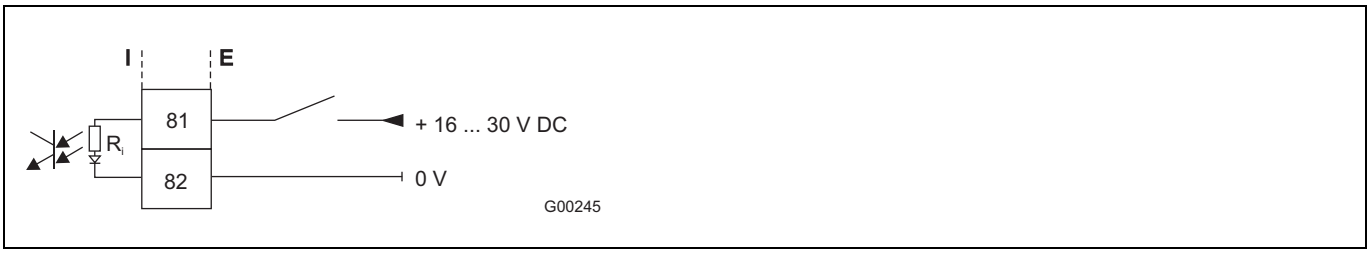


Fig. 22: Contact input for external totalizer reset and external zero return

Pulse Output

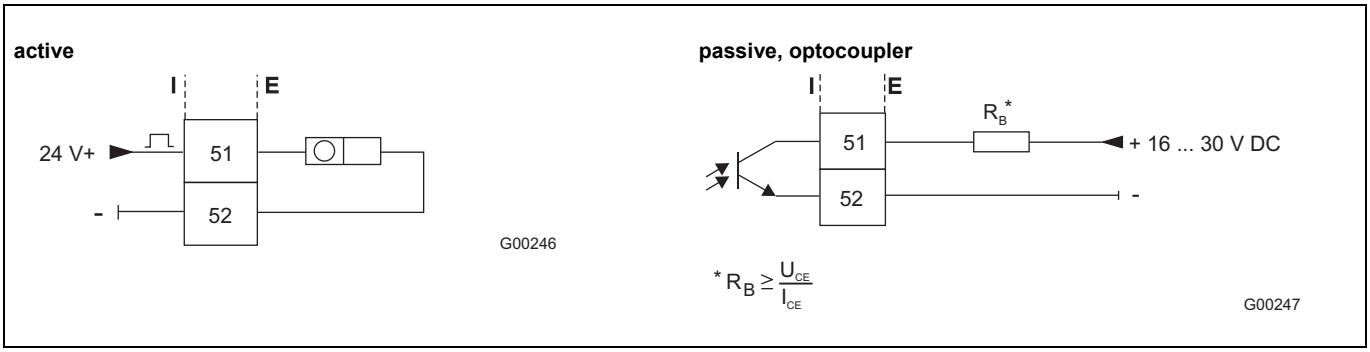


Fig. 23: Pulse output active and pulse output passive, optocoupler

4.5.2 Electrical connections between the transmitter and the flowmeter sensor

Connecting transmitter ME2 to flowmeter sensor MS2

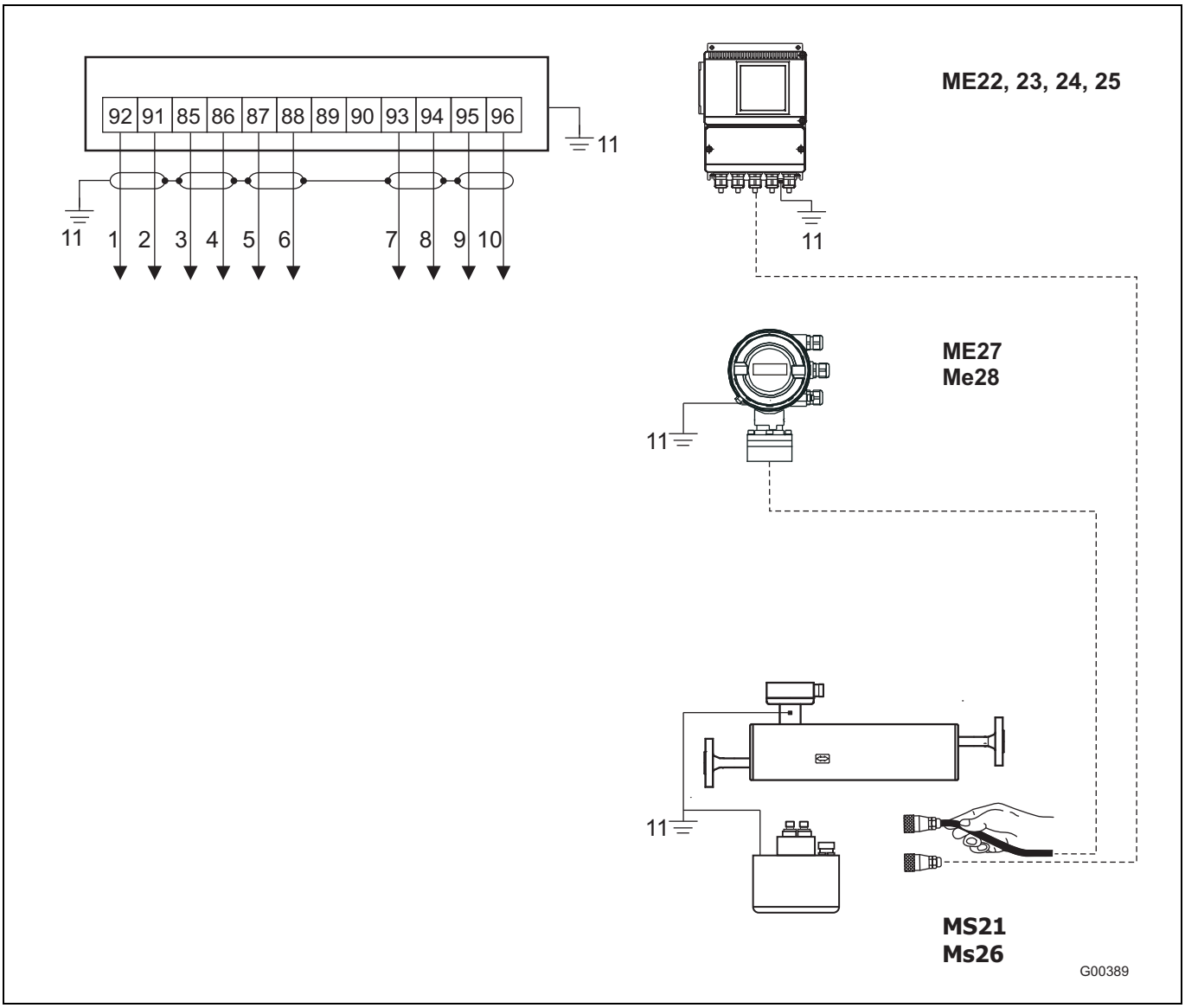


Fig. 24

91 / 92	Driver
93 / 94 / 95 / 96	Temperature
85 / 86	Sensor 1
87 / 88	Sensor 2

1 Red
2 Brown
3 Green
4 Blue
5 Gray
6 Violet
7 White
8 Black
9 Orange
10 Yellow
11 "PA" equipotential bonding. When connecting transmitter to flowmeter sensor MS26, transmitter also has to be connected to "PA".

4.5.3 Electrical connections between the transmitter and the peripherals

Input and output signals, supply power ME2/MS2

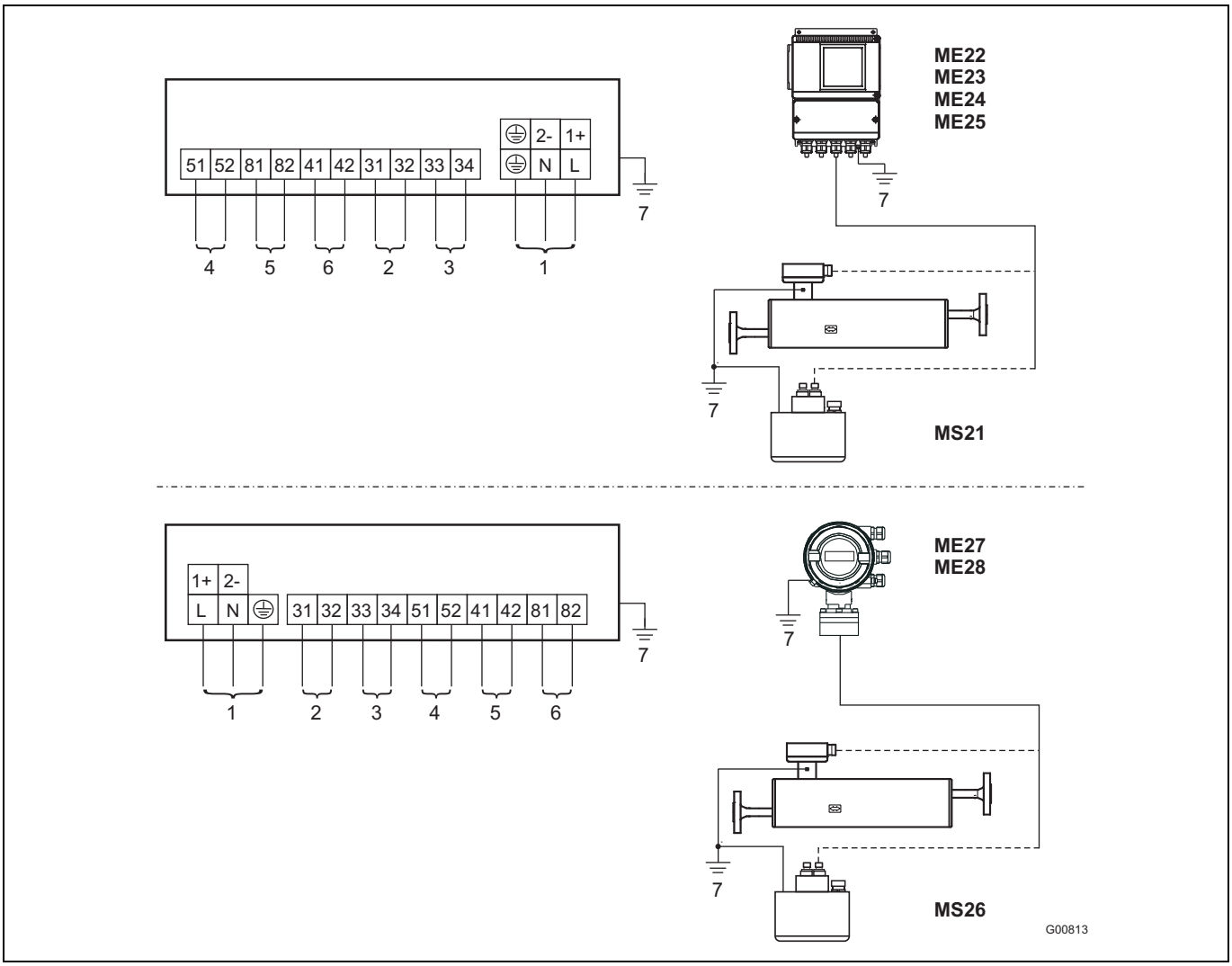


Fig. 25

1 Supply power
Line voltage: U_{AC} 100 ... 230 V AC, frequency 50/60 Hz, terminals L, N, ⏚
Low voltage: U_{AC} 24 V, frequency 50/60 Hz, terminals 1+, 2-
U_{DC} 24 V

2 Current output 1: can be selected via software
2a: function: active
Terminals: 31, 32; 0/4 … 20 mA (0 Ω ≤ R_B ≤ 560 Ω, ME27/28: 0 Ω <= RB <= 300 Ω)
2b: alternate function: passive (option D)
Terminals: 31, 32; 4 ... 20 mA (0 Ω ≤ R_B ≤ 600 Ω)
Source voltage 12 ≤ U_q ≤ 30 V

3 Current output 2: can be selected via software
Function: passive
Terminals: 33, 34; 4 … 20 mA (0 Ω ≤ R_B ≤ 600 Ω)
Source voltage 12 ≤ U_q ≤ 30 V

4a Passive pulse output, terminals: 51, 52
f_{max} = 5 kHz, pulse width 0.1 … 2,000 ms
Setting range: 0.001 … 1,000 pulses/unit
"Closed": 0 V ≤ U_{CEL} ≤ 2 V, 2 mA ≤ I_{CEL} ≤ 65 mA
"Open": 16 V ≤ U_{CEH} ≤ 30 V, 0 mA ≤ I_{CEH} ≤ 0.2 mA

4b Active pulse output
U = 16 ... 30 V, load ≥ 150 Ω, f_{max} = 5 kHz,

5 Contact output, passive
Terminals: 41, 42
"Closed": 0 V ≤ U_{CEL} ≤ 2 V, 2 mA ≤ I_{CEL} ≤ 65 mA
"Open": 16 V ≤ U_{CEH} ≤ 30 V, 0 mA ≤ I_{CEH} ≤ 0.2 mA

6 Contact input, passive
Terminals: 81, 82
"On": 16 V ≤ U_{KL} ≤ 30 V
"Off": 0 V ≤ U_{KL} ≤ 2 V

7 "PA" equipotential bonding. When transmitter ME2 is connected to flowmeter sensor MS26, transmitter ME2 also has to be connected to "PA".

4.6 Dimensions

4.6.1 Transmitter housing and suggested installation method

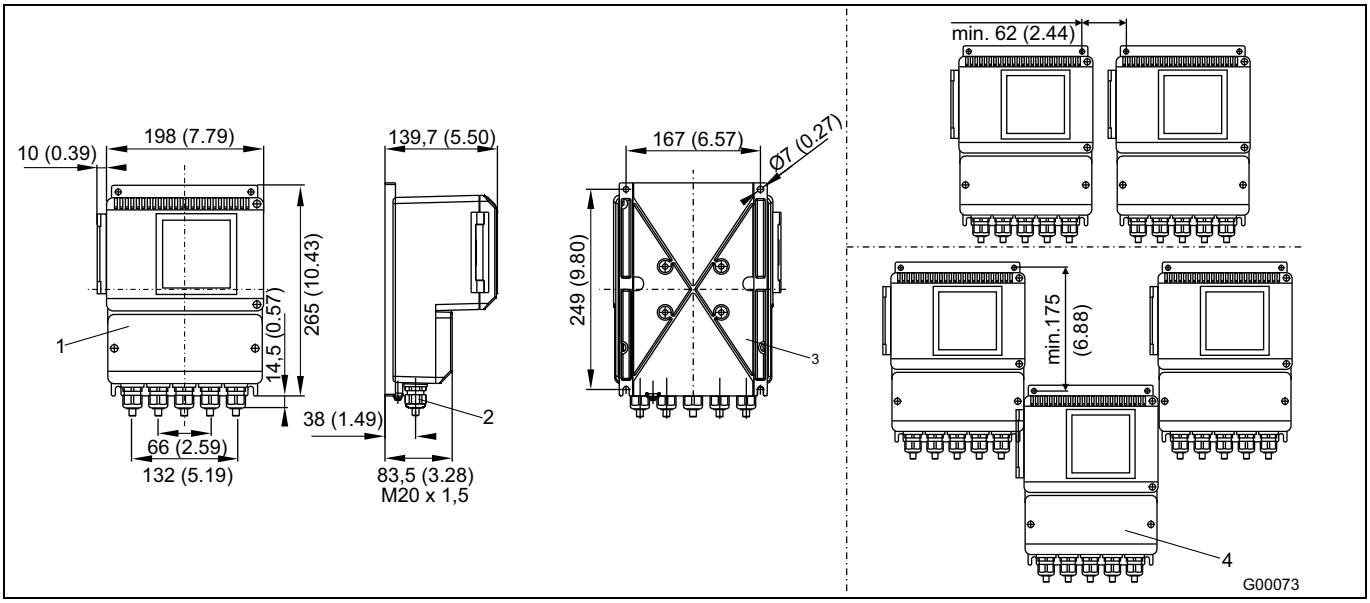


Fig. 26: Dimensions in mm (inch)

1 Field-mount housing with window
2 Cable gland M20 x 1.5
3 Installation holes for pipe mounting set, for 2" pipe installation; mounting set available on request (order no. 612B091U07)
4 Protection class IP 67

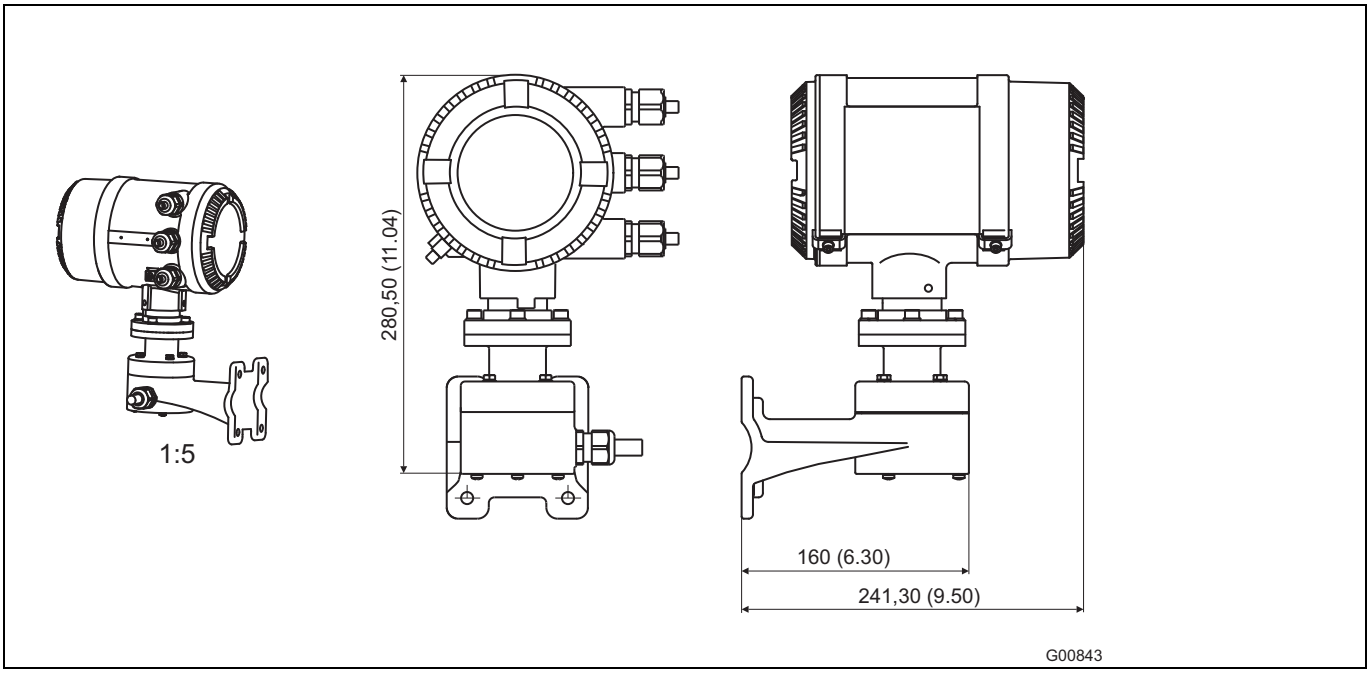


Fig. 27: Dimensions of ME26/27/28 transmitter housing

4.7 Ordering information

External transmitter, DSP technology, for remote mount sensor MS2

		Main order number								Additional order no.
	Version number	1 - 3	4	5	6	7	8	9	10	11	
CoriolisMaster mass flowmeter	**FCM2000**	**ME2**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**XX**
Design											
Remote mount design with flowmeter sensor MS21 size "S"			2								
Remote mount design with flowmeter sensor MS21 size "T", "U"			3								
Remote mount design with flowmeter sensor MS26 size "S"			4								
Remote mount design with flowmeter sensor MS26 size "T", "U"			5								
Remote mount design ATEX with flowmeter sensor MS26 size "S"			7								
Remote mount design ATEX with flowmeter sensor MS26 size "T", "U"			8								
Explosion protection/Cable gland/Ambient temperature											
None/cable gland M20 x 1.5/standard				A							
None/cable gland NPT 1/2 in./standard				T							
FMus Class I, Div. 2, Zone 2/cable gland NPT 1/2 in./standard				O							
ATEX, IECEx Zone 1/M20 x 1.5/standard			1)	B							
FMus Class I, Div. 1, Zone 1/NPT 1/2 in./standard				C							
cFM Class I, Div. 1, Zone 1/NPT 1/2 in./standard				D							
cFM Class I, Div. 2, Zone 2/NPT 1/2 in./standard				P							
Housing											
Field-mount housing, rectangular				2)	3						
Field-mount housing, round, with wall bracket, Ex, incl. 10 m cable				3)	8						
Operating mode/Software version											
Standard software (mass and density measurement)						A					
Standard software plus concentration measurement (DensiMass)						C					
Outputs											
Current output I (active), current output II (passive), pulse output (active) [Ex not possible]						2)	A				
Current output I (active), current output II (passive), pulse output (passive)							B				
Current output I (passive, "ia"), current output II (passive, "ia"), pulse output (passive, "ia")						4)	D				
Not selected/fieldbus							X				
Communication											
None								0			
HART protocol								1			
Power supply											
100 ... 230 V AC									G		
24 V AC/DC									K		
Name plate											
German									5)	G	
English										E	
Language of documentation											
German											M1
English											M5
Western Europe/Scandinavia language package (languages: DA, ES, FR, IT, NL, PT, FI, SV)											MW
Eastern Europe language package (languages: EL, CS, ET, LV, LT, HU, HR, PL, SK, SL, RO, BG)											ME
Other											MZ

1) With ME26/ME27/ME28 only. IECEx with ME26 only.
2) Not with ME26/ME27/ME28.
3) With ME26/ME27/ME28 only.
4) Only for ATEx, IECEx Zone 1 or FM Div. 1 and with "ia" outputs.
5) Not with ATEX, IECEx, or FM

5 Ex relevant specifications in accordance with ATEX/IECEx

5.1 Safety-relevant information ATEX / IECEx

Overview of the different output options

	ATEX/IECEx Zone 2	**ATEX/IECEx Zone 1**
I Output option A/B in the order number	- Current output 1: active - Current output 2: passive - Pulse output: active/passive, switchable - Contact input and output: passive	- 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		- Current output 1: passive - Current output 2: passive - Pulse output: active/passive, switchable - Contact input and output: passive

Version I: Active/Passive current outputs

Types: ME21/ME22/ME23/ME24 and ME25				
	Protection type "nA" (Zone 2)		General operating values	
	U (V)	I (mA)	U_b (V)	I_b (mA)
Current output 1 Active Terminals 31/32	30	30	30	30
Current output 2 Passive Terminals 33/34	30	30	30	30
Pulse output Active or passive Terminals 51/52	30	65	30	65
Contact output Passive Terminals 41/42	30	65	30	65
Contact input Passive Terminals 81/82	30	10	30	10

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

Types: ME26/ME27 and ME28												
	Protection type "nA" (Zone 2)		General operating values		Protection type "e" (Zone 1)		Protection type "ib" (Zone 1)					
	U_i (V)	I_i (mA)	U_b (V)	I_b (mA)	U (V)	I (A)	U_o (V)	I_o (mA)	P_o (mW)	C_o (nF)	C_o pa (nF)	L_o (mH)
Current output 1 Active Terminals 31/32 Terminal 32 is connected to "PA"	30	30	30	30	60	35	20	100	500	217	0	3.8
							U_i (V)	I_i (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 Terminals 33/34 Terminal 34 is connected to "PA"	30	30	30	30	60	35	30	100	760	2.4	2.4	0.17
Pulse output Passive Terminals 51/52	30	65	30	65	60	35	15	30	115	2.4	2.4	0.17
Contact output Passive Terminals 41/42	30	65	30	65	60	35	15	30	115	2.4	2.4	0.17
Contact input Passive Terminals 81/82	30	10	30	10	60	35	30	60	500	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/ME27 and ME28												
	Protection type "nA" (Zone 2)		General operating values		Protection type "e" (Zone 1)		Protection type "ia" (Zone 1)					
	U_i (V)	I_i (mA)	U_b (V)	I_b (mA)	U (V)	I (A)	U_i (V)	I_i (mA)	P_i (mW)	C_i (nF)	C_i pa (nF)	L_i (mH)
Current output 1 Passive Terminals 31/32	30	30	30	30	60	35	60	300	2000	0,47	0,47	0,17
Current output 2 Passive Terminals 33/34	30	30	30	30	60	35	60	300	2000	0,47	0,47	0,17
Pulse output Passive Terminals 51/52	30	65	30	65	60	35	60	300	2000	0,47	0,47	0,17
Contact output Passive Terminals 41/42	30	65	30	65	60	35	60	300	2000	0,47	0,47	0,17
Contact input Passive Terminals 81/82	30	10	30	10	60	35	60	300	2000	0,47	0,47	0,17

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

Important
If the protective conductor (PE) is connected in the flowmeter's terminal box, you must ensure that no dangerous potential difference can arise between the protective conductor (PE) and the equipotential bonding (PA) in the potentially explosive area.

5.1.1 ATEX/IECEx Ex approval

EC type-examination certificate in accordance with ATEX and IECEx
KEMA ATEX 08ATEX0150 X, KEMA 08 ATEX 0151X, or IECEx KEM 08.0034X

5.1.1.1 Flowmeter sensor MS2 in accordance with ATEX

Model	**MS2** **Zone 1**
Ambient temperature	-20 ... 50 °C (-4 ... 122 °F)
Temperature class	
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	–

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 coding applies for ATEX and IECEx, depending on the design of the flowmeter sensor (compact or separate); see the overview on page 4).

Design MS26

Zone 1	**Designation**
ATEX	II 2 G Ex ib IIC T5 ... T3

5.1.1.2 Transmitter ME2, separate design, in accordance with ATEX and IECEx

Ambient and process conditions:
T_{amb} -40 ... 60 °C (-40 ... 140 °F)
Protection class IP 65, IP 67, and NEMA 4X/type 4X

Specific coding applies for ATEX and IECEx, depending on the design of the flowmeter sensor (compact or separate); see the overview on page 4).

Design ME21 / ME24 / ME25 M, N

	Designation	
ATEX	II 3 G Ex nR II T6 II 3 G Ex nR [nL] IIC T6 II 2 D Ex tD A21 IP6X T115 °C FNICO field device	No fieldbus, no M12 plug FNICO fieldbus, no M12 plug No M12 plug FNICO fieldbus
IECEx	Ex nR II T6 Ex nR [nL] IIC T6 Ex tD A21 IP6X T115 °C FNICO field device	No fieldbus, no M12 plug FNICO fieldbus, no M12 plug No M12 plug FNICO fieldbus

Design ME27/ME28 for flowmeter sensor MS2

Zone 1	**Designation**	
ATEX		
Version II/III	II 2 G Ex d e [ia] [ib] IIC T6	2 passive analog outputs, outputs "ia"/"e", depending on user wiring, or FISCO fieldbus
Version I	II 2 G Ex d e [ib] IIC T6	Active/passive analog outputs, outputs "ib"/"e", depending on user wiring
Version II/III	II 2 D Ex tD [iaD] A21 IP6X T115 °C	2 passive analog outputs, outputs "ia"/"e", depending on user wiring, or FISCO fieldbus
Version I	II 2 D Ex tD [ibD] A21 IP6X T115 °C	Active/passive analog outputs, outputs "ib"/"e", depending on user wiring
	FISCO field device	FISCO fieldbus

6 Ex relevant specifications in accordance with cFMus

6.1 Data relating to MS2x operation

6.1.1 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/I/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}	-40 ... 50 °C (-40 ... 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 1.2 "FM device overview (PID: 3036514)".

6.1.2 Temperature data

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

	Ambient temperature
	-20 ... 50 °C (-4 ... 122 °F)
Temperature class	**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	-

6.2 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	- Current output 1: active - Current output 2: passive - Pulse output: active/passive, switchable - Contact input and output: passive	- 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		- Current output 1: passive - Current output 2: passive - Pulse output: active/passive, switchable - Contact input and output: passive

6.2.1 Electrical data relating to Div. 1

Version I: Active/Passive current outputs

Types: ME26/27/28: Active HART

	Type of protection IS					
Inputs and outputs	**$Vmax_o$ [V]**	**$Imax_o$ [mA]**	**P_o [mW]**	**C_o [nF]**	**$C_{o\ PA}$ [nF]**	**L_0 [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: Passive HART

	Type of protection IS					
Inputs and outputs	**Vmax [V]**	**Imax [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.

Important (Note)

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).

6.2.2 Electrical data relating to Div. 2

Version I: Active/Passive current outputs

Types: ME21/24/25: HART

	Type of protection NI	
Inputs and outputs	**$Vmax_o$ [V]**	**$Imax_o$ [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.

Important (Note)

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).

7 Questionnaire

Customer:	**Date:**
Ms./Mr.:	**Department**
Phone:	**Fax:**

Fluid:	Liquid content:	Gas content:	
Flowrate: (min., max., operating point)	kg/h		
Density: (min., max., operating point)	kg/m³		
Dyn. viscosity: (min., max., operating point)	mPas/cP		
Fluid temperature: (min., max., operating point)	°C		
Ambient temperature:	°C		
Pressure: (min., max., operating point)	bar		
Rate of flow:	☐ Steady	☐ Pulsating	
Batch operation:	☐ Yes	☐ No	
Concentration calculation:	☐ Yes	☐ No	
Transmitter design:	☐ Compact	☐ Separate	
Explosion protection:	☐ Yes	☐ No	
Supply power:	☐ 100 … 230 V, 50/60 Hz	☐ 24 V AC/DC, 50/60 Hz	
Electrical outputs:		Communication:	
	☐ Current output I: 0/4 … 20 mA		
	☐ Current output II: 0/4 … 20 mA		
	☐ Pulse output, active	☐ HART	
	☐ Pulse output, passive		
Additional specifications: Pipeline diameter: Process connection:	……. mm …….		

Notes

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D184S068U02

DS/FCM2000-EN Rev. P 07.2017