

Note: These specifications are an abridged version. For complete specifications refer to Bulletin SS0M024 for the Promass 80/83F and Bulletin SS0M025 for the Promass 84F.

FMC Technologies Coriolis Mass Flow Meters bring advanced Coriolis sensor technology and digital signal processing to liquid measurement. FMC's Coriolis product offering sets a new standard for Coriolis mass flow meters, and with no moving parts the cost of ownership is reduced versus alternative metering technologies.

Exceptional flow sensitivity and performance result from its unique design geometry and rugged construction. High speed sampling and no zeroing stability ensure ultimate measurement stability and performance for a wide variety of products and markets. When high accuracy and custody transfer superiority is demanded, FMC Coriolis Meters are the first choice.

Features and Benefits

FMC Coriolis metering technology offers the following advanced features and benefits:

- Perfectly balanced dual tube design to make true “fit and forget” meters, thus eliminating the need for expensive pipe supports and long runs of straight pipe
 - No supports or braces are needed for installation
 - Installation envelope is compact and space saving
- Highly sophisticated manufacturing techniques have solved “zeroing” the meter or drifting which ensures the highest accuracy and lowest impact on meter stability
 - Immune to pipeline noise/vibration as well as temperature changes
- Cutting edge DSP (digital signal processing) for the 80, 83, and 84 transmitters optimize the signal to noise ratio and ensure high speed and accuracy – the fastest on the market
 - 20 ms response time
- The secondary containment is standard for increased safety so there is limited concern for spills or leaks
- Universal sensor design handles most applications from 3/8 to 10 inch diameter pipe and flow rates ranging from 73.5 lb/min to 80,840 lb/min
- Fully traceable calibration for highest accuracy
- Sensor material available in both stainless steel and Alloy material with temp. ranges up to 660° degrees F
- MODBUS communications are available to transmit live flow data to the Smith Meter® AccuLoad® and microLoad™ preset controllers
- Available with ASME B16.5 150, 300 and 600 carbon steel flanges



Specifications

Accuracy

Model	Flow Accuracy ¹ (of rate)	
	Mass Flow & Volume Flow (Liquid)	
Promass 83F - 84F	Standard Cal.	Premium Cal.
	± 0.10%	± 0.05%
Promass 80F	Standard Cal.	Optional Cal.
	± 0.15%	± 0.10%
Promass 83F, 84F & 80F	Mass Flow (Gas)	
	± 0.35%	

Density Accuracy	Promass 80F	Promass 83F-84F
Field/Reference	± 0.0005 g/cc	± 0.0005 g/cc
Special Cal.	± 0.001 g/cc	± 0.001 g/cc
Standard Cal.	± 0.01 g/cc	± 0.01 g/cc

Flow Ranges

Size Range ²	lb/min	BPH	GPM
3/8"	0 to 73.5	13	9
1/2"	0 to 238	41	29
1"	0 to 660	113	78
1-1/2"	0 to 1,650	283	198
2"	0 to 2,570	441	309
3"	0 to 6,600	1,132	792
4"	0 to 12,860	2,206	1,544
6"	0 to 29,400	5,043	3,530
10"	0 to 80,840	13,866	9,706

¹ ± [(zero point stability ÷ measured value) · 100%] o.r., PremiumCal (optional)

² Flow rates based on process water

Product Temperature Range

Promass F: -50 to +200 °C

Promass F: (High temperature version): -50 to +350 °C

Ambient Temperature Range

Sensor and Transmitter

Standard: -20 to +60 °C

Optional: -40 to +60 °C

Repeatability

Mass Flow/Volume Flow (Liquid)

.05% in 5 runs*

Mass Flow (Gas)

$\pm 0.25\% \pm [\frac{1}{2} \cdot (\text{zero point stability} \div \text{measured value}) \cdot 100]$ % o.r.

Density Measurement (Liquid)

1 g/cc = 1 kg/l

Promass F: ± 0.00025 g/cc

*Per API Chapter 5.6 Table 1

Nominal Pressure Range

Process Connection

Pressure Class	Stainless Steel	Carbon Steel
150	275 psig	285 psig
300	720 psig	740 psig
600	1,440 psig	1,480 psig

Sensor Tubes (Primary)

Promass F: According to DIN PN 16 to 100 / according to ASME B16.5 CI 150, CI 300, CI 600 / JIS 10K, 20K, 40K, 63K

Sensor Body (Secondary Containment)

DN 8 to 50: 40 bar

DN 80: 25 bar

DN 100 to 150: 16 bar

DN 250: 10 bar

Material of Construction

Sensor

Measuring Tubes

Promass F

DN 8 to 100: Stainless steel 1.4539/904L

DN 150: Stainless steel 1.4404/316L

DN 250: Stainless steel 1.4404/316L; manifold: CF3M

DN 8 to 150: Alloy C-22 2.4602/N 06022

Promass F (High temperature version)

DN 8, 50, 80: Alloy C-22 2.4602/N 06022

Transmitter Housing

Compact housing: Powder coated die-cast aluminium

Compact housing: Wall-mount housing: Powder coated die-cast aluminium

Remote field housing: Powder coated die-cast aluminium

Connection housing, sensor (remote version): Powder coated die-cast aluminium (high-temperature version and version for heating)

Approvals

Custody Transfer

PTB, NMI, METAS, BEV, NTEP, MC

Approvals for hazardous area:

ATEX, FM, CSA, TIIS, IECEx, NEPSI

Ex Approved

CE Tested

Meets the EMC requirements

For a complete listing of approvals please see Bulletin SS0M025.

Outputs

Current Output

Active/passive selectable, galvanically isolated, time constant selectable (0.05 to 100 s), full scale value selectable, temperature coefficient: Typically 0.005% o.r./°C, resolution: 0.5 μ A

Active: 0/4 to 20 mA, $R_L < 700\Omega$ (for HART: $R_L \geq 250\Omega$)

Passive: 4 to 20 mA; supply voltage V_S 18 to 30 V DC; $R_i \geq 150\Omega$

Pulse/Frequency Output, HART

For custody transfer measurement, two pulse outputs can be operated.

Passive, galvanically isolated, open collector, 30 V DC, 250 mA

Frequency Output

Full scale frequency 2 to 10000 Hz ($f_{max} = 12500$ Hz), on/off ratio 1:1, pulse width max. 2 s

In "Phase-shifted pulse outputs" operating mode, the end frequency is limited to a maximum of 5000 Hz.

Pulse Output

Pulse value and pulse polarity selectable, pulse width configurable (0.05 to 2000 ms)

Pulse/Frequency Output, MODBUS RS485

Active/passive selectable, galvanically isolated

Active: 24 V DC, 25 mA (max. 250 mA during 20 ms), $R_L > 100\Omega$

Passive: Open Collector, 30 V DC, 250 mA

Frequency output: Full scale frequency 2 to 10000 Hz ($f_{max} = 12500$ Hz), on/off ratio 1:1, pulse width max. 2 s.

MODBUS RS485

MODBUS device type: Slave

Address range: 1 to 247

Functions codes supported: 03, 04, 06, 08, 16, 23

Broadcast: supported with the function codes 06, 16, 23

Physical interface: RS485 in accordance with standard EIA/TIA-485

Baud rate supported: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 Baud

Transmission mode: RTU oder ASCII

Response time: Direct data access = typically 25 to 50 ms

Relay Output

Normally closed (NC or break) or normally open (NO or make) contacts available max. 30 V/ 0.5 A AC; 60 V/ 0.1 A DC, galvanically isolated

Signal on Alarm

Current output: Failsafe mode selectable (e.g. in accordance with NAMUR Recommendation NE 43)

Pulse/frequency output: Failsafe mode selectable

Relay output: De-energised by fault or power supply failure

MODBUS RS485: If an error occurs, the value NaN (not a number) is output for the process variables

Display Interface

Promass 80

- Push-button operation for easy programming
- Two-line backlit display so two measuring variables can be freely assigned on the display
- Setup is guided with simple prompts on the display
- Self-diagnostic function with clear text messages on the display to help with troubleshooting

Promass 83

- Quick setup for fast and easy commissioning
- Touch control operation allows programming without opening electronics
- 4-line back lit display
- Advanced diagnostics, batching and concentration measurement

Promass 84

- NTEP approved to NIST Handbook 44, Section 3.37 for liquid and gases
- Analog and MODBUS communications
- Digital information available, even when sealed for custody transfer

Additional Functions of the Transmitters

Available Combinations	Promass	
	80	83-84
F-Sensor	•	•
Features		
Backlit Display	2-line	4-line
Programming		
HART®	•	•
FieldTool	•	•
Push-button	•	
Touch Control		•
Housing		
Compact aluminum	•	•
Compact stainless steel	•	•
Remote aluminum wall mount	•	•
Maximum Remote Distance	65 ft.	65 ft.
Outputs		
Fixed modules	6	11
Flexible modules	0	8
Max number of I/O combinations ²	4	4
Profibus	PA	PA, PD
FOUNDATION™ Fieldbus		•
Modbus		•
Measured Variables		
Mass flow	•	•
Volumetric flow	•	•
Density	•	•
Temperature	•	•
Totalizers	1	3
Sensor Memory Chip (S-DAT)	•	•
Transmitter Memory Chip (T-DAT)		•
Special Functions (F-CHIP)		
Advanced Diagnostics		•
Concentration Measurement		•
Batching		•
Pulsating Flow Setting		•
Quick Setup (O = application specific)	•	O
Hazardous Area Approvals		
XP; FM Cl. I Div. 1/CSA Cl. I Div. 2	•	•
Power Supply		
85-260 VAC	•	•
20-55 VAC/16-62 VDC	•	•

² Max number of:	Promass 80	83-84
Current outputs.....	2	3
Frequency outputs.....	1	2
Status/relay outputs.....	1	2
Status inputs.....	1	1

Power Supply

Supply voltage – User Selectable upon ordering
 85 to 260 V AC, 45 to 65 Hz
 20 to 55 V AC, 45 to 65 Hz
 16 to 62 V DC

Flowmeter Selection

Note: Refer to the Application Data Sheet FM0M025 provided by your FMC representative for a more in depth list of requirements needed to properly order a meter.

Promass sensor sizing requires the following information:

- Flow Rate (Min., Max., and Nominal)
- Operating Viscosity
- Specific Gravity
- Line Size
- Pressure
- Temperature

The following steps guide flowmeter selection:

1. **Determine the normal flow rate for the application.** Select the sensor such that this rate is as high in the range of the sensor as possible, pressure drop permitting.
2. **Calculate accuracy and repeatability.** Use the corresponding equations to properly calculate the following:

Accuracy (Promass F)

Mass Flow (Liquid)

$$\pm 0.05\% \pm [\frac{1}{2} \cdot (\text{zero point stability} \div \text{measured value}) \cdot 100]\% \text{ o.r., Premium Cal (optional)}$$

Mass Flow (Gas)

$$\pm 0.35\% \pm [\frac{1}{2} \cdot (\text{zero point stability} \div \text{measured value}) \cdot 100]\% \text{ o.r.}$$

Volume Flow (Liquid)

$$\pm 0.15\% \pm [\frac{1}{2} \cdot (\text{zero point stability} \div \text{measured value}) \cdot 100]\% \text{ o.r.}$$

Repeatability Promass F

Mass Flow (Liquid)

$$\pm 0.05\% \pm [\frac{1}{2} \cdot (\text{zero point stability} \div \text{measured value}) \cdot 100]\% \text{ o.r., Premium Cal (optional)}$$

Mass Flow (Gas)

$$\pm 0.25\% \pm [\frac{1}{2} \cdot (\text{zero point stability} \div \text{measured value}) \cdot 100]\% \text{ o.r.}$$

Volume Flow (Liquid)

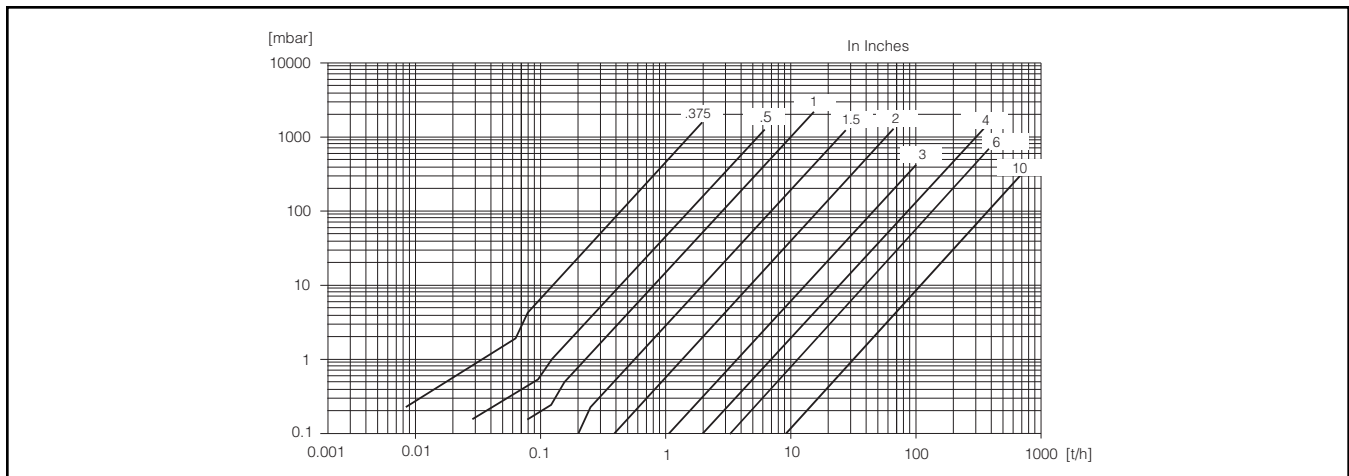
$$\pm 0.05\% \pm [\frac{1}{2} \cdot (\text{zero point stability} \div \text{measured value}) \cdot 100]\% \text{ o.r.}$$

3. Estimate actual pressure drop. The chart on the following page represents the apparent pressure drop at various mass flow rates and line sizes. Each curve represents a different meter size. Locate the normal flow rate on the horizontal axis. Use the curves to identify the associated apparent pressure drop on the vertical axis.

Pressure Loss Coefficient for Promass F

DN	Inches	d [m]	K	K1	K2
8	.375	$5.35 \cdot 10^3$	$5.35 \cdot 10^7$	$9.60 \cdot 10^7$	$1.90 \cdot 10^7$
15	.5	$8.30 \cdot 10^3$	$5.35 \cdot 10^6$	$1.90 \cdot 10^7$	$10.60 \cdot 10^5$
25	1	$12.00 \cdot 10^3$	$5.35 \cdot 10^6$	$6.40 \cdot 10^6$	$4.50 \cdot 10^5$
40	1.5	$17.60 \cdot 10^3$	$5.35 \cdot 10^5$	$1.30 \cdot 10^6$	$1.30 \cdot 10^5$
50	2	$26.00 \cdot 10^3$	$5.35 \cdot 10^4$	$5.00 \cdot 10^5$	$1.40 \cdot 10^4$
80	3	$40.50 \cdot 10^3$	$5.35 \cdot 10^4$	$7.71 \cdot 10^4$	$1.42 \cdot 10^4$
100	4	$51.20 \cdot 10^3$	$5.35 \cdot 10^3$	$3.54 \cdot 10^4$	$5.40 \cdot 10^3$
150	6	$68.90 \cdot 10^3$	$5.35 \cdot 10^3$	$2.04 \cdot 10^4$	$6.46 \cdot 10^2$
250	10	$102.26 \cdot 10^3$	$5.35 \cdot 10^2$	$6.10 \cdot 10^3$	$1.33 \cdot 10^2$

Pressure Loss Diagram for Water



Dimensions

For a complete list of sensor (3/8 to 10 inch) and transmitter dimensions, please refer to specification bulletins:

Promass 80/83F Bulletin SS0M024

Promass 84F Bulletin SS0M025

Options and Modeling

For options and modeling codes refer to Bulletin SS0M027A1

EXAMPLE – 1 Inch Promass 80 Transmitter, F Sensor

80F25	A	AAS	A	9	N	1	B	A	A	D
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	8XFXX	010	020	030	040	050	060	070	080	090	100
000 Transmitter and Nominal Diameters											
010 Measuring Tube Material											
020 Process Connection											
030 Additional Test, Certificate											
040 FMC (US, Canada and Mexico) Calibration Mass Flow, Density											
050 Approval											
060 Housing											
070 Cable Entry											
080 Power Supply, Display											
090 Adjustment, Software Feature											
100 Output, Input											

Revisions included in SS0M027 Issue/Rev. 0.3 (11/11):

Page 1: Under Specifications the Flow Ranges were corrected.

Page 1: Under Features and Benefits ASME B16.5 150, 300 and 600 Carbon Steel Flanges were added.

Page 2: Under Nominal Pressure Range, Process Connections were added.

Page 2: Under Repeatability - Mass Flow (Liquid) changed to Mass Flow/Volume Flow (Liquid) and .05% in 5 runs* (Per API chapter 5.6 Table 1).

The specifications contained herein are subject to change without notice and any user of said specifications should verify from the manufacturer that the specifications are currently in effect. Otherwise, the manufacturer assumes no responsibility for the use of specifications which may have been changed and are no longer in effect.

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