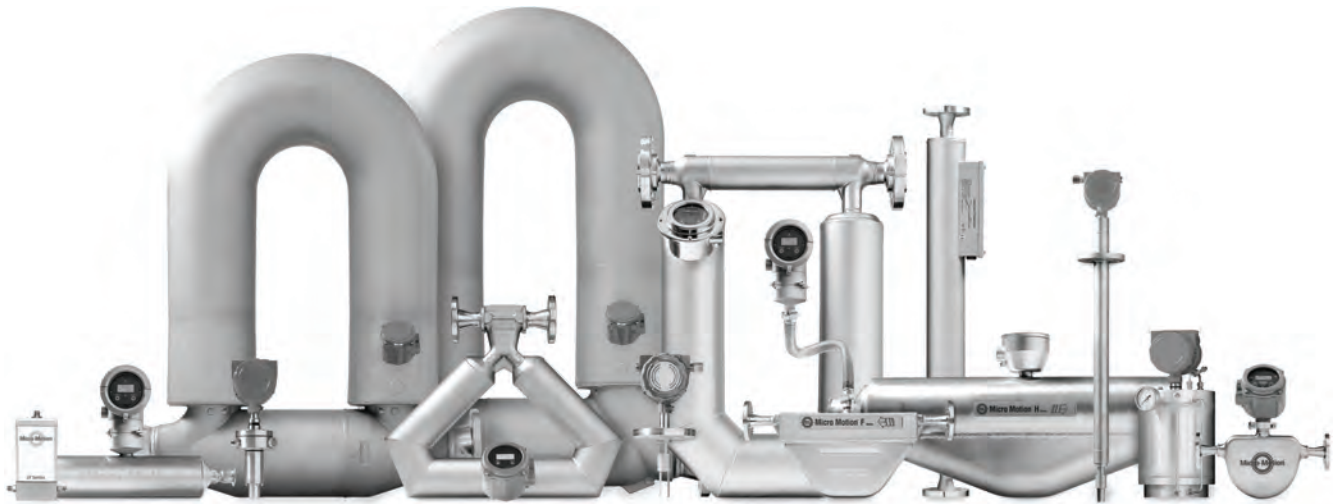


Product Data Sheet

PS-00235, Rev. K
April 2011

Micro Motion® Technical Overview and Specification Summary

Emerson's world-leading Micro Motion® Coriolis flow and density measurement devices have set the standard for superior measurement technology. Micro Motion truly offers the best measurement solutions for any process challenge.



Technology leadership

Micro Motion is committed to technology innovations that deliver the highest-performing solutions for your complex measurement challenges.

Widest breadth of products

Micro Motion has the widest range of flow and density measurement devices for virtually any process, application, or fluid. A wide variety of wetted materials, line sizes, and an extensive range of output options enable optimal system integration.

Unparalleled value

Benefit from expert field and technical application service and support made possible from more than 600,000 meters installed worldwide and over 30 years of flow and density measurement experience.



Micro Motion Coriolis flow and density meters

	ELITE®	F-Series	H-Series	T-Series	R-Series	LF-Series	7835 7845 7847	7826 7827 7828 7829	7812 3098
Application type									
Continuous control	●	●	●	●	●	●	●	●	●
Batching / loading / blending	●	●	●	●	●	●	●	●	●
Custody transfer	●	◐	◐				●	◐	●
Measurement accuracy									
Liquid & slurry – Flow	±0,05%	±0,10%	±0,10%	±0,15%	±0,50%	±0,50%			
Liquid & slurry – Density	±0,0002 g/cm ³ (±0,2 kg/m ³)	±0,001 g/cm ³ (±1,0 kg/m ³)	±0,001 g/cm ³ (±1,0 kg/m ³)	±0,002 g/cm ³ (±2,0 kg/m ³)		±0,005 g/cm ³ (±5,0 kg/m ³)	±0,0001 g/cm ³ (±0,1 kg/m ³)	±0,001 g/cm ³ (±1,0 kg/m ³)	
Liquid – Viscosity								±1% FS	
Gas – Flow	±0,35%	±0,50%	±0,50%	±0,50%	±0,75%	±0,50%			
Gas – Density									±0,10%
Capabilities									
Self-draining	◐	●	●	●	●		●	●	
Sanitary / hygienic	◐		●	●			◐		
Entrained gas	●	◐	◐				◐		
Meter verification	●	●	●						
Secondary containment	●	●	●	●			●		
High temperature*	◐	◐							
High pressure**	◐	◐						●	
Cryogenic*	●						◐		
Wetted materials									
300-series stainless steel	●	●	●		●	●	●	●	●
Super Duplex	◐								
Alloy C-22	●	●						●	
Alloy B-3								●	
Ni-Span-C®							●		●
Titanium				●				●	
Monel®								●	
Zirconium								●	
Fits nominal line sizes									
Inches	1/10–12	1/4–4	1/4–4	1/4–2	1/4–3	1/32–1/4	1	1 or larger	1/4 or larger
Millimeters	3–300	6–100	6–100	6–50	6–75	0,8–6	23	25 or larger	6 or larger

* Standard temperature is –100 to +204 °C
 High temperature is above +204 °C
 Cryogenic is below –100 °C

** Above 103 bar

● Supported on all models

◐ Supported on some models

Product comparison
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Product details
Pages 4–5

Performance
Pages 6–8

Line size and flow rate
Page 9

Gas flow specifications
Pages 10–11

Temperature ratings
Page 12

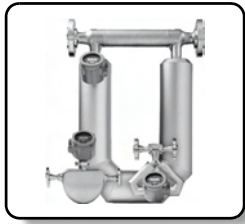
Pressure ratings
Page 13

Micro Motion transmitters and controllers

	1500	1700	2200S	2400S	2500	2700	FMT	3300	3350	3500	3700	7950 7951
Output variables												
Mass / volume flow	●	●	●	●	●	●	●	●	●	●	●	
Net product content / flow‡				●	●	●				●	●	
Temperature			●	●	●	●	●			●	●	●
Density			●	●	●	●	●			●	●	●
Concentration				●	●	●				●	●	●
Viscosity / referred viscosity												●
Local display												
2-line		●	●	●		●						
Multi-line								●	●	●	●	●
Power												
AC		●		●		●		●	●	●	●	●
DC	●	●		●	●	●	●	●	●	●	●	●
Loop powered			●									
Outputs												
4–20 mA	●	●	●	●	●	●	●			●	●	●
10 kHz pulse	●	●		●	●	●	●			●	●	
Discrete	●	●		●	●	●	●	●	●	●	●	●
HART® / WirelessHART®	●	●	●	●	●	●		●	●	●	●	
Modbus®	●	●			●	●	●	●	●	●	●	●
FOUNDATION™ fieldbus						●						
PROFIBUS-PA						●						
PROFIBUS-DP				●			●					
DeviceNet™				●								
Inputs												
10 kHz pulse								●	●			
Discrete				●	●	●	●	●	●	●	●	
4–20 mA												●
HART										●	●	
2-wire density sensor												●
3-wire density sensor												●
4-wire Coriolis sensor	●	●			●	●				●	●	
9-wire Coriolis sensor	●	●			●	●				●	●	
Mounting												
Integral – Field		●	●	●		●	●					
Remote – Field		●				●			●		●	●
Remote – Control room	●				●			●		●		●
Remote – Rack/panel mount								●		●		
Special application types												
Batch controller								●	●	●	●	
Custody transfer						●		●	●	●	●	
Two-phase flow / entrained gas	●	●		●	●	●				●	●	
Filling & dosing	●						●					
Meter verification	●	●		●	●	●				●	●	
SIS Certified		●				●						
Hazardous approvals												
C1D1		●	●			●						
C1D2		●	●	●		●	●		●		●	
Zone 1		●	●			●			●		●	
Zone 2		●	●	●		●	●		●		●	

‡ Flow rate of product based on concentration. For example, in a dissolved sugar solution, the measurement is the flow rate of the sugar alone.

Micro Motion Coriolis flow and density meters



ELITE

Peak performance Coriolis meter

- Best precision flow and density measurement
- Superior performance in the most challenging applications



7835

Peak performance density meter

- Best precision density measurement
- Industry standard for fiscal hydrocarbon measurement
- Superior reliability



F-Series

High performance compact drainable Coriolis meter

- Best flow and density measurement in a compact, drainable flow meter
- Broadest range of application coverage
- Superior reliability and safety



7845 / 7847

High performance density meter

- Superior precision density measurement
- Broadest range of density measurement
- Superior reliability



H-Series

Hygienic compact drainable Coriolis meter

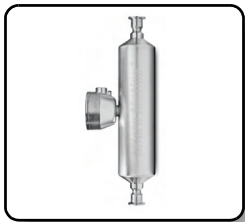
- Best flow and density measurement in a compact hygienic flow meter
- Comprehensive hygienic application coverage
- Superior reliability



7812

Fiscal gas density meter

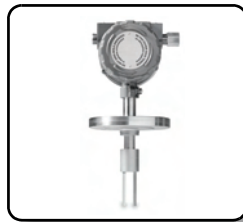
- Best precision gas density measurement
- Industry standard for fiscal hydrocarbon measurement
- Superior reliability and safety



T-Series

Straight tube full-bore Coriolis meter

- Superior flow measurement in a single straight tube flow meter
- Comprehensive hygienic application coverage
- Superior reliability



7826 / 7828

Direct insertion density meter

- High accuracy density measurement
- Greatest installation flexibility
- Superior reliability and safety



R-Series

General purpose flow-only Coriolis meter

- Simple to install and easy to use Coriolis flow measurement
- Broadest range of application coverage
- Superior reliability



7827 / 7829

Direct insertion viscosity meter

- Multivariable measurement of viscosity, density, and temperature
- Unique direct insertion design
- Superior reliability and safety



LF-Series

Extreme low-flow Coriolis meter

- Highest precision miniaturized flow meter
- Scalable platform for the most demanding low-flow applications
- Superior reliability



3098

Gas specific gravity meter

- Direct measurement of gas specific gravity
- Continuous online measurement
- Fast speed of response

Micro Motion transmitters and controllers

Micro Motion transmitters and controllers from Emerson Process Management utilize MVD™ technology to deliver accurate, high-speed multivariable signals. Micro Motion transmitters are available with a wide selection of communication protocols, including HART®, FOUNDATION™ fieldbus, PROFIBUS, DeviceNet™, Modbus®, and more. Micro Motion transmitters also carry advanced diagnostic tools, allowing you to rest easy knowing your process is being monitored correctly.

Only MVD technology allows you to:

- Dramatically reduce signal noise and obtain faster response times compared to analog devices
- Measure multiple variables for accurate process control
- Identify and resolve problems easily with built-in smart diagnostics
- Check performance with true in-situ meter verification



1500/2500

Compact control-room transmitter

- DIN rail mount with flexible installation options
- Wide variety of I/O and application capabilities to fit your needs



2200S

2-wire transmitter

- Loop powered for simple installation
- Compact design integrally mounted to sensor



1700/2700

Versatile field-mount transmitter

- Integral and remote mount options
- Wide variety of I/O and application capabilities to fit your needs



2400S

Compact integral transmitter

- Simple I/O options



FMT

Compact filling and dosing transmitter

- Easy-to-clean, hygienic design that enables SIP/CIP
- Highest accuracy and fast response time

The Series 3000 product line offers basic PLC-type functionality such as easy one-stage and two-stage batch control with ticket printing output. In addition, the Model 3500 and Model 3700 offer MVD transmitter functionality, combining transmitter and controller in a single package.

The Series 3000 also offers:

- A single operator interface for easy startup, control, and operation
- Full configuration capabilities that eliminate the need for external tools
- Effective security capabilities suitable for custody transfer applications



3300

Rack/panel mount discrete controller

3500

Rack/panel mount transmitter with discrete controller



3350

Field mount discrete controller

3700

Field mount transmitter with discrete controller

Accuracy – Liquids and slurries

	Flow accuracy ⁽¹⁾		Temperature	Density (kg/m ³) ⁽¹⁾
	Mass	Volume		
ELITE	±0,05% ⁽²⁾	±0,05% ⁽²⁾	±1 °C	±0,2 ⁽²⁾
F-Series	±0,10%	±0,15%	±1 °C	±1,0
H-Series	±0,10%	±0,15%	±1 °C	±1,0
T-Series	±0,15%	±0,25%	±1 °C	±2,0
R-Series	±0,50%	±0,50%	±1 °C	—
LF-Series	±0,50%	±0,50%	±1 °C	±5,0
7835	—	—	Class A RTD	±0,1
7845/7847	—	—	Class A RTD	±0,1
7826/7828	—	—	Class B RTD	±1,0

(1) Flow rate accuracies are base percentages. For total accuracy see the box on page 7. Stated accuracy includes the combined effects of repeatability, linearity, and hysteresis. Specifications for ELITE ±0,2 kg/m³ density accuracy are based on reference conditions of water at 20 to 60 °C and 1 to 2 bar. All other specifications are based on reference conditions of water at 20 to 25 °C and 1 to 2 bar.

(2) The accuracy for some ELITE sensor models may differ. Consult the ELITE Product Data Sheet for details.

Repeatability – Liquids and slurries

	Flow	Density (kg/m ³)
ELITE	±0,025%	±0,1
F-Series	±0,05%	±0,5
H-Series	±0,05%	±0,5
T-Series	±0,05%	±0,5
R-Series	±0,25%	—
LF-Series	±0,05%	±2,0
7835	—	±0,02
7845/7847	—	±0,05
7826/7828	—	±0,1

Performance – Gases

	Mass flow accuracy ⁽¹⁾	Temperature	Density
ELITE	±0,35%	±1 °C	—
F-Series	±0,50%	±1 °C	—
H-Series	±0,50%	±1 °C	—
T-Series	±0,50%	±1 °C	—
R-Series	±0,75%	±1 °C	—
LF-Series	±0,50%	±1 °C	—
7812	—	Class A RTD	±0,10%
3098	—	—	±0,10%

(1) Flow accuracies are base percentages. For total accuracy, see the box on this page. Stated accuracy includes the combined effects of repeatability, linearity, and hysteresis.

Total accuracy with transmitter with MVD technology

If flow rate $\geq \frac{\text{zero stability}}{(\text{base accuracy \%}) \div 100}$ then total accuracy = \pm base accuracy % of rate

If flow rate $< \frac{\text{zero stability}}{(\text{base accuracy \%}) \div 100}$ then total accuracy = $\pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right]$ % of rate

NOTE: For zero stabilities, see page 8.

Product Selector/Configurator

Micro Motion offers an on-line program for finding the best products to fit your application. The Product Selector/Configurator allows you to specify the parameters that matter to you, such as accuracy, flow capacity, pressure drop, or turndown. To use the Product Selector/Configurator, visit our web site at www.micromotion.com.

Zero stabilities

Family	Model	kg/h	l/h ⁽¹⁾
ELITE	CMFS010M	0,002	0,002
	CMFS010H, P	0,004	0,004
	CMFS015M	0,01	0,01
	CMFS015H, P	0,02	0,02
	CMF010	0,002	0,002
	CMF010P	0,004	0,004
	CMF025	0,027	0,027
	CMF050	0,163	0,163
	CMF100	0,680	0,680
	CMF200	2,18	2,18
	CMF300	6,80	6,80
	CMF400	40,91	40,91
	CMFHC2	68	68
	CMFHC3	136	136
	CMFHC4	204	204
	F-Series	F025	0,1765
F050		0,544	0,544
F100		2,177	2,177
F200		6,965	6,965
F300		21,76	21,76
H-Series	H025	0,1765	0,1765
	H050	0,544	0,544
	H100	2,177	2,177
	H200	6,965	6,965
	H300	21,76	21,76
T-Series	T025	0,11	0,11
	T050	0,61	0,61
	T075	2,24	2,24
	T100	4,80	4,80
	T150	13,92	13,92
R-Series	R025	0,27	0,27
	R050	0,82	0,82
	R100	3,27	3,27
	R200	8,71	8,71
LF-Series	LF2M	0,00013	0,00013
	LF3M	0,00100	0,00100
	LF4M	0,00400	0,00400

(1) Based on standard temperature and pressure conditions of water at 20 to 25 °C and 1 to 2 bar.

Line sizes and maximum flow rates

Family	Model	Line size (mm)	Maximum flow rate	
			kg/h	l/h
ELITE	CMFS010	2–4	108	108
	CMFS015	4–6	330	330
	CMF010	2–4	108	108
	CMF025	6–12	2180	2180
	CMF050	12–25	6800	6800
	CMF100	25–50	27200	27200
	CMF200	50–75	87100	87100
	CMF300	75–100	272000	272000
	CMF400	100–150	545000	545000
	CMFHC2	150–200	1470000	1470000
	CMFHC3	200–250	2550000	2550000
	CMFHC4	250–300	3265870	3265870
F-Series	F025	6–12	2720	2720
	F050	12–25	8160	8160
	F100	25–50	32650	32650
	F200	50–75	87100	87100
	F300	75–100	272000	272000
H-Series	H025	6–12	2068	2068
	H050	12–25	4900	4900
	H100	25–50	22320	22320
	H200	50–75	63960	63960
	H300	75–100	272000	272000
T-Series	T025	6–12	680	680
	T050	12–20	3800	3800
	T075	20–25	14000	14000
	T100	25–40	30000	30000
	T150	40–50	87000	87000
R-Series	R025	6–12	2720	2720
	R050	12–25	8160	8160
	R100	25–50	32650	32650
	R200	50–75	87100	87100
LF-Series	LFM2M	0,8–3	0,38	0,38
	LFM3M	1,5–6	1,00	1,00
	LFM4M	3–6	27,00	27,00
7835		25	15000	15000
7845/7847		25	15000	15000
7812, 7826, 7828		Line sizes and flow rates are installation-dependent. Contact your sales representative.		

Typical gas flow rates (air)

Flow rates that produce approximately 0,68 bar pressure drop on air at 20 °C and 6,8 bar

Family	Model	Mass flow (kg/h)	Volume flow (Nm ³ /h) ⁽¹⁾
ELITE	CMFS010	8	6
	CMFS015	24	18
	CMF010	8	6
	CMF025	130	100
	CMF050	400	310
	CMF100	1300	1000
	CMF200	3800	2900
	CMF300	10000	8000
	CMF400	27000	21000
	CMFHC2	41000	31000
	CMFHC3	68000	52000
	CMFHC4	110000	84000
	F-Series	F025	130
F050		400	310
F100		1300	1000
F200		3800	2900
F300		8400	6500
H-Series	H025	130	100
	H050	400	310
	H100	1300	1000
	H200	2400	1800
	H300	8400	6500
T-Series	T025	45	40
	T050	320	270
	T075	1190	990
	T100	2620	2170
	T150	7430	6170
R-Series	R025	130	100
	R050	400	310
	R100	1300	1000
	R200	3800	2900
LF-Series	LFM2M	0,1	0,09
	LFM3M	0,4	0,36
	LFM4M	3,6	3
7812		n/a	0,01
3098		n/a	0,216

(1) Normal (Nm³/hr) reference conditions are 1,013 bar and 0 °C.

Typical gas flow rates (natural gas)

Flow rates that produce approximately 3,4 bar pressure drop on natural gas (MW 16,675) at 20 °C and 34,0 bar

Family	Model	Mass flow (kg/h)	Volume flow (Nm ³ /h) ⁽¹⁾
ELITE	CMFS010	30	45
	CMFS015	90	130
	CMF010	30	45
	CMF025	410	580
	CMF050	1100	1600
	CMF100	4000	5900
	CMF200	11000	16000
	CMF300	30000	43000
	CMF400	82000	120000
	CMFHC2	120000	160000
	CMFHC3	200000	270000
	CMFHC4	300000	400000
F-Series	F025	410	580
	F050	1100	1600
	F100	4000	5900
	F200	11000	16000
	F300	24000	35000
H-Series	H025	410	580
	H050	1100	1600
	H100	4000	5900
	H200	9000	12700
	H300	24000	35000
T-Series	T025	170	240
	T050	1250	1800
	T075	4600	6500
	T100	10000	14300
	T150	28400	40400
R-Series	R025	410	580
	R050	1100	1600
	R100	4000	5900
	R200	11000	16000
7812		n/a	0,01
3098		n/a	0,216

(1) Normal (Nm³/hr) reference conditions are 1,013 bar and 0 °C.

Standard or Normal Volumetric Capability

Standard and normal volumes are “quasi mass” flow units for any fixed composition fluid. Standard and normal volumes do not vary with operating pressure, temperature, or density. With knowledge of density at standard or normal conditions (available from reference sources), a Micro Motion meter can be configured to output in standard or normal volume units without the need for pressure, temperature, or density compensation. Contact your local sales representative for more information.

Temperature ratings

Family	Model	°C ⁽¹⁾
ELITE	Standard models	-240 to +204
	High-temperature models	-50 to +350
F-Series	Standard models	-100 to +204
	High-temperature models	-40 to +350
H-Series	All models	-100 to +204
T-Series	All models	-50 to +150
R-Series	All models	-50 to +125
LF-Series	All models	0 to +65
7835		-50 to +110
7845/7847		-50 to +160
7826/7828		-50 to +200
7812		-20 to +125 ⁽²⁾
3098		-30 to +50

(1) Temperature rating may be affected by electronics, hazardous area classification, and/or ambient temperature.

(2) High-temperature option shown. Standard temperature range is -20 to +85 °C.

Pressure ratings

Family	Model	Material	bar
ELITE	Standard models	Stainless steel	100–125
		Nickel alloy	170–225
	CMF010P	Nickel alloy ⁽¹⁾	413
	CMFS010P		
	CMFS010H		
	CMFS015P		
CMFS015H			
	CMF400P	Nickel alloy	205
F-Series	Standard models	Stainless steel	100
		Nickel alloy	148
	F025P	Stainless steel	158
	F050P	Stainless steel	345
H-Series	All models	Stainless steel	100
T-Series	All models	Titanium	100
R-Series	All models	Stainless steel	100
LF-Series	All models	Stainless steel	100
7835		Ni-Span-C and stainless steel	150
7845		Stainless steel	100
7847		Stainless steel and nickel alloy	20
7826/7828		Stainless steel and nickel alloy	207
7812		Ni-Span-C	250
3098		Ni-Span-C	10

(1) Models CMF010P, CMFS010P, CMFS015P, and CMF400P have nickel alloy tubes and stainless steel fittings.

Micro Motion—The undisputed leader in flow and density measurement



World-leading Micro Motion measurement solutions from Emerson Process Management deliver what you need most:

Technology leadership

Micro Motion introduced the first reliable Coriolis meter in 1977. Since that time, our ongoing product development has enabled us to provide the highest performing measurement devices available.

Product breadth

From compact, drainable process control to high flow rate fiscal transfer—look no further than Micro Motion for the widest range of measurement solutions.

Unparalleled value

Benefit from expert phone, field, and application service and support made possible by more than 600000 meters installed worldwide and over 30 years of flow and density measurement experience.

 www.micromotion.com

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