Product Data Sheet
PS-001350, Rev. E
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Micro Motion® Filling Mass Transmitters with MVD™ Technology

The Micro Motion® Filling Mass Transmitter, from Emerson Process Management, is designed for any process that requires high-speed high-accuracy filling or dosing. This new design minimizes space requirements and installation cost and effort, for easy integration into almost any filling machine. Whether you're filling bottles, vials, syringes, cans, or tubes, the FMT solution delivers the accuracy, repeatability, and ease of use you expect from Micro Motion and Coriolis mass flow measurement.

FMT — **Compact integral high-speed filling transmitter**

1500 FT — Compact remote-mount filling transmitter

Increase filling accuracy and throughput with the most versatile filling solution available today

- Coriolis mass-based measurement is immune to variations in process fluid, temperature, or pressure. Handles entrained gas, suspended solids, gases, aerosols, viscous fluids, aggressive fluids, and non-conductive fluids with equal ease.
- Compatible with wide variety of integrated-valve-control strategies or traditional direct-pulse (external-valve-control) applications
- Rapid line changeover with easy-to-clean, hygienic design that enables Clean In Place (CIP)
- Integral design enables optimal space usage
- Highest accuracy and fast response time enable tighter process control and reduce product waste

Micro Motion®

EMERSON™
Process Management

Micro Motion Filling Mass Transmitters

Utilizing Micro Motion MVD™ technology, the Micro Motion Filling Mass Transmitter delivers pinpoint control of filling, dosing, and bottling processes. Select the size and surface finish you need from the range of supported Micro Motion sensors. Choose Modbus or PROFIBUS-DP digital communications, integrated valve control for next-generation speed and reliability, or external valve control for traditional pulse-counting applications.

MVD™ technology. Micro Motion MultiVariable Digital (MVD) technology provides mass, density, and temperature process data in one device, supporting continuous monitoring of product quality with a complete real-time view of fluid characteristics. Front-end digital signal processing reduces measurement noise and delivers an accurate, fast-response flow signal. Additionally, the multivariable design minimizes space requirements, improves response time, and eliminates the cumulative error associated with multiple-device measurement solutions.

When combined with Coriolis mass-based measurement, MVD technology gives you the fastest, most accurate, most reliable data available today.

Features. The Filling Mass Transmitter is optimized for sub-second fills and very small containers.

Operate and maintain your filling application at the highest degree of accuracy with:

- User-selectable filling algorithms with integrated valve control
  - One-stage or two-stage filling
  - Timed filling
  - Dual-fillhead filling
  - Dual-fillhead timed filling
- Automatic overshoot compensation (AOC)
  - User-selectable AOC algorithms: never overfill, never underfill, fixed, rolling average
  - Individual settings for each valve
  - “Self-training” option
- User-selectable filling options
  - Measure in mass or volume units
  - Count up or count down to target
  - Track by quantity or percent of target
- Digital communications
  - Continuous monitoring of density and temperature, for real-time quality control
  - “On the fly” changes to fill target or recipe
- Automatic or manual purge cycle
- “Clean In Place” (CIP)
  - Rapid product changeover
  - Simplified maintenance
- Diagnostics customized for filling support
  - Onboard logging of fill statistics (actual fill amount, actual fill time)
  - Fill statistics automatically reported to PLC

Contents

Micro Motion Filling Mass Transmitters

Industries. The Filling Mass Transmitter supports applications in a wide variety of industries:

- Pharmaceutical and nutraceutical
- Food and beverage
- Chemical
- Cosmetic and personal care
- Household

Integrated valve control. Two high-precision discrete outputs support integrated-valve-control strategies. Integrated valve control:

- Eliminates the “dead time” and error associated with generating and counting the pulse train
- In combination with Automatic Overshoot Compensation, eliminates standard filling errors associated with “target hunting” and varying flow rates
- Eliminates the time and error associated with PLC-internal calculations, communications, and other processes

Result: Integrated valve control reduces fill standard deviation, especially in very short or small fills. Bottom line: Enhanced product utilization, product consistency, and product quality.

Traditional pulse-counting “external valve control” applications can still reap the benefits of enhanced accuracy, reliability, and stability by upgrading to the Filling Mass Transmitter with the frequency/pulse output option.

Performance. In laboratory testing, the Filling Mass Transmitter has performed to an outstanding level of consistency and reliability.

Fill duration	Standard deviation of fill totals
0.5 to 1 second	0.07
1 to 3 seconds	0.03
3 seconds +	0.015

Platform. The Filling Mass Transmitter implements the latest Micro Motion internal architecture and is integrally mounted to your choice of sensor. External connections are simple M-12 circular connectors. This optimized design:

- Simplifies installation and reduces installation costs with a multi-variable integral device
- Minimizes space requirements with ultra-compact transmitter
- Minimizes response time
- Reduces or eliminates inter-device timing errors
- Minimizes cleaning requirements with highly polished crevice-free surfaces

The system is compatible with both linear and rotary filling machines, and can be installed in almost any orientation.

Sensors. Choose the correct sensor, material, and surface finish for your application from Micro Motion’s industry-leading sensor lines:

- F-Series
- H-Series
- ELITE® CMFS

For the ultimate in precision, pair the Filling Mass Transmitter with the ELITE CMFS sensor.

Specifications

Physical specifications

Housing and mounting	Transmitter: 316L stainless steel Sensor: Refer to sensor specifications for sensor case materials. Transmitter is integrally mounted to sensor at factory and electronics are encapsulated. • ELITE CMFS sensors: Transmitter is welded to sensor. • All other sensors: Transmitter is clamped to sensor. Surface finish options: • Standard (130 Ra) • Improved (64 Ra)
Weight	Transmitter: 7.1 lb (3.2 kg) Sensor: Refer to sensor specifications for sensor weight.
Dimensions	Transmitter: 2″ × 8.95″ × 5.2″ (50.8 × 227.3 × 101.6 mm). See figure on page 7. Sensor: Refer to sensor specifications for sensor dimensions.
Status LED	One or two status indicators on internal transmitter module (for commissioning, not visible in normal use) • LED1: Indicates transmitter status • LED2: Indicates PROFIBUS-DP connection status(1)

(1) Available only with Output Option Q, U, or V.

Electrical connections

Connection type	M-12 circular connectors	
Power connection	Output Options P, Q, R, S, U, V	Power and mA on same connector
	Output Option T	mA on separate connector
Digital communications	Output Options P, R, S, T	Modbus
	Output Options Q, U, V	PROFIBUS-DP

Power supply

Power requirements	Input supply: 24 VDC System requirements: 5.5 W (device) + I/O requirements (1 A max at 24 VIO passthrough)
Fuse	Device fuse: 800 mA 24 VIO fuse: 1.6 A
Safety	Reverse-polarity and short-circuit protection Complies with low voltage directive 2006/95/EC per IEC 61010-1 Installation (overvoltage) Category II, Pollution Degree 2

Specifications *continued*

Input/output signals

One mA output	Active (internally powered) Not intrinsically safe Isolated to ±50 VDC from all other outputs and earth ground Maximum load limit: 820 Ω Typical use: Report mass flow, volume flow, density, temperature, percent of fill completed (updated every 10 milliseconds) Output is linear with process from 3.8 to 20.5 mA, per NAMUR NE43 (June 1994)
Two high-precision discrete outputs[1]	Passive (externally powered): 3–30 VDC max., sinking up to 500 mA at 30 VDC max. Not intrinsically safe Typical use: Discrete valve control Propagation delay: • OFF to ON: 0.25 to 1.0 milliseconds • ON to OFF: 0.02 to 0.15 milliseconds
One standard discrete output[1]	Passive (externally powered): 3–30 VDC max., sinking up to 500 mA at 30 VDC max. Not intrinsically safe Typical use: Report fill in progress or fault, or control purge valve
One standard discrete input[1]	Passive (externally powered): • Internal power: Weak 100 K internal pull-up allows contact-closing input • External power: +3–30 VDC max. Not intrinsically safe Typical use: Begin fill, end fill, pause fill, resume fill, reset mass total, reset volume total, or reset all totals (includes fill total)
One standard frequency/pulse output[2]	Passive (externally powered): 30 VDC max., 24 VDC typical, sinking up to 500 mA at 30 VDC max. Not intrinsically safe Scalability: 0 to 10,000 Hz Typical use: Pulse input (flow rate) to PLC counter card or pulse-counting application

(1) Available only with Output Option R, S, T, U, or V.

(2) Available only with Output Option P or Q.

Digital communications

Service port	Standard Micro Motion service port protocol
Modbus/RS-485[1]	Auto-detects and responds to: • Modbus RTU or Modbus ASCII protocol (default: Modbus RTU) • All baud rates between 1200 and 38,400 • One or two stop bits • Any parity
PROFIBUS-DP[2]	Digital 2-way communications protocol Automatically recognizes network baud rate

(1) Available only with Output Option P, R, S, or T.

(2) Available only with Output Option Q, U, or V.

Specifications *continued*

Host interface

Output Options P, R, S, T	Micro Motion ProLink II v2.9.1 supports all functionality
Output Options Q, U, V	Micro Motion ProLink II v2.9.1 supports basic functionality Siemens SIMATIC PDM required for complete device configuration Supplied with transmitter: • GSD conforming to the PROFIBUS-DP specification - Provides PROFIBUS Class 1 Master functions - Enables control of all input and output process data • EDD conforming to PROFIBUS EDDL specifcation - Provides PROFIBUS Class 2 Master functions - Enables device configuration

Environmental limits

Ambient temperature limits	Operating and storage: –32 to +140 °F (–25 to +60 °C)
Humidity limits	5 to 95% relative humidity, non-condensing at 140 °F (60 °C)
Vibration limits	Meets IEC68.2.6, endurance sweep, 20 to 2000 Hz, 50 sweep cycles at 1.5 g

Environmental effects

EMI effects	Complies with EMC directive 2004/108/EC Complies with NAMUR NE21
Ambient temperature effect	On mA output: ±0.005% of span per °C

Hazardous area classifications

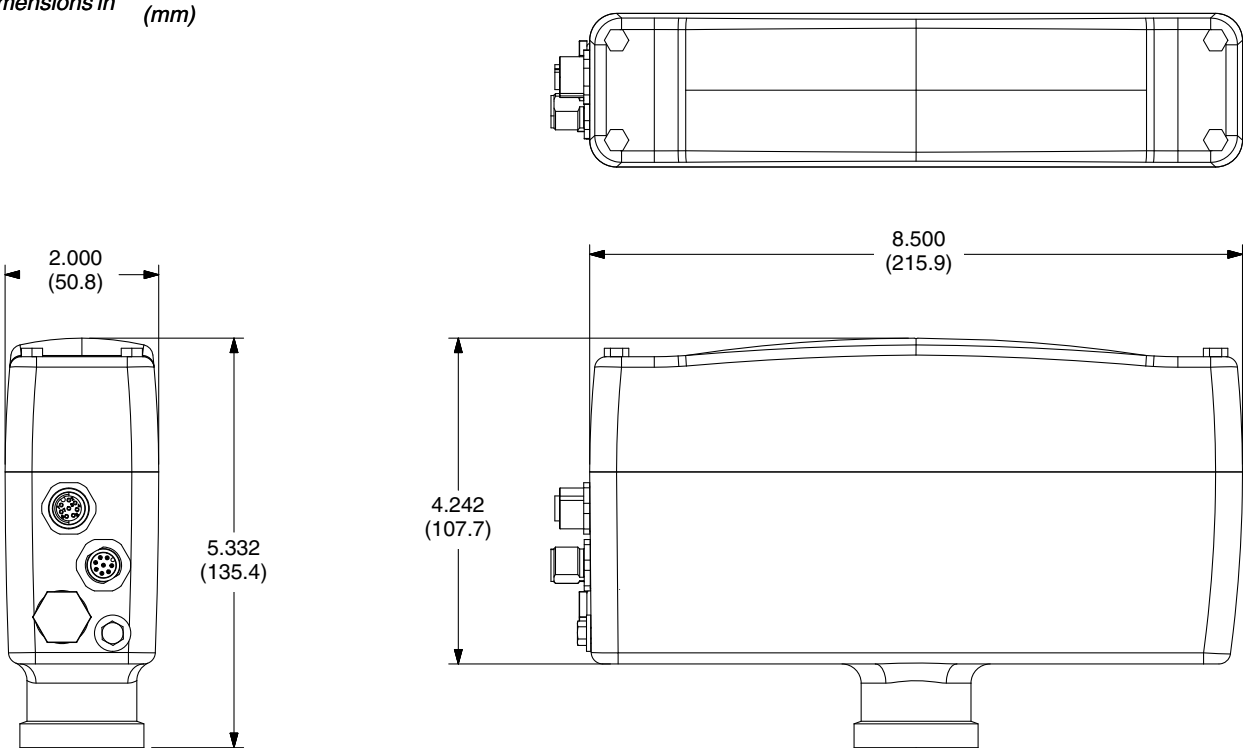
CSA[1] C-US		Class I Division 2 Groups A, B, C, D Class II Division 2 Groups F and G
ATEX[2]		II 3G Ex nA IIC T5 Gc (Zone 2) II 3D Ex tc IIIC T70°C Dc IP66/IP67
IECEx[3]		Ex nA IIC T5 Gc

(1) CSA is a Canadian approvals agency that provides approvals accepted both in Canada and in the U.S.A. (C-US).
(2) ATEX is a European directive.
(3) IECEx is an international directive.

Specifications *continued*

Dimensions

Dimensions in inches (mm)



Ordering information

Model	Product description
FMT	Micro Motion Coriolis Filling Mass Transmitter
Code	**Mounting / Housing material**
S[1]	Integral-mount transmitter / 316L stainless steel; standard finish (130 Ra)
I[1]	Integral-mount transmitter / 316L stainless steel; improved surface finish (64 Ra)
Code	**Output options / Digital communications / Power supply connector**
	External valve control
P[2]	1 frequency output 1 mA output Modbus/RS-485 mA output and power supply on shared connector
Q[2]	1 frequency output 1 mA output PROFIBUS-DP mA output and power supply on shared connector
	Integrated valve control
R[3]	1 mA output 2 high-precision discrete outputs and 1 standard discrete output/discrete input (isolated) Modbus/RS-485 mA output and power supply on shared connector
S[3]	1 mA output 2 high-precision discrete outputs and 1 standard discrete output/discrete input (high side common) Modbus/RS-485 mA output and power supply on shared connector
T[3]	1 mA output 2 high-precision discrete outputs and 1 standard discrete output/discrete input (high side common) Modbus/RS-485 mA output on separate connector
U[3]	1 mA output 2 high-precision discrete outputs and 1 standard discrete output/discrete input (isolated) PROFIBUS-DP mA output and power supply on shared connector
V[3]	1 mA output 2 high-precision discrete outputs and 1 standard discrete output/discrete input (high side common) PROFIBUS-DP mA output and power supply on shared connector
Code	**I/O terminations**
A	M-12 circular connectors
Code	**Display**
3	No display
Code	**Conduit connections**
2	M-12 circular connectors
Code	**Approvals**
M	Micro Motion standard (no approval)
2	CSA Class I Div 2 (U.S.A. and Canada)
L	ATEX II 3, Zone 2
3	IECEx, Zone 2

Ordering information *continued*

Code	Language
E	English installation manual and English guide to filling
F	French installation manual and English guide to filling
G	German installation manual and English guide to filling
I	Italian installation manual and English guide to filling
S	Spanish installation manual and English guide to filling
Code	**Software options 1**
Z	Host-controlled filling (flow variable)
B	Integrated valve control
Code	**Software options 2**
Z	No software options 2
Code	**Factory options**
Z	Standard product
X	ETO product
R	Restocked product (if available)
Typical model number: FMT S R A 3 2 M E B Z Z	

(1) Welded to ELITE CMFS sensors; clamped to all other sensors.

(2) Available only with Software Option 1, Code Z.

(3) Available only with Software Option 1, Code B.

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 750,000 meters installed worldwide and over 30 years of flow and density measurement experience.

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