

# Micro Motion™ FMT Transmitters with MVD™ Technology



## Increase 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 Filling Mass Transmitters

The Micro Motion Filling Mass Transmitter (FMT) is designed for any process that requires high-speed high-accuracy filling or dosing. This 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.

Using Micro Motion MVD technology, the Micro Motion FMT 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 either Modbus® or PROFIBUS®-DP digital communications, integrated valve control for next-generation speed and reliability, or external valve control for traditional pulse-counting applications

### Applications

#### MVD technology makes your meter work smarter

- Receive a faster response time and dramatically reduces signal noise through front end signal processing
- Reduce wiring costs through use of standard 4-wire instrument cables
- Obtain the cleanest, most accurate signal delivered through on-board signal processing, even with tough measurement conditions such as entrained gas

#### Mounting and installation flexibility to fit your exact needs

- Take advantage of form factors that include rugged field mounts with a full suite of hazardous area approvals or DIN rail packages that allow for cost-effective control room cabinets
- Access detailed operator feedback from local user interfaces
- Connect to either new or existing Micro Motion sensors easily through flexible configurations

#### Access information when you need it with asset tags

Newly shipped devices include a unique QR code asset tag that enables you to access serialized information directly from the device. With this capability, you can:

- Access device drawings, diagrams, technical documentation, and troubleshooting information in your MyEmerson account
- Improve mean time to repair and maintain efficiency
- Ensure confidence that you have located the correct device
- Eliminate the time-consuming process of locating and transcribing nameplates to view asset information

## FMT features

The FMT is optimized for sub-second fills and very small containers.

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

#### User-selectable fillings with integrated valve control

- One-stage or two-stage filling
- Timed filling
- Dual-fillhead filling
- Dual-fillhead timed filling

**Automatic overshoot compensation**

- User-selectable AOC algorithms: never overfill, never underfill, fixed, rolling average
- Individual settings for each value
- “Self-training” option

**User-selectable filling options**

- Measure in either Mass or Volume units
- Count up or count down to target
- Track by either quantity or percent of target

**Digital communications**

- Continuous monitoring of density and temperature, for real-time quality control
- “On-the-fly” changes to either the fill target or the recipe

**Clean In Place (CIP)**

- Rapid product changeover
- Simplified maintenance

**Diagnostics customized for filling support**

- On-board logging of fill statistics (actual fill amount, actual fill time)
- Fill statistics automatically reported to programmable logic controller (PLC)

**Automatic or manual purge cycle**

## FMT overview

**Industries**

The FMT 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

Integrated valve control reduces fill standard deviation, especially in very short or small fills, resulting in 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 FMT with the frequency/pulse output option.

### Performance

In laboratory testing, the FMT 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 FMT implements the latest Micro Motion internal architecture and is integrally mounted. External connections are simple M-12 circular connectors.

This optimized design:

- Simplifies installation and reduces installation costs with a multivariable 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.

### Sensors

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

- All CMFS sensors
- F025 - F100
- H025 - H100
- T025 - T150

For ultimate precision, pair the FMT with the ELITE CMFS sensor.

## Input/output signals

### One mA Output

- Active (internally powered)
- Not intrinsically safe
- Isolated to  $\pm 50$  VDC from all other outputs and earth ground
- Maximum load limit: 820  $\Omega$
- 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

### Two high-precision Discrete Outputs

- Available only with Output Option R, S, T, U, or V

- Passive (externally powered): 3–30 VDC maximum, sinking up to 500 mA at 30 VDC maximum
- 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

- Available only with Output Option R, S, T, U, or V
- Passive (externally powered): 3–30 VDC maximum, sinking up to 500 mA at 30 VDC maximum
- Not intrinsically safe
- Typical use: Report fill in progress or fault, or control purge valve

#### One standard Discrete Input

- Available only with Output Option R, S, T, U, or V
- Internally power: Weak 100 K internal pull-up allows contact-closing input
- External power: +3–30 VDC maximum
- 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

- Available only with Output Option P or Q
- Passive (externally powered): 30 VDC maximum, 24 VDC typical, sinking up to 500 mA at 30 VDC maximum
- Not intrinsically safe
- Scalability: 0 to 10,000 Hz
- Typical use: Pulse input (flow rate) to PLC counter card or pulse-counting application

## Digital communications

Protocol	Description	
Service port	Standard Micro Motion service port protocol: Modbus RTU 38,400 baud rate, one stop bit, no parity	There is only one physical port for both Modbus and the service port.
Modbus/RS-485 <sup>(1)</sup>	Auto-detects and responds to: <ul style="list-style-type: none"> <li>■ Modbus RTU protocol</li> <li>■ All baud rates between 1200 and 38,400</li> <li>■ One or two stop bits</li> <li>■ Any parity</li> </ul>	
PROFIBUS-DP <sup>(2)</sup>	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.

## Host interface

Code	Description
Output options: P, R, S, T	Micro Motion ProLink III supports all functionality
Output options: Q, U, V	Micro Motion ProLink III supports basic functionality Siemens SIMATIC PDM required for complete device configuration Supplied with the transmitter: <ul style="list-style-type: none"> <li>■ GSD conforming to the PROFIBUS-DP specification:                             <ul style="list-style-type: none"> <li>— Provides PROFIBUS Class 1 Master functions</li> <li>— Enables control of all input and output process data</li> </ul> </li> <li>■ EDD conforming to PROFIBUS EDDL specification                             <ul style="list-style-type: none"> <li>— Provides PROFIBUS Class 2 Master functions</li> <li>— Enables device configuration</li> </ul> </li> </ul>

## Power supply

	Description
Power requirements	Input supply: 24 VDC System requirements: 5.5 W (device) + I/O requirements (1 A maximum 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



## Environmental limits

Type	Limits
Ambient temperature limits	-32 °F (-36 °C) to 140 °F (60 °C)
Humidity limits	5 to 95% relative humidity, non-condensing at 140 °F (60 °C)
Vibration limits	Meets IEC68.2.6, endurance sweep, 5 to 2000 Hz, 50 sweep cycles at 1.0 g

## Environmental effects

Type	Effect
EMI effects	Complies with EMC directive 2008/104/EC per EN 61326-2-3
	Complies with NAMUR NE21 Version: 22.08.2007
Ambient temperature effect	On mA Output: ±0.005% of span per °C

## Hazardous area classifications

Agency	Approval	
CSA C-US		Class I, Div. 2, Groups A,B,C,D Class II, Div. 2, Groups F, G
ATEX		II 3G Ex nA IIC T5 Gc II 3D Ex tc IIIC T70° C Dc IP 66/67
IECEX		Ex nA IIC T5 Gc IP 66/67

## Electrical connections

Connection type	M-12 circular connections	
Power connection	Output options: P, Q, R, S, U, V	Power and mA on the same connector
	Output option T	mA on a separate connector
Digital communications	Output options: P, R, S, T	Modbus
	Output options: Q, U, V	PROFIBUS-DP

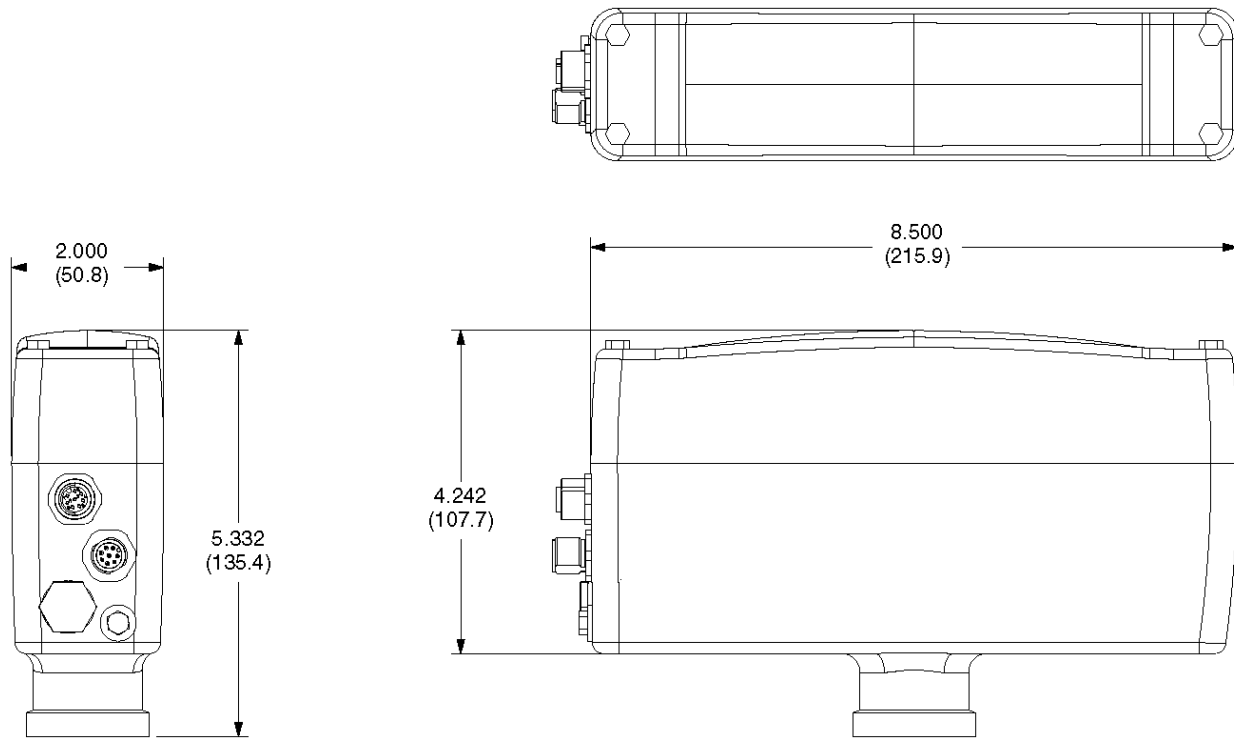
## Physical specifications

Specification	Value
Housing and mounting	<ul style="list-style-type: none"> <li>■ Transmitter: 316L stainless steel</li> <li>■ Sensor: Refer to sensor specifications for sensor case materials</li> <li>■ Transmitter is integrally mounted to the sensor at the factory and electronics are encapsulated.               <ul style="list-style-type: none"> <li>— ELITE CMFS sensors: welded to sensor.</li> <li>— F-Series, H-Series, and T-Series sensors: clamped to sensor.</li> </ul> </li> <li>■ Surface finish options:               <ul style="list-style-type: none"> <li>— Standard (130 Ra)</li> <li>— Improved (64 Ra)</li> </ul> </li> <li>■ The transmitter can be rotated on the mounting in 45 degree increments.</li> </ul>
Weight	See the sensor product data sheet for combined weight of the flow meter. Transmitter: 7.1 lb (3 kg)
Dimensions	Transmitter: 2 in × 8.95 in × 5.2 in (50.8 × 227.3 × 101.6 mm). Sensor: Refer to sensor specifications for sensor weight.

Specification	Value
Status LED	One or two status indicators on internal transmitter module (for commissioning, not visible in normal use): <ul style="list-style-type: none"> <li>■ LED1: Indicates transmitter status</li> <li>■ LED2: Indicates PROFIBUS-DP connection status<sup>(1)</sup></li> </ul>

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

## Dimensions



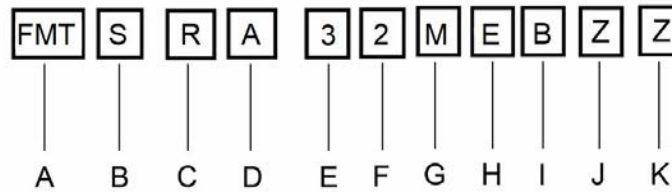
Dimensions are in inches [mm]

## Ordering information

This section lists the available options and ordering codes for the FMT transmitter.



**Example model code**



- A. Product family
- B. Mounting / housing material
- C. Output options
- D. I/O terminations
- E. Display
- F. Conduit connections
- G. Approvals
- H. Languages
- I. Software option 1
- J. Software option 2
- K. Factory options

**Base model**

**Code descriptions**

The codes below are model designations used to identify the type of meter and material of construction.

Code	Material
S	Integral mount transmitter / 316L stainless-steel; standard finish (130 RA)
R	1 mA Output
A	M-12 circular connectors
3	No display
2	M-12 circular connectors
M	Micro Motion standard (no approval)
E	English installation manual and English guide to filling
B	Integrated valve control
Z	No software options 2
Z	Standard product

**Product description**

Model	Product description
FMT	Micro Motion Coriolis Filling Mass Transmitter

## Mounting / Housing material

Code	Description
S <sup>(1)</sup>	Integral-mount transmitter / 316L stainless steel; standard finish (130 RA)
I <sup>(1)</sup>	Integral-mount transmitter / 316L stainless steel; improved surface finish (64 RA)

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

## Output options

Model	Description
P <sup>(1)</sup>	1 Pulse; 1 mA; Modbus
Q <sup>(1)</sup>	1 Pulse; 1 mA; PROFIBUS DP
R <sup>(2)</sup>	1 mA; 3 DO (Isolated); Modbus
S <sup>(2)</sup>	1 mA; 3 DO (high side common); Modbus
T <sup>(2)</sup>	1 mA; 3 DO (high side common); Modbus, (mA on a separate connector)
U <sup>(2)</sup>	1 mA; 3 DO (isolated); PROFIBUS DP
V <sup>(2)</sup>	1 mA; 3 DO (high side common); PROFIBUS DP

(1) *Available only with Software Option 1, code Z.*

(2) *Available only with Software Option 1, code B.*

## I/O termination

Code	I/O termination
A	M-12 circular connectors

## Display

Code	Display
3	No display

## Conduit connections

Code	Conduit connections
2	M-12 circular connectors

## Approvals

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

## Languages

Code	Languages
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

## Software options 1

Code	Software options 1
Z	Host-controlled filling (flow variable)
B	Integrated valve control

## Software options 2

Code	Software options 2
Z	No software options 2

## Factory options

Code	Factory options
Z	Standard product
X	ETO product
R	Restocked product (if available)

For more information: [www.emerson.com](http://www.emerson.com)

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