

Series 1000 and 2000 Transmitters with MVD™ Technology



MVD™ technology



Micro Motion

FISHER-ROSEMOUNT™

Micro Motion® Series 1000 and 2000 Transmitters with MVD™ Technology

The new approach to sensor electronics

Only Micro Motion® combines new MVD™ Technology with a modular architecture that redefines sensor electronics. That means multivariable digital processing that's scalable for any flow application. MVD Technology gets your most basic – or most complex – application up and running quicker, easier and more cost effectively than ever before.

MVD Technology

MVD Technology makes your Micro Motion flowmeter work smarter. Front-end digital processing dramatically reduces signal noise and gives you faster response time, compared to analog devices. Innovative MVD Technology also enables multiple variable measurement and diagnostics never before possible. And this is just the beginning.

Only MVD Technology allows you to:

- Measure multiple variables
- Choose integral or remote mounting with a standard, 4-wire signal cable
- Identify and resolve problems easily with built-in smart diagnostics
- Choose transmitter capabilities based on your application's needs
- Upgrade transmitter functionality as needed

What's the bottom line of MVD Technology?

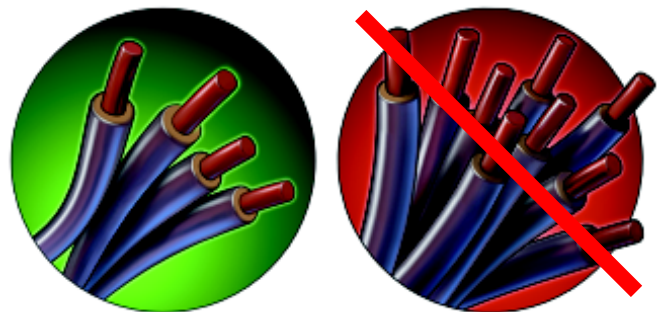
Reducing costs in your bottom line through improved process consistency and maximized uptime.

Scalable architecture

You asked for it and Micro Motion has delivered. Series 1000 and 2000 transmitters allow you to choose the functionality you want. Series 1000 transmitters are perfect for applications that require single variable measurement. For more demanding applications, Series 2000 transmitters measure multiple variables simultaneously, and have more output and digital communication options.

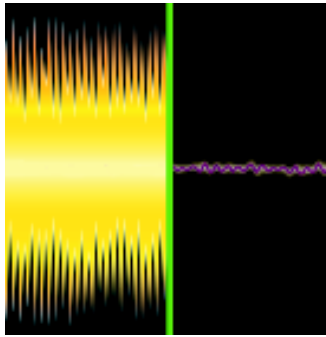
What happens when you put Micro Motion's MVD Technology together with the Series 1000 and 2000 transmitters?

Only four wires

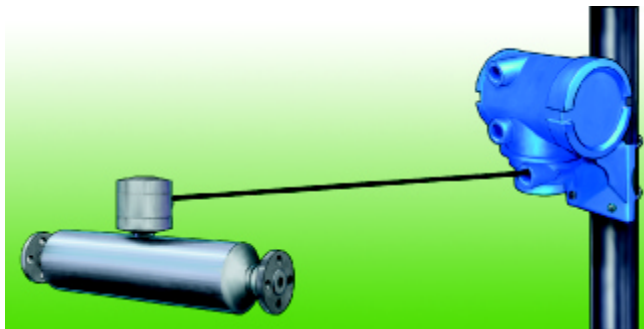


Approved for hazardous areas





Clean, noise-free, digital signals that improve measurement performance



Integral or remote mounting

Delivering a suite of power-packed standard features

All Series 1000 and 2000 transmitters offer:

- Class I, Division 1 / Zone 1 local operator interface to:
 - View process variables
 - View meter status at a glance
 - Start, stop, and reset transmitter totalizers
 - Zero flowmeter
 - Perform output simulation tests
 - Scale outputs
 - Set password security
- Compact, integral mounting to sensor with 360 degrees of rotation
- Cost-effective, hassle-free, 4-wire remote mounting to sensor
- Simple start-up with virtually no special programming requirements
- Digital communications
- Easy to access diagnostics: meter status, process issues, and more

Series 1000 single-variable transmitter

For applications requiring only a single flow variable

Series 1000 transmitters are ideal for flow applications where only a single variable is needed at any given time. Series 1000 transmitters feature a milliamp and a frequency/pulse output, and HART® or Modbus® digital communications.

Series 1000 transmitters can output any *one* of the following variables:

- Flow rate
- Total flow
- Density
- Temperature

Series 2000 Multivariable Transmitter

For applications requiring simultaneous monitoring of multiple flow variables

Series 2000 transmitters are designed specifically for applications where multiple variables are needed simultaneously. Series 2000 transmitters feature a milliamp and a frequency/pulse output, plus HART, Modbus, FOUNDATION™ fieldbus, and Profibus PA digital communications.

Series 2000 transmitters can *simultaneously* output:

- Flow rate
- Total flow
- Density
- Temperature

Series 1000 and 2000 functional specifications

Electrical connections

Input and output connections

Three pairs of wiring terminals for transmitter outputs.

Screw terminals accept one or two solid conductors, 14 to 12 AWG (2.5 to 4 mm²); or one or two stranded conductors, 22 to 14 AWG (0.34 to 2.5 mm²).

Power connection

One pair of wiring terminals accepts either AC or DC power.

One internal ground lug for power-supply ground wiring.

Screw terminals accept one or two solid conductors, 14 to 12 AWG (2.5 to 4 mm²); or one or two stranded conductors, 22 to 14 AWG (0.34 to 2.5 mm²).

Service port connection

Two clips for temporary connection to the service port.

Input/output signals

All transmitters

One 4-wire sensor signal input connection with ground, intrinsically safe.

HART/Modbus transmitters

One active 4-20 mA output

Not intrinsically safe

Isolated to ± 50 VDC from all other outputs and earth ground

Maximum load limit, 600 ohms

Can report mass flow, volume flow, density, or temperature

Output is linear with process from 3.8 to 20.5 mA, per NAMUR NE43 (June 1994)

One active frequency/pulse output

Not intrinsically safe

Can report mass flow or volume flow, which can be used to indicate flow rate or total

For Series 1000, output is dependent on mA output; for Series 2000, output is independent

Scalable to 10,000 Hz

Maximum output of 30 VDC max., 24 VDC typical

Internal 2.2 kohm pull-up

Output is linear with flow rate to 12,500 Hz

Fieldbus transmitters

One FOUNDATION fieldbus H1 output

FOUNDATION fieldbus wiring is intrinsically safe with an intrinsically safe power supply

Manchester-encoded digital signal conforms to IEC 1158-2.

Digital communications

All transmitters

One service port can be used for temporary connection only.

Uses RS-485 Modbus signal, baud rate of 38.4 kilobaud, one stop bit, no parity

HART/Modbus transmitters

HART Bell 202 signal is superimposed on the primary milliamp output, and is available for host system interface.

Frequency 1.2 and 2.2 kHz

Amplitude 0.8 V peak-to-peak

1200 baud

Requires 250 to 600 ohms load resistance

One RS-485 output can be used for direct connection to a HART or Modbus host system. Accepts baud rates between 1200 baud and 38.4 kilobaud.

Fieldbus transmitters

Transmitters are registered with the Fieldbus Foundation, and conform to the FOUNDATION fieldbus H1 protocol specification.

Input frequency from sensor

Mass flow 20 Hz

Volume flow 20 Hz

Density 10 Hz

Temperature 1 Hz

Analog Input Function Blocks

Cycle time host dependent

Update rate 50 milliseconds

Refresh rate host dependent

Power supply

Self-switching AC/DC input, automatically recognizes supply voltage.

Complies with low voltage directive 73/23/EEC per IEC 1010-1 with amendment 2

Installation (Overvoltage) Category II, Pollution Degree 2

The transmitter fieldbus circuit is passive, and draws its power from the fieldbus segment. Current draw from the fieldbus segment is 11.5 mA.

AC power

85 to 265 VAC, 50/60 Hz, 5 watts typical, 8 watts maximum

DC power

18 to 100 VDC, 5 watts typical, 8 watts maximum

Minimum 22 VDC with 1000 feet of 18 AWG (300 meters of 0.8mm²) power-supply cable

Fuse

IEC 127-1.25 fuse, slowblow

Series 1000 and 2000 functional specifications *continued*

Environmental limits

Ambient temperature limits

Operating	−40 to 140°F (−40 to 60°C)
Storage	−40 to 158°F (−40 to 70°C)

Note: Display responsiveness decreases, and display may become difficult to read, below −4°F (−20°C). Above 131°F (55°C), some darkening of display might occur.

Humidity limits

5 to 95% relative humidity, non-condensing at 140°F (60°C)

Vibration limits

Meets IEC 68.2.6, endurance sweep, 5 to 2000 Hz, 50 sweep cycles at 1.0 g.

Environmental effects

EMI effects

Series 1000 and 2000 transmitters conform to NAMUR NE21 (June 1997).

Series 1000 and 2000 transmitters meet EMC directive 89/336/EEC per EN 50081-2 (August 1993) and EN 50082-2 (March 1995), and EN 61326 Industrial.

Ambient temperature effect

On analog outputs ±0.005% of span per °C

Hazardous area classification

UL and CSA

Transmitter

Class I, Div. 1, Groups C and D. Class II, Div. 1, Groups E, F, and G explosion proof (when installed with approved conduit seals). Otherwise, Class I, Div. 2, Groups A, B, C, and D.

Outputs

Provides nonincendive sensor outputs for use in Class I, Div. 2, Groups A, B, C, and D; or intrinsically safe sensor outputs for use in Class I, Div. 1, Groups C and D or Class II, Div. 1, Groups E, F, and G.

CENELEC

HART/Modbus transmitters

Flameproof when installed with approved cable glands:

with display	EEx d [ib] IIB+H2 T6
without display	EEx d [ib] IIC T6

Increased safety when installed with approved cable glands:

with display	EEx de [ib] IIB+H2 T6
without display	EEx de [ib] IIC T6

Fieldbus transmitters

Flameproof when installed with approved cable glands:

with display	EEx d [ia/ib] IIB+H2 T6
without display	EEx d [ia/ib] IIC T6

Increased safety when installed with approved cable glands:

with display	EEx de [ia/ib] IIB+H2 T6
without display	EEx de [ia/ib] IIC T6

Series 2000 with FOUNDATION™ fieldbus

Series 2000 fieldbus software functionality

Series 2000 FOUNDATION fieldbus software is designed to permit remote testing and configuration of the transmitter using the Fisher-Rosemount DeltaV™ Fieldbus Configuration Tool, or other FOUNDATION fieldbus compliant hosts. The illustration below shows how the Coriolis sensor signal is channelled through the flowmeter to the control room and the FOUNDATION fieldbus configuration device.

Transducer block

The transducer block holds the data from the Coriolis sensor. It includes information about the sensor type, sensor configuration, engineering units, calibration, damping, and diagnostics.

Resource block

The resource block contains physical device information, including available memory, manufacturer identification, type of device, and features.

Function blocks

The Analog Input (AI) function block processes the measurement and makes it available to other function blocks. It also allows filtering, alarming, and engineering unit change. The four Series 2000 AI blocks process mass flow, volume flow, density, and temperature signals from the Coriolis sensor.

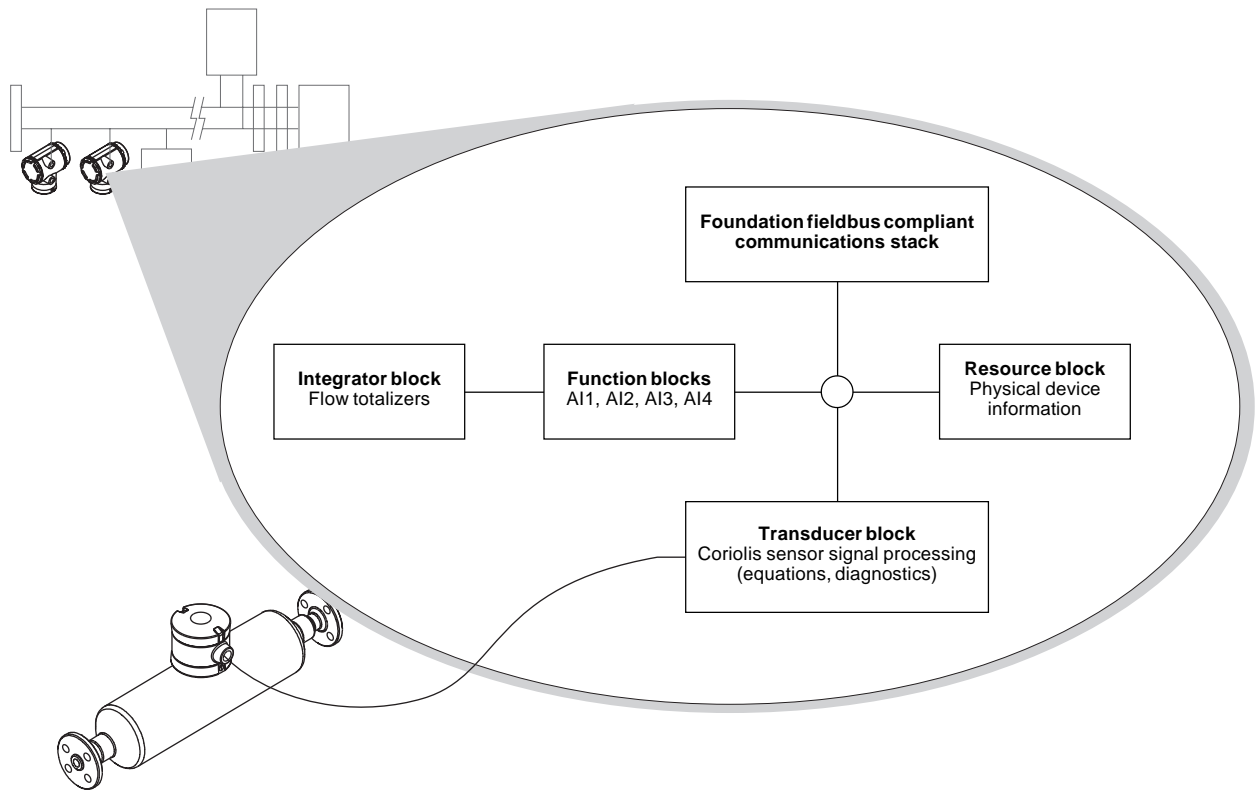
Integrator block

The integrator block provides functionality for the transmitter totalizers. The flow variable (mass or volume) can be selected and reset.

Diagnostics and service

Series 2000 transmitters automatically perform continuous self diagnostics. Using the transducer block, the user can perform on-line testing of the transmitter and sensor. Diagnostics are event driven and do not require polling for access.

Block diagram for Series 2000 transmitters with FOUNDATION fieldbus



Series 1000/2000 performance specifications

Performance specifications when used with Micro Motion T-Series sensors on liquids and slurries only.

Flow

Accuracy*	Repeatability*
$\pm 0.15\% \pm [(\text{zero stability/flow rate}) \times 100]\%$ of rate	$\pm 0.05\% \pm [\frac{1}{2}(\text{zero stability/flow rate}) \times 100]\%$ of rate

Density

Accuracy	Repeatability
$\pm 0.002 \text{ g/cc } (\pm 2.0 \text{ kg/m}^3)$	$\pm 0.0005 \text{ g/cc } (\pm 0.5 \text{ kg/m}^3)$

Temperature

Accuracy	Repeatability
$\pm 1^\circ\text{C} \pm 0.5\%$ of reading in $^\circ\text{C}$	$\pm 0.2^\circ\text{C}$

*Flow accuracy includes the combined effects of repeatability, linearity, and hysteresis. All specifications are based on reference conditions of water at 68 to 77°F (20 to 25°C), and 15 to 30 psig (1 to 2 bar) unless otherwise noted. For values of zero stability, refer to product specifications for each sensor.

Model 1700 and 2700 physical

Field-mount housing

NEMA 4X (IP67) epoxy painted cast aluminum housing.

Terminal compartment contains output terminals, power terminals and service-port terminals. The output terminals are physically separated from the power- and service-port terminals.

The electronics compartment contains all electronics and the standard display.

The sensor compartment contains the wiring terminals for connection to the core processor on the sensor.

Screw-terminal on housing for chassis ground.

Cable gland entrances are either ½-14 NPT or M20 x 1.5 female conduit ports.

Mounting

Model 1700 and 2700 field-mount transmitters are available integrally mounted to Micro Motion T-Series sensors, or in a remote-mount configuration.

Remote-mount transmitters include a mounting bracket, and require standard 4-wire signal cable, up to 1000 feet (300 meters) in length, between the sensor and the transmitter. Hardware for installing the transmitter on the mounting bracket is included.

The transmitter can be rotated on the sensor or the mounting bracket, 360 degrees, in 90-degree increments.

Interface/display

Segmented 2-line display with LCD screen with optical controls and flowmeter-status LED is standard. Suitable for hazardous area installation.

To facilitate various mounting orientations, the display can rotate on transmitter, 360 degrees, in 90-degree increments.

LCD line 1 lists the process variable, line 2 lists engineering unit of measure. Non-glare tempered glass lens.

Display controls feature optical switches that are operated through the glass with a red LED visual-feedback to confirm when a "button" is pressed.

Display functions

Operational

View process variables; start, stop, and reset totalizers.

Off-line

View diagnostic messages, zero flowmeter, initiate output simulation and diagnostic self-check.

Status light

Three-color LED status light on display panel indicates flowmeter condition at a glance. Green, yellow, or red, either continuously on or blinking, status light immediately indicates flowmeter status.

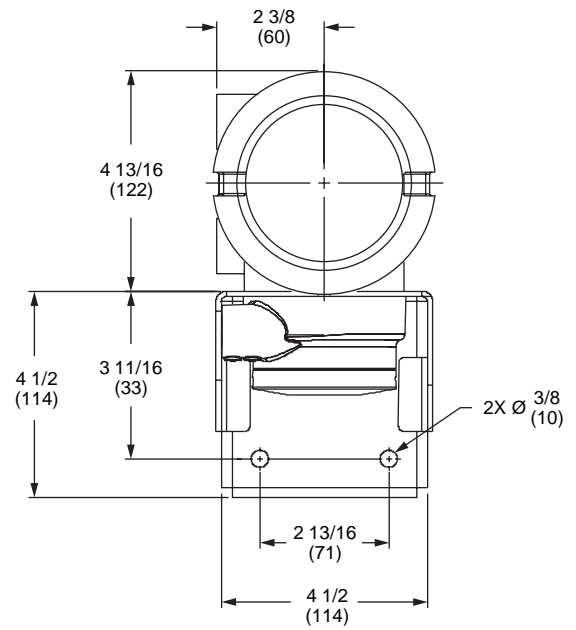
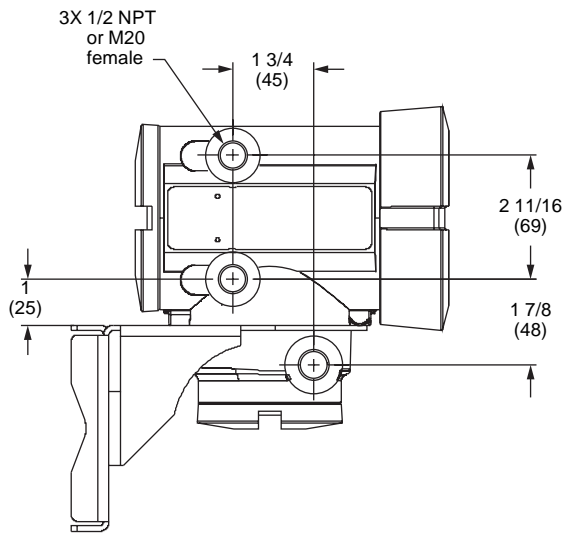
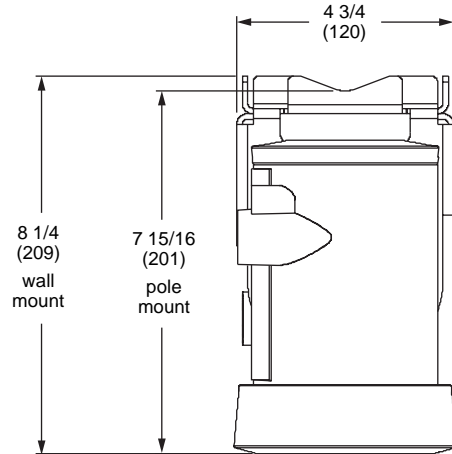
Weight

2 lb (1 kg)

For weight of integrally mounted transmitter and sensor, refer to sensor specifications.

Model 1700 and 2700 physical specifications *continued*

Dimensions in inches
(mm)



For dimensions of integrally mounted transmitter and sensor, refer to sensor specifications.

Series 1000 model number matrix

Code	Transmitter model								
1700	Model 1700 transmitter with MVD Technology								
	Code	Mounting options							
	I	Integral mount							
	R	Remote mount							
	S	Spare transmitter for integral mount							
		Code	Power-supply						
		1	85-265 VAC/18-100 VDC, self-switching AC/DC input						
			Code	Display					
			1	Standard display					
			3	No display					
			Code	Outputs					
			A	One milliamp, one frequency, one RS-485					
				Code	Conduit connections and glands				
				B	1/2-inch NPT female conduit ports, no glands				
				C	1/2-inch NPT female conduit ports, nickel-plated brass cable glands				
				D	1/2-inch NPT female conduit ports, stainless steel cable glands				
				E	M20 (20 mm) conduit ports, no glands				
				F	M20 (20 mm) conduit ports, nickel-plated brass cable glands				
				G	M20 (20 mm) conduit ports, stainless steel cable glands				
				Code	Approvals				
				M	Micro Motion standard (no approvals)				
				U	UL				
				C	CSA				
				Z	CENELEC Increased Safety				
				F	CENELEC Flameproof				
				Code	Language				
				M	Chinese				
				A	Danish				
				D	Dutch				
				E	English				
				H	Finnish				
				F	French				
				G	German				
				K	Greek				
				C	Icelandic				
				I	Italian				
				J	Japanese				
				N	Norwegian				
				O	Polish				
				P	Portuguese				
				R	Russian				
				S	Spanish				
				W	Swedish				
				Code	Software				
				ZZZ	None — requires output code A or G				
Example	1700	I	1	1	A	D	U	E	ZZZ

Series 2000 model number matrix

Code		Transmitter model								
2700		Model 2700 transmitter with MVD Technology								
Code		Mounting options								
I		Integral mount								
R		Remote mount								
S		Spare transmitter for integral mount								
Code		Power-supply								
1		85-265 VAC/18-100 VDC, self-switching AC/DC input								
Code		Display								
1		Standard display								
3		No display								
Code		Outputs								
A		One milliamp, one frequency, one RS-485								
B		FOUNDATION fieldbus H1								
G		Profibus PA								
Code		Conduit connections and glands								
B		1/2-inch NPT female conduit ports, no glands								
C		1/2-inch NPT female conduit ports, nickel-plated brass cable glands								
D		1/2-inch NPT female conduit ports, stainless steel cable glands								
E		M20 (20 mm) conduit ports, no glands								
F		M20 (20 mm) conduit ports, nickel-plated brass cable glands								
G		M20 (20 mm) conduit ports, stainless steel cable glands								
Code		Approvals								
M		Micro Motion standard (no approvals)								
U		UL								
C		CSA								
Z		CENELEC Increased Safety								
F		CENELEC Flameproof								
Code		Language								
M		Chinese								
A		Danish								
D		Dutch								
E		English								
H		Finnish								
F		French								
G		German								
K		Greek								
C		Icelandic								
I		Italian								
J		Japanese								
N		Norwegian								
O		Polish								
P		Portuguese								
R		Russian								
S		Spanish								
W		Swedish								
Code		Software								
ZZZ		None — requires output code A or G								
ZAZ		FOUNDATION fieldbus — requires output code B								
Example		2700	I	1	1	A	D	U	E	ZZZ

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