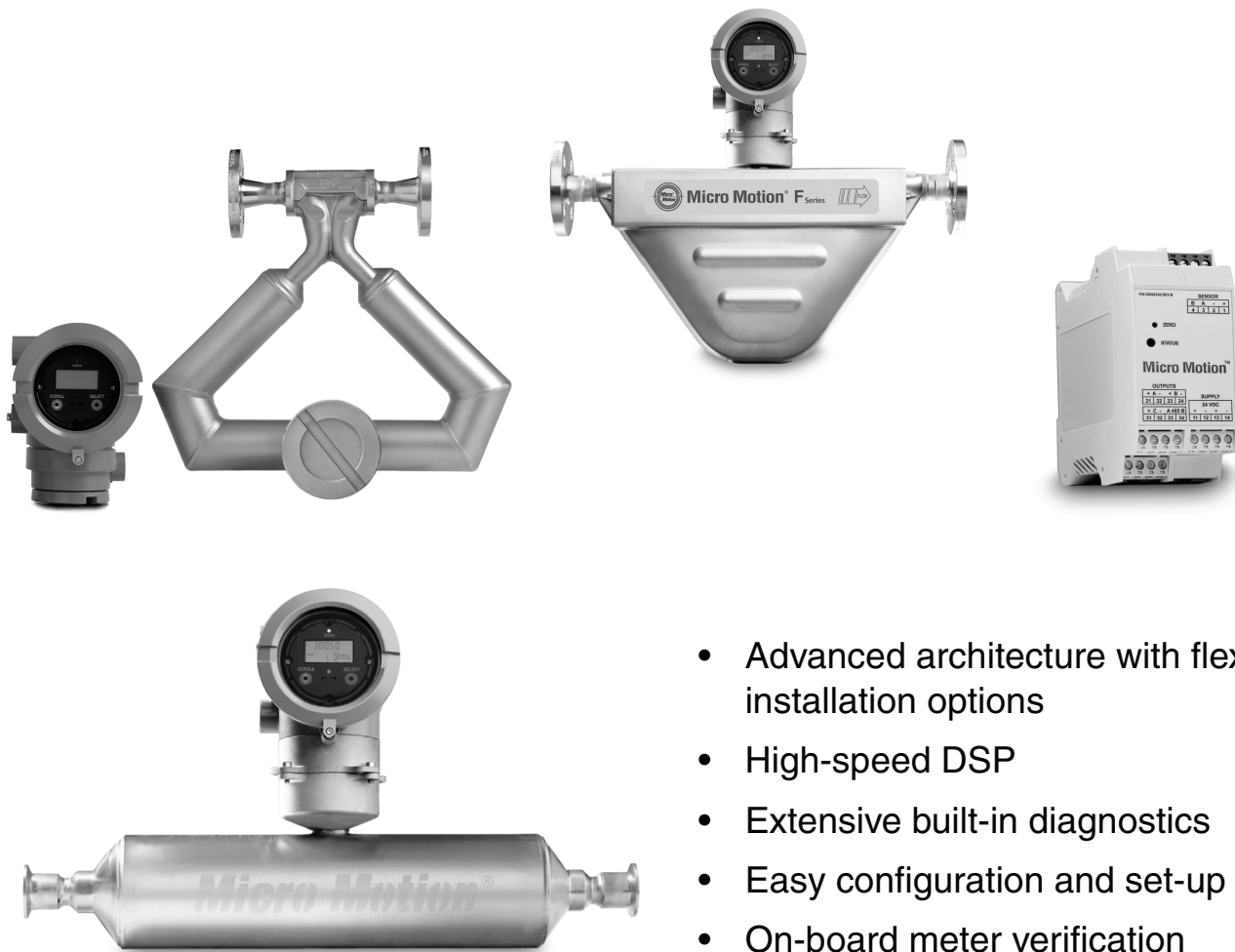


## Product Data Sheet

PS-00400, Rev. D

October 2006

# Micro Motion® Series 1000 and 2000 Transmitters with MVD™ technology



- Advanced architecture with flexible installation options
- High-speed DSP
- Extensive built-in diagnostics
- Easy configuration and set-up
- On-board meter verification



**SERV' INSTRUMENTATION**



**EMERSON**  
Process Management

# Micro Motion® Series 1000 and 2000 transmitters with MVD™ technology

## The modular, scalable approach to sensor electronics

Only Micro Motion combines MVD™ technology with a modular architecture that redefines sensor electronics. That means multivariable digital processing that is scalable for any application. MVD technology gets your most basic—or most complex—application up and running quicker, easier, and more cost effectively than ever before. The 1000-2000 Series is compatible with both the Core Processor and the Enhanced Core Processor with next-generation MVD technology.

## 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. When used with the Enhanced Core Processor, 1000-2000 Series transmitters expand the capability of Micro Motion ELITE® meters even further with the patented Meter Verification feature. A simple button-push tells you if measurement baselines have changed from their original state—with no need to remove the sensor from the line or spend thousands of dollars on secondary references.

Only MVD technology allows you to:

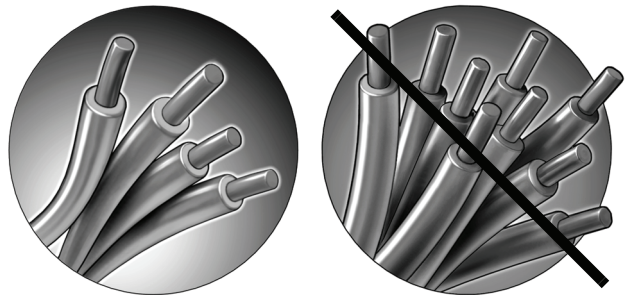
- Measure multiple variables
- Choose integral or remote mounting with a standard twisted, shielded 4-wire signal cable
- Identify and resolve problems easily with built-in smart diagnostics
- Choose transmitter capabilities based on your application's needs
- Upgrade transmitter functionality as needed

## What's the bottom line of MVD technology?

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

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

**Only four wires — dramatically reduces installation costs**



**Model 1700/2700 optional display for hazardous areas**



**Innovative compact DIN rail packaging**



# MVD technology delivers a suite of power-packed standard features

## Scalable architecture

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, have additional output and digital communications options, and can be used in custody transfer applications.

## All Series 1000 and 2000 transmitters offer:

- Cost-effective, hassle-free, 4-wire remote mounting to sensor
- Simple start-up with virtually no special programming requirements
- Meter verification option when used with the enhanced core processor
- Digital communications
- Easy-to-access diagnostics: sensor health, transmitter status, process variables, process events, and more
- Backward compatibility with 9-wire junction box sensors

## Model 1700 and 2700 transmitters add:

- Compact, integral mounting to sensor with 360 degrees of rotation
- Class I, Division 1/Zone 1 local operator interface to:
  - View process variables
  - View meter status at a glance
  - View and acknowledge alarms
  - Start, stop, and reset transmitter totalizers
  - Zero flowmeter (with restorable factory zero)
  - Perform output simulation tests
  - Change measurement units
  - Assign variables to outputs
  - Scale outputs
  - Set RS-485 communications options
- Safety: The only TÜV-certified SIS Coriolis meter with SIL 2 or SIL 3 capability
- Interface functions can be customized and password protected
  - Supports English, French, Spanish, and German languages

## Model 1500 and 2500 transmitters add:

- Compact, small-footprint remote-mount transmitter using 35 mm DIN rail
- Low power requirement with no need to run separate AC power to the sensor

# Series 1000 and 2000 output variables

## Series 1000 flow measurement transmitter

### For applications requiring only mass flow or volume flow measurement

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 *one* of the following variables:

- Mass flow rate
- Volume flow rate
- Gas standard volume flow rate

## 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 offer selected combinations of outputs, including milliamp, frequency, discrete inputs and outputs, plus Modbus, HART, FOUNDATION fieldbus™, and PROFIBUS-PA digital communications.

Series 2000 transmitters can *simultaneously* output multiple variables, including:

- Mass flow rate
- Volume flow rate
- Gas standard volume flow rate
- Density
- Temperature
- Drive gain

# Series 1000 and Series 2000 options meet your application needs

## **NEW!** Meter verification

Meter verification is a patented self-verification technology for in-situ assessment of calibration and health of the Coriolis meter. When a 1000-2000 Series transmitter is used in combination with an enhanced core processor, the meter verification option provides near instantaneous indication whether or not the meter has been affected by erosion, corrosion, or other influences affecting meter calibration. This self-verification compares the Coriolis meter's mechanical and electrical properties against a baseline established at the factory prior to shipment. Meters do not have to be removed from the line, and no secondary references are required to perform this operation. This dramatically reduces flow metering validation efforts and expense, and enables predictive maintenance that addresses meter health issues before they interrupt operation.

## TÜV SIS certification

The Micro Motion Model 1700 and Model 2700 transmitters have been safety certified to IEC 61508 which simplifies safety standard compliance and boosts plant availability. The IEC certification is available on the primary milliamp output with output option codes A, B, C, or D (see pages 27–29). One meter can be used in SIL 2 applications, and SIL 3 levels can be achieved if redundant meters are used.

## Discrete batch control

Simple discrete batch control is easy using Series 2000 transmitters. For transmitters with analog or intrinsically safe outputs, the frequency output can be configured as a discrete output, and for transmitters with configurable inputs and outputs, a channel can be configured as a discrete output, using batch targets entered from a host control system or from the local display. If additional inputs or outputs are required, the Series 3000 transmitter/controller should also be considered.

## Petroleum measurement

Series 2000 transmitters with the petroleum measurement software option can calculate:

- Base density
- CTL (the effect of temperature on a liquid)
- Gross volume at standard temperature
- Flow weighted average temperature
- Flow weighted average density (observed gravity)

One instrument can now be used to measure corrected volume flow and corrected density, eliminating the need for a densitometer, reducing maintenance, and lowering your capital investment. No calibration or recalibration for different density fluids is required. The software uses API MPMS Chapter 11.1 for Generalized Petroleum, Generalized Crude Oil, Lubricants, and other fluids with a known thermal coefficient of expansion to calculate base density from the flowing density and flowing temperature.

## **Series 1000 and 2000 options** *continued*

### **Custody transfer**

Series 2000 transmitters feature physical security for custody transfer applications such as bottle filling, CNG dispensing, and vehicle loading and unloading. Micro Motion Coriolis meters provide legal trade accuracies for a wide range of fluids without the need for upstream and downstream straight runs and without the need for external compensation. Custody transfer based on mass flow eliminates many of the problems associated with volumetric technologies: Coriolis meters have no moving parts, are not affected by seasonal variations in quantities delivered due to temperature changes, and can eliminate re-work and waste by providing the correct amount of product every time.

### **Fast response time**

Series 1000 and 2000 transmitters offer as a standard feature a selectable response time for the analog output and frequency output. The normal response mode uses the maximum amount of digital signal processing (DSP) and a 20 Hz update rate for the selected process variable. The special response mode uses a 100 Hz update rate with slightly reduced noise rejection. Micro Motion Coriolis sensors with Series 1000 and 2000 transmitters are an ideal choice for applications that require fast, accurate measurements. MVD DSP provides excellent repeatability with batch times as low as 1 second in duration, and eliminates process variations due to density and temperature changes.

# Electrical connections

## Input/output connections

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Model 1700/2700	Two (Model 1700) or three (Model 2700) pairs of wiring terminals for transmitter outputs Screw terminals accept one or two solid conductors, 14 to 12 AWG (2.5 to 4.0 mm <sup>2</sup> ); or one or two stranded conductors, 22 to 14 AWG (0.34 to 2.5 mm <sup>2</sup> )
Model 1500/2500	Three pairs of wiring terminals for transmitter outputs One pair of terminals for digital communications (Modbus/RS-485) Plug connectors accept stranded or solid conductors, 24 to 12 AWG (0.20 to 3.5 mm <sup>2</sup> )

## Power connection

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Model 1700/2700	One pair of wiring terminals accepts 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 4.0 mm <sup>2</sup> ); or one or two stranded conductors, 22 to 14 AWG (0.34 to 2.5 mm <sup>2</sup> )
Model 1500/2500	The transmitter has two pairs of terminals for the power connection: <ul style="list-style-type: none"><li>• Either pair accepts DC power</li><li>• The remaining pair is used for making a jumper connection to a second transmitter</li></ul> Plug connectors accept stranded or solid conductors, 24 to 12 AWG (0.20 to 2.5 mm <sup>2</sup> )

## Service port connection

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Model 1700/2700	Two clips for temporary connection to the service port
Model 1500/2500	One pair of terminals supports Modbus/RS-485 signal or service port mode. On device power-up, user has 10 seconds to connect in service port mode. After 10 seconds, the terminals default to Modbus/RS-485 mode.

## Core processor connection<sup>(1)</sup>

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The transmitter has two pairs of terminals for the 4-wire connection to the core processor:

- One pair is used for the RS-485 connection to the core processor
- One pair is used to supply power to the core processor

Plug connectors accept stranded or solid conductors, 24 to 12 AWG (0.20 to 2.5 mm<sup>2</sup>)

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(1) For Model 1700/2700 transmitters with an integral core processor (mounting code C), the 4-wire connection between the transmitter and core processor is not normally accessed.

# Input/output signals

## All output options

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Mounting codes R and B	One 4-wire sensor signal input connection, intrinsically safe
Mounting code C (9-wire remote transmitter)	One 9-wire sensor signal input connection, intrinsically safe

## Output option code A: Non-intrinsically safe analog output (with HART and Modbus) Models 1500, 1700, and 2700 transmitters

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One active 4–20 mA output	<p>Not intrinsically safe</p> <p>Isolated to <math>\pm 50</math> VDC from all other outputs and earth ground</p> <p>Maximum load limit: 820 ohms</p> <p>Models 1500 and 1700 can report mass flow or volume flow</p> <p>Model 2700 can report mass flow, volume flow, density, temperature, or drive gain</p> <p>Output is linear with process from 3.8 to 20.5 mA, per NAMUR NE43 (June 1994)</p>
One active frequency/pulse output <sup>(1)</sup>	<p>Not intrinsically safe</p> <p>Can report mass flow or volume flow, which can be used to indicate flow rate or total</p> <p>For Models 1500 and 1700, frequency output reports the same flow variable as the mA output</p> <p>For Model 2700, frequency output is independent of mA output</p> <p>Scalable to 10,000 Hz</p> <p>For Model 1500, output voltage is +15 VDC <math>\pm 3\%</math> with a 2.2 kohm internal pull-up resistor</p> <p>For Models 1700/2700, output voltage is +24 VDC <math>\pm 3\%</math> with a 2.2 kohm internal pull-up resistor</p> <p>Output is linear with flow rate to 12,500 Hz</p> <p>Configurable polarity: active high or active low</p> <p>Model 2700 discrete output: Can report five discrete events, flow direction, flow switch, calibration in progress, or fault</p> <p>Maximum sink capability is 500 mA</p>

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(1) On Model 2700 transmitters, this can also be configured as a discrete output.



# Input/output signals *continued*

## Output option codes B and C: Non-intrinsically safe configurable output Models 2500 and 2700 transmitters

Transmitter has a total of 3 configurable inputs/outputs. Refer to the data below and the information on page 15 for the ways that these 3 inputs/outputs can be configured.

One or two active 4–20 mA outputs	<p>Not intrinsically safe</p> <p>Isolated to <math>\pm 50</math> VDC from all other outputs and earth ground</p> <p>Maximum load limit of mA1: 820 ohms; of mA2: 420 ohms</p> <p>Can report mass flow, volume flow, density, temperature, or drive gain</p> <p>Output is linear with process from 3.8 to 20.5 mA, per NAMUR NE43 (June 1994)</p>
One or two active or passive frequency/pulse output	<p>Not intrinsically safe</p> <p>Can report mass flow or volume flow, which can be used to indicate flow rate or total</p> <p>If configured as a dual pulse output, the channels are electrically isolated but not independent (see custody transfer note below)</p> <p>Scalable to 10,000 Hz</p> <p>If internally powered (active), output voltage is +15 VDC <math>\pm 3\%</math> with a 2.2 kohm internal pull-up resistor.</p> <p>If externally powered (passive), output voltage is 30 VDC maximum, 24 VDC typical, sinking up to 500 mA at 30 VDC.</p> <p>Output is linear with flow rate to 12,500 Hz</p>
One or two active or passive discrete outputs	<p>Not intrinsically safe</p> <p>Can report five discrete events, flow switch, forward/reverse flow, calibration in progress, or fault</p> <p>If internally powered (active), output voltage is +15 VDC <math>\pm 3\%</math> with a 2.2 kohm internal pull-up resistor.</p> <p>If externally powered (passive), output voltage is 30 VDC maximum, 24 VDC typical, sinking up to 500 mA at 30 VDC.</p>
One discrete input	<p>Can be configured for internal or external power</p> <p>Not intrinsically safe</p> <p>Internal power +15 VDC, 7 mA maximum source current</p> <p>External power +3–30 VDC maximum</p> <p>Can start/stop totals and inventories, reset all totals, reset mass total, reset volume total, start sensor zero, or initiate multiple actions</p>
Custody transfer using double pulse frequency output	<p>The transmitter can be configured for two frequency outputs. The second output can be phase-shifted 0, 90, or 180 degrees from the first output, or the dual-pulse output can be set to quadrature mode.</p>

## Output option codes E and G: FOUNDATION fieldbus and PROFIBUS-PA Model 2700 transmitters

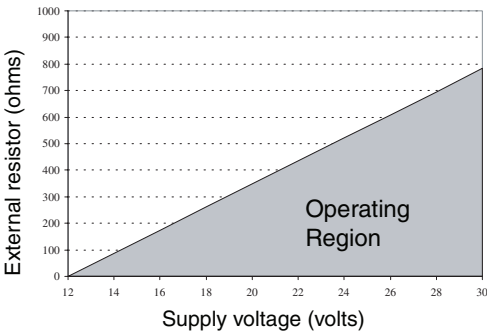
One FOUNDATION fieldbus H1 or PROFIBUS-PA output	<p>FOUNDATION fieldbus and PROFIBUS-PA wiring is intrinsically safe with an intrinsically safe power supply</p> <p>The transmitter fieldbus circuit is passive, and draws power from the fieldbus segment. Current draw from the fieldbus segment is 11.5 mA.</p> <p>Manchester-encoded digital signal conforms to IEC 61158-2</p>
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# Input/output signals *continued*

## Output option code D: Intrinsically safe Model 1700 and 2700 transmitters

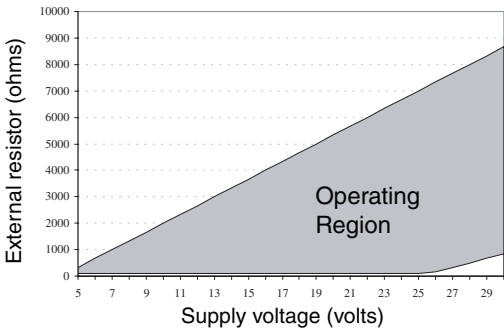
One intrinsically safe passive 4–20mA output (two with Model 2700)	Maximum input voltage, 30 VDC, 1 watt maximum Maximum current 300 mA Maximum load limits, see chart below Model 1700 can report mass flow or volume flow; Model 2700 can report mass flow, volume flow, density, temperature, or drive gain Entity parameters: $U_i = 30$ VDC, $I_i = 300$ mA, $P_i = 1$ W, $C_i =$ negligible, $L_i =$ negligible Output is linear with process from 3.8 to 20.5 mA, per NAMUR NE43 (June 1994)
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mA Output Load Resistance Value  
 $R_{max} = (V_{supply} - 12)/0.023^*$   
\*If communicating with HART a minimum of 250 ohms and 17.75 V supply is needed



One intrinsically safe frequency/pulse output (Model 1700) or configurable frequency/pulse/discrete output (Model 2700)	Maximum input voltage, 30 VDC, 0.75 watt maximum Maximum current 100 mA Maximum load limit, see chart below Can report mass flow or volume flow, which can be used to indicate flow rate or total For Model 1700, frequency output reports the same flow variable as the mA output For Model 2700, frequency output is independent of the mA output Scalable to 10,000 Hz Entity parameters: $U_i = 30$ VDC, $I_i = 100$ mA, $P_i = 0.75$ W, $C_i =$ negligible, $L_i =$ negligible Output is linear with flow rate to 12,500 Hz
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Frequency Output Load Resistance Value  
 $R_{max} = (V_{supply} - 4)/0.003$   
 $R_{min} = (V_{supply} - 25)/0.006$   
\*Absolute minimum = 100 ohms for  $V_{supply} < 25.6$  volts



# Digital communications

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## All output options

One service port can be used for temporary connection only  
Uses RS-485 Modbus signal, 38.4 kilobaud, one stop bit, no parity

## HART/Modbus

Models/output option codes:

- All models with output code A
- Model 2500 with output codes B and C

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

## HART Bell 202

Models/output option codes:

- Models 1700, 2500, and 2700 with output codes A, B, C, and D

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: to 1.0 mA
- 1200 baud
- Requires 250 to 600 ohms load resistance

## FOUNDATION fieldbus

Models/output option codes:

- Model 2700 with output code E

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

FISCO                      Field device in compliance with TS-60079-27:2002  
                                  $U_i = 30\text{ V}$ ,  $I_i = 380\text{ mA}$ ,  $P_i = 5.32\text{ W}$ ,  
                                  $C_i = \text{negligible}$ ,  $L_i = \text{negligible}$

## PROFIBUS-PA

Models/output option codes:

- Model 2700 with output code G

Transmitters are registered with the Profibus Organization, and fulfill the requirements of the PROFIBUS-PA Profile for Process Control Devices. Siemens® Simatic® PDM is required for configuration.

FISCO                      Field device in compliance with TS-60079-27:2002  
                                  $U_i = 30\text{ V}$ ,  $I_i = 380\text{ mA}$ ,  $P_i = 5.32\text{ W}$ ,  
                                  $C_i = \text{negligible}$ ,  $L_i = \text{negligible}$

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# Power supply

## Model 1700/2700

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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.

<b>AC power</b>	85 to 265 VAC, 50/60 Hz, 6 watts typical, 11 watts maximum.
<b>DC power</b>	18 to 100 VDC, 6 watts typical, 11 watts maximum Minimum 22 VDC with 1000 feet of 18 AWG (300 meters of 0.8 mm <sup>2</sup> ) power-supply cable. At startup, transmitter power source must provide a minimum of 1.5 amperes of short-term current at a minimum of 18 volts at the transmitter's power input terminals.
<b>Fuse</b>	IEC 127-1.25 fuse, slowblow.

## Model 1500/2500

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Transmitter power supply meets Installation (Overvoltage) Category II, Pollution Degree 2 requirements.

<b>DC power</b>	Minimum 19.2 to 28.8 VDC, 6.3 watts At startup, transmitter power source must provide a minimum of 1.0 amperes of short-term current per transmitter. Length and conductor diameter of the power cable must be sized to provide 19.2 VDC minimum at the power terminals, at a load current of 330 mA.
<b>Fuse</b>	IEC 1.6A fuse, slowblow

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# Environmental limits

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			°F	°C
<b>Ambient temperature limits</b>	Model 1700/2700 <sup>(1)(2)</sup>	Operating	−40 to +140	−40 to +60
		Storage	−40 to +140	−40 to +60
	Model 1500/2500 <sup>(3)</sup>	Operating	−40 to +131	−40 to +55
		Storage	−40 to +185	−40 to +85
<b>Humidity limits</b>	5 to 95% relative humidity, non-condensing at 140 °F (60 °C)			
<b>Vibration limits</b>	Meets IEC 68.2.6, endurance sweep, 5 to 2000 Hz, 50 sweep cycles at 1.0 g			

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(1) 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.

(2) ATEX and UL approvals require limiting ambient temperature to below 131 °F (55 °C).

(3) If the temperature is above 131 °F (55 °C), and you are mounting multiple transmitters, the transmitters must be at least 8.5 mm apart.

# Environmental effects

<b>EMI effects</b>	Complies with NAMUR NE21 (August 1998 German and May 1999 English). Meets EMC directive 89/336/EEC per EN 50081-2 (August 1993), EN 50082-2 (March 1995), and EN 61326 Industrial.
<b>Ambient temperature effect</b>	On analog outputs $\pm 0.005\%$ of span per °C

## Hazardous area classifications — Model 1700/2700



### UL, CSA, and CSA C-US

Ambient temperature is limited to below 131 °F (55 °C) for UL and CSA compliance.

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.

### ATEX

Ambient temperature is limited to below 131 °F (55 °C) for ATEX compliance.

Analog outputs (with HART/Modbus) and configurable input/output transmitters (output option codes A, B, or C)	All models CE 0575 	II 2G	
		II 2D IP66/IP67 T65 °C	
	Flameproof (when installed with approved cable glands):	With display Without display	EEx d [ib] IIB+H <sub>2</sub> T5 EEx d [ib] IIC T5
	Increased safety (when installed with approved cable glands):	With display Without display	EEx de [ib] IIB+H <sub>2</sub> T5 EEx de [ib] IIC T5
Foundation fieldbus, PROFIBUS-PA, and IS output transmitters (output option codes D, E, and G)	All models CE 0575 	II 2(1)G	
		II 2D IP66/IP67 T65 °C	
	Output codes E and G are FISCO field devices in compliance with TS-60079-27:2002		
	Flameproof (when installed with approved cable glands):	With display Without display	EEx d [ia/ib] IIB+H <sub>2</sub> T5 EEx d [ia/ib] IIC T5
	Increased safety (when installed with approved cable glands):	With display Without display	EEx de [ia/ib] IIB+H <sub>2</sub> T5 EEx de [ia/ib] IIC T5

## Hazardous area classifications — Model 1700/2700 *continued*

### IECEX

Ambient temperature is limited to below 131 °F (55 °C) for IECEx compliance.

HART/Modbus and configurable input/output transmitters (output option codes A, B, or C)	Flameproof when installed with approved cable glands	With display	Ex d [ib] IIB+H <sub>2</sub> T5
		Without display	Ex d [ib] IIC T5
FOUNDATION fieldbus, PROFIBUS-PA, and IS output transmitters (output option codes D, E, and G)	Flameproof when installed with approved cable glands	With display	Ex d [ib] IIB+H <sub>2</sub> T5
		Without display	Ex d [ib] IIC T5

### NEPSI

HART/Modbus and configurable input/output transmitters (output option codes A, B, or C)	Flameproof	With display	Ex d [ib] IIB+H <sub>2</sub> T5
		Without display	Ex d [ib] IIC T5
	Increased safety	With display	Ex de [ib] IIB+H <sub>2</sub> T5
		Without display	Ex de [ib] IIC T5
FOUNDATION fieldbus, PROFIBUS-PA, and IS output transmitters (output option codes D, E, and G)	Output codes E and G are FISCO field devices in compliance with TS-60079-27:2002		
	Flameproof	With display	Ex d [ia/ib] IIB+H <sub>2</sub> T5
		Without display	Ex d [ia/ib] IIC T5
	Increased safety	With display	Ex de [ia/ib] IIB+H <sub>2</sub> T5
		Without display	Ex de [ia/ib] IIC T5


## Hazardous area classifications — Model 1500/2500

### CSA and CSA C-US

Transmitter <sup>(1)</sup>	Class I, Div. 2, Groups A, B, C, and D
Sensor and sensor wiring to transmitter	Class I, Div. 1, Groups C and D or Class II, Div. 1, Groups E, F, and G

### ATEX

Ambient temperature is limited to –40 to +131 °F (–40 to +55 °C) for ATEX compliance.

All models CE 0575  II(2) G [EEx ib] IIB/IIC

(1) The Model 1500/2500 transmitter is a component only and must be installed in a suitable enclosure.

# Series 2000 transmitters with configurable inputs and outputs

## Series 2000 transmitters with configurable I/O functionality

The Series 2000 transmitter with configurable inputs and outputs is designed to increase transmitter flexibility and reduce the number of transmitter variations required in inventory. The table below shows the various configuration options that can be produced with the configurable I/O output option.

## Channel assignments for Series 2000 transmitters with configurable I/O (output option codes B and C)

- When output code B is selected, the transmitter ships with channels assigned to default values.
- When output code C is selected, the transmitter is custom configured prior to shipment.

Channel	Terminals		Configuration options	Default variable assignment	Power
	2700	2500			
A	1 & 2	21 & 22	mA output with Bell 202/HART (only)	Mass flow	Internal
B	3 & 4	23 & 24	mA output (default)	Density	Internal
			Frequency output <sup>(1)</sup>	Mass flow	Internal or external <sup>(2)</sup>
			Discrete output	Fwd/rev flow	Internal or external
C	5 & 6	31 & 32	Frequency output (default) <sup>(1)</sup>	Mass flow	Internal or external
			Discrete output	Flow switch	Internal or external
			Discrete input	None	Internal or external

(1) If channels B and C are both configured as a frequency output (dual pulse), both outputs are generated from the same signal. The outputs are electrically isolated but not independent.

(2) The user must supply power when a channel is set to external power.

# Model 2700 transmitter with FOUNDATION fieldbus

## Fieldbus software functionality

Model 2700 FOUNDATION fieldbus software is designed to permit remote testing and configuration of the transmitter using the DeltaV™ Fieldbus Configuration Tool, or other FOUNDATION fieldbus compliant hosts. 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.

Two new optional transducer blocks have been added.

- Petroleum measurement calculations using API MPMS Chapter 11.1. Provides measurement of Base Density, CTL, Gross volume at standard temperature, Flow weighted average temperature and flow weighted average density.
- Enhanced Density calculations for a number of applications, including:
  - %HFCS, °Brix, °Plato, °Balling; °Baumé at
  - SG60/60
  - Density at reference temperature
  - Specific gravity
  - Concentration derived from reference density
  - Concentration derived from specific gravity

## Resource block

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

## Analog input function blocks

The Analog Input (AI) function block processes the measurement from the Coriolis sensor and makes it available to other function blocks. It also allows filtering, alarm handling, and engineering unit changes. Each of the four Model 2700 AI blocks can be assigned to one variable from the five available: mass flow, volume flow, density, temperature, and drive gain.

## Analog output

The AO function block assigns an output value to a field device through a specified channel. The block supports mode control, signal status calculation, and simulation. The one Series 2000 AO block processes pressure from a pressure transmitter for pressure compensation.

## Proportional integral derivative

The optional proportional integral derivative (PID) function block combines all the necessary logic to perform proportional/integral/derivative control. The block supports mode control, signal scaling and limiting, feed forward control, override tracking, alarm limit detection, and signal status propagation.

## 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

Model 2700 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.

The Model 2700 also supports meter fingerprinting, which allows you to capture device-level snapshots of your meter performance.



# Liquid flow performance

	Sensor model	
<b>Mass flow accuracy</b> <sup>(1)(2)</sup>	ELITE®	±0.05% of rate
	F-Series	±0.10% of rate
	H-Series	±0.10% of rate
	T-Series	±0.15% of rate
	R-Series	±0.50% of rate
<b>Volume flow accuracy</b> <sup>(1)(2)</sup>	ELITE	±0.05% of rate
	F-Series	±0.15% of rate
	H-Series	±0.15% of rate
	T-Series	±0.25% of rate
	R-Series	±0.50% of rate
<b>Repeatability</b> <sup>(2)</sup>	ELITE	±0.025% of rate
	F-Series	±0.05% of rate
	H-Series	±0.05% of rate
	T-Series	±0.05% of rate
	R-Series	±0.25% of rate

(1) Stated flow accuracy includes the combined effects of repeatability, linearity, and hysteresis.

(2) For the details of flow accuracy and repeatability specifications, refer to the product data sheet for each sensor family.

# Density performance (liquid only)

	Sensor model	g/cm <sup>3</sup>	kg/m <sup>3</sup>
<b>Accuracy</b> <sup>(1)</sup>	ELITE	±0.0002	±0.2
	F-Series	±0.002	±2.0
	H-Series	±0.002	±2.0
	T-Series	±0.002	±2.0
	R-Series	Not rated for density	
<b>Repeatability</b> <sup>(1)</sup>	ELITE	±0.0001	±0.1
	F-Series	±0.001	±1.0
	H-Series	±0.001	±1.0
	T-Series	±0.0005	±0.5
	R-Series	Not rated for density	

(1) For the details of the density accuracy and repeatability specifications, refer to the product data sheet for each sensor family.

## Gas flow performance

	Sensor model	
<b>Accuracy</b>	ELITE®	±0.35% of rate
	T-Series	—
	F-Series	±0.50% of rate
	H-Series	±0.50% of rate
	R-Series	±0.75% of rate
<b>Repeatability</b>	ELITE	±0.20% of rate
	T-Series	—
	F-Series	±0.25% of rate
	H-Series	±0.25% of rate
	R-Series	±0.5% of rate

## Model 1700/2700 physical specifications

<b>Housing</b>	NEMA 4X (IP66) polyurethane-painted cast aluminum		
<b>Weight<sup>(1)</sup></b>	4-wire remote transmitter	With display	8 lb (3.6 kg)
		Without display	7 lb (3.2 kg)
	9-wire remote transmitter	With display	14 lb (6.3 kg)
		Without display	13 lb (5.9 kg)
<b>Terminal compartments</b>	Output terminals are physically separated from the power- and service-port terminals.		
<b>Cable gland entrances</b>	1/2"–14 NPT or M20 × 1.5 female conduit ports for outputs and power supply 3/4"–14 NPT female conduit port for sensor/core processor cable		
<b>Mounting</b>	Available integrally mounted to Micro Motion T-Series, R-Series, F-Series, and H-Series sensors		
	May be remotely connected to any Micro Motion sensor		
	Remote-mount transmitters include a mounting bracket. Hardware for installing the transmitter on the mounting bracket is included.		
	Transmitter can be rotated on the sensor or the mounting bracket, 360 degrees, in 90-degree increments		

(1) For weight of integrally mounted transmitter and sensor, refer to sensor product data sheet.

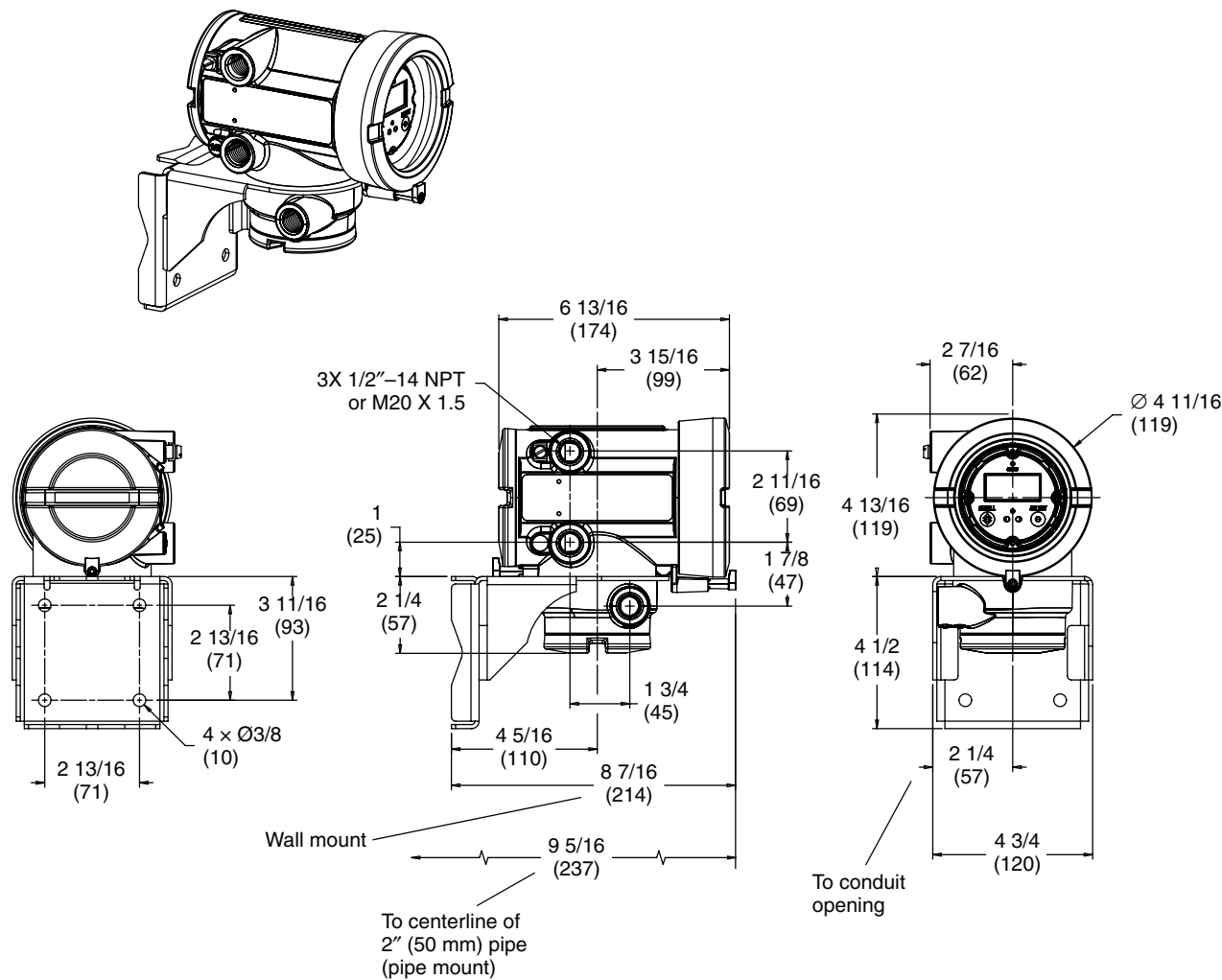
## Model 1700/2700 physical specifications *continued*

	Cable type	Wire gauge	Maximum length
Maximum cable lengths between sensor and transmitter	Micro Motion 9-wire	Not applicable	60 feet (20 meters)
	Micro Motion 4-wire	Not applicable	1000 feet (300 meters)
	User-supplied 4-wire:		
	• Power wires (VDC)	22 AWG (0.34 mm <sup>2</sup> )	300 feet (90 meters)
		20 AWG (0.5 mm <sup>2</sup> )	500 feet (150 meters)
18 AWG (0.8 mm <sup>2</sup> )		1000 feet (300 meters)	
• Signal wires (RS-485)	22 AWG (0.34 mm <sup>2</sup> ) or larger	1000 feet (300 meters)	
Interface/display	<p>Segmented 2-line display with LCD screen with optical controls and flowmeter-status LED is standard. Suitable for hazardous area installation.</p> <p>Available in both backlit and non-backlit versions</p> <p>To facilitate various mounting orientations, the display can be rotated on transmitter, 360 degrees, in 90-degree increments.</p> <p>LCD line 1 lists the process variable. LCD line 2 lists engineering unit of measure.</p> <p>Non-glare tempered glass lens.</p> <p>Display supports English, French, German, and Spanish languages.</p> <p>Display controls feature optical switches that are operated through the glass with a red LED for visual feedback to confirm when a “button” is pressed.</p>		
Display functions	Operational	View process variables; start, stop, and reset totalizers; view and acknowledge alarms.	
	Off-line	Zero flowmeter, meter verification, simulate outputs, change measurement units, configure outputs, and set RS-485 communications options.	
	Status LED	Three-color LED status light on display panel indicates flowmeter condition at a glance.	

# Model 1700/2700 physical specifications *continued*

## Dimensions — Remote-mount transmitter with display

Dimensions in *inches*  
(*mm*)



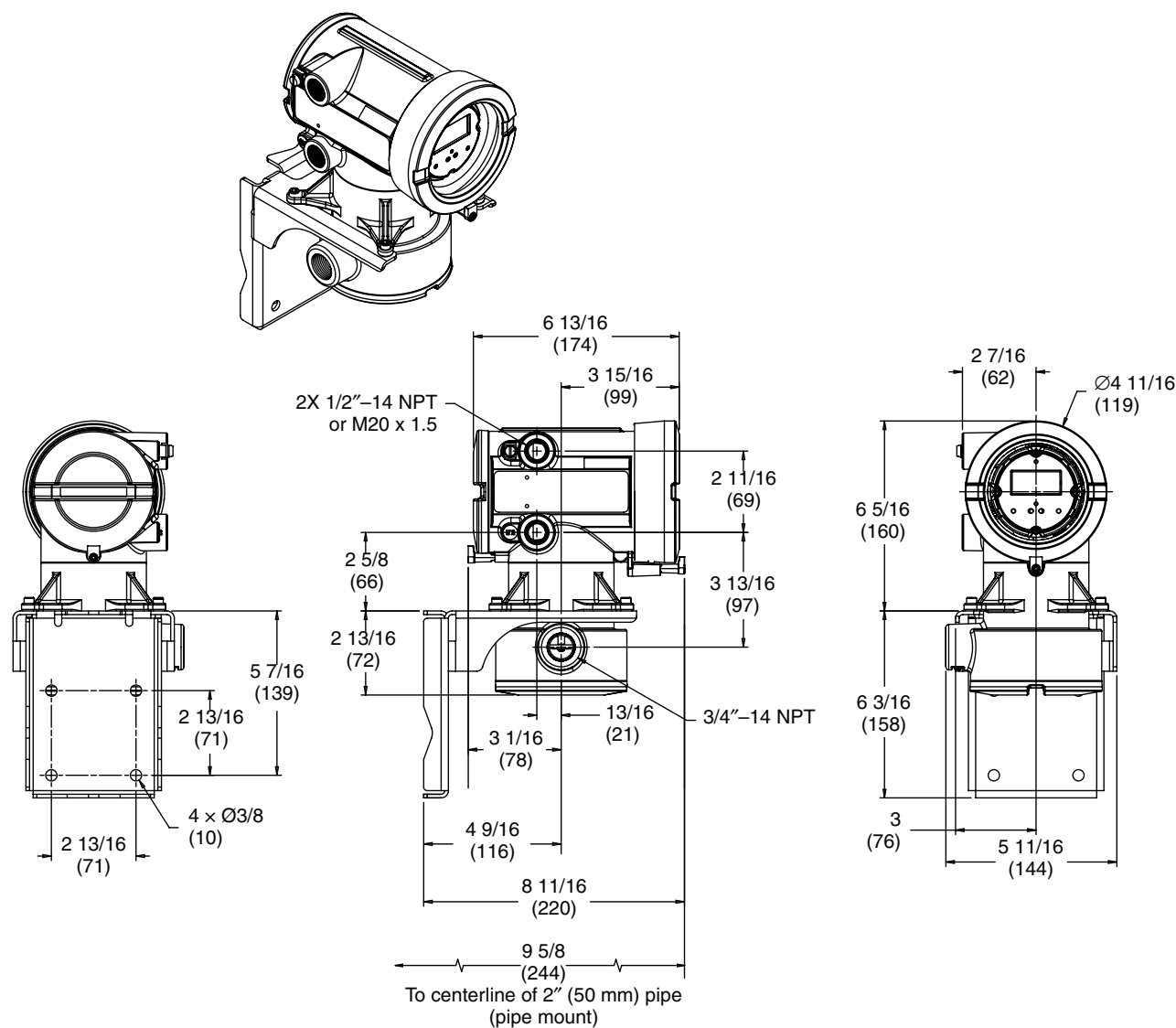
For dimensions of integrally mounted transmitter and sensor, refer to the sensor product data sheet.



# Model 1700/2700 physical specifications *continued*

## Dimensions — Remote-mount transmitter/core processor assembly with display

Dimensions in *inches*  
(mm)

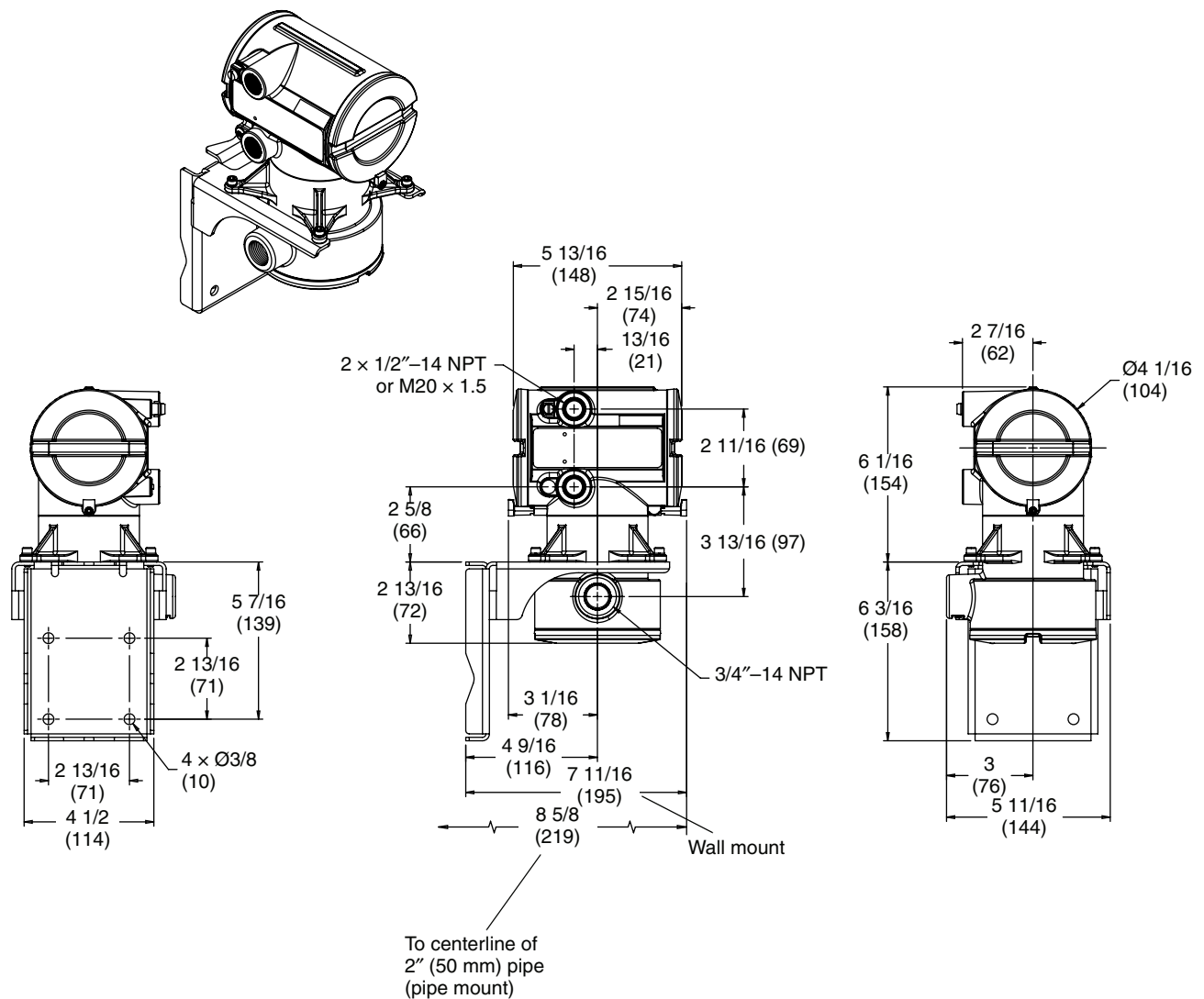


For dimensions of integrally mounted transmitter and sensor, refer to the sensor product data sheet.

# Model 1700/2700 physical specifications *continued*

## Dimensions — Remote-mount transmitter/core processor assembly without display

Dimensions in *inches*  
(*mm*)

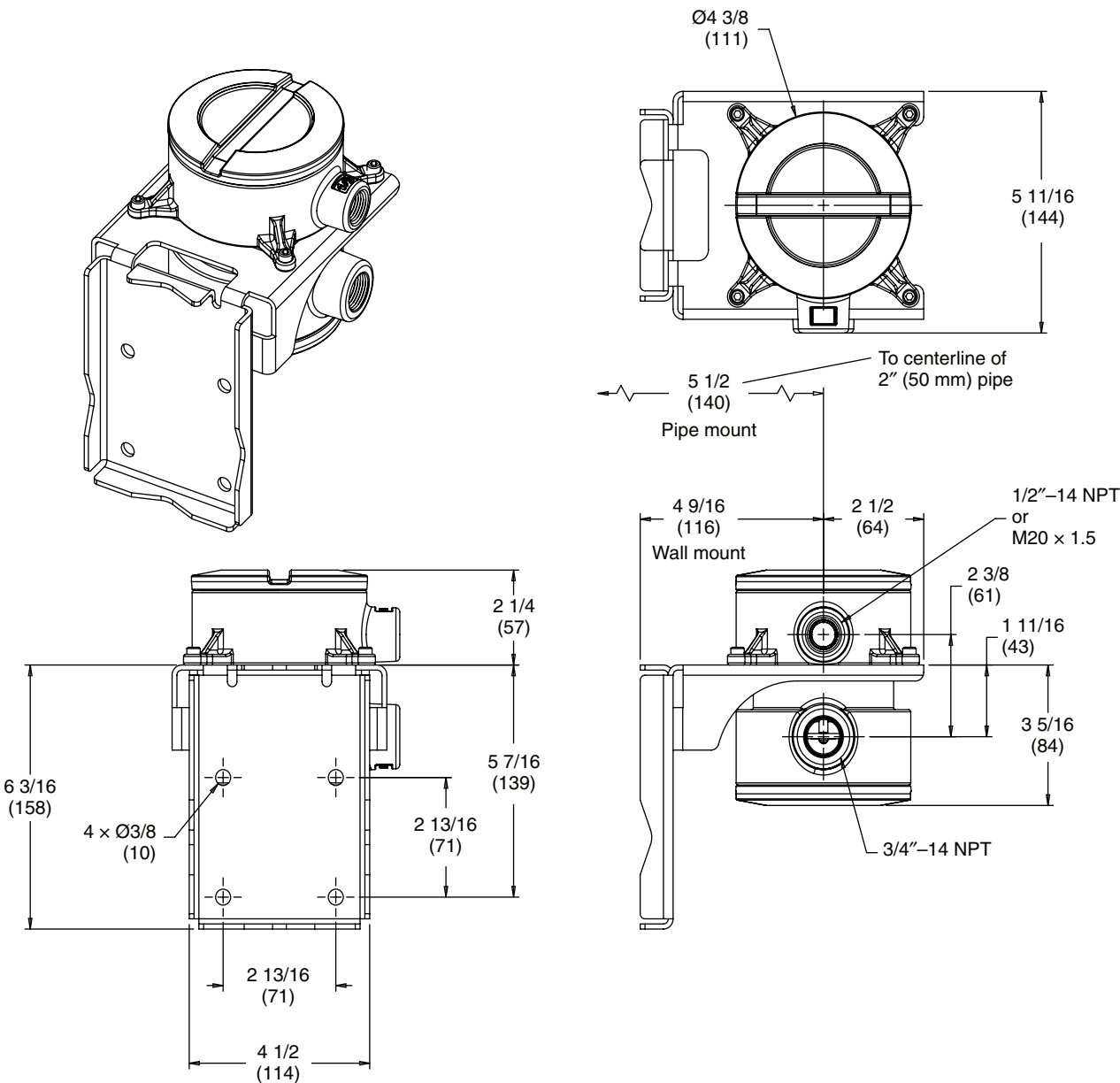


For dimensions of integrally mounted transmitter and sensor, refer to the sensor product data sheet.

# Model 1700/2700 physical specifications *continued*

## Dimensions — Remote core processor

Dimensions in *inches*  
*(mm)*





# Model 1500/2500 physical specifications

**Weight** 0.52 lb (0.24 kg)

**Mounting** Mounted on 35 mm rail  
 Rail must be grounded  
 May be remotely connected to any Micro Motion sensor  
 Requires standard 4-wire twisted, shielded signal cable, up to 1000 feet (300 meters) in length, between the sensor and the transmitter. (If the core processor is remotely mounted from the sensor, the maximum length of the 9-wire signal cable between the sensor and the remote core processor is 60 feet [20 meters].)

	Cable type	Wire gauge	Maximum length
<b>Maximum cable lengths between sensor and transmitter</b>	Micro Motion 9-wire	Not applicable	60 feet (20 meters)
	Micro Motion 4-wire	Not applicable	1000 feet (300 meters)
	User-supplied 4-wire:		
	• Power wires (VDC)	22 AWG (0.34 mm <sup>2</sup> )	300 feet (90 meters)
		20 AWG (0.5 mm <sup>2</sup> )	500 feet (150 meters)
		18 AWG (0.8 mm <sup>2</sup> )	1000 feet (300 meters)
	• Signal wires (RS-485)	22 AWG (0.34 mm <sup>2</sup> ) or larger	1000 feet (300 meters)

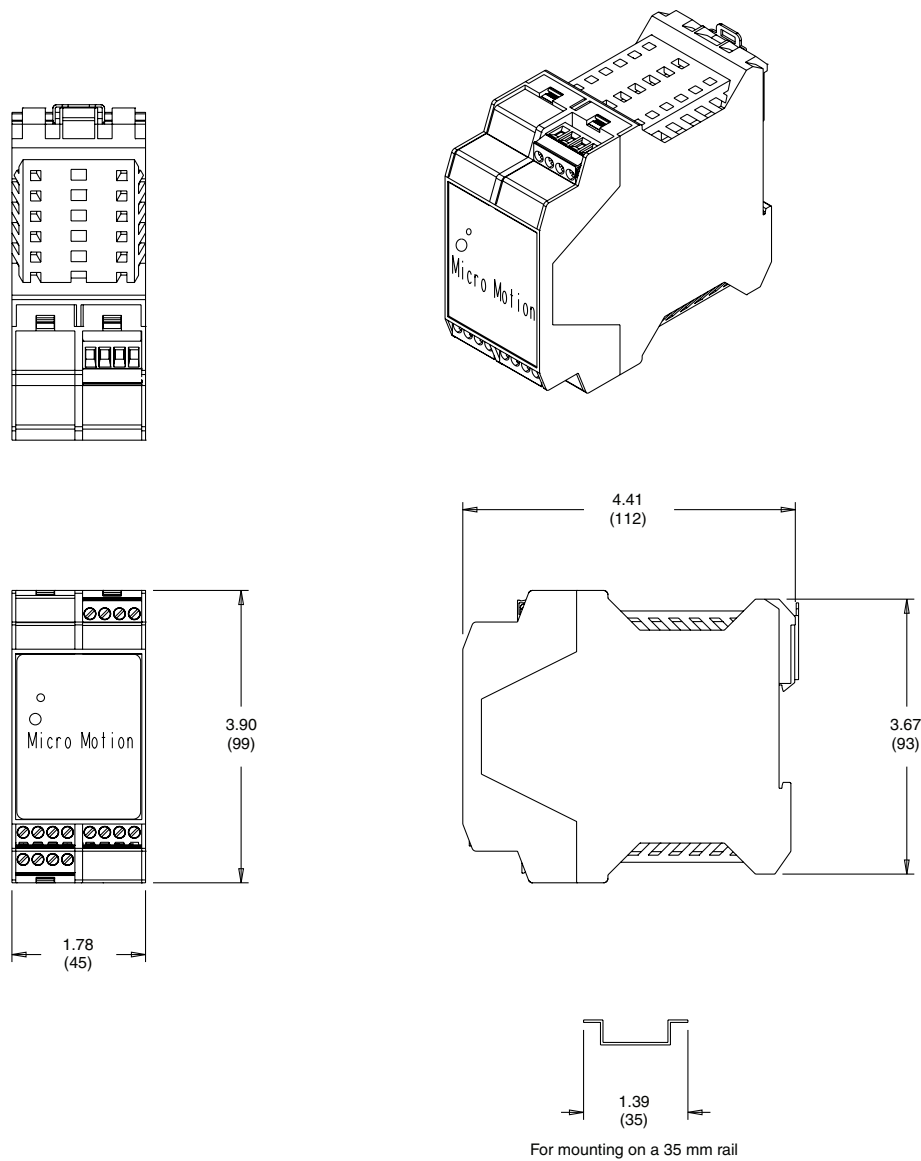
**Status LED** Three-color status LED on face of transmitter indicates flowmeter condition at a glance, using a solid green, yellow, or red light. Zero in progress is indicated by a flashing yellow light.

**Zero button** A zero button on the face of the transmitter can be used to start the transmitter zero procedure.

# Model 1500/2500 physical specifications *continued*

## Dimensions

Dimensions in *inches*  
(*mm*)



# Ordering information — Model 1700

Model	Product description
1700	Micro Motion Coriolis MVD single variable flow transmitter
Code	Mounting
R	4-wire remote mount transmitter
I	Integral mount transmitter
B <sup>(1)</sup>	4-wire remote mount transmitter with 9-wire remote core processor (includes 10 ft. [3 m] CFEPS cable)
C	9-wire remote transmitter (requires sensor with junction box; includes 10 ft. [3 m] CFEPS cable)
Code	Power
1	18 to 100 VDC or 85 to 265 VAC; self switching
Code	Display
1	Dual line display for process variables and totalizer reset
2	Backlit dual line display for process variables and totalizer reset
3	No display
Code	Output options
A	Analog outputs: one mA; one frequency; RS485
D	Intrinsically safe analog outputs: one mA, one frequency
Code	Conduit connections
B	1/2-inch NPT — no gland
C	1/2-inch NPT with brass/nickel cable gland
D	1/2-inch NPT with stainless steel cable gland
E	M20 — no gland
F	M20 with brass/nickel cable gland
G	M20 with stainless steel cable gland
Code	Approvals
M	Micro Motion Standard (no approval)
U	UL
C	CSA (Canada only)
A	CSA C-US (US and Canada)
Z	ATEX — Equipment Category 2 (Zone 1 — Increased safety terminal compartment)
F	ATEX — Equipment Category 2 (Zone 1 — Flameproof terminal compartment)
K <sup>(2)</sup>	NEPSI — Increased safety
P <sup>(2)</sup>	NEPSI — Flameproof
I	IECEx (Zone 1 — Flameproof terminal compartment)
Continued on next page	

(1) Mounting code B is not available with conduit connection code C or D.

(2) Must be combined with language code M.

## Ordering information — Model 1700 *continued*

Code	Language
A	Danish installation manual; English configuration manual
D	Dutch installation manual; English configuration manual
E	English installation manual; English configuration manual
F	French installation manual; French configuration manual
G	German installation manual; German configuration manual
H	Finnish installation manual; English configuration manual
I	Italian installation manual; English configuration manual
J	Japanese installation manual; English configuration manual
M	Chinese installation manual; Chinese configuration manual
N	Norwegian installation manual; English configuration manual
O	Polish installation manual; English configuration manual
P	Portuguese installation manual; English configuration manual
S	Spanish installation manual; Spanish configuration manual
W	Swedish installation manual; English configuration manual
C	Czech installation manual; English configuration manual
B	Hungarian CE requirements document; English installation and configuration manuals
K	Slovak CE requirements document; English installation and configuration manuals
T	Estonian CE requirements document; English installation and configuration manuals
U	Greek CE requirements document; English installation and configuration manuals
L	Latvian CE requirements document; English installation and configuration manuals
V	Lithuanian CE requirements document; English installation and configuration manuals
Y	Slovenian CE requirements document; English installation and configuration manuals
Code	Software options 1
Z	Flow variable (standard)
Code	Software options 2
C <sup>(1)</sup>	Meter verification, structural integrity method
S <sup>(2)</sup>	Safety certification of 4–20 mA output per IEC 61508
Z	No software options 2
Code	Factory options
Z	Standard product
X	ETO product
Typical Model Number: 1700 I 1 1 A D M E Z C Z	

(1) Requires transmitter to be connected to a sensor with an enhanced core processor.

(2) Available only with output codes A and D.

# Ordering information — Model 2700

Model	Product description
2700	Micro Motion Coriolis MVD multivariable flow and density transmitter
Code	Mounting
R	4-wire remote mount transmitter
I	Integral mount transmitter
B <sup>(1)</sup>	4-wire remote mount transmitter with 9-wire remote core processor (includes 10 ft. [3 m] CFEPS cable)
C	9-wire remote transmitter (requires sensor with junction box; includes 10 ft. [3 m] CFEPS cable)
Code	Power
1	18 to 100 VDC or 85 to 265 VAC; self switching
Code	Display
1	Dual line display for process variables and totalizer reset
2	Backlit dual line display for process variables and totalizer reset
3	No display
Code	Output options
A	Analog outputs: one mA; one frequency/discrete; RS485
B	Analog outputs: one mA; two configurable I/O channels — default configuration of 2 mA, 1 FO
C	Analog outputs: one mA; two configurable I/O channels — custom configuration
D	Intrinsically safe analog outputs: two mA, one frequency/discrete
E	FOUNDATION fieldbus H1 with standard function blocks (4 × AI, 1 × AO, 1 × Integrator)
G <sup>(2)</sup>	PROFIBUS-PA
Code	Conduit connections
B	1/2-inch NPT — no gland
C <sup>(1)</sup>	1/2-inch NPT with brass/nickel cable gland
D <sup>(1)</sup>	1/2-inch NPT with stainless steel cable gland
E	M20 — no gland
F	M20 with brass/nickel cable gland
G	M20 with stainless steel cable gland
Code	Approvals
M	Micro Motion Standard (no approval)
U	UL
C	CSA (Canada only)
A	CSA C-US (US and Canada)
Z	ATEX — Equipment Category 2 (Zone 1 — Increased safety terminal compartment)
F	ATEX — Equipment Category 2 (Zone 1 — Flameproof terminal compartment)
K <sup>(3)</sup>	NEPSI — Increased safety
P <sup>(3)</sup>	NEPSI — Flameproof
I	IECEx (Zone 1 — Flameproof terminal compartment)
Continued on next page	

(1) Mounting code B is not compatible with conduit connection codes C or D.

(2) Output option G is not compatible with sensors with an enhanced core processor.

(3) Must be combined with language code M.

## Ordering information — Model 2700 *continued*

Code	Language
A	Danish installation manual; English configuration manual
D	Dutch installation manual; English configuration manual
E	English installation manual; English configuration manual
F	French installation manual; French configuration manual
G	German installation manual; German configuration manual
H	Finnish installation manual; English configuration manual
I	Italian installation manual; English configuration manual
J	Japanese installation manual; English configuration manual
M	Chinese installation manual; Chinese configuration manual
N	Norwegian installation manual; English configuration manual
O	Polish installation manual; English configuration manual
P	Portuguese installation manual; English configuration manual
S	Spanish installation manual; Spanish configuration manual
W	Swedish installation manual; English configuration manual
C	Czech installation manual; English configuration manual
B	Hungarian CE requirements document; English installation and configuration manuals
K	Slovak CE requirements document; English installation and configuration manuals
T	Estonian CE requirements document; English installation and configuration manuals
U	Greek CE requirements document; English installation and configuration manuals
L	Latvian CE requirements document; English installation and configuration manuals
V	Lithuanian CE requirements document; English installation and configuration manuals
Y	Slovenian CE requirements document; English installation and configuration manuals
Code	Software options 1
Z	Flow & density variables (standard)
G <sup>(1)</sup>	Enhanced density measurement
A <sup>(1)</sup>	Petroleum measurement
X	ETO software option 1
Code	Software options 2
Z	No software options 2
C <sup>(2)</sup>	Meter verification, structural integrity method
W <sup>(3)</sup>	Weights and measures custody transfer
A <sup>(4)</sup>	Regulatory control suite: standard fieldbus function blocks plus 1 × PID function block
S <sup>(5)</sup>	Safety certification of 4–20 mA output per IEC 61508
X	ETO software option 2
Code	Factory options
Z	Standard product
X	ETO product
Typical Model Number: 2700 I 1 1 A D M E Z C Z	

(1) Not available with output option code G.

(2) Requires transmitter to be connected to a sensor with an enhanced core processor.

(3) Available only with output option codes A, B, or C.

(4) Available only with output option code E.

(5) Available only with output option codes A, B, C, or D.

## Ordering information — Model 1500

Model	Product description
1500	Micro Motion Coriolis MVD single variable flow transmitter
Code	Mounting
D	4-wire remote 35 mm DIN rail transmitter
B	4-wire remote 35 mm DIN rail transmitter with 9-wire remote core processor (includes 10 ft. [3 m] CFEPS cable)
Code	Power
3	19.2 to 28.8 VDC
Code	Conduit connections
A	None (for use with mounting option code D)
B <sup>(1)</sup>	1/2-inch NPT remote core processor — no gland
E <sup>(1)</sup>	M20 remote core processor — no gland
F <sup>(1)</sup>	Remote core processor — brass nickel cable gland
G <sup>(1)</sup>	Remote core processor — stainless steel cable gland
Code	Output options
A	One mA; one frequency; RS-485
Code	Terminals
B	Screw terminals
Code	Approvals
M	Micro Motion Standard (no approval)
C	CSA (Canada only)
A	CSA C-US (US and Canada)
B	ATEX — Safe area with intrinsically safe sensor outputs
P <sup>(2)</sup>	NEPSI — Safe area
Continued on next page	

(1) Available with mounting option code B only.

(2) Must be combined with language code M.

## Ordering information — Model 1500 *continued*

Code	Language
A	Danish installation manual; English configuration manual
D	Dutch installation manual; English configuration manual
E	English installation manual; English configuration manual
F	French installation manual; French configuration manual
G	German installation manual; German configuration manual
H	Finnish installation manual; English configuration manual
I	Italian installation manual; English configuration manual
J	Japanese installation manual; English configuration manual
M	Chinese installation manual; Chinese configuration manual
N	Norwegian installation manual; English configuration manual
O	Polish installation manual; English configuration manual
P	Portuguese installation manual; English configuration manual
S	Spanish installation manual; Spanish configuration manual
W	Swedish installation manual; English configuration manual
C	Czech installation manual; English configuration manual
B	Hungarian CE requirements document; English installation and configuration manuals
K	Slovak CE requirements document; English installation and configuration manuals
T	Estonian CE requirements document; English installation and configuration manuals
U	Greek CE requirements document; English installation and configuration manuals
L	Latvian CE requirements document; English installation and configuration manuals
V	Lithuanian CE requirements document; English installation and configuration manuals
Y	Slovenian CE requirements document; English installation and configuration manuals
Code	Software options 1
Z	Flow variable (standard)
X	ETO software option 1
Code	Software options 2
Z	No software option 2
C <sup>(1)</sup>	Meter verification, structural integrity method
X	ETO software option 2
Code	Factory options
Z	Standard product
X	ETO product
<b>Typical Model Number: 1500 D 3 A A B M E Z C Z</b>	

(1) Requires transmitter to be connected to a sensor with an enhanced core processor.



## Ordering information — Model 2500

Model	Product description
2500	Micro Motion Coriolis MVD multivariable flow and density transmitter
Code	Mounting
D	4-wire remote 35 mm DIN rail transmitter
B	4-wire remote 35 mm DIN rail transmitter with 9-wire remote core processor (includes 10 ft. [3 m] CFEPS cable)
Code	Power
3	19.2 to 28.8 VDC
Code	Conduit connections
A	None (for use with mounting option code D)
B <sup>(1)</sup>	1/2-inch NPT remote core processor — no gland
E <sup>(1)</sup>	M20 remote core processor — no gland
F <sup>(1)</sup>	Remote core processor — brass nickel cable gland
G <sup>(1)</sup>	Remote core processor — stainless steel cable gland
Code	Output options
B	One mA; two configurable I/O channels; RS485 — default configuration of 2 mA, 1 FO
C	One mA; two configurable I/O channels; RS485 — custom configuration
Code	Terminals
B	Screw terminals
Code	Approvals
M	Micro Motion Standard (no approval)
C	CSA (Canada only)
A	CSA C-US (US and Canada)
B	ATEX — Safe area with intrinsically safe sensor outputs
P <sup>(2)</sup>	NEPSI — Safe area
Continued on next page	

(1) Available with mounting option code B only.

(2) Must be combined with language code M.

## Ordering options — Model 2500 *continued*

Code	Language
A	Danish installation manual; English configuration manual
D	Dutch installation manual; English configuration manual
E	English installation manual; English configuration manual
F	French installation manual; French configuration manual
G	German installation manual; German configuration manual
H	Finnish installation manual; English configuration manual
I	Italian installation manual; English configuration manual
J	Japanese installation manual; English configuration manual
M	Chinese installation manual; Chinese configuration manual
N	Norwegian installation manual; English configuration manual
O	Polish installation manual; English configuration manual
P	Portuguese installation manual; English configuration manual
S	Spanish installation manual; Spanish configuration manual
W	Swedish installation manual; English configuration manual
C	Czech installation manual; English configuration manual
B	Hungarian CE requirements document; English installation and configuration manuals
K	Slovak CE requirements document; English installation and configuration manuals
T	Estonian CE requirements document; English installation and configuration manuals
U	Greek CE requirements document; English installation and configuration manuals
L	Latvian CE requirements document; English installation and configuration manuals
V	Lithuanian CE requirements document; English installation and configuration manuals
Y	Slovenian CE requirements document; English installation and configuration manuals
Code	Software options 1
Z	Flow and density variables (standard)
A	Petroleum measurement
Code	Software options 2
Z	No software options 2
C <sup>(1)</sup>	Meter verification, structural integrity method
W	Weights and measures custody transfer (requires external sealing for approval)
Code	Factory options
Z	Standard product
X	ETO product
<b>Typical Model Number: 2500 D 3 3 B B M E Z C Z</b>	

(1) Requires transmitter to be connected to a sensor with an enhanced core processor.



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