

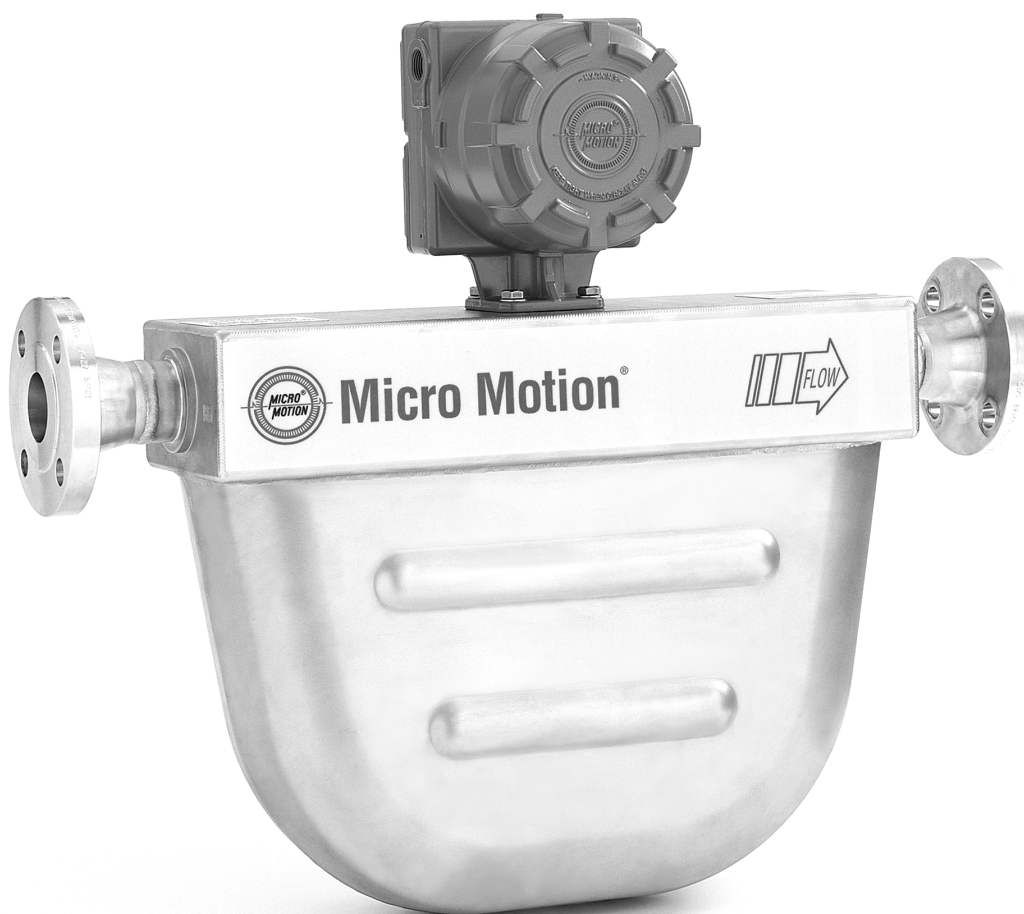
Product Data Sheet

PS-00217, Rev. A

August 2003

Micro Motion®

IFT9701 Mass and Volume Flow Transmitter



Micro Motion® IFT9701 mass and volume flow transmitter

Affordable, precise mass and volume flow measurement

The Micro Motion® IFT9701 microprocessor-based transmitter works with Micro Motion sensors to provide affordable, precise mass and volume flow measurement in a wide variety of fluid applications. The IFT9701 simultaneously transmits flow rate signal by means of an internally powered (active) milliamp output and an externally powered (passive) pulse output. The IFT9701 can communicate digitally using HART® protocol and the Bell 202 serial standard. For configuration in the field, use Micro Motion ProLink® II software, Emerson Process Management AMS software, or an Emerson Process Management Model 275 or 375 HART Communicator.

Mounting to sensor

To simplify and reduce the cost of flowmeter installation, the IFT9701 can be integrally mounted to any Micro Motion F-Series sensor. With optional remote mount hardware, the IFT9701 can be installed up to 1000 feet (300 meters) from a Micro Motion F-Series sensor, ELITE® sensor, standard or high-pressure Model D sensor, or Model DL sanitary sensor.

Weathertight housing and optional display

The IFT9701 is housed in a NEMA 4X (IP65) weathertight enclosure, and is available with an optional display.



Mass flow accuracy

Sensor model	Phase	Accuracy ⁽¹⁾
ELITE ⁽²⁾	liquid	$\pm 0.10\% \pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
	gas	$\pm 0.50\% \pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
F-Series	liquid	$\pm 0.20\% \pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
	gas	$\pm 0.70\% \pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
D (except DH38 and D600) and DL ⁽³⁾	liquid	$\pm 0.15\% \pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
	gas	$\pm 0.65\% \pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
DH38	liquid	$\pm 0.15\% \pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
	gas	$\pm 0.50\% \pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$

(1) Flow accuracy includes the combined effects of repeatability, linearity, and hysteresis. All specifications for liquids 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.

(2) For ELITE sensors with IFT9701 transmitters, specified accuracy applies to nominal flow range only.

(3) IFT9701 transmitters cannot be used with Model D600 or Model DT sensors.

Mass flow repeatability

Sensor model	Phase	Repeatability ⁽¹⁾
ELITE	liquid	$\pm 0.05\% \pm \left[\frac{1}{2} \left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
	gas	$\pm 0.25\% \pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
F-Series	liquid	$\pm 0.10\% \pm \left[\frac{1}{2} \left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
	gas	$\pm 0.35\% \pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
D (except DH38 and D600) and DL ⁽²⁾	liquid	$\pm 0.05\% \pm \left[\frac{1}{2} \left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
	gas	$\pm 0.30\% \pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
DH38	liquid	$\pm 0.05\% \pm \left[\frac{1}{2} \left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
	gas	$\pm 0.25\% \pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$

(1) All specifications for liquids 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.

(2) IFT9701 transmitters cannot be used with Model D600 or Model DT sensors.

Density performance

Sensor model	Phase	Accuracy		Repeatability	
		g/cc	kg/m ³	g/cc	kg/m ³
ELITE (except high-pressure CMF010P)	liquid	±0.002	±2.0	±0.001	±1.0
	gas	±0.02	±20.0	±0.01	±10.0
ELITE high-pressure CMF010P	liquid	±0.008	±8.0	±0.004	±4.0
	gas	±0.08	±80.0	±0.04	±40.0
F-Series	liquid only	±0.002	±2.0	±0.001	±1.0
D (except D600), DL, DH100, DH150, DH300 ⁽¹⁾	liquid only	±0.002	±2.0	±0.001	±1.0
DH6, DH12, DH38	liquid only	±0.004	±4.0	±0.002	±2.0
Density limits for volume flow		0.2 to 2.0 g/cc (200 to 2000 kg/m ³)			

(1) The IFT9701 cannot be used with Model D600 or Model DT sensors.

Temperature accuracy and repeatability

Sensor model	Temperature accuracy	Temperature repeatability
All models except D600 or DT	±1 °C ± 0.5% of reading in °C	±0.02 °C

Output signals

Analog (active)

One 4–20 mA output can represent the same mass or volume flow-rate variable as the pulse output.

- Internally powered (active)
- Galvanically isolated to ± 500 VDC from ground
- 600 ohm load limit
- Out-of-range capability: 3.8 or 20.5 mA

Milliamp (mA) output rangeability:

- Maximum span determined by sensor specifications
- Range limit determined by sensor maximum flow rate
- Minimum recommended span (% of nominal flow range):

ELITE sensors	2.5%
F-Series sensors	10%
D and DL sensors	10%

Pulse (passive)

One pulse output can represent the same mass or volume flow-rate variable as the analog output.

- Externally powered (passive); Model 3300 or 3350 peripheral device can serve as external power source
- Requires pull-up resistor to 5–30 VDC power supply
- Minimum resistance is 500 ohm at 5 V, 3 kohm at 30 V
- Galvanically isolated to ± 500 VDC
- Out-of-range capability to 7200 Hz
- Voltage in on state is less than 1 V
- Below 1 Hz, the pulse width will be 500 ms; at all pulse frequencies between 1 Hz and 7200 Hz, the pulse width is half the pulse period

Digital

HART protocol-compatible Bell 202 digital signal is superimposed on 4–20 mA analog signal and available for host system interface.

- Frequency 1.2 and 2.2 kHz
- Amplitude 0.5 mA peak-to-peak
- 1200 baud
- Requires 250 to 600 ohm load resistance

Low-flow cutoff

Flow rate below cutoff causes outputs to default to level that indicates zero flow.

Slug-flow inhibit

When transmitter senses density outside user-selected limits, outputs default to levels indicating zero flow.

Damping

Wide range of programmed filter time constants for damping on flow.

Fault indication

User-selected downscale (2 mA, 0 Hz) or upscale (22 mA, 7200 Hz) output levels indicate a fault condition.

Output testing

Current source: Can output a specified current between 2 and 22 mA.
Frequency source: Can output a specified frequency between 0.01 and 1200 Hz.

Display (optional)

5-digit, alphanumeric, liquid crystal display (LCD) installed on the field-wiring compartment cover. The LCD shows flow rate, and indicates slug flow, flowmeter zeroing in progress, and electronic faults.

Power supply options

85 to 250 VAC

- 45 to 65 Hz, 9 watts maximum power dissipation
- 20 VA maximum apparent line power
- Fused at 250 V/0.4 A IEC delayed, nonreplaceable
- Meets low-voltage directive 73/23/EEC

20 to 30 VDC

- 6 watts typical, 14 watts maximum
- Fused at 60 V/1.8 A trip
- Minimum startup voltage is 16 V at transmitter terminals
- Maximum total resistance for wiring is 13 ohms
- At startup, transmitter power source must provide a minimum of 0.7 amp of short-term current

Temperature limits

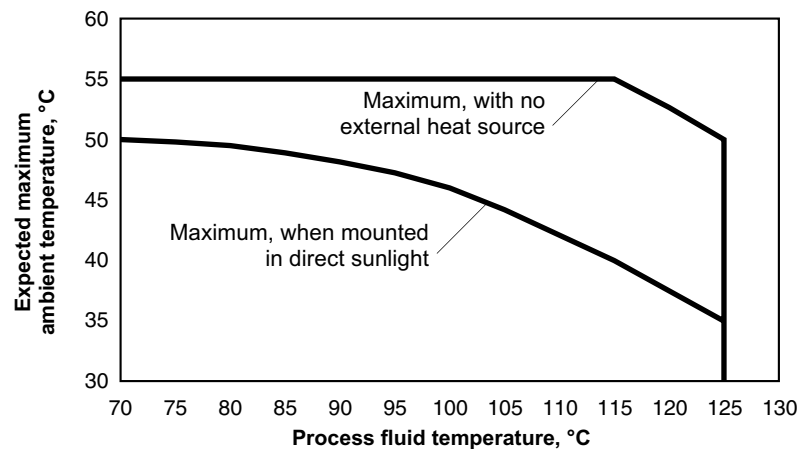
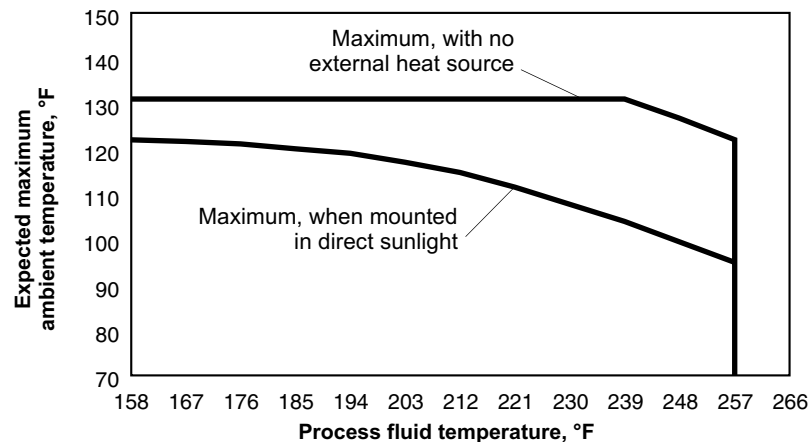
At their upper limits, process fluid temperature and ambient temperature restrict each other. The graphs on page 8 define the maximum recommended process fluid temperature based on maximum expected ambient temperature.

				°F	°C
Process fluid temperature		Transmitter integrally mounted to sensor	See graphs on page 8	–40 to +257	–40 to +125
		Transmitter remotely mounted from sensor	Refer to temperature limits for sensor		
Ambient temperature	Operating	Transmitter integrally mounted to sensor	See graphs on page 8		
		Transmitter remotely mounted from sensor	Without display With display	–22 to +131 +32 to +131	–30 to +55 0 to +55
	Storage	Without display With display	Without display With display	–40 to +185 –4 to +158	–40 to +85 –20 to +70
			With or without display	+131 maximum	+55 maximum
	UL, CSA	With or without display	With or without display	–40 to +131	–40 to +55
	ATEX	With or without display	With or without display	–40 to +131	–40 to +55

Temperature limits *continued*

Process fluid vs. ambient temperature

At their upper limits, process fluid temperature and ambient temperature restrict each other. The graphs below define the maximum recommended process fluid temperature based on maximum expected ambient temperature.



Environmental limits and effects

Humidity limits	5 to 95% non-condensing
Vibration limits	Meets IEC 68.2.6, 2 g, endurance sweep, 10 to 2000 Hz, 50 sweep cycles
Environmental effects	<p>Transmitters meet the requirements of the EMC directive 89/336/EEC per EN 50081-2 (January 1992) and EN 50082-2 (March 1995) when operated at nominal rated flow measurement range. For specific EMC effects within the EC, the Technical EMC file may be reviewed at Micro Motion Veenendaal</p> <p>All IFT9701 transmitters meet the requirements of SAMA PMC 33.1 (October 1978), Class 2, A, B, C (1% span) at nominal flow rate. All IFT9701 transmitters meet the recommendations of ANSI/IEEE C62.41 (1991) for surge and EFT</p> <p>To meet the above specifications, the transmitter must be installed with an approved Micro Motion sensor, and the sensor cable must be doubly shielded with full-contact glands, or installed in continuous, fully bonded metallic conduit. The transmitter and sensor must be directly connected to a low-impedance (less than 1 ohm) earth ground. Transmitter outputs must be standard twisted-pair, shielded instrument wire</p>
Ambient temperature effect on milliamp output	±0.005% of flow rate per °C deviation from output trim temperature

Hazardous area classifications

UL is a U.S.A. approvals agency. CSA is a Canadian approvals agency that provides approvals accepted both in the U.S.A. and in Canada. ATEX is a European directive.

For approvals that apply to an individual transmitter, see the hazardous area approvals tag attached to the transmitter.

UL and CSA	Class I, Div. 2, Groups A, B, C, and D			
UL nonincendive parameters for outputs	Parameter	Active 4-20 mA output	Parameter	Passive pulse output
	V_{OC}	20 V	V_{max}	20 V
	I_{SC}	5 mA	I_{max}	5 mA
	C_a	0.75 μ f	C_i	0
	L_a	100 mH	L_i	0
ATEX	When ordered for installation in a Zone 1 (hazardous) area, EEx de [ib] IIB/IIC T6. Otherwise [EEx ib] IIB/IIC			

Physical specifications

Shipping weight 12.5 lb (5.7 kg)

Housing NEMA 4X (IP65) epoxy polyester painted cast aluminum.

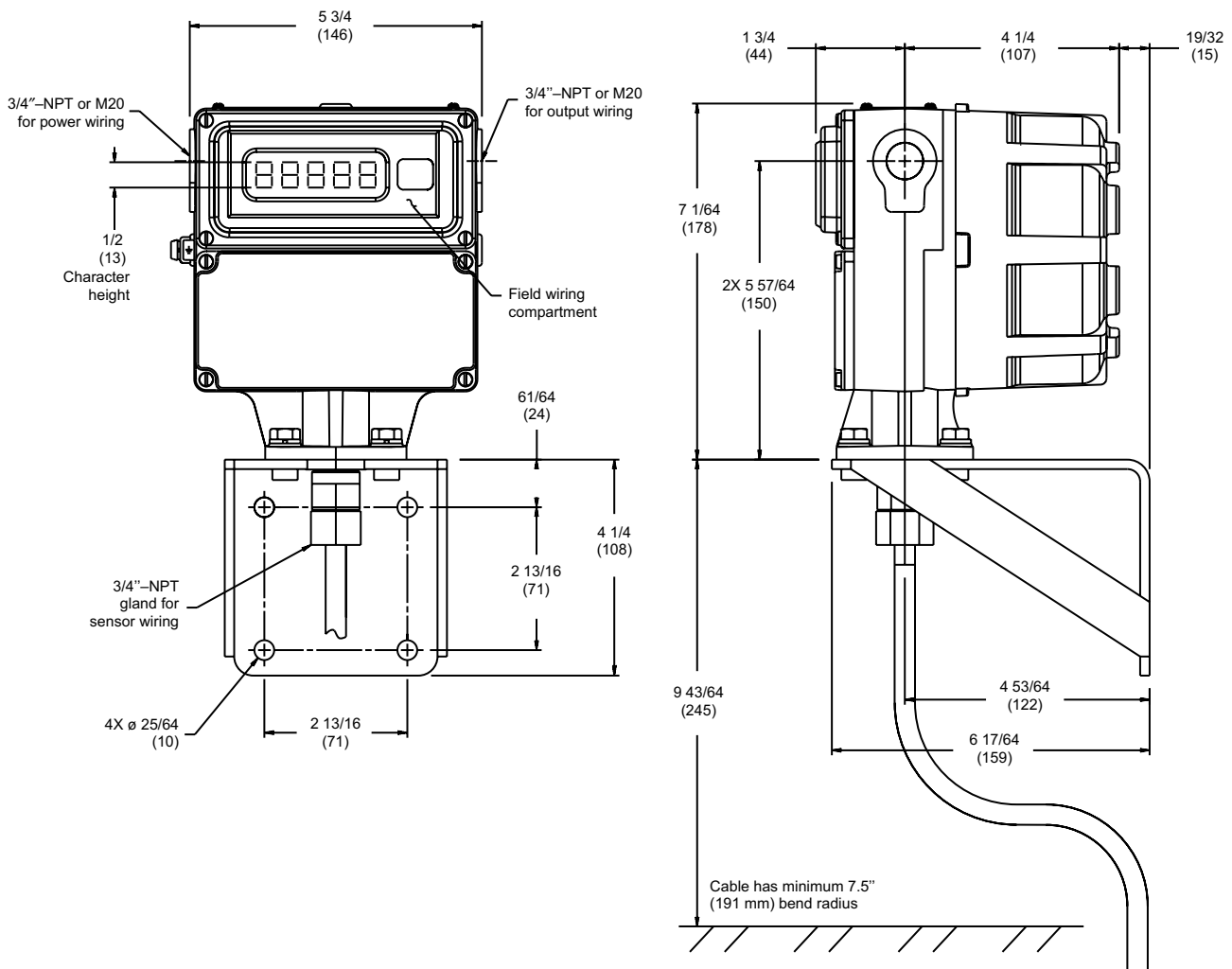
Two 3/4 – 14 NPT or M20 female conduit ports for power and output signal wiring. Remotely mounted transmitter has one additional 3/4 – 14 NPT female conduit for sensor cable.

Electrical connections Fixed screw terminals for all wiring connections. Screw terminal on housing for chassis ground.

Dimensions

Dimensions in inches (mm)

Dimensions are for a remotely mounted transmitter. For dimensions of an IFT9701 transmitter integrally mounted to an F-Series sensor, see the F-Series Sensor Product Data Sheet.



IFT9701 model number matrix

Code	Model number
IFT9701	IFT9701 single variable flow transmitter, remote/integral mount
Code	Mounting options
I	Integral mount
R	Remote mount, 16.4 ft (5 m) copper-shielded sensor cable, insulated with Teflon® coating
L	Remote mount, 49.2 ft (15 m) copper-shielded sensor cable, insulated with Teflon coating
J	Remote mount, hardware only — sensor cable must be ordered separately
S ⁽¹⁾	Remote mount, hardware with glands for shielded cable — sensor cable must be ordered separately
A ⁽¹⁾	Remote mount, hardware with glands for armored cable — sensor cable must be ordered separately
Code	Power-supply options
6	85 to 250 VAC
3	20 to 30 VDC
Code	Display options
N	No display
D ⁽²⁾	Display
Code	Conduit connections
1	20 mm (M20) conduit ports, no cable glands
2	20 mm (M20) conduit ports, with two nickel-plated brass cable glands approved for EExe (increased safety) installations
3	3/4-inch NPT conduit ports, no cable glands
Code	Approvals
M	Micro Motion standard (no approvals)
U ⁽³⁾	UL
C ⁽³⁾	CSA
Y	ATEX safe area
W	ATEX Zone 1
Code	Language
A	Danish quick reference and English manual
D	Dutch quick reference and English manual
E	English quick reference and English manual
F	French quick reference and French manual
G	German quick reference and German manual
H	Finnish quick reference and English manual
I	Italian quick reference and English manual
N	Norwegian quick reference and English manual
P	Portuguese quick reference and English manual
S	Spanish quick reference and Spanish manual
W	Swedish quick reference and English manual
Code	Factory options
Z	Standard product
X	CEQ (Custom Engineering Quotation) product
R	Restocked product (if available)
Typical Model Number: IFT9701 I 6 N 3 U E Z	

(1) Not available with approval code U.

(2) Not available on ATEX Zone 1 version (approval code W).

(3) Available with conduit connection code 3 only.

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