

Product Data Sheet

PS-00397, Rev. A

October 2003

Model DL

Mass Flow and Density Sensors



Micro Motion® Model DL sensors

Micro Motion® Model DL sensors are designed to meet 3-A Sanitary Standards for Milk and Milk products, and are USDA-accepted.

Model DL sensors feature a single, continuous 316L stainless steel flow tube, a design that makes the sensor self-draining, and allows it to be cleaned in place and withstand sterilization. The single flow path also resists plugging, and can be pigged.

Three sizes of Model DL sensors offer direct mass flow, volume flow, density, and temperature measurement of liquids and slurries — all in real time, without the need for additional equipment, manual calculations or estimations.

Model DL sensors have no moving parts, and no special mounting or flow conditioning requirements. Additionally, Model DL sensors require no maintenance — saving you money over the course of their lifetime.

A hermetically sealed 304L stainless steel case protects these sensors from the adverse effects of harsh environments. Each model is also available with optional purge connections.

Micro Motion is known worldwide for increasing plant efficiency, production, and profitability. More than 400,000 Micro Motion meters are installed and working in processes just like yours. Contact us, and learn more about Model DL sensors.



Liquid flow performance

		Mass		Volume	
		lb/min	kg/hr	gal/min	l/hr
Nominal flow range⁽¹⁾	DL065S	0 to 125	0 to 3405	0 to 15	0 to 3405
	DL100S	0 to 500	0 to 13,620	0 to 60	0 to 13,620
	DL200S	0 to 2500	0 to 68,100	0 to 300	0 to 68,100
Maximum flow rate	DL065S	250	6810	30	6810
	DL100S	800	21,792	96	21,792
	DL200S	3500	95,340	420	95,340
Accuracy⁽²⁾	Transmitters with MVD Technology	±0.15% ⁽³⁾			
	All other transmitters	±0.15% ± $\left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right]$ % of rate			
Repeatability⁽²⁾	Transmitters with MVD Technology	±0.05% ⁽³⁾			
	All other transmitters	±0.05% ± $\left[\frac{1}{2} \left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right]$ % of rate			
		lb/min	kg/hr	gal/min	l/hr
Zero stability	DL065S	0.025	0.68	0.0030	0.68
	DL100S	0.08	2.18	0.0096	2.18
	DL200S	0.35	9.5	0.042	9.5

(1) Micro Motion has adopted the terminology "nominal flow range." The upper limit of this range is the flow rate at which water at reference conditions causes approximately 15 psid (1 bar) of pressure drop for DL sensors.

(2) 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.

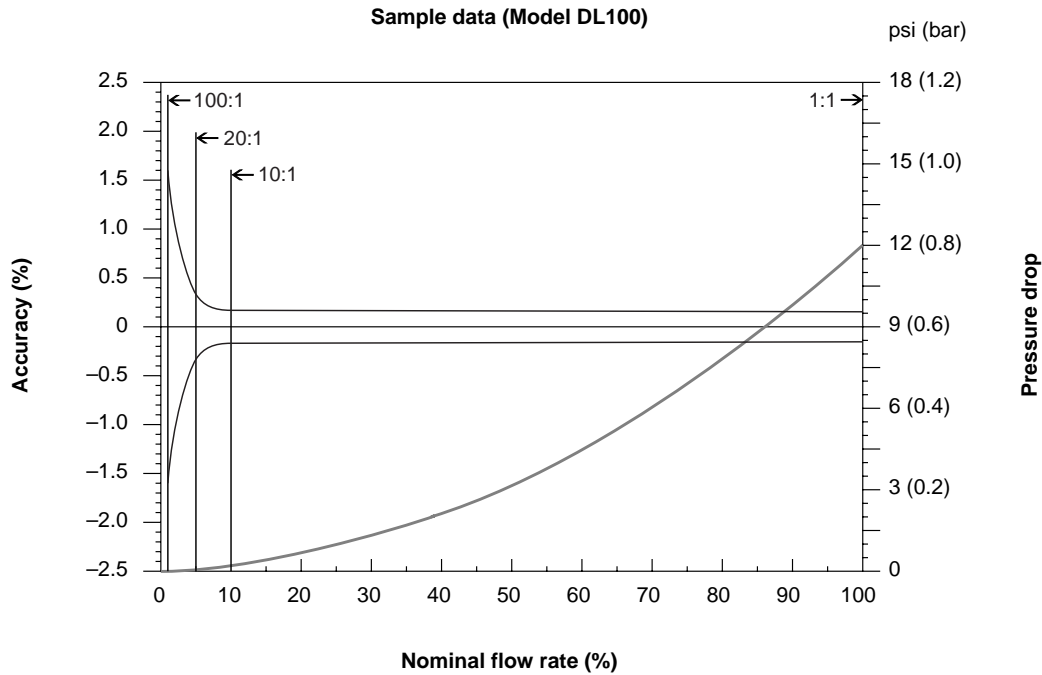
(3) When flow rate $< \frac{\text{zero stability}}{0.0015}$, accuracy = $\pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right]$ % of rate and

repeatability = $\pm \left[\frac{1}{2} \left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right]$ % of rate.

Liquid flow performance *continued*

Typical accuracy, turndown, and pressure drop with transmitter with MVD Technology

To determine accuracy, turndown, and pressure drop using your process variables, use Micro Motion's product selector at www.micromotion.com.



		Turndown				
		100:1	20:1	10:1	1:1	
Accuracy ($\pm\%$)	DL065S	2	0.4	0.2	0.15	
	DL100S	1.6	0.32	0.16	0.15	
	DL200S	1.4	0.28	0.15	0.15	
Pressure drop	DL065S	psi	~0	0.1	0.2	11.3
		bar	~0	0.01	0.01	0.78
	DL100S	psi	~0	0.1	0.2	12.0
		bar	~0	0.01	0.01	0.83
	DL200S	psi	~0	0.1	0.2	11.9
		bar	~0	0.01	0.01	0.82

Gas flow performance

When selecting sensors for gas applications, measurement accuracy is a function of fluid mass flow rate independent of operating temperature, pressure, or composition. However, pressure drop through the sensor is dependent upon operating temperature, pressure, and fluid composition. Therefore, when selecting a sensor for any particular gas application, it is highly recommended that each sensor be sized using Micro Motion's product selector, available at www.micromotion.com.

		lb/min	kg/hr
Nominal flow range⁽¹⁾	DL065S	0 to 125	0 to 3405
	DL100S	0 to 500	0 to 13,620
	DL200S	0 to 2500	0 to 68,100
Maximum flow rate	DL065S	250	6810
	DL100S	800	21,792
	DL200S	3500	95,340
Accuracy⁽²⁾	Transmitter with MVD Technology	±0.65% ⁽³⁾	
	All other transmitters	±0.65% ± $\left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right]$ % of rate	
Repeatability⁽²⁾	Transmitter with MVD Technology	±0.30% ⁽³⁾	
	All other transmitters	±0.30% ± $\left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right]$ % of rate	
		lb/min	kg/hr
Zero stability	DL065S	0.025	0.68
	DL100S	0.08	2.18
	DL200S	0.35	9.5

(1) Micro Motion has adopted the terminology "nominal flow range." The upper limit of this range is the flow rate at which water at reference conditions causes approximately 15 psid (1 bar) of pressure drop for DL sensors.

(2) 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.

(3) When flow rate < $\frac{\text{zero stability}}{0.0065}$, accuracy = $\pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right]$ % of rate and

$$\text{repeatability} = \pm \left[\frac{1}{2} \left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate.}$$

Density specifications (liquid only)

		With Series 1000/2000, Model 3500 or 3700, or RFT9739 transmitter		With IFT9701 transmitter	
		g/cc	kg/m ³	g/cc	kg/m ³
Accuracy	DL065S	±0.001	±1.0	±0.002	±2.0
	DL100S	±0.0005	±0.5	±0.002	±2.0
	DL200S	±0.0005	±0.5	±0.002	±2.0
Repeatability	DL065S	±0.0005	±0.5	±0.001	±1.0
	DL100S	±0.0002	±0.2	±0.001	±1.0
	DL200S	±0.0002	±0.2	±0.001	±1.0
Range	All models	0 to 5	0 to 5000	0 to 5	0 to 5000

Temperature specifications

Accuracy	All models	±1 °C ± 0.5% of reading in °C	
Repeatability	All models	±0.2 °C	
		°F	°C
Process fluid limits	DL065S	-400 to +350	-240 to +177
	DL100S	-400 to +350	-240 to +177
	DL200S	-400 to +400	-240 to +204
Ambient limits		°F	°C
	UL	All models	104 maximum
CSA	All models	-40 to +140	-40 to +60
ATEX	All models	Refer to graphs on page 8.	

Pressure ratings

		psi	bar
Flow tube rating⁽¹⁾	DL065S	1500	103
	DL100S	855	58
	DL200S	740	51
PED compliance	Sensors comply to council directive 97/23/EC of 29 May 1997 on Pressure Equipment.		
Housing	All models	Housing is not rated for pressure containment.	

(1) Flow tube pressure rating at 77 °F (25 °C), according to ASME B31.3. For operating temperatures of 301 to 400 °F (149 to 204 °C), tube pressure needs to be derated 7.2%.

Environmental effects

Process temperature effect	Process temperature effect is defined as the worst-case zero offset due to process fluid temperature change away from the zeroing temperature.		
		% of nominal flow rate per °C⁽¹⁾	
	DL065S	±0.001	
	DL100S	±0.002	
	DL200S	±0.004	
Pressure effect	Pressure effect is defined as the change in sensor flow and density sensitivity due to process pressure change away from the calibration pressure. Pressure effect can be corrected.		
		Pressure effect on flow accuracy	
		% of rate per psi	% of rate per bar
	DL065S	none	none
	DL100S	-0.005	-0.073
	DL200S	-0.009	-0.131
		Pressure effect on density accuracy	
		g/cc per psi	kg/m ³ per bar
	DL065S	none	none
	DL100S	-0.000001	-0.015
	DL200S	-0.000001	-0.015

(1) Nominal flow rate is the upper limit of the nominal flow range.

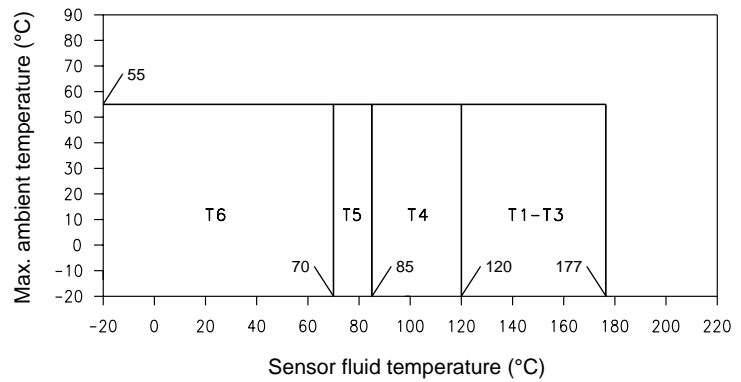
Hazardous area classifications

UL is a U.S.A. approvals agency. CSA is a Canadian approvals agency that provides approvals accepted in both the U.S.A. (C-US) and Canada. SAA is an Australian approvals agency. ATEX is a European directive.

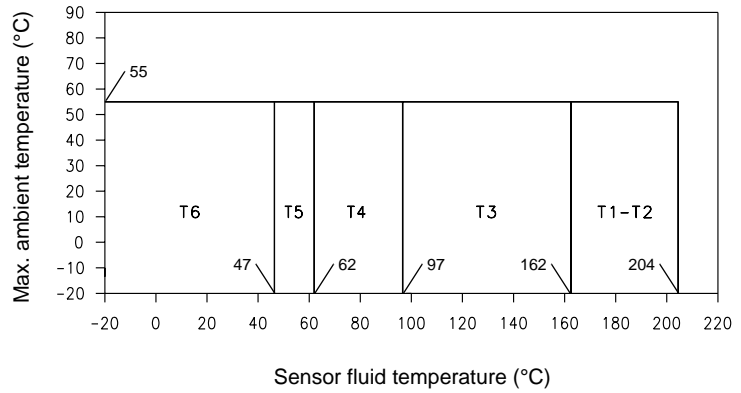
UL and CSA All models Class I, Div. 1, Groups C and D
 Class I, Div. 2, Groups A, B, C, and D
 Class II, Div. 1, Groups E, F, and G

SAA DL065S Not approved
 DL100S Ex ib IIB T4
 DL200S Ex ib IIB T4

ATEX DL065S and DL100S
 EEx ib IIC T1-T6



DL200S
 EEx ib IIB T1-T6



Materials of construction

Wetted parts⁽¹⁾	All models	316L stainless steel
Housing	All models	304L stainless steel
Junction box	All models	Epoxy-coated aluminum

(1) *General corrosion guides do not account for cyclical stress, and therefore should not be relied upon when choosing a wetted material for your Micro Motion flowmeter. Please refer to Micro Motion's corrosion guide for material compatibility information.*

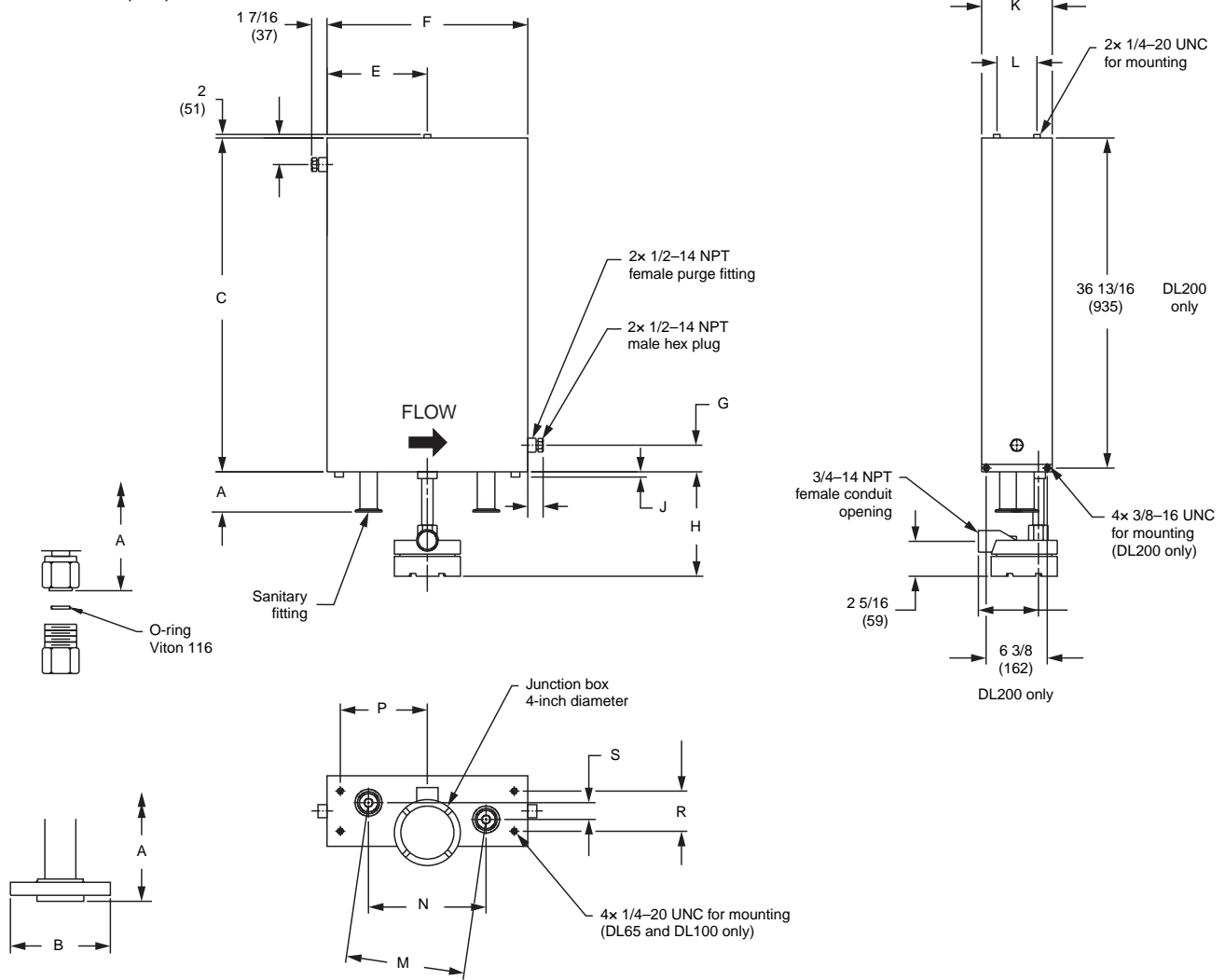
Weight

Approximate weight of sensors with noted fittings.

	Sanitary fittings		Union fittings		150 lb lap joint		300 lb lap joint	
	lb	kg	lb	kg	lb	kg	lb	kg
DL065S	26	12	26	12	30	14	32	15
DL100S	49	22	not applicable		53	24	55	25
DL200S	90	41	not applicable		100	45	104	47

Dimensions

Dimensions in inches
(mm)



Variable dimensions and process fitting options are provided on page 11.

Dimensions *continued*

		Dimensions ⁽¹⁾							
		C	D	E	F	G	H	J	
DL065S	inches	19	1 1/2	7 5/64	14 5/32	1 1/2	4 1/2	1/4	
	(mm)	(483)	(38)	(180)	(360)	(38)	(114)	(6)	
DL100S	inches	25	2	7 1/2	15	2	8 1/2	not applicable	
	(mm)	(635)	(51)	(191)	(381)	(51)	(216)	applicable	
DL200S	inches	37 1/8	2	8 1/2	17	2 7/8	4 1/2	not applicable	
	(mm)	(943)	(51)	(216)	(432)	(73)	(114)	applicable	
		K	L	M	N	P	R	S	
DL065S	inches	3 13/16	2 29/32	11 1/16	11	6 11/16	2 29/32	1 1/8	
	(mm)	(97)	(74)	(281)	(279)	(170)	(74)	(29)	
DL100S	inches	5 9/32	3	8 7/8	8 25/32	6 1/2	3	1 1/4	
	(mm)	(134)	(76)	(226)	(223)	(165)	(76)	(32)	
DL200S	inches	7 1/4	6 5/32	12 1/4	12	8 1/2	not applicable	2 1/2	
	(mm)	(184)	(156)	(311)	(305)	(216)	applicable	(64)	

(1) For dimensions A and B, see process fitting options below.

Fitting options

		Fitting code	Dim. A inches (mm)	Dim. B inches (mm)
DL065S fitting options⁽¹⁾	3/4-inch NPTF CAJON size 12 VCO fitting	245	3 (76)	—
	1-inch sanitary fitting (Tri-clamp compatible)	242	3 (76)	1 63/64 (50)
	1-inch ANSI 150 lb lap joint flange	243	3 (76)	4 1/4 (108)
	1-inch ANSI 300 lb lap joint flange	244	3 (76)	4 7/8 (124)
	DN25 DIN 11851 aseptic coupling	950	3 (76)	2 1/16 (52)
	DN25 PN40 lap joint flange; DIN 2656 type C face	951	3 (76)	4 1/2 (115)
DL100S fitting options⁽¹⁾	1-inch sanitary fitting (Tri-clamp compatible)	202	3 (76)	1 63/64 (50)
	1-inch 150 lb lap joint flange	223	3 (76)	4 1/4 (108)
	1-inch 300 lb lap joint flange	224	3 (76)	4 7/8 (124)
	DN25 DIN 11851 aseptic coupling	952	3 (76)	2 1/16 (52)
	DN25 PN40 lap joint flange; DIN 2656 type C face	953	3 (76)	4 1/2 (115)
DL200S fitting options⁽¹⁾	2-inch sanitary fitting (Tri-clamp compatible)	226	2 7/8 (73)	2 1/2 (64)
	2-inch 150 lb lap joint flange	227	2 7/8 (73)	6 (152)
	2-inch 300 lb lap joint flange	228	2 7/8 (73)	6 1/2 (165)
	DN50 DIN 11851 aseptic coupling	954	2 7/8 (73)	3 1/16 (78)
	DN50 PN40 lap joint flange; DIN 2656 type C face	955	2 7/8 (73)	6 1/2 (165)

(1) Fittings listed here are standard options. Other types of fittings are available. Contact your local Micro Motion representative.

Ordering information

Model	Product description
DL065S	Micro Motion Coriolis D-Series sensor; 0.65-inch; 316L stainless steel
DL100S	Micro Motion Coriolis D-Series sensor; 1-inch; 316L stainless steel
DL200S	Micro Motion Coriolis D-Series sensor; 2-inch; 316L stainless steel
Code	Process connections
###	See fitting options on page 11.
Code	Case options
S	Standard case
P	Purge fitting (two 1/2-inch NPT female)
Code	Approvals
M	Micro Motion Standard (no approval)
N	Micro Motion Standard / PED compliant
U	UL
C	CSA
B	ATEX / PED compliant
S ⁽¹⁾	SAA
Typical model number: DL100S 202 S U	

(1) Not available with Model DL065S.

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Product Data Sheet

PS-00024, Rev. A

February 2004

Micro Motion® Model RFT9739

Mass Flow and Density Transmitter



Micro Motion® Model RFT9739 transmitter

Precise, multivariable measurement

The RFT9739 transmitter works with Micro Motion sensors to provide precision fluid measurement in a wide variety of fluid applications. The RFT9739 has modular, microprocessor-based electronics, incorporating ASIC digital technology with a choice of digital communication protocols.

Combined with a Micro Motion sensor, the RFT9739 provides accurate mass flow, density, temperature, and volumetric measurements of process fluids. With a pressure transmitter properly installed in the flow loop, the transmitter also indicates pressure.

Four simultaneous output signals

The RFT9739 simultaneously transmits four output signals. Two independently configured analog outputs can each indicate flow rate, density, temperature, or pressure. A frequency/pulse output indicates flow rate or total. A control output indicates flow direction, a fault, or flowmeter zero in progress.

An integral liquid crystal display (LCD) is standard on the rack-mount model, optional with the field-mount version. Use the display to set communication parameters, read process variables, reset flow totalizers, and view diagnostic messages.

Field-mount or rack-mount

The RFT9739 is available in field-mount and rack-mount versions. The field-mount transmitter is housed in a NEMA 4X (IP65) explosion-proof enclosure that provides easy access to the electronics module, and allows the transmitter and sensor to be installed in the same hazardous area. The rack-mount transmitter's compact housing is ideal for control room installations.

Digital communications

The RFT9739 features user-selected Bell 202 or RS-485 serial standard for HART® or Modbus® communication protocol. For configuration in the field, use Micro Motion ProLink® II software, Emerson Process Management AMS software, or a Model 275 or 375 HART Communicator.

Operates with a variety of sensors

Choose from a wide range of sensors to suit your application. The RFT9739 is compatible with Micro Motion ELITE® sensors, the most accurate Coriolis meters available today. Or choose Micro Motion F-Series sensors, H-Series hygienic sensors, standard or high-pressure Model D sensors, Model DT high-temperature sensors, or Model DL sanitary sensors.

Mass flow performance

Accuracy ⁽¹⁾	Series	Phase	Accuracy
Accuracy ⁽¹⁾	ELITE	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	$\pm 0.70\% \pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
	H-Series	Liquid	$\pm 0.15\% \pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
		Gas	$\pm 0.70\% \pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
	D (except D38), DT, DL	Liquid	$\pm 0.15\% \pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
		Gas	$\pm 0.65\% \pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
	D38	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 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 gas measurement specifications and values of zero stability, refer to product specifications for each sensor.

Mass flow performance *continued*

Repeatability	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	$\pm 0.35\% \pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$
	H-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), DT, DL	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	$\pm 0.25\% \pm \left[\left(\frac{\text{zero stability}}{\text{flow rate}} \right) \times 100 \right] \% \text{ of rate}$

Density performance

			g/cc	kg/m ³
Accuracy⁽¹⁾	ELITE (except CMF010P)	Liquid	±0.0005	±0.5
		Gas	±0.002	±2.0
	CMF010P	Liquid	±0.002	±2.0
		Gas	±0.008	±8.0
	F-Series	Liquid only	±0.002	±2.0
	H-Series	Liquid only	±0.002	±2.0
	DH100, DH150	Liquid only	±0.002	±2.0
	DH38	Liquid only	±0.004	±4.0
	DL65, DT65, DT100, D150, DT150, DH300	Liquid only	±0.001	±1.0
	D300, D600, DL100, DL200	Liquid only	±0.0005	±0.5
Repeatability	ELITE (except CMF010P)	Liquid	±0.0002	±0.2
		Gas	±0.001	±1.0
	CMF010P	Liquid	±0.001	±1.0
		Gas	±0.004	±4.0
	F-Series	Liquid only	±0.001	±1.0
	H-Series	Liquid only	±0.001	±1.0
	DH100, DH150	Liquid only	±0.001	±1.0
	DH38	Liquid only	±0.002	±2.0
	DL65, DT65, DT100, D150, DT150, DH300	Liquid only	±0.0005	±0.5
	D300, D600, DL100, DL200	Liquid only	±0.002	±2.0

(1) 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 gas measurement specifications and values of zero stability, refer to product specifications for each sensor.

Temperature performance

Accuracy	All sensors	±1 °C ±0.5% of reading in °C
Repeatability	All sensors	±0.2 °C

Output signals

Analog outputs

Functional capabilities	Two independently configured analog outputs, designated as primary and secondary, can represent mass or volumetric flow rate, density, temperature, event 1 or event 2.		
	<ul style="list-style-type: none">• With a pressure transmitter, outputs can also provide indication for pressure• Internally powered, can be selected as 4-20 mA or 0-20 mA current outputs; cannot be changed from active to passive• Galvanically isolated to ± 50 VDC, 1000 ohm load limit• Out-of-range capability:<ul style="list-style-type: none">0-22 mA on 0-20 mA output3.8-20.5 mA on 4-20 mA output		
Milliamp (mA) output rangeability	<i>Flow</i>	<ul style="list-style-type: none">• Maximum span determined by sensor specifications• Range limit determined by sensor maximum rate• Minimum recommended span (% of nominal flow range):	
		ELITE sensors	2.5%
		F-Series and H-Series sensors	10%
		D, DT, and DL sensors	10%
		D300 and D600 sensors	5%
		High-pressure (DH) sensors	20% typical
	<i>Density</i>	Range limit	0 to 5 g/cc (0 to 5000 kg/m ³)
		Minimum span	0.05 g/cc (50 kg/m ³)
	<i>Temperature</i>	Range limit	-400 to +842 °F (-240 to +450 °C)
		Minimum span	36 °F (20 °C)

Frequency outputs

One frequency/pulse output can be configured to indicate mass flow rate, volumetric flow rate, mass total (inventory), or volume total (inventory), independent of analog outputs.

- Internally powered, 0-15 V square wave, unloaded; internal 2.2 kohm pull-up resistor to 15 V, galvanically isolated to ± 50 VDC
- In open collector configuration: sinking capability, 0.1 amps in "on" condition (0 volt level), 30 VDC compliance in "off" condition
- Signal can be scaled up to 10,000 Hz
- Out-of-range capability to 15,000 Hz
- Programmable pulse width for low frequencies

Dual-channel frequency (rack-mount transmitter only)

The dual-channel frequency output is approved for custody transfer applications. The two channels are referred to as frequency A and frequency B.

- Phase shift between channels is 90 degrees
 - Output derived from the primary frequency, and represents the same process variable as the frequency/pulse output, but with half the frequency
 - All specifications match frequency/pulse output except:
 - Signal can be scaled up to 5,000 Hz
 - Out-of-range capability to 7500 Hz
 - The output complies with VDE/VDI 2188 when jumper JP1 is installed
-

Output signals *continued*

Control

One control output can represent flow direction, fault alarm, zero in progress, event 1 or event 2.

- Internally powered, digital level 0 or 15 V, 2.2 kohm pull-up, galvanically isolated to ± 50 VDC
- In open collector configuration: sinking capability, 0.1 amps in “on” condition (0 volt level), 30 VDC compliance in “off” condition

Communication

Switch allows selection of Bell 202 and/or RS-485 serial standard

- Bell 202 signal is superimposed on primary variable mA 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 1000 ohms load resistance
- RS-485 signal is a ± 5 V square wave referenced to transmitter ground. Baud rates between 1200 baud and 38.4 kilobaud can be selected.

Additional outputs

Sensor frequency For use with Micro Motion peripheral devices, 8 V peak-to-peak at sensor natural frequency, referenced to sensor ground, 10 kohm output impedance

Sensor temperature For use with Micro Motion peripheral devices, 5 mV/°C, referenced to signal ground, 10 kohm output impedance

API gravity API gravity references to 60 °F (15 °C). Uses correlation based on API equation 2540 for Generalized Petroleum Products
Minimum 4-20 mA span: 10 °API
Accuracy of corrected density calculation relative to API-2540 from 0 to +300 °F (–18 to +149 °C):

Process fluid	g/cc	kg/m ³	°API
Diesel, heater, and fuel oils	± 0.0005	± 0.5	± 0.2
Jet fuels, kerosenes, and solvents	± 0.002	± 2.0	± 0.5
Crude oils and JP4	± 0.004	± 4.0	± 1.0
Lube oils	± 0.01	± 10	± 2.0
Gasoline and naphthenes	± 0.02	± 20	± 5.0

Standard volume Outputs standard volume at 60 °F or 15 °C for Generalized Petroleum Products when °API is selected as density unit of measure

- Accuracy of standard volume measurements depends on accuracies of mass flow rate, density, temperature and temperature-corrected °API calculation, and can be estimated using the root mean square method
- Standard volume accuracy of $\pm 0.5\%$ of rate is typically attainable for Generalized Petroleum Products such as fuel oils, jet fuels, and kerosenes

Output signals *continued*

Pressure compensation	The analog input can accept a signal from a pressure transmitter for pressure compensation of flow and density. <ul style="list-style-type: none">• Range 0-25 mA• Can be used to power independent pressure or differential pressure transmitter• Voltage sourcing capability 15 V• Input impedance 100 ohms	
Low-flow cutoff	Flow values below the user-defined low-flow cutoff cause the digital, mA, and frequency outputs to default to zero flow levels. Each mA output may be configured for an additional low-flow cutoff.	
Slow-flow limits	Transmitter senses density outside limits. Flow output remains at last measured value, for a programmed time of 0 to 60 seconds, before defaulting to zero flow.	
Damping	Wide range of programmed filter time constants for damping on flow, density, and temperature. Additional damping may be applied to mA outputs.	
Fault indication	Faults can be indicated by user-selected downscale (0–2 mA, 0 Hz) or upscale (22–24 mA, 15–19 kHz) output levels. The control output can also be configured to indicate a fault condition at 0 V.	
Output testing	Current source	Transmitter can produce a user-specified current between 0 and 22 mA on a 0–20 mA output, or between 2 and 22 mA on a 4–20 mA output.
	Frequency source	Transmitter can produce a user-specified frequency between 0.1 and 15,000 Hz.
Local display (optional)	Optional for field-mount transmitter; standard on rack-mount transmitter. <ul style="list-style-type: none">• Display is a 2-line, 16-character, alphanumeric liquid crystal display (LCD)• Using the scroll function, the user can view flow rate, density, temperature, mass and volume totals and inventory levels, and status messages• A reset button allows the user to reset the transmitter's flow totalizers and communication parameters, and perform the flowmeter zeroing procedure	

Power supply options

Field-mount transmitter	<p>The internal power supply of the field-mount RFT9739 transmitter is one of the following (power codes 4 or 5):</p> <ul style="list-style-type: none"> • 85 to 250 VAC⁽¹⁾, 48 to 62 Hz, 10 watts typical, 15 watts maximum, fused in accordance with IEC 127-3 400mA/250V, time-lag, subminiature • 12 to 30 VDC⁽²⁾, 7 watts typical, 14 watts maximum, fused in accordance with IEC 127-3 1.6A/125V, time-lag, subminiature
Rack-mount transmitter	<p>The internal power supply of the rack-mount RFT9739 transmitter is one of the following (power codes 1, 2, or 3):</p> <ul style="list-style-type: none"> • 110/115 VAC \pm 25%⁽¹⁾, 48 to 62 Hz, 10 watts typical, 15 watts maximum, fused in accordance with UL/CSA 250mA/250V, time-lag, 5 x 20 mm • 220/230 VAC \pm 25%⁽¹⁾, 48 to 62 Hz, 10 watts typical, 15 watts maximum, fused in accordance with UL/CSA 250mA/250V, time-lag, 5 x 20 mm • 12 to 30 VDC⁽³⁾, 7 watts typical, 14 watts maximum, fused in accordance with UL/CSA 2A/125V, medium-lag, 5 x 20mm

- (1) All AC-powered RFT9739 transmitters comply with low-voltage directive 73/23/EEC per IEC 1010-1 with Amendment 2.
- (2) At startup, transmitter power source must provide a minimum of 1.6 amperes of short-term current at a minimum of 12 volts at the transmitter's power input terminals.
- (3) At startup, transmitter power source must provide a minimum of 2 amperes of short-term current at a minimum of 12 volts at the transmitter's power input terminals.

Temperature limits

				°F	°C
Ambient temperature	Field-mount transmitter	Without display	Operating	-22 to +131	-30 to +55
			Storage	-40 to +176	-40 to +80
		With display	Operating	+14 to +131	-10 to +55
		Storage	-4 to +158	-20 to +70	
	Rack-mount transmitter	Operating	+32 to +122	0 to +50	
		Storage	-4 to +158	-20 to +70	
Approval temperature	Field-mount transmitter	All models	UL	+131 maximum	+55 maximum
			ATEX	-22 to +113	-30 to +45
	Rack-mount transmitter	UL	+131 maximum	+55 maximum	
		ATEX	-4 to +131	-20 to +55	

Environmental limits and effects

Humidity limits		Meets SAMA PMC 31.1-1980
Vibration limits	Field-mount transmitter	Meets SAMA PMC 31.1-1980, Condition 2
	Rack-mount transmitter	Meets SAMA PMC 31.1-1980, Condition 1
EMI effect	Field-mount transmitter	Field-mount RFT9739 transmitters with enhanced EMI immunity meet the requirements of the EMC directive 89/336/EEC per EN 50081-1 (August 1993) and EN 50082-2 (March 1995) when operated at nominal rated flow measurement range. Enhanced EMI immunity is required for transmitters installed in the European Community after 1 January 1996. For specific EMC effects within the EC, the Technical EMC file may be reviewed at Emerson Process Management Veenendaal.
Environmental effects		<p>All RFT9739 transmitters meet the requirements of SAMA PMC 33.1 (October 1978), Class 1, A, B, C (0.6% span) at nominal flow rate. All RFT9739 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 either double-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 run in standard twisted-pair, shielded instrument wire.</p>
Ambient temperature effect	On mA outputs	±0.005% of span/°C
	On temperature output	±0.01°C/°C
	On mA input	±0.01% of span/°C

Field-mount RFT9739 hazardous area classifications

When properly installed with an approved sensor, the RFT9739 field-mount transmitter can be installed in the areas described below. 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. SAA is an Australian approvals agency. ATEX is a European directive.

UL and CSA	Transmitter without display	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.
	Transmitter with display	Transmitter: 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.

UL Division 2 nonincendive parameters

Parameter	Analog output (Terminals 17-18, 19-20)	Frequency/pulse output (Terminals 14-16)
V _{OC}	36.5 V	16 V
I _{SC}	22 mA	51 mA
C _a	0.135 µf	1.5 µf
L _a	100 mH	37 mH

SAA	Transmitter without display	Exd [ib] IIC T4 IP66
	Transmitter with display	Ex [ib] IIC IP66
ATEX	Transmitter without display	II2G EExd[ib] IIC T6 II(2)G [EExib] IIC Flameproof transmitter Safe area transmitter
	Transmitter with display	II(2)G [EExib] IIC

Rack-mount RFT9739 hazardous area classifications

When properly installed with an approved sensor, the RFT9739 rack-mount transmitter can be installed in the areas described below. 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.

UL Non-hazardous locations. 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, Groups E, F, and G.

CSA Non-hazardous locations. Connections to sensor are intrinsically safe for use in Class I, Div. 1, Groups C, D, and Class II, Groups E, F, and G.

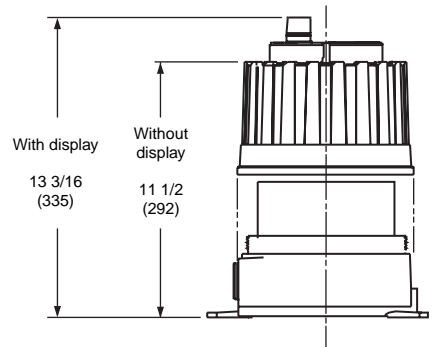
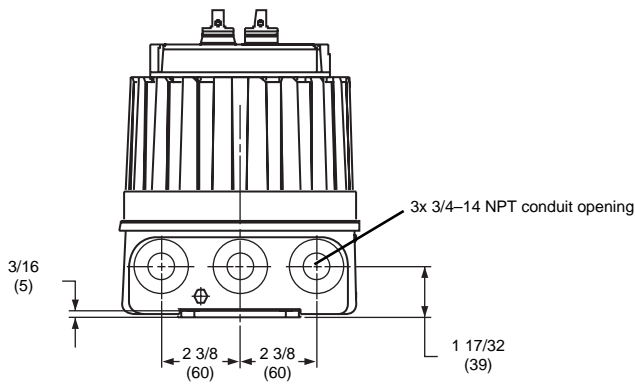
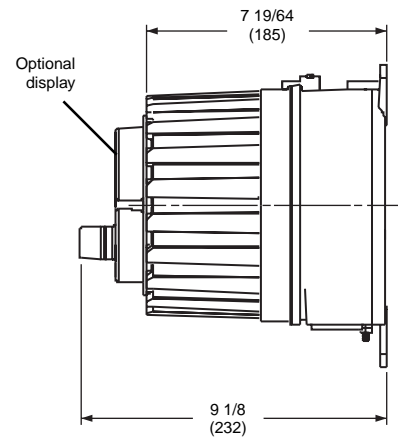
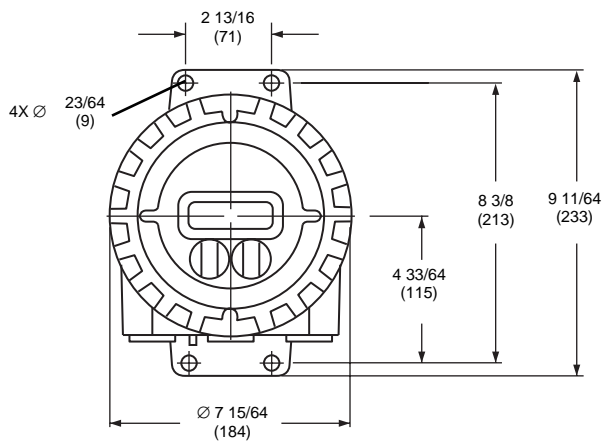
ATEX Safe area only. Connections to sensor are intrinsically safe in [EEx ib] IIC areas.

RFT9739 field-mount physical specifications

Weight (without display)	12.5 lb (5.7 kg)
Housing	NEMA 4X (IP65) epoxy polyester painted cast aluminum
Cable gland entrances	Three 3/4"–14 NPT on transmitter base
Electrical connections	<ul style="list-style-type: none"> • Screw terminal blocks for all signal wiring can be unplugged • Fixed screw terminals for power connections • Screw terminal on housing for chassis ground • Studs for intrinsic safety ground

Dimensions

Dimensions in inches (mm)



Minimum clearance for cover removal

RFT9739 rack-mount physical specifications

Weight (without display)

4.4 lb (2.0 kg)

Housing

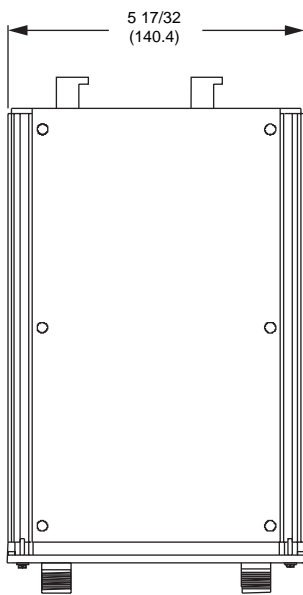
19-inch rack, European standard DIN 41494
128 mm (3HE) high x 142 mm (28TE) wide x 231.9 mm deep

Electrical connections

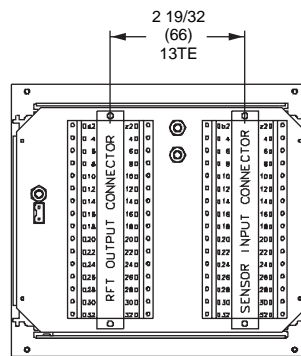
Two connectors per DIN 41612, type F
Choose either fast-on (wire-pin) solder connectors (standard) or Y-shaped screw-terminal connectors (optional)
Sensor connectors and output connectors are not interchangeable

Dimensions

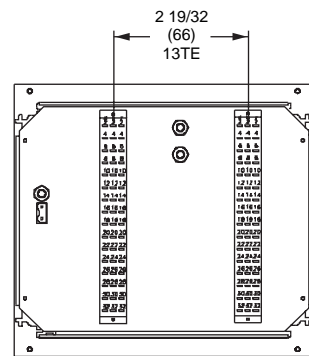
Dimensions in inches (mm)



Back panel with DIN 41612 male Y-shaped screw terminals

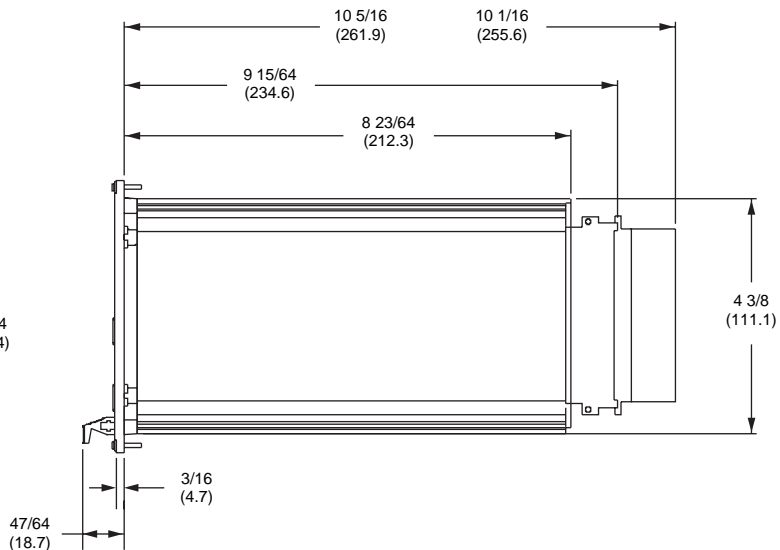
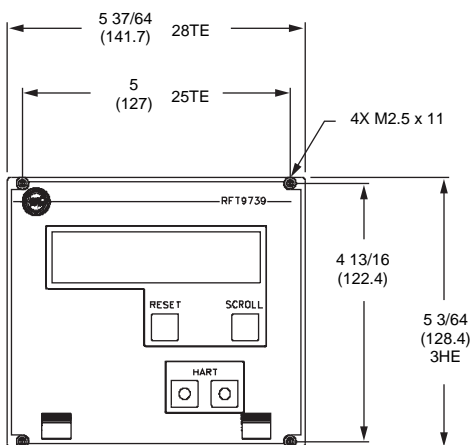


Back panel with DIN 41612 male fast-on/solder terminals



With Y-shaped screw terminals

With fast-on/solder terminals



Ordering information — RFT9739 field-mount with display

Code	Product description
RFT9739D	RFT9739 multivariable transmitter; remote field-mount; with display; NEMA 4X
Code	Power
4	85–205 VAC
5	12–30 VDC
Code	Configuration
S ⁽¹⁾	Standard configuration (not CE compliant)
E	Enhanced EMI immunity (CE compliant)
Code	Approvals
M	Micro Motion standard (no approvals)
U	UL
C	CSA
Y	ATEX intrinsically safe sensor outputs
S ⁽²⁾	SAA
Code	Conduit connections
A	No fittings or glands (for approval codes M, U, C, and Y)
B	1 gland; nickel-plated brass (for ATEX approval code Y only)
C	3 glands; nickel-plated brass (for ATEX approval code Y only)
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
O	Polish 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 product
R	Restocked product (if available)
Typical model number: RFT9739D 4 S C A E Z	

(1) Not valid with approval code Y.

(2) Not valid with the DL065S, DS600S, or DT sensors.

Ordering information — RFT9739 field-mount without display

Code	Product description
RFT9739E	RFT9739 multivariable transmitter; remote field-mount; NEMA 4X; explosion-proof
Code	Power
4	85–205 VAC
5	12–30 VDC
Code	Configuration
S ⁽¹⁾	Standard configuration (not CE compliant)
E	Enhanced EMI immunity (CE compliant)
Code	Approvals
M	Micro Motion standard (no approvals)
U	UL
C	CSA
Y	ATEX intrinsically safe sensor outputs
W	ATEX intrinsically safe sensor outputs; flameproof transmitter
S ⁽²⁾	SAA
Code	Conduit connections
	For approval code M (MMI standard):
A	No fittings or glands
B	1 gland; nickel-plated brass
C	3 glands; nickel-plated brass
	For approval code U (UL):
J	1 explosion-proof seal fitting
K	1 explosion-proof seal fittings
	For approval code C (CSA):
A	No fittings or glands
	For approval code Y (ATEX intrinsically safe sensor outputs):
A	No fittings or glands
B	1 gland; nickel-plated brass
C	3 glands; nickel-plated brass
	For approval code W (ATEX intrinsically safe sensor outputs; flameproof transmitter):
A	No fittings or glands
D	1 gland; nickel-plated brass
E	1 gland; stainless steel
F	3 glands; nickel-plated brass
G	3 glands; stainless steel
	For approval code S (SAA):
A	No fittings or glands

Continued on next page.

(1) Not valid with approval codes Y and W.

(2) Not valid with the DL065S, DS600S, or DT sensors.

Ordering information — RFT9739 field-mount without display *continued*

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
O	Polish 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 product
R	Restocked product (if available)
Typical model number: RFT9739E 4 S U J E Z	

Ordering information — RFT9739 rack-mount

Code	Product description
RFT9739R	RFT9739 multivariable transmitter; remote rack/panel mount
Code	Power
1	110/115 VAC
2	220/230 VAC
3	12–30 VDC
Code	Configuration
E	Enhanced EMI immunity (CE compliant)
Code	Approvals
M	Micro Motion standard (no approvals)
U	UL
C	CSA
Y	ATEX intrinsically safe sensor outputs
Code	Terminal connections
F	Fast-on/solder connections
S	Y-shaped screw terminals
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
O	Polish 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 product
R	Restocked product (if available)
Typical model number: RFT9739R 1 E U F E Z	

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