Series 8700

Magnetic Flowmeter Systems

THE SERIES 8700 MAGNETIC FLOWMETER SYSTEMS PROVIDE...

Versatile Flow Measurement

- *Obstuctionless flow measurement that is ideal for metering any conductive fluid*
- *A wide variety of construction materials, providing compatibility in virtually all applications*
- *Measure flow virtually unaffected by density, temperature, pressure, and viscosity changes*
- *Fully interchangeable transmitters and flowtubes*

Accuracy, Dependability

- *High accuracy and stable repeatability*
- *Special design allows for easier and less expensive use and maintenance*
- *Simplified installation with no separate calibration devices, manual zeroing, or periodic calibration*

Contents

SERIES 8700 MAGNETIC FLOWMETER FLOWTUBES

Model 8705 Flowtube

- *Superior performance: ±0.5% accuracy within flow range of 1 to 30 ft/s (0.3 to 10 m/s)*
- *Five lining options and five electrode material options*
- *Fully welded steel housing for maximum protection*
- *ISO lay length*
- *Separate sealed electrode compartment provides secondary containment for complete fugitive emission control*
- *ASME B16.5 (ANSI) and DIN flanges available*
- *3A Sanitary available*

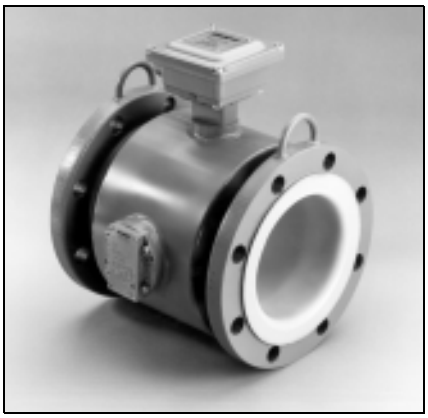


FIGURE 1. Model 8705 Flowtube.

Model 8707 High-Signal Flowtube

- *Superior performance: ±0.5% accuracy within flow range of 3 to 30 ft/s (1 to 10 m/s)*
- *Four lining options, five electrode material options, and four ASME B16.5 (ANSI) ASME B16.5 (ANSI) Flange options*
- *Increased magnetic field strength for noisy applications*
- *ISO lay length*
- *Optional dual transmitter calibration for Model 8712H and Model 8712C transmitters*

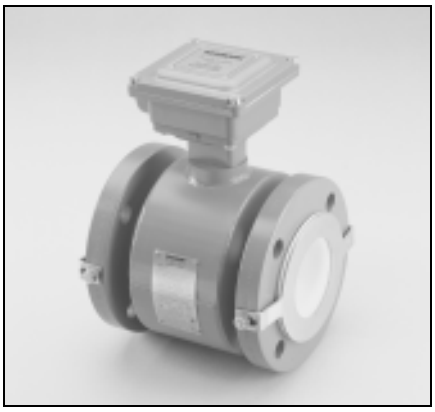


FIGURE 2. Model 8707 HIgh-Signal Flowtube.

Model 8711 Flowtube

- *Superior performance: ±0.5% accuracy within flow range of 3 to 30 ft/s (1 to 10 m/s)*
- *Maximum flexibility: flangeless design accepts ASME B16.5 (ANSI), DIN, and BS flanges*
- *Tefzel® (ETFE) lining*
- *Alignment rings for easy installation*
- *Compact, rugged, lightweight design*
- *Five electrode material options*

FIGURE 3. Model 8711 Flowtube.

Cover Photo: GROUP-010AC

SERIES 8700 MAGNETIC FLOWMETER TRANSMITTERS

Model 8712C/U/H Transmitter

- *Use of HART® communication protocol eliminates unnecessary trips to the field*
- *Eliminates manual calibrating, zeroing, and calculating*
- *Optional local operator interface (LOI)*
- *Standard empty pipe detection*

Model 8712U Universal Transmitter

- *Works with any manufacturer's flowtube*
- *Drives AC and DC flowtubes with pulsed DC technology*
- *Offers automatic in-process calibration*

Model 8712H High-Signal Transmitter

- *Pulsed dc solution for most demanding flow measurement applications*
- *Works in conjunction with Model 8707 flowtubes*

FIGURE 4. Model 8712 Magnetic Flowmeter Transmitter.

Model 8732C Transmitter

- *Uses HART communication protocol to eliminate unnecessary trips to the field*
- *Eliminates manual calibrating, zeroing, and calculating*
- *Compact, integral-mount design eliminates wiring errors between flowtube and transmitter*
- *Optional local operator interface (LOI)*
- *Rugged, explosion-proof housing*
- *Standard empty pipe detection*

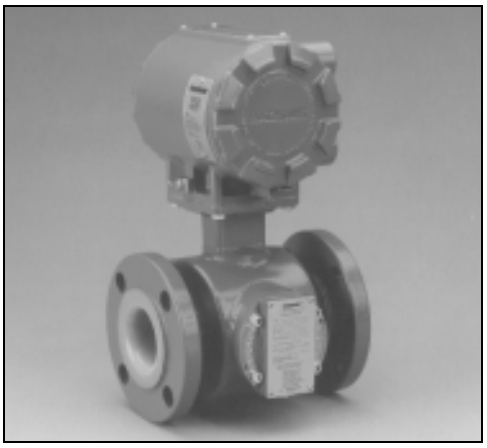


FIGURE 5. Model 8732C Transmitter.

MODEL 8714D REFERENCE CALIBRATION STANDARD

- *Offers transmitter field calibration traceable to NIST*
- *Assists with routine calibration programs*
- *Simulates flow at the magnetic flowmeter transmitter*

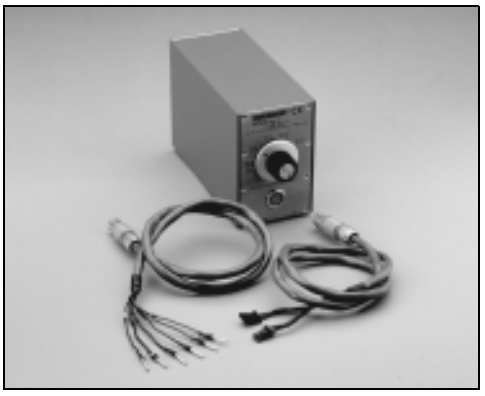


FIGURE 6. Model 8714D Reference Calibration Standard.

Series 8700 System Overview

The Series 8700 Magnetic Flowmeter Systems provide obstructionless flow measurement, ideal for metering any conductive fluid. A wide choice of construction materials provides compatibility with virtually all applications, from highly corrosive liquids to fibrous slurries that are often considered difficult to measure with other devices. Rosemount® magnetic flowmeters offer the benefit of measuring flow virtually unaffected by density, temperature, pressure, and viscosity changes.

All Series 8700 Magnetic Flowmeter Systems are microprocessor-based members of the Rosemount SMART FAMILY® of instruments. They offer high accuracy and stable repeatability and are specially designed for easier and less expensive use and maintenance. Fully interchangeable transmitters and flowtubes simplify installation and no longer require separate calibration devices, manual zeroing, or periodic calibration.

OPERATION

The operating principle of the magnetic flowmeter system is based upon Faraday's Law of electromagnetic induction, which states that *a voltage will be induced in a conductor moving through a magnetic field*.

Faraday's Law: E=kBDV

The magnitude of the induced voltage **E** is directly proportional to the velocity of the conductor **V**, conductor width **D**, and the strength of the magnetic field **B**. Figure 7 illustrates the relationship between the physical components of the magnetic flowmeter and Faraday's Law.

Magnetic field coils placed on opposite sides of the pipe generate a magnetic field. As the conductive process liquid moves through the field with average velocity **V**, electrodes sense the induced voltage. The width of the conductor is represented by the distance between electrodes. An insulating liner prevents the signal from shorting to the pipe wall.

The only variable in this application of Faraday's law is the velocity of the conductive liquid **V** because field strength is controlled constant and electrode spacing is fixed. Therefore, the output voltage **E** is directly proportional to liquid velocity, resulting in the inherently linear output of a Rosemount Magnetic Flowmeter.

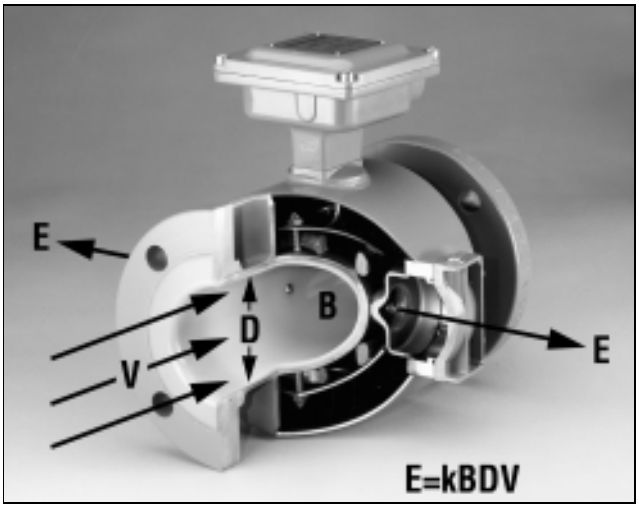


FIGURE 7. Cutaway View of the Model 8705 Magnetic Flowmeter Flowtube.

Rosemount Magnetic Flowmeter Flowtubes

Both flanged-style (Model 8705 and Model 8707 High-Signal) and wafer-style (Model 8711) flowtubes use pulsed dc technology. This provides high efficiency and low power consumption. They feature continuous automatic zeroing to compensate for variations in the process environment. The simple design of these devices enhances reliability because there are no electronics in the flowtube.

Rosemount flowtubes can be used to measure process fluids with conductivities as low as 5 microsiemens per centimeter. All Rosemount flowtubes are calibrated to National Institute of Standards and Technology (NIST) specifications.

FEATURES

Rosemount flowtubes feature lightweight coils, multiple options for lining and electrode materials and three forms of grounding.

Magnetic Coils

The unique controlled-flux coil design results in significant flowtube weight reduction. This complete lightweight design eliminates the bulky iron cores found in other magnetic flowmeter flowtubes and reduces shipping, handling, and installation costs. All coils are rigidly attached directly to the flowtube to ensure the magnetic field cannot be disrupted by pipe vibration.

Lining Materials

Rosemount Inc. offers five lining materials on either the Model 8705 or model 8707 High-Signal Magnetic Flowtubes to ensure compatibility with virtually any application. Teflon (PTFE) and Tefzel (ETFE) are available lining material options on the wafer-style Model 8711 flowtube. For guidance on selecting lining materials, refer to the Magnetic Flowmeter Material Selection Guide (document number 00816-0100-3033).

Teflon® (PTFE)

Teflon (PTFE) is the most commonly used liner material for magnetic flowmeter flowtubes. Teflon (PTFE) is a highly chemical-resistant material and has excellent high-temperature capabilities. Very few materials adhere well to Teflon (PTFE); coatings that might build up on other lining materials will usually not adhere to a Teflon (PTFE) surface. It has fair abrasion resistance and is available on all Rosemount flowtubes.

Tefzel® (ETFE)

Tefzel (ETFE) has chemical resistance properties similar to Teflon (PTFE). Tefzel (ETFE) lining forms a molecular bond with stainless steel tube walls and becomes an integral part of the flowtube assembly. If the lining is damaged, this bond prevents process fluid penetration between the lining and the electrode area. Tefzel (ETFE) has good resistance to abrasive wear. Tefzel (ETFE) is available on all Rosemount flowtubes.

Polyurethane

Polyurethane is a resilient material with excellent abrasion resistance and offers long service life in slurry flows with abrasive solids. Polyurethane has limited chemical resistance.

Neoprene

The abrasion resistance of neoprene is generally not as good as polyurethane, but its chemical resistance is superior. In applications where there is a combination of chemical and abrasive wear, a neoprene lining could exhibit significantly longer life.

Linatex

The abrasion resistance characteristics of Linatex are similar to neoprene, although it has slightly poorer chemical resistance in acid service. Linatex is a softer material than polyurethane and neoprene.

Lining Material	Process Temperature Limits	Vacuum Limits
Teflon (PTFE)	–20 to 350 °F (–29 to 177 °C)	Full vacuum to maximum temperature limits through 4-inch (100 mm) line sizes. Consult the factory for larger line sizes.
Tefzel (ETFE)	–20 to 300 °F (–29 to 149 °C)(1)	Full vacuum to maximum temperature limits for all line sizes.(2)
Polyurethane	0 to 140 °F (–18 to 60 °C)	Full vacuum to maximum temperature limits for all line sizes.
Neoprene	0 to 185 °F (–18 to 85 °C)	Full vacuum to maximum temperature limits for all line sizes.
Linatex	0 to 158 °F (–18 to 70 °C)	Full vacuum to maximum temperature limits for all line sizes.

(1) Model 8711 0.15- and 0.30-inch line sizes are limited to 200 °F (93 °C).

(2) Full vacuum unavailable in the 0.15- and 0.30-inch line sizes.

Electrodes

Rosemount Inc. offers five different electrode materials with varied advantages depending on the application. Refer to the Magnetic Flowmeter Material Selection Guide (document number 00816-0100-3033) for detailed guidance on selecting electrode materials.

316L Stainless Steel

As a reliable general purpose electrode material, stainless steel provides a combination of corrosion and abrasion resistance. It is not suitable for use with sulfuric or hydrochloric acids.

Hastelloy® C-276

Hastelloy C-276 provides increased corrosion resistance in comparison to stainless steel and is especially effective for use with oxidizing fluids. Hastelloy C-276 is also a high strength material and is very effective for use in slurry applications that contain a high percentage of solids.

Tantalum

In most corrosive process fluids, tantalum offers a greater resistance to chemicals than 316L stainless steel and Hastelloy C-276. Tantalum must not be used with hydrofluoric acid, fluosilicic acid, or sodium hydroxide.

90% Platinum-10% Iridium

Out of all available electrode materials, 90% platinum–10% iridium provides the greatest resistance against chemicals, but must not be used with aqua regia.

Titanium

Titanium performs well in caustic solutions that are not hot and concentrated. It provides excellent sea water performance, but should not be used with hydrofluoric acid, hydrochloric acid, or sulfuric acid.

Upstream/Downstream Piping Length

Magnetic flowmeters are less sensitive to liquid velocity profile variation than most other flowmeters. However, to ensure specification accuracy over widely varying process conditions, install the flowtube with a minimum of five straight pipe diameters upstream and two straight pipe diameters downstream from the electrode plane. This will allow disturbances to settle out prior to measurement. This procedure is usually adequately allows for disturbances created by elbows, valves, and reducers.

Flowtube Grounding

A reliable ground path is required between the flowtube and the process fluid. The ground straps provided with every Series 8700 flowtube may be inadequate where nonconductive material lines the process pipe. Optional grounding rings, grounding electrodes, and lining protectors are available with Series 8700 flowtubes to ensure proper grounding.

Grounding Electrodes

For installations with the process fluid conductivity above 100 microsiemens per centimeter, a third grounding electrode can provide a sufficient ground path. The grounding electrode is made with the same material as the sensing electrodes.

Grounding Rings

In low conductivity process fluids or cathodic protection situations, grounding rings are recommended and should be used on the upstream and downstream faces of the flowtube. Grounding rings are available in a variety of materials for wide fluid compatibility.

Lining Protectors

Flanged flowtube lining protectors are used in applications where the process fluid contains abrasive solids that would cause excessive lining wear at the upstream edge of the flowtube. Rosemount lining protectors are permanently installed over the lining faces at each end of the flowtube to prevent abrasive wear. They also protect the leading edge of the lining from damage during installation. Lining protectors prevent damage to the Teflon (PTFE) lining that is caused by overtorquing the flange bolts. They also provide a ground path to the process liquid and eliminate the need for grounding rings or a grounding electrode. Lining protectors are available on Teflon- and Tefzel-lined Model 8705 and Model 8707 high-signal flowtubes.

Flowmeter Sizing

Because of its effect on flow velocity, flowtube size is an important consideration. It may be necessary to select a magnetic flowmeter that is larger or smaller than the adjacent piping to ensure the fluid velocity is in the specified measuring range of the flowtube. Suggested guidelines and examples for sizing normal velocities in different applications are listed in Table 20, Table 21, and Table 22. Operation outside these guidelines may also give acceptable performance.

TABLE 20. Sizing Guidelines.

Application	Velocity Range (ft/s)	Velocity Range (m/s)
Normal Service	2–20	0.6–6.1
Abrasive Slurries	3–10	0.9–3.1
Non-Abrasive Slurries	5–15	1.5–4.6

To convert flow rate to velocity, use the appropriate factor listed in Table 22 and the following equation:

$$\text{Velocity} = \frac{\text{Flow Rate}}{\text{Factor}}$$

Example: SI Units

Magmeter Size: 100 mm **(factor from Table A-2 = 492.0)**
Normal Flow Rate: 800 L/min

$$\text{Velocity} = \frac{800\ (\text{L/min})}{492.0}$$

Velocity = 1.7 m/s

Example: English Units

Magmeter Size: 4 inch **(factor from Table A-2 = 39.679)**
Normal Flow Rate: 300 GPM

$$\text{Velocity} = \frac{300\ (\text{gpm})}{39.679}$$

Velocity = 7.56 ft/s

TABLE 21. Line Size vs. Conversion Factor.

Nominal Line Size Inches (mm)	Gallons Per Minute Factor	Liters Per Minute Factor
0.15 (4)	0.055	0.683
0.30 (8)	0.220	2.732
½ (15)	0.947	11.745
1 (25)	2.693	33.407
1½ (40)	6.345	78.69
2 (50)	10.459	129.7
3 (80)	23.042	285.7
4 (100)	39.679	492.0
6 (150)	90.048	1,116
8 (200)	155.94	1,933
10 (250)	245.78	3,048
12 (300)	352.51	4,371
14 (350)	421.70	5,229
16 (400)	550.80	6,830
18 (450)	697.19	8,645
20 (500)	866.51	10,745
24 (600)	1,253.2	15,541
30 (750)	2,006.0	24,877
36 (900)	2,935.0	36,398

TABLE 22. Line Size vs. Velocity/Rate.

Nominal Line Size in Inches (mm)	Minimum/Maximum Flow Rate					
	Gallons per Minute			Liters per Minute		
	at .04 ft/s (Low-flow Cutoff)	at 1 ft/s (Min Range Setting)	at 30 ft/s (Max Range Setting)	at .012 m/s (Low-flow Cutoff)	at 0.3 m/s (Min Range Setting)	at 10 m/s (Max Range Setting)
.15 (4)	0.002	0.055	1.65	0.01	0.21	6.83
.30 (8)	0.009	0.220	6.60	0.03	0.83	27.32
1/2 (15)	0.038	0.947	28.412	0.14	3.58	117.45
1 (25)	0.108	2.694	80.813	0.41	10.18	334.07
1 1/2 (40)	0.254	6.345	190.36	0.96	23.98	786.9
2 (50)	0.418	10.459	313.77	1.58	39.54	1,297
3 (80)	0.922	23.042	691.26	3.49	87.10	2,857
4 (100)	1.588	36.679	1,190.4	6.00	138.6	4,920
6 (150)	3.600	90.048	2,701.4	13.61	340.3	11,167
8 (200)	6.240	155.94	4,677.8	23.59	589.4	19,337
10 (250)	9.840	245.78	7,373.4	37.20	929.0	30,480
12 (300)	14.200	352.51	10,575	53.68	1,332	43,715
14 (350)	16.800	421.70	12,651	63.50	1,594	52,296
16 (400)	22.000	550.80	16,524	83.16	2,082	68,304
18 (450)	27.800	697.19	20,916	105.0	2,635	86,459
20 (500)	34.600	866.51	25,995	130.7	3,275	107,457
24 (600)	50.200	1,253.2	37,596	189.7	4,737	155,414
30 (750)	80.200	2,006.0	60,180	303.1	7,582	248,773
36 (900)	117.40	2,935.0	88,050	443.7	11,094	363,983

Model 8705 Flanged and Model 8707 High-Signal Flanged Magnetic Flowmeter Flowtubes

FIGURE 8. Model 8705 Flanged Magnetic Flowmeter Flowtube.

FEATURES

Sealed Housing

The housing for the Model 8705 and Model 8707 is fabricated from carbon steel and is fully welded to provide a hermetic seal that protects against moisture and other contaminants. The sealed housing ensures maximum flowtube reliability by protecting all internal components and wiring from the most hostile environments.

Secondary Containment

The Model 8705 is available with separate sealed compartments that surround electrodes and capture any fluid leakage that may result from a damaged flowtube liner. Because leakage is contained in this secondary sealed compartment, potentially hazardous process fluids can be removed for proper disposal through a drain plug.

High-Signal Flowtube

The Model 8707 High-Signal Flowtube, used in conjunction with the Model 8712H High-Signal Transmitter, forms the Rosemount High-Signal Magnetic Flowmeter System. This system provides stable flow measurement in the most difficult high-noise applications while maintaining the benefits of dc technology. The increased signal strength of the Rosemount high-signal system is made possible through a combination of flowtube coil design that incorporates the most advanced materials and an extremely efficient and innovative coil drive circuit. The increased signal strength of the Rosemount high-signal system, coupled with advanced signal processing and superior filtering techniques, provides the solution to demanding flow measurement applications.

Sanitary Construction

By using Tri-Clover Tri-Clamp® adapters, the Model 8705 is available in a 3-A approved sanitary configuration. To ensure a crevice-free interface, the adapter flanges are designed to attach to a magnetic flowtube of smaller diameter than the process piping. Because of this downsizing, the exposed Teflon (PTFE) leading edge is continuously cleansed by the flowing process. The adapters provided are polished internally and externally. Each adapter is attached to the flowtube with the appropriate stainless steel bolts for easy assembly.

Liquid will not pool on the external surface of the Model 8705, thus satisfying 3-A requirements. The steel tube, flanges, and housing are all covered with polyurethane paint to hold up to innumerable hose downs.

SPECIFICATIONS

Functional Specifications

Service

Conductive liquids and slurries.

Line Sizes

1/2–36 inch (15–900 mm) for Model 8705.

3–36 inch (80–600 mm) for Model 8707.

Interchangeability

Model 8705 Flowtubes are interchangeable with Model 8712C/U, Model 8732, and Model 8742C Transmitters. Model 8707 High-Signal Flowtubes are interchangeable with Model 8712H High-Signal Transmitters. System accuracy is maintained regardless of line size or optional features. Each flowtube nameplate has a sixteen-digit calibration number that can be entered into a transmitter through the Local Operator Interface (LOI) or the HART Communicator on the Model 8712C/U/H and the Model 8732C. In a FOUNDATION™ fieldbus environment, the Model 8742C can be configured using the DeltaV™ fieldbus configuration tool or another FOUNDATION fieldbus configuration device. No further calibration is necessary.

Upper Range Limit

30 ft/s (10 m/s).

Process Temperature Limits

Teflon (PTFE) Lining

–20 to 350 °F (–29 to 177 °C).

Tefzel (ETFE) Lining

–20 to 300 °F (–29 to 149 °C).

Polyurethane Lining

0 to 140 °F (–18 to 60 °C).

Neoprene Lining

0 to 185 °F (–18 to 85 °C).

Linatex Lining (Not available for Model 8707)

0 to 158 °F (–18 to 70°C).

Ambient Temperature Limits

–30 to 150 °F (–34 to 65 °C).

Pressure Limits

See Table 24 and Table 25.

Vacuum Limits

Teflon (PTFE) Lining

Full vacuum to 350 °F (177 °C) through 4-inch (100 mm) line sizes. Consult factory for vacuum applications with line sizes of 6 inches (150 mm) or larger.

All Other Standard Flowtube Lining Materials

Full vacuum to maximum material temperature limits for all available line sizes.

Submergence Protection

IP 68. Continuous to 30 feet (10 meters).

Hazardous Location Certifications

N0 Factory Mutual (FM) Approval Non-incendive, non-flammable fluid service for Class I, Division 2 Groups A, B, C, and D; Dust-ignition proof for Class II/III, Division 1 Groups E, F, and G hazardous locations. T5 temperature level.
AND
Canadian Standards Association (CSA) Approval Suitable for use in Class I, Division 2 Groups A, B, C, and D; Dust-ignition proof for Class II/III, Division 1, Groups E, F, and G hazardous locations.
AND
CE Marking (Model 8705 only).

N5 Factory Mutual (FM) Approval Non-incendive, flammable fluid service for Class I, Division 2 Groups A, B, C, and D; Dust-ignition proof for Class II/III, Division 1 Groups E, F, and G hazardous locations. T5 temperature level.

KD KEMA/CENELEC (Model 8705 only)
EEx e ia IIC T3...T6 (See Table 23)
AND
CE Marking (Model 8705 only).

TABLE 23. Relation Between Ambient Temperature, Process Temperature, and Temperature Class

Meter Size (inches)	Maximum Ambient Temperature	Maximum Process Temperature	Temperature Class
1/2	149 °F (65 °C)	240 °F (116 °C)	T3
1	149 °F (65 °C)	248 °F (120 °C)	T3
1	95 °F (35 °C)	95 °F (35 °C)	T4
1 1/2	149 °F (65 °C)	257 °F (125 °C)	T3
1 1/2	140 °F (60 °C)	140 °F (60 °C)	T4
2	149 °F (65 °C)	257 °F (125 °C)	T3
2	149 °F (65 °C)	167 °F (75 °C)	T4
2	104 °F (40 °C)	104 °F (40 °C)	T5
3 - 4	149 °F (65 °C)	266 °F (130 °C)	T3
3 - 4	149 °F (65 °C)	167 °F (75 °C)	T4
3 - 4	131 °F (55 °C)	194 °F (90 °C)	T5
3 - 4	104 °F (40 °C)	104 °F (40 °C)	T6
6	149 °F (65 °C)	175 °F (79 °C)	T3
6	149 °F (65 °C)	167 °F (75 °C)	T4
6	149 °F (65 °C)	230 °F (110 °C)	T5
6	140 °F (60 °C)	140 °F (60 °C)	T6
8 - 36	149 °F (65 °C)	284 °F (140 °C)	T3
8 - 36	149 °F (65 °C)	240 °F (116 °C)	T4
8 - 36	149 °F (65 °C)	176 °F (80 °C)	T5
8 - 36	149 °F (65 °C)	149 °F (65 °C)	T6

Conductivity Limits

Process liquid must have a conductivity of 5 microsiemens/cm (5 micromhos/cm) or greater for Model 8705. Process liquid must have a conductivity of 50 microsiemens/cm (50 micromhos/cm) for Model 8707. Excludes the effect of interconnecting cable length in remote mount transmitter installations.

TABLE 24. Flowtube Temperature vs. Pressure Limits for ASME B16.5 Class Flanges ($^1/_2$- to 24-inch line sizes).(1)

Flange Material	Flange Rating	Pressure			
		@ -20 to 100 °F (-29 to 38 °C)	@ 200 °F (93 °C)	@ 300 °F (149 °C)	@ 350 °F (177 °C)
Carbon Steel	Class 150	255 psi	260 psi	230 psi	215 psi
	Class 300	740 psi	675 psi	655 psi	645 psi
304 Stainless Steel	Class 150	275 psi	235 psi	205 psi	190 psi
	Class 300	720 psi	600 psi	530 psi	500 psi

(1) 30- and 36-inch AWWA C207 Table 2 Class D rated to 150 psi at 150 °F (66 °C).

TABLE 25. Flowtube Temperature vs. Pressure Limits for DIN Flanges (15 to 600 mm line sizes).

Flange Material	Flange Rating	Pressure			
		@ -196 to 50 °C (-320 to 122 °F)	@ 100 °C (212 °F)	@ 150 °C (302 °F)	@ 175°C (347 °F)
Carbon Steel	PN 10	10 bar	10 bar	9.6 bar	9 bar
	PN 16	16 bar	16 bar	15.2 bar	14.2 bar
	PN 25	25 bar	25 bar	24 bar	22.5 bar
	PN 40	40 bar	40 bar	37.1 bar	34.5 bar
304 Stainless Steel	PN 10	10 bar	8.4 bar	7.6 bar	7.2 bar
	PN 16	16 bar	13.5 bar	12.2 bar	11.6 bar
	PN 25	25 bar	21.2 bar	19.1 bar	18.2 bar
	PN 40	31.1 bar	27.5 bar	25.8 bar	25.1 bar

Performance Specifications

(System specifications are given using the frequency output and with the unit at referenced conditions.)

Accuracy

Model 8705 with Model 8712C/U, Model 8732C, or Model 8742C

±0.5% of rate from 1 to 30 ft/s (0.3 to 10 m/s). Includes combined effects of linearity, hysteresis, repeatability, and calibration uncertainty. Accuracy is ±0.005 ft/s (±0.0015 m/s) from low-flow cutoff to 1.0 ft/s (0.3 m/s).

Model 8707 with Model 8712C/U/H, Model 8732C, or Model 8742C

±0.5% of rate from 3 to 30 ft/s (1 to 10 m/s). Include combined effects of linearity, hysteresis, repeatability and calibration uncertainty. Accuracy is ±0.015 ft/s (±0.0045 m/s) from low-flow cutoff to 3.0 ft/s (1 m/s).

Vibration Effect

Meets IEC 770 Pipeline Installation Conditions.

Mounting Position Effect

None when installed to ensure flowtube remains full.

Physical Specifications

Non-Wetted Materials

Flowtube

AISI Type 304 SST.

Flanges

Carbon steel, AISI Type 304 SST, or Type 316 SST.

Housing

Welded steel.

Paint

Polyurethane.

Process Wetted Materials

Lining

Teflon (PTFE), Tefzel (ETFE), polyurethane, neoprene, Linatex.

Electrodes

316L SST, Hastelloy C-276, tantalum, 90% platinum-10% iridium, titanium.

Process Connections

ASME B16.5 (ANSI) Class 150, Class 300, or Class 600

0.5- to 24-inch.

AWWA C207 Table 2 Class D
30- and 36-inch.

DIN PN 10, 16, 25, and 40
PN10: Not available for flange sizes from 15 to 150 mm.

PN16: Not available for flange sizes from 15 to 80 mm.

PN 25: Not available for flange sizes from 15 to 150 mm.

PN40: Available for all flange sizes.

AISI Type 304 SST Sanitary Tri-Clover
3-A approved quick disconnect ferrule-mounted to ASME B16.5 (ANSI) Class 150 flange; 0.5- to 3-inch.

Electrical Connections
Two ¾–14 NPT connections with number 8 screw terminals are provided in the terminal enclosure for electrical wiring.

Grounding Electrode
A grounding electrode is installed similarly to the measurement electrodes through the flowtube lining. It is available in all electrode materials.

Grounding Rings
Grounding rings are installed between the flange and the tube face on both ends of the flowtube. They have an I.D. slightly larger than the flowtube I.D. and an external tab to attach ground wiring. Grounding rings are available in 316L SST, Hastelloy-C, titanium, and tantalum.

Lining Protectors
Lining protectors are installed between the flange and the tube face on both ends of the flowtube. The leading edge of lining material is protected by the lining protector; lining protectors cannot be removed once they are installed. Lining protectors are available in 316L SST, Hastelloy-C, and titanium.

Flowtube Dimensions
See Table 27, Table 29, Table 28.

See Figure 9, Figure 10, and Figure 11.

Weight
See Table 26.

TABLE 26. Flowtube Weight.

Nominal Line Size[1] Inches (mm)	Flowtube Flange Rating		Flowtube Weight lb (kg)
	ASME B16.5 (ANSI)	DIN	
½ (15) ½ (15)	150 300	PN 40	20 (9) 22 (10)
1 (25) 1 (25)	150 300	PN 40	20 (9) 22 (10)
1½ (40) 1½ (40)	150 300	PN 40	22 (10) 24 (11)
2 (50) 2 (50)	150 300	PN 40	26 (12) 28 (13)
3 (80) 3 (80)	150 300	PN 40	40 (18) 47 (21)
4 (100) 4 (100)	150 300	PN 16	48 (22) 65 (30)
6 (150) 6 (150)	150 300	PN 16	81 (37) 93 (42)
8 (200) 8 (200)	150 300	PN 10	110 (50) 162 (74)
10 (250) 10 (250)	150 300	PN 10	220 (98) 300 (136)
12 (300) 12 (300)	150 300	PN 10	330 (150) 435 (197)
14 (350) 16 (400)	150 150	PN 10 PN 10	370 (168) 500 (227)
18 (450) 20 (500)	150 150	PN 10 PN 10	600 (272) 680 (308)
24 (600)	150	PN 10	1,000 (454)
30 (750) 36 (900)	125 125	CF CF	1,400 (637) 1,975 (898)

(1) 30- and 36-inch AWWA C207 Table 2 Class D rated to 150 psi at 150 °F (66 °C).

CF = Consult Factory

TABLE 27. Model 8705 and Model 8707 Dimensions in Inches (Millimeters).
Refer to Dimensional Drawings, Figure 9, Figure 10, and Figure 11.

Line Size[1] and Flange Rating (ASME B 16.5)	Liner Face Diameter "A"	Process Flange Rad. "B"	Overall Flowtube Length "L"[2]	Body Height "C"	Body Width '"D"	Centerline to Conduit "E"	Bolt Hole Circle Diameter	Bolt Hole Diameter	Number and Size of Bolts
0.5–150 0.5 –300	1.38 (35) 1.38 (35)	1.75 (44) 1.88 (48)	7.88 (200) 7.88 (200)	8.75 (222) 8.75 (222)	6.88 (175) 6.88 (175)	5.16 (131) 5.16 (131)	2.38 (60) 2.62 (67)	0.62 (16) 0.62 (16)	4–1/2 4–1/2
1 –150 1 –300	2.00 (51) 2.00 (51)	2.13 (54) 2.44 (62)	7.88 (200) 7.88 (200)	8.75 (222) 8.75 (222)	7.34 (186) 7.34 (186)	5.16 (131) 5.16 (131)	3.12 (79) 3.50 (89)	0.62 (16) 0.75 (19)	4–1/2 4–5/8
1.5 –150 1.5 –300	2.88 (73) 2.88 (73)	2.50 (64) 3.06 (78)	7.88 (200) 7.88 (200)	9.52 (242) 9.52 (242)	7.05 (179) 7.05 (179)	5.57 (141) 5.57 (141)	3.88 (99) 4.50 (114)	0.62 (16) 0.88 (22)	4–1/2 4–3/4
2 –150 2 –300	3.62 (92) 3.62 (92)	3.00 (76) 3.25 (83)	7.88 (200) 7.88 (200)	9.52 (242) 9.52 (242)	7.47 (190) 7.47 (190)	5.57 (141) 5.57 (141)	4.75 (121) 5.00 (127)	0.75 (19) 0.75 (19)	4–5/8 8–5/8
3 –150 3 –300	5.00 (127) 5.00 (127)	3.75 (95) 4.13 (105)	7.88 (200) 8.63 (219)	11.52 (293) 11.52 (293)	9.57 (243) 9.57 (243)	6.57 (167) 6.57 (167)	6.00 (152) 6.62 (168)	0.75 (19) 0.88 (22)	4–5/8 8–3/4
4 –150 4 –300	6.19 (157) 6.19 (157)	4.50 (114) 5.00 (127)	9.84 (250) 10.88 (276)	12.22 (310) 12.22 (310)	10.01 (254) 10.01 (254)	6.92 (176) 6.92 (176)	7.50 (191) 7.88 (200)	0.75 (19) 0.88 (22)	8–5/8 8–3/4
6 –150 6 –300	8.50 (216) 8.50 (216)	5.50 (140) 6.25 (159)	11.81 (300) 13.06 (332)	14.39 (366) 14.39 (366)	10.41 (264) 10.41 (264)	8.05 (204) 8.05 (204)	9.50 (241) 10.62 (270)	0.88 (22) 0.88 (22)	8–3/4 12–3/4
8 –150 8 –300	10.62 (270) 10.62 (270)	6.75 (171) 7.50 (191)	13.78 (350) 15.60 (396)	16.33 (415) 16.33 (415)	11.38 (289) 11.38 (289)	9.02 (229) 9.02 (229)	11.75 (298) 13.00 (330)	0.88 (22) 1.00 (25)	8–3/4 12–7/8
10 –150 10 –300	12.75 (324) 12.75 (324)	8.00 (203) 8.75 (225)	15.00 (381) 17.13 (435)	19.11 (485) 19.11 (485)	17.00 (432) 17.00 (432)	10.44 (265) 10.44 (265)	14.25 (362 15.25 (387)	1.00 (25) 1.12 (28)	12–7/8 16–1
12 –150 12 –300	15.00 (381) 15.00 (381)	9.50 (241) 10.25 (260)	18.00 (457) 20.14 (512)	21.27 (540) 21.27 (540)	19.16 (487) 19.16 (487)	11.52 (293) 11.52 (293)	17.00 (432) 17.75 (451)	1.00 (25) 1.25 (32)	12–7/8 16–1 1/8
14 –150 14 –300	16.25 (413) 16.25 (413)	10.50 (267) 11.50 (292)	21.00 (533) 23.25 (591)	23.39 (594) 23.39 (594)	21.28 (541) 21.28 (541)	12.58 (320) 12.58 (320)	18.75 (476) 20.25 (514)	1.12 (28) 1.25 (32)	12–1 20–1 1/8
16 –150 16 –300	18.50 (470) 18.50 (470)	11.75 (298) 12.75 (324)	24.00 (610) 26.25 (667)	25.41 (645) 25.41 (645)	23.30 (592) 23.30 (592)	13.59 (345) 13.59 (345)	21.25 (540) 22.50 (572)	1.12 (28) 1.38 (35)	16–1 20–1 1/4
18 –150 18 –300	21.00 (533) 21.00 (533)	12.50 (318) 14.00 (356)	27.00 (686) 30.12 (765)	27.93 (709) 27.93 (709)	25.82 (656) 25.82 (656)	14.85 (377) 14.85 (377)	22.75 (578) 24.75 (629)	1.25 (32) 1.38 (35)	16–1 1/8 24–1 1/4
20 –150 20 –300	23.00 (584) 23.00 (584)	13.75 (349) 15.25 (387)	30.00 (762) 33.25 (845)	29.95 (761) 29.95 (761)	27.84 (707) 27.84 (707)	15.86 (403) 15.86 (403)	25.00 (635) 27.00 (686)	1.25 (32) 1.38 (35)	20–1 1/8 24–1 1/4
24 –150 24 –300	27.25 (692) 27.25 (692)	16.00 (406) 18.00 (457)	36.00 (914) 39.64 (1007)	34.50 (876) 34.50 (876)	32.39 (823) 32.39 (823)	18.14 (461) 18.14 (461)	29.50 (749) 32.00 (813)	1.37 (35) 1.62 (41)	20–1 1/4 24–1 1/2
30 36	33.80 (859) 40.27 (1023)	19.38 (492) 23.00 (584)	37.25 (946) 40.75 (1035)	40.41 (1026) 48.29 (1227)	38.50 (928) 46.38 (1178)	21.31 (541) 25.25 (641)	36.00 (914) 42.75 (1086)	1.38 (35) 1.63 (41)	28–1 1/4 32–1 1/2
Dimensions with ASME B16.5 (ANSI) Flanges									

(1) 30- and 36-inch AWWA C207 Table 2 Class D rated to 150 psi at 150 °F.

(2) When grounding rings (2 rings per meter) are specified, add 0.25 inch (6.35 mm) for 0.50- through 14-inch (15 through 350 mm) flowtubes, add 0.50 inch (12.7 mm) for 16-inch (400 mm) and larger. When lining protectors are specified, add 0.25 inch (6.35 mm) for ½- through 12-inch (15 through 300 mm) flowtubes, add 0.50 inch (12.7 mm) for 14- through 36-inch (350 through 900 mm) flowtubes.

TABLE 28. Flowtube Dimensions in inches (millimeters).

Line Size and Flange Rating	Nominal Tri-Clamp Diameter	Process Flange Rad. "B"	Body Height "C" Max	Centerline to Conduit "E"	Overall Flowtube Length "L"
0.5–150 lb.	1.00 (25)	1.75 (44)	8.38 (213)	5.16 (131)	13.78 (350)
1–150 lb.	1.50 (40)	2.13 (54)	8.38 (213)	5.16 (131)	13.78 (350)
1.5–150 lb.	2.00 (50)	2.50 (64)	9.00 (229)	5.56 (141)	13.78 (350)
2–150 lb.	3.00 (80)	3.00 (76)	9.00 (229)	5.56 (141)	13.78 (350)
3–150 lb.	4.00 (100)	3.75 (95)	12.00 (305)	6.57 (167)	13.78 (350)
Dimensions with ASME B16.5 (ANSI) Flanges and Tri-Clamp Adapters.					

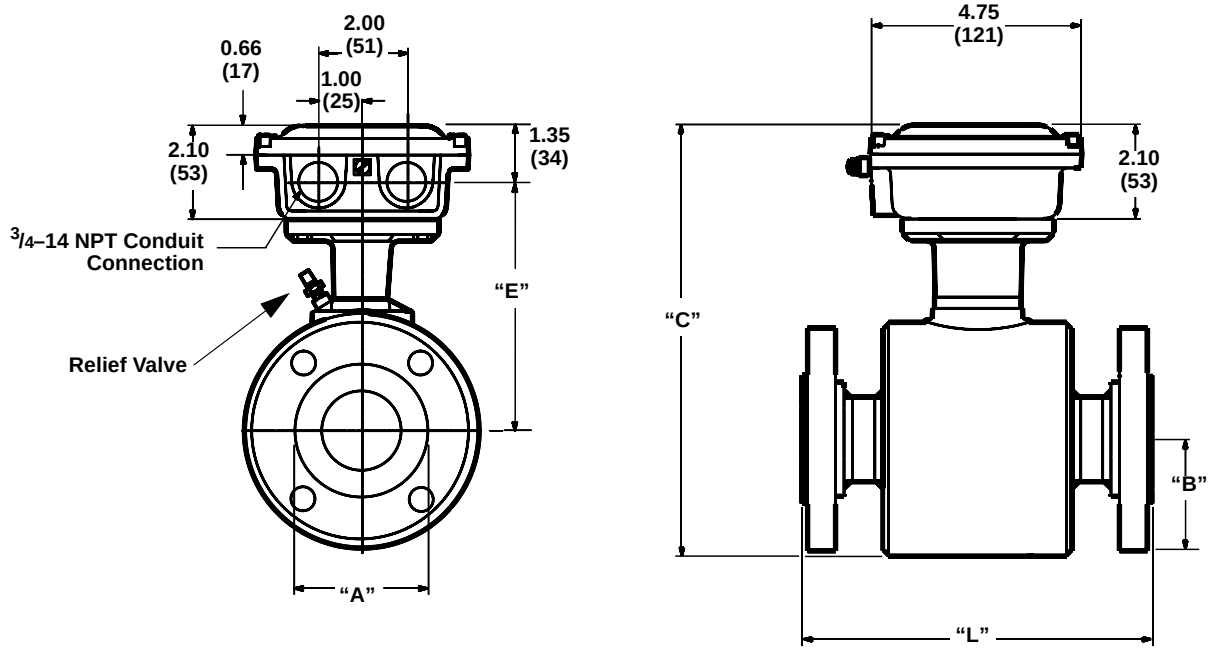
TABLE 29. Model 8705 Flowtube Dimensions with DIN Flanges in Millimeters (Inches).

Line Size[1] and Flange Rating	Liner Face Diameter "A"	Process Flange Rad. "B"	Overall Flowtube Length "L"[2]	Body Height "C"	Body Width "D" with Port	Centerline to Conduit "E"	Bolt Hole Circle Diameter	Bolt Hole Diameter	Number of Bolts
15 mm PN 10–40	45 (1.77)	47 (1.87)	200 (7.88)	222 (8.75)	175 (6.88)	131 (5.16)	65 (2.56)	14 (0.55)	4
25 mm PN 10–40	68 (2.68)	58 (2.27)	200 (7.88)	222 (8.75)	186 (7.34)	131 (5.16)	85 (3.35)	14 (0.55)	4
40 mm PN 10–40	88 (3.46)	75 (2.96)	200 (7.87)	242 (9.52)	179 (7.05)	141 (5.57)	110 (4.33)	18 (0.71)	4
50 mm PN 10–40	102 (4.02)	83 (3.25)	200 (7.87)	242 (9.52)	190 (7.47)	141 (5.57)	125 (4.92)	18 (0.71)	4
80 mm PN 10–40	138 (5.43)	100 (3.94)	200 (7.87)	293 (11.52)	243 (9.57)	167 (6.57)	160 (6.30)	18 (0.71)	8
100 mm PN 10–16	158 (6.22)	110 (4.33)	250 (9.84)	310 (12.22)	254 (10.01)	176 (6.92)	180 (7.09)	18 (0.71)	8
100 mm PN 25–40	162 (6.38)	117 (4.63)	250 (9.84)	310 (12.22)	254 (10.01)	176 (6.92)	190 (7.48)	22 (0.87)	8
150 mm PN 10–16	212 (8.35)	142 (5.61)	300 (11.81)	366 (14.39)	264 (10.41)	204 (8.05)	240 (9.45)	22 (0.87)	8
150 mm PN 25	218 (8.58)	150 (5.91)	300 (11.81)	366 (14.39)	264 (10.41)	204 (8.05)	240 (9.45)	22 (0.87)	8
150 mm PN 40	218 (8.58)	150 (5.91)	332 (13.06)	366 (14.39)	264 (10.41)	204 (8.05)	240 (9.45)	22 (0.87)	8
200 mm PN 10	268 (10.55)	170 (6.70)	351 (13.81)	415 (16.33)	289 (13.38)	229 (9.02)	295 (11.61)	22 (0.87)	8
200 mm PN 16	268 (10.55)	170 (6.70)	351 (13.81)	415 (16.33)	289 (13.38)	229 (9.02)	295 (11.61)	22 (0.87)	8
200 mm PN 25	278 (10.94)	180 (7.09)	350 (13.78)	415 (16.33)	289 (13.38)	229 (9.02)	310 (12.20)	26 (1.02)	12
200 mm PN 40	285 (11.22)	187 (7.38)	396 (15.60)	415 (16.33)	289 (13.38)	229 (9.02)	320 (12.60)	30 (1.18)	12
250 mm PN 10	320 (12.60)	197 (7.70)	381 (15.00)	485 (19.11)	432 (17.00)	265 (10.44)	350 (13.78)	22 (0.87)	12
250 mm PN 16	320 (12.60)	202 (7.97)	381 (15.00)	485 (19.11)	432 (17.00)	265 (10.44)	355 (13.98)	26 (1.02)	12
250 mm PN 25	335 (13.19)	213 (8.39)	381 (15.00)	485 (19.11)	432 (17.00)	265 (10.44)	370 (14.67)	30 (1.18)	12
250 mm PN 40	345 (13.58)	225 (8.86)	435 (17.13)	485 (19.11)	432 (17.00)	265 (10.44)	385 (15.16)	33 (1.30)	12
300 mm PN 10	370 (14.57)	223 (8.76)	457 (18.00)	540 (21.27)	487 (19.16)	265 (10.44)	400 (15.75)	22 (0.87)	12
300 mm PN 16	378 (14.88)	230 (9.06)	457 (18.00)	540 (21.27)	487 (19.16)	293 (11.52)	410 (16.14)	26 (1.02)	12
300 mm PN 25	395 (15.55)	242 (9.55)	457 (18.00)	540 (21.27)	487 (19.16)	293 (11.52)	430 (16.93)	30 (1.18)	16
300 mm PN 40	410 (16.14)	258 (10.12)	512 (20.14)	540 (21.27)	487 (19.16)	293 (11.52)	450 (17.72)	33 (1.30)	16
350 mm PN 10	430 (16.93)	252 (9.94)	534 (21.03)	594 (23.39)	541 (21.28)	293 (11.52)	460 (18.11)	22 (0.87)	16
350 mm PN 16	438 (17.24)	260 (10.24)	534 (21.03)	594 (23.39)	541 (21.28)	320 (12.58)	470 (18.50)	26 (1.02)	16
350 mm PN 25	450 (17.72)	277 (10.93)	534 (21.03)	594 (23.39)	541 (21.28)	320 (12.58)	490 (19.29)	33 (1.30)	16
350 mm PN 40	465 (18.31)	290 (11.42)	591 (23.25)	594 (23.39)	541 (21.28)	320 (12.58)	510 (20.08)	36 (1.42)	16
400 mm PN 10	482 (18.98)	282 (11.12)	610 (24.00)	645 (25.04)	592 (23.30)	345 (13.59)	515 (20.28)	26 (1.02)	16
400 mm PN 16	490 (19.29)	290 (11.42)	610 (24.00)	645 (25.04)	592 (23.30)	345 (13.59)	525 (20.67)	30 (1.18)	16
400 mm PN 25	505 (19.88)	310 (12.21)	610 (24.00)	645 (25.04)	592 (23.30)	345 (13.59)	550 (21.65)	36 (1.42)	16
400 mm PN 40	535 (21.06)	330 (12.99)	667 (26.25)	645 (25.04)	592 (23.30)	345 (13.59)	585 (23.03)	39 (1.54)	16
450 mm PN 10	532 (20.94)	308 (12.13)	686 (27.00)	709 (27.93)	656 (25.82)	377 (14.85)	565 (22.24)	26 (1.02)	20
450 mm PN 16	550 (21.65)	320 (12.60)	686 (27.00)	709 (27.93)	656 (25.82)	377 (14.85)	585 (23.03)	30 (1.18)	20
450 mm PN 40	560 (22.05)	343 (13.50)	765 (30.12)	709 (27.93)	656 (25.82)	377 (14.85)	610 (24.02)	30 (1.18)	20
500 mm PN 10	585 (23.03)	335 (13.19)	762 (30.00)	761 (29.95)	707 (27.84)	403 (15.86)	620 (24.41)	26 (1.02)	20
500 mm PN 16	610 (24.02)	358 (14.08)	762 (30.00)	761 (29.95)	707 (27.84)	403 (15.86)	650 (25.59)	33 (1.30)	20
500 mm PN 25	615 (24.21)	365 (14.37)	762 (30.00)	761 (29.95)	707 (27.84)	403 (15.86)	660 (25.98)	36 (1.42)	20
500 mm PN 40	615 (24.21)	378 (14.88)	845 (33.25)	761 (29.95)	707 (27.84)	403 (15.86)	670 (26.38)	42 (1.65)	20
600 mm PN 10	685 (26.97)	390 (15.36)	914 (36.00)	885 (34.85)	823 (32.39)	461 (18.14)	725 (28.54)	30 (1.18)	20
600 mm PN 16	725 (28.54)	420 (16.54)	914 (36.00)	877 (34.51)	823 (32.39)	461 (18.14)	770 (30.31)	36 (1.42)	20
600 mm PN 25	720 (28.35)	423 (16.64)	914 (36.00)	877 (34.51)	823 (32.39)	461 (18.14)	770 (30.31)	39 (1.54)	20
600 mm PN 40	735 (18.94)	445 (17.52)	1,007 (39.64)	886 (34.88)	823 (32.39)	461 (18.14)	795 (31.30)	48 (1.88)	20
Dimensions with DIN Flanges									

(1) Consult factory for larger line sizes.

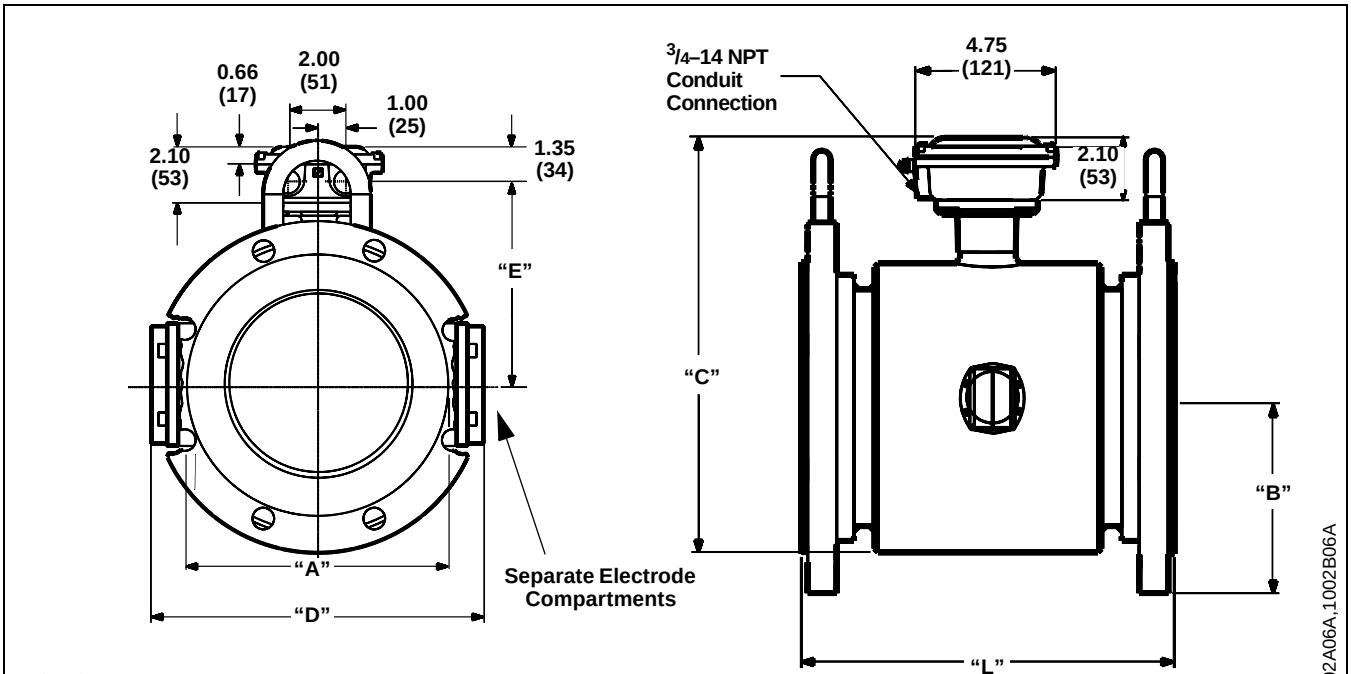
(2) When grounding rings (2 rings per meter) are specified, add 6.35 mm (0.25 in.) for 15 mm through 350 mm (½- through 14 in.) flowtubes or 12.7 mm (0.50 in.) for 400 mm (16 in.) and larger. When lining protectors are specified, add 6.35 mm (0.25 in.) for 15 mm through 300 mm (½- through 12-in.) flowtubes, 12.7 mm (0.50 in.) for 350 mm through 900 mm (14- through 36-in.) flowtubes.

FIGURE 9. Dimensional Drawing of Model 8705 and Model 8707 Flowtubes,
Typical of 1/2- through 4-inch (15 through 100 mm) Line Sizes with Option Code W1, Housing Configuration.



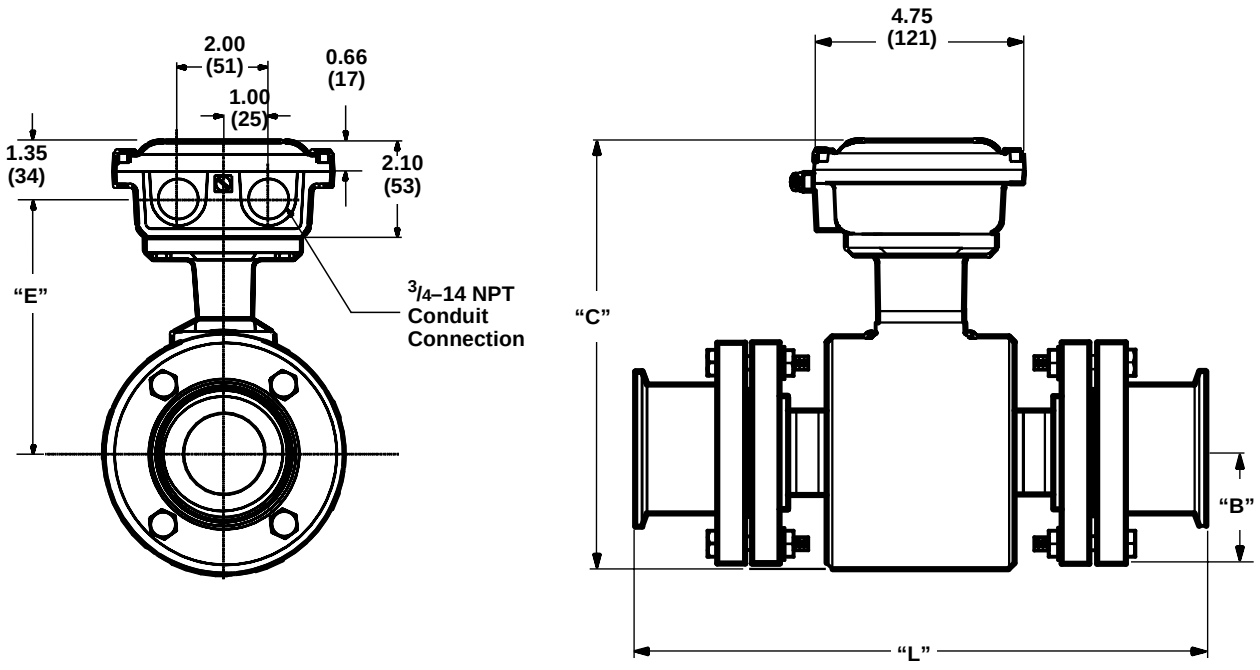
NOTES
Dimensions are in inches (millimeters).
See Table 27 and 29 for variable dimensions.

FIGURE 10. Dimensional Drawing of Model 8705 and Model 8707 Flowtubes,
Typical of 6- through 36-inch (150 through 900 mm) Line Sizes with Option Code W3, Housing Configuration.



NOTES
Dimensions are in inches (millimeters).
Consult factory for larger line sizes.
See Table 27 and 29 for variable dimensions.

FIGURE 11. Dimensional Drawing of Model 8705 Sanitary Flowtubes,
Typical of 1/2- through 3-inch (15 through 86 mm) Line Sizes with Option Code W0, Housing Configuration.



NOTES
Dimensions are in inches (millimeters).
See Table 7 for variable dimensions.

ORDERING INFORMATION

NA = Not Available

Code	Product Description	Availability
8705	Magnetic Flowmeter Flowtube	•
Code	**Lining Material**	
T	*Teflon* (PTFE)	•
F	*Tefzel* (ETFE) (available in ½- to 16-inch (15 to 400 mm) line sizes)	•
P	Polyurethane (available in 1½- to 36-inch (40 to 900 mm) line sizes)	•
N	Neoprene (available in 1½- to 36-inch (40 to 900 mm) line sizes)	•
L	Linatex natural rubber (available in 1½- to 36-inch (40 to 900 mm) line sizes)	•
Code	**Electrode Material / Electrode Type**	
	Two Measurement Electrodes	
SA	316L Stainless Steel	•
HA	*Hastelloy* C-276	•
TA	Tantalum	•
PA	90% Platinum—10% Iridium	•
NA	Titanium	•
	Two Measurement Electrodes + Third Grounding Electrode	
SE	316L Stainless Steel	•
HE	*Hastelloy* C-276	•
TE	Tantalum	•
PE	90% Platinum—10% Iridium	•
NE	Titanium	•
	Two Bulletnose Measurement Electrodes	
SB	316L Stainless Steel	•
HB	*Hastelloy* C-276	•
	Two Removable Measurement Electrodes (not available in ½- and 1-inch (14 and 25 mm) line sizes); requires W3 option	
SR	316L Stainless Steel	•
HR	*Hastelloy* C-276	•
Other electrode materials and types available upon request. Consult factory.		

		Lining Material (from above)		
Code	**Line Size**	**Code T**	**Code F**	**Code P, N, and L**
005	½ inch (15 mm)	•	•	NA
010	1 inch (25 mm)	•	•	NA
015	1½ inch (40 mm)	•	•	•
020	2 inch (50 mm)	•	•	•
030	3 inch (80 mm)	•	•	•
040	4 inch (100 mm)	•	•	•
060	6 inch (150 mm)	•	•	•
080	8 inch (200 mm)	•	•	•
100	10 inch (250 mm)	•	•	•
120	12 inch (300 mm)	•	•	•
140	14 inch (350 mm)	•	•	•
160	16 inch (400 mm)	•	•	•
180	18 inch (450 mm)	•	NA	•
200	20 inch (500 mm)	•	NA	•
240	24 inch (600 mm)	•	NA	•
300	30 inch (750 mm) (available with Electrode Access [W3 option] only)	•	NA	•
360	36 inch (900 mm) (available with Electrode Access [W3 option] only)	•	NA	•

NA = Not Available

Code	Flange Material, Type, and Rating	Availability
C1	Carbon Steel, ASME B16.5 (ANSI) Class 150 (30- and 36-inch AWWA C207 Table 2 Class D Flat Face)	•
C3	Carbon Steel, ASME B16.5 (ANSI) Class 300	•
C6	Carbon Steel, ASME B16.5 (ANSI) Class 600[1] (maximum pressure: 1000 psig; available in ½- through 10-inch [15 through 250 mm])	•
C7	Carbon Steel, ASME B16.5 (ANSI) Class 600[2] (with lining material codes P, N, and L only; available in 1½- through 8-inch [40 through 200 mm])	•
S1	304 Stainless Steel, ASME B16.5 (ANSI) Class 150 (30- and 36-inch AWWA C207 Table 2 Class D Flat Face)	•
S3	304 Stainless Steel, ASME B16.5 (ANSI) Class 300	•
S6	304 Stainless Steel, ASME B16.5 (ANSI) Class 600[1] (maximum pressure: 1000 psig; available in ½- through 10-inch [15 through 250 mm])	•
S7	304 Stainless Steel, ASME B16.5 (ANSI) Class 600[2] (lining material codes P, N, and L only; available in 1½- through 8-inch [40 through 200 mm])	•
P1	316 Stainless Steel, ASME B16.5 (ANSI) Class 150 (30- and 36-inch AWWA C207 Table 2 Class D Flat Face), pipe and flange	•
P3	316 Stainless Steel, ASME B16.5 (ANSI) Class 300, pipe and flange	•
CD	Carbon Steel, DIN PN 10 (not available for flange sizes 15 to 150 mm)	•
CE	Carbon Steel, DIN PN 16 (not available for flange sizes 15 to 80 mm)	•
CF	Carbon Steel, DIN PN 25 (not available for flange sizes 15 to 150 mm)	•
CH	Carbon Steel, DIN PN 40 (not available for flange sizes 750 to 900 mm)	•
SD	Stainless Steel, DIN PN 10 (not available for flange sizes 15 to 150 mm)	•
SE	Stainless Steel, DIN PN 16 (not available for flange sizes 15 to 80 mm)	•
SF	Stainless Steel, DIN PN 25 (not available for flange sizes 15 to 150 mm)	•
SH	Stainless Steel, DIN PN 40 (not available for flange sizes 750 to 900 mm)	•
Other flange materials, types, and ratings avilable upon request. Consult factory.		
Code	**Electrode Housing Configuration**	
W0	Sealed, welded housing	•
W1	Sealed, welded housing with pressure relief	•
W3	Sealed, welded housing with separate electrode compartments	•
Code	**Hazardous Location Certifications**	
N0	Factory Mutual (FM) Class I, Division 2 Approval for nonflammable fluids; Canadian Standards Association (CSA) Class I, Division 2 Approval; CE Marking	•
N5	Factory Mutual (FM) Class I, Division 2 Approval for flammable fluids	•
KD	KEMA/CENELEC EEx e ia IIC Approval; CE Marking	•

NA = Not Available

Code	Options	
	Optional Grounding Rings[3]	
G1	316L SST Grounding Rings	•
G2	*Hastelloy* C-276 Grounding Rings (½- to 12-inch (15 to 300 mm) flowtube line sizes)	•
G3	Titanium Grounding Rings (½- to 12-inch (15 to 300 mm) flowtube line sizes)	•
G4	Tantalum Grounding Rings (½- to 8-inch (15 to 200 mm) flowtube line sizes)	•
	Optional Lining Protectors[3]	
L1	316L SST Lining Protectors	•
L2	*Hastelloy* C-276 Lining Protectors (½- to 12-inch (15 to 300 mm) flowtube line sizes)	•
L3	Titanium Lining Protectors (½- to 12-inch (15 to 300 mm) flowtube line sizes)	•
	Optional Sanitary Connections[4]	
A3	Sanitary 3-A (½- to 3-inch (15 to 80 mm) sizes only); ASME B16.5 (ANSI) Class 150 to Tri-Clamp Adapter	•
A4	Sanitary 3-A (2½-inch (64 mm) sizes only); ASME B16.5 (ANSI) Class 150 to Tri-Clamp Adapter	•
A5	Cherry Burrell Sanitary I-line (½- to 3-inch (15 to 80 mm) sizes only); ASME B16.5 (ANSI) Class 150 to I-line Adapter	•
A6	Cherry Burrell Sanitary I-line (2½-inch (64 mm) sizes only); ASME B16.5 (ANSI) Class 150 to I-Line Adapter	•
	Other Options	
B1	Integral Mount with Model 8712C/U Transmitter	•
B3	Integral Mount with Model 8732C/8742C Transmitter	•
D1	High Accuracy Calibration [0.25% of rate from 3-30 ft/s (0.9-10 m/s)] matched flowtube and transmitter system[5]	•
H1	Model 8701 flowtube lay length (available for ½- to 4-inch (15 to 100 mm) line sizes); spool piece: ASME B16.5 (ANSI) Class 150 or Class 300 flange and 304 stainless steel pipe	•
H2	Model 8701 Flowtube lay length (available for ½- to 16-inch (15-400 mm) line sizes.)	•
Q4	Inspection Certificate for Calibration Data Consistent with ISO 10474 3.1B	•
Q8	Material Traceability Certificate per DIN 3.1 B	•
Q9	Material Traceability Certificate (electrodes only) per DIN 3.1B 337	•
Q66	Welding Procedure Qualification Record Documentation	•
Q69	Welder Performance Qualification Record Documentation	•
Q70	Inspection Certificate Weld Examination, ISO 10474 3.1B	
	– ½- to 12-inch [15-300 mm] flowtube line sizes	•
	– 14- to 18-inch [350-450 mm] flowtube line sizes	•
	– 20- to 36-inch [500-900 mm] flow tube line sizes	•
Typical Model Number:	**8705 T SA 040 C1 W0 N0**	

(1) Electrode options limited to two measurement electrodes or two measurement electrodes + third grounding electrode.

(2) Electrode options limited to two stainless steel or two Hastelloy C-276 measurement electrodes only.

(3) Grounding Rings and Lining Protectors provide the same fluid grounding function. Lining Protectors available in Teflon (PTFE) and Tefzel (ETFE) only.

(4) Sealed, welded housing (Option Code W0 or W1) required. Only available with Teflon (PTFE) lining material (Option Code T) and 316L Stainless Steel, Hastelloy C-276, and 90% Platinum-10% Iridium electrode material (Option Codes S, H, and P). Not available with integral mount Model 8712 transmitter. Sanitary connection codes A4 and A6 only available in line size code 020. A4 and A6 option codes are only available in 2 inch (50mm) line size.

(5) Option Code must be ordered for both flowtube and transmitter.

CE

NA = Not Available

Code	Product Description	Availability
8707	High-Signal Magnetic Flowmeter Flowtube	•
Code	**Lining Material**	
T	*Teflon* (PTFE)	•
F	*Tefzel* (ETFE) (available in 3- to 16-inch (80 to 400 mm) line sizes.)	•
P	Polyurethane	•
N	Neoprene	•
L	Linatex natural rubber	•
Code	**Electrode Material / Electrode Type**	
	Two Measurement Electrodes	
SA	316L Stainless Steel	•
HA	*Hastelloy* C-276	•
TA	Tantalum	•
PA	90% Platinum —10% Iridium	•
NA	Titanium	•
	Two Bulletnose Measurement Electrodes	
SB	316L Stainless Steel	•
HB	*Hastelloy* C-276	•

		Lining Material (from above)		
Code	**Line Size**	**Code T**	**Code F**	**Code P, N, and L**
030	3 inch (80 mm)	•	•	•
040	4 inch (100 mm)	•	•	•
060	6 inch (150 mm)	•	•	•
080	8 inch (200 mm)	•	•	•
100	10 inch (250 mm)	•	•	•
120	12 inch (300 mm)	•	•	•
140	14 inch (350 mm)	•	•	•
160	16 inch (400 mm)	•	•	•
180	18 inch (450 mm)	•	NA	•
200	20 inch (500 mm)	•	NA	•
240	24 inch (600 mm)	•	NA	•
300	30 inch (750 mm) (available with Electrode Access [W3 option] only.)	•	NA	•
360	36 inch (900 mm) (available with Electrode Access [W3 option] only.)	•	NA	•

Code	Flange Material, Type, and Rating	
C1	Carbon Steel, ASME B16.5 (ANSI) Class 150 (30- and 36-inch AWWA C207 Table 2 Class D Flat Face)	•
C3	Carbon Steel, ASME B16.5 (ANSI) Class 300	•
S1	304 Stainless Steel, ASME B16.5 (ANSI) Class 150 (30- and 36-inch AWWA C207 Table 2 Class D Flat Face)	•
S3	304 Stainless Steel, ASME B16.5 (ANSI) Class 300	•
Code	**Housing Configuration**	
W0	Sealed, welded housing	•
W1	Sealed, welded housing with pressure relief	•
W3	Sealed, welded housing with separate electrode compartments (only available with line size codes 300 and 360)	•
Code	**Hazardous Location Certifications**	
N0	Factory Mutual (FM) Class I, Division 2 Approval for nonflammable fluids; Canadian Standards Association (CSA) Class I, Division 2 Approval	•
N5	Factory Mutual (FM) Class I, Division 2 Approval for flammable fluids	•

NA = Not Available

Code	Options	Availability
	Optional Grounding Rings(1)	
G1	316L SST Grounding Rings	•
G2	*Hastelloy* C-276 Grounding Rings (3- to 12-inch (80 to 300 mm) flowtube line sizes)	•
G3	Titanium Grounding Rings (3- to 12-inch (80 to 300 mm) flowtube line sizes)	•
G4	Tantalum Grounding Rings (3- to 8-inch (80 to 200 mm) flowtube line sizes)	•
	Optional Lining Protectors(1)	
L1	316L SST Lining Protectors	
L2	*Hastelloy* C-276 Lining Protectors (3- to 12-inch (80 to 300 mm) flowtube line sizes)	•
L3	Titanium Lining Protectors (3- to 12-inch (80 to 300 mm) flowtube line sizes)	•
	Other Options	
B1	Integral Mount with Model 8712C/U/H transmitter	•
B3	Integral Mount with Model 8732C/8742C transmitter	•
D1	High Accuracy Calibration [0.25% of rate from 3-30 ft/s (0.9-10 m/s)] matched flowtube and transmitter system(2)	•
D2	Dual Flowtube Calibration Numbers on Model 8712H and Model 8712C Transmitters	•
H1	Model 8703 flowtube lay length (available for 3- to 4-inch (80 to 100 mm) line sizes); spool piece: ASME B16.5 (ANSI) Class 150 or Class 300 flange and 304 stainless steel pipe	•
H2	Model 8703 flowtube lay length (available for 3- to 16-inch (80 to 400 mm) line sizes	•
Q4	Inspection Certificate for Calibration Data Consistent with ISO 10474 3.1B	•
Q8	Material Traceability Certificate per DIN 3.1 B	•
Q9	Material Traceability Certificate (electrodes only) per DIN 3.1B 337	•
Q66	Welding Procedure Qualification Record Documentation	•
Q69	Welder Performance Qualification Record Documentation	•
Q70	Inspection Certificate Weld Examination, ISO 10474 3.1B	
	– 3- to 12-inch [80-300 mm] flowtube line sizes	•
	– 14- to 18-inch [350-450 mm] flowtube line sizes	•
	– 20- to 36-inch [500-900 mm] flow tube line sizes	•
Typical Model Number: 8707 T SA 040 C1 W0 N0		

(1) Grounding Rings and Lining Protectors provide the same fluid grounding function. Lining Protectors available with Teflon (PTFE) and Tefzel (ETFE) lining material only.

(2) Option Code must be ordered for both flowtube and transmitter.

Model 8711 Wafer Magnetic Flowmeter Flowtubes

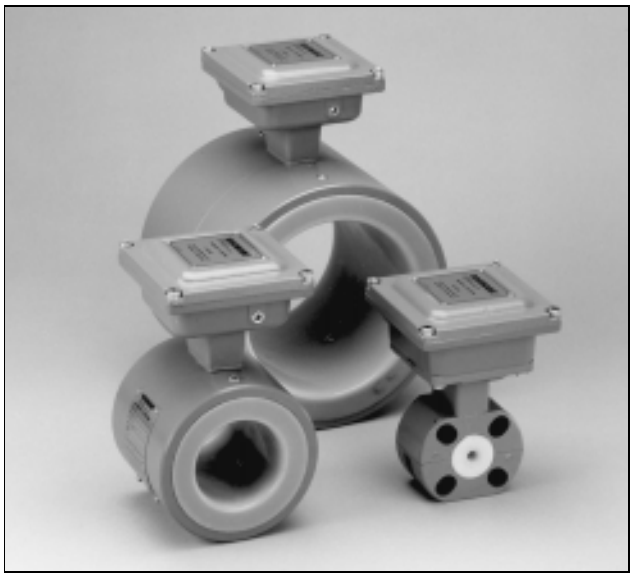


FIGURE 12. Model 8711 Wafer Magnetic Flowmeter Flowtubes.

FEATURES

Flangeless Design

The flangeless design of the Model 8711 flowtube makes it an economical, compact, and lightweight alternative to flanged magnetic flowmeters. Model 8711 flowtubes provide self-centering installation and can be used with a variety of styles.

Combinations for All Process Fluids

Tefzel (ETFE) lining and several choices of electrode materials are available for the Model 8711. These options make the Model 8711 an affordable, competitive alternative for all process fluids.

SPECIFICATIONS

Functional Specifications

Service
Conductive liquids and slurries.

Line Sizes
0.15- through 8-inch (4 through 200 mm).

Interchangeability
Model 8711 Flowtubes are interchangeable with Model 8712C/U, Model 8732, and Model 8742C Transmitters. System accuracy is maintained regardless of line size or optional features. Each flowtube nameplate has a sixteen-digit calibration number that can be entered into a transmitter through the Local Operator Interface (LOI) or the HART Communicator on the Model 8712C/U/H and the Model 8732C. In a FOUNDATION fieldbus environment, the Model 8742C can be configured using the DeltaV fieldbus configuration tool or another FOUNDATION fieldbus configuration device. No further calibration is necessary.

Upper Range Limit
30 ft/s (10 m/s).

Process Temperature Limits

Tefzel (ETFE) Lining
–20 to 300 °F (–29 to 149 °C) for 0.5- through 8-inch (15–200 mm) line sizes.

–20 to 200 °F (–29 to 93 °C) for 0.15- and 0.3-inch (4 and 8 mm) line sizes.

Teflon (PTFE) Lining
-20 to 350 °F (-29 to 177 °C).

Ambient Temperature Limits
–30 to 150 °F (–34 to 65 °C).

Maximum Safe Working Pressure at 100 °F (38 °C)

Tefzel (ETFE) Lining
Full vacuum to 740 psi (5.1 MPa) for 0.5- through 8-inch (15 through 200 mm) flowtubes.

285 psi (1.96 MPa) for 0.15- and 0.30-inch (4 and 8 mm) flowtubes.

Teflon (PTFE) Lining
Full vacuum through 4-inch (100 mm) line sizes. Consult factory for vacuum applications with line sizes of 6 inches (150 mm) or larger.

Hazardous Location Certifications

N0 Factory Mutual (FM) Approval Non-incendive, non-flammable fluid service for Class I, Division 2 Groups A, B, C, and D; Dust-ignition proof for Class II/III, Division 1 Groups E, F, and G hazardous locations. T5 temperature level.
AND
Canadian Standards Association (CSA) Approval Suitable for use in Class I, Division 2 Groups A, B, C, and D; Dust-ignition proof for Class II/III, Division 1, Groups E, F, and G hazardous locations.
AND
CE Marking.

N5 Factory Mutual (FM) Approval Non-incendive, flammable fluid service for Class I, Division 2 Groups A, B, C, and D; Dust-ignition proof for Class II/III, Division 1 Groups E, F, and G hazardous locations. T5 temperature level.

E5 Factory Mutual (FM) Approval Explosion Proof for Class I, Division 1, Groups C and D. T5 temperature level. Available for remote mount transmitter or integral mount Model 8732C transmitters.

CD KEMA/CENELEC Approval EEx e ia IIC T3...T6 (See Table 30).

Conductivity Limits

Process liquid must have a conductivity of 5 microsiemens/cm (5 micromhos/cm) or greater for Model 8711. Excludes the effect of interconnecting cable length in remote mount transmitter installations.

TABLE 30. Relation Between Ambient Temperature, Process Temperature, and Temperature Class.

Meter Size (inches)	Maximum Ambient Temperature	Maximum Process Temperature	Temperature Class
1/2	149 °F (65 °C)	240 °F (116 °C)	T3
1	149 °F (65 °C)	248 °F (120 °C)	T3
1	95 °F (35 °C)	95 °F (35 °C)	T4
1 1/2	149 °F (65 °C)	257 °F (125 °C)	T3
1 1/2	140 °F (60 °C)	140 °F (60 °C)	T4
2	149 °F (65 °C)	257 °F (125 °C)	T3
2	149 °F (65 °C)	167 °F (75 °C)	T4
2	104 °F (40 °C)	104 °F (40 °C)	T5
3 to 4	149 °F (65 °C)	266 °F (130 °C)	T3
3 to 4	149 °F (65 °C)	167 °F (75 °C)	T4
3 to 4	131 °F (55 °C)	194 °F (90 °C)	T5
3 to 4	104 °F (40 °C)	104 °F (40 °C)	T6
6	149 °F (65 °C)	175 °F (79 °C)	T3
6	149 °F (65 °C)	167 °F (75 °C)	T4
6	149 °F (65 °C)	230 °F (110 °C)	T5
6	140 °F (60 °C)	140 °F (60 °C)	T6
8 to 36	149 °F (65 °C)	284 °F (140 °C)	T3
8 to 36	149 °F (65 °C)	240 °F (116 °C)	T4
8 to 36	149 °F (65 °C)	176 °F (80 °C)	T5
8 to 36	149 °F (65 °C)	149 °F (65 °C)	T6

Performance Specifications

(System specifications are given using the frequency output and with the unit at referenced conditions.)

Accuracy

Model 8711 with Model 8712C/U, Model 8732C, or Model 8742C Transmitters
±0.5% of rate from 3 to 30 ft/s (1 to 10 m/s).

±0.015 ft/s (0.045 m/s) from low-flow cutoff to 3 ft/s (1 m/s).

Vibration Effect

Meets IEC 770 Pipeline Installation Conditions.

Mounting Position Effect

No effect when installed to ensure flowtube remains full.

Physical Specifications

Non-Wetted Materials

Flowtube
303 SST (ASTM A-743).

Coil Housing
Investment cast steel (ASTM A-27).

Paint
Polyurethane.

Process-Wetted Materials

Lining
Tefzel (ETFE), Teflon (PTFE).

Electrodes
316L SST, Hastelloy C-276, tantalum, 90% platinum—10% iridium, titanium.

Process Connections

Mounts between these Flange Configurations

ASME B16.5 (ANSI): Class 150, 300.vv.

DIN: PN 10 and 25.

BS: 10 Table D, E, and F.

Studs, Nuts, and Washers(1)

ASME B16.5 (ANSI)

0.15- through 1-inch (4 through 25 mm): 316 SST, ASTM A193, Grade B8M, Class 1 threaded mounting studs; ASTM A194, Grade 8M heavy hex nuts; SAE per ANSI B18.2.1, Type A, Series N flat washers.

1.5- through 8-inch (40 through 200 mm): CS, ASTM A193, Grade B7, Class 1 threaded mounting studs; ASTM A194, Grade 2H heavy hex nuts; SAE per ANSI B18.2.1, Type A, Series N flat washers; all items clear, chromate zinc-plated.

DIN

4 through 25 mm (0.15- through 1-inch): 316 SST ASTM A193, Grade B8M Class 1 threaded mounting studs; ASTM A194, Grade 8M, DIN 934 H=D, metric heavy hex nuts; 316 SST, A4, DIN 125 flat washers.

40 through 200 mm (1.5- through 8-inch): CS, ASTM A193, Grade B7 threaded mounting studs; ASTM A194, Grade 2H, DIN 934 H=D, metric heavy hex nuts; CS, DIN 125 flat washers; all items yellow zinc-plated.

Electrical Connections

Two ¾–14 NPT connections with number 8 screw terminals are provided in the terminal enclosure for electrical wiring.

Grounding Electrode

A grounding electrode is installed similarly to the measurement electrodes through the flowtube lining. It is available in all electrode materials.

Grounding Rings

Grounding rings are installed between the flange and the tube face on both ends of the flowtube. They have an I.D. slightly larger than the flowtube I.D. and an external tab to attach ground wiring. Grounding rings are available in 316L SST, Hastelloy C-276, titanium, and tantalum.

Flowtube Dimensions and Weight

See Table 31.

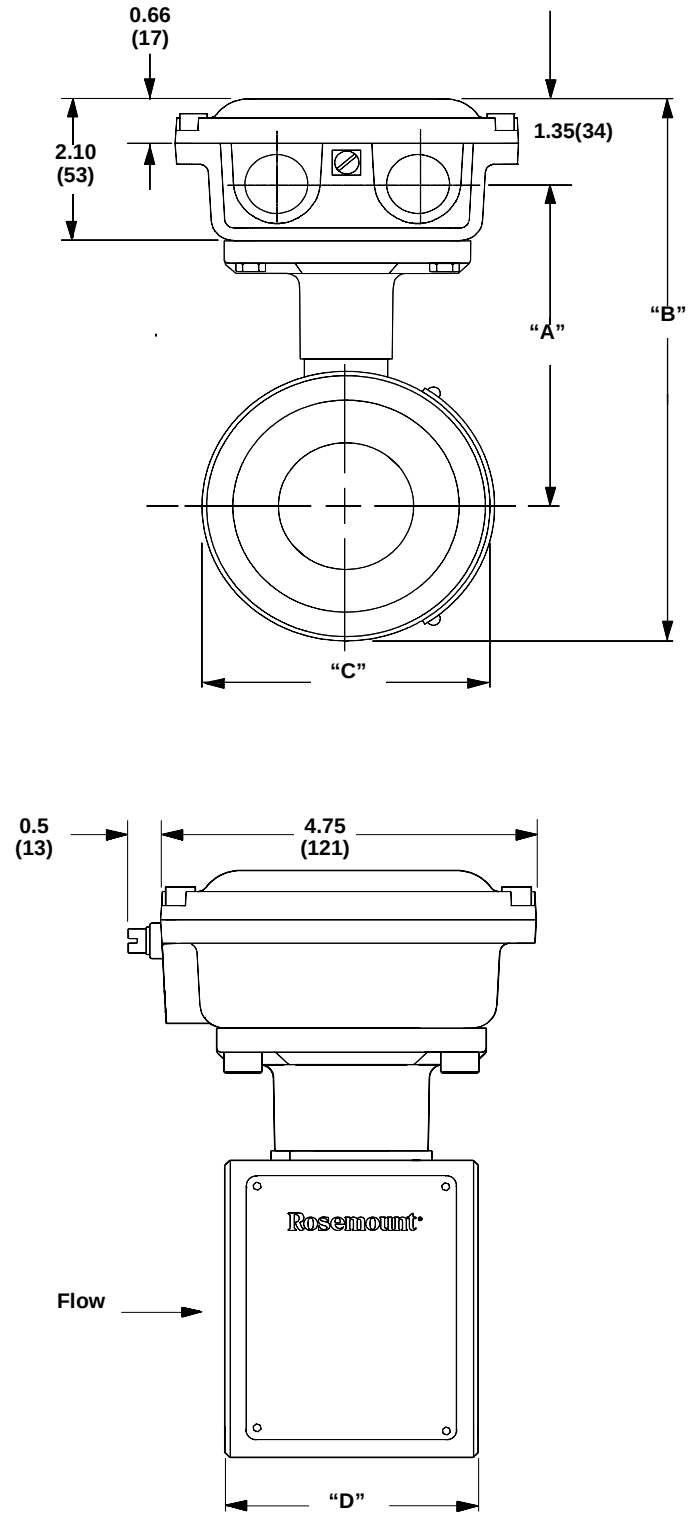
(1) 0.15 and 0.30 inch (4 and 80 mm) flowtubes mount between 1/2-inch flange.

TABLE 31. Flowtube Dimensions and Weight.

Nominal Line Size Inches (mm)		Flowtube Housing Dimensions						Flowtube Length "D"		Inside Diameter		Weight lb (kg)	
		"A" Max.		"B"		"C"							
0.15(1)	(4)	4.00	(102)	5.44	(138)	3.56	(90)	2.17	(55)	.165	(4)	4	(2)
0.30(1)	(8)	4.00	(102)	5.44	(138)	3.56	(90)	2.17	(55)	.287	(7)	4	(2)
0.5	(15)	4.00	(102)	5.44	(138)	3.56	(90)	2.17	(55)	.595	(15)	4	(2)
1	(25)	4.31	(109)	6.06	(154)	4.50	(114)	2.17	(55)	.959	(24)	5	(2)
1.5	(40)	4.42	(112)	7.41	(188)	3.28	(83)	2.73	(69)	1.50	(38)	5	(2)
2	(50)	4.64	(118)	7.94	(202)	3.91	(99)	3.26	(83)	1.95	(50)	7	(3)
3	(80)	5.26	(134)	9.19	(233)	5.16	(131)	4.68	(119)	2.98	(76)	13	(6)
4	(100)	5.87	(149)	10.41	(264)	6.38	(162)	5.88	(149)	3.90	(99)	22	(10)
6	(150)	6.97	(177)	12.60	(320)	8.56	(217)	6.87	(174)	5.825	(148)	35	(16)
8	(200)	8.00	(2003)	14.66	(372)	10.63	(270)	8.86	(225)	7.87	(200)	60	(27)

(1) 0.15 and 0.30 inch (4 and 8 mm) flowtubes mount between ½-inch (13 mm) flange.

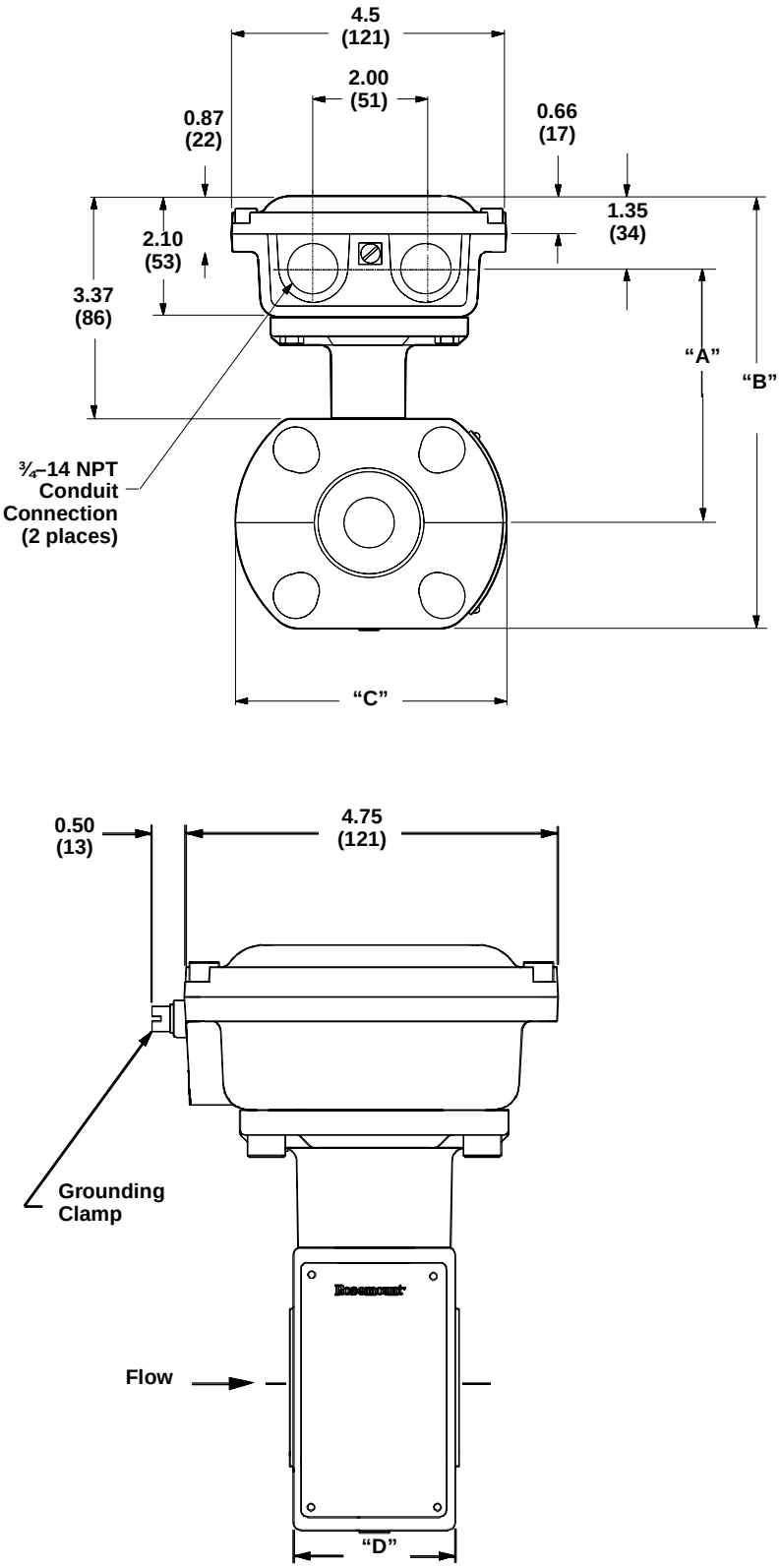
FIGURE 13. Model 8711 Dimensional Drawings (1.5-inch through 8-inch line sizes).



NOTE
Dimensions are in inches (millimeters). See Table 31 for variable dimensions.

8711-1012B04A, 1012A04A

FIGURE 14. Model 8711 Dimensional Drawings (0.15-inch through 1-inch line sizes).



NOTE
Dimensions are in inches (millimeters). See Table 31 for variable dimensions.

8711-1012B03A, 1012A03A

ORDERING INFORMATION

NC = No Charge
NA = Not Applicable

Model	Product Description	Availability
8711	Magnetic Flowmeter Flowtube (flangeless construction)	•
Code	**Lining Material**	
T	*Tefzel* (ETFE)	•
S	*Teflon* (PTFE) (not available with 0.15 and 0.30 inch [4 and 8 mm] line sizes)	•
Code	**Electrode Material / Electrode Type**	
	Two Measurement Electrodes	
SA	316L Stainless Steel	•
HA	*Hastelloy* C-276	•
TA	Tantalum	•
PA	90% Platinum—10% Iridium	•
NA	Titanium	•
	Two Measurement Electrodes + Third Grounding Electrode	
SE	316L Stainless Steel	•
HE	*Hastelloy* C-276	•
TE	Tantalum	•
PE	90% Platinum—10% Iridium	•
NE	Titanium	•
Code	**Line Size**	
15F	0.15 inch (4 mm) (not available with *Teflon* (PTFE) lining material)	•
30F	0.30 inch (8 mm) (not available with *Teflon* (PTFE) lining material)	•
005	½ inch (15 mm)	•
010	1inch (25 mm)	•
015	1½ inch (40mm)	•
020	2 inch (50mm)	•
030	3 inch (80 mm)	•
040	4 inch (100 mm)	•
060	6 inch (150 mm)	•
080	8 inch (200 mm)	•
Code	**Transmitter Mounting Configuration**	
R	Remote, mounted to Model 8712C/U transmitter (2-inch pipe or surface mount)	•
S	Integral, mounted to Model 8712C/U transmitter	•
U	Integral, mounted to Model 8732C/8742C transmitter	•

NC = No Charge
NA = Not Applicable

Code	Mounting Kit	Availability
	Expanded Kit: includes two alignment rings (where applicable), threaded SST studs, and nuts	
1	ASME B16.5 (ANSI) Class 150	•
2	DIN PN 10/16 (8 inch [200 mm] has a PN 10 mounting kit only)	•
3	ASME B16.5 (ANSI) Class 300	•
4	DIN PN 25/40 (8 inch [200 mm] has a PN 25 mounting kit only)	•
	Standard Kit: includes two alignment rings (where applicable)	
5	ASME B16.5 (ANSI) Class 150	•
6	DIN PN 10/16 (8 inch [200 mm] has a PN 10 alignment rings only)	•
7	ASME B16.5 (ANSI) Class 300	•
8	DIN PN 25/40 (8 inch [200 mm] has a PN 25 alignment rings only)	•
Code	**Hazardous Location Certifications**	
N0	Factory Mutual (FM) Class I, Division 2 Approval for nonflammable fluids; Canadian Standards Association (CSA) Class I, Division 2 Approval; CE Marking	•
N5	Factory Mutual (FM) Class 1, Division 2 Approval for flammable fluids	•
E5	Factory Mutual (FM) Class 1, Division 1, Explosion-Proof Approval (available with integral mount Model 8732C or remote mount transmitters)	•
CD	KEMA/CENELEC EEx e ai IIC Increased Safety Approval; CE Marking	•
Code	**Options**	
G1	316L SST Grounding Rings	•
G2	*Hastelloy* C-276 Grounding Rings	•
G3	Titanium Grounding Rings	•
G4	Tantalum Grounding Rings	•
Q4	Inspection Certificate for Calibration Data Consistent with ISO 10474 3.1B	•
Q8	Material Traceability Certificate per DIN 3.1B	•
Q9	Material Traceability Certificate (Electrodes only) per DIN 3.1B	•
Q66	Welding Procedure Qualification Record Documentation	•
Q69	Welder Performance Qualification Record Documentation	•
Q70	Inspection Certificate Weld Examination, ISO 10474 3.1B – .15 to 8-inch [4-300 mm] flowtube line sizes	•
Typical Model Number: 8711 T SA 030 U 5 N0		

Rosemount Series 8700 Transmitters

ROSEMOUNT SERIES 8700 MAGNETIC FLOWMETER FAMILY

All Rosemount magnetic flowmeter transmitters are members of the Rosemount SMART FAMILY of instruments and provide pulsed dc coil drive current to flowtubes. Transmitters are used to convert the electrode signal into 4–20 mA and frequency outputs using HART Communications protocol.

Model 8712C

... is a remote-mount Smart transmitter for use exclusively with all Rosemount Series 8700 Flowtubes.

Model 8712U

... is a remote-mount universal Smart transmitter designed for use with any flowtube, including those of other manufacturers.

Model 8712H

... is a remote mount Smart transmitter designed for use with Model 8707 High-Signal Flowtubes.

Model 8732C

... is an integrally-mounted Smart transmitter that is directly installed on a Rosemount Model 8705 or Model 8711 flowtubes at the factory.

Model 8714D

... is a multi-point reference calibration standard that will operate in conjunction with the Model 8712C, Model 8712U, or Model 8732C transmitter to electrically simulate a flowtube. It accurately produces a simulated electrical flow signal for the purpose of transmitter calibration.

FEATURES

Microprocessor-Based

Rosemount transmitters are microprocessor-based and convert flow signals to digital data. This process offers greater accuracy and range in comparison to analog devices. The selected process variables are stored as digital data, enabling precise corrections and engineering unit conversion. The corrected data are converted to a standard 4–20 mA current that is applied to the output loop.

Data Storage

Configuration data for any Rosemount transmitter are stored in nonvolatile EEPROM memory. The data are retained in the transmitter when power is interrupted, so the transmitter is functional immediately upon power-up.

Flexibility

To ensure maximum flexibility, Rosemount transmitters can be configured locally or remotely. Parameters that affect transmitter output and identification information can be accessed and changed via three methods: at the transmitter site with the local operator interface (LOI), from any wiring termination point in the 4–20 mA loop using a HART Communicator, or directly with a Fisher-Rosemount control system. All have access to the same data and use on-screen prompting to lead the user through the data input and communication process. Rosemount transmitters can be ordered factory configured, eliminating the need for an interface.

HART Communicator

The HART Communicator can be used to configure a Rosemount transmitter from any wiring termination point in the 4–20 mA loop, including the control room. The HART protocol uses an industry-standard Bell 202 frequency shift keying (FSK) technique that allows simultaneous communication and flow rate output without compromising loop integrity.

Advanced Digital Signal Processing (DSP)

Standard on all Rosemount transmitters, DSP combats the noisy output signals that are common in difficult applications. In addition to offering selectable coil drive frequencies (6 or 30 Hz), our microprocessor-based transmitters actually scrutinize each input based on three user-defined parameters to reject noise specific to an application.

Diagnostics

Rosemount transmitters are designed to provide worry-free operation. During normal operation, each transmitter performs a series of continuous self-diagnostic checks, immediately signaling if problems develop in the transmitter, flowtube, or process. Diagnostic messages assist in isolating and correcting problems. In addition, transmitters can be checked during several user-initiated self tests.

Empty Pipe Detection

Rosemount SMART FAMILY transmitters incorporate a unique empty pipe detection feature that eliminates the needs for a dedicated empty pipe detection electrode or field adjustments of potentiometers or switches. When the transmitter detects an empty pipe condition, the outputs are set to the zero flow values. The user is notified via HART communications and the optional LOI. The empty pipe detection circuitry will also detect an open electrode connection.

Series 8712C/U/H Magnetic Flowmeter Transmitters

8712-006AB

FEATURES

Series 8712 Transmitters feature an optional local operator interface and digital technology.

General

Rosemount Series 8712 Transmitters provide remote mounting capabilities for installations where it is impractical for integrally mounted configurations. It is possible to interrogate or reconfigure a Series 8712 transmitter without visiting the instrument site.

Local Operator Interface (LOI)

Series 8712 Transmitters have an optional LOI that performs all the functions necessary for setting up a transmitter and flowtube system. The LOI is designed for fast, easy configuration with keypad access to transmitter parameters. Installed on the top cover of the transmitter, it has a two-line by 20-character backlit display and 15 keys. The keys are arranged in four groups for direct access to commonly used functions. The LOI software leads the user through each step of transmitter setup. When a parameter is changed, the LOI makes a final verification check before actual data entry.

Model 8712C

The Model 8712C operates in conjunction with all Rosemount magnetic flowmeter flowtubes.

Model 8712U

The Model 8712U is a universal transmitter designed to operate on all Rosemount flowtubes and all other magnetic flowmeter flowtubes. This transmitter is capable of driving ac and dc flowtubes with pulsed dc technology. With the Model 8712U, older ac flowtubes can be converted to dc technology and benefit from all of its advantages such as zero stability, better repeatability, and ease of use.

Model 8712H

The Model 8712H High-Signal Transmitter, combined with the Model 8707 High-Signal Flowtube, forms the Rosemount High-Signal Magnetic Flowmeter System. This system handles difficult high-noise applications while maintaining the benefits of dc technology. The increased signal strength of the Rosemount high-signal system is made possible through a combination of a highly efficient and innovative coil drive circuit. The increased signal strength of the Model 8712H, coupled with advanced signal processing and superior filtering techniques, provides the solution to demanding flow measurement applications.

Modular Construction

Rosemount Transmitters are housed in dual-compartment, NEMA 4X enclosures. The terminal block for the Series 8712 Transmitter is accessible without exposing the electronics and modular construction makes maintenance easy. If any transmitter diagnostic routine detects a fault, the electronics can be replaced in the field without compromising accuracy.

SPECIFICATIONS

Functional Specifications

Flowtube Compatibility
Model 8712C is compatible with all Rosemount flowtubes: Models 8705, 8707, and 8711. The Model 8712U is also compatible with AC and DC powered flowtubes of other manufacturers. The Model 8712H is only compatible with Model 8707 High-Signal flowtube.

Flowtube Coil Resistance
Model 8712C: 25 Ω maximum.

Model 8712U: 350 Ω maximum.

Model 8712H: 10 Ω maximum.

Flow Rate Range
Capable of processing signals from fluids that are traveling between 0.04 and 30 ft/s (0.01 to 10 m/s) for both forward and reverse flow in all flowtube sizes. Full scale continuously adjustable between –30 and 30 ft/s (–10 to 10 m/s).

Conductivity Limits
Process liquid must have a conductivity of 5 microsiemens/cm (5 micromhos/cm) or greater for Model 8712C/U. Process liquid must have a conductivity of 50 microsiemens/cm (50 micromhos/cm) for the Model 8712H. Excludes the effect of interconnecting cable length in remote mount transmitter installations.

Power Supply
Model 8712C/U: 115 or 230 V ac ±10%, 50–60 Hz or 10–30 V dc.

Model 8712H: 115 V ac ±10%, 50–60 Hz.

Installation Coordination
Installation (overvoltage) Category II.

Power Consumption
Model 8712C/U: 20 watts maximum.

Model 8712H: 300 watts maximum.

Ambient Temperature Limits

Operating
Model 8712C/U: –20 to 140 °F (–29 to 60 °C) with local operator interface.

–30 to 150 °F (–34 to 66 °C) without local operator interface.

Model 8712H: –20 to 130 °F (–29 to 54 °C) with or without local operator interface.

Storage
–22 to 176 °F (–30 to 80 °C).

Humidity Limits
0–100% RH at 120 °F (49 °C), decreases linearly to 10% RH at 130 °F (54 °C).

Enclosure Ratings
NEMA 4X, CSA Enclosure Type 4X.

Output Signals

Analog Output Adjustment
4–20 mA, jumper-selectable as internally or externally powered 5 to 24 V dc; 0 to 1000 Ω load.

Engineering units—lower and upper range values are user-selectable.

Output automatically scaled to provide 4 mA at lower range value and 20 mA at upper range value. Full scale continuously adjustable between -30 and 30 ft/s (-10 to 10 m/sec), 1 ft/s (0.3 m/s) minimum span.

HART Communications, digital flow signal, superimposed on 4–20 mA signal, available for control system interface. 250 Ω required for HART communications.

Scalable Frequency Adjustment
0-1000 Hz, externally powered at 5 to 24 V dc, translator switch closure up to 5.75 w. Pulse value can be set to equal desired volume in selected engineering units. Pulse width adjustable from 0.5 to 100 m/s. Local operator interface automatically calculates and displays maximum allowable output frequency.

Auxiliary Output Function
Externally powered at 5 to 24 V dc, transistor switch closure up to 3 W to indicate either:

Reverse Flow: Activates switch closure output when reverse flow is detected. The reverse flow rate is displayed.

Zero Flow: Activates switch closure output when flow goes to 0 ft/s.

Positive Zero Return
Forces outputs of the transmitter to the zero flow rate signal level. Activated by applying a contact closure.

Software Lockout
Security lockout jumper on the electronics board can be set to deactivate all LOI and HART-based communicator functions to protect configuration variables from unwanted or accidental change.

Output Testing

Analog Output Test
Transmitter may be commanded to supply a specified current between 3.75 and 23.25 mA.

Pulse Output Test
Transmitter may be commanded to supply a specified frequency between 1 and 1000 Hz.

Turn-on Time
30 minutes to rated accuracy from power up, 5 seconds from power interruption.

Start-up Time
0.2 seconds from zero flow.

Low Flow Cutoff
Adjustable between 0.04 and 1 ft/s (0.01 and 0.3 m/s). Below selected value, output is driven to the zero flow rate signal level.

Overrange Capability
Signal output will remain linear until 110% of upper range value or 33 ft/s. The signal output will remain constant above these values. Out of range message displayed on LOI and the HART Communicator.

Damping
Adjustable between 0.2 and 256 seconds.

Flowtube Compensation
Rosemount flowtubes are flow-calibrated and assigned a calibration factor at the factory. The calibration factor is entered into the transmitter, enabling interchangeability of flowtubes without calculations or a compromise in accuracy.

Model 8712U transmitters and other manufacturer's flowtubes can be calibrated at known process conditions or at the Rosemount NIST-Traceable Flow Facility. Transmitters calibrated on site require a two-step procedure to match known flow rate.

Hazardous Locations Certifications

N0 Factory Mutual (FM) Approval Non-incendive, non-flammable fluid service for Class I, Division 2 Groups A, B, C, and D; Dust-ignition proof for Class II/III, Division 1 Groups E, F, and G hazardous locations. T5 temperature level.
AND
Canadian Standards Association (CSA) Approval Suitable for use in Class I, Division 2 Groups A, B, C, and D; Dust-ignition proof for Class II/III, Division 1, Groups E, F, and G hazardous locations.

N5 Factory Mutual (FM) Approval Non-incendive, flammable fluid service for Class I, Division 2 Groups A, B, C, and D; Dust-ignition proof for Class II/III, Division 1 Groups E, F, and G hazardous locations. T5 temperature level.

CE CE Marking.

Performance Specifications

(System specifications are given using the frequency output and with the unit at referenced conditions.)

Accuracy

Model 8712C/U with Model 8705 Flowtube
System accuracy is ±0.5% of rate from 1 to 30 ft/s (0.3 to 10 m/s); between 0.04 and 1.0 ft/s (0.01 and 0.3 m/s), the system has an accuracy of ±0.005 ft/s. Analog output has the same accuracy as frequency output plus an additional 0.05% of span.

Model 8712H with Model 8707 Flowtube
System accuracy is ±0.5% of rate from 3 to 30 ft/s (1 to 10 m/s); between 0.04 and 3.0 ft/s (0.01 and 0.3 m/s), the system has an accuracy of ±0.005 ft/s. Analog output has the same accuracy as frequency output plus an additional 0.05% of span.

Model 8712C/U with Model 8711 Flowtube
System accuracy is ±0.5% of rate from 3 to 30 ft/s (1 to 10 m/s); below 3 ft/s (1 m/s), the system has an accuracy of ±0.015 ft/s (0.005 m/s). Analog output has the same accuracy as frequency output plus an additional 0.05% of span.

Model 8712U with Other Manufacturers' Flowtubes
When calibrated in the Rosemount Flow Facility, system accuracies as good as 0.5% of rate can be attained. Analog output has the same accuracy as frequency output, plus an additional 0.05% of span.

There is no accuracy specification for other manufacturers' flowtubes calibrated in the process line.

Vibration Effect
±0.1% of span per SAMA PMC 31.1, Level 2.

Repeatability
±0.1% of reading.

Response Time
0.2 seconds maximum response to step change in input.

Stability
±0.1% of rate over six months.

Ambient Temperature Effect
±1% per 100 °F (37.8 °C).

RFI Effect
Class 1, A, B, C: ±0.5% of span at 3 V/m per SAMA PMC 33.1, wires and conduit.

Supply Voltage Effect
Transmitter meets supply voltage effect requirements of SAMA PMC 31.1, Section 5.10.1 through 5.10.5. Transmitter withstands surges in supply voltage as specified in IEEE 472, 1974.

Physical Specifications

Materials of Construction

Housing
Low-copper aluminum, NEMA 4X and IEC 529 IP65.

Pollution Degree 2.

Paint
Polyurethane.

Cover Gasket
Rubber.

Electrical Connections
Three ¾–14 NPT connections provided on the base of the transmitter. Screw terminals provided for all of the connections. Power wiring connected to the transmitter only. Remote mounted transmitters require only a single conduit connection to the flowtube. Integrally mounted transmitters are factory wired to the flowtube.

Cable Requirements for Remote Transmitters

Transmitter Input Power

Description	P/N
Signal Cable (20 AWG) Belden 8762, Alpha 2411 equivalent	08712-0061-0001
Coil Drive Cable (14 AWG) Belden 8720, Alpha 2442 equivalent	08712-0060-0001
Combination Signal and Coil Drive Cable (18 AWG)(1) Belden 9368 equivalent	08712-0750-0001

(1) Combination signal and coil drive cable is not recommended for high-signal magmeter system. For remote mount installations, combination signal and coil drive cable should be limited to less than 100 ft (30 m).

Remote transmitter installations require equal lengths of signal and coil drive cables. Integrally mounted transmitters are factory wired and do not require interconnecting cables.

Lengths from 5 to 1,000 feet (1.5 to 300 meters) may be specified, and will be shipped with the flowtube. When ordering the combination cable, the lengths specified must be from 5 to 500 feet (1.5 to 150 meters).

Cable longer than 100 feet (30 meters) is not recommended for high-signal systems.

Line Power Fuses

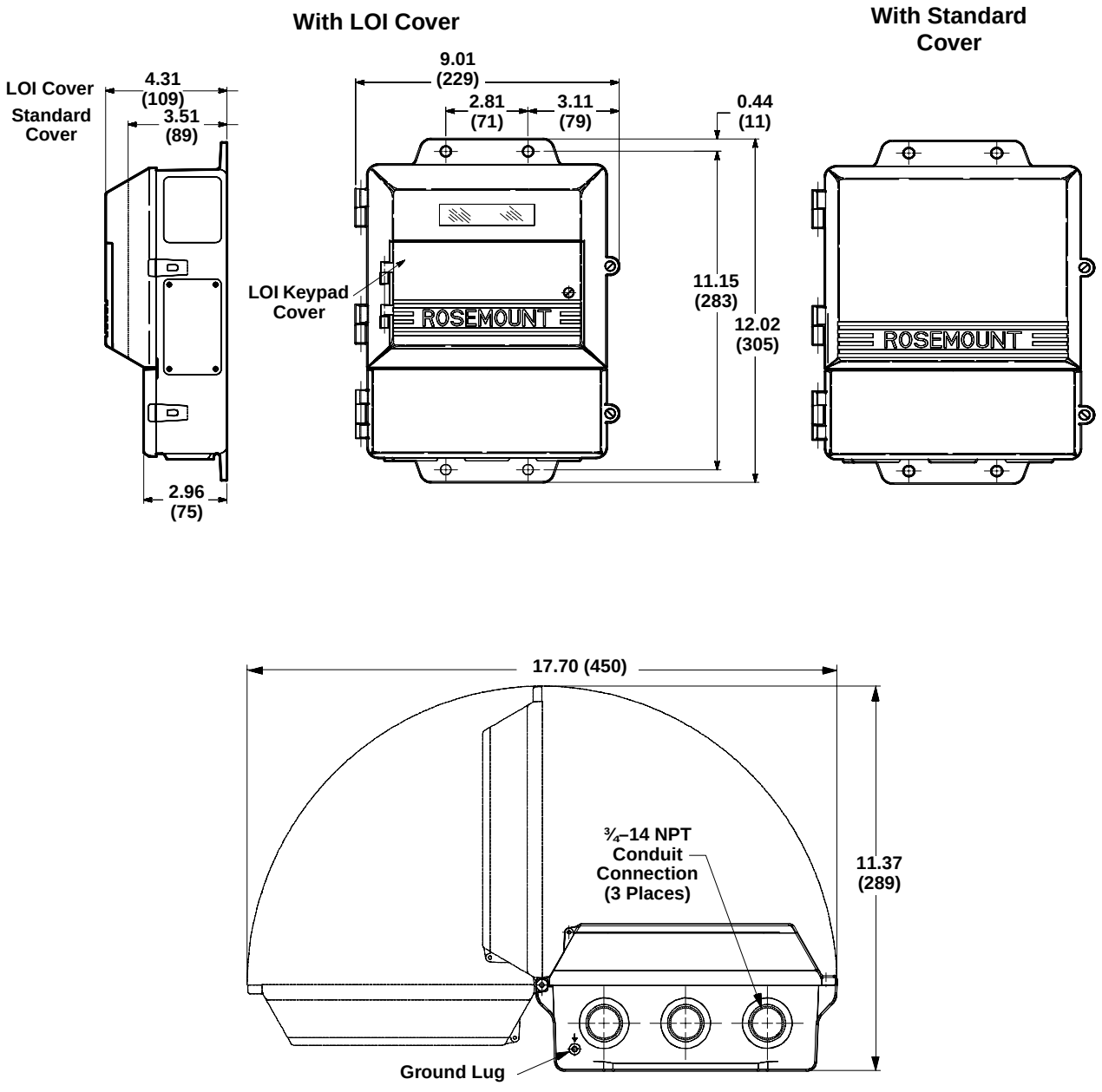
115 V ac systems
1 amp, Quick-acting Bussman AGCI or equivalent.
5 amp, Quick-acting Bussman AGCI or equivalent (Model 8712H only).

230 V ac systems
½ amp, Quick-acting Bussman AGCI or equivalent.

10–30 V dc systems
3 amp, Quick-acting Bussman AGCI or equivalent.

Transmitter Dimensions and Weight
Transmitter approximately 9 lb (4 kg). Add 1 lb (0.5 kg) for local operator interface. See Figure 15.

FIGURE 15. Model 8712C/U/H Transmitter Dimension Drawings and Field Wiring



NOTE
Dimensions are in inches (millimeters).

8712-12A01A, 8712B01A, 8712C01A, 8712D01A

ORDERING INFORMATION

NC = No Charge
NA = Not Applicable

		Availability		
Model	**Product Description**	**C**	**U**	**H**
8712C	Magnetic Flowmeter Transmitter	•	NA	NA
8712U	Universal Magnetic Flowmeter Transmitter	NA	•	NA
8712H	High-Signal Magnetic Flowmeter Transmitter (For use with Model 8707 High-Signal Flowtube only.)	NA	NA	•
Code	**Transmitter Style**	**C**	**U**	**H**
R	Remote (2-inch pipe or surface mounting)	•	•	•
T	Integral (mounted to flowtube)	•	•	•
Code	**Power Supply Voltage**	**C**	**U**	**H**
03	10–30 V dc	•	•	NA
12	115 V ac, 50–60 Hz	•	•	•
24	230 V ac, 50–60 Hz	•	•	NA
Code	**Hazardous Location Certifications**	**C**	**U**	**H**
N0	Factory Mutual (FM) Class I, Division 2 Approval for nonflammable fluids; Canadian Standards Association (CSA) Class I, Division 2 Approval	•	•	•
N5	Factory Mutual (FM) Class I, Division 2 Approval for flammable fluids	•	•	•
CE	CE Marking	•	•	NA
Code	**Options**	**C**	**U**	**H**
B6	Stainless Steel 4-bolt Kit for 2-inch Pipe Mount	•	•	•
C1	Custom Configuration (Completed CDS 00806-0100-4668 required with order)	•	•	•
D1	High Accuracy Calibration [0.25% of rate from 3 to 30 ft/s (0.9 to 10 m/s)] matched flowtube and transmitter system(1)	•	NA	NA
M4	Local Operator Interface (LOI)	•	•	•
T1	Battery-backed Totalizer	•	•	NA
Typical Model Number: 8712C R 12 N0 M4				

(1) Option Code must be ordered for both flowtube and transmitter.

Rosemount Model 8732C
Magnetic Flowmeter Transmitter

FEATURES

General

Rosemount Model 8732C Transmitters were designed to provide high performance in an integral mount package.

Rugged Design

The Model 8732C has a sealed compartment, ideal for harsh environment installations where moisture and contaminant infiltration are possible. Separate O-ring seals provide isolation for the transmitter electronics, wiring compartment, and flowtube adapter. Additionally, the explosion proof housing is designed to meet stringent international standards. The Model 8732C provides full RFI/EMI protection.

Local Operator Interface (LOI)

Model 8732C Transmitters have an optional LOI which performs all the necessary functions for setting up a transmitter and flowtube system. The LOI is installed on the side of the transmitter opposite the terminal block and has a two-line by

16-character backlit display and four optical switches. The transmitter can be configured with all covers in place to simplify adjustments in hazardous environments and ensure that internal components are not exposed to external contaminants.

SPECIFICATIONS

Functional Specifications

Flowtube Compatibility
Compatible with Rosemount Model 8705 and Model 8711 Flowtubes.

Flowtube Coil Resistance
25 V maximum (Model 8732C).

Flow Rate Range
Capable of processing signals from fluids that are traveling between 0.04 and 30 ft/s (0.01 to 10 m/s) for both forward and reverse flow in all flowtube sizes. Full scale continuously adjustable between –30 and 30 ft/s (–10 to 10 m/s).

Conductivity Limits
Process liquid must have a conductivity of 5 microsiemens/cm (5 micromhos/cm) or greater for Model 8732C. Excludes the effect of interconnecting cable length in remote mount transmitter installations.

Power Supply
85 or 250 V ac ±10%, 50–60 Hz or 10–30 V dc.

Installation Coordination
Installation (overvoltage) Category II.

Power Consumption
10 watts maximum.

Ambient Temperature Limits

Operating
–40 to 165 °F (–40 to 74 °C) without local operator interface.

13 to 149 °F (–25 to 65 °C) with local operator interface.

Storage
–40 to 185 °F (–40 to 85 °C).

Humidity Limits
0–100% RH to 150 °F (65 °C).

Output Signals

Analog Output Adjustment
4–20 mA, jumper-selectable as internally or externally powered 5 to 24 V dc; 0 to 1000 Ω load.

Engineering units—lower and upper range values are user-selectable.

Output automatically scaled to provide 4 mA at lower range value and 20 mA at upper range value. Full scale continuously adjustable between -30 and 30 ft/s (-10 to 10 m/sec), 1 ft/s (0.3 m/s) minimum span.

HART Communications, digital flow signal, superimposed on 4–20 mA signal, available for control system interface. 250 Ω required for HART communications.

Scalable Frequency Adjustment

0-1000 Hz, externally powered at 5 to 24 V dc, translator switch closure up to 5.75 w. Pulse value can be set to equal desired volume in selected engineering units. Pulse width adjustable from 0.5 to 100 m/s. Local operator interface automatically calculates and displays maximum allowable output frequency.

Auxiliary Output Function

Externally powered at 5 to 24 V dc, transistor switch closure up to 3 W to indicate either:

Reverse Flow: Activates switch closure output when reverse flow is detected. The reverse flow rate is displayed.

Zero Flow: Activates switch closure output when flow goes to 0 ft/s.

Software Lockout

Security lockout switch on the electronics board can be set to deactivate all LOI and HART-based communicator functions to protect configuration variables from unwanted or accidental change.

Output Testing

Analog Output Test

Transmitter may be commanded to supply a specified current between 3.75 and 23.25 mA.

Pulse Output Test

Transmitter may be commanded to supply a specified frequency between 1 and 1000 Hz.

Turn-on Time

30 minutes to rated accuracy from power up;
5 seconds from power interruption.

Start-up Time

0.2 seconds from zero flow.

Low Flow Cutoff

Adjustable between 0.001 and 1 ft/s
(0.0003 and 0.3 m/s). Below selected value, output is driven to the zero flow rate signal level.

Overrange Capability

Signal output will remain linear until 110% of upper range value or 33 ft/s. The signal output will remain constant above these values. Out of range message displayed on LOI and the HART Communicator.

Damping

Adjustable between 0.2 and 256 seconds.

Flowtube Compensation

Rosemount flowtubes are flow-calibrated and assigned a calibration factor at the factory. The calibration factor is entered into the transmitter, enabling interchangeability of flowtubes without calculations or a compromise in accuracy.

Hazardous Location Certifications

N0 Factory Mutual (FM) Approval Non-incendive, non-flammable fluid service for Class I, Division 2 Groups A, B, C, and D;
Dust-ignition proof for Class II/III, Division 1 Groups E, F, and G hazardous locations. T5 temperature level.
AND
Canadian Standards Association (CSA) Approval Suitable for use in Class I, Division 2 Groups A, B, C, and D;
Dust-ignition proof for Class II/III, Division 1, Groups E, F, and G hazardous locations.
AND
CE Marking.

N5 Factory Mutual (FM) Approval Non-incendive, flammable fluid service for Class I, Division 2 Groups A, B, C, and D; Dust-ignition proof for Class II/III, Division 1 Groups E, F, and G hazardous locations. T5 temperature level.

E5 FM Approval Explosion-Proof for Class I, Division 1, Groups C and D. Available for integrally-mounted Model 8711 Wafer Magnetic Flowmeter Flowtubes.

ED KEMA/CENELEC Approval
EEx d IIB T6.

Performance Specifications

(System specifications are given using the frequency output and with the unit at reference conditions.)

Accuracy

Model 8732C with Model 8705 Flowtube:
System accuracy is ±0.5% of rate from 1 to 30 ft/s (0.3 to 10 m/s); below 1.0 ft/s (0.3 m/s), the system has an accuracy of ±0.005 ft/s (0.0015 m/s). Analog output has the same accuracy as frequency output plus an additional 0.05% of span.

Model 8732C with Model 8711 Flowtube:
System accuracy is ±0.5% of rate from 3 to 30 ft/s (0.9 to 10 m/s); below 3 ft/s (0.9 m/s), the system has an accuracy of ±0.015 ft/s (0.005 m/s). Analog output has the same accuracy as frequency output plus an additional 0.05% of span.

Vibration Effect

Meets IEC 770 Pipeline Installation Conditions.

Repeatability

±0.1% of reading.

Response Time

0.2 seconds maximum response to step change in input.

Stability

±0.1% of rate over six months.

Ambient Temperature Effect

±0.25% change over operating temperature range.

EMC Compliance

Complies with the increased requirements from the NAMUR Recommendations: May 1993, Part 1. Electromagnetic compatibility (EMC) for process and laboratory apparatus.

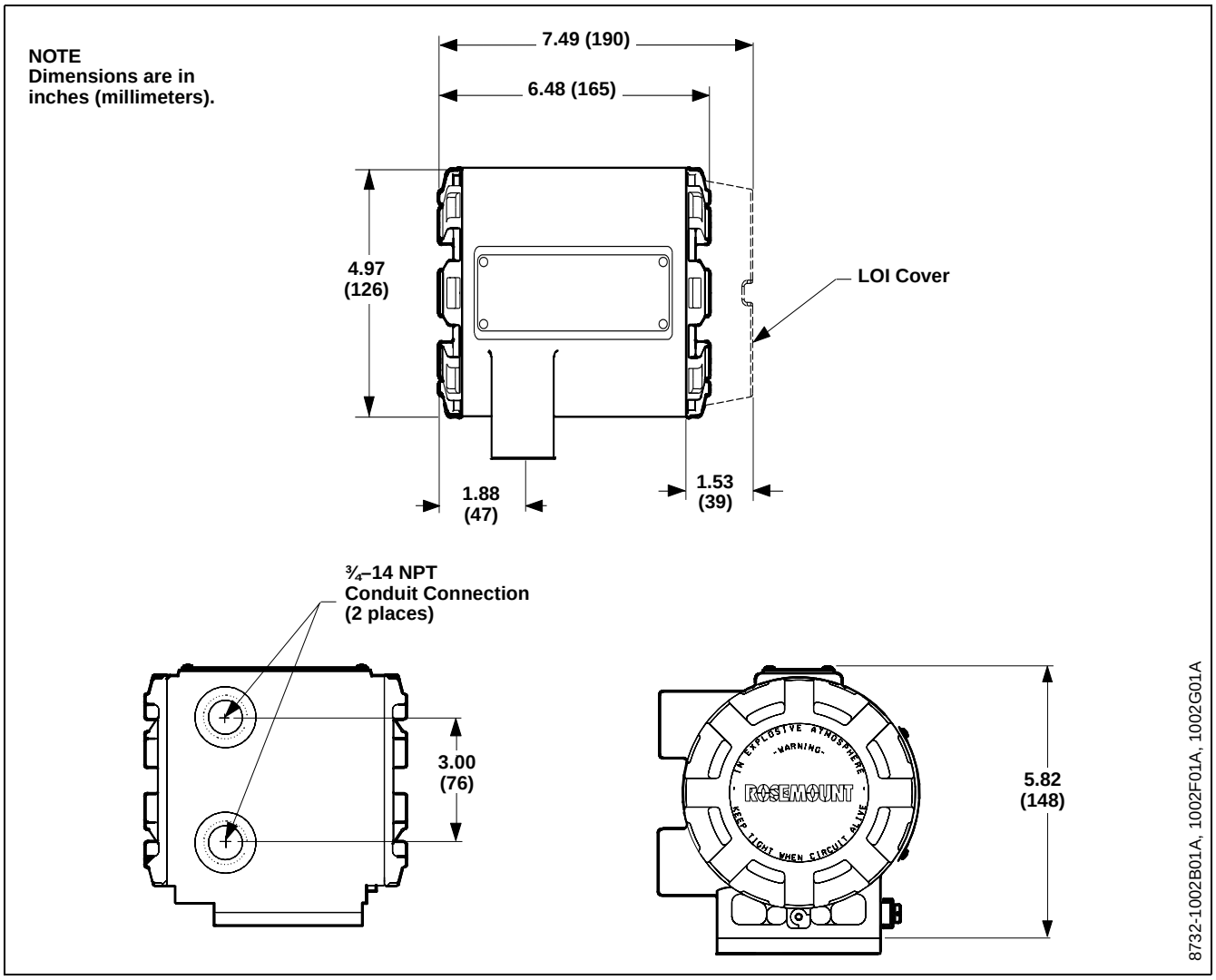


FIGURE 16. Model 8732C Dimensional Drawings.

Physical Specifications

Materials of Construction

Housing
Low copper aluminum, NEMA 4X and IEC 529 IP66.

Pollution Degree II.

Paint
Polyurethane.

Cover Gasket
Rubber.

Electrical Connections
Two ¾–14 NPT connections provided on the transmitter housing. PG13.5 and CM20 adapters are available. Screw terminals provided for all connections. Power wiring connected to transmitter only. Integrally mounted transmitters are factory wired to the flowtube.

Mounting
Transmitter is mounted integrally with the flowtube and does not require interconnecting cables.

Transmitter Dimensions and Weight
Approximately 7 pounds (3.2 kg). Add 1 pound (0.5 kg) for Option Code M4. See Figure 16.

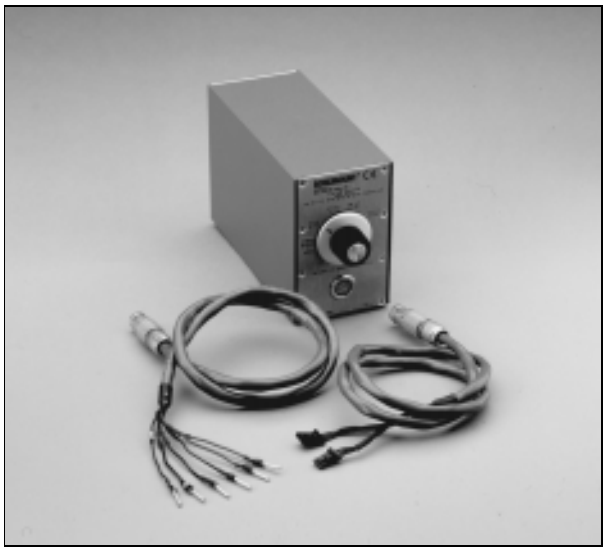
ORDERING INFORMATION

NC = No Charge
NA = Not Applicable

Model	Product Description	Availability
8732C	Magnetic Flowmeter Transmitter	•
Code	**Transmitter Style**	
T	Integral (mounted to flowtube)	•
Code	**Power Supply Voltage**	
03	15–30 V dc	•
12	85–250 V ac, 50–60 Hz	•
Code	**Hazardous Location Certifications**	
N0	Factory Mutual (FM) Class I, Division 2 Approval for nonflammable fluids; Canadian Standards Association (CSA) Class I, Division 2 Approval; CE Marking	•
N5	Factory Mutual (FM) Class I, Division 2 Approval for flammable fluids	•
E5	Factory Mutual (FM) Class I, Division 1, Explosion Proof Approval	•
ED	KEMA/CENELEC EEx d II BT6 Increased Safety Approval; CE Marking	•
Code	**Options**	
C1	Custom Configuration – Completed CDS (document number 00806-0100-4668) required with order	•
D1	High Accuracy Calibration [0.25% of rate from 3 to 30 ft/s (0.9 to 10 m/s)] matched flowtube and transmitter system(1)	•
J1	CM 20 Conduit Adaptor	•
J2	PG 13.5 Conduit Adaptor	•
L1	Transient Protection Circuitry	•
M4	Local Operator Interface	•
T1	Non-volatile Totalizer	•
Typical Model Number:	**8732C T 12 N0 M4**	

(1) Option Code must be ordered for both flowtube and transmitter.

Rosemount Model 8714D Reference Calibration Standard



8714D-001AB

FEATURES

General

Rosemount Model 8714D provides the ability to calibrate a Model 8712C/U Rosemount Magnetic Flowmeter Transmitter in the field to ensure long-term accuracy of the flowmeter system. Model 8714DQ4 attaches to the transmitter's flowtube connection and ensures traceability to NIST standards.

SPECIFICATIONS

Functional Specifications

Ambient Temperature Limits

Operating
–30 to 140 °F (–34 to 60 °C).

Storage
–40 to 140 °F (–40 to 60 °C).

Humidity Limits

0 to 95% relative humidity.

Performance Specifications

Accuracy

±0.05% of rate at 30 ft/s.

±0.10% of rate at 10 ft/s and 3 ft/s.

Warm-up Time

30 minutes.

Ambient Temperature Effect

< 0.015% of rate per 10 °F (< 0.027% per 10 °C).

Humidity Effect

No effect from 0 to 60% relative humidity.
< 0.10% of rate from 60 to 90% relative humidity.

Long-Term Stability

< 0.10% of rate shift in one year.

Physical Specifications

Electrical Connections

Electrical connections are compatible with Model 8712C/U or Model 8732C terminal blocks.

Mounting

Any position is acceptable.

Materials of Construction

Housing
Extruded aluminum.

Covers
Stamped aluminum, silk-screened.

Paint
Epoxy polyester.

Weight

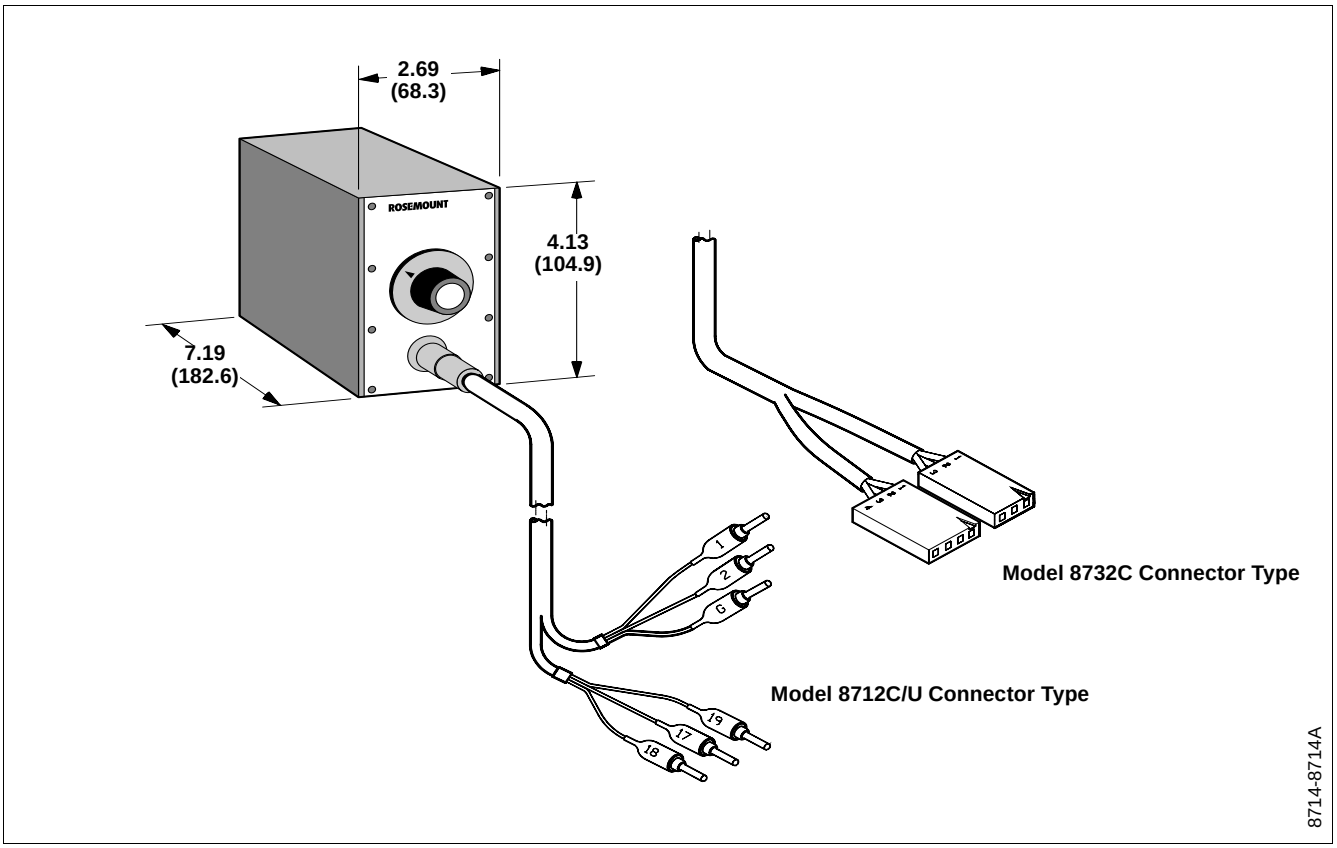
Approximately 3 lb (2 kg).

ORDERING INFORMATION

Model	Description	Availability
8714DQ4	Reference Calibration Standard	•

CE

FIGURE 17. Model 8714D is shipped with both the Model 8712C/U and Model 8732C Connector Types.



ORDERING INFORMATION

The listed prices are effective with date of issue and are subject to change without notice.

All prices are F.O.B. our plant at Chanhassen, MN. The prices are exclusive of all sales and use taxes.

Minimum spares order is $100.00.

Tagging

The flowtube and transmitter will be tagged, at no charge, in accordance with customer requirements.

Standard SST tag is wired to the transmitter. Tag character height is 0.125 in. (3.18 mm); 85 characters maximum.

Tag may be permanently stamped on flowtube and/or transmitter nameplate upon request; 65 characters maximum.

Ordering Procedure

To order, select the desired flowtube and/or transmitter by specifying model codes from the ordering table.

For remote transmitter applications, note the cable specification requirements.

Flowtubes and transmitters must be selected from Product Data Sheet 00813-0100-4727.

Standard Configuration

Unless the Configuration Data Sheet is completed, the transmitter will be shipped as follows:

Engineering Units:	ft/sec
4 mA (1 V dc):	0
20 mA (5 V dc):	30
Tube Size:	3-inch
Flowtube Calibration Number:	1000005010000000

The Model 8732C Transmitter is factory-calibrated with the attached flowtube size and appropriate calibration number.

Custom Configuration (Option Code C1)

If Option Code C1 is ordered, Configuration Data Sheet (CDS) 00806-0100-4668 must be submitted at the time of order.

Cable Requirements for Remote Transmitters

Transmitter Input Power

Description	P/N
Signal Cable (20 AWG) Belden 8762, Alpha 2411 equivalent	08712-0061-0001
Coll Drive Cable (14 AWG) Belden 8720, Alpha 2442 equivalent	08712-0060-0001
Combination Signal and Coil Drive Cable (18 AWG)(1) Belden 9368 equivalent	08712-0750-0001

(1) Combination signal and coil drive cable is not recommended for high-signal magmeter system. For remote mount installations, combination signal and coil drive cable should be limited to less than 100 ft (30 m).

Remote transmitter installations require equal lengths of signal and coil drive cables. Integrally mounted transmitters are factory wired and do not require interconnecting cables.

Lengths from 5 to 1,000 feet (1.5 to 300 meters) may be specified, and will be shipped with the flowtube. When ordering the combination cable, the lengths specified must be from 5 to 500 feet (1.5 to 150 meters).

Cable longer than 100 feet (30 meters) is not recommended for high-signal systems.

ROSEMOUNT SMART FAMILY® INSTRUMENTS

Rosemount SMART FAMILY instruments include pressure, temperature, level, and flow measurement.

All SMART FAMILY instruments are designed to communicate using HART (Highway Addressable Remote Transducer) protocol with the hand-held HART Communicator and Fisher-Rosemount Control Systems.

Flow Measurement Product Data Sheets

00813-0100-4003	Model 8800C Smart Vortex Flowmeter
00813-0100-4716	Model 3095 MV™ Multivariable™ Mass Flow Transmitter
00813-0100-4760	Diamond II+Annubar®
00813-0100- 4761	ProBar® Volumetric Flowmeter
00813-0100- 4762	Mass ProBar® Mass Flowmeter
00813-0100- 4686	Model 1195 Integral Orifice

CONFIGURATION DATA SHEET

CONFIGURATION DATA SHEET
(Unless otherwise specified, transmitter will be shipped as ★ *Default Factory Configuration.*)

Customer: ____________________ P.ONo: ____________________

Transmitter Model No: ____________________ Line Item: ____________________

SST Transmitter Tag No:
(72 characters maximum)
|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|

Transmitter Tag (Software): |_|_|_|_|_|_|_|_| (8 characters maximum)

OUTPUT INFORMATION (Minimum Information Necessary for Startup)

Fluid Description = ____________________

Units = ☐ ★ ***Ft/Sec***

☐ Gal/Sec	☐ Gal/Min	☐ Gal/Hr	☐ Gal/Day	☐ Special (Fill out the information in the box below. Examples on back side.)
☐ Liters/Sec	☐ Liters/Min	☐ Liters/Hr	☐ Liters/Day	
☐ Imp. Gal/Sec	☐ Imp. Gal/Min	☐ Imp. Gal/Hr	☐ Imp. Gal/Day	
☐ CuMeters/Sec	☐ CuMeters/Min	☐ CuMeters/Hr	☐ CuMeters/Day	
		☐ Meters/Sec		

①Volume Units = |_|_|_|_| *(4 characters)*
②Base Units
☐ Gallons   Imp. Gallons
☐ Liters   Cubic Meters
☐ Feet   Meters
③Conversion No. ____________
④Time Base
☐ Hours   Minute
☐ Day   Second
⑤Rate Units = |_|_|_|_| *(4 characters)*

20 mA (Full Scale) Value = ★ ***30 ft/sec*** ________

4mA (Zero) Value = ★ ***0.0 ft/sec*** ________

Damping = ★ ***2.0 seconds*** ________

Flowrate Display ☐ ★ ***Eng Units and % span*** ☐ Eng Units and Gross Total ☐ % Span and Gross Total

Totalizer Display ☐ ★ ***Net and Gross*** ☐ Forward and Reverse

Hardware Jumpers

A) Write Protect	☐★ ***Off***	☐ On
B) Analog Loop Power	☐★ ***Internal***	☐ External
C) Alarm Option	☐★ ***High***	☐ Low
Flowtube Size = ________	.15 – 60" ★ **3"**	

Flowtube Calibration No.: |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_| 16 Digits from flowtube ★***1000005010000000***

SST Flowtube Tag No.: ____________________

AUXILIARY OUTPUT INFORMATION (Not Required for Typical Start-up)

Pulse Scaling:
★***.03 ft***
1 Pulse = ________ units

Auxiliary Output Control
☐ ★ ***Zero Flow***
☐ Reverse Flow

Operating Mode:
☐ ★ ***Normal***
☐ Filter (Operating Mode for Model 8712H or Model 8732C is not available.)

Low Flow Cutoff
★ ***.04***
________ ft/sec

Coil Pulse Mode
☐ ★ ***6 Hz***
☐ 30 Hz (Coil Pulse Mode for Model 8712H is preset at the factory.)

Pulse Width
★***. 5***
________ ms

Signal Processing
☐ ★ ***Off***
☐ On
________ ★ ***90*** No. Samples
________ ★ ***2*** Max.% Limit %
________ ★ ***2*** Time Limit Sec

Flowtube Gain
★ ***100*** (Model 8712U only)(1)
Transmitter Gain
★ ***A*** (Model 8712U only)(1)
Coil Current
★ ***A*** (Model 8712U only)(1)

FLOWTUBE INFORMATION (Data Only – Does Not Affect Transmitter Output)

Descriptor: |_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_| (16 characters maximum) Date (day/month/year): |_|_| |_|_| |_|_|

Message:
|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_|_| (32 characters maximum)

Flowtube Tag No. (Software): |_|_|_|_|_|_|_|_| (8 characters maximum)

Flowtube Serial No: |_|_|_|_|_|_|_| (7 characters maximum)

Enter either the Rosemount flowtube model number or select one option from each of the following groups of options:
Flowtube Model No. _____
Or:

Electrode Material:
☐ ★***316 SST***
☐ Titanium
☐ Alloy-20
☐ *Hastelloy C*®
☐ Tantalum
☐ Platinum-Iridium
☐ Special

Flange Material:
☐ ★***Carbon Steel***
☐ Standard
☐ 304 SST
☐ Special

Electrode Type:
☐ ★ ***Standard***
☐ Bullet
☐ Ultrasonic
☐ Standard, plus Grounding
☐ Special

Liner Material:
☐ ★***Teflon***® **(PTFE)**
☐ *Tefzel*® (ETFE)
☐ Polyurethane
☐ *Ryton*®
☐ Ceramic
☐ Neoprene
☐ Special

☐ ★ ***4–20 mA, scaled pulse, and auxiliary output with simultaneous digital signal based on HART® protocol (Model 8712C/U/H only)***
☐ ★ ***4–20 mA and scaled pulse with simultaneous digital signal based on HART protocol (Model 8732C only)***
☐ 4–20 mA and auxiliary output with simultaneous digital signal based on *HART* protocol (Model 8732C only)
☐ Burst mode of *HART* digital process variable

Burst mode output options:
☐ Primary variable in engineering units.
☐ Primary variable in percent of range.
☐ All dynamic variables in engineering units.
☐ All dynamic variables in engineering units and the primary variable mA value.

☐ Multidrop Communications(2)
Choose transmitter address (1-15)(3): _____

SPECIAL UNITS – OUTPUT INFORMATION EXAMPLE
(If applicable, complete the information on the front as shown in the examples below.)

Example 1:
User wants Barrels per day
(1 Barrel = 31 gallons):

① Vol Unit = BARL
② Base Units = Gallons
③ Conversion No. = 31.0
④ Time Base = Day
⑤ Rate Units = B/DY

Example 2:
User wants Kgs per minute
(Density = 1.05 Kg/Liter with 1 Kg = 0.9524 liters):

① Vol Unit = Kg
② Base Units = Liters
③ Conversion No. = 0.9524
④ Time Base = Minute
⑤ Rate Units = Kg/m

(1) Factory configured for Rosemount flowtubes. When using other manufacturers' flowtubes, this parameter must be configured in the field with the Universal Trim feature .

(2) This option fixes the transmitter's analog output at 4 mA.

(3) Default transmitter address is 1 if multidrop communication is selected.

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