Quick Installation Guide
00825-0100-4661, Rev AA
November 2003

Rosemount 8712D / 8700 Series

Rosemount Magnetic Flowmeter Systems (Transmitter and Flowtube)

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Process Management

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Rosemount 8712D / 8700 Series

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⚠ IMPORTANT NOTICE

This installation guide provides basic guidelines for the Rosemount® 8712D. It does not provide instructions for detailed configuration, diagnostics, maintenance, service and troubleshooting installations. Refer to the 8712D reference manual (document number 00809-0100-4661) for more instruction. The manual and this QIG are also available electronically on www.rosemount.com.

⚠ WARNING

Failure to follow these installation guidelines could result in death or serious injury:

Installation and servicing instructions are for use by qualified personnel only. Do not perform any servicing other than that contained in the operating instructions, unless qualified. Verify that the operating environment of the flowtube and transmitter is consistent with the appropriate FM or CSA approval.

Do not connect a Rosemount 8712D to a non-Rosemount flowtube that is located in an explosive atmosphere.

⚠ WARNING

Explosions could result in death or serious injury:

Installation of this transmitter in an explosive environment must be in accordance with the appropriate local, national, and international standards, codes, and practices. Please review the approvals section of the 8712D reference manual for any restrictions associated with a safe installation.

- Before connecting a HART-based communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.

Electrical shock can result in death or serious injury

- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

⚠ WARNING

The flowtube liner is vulnerable to handling damage. Never place anything through the flowtube for the purpose of lifting or gaining leverage. Liner damage can render the flowtube useless.

To avoid possible damage to the flowtube liner ends, do not use metallic or spiral-wound gaskets. If frequent removal is anticipated, take precautions to protect the liner ends. Short spool pieces attached to the flowtube ends are often used for protection.

Correct flange bolt tightening is crucial for proper flowtube operation and life. All bolts must be tightened in the proper sequence to the specified torque limits. Failure to observe these instructions could result in severe damage to the flowtube lining and possible flowtube replacement.

STEP 1: PRE-INSTALLATION

Before installing the Rosemount 8712D Magnetic Flowmeter Transmitter, there are several pre-installation steps that should be completed to make the installation process easier:

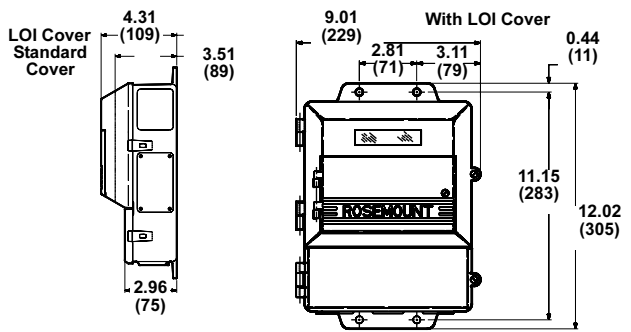
- Identify the options and configurations that apply to your application
- Set the hardware switches if necessary
- Consider mechanical, electrical, and environmental requirements

Mechanical Considerations

The mounting site for the Rosemount 8712D transmitter should provide enough room for secure mounting, easy access to conduit ports, full opening of the transmitter covers, and easy readability of the LOI screen (see Figure 1). The transmitter should be mounted in an manner that prevents moisture in conduit from collecting in the transmitter.

The 8712D is mounted separately from the flowtube, it is not subject to limitations that might apply to the flowtube.

Figure 1. Rosemount 8712D Dimensional Drawing



Environmental Considerations

To ensure maximum transmitter life, avoid excessive heat and vibration. Typical problem areas:

- high-vibration lines with integrally mounted transmitters
- warm-climate installations in direct sunlight
- outdoor installations in cold climates.

Remote-mounted transmitters may be installed in the control room to protect the electronics from the harsh environment and provides easy access for configuration or service.

Rosemount 8712D transmitters require external power and there must be access to a suitable power source.

Installation Procedures

Rosemount 8712D installation includes both detailed mechanical and electrical installation procedures.

Mount the Transmitter

At a remote site the transmitter may be mounted on a pipe up to two inches in diameter or against a flat surface.

Pipe Mounting

To mount the transmitter on a pipe:

1. Attach the mounting plate to the pipe using the mounting hardware.
2. Attach the 8712D to the mounting plate using the mounting screws.

Surface Mounting

To surface mount the transmitter:

1. Attach the 8712D to the mounting location using the mounting screws.

Identify Options and Configurations

The standard application of the 8712D includes a 4–20 mA output and control of the flowtube coils. Other applications may require one or more of the following configurations or options:

- Multidrop Communications
- PZR (Positive Zero Return)
- Auxiliary Output
- Pulse Output

Additional options may apply. Be sure to identify those options and configurations that apply to your situation, and keep a list of them nearby for consideration during the installation and configuration procedures.

Hardware Jumpers/Switches

The 8712D electronics board is equipped with three user-selectable hardware switches. These switches set the Failure Alarm Mode, Internal/External Analog Power, and Transmitter Security. The standard configuration for these switches when shipped from the factory are as follows:

Failure Alarm Mode:	HIGH
Internal/External Analog Power:	INTERNAL
Transmitter Security:	OFF

Changing Hardware Switch Settings

In most cases, it is not necessary to change the setting of the hardware switches. If you need to change the switch settings, complete the steps outlined in the manual.

Electrical Considerations

Before making any electrical connections to the 8712D, consider the following standards and be sure to have the proper power supply, conduit, and other accessories.

STEP 2: WIRING

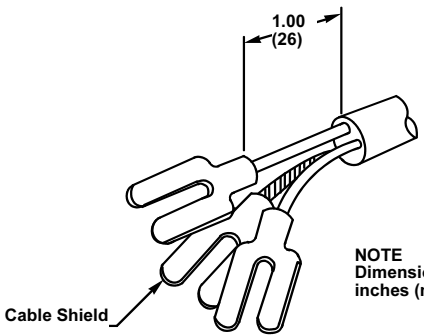
Conduit Ports and Connections

Both the flowtube and transmitter junction boxes have ports for ¾-inch NPT conduit connections. These connections should be made in accordance with local or plant electrical codes. Unused ports should be sealed with metal plugs. Proper electrical installation is necessary to prevent errors due to electrical noise and interference. Separate conduits are not necessary for the two cables, but a dedicated conduit line between each transmitter and flowtube is required. Shielded cable must be used for best results in electrically noisy environments.

Conduit Cables

Run the appropriate size cable through the conduit connections in your magnetic flowmeter system. Run the power cable from the power source to the transmitter. Run the coil drive and electrode cables between the flowmeter and transmitter. Prepare the ends of the coil drive and electrode cables as shown in Figure 2. Limit the unshielded wire length to 1-inch on both the electrode and coil drive cables. Excessive lead length or failure to connect cable shields can create electrical noise resulting in unstable meter readings.

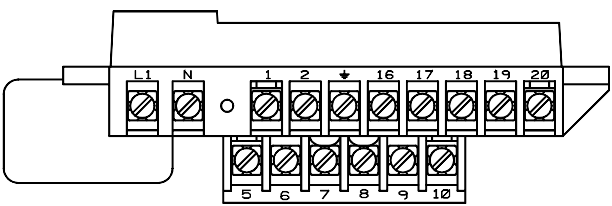
Figure 2. Cable Preparation Detail



Step 2.1 Transmitter Coil Input

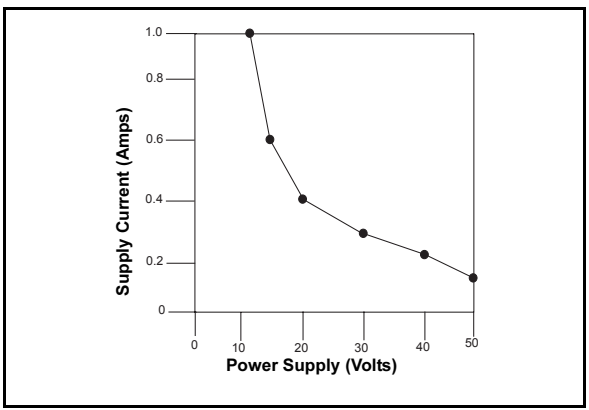
This wiring section covers supplying power to the flowtube coils through the transmitter. The transmitter coil input power sends a pulsed DC frequency to the flowtube.

Figure 3. Transmitter Power Connections



Wire the transmitter according to local electrical requirements. Ground the transmitter cage via the threaded conduit connection (see Figure 2). For ac power applications, connect ac Neutral to terminal N and connect ac Line to terminal L1. For dc power applications, properly connect the positive and negative terminals. Units powered by 12-42 V dc power supply may draw up to 1 amp of current. In addition, follow the supply wire and disconnect requirements below:

Figure 4. Power Supply Current



Supply Wire Requirements

Use 12 to 18 AWG wire rated for the proper temperature application. For connections in ambient temperatures above 140 °F (60 °C), use a wire rated for at least 176 °F (80 °C). For ambients greater than 176 °F (80 °C), use a wire rated for at least 230 °F (110 °C).

Disconnects

Connect the device through an external disconnect or circuit breaker. Clearly label the disconnect or circuit breaker and locate it near the transmitter and per local electrical control.

Installation Category

The installation category for the Rosemount 8712D is (Overvoltage) Category II.

Overcurrent Protection

The Rosemount 8712D Flowmeter Transmitter requires overcurrent protection of the supply lines. Maximum ratings of overcurrent devices are as follows:

Power System	Fuse Rating	Manufacturer
12-42 V DC	250 V; 3 Amp, Quick Acting	Bussman AGCI or Equivalent
90-250 V AC	250 V; 1 Amp, Quick Acting	Bussman AGCI or Equivalent

Requirements for 115 V ac or 230 V ac Power Supply

Wire the transmitter according to local electrical requirements for 90 - 250 V AC. In addition, follow the supply wire and disconnect requirements below:

Requirements for 12-42 V dc Power Supply

Units powered with 12-42 V DC may draw up to 1 amp of current. As a result, the input power wire must meet certain gauge requirements. For combinations not shown, you can calculate the maximum distance given the supply current, the voltage of the source, and the minimum start-up voltage of the transmitter, 12 V DC, using the following equation:

$$\text{MaximumResistance} = \frac{\text{SupplyVoltage} - 12\text{Vdc}}{\text{SupplyCurrent}}$$

Table 1. Length of Annealed Copper (cu) Wires

Types of Power Supply Wires		Maximum Length of the Wire for Each Corresponding Power Supply Source			
Wire Gauge	**Annealed Cu milliohms/ft (milliohms/m)**	**42 V Supply ft (m)**	**30 V Supply ft (m)**	**20 V Supply ft (m)**	**12.5 V Supply ft (m)**
20	0.01015 (0.033292)	1478 (451)	887 (270)	394 (120)	25 (8)
18	0.006385 (0.020943)	2349 (716)	1410 (430)	626 (191)	39 (12)
16	0.004016 (0.013172)	3735 (1139)	2241 (683)	996 (304)	62 (19)
14	0.002525 (0.008282)	5941 (1811)	3564 (1087)	1584 (483)	99 (30)
12	0.001588 (0.005209)	9446 (2880)	5668 (1728)	2519 (768)	157 (48)
10	0.000999 (0.003277)	15015 (4578)	9009 (2747)	4004 (1221)	250 (76)

Table 2. Length of Hand-drawn Copper (cu) Wires

Types of Power Supply Wires		Maximum Length of the Wire for Each Corresponding Power Supply Source			
Wire Gauge	**Annealed Cu milliohms/ft (milliohms/m)**	**42 V Supply ft (m)**	**30 V Supply ft (m)**	**20 V Supply ft (m)**	**12.5 V Supply ft (m)**
18	0.00664 (0.021779)	2259 (689)	1355 (413)	602 (184)	38 (11)
16	0.004176 (0.013697)	3592 (1095)	2155 (657)	958 (292)	60 (18)
14	0.002626 (0.008613)	5712 (1741)	3427 (1045)	1523 (464)	95 (29)
12	0.001652 (0.005419)	9080 (2768)	5448 (1661)	2421 (738)	151 (46)
10	0.01039 (0.003408)	14437 (4402)	8662 (2641)	3850 (1174)	241 (73)

Options, Considerations, and Procedures

Step 2.2 Transmitter Communication Input

Connect 4–20 mA Loop External Power Source

The 4–20 mA output loop signal may be powered internally or externally. The default position of the internal/external analog power jumper is in the *internal* position. The user-selectable power supply jumper is located on the electronics board.

Internal

The 4–20 mA analog power loop may be powered from the transmitter itself. Resistance in the loop must be 1,000 ohms or less. If a HART Communicator or control system will be used, it must be connected across a minimum of 250 ohms resistance in the loop.

External

HART multidrop installations require a 10–30 V dc external analog power source. If a HART Communicator or control system is to be used, it must be connected across a minimum of 250 ohms resistance in the loop.

To connect external power to the 4–20 mA loop, connect -dc to Terminal 8 and +dc to Terminal 7. (See Figure 3)

NOTE

To connect any of the other output options (pulse output for totalizing, auxiliary output for switch closure, or positive zero return), consult the the comprehensive product manual.

Step 2.3 Transmitter to Flowtube Wiring

A single dedicated conduit run for the coil drive and electrode cables is recommended between a flowtube and a remote transmitter. Bundled cables in a single conduit are likely to create interference and noise problems in your system. One set of cables per conduit run is recommended. If wiring from multiple systems must be combined, group electrode wiring in one conduit, and coil drive wiring in a separate conduit.

Figure 5. Conduit Preparation

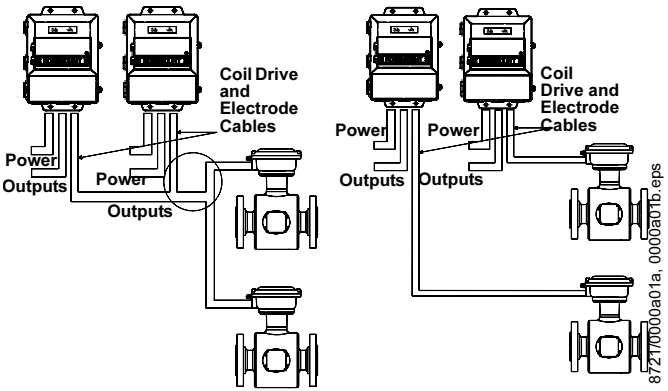


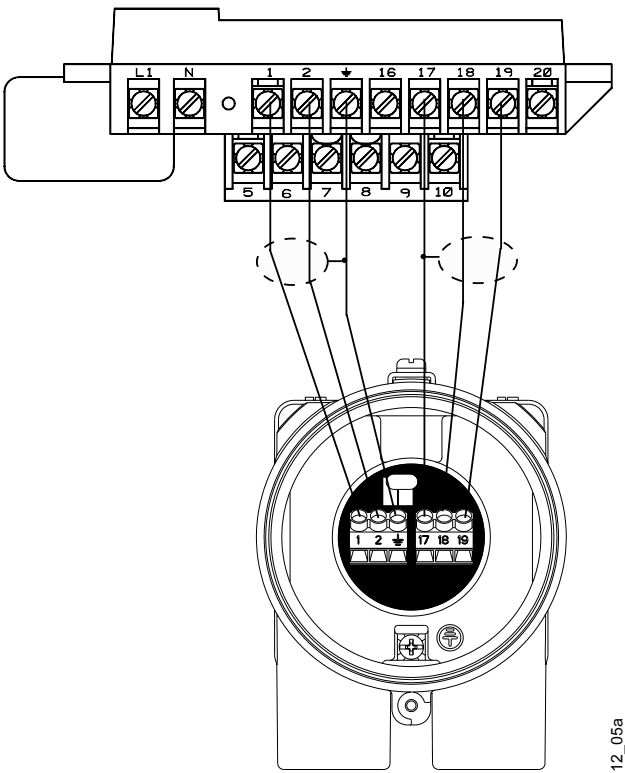
Table 3. Cable Requirements

Description	Length	Part Number
Signal Cable (20 AWG) Belden 8762, Alpha 2411 equivalent	ft	08712-0061-0001
	m	08712-0061-0003
Coil Drive Cable (14 AWG) Belden 8720, Alpha 2442 equivalent	ft	08712-0060-0001
	m	08712-0060-0003
Combination Signal and Coil Drive Cable (18 AWG)(1)	ft	08712-0752-0001
	m	08712-0752-0003

(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).

Flowtube to Transmitter Connections

Figure 6. Wiring Diagram



STEP 3: BASIC CONFIGURATION

Once the magnetic flowmeter is installed and power has been supplied, transmitter must be configured through the basic setup. These parameters can be configured through either a local operator interface, a HART Communicator or AMS. A table of all the parameters are on page 18. Descriptions of the more advanced functions are included in the comprehensive product manual.

Basic Setup

Four parameters are required to set up the 8712D: calibration number, line size, URV, and Units.

- **Calibration Number**
  The tube *calibration number* is a 16-digit number used to characterize the flowtubes.
- **Line Size**
  The *line size* (tube size) must be set to match the actual flowtube connected to the transmitter. The size must be specified in inches according to the available sizes listed below.

Available Line Sizes inches (millimeters)		
0.1 (3)	6 (152)	36 (914)
0.15 (4)	8 (203)	40 (1016)
0.25 (6)	10 (254)	42 (1067)
0.3 (8)	12 (305)	48 (1219)
0.5 (13)	14 (356)	54 (1372)
0.75 (19)	16 (406)	56 (1422)
1 (25)	18 (457)	60 (1524)
1.5 (38)	20 (508)	64 (1626)
2 (51)	24 (610)	72 (1829)
2.5 (64)	28 (711)	80 (2032)
3 (76)	30 (762)	
4 (102)	32 (813)	

- **URV (Upper Range Value)**
  The *upper range value* (URV), or analog output range, is preset to 30 ft/s at the factory. The units that appear will be the same as those selected under the units parameter.
- **Flow Rate Units**
  The *flow rate units* variable specifies the format in which the flow rate will be displayed. Units should be selected to meet your particular metering needs.

The Tag and LRV parameters are frequently used and are included in Basic Setup.

- **Tag**
  Tag is the quickest and shortest way of identifying and distinguishing between transmitters. Transmitters can be tagged according to the requirements of your application. The tag may be up to eight characters long.
- **LRV (Lower Range Value)**
  Reset the *lower range value* (LRV), or analog output zero, to change the size of the range (or span) between the URV and LRV. Under normal circumstances, the LRV should be set to a value near the minimum expected flow rate to maximize resolution. The LRV must be between –39.3 ft/s to 39.3 ft/sec.

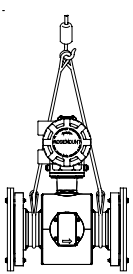
Function	HART Fast Keys	LOI Key
PROCESS VARIABLES	1, 1	
DIAGNOSTICS AND SERVICE		
Analog Output Test	1, 1, 2	Aux. function
Pulse Output Test	1, 2, 3	Aux. Function
Self Test	1, 2, 1, 2	Aux. Function
D/A Trim and 4-20 mA Output Trim	1, 2, 4, 1	Aux. Function
Scaled D/A Trim	1, 2, 4, 2	
Electronics Trim	1, 2, 4, 3	Aux. Function
Auto Zero Trim	1, 2, 4, 4	Aux. Function
Universal Auto Trim	1, 2, 4, 5	Aux. Function
BASIC SETUP		
Tag	1, 3, 1	XMTR Info
Flow Rate Units	1, 3, 2, 1	Units
URV (Upper Range Value)	1, 3, 3	Analog Output Range
LRV (Lower Range Value)	1, 3, 4	Aux. Function
Line Size	1, 3, 5	Tube Size
Calibration Number	1, 3, 6	Tube Cal No.
Damping	1, 3, 7	Damping
DETAILED SETUP		
Pulse Output Scaling	1, 4, 3, 2, 1	Aux. Function
Pulse Width	1, 4, 3, 2, 2	Aux. Function
Special Units	1, 3, 2, 2	Aux. Function
User-Defined Volume Unit	1, 3, 2, 2, 1	Aux. Function
Base Volume Unit	1, 3, 2, 2, 2	Aux. Function
Conversion Number	1, 3, 2, 2, 3	Aux. Function
Base Tim Unit	1, 3, 2, 2, 4	Aux. Function
User-Defined Flow Unit	1, 3, 2, 2, 5	Aux. Function
Auxiliary Output	1, 4, 3, 3	Aux. Function
Totalizer	1, 1, 4	Totalizer
Measure Gross Total	1, 1, 4, 1	Totalizer
Start Totalizer	1, 1, 4, 4	Totalizer
Stop Totalizer	1, 1, 4, 5	Totalizer
Reset Totalizer	1, 1, 4, 6	Totalizer
Low Flow Cutoff	1, 4, 4, 1	Aux. Function
Coil Dive Frequency	1, 4, 1, 3	Aux. Function
Signal Process Control Status	1, 4, 4, 4	Aux. Function

Function	HART Fast Keys	LOI Key
Empty Pipe	1, 4, 1, 7	Aux. Function
Control Status	1, 4, 4, 4	Aux. Function
Signal Processing Control	1, 4, 4	Aux. Function
Number of Samples	1, 4, 4, 5	Aux. Function
Maximum Percent Limit	1, 4, 4, 6	Aux. Function
Time Limit	1, 4, 4, 7	Aux. Function
REVIEW VARIABLES		
Review	1, 5	
MISCELLANEOUS FUNCTIONS		
Message	1, 4, 5, 4	XMTR Info
Date	1, 4, 5, 5	XMTR Info
Flowtube Tag	1, 4, 5, 8	XMTR Info
Flowtube Serial Number	1, 4, 5, 7	XMTR Info

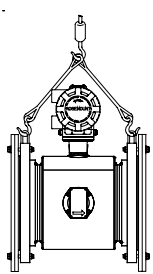
STEP 4: HANDLING

Handle all parts carefully to prevent damage. Whenever possible, transport the system to the installation site in the original shipping containers. Teflon®-lined flowtubes are shipped with end covers that protect it from both mechanical damage and normal unrestrained distortion. Remove the end covers just before installation.

Figure 7. Rosemount 8705 Flowtube Support for Handling



½- through 4-Inch Flowtubes



6-Inch and Larger Flowtubes

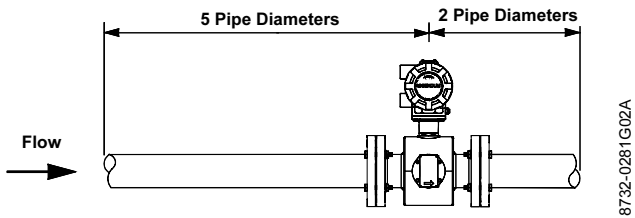
8732-0281B02A, C02A

STEP 5: MOUNTING

Upstream/Downstream Piping

To ensure specification accuracy over widely varying process conditions, install the flowtube a minimum of five straight pipe diameters upstream and two pipe diameters downstream from the electrode plane (see Figure 8).

Figure 8. Upstream and Downstream Straight Pipe Diameters



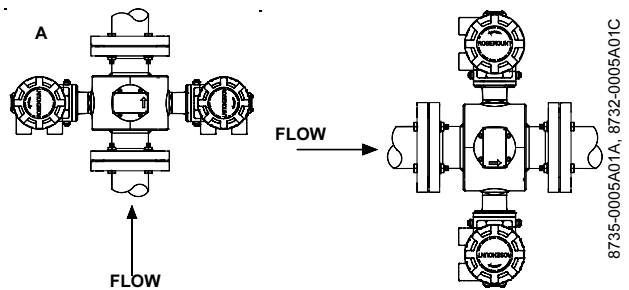
Flow Direction

The flowtube should be mounted so that the FORWARD end of the flow arrow, shown on the flowtube identification tag, points in the direction of flow through the tube.

Flowtube Orientation

The flowtube should be installed in a position that ensures the flowtube remains full during operation. Vertical installation allows upward process fluid flow keeps the cross-sectional area full, regardless of flow rate. Horizontal installation should be restricted to low piping sections that are normally full. In these cases, orient the electrode plane to within 45 degrees of horizontal.

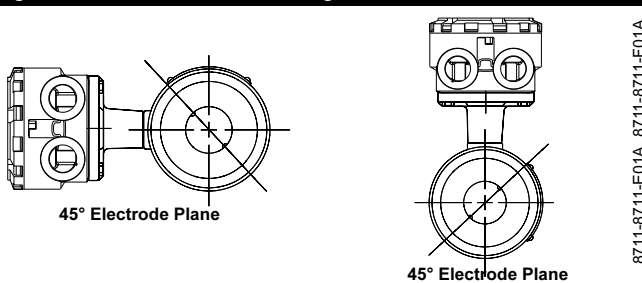
Figure 9. Flowtube Orientation



The electrodes in the Rosemount 8705 flowtube are properly orientated when the two measurement electrodes are in the 3 and 9 o'clock positions, as shown on the right of Figure 9.

The electrodes in the Rosemount 8711 are properly orientated when the top of the flowtube is either vertical or horizontal, as shown in Figure 10. Avoid any mounting orientation that positions the top of the flowtube at 45° from the vertical or horizontal position.

Figure 10. Rosemount 8712 Mounting Position



STEP 6: INSTALLATION (FLANGED FLOWTUBE)

Gaskets

The flowtube requires a gasket at each of its connections to adjacent devices or piping. The gasket material selected must be compatible with the process fluid and operating conditions. Metallic or spiral-wound gaskets can damage the liner. Gaskets are required on each side of the grounding ring. All other applications (including flowtubes with lining protectors or a grounding electrode) require only one gasket on each end connection.

Flange Bolts

Suggested torque values by flowtube line size and liner type are listed in Table 4 for ASME B16.5 (ANSI) and Table 5 for DIN flanges. Consult the factory if the flange rating of the flowtube is not listed. Tighten flange bolts on the upstream side of the flowtube in the incremental sequence shown in Figure 11 to 20% of the suggested torque values. Repeat the process on the downstream side of the flowtube. For flowtubes with more or less flange bolts, tighten the bolts in a similar crosswise sequence. Repeat this entire tightening sequence at 40%, 60%, 80%, and 100% of the suggested torque values or until the leak between the process and flowtube flanges stop.

If leakage has not stopped at the suggested torque values, the bolts can be tightened in additional 10% increments until the joint stops leaking, or until the measured torque value reaches the maximum torque value of the bolts. Practical consideration for the integrity of the liner often leads the user to distinct torque values to stop leakage due to the unique combinations of flanges, bolts, gaskets, and flowtube liner material.

Check for leaks at the flanges after tightening the bolts. Failure to use the correct tightening methods can result in severe damage. Flowtubes require a second tightening 24 hours after the initial installation. Over time, flowtube liner materials may deform under pressure.

Figure 11. Flange Bolt Torquing Sequence

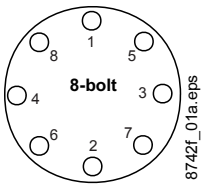


Table 4. Suggested Flange Bolt Torque Values for Rosemount 8705 and 8707 High-Signal Flowtubes

		Teflon/Tefzel/PFA liners		Polyurethane/Neoprene/ Linatex liners	
Size Code	**Line Size**	**Class 150 (pound-feet)**	**Class 300 (pound-feet)**	**Class 150 (pound-feet)**	**Class 300 (pound-feet)**
005	1/2-inch (15 mm)	8	8	-	-
010	1 inch (25 mm)	8	12	-	-
015	1 1/2 inch (40 mm)	13	25	7	18
020	2 inch (50 mm)	19	17	14	11
030	3 inch (80 mm)	34	35	23	23
040	4 inch (100 mm)	26	50	17	32
060	6 inch (150mm)	45	50	30	37
080	8 inch (200 mm)	60	82	42	55
100	10 inch (250 mm)	55	80	40	70
120	12 inch (300 mm)	65	125	55	105
140	14 inch (350 mm)	85	110	70	95
160	16 inch (400 mm)	85	160	65	140
180	18 inch (450 mm)	120	170	95	150
200	20 inch (500 mm)	110	175	90	150
240	24 inch (600 mm)	165	280	140	250
300	30 inch (750 mm)	195	415	165	375
360	36 inch (900 mm)	280	575	245	525

Table 5. Flange Bolt Torque and Bolt Load Specifications for 8705

		Teflon/Tefzel liner							
		PN10		PN 16		PN 25		PN 40	
Size Code	Line Size	(Newton-meter)	(Newton)	(Newton-meter)	(Newton)	(Newton-meter)	(Newton)	(Newton-meter)	(Newton)
005	0.5-inch (15 mm)			10	4400			10	4400
010	1 inch (25 mm)			20	10100			20	10100
015	1.5 inch (40 mm)			50	16100			50	16100
020	2 inch (50 mm)			60	20100			60	20100
030	3 inch (80 mm)			50	16800			50	16800
040	4 inch (100 mm)			50	17800			70	19600
060	6 inch (150mm)			90	24700			130	28700
080	8 inch (200 mm)	130	35200	90	19700	130	29200	170	34400
100	10 inch (250 mm)	100	28000	130	28300	190	38000	250	44800
120	12 inch (300 mm)	120	32000	170	38400	190	38600	270	47700
140	14 inch (350 mm)	160	43800	220	49500	320	57200	410	68100
160	16 inch (400 mm)	220	50600	280	56200	410	68100	610	92900
180	18 inch (450 mm)	190	43200	340	68400	330	55100	420	64000
200	20 inch (500 mm)	230	51100	380	68900	440	73300	520	73900
240	24 inch (600 mm)	290	58600	570	93600	590	90100	850	112000

		Polyurethane, Linatex, and Neoprene Liners							
		PN 10		PN 16		PN 25		PN 40	
Size Code	Line Size	(Newton-meter)	(Newton)	(Newton-meter)	(Newton)	(Newton-meter)	(Newton)	(Newton-meter)	(Newton)
010	1 inch (25 mm)			20	7040			20	7040
015	1.5 inch (40 mm)			30	10700			30	10700
020	2 inch (50 mm)			40	13400			40	13400
030	3 inch (80 mm)			30	11100			30	11100
040	4 inch (100 mm)			40	11700			50	13200
060	6 inch (150mm)			60	16400			90	19200
080	8 inch (200 mm)	90	23400	60	13100	90	19400	110	22800
100	10 inch (250 mm)	70	18600	80	18800	130	25400	170	29900
120	12 inch (300 mm)	80	21300	110	25500	130	25800	180	31900
140	14 inch (350 mm)	110	29100	150	33000	210	38200	280	45400
160	16 inch (400 mm)	150	33700	190	37400	280	45400	410	62000
180	18 inch (450 mm)	130	28700	230	45600	220	36800	280	42700
200	20 inch (500 mm)	150	34100	260	45900	300	48800	350	49400
240	24 inch (600 mm)	200	39200	380	62400	390	60100	560	74400

STEP 6: INSTALLATION (WAFER FLOWTUBE)

Gaskets

The flowtube requires a gasket at each of its connections to adjacent devices or piping. The gasket material selected must be compatible with the process fluid and operating conditions. Metallic or spiral-wound gaskets can damage the liner. Gaskets are required on each side of the grounding ring. All other applications (including flowtubes with lining protectors or a grounding electrode) require only one gasket on each end connection.

Alignment and Bolting

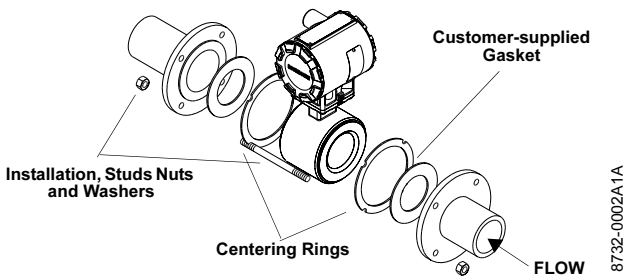
1. On $1^1/_2$ - through 8-inch (40 through 200 mm) line sizes, place centering rings over each end of the flowtube. The smaller line sizes, 0.15- through 1-inch (4 through 25 mm), do not require centering rings. On the 4- and 6-inch PN 10–16, insert the flowtube with rings first and then insert the studs. The slots on this ring scenario are located on the inside of the ring.
2. Insert studs for the bottom side of the flowtube between the pipe flanges. Stud specifications are listed in Table 6. **Using carbon steel bolts on smaller line sizes, 0.15- through 1-inch (4 through 25 mm), rather than the required stainless steel bolts, will degrade performance.**

Table 6. Stud Specifications

Nominal Flowtube Size	Stud Specifications
0.15 – 1 inch (4 – 25 mm)	316 SST ASTM A193, Grade B8M Class 1 threaded mounted studs
$1^1/_2$ – 8 inch (40 – 200 mm)	CS, ASTM A193, Grade B7, threaded mounting studs

3. Place the flowtube between the flanges. Make sure that the centering rings are properly placed in the studs. The studs should be aligned with the markings on the rings that correspond to the flange you are using.
4. Insert the remaining studs, washers, and nuts.
5. Tighten to the torque specifications shown in Table 4. Do not overtighten the bolts or the liner may be damaged.

Figure 12. Gasket Placement with Centering Rings



Flange Bolts

Tighten flange bolts in a crosswise sequence. Always check for leaks at the flanges after tightening the flange bolts. All flowtubes require a second torquing 24 hours after initial flange bolt tightening.

Table 7.

Size Code	Line Size	Pound-feet	Newton-meter
15F	0.15 inch (4 mm)	5	11
30F	0.30 inch (8 mm)	5	11
005	1/2-inch (15 mm)	5	11
010	1 inch (25 mm)	10	9
015	1 1/2 inch (40 mm)	15	14
020	2 inch (50 mm)	25	21
030	3 inch (80 mm)	40	20
040	4 inch (100 mm)	30	45
060	6 inch (150 mm)	50	77
080	8 inch (200 mm)	70	61

STEP 6: INSTALLATION (SANITARY FLOWTUBE)

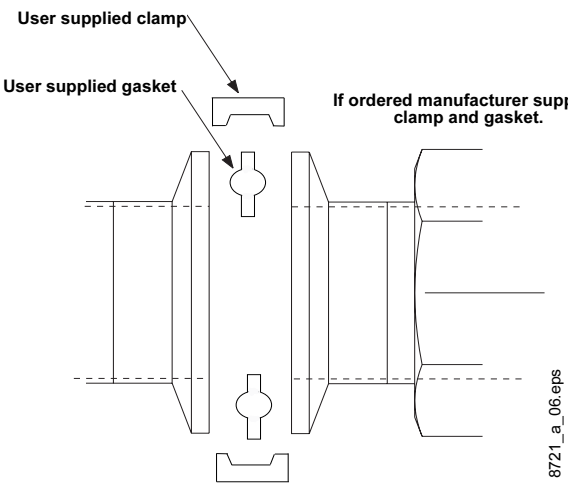
Gaskets

The flowtube requires a gasket at each of its connections to adjacent devices or piping. The gasket material selected must be compatible with the process fluid and operating conditions. Gaskets are supplied with all Rosemount 8721 Sanitary flowtubes except when the process connection is an IDF sanitary screw type.

Alignment and Bolting

Standard plant practices should be followed when installing a magmeter with sanitary fittings. Unique torque values and bolting techniques are not required.

Figure 13. Rosemount 8721 Sanitary Installation



STEP 7: GROUNDING

Use Table 8 to determine which grounding option to follow for proper installation. The flowtube case should always be earth grounded in accordance with national and local electrical codes. Failure to do so may impair the protection provided by the equipment. The Internal Ground Connection (Protective Ground Connection) located in side the junction box is the Internal Ground Connection screw. This screw is identified by the ground symbol.

Table 8. Grounding Installation

	Grounding Options			
Type of Pipe	**No Grounding Options**	**Grounding Rings**	**Grounding Electrodes**	**Lining Protectors**
Conductive Unlined Pipe	See Figure 14	Not Required	Not Required	See Figure 15
Conductive Lined Pipe	Insufficient Grounding	See Figure 15	See Figure 14	See Figure 15
Non-Conductive Pipe	Insufficient Grounding	See Figure 16	See Figure 17	See Figure 16

Figure 14. No Grounding Options or Grounding Electrode in Lined Pipe

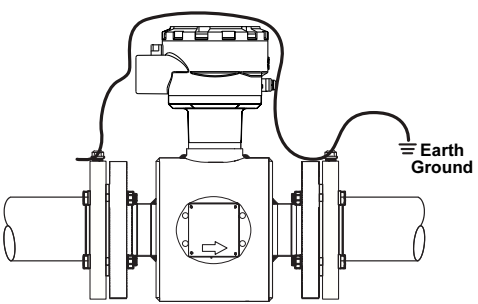


Figure 15. Grounding with Grounding Rings or Lining Protectors

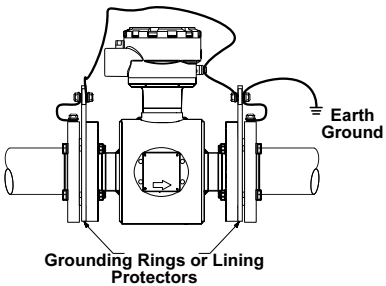


Figure 16. Grounding with Grounding Rings or Lining Protectors

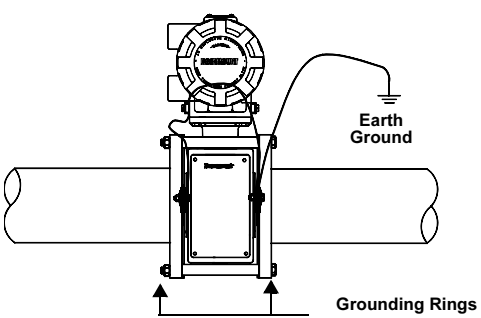
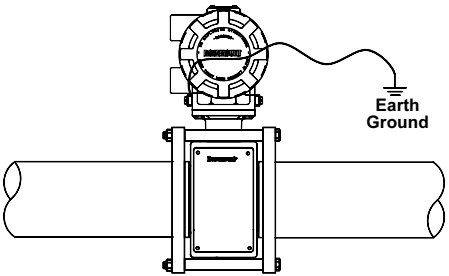


Figure 17. Grounding with Grounding Electrodes



Product Certificates

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota, USA

Fisher-Rosemount Technologias de Flujo, S.A. de C.V. — Chihuahua, Chihuahua, Mexico

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on our website at www.rosemount.com. A hard copy may be obtained by contacting our local sales office.

ATEX Directive

Rosemount Inc. complies with the ATEX Directive.

Type n protection type in accordance with EN50 021

⚠

- Closing of entries in the device must be carried out using the appropriate EExe or EExn metal cable gland and metal blanking plug or any appropriate ATEX approved cable gland and blanking plug with IP66 rating certified by an EU approved certification body.

European Pressure Equipment Directive (PED) (97/23/EC)

Model 8705 Magnetic Flowmeter flowtubes in line size and flange combinations:

Line Size: 1 1/2 inch - 3 inch with all flanges available.

Line Size: 4 inch - 24 inch with all DIN flanges and ANSI 150 and ANSI 300 flanges.

Line Size: 30 inch - 36 inch with AWWA 125 flanges

QS Certificate of Assessment - EC No. PED-H-20
Module H Conformity Assessment

Model 8711 Magnetic Flowmeter Flowtubes
Line Sizes: 1.5, 2, 3, 4, 6, and 8 inch
QS Certificate of Assessment - EC No. PED-H-20
Module H Conformity Assessment

Model 8721 Sanitary Magmeter Flowtubes
in line sizes of $1^{1}/_{2}$ inch and larger:
Module A Conformity Assessment

All other Model 8705/8711/8721 Flowtubes — Sound Engineering Practice

Flowtubes that are SEP or Category I with Explosion-Proof protection are outside the scope of PED and cannot be marked for compliance with PED.

Mandatory CE-marking for flowtubes in accordance with Article 15 of the PED can be found on the flowtube body (CE 0434).

Flowtube category I is assessed for conformity per module A procedures.

Flowtube categories II – IV, use module H for conformity assessment procedures.

Electro Magnetic Compatibility (EMC) (89/336/EEC)

EN 50081-1: 1992, EN 50082-2: 1995,
EN 61326: 1997/ A1:1998

Installed signal wiring should not be run together and should not be in the same cable tray as AC power wiring.

Device must be properly grounded or earthed according to local electric codes.

To improve protection against signal interference, shielded cable is recommended, see “Connect Wiring and Power Up” on page 16 for more information.

Low Voltage Directive (93/68/EEC)

EN 61010-1: 1995

Other important guidelines

Only use new, original parts.

To prevent the process medium escaping, do not unscrew or remove process flange bolts, adapter bolts or bleed screws during operation.

Maintenance shall only be done by qualified personnel.

CE Marking is a standard on 8712D.

Compliance with European Union EMC and Low Voltage Directives.

Hazardous Location Certifications

Remote-mounted systems do not require matched hazardous location certification option codes on tube and transmitter.

Transmitter Approval Information

TABLE 9. Transmitter Option Codes

Approval Codes	Rosemount 8712D
N0	•
N5	•

North American Certifications

Factory Mutual (FM)

N0 Division 2 Approval (All transmitters)

Class I, Division 2, Groups A, B, C, D
Temp Codes – T4 (at 40°C),
Dust-ignition proof Class II/III, Division 1, Groups E, F, G
Temp Codes – T4 (at 40°C),
Enclosure Type 4X

N5 Division 2 Approval for flowtubes with IS electrodes only

Class I, Division 2, Groups A, B, C, D
Temp Codes – T4 (at 40°C),
Dust-ignition proof Class II/III, Division 1, Groups E, F, G
Temp Codes – T4
Enclosure Type 4X

Flowtube Approval Information

Table 10. Flowtube Option Codes(1)

Approval Codes	Rosemount 8705 Flowtube		Rosemount 8707 Flowtube		Rosemount 8711 Flowtube	
	For Non-flammable Fluids	For Flammable Fluids	For Non-flammable Fluids	For Flammable Fluids	For Non-flammable Fluids	For Flammable Fluids
N0	•		•		•	
N5	•	•	•	•	•	•
E5					•	•
CD(2)					•	•
KD(2)	•	•				

(1) CE Marking is standard on Model 8705 and 8711. No hazardous location certifications are available on the Model 570TM.
(2) Refer to Table 11 on page 41 for relation between ambient temperature, process temperature, and temperature class.

Factory Mutual (FM)

N0 Division 2 Approval for Non-Flammable Fluids (All Flowtubes)

Class I, Division 2, Groups A, B, C, D
Temp Code – T5 (8705/8711 at 60°C)
Temp Code – T3C (8707 at 60°C)
Dust-Ignition proof Class II/III, Division 1, Groups E, F, G
Temp Code – T6 (8705/8711 at 60°C)
Temp Code – T5 (8707 at 60°C)
Enclosure Type 4X

N5 Division 2 Approval for Flammable Fluids (All Flowtubes)

Class I, Division 2, Groups A, B, C, D
Temp Code – T5 (8705/8711 at 60°C)
Temp Code – T3C (8707 at 60°C)
Dust-Ignition proof Class II/III, Division 1, Groups E, F, G
Temp Code – T6 (8705/8711 at 60°C)
Temp Code – T5 (8707 at 60°C)
Enclosure Type 4X

E5 Explosion-Proof (8711 Only)

Explosion-Proof for Class I, Division 1, Groups C, D
Temp Code – T6 at 60°C
Dust-Ignition proof Class II/III, Division 1, Groups E, F, G
Temp Code – T6 at 60°C
Class I, Division 2, Groups A, B, C, D
Temp Code – T5 at 60°C
Enclosure Type 4X

Canadian Standards Association (CSA)

N0 Suitable for Class I, Division 2, Groups A, B, C, D
Temp Code – T5 (8705/8711 at 60°C)
Temp Code – T3C (8707 at 60°C)
Dust-Ignition proof Class II/III, Division 1, Groups E, F, G
Enclosure Type 4X

European Certifications

N1 Pending - CENELEC Non-Sparking/Non-incendive (8705/8711 Only)

Certificate No: KEMA02ATEX1302X ⟨Ex⟩ II 3G
EEx nA [L] IIC T3... T6

SPECIAL CONDITIONS FOR SAFE USE (X):

To Be Determined.

CD CENELEC Increased Safety (Zone 1) with IS Electrodes (8711 only)

Certificate No: KEMA03ATEX2052X ⟨Ex⟩ II 1/2G
EEx e ia IIC T3... T6 (Ta = -20 to +65°) (See Table 11)
CE 0575

KD CENELEC Increased Safety (Zone 1) with IS Electrodes (8705 only)

Certificate No. KEMA 03ATEX2052X Ex II 1/2G

EEx e ia IIC T3... T6 (Ta = -20 to 65°C) (See Table 11)

CE 0575

SPECIAL CONDITIONS FOR SAFE USE:

The relation between ambient temperature, process temperature and temperature class is to be taken from the table under (15 - description) above. (See Table 11).

The electrical data is to be taken from the summary under (15 - electrical data) above. (See Table 12).

Table 11. Relation between ambient temperature, process temperature, and temperature class(1)

Meter Size (Inches)	Maximum Ambient Temperature	Maximum Process Temperature	Temperature Class
1/2	149°F (65°C)	239°F (115°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)	194°F (90°C)	T4
3 - 4	131°F (55°C)	131°F (55°C)	T5
3 - 4	104°F (40°C)	104°F (40°C)	T6
6	149°F (65°C)	275°F (135°C)	T3
6	149°F (65°C)	230°F (110°C)	T4
6	149°F (65°C)	167°F (75°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)	239°F (115°C)	T4
8 - 36	149°F (65°C)	176°F (80°C)	T5
8 - 36	149°F (65°C)	149°F (65°C)	T6

(1) This table is applicable for CD and KD option codes only.

Table 12. Electrical Data for Rosemount 8705 and 8711 Flowtubes

Coil excitation circuit	40 V dc (pulsed), 0,5 A, 20 W maximum
Electrode circuit:	in type of explosion protection intrinsic safety EEx ia IIC, 5 V 1 mW maximum, U_m = 250 V

Quick Installation Guide
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Rosemount 8712D / 8700 Series