Technical Note
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Rosemount 8700 Series Flowmeter in Fire Pump System Applications

Fire Pump System Applications

The Rosemount 8700 Magnetic Flowmeter meets or exceeds the requirements of a magnetic flowmeter for use as a component in a Fire Pump System.

The Rosemount 8700 Series Flowmeter provides an accurate and repeatable signal that indicates the rate of flow of the fluid through the Fire Pump system. This signal is used by the control device or system to verify that the water flow rate is sufficient to meet the fire safety system requirements.

HART COMMUNICATION PROTOCOL CE FM APPROVED

Content

The Rosemount 8700 Magnetic Flowmeter system consists of the sensor and a transmitter. The sensor detects the fluid flow, creating a signal that is sent to the transmitter. The transmitter converts this signal to a 4-20 mA output that is proportional to fluid flow. This output is used by the control device or system as an accurate, repeatable representation of the fluid flow. The transmitter can be integrally mounted to the sensor, or can be remotely mounted away from the sensor.

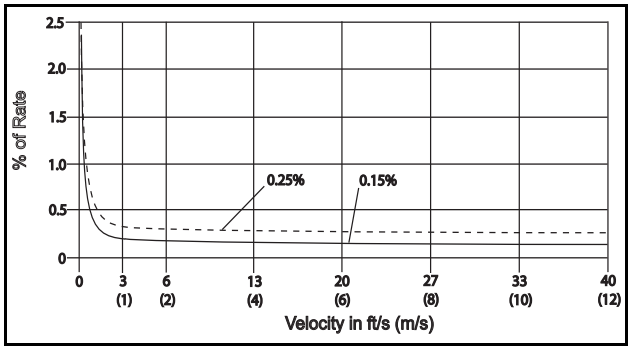
Once configuration of the meter is complete, the transmitter can be locked out to prevent any changes to the flowmeter. Special tamper evident fasteners are available to seal the electronics and termination housings.

Performance Specifications

Accuracy

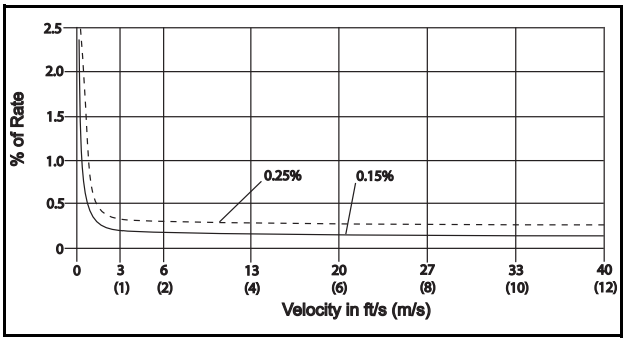
Rosemount E Series with 8705 Sensor:
Standard system accuracy is ±0.25% of rate ±1.0 mm/sec from 0.04 to 6 ft/s (0.01 to 2 m/s); above 6 ft/s (2 m/s), the system has an accuracy of ±0.25% of rate ±1.5 mm/sec.

Optional high accuracy is ±0.15% of rate ±1.0 mm/sec from 0.04 to 13 ft/s (0.01 to 4 m/s); above 13 ft/s (4 m/s), the system has an accuracy of ±0.18% of rate.



Rosemount E-Series with 8711 Sensor:
Standard system accuracy is ±0.25% of rate ±2.0 mm/sec from 0.04 to 39 ft/s (0.01 to 12 m/s).

Optional high accuracy is ±0.15% of rate ±1.0 mm/sec from 0.04 to 13 ft/s (0.01 to 4 m/s); above 13 ft/s (4 m/s), the system has an accuracy of ±0.18% of rate.



Repeatability

System repeatability is ±0.1% of reading.

Response Time

Response time for Fire Pump System applications is 2.0 seconds maximum response time to step change or spike in flow.

Set Up

All Rosemount flowmeters are shipped with Quick Installation Guides (QIG) that provide installation and operation instructions including mounting, wiring and configuration. Product manuals can be found online at www.rosemount.com, or can be obtained from your Emerson Process Management sales representative.

The flowmeter system can be ordered pre-configured from the factory, or can be configured on site using a Field Communicator or optional local operator interface.

A Field Communicator or the Local Operator Interface (LOI) may be used to check or change configuration in the field. The LOI or Field Communicator screen flow diagrams are found in the QIG and manual. The arrow keys are used to navigate between screens, and in the case of the 8712 remote transmitter, dedicated keys are used to access the most common functions.

Fire Pump Configuration Parameters

Calibration Number (8712E Dedicated Key; 8732E Basic Setup)

The calibration factor is unique to each sensor and is documented on the sensor label. The calibration factor must be entered into the transmitter.

Line Size (8712E Dedicated Key; 8732E Basic Setup)

This parameter sets the transmitter to the correct sensor line size.

The meter minimum line size selection should be based on the Pump Rating and must follow the guidelines shown in Table 1.

Table 1. Flowmeter Minimum Line Size Selection for Fire Pump Systems

Pump Rating		Meter Line Size	
Gal/min	dm^3/min	inches	mm
200	760	2	50
200	760	3	76
250	950	3.5	89
300	1140	3.5	89
450	1710	4	102
500	1890	5	127
750	2830	5	127
1000	3790	6	152
1250	4730	6	152
1500	5675	8	203
2000	7570	8	203
2500	9460	8	203
3000	11340	8	203
3500	13250	10	254
4000	15140	10	254
4500	17030	10	254
5000	18925	12	305

Flow Units (8712E Dedicated Key; 8732E Basic Setup)

This parameter sets the units of measure (gal/min, ft/sec, etc.). For Fire Pump systems, the device must read in units of volume / units of time. For systems installed in the United States, the units of measure must be Gallons per Minute (gal/min).

PV URV (Upper Range Value) (8712E Dedicated Key; 8732E Basic Setup)

The URV, or max flow rate parameter sets the upper range on the 4-20 mA output. The Upper Range Value is the flow rate that is represented by a 20 mA output.

For Fire Pump systems, the upper range must be set to 200% of the Pump Rating for which it will be used. Reference Table 2 for the minimum upper range values.

Table 2. Minimum Upper Range Values

Pump Rating		Minimum Upper Range Value	
gal/min	dm^3/min	gal/min	dm^3/min
200	760	400	1520
250	950	500	1900
300	1140	600	2280
450	1710	900	3420
500	1890	1000	3780
750	2830	1500	5660
1000	3790	2000	7580
1250	4730	2500	9460
1500	5675	3000	11350
2000	7570	4000	15140
2500	9460	5000	18920
3000	11340	6000	22680
3500	13250	7000	26500
4000	8000	8000	30280
4500	17030	9000	34060
5000	18925	10,000	37850

Failure Alarm Mode

The magnetic flow transmitter continuously performs self diagnostics on the entire magnetic flowmeter system: the transmitter, the sensor and the interconnecting wiring. The results of the self diagnostics are stored in the transmitter memory and can be viewed should a failure occur.

If the flowmeter experiences a failure, the output is driven to a level outside the normal 4-20 mA range of operation. The Alarm level is set to Hi or Low based on the hardware switch position shown in Figures 1 and 2. The factory default for these switches is Hi, which drives the output to 23.25 mA, if a flowmeter failure is detected. (Setting the switch to the Low position will drive the output to 3.75 mA on a flowmeter failure.)

The control system should be set up to detect the following flowmeter signals that are out of normal 4-20 mA range:

- 0.0 mA which indicates a loss of 4-20 mA loop power
- 23.25 mA which indicates a flowmeter failure

Configuring the Failure Alarm Mode high (23.25 mA) provides further protection, as it will result in a flow signal that will indicate a flow rate significantly higher than the flow alarm setting.

Reverse Flow Disabled (8712E and 8732E Detailed Setup/Output Config)

The factory default for the Reverse Flow setting is Disabled. If the flowmeter detects reverse fluid flow, the output will stay at 4 mA until positive flow is detected. The flowmeter should never be configured to enable reverse flow when used in a Fire Pump System.

When using the 8732E transmitter, the Reverse Flow is disabled by setting the Aux Out to Zero Flow. Setting the Aux Out to Zero Flow does not allow reverse flow.

Empty Pipe On (8712E and 8732E Diagnostics/Diag Controls)

The factory default for Empty Pipe is **OFF**. The Empty Pipe function must be turned **ON** to provide a stable zero flow output when an empty pipe condition is sensed.

Damping (8712E Dedicated Key; 8732E Basic Setup)

The factory default for Damping is **2 seconds**. The Damping should be reviewed to make certain that the value does not exceed 2. Damping allows selection of a response time, in seconds, to a step change in flow rate.

Signal Processing (8712E and 8732E Detailed Setup)

The Factory Default for Signal Processing is **OFF**. Signal Processing derives an output signal based on a number of variables, and can affect response time, and therefore must remain **OFF**.

Table 3. Fire Pump Flowmeter System Setup

Transmitter Configuration Parameters	Factory Default	Required Setting	Comments
Sensor Calibration Number	None	Match Sensor	Confirm that Calibration Factor in Transmitter matches the Calibration Factor on the Sensor label.
Line Size	None	Match Sensor	Confirm that the Line Size in the Transmitter matches the Sensor line size. Reference Table 1 for proper sensor line size selection based on the pump rating.
Units	Ft/Sec	User Selected	Set Units of measure as desired by customer. (Gal/Min, Lit/Min, etc.). For installations into the United States, the system must be configured in units of gallons per minute (gal/min).
Upper Range Value	30 Ft/Sec	User Selected	Set Upper Range Value to the flow rate to be represented by a 20 mA output. Reference Table 2 for minimum Upper Range Value settings based on the pump rating.
Failure Alarm Mode	High	High	Confirm the Failure Alarm Mode is set to High.
Reverse Flow	Disabled	Disabled	Confirm that Reverse Flow is Disabled.
Empty Pipe		On	Set Empty Pipe On.
Damping	2 Seconds	1 Second	Verify that damping does not exceed 2 seconds.
Signal Processing	Off	Off	Confirm Signal Process is turned Off.

Lock Out and Sealing

Once the operation of the Fire Pump System has been tested and confirmed, the flowmeter configuration can be locked to prevent configuration changes, and the transmitter can be sealed with tamper evident seals. Each Rosemount flow transmitter has a transmitter security switch located on the main transmitter circuit board that when set to the **ON** position prevents any changes to the configuration. The operator can still view parameters, but cannot make any changes.

Once proper operation has been confirmed, the following steps should be used to lock out and seal the flowmeter:

1. Open the Transmitter cover and locate the Transmitter Security switch on the main transmitter board. (see Figure 1 and Figure 2 for location of the Transmitter Security Switch.)

NOTE
8732E transmitter board: The transmitter Security Switch is located near the right side of the board labeled Security.

8712E transmitter board: The transmitter Security Switch is located near the middle of the board and is labeled *Security*.

2. Set the hardware switch to the **ON** position, enabling the transmitter security.
3. Close the covers tightly and seal with tamper evident seals. (Tamper-proof Kits can be used to simplify sealing the flowmeter.)

Figure 1. Rosemount 8732E Electronics Board and Hardware Switches

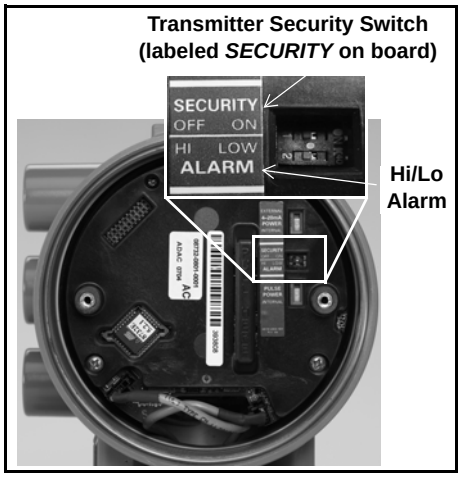
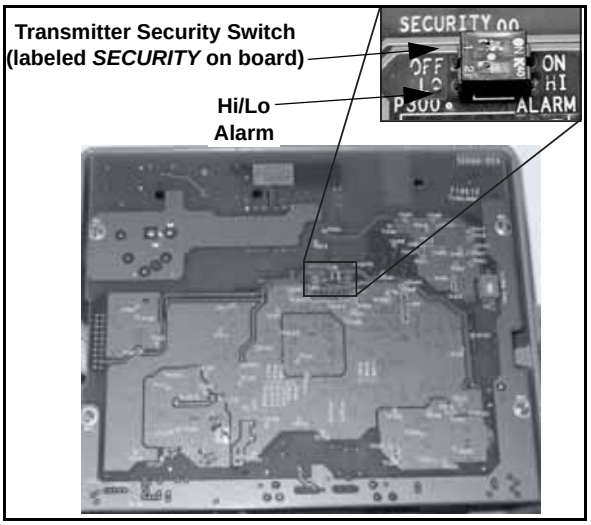


Figure 2. Rosemount 8712E Electronics Board and Hardware Switches



Tamper-proof Kits

For Fire Pump applications, it is recommended that the flowmeter be sealed. Tamper-proof Kits, shown below, can be used to seal the flowmeters, and are sold separately.

Figure 3. Rosemount 8705 with remote junction box (used with remote transmitter)

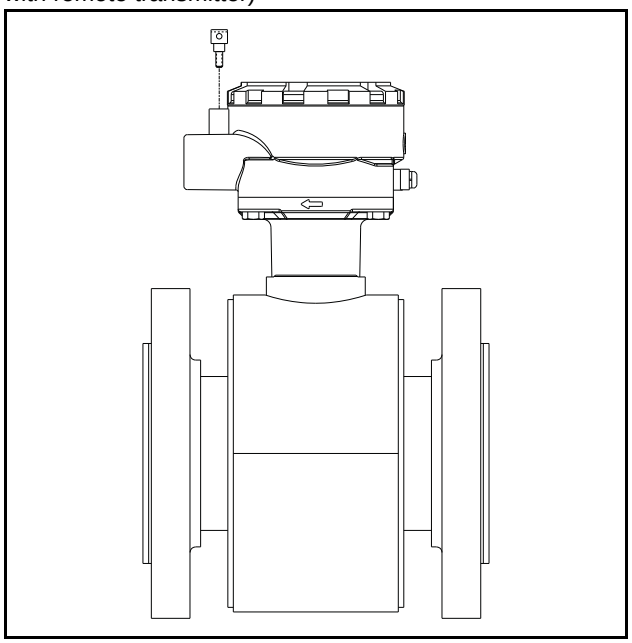


Figure 4. Rosemount 8732E transmitter integrally mounted to the 8705 sensor.

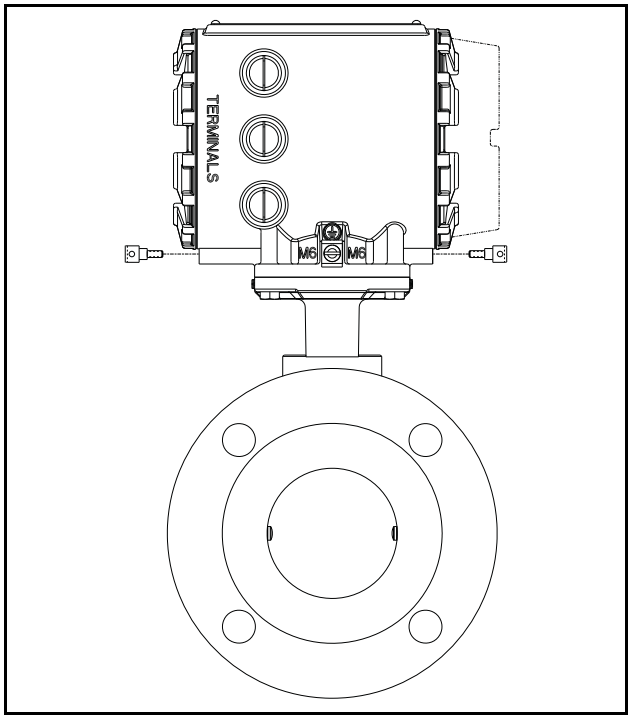
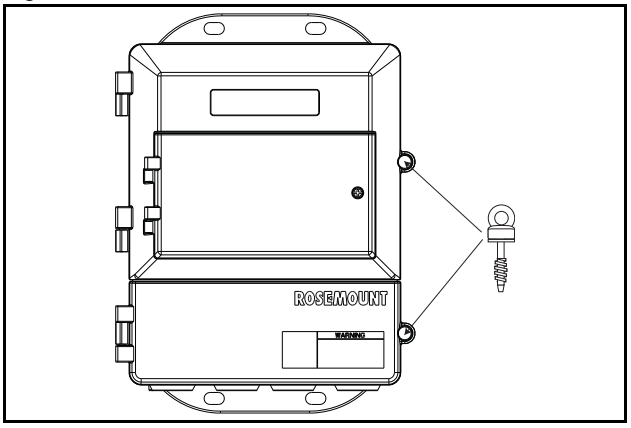


Figure 5. Rosemount 8712E



08721-0549-0001 8732E Integral Tamper-proof Kit

Contains 2 tamper-proof fasteners; one each for 8732E electronics cover and 8732E terminal cover.

08721-0548-0001 8712E Remote Tamper-proof Kit

Contains 2 tamper-proof fasteners; one each for the electronics cover and terminal cover.

08721-0547-0001 Remote Sensor Tamper-proof Kit

Contains 2 tamper-proof fasteners; for the sensor remote junction box.

Rosemount Fire Pump System Flowmeter Configuration Values

To be completed prior to sealing the unit.

	Factory Default	As-Left Setting	Comment
Calibration Factor	None	_____	Calibration factor is found on the flowtube and must be entered in the transmitter.
Line Size	None	_____	Confirm that the Line Size in the Transmitter matches the Flow Tube line size.
Units	Ft/Sec	_____	Units of measure as desired by customer. (Gal/Min, Lit/Min, etc.)
Upper Range Value	30 Ft/Sec	_____	Upper Range Value to the flow rate to be represented by a 20 mA output.
Failure Alarm Mode	High	☐ High	Confirm the Failure Alarm Mode is set to High.
Reverse Flow	Disabled	☐ Disabled	Confirm that Reverse Flow is Disabled.
Empty Pipe	Off	☐ On	Set Empty Pipe On.
Damping	2 Seconds	____ Seconds	Verify damping is not greater than 2 seconds.
Signal Processing	Off	☐ Off	Confirm Signal Processing is turned Off.
Transmitter Security Switch	Off	☐ On	Set Transmitter Security Switch to On after fire pump system timing has been verified.
Transmitter Seals	None	☐ Unit Sealed	Seal in place.
_____ Installed By		_____ Date	
_____ Sealed By		_____ Date	

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Certificate of Compliance

This certificate is issued for the following:

FIRE PUMP FLOWMETER SYSTEMS

MODEL 8705 IN SIZES 2, 3, 4, 6, 8, 10 AND 12 INCH NPS AND
MODEL 8711 IN SIZES 2, 3, 4, 6 AND 8 INCH NPS MAGNETIC FLOW TUBE SENSOR
WITH MODELS 8712D/E AND 8732E MAGNETIC FLOWTUBE TRANSMITTERS

Prepared for:

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Approval Identification: 3035016 Approval Granted: July 12, 2010

Said Approval is subject to satisfactory field performance, continuing follow-up Facilities and Procedures Audits, and strict conformity to the constructions as shown in the Approval Guide, an online resource of FM Approvals.

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