Rosemount 8721 Sanitary Flowmeter in Pasteurization Applications

Pasteurization Applications

The Rosemount 8721 Magnetic Flowmeter meets or exceeds the requirements of a magnetic flowmeter for use as a component in a Meter Based Timing System in Grade "A" milk plants as outlined in the Pasteurized Milk Ordinance (PMO). This is documented in the provisions of the review letter, M-b 350. The Rosemount 8721 was designed specifically for use in sanitary applications, with materials, fit, and finish that meet application and CIP/SIP requirements.

- Rosemount 8721 conforms to 3-A Sanitary Standards and is authorized to display the 3-A Symbol; Authorization #1222

- Rosemount 8721 is European Hygienic Equipment Design Group (EHEDG) Type EL certified; Certificate #C03-5229

The Rosemount 8721 Flowmeter provides an accurate and repeatable signal that indicates the rate of flow of the fluid through the pasteurization loop. This signal is used by the pasteurization control device or system to determine if the product holding time meets the legal holding time requirement for the pasteurization process being used. If it does not, the flow must be diverted by the system to the unpasteurized milk return.

Content

Rosemount 8721

The Rosemount 8721 Flowmeter system consists of the magnetic flowtube and a transmitter. The flowtube senses the fluid flow, creating a signal that is sent to the transmitter. The transmitter converts this signal to a 4-20ma output that is proportional to fluid flow. This output is used by the pasteurization control device or system as an accurate, repeatable representation of the fluid flow. The transmitter can be integrally mounted to the flowtube, or can be remotely mounted away from the flowtube.

Once the timing system is verified by the Regulatory agency, the transmitter can be locked out to prevent any changes to the flowmeter. Special tamper evident fasteners allow the Regulatory Agency to seal the electronics and termination housings.

Performance Specifications

Accuracy

System Accuracy for PMO applications is ±0.5% of rate from 1 to 20 ft/sec (0.3 to 6.66 m/sec); including combined effects of linearity, hysteresis, repeatability and calibration uncertainty. (Optional 0.25% accuracy is available.)

Repeatability

System repeatability is ± 0.1% of reading.

Response Time

Response time for Pasteurized Milk Ordinance (PMO) applications is 1.0 second maximum response time to step change or spike in flow.

Max/Min Flow Rates

TABLE 1. Flow Rates at specification accuracy

Size	Minimum Flow Rate	Maximum Flow Rate
inches (mm)	Gal/min (l/min)	Gal/min (l/min)
$^{1}/_{2}$ (15)	0.941 (3.50)	18.82 (77.8)
1 (25)	2.694 (10.18)	53.88 (222.72)
1 ½ (40)	6.345 (23.98)	126.90 (524.6)
2 (64)	10.459 (39.54)	209.18 (864.67)
2 ½ (80)	14.922 (55.51)	298.44 (1233.34)
3 (80)	23.042 (87.10)	460.84 (1904.67)
4 (100)	36.679 (138.6)	793.6 (3280)

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 Rosemount sales representative.

The flowmeter system can be ordered pre-configured from the factory, or can be configured on site using a Field Communicator (Rosemount 375) or optional local operator interface.

A HART Field Communicator or the Local Operator Interface may be used to check or change configuration in the field. The LOI or HART 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 8712D remote transmitter, dedicated keys are used to access the most common functions.

PMO Configuration Parameters

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

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

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

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

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

This parameter sets the units of measure (gal/min, ft/sec, etc.)

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

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

Failure Alarm Mode

The magnetic flow transmitter continuously performs self diagnostics on the entire magnetic flowmeter system: the transmitter, the flow tube 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 flow meter experiences a failure, the output is driven to a level outside the normal 4-20ma 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 23.25ma if a flow meter failure is detected. (Setting the switch to the Low position will drive the output to 3.75ma on a flow meter failure.) This switch should be kept in the Hi position for fail-safe operation in a Meter Based Timing Systems.

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

- 0.0ma which indicates a loss of 4-20ma loop power
- 23.25ma which indicates a flow meter 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 milk flow rate significantly higher than the flow alarm setting. According to the PMO, the control system for the Meter Based Timing System must be configured to divert flow to the unpasteurized milk return if the flow alarm setting is exceeded. Setting the Failure Alarm Mode high guarantees that the flow alarm setting is exceeded in the case of a flow meter failure, diverting the flow to the unpasteurized milk return.

Reverse Flow Disabled
(8712D Aux Function; 8732C Detailed Setup/Dig Out/Aux Out; 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 Meter Based Timing System.

When using the 8732C or 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
(8712D Aux Function; 8732C Detailed Setup; 8712E and 8732E Diagnostics/Diag Controls)

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

Damping
(8712D and 8712E Dedicated Key; 8732C and 8732E Basic Setup)

The factory default for Damping is **2 seconds**. The Damping must be changed to 1 second for PMO applications. Damping allows selection of a response time, in seconds, to a step change in flow rate.

Signal Processing
(8712D Aux Function; 8712E and 8732C 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** in PMO applications

TABLE 2. PMO Setup

	Factory Default	Required PMO Setting	Comments
Calibration Factor	None	Match Flowtube	Confirm that Calibration Factor in Transmitter matches the Calibration Factor on the Flow Tube label.
Line Size	None	Match Flowtube	Confirm that the Line Size in the Transmitter matches the Flow Tube line size.
Units	Ft/Sec	User Selected	Set Units of measure as desired by customer. (Gal/Min, Lit/Min, etc.)
Upper Range Value	30 Ft/Sec	User Selected	Set Upper Range Value to the flow rate to be represented by a 20ma 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		On	Set Empty Pipe On.
Damping	2 Seconds	1 Second	Set Damping to 1 second.
Signal Processing	Off	Off	Confirm Signal Process is turned Off.

Installation

The magnetic flow meter must be installed in compliance with the PMO. The PMO requires that the flow meter is installed with 10 upstream and 10 downstream diameters of straight pipe. For example, a 1" diameter flow meter must have 10" of straight pipe immediately upstream and downstream from the flow meter. The meter must also be mounted in such a manner to assure that it is always full during operation. See the diagram below showing one method for using a magnetic flow meter as a timing meter in a pasteurization loop.
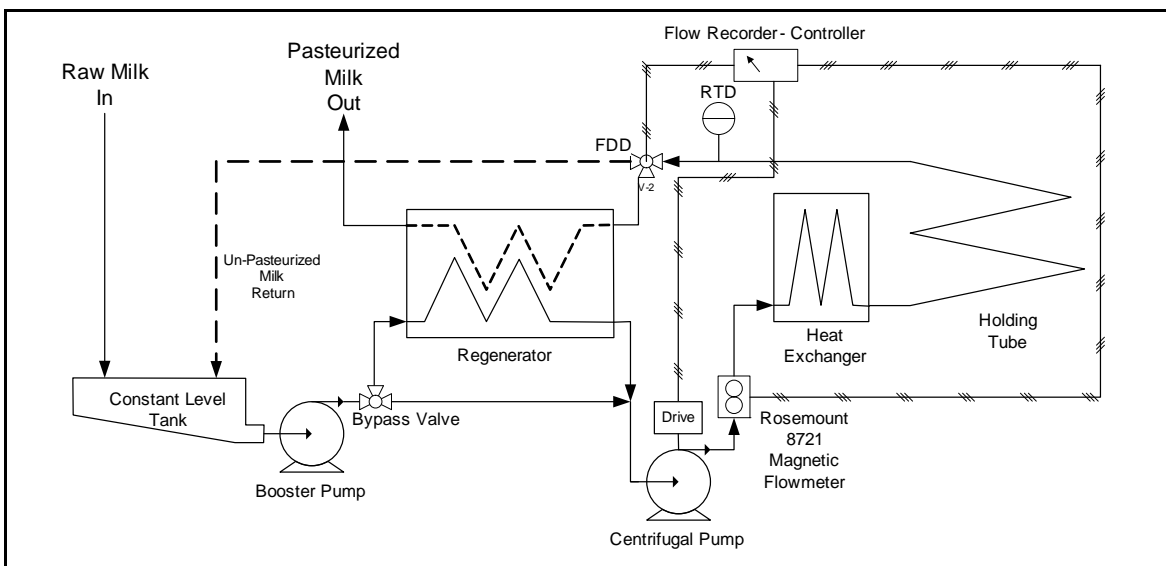
Lock Out and Sealing

Once the operation of the Meter Based Timing System has been tested and confirmed, the flow meter configuration can be locked to prevent configuration changes, and the transmitter sealed with tamper evident regulatory 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 the inspector has confirmed proper operation, the following steps should be used to lock out and seal the flow meter:

1. Open the Transmitter cover and locate the Transmitter Security switch on the main transmitter board. (see Figure 1, Figure 2, and Figure 3 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.

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

8732C transmitter board: The transmitter Security Switch is located near the top of the board and is labeled *WP*.

2. Set the hardware switch to the **ON** position, enabling the transmitter security.

3. Close the covers tightly and seal with tamper evident seals. (Tamperproof Kits can be used to simplify sealing the flow meter.)

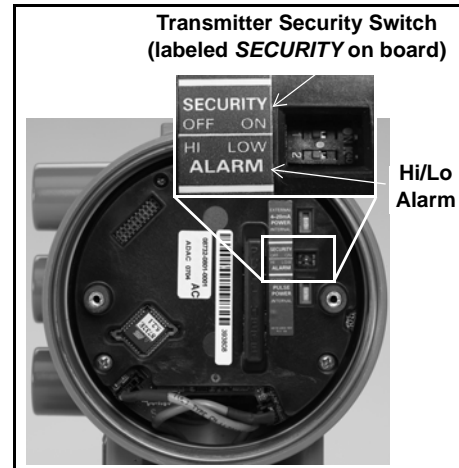FIGURE 1. Rosemount 8732E Electronics Board and Hardware Switches

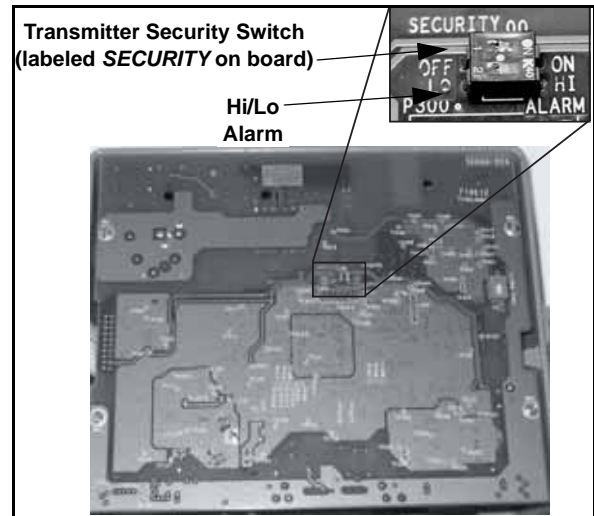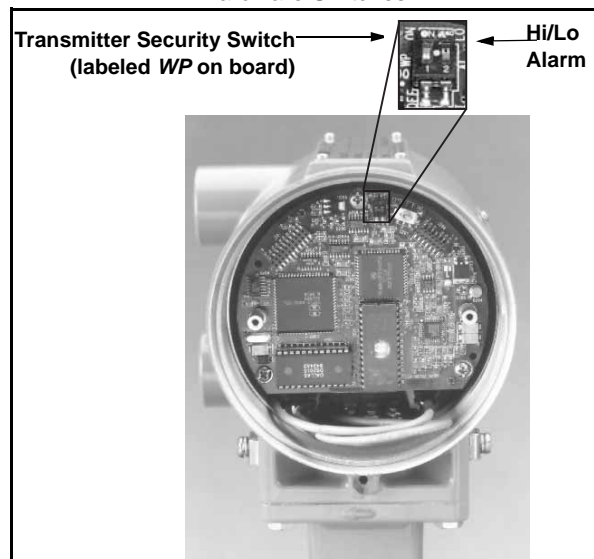FIGURE 2. Rosemount 8712D and 8712E Electronics Board and Hardware Switches

FIGURE 3. Rosemount 8732C Electronics Board and Hardware Switches

Tamperproof Kits

For MBTS applications, the flow meter must be sealed by the Regulatory Agency. Tamperproof Kits, shown below, can be used to seal the flow meters, and are sold separately.

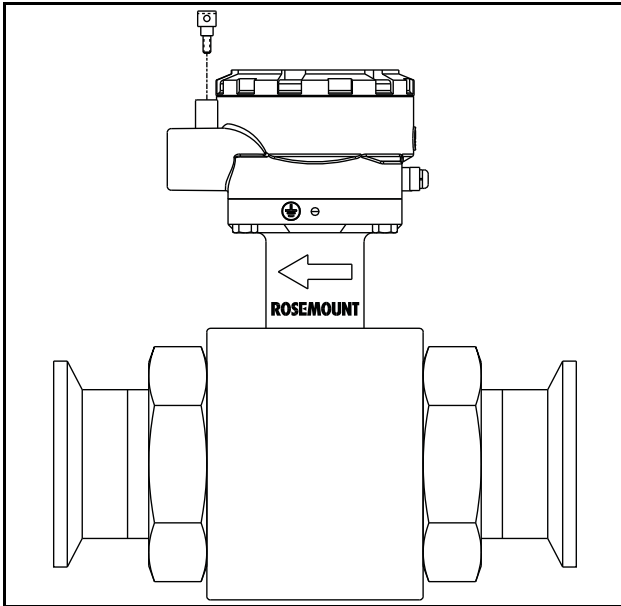FIGURE 4. Rosemount 8721 with remote junction box (used with remote transmitter)

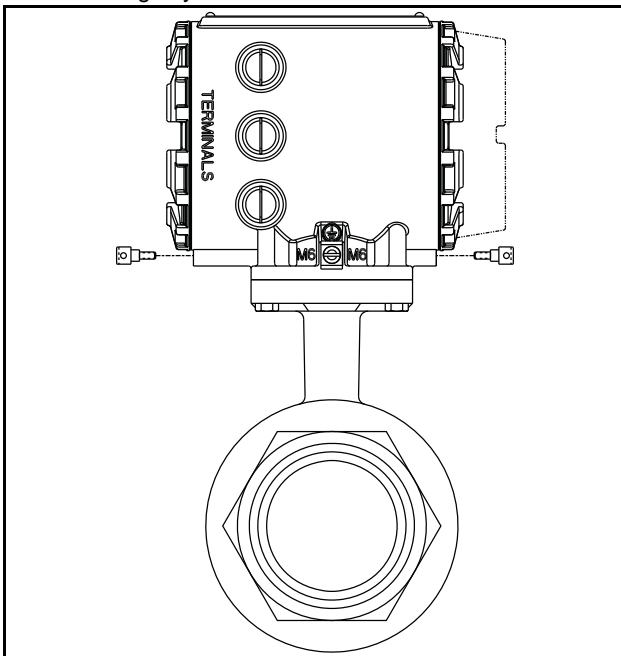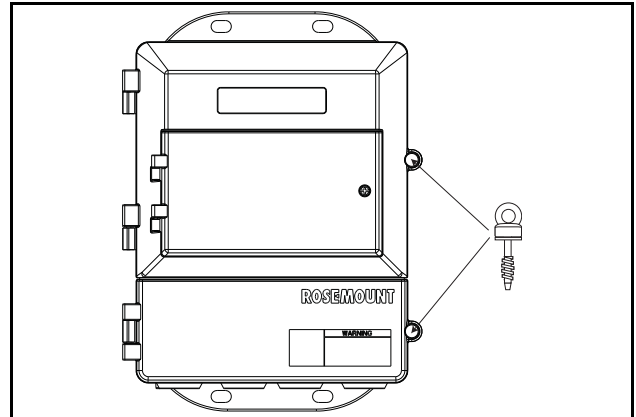FIGURE 5. Rosemount 8732C or 8732E transmitter integrally mounted to the 8721 flow tube.

FIGURE 6. Rosemount 8712D and 8712E

08721-0549-0001 8732E Integral Tamperproof Kit

Contains 2 tamperproof fasteners; one each for 8732E electronics cover and 8732E terminal cover.

08721-0548-0001 8712D and 8712E Remote Tamperproof Kit

Contains 2 tamperproof fasteners; one each for 8712D electronics cover, 8712D terminal cover.

08721-0547-0001 8732C Integral Tamperproof Kit

Contains 2 tamperproof fasteners; one each for 8732C electronics cover and 8732C terminal cover.

This kit can be used as a tamperproof fastener for the flowtube remote junction box.

Rosemount Sanitary 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 20ma 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	Set Damping to 1 Second.
Signal Processing	Off	☐ Off	Confirm Signal Processing is turned Off.
Transmitter Security Switch	Off	☐ On	Set Transmitter Security Switch to On after PMO system timing has been verified.
Transmitter Seals	None	☐ Unit Sealed	Inspector seal in place.

_____   _____
Installed By   Date

_____   _____
Regulatory Inspector   Date

Emerson Process Management

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