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Reference Manual
00809-0100-4665, Rev AA
August 2010

Rosemount 8732

Integral Mount or Remote Mount Magnetic Flowmeter System with Profibus-PA



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Reference Manual
00809-0100-4665, Rev AA
August 2010

Rosemount 8732

Integral Mount or Remote Mount Magnetic Flowmeter System with Profibus-PA

NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

Rosemount Inc. has two toll-free assistance numbers:

Customer Central
Technical support, quoting, and order-related questions.

United States - 1-800-999-9307 (7:00 am to 7:00 pm CST)

Asia Pacific- 65 777 8211

Europe/ Middle East/ Africa - 49 (8153) 9390

North American Response Center
Equipment service needs.

1-800-654-7768 (24 hours—includes Canada)

Outside of these areas, contact your local Emerson Process Management representative.

⚠CAUTION

The products described in this document are NOT designed for nuclear-qualified applications. Using non-nuclear qualified products in applications that require nuclear-qualified hardware or products may cause inaccurate readings.

For information on Rosemount nuclear-qualified products, contact your local Emerson Process Management Sales Representative.

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Section 1 Introduction

System Description . . . . . page 1-1
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SYSTEM DESCRIPTION

The Rosemount® 8700 Series Magnetic Flowmeter System consists of a sensor and transmitter, and measures volumetric flow rate by detecting the velocity of a conductive liquid that passes through a magnetic field.

There are four Rosemount magnetic flowmeter sensors:

- Flanged Rosemount 8705
- Flanged High-Signal Rosemount 8707
- Wafer-Style Rosemount 8711
- Sanitary Rosemount 8721

There are two Rosemount magnetic flowmeter transmitters:

- Rosemount 8712
- Rosemount 8732

The sensor is installed in-line with process piping — either vertically or horizontally. Coils located on opposite sides of the sensor create a magnetic field. Electrodes located perpendicular to the coils make contact with the process fluid. A conductive liquid moving through the magnetic field generates a voltage at the two electrodes that is proportional to the flow velocity.

The transmitter drives the coils to generate a magnetic field, and electronically conditions the voltage detected by the electrodes to provide a flow signal. The transmitter can be integrally or remotely mounted from the sensor.

This manual is designed to assist in the installation and operation of the Rosemount 8732 Magnetic Flowmeter Transmitter and the Rosemount 8700 Series Magnetic Flowmeter Sensors.

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SAFETY MESSAGES

Procedures and instructions in this manual may require special precautions to ensure the safety of the personnel performing the operations. Refer to the safety messages listed at the beginning of each section before performing any operations.

⚠WARNING

Attempting to install and operate the Rosemount 8705, 8707 High-Signal, 8711 or 8721 Magnetic Sensors with the Rosemount 8712 or 8732 Magnetic Flowmeter Transmitter without reviewing the instructions contained in this manual could result in personal injury or equipment damage.

SERVICE SUPPORT

To expedite the return process outside the United States, contact the nearest Emerson Process Management representative.

Within the United States and Canada, call the North American Response Center using the 800-654-RSMT (7768) toll-free number. The Response Center, available 24 hours a day, will assist you with any needed information or materials.

The center will ask for product model and serial numbers, and will provide a Return Material Authorization (RMA) number. The center will also ask for the name of the process material to which the product was last exposed.

⚠ Mishandling products exposed to a hazardous substance may result in death or serious injury. If the product being returned was exposed to a hazardous substance as defined by OSHA, a copy of the required Material Safety Data Sheet (MSDS) for each hazardous substance identified must be included with the returned goods.

The North American Response Center will detail the additional information and procedures necessary to return goods exposed to hazardous substances.

⚠ See “Safety Messages” on page D-1 for complete warning information.

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Section 2 Installation

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This section covers the steps required to physically install the magnetic flowmeter. Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations. Please refer to the following safety messages before performing any operation in this section.

SAFETY MESSAGES

⚠ This symbol is used throughout this manual to indicate that special attention to warning information is required.

⚠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 sensor and transmitter is consistent with the appropriate hazardous area approval.

Do not connect a Rosemount 8732 to a non-Rosemount sensor 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 8732 reference manual for any restrictions associated with a safe installation.

Before connecting a handheld 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.

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⚠WARNING

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

To avoid possible damage to the sensor 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 sensor ends are often used for protection.

Correct flange bolt tightening is crucial for proper sensor 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 sensor lining and possible sensor replacement.

Emerson Process Management can supply lining protectors to prevent liner damage during removal, installation, and excessive bolt torquing.

TRANSMITTER SYMBOLS

Caution symbol — check product documentation for details ⚠

Protective conductor (grounding) terminal ⏚

PRE-INSTALLATION

Before installing the Rosemount 8732 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

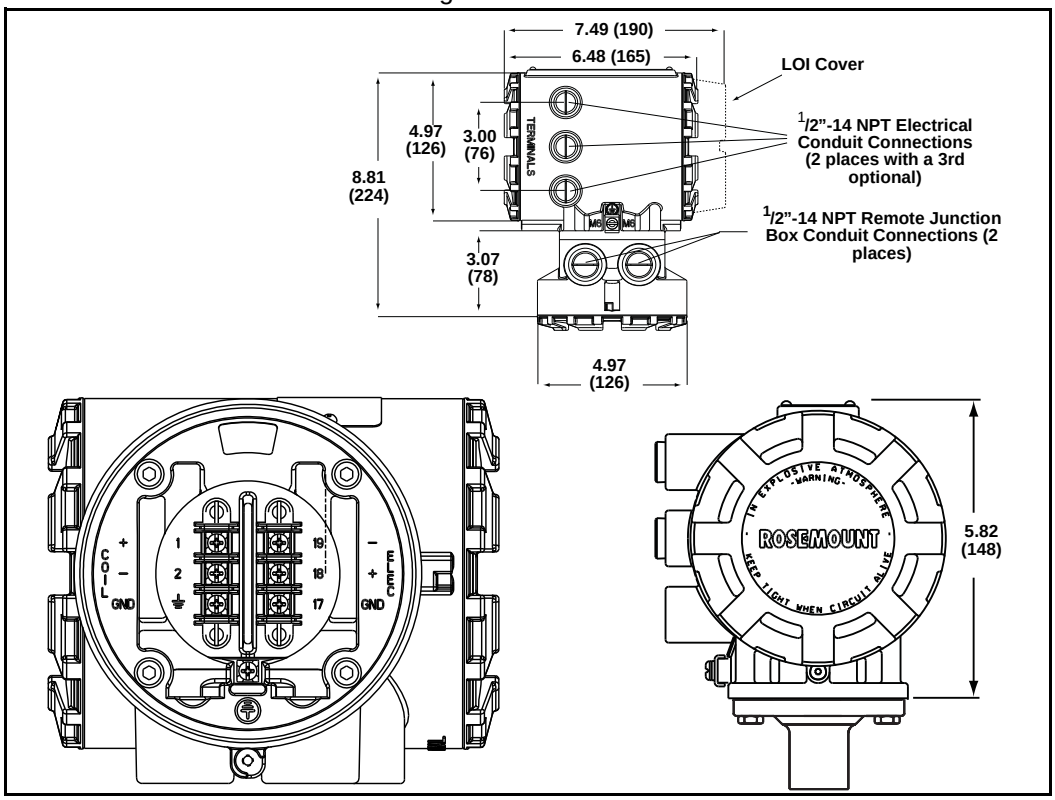
MECHANICAL CONSIDERATIONS

The mounting site for the 8732 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 2-1). The transmitter should be mounted in a manner that prevents moisture in conduit from collecting in the transmitter.

If the 8732 is mounted remotely from the sensor, it is not subject to limitations that might apply to the sensor.

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Figure 2-1. Rosemount 8732 Dimensional Drawing



ENVIRONMENTAL CONSIDERATIONS

To ensure maximum transmitter life, avoid temperature extremes and vibration. Typical problem areas include:

- 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 a harsh environment and provides easy access for configuration or service.

Rosemount 8732 transmitters require external power so there must be access to a suitable power source.

INSTALLATION PROCEDURES

Rosemount 8732 installation includes both detailed mechanical and electrical installation procedures.

Mount the Transmitter

Remote-mounted transmitters 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 bracket to the pipe using the mounting hardware.
2. Attach the 8732 to the mounting bracket using the mounting screws.

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Hardware Jumpers/Switches

The 8732 Profibus PA electronics board is equipped with two user-selectable hardware switches. These switches do not have any functionality and should be left in the default positions as listed below:

Simulate Enable	OFF
Transmitter Security	OFF

Changing the switch position will have no effect on the functionality of the electronics.

Conduit Ports and Connections

Both the sensor and transmitter junction boxes have ports for 1/2-inch NPT conduit connections, with optional CM20 and PG 13.5 adapter connections available. These connections should be made in accordance with national, local or plant electrical codes. Unused ports should be sealed with metal plugs and PTFE tape or other thread sealant. Connections should also be made in accordance with area approval requirements, see examples below for details. Proper electrical installation is necessary to prevent errors due to electrical noise and interference. Separate conduits are not necessary for the coil drive and signal cables connecting the transmitter to the sensor, but a dedicated conduit line between each transmitter and sensor is required. A shielded cable must be used.

Example 1: Installing flanged sensors into an IP68 area. Sensors must be installed with IP68 cable glands and cable to maintain IP68 rating. Unused conduit connections must be properly sealed to prevent water ingress. For added protection, dielectric gel can be used to pot the sensor terminal block. Consult technical document 00840-0100-4750 when installing meters into an IP68 installation.

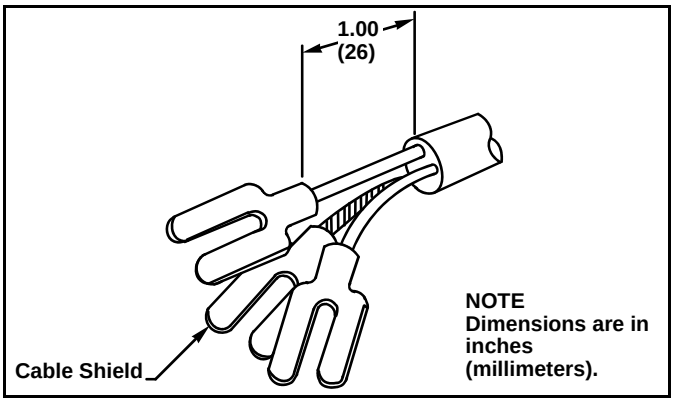
Example 2: Installing flowmeters into explosion proof/flameproof areas. Conduit connections and conduit must be rated for use in the hazardous area to maintain flowmeter approval rating. Consult Appendix B: of this manual for installation requirements for hazardous areas.

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. Do not run power cables and output signal cables in the same conduit. For remote mount installations, run the coil drive and electrode cables between the flowmeter and transmitter. Refer to Electrical Considerations for wire type. Prepare the ends of the coil drive and electrode cables as shown in Figure 2-2. Limit the unshielded wire length to 1-in. 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.

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Figure 2-2. Cable Preparation Detail



Electrical Considerations

Before making any electrical connections to the Rosemount 8732, consider the following standards and be sure to have the proper power supply, conduit, and other accessories. When preparing all wire connections, remove only the insulation required to fit the wire completely under the terminal connection. Removal of excessive insulation may result in an unwanted electrical short to the transmitter housing or other wire connections.

Transmitter Input Power

The 8732 transmitter is designed to be powered by 90-250 V AC, 50–60 Hz or 12–42 V DC. The eighth digit in the transmitter model number designates the appropriate power supply requirement.

Model Number	Power Supply Requirement
1	90-250 V AC
2	12-42 V DC

Supply Wire Temperature Rating

Use 14 to 18 AWG wire rated for the proper temperature of the application. For connections in ambient temperatures above 140 °F (60 °C), use a wire rated for 176 °F (80 °C). For ambients greater than 176 °F (80 °C), use a wire rated for 230 °F (110 °C). For DC powered transmitters with extended power cable lengths, verify that there is a minimum of 12 Vdc at the terminals of the transmitter.

Disconnects

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

Requirements for 90-250 V AC Power Supply

Wire the transmitter according to national, local, and plant electrical requirements for the supply voltage. In addition, follow the supply wire and disconnect requirements on page 2-6.

Requirements for 12-42 V DC Power Supply

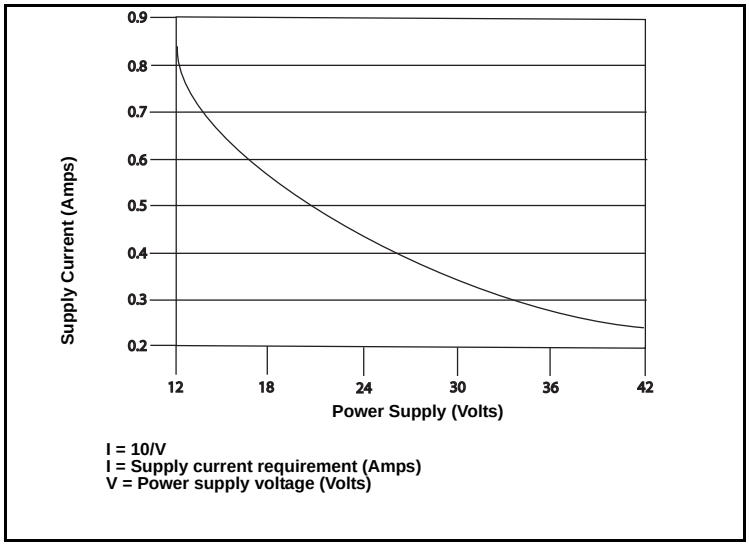
Units powered with 12-42 V DC may draw up to 1 amp of current. As a result, the input power wire must meet certain gauge requirements.

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Figure 2-3 shows the supply current for each corresponding supply voltage. 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:

$$\text{MaximumResistance} = \frac{\text{SupplyVoltage} - 12\text{VDC}}{1\text{amp}}$$

Figure 2-3. Supply Current versus Input Voltage



Installation Category

The installation category for the Rosemount 8732 is (overvoltage) Category II.

Overcurrent Protection

The Rosemount 8732 Flowmeter Transmitter requires overcurrent protection of the supply lines. Maximum ratings of overcurrent devices are as follows:

Power System	Fuse Rating	Manufacturer
95-250 Vac	250 V; 2 Amp, Quick Acting	Bussman AGCI or Equivalent
42 Vdc	50 V, 3 Amp, Quick Acting	Bussman AGCI or Equivalent

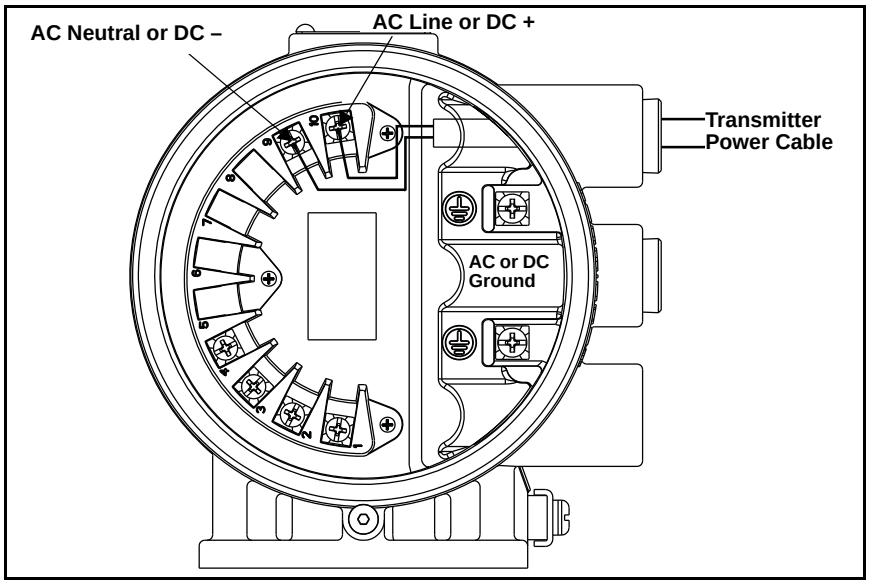
Connect Transmitter Power

To connect power to the transmitter, complete the following steps.

1. Ensure that the power source and connecting cable meet the requirements outlined on page 2-7.
2. Turn off the power source.
3. Open the power terminal cover.
4. Run the power cable through the conduit to the transmitter.
5. Connect the power cable leads as shown in Figure 2-4.
   a. Connect AC Neutral or DC- to terminal 9.
   b. Connect AC Line or DC+ to terminal 10.
   c. Connect AC Ground or DC Ground to the ground screw mounted inside the transmitter enclosure.

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Figure 2-4. AC Transmitter Power Connections



Connect Profibus PA Wiring

The Profibus PA signal provides the output information from the transmitter.

Transmitter Communication Input

The Profibus PA communication requires a minimum of 9 V dc and a maximum of 32 V dc at the transmitter communication terminals.

NOTES

- **Do not** exceed 32 V dc at the transmitter communication terminals.
- **Do not** apply ac line voltage to the transmitter communication terminals.

Improper supply voltage can damage the transmitter.

Field Wiring

Power independent of the coil power supply must be supplied for Profibus PA communications. Use shielded, twisted pair for best results. For new installations or to get maximum performance, twisted pair cable designed especially for Profibus should be used. Table 2-1 details cable characteristics and ideal specifications.

Table 2-1. Ideal Cable Specifications for Profibus Wiring

Characteristic	Ideal Specification
Impedance	135 Ω to 165 Ω (150 Ω Nominal)
Wire Size	22 AWG (0,34 mm^2)
Shield Coverage	90%
Loop Resistance	< 110 Ω /km
Capacitance	< 30 pF/km

See “Safety Messages” on page 2-1 for complete warning information.

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NOTE
The number of devices on a Profibus segment is limited by the power supply voltage, the resistance of the cable, and the amount of current drawn by each device.

Transmitter Wiring Connection

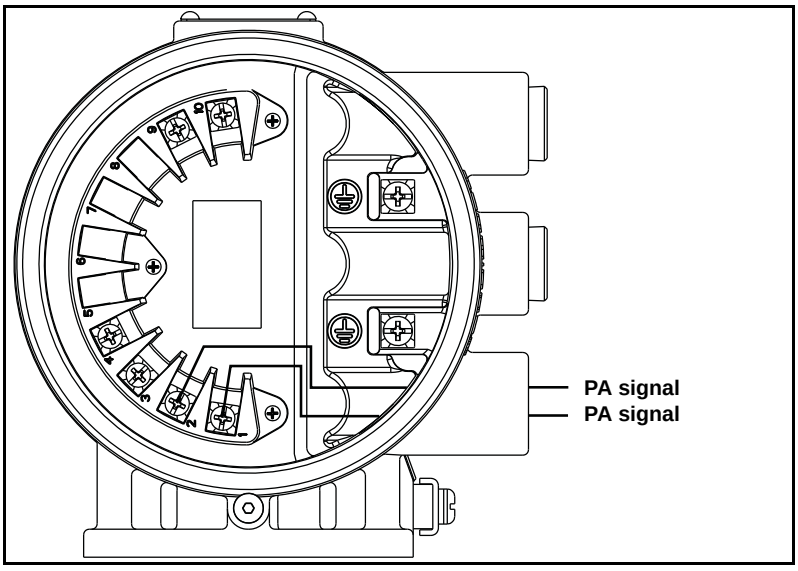
To connect the 8732 to the Profibus PA segment, complete the following steps.

1. Ensure that the power source and connecting cable meet the requirements outlined above and in “Field Wiring” on page 2-7.
2. Turn off the transmitter and power sources.
3. Run the Profibus PA cable into the transmitter.
4. Connect PA to Terminal 1.
5. Connect PA to Terminal 2.

NOTE
Profibus PA signal wiring for the 8732 is not polarity sensitive.

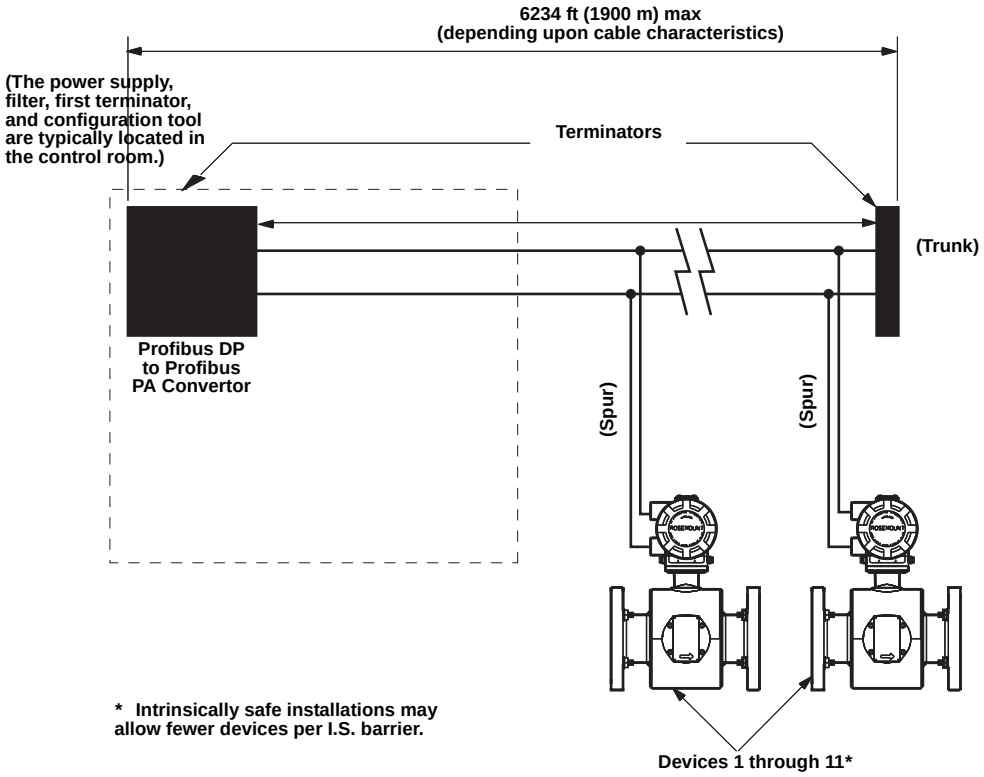
Refer to Figure 2-5 on page 2-8.

Figure 2-5. Profibus PA Signal Connections



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Figure 2-6. Rosemount 8732
Transmitter Field Wiring



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SENSOR CONNECTIONS

This section covers the steps required to physically install the transmitter including wiring and calibration.

Rosemount Sensors

To connect the transmitter to a non-Rosemount sensor, refer to the appropriate wiring diagram in “Universal Sensor Wiring Diagrams” on page E-1. The calibration procedure listed is not required for use with Rosemount sensors.

Transmitter to Sensor Wiring

Flanged and wafer sensors have two conduit ports as shown in Figure 2-7. Either one may be used for both the coil drive and electrode cables. Use the stainless steel plug that is provided to seal the unused conduit port. Use PTFE tape or thread sealant appropriate for the installation when sealing the conduit.

A single dedicated conduit run for the coil drive and electrode cables is needed between a sensor and a remote transmitter. Bundled cables in a single conduit are likely to create interference and noise problems in your system. Use one set of cables per conduit run. See Figure 2-7 for proper conduit installation diagram and Table 2-2 for recommended cable. For integral and remote wiring diagrams refer to Figure 2-9.

Figure 2-7. Conduit Preparation

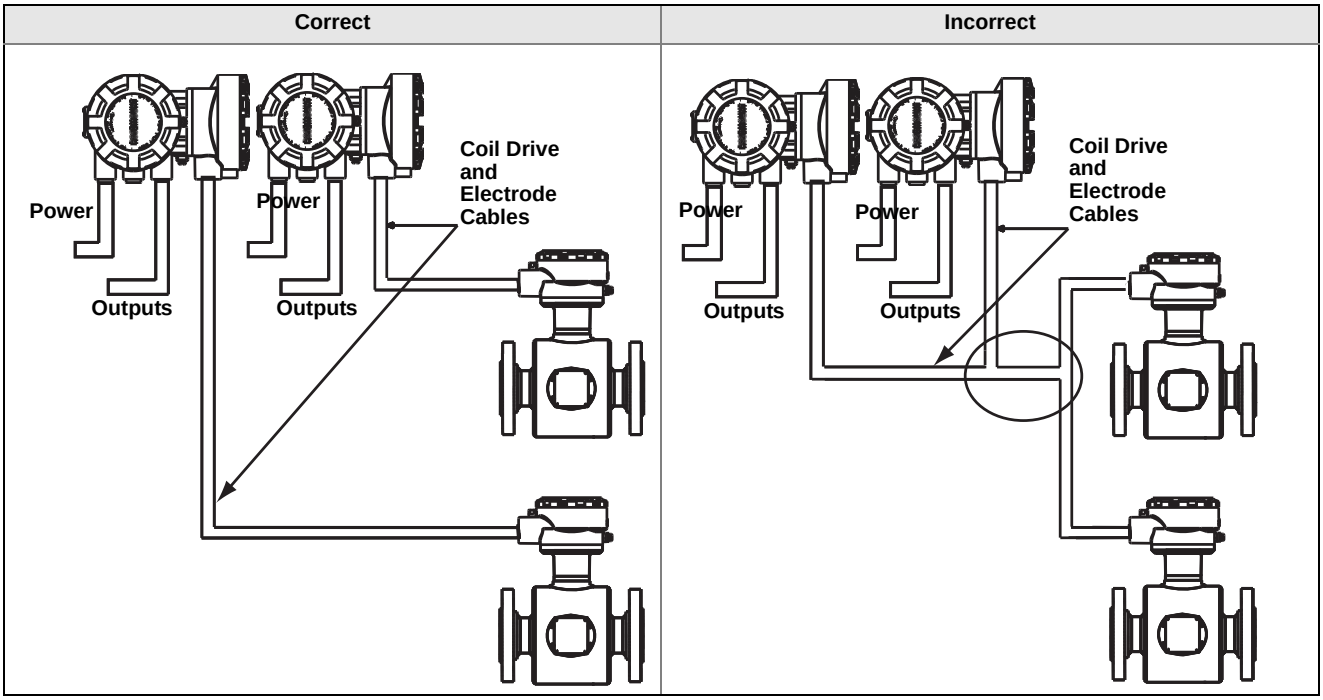


Table 2-2. Cable Requirements

Description	Units	Part Number
Signal Cable (20 AWG) Belden 8762, Alpha 2411 equivalent	ft m	08712-0061-0001 08712-0061-2003
Coil Drive Cable (14 AWG) Belden 8720, Alpha 2442 equivalent	ft m	08712-0060-0001 08712-0060-2003
Combination Signal and Coil Drive Cable (18 AWG)(1)	ft m	08712-0752-0001 08712-0752-2003

(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 330 ft. (100 m).

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Rosemount recommends using the combination signal and coil drive for N5, E5 approved sensors for optimum performance.

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 sensor.

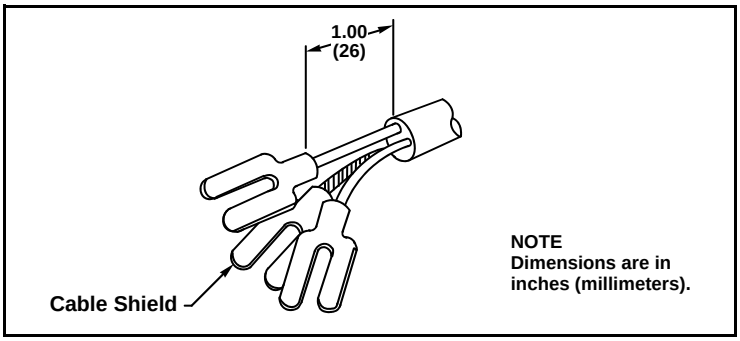
Conduit Cables

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 sensor and transmitter.

Prepare the ends of the coil drive and electrode cables as shown in Figure 2-8. Limit the unshielded wire length to 1-inch on both the electrode and coil drive cables.

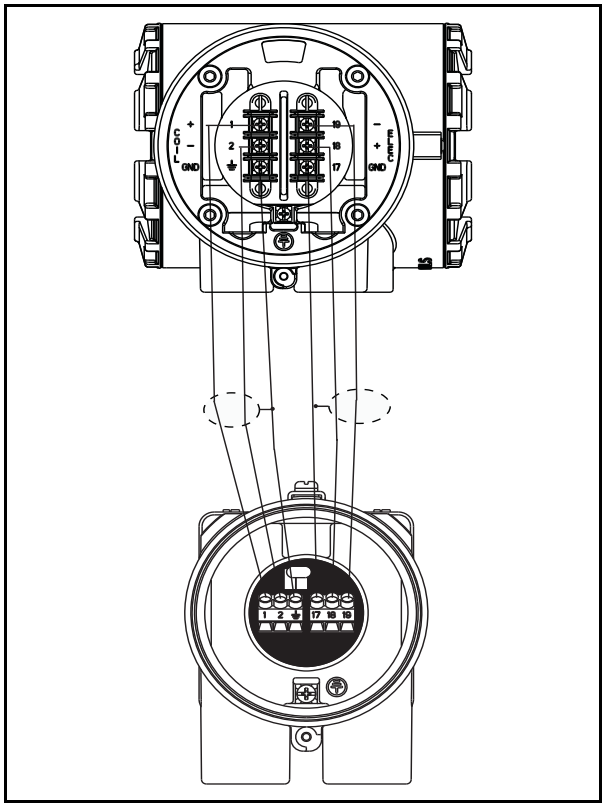
NOTE
Excessive lead length or failure to connect cable shields can create electrical noise resulting in unstable meter readings.

Figure 2-8. Cable Preparation Detail



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Figure 2-9. Wiring Diagram



Transmitter Terminal	Sensor Terminal	Wire Gauge	Wire Color
1	1	14	Clear or Red
2	2	14	Black
⏚	⏚	14	Shield
17	17	20	Shield
18	18	20	Black
19	19	20	Clear or Red

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Section 3 Configuration

Quick Start-Up . . . . . page 3-1
Assigning Device Tag and Node Address . . . . . page 3-2
Basic Setup . . . . . page 3-2

This section covers basic operation, software functionality, and basic configuration procedures for the Rosemount 8732E Magnetic Flowmeter Transmitter with Profibus PA. For more information about the Profibus PA technology and the function blocks used in the transmitter, refer to Appendix F: Physical Block and Appendix G.

Calibration

Rosemount sensors are wet calibrated at the factory. They do not need further calibration during installation.

Each Profibus PA configuration tool or host device has a different way of displaying and performing configurations. Some will use Device Descriptions (DD) and DD Methods to make configuring and displaying data consistent across host platforms. There is no requirement that a configuration tool or host support these features. This section describes how to reconfigure the device manually.

QUICK START-UP

Once the magnetic flowmeter system is installed and communication is established, configuration of the transmitter must be completed. The standard transmitter configuration, without Option Code C1, Custom Configuration, is shipped with the following parameters:

Engineering Units:	ft/s
Sensor Size:	3-in.
Sensor Calibration Number:	100000501000000

Sensor Calibration Number

A unique sensor calibration number, imprinted on the sensor tag, enables any Rosemount sensor to be used with any Rosemount transmitter without further calibration. Rosemount flow lab tests determine individual sensor output characteristics. The characteristics are identified by a 16-digit calibration number. In a Profibus PA environment, the 8732E can be configured using an 8732E Profibus PA LOI or a Simatic PDM. Please see Section 4 for 8732E PA LOI and PDM information.

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The calibration number is more than a correction factor, or K- factor, for the sensor. The first five digits represent the low frequency gain. The ninth through thirteenth digits represent the high frequency gain. Both numbers are normalized from an ideal number of 10000. Standard configurations use the low frequency gain, but in noisy applications it may be worthwhile to switch to the higher frequency. An additional transmitter procedure, called Auto Zero, is recommended to perform at the higher coil drive frequency. The seventh and eighth digits represent the zero offset at both frequencies where the nominal value is 50. Empty pipe functionality is a transmitter feature that is controlled by a parameter in the transducer block. To turn off this feature, see Appendix C.

ASSIGNING DEVICE TAG AND NODE ADDRESS

The 8732E Magnetic Flowmeter Transmitter is shipped with a blank tag. The device is shipped with a default address of 126.

If the tag or address needs to be changed, use the features of the configuration tool. The tools do the following:

- Change the tag to a new value.
- Change the address to a new address.

BASIC SETUP

AI Block

The Analog Input (AI) function block processes field device measurements and makes them available to the master. The output value from the AI block is in engineering units and contains a status indicating the quality of the measurement. The measuring device may have several measurements or derived values available in different channels. Use the channel number to define the variable that the AI block processes. The 8732E transmitter only supports “Flow” as AI Block variable.

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AI Block Parameter Attribute Definitions

The following table describes the parameters that are available in the analog input function block. Each line item in the table defines the element and specifies the requirements for each element.

Absolute Index	Parameter	Description
	Profibus PA Specific Block Header	
16	BLOCK_OBJECT	This object contains the characteristics of the blocks.
17	ST_REV	The modification of at least one static parameter in a block has to be incremented by the according ST_REV at least by one.
18	TAG_DESC	Every block can be assigned a textual TAG description. The TAG_DESC must be unambiguous and unique in the fieldbus system.
19	STRATEGY	Grouping of Function Block. The STRATEGY field can be used to group blocks.
20	ALERT_KEY	This parameter contains the identification number of the plant unit. It helps to identify the location (plant unit) of an event.
21	TARGET_MODE	The TARGET_MODE parameter contains desired mode normally set by a control application or an operator. The modes are valid alternatively only, i.e. only one mode can be set at one time. A write access to this parameter with more then one mode is out of the range of the parameter and have to be refused.
22	MODE_BLK	This parameter contains the current mode, the permitted and normal mode of the block.
23	ALARM_SUM	This parameter contains the current states of the block alarms.
24	BATCH	This parameter is intended to be used in Batch applications. Not implemented in 8732E device.
25	RESERVED by PNO	
26	OUT	The Function Block parameter OUT contains the current measurement value in a vendor specific or configuration adjusted engineering unit and the belonging state in AUTO MODE. The Function Block parameter OUT contains the value and status set by an operator in MAN MODE.
27	PV_SCALE	Conversion of the Process Variable into percent using the high and low scale values. The engineering unit of PV_SCALE high and low scale values are directly.
28	OUT_SCALE	Related to the PV_UNIT of the configured Transducer Block (configured via Channel parameter). The PV_SCALE high and low scale values follow the mapped to last 16 characters of DEVICE_ID_STRING parameter in Mfg. Block.
29	LIN_TYPE	Type of linearization. The 8732E only supports “No linearization”.
30	CHANNEL	Reference to the active Transducer Block which provides the measurement value to the Function Block.
31	RESERVED	
32	PV_FTIME	Filter time of the Process Variable.

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Absolute Index	Parameter	Description
33	FSAFE_ TYPE	Defines the reaction of device, if a fault is detected. The calculated ACTUAL MODE remains in AUTO. 0: value FSAFE_VALUE is used as OUT Status - UNCERTAIN_Substitute Value, 1: use last stored valid OUT value Status - UNCERTAIN_LastUsableValue if there is no valid value available, then UNCERTAINInital_Value, OUT value is = Initial value 2: OUT has the wrong calculated value and status Status - BAD_* (* as calculated)
34	FSAFE_VALUE	Default value for the OUT parameter, if a sensor or sensor electronic fault is detected. The unit of this parameter is the same as the OUT parameter.
35	ALARM_HYS	Within the scope of the PROFIBUS-PA specification for transmitters there are functions for the monitoring of limit violation (off-limit conditions) of adjustable limits. Maybe the value of one process variable is just the same as the value of a limit and the variable fluctuates around the limit it will occur a lot of limit violations. That triggers a lot of messages; so it must be possible to trigger messages only after crossing an adjustable hysteresis. The sensitivity of triggering of the alarm messages is adjustable. The value of the hysteresis is fixed in ALARM_HYS and is the same for the parameters HI_HI_LIM, HI_LIM, LO_LIM and LO_LO_LIM. The hysteresis is expressed as value below high limit and above low limit in the engineering unit of xx_LIM.
36	RESERVED	
37	HI_HI_LIM	Value for upper limit of alarms
38	RESERVED	
39	HI_LIM	Value for upper limit of warnings
40	RESERVED	
41	LO_LIM	Value for lower limit of warnings
42	RESERVED	
43	LO_LO_LIM	Value for the lower limit of alarms
44	RESERVED	
45	RESERVED	
46	RESERVED	
47	RESERVED	
48	RESERVED	
49	RESERVED	
50	SIMULATE	For commissioning and test purposes the input value from the Transducer Block in the Analog Input Function Block AI-FB can be modified. That means that the Transducer and AI-FB will be disconnected.
51-60	RESERVED BY PNO	
61	VIEW_1_AI	

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Totalizer Block

Totalizer 1 is Slot 2

Totalizer 2 is Slot 3

Totalizer 3 is Slot 4

The 8732E transmitter has three independent totalizer blocks. These blocks can be used to totalize independently over different time ranges or using different units of measure.

Totalize Block Parameter Attribute Definitions

The following table describes the parameters that are available in the totalizer (INTEG) block. Each line item in the table defines the element and specifies the requirements for each element.

Index	Parameter	Description
	Profibus PA Specific Block Header	
16	BLOCK_OBJECT	This object contains the characteristics of the blocks.
17	ST_REV	The modification of at least one static parameter in a block has to be incremented by the according ST_REV at least by one.
18	TAG_DESC	Every block can be assigned a textual TAG description. The TAG_DESC must be unambiguous and unique in the fieldbus system.
19	STRATEGY	Grouping of Function Block. The STRATEGY field can be used to group blocks.
20	ALERT_KEY	This parameter contains the identification number of the plant unit. It helps to identify the location (plant unit) of an event.
21	TARGET_MODE	The TARGET_MODE parameter contains desired mode normally set by a control application or an operator. The modes are valid alternatively only, i.e. only one mode can be set at one time. A write access to this parameter with more then one mode is out of the range of the parameter and have to be refused.
22	MODE_BLK	This parameter contains the current mode, the permitted and normal mode of the block.
23	ALARM_SUM	This parameter contains the current states of the block alarms.
24	BATCH	This parameter is intended to be used in Batch applications. Not implemented in 8732E device.
25	RESERVED	

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	Profibus PA specific Parameters	
26	TOTAL	The Function Block parameter TOTAL contains the integrated quantity of the rate parameter provided by CHANNEL and the associated status.
27	UNIT_TOT	Unit of the totalized quantity.
28	CHANNEL	Reference to the active Transducer Block, which provides the measurement value to the Function Block.
29	SET_TOT	The following selections of this Function Block parameter are possible: 0: TOTALIZE; “normal“ operation of the Totalizer 1: RESET; assign value “0“ to Totalizer 2: PRESET; assign value of PRESET_TOT to Totalizer
30	MODE_TOT	0: BALANCED; true arithmetic integration of the incoming rate values. 1: POS_ONLY; totalization of positive incoming rate values only. 2: NEG_ONLY; totalization of negative incoming rate values only. 3: HOLD; totalization stopped
31	FAIL_TOT	0: RUN; totalization is continued using the input values despite the BAD status. The status is ignored. 1: HOLD; totalization is stopped during occurrence of BAD status of incoming values. 2: MEMORY; totalization is continued based on the last incoming value with GOOD status before the first occurrence of BAD status.
32	PRESET_TOT	This value is used as a preset for the internal value of the FB algorithm. The value is effective if using the SET_TOT function.
33	ALARM_HYS	Within the scope of the PROFIBUS-PA specification for transmitters there are functions for the monitoring of limit violation (off-limit conditions) of adjustable limits. Maybe the value of one process variable is just the same as the value of a limit and the variable fluctuates around the limit it will occur a lot of limit violations. That triggers a lot of messages; so it must be possible to trigger messages only after crossing an adjustable hysteresis. The sensitivity of triggering of the alarm messages is adjustable. The value of the hysteresis is fixed in ALARM_HYS and is the same for the parameters HI_HI_LIM, HI_LIM, LO_LIM and LO_LO_LIM. The hysteresis is expressed as value below high limit and above low limit in the engineering unit of xx_LIM.
34	HI_HI_LIM	Value for upper limit of alarms
35	HI_LIM	Value for upper limit of warnings
36	LO_LIM	Value for lower limit of warnings
37	LO_LO_LIM	Value for the lower limit of alarms
38 - 51	RESERVED BY PNO	
52	VIEW_1_TOT	

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TRANSDUCER BLOCK

PV

The *process variables* (PV) measure flow in several ways that reflect your needs and the configuration of your flowmeter. When commissioning a flowmeter, review each process variable, its function and output, and take corrective action if necessary before using the flowmeter in a process application

PV Value – The actual measured flow rate in the line. Use the Process Variable Units function to select the units for your application.

PV Status – The status of the process variable. This indicates whether the reported flow rate is “good”, “uncertain”, or “bad”.

PV Value

The PV Value shows the current measured flow rate.

PV Status

The PV Status shows the health of the PV Value.

Good - The PV Value is valid and the flowmeter system is operating normally.

Uncertain - The PV Value is being reported, but a condition exists that is potentially compromising the measurement. This condition could be caused by a problem with the flowmeter or the process.

Bad - A problem exists with the flowmeter system that has resulted in a potentially faulty flow measurement. Consult status and diagnostic information to identify the problem.

BASIC SETUP

The basic configuration functions of the Rosemount 8732 must be set for all applications of the transmitter in a magnetic flowmeter system. If your application requires the advanced functionality features of the Rosemount 8732, see Section 4 of this manual.

Flow Units

Flow Units set the output units for the Primary Variable. This parameter is configured in the Transducer Block.

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Options for Flow Rate Units

• ft/s	• bbl/s (1 Barrel = 42 gallons)
• ft/m	• bbl/min (1 Barrel = 42 gallons)
• ft/h	• bbl/h (1 Barrel = 42 gallons)
• m/s	• bbl/d (1 Barrel = 42gallons)
• m/h	• cm^3/s
• gal/s	• cm^3/min
• GPM	• cm^3/h
• gal/h	• cm^3/d
• gal/d	• lb/s
• L/s	• lb/min
• L/min	• lb/h
• L/h	• lb/d
• L/d	• kg/s
• CFS	• kg/min
• CFM	• kg/h
• CFH	• kg/d
• ft^3/d	• STon/s
• m^3/s	• STon/min
• m^3/min	• STon/h
• m^3/h	• STon/d
• m^3/d	• t/s
• IGAL/s	• t/min
• IGAL/min	• t/h
• IGAL/h	• t/d
• IGAL/d	• BBL/s (1 Barrel = 31 gallons)
	• BBL/m (1 Barrel = 31 gallons)
	• BBL/h (1 Barrel = 31 gallons)
	• BBL/d (1 Barrel = 31 gallons)

Line Size

The *line size* (sensor size) must be set to match the actual sensor connected to the transmitter. The size must be specified in inches according to the available sizes listed below. If a value is entered from a control system that does not match one of these figures, the value will go to the next highest option. This parameter is configured in the Transducer Block.

The line size (inches) options are as follows:

0.1, 0.15, 0.25, 0.30, 0.50, 0.75, 1, 1.5, 2, 2.5, 3, 4, 6, 8, 10, 12, 14, 16, 18, 20, 24, 28, 30, 32, 36, 40, 42, 44, 48, 54, 56, 60, 64, 72, 80

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Upper Range Value

This parameter set the flow rate in engineering units that corresponds to 100% flow. This parameter is configured in the Transducer Block.

The Upper Range Value can be set for both forward or reverse flow rates. Flow in the forward direction is represented by positive values and flow in the reverse direction is represented by negative values. The URV can be any value from –43.3 ft/s to +43.3 ft/s (-13.2 m/s to +13.2 m/s), as long as it is at least 1 ft/s (0.3 m/s) from the lower range value (LRV). The URV can be set to a value less than the lower range value.

NOTE
Line size and density must be selected prior to configuration of URV and LRV.

Lower Range Value

This parameter sets the flow rate in engineering units that corresponds to 0% flow. This parameter is configured in the Transducer Block.

Set the *lower range value* (LRV) 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 –43.3 ft/s to +43.3 ft/s (-13.2 m/s to +13.2 m/s).

NOTE
Line size and density must be selected prior to configuration of URV and LRV.

The minimum allowable span between the URV and LRV is 1 ft/s (0.3 m/s). Do not set the LRV within 1 ft/s (0.3 m/s) of the URV. For example, if the URV is set to 15.67 ft/s (4.8 m/s) and if the desired URV is greater than the LRV, then the highest allowable LRV setting would be 14.67 ft/s (4.5 m/s). If the desired URV is less than the LRV, then the lowest allowable LRV would be 16.67 ft/s (5.1 m/s).

Calibration Number

The sensor *calibration number* is a 16-digit number used to identify sensors calibrated at the Rosemount factory. The calibration number is also printed inside the sensor terminal block or on the sensor name plate. The number provides detailed calibration information to the Rosemount 8732. To function properly within accuracy specifications, the number stored in the transmitter must match the calibration number on the sensor exactly. This parameter is configured in the Transducer Block.

NOTE
Sensors from manufacturers other than Rosemount Inc. can also be calibrated at the Rosemount factory. Check the sensor for Rosemount calibration tags to determine if a 16-digit sensor calibration number exists for your sensor.

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NOTE
Be sure the calibration number reflects a calibration to a Rosemount reference transmitter. If the calibration number was generated by a means other than a certified Rosemount flow lab, accuracy of the system may be compromised.

If your sensor is not a Rosemount sensor and was not calibrated at the Rosemount factory, contact your Rosemount representative for assistance.

If your sensor is imprinted with an eight-digit number or a k-factor, check in the sensor wiring compartment for the sixteen-digit calibration number. If there is no serial number, contact the factory for a proper conversion.

Damping

Adjustable between 0.0 and 256 seconds. This parameter is configured in the Transducer Block.

Damping allows selection of a response time, in seconds, to a step change in flow rate. It is most often used to smooth fluctuations in output.

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Section 4 Operation

Introduction . . . . . **page 4-1**
Local Operator Interface . . . . . **page 4-1**
Diagnostics . . . . . **page 4-3**
Advanced Configuration . . . . . **page 4-12**
Detailed Setup . . . . . **page 4-12**

INTRODUCTION

This section contains information for advanced configuration parameters and diagnostics.

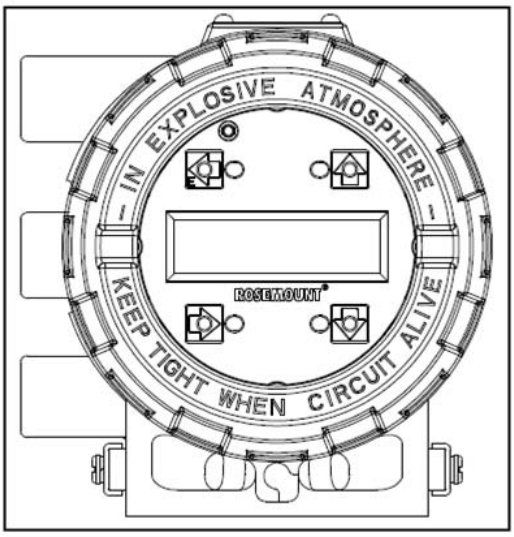
The software configuration settings for the Rosemount 8732 can be accessed through an 8732 LOI or by using a Class 2 Master. Before operating the Rosemount 8732 in an actual installation, you should review all of the factory set configuration data to ensure that they reflect the current application.

LOCAL OPERATOR INTERFACE

The optional Local Operator Interface (LOI) provides an operator communications centre for the 8732. By using the LOI, the operator can access some of the transmitter function - totalizer, basic set-up, or other functions under the detailed set-up. The LOI is integral to the transmitter electronics. If you need the added functionality, or if your transmitter does not have an LOI, you must use a configuration tool such as the Simatic PDM tool.

Basic Features

The basic features of the LOI include 4 navigational arrow keys which are optical switches that are used to access the menu structure. See Figure below:



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Data Entry

The LOI keypad does not have numerical keys. Numerical data is entered by the following procedure.

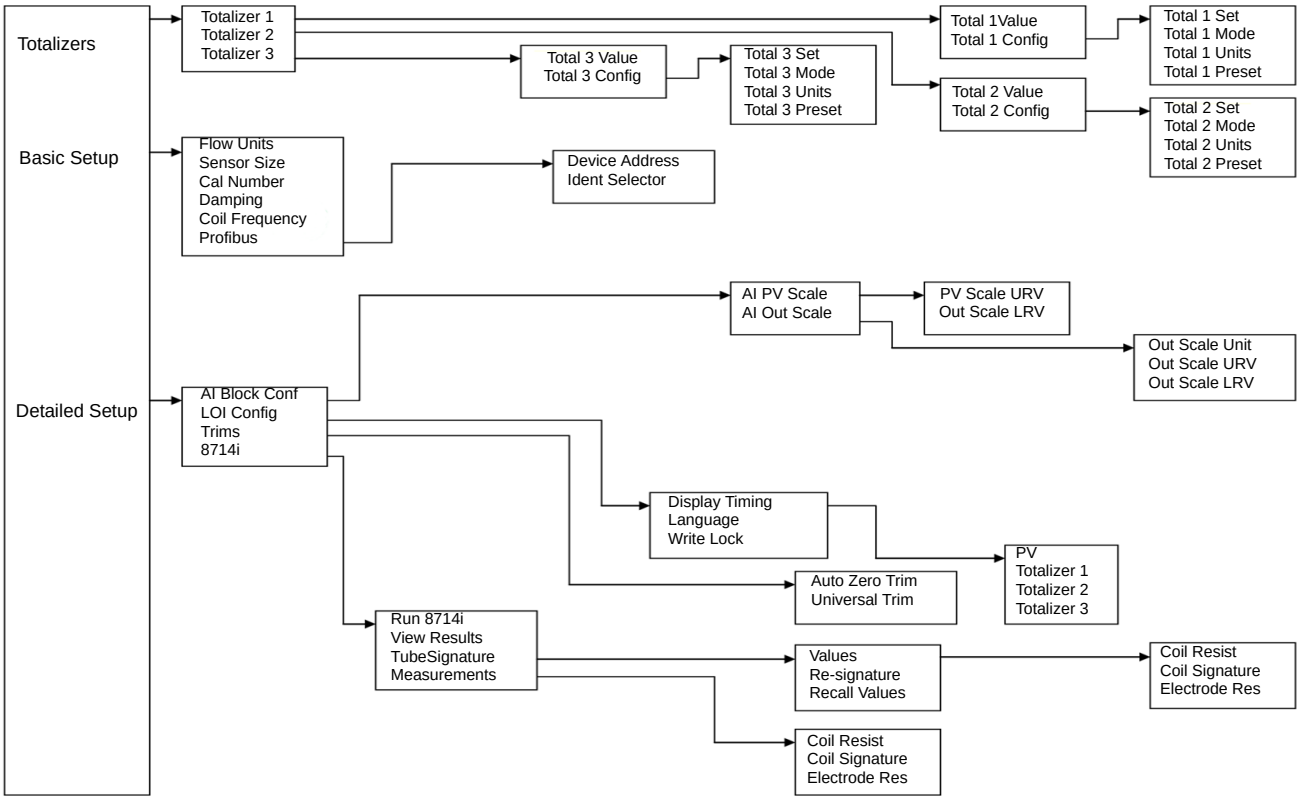
1. Access the appropriate function.
2. Use the **RIGHT ARROW** key to move to the value to change.
3. Use the UP and DOWN ARROWS to change the highlighted value. For numerical data, toggle through the digits 0–9, decimal point, and dash. For alphabetical data, toggle through the letters of the alphabet A–Z, digits 0–9, and the symbols _,&, +, -, *, /, $, @,%, and the blank space.
4. Use the **RIGHT ARROWS** to highlight other digits you want to change and change them.
5. Press “E” (the left arrow key) when all changes are complete to save the entered values.

LOI Language

This allows you to configure the language shown on the display. There are five options available:

- English
- Spanish
- Portuguese
- German
- French

LOI Menu Tree



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Class 2 Masters

There are a number of available PROFIBUS configuration tools. These Class 2 Masters are manufacturer-independent tools for the operation, configuration, maintenance, and diagnosis of intelligent field devices. Device descriptor based Class 2 Masters allow 100% configuration capability on the 8732E Profibus PA transmitter.

Class 2 Masters always need to be connected to the DP segment. They cannot be directly connected to a PA segment.

DIAGNOSTICS

Diagnostics are used to verify that the transmitter is functioning properly, to assist in troubleshooting, to identify potential causes of error messages, and to verify the health of the transmitter and sensor. All the diagnostic test can be initiated through the use of a Class 2 Master. Some diagnostics can be accessed using the LOI.

Rosemount offers several different diagnostic suites providing various functionality.

Standard diagnostics included with every Rosemount 8732 transmitter are Empty Pipe detection, Electronics Temperature monitoring, Coil Fault detection, and various loop and transmitter tests.

Advanced diagnostics suite option one (D01 option) contains advanced diagnostics for High Process Noise detection and Grounding and Wiring fault detection.

Advanced diagnostics suite option two (D02 option) contains advanced diagnostics for the 8714i Meter Verification. This diagnostic is used to verify the accuracy and performance of the magnetic flow meter installation.

Empty Pipe Detection

Turn the empty pipe diagnostic on or off as required by the application. For more details on the empty pipe diagnostic, see Appendix C: Diagnostics.

Electronics Temperature Out of Range

Turn the electronics temperature diagnostic on or off as required by the application. For more details on the electronics temperature diagnostic, see Appendix C: Diagnostics.

High Process Noise Detection

Turn the high process noise diagnostic on or off as required by the application. For more details on the high process noise diagnostic, see Appendix C: Diagnostics.

Grounding / Wiring Fault Detection

Turn the grounding / wiring diagnostic on or off as required by the application. For more details on the grounding / wiring diagnostic, see Appendix C: Diagnostics.

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Basic Diagnostics

The basic diagnostics menu contains all of the standard diagnostics and tests that are available in the 8732E transmitter.

Empty Pipe Limits

Empty Pipe allows you to view the current value and configure the diagnostic parameters. For more detail on this parameter see Appendix C: Diagnostics.

EP Value

Read the current Empty Pipe Value. This number is a unitless number and is calculated based on multiple installation and process variables. For more detail on this parameter see Appendix C: Diagnostics.

EP Trigger Level

Limits: 3 to 2000

Configure the threshold limit that the empty pipe value must exceed before the diagnostic alert activates. Default from the factory is set to 100. For more detail on this parameter see Appendix C: Diagnostics.

EP Counts

Limits: 5 to 50

Configure the number of consecutive times that the empty pipe value must exceed the empty pipe trigger level before the diagnostic alert activates. Counts are taken at 1.5 second intervals. Default from the factory is set to 5. For more detail on this parameter see Appendix C: Diagnostics.

Electronics Temp Value

Electronics Temperature allows you to view the current value for the electronics temperature.

Advanced Diagnostics

The advanced diagnostics menu contains information on all of the additional diagnostics and tests that are available in the 8732 transmitter if one of the diagnostics suite packages was ordered.

Rosemount offers two advanced diagnostic suites. Functionality under this menu will depend on which of these suites are ordered.

Advanced diagnostics suite option one (D01 option) contains advanced diagnostics for High Process Noise detection and Grounding and Wiring fault detection.

Advanced diagnostics suite option two (D02 option) contains advanced diagnostics for the 8714i Meter Verification. This diagnostic is used to verify the accuracy and performance of the magnetic flow meter installation.

8714i Meter Verification

This diagnostic allows you to test and verify that the sensor, transmitter, or both are working within specifications. For more details on this diagnostic, see Appendix C: Diagnostics.

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Run 8714i
Run the meter verification test to check the transmitter, sensor, or entire installation.

Full Meter Verification
Run the internal meter verification to check the entire installation, sensor and transmitter at the same time.

Transmitter Only
Run the internal meter verification to check the transmitter only.

Sensor Only
Run the internal meter verification to check the sensor only.

8714i Results

Review the results of the most recently performed 8714i Meter Verification test. Information in this section details the measurements taken and if the meter passed the verification test. For more details on these results and what they mean, see Appendix C: Diagnostics.

Test Condition

Displays the conditions that the 8714i Meter Verification test was performed under. For more details on this parameter see Appendix C: Diagnostics.

Test Criteria

Displays the criteria that the 8714i Meter Verification test was performed against. For more details on this parameter see Appendix C: Diagnostics.

8714i Result

Displays the results of the 8714i Meter Verification test as pass or fail. For more details on this parameter see Appendix C: Diagnostics.

Simulated Velocity

Displays the test velocity used to verify transmitter calibration. For more details on this parameter see Appendix C: Diagnostics.

Actual Velocity

Displays the velocity measured by the transmitter during the transmitter calibration verification test. For more details on this parameter see Appendix C: Diagnostics.

Velocity Deviation

Displays the deviation of the transmitter calibration verification test. For more details on this parameter see Appendix C: Diagnostics.

Transmitter Calibration Result

Displays the result of the transmitter calibration verification test as pass or fail. For more details on this parameter see Appendix C: Diagnostics.

Sensor Calibration Deviation

Displays the deviation of the sensor calibration verification test. For more details on this parameter see Appendix C: Diagnostics.

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Sensor Calibration Result

Displays the result of the sensor calibration verification test as pass or fail. For more details on this parameter see Appendix C: Diagnostics.

Coil Circuit Result

Displays the result of the coil circuit test as pass or fail. For more details on this parameter see Appendix C: Diagnostics.

Electrode Circuit Result

Displays the result of the electrode circuit test as pass or fail. For more details on this parameter see Appendix C: Diagnostics.

Sensor Signature

The sensor signature describes the sensor characteristics to the transmitter and is an integral part of the sensor meter verification test. From this menu you can view the current stored signature, have the transmitter take and store the sensor signature, and re-call the last saved good values for the sensor signature. For more details on this parameter see Appendix C: Diagnostics.

Signature Values

Review the current values stored for the sensor signature. For more details on this parameter see Appendix C: Diagnostics.

Coil Resistance

View the reference value for the coil resistance taken during the sensor signature process.

Coil Signature

View the reference value for the coil signature taken during the sensor signature process.

Electrode Resistance

View the reference value for the electrode resistance taken during the sensor signature process.

Re-Signature Meter

Have the transmitter measure and store the sensor signature values. These values will then be used as the baseline for the meter verification test. Use this when connecting to older Rosemount or competitors' sensors or installing the magnetic flowmeter system for the first time. For more details on this parameter see Appendix C: Diagnostics.

Recall Last Saved Values

Recalls the last saved "good" values for the sensor signature.

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Set Pass/Fail Criteria

Set the maximum allowable deviation percentage test criteria for the 8714i Meter Verification test. There are three tests that this criteria can be set for:

- Full Pipe; No Flow (Best test condition) – Default is 2%
- Full Pipe; Flowing – Default is 3%
- Empty Pipe – Default is 5%

NOTE
If the 8714i Meter Verification test is done with an empty pipe, the electrode circuit will NOT be tested.

No Flow Limit

Limits: 1 to 10 percent

Set the pass/fail test criteria for the 8714i Meter Verification test at Full Pipe, No Flow conditions.

Flowing Limit

Limits: 1 to 10 percent

Set the pass/fail test criteria for the 8714i Meter Verification test at Full Pipe, Flowing conditions.

Empty Pipe Limit

Limits: 1 to 10 percent

Set the pass/fail test criteria for the 8714i Meter Verification test at Empty Pipe conditions.

Measurements

View the measured values taken during the meter verification process. These values are compared to the signature values to determine if the test passes or fails. Values are shown for the Coil Resistance, Coil Signature, and Electrode Resistance.

Coil Resistance

View the measured value for the coil resistance taken during the meter verification test.

Coil Signature

View the measured value for the coil signature taken during the meter verification test.

Electrode Resistance

View the measured value for the electrode resistance taken during the meter verification test.

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Licensing

If a diagnostic suite was not ordered initially, advanced diagnostics can be licensed in the field. Access the licensing information from this menu. For more details on licensing, see Appendix C: Diagnostics.

License Status

Determine if a diagnostics suite has been licensed, and if so, which diagnostics are available for activation.

License Key

A license key is required to activate diagnostics in the field if the diagnostic suite was not initially ordered. This menu allows for gathering of necessary data to generate a license key and also the ability to enter the license key once it has been received.

Device ID

This function displays the Device ID and Software Revision for the transmitter. Both of these pieces of information are required to generate a license key.

License Key

Allows you to enter a license key to activate a diagnostic suite.

Diagnostic Variables

From this menu, all of the diagnostic variable values can be reviewed. This information can be used to get more information about the transmitter, sensor, and process, or to get more detail about an alert that may have activated.

Empty Pipe Value

Read the current value of the Empty Pipe parameter. This value will read zero if Empty Pipe is turned off.

Electronics Temperature

Read the current value of the Electronics Temperature.

Line Noise

Read the current value of the amplitude of AC line noise measured on the transmitter’s electrode inputs. This value is used in the grounding / wiring diagnostic.

5Hz SNR

Read the current value of the signal to noise ratio at 5 Hz. For optimum performance, a value greater than 100 is preferred. Values less than 25 will cause the High Process Noise alert to activate.

37Hz SNR

Read the current value of the signal to noise ratio at 37.5 Hz. For optimum performance, a value greater than 100 is preferred. Values less than 25 will cause the High Process Noise alert to activate.

Signal Power

Read the current value of the velocity of the fluid through the sensor. Higher velocities result in greater signal power.

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8714i Results

Review the results of the 8714i Meter Verification tests. For more details on these results and what they mean, see Appendix C: Diagnostics.

Test Condition

Displays the conditions that the 8714i Meter Verification test was performed under. For more details on this parameter see Appendix C: Diagnostics.

Test Criteria

Displays the criteria that the 8714i Meter Verification test was performed against. For more details on this parameter see Appendix C: Diagnostics.

8714i Result

Displays the results of the 8714i Meter Verification test as pass or fail. For more details on this parameter see Appendix C: Diagnostics.

Simulated Velocity

Displays the test velocity used to verify transmitter calibration. For more details on this parameter see Appendix C: Diagnostics.

Actual Velocity

Displays the velocity measured by the transmitter during the transmitter calibration verification test. For more details on this parameter see Appendix C: Diagnostics.

Velocity Deviation

Displays the deviation of the transmitter calibration verification test. For more details on this parameter see Appendix C: Diagnostics.

Transmitter Calibration Result

Displays the result of the transmitter calibration verification test as pass or fail. For more details on this parameter see Appendix C: Diagnostics.

Sensor Calibration Deviation

Displays the deviation of the sensor calibration verification test. For more details on this parameter see Appendix C: Diagnostics.

Sensor Calibration Result

Displays the result of the sensor calibration verification test as pass or fail. For more details on this parameter see Appendix C: Diagnostics.

Coil Circuit Result

Displays the result of the coil circuit test as pass or fail. For more details on this parameter see Appendix C: Diagnostics.

Electrode Circuit Result

Displays the result of the electrode circuit test as pass or fail. For more details on this parameter see Appendix C: Diagnostics.

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Trims

Trims are used to calibrate the transmitter, re-zero the transmitter, and calibrate the transmitter with another manufacturer's sensor. Proceed with caution whenever performing a trim function.

Electronics Trim

Electronics trim is the function by which the factory calibrates the transmitter. This procedure is rarely needed by customers. It is only necessary if you suspect the Rosemount 8732E is no longer accurate. A Rosemount 8714 Calibration Standard is required to complete an Electronics trim. Attempting an Electronics trim without a Rosemount 8714 Calibration Standard may result in an inaccurate transmitter or an error message. Electronics trim must be performed only with the coil drive mode set to 5 Hz and with a nominal sensor calibration number stored in the memory.

NOTE
Attempting an Electronics trim without a Rosemount 8714 may result in an inaccurate transmitter, or an "ELECTRONICS TRIM FAILURE" message may appear. If this message occurs, no values were changed in the transmitter. Simply power down the Rosemount 8732E to clear the message.

To simulate a nominal sensor with the Rosemount 8714, you must change the following parameters in the Rosemount 8732E:

1. Sensor Calibration Number—1000015010000000
2. Units—ft/s
3. Coil Drive Frequency - 5 Hz

The instructions for changing the Sensor Calibration Number and Units are located in "Flow Units" on page 3-7. Instructions for changing the Coil Drive Frequency can be found on page 4-14 in this section.

Set the loop to manual, if necessary, before you begin. Complete the following steps:

1. Power down the transmitter.
2. Connect the transmitter to a Rosemount 8714 Calibration Standard.
3. Power up the transmitter with the Rosemount 8714 connected and read the flow rate. The electronics need about a 5-minute warm-up time to stabilize.
4. Set the 8714 calibrator to the 30 ft/s setting.
5. The flow rate reading after warm-up should be between 29.97 and 30.03 ft/s.
6. If the reading is within the range, return the transmitter to the original configuration parameters.
7. If the reading is not within this range, initiate an Electronics trim with the Profibus PA configuration tool. The Electronics trim takes about 90 seconds to complete. No transmitter adjustments are required.

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Universal Trim

The Universal Trim function enables the Rosemount 8732E to calibrate sensors that were not calibrated at the Rosemount factory. The function is activated as one step in a procedure known as in-process calibration. If your Rosemount sensor has a 16-digit calibration number, in-process calibration is not required. If it does not, or if your sensor is made by another manufacturer, complete the following steps for in-process calibration.

1. Determine the flow rate of the process fluid in the sensor.

NOTE
The flow rate in the line can be determined by using another sensor in the line, by counting the revolutions of a centrifugal pump, or by performing a bucket test to determine how fast a given volume is filled by the process fluid.

2. Complete the Universal Trim function.
3. When the routine is completed, the sensor is ready for use.

Auto Zero

The Auto Zero function initializes the transmitter for use with the 37 Hz coil drive mode only. Run this function only with the transmitter and sensor installed in the process. The sensor must be filled with process fluid at zero flow. Before running the Auto Zero function, be sure the coil drive mode is set to 37 Hz (Auto Zero will not run with the coil drive frequency set at 5 Hz).

Set the loop to manual if necessary and begin the Auto Zero procedure. The transmitter completes the procedure automatically in about 90 seconds. A symbol appears in the lower right-hand corner of the display to indicate that the procedure is running.

Master Reset

The master reset is a function that the user can execute to reset the device configuration to the default setting.

There are three types of Master Reset:

Cold Start - Reset the device to a default configuration. The device address is not changed.

Warm Start - Restart the device. This reset function acts just like a power cycle. None of the configuration parameters are changed.

Reset Address - This reset changes the bus address of the device to the default address of 126. This change happens immediately regardless of the state of data exchange the transmitter is in.

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ADVANCED CONFIGURATION

In addition to the basic configuration options and the diagnostic information and controls, the 8732 has many advanced functions that can also be configured as required by the application.

DETAILED SETUP

The detailed setup function provides access to other parameters within the transmitter that can be configured such as coil drive frequency, output parameters, local display configuration, and other general information about the device.

Additional Parameters

The additional parameters menu provides a means to configure optional parameters within the 8732E transmitter.

Density Value

The density value is used to convert from a volumetric flow rate to a mass flow rate using the following equation:

$Q_m = Q_v \times \rho$

Where:

Q_m is the mass flow rate

Q_v is the volumetric flow rate, and

ρ is the fluid density

NOTE
A density value is required to configure the flow units for mass flow rate measurement.

Sensor Range: High

This parameter is the maximum value that the PV Range value can be set to. This is the upper measuring limit of the transmitter and sensor.

Sensor Range: Low

This parameter is the minimum value that the PV Range value can be set to. This is the lower measuring limit of the transmitter and sensor.

Measurement Mode

Enable or disable the transmitter's ability to read reverse flow.

Measurement Mode allows the transmitter to read negative flow. This may occur when flow in the pipe is going the negative direction, or when either electrode wires or coil wires are reversed. This also enables the totalizer to count in the reverse direction.

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Signal Processing

The 8732E contains several advanced functions that can be used to stabilize erratic outputs caused by process noise. The signal processing menu contains this functionality. Below is sample PDM screen shot of Signal Processing.

Operating Mode (Operation)

The Operating Mode should be used only when the signal is noisy and gives an unstable output. Filter mode automatically uses 37 Hz coil drive mode and activates signal processing at the factory set default values. When using filter mode, perform an auto zero with no flow and a full sensor. Either of the parameters, coil drive mode or signal processing, may still be changed individually. Turning Signal Processing off or changing the coil drive frequency to 5 Hz will automatically change the Operating Mode from filter mode to normal mode.

SP Control

When ON is selected, the Rosemount 8732E output is derived using a running average of the individual flow inputs. Signal processing is a software algorithm that examines the quality of the electrode signal against user-specified tolerances. This average is updated at the rate of 10 samples per second with a coil drive frequency of 5 Hz, and 75 samples per second with a coil drive frequency of 37 Hz. The three parameters that make up signal processing (number of samples, maximum percent limit, and time limit) are described below.

Number of Samples

0 to 125 Samples

The number of samples function sets the amount of time that inputs are collected and used to calculate the average value. Each second is divided into tenths (1/10) with the number of samples equaling the number of 1/10 second increments used to calculate the average.

For example, a value of:

1 averages the inputs over the past 1/10 second

100 averages the inputs over the past 10 seconds

Percent of Rate

0 to 100 Percent

The maximum percent limit is a tolerance band set up on either side of the running average. The percentage value refers to deviation from the running average. For example, if the running average is 100 gal/min, and a 2 percent maximum limit is selected, then the acceptable range is from 98 to 102 gal/min.

Values within the limit are accepted while values outside the limit are analyzed to determine if they are a noise spike or an actual flow change.

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Time Limit

0 to 256 Seconds

The time limit parameter forces the output and running average values to the new value of an actual flow rate change that is outside the percent limit boundaries. It thereby limits response time to flow changes to the time limit value rather than the length of the running average.

For example, if the number of samples selected is 100, then the response time of the system is 10 seconds. In some cases this may be unacceptable. By setting the time limit, you can force the 8732E to clear the value of the running average and re-establish the output and average at the new flow rate once the time limit has elapsed. This parameter limits the response time added to the loop. A suggested time limit value of two seconds is a good starting point for most applicable process fluids. The selected signal processing configuration may be turned ON or OFF to suit your needs.

Coil Drive Frequency

Coil drive frequency allows pulse-rate selection of the sensor coils.

5 Hz
The standard coil drive frequency is 5 Hz, which is sufficient for nearly all applications.

37 Hz
If the process fluid causes a noisy or unstable output, increase the coil drive frequency to 37 Hz. If the 37 Hz mode is selected, perform the auto zero function with no flow and a full sensor.

Low Flow Cutoff

Low flow cutoff allows you to specify the flow rate, between 0.01 and 38.37 feet per second, below which the outputs are driven to zero flow. The units format for low flow cutoff cannot be changed. It is always displayed as feet per second regardless of the format selected. The low flow cutoff value applies to both forward and reverse flows.

Device Info

Information variables are used for identification of flowmeters in the field and to store information that may be useful in service situations. Information variables have no effect on flowmeter output or process variables.

Device ID

This function displays the Device ID of the transmitter. This is one piece of information required to generate a license code to enable diagnostics in the field.

PV Sensor S/N

The PV sensor serial number is the serial number of the sensor connected to the transmitter and can be stored in the transmitter configuration for future reference. The number provides easy identification if the sensor needs servicing or for other purposes.

Sensor Tag

Sensor tag is the quickest and shortest way of identifying and distinguishing between sensors. Sensors can be tagged according to the requirements of your application. The tag may be up to eight characters long.

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DSP Software Rev

This function displays the software revision number of the transmitter.

Construction Materials

Construction materials contain information about the sensor that is connected to the transmitter. This information is configured into the transmitter for later reference. This information can be helpful when calling the factory for support.

Flange Type

Flange type enables you to select the flange type for your magnetic transmitter system. This variable only needs to be changed if you have changed your sensor. Options for this value are:

• ANSI 150	• PN 10
• ANSI 300	• PN 16
• ANSI 600	• PN 25
• ANSI 900	• PN 40
• ANSI 1500	• PN 64
• ANSI 2500	• Other
• Wafer	

Flange Material

Flange material enables you to select the flange material for your magnetic transmitter system. This variable only needs to be changed if you have changed your sensor. Options for this value are:

- Carbon Steel
- 304L Stainless Steel
- 316L Stainless Steel
- Wafer
- Other

Electrode Type

Electrode type enables you to select the electrode type for your magnetic transmitter system. This variable only needs to be changed if you have replaced electrodes or if you have replaced your sensor. Options for this value are:

- Standard
- Std & Ground
- Bullet
- Other

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Electrode Material

Electrode Material enables you to select the electrode material for your magnetic transmitter system. This variable only needs to be changed if you have replaced electrodes or if you have replaced your sensor. Options for this value are:

- 316L SST
- Nickel Alloy 276 (UNS N10276)
- Tantalum
- Titanium
- 80% Platinum – 20% Iridium
- Alloy 20
- Other

Liner Material

Liner material enables you to select the liner material for the attached sensor. This variable only needs to be changed if you have replaced your sensor. Options for this value are:

- PTFE
- ETFE
- PFA
- Polyurethane
- Linatex
- Natural Rubber
- Neoprene
- Other

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Section 5 Sensor Installation

Safety Messages . . . . . page 5-1
Sensor Handling . . . . . page 5-3
Sensor Mounting . . . . . page 5-4
Installation (Flanged Sensor) . . . . . page 5-7
Installation (Wafer Sensor) . . . . . page 5-10
Installation (Sanitary Sensor) . . . . . page 5-12
Grounding . . . . . page 5-12
Process Leak Protection (Optional) . . . . . page 5-16

This section covers the steps required to physically install the magnetic sensor. For electrical connections and cabling see Section 2: "Installation". Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations. Please refer to the following safety messages before performing any operation in this section.

SAFETY MESSAGES

⚠ This symbol is used throughout this manual to indicate that special attention to warning information is required.

⚠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 sensor and transmitter is consistent with the appropriate hazardous area approval.

Do not connect a Rosemount 8732 to a non-Rosemount sensor that is located in an explosive atmosphere.

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⚠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 8732 reference manual for any restrictions associated with a safe installation.

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

To avoid possible damage to the sensor 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 sensor ends are often used for protection.

Correct flange bolt tightening is crucial for proper sensor 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 sensor lining and possible sensor replacement.

Emerson Process Management can supply lining protectors to prevent liner damage during removal, installation, and excessive bolt torquing.

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SENSOR HANDLING

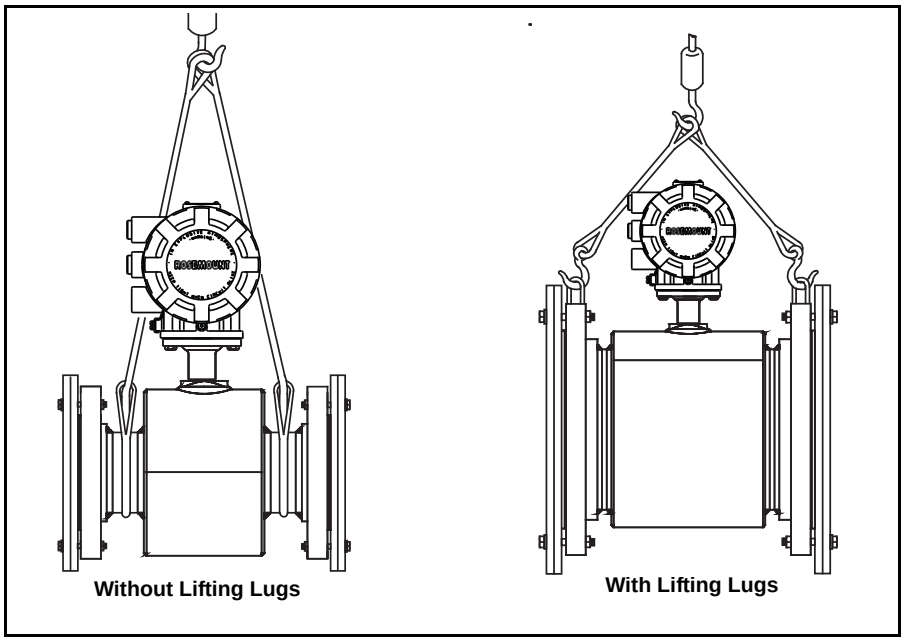
⚠ Handle all parts carefully to prevent damage. Whenever possible, transport the system to the installation site in the original shipping containers. PTFE-lined sensors are shipped with end covers that protect it from both mechanical damage and normal unrestrained distortion. Remove the end covers just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

Flanged sensors with a lifting lug on each flange make the sensor easier to handle when it is transported and lowered into place at the installation site.

Flanged sensors that do not have lugs must be supported with a lifting sling on each side of the housing.

Figure 5-1 shows sensors correctly supported for handling and installation. Notice the plywood end pieces are still in place to protect the sensor liner during transportation.

Figure 5-1. Rosemount 8705 Sensor Support for Handling



⚠ See ”Safety Messages” on pages 5-1 and 5-2 for complete warning information.

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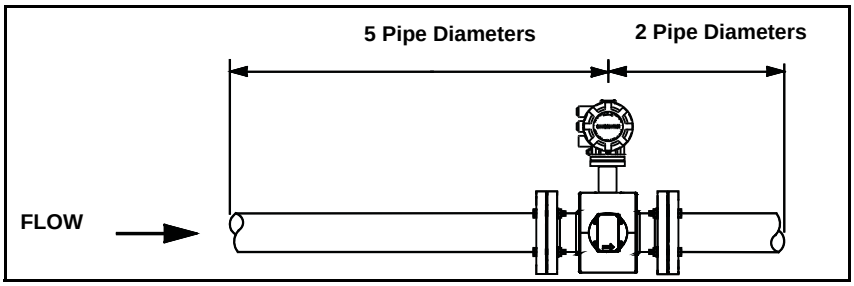
SENSOR MOUNTING

Physical mounting of a sensor is similar to installing a typical section of pipe. Conventional tools, equipment, and accessories (bolts, gaskets, and grounding hardware) are required.

Upstream/Downstream Piping

To ensure specification accuracy over widely varying process conditions, install the sensor a minimum of five straight pipe diameters upstream and two pipe diameters downstream from the electrode plane (see Figure 5-2).

Figure 5-2. Upstream and Downstream Straight Pipe Diameters



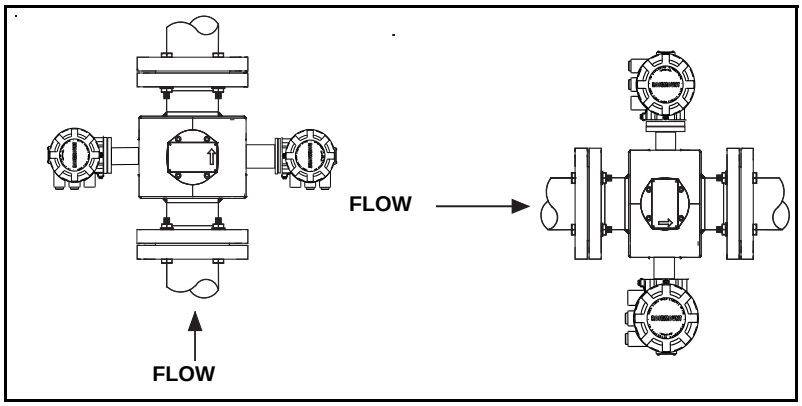
Sensor Orientation

The sensor should be installed in a position that ensures the sensor remains full during operation. Figures 5-3, 5-4, and 5-5 show the proper sensor orientation for the most common installations. The following orientations ensure that the electrodes are in the optimum plane to minimize the effects of entrapped gas.

Vertical installation allows upward process fluid flow and is generally preferred. Upward flow keeps the cross-sectional area full, regardless of flow rate. Orientation of the electrode plane is unimportant in vertical installations. As illustrated in Figures 5-3 and 5-4, avoid *downward* flows where back pressure does not ensure that the sensor remains full at all times.

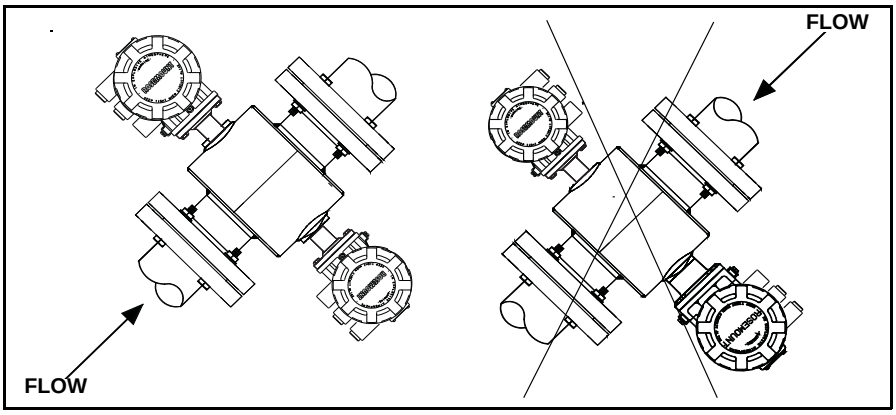
Installations with reduced straight runs from 0 to five pipe diameters are possible. In reduced straight pipe run installations, performance will shift to as much as 0.5% of rate. Reported flow rates will still be highly repeatable.

Figure 5-3. Vertical Sensor Orientation



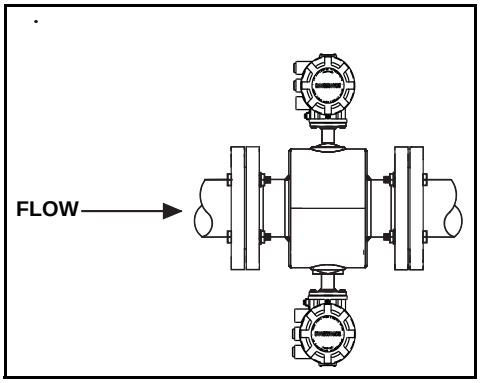
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Figure 5-4. Incline or Decline Orientation



Horizontal installation should be restricted to low piping sections that are normally full. Orient the electrode plane to within 45 degrees of horizontal in horizontal installations. A deviation of more than 45 degrees of horizontal would place an electrode at or near the top of the sensor thereby making it more susceptible to insulation by air or entrapped gas at the top of the sensor.

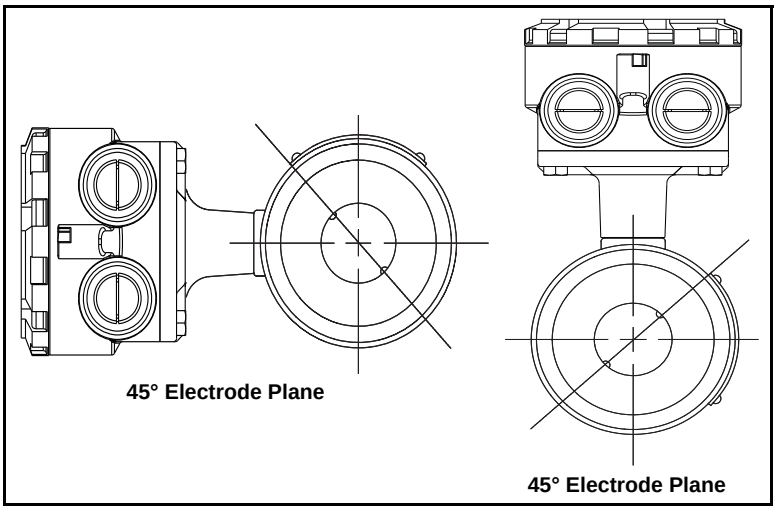
Figure 5-5. Horizontal Sensor Orientation



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The electrodes in the Rosemount 8711 are properly oriented when the top of the sensor is either vertical or horizontal, as shown in Figure 5-6. Avoid any mounting orientation that positions the top of the sensor at 45 degrees from the vertical or horizontal position.

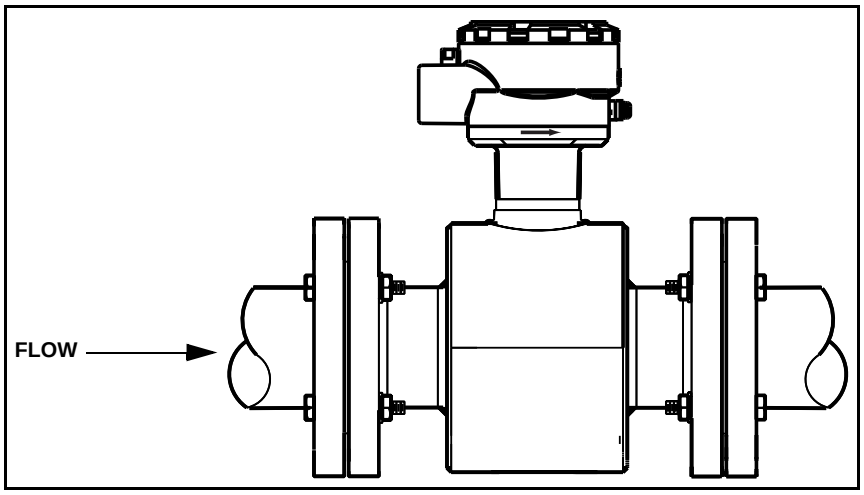
Figure 5-6. Rosemount 8711 Mounting Position



Flow Direction

The sensor should be mounted so that the FORWARD end of the flow arrow, shown on the sensor identification tag, points in the direction of flow through the sensor (see Figure 5-7).

Figure 5-7. Flow Direction



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INSTALLATION (FLANGED SENSOR)

The following section should be used as a guide in the installation of the flange-type Rosemount 8705 and Rosemount 8707 High-Signal Sensors. Refer to page 5-10 for installation of the wafer-type Rosemount 8711 Sensor.

Gaskets

⚠ The sensor 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.** If the gaskets will be removed frequently, protect the liner ends. All other applications (including sensors with lining protectors or a grounding electrode) require only one gasket on each end connection, as shown in Figure 5-8. If grounding rings are used, gaskets are required on each side of the grounding ring, as shown in Figure 5-9.

Figure 5-8. Gasket Placement

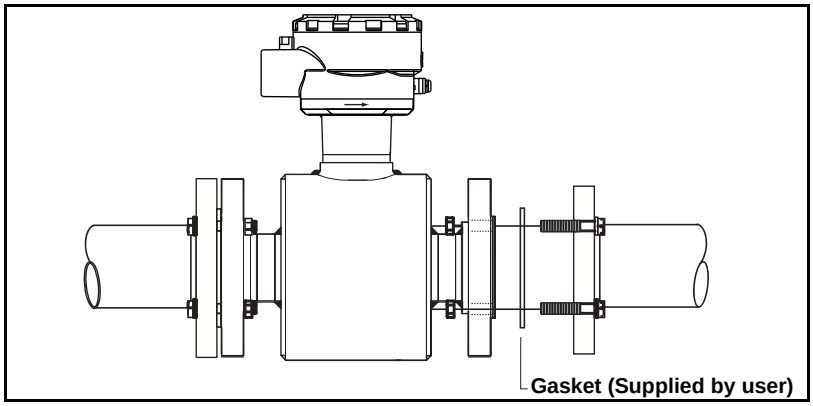
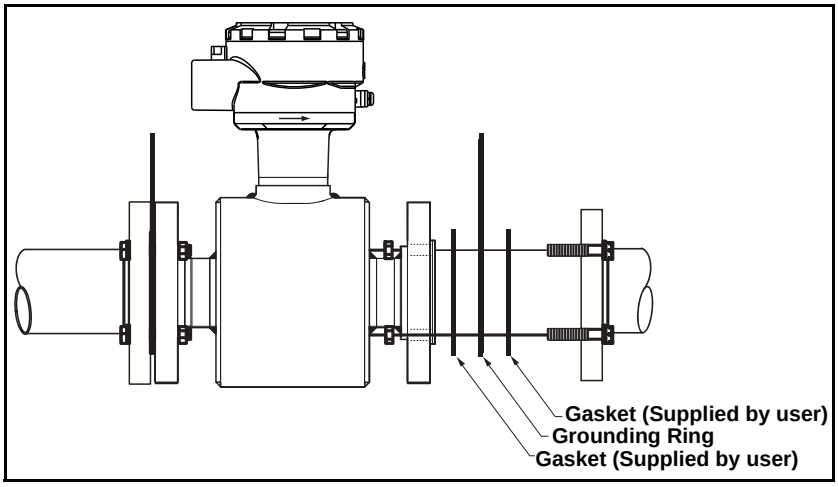


Figure 5-9. Gasket Placement with Non-attached Grounding Rings



Flange Bolts

Suggested torque values by sensor line size and liner type are listed in Table 5-1 on page 5-8 for ASME B16.5 (ANSI) flanges and Table 5-2 and Table 5-3 for DIN flanges. Consult the factory for other flange ratings. Tighten flange bolts in the incremental sequence as shown in Figure 5-10. See Table 5-1 and Table 5-2 for bolt sizes and hole diameters.

⚠ See ”Safety Messages” on pages 5-1 and 5-2 for complete warning information.

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NOTE
Do not bolt one side at a time. Tighten each side simultaneously. Example:
1. Snug left
2. Snug right
3. Tighten left
4. Tighten right

Do not snug and tighten the upstream side and then snug and tighten the downstream side. Failure to alternate between the upstream and downstream flanges when tightening bolts may result in liner damage.

⚠ Always check for leaks at the flanges after tightening the flange bolts. Failure to use the correct flange bolt tightening methods can result in severe damage. All sensors require a second torquing 24 hours after initial flange bolt tightening.

Table 5-1. Flange Bolt Torque Specifications for Rosemount 8705 and 8707 High-Signal Sensors

		PTFE/ETFE liner			Polyurethane liner	
Size Code	**Line Size**	**Class 150 (pound-feet)**	**Class 300 (pound-feet)**	**Class 600[(1)] (Derated to 1000 psi)**	**Class 150 (pound-feet)**	**Class 300 (pound-feet)**
005	0.5-in. (15 mm)	8	8	8	8	-
010	1- in. (25 mm)	8	12	13	13	-
015	1.5-in. (40 mm)	13	25	29	29	7
020	2-in. (50 mm)	19	17	20	20	14
030	3-in. (80 mm)	34	35	41	41	23
040	4-in. (100 mm)	26	50	68	68	17
060	6-in. (150mm)	45	50	77	77	30
080	8-in. (200 mm)	60	82	121	121	42
100	10-in. (250 mm)	55	80	129	129	40
120	12-in. (300 mm)	65	125	146	146	55
140	14-in. (350 mm)	85	110	194	194	70
160	16-in. (400 mm)	85	160	274	274	65
180	18-in. (450 mm)	120	170	432	432	95
200	20-in. (500 mm)	110	175	444	444	90
240	24-in. (600 mm)	165	280	731	731	140
300	30-in. (750 mm)	195	375	-	-	165
360	36-in. (900 mm)	280	575	-	-	245

(1) Derated available with PTFE lining only.

For sensors with ANSI 600# full rated, 900#, 1500#, and 2500# flanges, the liner is protected from over-compression by the flange design. Standard flange torque specifications as determined by ANSI and ASME should be followed. No special precaution is required to prevent liner damage caused by over torquing. Bolt tightening procedures laid out in this Quick Installation Guide must still be followed.

To prevent liner damage on any magnetic flowmeter, a flat gasket must be used. For optimum results on meters with high pressure flanges (ANSI 600# or above), it is recommended that a flat full face gasket be used.

Under NO circumstances should a spiral wound or flexitallic gasket be used as this will damage the liner sealing surface.

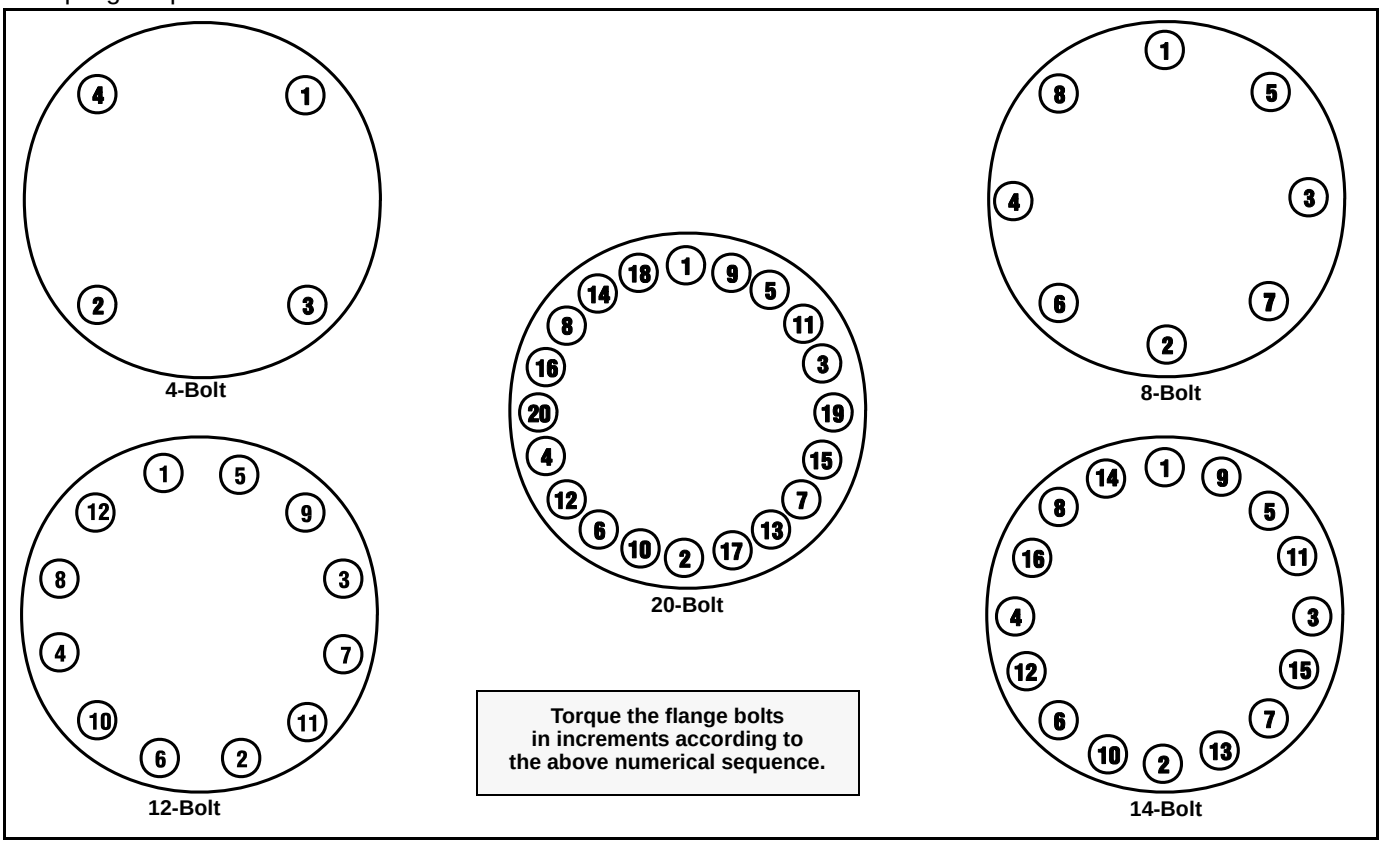
⚠ See ”Safety Messages” on pages 5-1 and 5-2 for complete warning information.

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Table 5-2. Flange Bolt Torque and Bolt Load Specifications for Rosemount 8705

Size Code	Line Size	PTFE/ETFE liner							
		PN10		PN 16		PN 25		PN 40	
		(Newton-meter)	(Newton)	(Newton-meter)	(Newton)	(Newton-meter)	(Newton)	(Newton-meter)	(Newton)
005	1/2-inch (15 mm)	7	3209	7	3809	7	3809	7	4173
010	1 inch (25 mm)	13	6983	13	6983	13	6983	13	8816
015	1 1/2 inch (40 mm)	24	9983	24	9983	24	9983	24	13010
020	2 inch (50 mm)	25	10420	25	10420	25	10420	25	14457
030	3 inch (80 mm)	14	5935	14	5935	18	7612	18	12264
040	4 inch (100 mm)	17	7038	17	7038	30	9944	30	16021
060	6 inch (150mm)	23	7522	32	10587	60	16571	60	26698
080	8 inch (200 mm)	35	11516	35	11694	66	18304	66	36263
100	10 inch (250 mm)	31	10406	59	16506	105	25835	105	48041
120	12 inch (300 mm)	43	14439	82	22903	109	26886	109	51614
140	14 inch (350 mm)	42	13927	80	22091	156	34578	156	73825
160	16 inch (400 mm)	65	18189	117	28851	224	45158	224	99501
180	18 inch (450 mm)	56	15431	99	24477	—	—	—	67953
200	20 inch (500 mm)	66	18342	131	29094	225	45538	225	73367
240	24 inch (600 mm)	104	25754	202	40850	345	63940	345	103014

Figure 5-10. Flange Bolt Torquing Sequence



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Table 5-3. Flange Bolt Torque and Bolt Load Specifications for Rosemount 8705

Size Code	Line Size	Polyurethane Liner							
		PN 10		PN 16		PN 25		PN 40	
		(Newton-meter)	(Newton)	(Newton-meter)	(Newton)	(Newton-meter)	(Newton)	(Newton-meter)	(Newton)
005	1/2-inch (15 mm)	1	521	1	826	2	1293	6	3333
010	1 inch (25 mm)	2	1191	3	1890	5	2958	10	5555
015	1 1/2 inch (40 mm)	5	1960	7	3109	12	4867	20	8332
020	2 inch (50 mm)	6	2535	10	4021	15	6294	26	10831
030	3 inch (80 mm)	5	2246	9	3563	13	5577	24	19998
040	4 inch (100 mm)	7	3033	12	4812	23	7531	35	11665
060	6 inch (150mm)	16	5311	25	8425	47	13186	75	20829
080	8 inch (200 mm)	27	8971	28	9487	53	14849	100	24687
100	10 inch (250 mm)	26	8637	49	13700	87	21443	155	34547
120	12 inch (300 mm)	36	12117	69	19220	91	22563	165	36660
140	14 inch (350 mm)	35	11693	67	18547	131	29030	235	47466
160	16 inch (400 mm)	55	15393	99	24417	189	38218	335	62026
200	20 inch (500 mm)	58	15989	114	25361	197	39696	375	64091
240	24 inch (600 mm)	92	22699	178	36006	304	56357	615	91094

INSTALLATION (WAFER SENSOR)

The following section should be used as a guide in the installation of the Rosemount 8711 Sensor. Refer to page 5-7 for installation of the flange-type Rosemount 8705 and 8707 High-Signal sensor.

Gaskets

⚠ The sensor 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.** If the gaskets will be removed frequently, protect the liner ends. If grounding rings are used, a gasket is required on each side of the grounding ring.

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 sensor. The smaller line sizes, 0.15- through 1-inch (4 through 25 mm), do not require centering rings.
2. Insert studs for the bottom side of the sensor between the pipe flanges. Stud specifications are listed in Table 5-4. **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.**

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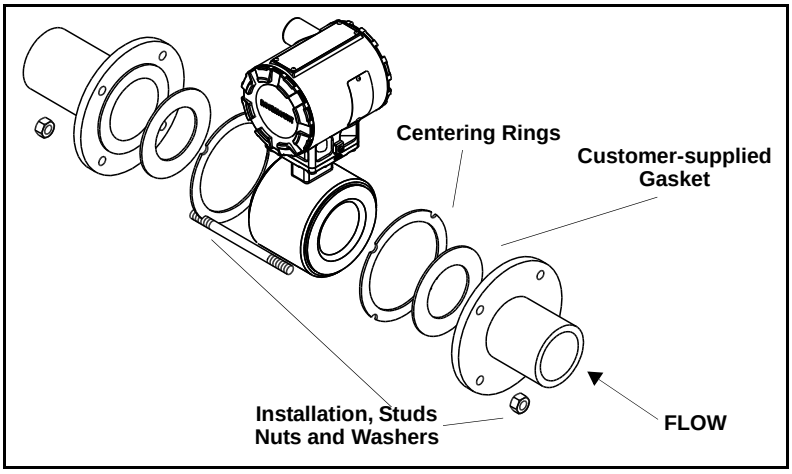
Table 5-4. Stud Specifications

Nominal Sensor 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 sensor 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 5-5. Do not overtighten the bolts or the liner may be damaged.

NOTE
On the 4- and 6- inch PN 10-16, insert the sensor with rings first and then insert the studs. The slots on this ring scenario are located on the inside of the ring.

Figure 5-11. Gasket Placement with Centering Rings



Flange Bolts

Sensor sizes and torque values for both Class 150 and Class 300 flanges are listed in Table 5-5. Tighten flange bolts in the incremental sequence, shown in Figure 5-10.

NOTE
Do not bolt one side at a time. Tighten each side simultaneously. Example:
1. Snug left
2. Snug right
3. Tighten left
4. Tighten right

Do not snug and tighten the upstream side and then snug and tighten the downstream side. Failure to alternate between the upstream and downstream flanges when tightening bolts may result in liner damage.

⚠ Always check for leaks at the flanges after tightening the flange bolts. All sensors require a second torquing 24 hours after initial flange bolt tightening.

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Table 5-5. Flange bolt Torque Specifications of Rosemount 8711 Sensors

Size Code	Line Size	Pound-feet	Newton-meter
15F	0.15 inch (4 mm)	5	6.8
30F	0.30 inch (8 mm)	5	6.8
005	1/2-inch (15 mm)	5	6.8
010	1 inch (25 mm)	10	13.6
015	1 1/2 inch (40 mm)	15	20.5
020	2 inch (50 mm)	25	34.1
030	3 inch (80 mm)	40	54.6
040	4 inch (100 mm)	30	40.1
060	6 inch (150 mm)	50	68.2
080	8 inch (200 mm)	70	81.9

INSTALLATION (SANITARY SENSOR)

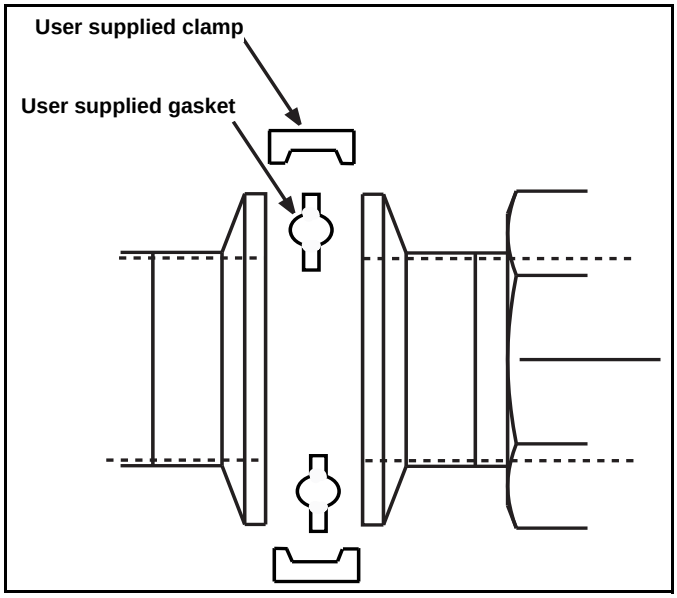
Gaskets

The sensor 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 sensors 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 5-12. Rosemount 8721 Sanitary Installation



GROUNDING

Process grounding the sensor is one of the most important details of sensor installation. Proper process grounding ensures that the transmitter amplifier is referenced to the process. This creates the lowest noise environment for the transmitter to make a stable reading. Use Table 5-6 to determine which grounding option to follow for proper installation.

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NOTE
Consult factory for installations requiring cathodic protection or situations where there are high currents or high potential in the process.

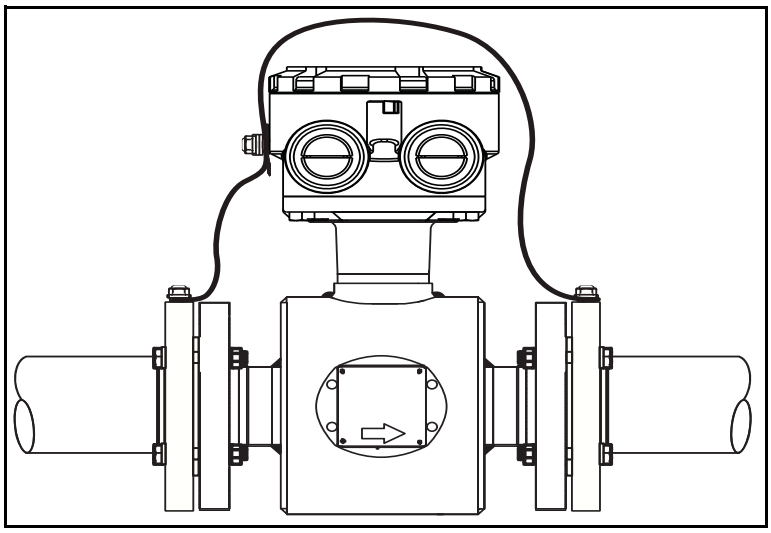
The sensor case should always be earth grounded in accordance with national and local electrical codes. Failure to do so may impair the protection provided by the equipment. The most effective grounding method is direct connection from the sensor to earth ground with minimal impedance.

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 5-6. Grounding Installation

	Grounding Options			
Type of Pipe	**No Grounding Options**	**Grounding Rings**	**Grounding Electrodes**	**Lining Protectors**
Conductive Unlined Pipe	See Figure 5-13	Not Required	Not Required	See Figure 5-14
Conductive Lined Pipe	Insufficient Grounding	See Figure 5-14	See Figure 5-13	See Figure 5-14
Non-Conductive Pipe	Insufficient Grounding	See Figure 5-15	See Figure 5-16	See Figure 5-15

Figure 5-13. No Grounding Options or Grounding Electrode in Lined Pipe



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Figure 5-14. Grounding with Grounding Rings or Lining Protectors

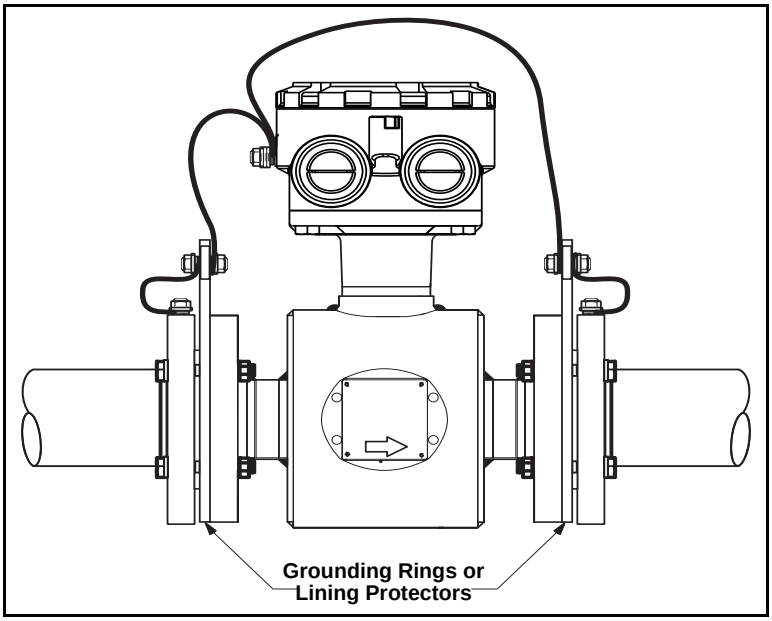
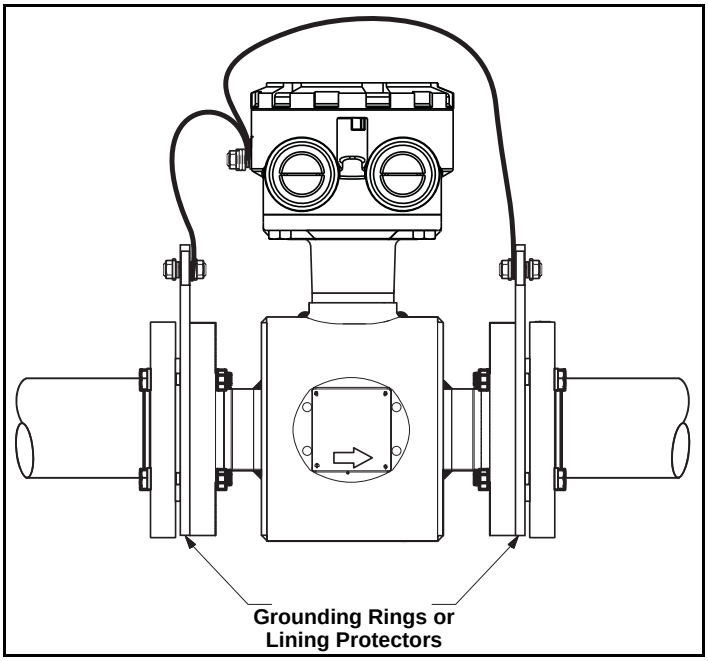
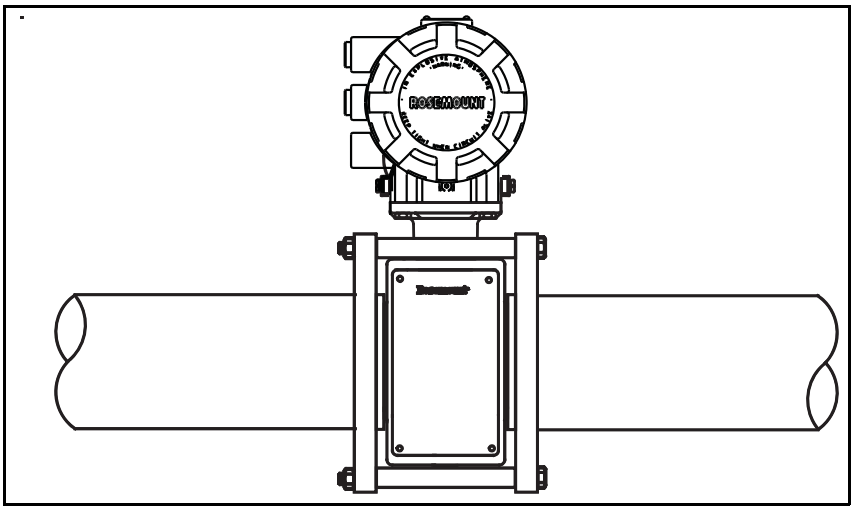


Figure 5-15. Grounding with Grounding Rings or Lining Protectors



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Figure 5-16. Grounding with Grounding Electrodes



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PROCESS LEAK PROTECTION (OPTIONAL)

The Rosemount 8705 and 8707 High-Signal Sensor housing is fabricated from carbon steel to perform two separate functions. First, it provides shielding for the sensor magnetics so that external disturbances cannot interfere with the magnetic field and thus affect the flow measurement. Second, it provides the physical protection to the coils and other internal components from contamination and physical damage that might occur in an industrial environment. The housing is completely welded and gasket-free.

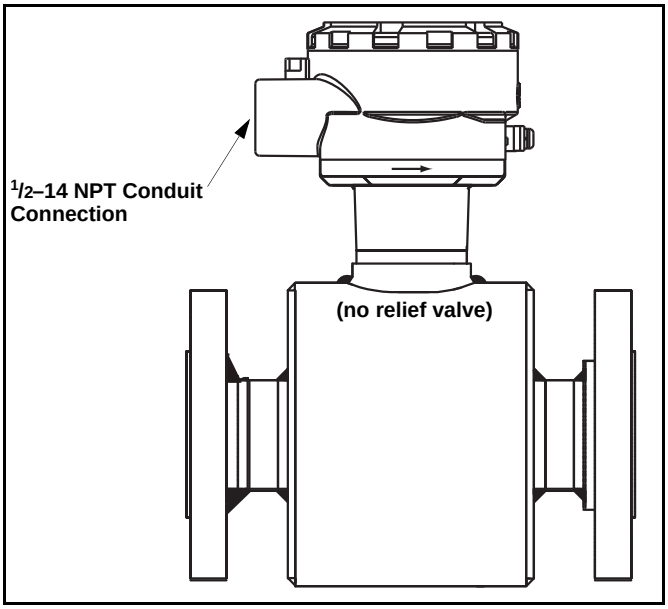
The three housing configurations are identified by the W0, W1, or W3 in the model number option code when ordering. Below are brief descriptions of each housing configuration, which are followed by a more detailed overview.

- **Code W0** — sealed, welded coil housing (standard configuration)
- **Code W1** — sealed, welded coil housing with a relief valve capable of venting fugitive emissions to a safe location (additional plumbing from the sensor to a safe area, installed by the user, is required to vent properly)
- **Code W3** — sealed, welded coil housing with separate electrode compartments capable of venting fugitive emissions (additional plumbing from the sensor to a safe area, installed by the user, is required to vent properly)

Standard Housing Configuration

The standard housing configuration is identified by a code W0 in the model number. This configuration does not provide separate electrode compartments with external electrode access. In the event of a process leak, these models will not protect the coils or other sensitive areas around the sensor from exposure to the pressure fluid (Figure 5-17).

Figure 5-17. Standard Housing Configuration — Sealed Welded Housing (Option Code W0)

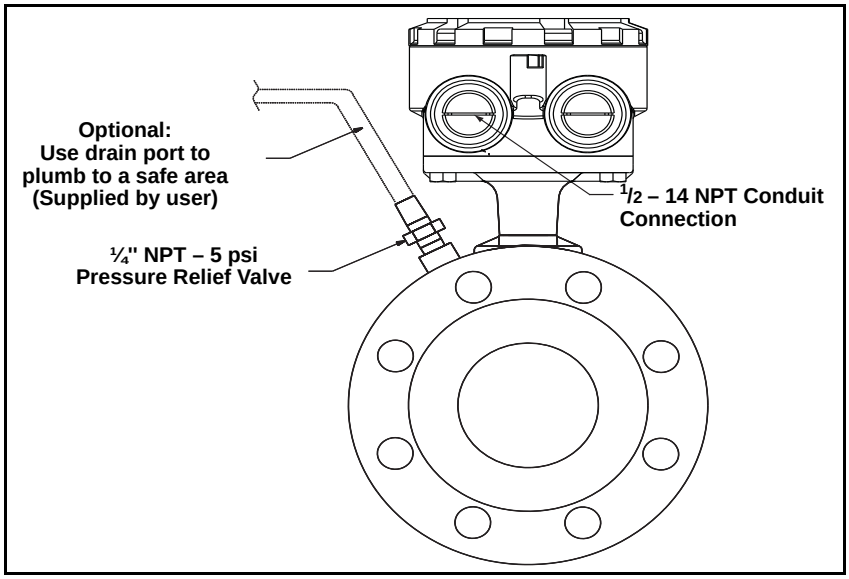


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Relief Valves

The first optional configuration, identified by the W1 in the model number option code, uses a completely welded coil housing. This configuration does not provide separate electrode compartments with external electrode access. This optional housing configuration provides a relief valve in the housing to prevent possible overpressuring caused by damage to the lining or other situations that might allow process pressure to enter the housing. The relief valve will vent when the pressure inside the sensor housing exceeds 5 psi. Additional piping (provided by the user) may be connected to this relief valve to drain any process leakage to safe containment (see Figure 5-18).

Figure 5-18. Coil-Housing Configuration — Standard Welded Housing With Relief Valve (Option Code W1)



Process Leak Containment

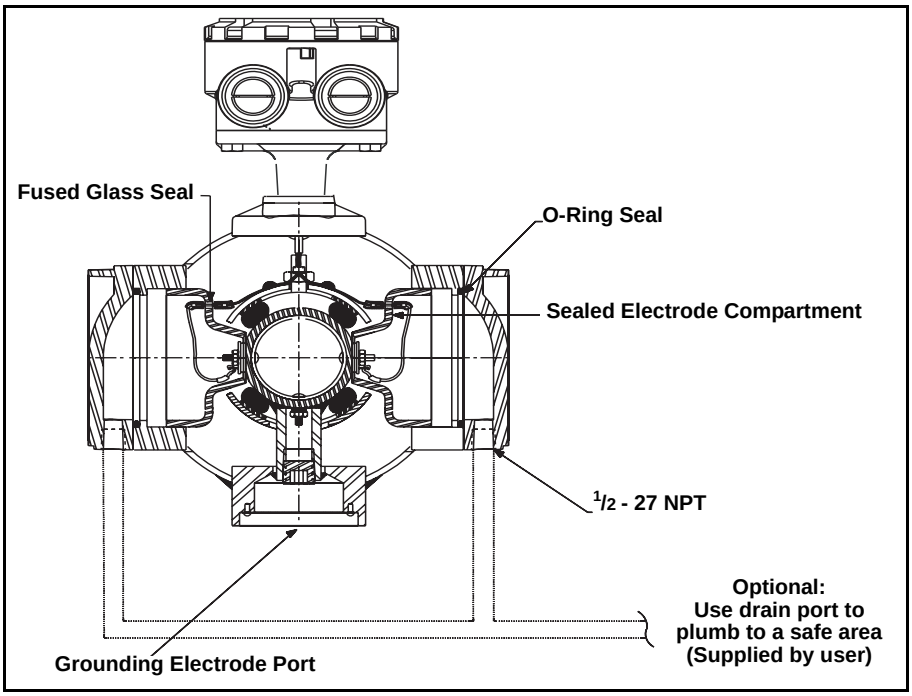
The second optional configuration, identified as option code W3 in the model number, divides the coil housing into three compartments: one for each electrode and one for the coils. Should a damaged liner or electrode fault allow process fluid to migrate behind the electrode seals, the fluid is contained in the electrode compartment. The sealed electrode compartment prevents the process fluid from entering the coil compartment where it would damage the coils and other internal components.

The electrode compartments are designed to contain the process fluid at full line pressure. An o-ring sealed cover provides access to each of the electrode compartments from outside the sensor; drainports are provided in each cover for the removal of fluid.

NOTE
The electrode compartment could contain full line pressure and it must be depressurized before the cover is removed.

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Figure 5-19. Housing Configuration — Sealed Electrode Compartment (Option Code W3)



If necessary, capture any process fluid leakage, connect the appropriate piping to the drainports, and provide for proper disposal (see Figure 5-19).

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Section 6 Maintenance and Troubleshooting

Safety Information . . . . . page 6-1
Installation Check and Guide . . . . . page 6-2
Diagnostic Messages . . . . . page 6-3
Transmitter Troubleshooting . . . . . page 6-5
Quick Troubleshooting . . . . . page 6-7

This section covers basic transmitter and sensor troubleshooting. Problems in the magnetic flowmeter system are usually indicated by incorrect output readings from the system, error messages, or failed tests. Consider all sources when identifying a problem in your system. If the problem persists, consult your local Rosemount representative to determine if the material should be returned to the factory. Emerson Process Management offers several diagnostics that aid in the troubleshooting process.

Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations. Please read the following safety messages before performing any operation described in this section. Refer to these warnings when appropriate throughout this section.

SAFETY INFORMATION

⚠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 sensor and transmitter is consistent with the appropriate FM or CSA approval.

Do not connect a Rosemount 8732 to a non-Rosemount sensor that is located in an explosive atmosphere.

Mishandling products exposed to a hazardous substance may result in death or serious injury. If the product being returned was exposed to a hazardous substance as defined by OSHA, a copy of the required Material Safety Data Sheet (MSDS) for each hazardous substance identified must be included with the returned goods.

The 8732 performs self diagnostics on the entire magnetic flowmeter system: the transmitter, the sensor, and the interconnecting wiring. By sequentially troubleshooting each individual piece of the magmeter system, it becomes easier to pin point the problem and make the appropriate adjustments.

If there are problems with a new magmeter installation, see “Installation Check and Guide” on page 6-2 for a quick guide to solve the most common installation problems. For existing magmeter installations, Table 6-4 lists the most common magmeter problems and corrective actions.

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INSTALLATION CHECK AND GUIDE

Use this guide to check new installations of Rosemount magnetic flowmeter systems that appear to malfunction.

Before You Begin

Transmitter

Apply power to your system before making the following transmitter checks.

1. Verify that the correct sensor calibration number is entered in the transmitter. The calibration number is listed on the sensor nameplate.
2. Verify that the correct sensor line size is entered in the transmitter. The line size value is listed on the sensor nameplate.
3. Verify that the function blocks are not in Out of Service mode.
4. Verify that the transmitter is functioning correctly by using the 8714i Meter Verification diagnostic or the 8714D Calibration Reference Standard.

Sensor

Be sure that power to your system is removed before beginning sensor checks.

1. **For horizontal flow installations**, ensure that the electrodes remain covered by process fluid.

   For vertical or inclined installations, ensure that the process fluid is flowing up into the sensor to keep the electrodes covered by process fluid.
2. Ensure that the grounding straps on the sensor are connected to grounding rings, lining protectors, or the adjacent pipe flanges. Improper grounding will cause erratic operation of the system.

Wiring for Remote Configurations

1. The signal wire and coil drive wire must be twisted shielded cable. Emerson Process Management, Rosemount division. recommends 20 AWG twisted shielded cable for the electrodes and 14 AWG twisted shielded cable for the coils.
2. The cable shield must be connected at both ends of the electrode and coil drive cables. Connection of the signal wire shield at both ends is necessary for proper operation. It is recommended that the coil drive wire shield also be connected at both ends for maximum flowmeter performance
3. The signal and coil drive wires must be separate cables, unless Emerson Process Management specified combo cable is used. See Table 2-2 on page 2-11.
4. The single conduit that houses both the signal and coil drive cables should not contain any other wires.

Process Fluid

1. The process fluid conductivity should be 5 microsiemens (5 micro mhos) per centimeter minimum.
2. The process fluid must be free of air and gasses.
3. The sensor should be full of process fluid.

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DIAGNOSTIC MESSAGES

Problems in the magnetic flowmeter system are usually indicated by incorrect output readings from the system, error messages, or failed tests. Consider all sources in identifying a problem in your system.

Table 6-1. Rosemount 8732 Basic Diagnostic Messages

Message	Local Display Error Message (English)	Potential Cause	Corrective Action
"Profibus Not Communicating"	Profibus Not Communicating	Profibus segment is disconnected	Connect the Profibus segment
		Profibus segment power missing	Verify the segment Profibus voltage
		Electronics failure	Replace electronics
"Sensor Processor Not Communicating"	Sensor Comm Err	Transmitter input power (AC/DC) is not connected	Connect the input power. If the LCD displays a message, the input power is applied
		Electronics failure	Replace electronics
"Empty Pipe Detected"	Empty Pipe	Empty Pipe	None - message will clear when pipe is full
		Wiring Error	Check that wiring matches appropriate wiring diagrams - see Appendix E: Universal Sensor Wiring Diagrams
		Electrode Error	Perform sensor tests C and D (see Table 6-5 on page 6-8)
		Conductivity less than 5 microsiemens per cm	Increase Conductivity to greater than or equal to 5 microsiemens per cm
		Intermittent Diagnostic	Adjust tuning of Empty Pipe parameters
"Coil Drive Open Circuit"	Coil Open Ckt	Improper wiring	Check coil drive wiring and sensor coils Perform sensor test A - Sensor Coil
		Other manufacturer's sensor	Change coil current to 75 mA Perform a Universal Auto Trim to select the proper coil current
		Circuit Board Failure	Replace Rosemount 8732 Electronics
		Coil Circuit OPEN Fuse	Return to factory for fuse replacement
"Auto Zero Failure (Cycle power to clear messages, no changes were made)"	Auto Zero Fail	Flow is not set to zero	Force flow to zero, perform autozero
		Unshielded cable in use	Change wire to shielded cable
		Moisture problems	See moisture problems in "Accuracy Section"
		Empty pipe is present	Fill sensor with process fluid
"Universal Trim Failure"	Univ Trim Fail	No flow in pipe while performing Universal Auto Trim	Establish a known flow in sensor, and perform Universal Auto-Trim calibration
		Wiring error	Check that wiring matches appropriate wiring diagrams - see "Universal Sensor Wiring Diagrams" on page E-1
		Flow rate is changing in pipe while performing Universal Auto-Trim routine	Establish a constant flow in sensor, and perform Universal Auto-Trim calibration
		Flow rate through sensor is significantly different than value entered during Universal Auto-Trim routine	Verify flow in sensor and perform Universal Auto-Trim calibration
		Incorrect calibration number entered into transmitter for Universal Auto-Trim routine	Replace sensor calibration number with 1000005010000001
		Wrong sensor size selected	Correct sensor size setting - See "Line Size" on page 3-9
		Sensor failure	Perform sensor tests C and D (see Table 6-5 on page 6-8)
"Electronics Failure"	Electronics Fail	Electronics self check failure	Replace Electronics
"Electronics Temperature Out of Range"	Temp Out of Rng	Ambient temperature exceeded the electronics temperature limits	Move transmitter to a location with an ambient temperature range of -40 to 165 °F (-40 to 74 °C)
"Reverse Flow Detected"	Reverse Flow	Electrode or coil wires reverse	Verify wiring between sensor and transmitter
		Flow is reverse	Turn ON Reverse Flow Enable to read flow
		Sensor installed backwards	Re-install sensor correctly, or switch either the electrode wires (18 and 19) or the coil wires (1 and 2)
"Sensor Hi Limit Exceeded"	Flow >Sens limit	Flow rate is greater than 43 ft/sec	Lower flow velocity, increase pipe diameter
		Improper wiring	Check coil drive wiring and sensor coils Perform sensor test A - Sensor Coil (see Table 6-5 on page 6-8)

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Table 6-1. Rosemount 8732 Basic Diagnostic Messages

Message	Local Display Error Message (English)	Potential Cause	Corrective Action
“DSP Hardware not compatible with software”	Incompatible SW	DSP Software Revision is not equal to Hornet’s Expectations.	Install software revision equal to Hornet's Expectation

Table 6-2. Rosemount 8732 Advanced Diagnostic Messages (Suite 1 - Option Code D01)

Message	Local Display Error Message (English)	Potential Cause	Corrective Action
Grounding/Wiring Fault	Grnd/Wire Fault	Improper installation of wiring	See “Sensor Connections” on page 2-11
		Coil/Electrode shield not connected	See “Sensor Connections” on page 2-11
		Improper process grounding	See “Grounding” on page 5-12
		Faulty ground connection	Check wiring for corrosion, moisture in the terminal block, and refer to “Grounding” on page 5-12
		Sensor not full	Verify sensor is full and empty pipe diagnostic is on
High Process Noise	Hi Process Noise	Slurry flows - mining/pulp stock	Decrease the flow rate below 10 ft/s (3 m/s) Complete the possible solutions listed under “Step 2: Process Noise” on page 6-7
		Chemical additives upstream of the sensor	Move injection point downstream of the sensor, or move the sensor Complete the possible solutions listed under “Step 2: Process Noise” on page 6-7
		Electrode not compatible with the process fluid	Refer to the Rosemount Magnetic Flowmeter Material Selection Guide (00816-0100-3033)
		Air in line	Move the sensor to another location in the process line to ensure that it is full under all conditions
		Electrode coating	Use bulletnose electrodes Downsize sensor to increases flowrate above 3 ft/s (1 m/s) Periodically clean sensor
		Styrofoam or other insulating particles	Complete the possible solutions listed under “Step 2: Process Noise” on page 6-7 Consult factory
		Low conductivity fluids (below 10 microsiemens/cm)	Trim electrode and coil wires - refer to “Installation” on page 2-1

Table 6-3. Rosemount 8732 Advanced Diagnostic Messages (Suite 2 - Option Code D02)

Message	Potential Cause	Corrective Action
8714i Failed	Transmitter Calibration Verification test failed	Verify pass/fail criteria Rerun 8714i Meter Verification under no flow conditions Verify calibration using 8714D Calibration Standard Perform digital trim Replace electronics board
	Sensor Calibration test failed	Verify pass/fail criteria Perform sensor test - see Table 6-5 on page 6-8
	Sensor Coil Circuit test failed	Verify pass/fail criteria Perform sensor test - see Table 6-5 on page 6-8
	Sensor Electrode Circuit test failed	Verify pass/fail criteria Perform sensor test - see Table 6-5 on page 6-8

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TRANSMITTER TROUBLESHOOTING

Table 6-4. Advanced Troubleshooting–Rosemount 8732

Symptom	Potential Cause	Corrective Action
Does not appear to be within rated accuracy	Transmitter, control system, or other receiving device not configured properly	Check all configuration variables for the transmitter, sensor, communicator, and/or control system Check these other transmitter settings: •Sensor calibration number •Units •Line size
	Electrode Coating	Use bulletnose electrodes; Downsize sensor to increase flow rate above 3 ft/s; Periodically clean sensor
	Air in line	Move the sensor to another location in the process line to ensure that it is full under all conditions.
	Moisture problem	Perform the sensor Tests A, B, C, and D (see Table 6-5 on page 6-8)
	Improper wiring	If electrode shield and signal wires are switched, flow indication will be about half of what is expected. Check wiring diagrams for your application.
	Flow rate is below 1 ft/s (specification issue)	See accuracy specification for specific transmitter and sensor
	Auto zero was not performed when the coil drive frequency was changed from 5 Hz to 37 Hz	Set the coil drive frequency to 37 Hz, verify the sensor is full, verify there is no flow, and perform the auto zero function.
	Sensor failure–Shorted electrode	Perform the sensor Tests C and D (see Table 6-5 on page 6-8)
	Sensor failure–Shorted or open coil	Perform the sensor Tests A and B (see Table 6-5 on page 6-8)
	Transmitter failure	Verify transmitter operation with an 8714 Calibration Standard or replace the electronic board
Noisy Process	Chemical additives upstream of magnetic flowmeter	Complete the Noisy Process Basic procedure. Move injection point downstream of magnetic flowmeter, or move magnetic flowmeter.
	Sludge flows–Mining/Coal/ Sand/Slurries (other slurries with hard particles)	Decrease flow rate below 10 ft/s
	Styrofoam or other insulating particles in process	Complete the Noisy Process Basic procedure; Consult factory
	Electrode coating	Use replaceable electrodes in Rosemount 8705. Use a smaller sensor to increase flow rate above 3 ft/s. Periodically clean sensor.
	Air in line	Move the sensor to another location in the process line to ensure that it is full under all conditions.
	Low conductivity fluids (below 10 microsiemens/cm)	• Trim electrode and coil wires – see “Conduit Cables” on page 2-6 • Keep flow rate below 3 FPS • Integral mount transmitter • Use 8712-0752-1,3 cable • Use N0 approval sensor
Advanced Troubleshooting continued on next page		

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Table 6-4. Advanced Troubleshooting–Rosemount 8732

Symptom	Potential Cause	Corrective Action
Meter output is unstable	Medium to low conductivity fluids (10–25 microsiemens/cm) combined with cable vibration or 60 Hz interference	Eliminate cable vibration: • Integral mount • Move cable to lower vibration run • Tie down cable mechanically • Trim electrode and coil wires • See “Conduit Cables” on page 2-6 • Route cable line away from other equipment powered by 60 Hz • Use 8712-0752-1,3 cable
	Electrode incompatibility	Check the Technical Data Sheet, Magnetic Flowmeter Material Selection Guide (document number 00816-0100-3033), for chemical compatibility with electrode material.
	Improper grounding	Check ground wiring – see “Mount the Transmitter” on page 2-3 for wiring and grounding procedures
	High local magnetic or electric fields	Move magnetic flowmeter (20–25 ft away is usually acceptable)
	Control loop improperly tuned	Check control loop tuning
	Sticky valve (look for periodic oscillation of meter output)	Service valve
	Sensor failure	Perform the sensor Tests A, B, C, and D (See Table 6-5 on page 6-8)
Reading does not appear to be within rated accuracy	Transmitter, control system, or other receiving device not configured properly	Check all configuration variables for the transmitter, sensor, communicator, and/or control system Check these other transmitter settings: Sensor calibration number Units Line size
	Electrode coating	Use bulletnose electrodes in the Rosemount 8705 Sensor. Downsize the sensor to increase the flow rate above 3 ft/s. Periodically clean the sensor
	Air in line	Move the sensor to another location in the process line to ensure that it is full under all conditions
	Flow rate is below 1 ft/s (specification issue)	See the accuracy specification for specific transmitter and sensor
	Insufficient upstream/downstream pipe diameter	Move sensor to location where 5 pipe diameters upstream and 2 pipe diameters downstream is possible
	Cables for multiple magmeters run through same conduit	Run only one conduit cable between each sensor and transmitter
	Auto zero was not performed when the coil drive frequency was changed from 5 Hz to 37.5 Hz	Perform the auto zero function with full pipe and no flow
	Sensor failure—shorted electrode	See Table 6-5 on page 6-8
	Sensor failure—shorted or open coil	See Table 6-5 on page 6-8
	Transmitter failure	Replace the electronics board
	Transmitter wired to correct sensor	Check wiring

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QUICK TROUBLESHOOTING

Step 1: Wiring Errors

The most common magmeter problem is wiring between the sensor and the transmitter in remote mount installations. The signal wire and coil drive wire must be twisted shielded cable: 20 AWG twisted shielded cable for the electrodes and 14 AWG twisted shielded cable for the coils. Ensure that the cable shield is connected at both ends of the electrode and coil drive cables. Signal and coil drive wires must have their own cables. The single conduit that houses both the signal and coil drive cables should not contain any other wires. For more information on proper wiring practices, refer to “Transmitter to Sensor Wiring” on page 2-11.

Step 2: Process Noise

In some circumstances, process conditions rather than the magmeter can cause the meter output to be unstable. Possible solutions for addressing a noisy process situation are given below. When the output attains the desired stability, no further steps are required.

Use the Auto Zero function to initialize the transmitter for use with the 37.5 Hz coil drive mode only. Run this function only with the transmitter and sensor installed in the process. The sensor must be filled with process fluid with zero flow rate. Before running the auto zero function, be sure the coil drive mode is set to 37.5 Hz.

Set the loop to manual if necessary and begin the auto zero procedure. The transmitter completes the procedure automatically in about 90 seconds. A symbol appears in the lower right-hand corner of the display to indicate that the procedure is running.

1. Change the coil drive to 37.5 Hz. Complete the Auto Zero function, if possible (see “Coil Drive Frequency” on page 4-13).
2. Turn on Digital Signal Processing (see “Signal Processing” on page 4-25)
3. Increase the damping (see “Damping” on page 3-17).

If the preceding steps fail to resolve the process noise symptoms, consult your Rosemount sales representative about using a high-signal magnetic flowmeter system.

Step 3: Installed Sensor Tests

If a problem with an installed sensor is identified, Table 6-5 can assist in troubleshooting the sensor. Before performing any of the sensor tests, disconnect or turn off power to the transmitter. To interpret the results, the hazardous location certification for the sensor must be known. Applicable codes for the Rosemount 8705 are N0, N5, and KD. Applicable codes for the Rosemount 8707 are N0 and N5. Applicable codes for the Rosemount 8711 are N0, N5, E5, and KD. Always check the operation of test equipment before each test.

If possible, take all readings from inside the sensor junction box. If the sensor junction box is inaccessible, take measurements as close as possible. Readings taken at the terminals of remote-mount transmitters that are more than 100 feet away from the sensor may provide incorrect or inconclusive information and should be avoided. A sensor circuit diagram is provided in Figure 6-1 on page 6-9.

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Table 6-5. Sensor Test

Test	Sensor Location	Required Equipment	Measuring at Connections	Expected Value	Potential Cause	Corrective Action
A. Sensor Coil	Installed or Uninstalled	Multimeter	1 and 2 = R	$2\Omega \le R \le 18\Omega$	• Open or Shorted Coil	• Remove and replace sensor
B. Shields to Case	Installed or Uninstalled	Multimeter	17 and ⏚ ⏚ and case ground 17 and case ground	$< 0.2\Omega$	• Moisture in terminal block • Leaky electrode • Process behind liner	• Clean terminal block • Remove sensor
C. Coil Shield to Coil	Installed or Uninstalled	Multimeter	1 and ⏚ 2 and ⏚	$\infty\Omega$ (< 1nS) $\infty\Omega$ (< 1nS)	• Process behind liner • Leaky electrode • Moisture in terminal block	• Remove sensor and dry • Clean terminal block • Confirm with sensor coil test
D. Electrode Shield to Electrode	Installed	LCR (Set to Resistance and 120 Hz)	18 and 17 = R_1 19 and 17 = R_2	R_1 and R_2 should be stable NO: $\lvert R_1 - R_2 \rvert \le 300\Omega$ N5, E5, CD, ED: $\lvert R_1 - R_2 \rvert \le 1500\Omega$	• Unstable R_1 or R_2 values confirm coated electrode • Shorted electrode • Electrode not in contact with process • Empty Pipe • Low conductivity • Leaky electrode	• Remove coating from sensor wall • Use bulletnose electrodes • Repeat measurement • Pull sensor, complete test in Table 6-6 and Table 6-7 on page 6-10 out of line.

To test the sensor, a multimeter capable of measuring conductance in nanosiemens is preferred. Nanosiemens is the reciprocal of resistance.

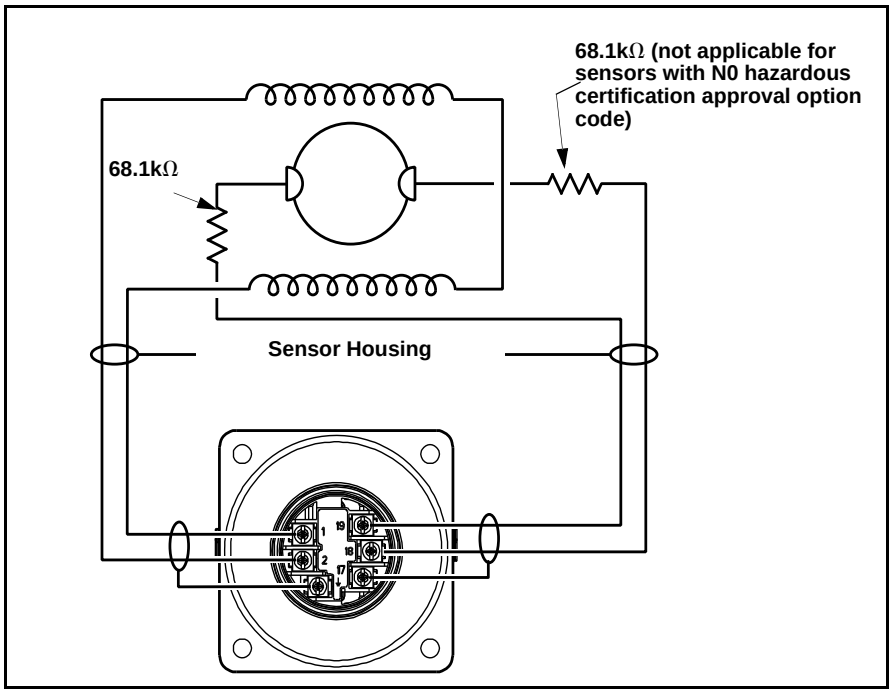
$$1\text{nanosiemens} = \frac{1}{1\text{gigaohm}}$$

or

$$1\text{nanosiemens} = \frac{1}{1 \times 10^{9}\text{ohm}}$$

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Figure 6-1. Sensor Circuit Diagram



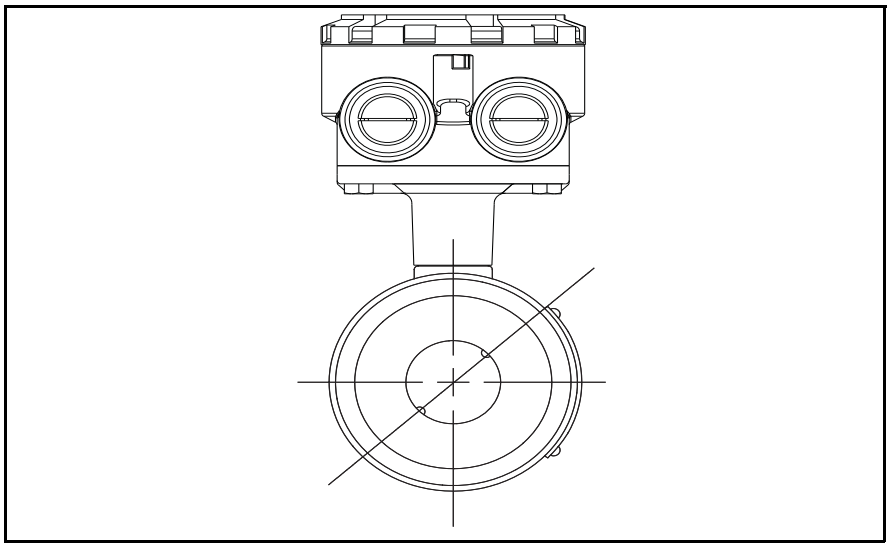
Step 4: Uninstalled Sensor Tests

An uninstalled sensor can also be used for sensor troubleshooting. To interpret the results, the hazardous location certification for the sensor must be known. Applicable codes for the Rosemount 8705 are N0, N5, and KD. Applicable codes for the Rosemount 8707 are N0 and N5. Applicable codes for the Rosemount 8711 are N0, N5, E5, and KD.

A sensor circuit diagram is provided in Figure 6-1. Take measurements from the terminal block and on the electrode head inside the sensor. The measurement electrodes, 18 and 19, are on opposite sides in the inside diameter. If applicable, the third grounding electrode is in between the other two electrodes. On Rosemount 8711 sensors, electrode 18 is near the sensor junction box and electrode 19 is near the bottom of the sensor (Figure 6-2). The different sensor models will have slightly different resistance readings. Flanged sensor resistance readings are in Table 6-6 while wafer sensor resistance readings are in Table 6-7.

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Figure 6-2. 45° Electrode Plane



To insure accuracy of resistance readings, zero out multimeter by shorting and touching the leads together.

Table 6-6. Uninstalled Rosemount 8705 / 8707 Flanged Sensor Tests

Measuring at Connections	Hazardous Location Certifications	
	N0	N5, KD
18 and Electrode(1)	≤ 275Ω	61kΩ ≤ R ≤ 75kΩ
19 and Electrode(1)	≤ 275Ω	61kΩ ≤ R ≤ 75kΩ
17 and Grounding Electrode	≤ 0.3Ω	≤ 0.3Ω
17 and Ground Symbol	≤ 0.3Ω	≤ 0.3Ω
17 and 18	Open	Open
17 and 19	Open	Open
17 and 1	Open	Open

(1) It is difficult to tell from visual inspection alone which electrode is wired to which number terminal in the terminal block. Measure both electrodes. One electrode should result in an open reading, while the other electrode should be less than 275Ω.

Table 6-7. Uninstalled Rosemount 8711 Wafer Sensor Tests

Measuring at Connections	Hazardous Location Certification	
	N0	N5, E5, CD
18 and Electrode(1)	≤ 0.3Ω	61kΩ ≤ R ≤ 75kΩ
19 and Electrode(2)	≤ 275Ω	61kΩ ≤ R ≤ 75kΩ
17 and Grounding Electrode	≤ 0.3Ω	≤ 0.3Ω
17 and Grounding Symbol	≤ 0.3Ω	≤ 0.3Ω
17 and 18	Open	Open
17 and 19	Open	Open
17 and 1	Open	Open

(1) Measure the electrode closest to the junction box
(2) Measure the electrode farthest away from the junction box.

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Appendix A Reference Data

Functional Specifications . . . . . page A-1
E-Series Advanced Diagnostics Capabilities . . . . . page A-4
Output Signals . . . . . page A-4
Profibus PA fieldbus Digital Output Specifications . . . . . page A-4
Performance Specifications . . . . . page A-6
Physical Specifications . . . . . page A-8
Ordering Information . . . . . page A-9

FUNCTIONAL SPECIFICATIONS

Sensor Compatibility

Compatible with Rosemount 8705, 8711, 8721, and 570TM sensors.
Compatible with Rosemount 8707 sensor with D2 Dual calibration option.
Compatible with AC and DC powered sensors of other manufacturers.

Sensor Coil Resistance

350 Ω maximum

Transmitter Coil Drive Current

500 mA

Flow Rate Range

Capable of processing signals from fluids that are traveling between 0.04 and 39 ft./s (0.01 to 12 m/s) for both forward and reverse flow in all sensor sizes. Full scale continuously adjustable between –39 and 39 ft./s (–12 to 12 m/s).

Conductivity Limits

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

Power Supply

90 -250 V AC, 50–60 Hz or 12-42 V DC

AC Power Supply Requirements

Units powered by 90-250 V AC have the following power requirements.

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Figure A-1. AC Current Requirements

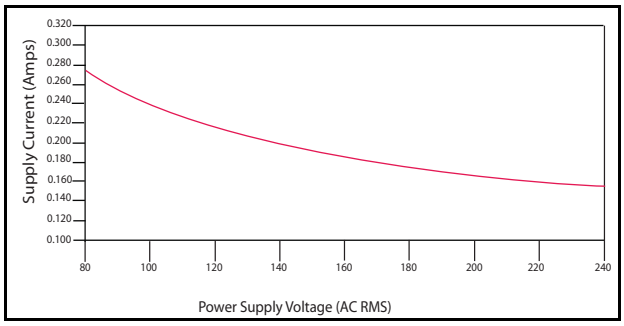
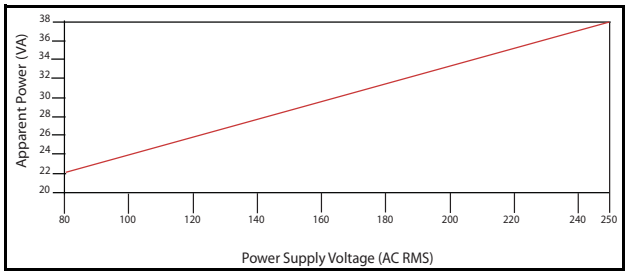


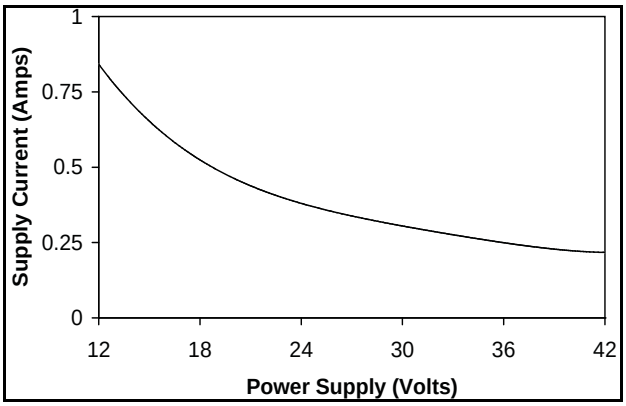
Figure A-2. Apparent Power



DC Supply Current Requirements

Units powered by 12-42 V DC power supply may draw up to 1 amp of current steady state.

Figure A-3. DC Current Requirements

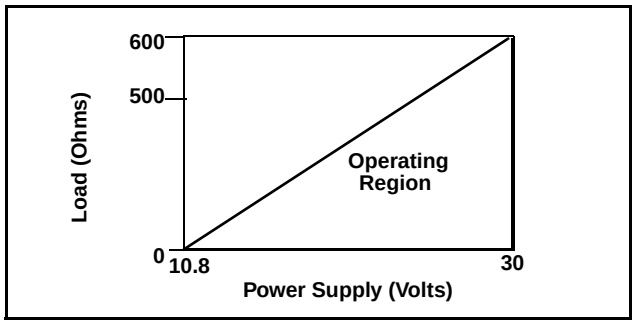


DC Load Limitations (Analog Output)

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

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Figure A-4. 8732E DC Load Limitations



R_{max} = 31.25 (V_{ps} – 10.8)
V_{ps} = Power Supply Voltage (Volts)
R_{max} = Maximum Loop Resistance (Ohms)

Power Consumption

10 watts maximum

Switch-on current

AC: Maximum 26 A (< 5 ms) at 250 V AC

DC: Maximum 30 A (< 5 ms) at 42 V DC

Ambient Temperature Limits

Operating

–58 to 165 °F (–50 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)

–22 to 176 °F (–30 to 80 °C) with local operator interface

Humidity Limits

0–100% RH to 150 °F (65 °C)

Enclosure Rating

Type 4X, IEC 60529, IP66 (transmitter)

Transient Protection Rating

The 8732E has built in transient protection that conforms to EN 61000-4-4 for burst currents and 61000-4-5 for surge currents. For CE testing the transmitter is compliant with IEC 611185-2.2000 Class 3 which is up to 2 kV and up to 2 kA protection.

Turn-on Time

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

Start-up Time

50 ms from zero flow

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Low Flow Cutoff

Adjustable between 0.01 and 38.37 ft./s (0.003 and 11.7 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 44 ft./s (13 m/s). The signal output will remain constant above these values. Out of range message displayed on LOI and the Field Communicator.

Damping

Adjustable between 0 and 256 seconds

E-SERIES ADVANCED DIAGNOSTICS CAPABILITIES

Basic

Self test
Transmitter faults
Analog output test
Pulse output test
Tunable empty pipe
Reverse flow
Coil circuit fault
Electronics temperature

Process Diagnostics (D01)

Ground/wiring fault
High process noise

SMART Meter Verification (D02)

Smart Meter Verification

OUTPUT SIGNALS

8732 LOI Lockout

All optical switches on the display can be locked locally from the display layout configuration screen by holding the upper right optical switch for 10 seconds. The display can be reactivated holding the same switch for 10 seconds.

PROFIBUS PA FIELDBUS DIGITAL OUTPUT SPECIFICATIONS

Output Signal

Manchester-encoded digital signal that conforms to IEC 1158-2 and ISA 50.02.

Profile Version

3.01

Identification Number

Generic: 0x9740

Manufacturer Specific: 0x0C15

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Profibus PA Function Blocks

Physical Block - Slot 0

The Physical Block contains physical transmitter information, including available memory, manufacturer identification, device type, software tag, and unique identification.

Transducer Block - Slot 5

The transducer block calculates flow from the measured induced voltage and provides the flowrate input to the AI Block. The calculation includes information related to the calibration number, line size, and diagnostics.

Analog Input Block - Slot 1

The AI function block processes the measurement and makes it available to the Host system. The AI function block also allows filtering, alarming, and engineering unit changes. The 8732E Transmitter with Profibus PA digital fieldbus comes standard with one AI function block which is dedicated to flow.

Totalizer Block (3 blocks) - Slots, 2, 3, 4

The Totalizer function block allows for totalization of the flow signal. The 8732E Transmitter with Profibus PA digital fieldbus comes with 3 independent totalizer blocks. Each totalized value can be displayed on the Local Operator Interface of the device in addition to the Primary Variable.

Sensor Compensation

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

8732E transmitters and other manufacturers' sensors 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 a known flow rate. This procedure can be found in the Operations Manual:

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PERFORMANCE SPECIFICATIONS

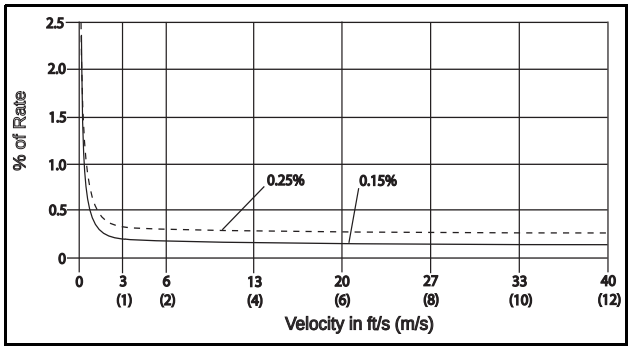
(System specifications are given using the frequency output and with the unit at reference conditions.)

Accuracy

Includes the combined effects of linearity, hysteresis, repeatability, and calibration uncertainty.

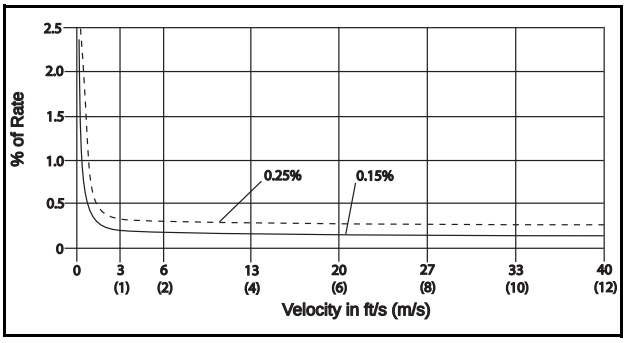
Rosemount E Series with 8705/8707 Sensor:
Standard system accuracy is ±0.25% of rate ±1.0 mm/sec from 0.04 to 6 ft./s (0.01 to 2 m/s); above 6 ft./s (2 m/s), the system has an accuracy of ±0.25% of rate ±1.5 mm/sec.

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.(1)



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.

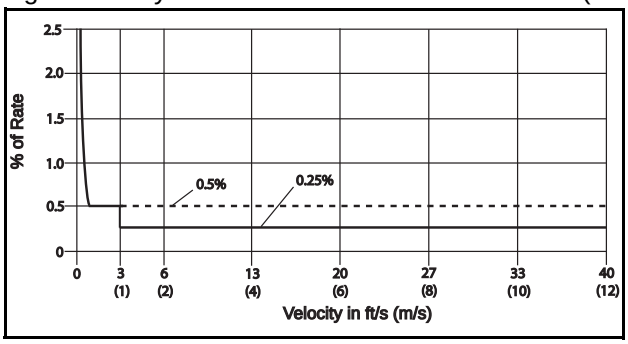


Rosemount E-Series with 8721 Sensor:
Standard system accuracy is ±0.5% of rate from 1 to 39 ft./s (0.3 to 12 m/s); between 0.04 and 1.0 ft./s (0.01 and 0.3 m/s), the system has an accuracy of ±0.005 ft./s (0.0015 m/s).

(1) For Sensor sizes greater than 12 in. (300 mm) the high accuracy is ±0.25% of rate from 3 to 39 ft./sec (1 to 12 m/sec).

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Optional high accuracy is ±0.25% of rate from 3 to 39 ft./s (1 to 12 m/s).



Rosemount E-Series with Legacy 8705/8707 Sensors:
Standard system accuracy is ±0.5% of rate from 1 to 39 ft./s (0.3 to 12 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 (0.0015 m/s).

Rosemount E-Series with Legacy 8711 Sensors:
Standard system accuracy is ±0.5% of rate from 3 to 39 ft./s (1 to 12 m/s); between 0.04 and 3.0 ft./s (0.01 and 1 m/s), the system has an accuracy of ±0.015 ft./s (0.005 m/s).

Rosemount E-Series with Other Manufacturers' Sensors:
When calibrated in the Rosemount Flow Facility, system accuracies as good as 0.5% of rate can be attained.

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

Vibration Effect

IEC 60770-1

Repeatability

±0.1% of reading

Response Time

50 ms maximum response time 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

EN61326-1: 2006 (Industrial) electromagnetic compatibility (EMC) for process and laboratory apparatus.

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PHYSICAL SPECIFICATIONS

Materials of Construction

Housing

Low copper aluminum, Type 4X and IEC 60529 IP66

Paint

Polyurethane

Cover Gasket

Rubber

Electrical Connections

Two $^{1}/_{2}$–14 NPT connections provided on the transmitter housing (optional third connection available). 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 sensor.

Transmitter Weight

Approximately 7 pounds (3.2 kg). Add 1 pound (0.5 kg) for Option Code M4.

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ORDERING INFORMATION

Table A-1. Rosemount 8732E/ Profibus PA Ordering Information

Model	Product Description	8732E	
8732E	Magnetic Flowmeter Transmitter	•	
Transmitter Style			
Standard			**Standard**
S	Standard	•	★
Transmitter Mount			
Standard			**Standard**
T	Integral Mount	•	★
R	Remote Mount for 2 in. pipe or panel (includes CS mounting bolts and 304 SST bracket)	•	★
Transmitter Power Supply			
Standard			**Standard**
1	AC Power Supply (90 to 250 V AC, 50-60Hz)	•	★
2	DC Power Supply (12 to 42 V DC)	•	★
Outputs			
Standard			**Standard**
P	Profibus PA fieldbus digital electronics with FISCO Intrinsically Safe Output	•	★
		8732E	
Expanded			
U	Profibus PA fieldbus digital electronics (Available with approval code NA only)	•	
Conduit Entry			
8732E - 2 Conduits			
Standard			**Standard**
1	1/2 - 14 NPT	•	★
Expanded			
2	CM20(1)	•	
3	PG 13.5(1)	•	
3 Conduits			
Standard			**Standard**
4	1/2 - 14 NPT	•	★
Expanded			
5	CM20(1)	•	
6	PG 13.5(1)	•	
Safety Approvals(2)			
Standard			**Standard**
NA	CE Marking, no hazardous location approval	•	★
FM & CSA			
Standard			**Standard**
N0	FM Class 1 Div 2 for non-flammable: CSA Class 1 Div 2	•	★
N5	FM Class 1 Div 2 for flammable fluids	•	★
E5	FM Class 1 Div 1, explosion-proof	•	★
ATEX			
Standard			**Standard**
ED	ATEX flameproof Ex de IIB T6, and ATEX Dust Approval; Ex de [ia] IIB T6 with IS Output	•	★
ND	ATEX Dust Ex tD A20 IP66 T100 °C	•	★
Expanded			
E1	ATEX flameproof Ex de IIC T6, and ATEX Dust Approval; Ex de [ia] IIC T6 with IS Output	•	
N1	ATEX Type Ex nA nL IIC T4 or Ex nA nL [ia] IIC T4	•	

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Table A-1. Rosemount 8732E/ Profibus PA Ordering Information

IECEx			
Standard			**Standard**
EF	IECEx flameproof Ex de IIB T6 Gb and IECEx Dust Approval; Ex de [ia IIC Ga] IIB T6 Gb with IS Output	•	★
NF	Ex tD A20 IP66 T100 °C or Ex tD A20 IP66 T100 °C [Ex ia Ga] IIC	•	★
Expanded			
E7	IECEx flameproof Ex de IIC T6 Gb and IECEx Dust Approval; Exde [ia Ga] IIC T6 Gb with IS Output	•	
N7	Ex nA nL IIC T4 and IECEx Dust; Ex nA nL [ia] IIC T4 with FISCO/FNICO outputs	•	
NEPSI and CMC (China)			
Standard			**Standard**
EP	NEPSI flameproof Ex de IIB T6; Ex de [ia] IIB T6 with IS output	•	★
Expanded			
E3	NEPSI flameproof Ex de IIC T6; Ex de [ia] IIC T6 with IS output	•	
InMetro (Brazil)			
Standard			**Standard**
EB	InMetro flameproof BR-Ex de IIB T6; BR- Ex de [ia] IIB T6 with IS outputs	•	★
Expanded			
E2	InMetro flameproof BR-Ex de IIC T6; BR- Ex de [ia] IIC T6 with IS outputs	•	
GOST (Russia)		**8732E**	
Standard			**Standard**
EM	GOST flameproof EX de IIB T6; Ex de [ia] IIB T6 with IS outputs	•	★
Expanded			
E8	GOST flameproof Ex de IIC T6; Ex de [ia] IIC T6 with IS outputs	•	
KOSHA (Korea)			
Standard			**Standard**
EK	KOSHA flameproof EX de IIB T6; Ex de [ia] IIB T6 with IS outputs	•	★
Expanded			
E9	KOSHA flameproof Ex de IIC T6; Ex de [ia] IIC T6 with IS outputs	•	
Options (Include with selected model number)			
PlantWeb Product/Process Diagnostics			
Standard			**Standard**
D01	Magmeter digital fieldbus Diagnostic Suite 1: High Process Noise and Ground/Wiring Fault Detection	•	★
D02	Magmeter digital fieldbus Diagnostic Suite 2: SMART Meter Verification	•	★
Other Options			
Standard			**Standard**
M4	Local Operator Interface	•	★
Expanded			
C1	Custom Configuration (CDS Required)	•	
D1	High Accuracy Calibration (0.15% of rate for matched sensor and transmitter)(3)	•	
DT	Heavy Duty Tagging	•	
B6	316L Stainless Steel 4-bolt Kit for 2-in. Remote Pipe Mount	•	
GE	M12, 4-Pin, Male Connector (Eurofast)	•	
GM	A Size Mini, 4-Pin, Male Connector (Minifast)	•	
GT	A Size, Spade Terminal Mini, 5-pin, Male Connector (Minifast)	•	
Q4	Inspection certificate; calibration data, ISO10474 3.1B	•	
QIG Language		**8732E**	
Expanded			
YA	Danish	•	
YB	Hungarian	•	
YC	Czech	•	
YD	Dutch	•	
YE	Bulgarian	•	
YF	French	•	

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Table A-1. Rosemount 8732E/ Profibus PA Ordering Information

YG	German	•	
YH	Finnish	•	
YI	Italian	•	
YJ	Japanese	•	
YL	Polish	•	
YM	Mandarin	•	
YN	Norwegian	•	
YP	Portuguese	•	
YS	Spanish	•	
YR	Russian	•	
YW	Swedish	•	
Typical Model Number: 8732E S T 1 A 1 N0 DA1 DA2 M4			

(1) Adapters are used for this conduit entry type
(2) All product, ordered with or without Safety approvals, is compliant with local CE Marking and C-tick requirements unless specifically noted as a special
(3) D1 Option Code must be ordered with sensor and transmitter

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Appendix B Approval Information

Product Certifications . . . . . **page B-1**
Approved Manufacturing Locations . . . . . **page B-1**
European Directive Information . . . . . **page B-1**
Sensor Approval . . . . . **page B-5**

PRODUCT CERTIFICATIONS

Approved Manufacturing Locations

Rosemount Inc. — Eden Prairie, Minnesota, USA

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

Emerson Process Management Flow — Ede, The Netherlands

Asia Flow Technologies Center — Nanjing, China

European Directive Information

The EC declaration of conformity can be found on page B-1. The most recent revision can be found at www.rosemount.com.

Type n protection type in accordance with EN50021

⚠
- The installation of external connections and the plugging of any unused entries must be carried out using appropriate Ex e or Ex n cable glands and blanking plugs, component certified by an approved Certification Body.

CE CE Marking

Complies with EN 61326-1: 2006

For Rosemount 8732E transmitters:

Complies with Essential Health and Safety Requirements:
EN 60079-0: 2006
EN 60079-1: 2007
EN 60079-7: 2007
EN 60079-11: 2007
EN 60079-15: 2005
EN 61241-0: 2004
EN 61241-1: 2006

International Certificates

C-Tick Marking
Rosemount Inc. complies with the following IEC Requirements.

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For Rosemount 8732E transmitters:

IEC 60079-0: 2004
IEC 60079-0: 2007

IEC 60079-1: 2007
IEC 60079-7: 2006

IEC 60079-11: 2006
IEC 60079-15: 2005
IEC 61241-0: 2004
IEC 61241-1: 2004

NOTE
For intrinsically safe (IS) outputs on the 8732E output option code B, F, or P must be selected.
IS outputs for Class I, Division 1, Groups A, B, C, D. Temp Code – T4 at 60°C
IS outputs for Ex de [ia] IIB or IIC T6

NOTE
For the 8732E transmitters with a local operator interface (LOI), the lower ambient temperature limit is -20 °C.

North American Certifications

FM Approvals

N0 Non-incendive for Class I, Division 2, Groups A, B, C, and D non-flammable fluids (T4 at 60 °C: -50 °C ≤ Ta ≤ 60 °C), and Dust-ignition proof Class 2/III, Division 1, Groups E, F, and G (T5 at 60 °C) Hazardous locations; Enclosure Type 4X

N5 Non-incendive for Class I, Division 2, Groups A, B, C, and D flammable fluids (T4 at 60 °C: -50 °C ≤ Ta ≤ 60 °C), and Dust-ignition proof Class 2/III, Division 1, Groups E, F, and G (T5 at 60 °C) Hazardous locations; Enclosure Type 4X
Requires sensors with N5 Approval

E5 Explosion-proof for Class I, Division 1, Groups C and D (T6 at 60 °C), and Dust-ignition proof Class 2/III, Division 1, Groups E, F, and G (T5 at 60 °C), Non-incendive for Class I, Division 2, Groups A, B, C, and D flammable fluids (T4 at 60 °C: -50 °C ≤ Ta ≤ 60 °C) Hazardous locations; Enclosure Type 4X

Canadian Standards Association (CSA)

N0 Non-incendive for Class I, Division 2, Groups A, B, C, and D non-flammable fluids (T4 at 60 °C: -50 °C ≤ Ta ≤ 60 °C), and Dust-ignition proof Class 2/III, Division 1, Groups E, F, and G (T5 at 60 °C) Hazardous locations; Enclosure Type 4X

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European Certifications

E1 ATEX Flameproof

Certificate No.: KEMA 07ATEX0073 X ⟨Ex⟩ II 2G
Ex de IIC or Ex de [ia] IIC T6 (-50°C ≤ Ta ≤ +60 °C)
with LOI (-20°C ≤ Ta ≤ +60 °C)
V_{max} = 250 V AC or 42 V DC
CE 0575

ED ATEX Flameproof

Certificate No.: KEMA 07ATEX0073 X ⟨Ex⟩ II 2G
Ex de IIB or Ex de [ia] IIB T6 (-50°C ≤ Ta ≤ +60 °C)
with LOI (-20°C ≤ Ta ≤ +60 °C)
V_{max} = 250 V AC or 42 V DC
CE 0575

ND(1) ATEX Dust Certificate No.: KEMA 06ATEX0006
⟨Ex⟩ II 1D
Ex tD A20 IP66 T 100 °C
with I.S.: [Ex ia] IIC ⟨Ex⟩ II (1)G
Amb. Temp. Limits: (-20 °C ≤ Ta ≤ + 65 °C)
V_{max} = 250 V AC or 42 V DC
IP 66
CE 0575

(1) Max surface temperature is 40 °C above the ambient temperature conditions. Tmax = 100 °C

Special conditions for safe use (KEMA 07ATEX0073 X):

Contact Rosemount Inc. for information on the dimensions of the flameproof joints. The property class of the security screws which attach the flowtube or junction box to the transmitter is SST A2-70, or SST A4-70.

Installation Instructions:

The cable and conduit entry devices and blanking elements shall be of a certified flameproof or increased safety type, suitable for the conditions of use and correctly installed. With the use of conduit, a certified stopping box shall be provided immediately to the entrance of the enclosure.

N1 ATEX Type n Certificate No: BASEEFA 07ATEX0203X

⟨Ex⟩ II 3(1)G

Ex nA nL [ia] IIC T4 (-50 °C ≤ Ta ≤ 60 °C)

with LOI: (-20 °C ≤ Ta ≤ 60 °C)
V_{max} = 42 V DC
CE 0575

Special conditions for safe use (x)

The apparatus is not capable of withstanding the 500V insulation test required by Clause 6.8.1 of EN 60079-15: 2005. This must be taken into account when installing the apparatus.

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International Certifications

IECEx

E7 IECEx Flameproof Certificate No.: KEM 07.0038X
Ex de IIC T6 Gb or Ex de [ia Ga] IIC T6 Gb (-50 °C ≤ Ta ≤ +60 °C)
with LOI (-20°C ≤ Ta ≤ +60 °C)
V_{max} = 250 V AC or 42 V DC

EF IECEx Flameproof Certificate No.: KEM 07.0038X
Ex de IIB T6 Gb or Ex de [ia IIC Ga] IIB T6 Gb (-50 °C ≤ Ta ≤ +60 °C)
with LOI (-20°C ≤ Ta ≤ +60 °C)
V_{max} = 250 V AC or 42 V DC

NF IECEx Dust Certificate No.: KEM 07.0038X
Ex tD A20 IP66 T 100 °C

with I.S.: Ex tD A20 IP66 T 100 °C [Ex ia Ga] IIC

T6 (-50 °C ≤ Ta ≤ +60 °C)
with LOI (-20°C ≤ Ta ≤ +60 °C)
V_{max} = 250 V AC or 42 V DC

Special conditions for safe use (KEM 07.0038X):

Contact Rosemount Inc. for information on the dimensions of the flameproof joints. The property class of the security screws which attach the flowtube or junction box to the transmitter is SST A2-70, or SST A4-70.

Installation Instructions:

The cable and conduit entry devices and blanking elements shall be of a certified flameproof or increased safety type, suitable for the conditions of use and correctly installed. With the use of conduit, a certified stopping box shall be provided immediately to the entrance of the enclosure.

N7 IECEx Type n Certificate No: IECEx BAS 07.0062X

Ex nA nL [ia] IIC T4 (-50 °C ≤ Ta ≤ +60 °C)
with LOI: (-20 °C ≤ Ta ≤ +60 °C)

V_{max} = 42 V DC

Special conditions for safe use (x)

The apparatus is not capable of withstanding the 500V insulation test required by Clause 6.8.1 of IEC 60079-15: 2005. This must be taken into account when installing the apparatus.

NEPSI - China

E3 NEPSI Flameproof Certificate No.: GYJ071438X
Ex de IIC or Ex de [ia] IIC T6 (-50 °C ≤ Ta ≤ +60 °C)
with LOI (-20°C ≤ Ta ≤ +60 °C)
V_{max} = 250 V AC or 42 V DC

EP NEPSI Flameproof Certificate No.: GYJ071438X
Ex de IIB or Ex de [ia] IIB T6 (-50 °C ≤ Ta ≤ +60 °C)
with LOI (-20°C ≤ Ta ≤ +60 °C)
V_{max} = 250 V AC or 42 V DC

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InMetro - Brazil

E2 InMetro Flameproof Certificate No.: NCC 5030/08
BR-Ex de IIC or BR-Ex de [ia] IIC T6 (-50 °C ≤ Ta ≤ +60 °C)
with LOI (-20°C ≤ Ta ≤ +60 °C)
V_{max} = 250 V AC or 42 V DC

EB InMetro Flameproof Certificate No.: NCC 5030/08
BR-Ex de IIB or BR-Ex de [ia] IIB T6 (-50 °C ≤ Ta ≤ +60 °C)
with LOI (-20°C ≤ Ta ≤ +60 °C)
V_{max} = 250 V AC or 42 V DC

KOSHA - Korea

E9 KOSHA Flameproof Certificate No.: 2008-2094-Q1X
Ex de IIC or Ex de [ia] IIC T6 (-50 °C ≤ Ta ≤ +60 °C)
with LOI (-20°C ≤ Ta ≤ +60 °C)
V_{max} = 250 V AC or 42 V DC

EK KOSHA Flameproof Certificate No.: 2008-2094-Q1X
Ex de IIB or Ex de [ia] IIB T6 (-50 °C ≤ Ta ≤ +60 °C)
with LOI (-20°C ≤ Ta ≤ +60 °C)
V_{max} = 250 V AC or 42 V DC

SENSOR APPROVAL

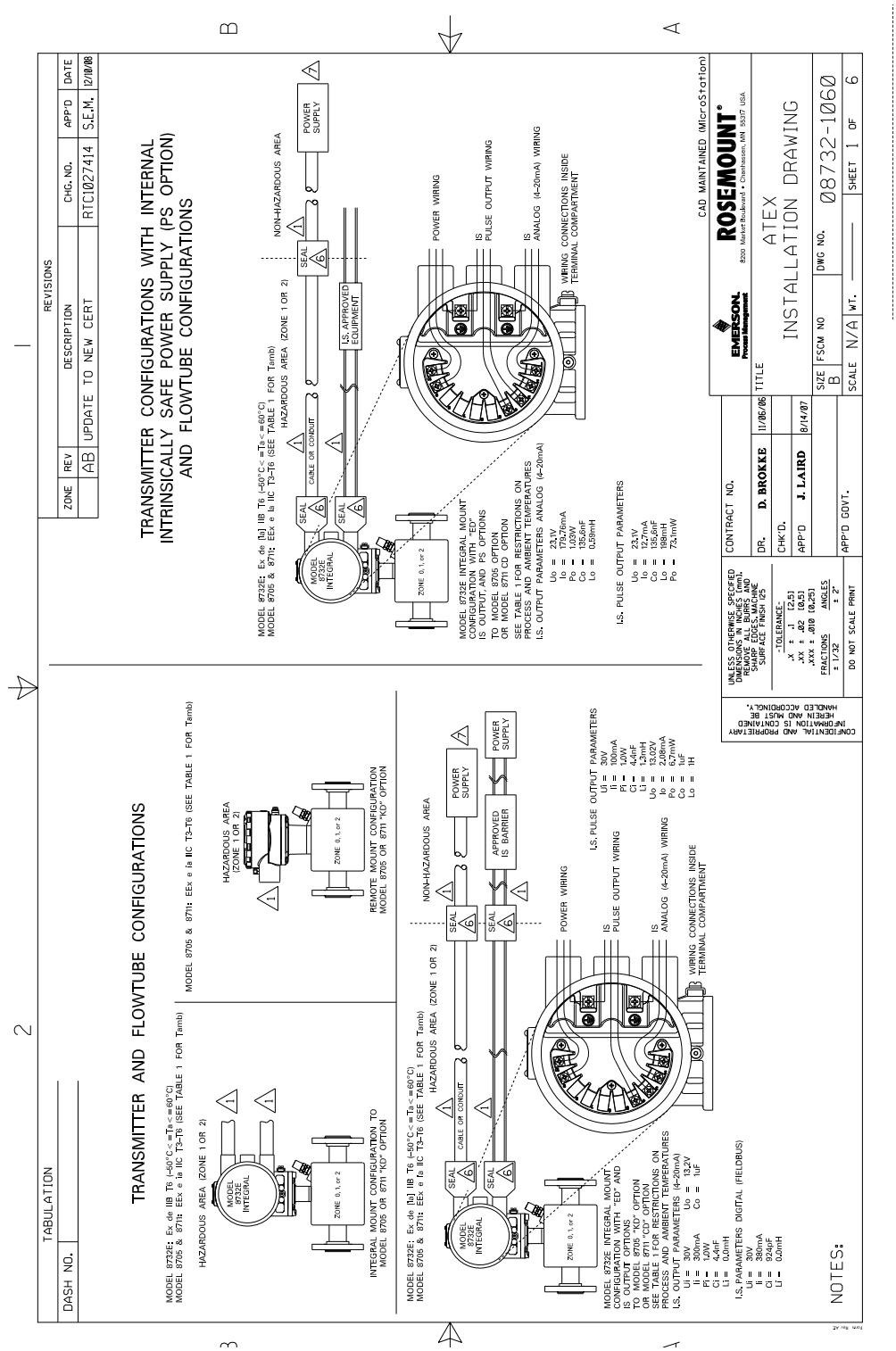
Table B-1. Sensor Option Codes(1)

Approval Codes	Rosemount 8705 Sensor		Rosemount 8707 Sensor		Rosemount 8711 Sensor		Rosemount 8721 Sensors
	For Non-flammable Fluids	For Flammable Fluids	For Non-flammable Fluids	For Flammable Fluids	For Non-flammable Fluids	For Flammable Fluids	For Non-flammable Fluids
NA	•						•
N0	•		•		•		
ND	•	•	•	•	•	•	•
N1	•	•			•	•	
N5	•	•	•	•	•	•	
N7	•	•			•	•	
ND	•	•			•	•	
NF	•	•			•	•	
E1	•	•			•	•	
E2	•	•			•	•	
E3	•	•			•	•	
E5(2)	•	•			•	•	
E8	•	•			•	•	
E9	•	•			•	•	
EB	•	•			•	•	
EK	•	•			•	•	
EM	•	•			•	•	
EP	•	•			•	•	
KD	•	•			•	•	

(1) CE Marking is standard on Rosemount 8705, 8711, and 8721.
(2) Available in line sizes up to 8 in. (200 mm) only.

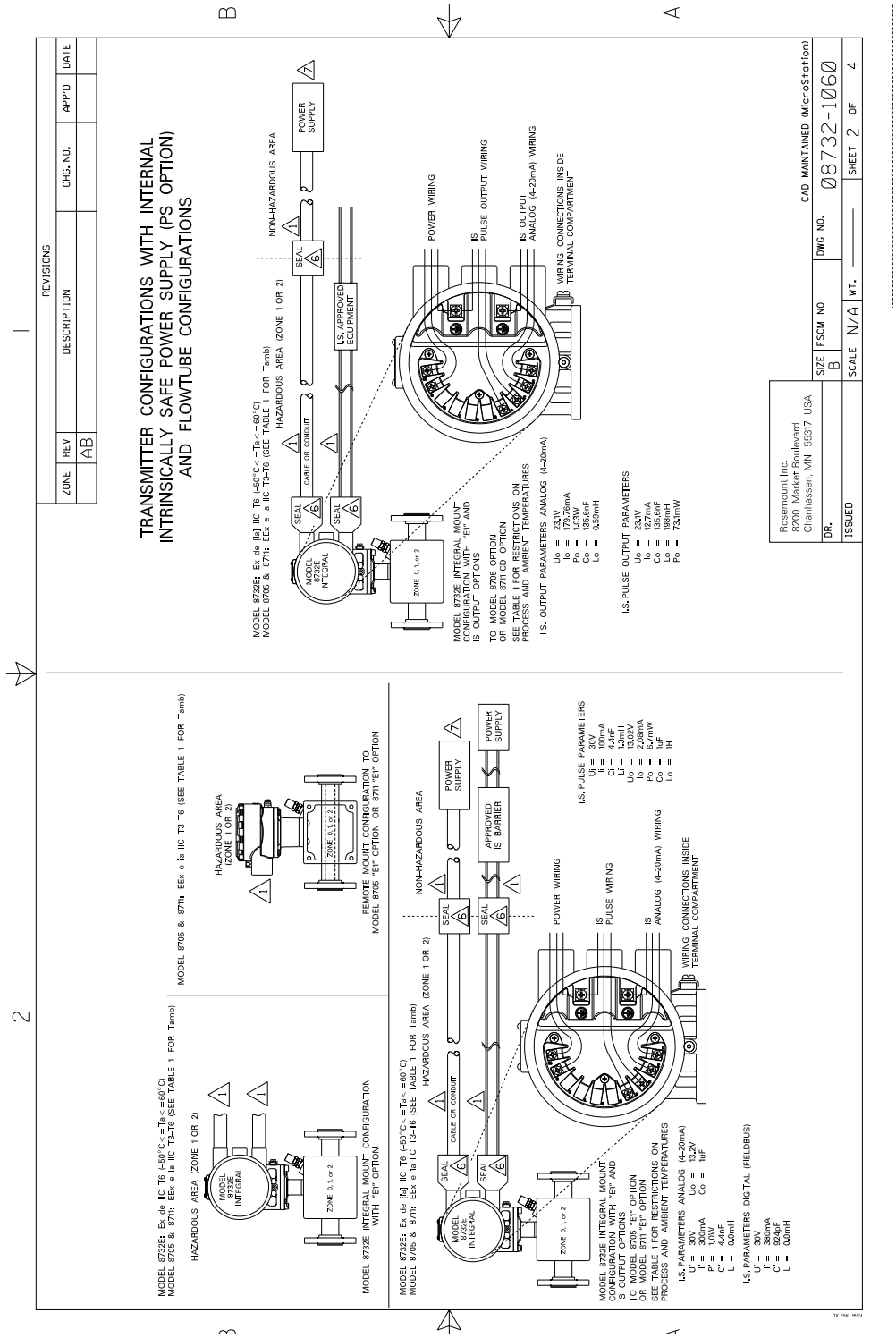
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Figure B-1. ATEX Installation Drawings



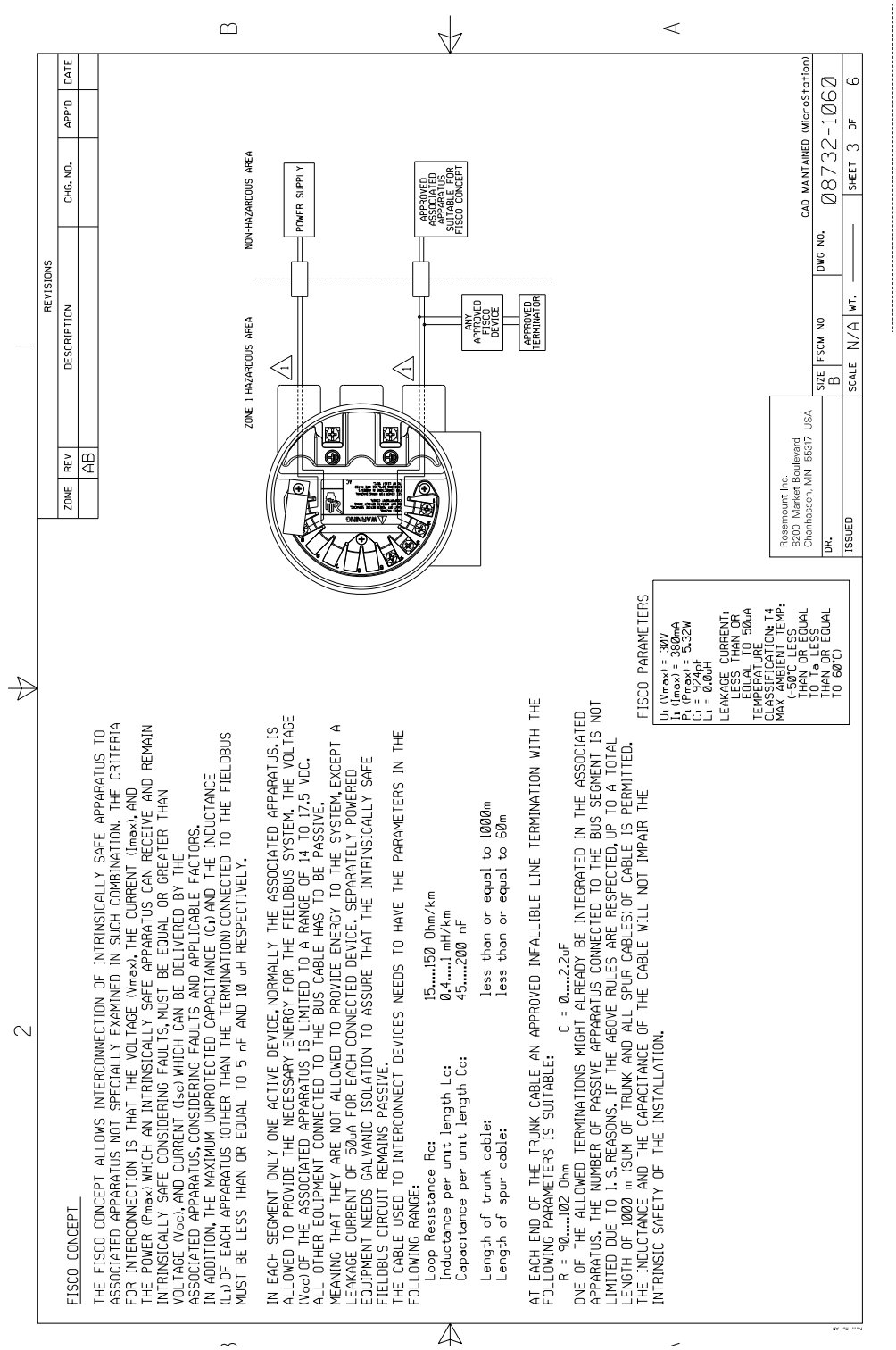
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Figure B-2. ATEX Installation Drawings (Cont.)



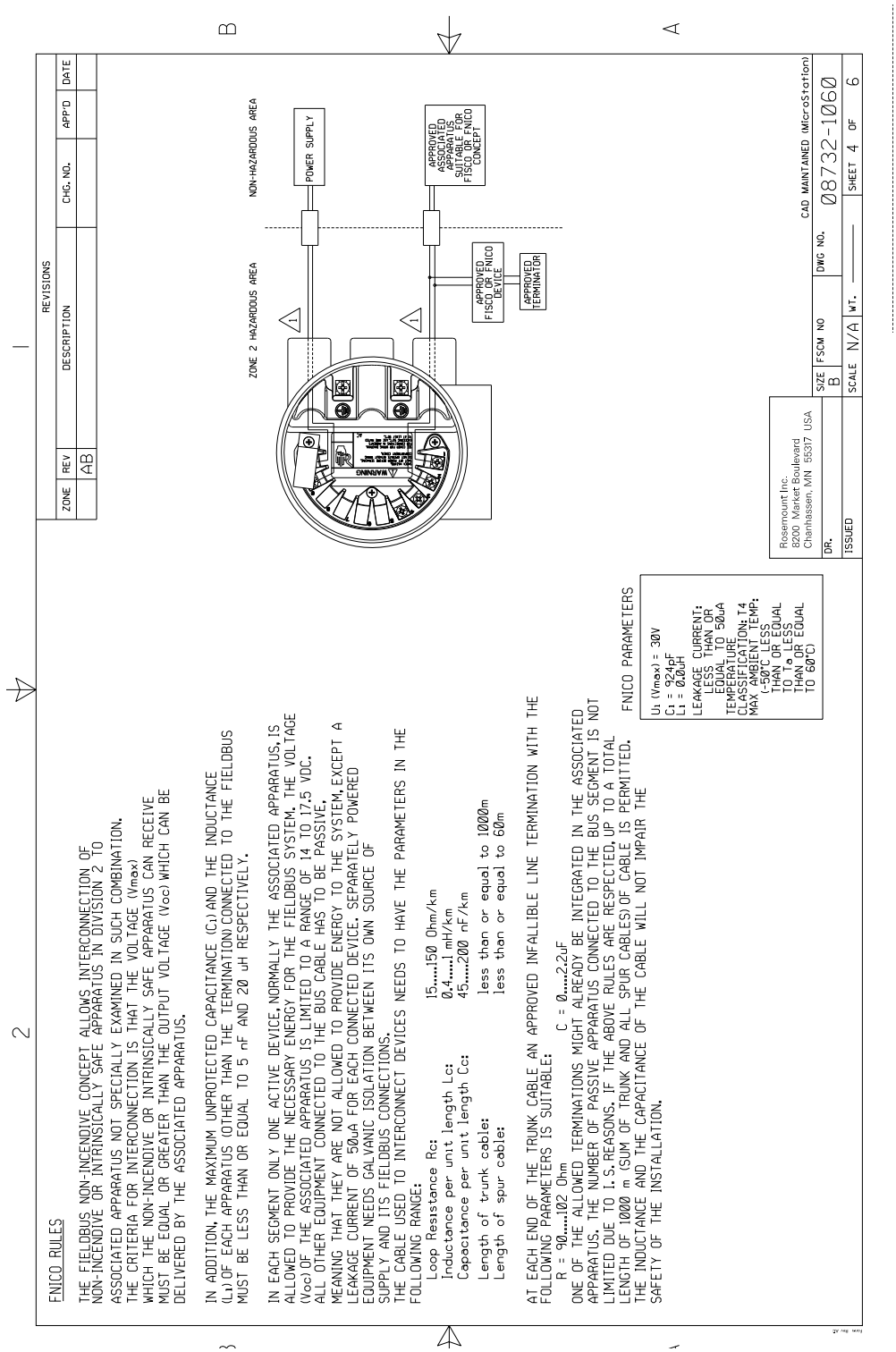
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Figure B-3. ATEX Installation Drawings (Cont.)



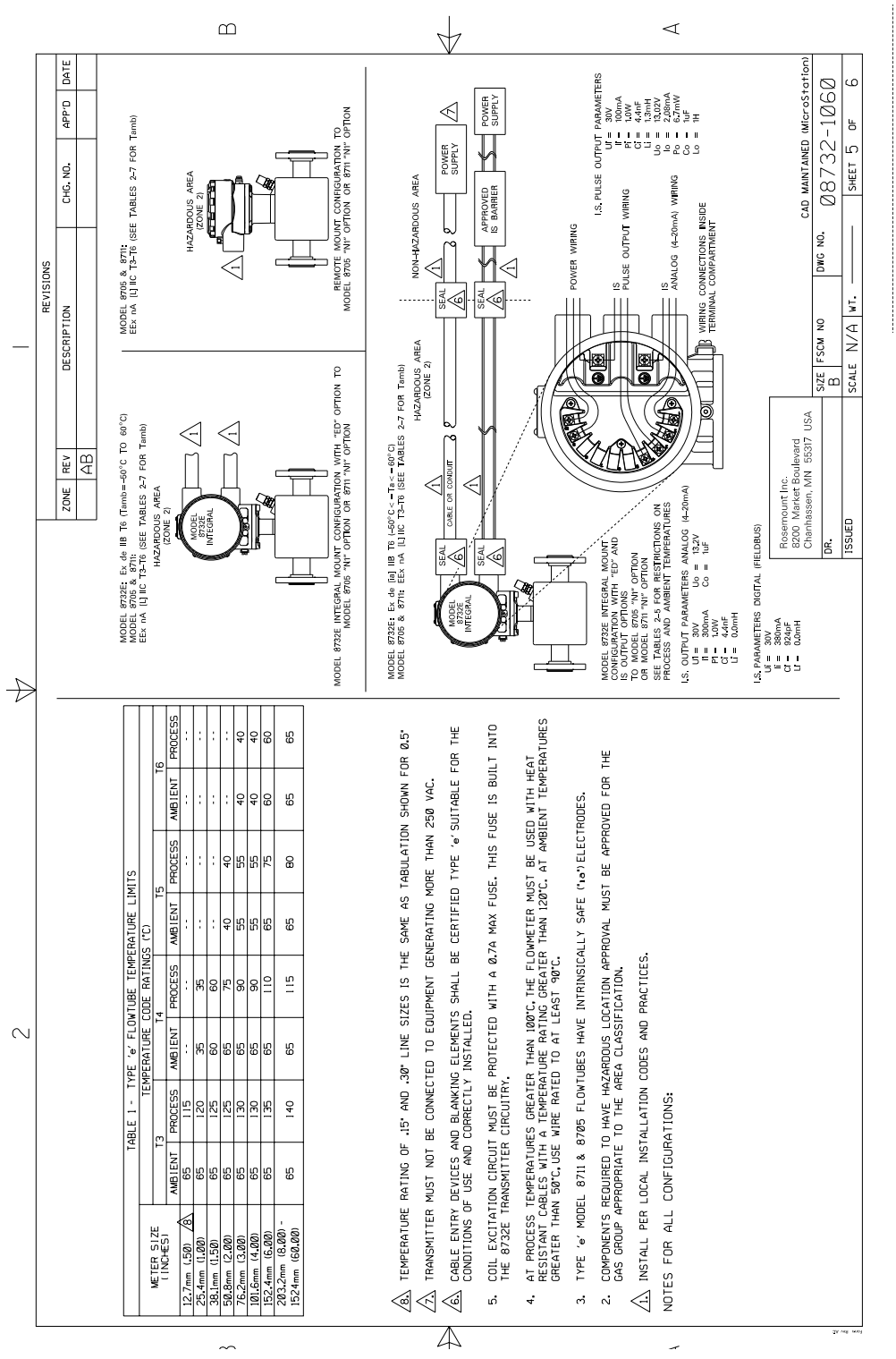
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Figure B-4. ATEX Installation Drawings (Cont.)



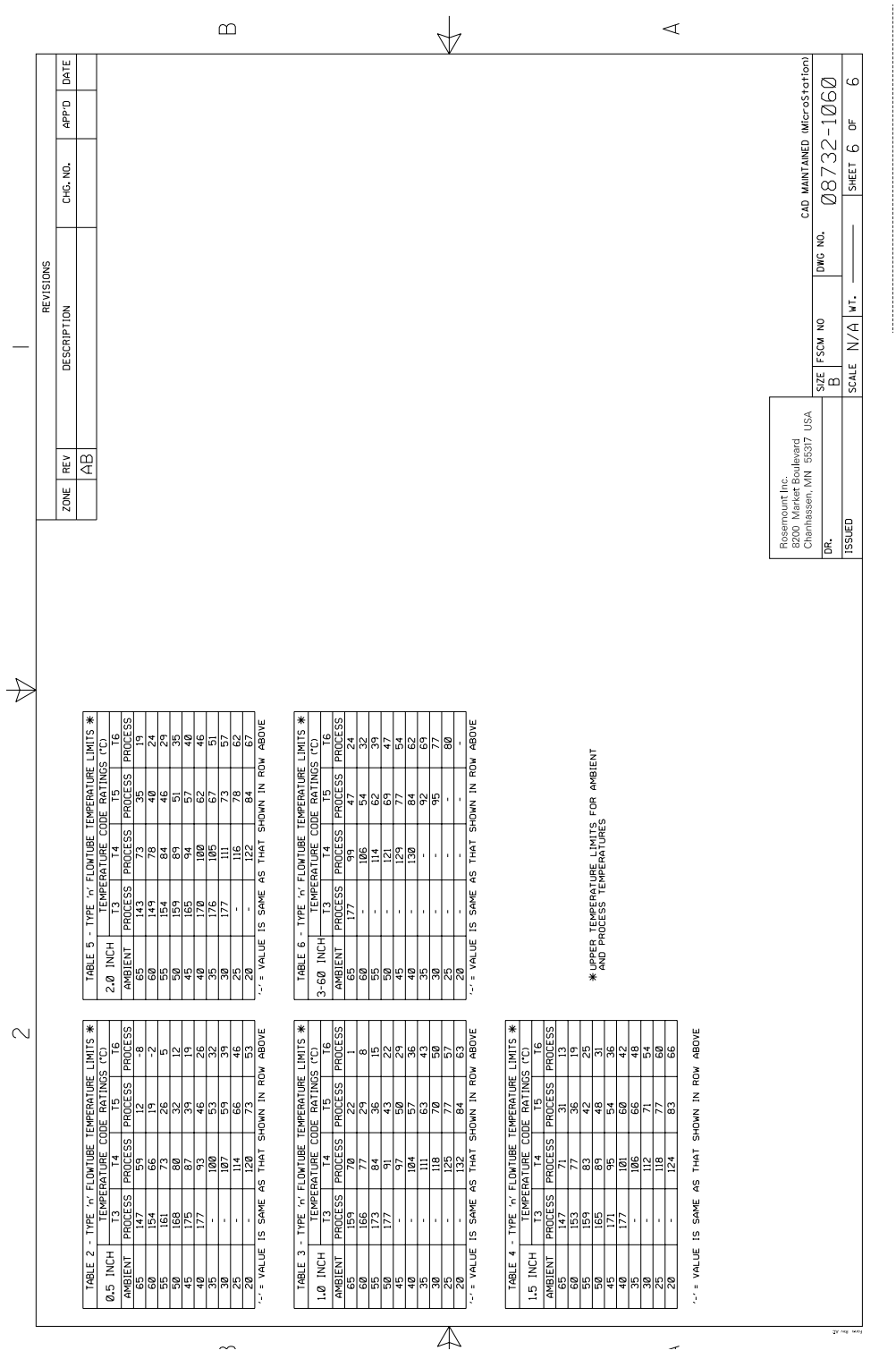
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Figure B-5. ATEX Installation Drawings (Cont.)



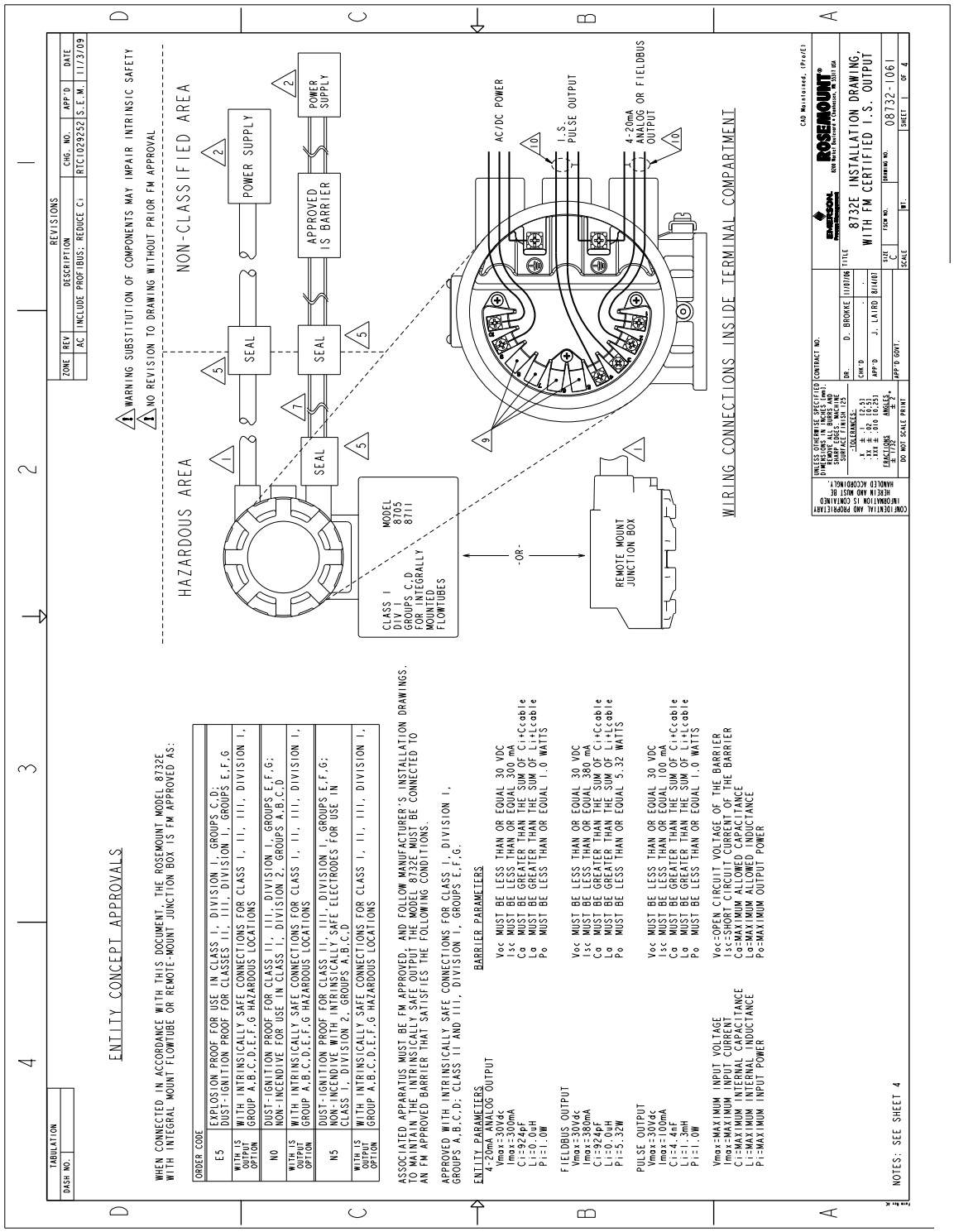
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Figure B-6. ATEX Installation Drawings (Cont.)



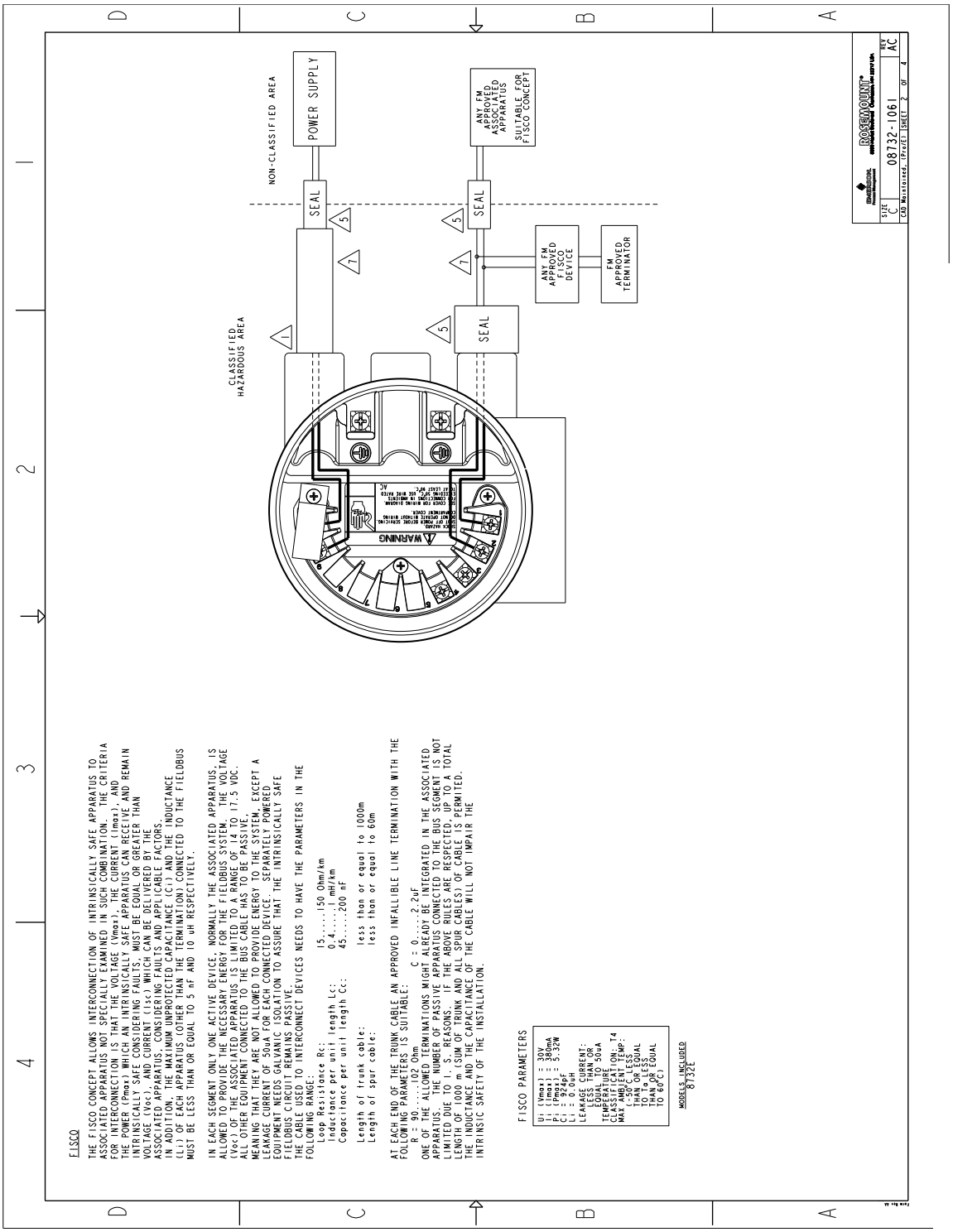
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Figure B-7. Installation Drawings with FM Certified I.S. Output



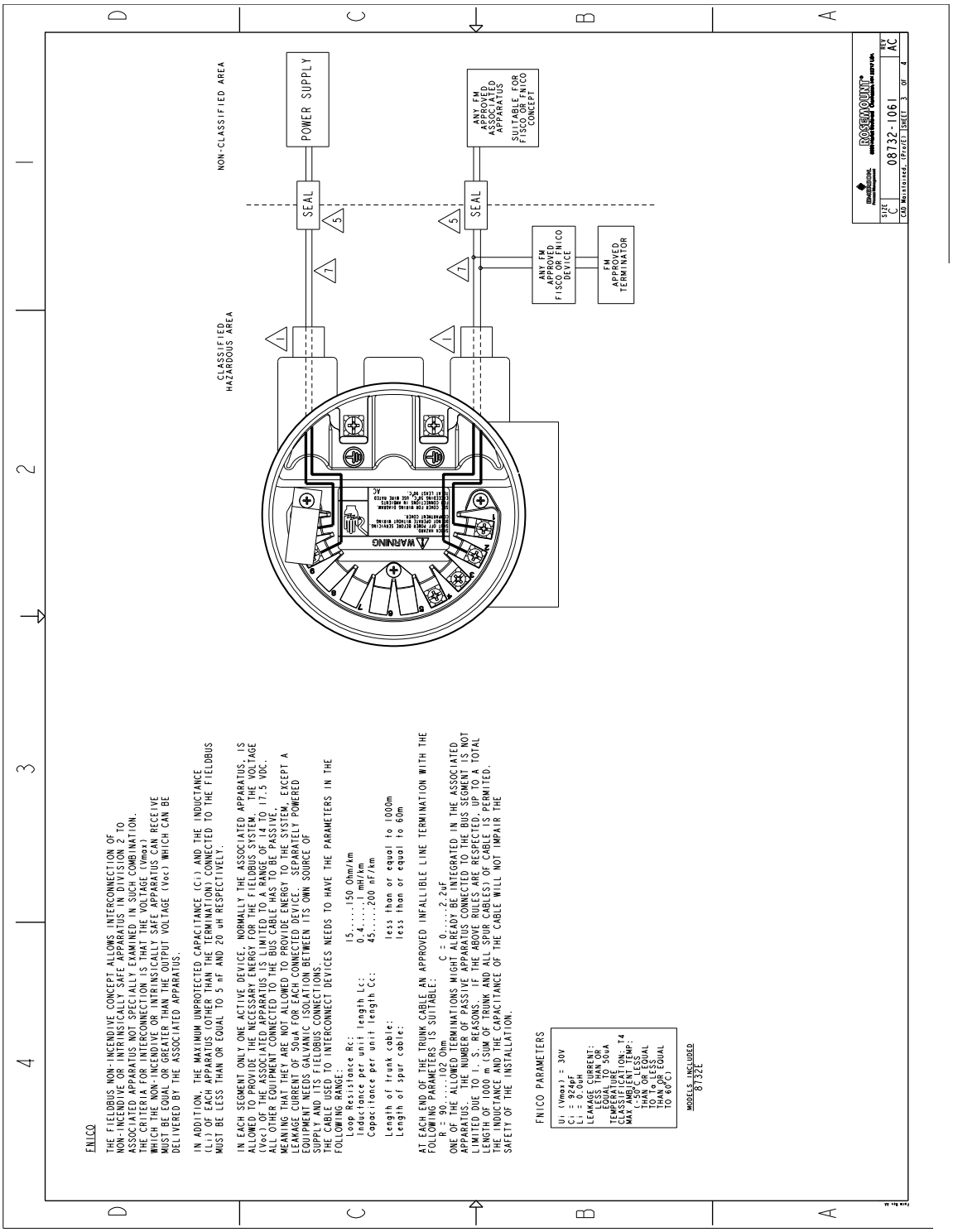
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Figure B-8. Installation Drawings with FM Certified I.S. Output (Cont.)



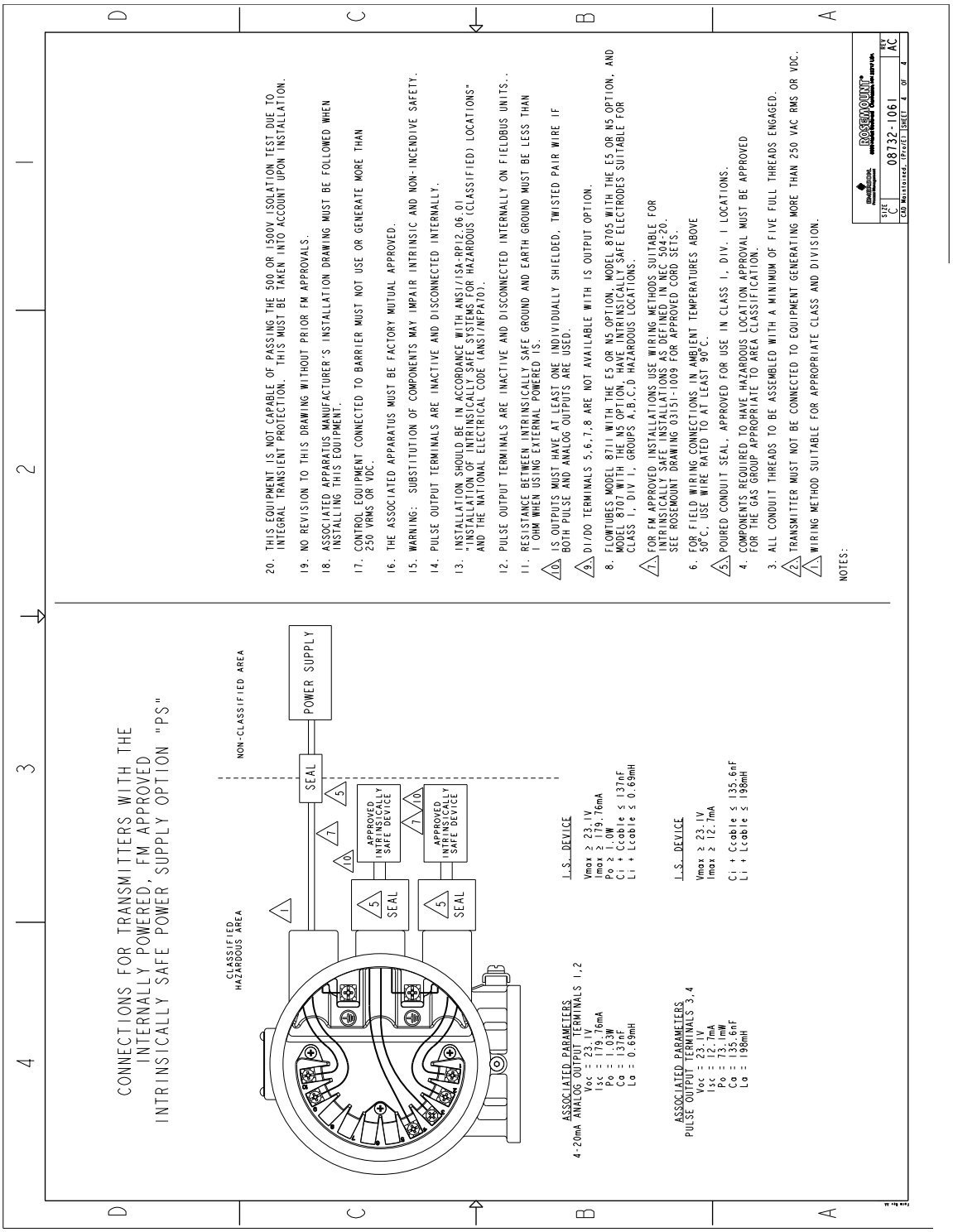
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Figure B-9. Installation Drawings with FM Certified I.S. Output (Cont.)



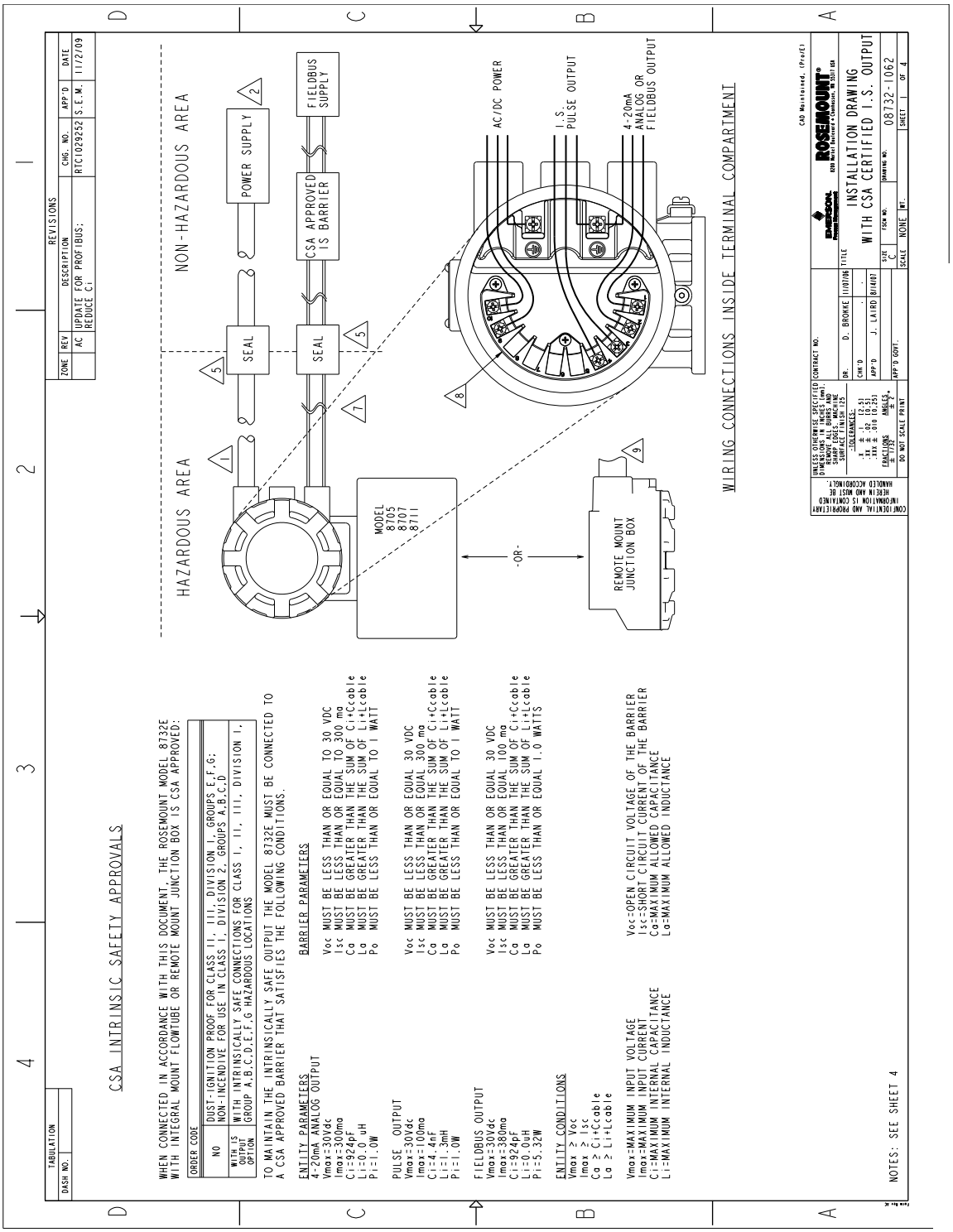
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Figure B-10. Installation Drawings with FM Certified I.S. Output (Cont.)



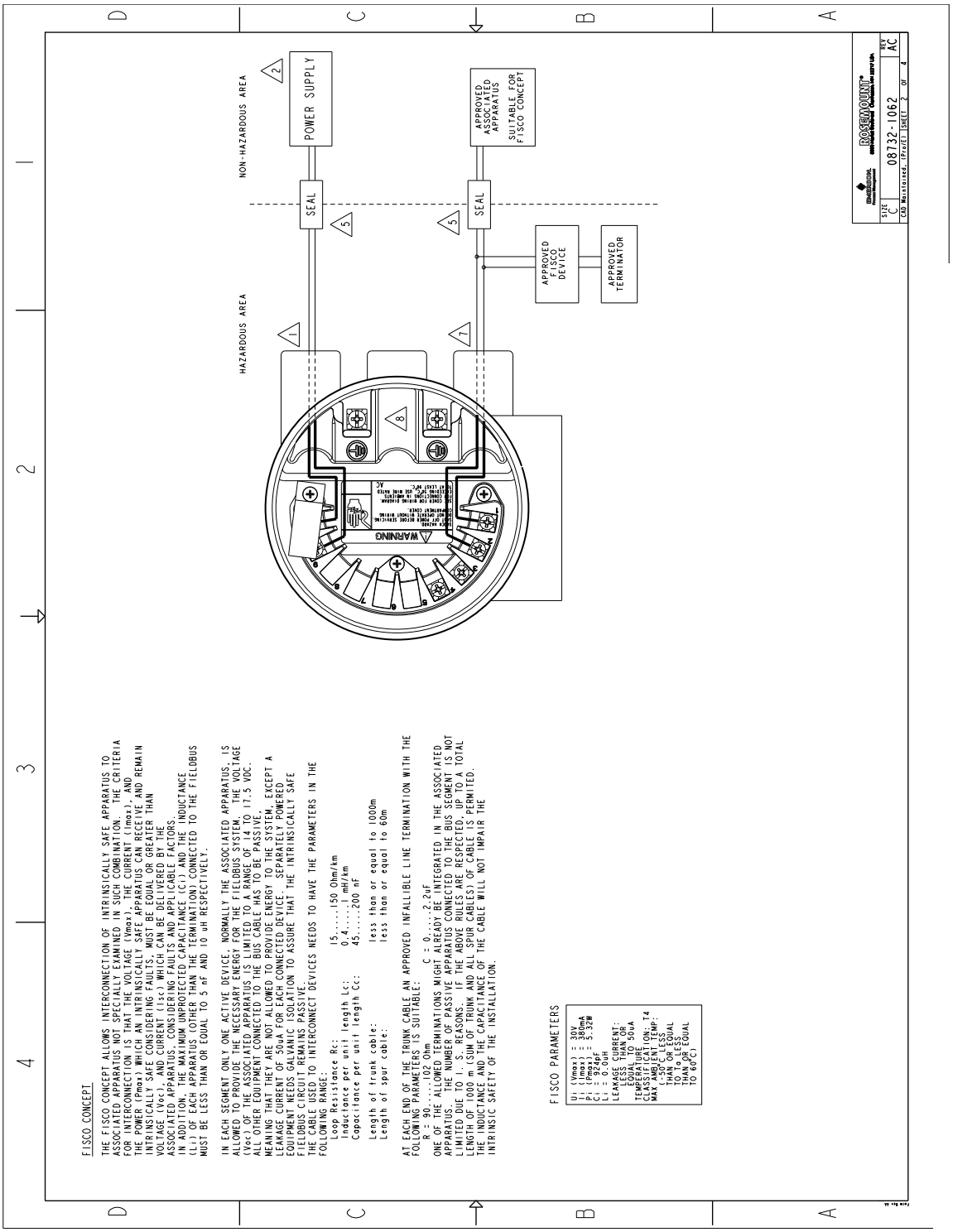
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Figure B-11. Installation Drawings with CSA Certified I.S. Output



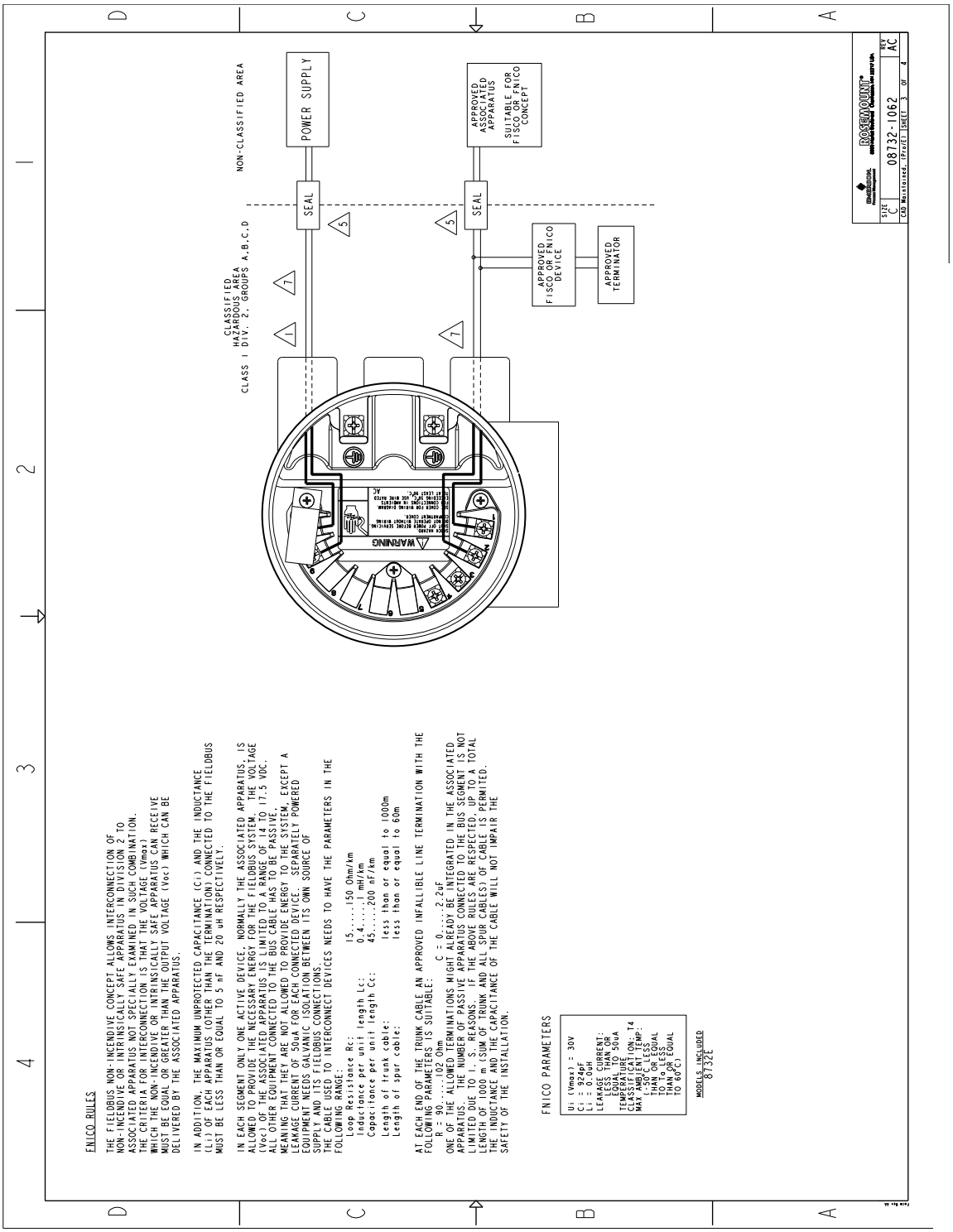
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Figure B-12. Installation Drawings with CSA Certified I.S. Output (Cont.)



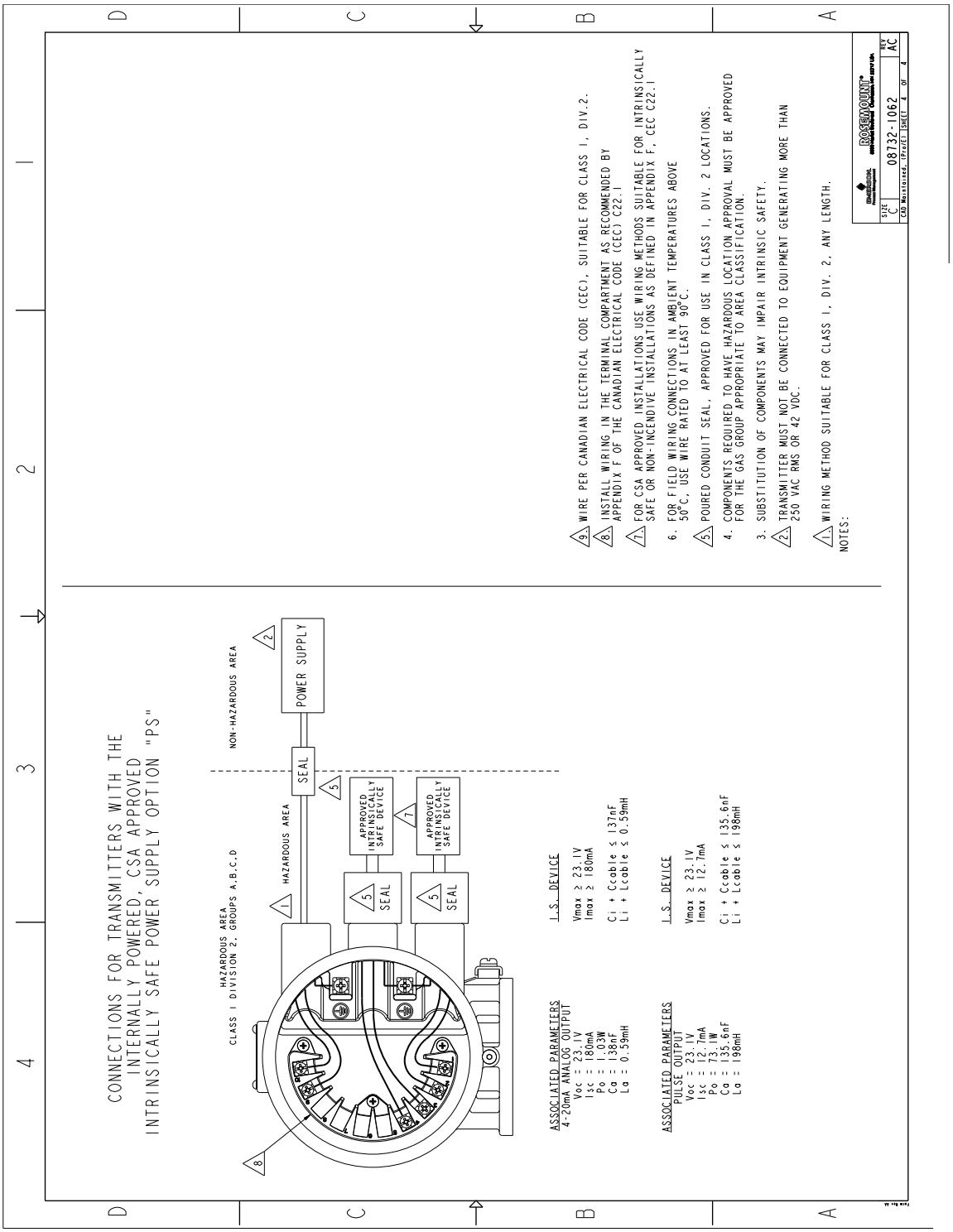
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Figure B-13. Installation Drawings with CSA Certified I.S. Output (Cont.)



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Figure B-14. Installation Drawings with CSA Certified I.S. Output (Cont.)



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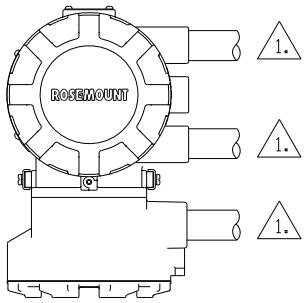
Figure B-15. Installation Drawings Hazardous (Classified Location)

CONFIDENTIAL AND PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY

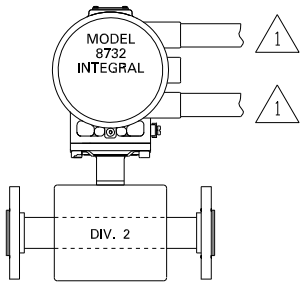
REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AE	UPDATE TRANSMITTER, JUNCTION BOX VIEWS	RTC1029252	S.E.M.	10/12/09

HAZARDOUS (CLASSIFIED) LOCATION

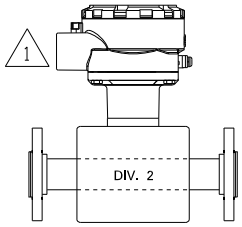
DUST-IGNITION PROOF FOR
CLASS II/III, DIV. 1, GROUPS E, F, & G;
SUITABLE FOR
CLASS I, DIV. 2, GROUPS A, B, C, & D.
CSA ENCLOSURE TYPE 4X
AMBIENT TEMP. LIMITS: -50°C TO +60°C.



REMOTE MOUNT CONFIGURATION



MODEL 8705, 8707, 8711, OR 8750W INTEGRAL,
"STANDARD PRODUCT OFFERING"



MODEL 8705, 8707, 8750W REMOTE
OR
MODEL 8711 REMOTE
"STANDARD PRODUCT OFFERING"

1. INSTALL PER CANADIAN ELECTRICAL CODE (CEC).

2. MODEL 8705, 8707, 8711, & 8750W FLOWTUBES HAVE NON-INCENDIVE ELECTRODES FOR CLASS I, DIVISION 2, GROUPS A, B, C, AND D.

WARNING EXPLOSIVE HAZARD-
SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIV 2

WARNING EXPLOSIVE HAZARD-
DO NOT SET UP SWITCHES UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS

CAD MAINTAINED (MicroStation)

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125

-TOLERANCE-
.X ± .1 [2,5]
.XX ± .02 [0,5]
.XXX ± .010 [0,25]
FRACTIONS ± 1/32
ANGLES ± 2°

DO NOT SCALE PRINT

CONTRACT NO.

DR. C. SCRIBNER 4/18/95
CHK'D
APP'D. J.TEMPLIN 8/25/95
APP'D. GOVT.

EMERSON. Process Management
ROSEMOUNT®
8200 Market Boulevard • Chanhassen, MN 55317 USA

TITLE INSTALLATION DRAWING:
MODEL 8732, 8705, 8707, 8711, 8750W
CSA

SIZE A | FSCM NO | DWG NO. 08732-1051
SCALE N/A | WT. ——— | SHEET 1 OF 1

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Figure B-16. Installation Drawings Factory Mutual Hazardous Location

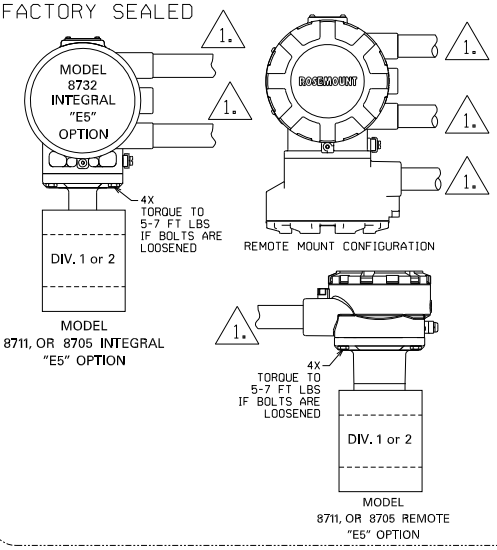
CONFIDENTIAL AND PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY

REVISIONS

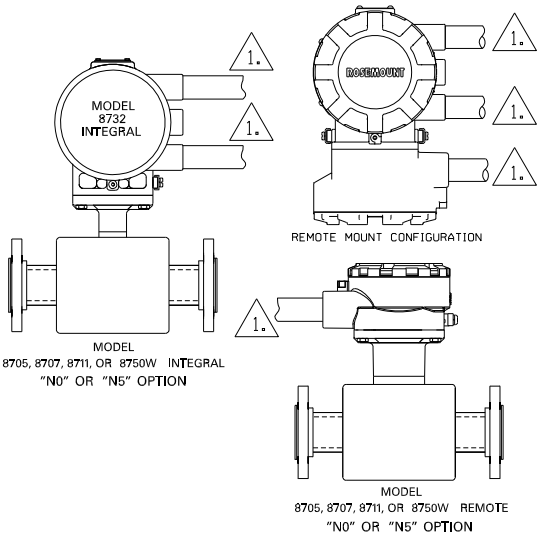
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AF	UPDATE JUNCTION BOX	RTC1028826	S.E.M.	7/23/09

HAZARDOUS (CLASSIFIED) LOCATION

EXPLOSION PROOF FOR
CLASS I, DIV. 1, GROUPS C, D; T6
DUST-IGNITION PROOF FOR
CLASS II/III, DIV. 1, GROUPS E, F, G; T6
NONINCENDIVE FOR
CLASS I, DIV. 2, GROUPS A, B, C, D; T4
ENCLOSURE TYPE 4X
AMBIENT TEMP. LIMITS: -50°C TO +60°C.
FACTORY SEALED



DUST-IGNITION PROOF FOR
CLASS II/III, DIV. 1, GROUPS E, F, G; T6
NONINCENDIVE FOR
CLASS I, DIV. 2, GROUPS A, B, C, D; T4
ENCLOSURE TYPE 4X
AMBIENT TEMP. LIMITS: -50°C TO +60°C.



3. MODEL 8711 AND 8705 WITH E5 AND N5 OPTION, AND 8750W AND 8707 WITH N5 OPTION FLOWTUBES HAVE INTRINSICALLY SAFE ELECTRODES SUITABLE FOR FLAMMABLE PROCESS.

2. ALL CONDUIT THREADS MUST BE ASSEMBLED WITH A MINIMUM OF FIVE FULL THREADS ENGAGEMENT.

1. INSTALL PER NATIONAL ELECTRICAL CODE (NEC) FOR DIVISION 1 OR 2 INSTALLATIONS.

NOTES:

CAD MAINTAINED (MicroStation)

UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125

-TOLERANCE-
.X ± .1 [2,5]
.XX ± .02 [0,5]
.XXX ± .010 [0,25]

FRACTIONS ± 1/32 ANGLES ± 2°

DO NOT SCALE PRINT

Form Rev AC

CONTRACT NO.

DR.	C. SCRIBNER	4/18/95
CHK'D		
APP'D.	J.TEMPLIN	8/25/95
APP'D. GOVT.		

EMERSON. Process Management

ROSEMOUNT®
8200 Market Boulevard • Chanhassen, MN 55317 USA

TITLE INSTALLATION DRAWING:
MODEL 8705, 8707, 8711, 8732, 8750W
FACTORY MUTUAL HAZARDOUS LOCATIONS

SIZE	FSCM NO	DWG NO.	
A		08732-1052	
SCALE N/A	WT. ———	SHEET 1 OF 1	

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Appendix C Diagnostics

Diagnostic Availability . . . . . page C-1
Licensing and Enabling . . . . . page C-2
Tunable Empty Pipe Detection . . . . . page C-2
Ground/Wiring Fault Detection . . . . . page C-4
High Process Noise Detection . . . . . page C-5
8714i Meter Verification . . . . . page C-8
Rosemount Magnetic Flowmeter Calibration Verification Report . . . . . page C-14

DIAGNOSTIC AVAILABILITY

With Rosemount Magmeter diagnostics enabled, users can change their practices to improve plant availability and output, and reduce costs through simplified installation, maintenance and troubleshooting.

Table C-1. Rosemount Magmeter Diagnostics

Diagnostics	Mag User Practice	8732 PA
Basic		
Empty Pipe	Process Management	•
Electronics Temperature	Maintenance	•
Coil Fault	Maintenance	•
Transmitter Faults	Maintenance	•
Reverse Flow	Process Management	•
Advanced (Suite 1)		D01 Option
High Process Noise	Process Management	•
Grounding/Wiring Fault	Installation	•
Advanced (Suite 2)		D02 Option
8714i Meter Verification	Meter Verification	•

Options for Accessing Diagnostics

All the diagnostic test can be initiated through the use of a class II master. Some diagnostics can be accessed using the LOI.

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LICENSING AND ENABLING

All non-basic diagnostics must be licensed by ordering option code D01, D02, or both. In the event that a diagnostic option is not ordered, advanced diagnostics can be licensed in the field through the use of a license key. To obtain a license key, contact your local Rosemount Representative. Each transmitter has a unique license key specific to the diagnostic option code. See the detailed procedures below for entering the license key and enabling the advanced diagnostics.

Licensing the 8732 Diagnostics

For licensing the advanced diagnostics, follow the steps below.

1. Power-up the 8732 transmitter
2. Verify that you have 1.01.001 software or later
3. Determine the Device ID
4. Obtain a License Key from your local Rosemount Representative.
5. Enter License Key
6. Enable Advanced Diagnostics

TUNABLE EMPTY PIPE DETECTION

The Tunable Empty Pipe detection provides a means of minimizing issues and false readings when the pipe is empty. This is most important in batching applications where the pipe may run empty with some regularity.

If the pipe is empty, this diagnostic will activate, set the flow rate to 0, and deliver a PlantWeb alert.

Turning Empty Pipe On/Of

The Empty Pipe diagnostic can be turned on or off as required by the application. If the advanced diagnostics suite 1 (D01 Option) was ordered, then the Empty Pipe diagnostic will be turned on. If D01 was not ordered, the default setting is off.

Tunable Empty Pipe Parameters

The Tunable Empty Pipe diagnostic has one read-only parameter, and two parameters that can be custom configured to optimize the diagnostic performance.

Empty Pipe Value

Reads the current Empty Pipe Value. This is a read-only value. This number is a unitless number and is calculated based on multiple installation and process variables such as sensor type, line size, process fluid properties, and wiring. If the Empty Pipe Value exceeds the Empty Pipe Trigger Level for a specified number of updates, then the Empty Pipe diagnostic alert will activate.

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Empty Pipe Trigger Level

Limits: 3 to 2000

This value configures the threshold limit that the Empty Pipe Value must exceed before the Empty Pipe diagnostic alert activates. The default setting from the factory is 100.

Empty Pipe Trigger Count

Limits: 5 to 50

This value configures the number of consecutive updates that the Empty Pipe Value must exceed the Empty Pipe Trigger Level before the Empty Pipe diagnostic alert activates. The default setting from the factory is 5.

Optimizing Tunable Empty Pipe

The Tunable Empty Pipe diagnostic is set at the factory to properly diagnose most applications. If this diagnostic unexpectedly activates, the following procedure can be followed to optimize the Empty Pipe diagnostic for the application.

1. Record the Empty Pipe Value with a full pipe condition.

Example

Full reading = 0.2

2. Record the Empty Pipe Value with an empty pipe condition.

Example

Empty reading = 80.0

3. Set the Empty Pipe Trigger Level to a value between the full and empty readings. For increased sensitivity to empty pipe conditions, set the trigger level to a value closer to the full pipe value.

Example

Set the trigger level to 25.0

4. Set the Empty Pipe Counts to a value corresponding to the desired sensitivity level for the diagnostic. For applications with entrained air or potential air slugs, less sensitivity may be desired.

Example

Set the counts to 10

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Troubleshooting Empty Pipe

The following actions can be taken if Empty Pipe detection is unexpected.

1. Verify the sensor is full.
2. Verify that the sensor has not been installed with a measurement electrode at the top of the pipe.
3. Decrease the sensitivity by setting the Empty Pipe Trigger Level to a value above the Empty Pipe Value read with a full pipe.
4. Decrease the sensitivity by increasing the Empty Pipe Counts to compensate for process noise. The Empty Pipe Counts is the number of consecutive Empty Pipe Value readings above the Empty Pipe Trigger Level required to activate the Empty Pipe alert. The count range is 5-50, with factory default set at 5.
5. Increase process fluid conductivity above 50 microsiemens/cm.
6. Properly connect the wiring between the sensor and the transmitter. Corresponding terminal block numbers in the sensor and transmitter must be connected.
7. Perform the sensor electrical resistance tests. Confirm the resistance reading between coil ground (ground symbol) and coil (1 and 2) is infinity, or open. Confirm the resistance reading between electrode ground (17) and an electrode (18 or 19) is greater than 2 kohms and rises. For more detailed information, consult Table 6-5 on page 6-8.

GROUND/WIRING FAULT DETECTION

The Ground/Wiring Fault Detection diagnostic provides a means of verifying installations are done correctly. If the installation is not wired or grounded properly, this diagnostic will activate and deliver a PlantWeb alert. This diagnostic can also detect if the grounding is lost over-time due to corrosion or another root cause.

Turning Ground/Wiring Fault On/Of

The Ground/Wiring Fault diagnostic can be turned on or off as required by the application. If the advanced diagnostics suite 1 (D01 Option) was ordered, then the Ground/Wiring Fault diagnostic will be turned on. If D01 was not ordered or licensed, this diagnostic is not available.

Ground/Wiring Fault Parameters

The Ground/Wiring Fault diagnostic has one read-only parameter. It does not have any configurable parameters.

Line Noise

Reads the current amplitude of the Line Noise. This is a read-only value. This number is a measure of the signal strength at 50/60 Hz. If the Line Noise value exceeds 5 mV, then the Ground/Wiring Fault diagnostic alert will activate.

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Troubleshooting Ground/Wiring Fault

The transmitter detected high levels of 50/60 Hz noise caused by improper wiring or poor process grounding.

1. Verify that the transmitter is earth grounded.
2. Connect ground rings, grounding electrode, lining protector, or grounding straps. Grounding diagrams can be found in “Grounding” on page 5-12.
3. Verify sensor is full.
4. Verify wiring between sensor and transmitter is prepared properly. Shielding should be stripped back less than 1 in. (25 mm).
5. Use separate shielded twisted pairs for wiring between sensor and transmitter.
6. Properly connect the wiring between the sensor and the transmitter. Corresponding terminal block numbers in the sensor and transmitter must be connected.

Ground/Wiring Fault Functionality

The transmitter continuously monitors signal amplitudes over a wide range of frequencies. For the Ground/Wiring Fault diagnostic, the transmitter specifically looks at the signal amplitude at frequencies of 50 Hz and 60 Hz which are the common AC cycle frequencies found throughout the world. If the amplitude of the signal at either of these frequencies exceeds 5 mV, that is an indication that there is a ground or wiring issue and that stray electrical signals are getting into the transmitter. The diagnostic alert will activate indicating that the ground and wiring of the installation should be carefully reviewed.

HIGH PROCESS NOISE DETECTION

The High Process Noise diagnostic detects if there is a process condition causing unstable or noisy readings, but the noise is not real flow variation. One common cause of high process noise is slurry flow, like pulp stock or mining slurries. Other conditions that cause this diagnostic to activate are high levels of chemical reaction or entrained gas in the liquid. If unusual noise or variation is seen, this diagnostic will activate and deliver a PlantWeb alert. If this situation exists and is left without remedy, it will add additional uncertainty and noise to the flow reading.

Turning High Process Noise On/Off

The High Process Noise diagnostic can be turned on or off as required by the application. If the advanced diagnostics suite 1 (D01 Option) was ordered, then the High Process Noise diagnostic will be turned on. If D01 was not ordered or licensed, this diagnostic is not available.

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High Process Noise Parameters

The High Process Noise diagnostic has two read-only parameters. It does not have any configurable parameters. This diagnostic requires that flow be present in the pipe and the velocity be > 1 ft/s.

5 Hz Signal to Noise Ratio

Reads the current value of the signal to noise ratio at the coil drive frequency of 5 Hz. This is a read-only value. This number is a measure of the signal strength at 5 Hz relative to the amount of process noise. If the transmitter is operating in 5 Hz mode, and the signal to noise ratio remains below 25 for approximately one minute, then the High Process Noise diagnostic alert will activate.

37 Hz Signal to Noise Ratio

Reads the current value of the signal to noise ratio at the coil drive frequency of 37 Hz. This is a read-only value. This number is a measure of the signal strength at 37 Hz relative to the amount of process noise. If the transmitter is operating in 37 Hz mode, and the signal to noise ratio remains below 25 for approximately one minute, then the High Process Noise diagnostic alert will activate.

Troubleshooting High Process Noise

The transmitter detected high levels of process noise. If the signal to noise ratio is less than 25 while operating in 5 Hz mode, proceed with the following steps:

1. Increase transmitter coil drive frequency to 37 Hz (refer to “Coil Drive Frequency” on page 4-13) and, if possible, perform Auto Zero function (refer to “Auto Zero” on page 4-12).
2. Verify sensor is electrically connected to the process with grounding electrode, grounding rings with grounding straps, or lining protector with grounding straps.
3. If possible, redirect chemical additions downstream of the magmeter.
4. Verify process fluid conductivity is above 10 microsiemens/cm.

If the signal to noise ratio is less than 25 while operating in 37 Hz mode, proceed with the following steps:

1. Turn on the Digital Signal Processing (DSP) technology and follow the setup procedure (refer to Appendix D: Digital Signal Processing). This will minimize the level of damping in the flow measurement and control loop while also stabilizing the reading to minimize valve actuation.
2. Increase damping to stabilize the signal (refer to “PV Damping” on page 3-11). This will add dead-time to the control loop.
3. Move to a Rosemount High-Signal flowmeter system. This flowmeter will deliver a stable signal by increasing the amplitude of the flow signal by ten times to increase the signal to noise ratio. For example if the signal to noise ratio (SNR) of a standard magmeter is 5, the High-Signal would have a SNR of 50 in the same application. The Rosemount High-Signal system is comprised of the 8707 sensor which has modified coils and magnetics and the 8712H High-Signal transmitter.

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NOTE
In applications where very high levels of noise are a concern, it is recommended that a dual-calibrated Rosemount High-Signal 8707 sensor be used. These sensors can be calibrated to run at lower coil drive current supplied by the standard Rosemount transmitters, but can also be upgraded by changing to the 8712H High-Signal transmitter.

High Process Noise Functionality

The High Process Noise diagnostic is useful for detecting situations where the process fluid may be causing electrical noise resulting in a poor measurement from the magnetic flowmeter. There are three basic types of process noise that can affect the performance of the magnetic flowmeter system.

1/f Noise

This type of noise has higher amplitudes at lower frequencies, but generally degrades over increasing frequencies. Potential sources of 1/f noise include chemical mixing and the general background noise of the plant.

Spike Noise

This type of noise generally results in a high amplitude signal at specific frequencies which can vary depending on the source of the noise. Common sources of spike noise include chemical injections directly upstream of the flowmeter, hydraulic pumps, and slurry flows with low concentrations of particles in the stream. The particles bounce off of the electrode generating a “spike” in the electrode signal. An example of this type of flow stream would be a recycle flow in a paper mill.

White Noise

This type of noise results in a high amplitude signal that is relatively constant over the frequency range. Common sources of white noise include chemical reactions or mixing that occurs as the fluid passes through the flowmeter and high concentration slurry flows where the particulates are constantly passing over the electrode head. An example of this type of flow stream would be a high consistency pulp stock stream (>10%) in a paper mill.

The transmitter continuously monitors signal amplitudes over a wide range of frequencies. For the high process noise diagnostic, the transmitter specifically looks at the signal amplitude at frequencies of 2.5 Hz, 7.5 Hz, 32.5 Hz, and 42.5 Hz. The transmitter uses the values from 2.5 and 7.5 Hz and calculates an average noise level. This average is compared to the amplitude of the signal at 5 Hz. If the signal amplitude is not 25 times greater than the noise level, and the coil drive frequency is set at 5 Hz, the High Process Noise alert will activate indicating that the flow signal may be compromised. The transmitter performs the same analysis around the 37.5 Hz coil drive frequency using the 32.5 Hz and 42.5 Hz values to establish a noise level.

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8714I METER VERIFICATION

The 8714i Meter Verification diagnostic provides a means of verifying the flowmeter is within calibration without removing the sensor from the process. This is a manually initiated diagnostic test that provides a review of the transmitter and sensors critical parameters as a means to document verification of calibration. The results of running this diagnostic provide the deviation amount from expected values and a pass/fail summary against user-defined criteria for the application and conditions.

Initiating 8714i Meter Verification

The 8714i Meter Verification diagnostic can be initiated as required by the application. If the advanced diagnostic suite (D02) was ordered, then the 8714i Meter Verification diagnostic will be available. If D02 was not ordered or licensed, this diagnostic will not be available.

Sensor Signature Parameters

The sensor signature describes the magnetic behavior of the sensor. Based on Faraday's law, the induced voltage measured on the electrodes is proportional to the magnetic field strength. Thus, any changes in the magnetic field will result in a calibration shift of the sensor.

Establishing the baseline sensor signature

The first step in running the 8714i Meter Verification test is establishing the reference signature that the test will use as the baseline for comparison. This is accomplished by having the transmitter take a signature of the sensor.

Having the transmitter take an initial sensor signature when first installed will provide the baseline for the verification tests that are done in the future. The sensor signature should be taken during the start-up process when the transmitter is first connected to the sensor, with a full line, and ideally with no flow in the line. Running the sensor signature procedure when there is flow in the line is permissible, but this may introduce some noise into the signature measurements. If an empty pipe condition exists, then the sensor signature should only be run for the coils.

Once the sensor signature process is complete, the measurements taken during this procedure are stored in non-volatile memory to prevent loss in the event of a power interruption to the meter.

8714i Meter Verification Test Scope

The 8714i Meter Verification can be used to verify the entire flowmeter installation, or individual parts such as the transmitter or sensor. This parameter is set at the time that the 8714i Meter Verification test is initiated.

All

Run the 8714i Meter Verification test and verify the entire flowmeter installation. This parameter results in the verification test performing the transmitter calibration verification, sensor calibration verification, coil health check, and electrode health check. Transmitter calibration and sensor calibration are verified to the percentage associated with the test condition selected when the test was initiated.

Flowtube Sensor

Run the 8714i Meter Verification test on the sensor only. This results in the verification test checking the sensor calibration to the limits of the test criteria selected when the 8714i Meter Verification test was initiated, verifying the coil circuit health, and the electrode circuit health.

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Transmitter

Run the 8714i Meter Verification test on the transmitter only. This results in the verification test only checking the transmitter calibration to the limits of the test criteria selected when the 8714i Meter Verification test was initiated.

8714i Meter Verification Test Parameters

The 8714i has a multitude of parameters that set the test criteria, test conditions, and scope of the calibration verification test.

Test Conditions for the 8714i Meter Verification

There are three possible test conditions that the 8714i Meter Verification test can be initiated under. This parameter is set at the time that the Sensor Signature or 8714i Meter Verification test is initiated.

No Flow, Full Pipe

Run the 8714i Meter Verification test with a full pipe and no flow in the line. Running the 8714i Meter Verification test under this condition provides the most accurate results and the best indication of magnetic flowmeter health.

Flowing, Full Pipe

Run the 8714i Meter Verification test with a full pipe and flow in the line. Running the 8714i Meter Verification test under this condition provides the ability to verify the magnetic flowmeter health without shutting down the process flow in applications where a shutdown is not possible. Running the calibration verification under flowing conditions can cause false fails if the flow rate is not at a steady flow, or if there is process noise present.

Empty Pipe

Run the 8714i Meter Verification test with an empty pipe. Running the 8714i Meter Verification test under this condition provides the ability to verify the magnetic flowmeter health with an empty pipe. Running the calibration verification under empty pipe conditions will not check the electrode circuit health.

8714i Meter Verification Test Criteria

The 8714i Meter Verification diagnostic provides the ability for the user to define the test criteria that the verification must test to. The test criteria can be set for each of the flow conditions discussed above.

No Flow, Full Pipe

Set the test criteria for the No Flow condition. The factory default for this value is set to two percent with limits configurable between one and ten percent.

Flowing, Full Pipe

Set the test criteria for the Flowing, Full condition. The factory default for this value is set to three percent with limits configurable between one and ten percent

Empty Pipe

Set the test criteria for the Empty Pipe condition. The factory default for this value is set to three percent with limits configurable between one and ten percent

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8714i Meter Verification Test Results Parameters

Once the 8714i Meter Verification test is initiated, the transmitter will make several measurements to verify the transmitter calibration, sensor calibration, coil circuit health, and electrode circuit health. The results of these tests can be reviewed and recorded on the calibration verification report found on page C-14. This report can be used to validate that the meter is within the required calibration limits to comply with governmental regulatory agencies such as the Environmental Protection Agency or Food and Drug Administration.

Viewing the 8714i Meter Verification Results

Depending on the method used to view the results, they will be displayed in either a menu structure, as a method, or in the report format. When using the 375 Field Communicator, each individual component can be viewed as a menu item. In AMS, the calibration report is populated with the necessary data eliminating the need to manually complete the report found on page C-14.

The results are displayed in the following order:

Test Condition

Review the test condition that the 8714i Meter Verification test was performed under.

Test Criteria

Review the test criteria used to determine the results of the 8714i Meter Verification tests.

8714i Result

Displays the overall result of the 8714i Meter Verification test as either a Pass or Fail.

Simulated Velocity

Displays the simulated velocity used to verify the transmitter calibration

Actual Velocity

Displays the velocity measured by the transmitter during the transmitter calibration verification process

Velocity Deviation

Displays the deviation in the actual velocity compared to the simulated velocity in terms of a percentage. This percentage is then compared to the test criteria to determine if the transmitter is within calibration limits.

Transmitter Calibration Verification

Displays the results of the transmitter calibration verification test as either a Pass or Fail

Sensor Calibration Deviation

Displays the deviation in the sensor calibration. This value tells how much the sensor calibration has shifted from the original baseline signature. This percentage is compared to the test criteria to determine if the sensor is within calibration limits.

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Sensor Calibration Verification

Displays the results of the sensor calibration verification test as either a Pass or Fail.

Coil Circuit Verification

Displays the results of the coil circuit health check as either a Pass or Fail

Electrode Circuit Verification

Displays the results of the electrode circuit health check as either a Pass or Fail.

Optimizing the 8714i Meter Verification

The 8714i Meter Verification diagnostic can be optimized by setting the test criteria to the desired levels necessary to meet the compliance requirements of the application. The following examples below will provide some guidance on how to set these levels.

Example

An effluent meter must be certified every year to comply with Environmental Protection Agency and Pollution Control Agency standards. These governmental agencies require that the meter be certified to five percent accuracy.

Since this is an effluent meter, shutting down the process may not be viable. In this instance the 8714i Meter Verification test will be performed under flowing conditions. Set the test criteria for Flowing, Full to five percent to meet the requirements of the governmental agencies.

Example

A pharmaceutical company requires semi-annual verification of meter calibration on a critical feed line for one of their products. This is an internal standard, but plant requirements require a calibration record be kept on-hand. Meter calibration on this process must meet one percent. The process is a batch process so it is possible to perform the calibration verification with the line full and with no flow.

Since the 8714i Meter Verification test can be run under no flow conditions, set the test criteria for No Flow to one percent to comply with the necessary plant standards.

Example

A food and beverage company requires an annual verification of a meter on a product line. The plant standard calls for the accuracy to be three percent or better. They manufacture this product in batches, and the measurement cannot be interrupted when a batch is in process. When the batch is complete, the line goes empty.

Since there is no means of performing the 8714i Meter Verification test while there is product in the line, the test must be performed under empty pipe conditions. The test criteria for Empty Pipe should be set to three percent, and it should be noted that the electrode circuit health cannot be verified.

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Troubleshooting the 8714i Meter Verification Test

In the event that the 8714i Meter Verification test fails, the following steps can be used to determine the appropriate course of action. Begin by reviewing the 8714i results to determine the specific test that failed.

Figure C-1. Troubleshooting the 8714i Meter Verification Test Table

Test	Potential Causes of Failure	Steps to Correct
Transmitter Verification Test Failed	• Unstable flow rate during the verification test • Noise in the process • Transmitter drift • Faulty electronics	• Perform the test with no flow in the pipe • Check calibration with an external standard like the 8714D • Perform a digital trim • Replace the electronics
Sensor Verification Failed	• Moisture in the terminal block of the sensor • Calibration shift caused by heat cycling or vibration	• Remove the sensor and send back for recalibration.
Coil Circuit Health Failed	• Moisture in the terminal block of the sensor • Shorted Coil	• Perform the sensor checks detailed on page 6-8.
Electrode Circuit Health Failed	• Moisture in the terminal block of the sensor • Coated Electrodes • Shorted Electrodes	• Perform the sensor checks detailed on page 6-8.

8714i Meter Verification Functionality

The 8714i Meter Verification diagnostic functions by taking a baseline sensor signature and then comparing measurements taken during the verification test to these baseline results.

Sensor Signature Values

The sensor signature describes the magnetic behavior of the sensor. Based on Faraday's law, the induced voltage measured on the electrodes is proportional to the magnetic field strength. Thus, any changes in the magnetic field will result in a calibration shift of the sensor. Having the transmitter take an initial sensor signature when first installed will provide the baseline for the verification tests that are done in the future. There are three specific measurements that are stored in the transmitter's non-volatile memory that are used when performing the calibration verification.

Coil Circuit Resistance

The Coil Circuit Resistance is a measurement of the coil circuit health. This value is used as a baseline to determine if the coil circuit is still operating correctly when the 8714i Meter Verification diagnostic is initiated.

Coil Signature

The Coil Signature is a measurement of the magnetic field strength. This value is used as a baseline to determine if a sensor calibration shift has occurred when the 8714i Meter Verification diagnostic is initiated

Electrode Circuit Resistance

The Electrode Circuit Resistance is a measurement of the electrode circuit health. This value is used as a baseline to determine if the electrode circuit is still operating correctly when the 8714i Meter Verification diagnostic is initiated.

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8714i Meter Verification Measurements

The 8714i Meter Verification test will make measurements of the coil resistance, coil signature, and electrode resistance and compare these values to the values taken during the sensor signature process to determine the sensor calibration deviation, the coil circuit health, and the electrode circuit health. In addition, the measurements taken by this test can provide additional information when troubleshooting the meter.

Coil Circuit Resistance

The Coil Circuit Resistance is a measurement of the coil circuit health. This value is compared to the coil circuit resistance baseline measurement taken during the sensor signature process to determine coil circuit health.

Coil Signature

The Coil Signature is a measurement of the magnetic field strength. This value is compared to the coil signature baseline measurement taken during the sensor signature process to determine sensor calibration deviation.

Electrode Circuit Resistance

The Electrode Circuit Resistance is a measurement of the electrode circuit health. This value is compared to the electrode circuit resistance baseline measurement taken during the sensor signature process to determine electrode circuit health.

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ROSEMOUNT MAGNETIC FLOWMETER CALIBRATION VERIFICATION REPORT

Calibration Verification Report Parameters

User Name: _____

Calibration Conditions: ☐ Internal ☐ External

Tag #:_____

Test Conditions: ☐ Flowing ☐ No Flow, Full Pipe ☐ Empty Pipe

Flowmeter Information and Configuration

Software Tag:_____

PV URV (20 mA scale):_____

Calibration Number:_____

PV LRV (4 mA scale):_____

Line Size:_____

PV Damping:_____

Transmitter Calibration Verification Results

Simulated Velocity:_____

Actual Velocity:_____

Deviation %:_____

Transmitter: PASS / FAIL / NOT TESTED

Sensor Calibration Verification Results

Sensor Deviation %:_____

Sensor: PASS / FAIL / NOT TESTED

Coil Circuit Test: PASS / FAIL / NOT TESTED

Electrode Circuit Test: PASS / FAIL / NOT TESTED

Summary of Calibration Verification Results

Verification Results: The result of the flowmeter verification test is: PASSED / FAILED

Verification Criteria: This meter was verified to be functioning within _____ % of deviation from the original test parameters.

Signature:_____

Date:_____

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Appendix D Digital Signal Processing

Safety Messages . . . . . page D-1
Procedures . . . . . page D-2

SAFETY MESSAGES

Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations. Please read the following safety messages before performing any operation described in this section.

Warnings

⚠WARNING

Explosions could result in death or serious injury:

- Verify that the operating atmosphere of the sensor and transmitter is consistent with the appropriate hazardous locations certifications.
- Do not remove the transmitter cover in explosive atmospheres when the circuit is alive.
- Before connecting a Field 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.
- Both transmitter covers must be fully engaged to meet explosion-proof requirements.

⚠WARNING

Failure to follow safe installation and servicing guidelines could result in death or serious injury:

- Make sure only qualified personnel perform the installation.
- Do not perform any service other than those contained in this manual unless qualified.

Process leaks could result in death or serious injury:

- The electrode compartment may contain line pressure; it must be depressurized before the cover is removed.

⚠WARNING

High voltage that may be present on leads could cause electrical shock:

- Avoid contact with leads and terminals.

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PROCEDURES

If the output of your Rosemount 8732 is unstable, first check the wiring and grounding associated with the magnetic flowmeter system. Ensure that the following conditions are met:

- Ground straps are attached to the adjacent flange or ground ring?
- Grounding rings, lining protectors, or grounding electrodes are being used in lined or nonconductive piping?
- Both of the shields are attached at both ends?

The causes of unstable transmitter output can usually be traced to extraneous voltages on the measuring electrodes. This “process noise” can arise from several causes including electrochemical reactions between the fluid and the electrode, chemical reactions in the process itself, free ion activity in the fluid, or some other disturbance of the fluid/electrode capacitive layer. In such noisy applications, an analysis of the frequency spectrum reveals process noise that typically becomes significant below 15 Hz.

In some cases, the effects of process noise may be sharply reduced by elevating the coil drive frequency above the 15 Hz region. The Rosemount 8732 coil drive mode is selectable between the standard 5 Hz and the noise-reducing 37 Hz. See “Coil Drive Frequency” on page 4-26 for instructions on how to change the coil drive mode to 37 Hz.

Auto Zero

To ensure optimum accuracy when using 37 Hz coil drive mode, there is an auto zero function that must be initiated during start-up. The auto zero operation is also discussed in the start-up and configuration sections. When using 37 Hz coil drive mode it is important to zero the system for the specific application and installation.

The auto zero procedure should be performed only under the following conditions:

- With the transmitter and sensor installed in their final positions. This procedure is not applicable on the bench.
- With the transmitter in 37 Hz coil drive mode. Never attempt this procedure with the transmitter in 5 Hz coil drive mode.
- With the sensor full of process fluid at zero flow.

These conditions should cause an output equivalent to zero flow.

Signal Processing

If the 37 Hz coil drive mode has been set, and the output is still unstable, the damping and signal processing function should be used. It is important to set the coil drive mode to 37 Hz first, so the loop response time is not increased.

The 8732 provides for a very easy and straightforward start-up, and also incorporates the capability to deal with difficult applications that have previously manifested themselves in a noisy output signal. In addition to selecting a higher coil drive frequency (37 Hz vs. 5 Hz) to isolate the flow signal from the process noise, the 8732 microprocessor can actually scrutinize each input based on three user-defined parameters to reject the noise specific to the application.

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This software technique, known as signal processing, “qualifies” individual flow signals based on historic flow information and three user-definable parameters, plus an on/off control. These parameters are:

1. Number of samples: The number of samples function sets the amount of time that inputs are collected and used to calculate the average value. Each second is divided into tenths ($^1/_{10}$) with the number of samples equaling the number of $^1/_{10}$ second increments used to calculate the average. Factory Preset Value = 90 samples.

   For example, a value of:

   1 averages the inputs over the past $^1/_{10}$ second

   10 averages the inputs over the past 1 second

   100 averages the inputs over the past 10 seconds

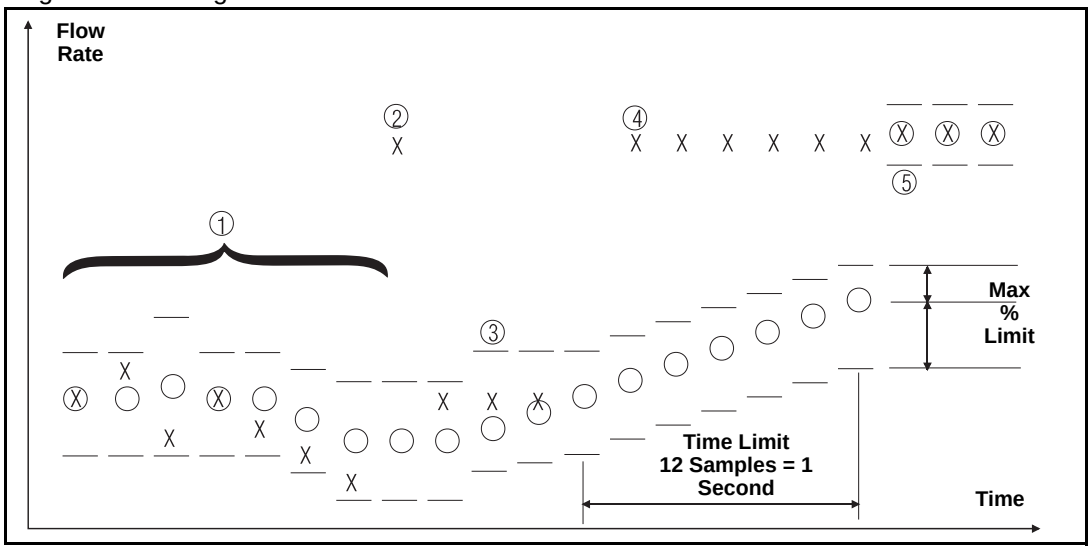
   125 averages the inputs over the past 12.5 seconds

2. Maximum Percent Limit: The tolerance band set up on either side of the running average, referring to percent deviation from the average. Values within the limit are accepted while value outside the limit are scrutinized to determine if they are a noise spike or an actual flow change. Factory Preset Value = 2 percent.
3. Time Limit: Forces the output and running average values to the new value of an actual flow rate change that is outside the percent limit boundaries, thereby limiting response time to real flow changes to the time limit value rather than the length of the running average. Factory Preset Value = 2 seconds.

How Does It Really Work?

The best way to explain this is with the help of an example, plotting flow rate versus time

Figure D-1. Signal Processing



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x: Input flow signal from sensor.

o: Average flow signals and transmitter output, determined by the “number of samples” parameter.

Tolerance band, determined by the “percent limit” parameter.
– Upper value = average flow + [(percent limit/100) average flow]
– Lower value = average flow – [(percent limit/100) average flow]

1. This scenario is that of a typical non-noisy flow. The input flow signal is within the percent limit tolerance band, therefore qualifying itself as a good input. In this case the new input is added directly into the running average and is passed on as a part of the average value to the output.
2. This signal is outside the tolerance band and therefore is held in memory until the next input can be evaluated. The running average is provided as the output.
3. The previous signal currently held in memory is simply rejected as a noise spike since the next flow input signal is back within the tolerance band. This results in complete rejection of noise spikes rather than allowing them to be “averaged” with the good signals as occurs in the typical analog damping circuits.
4. As in number 2 above, the input is outside the tolerance band. This first signal is held in memory and compared to the next signal. The next signal is also outside the tolerance band (in the same direction), so the stored value is added to the running average as the next input and the running average begins to slowly approach the new input level.
5. To avoid waiting for the slowly incrementing average value to catch up to the new level input, a shortcut is provided. This is the “time limit” parameter. The user can set this parameter to eliminate the slow ramping of the output toward the new input level.

When Should Signal Processing Be Used?

The Rosemount 8732 offers three separate functions that can be used in series for improving a noisy output. The first step is to toggle the coil drive to the 37 Hz mode and initialize with an auto zero. If the output is still noisy at this stage, signal processing should be actuated and, if necessary, tuned to match the specific application. Finally, if the signal is still too unstable, the traditional damping function can be used.

NOTE
Failure to complete an Auto Zero will result in a small (<1%) error in the output. While the output level will be offset by the error, the repeatability will not be affected.

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Appendix E Universal Sensor Wiring Diagrams

Rosemount Sensors . . . . . page E-3
Brooks Sensors . . . . . page E-6
Perform the Universal Auto Trim function. . . . . page E-5
Fischer And Porter Sensors . . . . . page E-9
Foxboro Sensors . . . . . page E-15
Kent Veriflux VTC Sensor . . . . . page E-19
Kent Sensors . . . . . page E-20
Krohne Sensors . . . . . page E-21
Taylor Sensors . . . . . page E-22
Yamatake Honeywell Sensors . . . . . page E-24
Yokogawa Sensors . . . . . page E-25
Generic Manufacturer Sensors . . . . . page E-26

The wiring diagrams in this section illustrate the proper connections between the Rosemount 8732 and most sensors currently on the market. Specific diagrams are included for most models, and where information for a particular model of a manufacturer is not available, a generic drawing pertaining to that manufacturers' sensors is provided. If the manufacturer for your sensor is not included, see the drawing for generic connections.

Any trademarks used herein regarding sensors not manufactured by Rosemount are owned by the particular manufacturer of the sensor.

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Table E-1. Sensor Cross References

Rosemount Transmitter	Sensor Manufacturer	Page Number
Rosemount		
Rosemount 8732	Rosemount 8705, 8707, 8711	page E-3
Rosemount 8732	Rosemount 8701	page E-4
Brooks		
Rosemount 8732	Model 5000	page E-6
Rosemount 8732	Model 7400	page E-7
Endress and Hauser		page E-5
Rosemount 8732	Generic Wiring for Sensor	page E-8
Fischer and Porter		page E-9
Rosemount 8732	Model 10D1418	page E-9
Rosemount 8732	Model 10D1419	page E-10
Rosemount 8732	Model 10D1430 (Remote)	page E-11
Rosemount 8732	Model 10D1430	page E-12
Rosemount 8732	Model 10D1465, 10D1475 (Integral)	page E-13
Rosemount 8732	Generic Wiring for Sensors	page E-14
Foxboro		
Rosemount 8732	Series 1800	page E-15
Rosemount 8732	Series 1800 (Version 2)	page E-16
Rosemount 8732	Series 2800	page E-17
Rosemount 8732	Generic Wiring for Sensors	page E-18
Kent		
Rosemount 8732	Veriflux VTC	page E-19
Rosemount 8732	Generic Wiring for Sensors	page E-20
Krohne		
Rosemount 8732	Generic Wiring for Sensors	page E-21
Taylor		
Rosemount 8732	Series 1100	page E-23
Rosemount 8732	Generic Wiring for Sensors	page E-23
Yamatake Honeywell		
Rosemount 8732	Generic Wiring for Sensors	page E-24
Yokogawa		
Rosemount 8732	Generic Wiring for Sensors	page E-25
Generic Manufacturer Wiring		page E-26
Rosemount 8732	Generic Wiring for Sensors	page E-26

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ROSEMOUNT SENSORS

Rosemount 8705/8707/8711/8721 Sensors to Rosemount 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure .

Figure E-1. Wiring Diagram to a Rosemount 8732 Transmitter

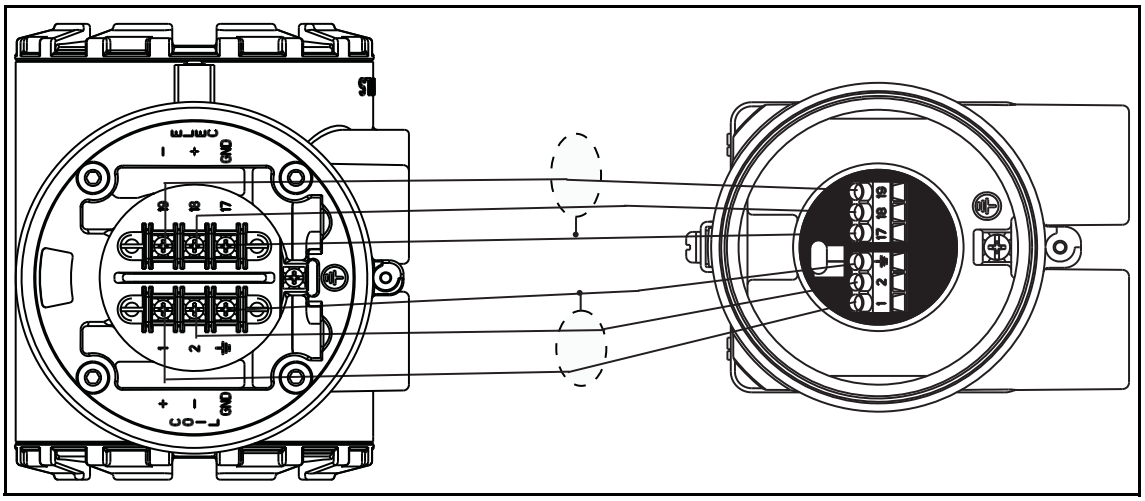
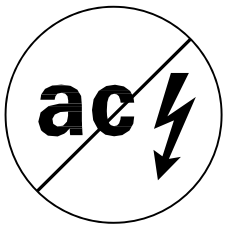


Table E-2. Rosemount 8705/8707/8711/8721 Sensor Wiring Connections

Rosemount 8732 Transmitters	Rosemount 8705/8707/8711/8721 Sensors
1	1
2	2
⏚	⏚
17	17
18	18
19	19

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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Rosemount 8701 Sensor to Rosemount 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure E-2 on page E-4.

Figure E-2. Wiring Diagram for Rosemount 8701 Sensor and Rosemount 8732 Transmitter

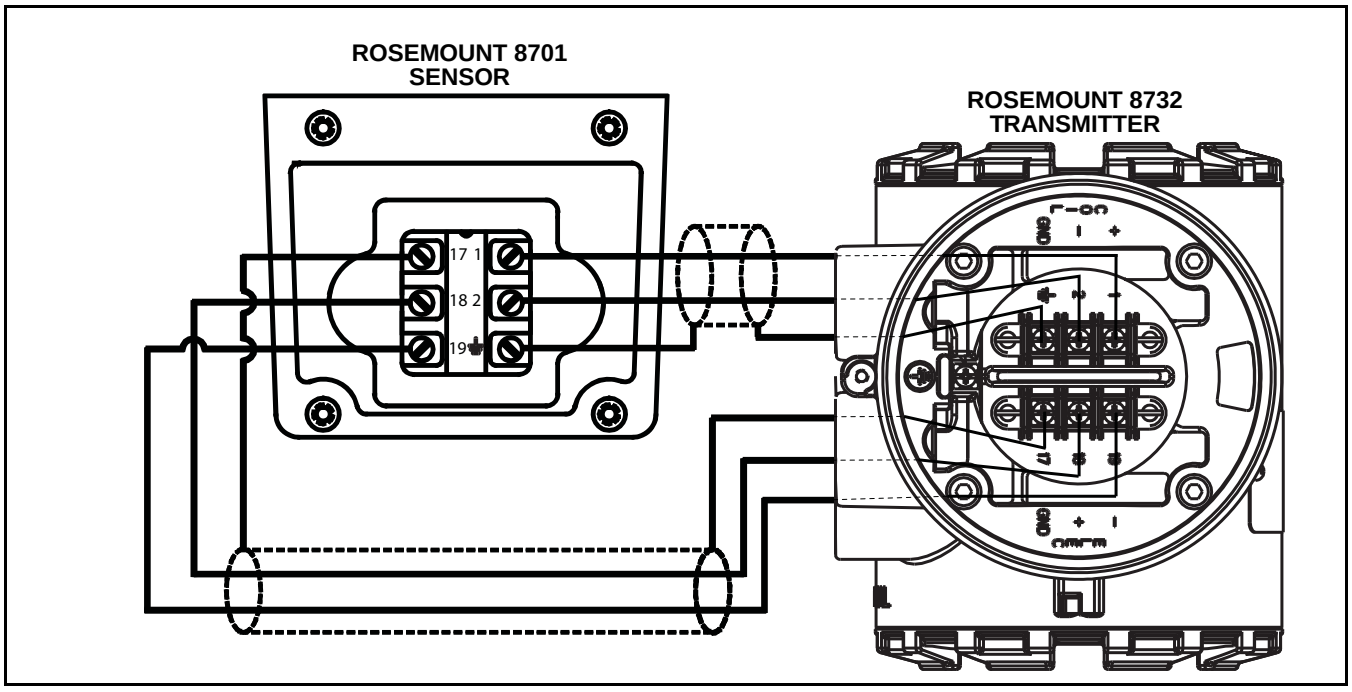
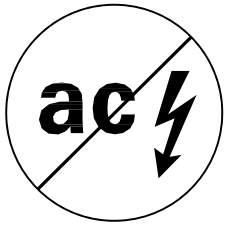


Table E-3. Rosemount 8701 Sensor Wiring Connections

Rosemount 8732	Rosemount 8701 Sensors
1	1
2	2
⏚	⏚
17	17
18	18
19	19

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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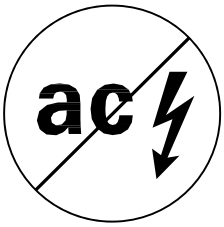
Connecting Sensors of Other Manufacturers

Before connecting another manufacturer's sensor to the Rosemount 8732 transmitter, it is necessary to perform the following functions.

1. Turn off the AC power to the sensor and transmitter. Failure to do so could result in electrical shock or damage to the transmitter.
2. Verify that the coil drive cables between the sensor and the transmitter are not connected to any other equipment.
3. Label the coil drive cables and electrode cables for connection to the transmitter.
4. Disconnect the wires from the existing transmitter.
5. Remove the existing transmitter. Mount the new transmitter. See "Mount the Transmitter" on page 2-3.
6. Verify that the sensor coil is configured for series connection. Other manufacturers sensors may be wired in either a series or parallel circuit. All Rosemount magnetic sensors are wired in a series circuit. (Other manufacturers AC sensors (AC coils) wired for 220V operation are typically wired in parallel and must be rewired in series.)
7. Verify that the sensor is in good working condition. Use the manufacturer's recommended test procedure for verification of sensor condition. Perform the basic checks:
   a. Check the coils for shorts or open circuits.
   b. Check the sensor liner for wear or damage.
   c. Check the electrodes for shorts, leaks, or damage.
8. Connect the sensor to the transmitter in accordance with reference wiring diagrams. See Appendix E: Universal Sensor Wiring Diagrams for specific drawings.
9. Connect and verify all connections between the sensor and the transmitter, then apply power to the transmitter.
10. Perform the Universal Auto Trim function.

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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BROOKS SENSORS

Model 5000 Sensor to Rosemount 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure E-3.

Figure E-3. Wiring Diagram for Brooks Sensor Model 5000 and Rosemount 8732

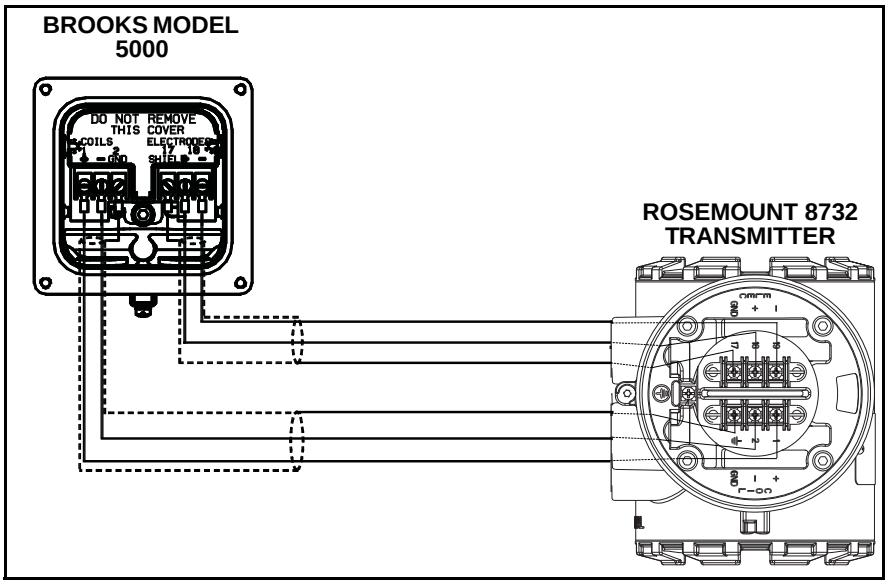
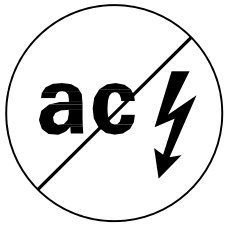


Table E-4. Brooks Model 5000 Sensor Wiring Connections

Rosemount 8732	Brooks Sensors Model 5000
1	1
2	2
⏚	⏚
17	17
18	18
19	19

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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Model 7400 Sensor to Rosemount 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure E-4.

Figure E-4. Wiring Diagram for Brooks Sensor Model 7400 and Rosemount 8732

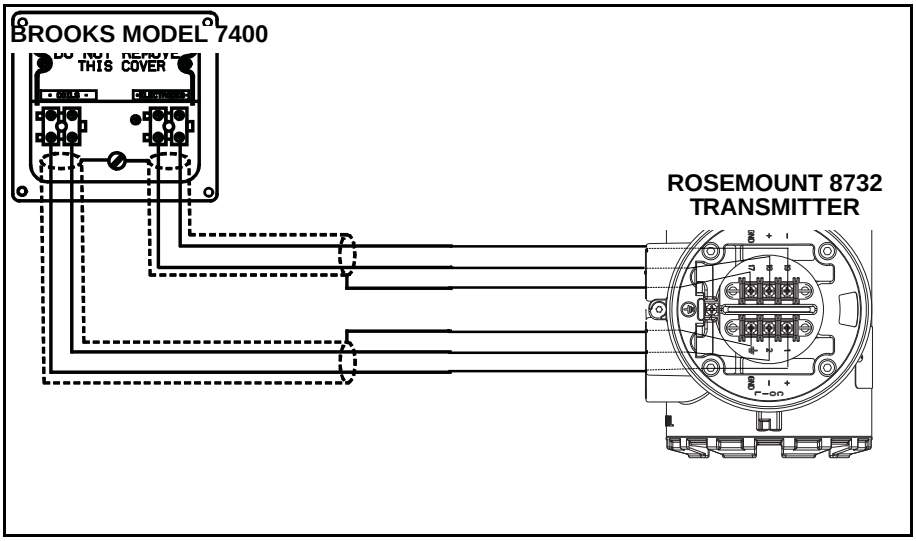
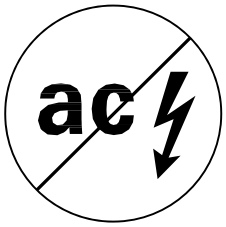


Table E-5. Brooks Model 7400 Sensor Wiring Connections

Rosemount 8732	Brooks Sensors Model 7400
1	Coils +
2	Coils –
⏚	⏚
17	Shield
18	Electrode +
19	Electrode –

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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ENDRESS AND HAUSER SENSORS

Endress and Hauser Sensor to Rosemount 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure E-5.

Figure E-5. Wiring Diagram for Endress and Hauser Sensors and Rosemount 8732

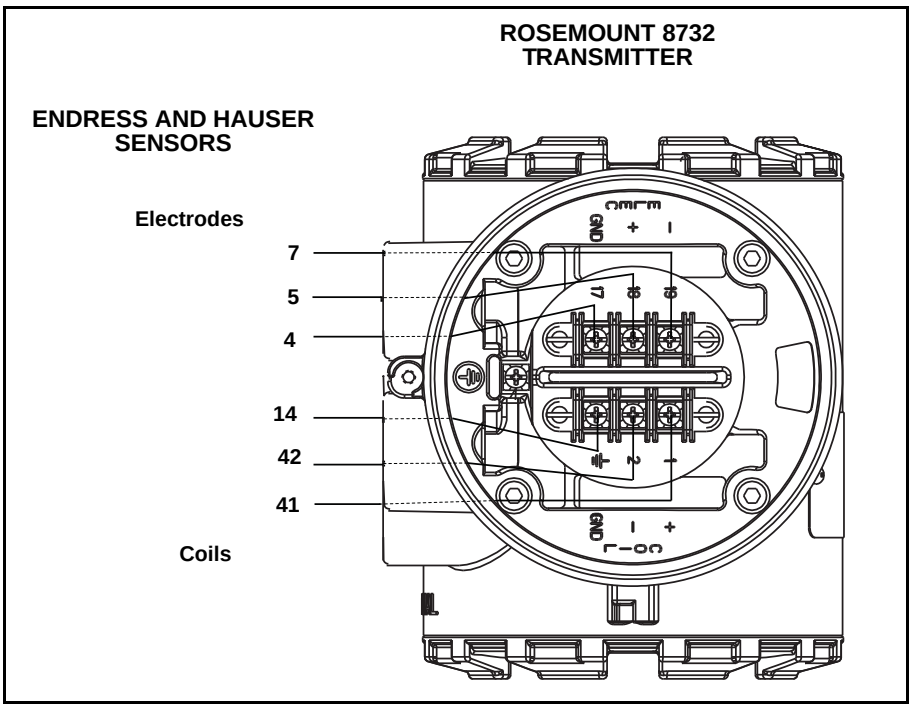


Table E-6. Endress and Hauser Sensor Wiring Connections

Rosemount 8732	Endress and Hauser Sensors
1	41
2	42
⏚	14
17	4
18	5
19	7

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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FISCHER AND PORTER SENSORS

Model 10D1418 Sensor to Rosemount 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure E-6.

Figure E-6. Wiring Diagram for Fischer and Porter Sensor Model 10D1418 and Rosemount 8732

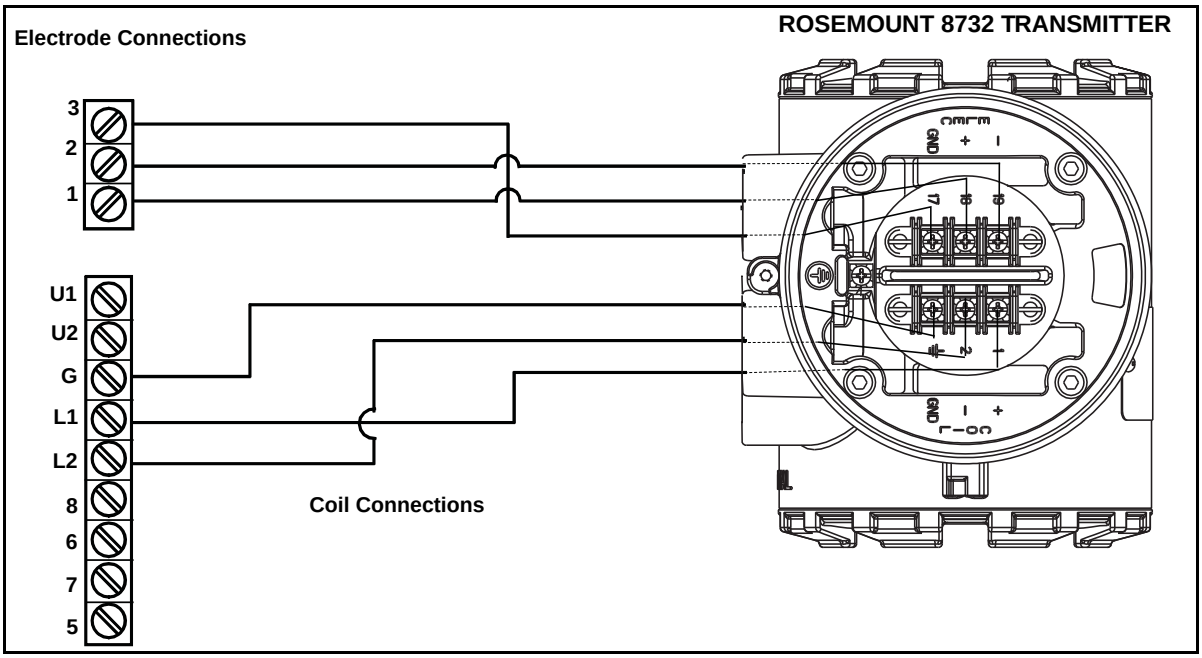
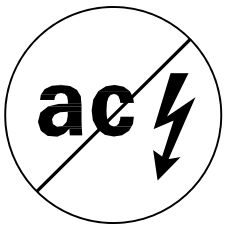


Table E-7. Fischer and Porter Model 10D1418 Sensor Wiring Connections

Rosemount 8732	Fischer and Porter Model 10D1418 Sensors
1	L1
2	L2
⏚	Chassis Ground
17	3
18	1
19	2

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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Model 10D1419 Sensor to Rosemount 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure E-7.

Figure E-7. Wiring Diagram for Fischer and Porter Sensor Model 10D1419 and Rosemount 8732

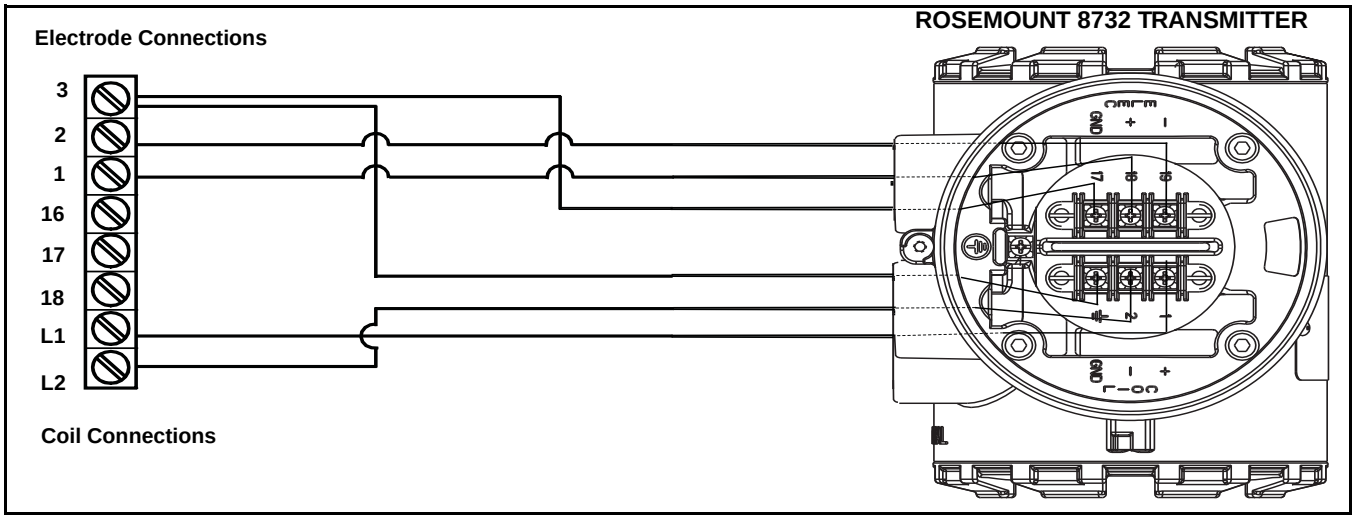
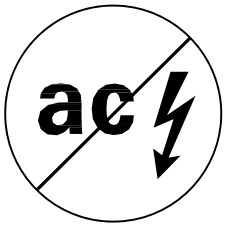


Table E-8. Fischer and Porter Model 10D1419 Sensor Wiring Connections

Rosemount 8732	Fischer and Porter Model 10D1419 Sensors
1	L1
2	L2
⏚	3
17	3
18	1
19	2

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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Model 10D1430 Sensor (Remote) to Rosemount 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure E-8.

Figure E-8. Wiring Diagram for Fischer and Porter Sensor Model 10D1430 (Remote) and Rosemount 8732

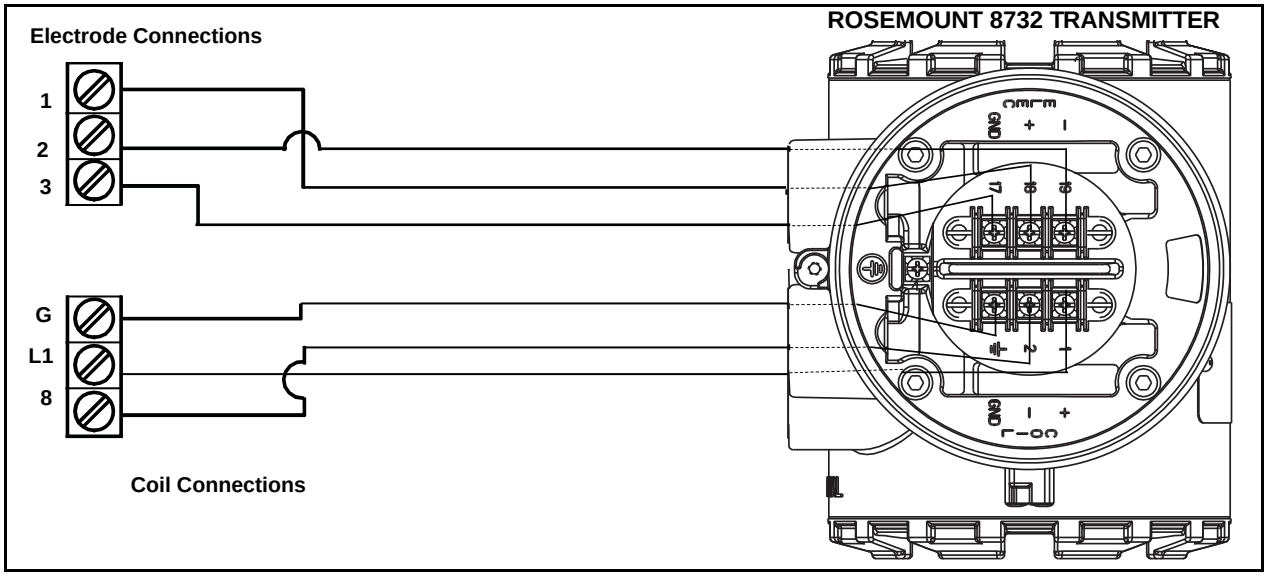


Table E-9. Fischer and Porter Model 10D1430 (Remote) Sensor Wiring Connections

Rosemount 8732	Fischer and Porter Model 10D1430 (Remote) Sensors
1	L1
2	8
⏚	G
17	3
18	1
19	2

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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Model 10D1430 Sensor (Integral) to Rosemount 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure E-9.

Figure E-9. Wiring Diagram for Fischer and Porter Sensor Model 10D1430 (Integral) and Rosemount 8732

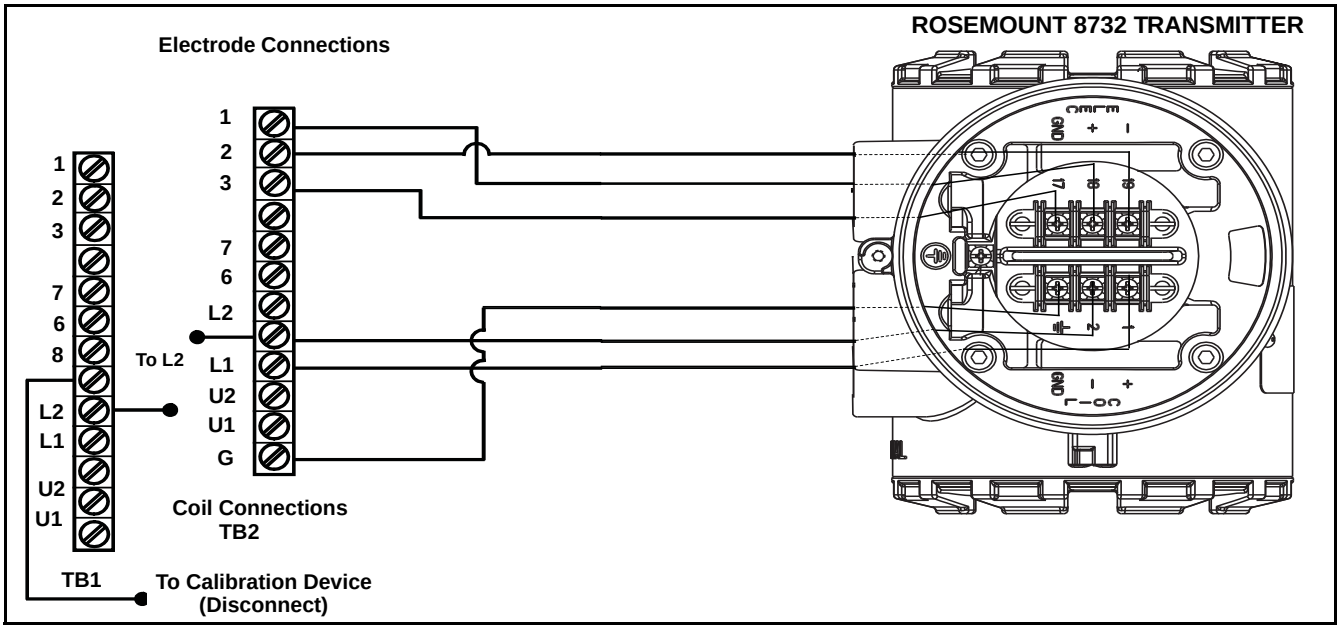
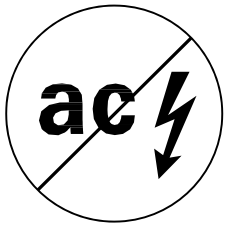


Table E-10. Fischer and Porter Model 10D1430 (Integral) Sensor Wiring Connections

Rosemount 8732	Fischer and Porter Model 10D1430 (Integral) Sensors
1	L1
2	L2
⏚	G
17	3
18	1
19	2

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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Model 10D1465 and Model 10D1475 Sensors (Integral) to 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure E-10.

Figure E-10. Wiring Diagram for Fischer and Porter Sensor Model 10D1465 and Model 10D1475 (Integral) and Rosemount 8732

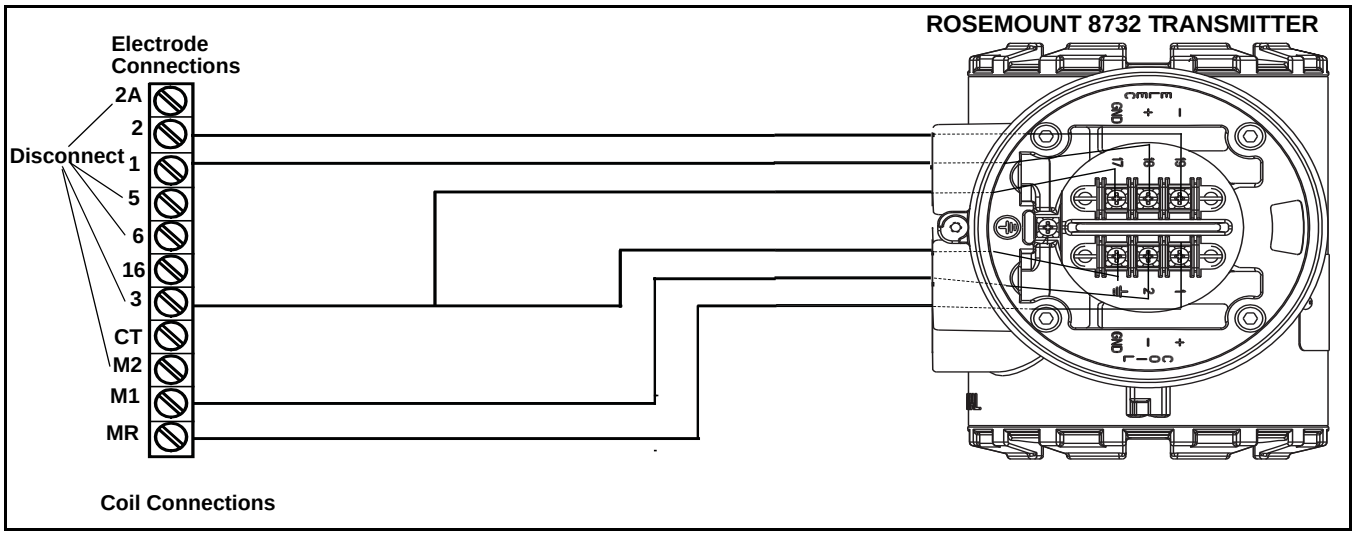
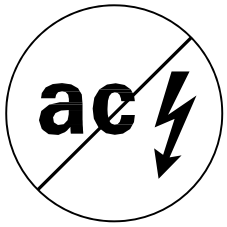


Table E-11. Fischer and Porter Model 10D1465 and 10D1475 Sensor Wiring Connections

Rosemount 8732	Fischer and Porter Model 10D1465 and 10D1475 Sensors
1	MR
2	M1
⏚	3
17	3
18	1
19	2

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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Fischer and Porter Sensor to Rosemount 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure E-11.

Figure E-11. Generic Wiring Diagram for Fischer and Porter Sensors and Rosemount 8732

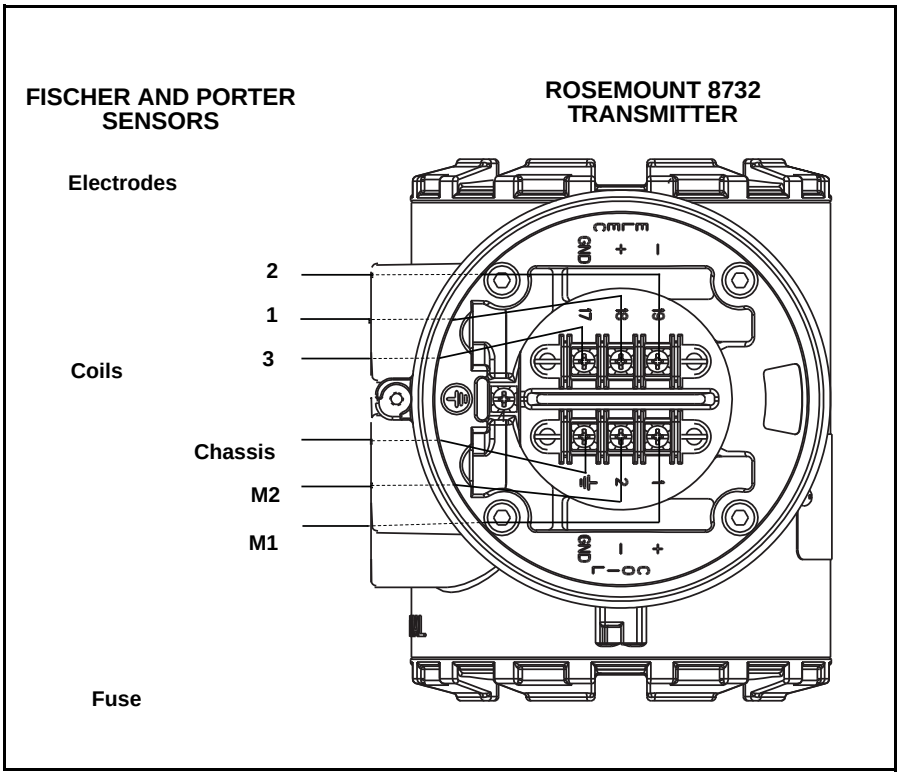
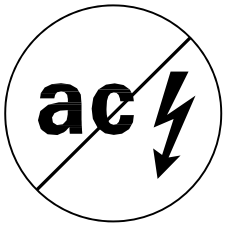


Table E-12. Fischer and Porter Generic Sensor Wiring Connections

Rosemount 8732	Fischer and Porter Sensors
1	M1
2	M2
⏚	Chassis Ground
17	3
18	1
19	2

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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FOXBORO SENSORS

Connect coil drive and electrode cables as shown in Figure E-12.

Series 1800 Sensor to Rosemount 8732 Transmitter

Figure E-12. Wiring Diagram for Foxboro Series 1800 and Rosemount 8732

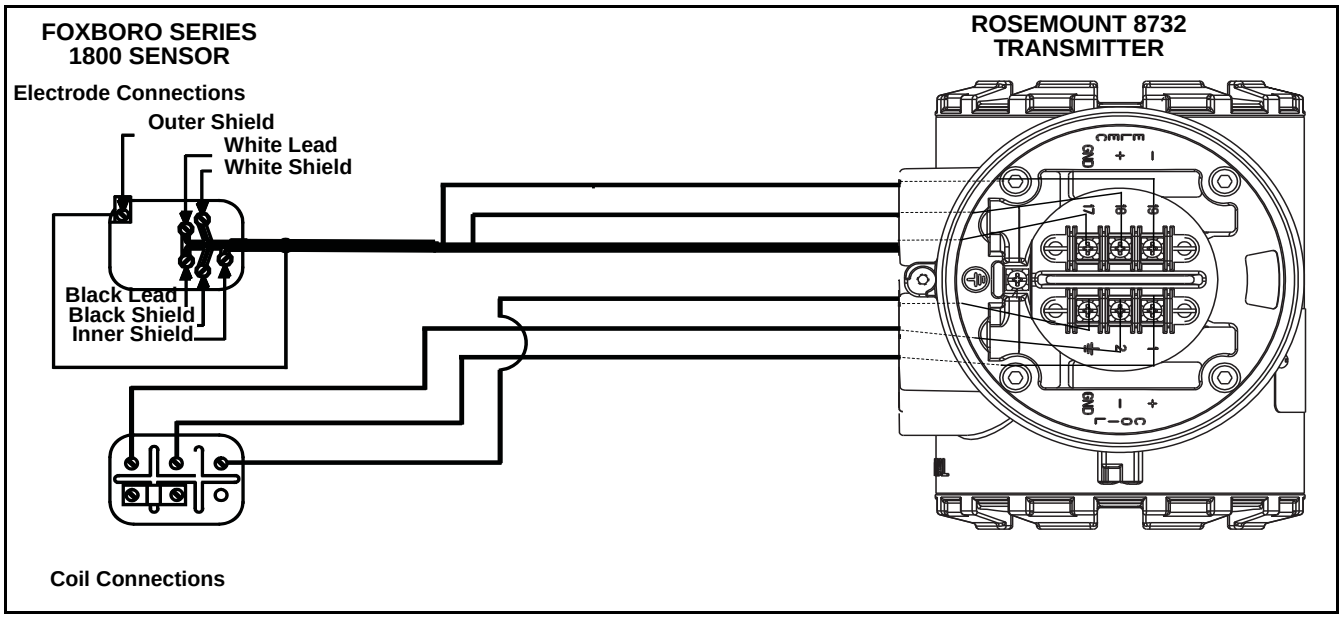
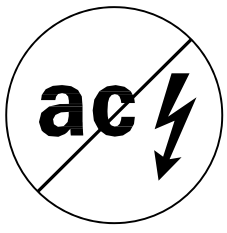


Table E-13. Foxboro Generic Sensor Wiring Connections

Rosemount 8732	Foxboro Series 1800 Sensors
1	L1
2	L2
⏚	Chassis Ground
17	Any Shield
18	Black
19	White

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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Series 1800 (Version 2) Sensor to Rosemount 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure E-13.

Figure E-13. Wiring Diagram for Foxboro Series 1800 (Version 2) and Rosemount 8732

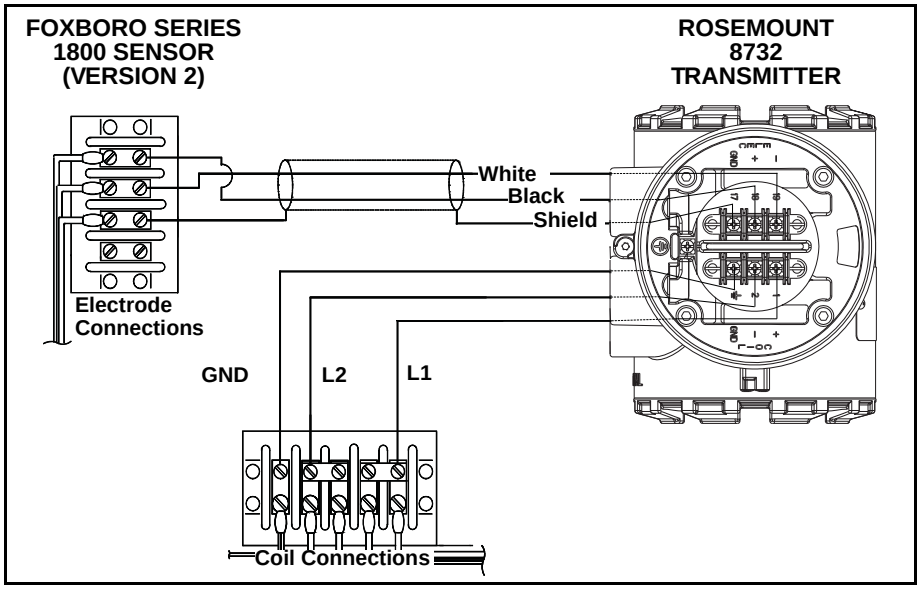
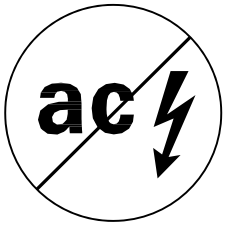


Table E-14. Foxboro Generic Sensor Wiring Connections

Rosemount 8732	Foxboro Series 1800 Sensors
1	L1
2	L2
⏚	Chassis Ground
17	Any Shield
18	Black
19	White

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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Series 2800 Sensor to 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure E-14.

Figure E-14. Wiring Diagram for Foxboro Series 2800 and Rosemount 8732

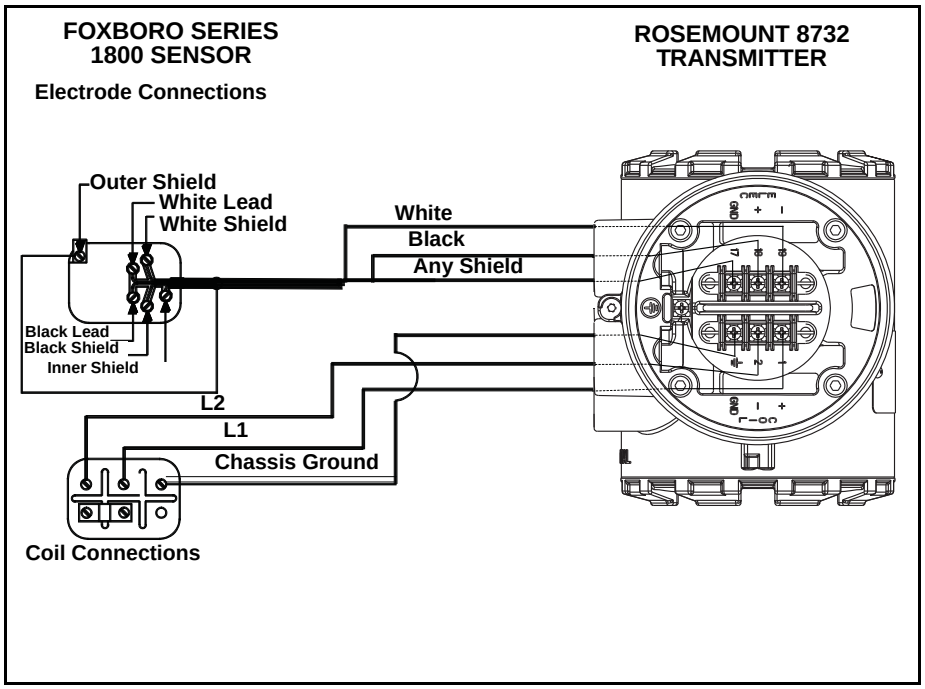
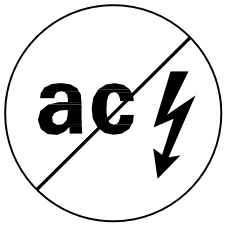


Table E-15. Foxboro Series 2800 Sensor Wiring Connections

Rosemount 8732	Foxboro Series 2800 Sensors
1	L1
2	L2
⏚	Chassis Ground
17	Any Shield
18	Black
19	White

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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Foxboro Sensor to 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure E-15.

Figure E-15. Generic Wiring Diagram for Foxboro Sensors and Rosemount 8732

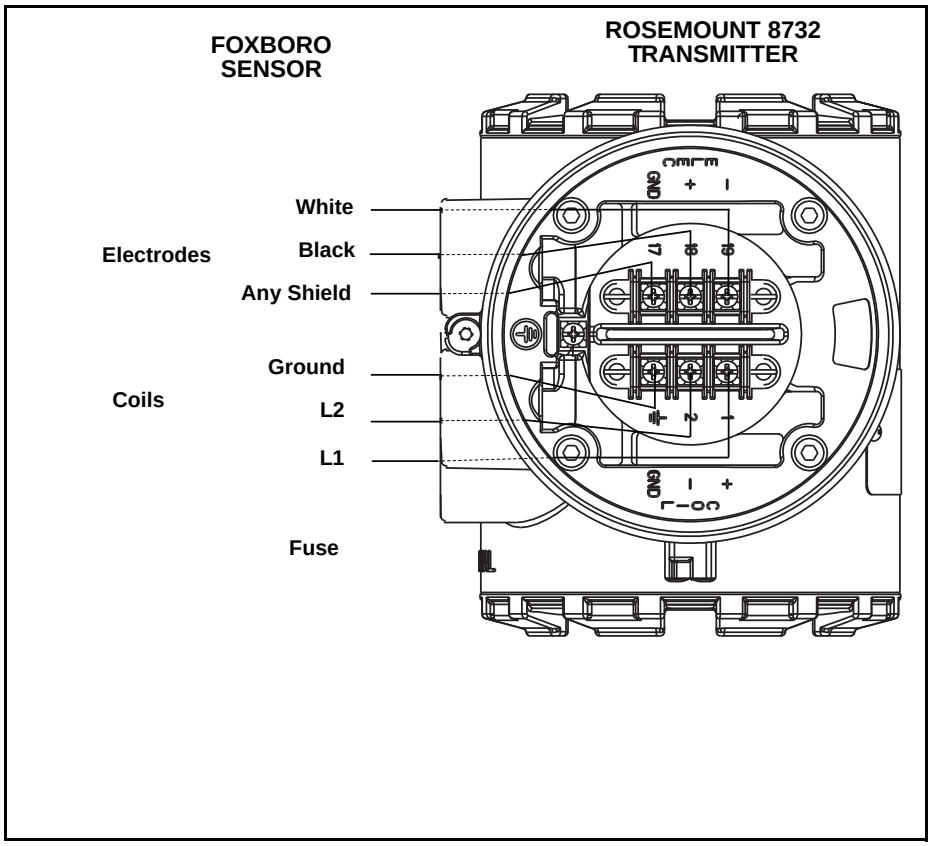
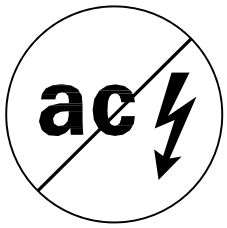


Table E-16. Foxboro Sensor Wiring Connections

Rosemount 8732	Foxboro Sensors
1	L1
2	L2
⏚	Chassis Ground
17	Any Shield
18	Black
19	White

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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KENT VERIFLUX VTC SENSOR

Veriflux VTC Sensor to 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure E-16.

Figure E-16. Wiring Diagram for Kent Veriflux VTC Sensor and Rosemount 8732

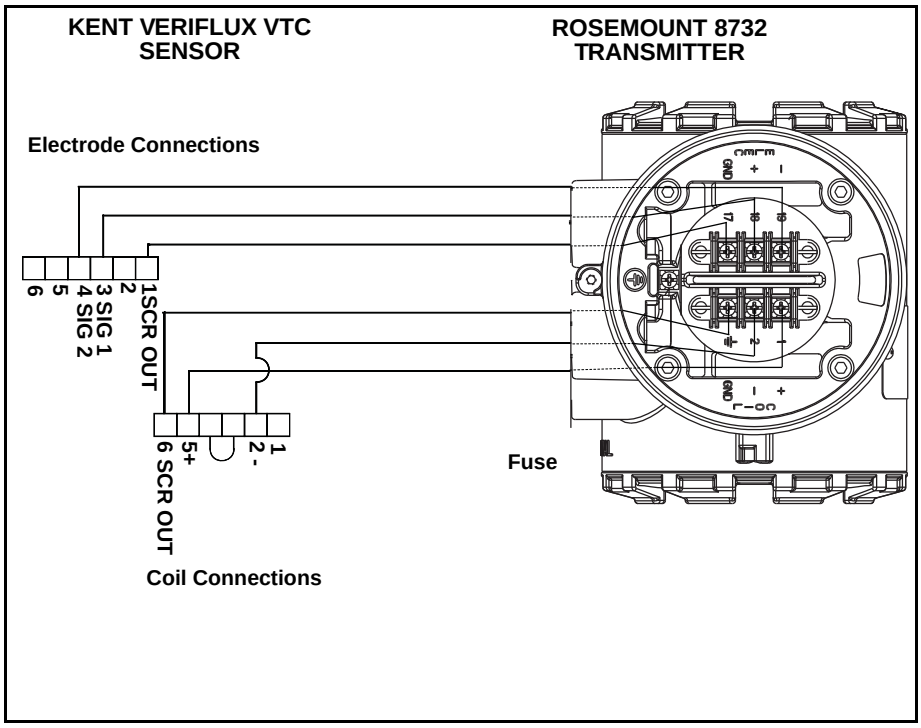
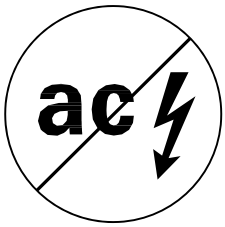


Table E-17. Kent Veriflux VTC Sensor Wiring Connections

Rosemount 8732	Kent Veriflux VTC Sensors
1	2
2	1
⏚	SCR OUT
17	SCR OUT
18	SIG1
19	SIG2

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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KENT SENSORS

Kent Sensor to Rosemount 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure E-17.

Figure E-17. Generic Wiring Diagram for Kent Sensors and Rosemount 8732

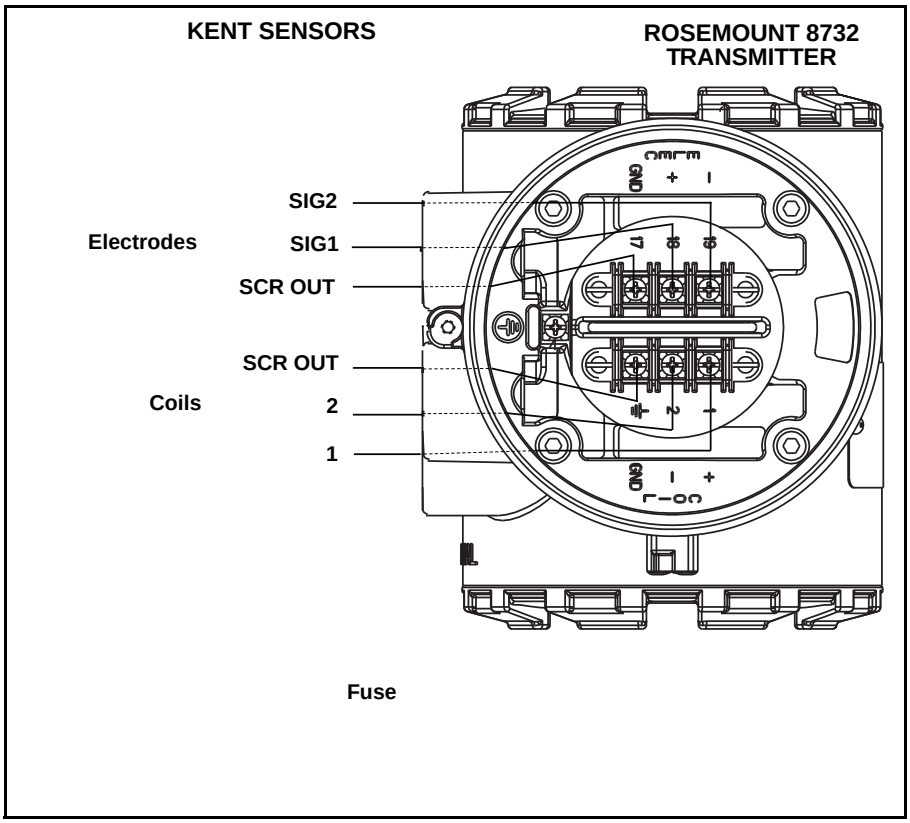
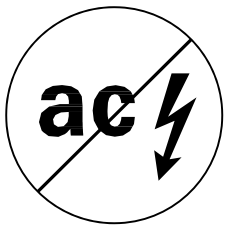


Table E-18. Kent Sensor Wiring Connections

Rosemount 8732	Kent Sensors
1	1
2	2
⏚	SCR OUT
17	SCR OUT
18	SIG1
19	SIG2

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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KROHNE SENSORS

Krohne Sensor to Rosemount 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure E-18.

Figure E-18. Generic Wiring Diagram for Krohne Sensors and Rosemount 8732

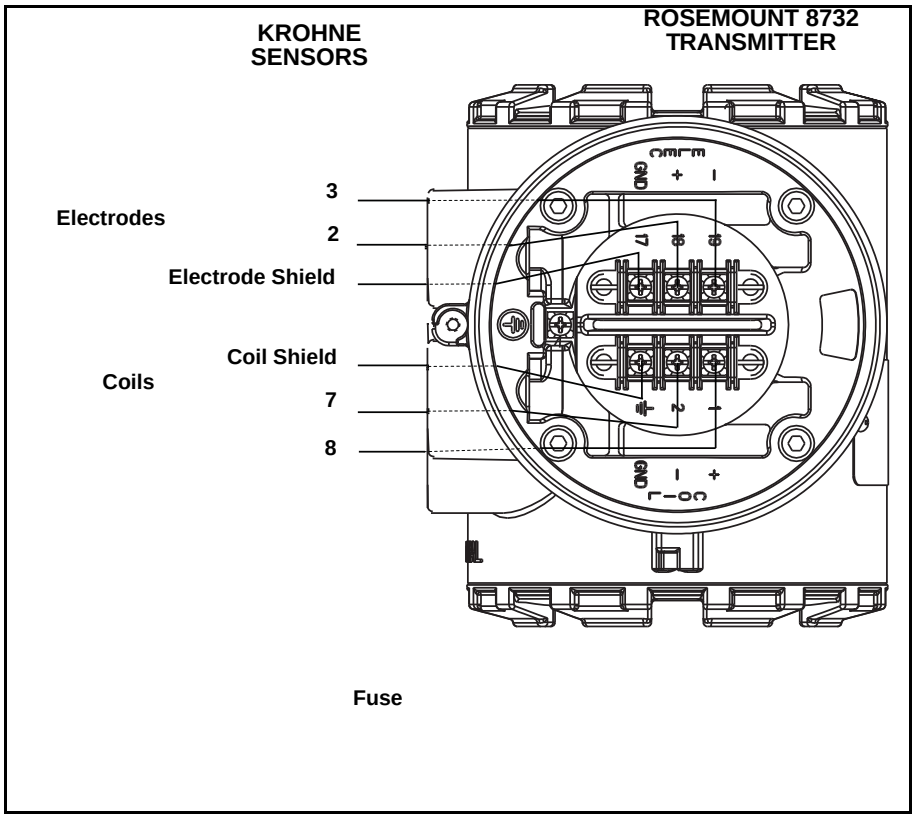
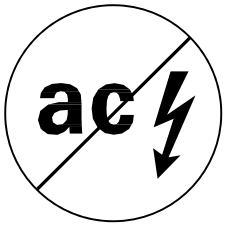


Table E-19. Krohne Sensor Wiring Connections

Rosemount 8732	Krohne Sensors
1	8
2	7
⏚	Coil Shield
17	Electrode Shield
18	2
19	3

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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TAYLOR SENSORS

Series 1100 Sensor to Rosemount 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure E-19.

Figure E-19. Wiring Diagram for Taylor Series 1100 Sensors and Rosemount 8732

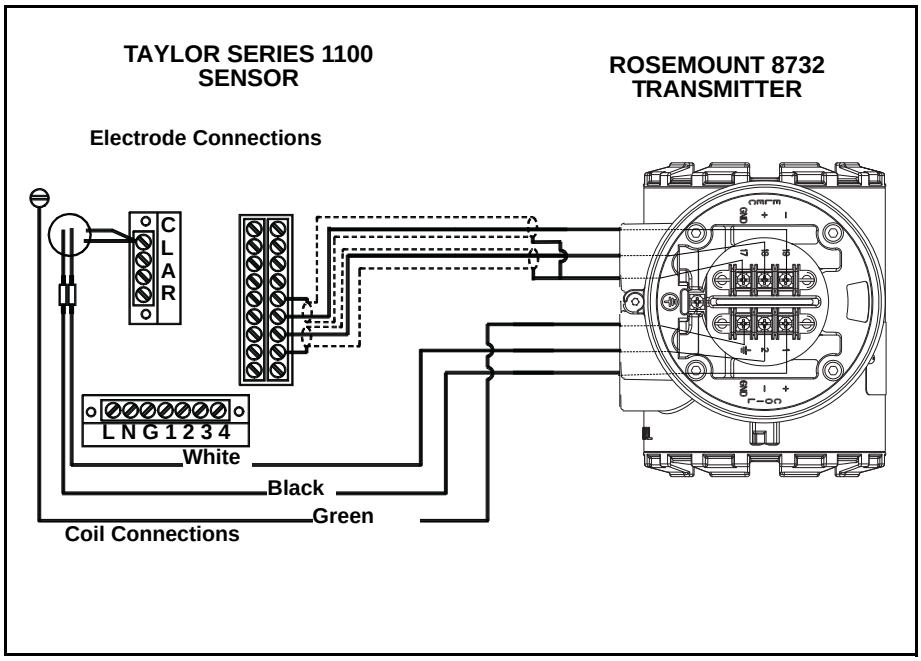
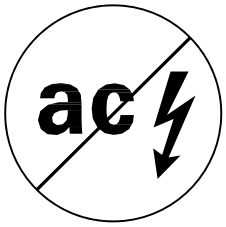


Table E-20. Taylor Series 1100 Sensor Wiring Connections

Rosemount 8732	Taylor Series 1100 Sensors
1	Black
2	White
⏚	Green
17	S1 and S2
18	E1
19	E2

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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Taylor Sensor to Rosemount 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure E-20.

Figure E-20. Generic Wiring Diagram for Taylor Sensors and Rosemount 8732

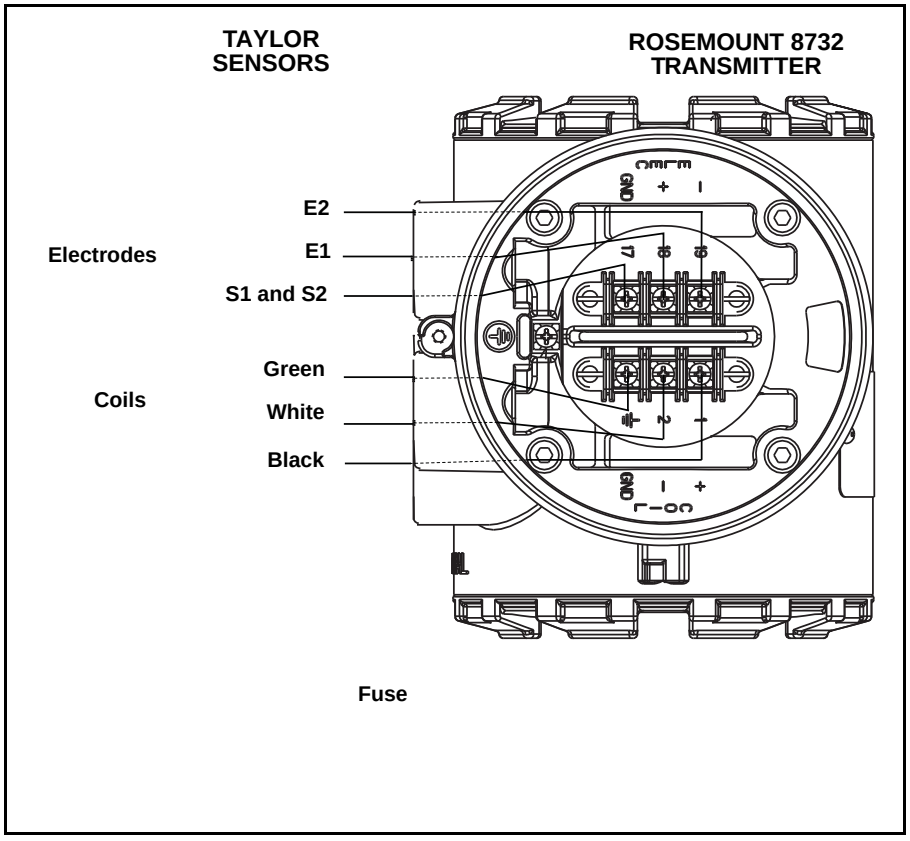
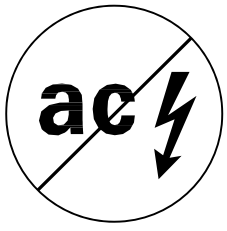


Table E-21. Taylor Sensor Wiring Connections

Rosemount 8732	Taylor Sensors
1	Black
2	White
⏚	Green
17	S1 and S2
18	E1
19	E2

⚠CAUTION

This is a pulsed DCDC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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YAMATAKE HONEYWELL SENSORS

Yamatake Honeywell Sensor to Rosemount 8732 Transmitter

Connect coil drive and electrode cables as shown in Figure E-21.

Figure E-21. Generic Wiring Diagram for Yamatake Honeywell Sensors and Rosemount 8732

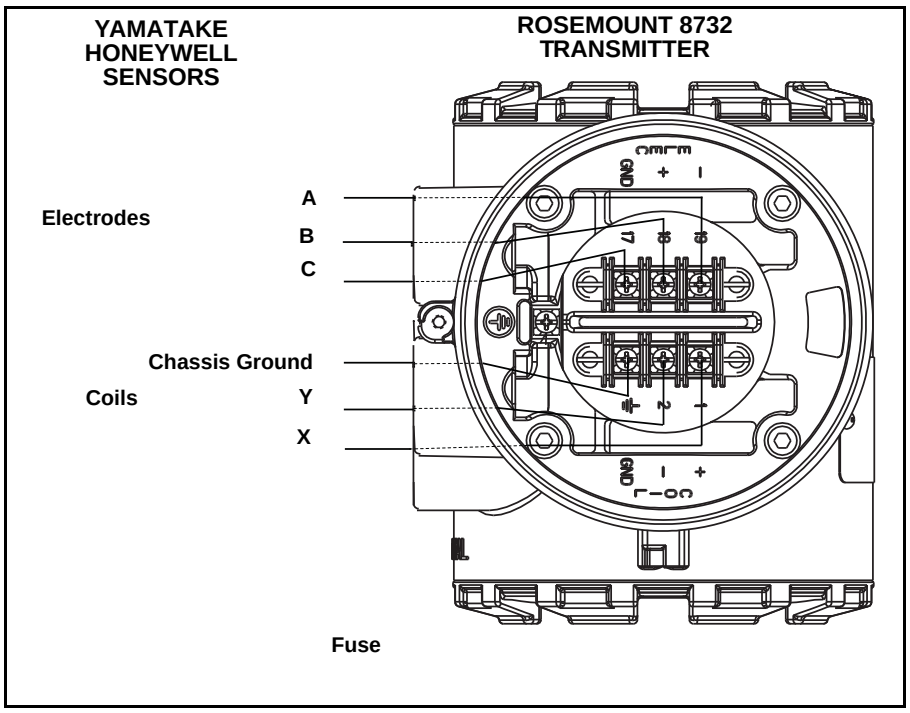
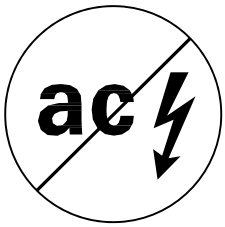


Table E-22. Yamatake Honeywell Sensor Wiring Connections

Rosemount 8732	Yamatake Honeywell Sensors
1	X
2	Y
⏚	Chassis Ground
17	C
18	B
19	A

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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YOKOGAWA SENSORS

Connect coil drive and electrode cables as shown in Figure E-22.

Yokogawa Sensor to Rosemount 8732 Transmitter

Figure E-22. Generic Wiring Diagram for Yokogawa Sensors and Rosemount 8732

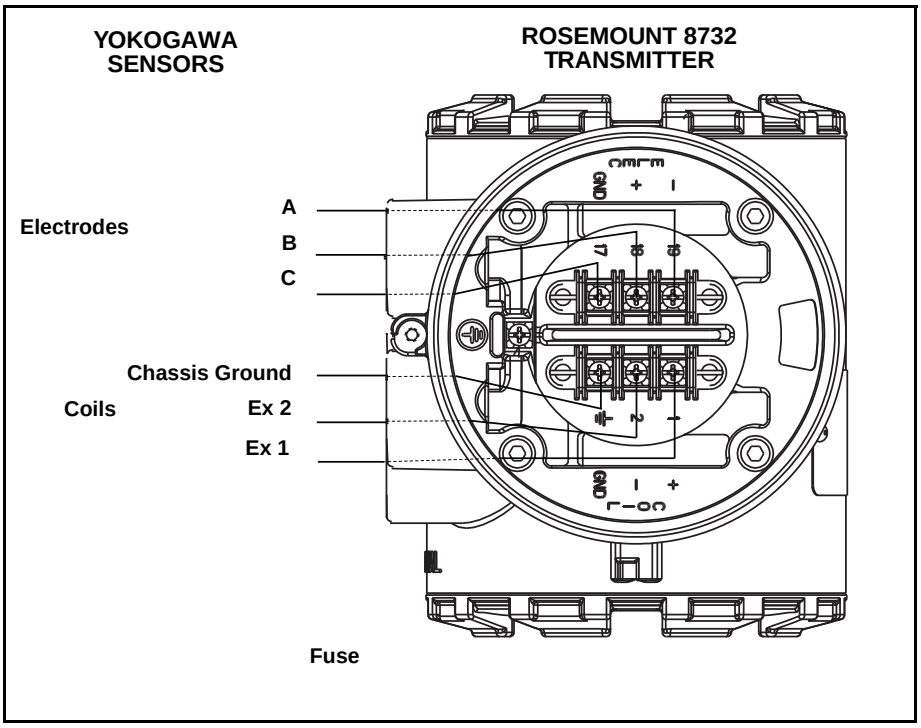
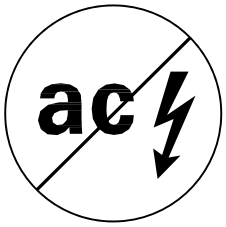


Table E-23. Yokogawa Sensor Wiring Connections

Rosemount 8732	Yokogawa Sensors
1	EX1
2	EX2
⏚	Chassis Ground
17	C
18	B
19	A

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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GENERIC MANUFACTURER SENSORS

Generic Manufacturer Sensor to Rosemount 8732 Transmitter

Identify the Terminals

First check the sensor manufacturer's manual to identify the appropriate terminals. Otherwise, perform the following procedure.

Identify coil and electrode terminals

1. Select a terminal and touch an ohmmeter probe to it.
2. Touch the second probe to each of the other terminals and record the results for each terminal.
3. Repeat the process and record the results for every terminal.

Coil terminals will have a resistance of approximately 3-300 ohms.

Electrode terminals will have an open circuit.

Identify a chassis ground

1. Touch one probe of an ohmmeter to the sensor chassis.
2. Touch the other probe to the each sensor terminal and the record the results for each terminal.

The chassis ground will have a resistance value of one ohm or less.

Wiring Connections

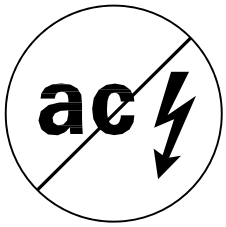
Connect the electrode terminals to Rosemount 8732 terminals 18 and 19. The electrode shield should be connected to terminal 17.

Connect the coil terminals to Rosemount 8732 terminals 1, 2, and ⏚.

If the Rosemount 8732 Transmitter indicates a reverse flow condition, switch the coil wires connected to terminals 1 and 2.

⚠CAUTION

This is a pulsed DC magnetic flowmeter. **Do not connect AC power to the sensor or to terminals 1 and 2 of the transmitter**, or replacement of the electronics board will be necessary.



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Appendix F Physical Block

Physical Block Parameter Attribute Definitions . . . . . page F-1
I&M Parameters . . . . . page F-4

PHYSICAL BLOCK PARAMETER ATTRIBUTE DEFINITIONS

The following table describes the parameters that are available in the physical block. Each line item in the table defines the element and specifies the requirements for each element. If a column is blank for a data element, it can be assumed that the column does not apply to that element.

Table F-1. Physical Block Parameters

Index	Parameter	Description
	Profibus PA Specific Block Header	
16	BLOCK_OBJECT	This object contains the characteristics of the blocks.
17	ST_REV	The modification of at least one static parameter in a block has to be incremented by the according ST_REV at least by one.
18	TAG_DESC	Every block can be assigned a textual TAG description. The TAG_DESC must be unambiguous and unique in the fieldbus system.
19	STRATEGY	Grouping of Function Block. The STRATEGY field can be used to group blocks.
20	ALERT_KEY	This parameter contains the identification number of the plant unit. It helps to identify the location (plant unit) of an event.
21	TARGET_MODE	The TARGET_MODE parameter contains desired mode normally set by a control application or an operator. The modes are valid alternatively only, i.e. only one mode can be set at one time. A write access to this parameter with more then one mode is out of the range of the parameter and have to be refused.
22	MODE_BLK	This parameter contains the current mode, the permitted and normal mode of the block.
23	ALARM_SUM	This parameter contains the current states of the block alarms.
24	SOFTWARE_REVISION	Label of code in the device for tracking purpose. Please refer to D_8732EPA_SCMP.doc for details.
25	HARDWARE_REVISION	Mapped to HW_REV parameter in Manufacturing Block

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Index	Parameter	Description
26	DEVICE_MAN_ID	Mapped to Mfg_ID parameter in Manufacturing Block
27	DEVICE_ID	Mapped to DEV_TYPE parameter in Manufacturing Block
28	DEVICE_SER_NUM	Mapped to last 16 characters of DEVICE_ID_STRING parameter in Manufacturing Block
29	DIAGNOSIS	Detailed information of the device, bitwize coded. More than one message is possible at once. If MSB of byte 4 is set to 1 than more diagnostic information is available in the DIAGNOSIS_EXTENSION parameter.
30	DIAGNOSIS_EXTENSION	Additional manufacturer-specific information of the device, bitwize coded. More than one message is possible at once.
31	DIAGNOSIS_MASK	Supported std diagnostics Warmstart Coldstart maint requd ident number violation function check failed maint demanded extension available
32	DIAGNOSIS_MASK_EXTENSION	Definition of supported DIAGNOSIS_EXTENSION information-bits.
33	RESERVED	
34	WRITE_LOCKING	Software write protection. 0: acyclic write service of all parameter are refused, except WRITE_LOCKING and the TAB_ENTRY parameter of the Linearization table, i.e. access is denied. 2457: is the default value and means all writable parameters of a device are writable.
35	FACTORY_RESET	1: (mandatory) is the command for resetting device for default values. The setting of the bus address is not affected. 2506: (optional) is the command for warmstart of the device. All parametrisation remains unchanged. 2712: (optional) The bus address to its default address; other parametrisation remains unchanged. The bus address is changed immediately regardless if the device is in cyclic data transfer state. The reset is not suspended up to a subsequent power cycle/warmstart.
36	DESCRIPTOR	User-definable text (a string) to describe the device within the application.
37	DEVICE_MESSAGE	User-definable MESSAGE (a string) to describe the device within the application or in the plant.
38	DEVICE_INSTALL_DATE	Date of installation of the device.
39	LOCAL_OP_ENA	Local operation enable. 0: disabled (Local operation not allowed, i.e. change of FB MODE from host device only) 1: enabled (Local operation is allowed).

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Index	Parameter	Description
40	IDENT_NUMBER_SELECTOR	0: profile specific Ident_Number V3.0 (mandatory) 1: manufacturer specific Ident_Number V3.0 (optional)
41	HW_WRITE_PROTECTION	Not supported in the device
42	FEATURE	Supported: Expanded diag, condensed status Enabled: Expanded diag,condensed status
43	COND_STATUS_DIAG	Indicates the mode of a device that can be configured for status and diagnostic behavior. 0: Conventional Status and Diagnosis is provided. 1: Condensed Status and Diagnosis information is provided.
44	DIAG_EVENT_SWITCH	Optional parameter not supported in the device
45-48	RESERVED by PNO	
	Manufacturer Specific Parameters	
49	DEVICE_ADDRESS	Device address on the profibus network
50	MFG_BOARD_NUM	Mapped to mfg block board number parameter
51	STACK_LIB_VERSION	Library revision of Stack for tracking purpose
52	VIEW_1_PB	Std View_1 object of Physical block

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I&M PARAMETERS

Table F-2. I&M Parameters

Index - The I&M block index

Sub Index - IM_INDEX values

Element - The sub parameter index within the I&M parameter

Parameter Mnemonic - Usage identifier for the I&M parameter

Parameter Name - This simply gives a name to the data element. This name should be consistent across documentation.

Initial Value - If the data element is reset, this is the value that will be used. The behavior of the different storage types is define below.

Index	Sub Index	Element	Parameter Mnemonic	Parameter Name	Initial Value
255	65000	0	I&M0	Header	0x20(Blank)
		1		MANUFACTURER_ID	PB.DEVICE_MAN_ID
		2		ORDER_ID	
		3		SERIAL_NUMBER	PB.DEVICE_SER_NUM
		4		HARDWARE_REVISION	0xFFFF
		5		SOFTWARE_REVISION	V, 0xFF, 0xFF, 0xFF
		6		REV_COUNTER	0
		7		PROFILE_ID	0x9700
		8		PROFILE_SPECIFIC_TYPE	1,1
		9		IM_VERSION	0x01,0x01
		10		IM_SUPPORTED	0x07
	65001	0	I&M1	Header	Blank
		1		TAG_FUNCTION	PB.TAG_DESC
		2		TAG_LOCATION	Blank
	65002	0	I&M2	Header	Blank
		1		DATE	PB.DEVICE_INSTALL_DATE
		2		reserved	Blank
	650016	0	PA_IM_0	Header	Blank
		1		PA_IM_VERSION	1,0
		2		HARDWARE_REVISION	PB. HARDWARE_REVISION
		3		SOFTWARE_REVISION	PB. SOFTWARE_REVISION
		4		reserved	Blank
		6		PA_IM_SUPPORTED	0x00,0x00

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Appendix G Transducer Block

Transducer Block Parameter Attribute Definitions . . . . . page G-1

TRANSDUCER BLOCK PARAMETER ATTRIBUTE DEFINITIONS

The following table describes the parameters that are available in the transducer block. Each line item in the table defines the element and specifies the requirements for each element. If a column is blank for a data element, it can be assumed that the column does not apply to that element.

Table G-1. Transducer Block Parameters

Index	Parameter Name	Description
	Profibus PA Specific Block Header Information	
16	BLOCK_OBJECT	This object contains the characteristics of the blocks.
17	ST_REV	The modification of at least one static parameter in a block has to be incremented by the according ST_REV at least by one.
18	TAG_DESC	Every block can be assigned a textual TAG description. The TAG_DESC must be unambiguous and unique in the fieldbus system.
19	STRATEGY	Grouping of Function Block. The STRATEGY field can be used to group blocks.
20	ALERT_KEY	This parameter contains the identification number of the plant unit. It helps to identify the location (plant unit) of an event.
21	TARGET_MODE	The TARGET_MODE parameter contains desired mode normally set by a control application or an operator. The modes are valid alternatively only, i.e. only one mode can be set at one time. A write access to this parameter with more then one mode is out of the range of the parameter and have to be refused.
22	MODE_BLK	This parameter contains the current mode, the permitted and normal mode of the block.
23	ALARM_SUM	This parameter contains the current states of the block alarms.
	Magnetic Flow Meter Specific Parameters	
24	CALIBR_FACTOR	This parameter is standard PA magnetic flow parameter. Not used within 8732E device.

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Index	Parameter Name	Description
25	LOW_FLOW_CUTOFF	When flow rate is less than this entered value, flow rate output will be set to 0.0 flow. See section Engineering Units for supported unit codes.
26	MEASUREMENT_MODE	Mode of flow measurement, either unidirectional or bidirectional measurement.
27	FLOW_DIRECTION	Please refer Profibus specifications.
28	ZERO_POINT	This parameter is standard PA magnetic flow parameter. Not used within 8732E device.
29	ZERO_POINT_ADJUST	This parameter is standard PA magnetic flow parameter. Not used within 8732E device.
30	ZERO_POINT_UNIT	This parameter is standard PA magnetic flow parameter. Not used within 8732E device.
31	NOMINAL_SIZE	Pleases refer to Profibus specifications Note: The value of the NOMINAL_SIZE parameter is determined from the value of the TUBE_SIZE parameter.
32	NOMINAL_SIZE_UNITS	Selects the unit for nominal size parameter.
33	VOLUME_FLOW	Please refer to Profibus specifications
34	VOLUME_FLOW_UNITS	Selected unit code for VOLUME_FLOW, VOLUME_FLOW_LO_LIMIT and VOLUME_FLOW_HI_LIMIT parameters.
35	VOLUME_FLOW_LO_LIMIT	Absolute value of the lower range value (volume flow) of the sensor. – Not referred in 8732E device for any status calculation. Used for setting up the range for the dial on PDM screen VOLUME_FLOW_HI_LIMIT parameters.
36	VOLUME_FLOW_HI_LIMIT	Absolute value of the upper range value (volume flow) of the sensor.- Not referred in 8732E device for any status calculation. Used for setting up the range for the dial on PDM screen.
37-56	RESERVED	Flow transducer block parameters listed in profile specification which are not applicable for mag flow meter.
57	SAMPLING_FREQ	Pls refer Profibus specifications Note: The value of the SAMPLING_FREQ parameter is determined from the value of the COIL_DRIVE_FREQ parameter.
58	SAMPLING_FREQ_UNITS	Selected unit code for SAMPLING_FREQ parameter.
59-68	Reserved by PNO	Please refer to Profibus specifications.
	Manufacture Specific Parameters	
69	DAMPING	Damping filter value in seconds.
70	DENSITY_UNIT	See section Engineering Units for supported unit codes.
71	DENSITY_VALUE	User entered density value to be used when calculating flow in mass flow units.
72	SENSOR_CAL_NO	Sensor Calibration Number.
73	SENSOR_SIZE	Sensor Line Size.
74	COIL_DRIVE_FREQ	Coil Drive Frequency Note: Enumerated value of this parameter determines the floating point value of the SAMPLING_FREQ parameter.
75	DIAG_SIG_POWER	Signal power at current coil drive frequency.
76	RESERVED	DETAILED_STATUS marked as RESERVED for PA device.
77	LOI_LANG	Selects the language to be used on the local display for status and diagnostics messages.

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Index	Parameter Name	Description
78	EP_TRIG_COUNTS	Number of EP measurements that must be above the trigger level to set empty pipe.
79	EP_TRIG_LEVEL	Empty Pipe Trigger Level.
80	EP_VALUE	Value of the Empty Pipe measurement. (Same scale as EP_TRIG_LEVEL).
81	ELECT_TEMP	Compensated electronics temperature with status.
82	TEMPERATURE_UNITS	See section Engineering Units for supported unit codes.
83	DSP_SOFTWARE_REV_NUM	DSP software Rev Number - major, minor, build.
84	PERFORM_AUTO_ZERO	Perform auto zero calibration routine Note1: Writing anything but a 2 has no effect. Reads will always return a 1 or a 2.
85	PERFORM_ELECTRONICS_TRIM	Perform input trim calibration routine Note1: Writing anything but a 2 has no effect. Reads will always return a 1 or a 2.
86	FLOW_TUBE_TAG	Text string identifier of sensor.
87	FLOW_TUBE_SERIAL NUMBER	Sensor serial number from physical tag on sensor.
88	LINER_MATERIAL	Enumerated string indicating liner material of installed sensor.
89	ELECTRODE_MATERIAL	Enumerated string indicating electrode material of installed sensor.
90	ELECTRODE_TYPE	Enumerated string indicating electrode type of installed sensor.
91	FLANGE_TYPE	Enumerated string indicating flange type of installed sensor.
92	FLANGE_MATERIAL	Enumerated string indicating flange material of installed sensor.
93	Reserved	Reserved.
94	DIAG_SNR_5HZ	Signal to Noise ratio at 5 Hz.
95	DIAG_SNR_37HZ	Signal to Noise ratio at 37.5 Hz.
96	Reserved	Reserved.
97	LINE_NOISE	50/60 Hz line noise
98	DIAGNOSTIC_HANDLING	On/off handling for diagnostics.
99-108	Reserved	Reserved.
109	SP_CONTROL	Signal Processing Control Code.
110	SP_NOISE_MODE	Noise Mode.
111	SP_NUM_SAMPS	Signal Processing Number of Samples.
112	SP_PERCENT_LIMIT	Signal Processing Percent Limit
113	SP_TIME_LIMIT	Signal Processing Time Limit
114	LICENSE_KEY	Key/password to enable diagnostic features. Any changes to the licensing will be shown in the LICENSE_STATUS parameter.
115	LICENSE_STATUS	Bit mask that shows which diagnostics are licensed.
116	METER_VERIF_TEST_SCOPE	Scope of the Flowmeter Verification Test. Note: This parameter needs to be configured before the Meter Verification is started via the PERFORM_METER_VERIFY parameter.

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Index	Parameter Name	Description
117	METER_VERIF_TEST_COND_IN	Incoming Test Condition of the Flowmeter Verification Test Note: This parameter needs to be configured before the Meter Verification is started via the PERFORM_METER_VERIFY parameter.
118	METER_VERIF_TEST_COND_OUT	Actual Test Condition of the Flowmeter Verification Test.
119	METER_VERIF_CRITERIA	Test limits that the Flowmeter Verification Test was ran against.
120	METER_VERIF_RESULT	Flowmeter Verification Test summary result.
121	COIL_RESIST_RESULT	Coil Resistance Test Result, part of the Flowmeter Verification Test.
122	COIL_INDUCT_RESULT	Coil Inductance Test Result, part of the Flowmeter Verification Test.
123	ELECT_RESIST_RESULT	Electrode Resistance Test Result, part of the Flowmeter Verification Test.
124	INT_SIM_RESULT	Internal Simulator Test Result, part of the Flowmeter Verification Test.
125	Reserved	Reserved.
126	COIL_INDUCT_VALUE	Coil Inductance value.
127	COIL_INDUCT_DEVIATION	Coil Inductance Deviation.
128	COIL_INDUCT_FINGERPRINT	Coil Inductance Fingerprint. Note: These values should be made Read Only in the DD. Only reset by the factory parameter NV_RESET, not by the RESTART w/ defaults.
129	COIL_RESIST_VALUE	Coil Resistance value
130	COIL_RESIST_FINGERPRINT	Coil Resistance Fingerprint Note: These values should be made Read Only in the DD. Only reset by the factory parameter NV_RESET, not by the RESTART w/ defaults.
131	ELECT_RESIST_VALUE	Electrode Resistance value
132	ELECT_RESIST_FINGERPRINT	Electrode Resistance Fingerprint
133	INT_SIM_DEVIATION	The internal flow simulator reading as a percent deviation from the reference value.
134	INT_SIM_REF_VALUE	Internal Flow Simulator Reference Value
135	INT_SIM_VALUE	The internal flow simulator reading.
136	METER_VERIF_EP_LIM	Flowmeter Verification Limit – Empty Pipe condition.
137	METER_VERIF_FLOWING_LIM	Flowmeter Verification Limit – Flowing condition.
138	METER_VERIF_NO_FLOW_LIM	Flowmeter Verification Limit – No Flow condition.
139	RECALL_FINGERPRINT_VALUES	Perform a recall of the previous fingerprint values.
140	PERFORM_REFINGERPRINT_FLOWTUBE	Perform the re-fingerprint command. Note: The parameter FINGERPRINT_SELECT needs to be configured before the Refingerprint operation is started.
141	PERFORM_METER_VERIFY	Perform the meter verification command. Note: The parameter METER_VERIF_TEST_SCOPE and METER_VERIF_TEST_COND_IN needs to be configured before the Refingerprint operation is started.

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Index	Parameter Name	Description
142	FINGERPRINT_SELECT	Components to re-fingerprint. Note: This parameter needs to be configured before the Refingerprint operation is started via the PERFORM_REFINGERPRINT_FLOWTUBE parameter.
143	SENSOR_RANGE_LO	Sensor range parameter used to calculate if the PV value is falling outside the sensor limits to generate diagnosis indication to Host.
144	SENSOR_RANGE_HI	Sensor range parameter used to calculate if the PV value is falling outside the sensor limits to generate diagnosis indication to Host.
145	SENSOR_RANGE_GAP	The gap in ft./s that need be the their between the parameters SENSOR_RANGE_LO & SENSOR_RANGE_HI.
146	PV_LOI_TIME	Time in seconds for which the LOI should show the value of volume flow. 0 indicates that the volume flow shall not be displayed on the LOI. If all the totalizer display timings are also 0 then the LOI shall default to show the volume flow value.
147	T1_LOI_TIME	Time in seconds for which the LOI should show the value of totalizer-1. 0 indicates that the totalizer-1 value shall not be displayed on the LOI.
148	T2_LOI_TIME	Time in seconds for which the LOI should show the value of totalizer-2. 0 indicates that the totalizer-2 value shall not be displayed on the LOI.
149	T3_LOI_TIME	Time in seconds for which the LOI should show the value of totalizer-3. 0 indicates that the totalizer-3 value shall not be displayed on the LOI.
150	VIEW_1_TB	View object 1 of the transducer block.

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Appendix H GSD File for Rosemount 8732E Magnetic Flow Transmitter

Profibus DP . . . . . page H-1
Module Related Information . . . . . page H-2
Extended Diagnostic Bytes - Manufacturer Specific . . . . page H-3
Description of the module assignment . . . . . page H-4

PROFIBUS DP

GSD Revision	**1**
Vendor Name	**Rosemount**
Model Name	**Rosemount Flow 8732E**
Revision	**V1.00**
Ident Number	**0x0C15**
Protocol Ident	**0; 0 = Profibus-DP**
Station Type	**0 = DP-Slave**
FMS supp	**0; 0 = Only DP Slave**
Hardware Release	**V1.0**
Bitmap Device	**V1.0**
31.25 supp	**RFD0C15**
45.45 supp	**1**
93.75 supp	**1**
MaxTsdr 31.25	**1**
MaxTsdr 45.45	**100**
MaxTsdr 93.75	**250**
Redundancy	**1000**
Repeater Ctrl_Sig	**0; No Redundancy supported**
24V Pins	**Not Connected**
Implementation Type	**Custom SW/HW**

BASIC DP SLAVE RELATED KEYWORDS

Freeze Mode supp	**0**
Sync Mode supp	**0**
Auto Baud supp	**0**
Set Slave Add supp	**1**
Min Slave Intervall	**250; in 100 us**

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MODULE RELATED INFORMATION

Modular Station	**1; 1: Modular Device**
MaxModule	**4 ;No. of(AI + Totalizer): 1-AI, 3-Totalizer**
Max Input Len	**20 ; Max Module x 5 Bytes - 5 * (1 AI + 3 TOT)**
Max Output Len	**6 ; No. of TOT x 2 Bytes - 2 * (3 TOT)**
Max Data Len	**6 ; Max_Input_Length + Max Output Length**
Slave Family	**12 ;Definition for Profibus PA Profile(independent\;of used Physicsl layer)**
Max Diag Data Len	**20 ;6 bytes (Standard Diagnostics) + 1 Byte\;(Ext.Diag. Header) + 7 Bytes (Ext. Diag.\;Std.) + 2 Bytes (Ext. Diag. Manufacturer)**
Ext User Prm Data Const(0)	**3**
Ext User Prm Data Const(0)	**0x00, 0x00, 0x00**

DESCRIPTION OF EXTENDED DP FEATURES

DPV1_Slave	**1;Device conforms to** DP-V1
C2 Read Write supp	**1**
C2 Max Data Len	**128**
C2 Read Write required	**1**
C2 Max Count Channels	**1**
Max Initiate PDU Length	**52 ; 48(Data) + 4(Header)**
C2 Response Timeout	**4000**
DPV1 Data Types	**0**

DESCRIPTION OF PHYSICAL INTERFACE FOR ASYNC. AND SYNC. TRANSMISSION

REVIEW	Rosemount Device is PA device
Physical_Interface	**0 ; RS-485 Standard Copper**
Transmission Delay 45.45	**0**
Reaction Delay 45.4	**0**
Transmission Delay 93.75	**0**
Reaction Delay 93.75	**0**
End Physical Interface	
Physical Interface	**1 ; IEC61158-2 - MBP**
Transmission Delay 31.25	**0**
Reaction Delay 31.25	**0**
End Physical Interface	

DESCRIPTION OF DEVICE RELATED DIAGNOSIS

Unit Diag Bit(16)	**Error appears**
Unit Diag Bit(17)	**Error disappears**
Unit Diag Bit(24)	**Hardware failure electronics**
Unit Diag Bit(25)	**Hardware failure mechanics**
Unit Diag Bit(26)	**Motor temperature too high**
Unit Diag Bit(27)	**Electronic temperature too high**
Unit Diag Bit(28)	**Memory error**
Unit Diag Bit(29)	**Measurement failure**
Unit Diag Bit(30)	**Device not initialized**
Unit Diag Bit(31)	**Device initialization failed**
Unit Diag Bit(32)	**Zero point error**
Unit Diag Bit(33)	**Power supply failed**

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Unit Diag Bit(16)	**Error appears**
Unit Diag Bit(34)	**Configuration invalid**
Unit Diag Bit(35)	**Restart**
Unit Diag Bit(36)	**Coldstart**
Unit Diag Bit(37)	**Maintenance required**
Unit Diag Bit(38)	**Characteristics invalid**
Unit Diag Bit(39)	**Ident_Number violation**
Unit Diag Bit(40)	**reserved (40)**
Unit Diag Bit(41)	**reserved (41)**
Unit Diag Bit(42)	**reserved (42)**
Unit Diag Bit(43)	**reserved (43)**
Unit Diag Bit(44)	**reserved (44)**
Unit Diag Bit(45)	**reserved (45)**
Unit Diag Bit(46)	**reserved (46)**
Unit Diag Bit(47)	**reserved (47)**
Unit Diag Bit(48)	**reserved (48)**
Unit Diag Bit(49)	**reserved (49)**
Unit Diag Bit(50)	**reserved (50)**
Unit Diag Bit51)	**reserved (51)**
Unit Diag Bit52)	**reserved (52**
Unit Diag Bit(53)	**reserved (53**
Unit Diag Bit(54)	**reserved (54)**
Unit Diag Bit(55)	**Extension Available**

EXTENDED DIAGNOSTIC BYTES - MANUFACTURER SPECIFIC

Unit Diag Bit(56)	**E01:DSP HW not cmptbl with SW**
Unit Diag Bit(57)	**E02:Electronics Failure**
Unit Diag Bit(58)	**E03:Coil Drive Open Circuit**
Unit Diag Bit(59)	**E04:Empty Pipe Detected**
Unit Diag Bit(60)	**E05:Electronics Trim Failure**
Unit Diag Bit(61	**E06:Auto Zero Failure**
Unit Diag Bit(62)	**E07:Sensor Hi Limit Exceeded**
Unit Diag Bit(63)	**E08:Sensor Processor Not Commn**
Unit Diag Bit(64)	**E09:Universal Trim Failure**
Unit Diag Bit(65)	**E10:Reverse Flow Detected**
Unit Diag Bit(66)	**E11:Elex. Temp. Out of Range**
Unit Diag Bit(67)	**E12:High Process Noise**
Unit Diag Bit(68)	**E13:Grounding/Wiring Fault**

MODULE DETAILS

Empty module	**Module**	EMPTY_MODULE 0x00	1	EndModule
Modules for flow meter	**Module**	AI 0x94	2	EndModule
	Module	TOTAL 0x41,0x84,0x85	3	EndModule
	Module	SETTOT_TOTAL" 0xC1,0x80,0x84,0x85	4	EndModule
	Module	SETTOT_MODETOT_TOTAL" 0xC1,0x81,0x84,0x85	5	EndModule

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DESCRIPTION OF THE MODULE ASSIGNMENT

The numbers corresponding against a particular slot indicates which module is default for this slot. The module references seperated by commas that follow next indicate which modules are allowed to be inserted into the relevant slot.

SlotDefinition	
Slot(1)	**AI Flow" 2 1,2**
Slot(2)	**Totalizer" 3 1,3,4,5**
Slot(3)	**Totalizer" 3 1,3,4,5**
Slot(4)	**Totalizer" 3 1,3,4,5**

VALID CONFIGURATIONS

Slot1 & Slot2 Configuration data

AI Total 0x94, 0x41, 0x84, 0x85
AI Total+SetTotal 0x94, 0xC1, 0x80, 0x84, 0x85
AI Total+SetTotal+ModeTotal 0x94, 0xC1, 0x81, 0x84, 0x85
AI Empty 0x94, 0x00
Empty Total 0x00, 0x41, 0x84, 0x85
Empty Total 0x00, 0x41, 0x84, 0x85
Empty Total+SetTotal 0x00, 0xC1, 0x80, 0x84, 0x85v
Empty Total+SetTotal+ModeTotal 0x00, 0xC1, 0x81, 0x84, 0x85

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