Installation Manual
MMI-20020979, Rev AB
May 2015

Micro Motion® Gas Density Meters (GDM)

Fiscal gas density measurement

Micro Motion®

EMERSON™
Process Management

Safety and approval information

This Micro Motion product complies with all applicable European directives when properly installed in accordance with the instructions in this manual. Refer to the EC declaration of conformity for directives that apply to this product. The EC declaration of conformity, with all applicable European directives, and the complete ATEX Installation Drawings and Instructions are available on the internet at *www.micromotion.com* or through your local Micro Motion support center.

Information affixed to equipment that complies with the Pressure Equipment Directive can be found on the internet at *www.micromotion.com/documentation*.

For hazardous installations in Europe, refer to standard EN 60079-14 if national standards do not apply.

Other information

Full product specifications can be found in the product data sheet. Troubleshooting information can be found in the transmitter configuration manual. Product data sheets and manuals are available from the Micro Motion web site at *www.micromotion.com/documentation*.

Return policy

Micro Motion procedures must be followed when returning equipment. These procedures ensure legal compliance with government transportation agencies and help provide a safe working environment for Micro Motion employees. Failure to follow Micro Motion procedures will result in your equipment being refused delivery.

Information on return procedures and forms is available on our web support system at *www.micromotion.com*, or by phoning the Micro Motion Customer Service department.

Emerson Flow customer service

Email:

- Worldwide: *flow.support@emerson.com*
- Asia-Pacific: *APflow.support@emerson.com*

Telephone:

North and South America		**Europe and Middle East**		**Asia Pacific**	
United States	800-522-6277	U.K.	0870 240 1978	Australia	800 158 727
Canada	+1 303-527-5200	The Netherlands	+31 (0) 704 136 666	New Zealand	099 128 804
Mexico	+41 (0) 41 7686 111	France	0800 917 901	India	800 440 1468
Argentina	+54 11 4837 7000	Germany	0800 182 5347	Pakistan	888 550 2682
Brazil	+55 15 3413 8000	Italy	8008 77334	China	+86 21 2892 9000
Venezuela	+58 26 1731 3446	Central & Eastern	+41 (0) 41 7686 111	Japan	+81 3 5769 6803
		Russia/CIS	+7 495 981 9811	South Korea	+82 2 3438 4600
		Egypt	0800 000 0015	Singapore	+65 6 777 8211
		Oman	800 70101	Thailand	001 800 441 6426
		Qatar	431 0044	Malaysia	800 814 008
		Kuwait	663 299 01		
		South Africa	800 991 390		
		Saudi Arabia	800 844 9564		
		UAE	800 0444 0684		

Contents

1 Planning

Topics covered in this chapter:

1.1 Installation checklist

☐ Verify the contents of the product shipment to confirm that you have all parts and information necessary for the installation.

Part	Quantity
Micro Motion® Gas Density Meter (GDM)	1
Accessories kit: - M20 to 1/2-inch NPT adapter (if applicable) - 1/2-inch NPT blanking plug - 2.5 mm hex key	1
Aluminum sleeve	1
Silicon fluid	1
Thermo-well pocket kit (if applicable)	1
Calibration certificate	1
Safety instructions booklets	2
Micro Motion Product Documentation DVD	1

☐ Make sure that all electrical safety requirements are met for the environment in which the meter will be installed.

☐ Make sure that the local ambient and process temperatures and process pressure are within the limits of the meter.

☐ Make sure that the hazardous area specified on the approval tag is suitable for the environment in which the meter will be installed.

☐ If installing the meter in a hazardous area, confirm that you have the required safety barriers or galvanic isolators for your installation.

☐ Make sure that you will have adequate access to the meter for verification and maintenance.

- ☐ Make sure that the process gas meets the recommended characteristics regarding composition, temperature, and pressure for your installation.
- ☐ Verify that you have all equipment necessary for your installation. Depending on your application, you may be required to install additional parts for optimal performance of the meter.
- ☐ Follow recommended best practices for installing the GDM to account for the effects of density, temperature, and pressure equilibrium.

1.2 Best practices

The following information can help you get the most from your meter.

- Handle the meter with care. Follow local practices for lifting or moving the meter.
- Ensure that the process gas is clean and dry.
- Do not use gases incompatible with the materials of construction. To prevent corrosion of the sensing element, the process gas should be compatible with Ni-Span-C.
- Do not expose the meter to excessive vibration (greater than 0.5 g continuously). Vibration levels in excess of 0.5 g can affect the meter accuracy.
- Perform a Known Density Verification (KDV) check of the meter prior to installing the meter in your system.
- Installing the meter in a bypass configuration allows you to remove the meter for servicing or calibration without affecting the main pipeline.
- Install the meter in a thermo-well pocket to ensure the temperature of the sample gas is equal to that of the pipeline gas. Micro Motion thermo-well pocket kits are available for purchase.
- Minimize the length and volume of the input sample pipe to ensure an optimal meter response time. Use 6 mm (1/4 in) instrument tubing and low-volume inlet filters.
- Control gas flow with a needle valve mounted before or after the meter, depending on the installation.
- Install an external coalescing filter in the sample gas inlet pipework to minimize condensate and dust contamination.
- Verify that the filters in your system are not causing any excessive flow restrictions.
- Verify that the pressure of the process gas is approximately equal to the pipeline pressure.
- Do not exceed more than a 10% reduction of the cross-sectional area at the point of insertion in the pipeline to ensure minimal effect on pressure.
- Ensure that the meter and associated pipework are pressure-tested to 1½ times the maximum operating pressure after installation.
- Install thermal insulation to the meter and the inlet and bypass-loop pipeline to maintain temperature equilibrium between the sample and pipeline gases. Do not insulate the transmitter (electronics) and maintain a nominal 1-in clearance between the insulation and the transmitter housing.

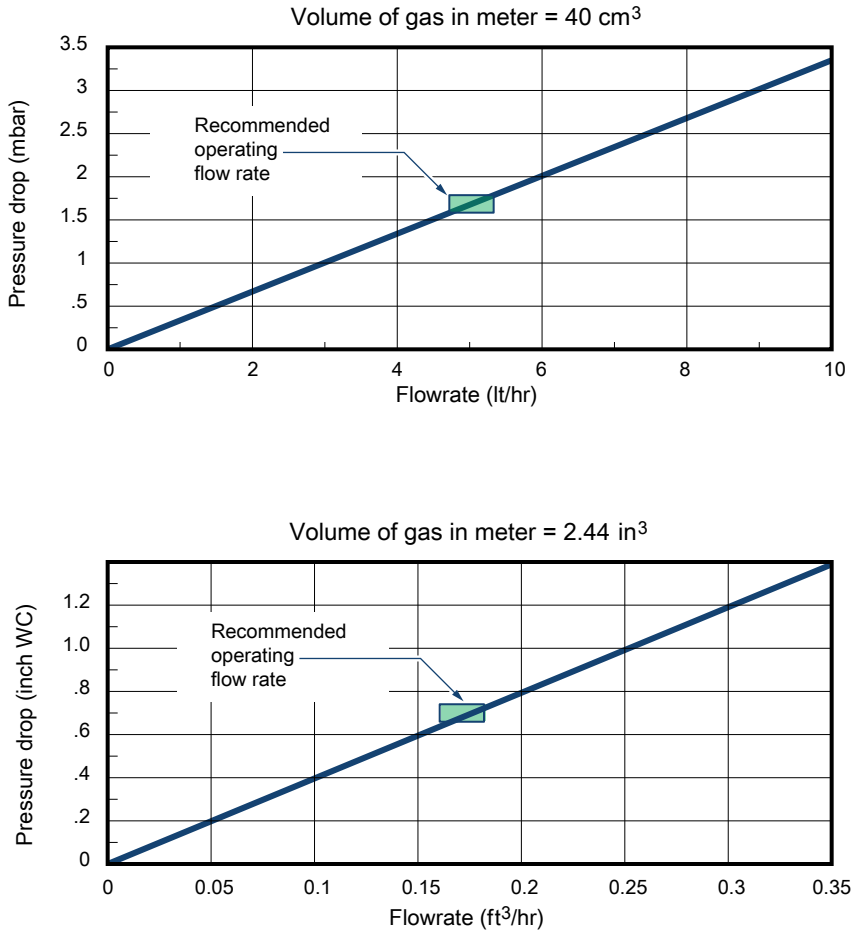
1.3 Recommended sample flow rate

Use the smallest acceptable flow rate for the process gas passing through the meter. This ensures a sample gas flow rate that is representative of the main flow with regard to the proportions of different gas constituents.

Micro Motion recommends a gas flow rate of 5 ±1 l/hr (0.176 ±0.35 ft^3/hr), although a flow rate between 1 to 10 l/hr (0.035 to 0.35 ft^3/hr) is acceptable.

At flow rates greater than 10 l/hr (0.35 ft^3/hr), the density reading can become slightly unstable and may introduce a small density error. For natural gas with a typical application density of approximately 0.06 g/cm^3 (60 kg/m^3), a pressure differential of approximately 1.66 mbar (0.67 in WC) is required to maintain a flow rate of 5 l/hr (0.176 ft^3/hr) .

Figure 1-1: Pressure drop through the meter



1.4 Power requirements

Following are the DC power requirements to operate the meter:

- 24 VDC, 0.45 W maximum
- Minimum 22.8 VDC with 1000 m (3280 ft) of 0.20 mm^2 (18 AWG) power-supply cable
- At startup, power source must provide a minimum of 0.5 A of short-term current at a minimum of 19.6 V at the power-input terminals.

Power cable recommendations

Figure 1-2: Minimum wire gauge (AWG per feet)

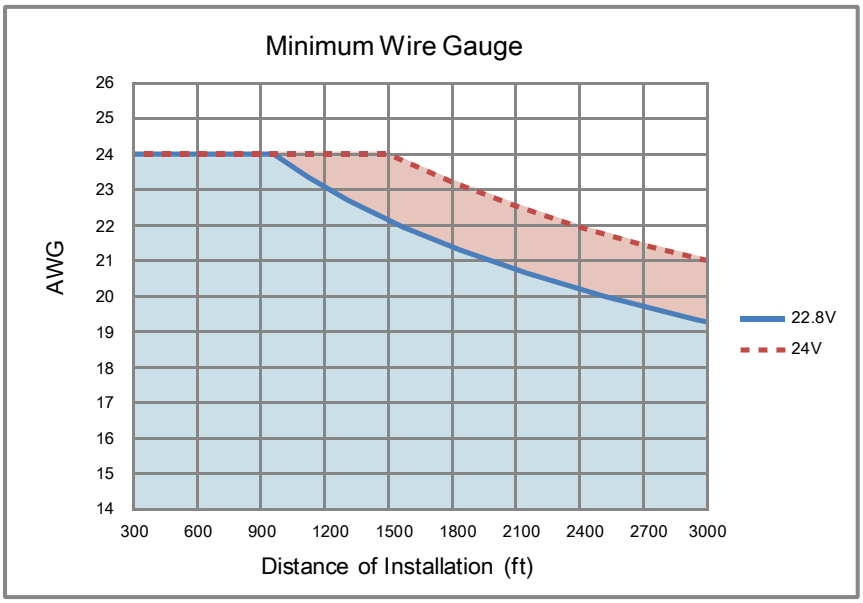
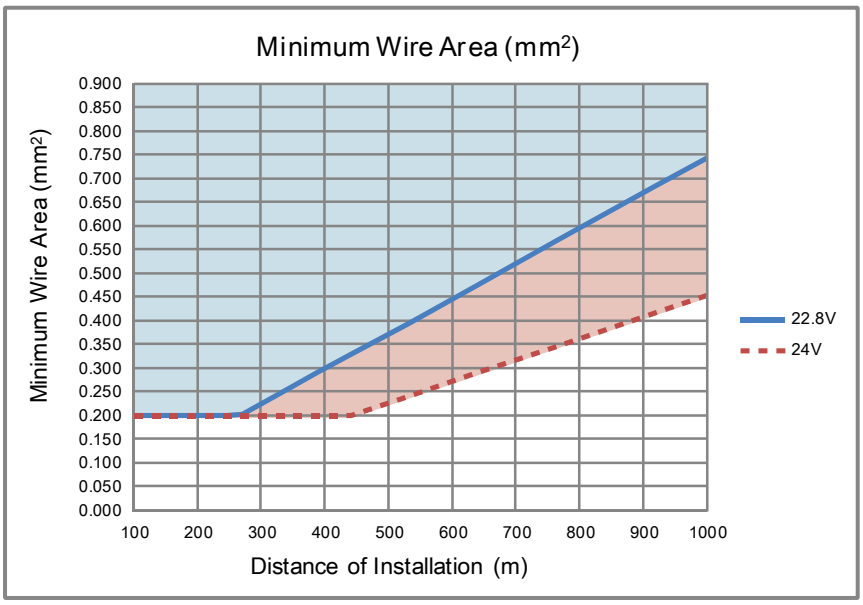


Figure 1-3: Minimum wire area (mm^2 per meter)



1.5 Installation requirements for the thermo-well pocket

Installation of the GDM in a thermo-well pocket helps maintain temperature equilibrium between the sample gas and pipeline gas. Micro Motion provides thermo-well pocket installation kits for purchase. Contact your local sales representative or Micro Motion Customer Support at *flow.support@emerson.com* for more information.

A thermo-well pocket installation requires the following, before you can mount and connect the GDM:

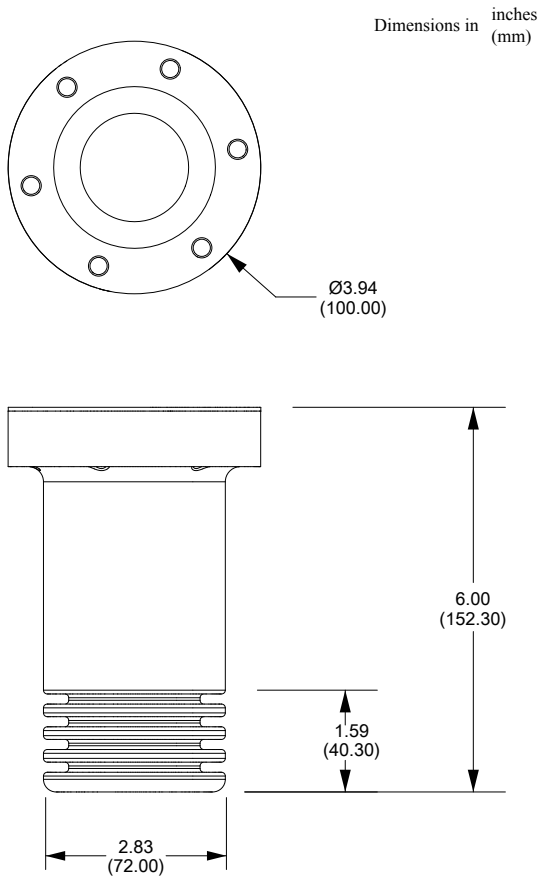
1. Create an aperture in the pipeline to receive the pocket (see *Figure 1-4* for the pocket dimensions).

   Important

   Micro Motion recommends that you do not exceed more than a 10% reduction of the cross-sectional area at the point of insertion to ensure minimal effect on pressure. Follow local practices and guidelines for welding in hazardous areas, if applicable.

2. Install and weld the pocket in place. Be sure to follow local practices and guidelines for welding in hazardous areas, if applicable.

Figure 1-4: Micro Motion thermo-well pocket dimensions



1.6 Recommended installations for gas density applications

Micro Motion recommends specific installations for the GDM depending on the gas density application – as defined by international standards, ISO 5167 and AGA 3. This information is provided for your reference only.

1.6.1 Installation in an orifice plate metering system

The orifice plate metering system is a widely used method for accurate flow measurement of natural gas. The orifice meter is a differential pressure device in which the orifice plate causes a pressure drop between the upstream and downstream sides. The flow rate is determined from the dimensions of the system (as defined by international standards ISO 5167 and AGA 3), and from measurements of differential pressure and fluid density.

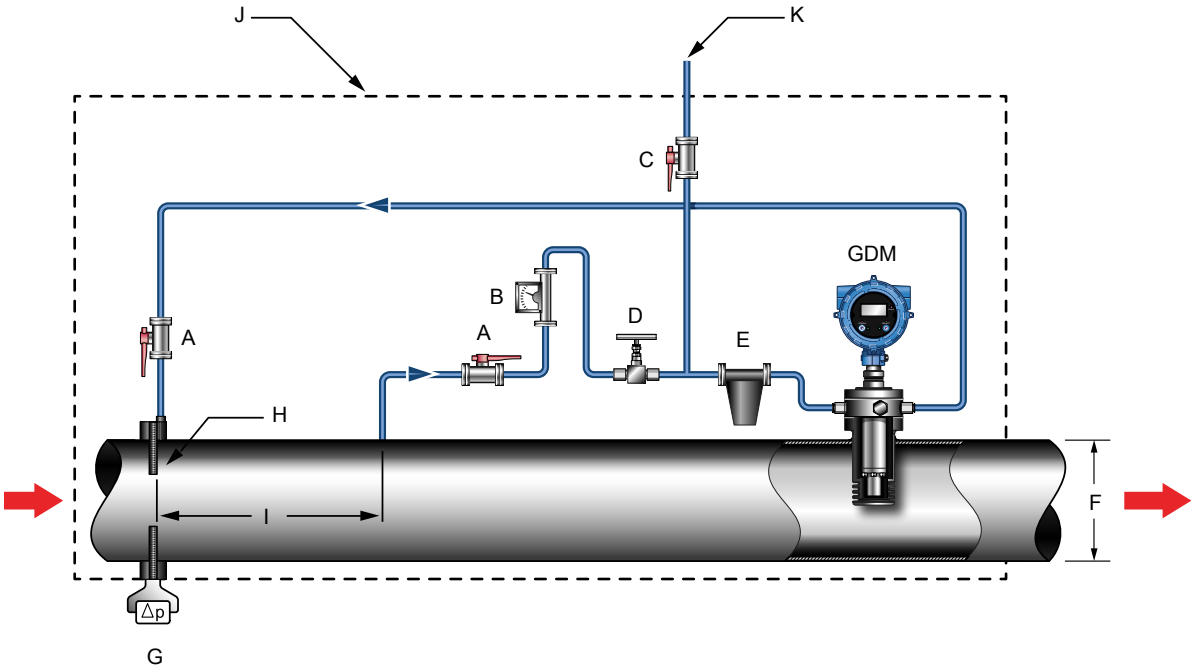
Meter installation in a pressure recovery application

The most common location for a density device in an orifice plate metering system is downstream from the orifice plate. This installation is commonly referred to as the pressure recovery method. The pressure recovery method allows an optimal gas flow rate, and provides easy access for checking filters and verifying the meter calibration.

Tip

Use 6-mm (1/4-in) instrument tubing for the gas input pipework. Use 12-mm (1/2-in) insertion tubing for the gas return pipework.

Figure 1-5: Meter installation in pressure recovery application



A. Meter isolation valves
B. Flowmeter
C. Venting valve
D. Flow control needle valve
E. Filter
F. Pipeline diameter
G. Differential pressure transmitter
H. Density point
I. Distance is eight times the pipeline diameter
J. Thermal insulation
K. Vent/vacuum test point

Note

Do not insulate the transmitter (electronics) and maintain a nominal 1-in clearance between the insulation and the transmitter housing.

With the pressure recovery installation method:

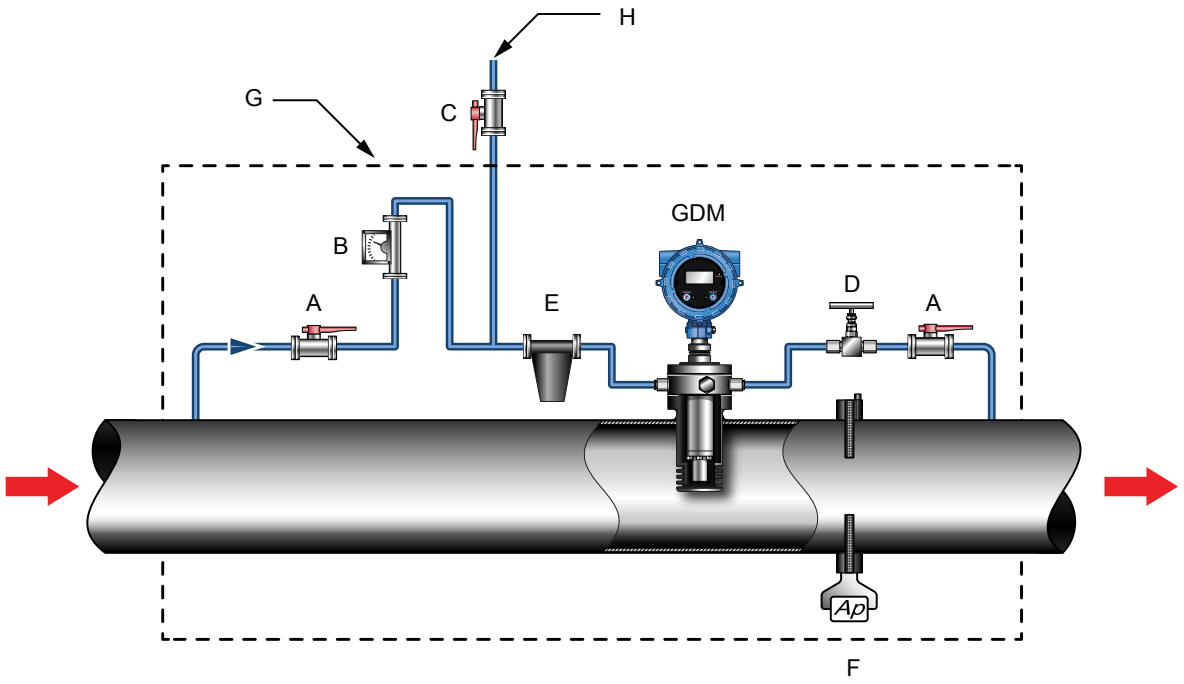
- No bypass of the orifice plate is necessary.
- Density is measured at the downstream tapping of the orifice plate, which reduces the significance of pressure build-up across the fine-gauge filters.
- Flow is achieved because the pressure after the orifice plate is lower than that further downstream.

- Pressure drops through the valves and filters do not affect the reading. The pressure inside the meter and at the gas outlet is equal to the pressure at the orifice downstream point.
- The correct expansion factor for the downstream point is used in the orifice flow calculations.
- The measured density at the density point is used in the mass flow calculation, as defined by ISO 5167 and AGA 3.

Meter installation in differential pressure application

An alternative to the downstream installation method is the upstream installation method, as defined by AGA 3. This method is also known as the differential pressure method, which is optimal for orifice plate metering. A disadvantage of this installation is that the sample gas flow is not measured because it bypasses the orifice plate.

Figure 1-6: Meter installation in differential pressure application



A. Meter isolation valves
B. Flowmeter
C. Venting valve
D. Flow control needle valve
E. Filter
F. Differential pressure transmitter
G. Thermal insulation
H. Vent/vacuum test point

Note

Do not insulate the transmitter (electronics) and maintain a nominal 1-in clearance between the insulation and the transmitter housing.

With the differential pressure installation method:

- The process gas flow bypasses the meter, but should be low enough [for example, 5 lt/hrs (0.176 ft^3/hr)] to not be of significance.
- The measured density is the upstream density.
- The control valve and the flowmeter can be mounted on either side of the meter to suit the installation and dependent on where the density point is.

Tip

To avoid excessive pressure drops in your sample pipeline, be sure to monitor the condition of the filters. Do this by varying the sample flow rate and monitoring the magnitude of the resultant density changes. Pressure drops through the filters can cause density errors if they become too large.

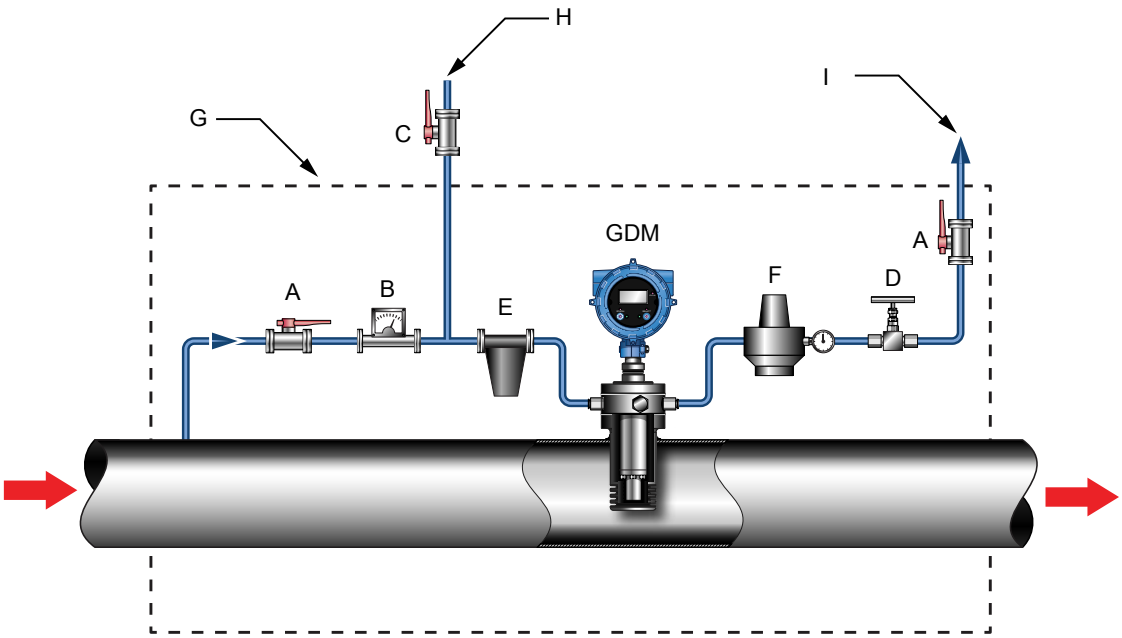
1.6.2 Meter installation in a vented gas application

The vented gas method allows the gas to be vented to flare or, in some cases, to atmosphere. With this method, the full-pipe pressure is available as a pressure drop. For high-pressure applications, a two-stage letdown system may be required to prevent icing.

⚠ CAUTION!

Because the full-pipe pressure is available as a pressure drop, ensure that the flow is adequately controlled by the control valve.

Figure 1-7: Meter installation in a vented gas application



A. Meter isolation valves
B. Flowmeter
C. Venting valve
D. Flow control needle valve
E. Filter
F. Pressure regulator
G. Thermal insulation
H. Vent/vacuum test point
I. Low-pressure vent system connection point

Note

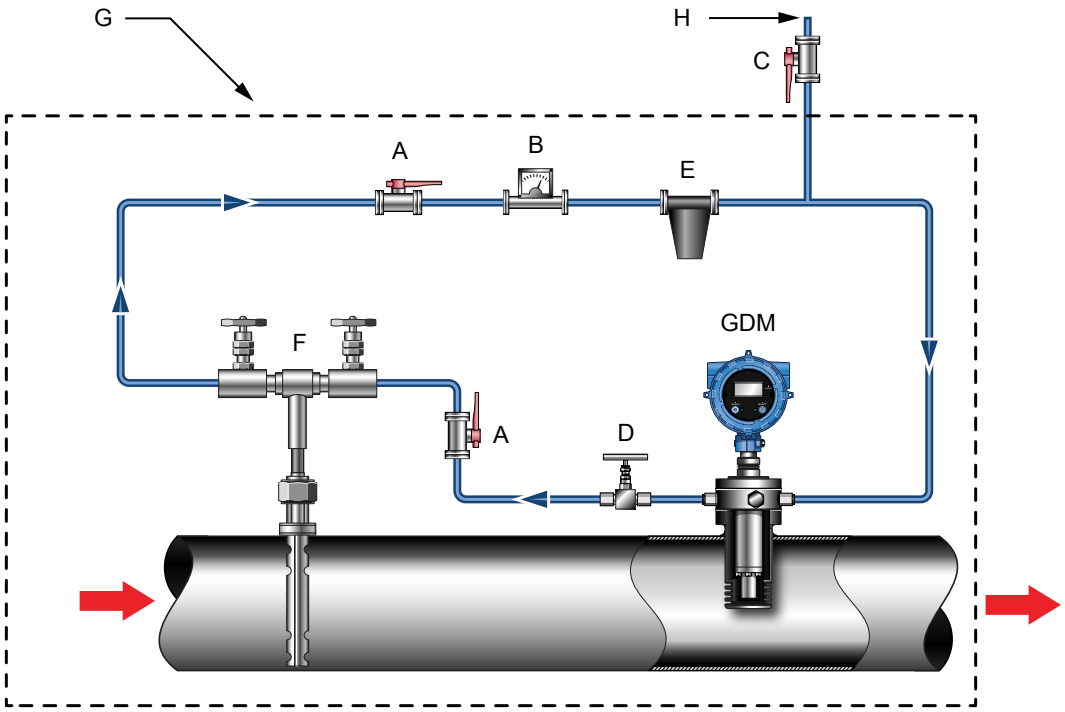
Do not insulate the transmitter (electronics) and maintain a nominal 1-in clearance between the insulation and the transmitter housing.

1.6.3 Meter installation in an ultrasonic meter application

To use the GDM with a full-bore ultrasonic meter, Micro Motion recommends that you install a Rosemount Annubar® flowmeter downstream from the ultrasonic meter as a means to provide differential pressure.

The following diagram shows a Rosemount Annubar meter installed to provide differential pressure for the measurement system. This type of installation method does not require sample gas to be vented to atmosphere. The Annubar and GDM must be installed a specific distance downstream from the ultrasonic meter in your pipeline. Refer to all manufacturer guidelines for best practices or recommendations for installing the meters in your system.

Figure 1-8: Meter installation in an ultrasonic meter application



A. Meter isolation valves
B. Flowmeter
C. Venting valve
D. Flow control needle valve
E. Filter
F. Annubar flowmeter
G. Thermal insulation
H. Vent/vacuum test point

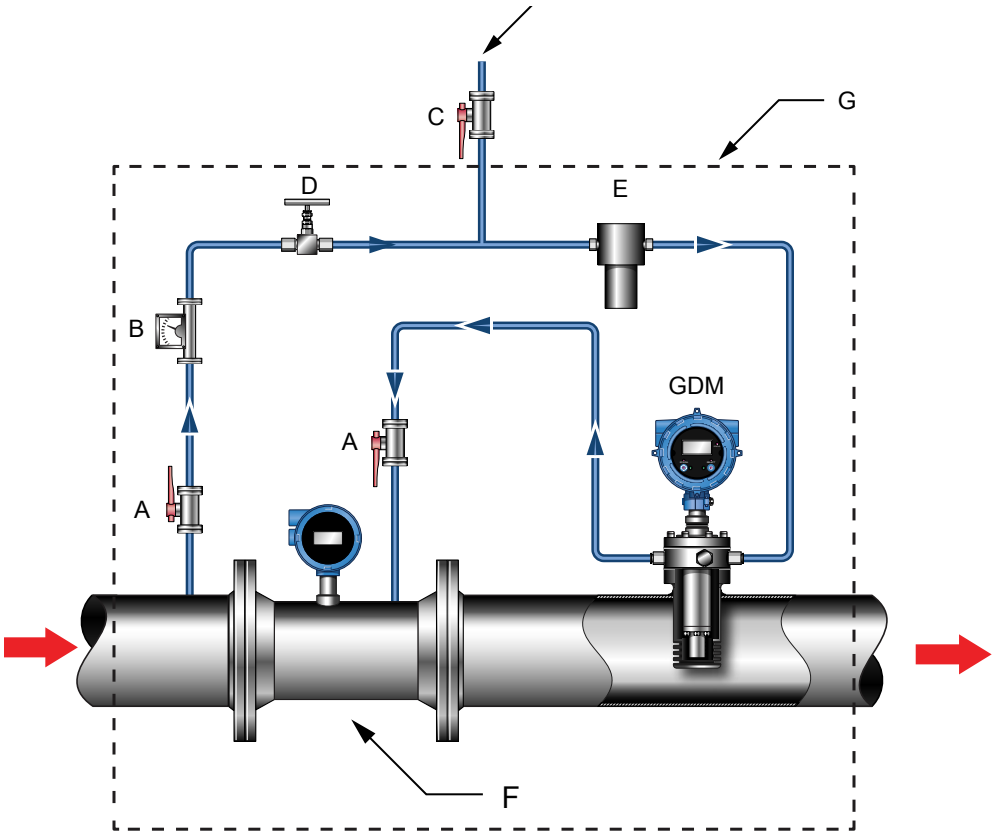
Note

Do not insulate the transmitter (electronics) and maintain a nominal 1-in clearance between the insulation and the transmitter housing.

1.6.4 Meter installation with a turbine flow meter

The following diagram shows a meter measurement system with a gas turbine flowmeter installation. Refer to manufacturer guidelines for best practices or recommendations for installing the meter in your system.

Figure 1-9: Meter installation with a turbine flow meter



A. Meter isolation valves
B. Flowmeter
C. Venting valve
D. Flow control needle valve
E. Filter
F. Turbine flowmeter
G. Thermal insulation
H. Vent/vacuum test point

Note

Do not insulate the transmitter (electronics) and maintain a nominal 1-in clearance between the insulation and the transmitter housing.

1.7 Perform a pre-installation meter check

1. Remove the meter from the box.

⚠ CAUTION!

Handle the meter with care. Follow all corporate, local, and national safety regulations for lifting and moving the meter.

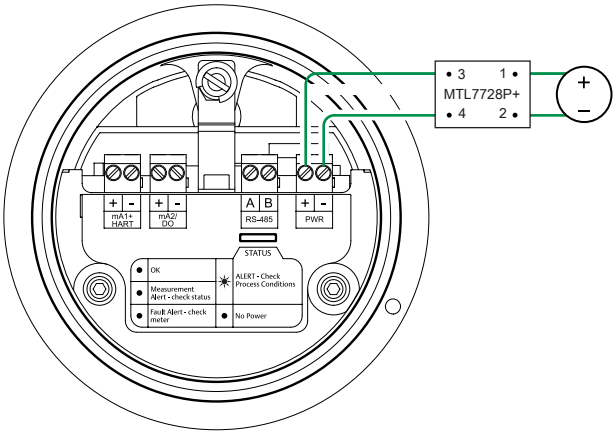
2. Visually inspect the meter for any physical damage.

   If you notice any physical damage to the meter, immediately contact Micro Motion Customer Support at *flow.support@emerson.com*.

3. Position and secure the meter in a vertical position with the flow arrow pointing upward.
4. Connect the power wiring, and power up the meter.

   Remove the back transmitter housing cover to access the PWR terminals.

Figure 1-10: Power supply wiring terminals



5. Perform a Known Density Verification (KDV) check.

   Use the Known Density Verification procedure to match the current meter calibration with the factory calibration. If the meter passes the test, then it has not drifted or changed during shipment.

   For more information on performing a KDV check, see the configuration and use manual that shipped with the product.

2 Mounting

Topics covered in this chapter:

2.1 Mount the meter in the pipeline

Prerequisites

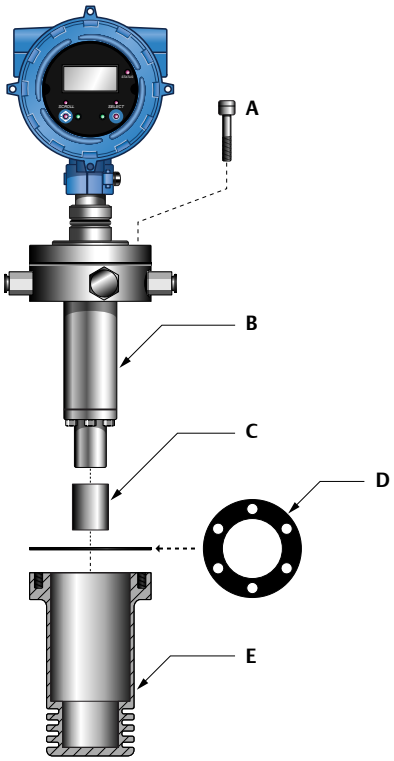
Important

Micro Motion recommends that you install the meter in a thermo-well pocket to maintain temperature equilibrium between the sample gas and the pipeline gas. For ease of maintenance, you can insert and remove the meter from the pocket as needed. See *Section 1.5* for more information on the pocket installation.

The following parts are recommended for installation in a pipeline.

- Micro Motion ® Gas Density Meter (GDM)
- Thermo-well pocket kit, which includes:
  - Thermo-well pocket
  - Anti-vibration gaskets
  - Aluminum sleeve
  - Silicone fluid
  - Mounting screws

Figure 2-1: Meter installation pieces



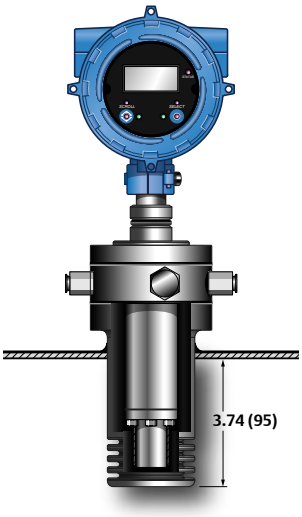
A. M8 socket-head cap screw (for mounting)
B. Meter housing
C. Aluminum sleeve (cylinder)
D. Anti-vibration gasket
E. Thermo-well pocket

Procedure

1. (Recommended) Install the thermo-well pocket in the aperture created in the pipeline and weld it into place.
2. Pour the supplied silicon fluid (an amount of 20 cm^3) into the interior of the pocket.
3. Place one 5-mm anti-vibration gasket on top of the pocket.

   Align the anti-vibration gasket holes with the bolt holes on the pocket.
4. Place the aluminum sleeve over the end of the meter housing.
5. Insert the meter housing into the pocket.
6. Secure the meter into place, using the supplied mounting screws.

Figure 2-2: Typical installation in pipeline (with thermo-well pocket)



2.2 Connect the gas bypass lines

Once you have mounted the meter in the pipeline, you are ready to connect the gas bypass lines.

Adjacent to the gas connection ports, the meter provides two filters to ensure optimal performance of the meter sensing element.

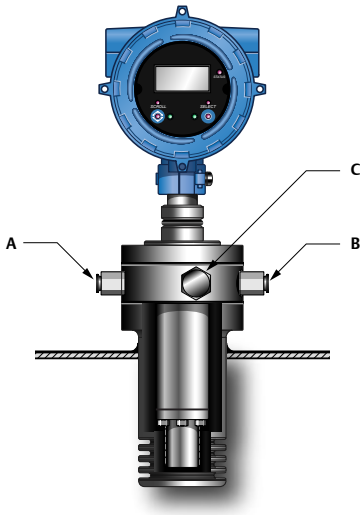
- 2 micron filter for the inlet connection
- 90 micron filter for the outlet connection

The outlet filter provides additional protection if reverse gas flow occurs. This filter arrangement is best suited for density measurement at the process gas return point.

Procedure

Connect the process gas bypass lines to the gas inlet/outlet ports.

Figure 2-3: Gas inlet/outlet connectors



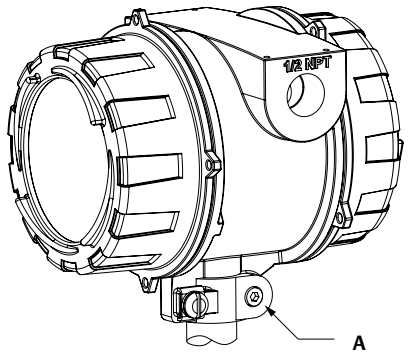
A. Process gas outlet
B. Process gas inlet
C. Filter

2.3 Rotate the electronics on the meter (optional)

You can rotate the transmitter on the meter up to 90°.

1. Using a 4 mm hex key, loosen the cap screw that holds the transmitter in place.

Figure 2-4: Component to secure transmitter in place



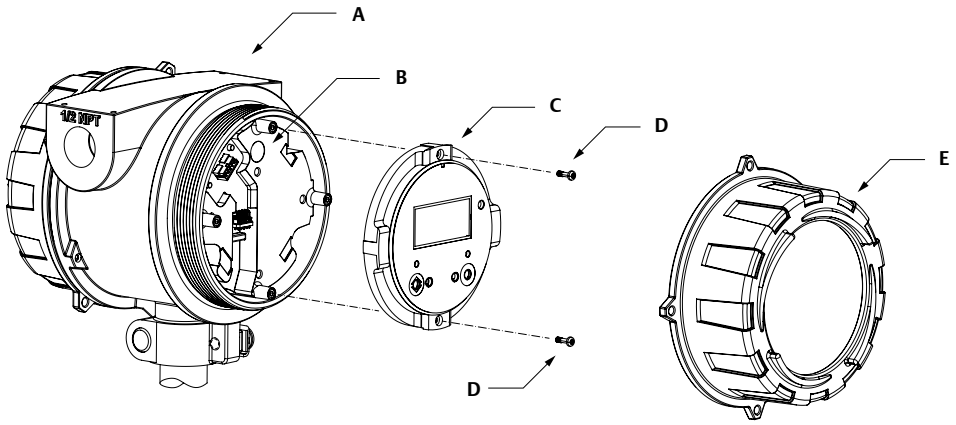
A. M5 socket-head cap screw

2. Rotate the transmitter clockwise to the desired orientation up to 90°.
3. Secure the cap screw in place and tighten to 60 lb·in (6.8 N·m).

2.4 Rotate the display on the transmitter (optional)

The display on the transmitter electronics module can be rotated 90° or 180° from the original position.

Figure 2-5: Display components



A. Transmitter housing
B. Sub-bezel
C. Display module
D. Display screws
E. Display cover

Procedure

1. If the meter is powered up, power it down.
2. Turn the display cover counterclockwise to remove it from the main enclosure.
3. Carefully loosen (and remove if necessary) the semi-captive display screws while holding the display module in place.
4. Carefully pull the display module out of the main enclosure until the sub-bezel pin terminals are disengaged from the display module.

Note
If the display pins come out of the board stack with the display module, remove the pins and reinstall them.

5. Rotate the display module to the desired position.
6. Insert the sub-bezel pin terminals into the display module pin holes to secure the display in its new position.
7. If you have removed the display screws, line them up with the matching holes on the sub-bezel, then reinsert and tighten them.
8. Place the display cover onto the main enclosure.
9. Turn the display cover clockwise until it is snug.
10. If appropriate, power up the meter.

2.5 Post-installation check

After you complete the installation of the meter, pressure test the meter and associated pipework to 1½ times the maximum operating pressure.

3 Wiring

Topics covered in this chapter:

3.1 Available output terminals and wiring requirements

Three pairs of wiring terminals are available for transmitter outputs. These outputs vary depending on your transmitter output option ordered. The Analog (mA), Time Period Signal (TPS), and Discrete (DO) outputs require external power, and must be connected to an independent 24 VDC power supply.

The screw connectors for each output terminal accept a maximum wire size of 14 AWG (2.5 mm^2).

Important

- Output wiring requirements depend on the hazardous area classification of the environment in which the meter is installed. It is your responsibility to verify that this installation meets all corporate, local, and national safety requirements and electrical codes.
- If you will configure the meter to poll an external temperature or pressure device, you must wire the mA output to support HART communications. You may use either HART/mA single-loop wiring or HART multi-drop wiring.

Table 3-1: Transmitter outputs

Transmitter version	Output channels		
	A	B	C
Analog	4–20 mA + HART	4–20 mA	Modbus/RS-485
Time period signal (TPS)	4–20 mA + HART	Time Period Signal (TPS)	Modbus/RS-485
Fixed	4–20 mA (temperature)	Time period signal (TPS)	Disabled

3.2 Hazardous area output wiring

Micro Motion provides safety barrier and galvanic isolator installation kits for wiring the meter in a hazardous environment. These kits provide the appropriate barriers or isolators depending on the outputs available and approvals required.

Information provided about wiring the safety barriers and galvanic isolators is intended as an overview. You should wire the meter according to the standards that are applicable at your site.

⚠ CAUTION!

- **Meter installation and wiring should be performed by suitably trained personnel only in accordance with the applicable code of practice.**
- **Refer to the hazardous area approvals documentation shipped with your meter. Safety instructions are available on the Micro Motion Product Documentation DVD and accessible on the Micro Motion website at *www.micromotion.com*.**

3.2.1 Hazardous area entity parameters

⚠ DANGER!

Hazardous voltage can cause severe injury or death. To reduce the risk of hazardous voltage, shut off power before wiring the meter.

⚠ DANGER!

Improper wiring in a hazardous environment can cause an explosion. Install the meter only in an area that complies with the hazardous classification tag on the meter.

Input entity parameters

Table 3-2: Input entity parameters: all connections

Parameter	Power supply	4–20 mA /Discrete Output/Time Period Signal	RS-485
Voltage (U_i)	30 VDC	30 VDC	18 VDC
Current (I_i)	484 mA	484 mA	484 mA
Power (P_i)	2.05 W	2.05 W	2.05 W
Internal capacitance (C_i)	0.0 pF	0.0 pF	0.0011 pF
Internal inductance (L_i)	0.0 H	0.0 H	0.0 H

RS-485 output and cable parameters

All connections to the meter receive their power from the connected intrinsically safe barrier. All cable parameters are derived from the output parameters of these devices. The RS-485 connection also receives power from the connected barrier (MTL7761AC), although this connection has specific output and cable parameters.

Table 3-3: RS-485 output and cable entity parameters (MTL7761AC)

Input parameters	
Voltage (U_i)	18 VDC
Current (I_i)	100 mA
Internal capacitance (C_i)	1 nF
Internal inductance (L_i)	0.0 H
Output parameters	
Voltage (U_o)	9.51 VDC
Current (instantaneous) (I_o)	480 mA
Current (steady state) (I)	106 mA
Power (P_o)	786 mW
Internal resistance (R_i)	19.8 Ω
Cable parameters for Group IIC	
External capacitance (C_o)	85 nF
External inductance (L_o)	154 µH
External inductance/resistance ratio (L_o/R_o)	31.1 µH/Ω
Cable parameters for Group IIB	
External capacitance (C_o)	660 nF
External inductance (L_o)	610 µH
External inductance/resistance ratio (L_o/R_o)	124.4 µH/Ω

Hazardous area voltage The meter entity parameters require the selected barrier's open-circuit voltage to be limited to less than 30 VDC (Vmax = 30 VDC).

Hazardous area current The meter entity parameters require the selected barrier's short-circuit currents to sum to less than 484 mA (Imax = 484 mA) for all outputs.

Hazardous area capacitance The capacitance (Ci) of the meter is 0.0011 µF. This value added to the wire capacitance (Ccable) must be lower than the maximum allowable capacitance (Ca) specified by the safety barrier. Use the following equation to calculate the maximum length of the cable between the meter and the barrier: $Ci + Ccable \leq Ca$

Hazardous area inductance The inductance (Li) of the meter is 0.0 µH. This value plus the field wiring inductance (Lcable), must be lower than the maximum allowable inductance (La) specified by the safety barrier. The following equation can then be used to calculate the maximum cable length between the meter and the barrier: $Li + Lcable \leq La$

3.2.2 Wire all available outputs using safety barriers

Micro Motion provides a safety barrier installation kit for wiring the meter in a hazardous area. Contact your local sales representative or Micro Motion Customer Support at *flow.support@emerson.com* for more information on ordering a barrier kit.

⚠ CAUTION!

- **Meter installation and wiring should be performed by suitably trained personnel only in accordance with the applicable code of practice.**
- **Refer to the hazardous area approvals documentation shipped with your meter. Safety instructions are available on the Micro Motion Product Documentation DVD and accessible on the Micro Motion website at *www.micromotion.com*.**

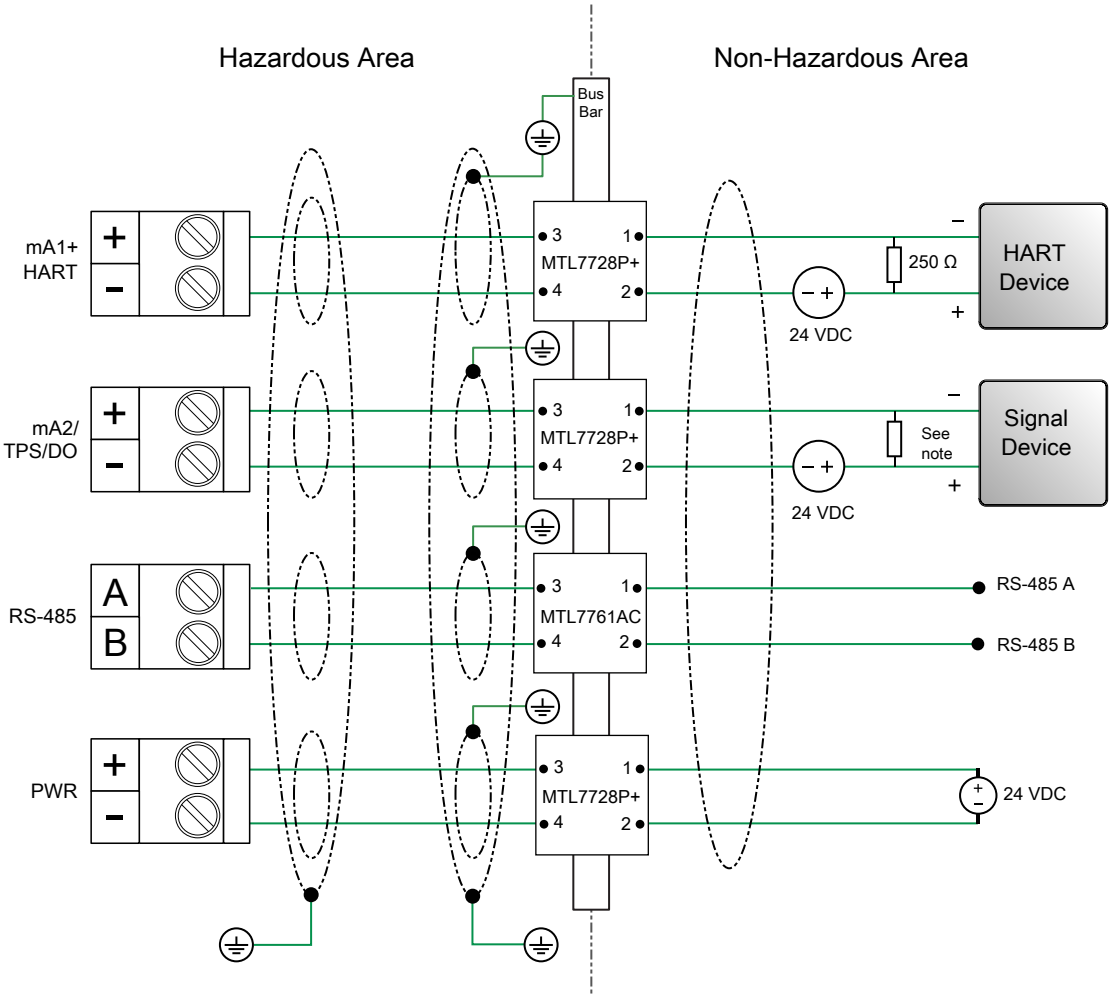
The safety barrier kit provides barriers for connecting all of the available meter outputs. Use the provided barriers with the designated output.

Output(s)	Barrier
4–20 mA	MTL7728P+
• 4–20 mA • Time Period Signal (TPS) • Discrete	MTL7728P+
Modbus/RS-485	MTL7761AC
Power	MTL7728P+

Procedure

Wire the barriers to the appropriate output terminal and pins.

Figure 3-1: Hazardous area mA/DO/TPS output wiring using safety barriers



Note

The recommended resistance will vary depending on your Channel B output. For mA outputs, 250 Ω is the recommended resistance. For TPS or Discrete outputs, 500–1000 Ω is the recommended resistance.

3.2.3 Wire Analog outputs using galvanic isolators

Micro Motion provides a galvanic isolator installation kit specific to wiring the Analog version of the meter in a hazardous area. Contact your local sales representative or Micro Motion Customer Support at *flow.support@emerson.com* for more information on ordering an isolator kit for your meter.

⚠ CAUTION!

- **Meter installation and wiring should be performed by suitably trained personnel only in accordance with the applicable code of practice.**
- **Refer to the hazardous area approvals documentation shipped with your meter. Safety instructions are available on the Micro Motion Product Documentation DVD and accessible on the Micro Motion website at *www.micromotion.com*.**

The galvanic isolator kit (Analog version) provides isolators for connecting the following outputs. Use the provided isolators with the designated output.

Note

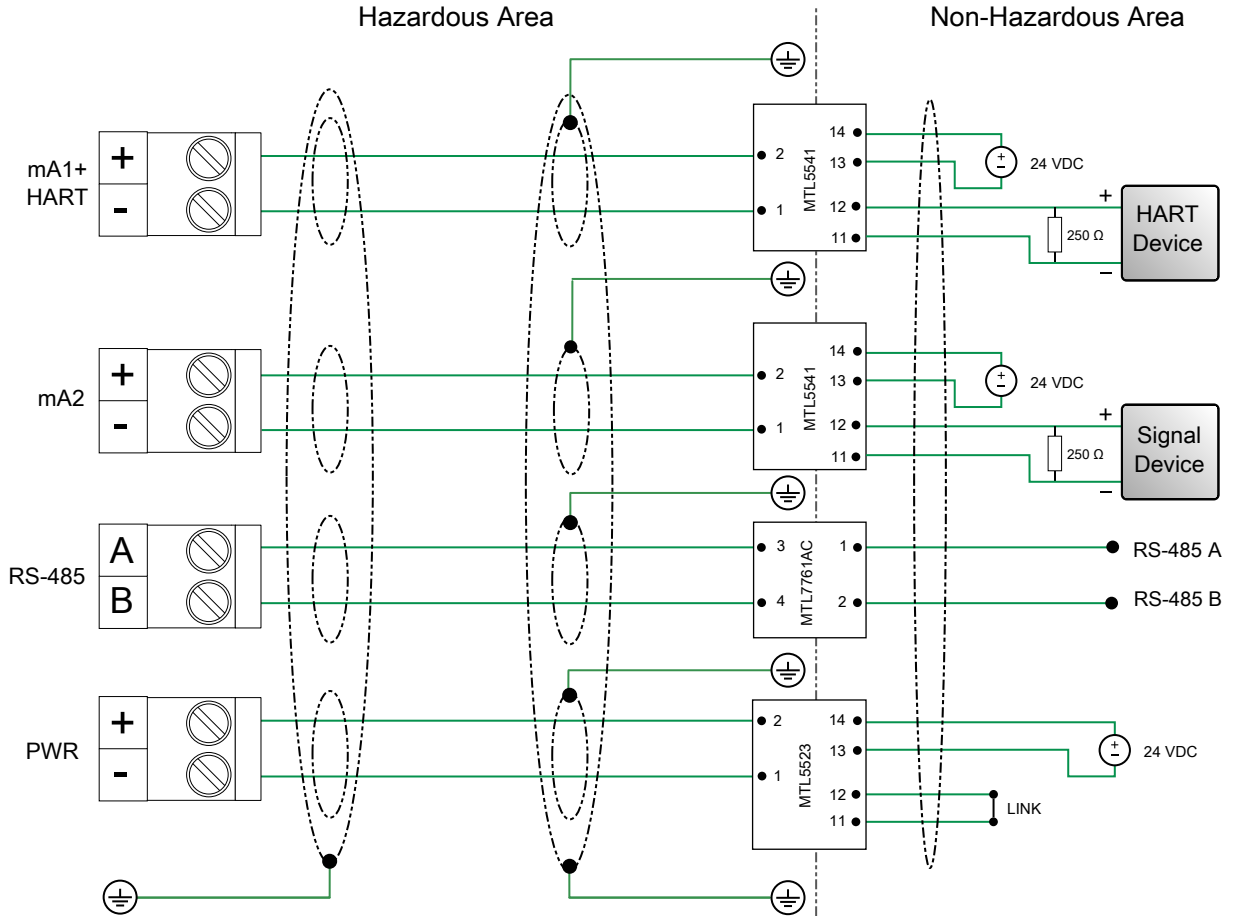
The RS-485 barrier is not isolated.

Output(s)	Isolator
4–20 mA + HART	MTL5541
4–20 mA	MTL5541
Modbus/RS-485	MTL7761AC
Power	MTL5523

Procedure

Wire the isolators to the appropriate output terminal and pins.

Figure 3-2: Hazardous area output wiring using galvanic isolators (mA outputs option)



3.2.4 Wire Time Period Signal (TPS) or Discrete output options using galvanic isolators

Micro Motion provides a galvanic isolator installation kit specific to wiring the Time Period Signal (TPS) and Discrete versions of the meter in a hazardous area. Contact your local sales representative or Micro Motion Customer Support at *flow.support@emerson.com* for more information on ordering an isolator kit for your meter.

⚠ CAUTION!

- **Meter installation and wiring should be performed by suitably trained personnel only in accordance with the applicable code of practice.**
- **Refer to the hazardous area approvals documentation shipped with your meter. Safety instructions are available on the Micro Motion Product Documentation DVD and accessible on the Micro Motion website at *www.micromotion.com*.**

The galvanic isolator kit (TPS/Discrete version) provides isolators for connecting the following outputs. Use the provided isolators with the designated output.

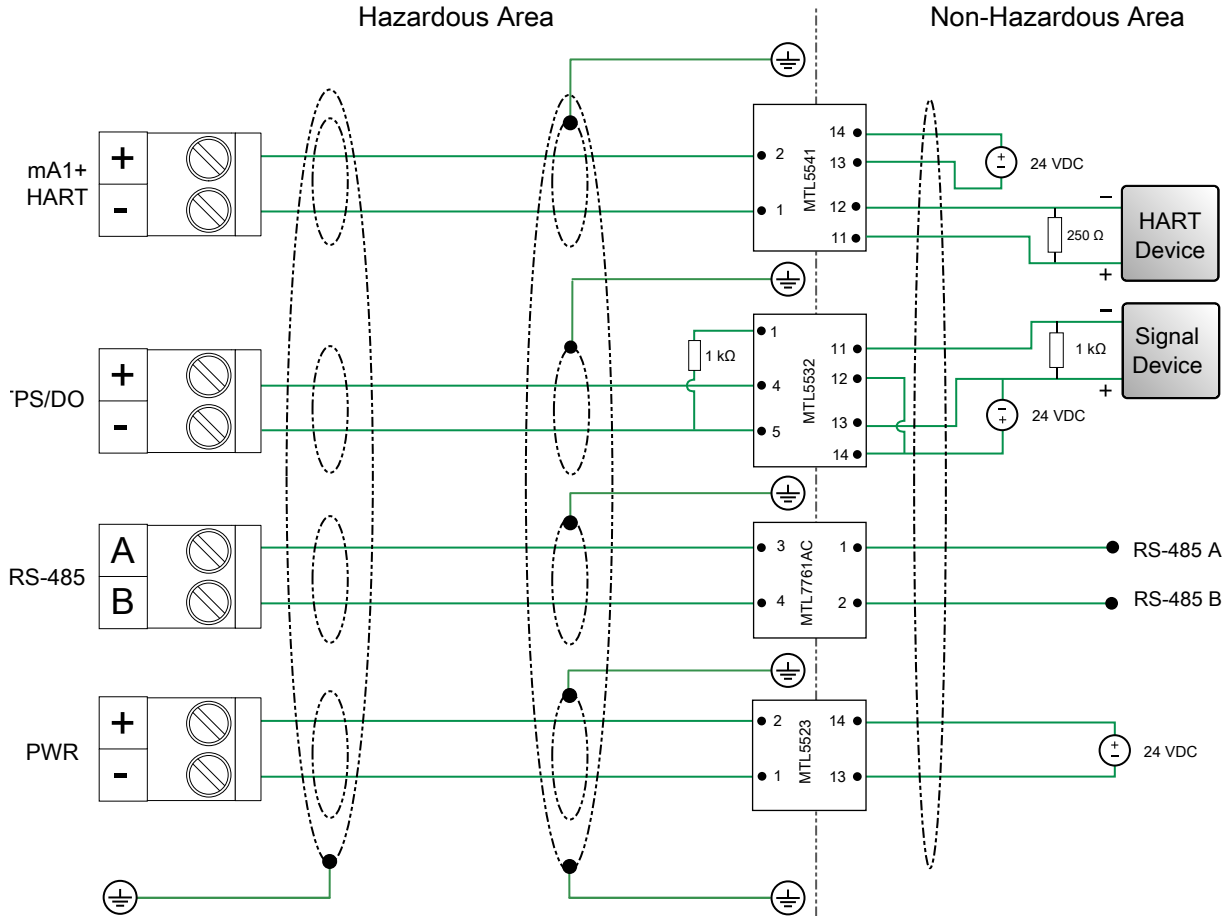
Note
The RS-485 barrier is not isolated.

Output(s)	Isolator
4–20 mA + HART	MTL5541
• Time Period Signal (TPS) • Discrete	MTL5532
Modbus/RS-485	MTL7761AC
Power	MTL5523

Procedure

1. Wire the isolators to the appropriate output terminal and pins.

Figure 3-3: Hazardous area output wiring using galvanic isolators (TPS and Discrete output options)



2. Set the isolator switch settings for the TPS/DO connection (MTL5532 isolator). You must set the isolator switches appropriately for Pins 1 through 5 (see *Table 1*).

The switches are located on the side of the isolator, and must be set to either Off (the up position) or On (the down position).

Figure 3-4: MTL5532 switch location (plus ON/OFF switch position)

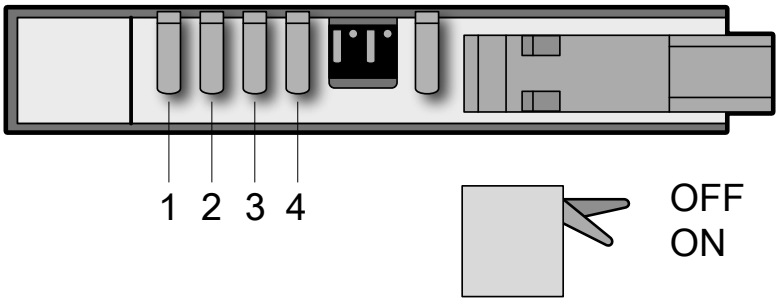


Table 3-4: MTL5532 switch settings

Switch	ON/OFF?
1	ON
2	OFF
3	OFF
4	OFF

4 Grounding

The meter must be grounded according to the standards that are applicable at the site. The customer is responsible for knowing and complying with all applicable standards.

Prerequisites

Micro Motion suggests the following guides for grounding practices:

- In Europe, EN 60079-14 is applicable to most installations, in particular Sections 12.2.2.3 and 12.2.2.4.
- In the U.S.A. and Canada, ISA 12.06.01 Part 1 provides examples with associated applications and requirements.
- For IECEx installations, IEC 60079-14 is applicable.

If no external standards are applicable, follow these guidelines to ground the meter:

- Use copper wire, 18 AWG (0.75 mm^2) or larger wire size.
- Keep all ground leads as short as possible, less than 1 Ω impedance.
- Connect ground leads directly to earth, or follow plant standards.

⚠ CAUTION!

Ground the meter to earth, or follow ground network requirements for the facility. Improper grounding can cause measurement error.

Procedure

Check the joints in the pipeline.

- If the joints in the pipeline are ground-bonded, the sensor is automatically grounded and no further action is necessary (unless required by local code).
- If the joints in the pipeline are not grounded, connect a ground wire to the grounding screw located on the sensor electronics.

MMI-20020979
Rev AB
2015

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