

Micro Motion™ G-Series Coriolis Flow and Density Sensors



Safety messages

Safety messages are provided throughout this manual to protect personnel and equipment. Read each safety message carefully before proceeding to the next step.

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 EU Declaration of Conformity for directives that apply to this product. The following are available: the EU Declaration of Conformity, with all applicable European directives, and the complete ATEX installation drawings and instructions. In addition, the IECEx installation instructions for installations outside of the European Union and the CSA installation instructions for installations in North America are available at Emerson.com or through your local Micro Motion support center.

Information affixed to equipment that complies with the Pressure Equipment Directive, can be found at Emerson.com. For hazardous installations in Europe, refer to standard EN 60079-14 if national standards do not apply.

Other information

Troubleshooting information can be found in the appropriate Configuration and Use Manual. Product Data Sheets and Manuals are available from the Micro Motion website at Emerson.com.

Return policy

Follow Emerson procedures when returning equipment. These procedures ensure legal compliance with government transportation agencies and help provide a safe working environment for Emerson employees. If you fail to follow Emerson procedures, then Emerson will not accept your returned equipment.

Return procedures and forms are available on our web support site at Emerson.com, or by calling the Micro Motion Customer Service department.

Contents

Chapter 1	Before you begin.....	5
	1.1 About this document.....	5
	1.2 Hazard messages.....	5
	1.3 Related documentation.....	6
Chapter 2	Planning.....	7
	2.1 Installation checklist.....	7
	2.2 Best practices.....	8
	2.3 Temperature limits.....	8
Chapter 3	Mounting.....	11
	3.1 Mount the sensor.....	11
Chapter 4	Wiring.....	13
	4.1 Options for wiring.....	13
	4.2 Connect 4-wire cable.....	13
Chapter 5	Grounding.....	19
Chapter 6	Supplementary information.....	21
	6.1 Pressure relief.....	21

1 Before you begin

1.1 About this document

This document provides information on planning, mounting, wiring, and grounding the G-Series sensor.

The information in this document assumes that users understand basic transmitter and sensor installation, configuration, and maintenance concepts and procedures.

1.2 Hazard messages

This document uses the following criteria for hazard messages based on ANSI standards Z535.6-2011 (R2017).

 **DANGER**

Serious injury or death will occur if a hazardous situation is not avoided.

 **WARNING**

Serious injury or death could occur if a hazardous situation is not avoided.

 **CAUTION**

Minor or moderate injury will or could occur if a hazardous situation is not avoided.

NOTICE

Data loss, property damage, hardware damage, or software damage can occur if a situation is not avoided. There is no credible risk of physical injury.

Physical access

 **WARNING**

Unauthorized personnel can potentially cause significant damage and/or misconfiguration of end users' equipment. Protect against all intentional or unintentional unauthorized use.

Physical security is an important part of any security program and fundamental to protecting your system. Restrict physical access to protect users' assets. This is true for all systems used within the facility.

1.3 Related documentation

You can find all product documentation at <https://www.emerson.com/en-ca/automation/micro-motion>.

See any of the following documents for more information:

- The hazardous area approvals documentation shipped with the sensor or available at [Emerson.com/flowmeasurementhttps://www.emerson.com/en-ca/automation/micro-motion](https://www.emerson.com/en-ca/automation/micro-motion).
- [Micro Motion G-Series Flow and Density Meters Product Data Sheet](#)
- [Micro Motion 9-Wire Flowmeter Cable Preparation and Installation Manual](#)
- The transmitter installation guide and the transmitter configuration and use guide

2 Planning

2.1 Installation checklist

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

 **WARNING**

Failure to abide by approvals can cause an explosion resulting in injury or death.

- Verify that the local ambient and process temperatures are within the limits of the meter.
- If your sensor has an integral transmitter, no wiring is required between the sensor and transmitter. Follow the wiring instructions in the transmitter installation manual for signal and power wiring.
- If your transmitter has remote-mounted electronics, follow the instructions in this manual for wiring between the sensor and the transmitter, and then follow the instructions in the transmitter installation manual for power and signal wiring.

Table 2-1: Maximum cable lengths







Cable type	To transmitter	Maximum length
Micro Motion 9-wire	5700 transmitter	1,000 ft (305 m)
	All other MVD transmitters	60 ft (18 m)
Micro Motion 4-wire	All 4-wire MVD transmitters	1,000 ft (305 m) without Ex-approval 500 ft (152 m) with IIC-rated sensors 1,000 ft (305 m) with IIB-rated sensors

Table 2-2: Maximum lengths for user-supplied 4-wire cable

Wire function	Wire size	Maximum length
Power (VDC)	22 AWG (0.326 mm ²)	300 ft (91 m)
	20 AWG (0.518 mm ²)	500 ft (152 m)
	18 AWG (0.823 mm ²)	1,000 ft (305 m)
Signal (RS-485)	22 AWG (0.326 mm ²) or larger	1,000 ft (305 m)

- For optimal performance, install the sensor in the preferred orientation. The sensor will work in any orientation as long as the flow tubes remain full of process fluid.

Table 2-3: Preferred sensor orientation

Process	Preferred orientation	Secondary preferred orientation	Alternate suitable orientation
Liquids && slurries			
Gases			

- Install the meter so that the flow direction arrow on the sensor case matches the actual forward flow of the process. (Flow direction is also software-selectable.)

2.2 Best practices

- There are no pipe run requirements for Micro Motion sensors. Straight runs of pipe upstream or downstream are unnecessary.
- If the sensor is installed in a vertical pipeline, liquids and slurries should flow upward through the sensor.
- Keep the sensor tubes full of process fluid.
- For halting flow through the sensor with a single valve, install the valve downstream from the sensor.
- The sensor does not require external supports. The flanges will support the sensor in any orientation.

2.3 Temperature limits

You can use sensors in the process and ambient temperature ranges shown in the temperature limit graphs.

For the purposes of selecting electronics options, only use temperature limit graphs as a general guide. If your process conditions are close to the gray area, consult technical support.

WARNING

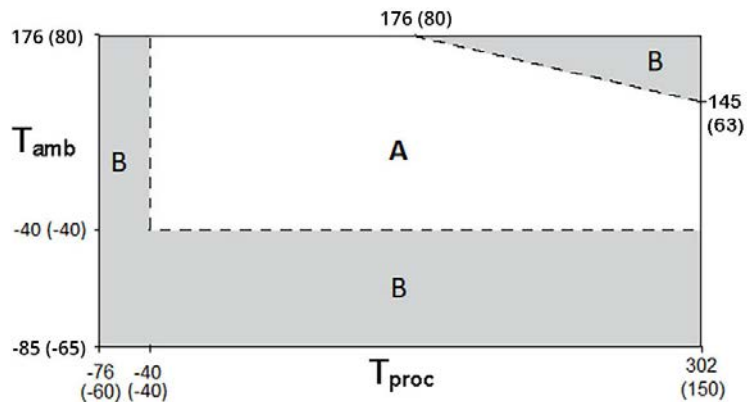
Temperature limits may be further restricted by hazardous area approvals that are necessary to avoid potential injury to personnel and damage to equipment. Refer to the hazardous area approvals documentation shipped with the sensor for specific temperature ratings for each model and configuration.

NOTICE

In all cases, the electronics cannot be operated where the ambient temperature is below -40 °F (-40 °C) or above 140 °F (60 °C). If a sensor is to be used where the ambient

temperature is outside of the range permissible for the electronics, the electronics must be remotely located where the ambient temperature is within the permissible range, as indicated by the shaded areas of the temperature limit graphs.

Figure 2-1: Ambient and process temperature limits for all G-Series meters



- T_{amb}** Ambient temperature °F (°C)
- T_{proc}** Process temperature °F (°C)
- A** All available electronic options
- B** Remote mount electronics only

3 Mounting

3.1 Mount the sensor

NOTICE

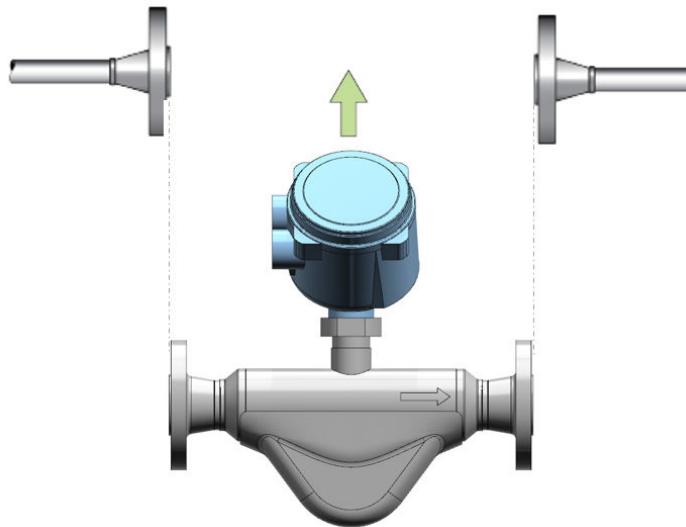
- Lifting the sensor by the electronics or purge connections can damage the device.
 - To reduce the risk of collecting liquid in the electronics housing, do not orient transmitters or sensor junction boxes with their conduit openings pointing upward.
-

Procedure

Mount the sensor.

Notes

- Do not use the sensor to support the piping.
 - The sensor does not require external supports. The flanges will support the sensor in any orientation.
 - Emerson recommends inserting bolts from the pipeline flange side and placing nuts on the sensor flange side because there is more space on the pipeline flange.
-



4 Wiring

4.1 Options for wiring

The wiring procedure you follow depends on which electronics option you have.

Table 4-1: Wiring procedures by electronics option

Electronics option	Wiring procedure
Integral transmitter	The transmitter is already connected to the sensor. No wiring is required between sensor and transmitter. See the transmitter installation manual for wiring the power and signal cable to the transmitter.
MVD™ Direct Connect™	There is no transmitter to wire. See the Micro Motion MVD Direct Connect Meters Installation Manual for wiring the power and signal cable between the sensor and the direct host.
Integral core processor with remote transmitter	The core processor is already connected to the sensor. Connect a 4-wire cable between the core processor and transmitter.
Remote core processor attached to transmitter	Connect a 9-wire cable between the sensor and the transmitter/core processor. Refer to both Connect the 9-wire cable and the Micro Motion 9-Wire Flowmeter Cable Preparation and Installation Manual .
Remote core processor separate from transmitter – <i>double-hop</i>	<ul style="list-style-type: none"> Connect a 4-wire cable between the core processor and transmitter. Refer to Connect 4-wire cable. Connect a 9-wire cable between the sensor and the core processor. Refer to both Connect the 9-wire cable and the Micro Motion 9-Wire Flowmeter Cable Preparation and Installation Manual.

4.2 Connect 4-wire cable

4.2.1 4-wire cable types and usage

Micro Motion offers two types of 4-wire cable: shielded and armored. Both types contain shield drain wires.

The cable supplied by Micro Motion consists of one pair of red and black 18 AWG (0.823 mm²) wires for the VDC connection, and one pair of white and green 22 AWG (0.326 mm²) wires for the RS-485 connection.

User-supplied cable must meet the following requirements:

- Twisted pair construction.
- Applicable hazardous area requirements, if the core processor is installed in a hazardous area.
- Wire gauge appropriate for the cable length between the core processor and the transmitter, or the host.

Wire gauge	Maximum cable length
VDC 22 AWG (0.326 mm ²)	300 ft (91 m)
VDC 20 AWG (0.518 mm ²)	500 ft (152 m)
VDC 18 AWG (0.823 mm ²)	1,000 ft (305 m)
RS-485 22 AWG (0.326 mm ²) or larger	1,000 ft (305 m)

4.2.2 Prepare a cable with a metal conduit

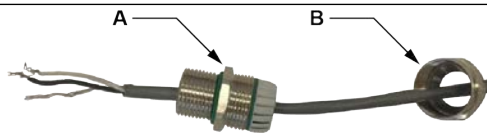
Procedure

1. Remove the core processor cover using a flat-blade screw driver.
2. Run the conduit to the sensor.
3. Pull the cable through the conduit.
4. Cut the drain wires and let them float at both ends of the conduit.

4.2.3 Prepare a cable with user-supplied cable glands

Procedure

1. Remove the core processor cover using a flat-blade screw driver.
2. Pass the wires through the gland nut and gland body.



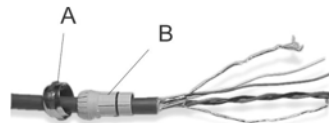
A. Gland body
B. Gland nut

3. Terminate the RS-485 shield and drain wires to the housing internal grounding screw.
4. Assemble the gland according to vendor instructions.

4.2.4 Prepare a cable with Micro Motion-supplied cable glands

Procedure

1. Remove the core processor cover using a flat-blade screw driver.
2. Pass the wires through the gland nut and clamping insert.



A. Gland nut
B. Clamping insert

3. Strip the cable jacket.

Option	Description
NPT gland type	Strip 4.5 in (114 mm)
M20 gland type	Strip 4.25 in (108 mm)

4. Remove the clear wrap and filler material.
5. Strip most of the shielding.

Option	Description
NPT gland type	Strip all but 0.75 in (19 mm)
M20 gland type	Strip all but 0.5 in (13 mm)

6. Wrap the drain wires twice around the shield and cut off the excess drain wires.

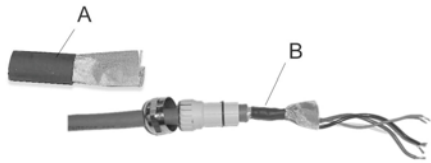



A. Drain wires wrapped around shield

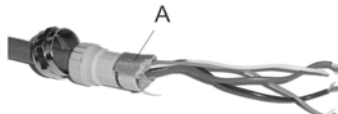
7. For foil (shielded cable) only:

Note

For braided (armored cable) skip this step and continue to the next step.

Option	Description
NPT gland type	<p>a. Slide the shielded heat shrink over the drain wires. Ensure that the wires are completely covered.</p> <p>b. Apply 250 °F (121.1 °C) heat to shrink the tubing. Do not burn the cable.</p> <p>c. Position the clamping insert so the interior end is flush with the braid of the heat shrink.</p>  <p>A. Shielded heat shrink B. After heat is applied</p>
M20 gland type	<p>Trim 0.3 in (8 mm).</p>  <p>A. Trim</p>

8. Assemble the gland by folding the shield or braid back over the clamping insert and 0.125 in (3 mm) past the O-ring.



A. Shield folded back

9. Install the gland body into the conduit opening on the core processor housing.

10. Insert the wires through the gland body and tighten the gland nut onto the gland body.



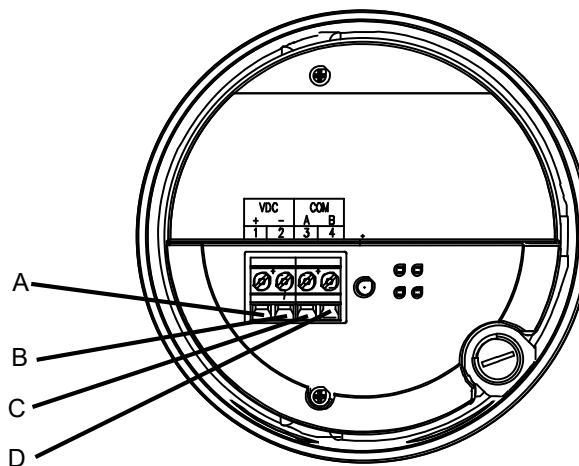
- A. Shield folded back
B. Gland body

4.2.5 Connect the wires to the core processor terminals

After the 4-wire cable has been prepared and shielded (if required), connect the individual wires of the 4-wire cable to the terminals on the core processor.

Procedure

1. Connect the wires to the enhanced core processor by using the enhanced core processor and connections, which are displayed in the following figure:



- A. Terminal 1 (Power supply +): Red wire
B. Terminal 2 (Power supply -): Black wire
C. Terminal 3 (RS-485/A): White wire
D. Terminal 4 (RS-485/B): Green wire

2. Reinstall the core processor cover.
3. Torque the cover screws to:
 - For aluminum housing: 10 in lbf (1.13 N m) to 13 in lbf (1.47 N m)
 - For stainless steel housing: minimum 19 in lbf (2.15 N m)

If properly seated, there will be no gap between cover and base.

4. Connect the wires to the transmitter terminals using the transmitter installation manual.

4.2.6 Connect the 9-wire cable

Procedure

1. Prepare and install the cable according to the instructions in the [Micro Motion 9-Wire Flowmeter Cable Preparation and Installation Manual](#).
2. Insert the stripped ends of the individual wires into the terminal blocks of the junction box.
Ensure that no bare wires remain exposed.
3. Match the wires color for color.
For wiring at the transmitter or remote core processor, refer to the transmitter documentation.
4. Tighten the screws to hold the wires in place.
5. Ensure integrity of gaskets; then tightly close and seal the junction box cover and all housing covers.
6. Refer to the transmitter installation manual for signal and power wiring instructions.

5 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

Use the following guides for grounding practices:

- In Europe, IEC 60079-14 is applicable to most installations, in particular sections 16.2.2.3 and 16.2.2.4.
- In the USA and Canada, ISA 12.06.01 Part 1 provides examples with associated applications and requirements.

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

- Use copper wire, 14 AWG (2.08 mm²) 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.

NOTICE

Ground the flow 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.

Tip

The sensor electronics may be a transmitter, core processor, or junction box. The grounding screw may be internal or external.

6 Supplementary information

6.1 Pressure relief

G-Series sensors are available with a rupture disk installed on the case.

Rupture disks vent process fluid from the sensor case in the unlikely event of a flow tube breach. The standard rupture activation pressure is 63.8 psig (4.4 barg). For more information about rupture disks, contact customer service. For more information about rupture disks, contact customer service.

If the sensor has a rupture disk, keep it installed at all times, as it would otherwise be necessary to re-purge the case. If the rupture disk is activated by a tube breach, the seal in the rupture disk will be broken, and the Coriolis meter should be removed from service.

Figure 6-1: Rupture disk on the G-Series



! WARNING

High-pressure fluid escaping from the sensor can cause severe injury or death

- Orient the sensor so that personnel and equipment will not be exposed to any discharge along the pressure relief path.
- Stay clear of the rupture disk pressure relief area.

NOTICE

When using a rupture disk, the housing can no longer assume a secondary containment function.

Keep the rupture disk installed at all times, as it would otherwise be necessary to re-purge the case.

If the rupture disk is activated by a tube breach, the seal in the rupture disk will be broken. If this happens, remove the Coriolis meter from service.

NOTICE

Removing the purge fitting, blind plug, or rupture disks compromises the Ex-i Safety Certification, the Ex-tc Safety Certification, and the ingress protection (IP)-rating of the Coriolis meter. Any modification to the purge fitting, blind plug, or rupture disks must maintain a minimum of IP66/IP67 Ratings.



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For more information: [Emerson.com/global](https://emerson.com/global)

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MICRO MOTION™

