Micro Motion® CNG050 Sensors

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

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		South Africa	800 991 390		
		Saudi Arabia	800 844 9564		
		UAE	800 0444 0684		

Contents

1   Planning

Topics covered in this chapter:

- *Installation checklist*
- *Best practices*
- *Temperature limits*

1.1   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.

☐   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 1-1: Maximum lengths for Micro Motion cable

Cable type	To transmitter	Maximum length
Micro Motion 4-wire	All 4-wire MVD transmitters	- 1000 ft (300 m) without Ex-approval - 500 ft (150 m) with IIC rated sensors - 1000 ft (300 m) with IIB rated sensors

Table 1-2: Maximum lengths for user-supplied 4-wire cable

Wire function	Wire size	Maximum length
Power (VDC)	22 AWG (0,35 mm^2)	300 ft (90 m)
	20 AWG (0,5 mm^2)	500 ft (150 m)
	18 AWG (0,8 mm^2)	1000 ft (300 m)
Signal (RS-485)	22 AWG (0,35 mm^2) or larger	1000 ft (300 m)

☐   The sensor will work in any orientation as long as the flow tubes remain full of process fluid.

☐ The sensor has a pressure relief feature to evacuate the case in the unlikely event of a loss of primary containment:

- The pressure relief feature is located underneath the calibration tag.

- Orient the sensor so that personnel and equipment will not be exposed to escaping pressurized discharge along the pressure relief path.

Figure 1-1: Pressure relief feature
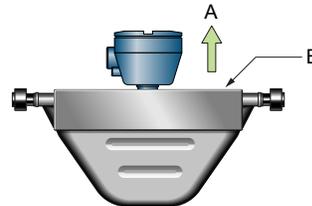
A. Pressure relief path
B. Calibration tag

⚠ **CAUTION!**

Failure to properly orient the sensor could result in exposure to pressurized discharge. Orient the sensor in a way that will not expose personnel and equipment to the pressure relief path.

- If the pressure relief feature is activated by a loss of primary containment, the calibration tag will release from the case.

☐ 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.)

1.2 Best practices

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

• 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. Gases should flow downward.

• 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.

• Minimize bending and torsional stress on the meter. Do not use the meter to align misaligned piping.

• The sensor does not require external supports. The flanges will support the sensor in any orientation.

1.3 Temperature limits

Sensors can be used in the process and ambient temperature ranges shown in the temperature limit graphs. For the purposes of selecting electronics options, temperature limit graphs should be used only as a general guide. If your process conditions are close to the gray area, consult with your Micro Motion representative.

The environmental limits of the sensor are as follows:

- Process fluid: –40 to +257 °F (–40 to +125 °C)
- Ambient temperature: –40 to +140 °F (–40 to +60 °C)

Notes

- 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 area of the temperature limit graphs.

- Temperature limits may be further restricted by hazardous area approvals. Refer to the hazardous area approvals documentation shipped with the sensor or available from the Micro Motion web site (*www.micromotion.com*).

- The extended-mount electronics option allows the sensor case to be insulated without covering the , but does not affect temperature ratings. When insulating the sensor case at elevated process temperatures (above 140 °F), please ensure electronics are not enclosed in insulation as this may lead to electronics failure.

2   Mounting

2.1   Mount the sensor

Use your common practices to minimize torque and bending load on process connections.

Tip

To reduce the risk of condensation problems, do not orient transmitters or sensor junction boxes with their conduit openings pointing upward.
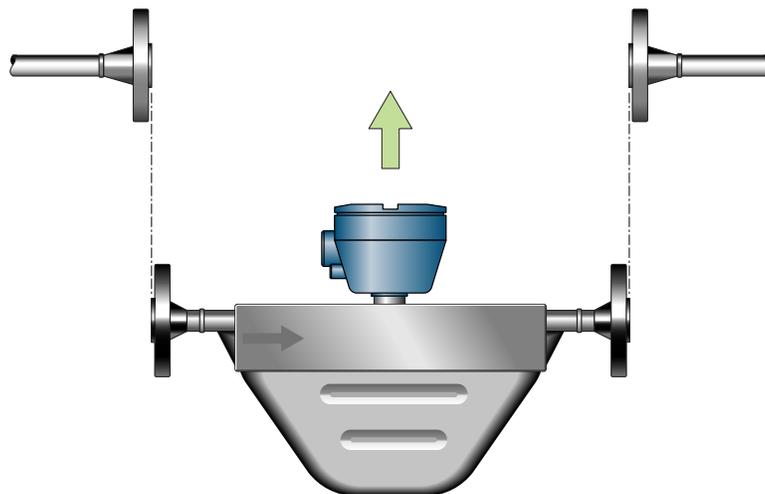
⚠ CAUTION!

Do not lift the sensor by the electronics. Lifting the sensor by the electronics can damage the device.

Figure 2-1:   Mounting 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.*

3 Wiring

Topics covered in this chapter:

- *Options for wiring*
- *Connect 4-wire cable*

3.1 Options for wiring

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

Table 3-1: 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 MVD Direct Connect 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. Refer to*Section 3.2*.

⚠ CAUTION!

Make sure the hazardous area specified on the sensor approval tag is suitable for the environment in which the sensor will be installed. Failure to comply with the requirements for intrinsic safety in a hazardous area could result in an explosion.

⚠ CAUTION!

Fully close and tighten all housing covers and conduit openings. Improperly sealed housings can expose electronics to moisture, which can cause measurement error or flowmeter failure. Inspect and grease all gaskets and O-rings.

3.2 Connect 4-wire cable

3.2.1 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 4-wire cable supplied by Micro Motion consists of one pair of red and black 18 AWG (0.75 mm^2) wires for the VDC connection, and one pair of white and green 22 AWG (0.35 mm^2) wires for the RS-485 connection.

User-supplied 4-wire 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.

Table 3-2: Wire gauge

Wire gauge	Maximum cable length
VDC 22 AWG (0.35 mm^2)	300 ft (90 m)
VDC 20 AWG (0.5 mm^2)	500 ft (150 m)
VDC 18 AWG (0.8 mm^2)	1000 ft (300 m)
RS-485 22 AWG (0.35 mm^2) or larger	1000 ft (300 m)

3.2.2 Prepare the 4-wire cable

Important

For user-supplied cable glands, the gland must be capable of terminating the drain wires.

Note

If you are installing unshielded cable in continuous metallic conduit with 360º termination shielding, you only need to prepare the cable – you do not need to perform the shielding procedure.

Figure 3-1: 4-wire cable preparation

Remove the core processor cover

Cable layout

Cable glands

Gland supplier

Micro Motion cable gland

Pass the wires through the gland nut and clamping insert.

Gland nut

Clamping insert

User-supplied cable gland

Pass the wires through the gland. Terminate the drain wires inside the gland.

Metal conduit

Run conduit to sensor

Lay cable in conduit

Done (do not perform the shielding procedure)

Gland type

NPT
1. Strip 4-1/2 inch (115 mm) of cable jacket.
2. Remove the clear wrap and filler material.
3. Strip all but 3/4 inch (19 mm) of shielding.

M20
1. Strip 4-1/4 inch (108 mm) of cable jacket.
2. Remove the clear wrap and filler material.
3. Strip all but 1/2 inch (12 mm) of shielding.

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

Drain wires wrapped around shield

Go to the shielding procedure

Figure 3-2: 4-wire cable shielding

From the preparation procedure

Gland supplier

Micro Motion cable gland

User-supplied cable gland

Cable shield type

Braided (armored cable)

Foil (shielded cable)

Gland type

NPT

M20

Trim 7 mm from the shielded heat shrink

Trim

Apply the Heat Shrink
1. Slide the shielded heat shrink over the drain wires. Ensure that the wires are completely covered.
2. Apply heat (250 °F or 120 °C) to shrink the tubing. Do not burn the cable.
3. Position the clamping insert so the interior end is flush with the braid of the heat shrink.

Shielded heat shrink

After heat applied

Terminate the shield and drain wires in the gland

Assemble the gland according to vendor instructions

Assemble the Gland
1. Fold the shield or braid back over the clamping insert and 1/8 inch (3 mm) past the O-ring.
2. Install the gland body into the conduit opening on the core processor housing.
3. Insert the wires through gland body and tighten the gland nut onto the gland body.

Shield folded back

Gland body

Done
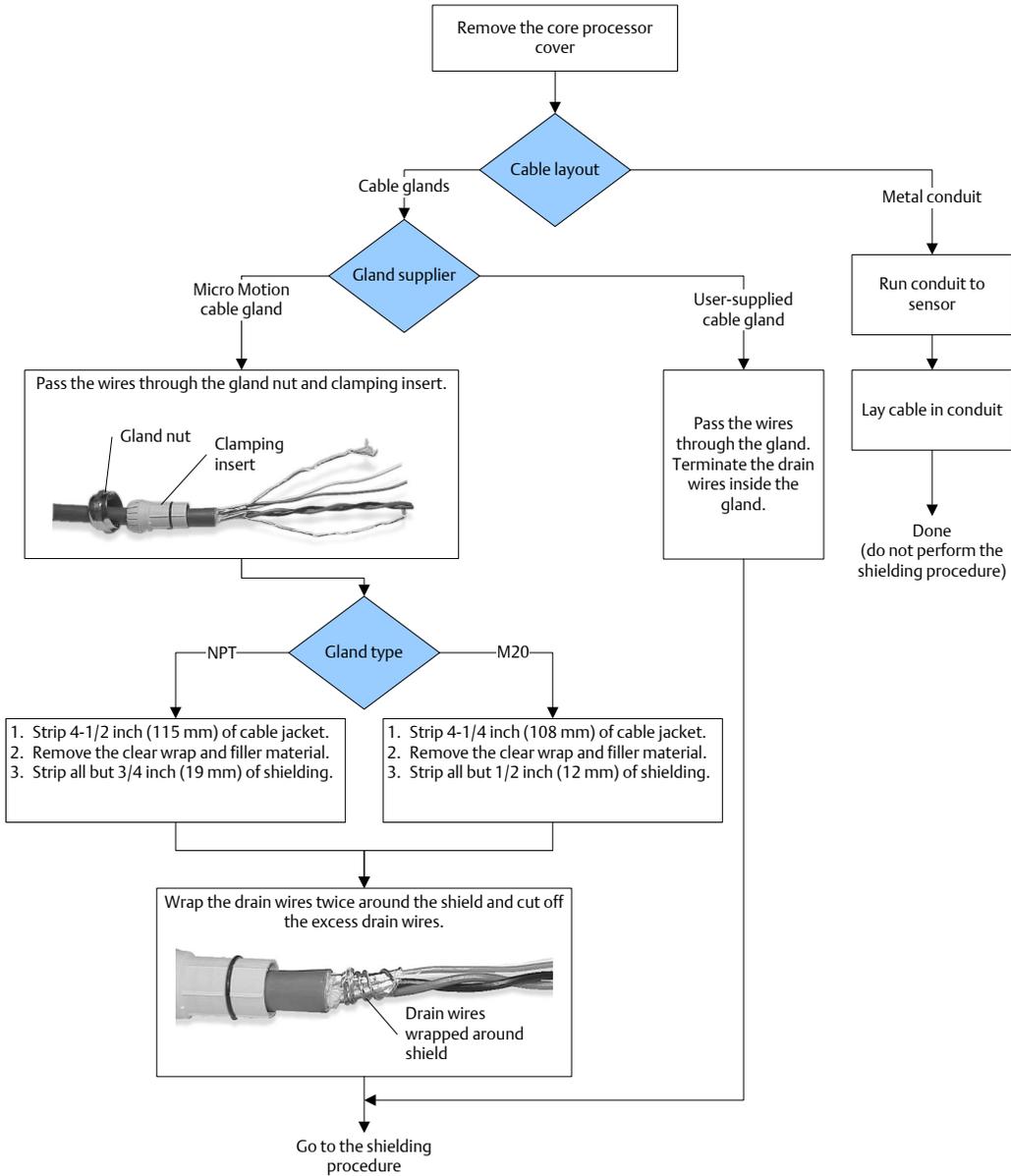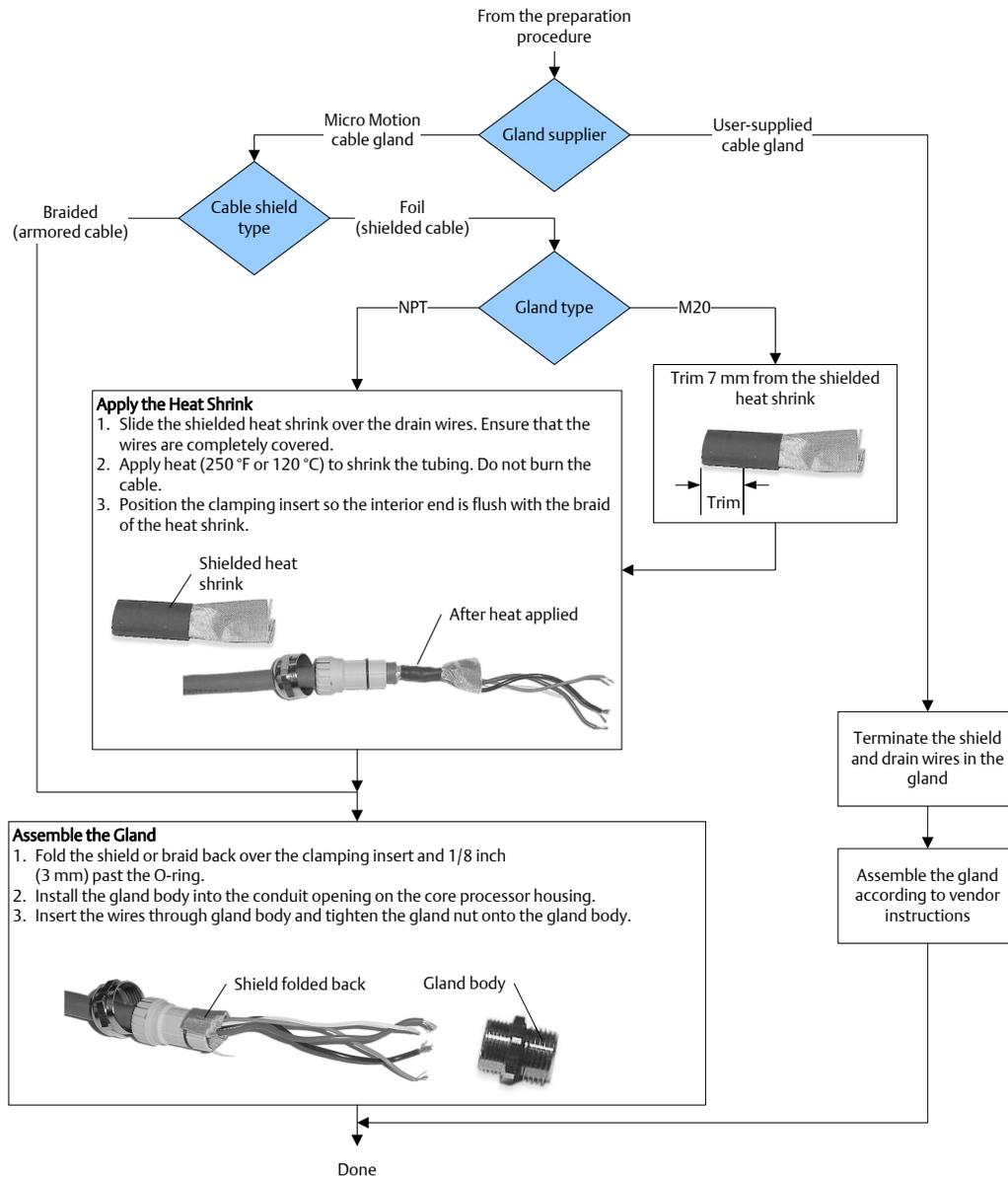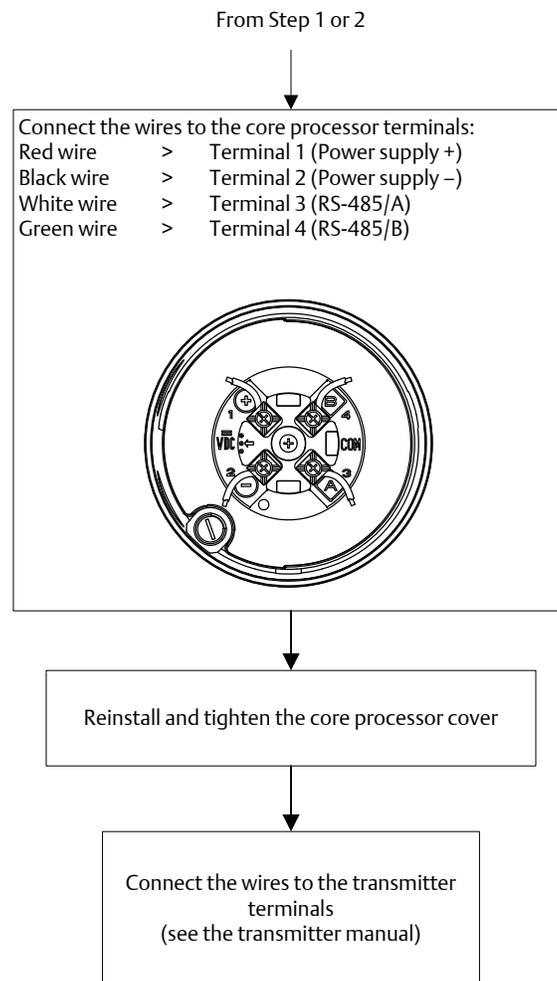
3.2.3 Connect the wires to the core processor terminals

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.

Figure 3-3: Core processor terminals

From Step 1 or 2

Connect the wires to the core processor terminals:
Red wire   >   Terminal 1 (Power supply +)
Black wire   >   Terminal 2 (Power supply –)
White wire   >   Terminal 3 (RS-485/A)
Green wire   >   Terminal 4 (RS-485/B)

Reinstall and tighten the core processor cover

Connect the wires to the transmitter
terminals
(see the transmitter manual)

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, IEC 79-14 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.

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

- Use copper wire, 14 AWG ($2,0$ 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 flowmeter 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.

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