

Micro Motion™ 820 Electronics



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/global.

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/global, or by calling the Micro Motion Customer Service department.

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1 Planning

1.1 Installation checklist

- If you plan to mount the electronics in a hazardous area:

 **WARNING**

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

- Make sure that the hazardous area specified on the approval tag is suitable for the environment in which the electronics will be installed.
- Verify that the local ambient and process temperatures are within the limits of the electronics.
- Verify that you are using low-voltage DC power for the electronics. Excess voltage can damage the electronics.
- For I.S. applications, refer to Micro Motion ATEX, UL, or CSA installation instructions.
- Mount the electronics in any orientation as long as the conduit openings do not point upward.

 **CAUTION**

Upward-facing conduit openings risk condensation entering the housing that can damage the electronics.

1.2 Power requirements

- 18 to 30 VDC, 3 watts typical, 5 watts maximum
- Minimum 28 VDC with 300 meters of 1 mm² power-supply cable
- At startup, power source must provide a minimum of 0.5 amperes of short term current at a minimum of 18 volts at the electrical parts power input terminals
- The maximum steady state current is 0.2A
- Complies with Installation (Overvoltage) Category II, Pollution Degree 2

Note

Length and conductor diameter of the power cable must be sized to provide 18 VDC minimum at the power terminals, at a load current of 0.2 amps.

Cable sizing formula

$$M = 18V + (R \times L \times 0.2A)$$

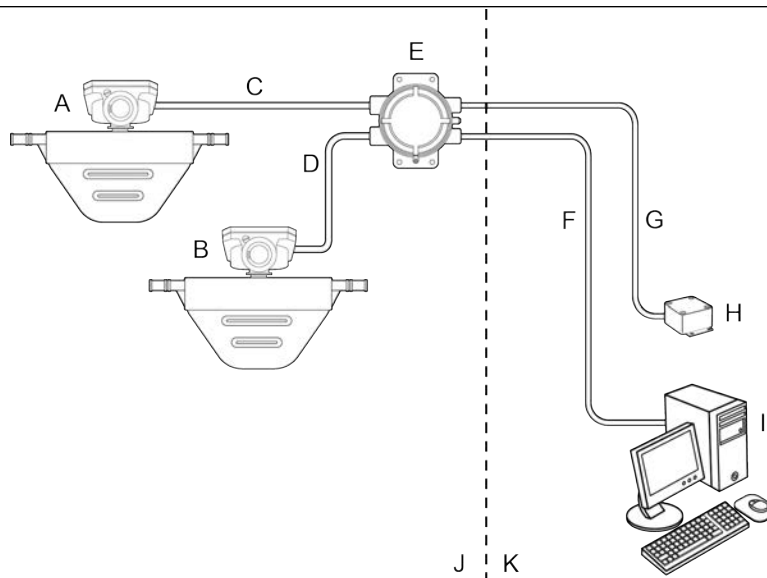
- M: minimum supply voltage
- R: cable resistance
- L: cable length

Table 1-1: Typical power cable resistance at 68 °F (20.0 °C)

Wire gauge	Resistance
14 AWG	0.0050 Ω/ft
16 AWG	0.0080 Ω/ft
18 AWG	0.0128 Ω/ft
20 AWG	0.0204 Ω/ft
2.5 mm ²	0.0136 Ω/m
1.5 mm ²	0.0228 Ω/m
1.0 mm ²	0.0340 Ω/m
0.75 mm ²	0.0460 Ω/m
0.50 mm ²	0.0680 Ω/m

2 Architecture

2.1 Sensors with 820 architecture



- A. Sensor 1 with junction box
- B. Sensor 2 with junction box
- C. 9-wire cable
- D. 9-wire cable
- E. 820
- F. User-supplied RS-485 cable
- G. User-supplied power cable
- H. Power supply
- I. Remote host
- J. Hazardous area
- K. Safe area

3 Mounting

3.1 Provide for maintenance accessibility

Mount the electronics enclosure in a location and orientation that satisfies the following conditions:

- Allows sufficient clearance to open the enclosure cover. Micro Motion recommends 7.88 in (200 mm) to 9.85 in (250 mm) clearance at the rear of the electronics enclosure.
- Provides clear access for installing cabling to the enclosure.

3.2 Mount the 820 electronics

Procedure

Attach the device to an instrument pole or wall. For a pipe mount, two user-supplied U-bolts are required. Contact Micro Motion to obtain a pipe-mount installation kit if required.

Figure 3-1: Pipe mount

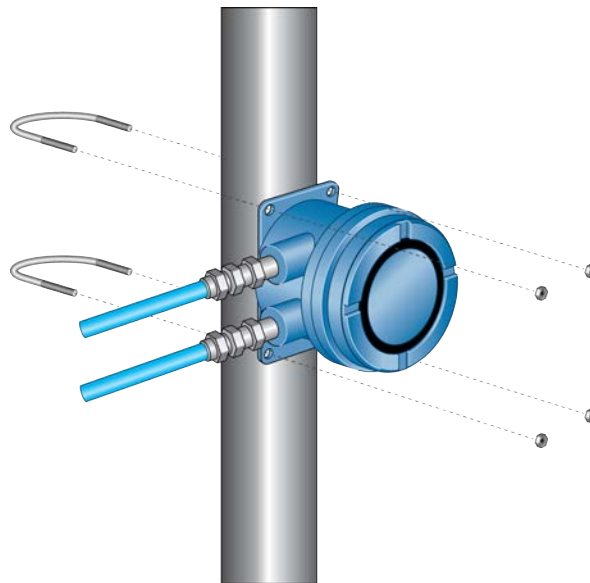
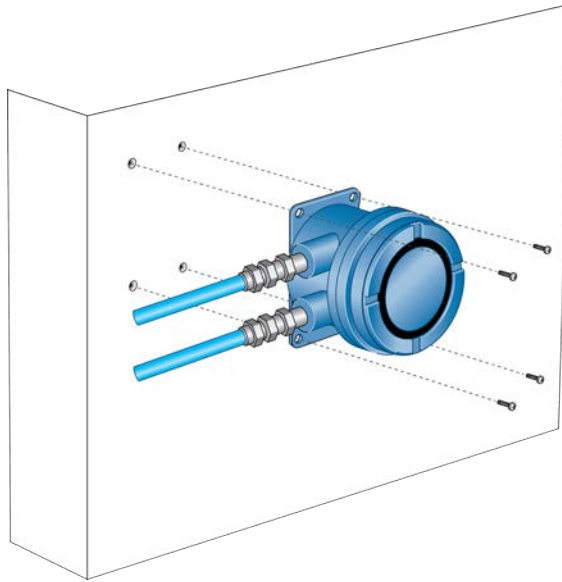


Figure 3-2: Wall mount



4 Wiring

4.1 Prepare the cable between the sensor and the 820

Micro Motion supplies two types of 9-wire cable: jacketed and shielded. The type of cable you are using determines how you will prepare the cable.

Procedure

Prepare the cable preparation procedure appropriate for your cable type.

4.1.1 9-wire cable types and usage

Cable types

Micro Motion supplies two types of 9-wire cable: jacketed, and shielded. Note the following differences between the cable types:

- Jacketed cable has a smaller bend radius than shielded cable.
- If hazardous-area compliance is required, the different cable types have different installation requirements.

Cable bend radii

Table 4-1: Bend radii of jacketed cable

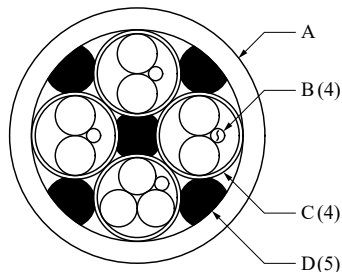
Jacket material	Outside diameter	Minimum bend radii	
		Static (no load) condition	Under dynamic load
PVC	0.39 in (10 mm)	3.15 in (80 mm)	6.26 in (159 mm)

Table 4-2: Bend radii of shielded cable

Jacket material	Outside diameter	Minimum bend radii	
		Static (no load) condition	Under dynamic load
PVC	0.55 in (14 mm)	4.25 in (108 mm)	8.5 in (216 mm)

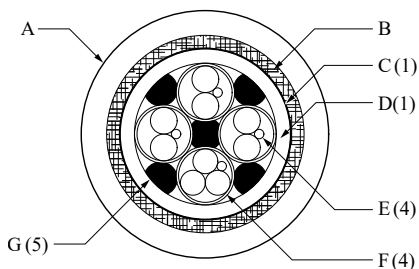
Cable illustrations

Figure 4-1: Cross-section view of jacketed cable



- A. Outer jacket
- B. Drain wire (4 total)
- C. Foil shield (4 total)
- D. Filler (5 total)

Figure 4-2: Cross-section view of shielded cable



- A. Outer jacket
- B. Tin-plated copper braided shield
- C. Foil shield (1 total)
- D. Inner jacket
- E. Drain wire (4 total)
- F. Foil shield (4 total)
- G. Filler (5 total)

4.2 Wire the 820 to the sensor

4.2.1 Wire the 820 to the sensor using jacketed cable

Prerequisites

For hazardous area installations, install the jacketed cable inside a user-supplied sealed metallic conduit that provides 360° termination shielding for the enclosed cable.

 **CAUTION**

- Sensor wiring is intrinsically safe. To keep sensor wiring intrinsically safe, keep the sensor wiring separated from power supply wiring and output wiring.
- Keep cable away from devices such as transformers, motors, and power lines, which produce large magnetic fields. Improper installation of cable, cable gland, or conduit could cause inaccurate measurements or flow meter failure.
- Improperly-sealed housings can expose electronics to moisture, which can cause measurement error or flowmeter failure. Install drip legs in conduit and cable, if necessary. Inspect and grease all gaskets and O-rings. Fully close and tighten all housing covers and conduit openings.

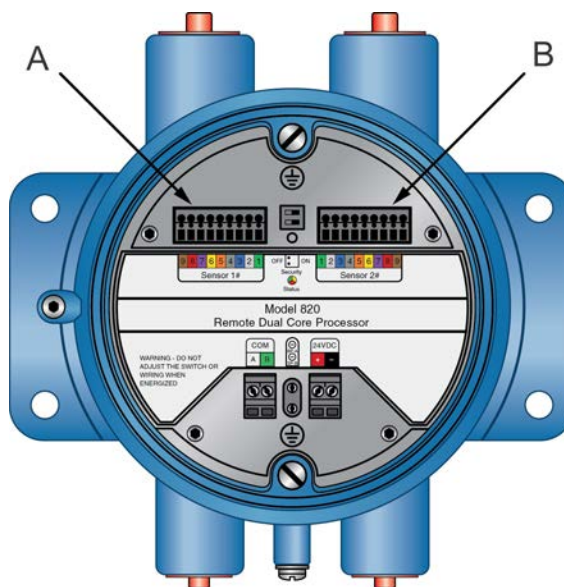
Procedure

1. Run the cable through the conduit. Do not install 9-wire cable and power cable in the same conduit.
2. To prevent conduit connectors from seizing in the threads of the conduit openings, apply a conductive anti-galling compound to the threads, or wrap threads with PTFE tape two to three layers deep.
Wrap the tape in the opposite direction that the male threads will turn when inserted into the female conduit opening.
3. Remove the device cover.
4. At the 820, do the following:
 - a) Connect a male conduit connector and waterproof seal to the conduit opening for 9-wire.
 - b) Pass the cable through the conduit opening for the 9-wire cable.
 - c) Insert the stripped end of each wire into the corresponding terminal at the 820 end, matching by color. Make sure no bare wires are exposed. See [Table 4-3](#).

Table 4-3: Terminal designations

Wire color	Function
Black	Drain wires
Brown	Drive +
Red	Drive -
Orange	Temperature -
Yellow	Temperature return
Green	Left pickoff +
Blue	Right pickoff +
Violet	Temperature +
Gray	Right pickoff -
White	Left pickoff -

Figure 4-3: 820 terminals



- A. Sensor 1
- B. Sensor 2

- d) Tighten the screws to hold the wire in place.
- e) Ensure integrity of gaskets, grease all O-rings, then replace the device housing cover and tighten all screws, as required.

4.2.2 Wire the 820 to the sensor using shielded cable

Prerequisites

For hazardous area installations, install shielded cable with cable glands at the 820 end. Cable glands that meet hazardous area requirements can be purchased from Micro Motion. Cable glands from other vendors can be used.

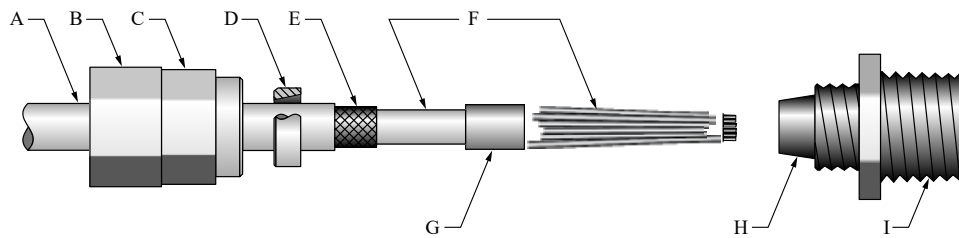
CAUTION

- Sensor wiring is intrinsically safe. To keep sensor wiring intrinsically safe, keep the sensor wiring separated from power supply wiring and output wiring.
- Keep cable away from devices such as transformers, motors, and power lines, which produce large magnetic fields. Improper installation of cable, cable gland, or conduit could cause inaccurate measurements or flow meter failure.
- Improperly-sealed housings can expose electronics to moisture, which can cause measurement error or flowmeter failure. Install drip legs in conduit and cable, if necessary. Inspect and grease all gaskets and O-rings. Fully close and tighten all housing covers and conduit openings.

Procedure

1. Identify the components of the cable gland and cable.

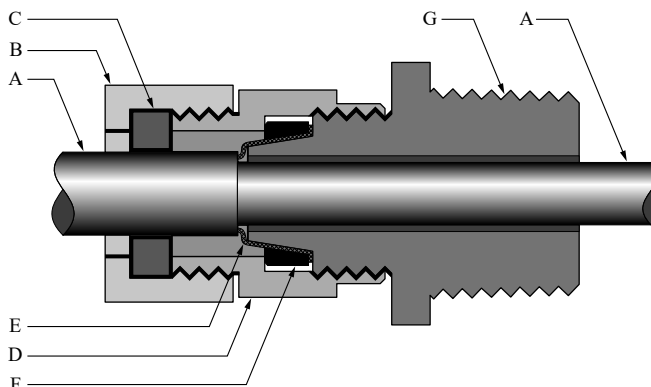
Figure 4-4: Cable gland and cable (exploded view)



- A. Cable
- B. Sealing nut
- C. Compression nut
- D. Brass compression ring
- E. Braided shield
- F. Cable
- G. Tape or heat-shrink tubing
- H. Clamp seat (shown as integral to nipple)
- I. Nipple

2. Unscrew the nipple from the compression nut.
3. Screw the nipple into the conduit opening for the 9-wire cable. Tighten it to one turn past hand-tight.
4. Slide the compression ring, compression nut, and sealing nut onto the cable. Make sure the compression ring is oriented so the taper will mate properly with the tapered end of the nipple.
5. Pass the cable end through the nipple so the braided shield slides over the tapered end of the nipple.
6. Slide the compression ring over the braided shield.
7. Screw the compression nut onto the nipple. Tighten the sealing nut and compression nut by hand to ensure that the compression ring traps the braided shield.
8. Use a 1 in (25 mm) wrench to tighten the sealing nut and compression nut between 20 ft lbf (27 N m) to 25 ft lbf (34 N m) of torque.

Figure 4-5: Cross-section of assembled cable gland with cable



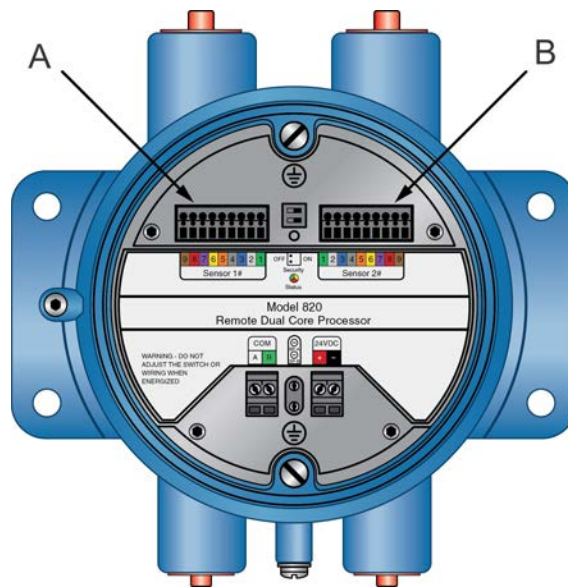
- A. Cable
- B. Sealing nut
- C. Seal
- D. Compression nut
- E. Braided shield
- F. Brass compression ring
- G. Nipple

9. Remove the device cover.
10. At the 820, connect the cable according to the following procedure:
 - a) Insert the stripped end of each wire into the corresponding terminal at the 820 ends, matching by color. Make sure no bare wires are exposed. See the following table.

Table 4-4: Terminal designations

Wire color	Function
Black	Drain wires
Brown	Drive +
Red	Drive -
Orange	Temperature -
Yellow	Temperature return
Green	Left pickoff +
Blue	Right pickoff +
Violet	Temperature +
Gray	Right pickoff -
White	Left pickoff -

Figure 4-6: 820 terminals



- A. Sensor 1
- B. Sensor 2

- b) Tighten the screws to hold the wires in place.
- c) Ensure integrity of gaskets, grease all O-rings, then replace the device housing cover and tighten all screws, as required.

5 Grounding

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

Micro Motion suggests the following guides for grounding practices:

- 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 or vessel standards.

5.1 Ground the 820

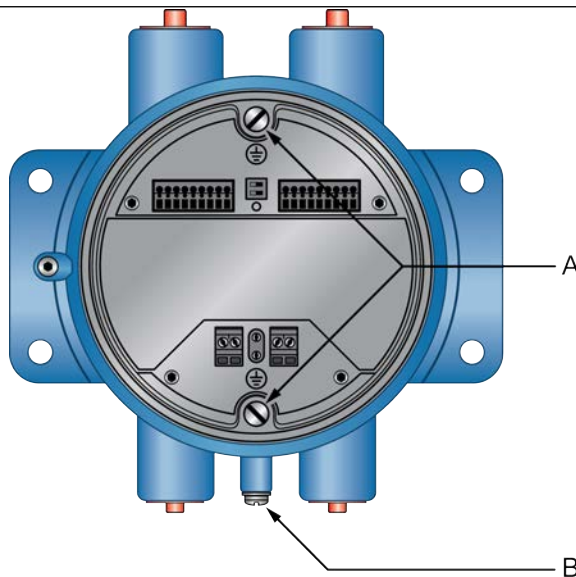
Note

Ground the processor 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 meter 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 internal or external grounding screw located on the 820.



- A. Internal grounding screws
- B. External grounding screw



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For more information: Emerson.com/global

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