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Installation Manual
20001700, Rev CH
October 2022

Micro Motion™ 1700 and 2700 Transmitters

Installation Manual



MICRO MOTION™

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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 Configuration Manual. Product data sheets and manuals are available from the Micro Motion website at Emerson.com.

Return policy

Follow Micro Motion procedures when returning equipment. These procedures ensure legal compliance with government transportation agencies and help provide a safe working environment for Micro Motion employees. If you fail to follow Micro Motion procedures, then Micro Motion 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.

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1 Before you begin

1.1 About this document

This manual provides information on planning, mounting, wiring, and initial setup of the Micro Motion 1700-2700 transmitter. For information on full configuration, maintenance, troubleshooting, or service of the transmitter, see the .

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 on the product documentation DVD shipped with the product or at Emerson.com.

See any of the following documents for more information:

- *Micro Motion Series 1000 and Series 2000 Transmitters with MVD Technology Product Data Sheet*
- 1700 documents
  - *Micro Motion Model 1700 Transmitters with Analog Outputs Configuration and Use Manual*
  - *Micro Motion Model 1700 Transmitters with Intrinsically Safe Outputs Configuration and Use Manual*
- 2700 documents
  - *Micro Motion Model 2700 Transmitters with Analog Outputs Configuration and Use Manual*
  - *Micro Motion Model 2700 Transmitters with Configurable Input/Outputs Configuration and Use Manual*
  - *Micro Motion Model 2700 Transmitters with Intrinsically Safe Outputs Configuration and Use Manual*
  - *Micro Motion Model 2700 Transmitters with FOUNDATION™ Fieldbus Configuration and Use Manual*
  - *Micro Motion Model 2700 Transmitters with PROFIBUS-PA Configuration and Use Manual*
- *Micro Motion Fuel Consumption Application for Transmitters Installation and Operation Guide*
- *Micro Motion 9-Wire Flow Meter Cable Preparation and Installation Guide*
- *Micro Motion Enhanced Density Application Manual*
- Sensor installation manual

2 Planning

2.1 Meter components

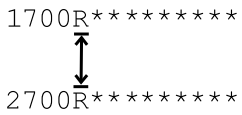
A meter consists of the following components:

- A transmitter
- A sensor
  The following sensors are compatible with the FMT:
  - All CMFS sensors
  - F025 - F100
  - H025 - H100
  - T025 - T150
- A core processor that provides additional memory and processing functions

2.2 Installation types

The transmitter was ordered and shipped for one of up to eight installation types. The fifth character of the transmitter model number indicates the installation type.

Figure 2-1: Installation type indication for 1700 and 2700 transmitters



The model number is located on the device tag on the side of the transmitter.

Table 2-1: Installation types for 1700 and 2700 transmitters

Model code	Description
R	Remote mount 4-wire
I	Integral
E	Remote enhanced core processor (painted aluminum housing) with remote transmitter
C	Remote mount 9-wire (painted aluminum housing with integral core)
B	Remote core processor with remote transmitter
M	Remote mount 4-wire (stainless steel housing)
P	Remote mount 9-wire (stainless steel housing)

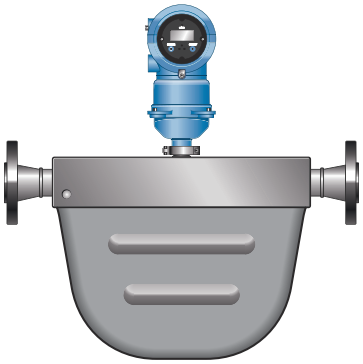
Table 2-1: Installation types for 1700 and 2700 transmitters *(continued)*

Model code	Description
H(1)	Remote mount 4-wire (painted aluminum housing) for connecting to Compact Density Meter (CDM), Fork Density Meter (FDM), Fork Viscosity Meter (FVM)

(1) This option is available only with the 2700 FOUNDATION™ fieldbus transmitter

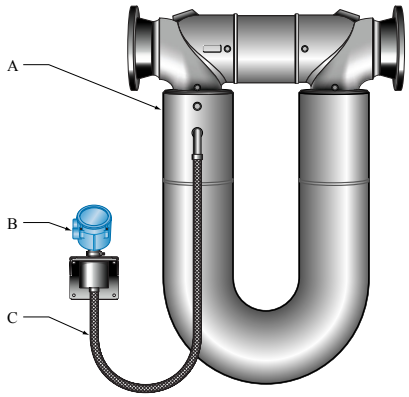
The transmitter is mounted directly to the sensor. Integral installations do not require separate transmitter installation. Power supply and I/O must be field wired to the transmitter.

Figure 2-2: Integral installation (model code I)



Note
If replacing an integral 1700/2700 transmitter with a spare transmitter, retain the transition ring. The replacement does not include a new transition ring.

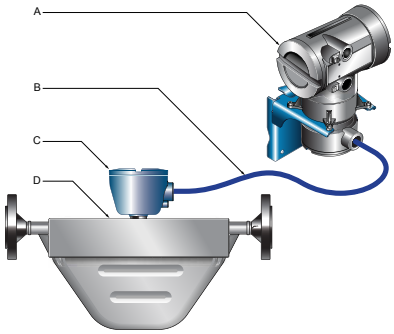
Figure 2-3: High-temperature meters with factory connection (model code I)



The transmitter is shipped with a flexible connection factory installed between the sensor and the transmitter. The transmitter must be dismounted from its shipping location (spot-welded to the sensor case) and then mounted separately. Power supply and I/O must be field wired to the transmitter.

A. Sensor
B. Transmitter or core processor
C. Factory-installed flexible connection

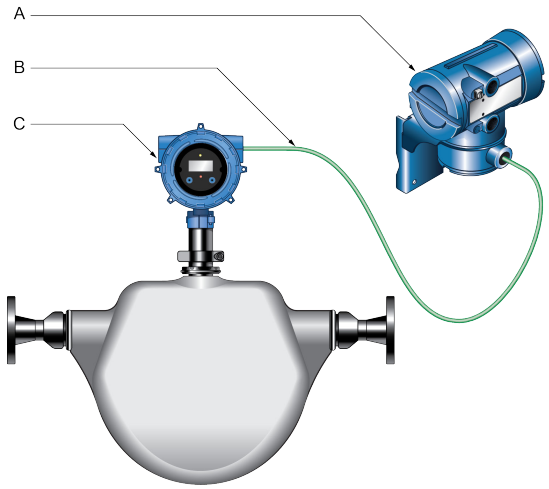
Figure 2-4: 4-wire remote installation for Coriolis meters (model code R or M)



The transmitter is installed remotely from the sensor. The 4-wire connection between the sensor and transmitter must be field wired. Power supply and I/O must be field wired to the transmitter.

A. Transmitter
B. Field-wired 4-wire connection
C. Core processor
D. Sensor

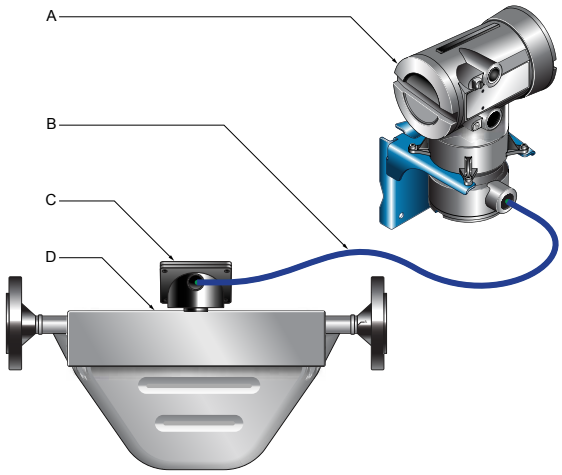
Figure 2-5: 4-wire remote installation for density and viscosity meters (CDM, FDM, or FVM with fieldbus only model code H)



The transmitter is installed remotely from the Compact Density Meter (CDM), Fork Density Meter (FDM), or Fork Viscosity Meter (FVM). The 4-wire connection between the sensor and transmitter must be field wired. Power supply and I/O must be field wired to the transmitter.

A. *Transmitter*
B. *Field-wired 4-wire connection*
C. *Meter electronics*

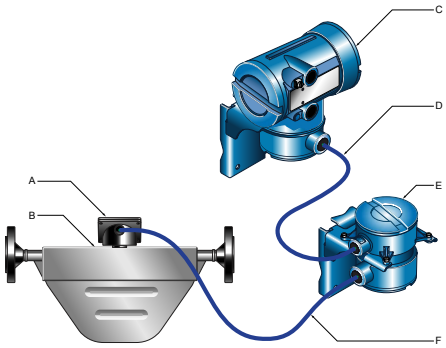
Figure 2-6: 9-wire remote installation (model code P)



The transmitter and core processor are combined in a single unit that is installed remotely from the sensor. The 9-wire connection between the transmitter/core processor and the sensor must be field wired. Power supply and I/O must be field wired to the transmitter.

A. Transmitter
B. Field-wired 9-wire connection
C. Junction box
D. Sensor

Figure 2-7: Remote core processor with remote sensor installation (model code B or E)



The transmitter, core processor, and sensor are all mounted separately. The 4-wire connection between the transmitter and core processor must be field wired. The 9-wire connection between the core processor and the sensor must be field wired. Power supply and I/O must be field wired to the transmitter. This configuration is sometimes called *double-hop*.

A. *Junction box*
B. *Sensor*
C. *Transmitter*
D. *Field-wired 4-wire connection*
E. *Core processor*
F. *Field-wired 9-wire connection*

2.3 Maximum cable lengths between sensor and transmitter

The maximum cable length between the sensor and transmitter that are separately installed is determined by cable type.

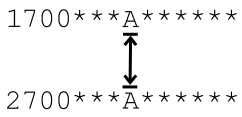
Cable type	Wire gauge	Maximum length
Micro Motion 4-wire remote mount	Not applicable	• 1,000 ft (305 m) without Ex-approval • 500 ft (152 m) with IIC rated sensors • 1,000 ft (305 m) with IIB rated sensors
Micro Motion 9-wire remote mount	Not applicable	60 ft (18 m)

Cable type	Wire gauge	Maximum length
User-supplied 4-wire	VDC 22 AWG (0.326 mm²)	300 ft (91 m)
	VDC 20 AWG (0.518 mm²)	500 ft (152 m)
	VDC 18 AWG (0.823 mm²)	1,000 ft (305 m)
	RS-485 22 AWG (0.326 mm²) or larger	1,000 ft (305 m)

2.4 Output options

The transmitter was ordered and shipped for one of up to 10 output options. You must know your transmitter output option to correctly install the transmitter. The eighth character of the transmitter model number indicates the output option.

Figure 2-8: Output option indication for 1700 and 2700 transmitters



The model number is located on the device tag on the side of the transmitter.

Table 2-2: Output options for 1700 transmitters

Letter	Description
A	Analog outputs – one mA, one frequency, one RS-485
D	Intrinsically safe analog outputs – one mA, one frequency

Table 2-3: Output options for 2700 transmitters

Letter	Description
A	Analog outputs – one mA, one frequency, one RS-485
B	Configurable I/O channels (default configuration of two mA, one frequency)
C	Configurable I/O channels (custom configuration)
D	Intrinsically safe analog outputs – two mA, one frequency
E	Intrinsically safe FOUNDATION fieldbus H1 with standard function blocks
G	PROFIBUS-PA
N	Non-incendive FOUNDATION fieldbus H1 with standard function blocks
2	WirelessHART® – one mA, one frequency, one RS-485
3	WirelessHART – one mA, two configurable I/O channels (custom configuration)
4	Intrinsically safe WirelessHART – two mA, one frequency

2.5 Electrical connections

Table 2-4: 1700 and 2700 transmitters

Connection type	1700	2700
Input/Output	• Intrinsically safe version: Two pairs of wiring terminals for transmitter outputs • Non-intrinsically safe analog outputs (output option A): Three pairs of wiring terminals for transmitter outputs	Three pairs of wiring terminals for transmitter I/O and communications
Power	• One pair of wiring terminals accepts AC or DC power • One internal ground lug for power-supply ground wiring	
Service port	Two clips for temporary connection to the service port	

Notes

- Each screw terminal connection accepts one or two solid conductors, 14 AWG (2.08 mm²) to 12 AWG (3.31 mm²) or one or two stranded conductors, 22 AWG (0.326 mm²) to 14 AWG (2.08 mm²). Each plug type connector accepts one stranded or solid conductor, 24 AWG (0.205 mm²) to 12 AWG (3.31 mm²).
- For 1700/2700 transmitters with an integral core processor (mounting code C), the 4-wire connection between the transmitter and core processor is not normally accessed.

2.6 Environmental limits

1700 and 2700

Type	Value
Ambient temperature limits (1)	Operating: -40 °F (-40.0 °C) to 140 °F (60.0 °C)
	Storage: -40 °F (-40.0 °C) to 140 °F (60.0 °C)
Humidity limits	5 to 95% relative humidity, non-condensing at 140 °F (60.0 °C)

Type	Value
Vibration limits	Meets IEC 60068-2-6,endurance sweep, 5 to 2000 Hz up to 1.0 g
Housing rating	NEMA 4X [IP66/67/69(K)](2)

(1) Display responsiveness decreases, and display may become difficult to read below -4 °F (-20.0 °C). Above 131 °F (55.0 °C), some darkening of display might occur.
(2) The protection is IP69K-based NEN-ISO 20653:2013 and IP69 when using standard IEC/EN 60529.

2.7 Hazardous area classifications

If you plan to mount the transmitter in a hazardous area:

- Verify that the transmitter has the appropriate hazardous area approval. Each transmitter has a hazardous area approval tag attached to the housing.
- Ensure that any cable used between the transmitter and the sensor meets the hazardous area requirements.

2.8 Power requirements

Self-switching AC/DC input, automatically recognizes supply voltage

- 85 to 265 VAC, 50/60 Hz, 6 watts typical, 11 watts maximum
- 18 to 100 VDC, 6 watts typical, 11 watts maximum
- Complies with low voltage directive 2006/95/EC per EN 61010-1 (IEC 61010-1) with amendment 2, and Installation (Overvoltage) Category II, Pollution Degree 2

Notes

For DC power:

- Power requirements assume a single transmitter per cable.
- At startup, the power source must provide a minimum of 1.5 amps of short-term current per transmitter.
- 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 0.5 amps.

$$M = 18V + (R \times L \times 0.5A)$$

M: Minimum supply voltage
R: Cable resistance
L: Cable length

Table 2-5: 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

Table 2-5: Typical power cable resistance at 68 °F (20.0 °C) *(continued)*

Wire gauge	Resistance
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

3 Mounting

3.1 Mounting for integral installations

There are no separate mounting requirements for integral transmitters.

3.2 Orientation

You can mount the transmitter in any orientation as long as the conduit openings do not point upward.

NOTICE
Upward-facing conduit openings risk condensation moisture entering the transmitter housing that could damage the transmitter.

3.3 Accessibility for maintenance

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

- Allows sufficient clearance to open the transmitter housing cover. Micro Motion recommends 8 in (203 mm) – 10 in (254 mm) clearance at the rear of the transmitter.
- Provides clear access for installing cabling to the transmitter.

3.4 Mounting options

There are two options available for mounting the transmitter:

- Mount the transmitter to a wall or flat surface.
- Mount the transmitter to an instrument pole.

3.4.1 Mount the transmitter to a wall

Prerequisites

- Use two 0.31 in (7.9 mm) U-bolts for a 2 in (51 mm) pipe, and four matching nuts that can withstand the process environment. Appropriate bolts and nuts are shipped with remote mount transmitters in the ship kit. The pipe mount kit can be ordered as part of the 1700/2700 part number.
- Ensure that the surface is flat and rigid, does not vibrate, or move excessively.
- Confirm that you have the necessary tools, and the mounting kit shipped with the transmitter.

Procedure

1. If desired, re-orient the transmitter on the mounting bracket.

a) Remove the junction end-cap from the junction housing.

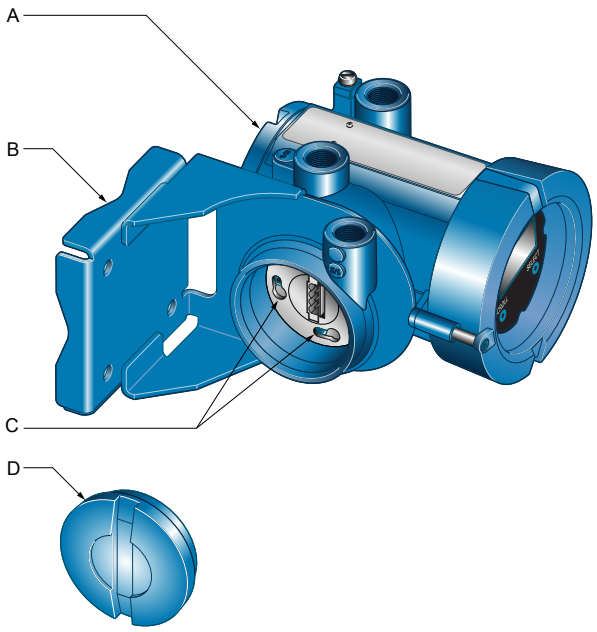
b) Loosen each of the four 0.16 in (4.1 mm) cap screws.

c) Rotate the bracket so that the transmitter is oriented as desired.

d) Tighten the cap screws, torquing to 30 in lbf (3.39 N m) to 38 in lbf (4.29 N m).

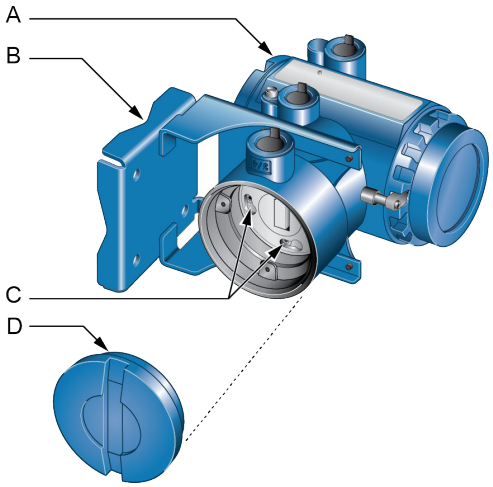
e) Replace the junction end-cap.

Figure 3-1: Components of 4-wire remote mount transmitter (aluminum housing)



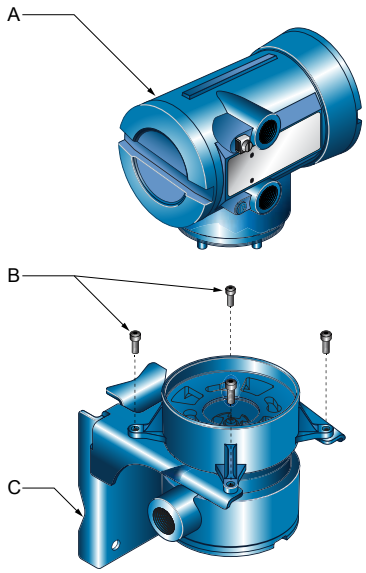
A. Transmitter
B. Mounting bracket
C. Cap screws
D. End-cap

Figure 3-2: Components of a 4-wire remote mount transmitter (stainless steel housing)



A. Transmitter
B. Mounting bracket
C. Cap screws
D. End-cap

Figure 3-3: Components of 9-wire remote mount transmitter



A. Transmitter
B. Cap screws
C. Mounting bracket

2. Attach the mounting bracket to the wall.

3.4.2 Mount the transmitter to an instrument pole

Prerequisites

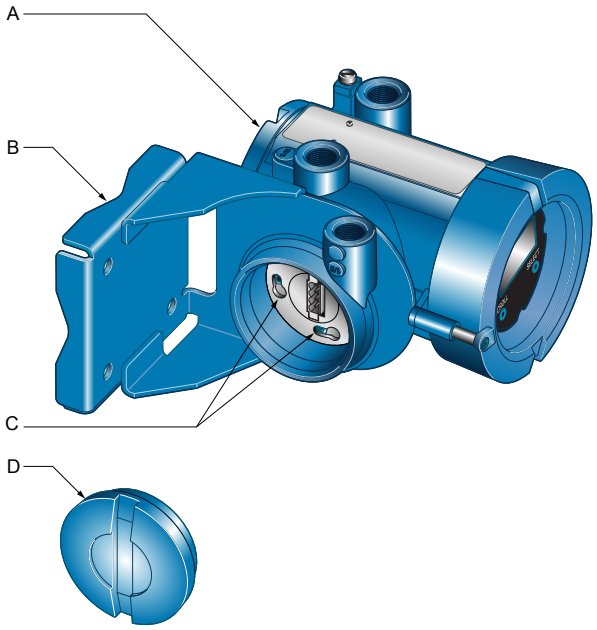
- Use two 0.3125 in (8 mm) U-bolts for 2 in (51 mm) pipe, and four matching nuts, that can withstand the process environment. Micro Motion does not supply U-bolts or nuts (appropriate bolts and nuts are available as an option).
- Ensure the instrument pole extends at least 12 in (305 mm) from a rigid base, and is no more than 2 in (51 mm) in diameter.

Procedure

1. If desired, re-orient the transmitter on the mounting bracket.
   a) For 4-wire remote mount transmitters, remove the junction end-cap from the junction housing.
   b) Loosen each of the four 0.16 in (4.1 mm) cap screws.
   c) Rotate the bracket so that the transmitter is oriented as desired.
   d) Tighten the cap screws, torquing to 30 in lbf (3.39 N m) to 38 in lbf (4.29 N m).

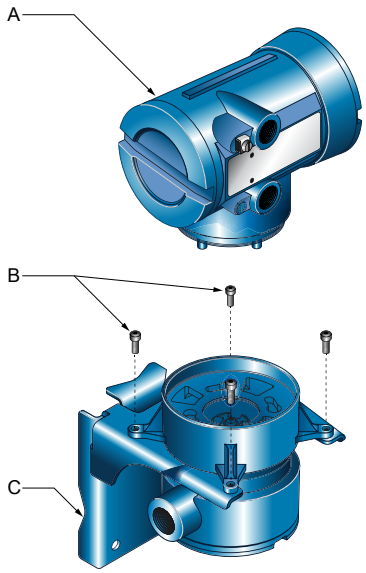
e) If applicable, replace the junction end-cap.

Figure 3-4: Components of 4-wire remote mount transmitter (aluminum housing)



A. Transmitter
B. Mounting bracket
C. Cap screws
D. End-cap

Figure 3-5: Components of 9-wire remote mount transmitter



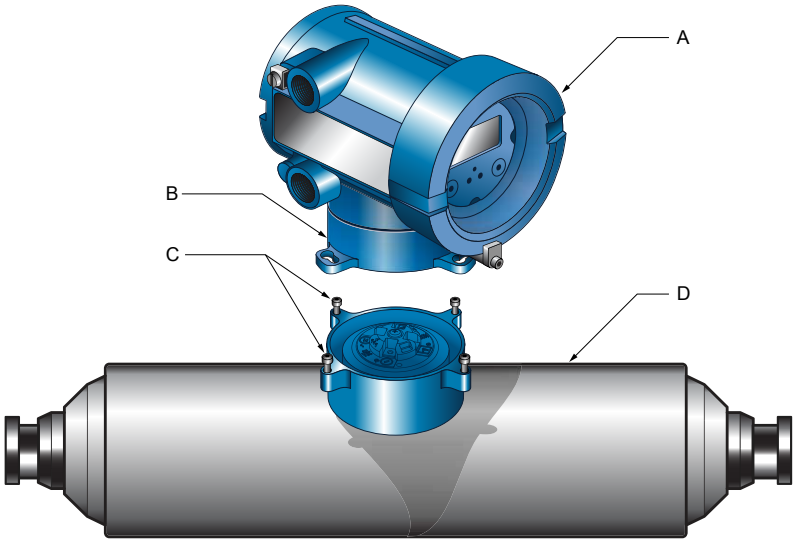
A. Transmitter and integral core
B. Cap screws
C. Mounting bracket

2. Attach the mounting bracket to an instrument pole.

3.5 Rotate the transmitter on the sensor (optional)

In integral installations, you can rotate the transmitter on the sensor up to 360º in 90º increments.

Figure 3-6: Components of an integral transmitter



A. Transmitter
B. Transition ring
C. Cap screws
D. Sensor

Procedure

1. Loosen each of the four cap screws 0.16 in (4.1 mm) that fasten the transmitter to the base.
2. Rotate the transmitter counter-clockwise so that the cap screws are in the unlocked position.
3. Gently lift the transmitter straight up, disengaging it from the cap screws.

   NOTICE
   Do not disconnect or damage the wires that connect the transmitter to the core processor.

4. Rotate the transmitter to the desired orientation.

   NOTICE
   Do not pinch or stress the wires.

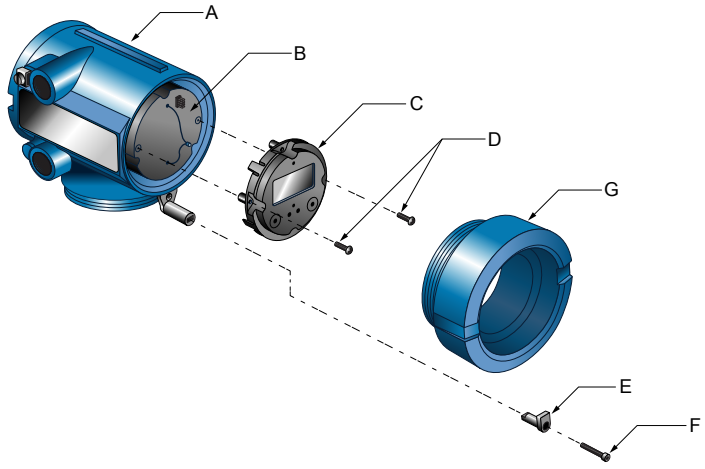
   The slots on the transition ring should be aligned with the cap screws.
5. Gently lower the transmitter onto the base, inserting the cap screws into the slots.

6. Rotate the transmitter clockwise so that the cap screws are in the locked position.
7. Tighten the cap screws, torquing to 1.70 ft lbf (2 N m) to 2.51 ft lbf (3 N m).

3.6 Rotate the user interface on the transmitter (optional)

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

Figure 3-7: Display components



A. *Transmitter housing*
B. *Sub-bezel*
C. *Display module*
D. *Display screws*
E. *End-cap clamp*
F. *Cap screw*
G. *Display cover*

Notes

- When using the touch buttons, you must cover at least a 0.31 in (7.9 mm) diameter circle over the surface above the touch button: using your thumb may be more effective because it has a greater surface area.
- When the housing cover is removed, the touch buttons do not function.

Procedure

1. Shut off power to the unit.
2. Remove the end-cap clamp by removing the cap screw.
3. Turn the display cover counterclockwise to remove it from the main enclosure.

4. Carefully loosen (and remove if necessary) the semicaptive display screws while holding the display module in place.
5. 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.

6. Rotate the display module to the desired position.
7. Insert the sub-bezel pin terminals into the display module pin holes to secure the display in its new position.
8. If you have removed the display screws, line them up with the matching holes on the sub-bezel, then reinsert and tighten them.
9. Place the display cover onto the main enclosure.
10. Turn the display cover clockwise until it is snug.
11. Replace the end-cap clamp by reinserting and tightening the cap screw.
12. Restore power to the transmitter.

4 Preparing the wires

4.1 Prepare the 4-wire cable

4.1.1 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 mm²)	300 ft (91 m)
VDC 20 AWG (0.518 mm²)	500 ft (152 m)
VDC 18 AWG (0.823 mm²)	1,000 ft (305 m)
RS-485 22 AWG (0.326 mm²) or larger	1,000 ft (305 m)

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.

Prepare a cable with user-supplied cable glands

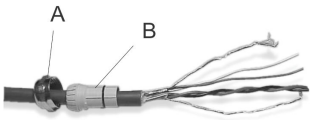
Procedure

1. Remove the core processor cover using a flat-blade screw driver.
2. Pass the wires through the gland.
3. Terminate the shield and drain wires inside the gland.
4. Assemble the gland according to vendor instructions.

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

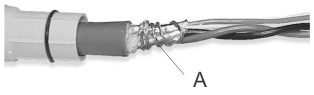
3. Strip the cable jacket.

Option	Description
NPT gland type	Strip 4.5 in (114 mm)
M20 gland type	Strip 4.25 in (107.9 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 (19.0 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.

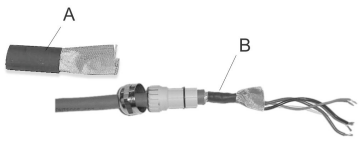
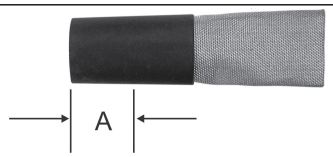


A. Drain wires wrapped around shield

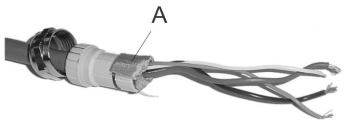
7. For foil (shielded cable) only:

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

Option	Description
NPT gland type	a. Slide the shielded heat shrink over the drain wires. Ensure that the wires are completely covered. b. Apply heat 250 °F (121.1 °C) to shrink the tubing. Do not burn the cable.

Option	Description
	c. Position the clamping insert so the interior end is flush with the braid of the heat shrink.  *A. Shielded heat shrink* *B. After heat is applied*
M20 gland type	Trim 0.3 in (8 mm).  *A. Trim*

8. Assemble the gland by folding the shield or braid back over the clamping insert and 0.125 in (3.18 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 Prepare the 9-wire cable

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

4.2.1 9-wire cable types and usage

Cable types

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

- Armored cable provides mechanical protection for the cable wires.
- Jacketed cable has a smaller bend radius than shielded or armored cable.
- If ATEX compliance is required, the different cable types have different installation requirements.

Cable jacket types

All cable types can be ordered with a PVC jacket or Teflon® FEP jacket. Teflon FEP is required for the following installation types:

- All installations that include a T-series sensor.
- All installations with a cable length of 250 ft (76.20 m) or greater, a nominal flow less than 20 percent, and ambient temperature changes greater than 68 °F (20.0 °C).

Table 4-1: Cable jacket material and temperature ranges

Cable jacket material	Handling temperature		Operating temperature	
	Low limit	High limit	Low limit	High limit
PVC	-4 °F (-20.0 °C)	194 °F (90.0 °C)	-40 °F (-40.0 °C)	221 °F (105.0 °C)
Teflon FEP	-40 °F (-40.0 °C)	194 °F (90.0 °C)	-76 °F (-60.0 °C)	302 °F (150.0 °C)

Cable bend radii

Table 4-2: Bend radii of jacketed cable

Jacket material	Outside diameter	Minimum bend radii	
		Static (no load) condition	Under dynamic load
PVC	0.415 in (10.54 mm)	3.15 in (80.0 mm)	6.25 in (158.8 mm)
Teflon FEP	0.340 in (8.64 mm)	2.6 in (66 mm)	5.15 in (130.8 mm)

Table 4-3: Bend radii of shielded cable

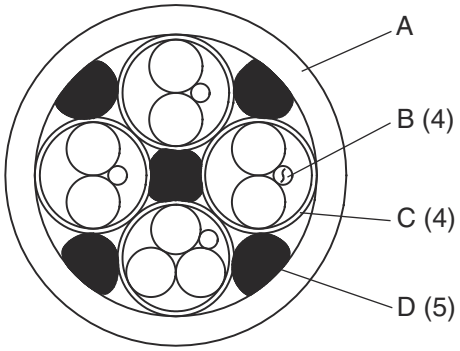
Jacket material	Outside diameter	Minimum bend radii	
		Static (no load) condition	Under dynamic load
PVC	0.525 in (13.33 mm)	4.25 in (107.9 mm)	8.5 in (216 mm)
Teflon FEP	0.425 in (10.80 mm)	3.25 in (82.6 mm)	6.38 in (162.1 mm)

Table 4-4: Bend radii of armored cable

Jacket material	Outside diameter	Minimum bend radii	
		Static (no load) condition	Under dynamic load
PVC	0.525 in (13.33 mm)	4.25 in (107.9 mm)	8.5 in (216 mm)
Teflon FEP	0.340 in (8.64 mm)	3.25 in (82.6 mm)	6.38 in (162.1 mm)

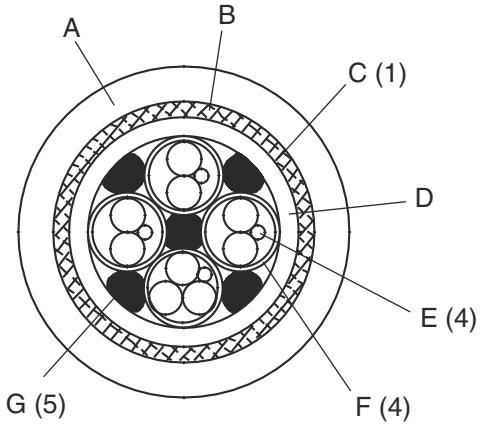
Cable illustrations

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



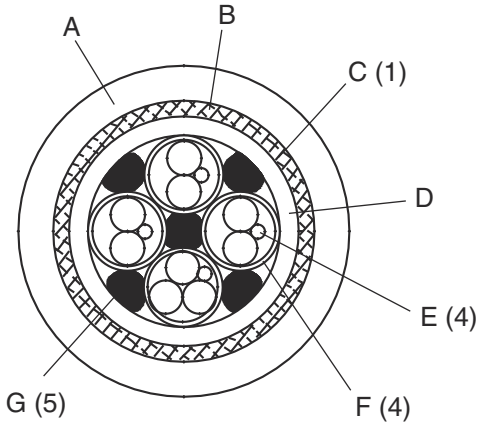
A. Outer jacket
B. Drain wire (4 total)
C. Foil shield (4 total)
D. Filler (5 total)

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)*

Figure 4-3: Cross-section view of armored cable



A. *Outer jacket*
B. *Stainless steel braided shield*
C. *Foil shield (1 total)*
D. *Inner jacket*
E. *Drain wire (4 total)*
F. *Foil shield (4 total)*
G. *Filler (5 total)*

4.2.2 Prepare jacketed cable

Prepare jacketed cable at sensor end

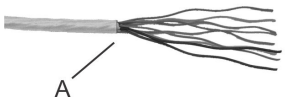
Procedure

1. Trim 4.5 in (114 mm) of cable jacket.
2. Remove the clear wrap and filler material.
3. Remove the foil that is around the insulated wires and separate them.



A. Trim cable jacket

4. Identify the drain wires in the cable. Clip off each drain wire as close as possible to the cable jacket.



A. Drain wires clipped

5. Slide the 1.5 in (38 mm) heat-shrink tubing over the wires and cable jacket. The tubing should completely cover the clipped ends of the drain wires.



A. Heat-shrink tubing

6. Without burning the cable, apply heat to shrink all tubing. Recommended temperature is 250 °F (121.1 °C).
7. Allow the cable to cool, then strip 0.25 in (6.4 mm) of insulation from each wire.

Prepare jacketed cable at transmitter end

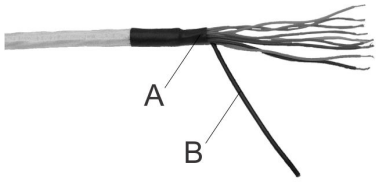
Procedure

1. Trim 4 in (102 mm) of cable jacket.
2. Remove the clear wrap and filler material.
3. Remove the foil that is around the insulated wires and separate them.



A. Trim cable jacket

4. Identify the drain wires in the cable and bring them together.
5. Fan the other wires to the outside of the cable.
6. Twist the drain wires together.
7. Slide the 3 in (76 mm) heat-shrink tubing over the drain wires. Push the tubing as close as possible to the cable jacket.
8. Slide the 1.5 in (38 mm) long heat-shrink tubing over the cable jacket. The tubing should completely cover all portions of the drain wires that remain exposed next to the cable jacket.



A. Heat-shrink tubing over cable jacket
B. Heat-shrink tubing over drain wires

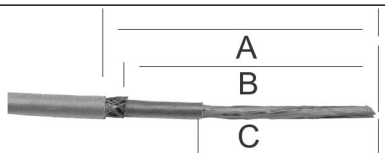
9. Without burning the cable, apply heat to shrink all tubing. Recommended temperature is 250 °F (121.1 °C).
10. Allow the cable to cool, then strip 0.25 in (6.4 mm) of insulation from each wire.

4.2.3 Prepare shielded or armored cable

Prepare shielded or armored cable at sensor end

Procedure

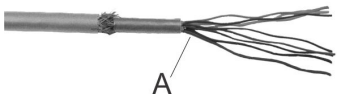
1. Without cutting the shield, strip 7 in (178 mm) of outer jacket.
2. Strip 6.5 in (165 mm) of braided shield, so 0.5 in (13 mm) of shield remains exposed.
3. Remove the foil shield that is between the braided shield and inner jacket.
4. Strip 4.5 in (114 mm) of inner jacket.



A. Trim outer jacket
B. Trim braided shield
C. Trim inner jacket

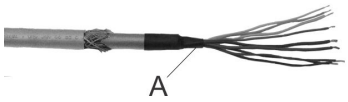
5. Remove the clear wrap and filler material.
6. Remove the foil that is around the insulated wires and separate them.

7. Identify the drain wires in the cable. Clip each drain wire as close as possible to the cable jacket.



A. Drain wires clipped

8. Slide the 1.5 in (38 mm) heat-shrink tubing over the cable jacket. The tubing should completely cover the clipped ends of the drain wires.



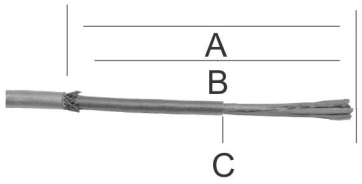
A. Heat-shrink tubing

9. Without burning the cable, apply heat to shrink all tubing. Recommended temperature is 250 °F (121.1 °C).
10. Allow the cable to cool, then strip 0.25 in (6.4 mm) of insulation from each wire.

Prepare shielded or armored cable at transmitter end

Procedure

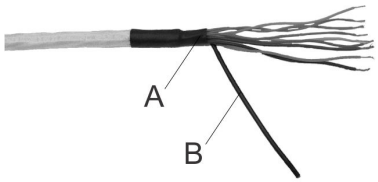
1. Without cutting the shield, strip 9 in (229 mm) of cable jacket.
2. Strip 8.5 in (216 mm) of braided shield, so 0.5 in (13 mm) of shield remains exposed.
3. Remove the foil shield that is between the braided shield and inner jacket.
4. Strip 4 in (102 mm) of inner jacket.



A. Trim outer jacket
B. Trim braided shield
C. Trim inner jacket

5. Remove the clear wrap and filler material.
6. Remove the foil that is around the insulated wires and separate them.
7. Identify the drain wires in the cable and bring them together.
8. Fan the other wires to the outside of the cable.

9. Twist the drain wires together.
10. Slide the 3 in (76 mm) heat-shrink tubing over the drain wires. Push the tubing as close as possible to the cable jacket.
11. Slide the 1.5 in (38 mm) long heat-shrink tubing over the cable jacket. The tubing should completely cover all portions of the drain wires that remain exposed next to the cable jacket.



A. Heat-shrink tubing over cable jacket
B. Heat-shrink tubing over drain wires

12. Without burning the cable, apply heat to shrink all tubing. Recommended temperature is 250 °F (121.1 °C).
13. Allow the cable to cool, then strip 0.25 in (6.4 mm) of insulation from each wire.

5 Wiring the transmitter to the sensor

Note
For integral installations, there is no need to connect wiring between the transmitter and the sensor.

5.1 Wire the transmitter to the sensor (4-wire)

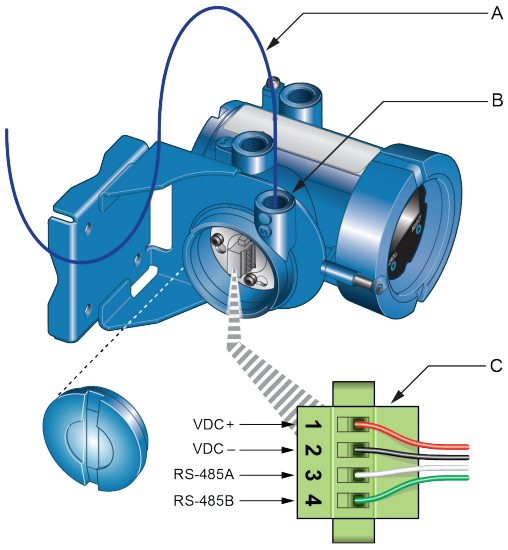
Use this procedure to wire the transmitter to the sensor in a 4-wire remote installation.

Procedure

1. Connect the cable to the sensor-mounted core processor as described in the sensor documentation.
2. Feed the wires from the sensor through the conduit opening on the transmitter.
3. Connect wires to the appropriate terminals on the mating connector.

Tip
You may find it easier to unplug the mating connector to connect the wires. If you do so, remember to firmly reseat the mating connector and tighten the mating connector screws so that the mating connector cannot accidentally come loose.

Figure 5-1: Wiring path for transmitters with aluminum housing



A. 4-wire cable
B. Transmitter conduit opening
C. Mating connector

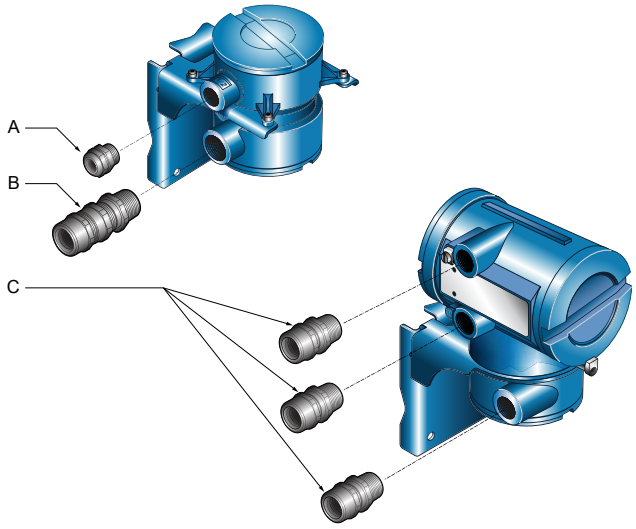
5.2 Wire the transmitter to the remote core processor (4-wire)

Use this procedure to wire the transmitter to the remote core processor in a 4-wire remote sensor installation. This procedure applies to both 700 and 800 core processors.

Procedure

1. If you are installing a Micro Motion-supplied cable gland at the core processor housing, identify the cable gland to use for the 4-wire cable conduit opening.

Figure 5-2: Cable gland identification

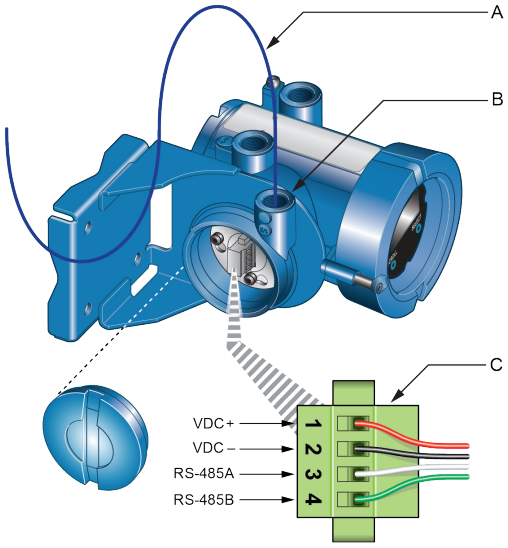


A. Cable gland used with 4-wire conduit opening
B. ¾ in–14 NPT cable gland used with 9-wire conduit opening
C. ½ in–14 NPT or M20x1.5 cable glands used with transmitter

2. Connect the cable to the core processor as described in the sensor documentation.
3. Feed the wires from the remote core processor through the conduit opening.
4. Connect wires to the appropriate terminals on the mating connector.

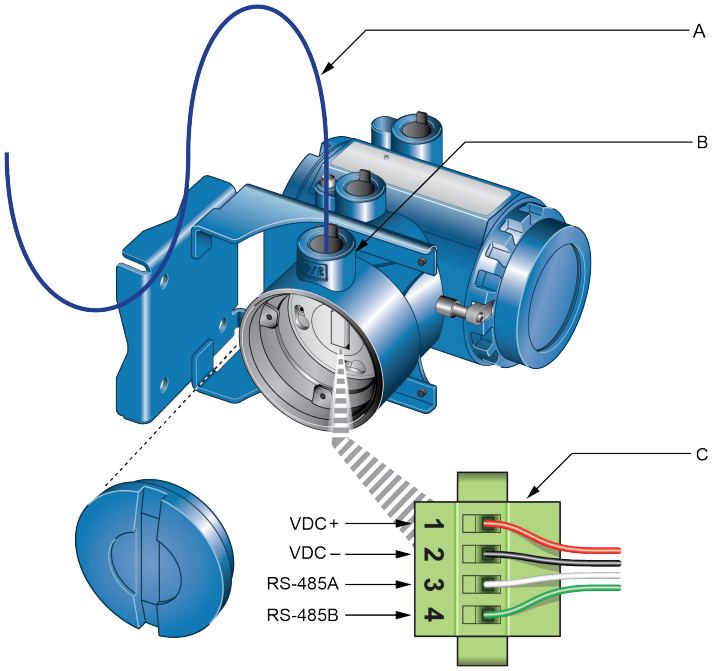
Tip
You may find it easier to unplug the mating connector to connect the wires. If you do so, remember to firmly reseat the mating connector and tighten the mating connector screws so that the mating connector cannot accidentally come loose.

Figure 5-3: Wiring path for transmitters with aluminum housing



A. 4-wire cable
B. Transmitter conduit opening
C. Mating connector

Figure 5-4: Wiring path for transmitters with stainless steel housing



A. 4-wire cable
B. Transmitter conduit opening
C. Mating connector

5.3 Wire the remote core processor to the sensor using jacketed cable (9-wire)

Use this procedure to wire the remote core processor to the sensor using jacketed cable in a 9-wire remote sensor installation.

Prerequisites

For ATEX installations, the jacketed cable must be installed inside a user-supplied sealed metallic conduit that provides 360° termination shielding for the enclosed cable.

WARNING
Sensor wiring is intrinsically safe. To keep sensor wiring intrinsically safe, keep the sensor wiring separated from power supply wiring and output wiring.

NOTICE

- Any fittings, adapters, or blanking elements used on either conduit entries or threaded joints that are a part of flame proof joints must comply with the requirements of EN/IEC

60079-1 & 60079-14 or CSA C22.2 No 30 & UL 1203 for Europe/International and North America respectively.
Only qualified personnel can select and install these elements in accordance with EN/IEC 60079-14 for ATEX/IECEx or to NEC/CEC for North America.

- To maintain the Ingress protection thread sealant, a sealing washer, or O-ring must be applied.
  - For Zone 1 applications thread sealant must also comply with the requirements of EN/IEC 60079-14 and thus must be non-setting, non-metallic, non-combustible, and maintain earthing between the equipment and conduit.
  - For Class I, Groups A, B, C, and D applications thread sealant must also comply with the requirements of UL 1203/CSA C22.2 No. 30.
- 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. Remove the junction box cover and core processor end-cap.
3. At both the sensor and transmitter, 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 sensor and transmitter ends, matching by color. No bare wires should remain exposed.

   Also see Sensor and remote core processor/transmitter terminals.

Table 5-1: Sensor and remote core processor terminal designations

Wire color	Sensor terminal	Remote core processor terminal	Function
Black	No connection	Ground screw (see note)	Drain wires
Brown	1	1	Drive +
Red	2	2	Drive –
Orange	3	3	Lead length compensator/ composite RTD/ID resistor

Table 5-1: Sensor and remote core processor terminal designations *(continued)*

Wire color	Sensor terminal	Remote core processor terminal	Function
Yellow	4	4	Temperature return
Green	5	5	Left pickoff +
Blue	6	6	Right pickoff +
Violet	7	7	Temperature +
Gray	8	8	Right pickoff –
White	9	9	Left pickoff –

d) Tighten the screws to hold the wire in place.

e) Ensure integrity of gaskets, grease all O-rings, then replace the junction-box and transmitter housing covers and tighten all screws, as required.

5.4 Wire the remote core processor to the sensor using shielded or armored cable (9-wire)

Use this procedure to wire the remote core processor to the sensor using shielded or armored cable in a 9-wire remote sensor installation.

Prerequisites

For ATEX installations, shielded or armored cable must be installed with cable glands, at both the sensor and remote core processor ends. Cable glands that meet ATEX requirements can be purchased from Micro Motion. Cable glands from other vendors can be used.

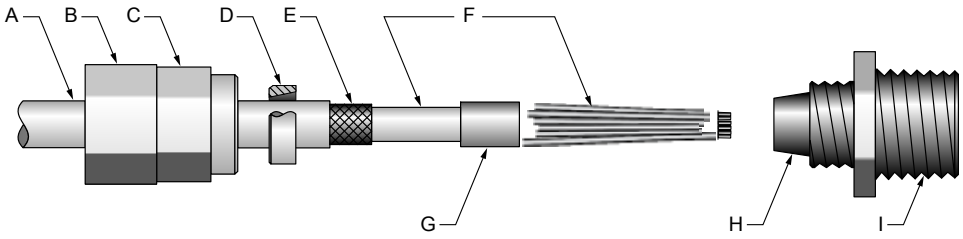
NOTICE

- 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.
- Install cable glands in the 9-wire conduit opening in the transmitter housing and the sensor junction box. Ensure that the cable drain wires and shields do not make contact with the junction box or the transmitter housing. Improper installation of cable or cable glands 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.

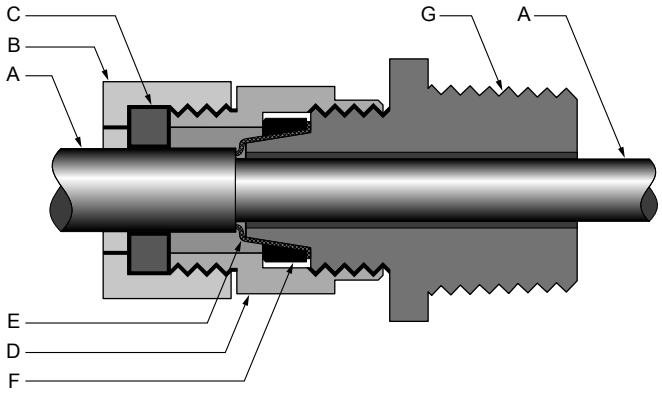
Figure 5-5: Cable gland and cable (exploded view)



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 20 ft lbf (27.1 N m) to 25 ft lbf (33.9 N m) of torque.

Figure 5-6: 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 junction box cover and remote core processor end-cap.
10. At both the sensor and remote core processor, connect the cable according to the following procedure:
    a) Insert the stripped end of each wire into the corresponding terminal at the sensor and remote core processor ends, matching by color. No bare wires should remain exposed.

    Also see Sensor and remote core processor/transmitter terminals.

Table 5-2: Sensor and remote core processor terminal designations

Wire color	Sensor terminal	Remote core processor terminal	Function
Black	No connection	Ground screw (see notes)	Drain wires
Brown	1	1	Drive +
Red	2	2	Drive –
Orange	3	3	Lead length compensator/ composite RTD/ID resistor
Yellow	4	4	Temperature return
Green	5	5	Left pickoff +
Blue	6	6	Right pickoff +

Table 5-2: Sensor and remote core processor terminal designations *(continued)*

Wire color	Sensor terminal	Remote core processor terminal	Function
Violet	7	7	Temperature +
Gray	8	8	Right pickoff –
White	9	9	Left pickoff –

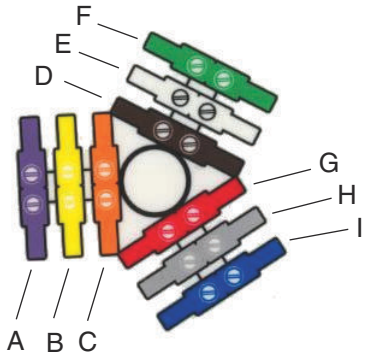
b) Tighten the screws to hold the wires in place.

c) Ensure integrity of gaskets, grease all O-rings, then replace the junction box cover and remote core processor end-cap and tighten all screws, as required.

5.5 Sensor and remote core processor/transmitter terminals

This section describes the sensor to remote control processor terminals or the sensor to transmitter terminals.

Figure 5-7: All ELITE, H-Series, and T-Series sensor, and 2005 or newer F-Series sensor terminals

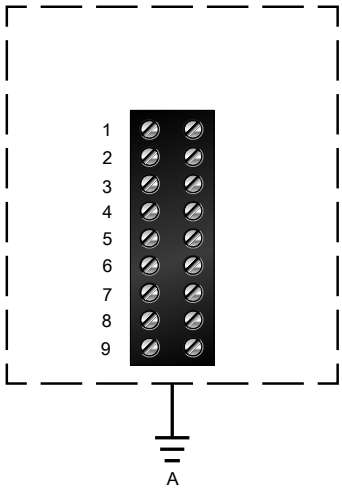


A. Violet
B. Yellow
C. Orange
D. Brown
E. White
F. Green
G. Red
H. Gray
I. Blue

Figure 5-8: All D and DL, and pre-2005 F-Series sensor terminals

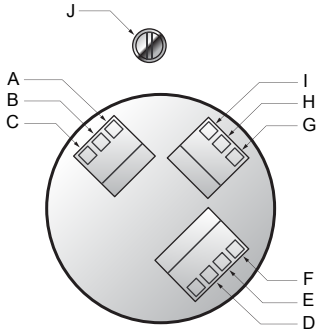


Figure 5-9: DT sensor terminals (user-supplied metal junction box with terminal block)



A. *Earth ground*

Figure 5-10: Remote core processor/transmitter terminals



A. Brown
B. Violet
C. Yellow
D. Orange
E. Gray
F. Blue
G. White
H. Green
I. Red
J. Ground screw (black)

6 Grounding

6.1 Ground the meter components

- In integral installations, all components are grounded together.
- In 4-wire remote installations, the transmitter and sensor are grounded separately.
- In 9-wire remote installations, the transmitter/core processor assembly and sensor are grounded separately.
- In a remote core processor with remote sensor installation, the transmitter, remote core processor, and sensor are all grounded separately.

Prerequisites

If national standards are not in effect, adhere to the following guidelines for grounding:

- Use copper wire, 14 AWG (2.08 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.

Procedure

Depending on your installation type:

Option	Description
For an integral installation	Ground via the piping if possible (see the sensor documentation). If grounding via the piping is not possible, ground according to applicable local standards using the transmitter's internal or external ground screw.
For all other installations	a. Ground the sensor according to the instructions in the sensor documentation. b. Ground the transmitter according to applicable local standards, using the transmitter's internal or external ground screw.

Figure 6-1: Transmitter internal grounding screw

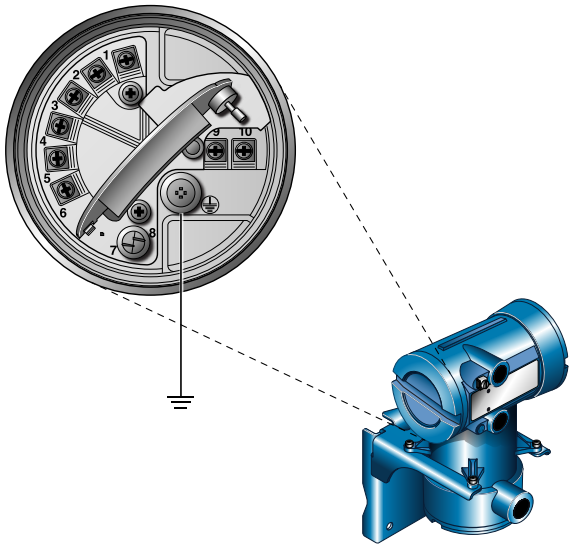
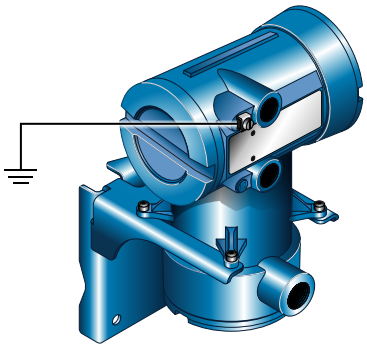


Figure 6-2: Transmitter external grounding screw



7 Wiring the power supply

7.1 Wire the power supply

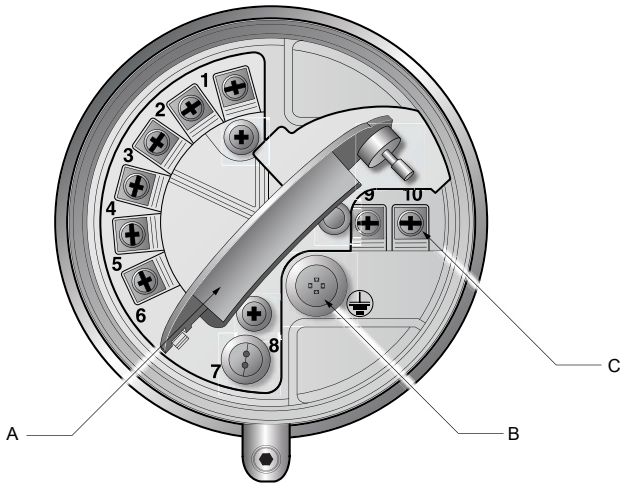
A user-supplied switch may be installed in the power supply line. For compliance with low-voltage directive 2006/95/EC (European installations), a switch in close proximity to the transmitter is required.

Procedure

1. Remove the transmitter housing cover.
2. Open the warning flap.
3. Connect the power supply wires to terminals 9 and 10.

   Terminate the positive (line) wire on terminal 10 and the return (neutral) wire on terminal 9.

Figure 7-1: Power supply wiring terminals

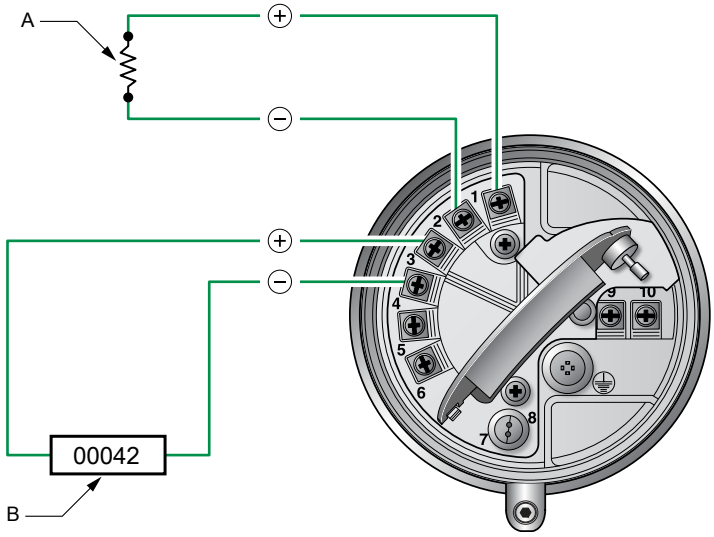


A. Warning flap
B. Equipment ground
C. Power supply wiring terminals (9 and 10)

4. Ground the power supply using the equipment ground, also under the warning flap.

8 I/O wiring for transmitters with analog outputs

8.1 Basic analog wiring

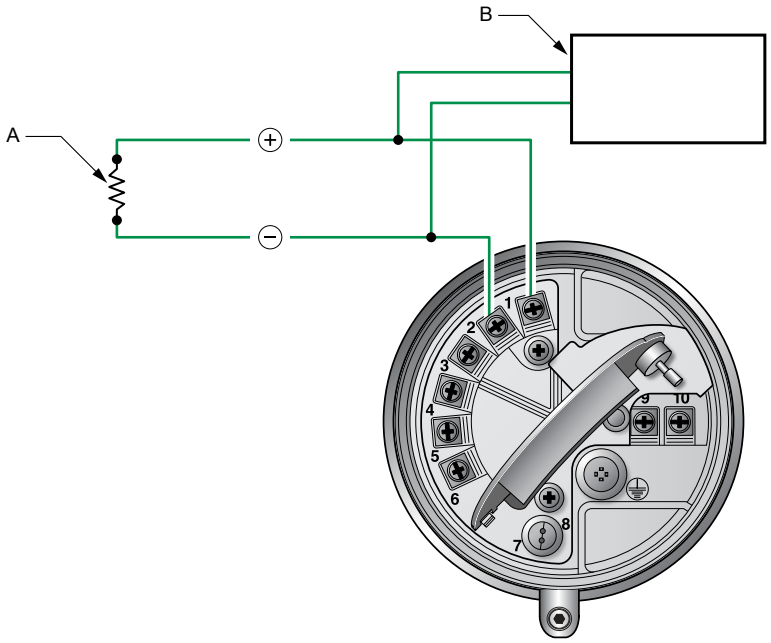


A. mA Output loop (820 Ω maximum loop resistance)
B. Frequency receiving device (output voltage level is +24 VDC ± 3%, with a 2.2 kΩ pull-up resistor)

8.2 HART®/analog single loop wiring

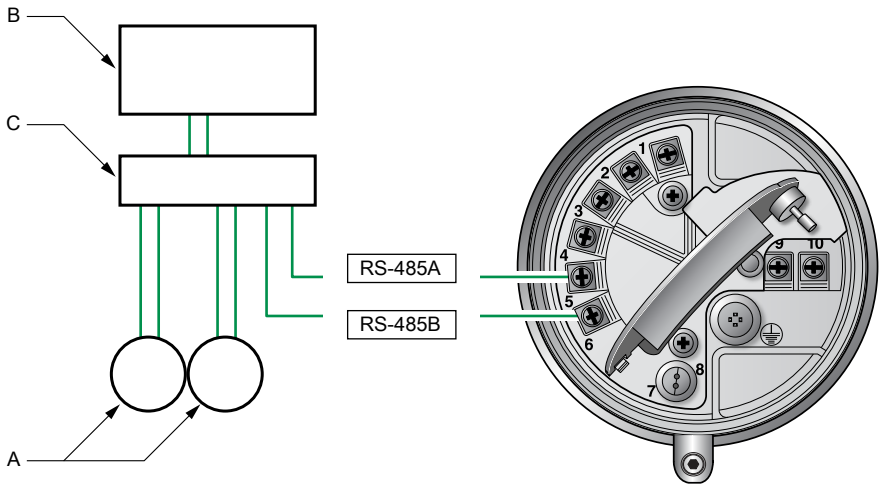
Note
For HART communications:

- 600 Ω maximum loop resistance
- 250 Ω minimum loop resistance



A. 820 Ω maximum loop resistance
B. HART-compatible host or controller

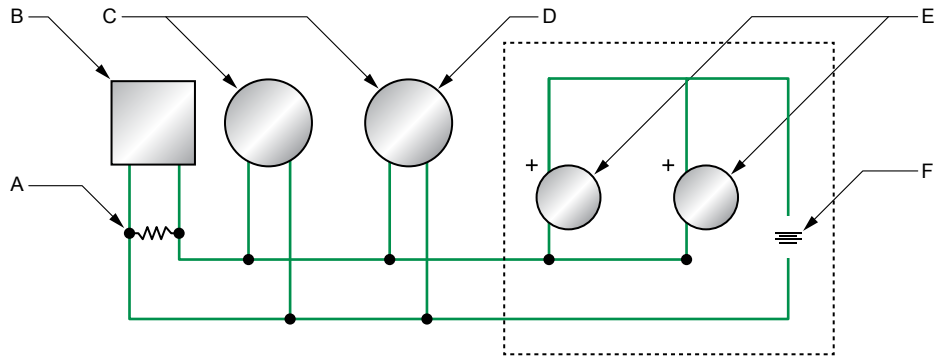
8.3 RS-485 point-to-point wiring



A. Other devices
B. Primary controller
C. Multiplexer

8.4 HART multidrop wiring

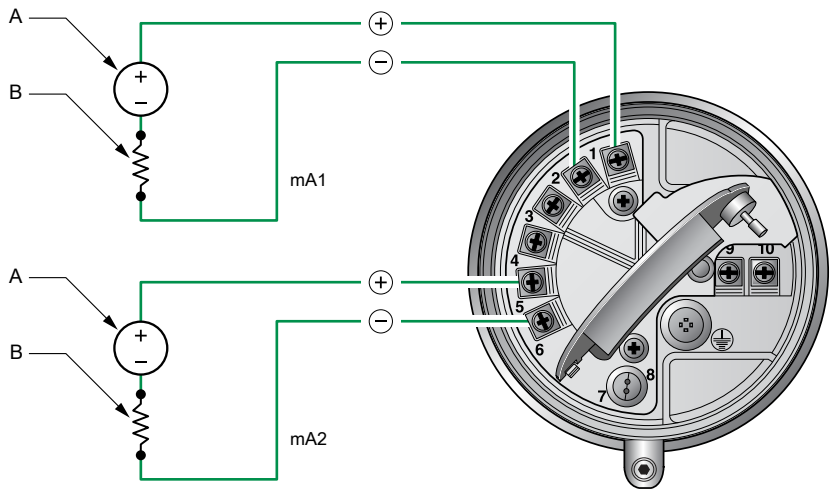
Tip
For optimum HART communication, single-point ground the output loop to an instrument-grade ground.



A. 250–600 Ω resistance
B. HART-compatible host or controller
C. HART-compatible transmitters
D. 1700 or 2700 transmitter
E. SMART FAMILY™ transmitters
F. 24 VDC loop power supply required for passive transmitters

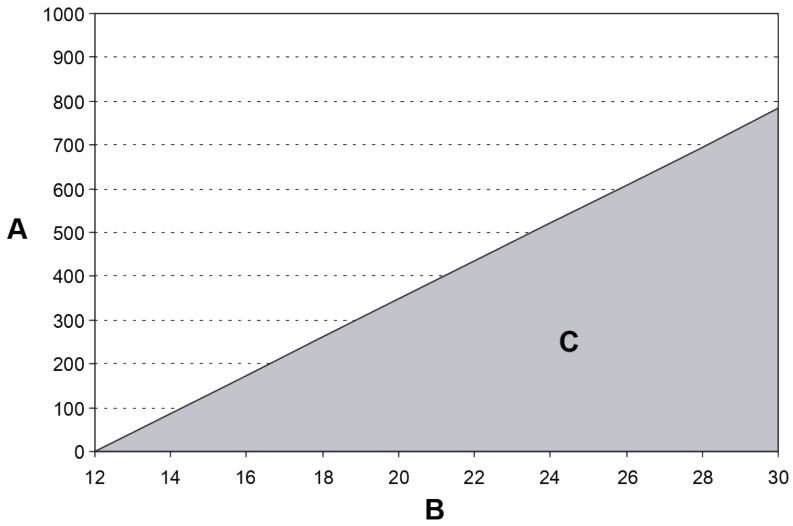
9 I/O wiring for transmitters with intrinsically safe outputs

9.1 Safe area mA Output wiring (2700)



A. External DC power supply (VDC)
B. R_{load}

Safe area mA Output load resistance values

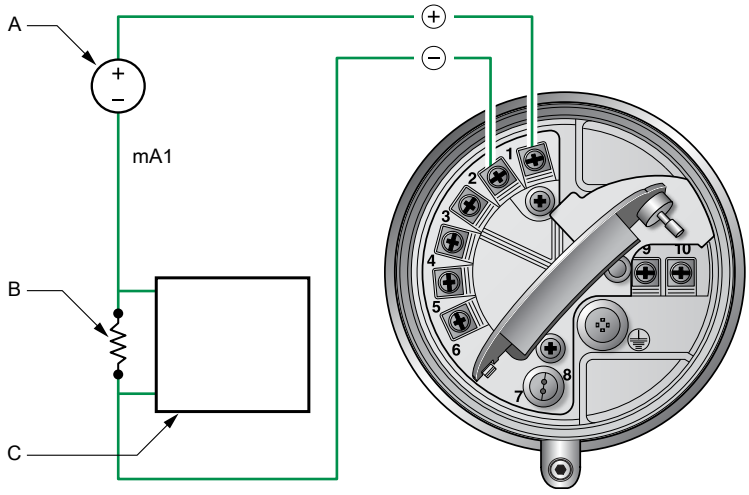


$$R_{\max} = (V_{\text{supply}} - 12) / 0.023$$

Minimum 250Ω and 17.5V required for HART communications

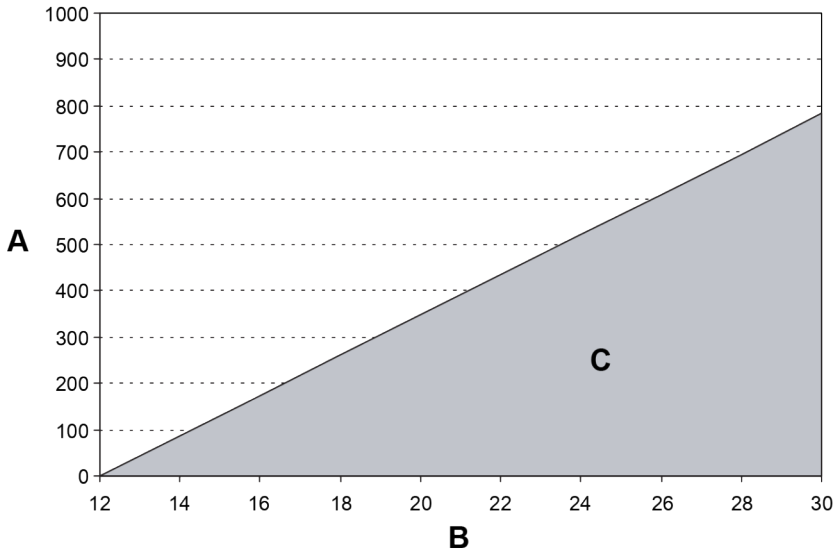
A. *External resistor R_{load} (ohms)*
B. *Supply voltage VDC (volts)*
C. *Operating region*

9.2 Safe area HART/analog single-loop wiring



A. *External DC power supply (VDC)*
B. *R_{load} (250–600 Ω resistance)*
C. *HART-compatible host or controller*

Safe area mA Output load resistance values



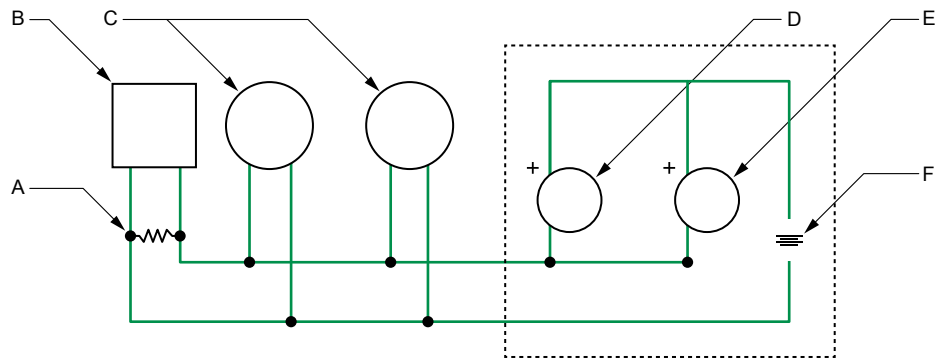
$$R_{\max} = (V_{\text{supply}} - 12) / 0.023$$

Minimum 250Ω and 17.5V required for HART communications

A. *External resistor R_{load} (ohms)*
B. *Supply voltage VDC (volts)*
C. *Operating region*

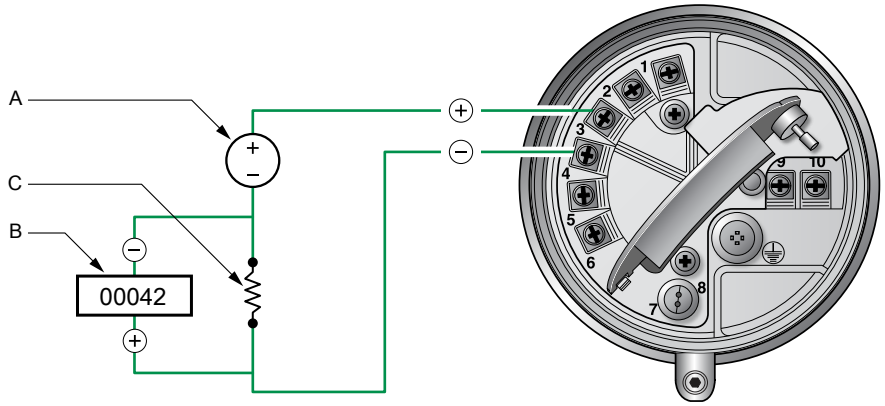
9.3 Safe area HART multidrop wiring

Tip
For optimum HART communication, single-point ground the output loop to an instrument-grade ground.



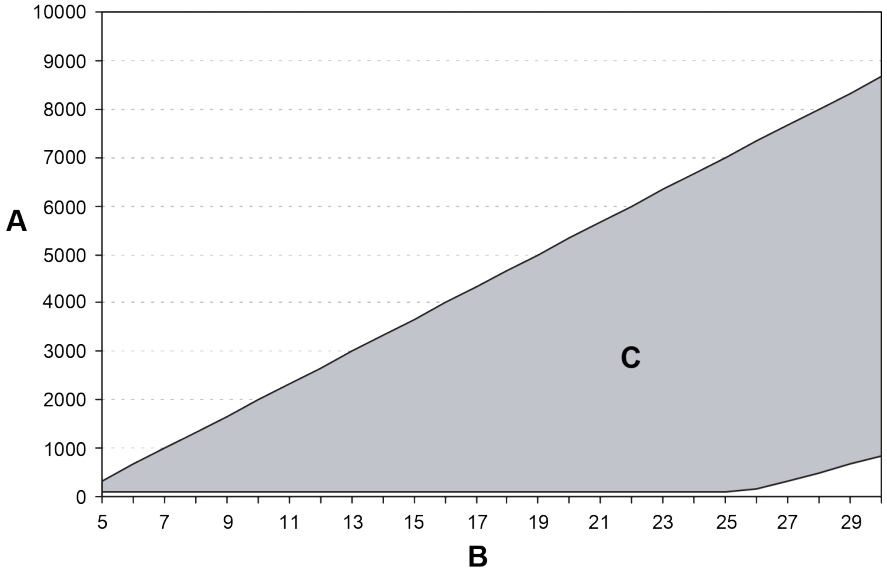
A. 250–600 Ω resistance
B. HART-compatible host or controller
C. HART-compatible transmitters
D. 1700 or 2700 transmitter with intrinsically safe outputs
E. SMART FAMILY transmitter
F. 24 VDC loop power supply required for HART 4–20 mA passive transmitters

9.4 Safe area Frequency Output/Discrete Output wiring



A. External DC power supply (VDC)
B. Counter
C. R_{load}

Safe area Frequency Output/Discrete Output load resistance values



$$R_{\max} = (V_{\text{supply}} - 4) / 0.003$$
$$R_{\min} = (V_{\text{supply}} - 25) / 0.006$$

Minimum 100Ω for supply voltage less than 25.6 volts

A. *External pull-up resistor R_{load} range (ohms)*
B. *Supply voltage VDC (volts)*
C. *Operating region*

9.5 Hazardous area wiring

Information provided about I.S. barriers is intended as an overview. Application-specific or product-specific questions should be addressed to the barrier manufacturer or Micro Motion.

WARNING

- Hazardous voltage can cause severe injury or death. Shut off the power before wiring transmitter outputs.
- Improper wiring in a hazardous environment can cause an explosion. Install the transmitter only in an area that complies with the hazardous classification tag on the transmitter.

Table 9-1: Safety parameters

Parameter	4–20 mA	Frequency/discrete
Voltage (U_i)	30 V	30 V
Current (I_i)	300 mA	100 mA
Power (P_i)	1.0 W	0.75 W

Table 9-1: Safety parameters *(continued)*

Parameter	4–20 mA	Frequency/discrete
Capacitance (C_i)	0.0005 µF	0.0005 µF
Inductance (L_i)	0.0 mH	0.0 mH

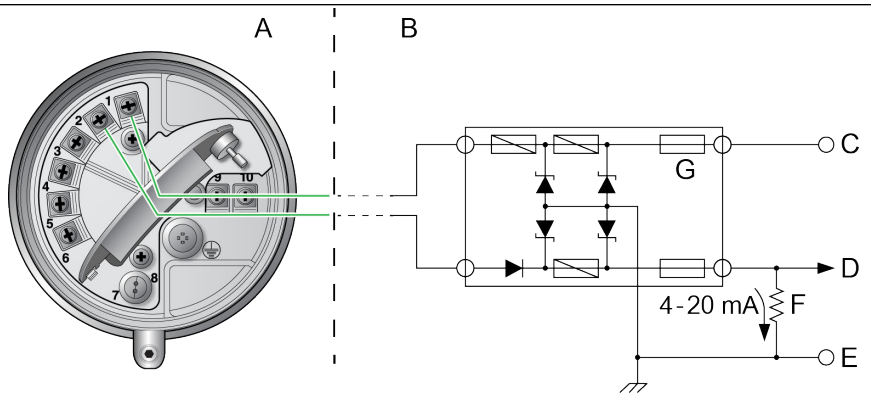
Voltage The transmitter's safety parameters require the selected barrier's open-circuit voltage to be limited to less than 30 VDC (V_{max} = 30 VDC). This voltage is the combination of the maximum safety barrier voltage (typically 28 VDC) plus an additional 2 VDC for HART communications when communicating in the hazardous area.

Current The transmitter's safety parameters require the selected barrier's short-circuit currents to sum to less than 300 mA (I_{max} = 300 mA) for the milliamp outputs and 100 mA (I_{max} = 100 mA) for the frequency/discrete output.

Capacitance The capacitance (C_i) of the transmitter is 0.0005 µF. This value added to the wire capacitance (C_{cable}) must be lower than the maximum allowable capacitance (C_o) specified by the I.S. barrier. Use the following equation to calculate the maximum length of the cable between the transmitter and the barrier: $C_i + C_{cable} \leq C_o$

Inductance The inductance (L_i) of the transmitter is 0.0 mH. This value plus the field wiring inductance (L_{cable}), must be lower than the maximum allowable inductance (L_o) specified by the I.S. barrier. The following equation can then be used to calculate the maximum cable length between the transmitter and the barrier: $L_i + L_{cable} \leq L_o$

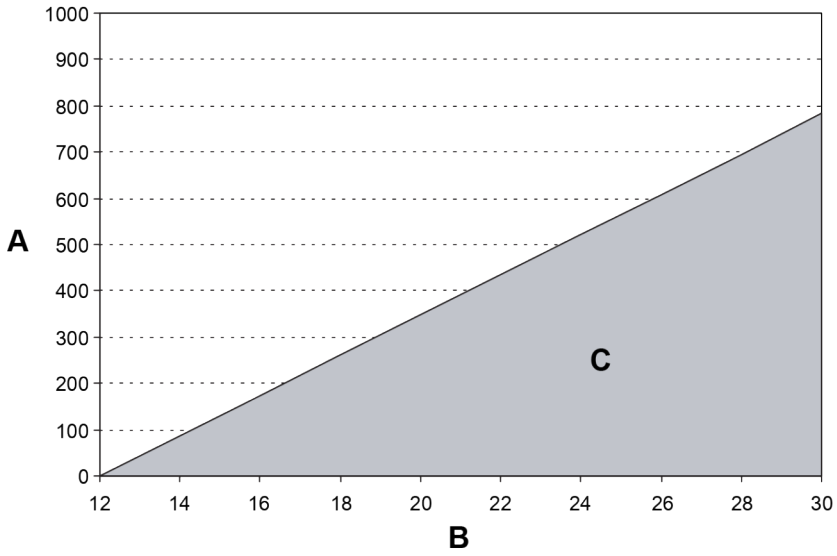
9.5.1 Hazardous area mA Output wiring



A. Hazardous area
B. Safe area
C. V_{in}
D. V_{out}
E. Ground
F. R_{load}
G. $R_{barrier}$

Note
Add R_{load} and $R_{barrier}$ to determine V_{in}.

Safe area mA Output load resistance values

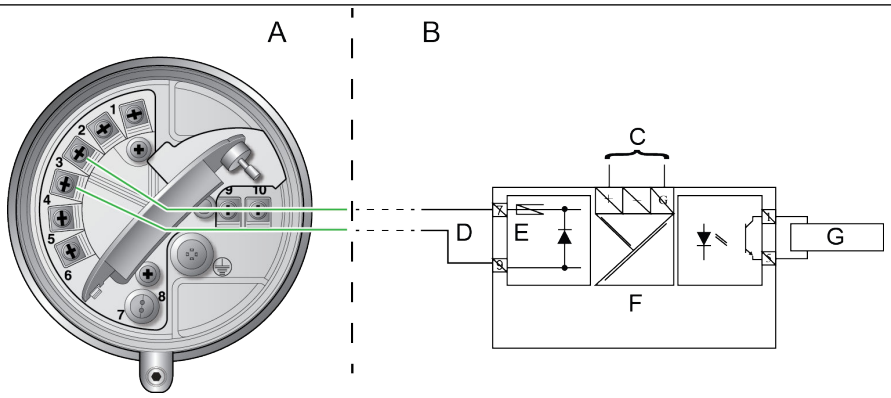


$$R_{\max} = (V_{\text{supply}} - 12) / 0.023$$

Minimum 250Ω and 17.5V required for HART communications

A. *External resistor R_{load} (ohms)*
B. *Supply voltage VDC (volts)*
C. *Operating region*

9.5.2 Hazardous area Frequency Output/Discrete Output wiring using a galvanic isolator



A. Hazardous area
B. Safe area
C. External power supply
D. V_{out}
E. R_{load}
F. Galvanic isolator (see note)
G. Counter

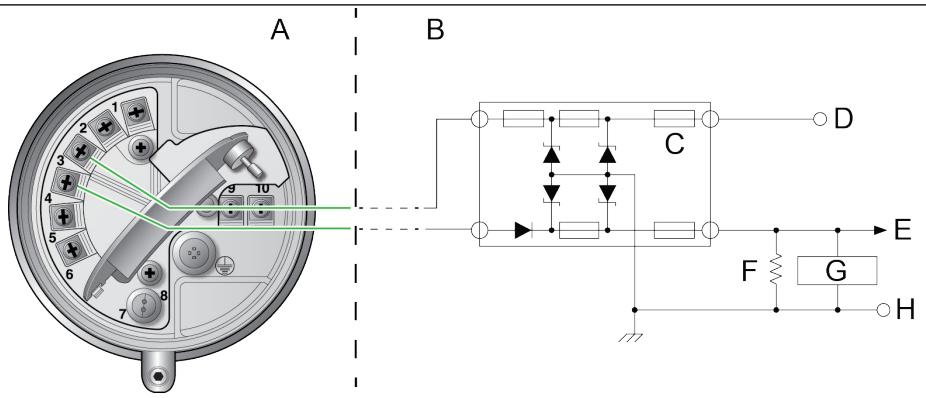
Note

The galvanic isolator shown here has an internal 1000 Ω resistor used for sensing current:

- ON > 2.1 mA
- OFF < 1.2 mA

These current switching levels comply with DIN19234 (NAMUR)/DIN EN 60947-5-6/IEC 60947-5-6.

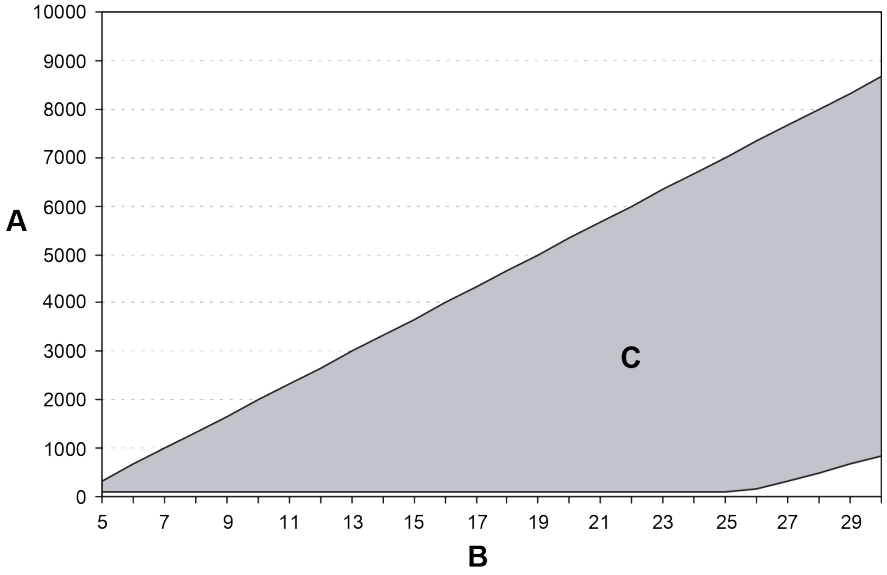
9.5.3 Hazardous area Frequency Output/Discrete Output wiring using barrier with external load resistance



A. *Hazardous area*
B. *Safe area*
C. $R_{barrier}$
D. V_{in}
E. V_{out}
F. *Counter*
G. R_{load}
H. *Ground*

Note
Add $R_{barrier}$ and R_{load} to determine V_{in}.

Safe area Frequency Output/Discrete Output load resistance values



$$R_{\max} = (V_{\text{supply}} - 4) / 0.003$$
$$R_{\min} = (V_{\text{supply}} - 25) / 0.006$$

Minimum 100Ω for supply voltage less than 25.6 volts

A. *External pull-up resistor R_{load} range (ohms)*
B. *Supply voltage VDC (volts)*
C. *Operating region*

10 I/O wiring for 2700 with configurable input/outputs

10.1 Channel configuration

The six wiring terminals are divided into three pairs, and called Channels A, B, and C.

- Channel A = terminals 1 and 2
- Channel B = terminals 3 and 4
- Channel C = terminals 5 and 6

Variable assignments are governed by channel configuration.

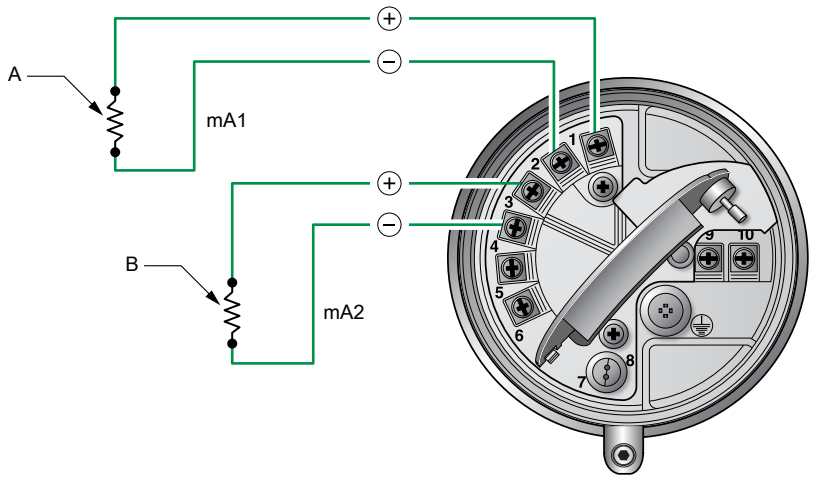
Table 10-1: Channel configuration

Channel	Terminals	Configuration options	Power
A	1, 2	mA Output with HART/Bell202	Internal
B	3, 4	mA Output (default)	Internal
		Frequency Output	Internal or external
		Discrete Output	Internal or external
C	5, 6	Frequency Output (default)	Internal or external
		Discrete Output	Internal or external
		Discrete Input	Internal or external

Notes

- For Channel A, the Bell 202 signal is superimposed on the mA Output.
- You must provide power to the outputs when a channel is set to external power.
- When both Channel B and Channel C are configured for Frequency Output (dual pulse), Frequency Output 2 is generated from the same signal that is sent to the first Frequency Output. Frequency Output 2 is electrically isolated but not independent.
- You cannot configure the combination of Channel B as Discrete Output and Channel C as Frequency Output.

10.2 Basic mA Output wiring

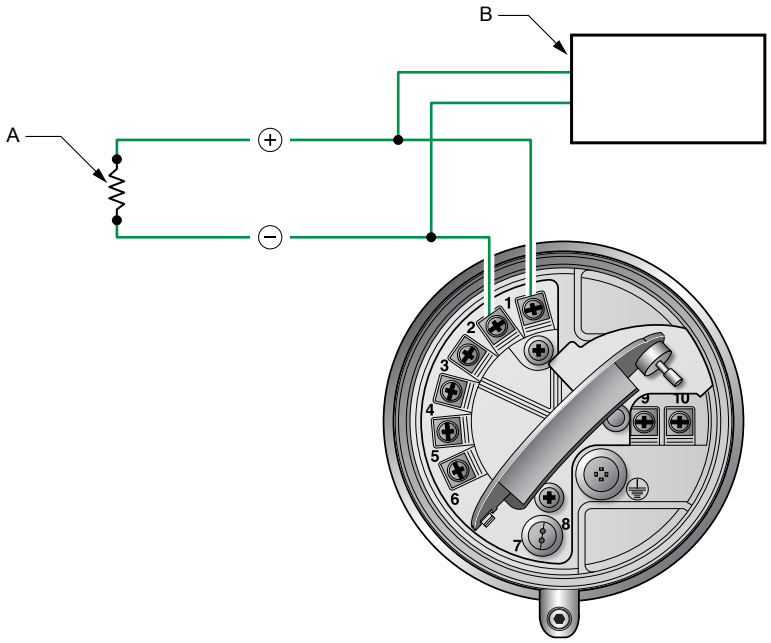


A. 820 Ω maximum loop resistance
B. 420 Ω maximum loop resistance

10.3 HART/analog single loop wiring

Note
For HART communications:

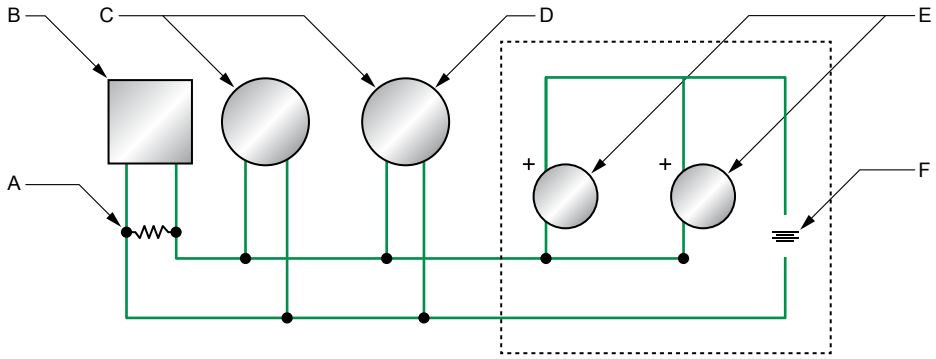
- 600 Ω maximum loop resistance
- 250 Ω minimum loop resistance



A. 820 Ω maximum loop resistance
B. HART-compatible host or controller

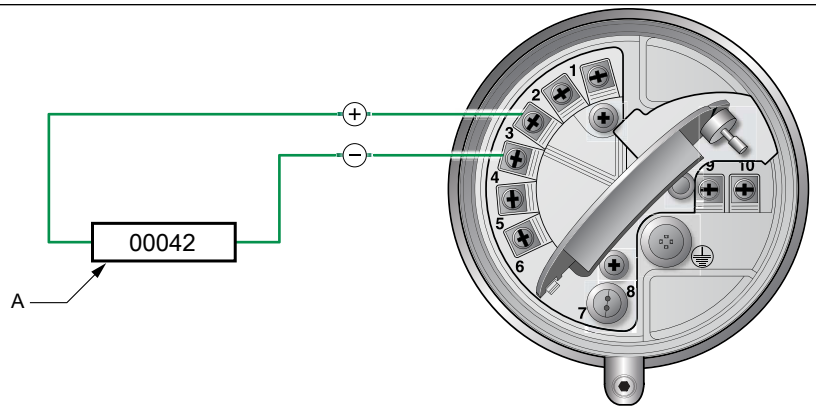
10.4 HART multidrop wiring

Tip
For optimum HART communication, single-point ground the output loop to an instrument-grade ground.



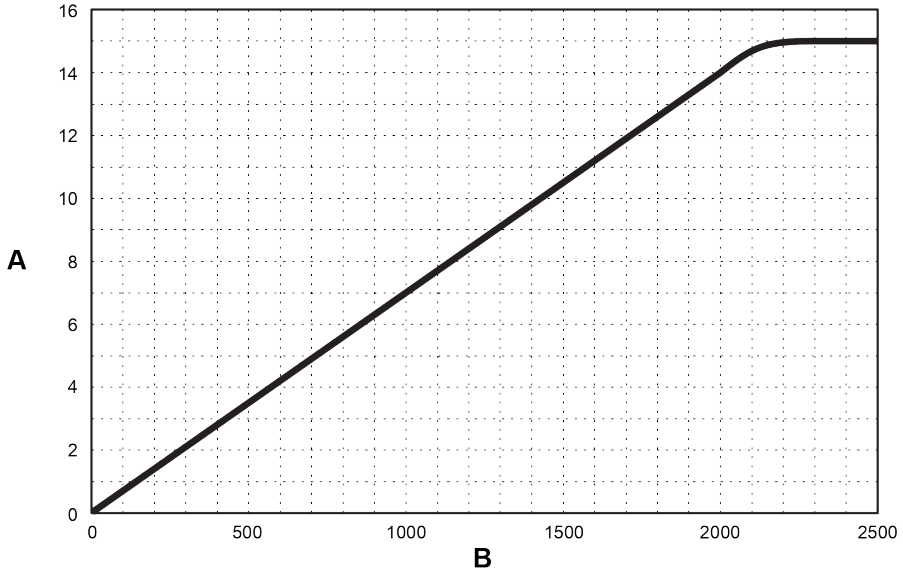
A. 250–600 Ω resistance
B. HART-compatible host or controller
C. HART-compatible transmitters
D. 2700 configurable I/O transmitter (internally powered outputs)
E. SMART FAMILY transmitters
F. 24 VDC loop power supply required for HART 4–20 mA passive transmitters

10.5 Internally powered Frequency Output wiring on Channel B



A. Counter

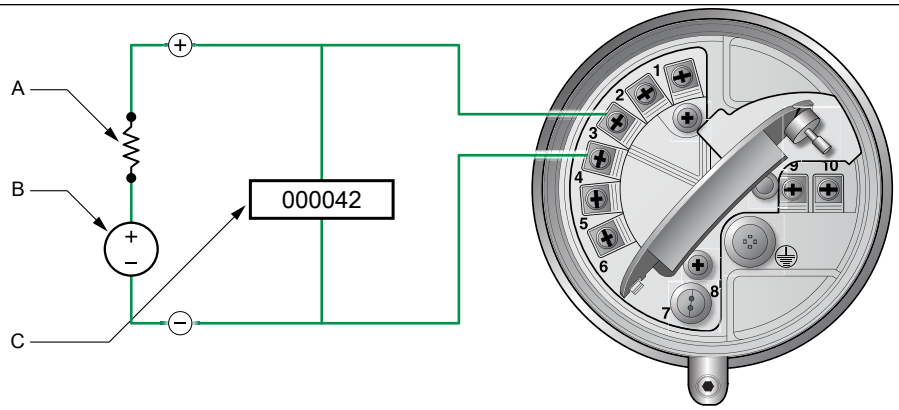
Output voltage versus load resistance



Maximum output voltage = 15 VDC ± 3%

A. High level output voltage (volts)
B. Load resistance (ohms)

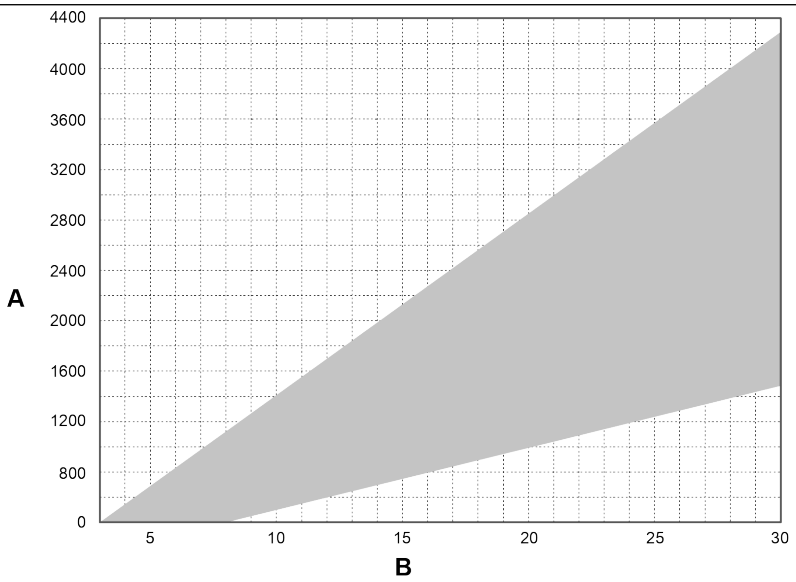
10.6 Externally powered Frequency Output wiring on Channel B



A. Pull-up resistor
B. External DC power supply (3–30 VDC)
C. Counter

NOTICE
Exceeding 30 VDC can damage the transmitter. Terminal current must be less than 500 mA.

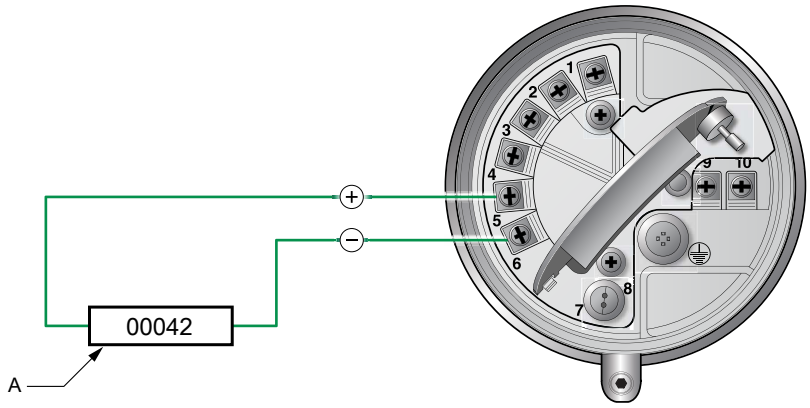
Recommended pull-up resistor versus supply voltage



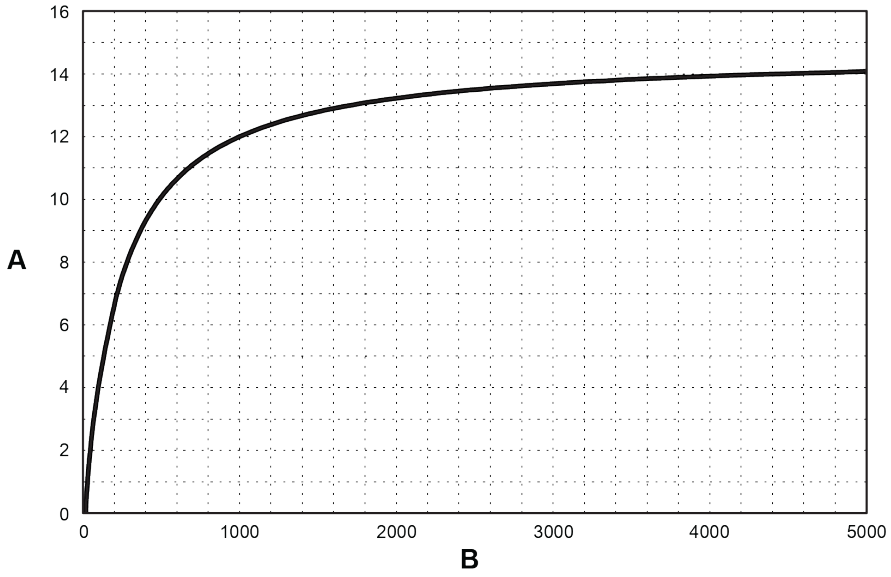
A. External pull-up resistor range (ohms)
B. Supply voltage (volts)

10.7 Internally powered FO wiring on Channel C

Figure 10-1: Internally powered FO wiring on Channel C



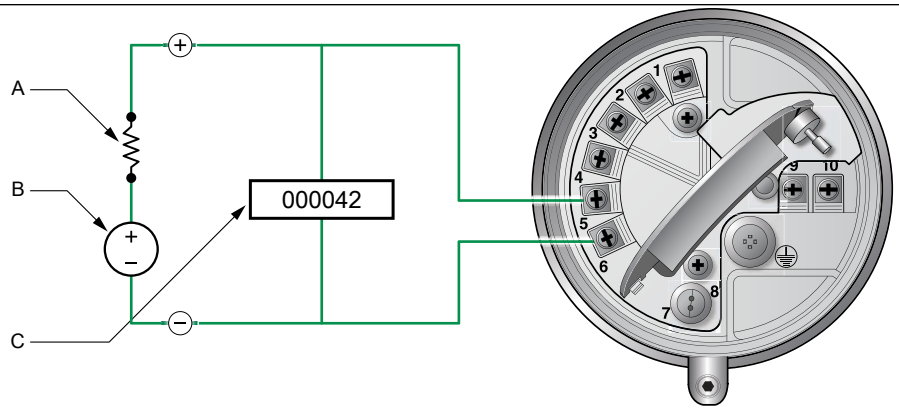
A. Counter



Maximum output voltage = 15 VDC ± 3%

A. High level output voltage (volts)
B. Load resistance (ohms)

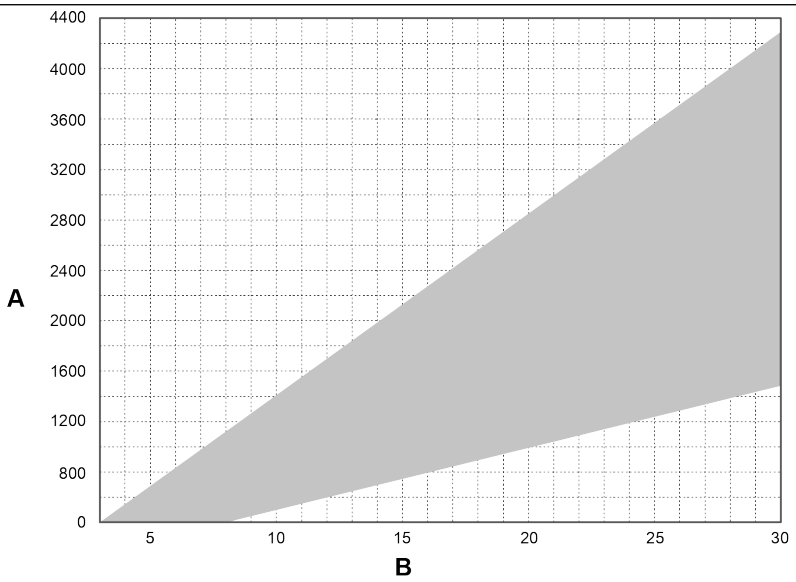
10.8 Externally powered Frequency Output wiring on Channel C



A. Pull-up resistor
B. External DC power supply (3–30 VDC)
C. Counter

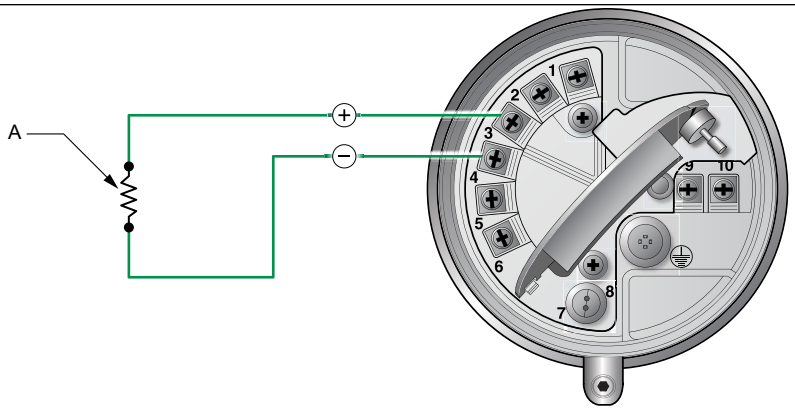
NOTICE
Exceeding 30 VDC can damage the transmitter. Terminal current must be less than 500 mA.

Recommended pull-up resistor versus supply voltage



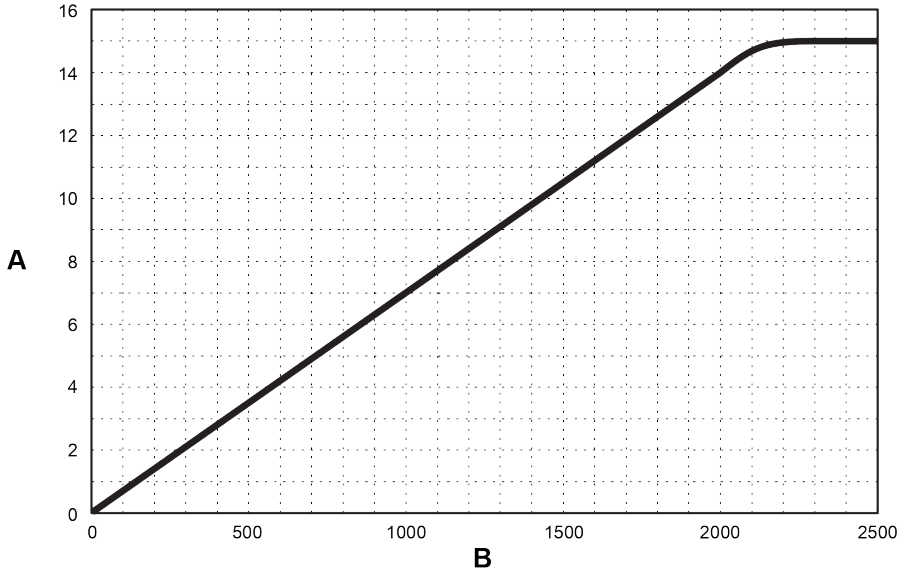
A. External pull-up resistor range (ohms)
B. Supply voltage (volts)

10.9 Internally powered Discrete Output wiring on Channel B



A. Total load

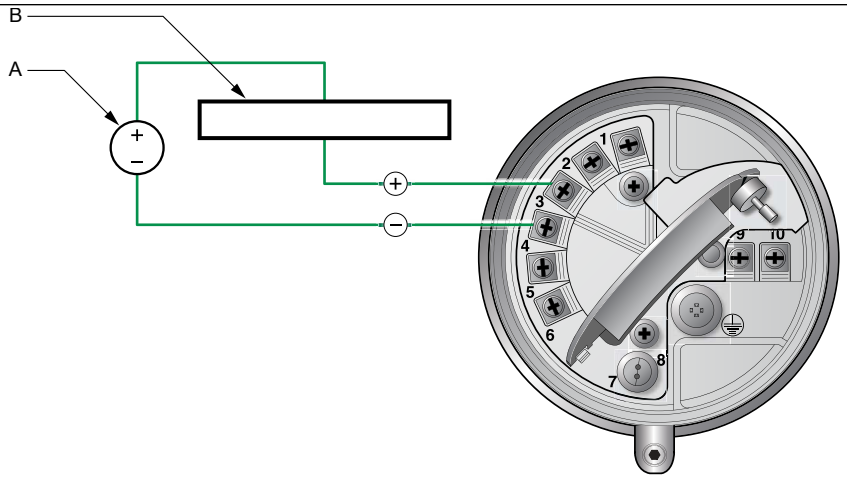
Output voltage versus load resistance



Maximum output voltage = 15 VDC ± 3%

A. High level output voltage (volts)
B. Load resistance (ohms)

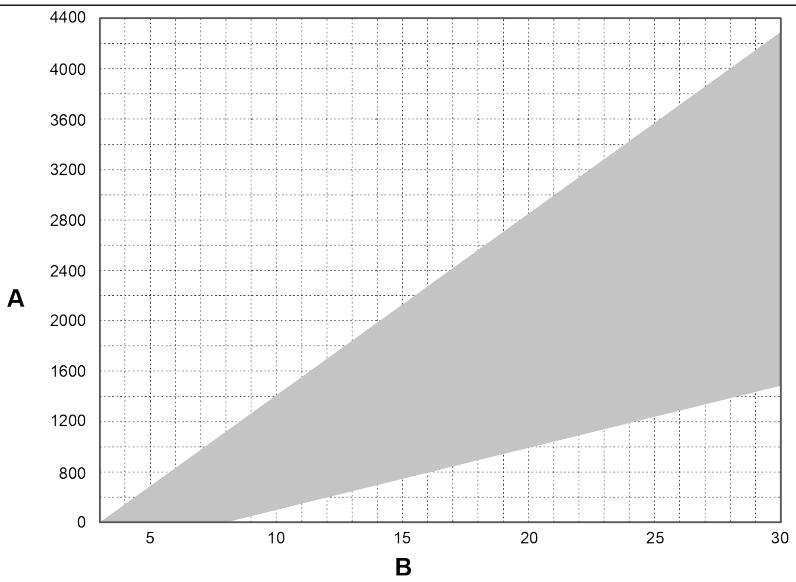
10.10 Externally powered Discrete Output wiring on Channel B



A. External DC power supply (3–30 VDC)
B. Pull-up resistor or DC relay

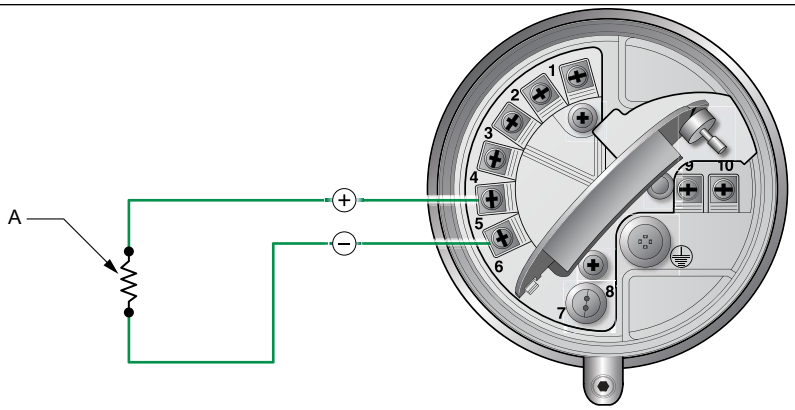
NOTICE
Exceeding 30 VDC can damage the transmitter. Terminal current must be less than 500 mA.

Recommended pull-up resistor versus supply voltage



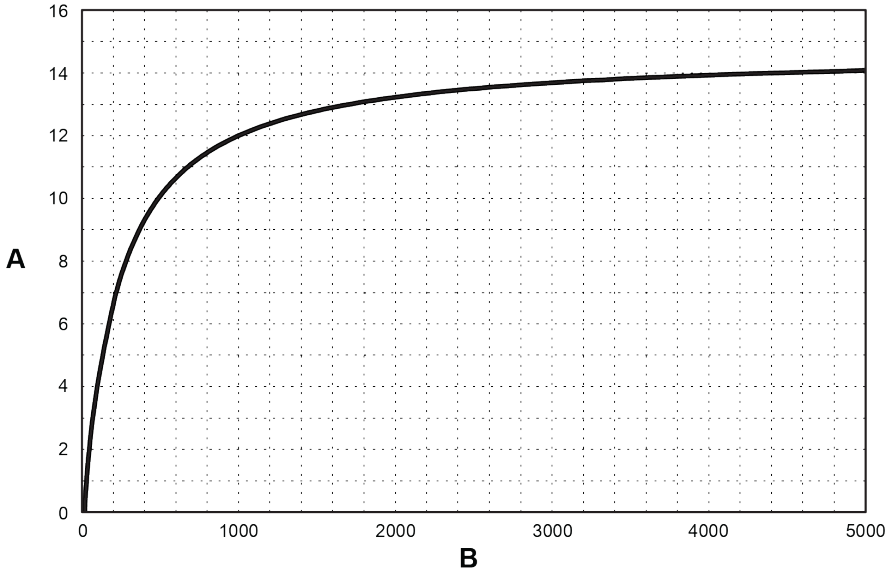
A. External pull-up resistor range (ohms)
B. Supply voltage (volts)

10.11 Internally powered Discrete Output wiring on Channel C



A. Total load

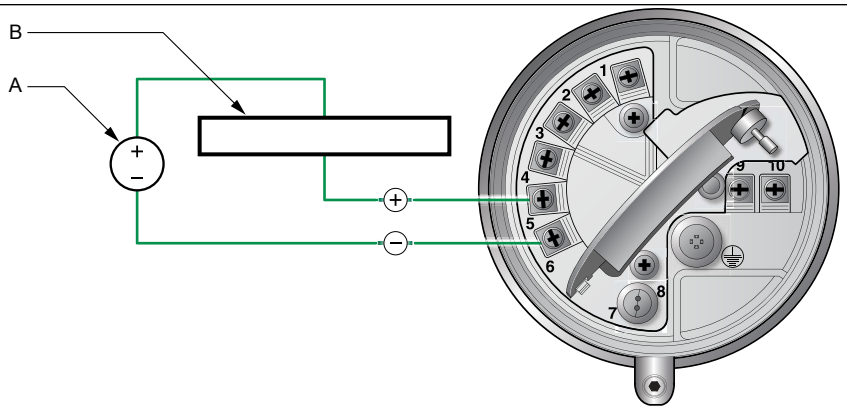
Output voltage versus load resistance



Maximum output voltage = 15 VDC ± 3%

A. High level output voltage (volts)
B. Load resistance (ohms)

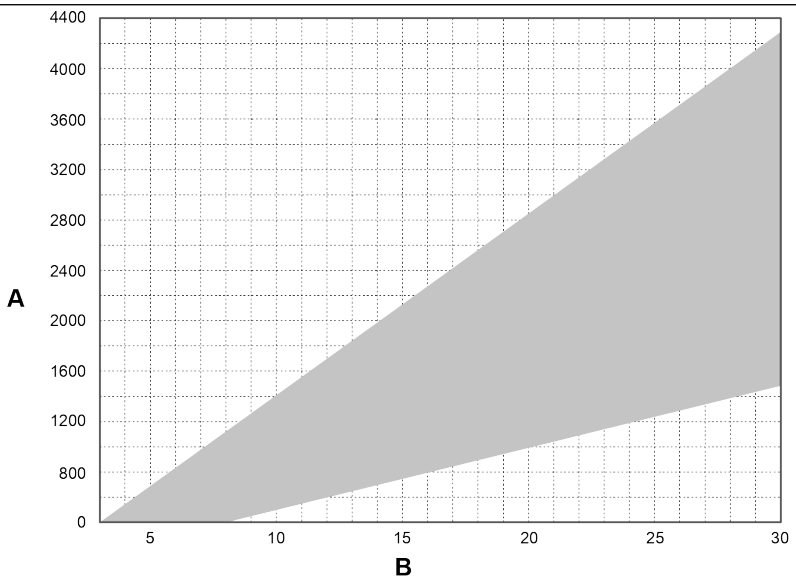
10.12 Externally powered Discrete Output wiring on Channel C



A. External DC power supply (3–30 VDC)
B. Pull-up resistor or DC relay

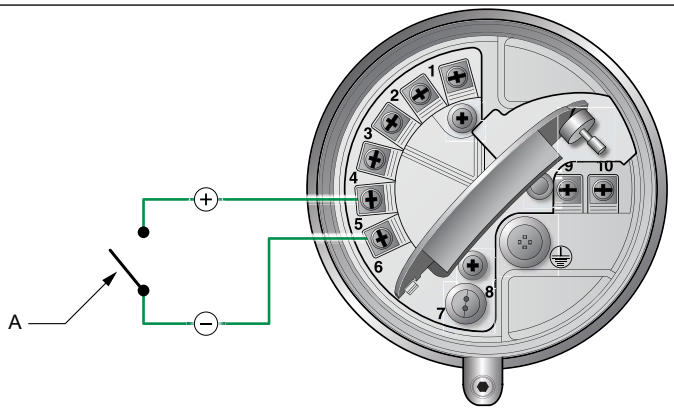
NOTICE
Exceeding 30 VDC can damage the transmitter. Terminal current must be less than 500 mA.

Recommended pull-up resistor versus supply voltage



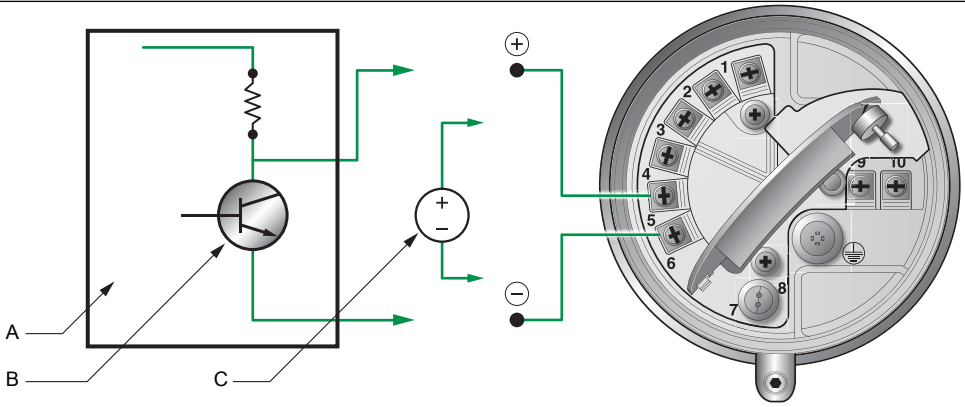
A. External pull-up resistor range (ohms)
B. Supply voltage (volts)

10.13 Internally powered Discrete Input wiring



A. Switch

10.14 Externally powered Discrete Input wiring



A. PLC or other device
B. Bipolar negative-positive-negative (NPN) transistor
C. Direct DC input

Power is supplied by either a PLC/other device or by direct DC input.

Table 10-2: Input voltage ranges for external power

VDC	Range
3–30	High level
0–0.8	Low level
0.8–3	Undefined

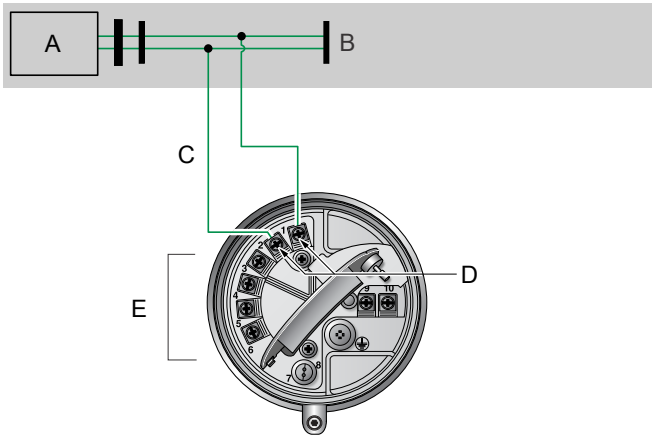
11 I/O wiring for 2700 with FOUNDATION fieldbus or PROFIBUS-PA

11.1 FOUNDATION fieldbus wiring

See the following wiring diagram, and refer to the FOUNDATION fieldbus wiring specification.

Important
The transmitter is either FISCO or FNICO approved. For FISCO-approved transmitters, a barrier is required.

Figure 11-1: FOUNDATION fieldbus wiring diagram



A. Bus power supply
B. FOUNDATION fieldbus network per FOUNDATION fieldbus wiring specification
C. Spur to network per FOUNDATION fieldbus wiring specification
D. Terminals 1 and 2
E. Terminals 3 – 6 (unused)

Note
The fieldbus communication terminals (1 and 2) are not polarity-sensitive.

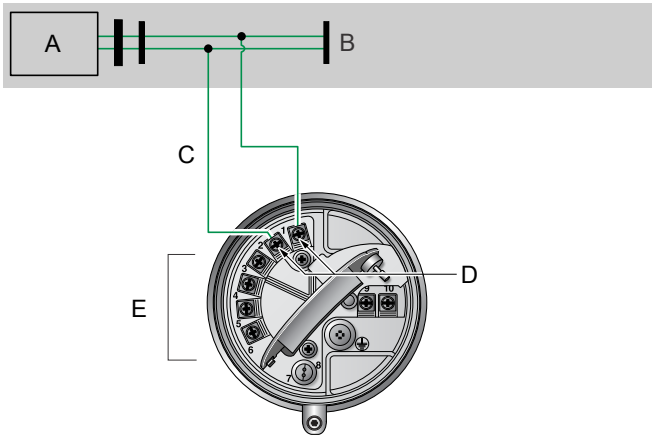
11.2 PROFIBUS-PA wiring

See the following wiring diagram, and refer to the *PROFIBUS-PA User and Installation Guideline* published by PNO.

Important

- The transmitter is FISCO approved.
- For intrinsically safe wiring, see the *PROFIBUS-PA User and Installation Guideline*.

Figure 11-2: PROFIBUS-PA wiring diagram



A. *Bus power supply*
B. *PROFIBUS-PA segment per PROFIBUS-PA User and Installation Guideline*
C. *Spur to PROFIBUS-PA segment per PROFIBUS-PA User and Installation Guideline*
D. *Terminals 1 and 2*
E. *Terminals 3 – 6 (unused)*

Note
The PROFIBUS communication terminals (1 and 2) are not polarity-sensitive.

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