

# Rosemount™ 402 and 402VP

## Contacting Conductivity Sensors



### Reliable conductivity measurements for your process

With Rosemount 402 and 402VP contacting conductivity sensors, you can accurately measure electrolytic conductivity in a broad range of applications from high purity water to clean cooling water. These sensors are ideal for use in clean, non-corrosive liquid having conductivity less than 20,000  $\mu\text{S}/\text{cm}$ .

# Overview



Minimize startup and installation time.

- A factory-measured cell constant ensures out-of-the-box accuracy and no initial calibration requirements.
- Available in cell constants of 0.01, 0.1, and 1.0/cm.

Meet your process mounting needs.

- The sensors are designed to be retracted through a 1¼-in. ball valve assembly (sold separately).
- Sensors may be removed from process piping without having to shut down or drain the line.
- Offered with Variopol (VP6) quick disconnect fittings.

A robust two-electrode design.

- The sensors have concentric titanium electrodes separated by a PEEK insulator.
- An EPDM O-ring seals the internal parts of the sensor from the process liquid.
- Maximum operating pressure up to 212 °F (100 °C).
- Maximum pressure rating up to 200 psig.

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## Ordering information



The Rosemount 402 contacting conductivity sensor is intended to measure electrolytic conductivity in clean water applications. You can configure these sensors with a 0.01/cm, 0.1/cm, or 1.0/cm to accommodate varying levels of conductivity. The sensors are available with either an integral cable connection (402) or Variopol (VP6) connector (402VP). Variopol cables sold separately (see [Accessories](#)).

**Table 1: Rosemount 402 Contacting Conductivity Sensor Ordering Information**

Option	Description
402	Conductivity sensor - Endurance retractable
<b>Cell constant</b>	
11	0.01/cm
12	0.1/cm
13	1.0/cm
<b>Temperature compensation</b>	
–	Pt-1000 (standard) for Rosemount 1056, 1066-C, 56, and 5081-C
54	Pt-100 for Rosemount 1054; series 2081
<b>Retraction assembly</b>	
–	No selection
31	Retraction, 1¼-in. full port, 316 stainless steel valve kit
<b>Integral junction box</b>	
–	No selection
60	Junction box
<b>Cable length</b>	
–	No selection
61	Sensor cable prepped for junction box
02	Integral 15-ft. (4.6 m) cable
20	Integral 20-ft. (6 m) cable
03	Integral 33-ft. (10 m) cable
50	Integral 50-ft. (15 m) cable
06	Integral 100-ft. (30 m) cable

**Table 1: Rosemount 402 Contacting Conductivity Sensor Ordering Information (continued)**

Option	Description
<b>Calibration and conformance certificates - optional level</b>	
CC	Certificate of Calibration (no test data given)
LC	Loop Calibration Certificate (sensor and transmitter calibrated together with test data)
EC	Electronic Calibration Certificate (sensor calibrated against factory instrument with test data)

**Note**

The Endurance™ Rosemount 402-11, -12, and -13 retractable conductivity sensors feature titanium electrodes, a 316 stainless steel sensor tube, and 10 ft. (3 m) of integral cable or an optional 4-in. (101.6 mm) for use with a junction box (option -61). The maximum temperature rating for the Rosemount 402 is 212 °F (100 °C), and the maximum pressure is 200 psig (1480 kPa [abs]). Pt 1000 resistance temperature device is standard.

**Table 2: Rosemount 402VP Contacting Conductivity Sensor Ordering Information**

Option	Description
402VP	Conductivity sensor - retractable Variopol connector
<b>Cell constant</b>	
11	0.01/cm
12	0.1/cm
13	1.0/cm
<b>Temperature compensation</b>	
–	Pt-1000 (standard) for Rosemount 1056, 1066-C, 56, and 5081-C
54	Pt-100 for Rosemount 1054; series 2081
<b>Retraction assembly</b>	
–	No selection
31	Retraction, 1¼-in. full port, 316 stainless steel valve kit
<b>Calibration and conformance certificates - optional level</b>	
CC	Certificate of Calibration (no test data given)
LC	Loop Calibration Certificate (sensor and transmitter calibrated together with test data)
EC	Electronic Calibration Certificate (sensor calibrated against factory instrument with test data)

**Note**

The Endurance Rosemount 402VP -11, -12, and -13 retractable conductivity sensors feature titanium electrodes, a 316 stainless steel sensor tube, and an integral Variopol (VP6.0) connector, which uses a mating VP cable. Pt 1000 resistance temperature device is the standard thermocompensation used. Optional thermocompensations are also available for compatibility with other instruments. The base Rosemount402VP sensor is compatible with the Rosemount 1056, 1057, 56, 5081-C, and 1066 instruments.

# Specifications

**Table 3: Rosemount 402/402VP Contacting Conductivity Sensor Specifications**

<b>Wetted materials</b>	
Electrodes	Titanium
Insulator	Glass filled PEEK
Body	316 stainless steel
O-ring	EPDM
Washer	Neoprene
All wetted surfaces have 15 micro in. (0.4 micrometer) Ra finish.	
<b>Temperature range</b>	
Standard	32 to 212 °F (0 to 100 °C)
<b>Maximum pressure</b>	
200 psig (1481 kPa [abs])	
<b>Vacuum</b>	
At 1.6-in. Hg (5.2 kPa) air leakage is less than 0.005 SCFM (0.00014 m <sup>3</sup> /min.)	
<b>Cell constants</b>	
0.01, 0.1, and 1.0/cm	
<b>Process connection</b>	
Sensor is inserted through 1 ¼-in. national pipe thread (NPT) full port ball valve.	
<b>Cable length</b>	
10 ft. (3 m) standard; for longer cable lengths, choose option -60 (integral junction box) and order interconnecting cable separately; Rosemount 402VP interconnecting VP6 cables sold separately (see <a href="#">Accessories</a> ).	

Figure 1: Recommended Range - Contacting Conductivity

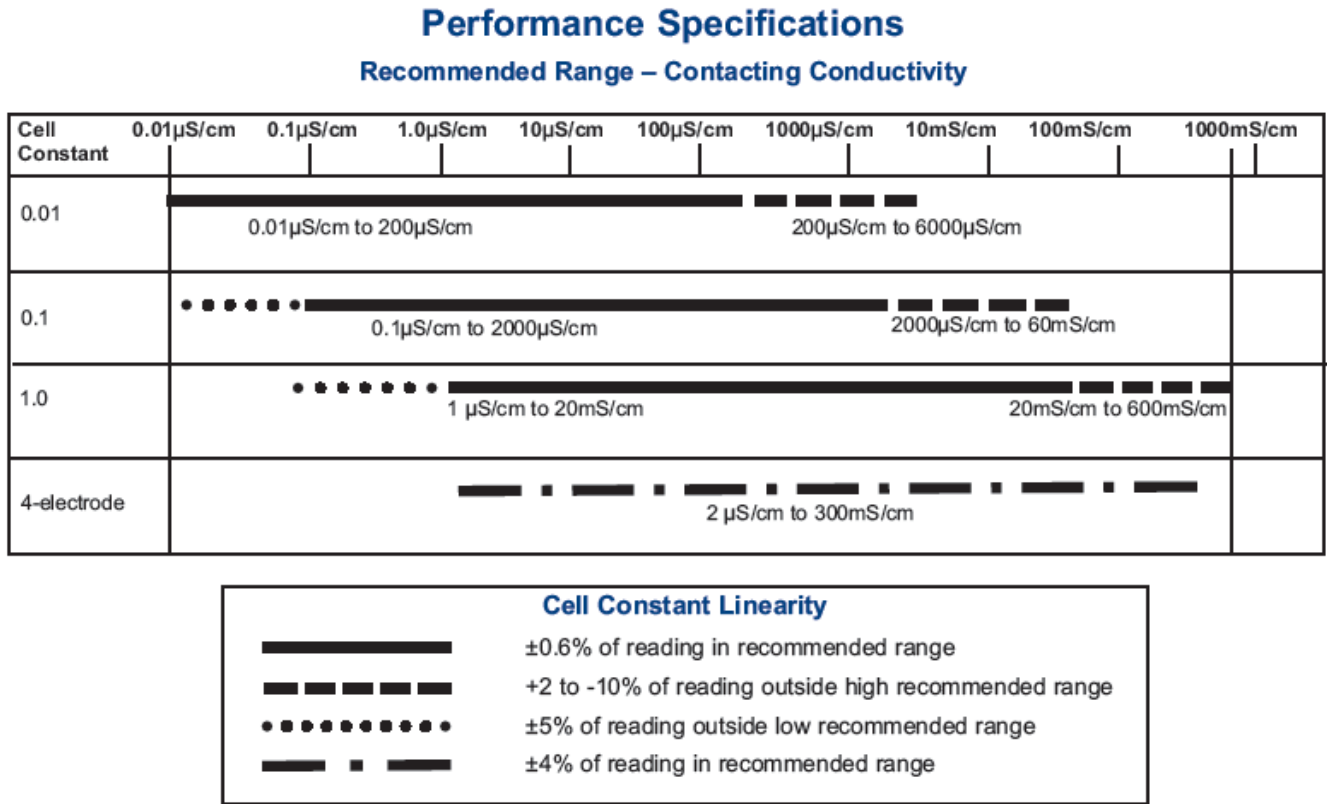


Table 4: Rosemount 402/402VP Weights and Shipping Weights

Model	With 10-ft. (3.1 m) cable		With junction box	
	Weight	Shipping weight	Weight	Shipping weight
Rosemount 402	3 lb. (1.5 kg)	4 lb. (2.0 kg)	4 lb. (2.0 kg)	5 lb. (2.5 kg)
Rosemount 402VP	3 lb. (1.5 kg)	4 lb. (2.0 kg)	N/A	N/A

Figure 2: Flow Cell



**Table 5: Flow Cell (24092-02) Specifications**

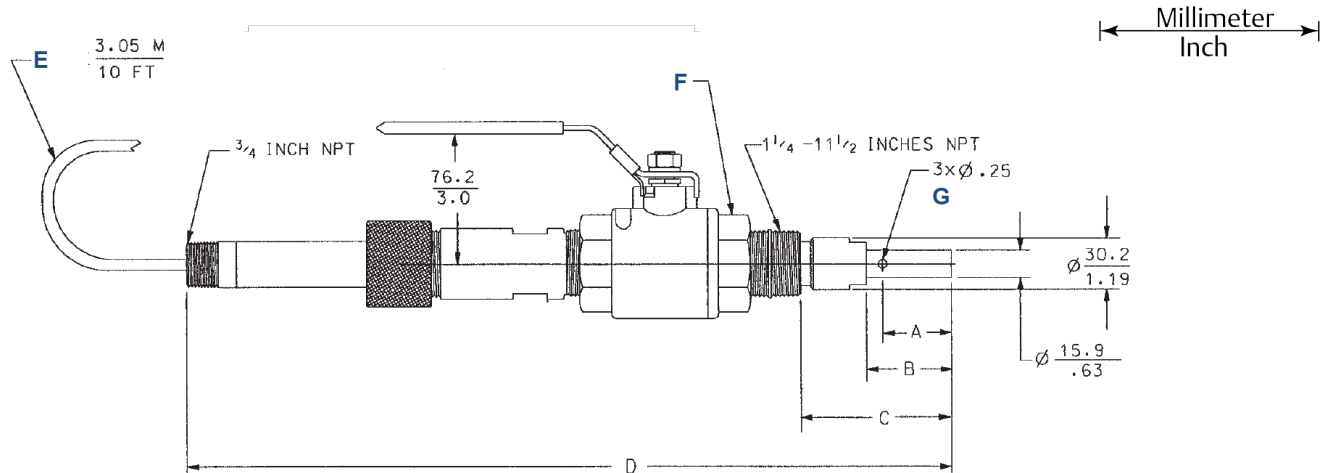
<b>Wetted materials</b>	
Body and nut	Polycarbonate and polyester
¼-in. fittings	316 stainless steel
O-ring	Silicone
<b>Process connection</b>	
Compression fittings for ¼-in. OD tubing	
<b>Temperature range</b>	
32 to 158 °F (0 to 70 °C)	
<b>Maximum pressure</b>	
90 psig (722 kPa [abs])	

**Table 6: Retraction Assembly Specifications**

<b>Assembly includes</b>	
Ball valve, retraction body, and pipe nipple	
<b>Wetted materials</b>	
Ball valve	316 stainless steel with Teflon® seals and seat steel
Nipple	316 stainless steel
Packing rings	Graphite
Packing bushing	303 stainless steel
Retraction body	316 stainless steel
<b>Process connection</b>	
Ball valve: 1¼-in. female national pipe thread (FNPT); nipple: 1¼-in. male national pipe thread (MNPT)	
<b>Temperature</b>	
32 to 212 °F (0 to 100 °C)	
<b>Pressure</b>	
200 psig (1481 kPa [abs]) maximum	
<b>Maximum retraction pressure</b>	
64 psig (542 kPa [abs]) maximum	
<b>Vacuum</b>	
AT 1.6 in. Hg (5.2 kPa), air leakage is less than 0.005 SCFM (0,00014m <sup>3</sup> /min).	

# Dimensional drawings

Figure 3: Rosemount 402 Dimensional Drawing



Rosemount 402-11 and 402-13 require kit 23765-00. All retractable sensors shown with retraction assembly kit PN 23765-00/01 (purchased separately).

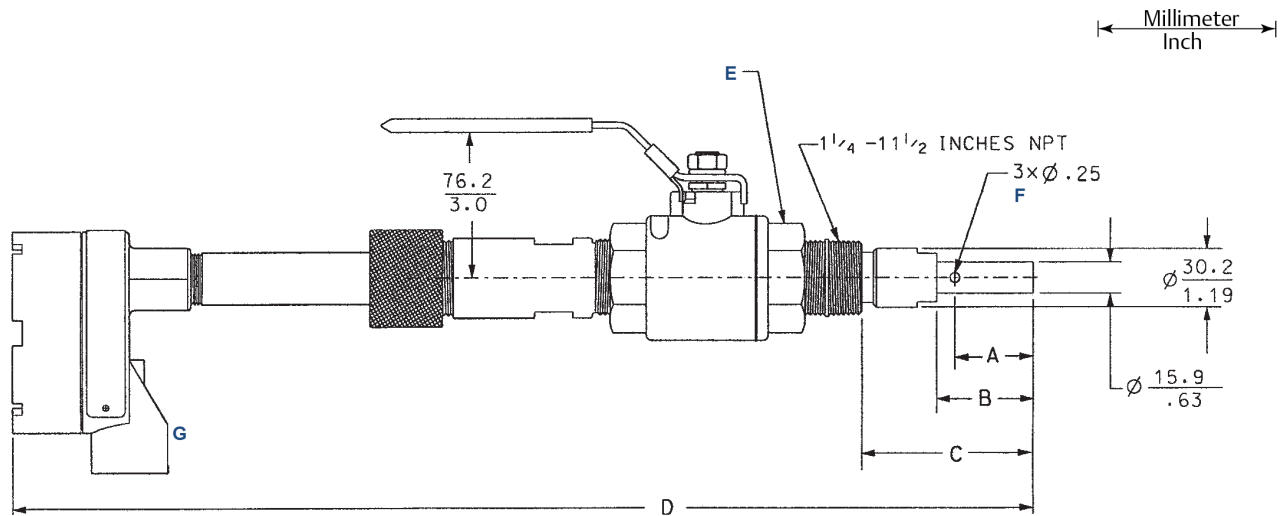
- A. Dimension (see Table 7)
- B. Dimension (see Table 7)
- C. Dimension (see Table 7)
- D. Dimension (see Table 7)
- E. Cable.
- F. Ball valve
- G. Equally spaced

Table 7: Rosemount 402 Dimensions

	Rosemount 402-11	Rosemount 402-12	Rosemount 402-13
Retraction assembly kit	23765-00	23765-00	23765-00
A: in. (mm)	1.59 (40.4)	.687 (17.4)	.667 (16.9)
B: in. (mm)	1.98 (50.3)	1.11 (28.2)	1.13 (28.7)
C: in. (mm) (minimum to maximum)	3.21 to 5.34 (82 to 136)	2.34 to 4.47 (59 to 114)	2.36 to 4.49 (60 to 114)
D: in. (mm)	18.3 (460.5)	17.33 (440.2)	17.33 (440.2)



Figure 4: Rosemount 402 with Integral Junction Box (Option -60) Dimensional Drawing



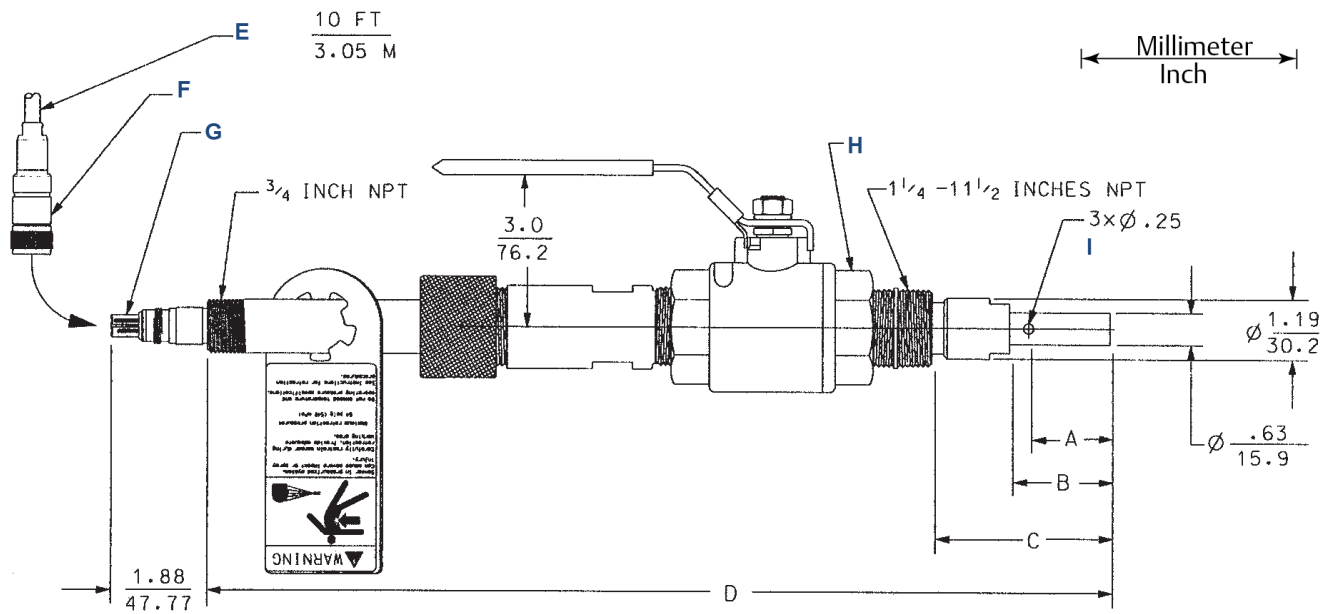
Rosemount 402-11 and 402-12 require kit PN 23765-00. All retractable sensors shown with retraction assembly kit PN 23765-00/02 (purchased separately).

- A. Dimension (see [Table 8](#))
- B. Dimension (see [Table 8](#))
- C. Dimension (see [Table 8](#))
- D. Dimension (see [Table 8](#))
- E. Ball valve
- F. Equally spaced
- G. Junction box

Table 8: Rosemount 402 with Integral Junction Box Dimensions

	Rosemount 402-11	Rosemount 402-12	Rosemount 402-13
Retraction assembly kit	23765-00	23765-00	23765-00
A: in. (mm)	1.59 (40.4)	.687 (17.4)	.667 (16.9)
B: in. (mm)	1.98 (50.3)	1.11 (28.2)	1.13 (28.7)
C: in. (mm) (minimum to maximum)	3.21 to 5.34 (82 to 136)	2.34 to 4.47 (59 to 114)	2.36 to 4.49 (60 to 114)
D: in. (mm)	21.1 (537)	20.3 (515)	20.3 (515)

Figure 5: Rosemount 402VP Dimensional Drawing



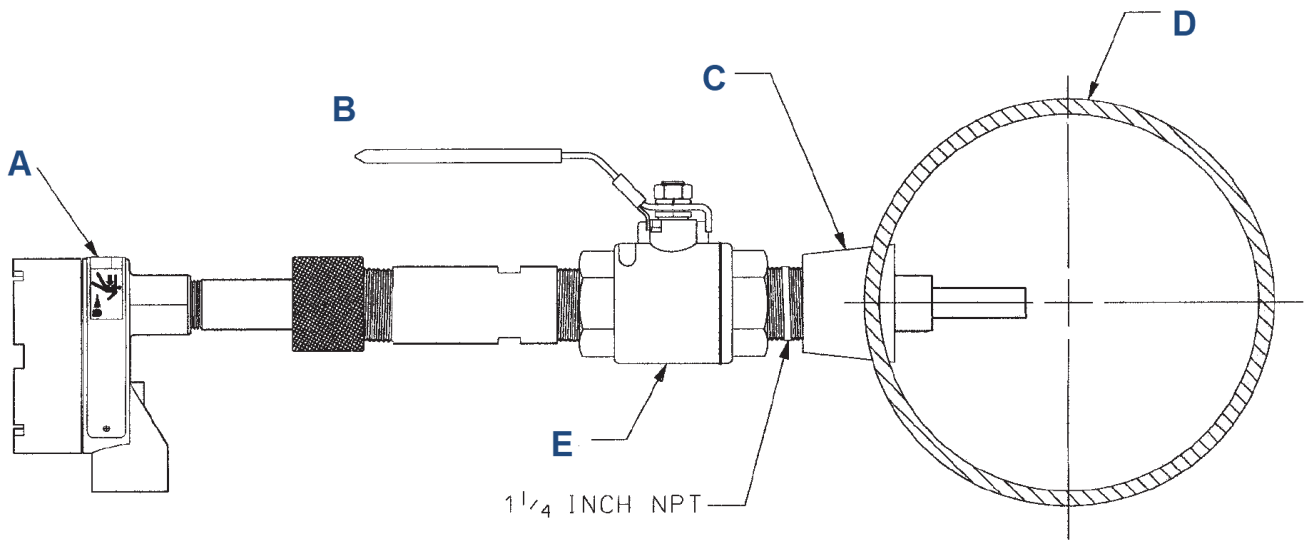
All retractable sensors shown with retraction assembly kit PN 23765-00/01. Rosemount 402-11 and 402-13 require kit PN 23765-00.

- A. Dimension (see Table 9)
- B. Dimension (see Table 9)
- C. Dimension (see Table 9)
- D. Dimension (see Table 9)
- E. Cable
- F. Variopol 6.0 socket
- G. Variopol 6.0 plug
- H. Ball valve
- I. Equally spaced

Table 9: Rosemount 402VP Dimensions

	Rosemount 402-11	Rosemount 402-12	Rosemount 402-13
Retraction assembly kit	23765-00	23765-00	23765-00
A: in. (mm)	1.59 (40.4)	.687 (17.4)	.667 (16.9)
B: in. (mm)	1.98 (50.3)	1.11 (28.2)	1.13 (28.7)
C: in. (mm) (minimum to maximum)	3.21 to 5.34 (82 to 136)	2.34 to 4.47 (59 to 114)	2.36 to 4.49 (60 to 114)
D: in. (mm)	18.3 (460.5)	17.33 (440.2)	17.33 (440.2)

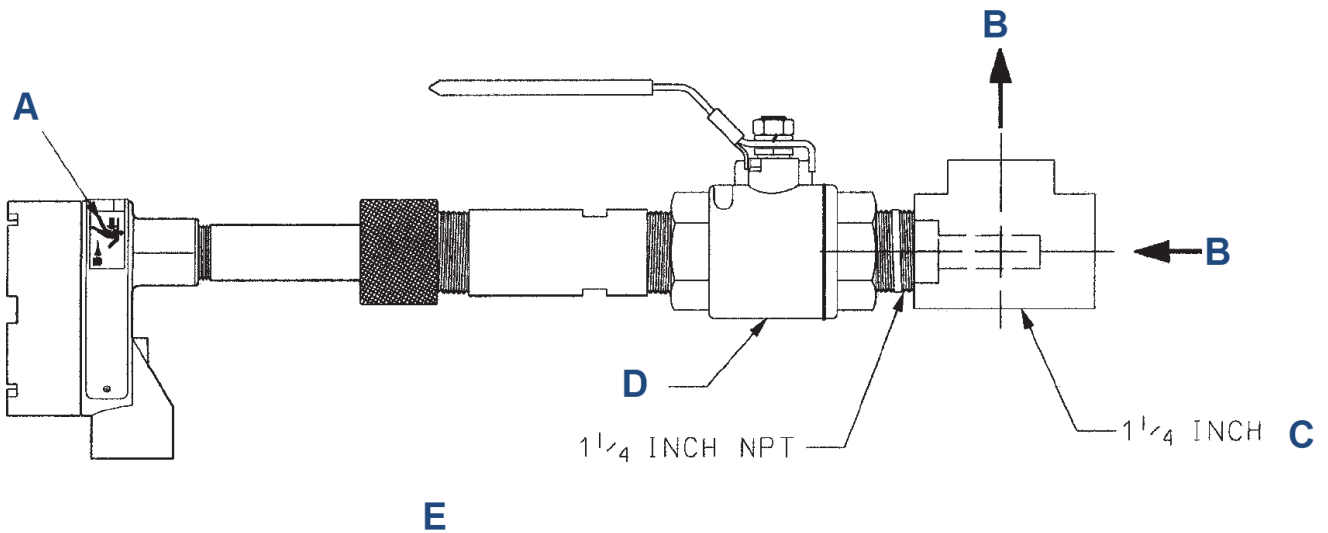
**Figure 6: Rosemount 402 Retractable Sensor Installed in a Large Pipe or Tank**



You can attach the Endurance™ retractable sensor through a weldolet in either a large pipe or tank.

- A. Warning label
- B. Retractable sensor assembly
- C. Weldolet
- D. Process piping
- E. Ball valve

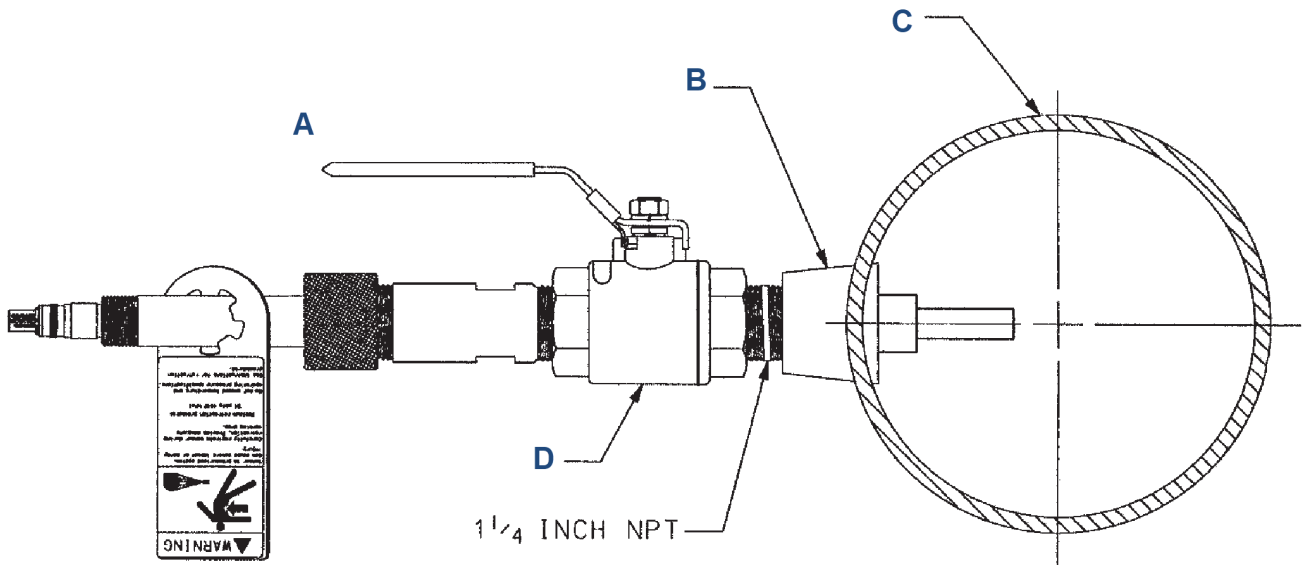
**Figure 7: Rosemount 402 Retractable Sensor Installed in a Standard Tee**



For best performance, orient the sensor with the end facing the liquid flow.

- A. Warning label
- B. Flow
- C. Tee
- D. Ball valve
- E. Retractable sensor assembly

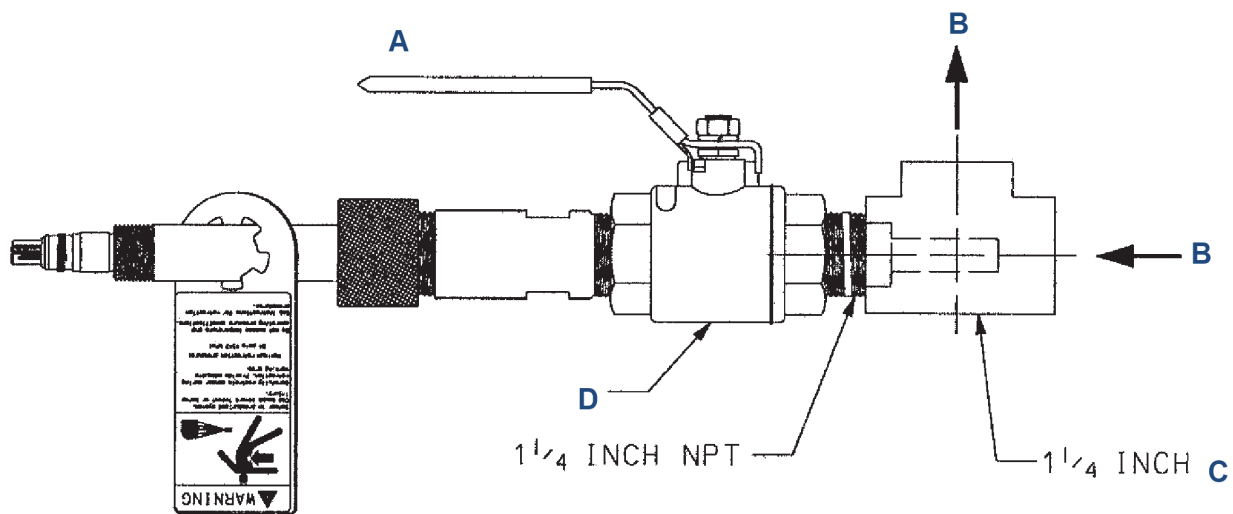
Figure 8: Rosemount 402VP Retractable Sensor Installed in a Large Pipe or Tank



You can attach the Endurance retractable sensor through a weldolet in either a large pipe or tank.

- A. Retractable sensor assembly
- B. Weldolet
- C. Process piping
- D. Ball valve

Figure 9: Rosemount 402VP Retractable Sensor Installed in a Standard Tee



For best performance, orient the sensor with the end facing the liquid flow.

- A. Retractable sensor assembly
- B. Flow
- C. Tee
- D. Ball valve

## Accessories

Part number	Description
23550-00	Junction box for a remote cable connection
9200275	Connecting cable, unterminated, specify length
23747-00	Connecting cable, terminated, specify length
23765-00	Retraction assembly kit (includes nipple, ball valve, and retraction body)
23796-00	Retraction body
9340078	1¼-in. national pipe thread (NPT) full port ball valve
05010781899	Conductivity standard SS-6, 200 µS/cm, 32 oz. (0.95 L)
05010797875	Conductivity standard, SS-6A, 200 µS/cm, 1 gal. (3.78 L)
05010782468	Conductivity standard, SS-5, 1000 µS/cm, 32 oz. (0.95 L)
05010783002	Conductivity standard SS-5A, 1000 µS/cm, 1 gal. (3.78 L)
05000705464	Conductivity standard, SS-1, 1409 µS/cm, 32 oz. (0.95 L)
05000709672	Conductivity standard, SS-1A 1409 µS/cm, 1 gal. (3.78 L)
05010782147	Conductivity standard SS-7, 5000 µS/cm, 32 oz. (0.95 L)
05010782026	Conductivity standard SS-7A, 5000 µS/cm, 1 gal. (3.78 L)
23747-06	2.5-ft. (0.8 m) interconnecting VP6 cable
23747-04	6.4-ft. (1.2 m) interconnecting VP6 cable
23747-02	10-ft. (3.0 m) interconnecting VP6 cable
23747-07	15-ft. (4.6 m) interconnecting VP6 cable
23747-08	20-ft. (6.1 m) interconnecting VP6 cable
23747-09	25-ft. (7.6 m) interconnecting VP6 cable
23747-10	30-ft. (9.1 m) interconnecting VP6 cable
23747-03	50-ft. (15.2 m) interconnecting VP6 cable
23747-11	100-ft. (30.5 m) interconnecting VP6 cable

## Engineering specifications

### Cell constants 0.01, 0.1, and 1.0/cm

- The sensor shall be suitable for the determination of electrolytic conductivity in clean, noncorrosive samples where the ability to remove the sensor from the process piping or tank without shutting down or draining lines or equipment is desired.
- The sensor shall be supplied with a retraction assembly and full port ball valve. The ball valve shall be connected to the piping or tank using a 1¼-in. close nipple.
- The sensor shall incorporate titanium electrodes and a PEEK insulator.
- The sensor shall have an integral platinum resistance temperature device (RTD) for temperature measurement.
- The sensor insertion tube shall be 316 stainless steel.
- The ball valve shall be 316 stainless steel with Teflon® seals and seats.

- The retraction body shall be 316 stainless steel and shall use three graphite packing rings to seal the sensor tube.
- The maximum temperature for the sensor shall be 212 °F (100 °C) at 200 psig (1481 kPa [abs]).
- The maximum retraction pressure shall be 64 psig (542 kPa [abs]).
- The sensor shall be suitable for vacuum service as low as 1.6 in. Hg (5.2 kPa).
- The sensor shall be available with integral cable, integral junction box, or a Variopol quick disconnect fitting.
- The sensor shall be Rosemount 402 (integral cable) or 402VP (Variopol fitting) or approved equal.



#### GLOBAL HEADQUARTERS

Emerson Automation Solutions  
6021 Innovation Blvd  
Shakopee, MN 55379, USA  
📞 +1 800 999 9307 or +1 952 906 8888  
📠 F +1 952 949 7001  
✉ liquid.csc@emerson.com

#### NORTH AMERICA

Emerson Automation Solutions  
8200 Market Blvd  
Chanhassen, MN 55317  
📞 Toll Free +1 800 999 9307  
📠 F +1 952 949 7001  
✉ liquid.csc@emerson.com

#### EUROPE


Emerson Automation Solutions  
Neuhofstrasse 19a P.O. Box 1046  
CH-6340 Baar  
Switzerland  
📞 T + 41 (0) 41 768 6111  
📠 F + 41 (0) 41 768 6300  
✉ liquid.csc@emerson.com


#### MIDDLE EAST AND AFRICA

Emerson Automation Solutions  
Emerson FZE  
Jebel Ali Free Zone  
Dubai, United Arab Emirates, P.O. Box 17033  
📞 T +971 4 811 8100  
📠 F +971 4 886 5465  
✉ liquid.csc@emerson.com


#### ASIA-PACIFIC

Emerson Automation Solutions  
1 Pandan Crescent  
Singapore 128461  
Singapore  
📞 T +65 777 8211  
📠 F +65 777 0947  
✉ liquid.csc@emerson.com

 [Linkedin.com/company/Emerson-Automation-Solutions](https://www.linkedin.com/company/Emerson-Automation-Solutions)

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