

Rosemount™ 228

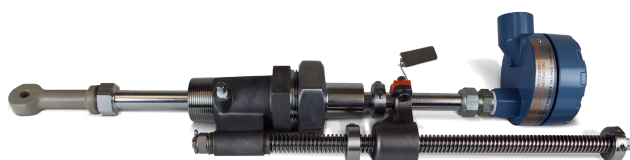
Toroidal Conductivity Sensor



A versatile conductivity sensor for solving diverse application challenges

Rosemount 228 Toroidal Conductivity Sensors reliably measure conductivity in highly conductive electrolyte solutions up to 2 S/cm (2,000,000 μ S/cm). These sensors work in dirty and corrosive applications where metal electrode sensors would otherwise fail. A robust sensor design makes the 228 ideal for measuring concentrations of acid, base, and salt solutions.

Overview



High-performance and reliability:

- Meet challenging application requirements with a selection of chemical-resistant body options including polyetheretherketone (PEEK) and Tefzel®.
- High-vibration tolerance with reinforced internal metal frame design.
- High-temperature option for process temperatures up to 392 °F (200 °C) and suitable for use under high-pressure up to 295 psig (21.4 bar).

Meet your process mounting needs:

- Suitable for insertion and submersion type applications.
- Versatile mounting options featuring either a ¾-inch male NPT or ⅝-inch 11 UNC process connection.
- Eliminate the need to shut down the process when removing sensors from piping and tanks by using an optional retraction assembly kit.

Ordering information

Rosemount 228 Toroidal Conductivity Sensors are molded of chemically resistant glass filled polyetheretherketone (PEEK) or Tefzel® and are ideal for measuring concentrations of acid, base, and salt solutions.

The sensors include an integral PT-100 RTD for temperature compensation and an integral cable length of 20 ft. (6.1 m). You can use the 228 with a variety of insertion mounting adapters to meet your installation requirements (see [Accessories](#)).

Note

For improved electromagnetic interference (EMI)/radio frequency interference (RFI) shielding, choose cable option 56-61 (not for use with the Rosemount 1181T, 1054, and 2054).

Allowed combinations for level 3 and 4 are: 54-61, 56-61, and 54-62.

Model

Code	Description
228	Conductivity sensor - toroidal insertion/submersion

Materials of construction

Code	Description
02	Polyetheretherketone (PEEK), standard temperature up to 248 °F (120 °C)
03	PEEK, high temperature up to 391 °F (200 °C)
04	Tefzel®, standard temperature up to 248 °F (120 °C) ⁽¹⁾
05	Unfilled Tefzel, standard temperature up to 248 °F (120 °C) ⁽²⁾

⁽¹⁾ Not available with options -50-62 and -54-62.

⁽²⁾ Not available with option -54-62.

Mounting

Code	Description
20	5/8-11 UNC (ethylene propylene diene monomer [EPDM] gasket standard), requires mounting adapter.
21	¾-in. male NPT threads ⁽¹⁾

⁽¹⁾ Not available with option 62.

Cable type

Code	Description
54	Unshielded cable ⁽¹⁾
56	Shielded cable for improved electromagnetic interference (EMI)/radio frequency interference (RFI) protection ⁽²⁾

⁽¹⁾ Recommended for use with transmitter models 1054 and 2054. May be used with transmitter models 1056, 1066-T, and 5081, but not recommended.

⁽²⁾ Recommended for use with transmitter models 1056, 1066-T, 56, and 5081.

Cable length

Code	Description
61	Integral 20-ft. (6.1 m) cable (for use with 54 and 56 options)
62	18 in. (457 mm) ⁽¹⁾
35	Integral 35-ft. (10 m) cable (for use with 54 and 56 options)
04	Integral 50-ft. (15 m) cable (for use with 54 and 56 options)
06	Integral 100-ft. (30 m) cable (for use with 54 and 56 options)
09	Integral 10-ft. (3 m) cable (for use with 54 and 56 options).

⁽¹⁾ For use with option 54 only. Connects sensor used in valve insertion assembly to junction box. Requires interconnecting cable to connect junction box to transmitter. Use either cable 23294-00 (unshielded) or 23294-05 (shielded).

Calibration and conformance certificates - optional level

Code	Description
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)

Material traceability certificates

Code	Description
MC	Material Traceability Certificate

Accessories

Accessory list

Part number	Description
23550-00	Remote junction box without preamplifier
33081-00	Adapter insert, polyetheretherketone (PEEK), 1 x ¾ in. for 23242-02
23294-00	Unshielded interconnecting cable for Rosemount 1054A, 1054B, and 2054C. Can also be used with Rosemount 1056, 56, 5081, and 1066-T, but not recommended. Prepped, specify length, per ft.
23294-05	Shielded interconnecting cable with additional shield wire for -03 option. For use with Rosemount 1056, 1066-T, 56, and 5081T. Prepped, specify length, per ft.
23311-00	Mechanical valve insertion assembly (code 20)
23311-01	Manual valve insertion assembly (code 20)
2001990	Sub assembly, adapter 2 inches bushing
9550179	O-ring, 2-135, EPR
23242-02	Mounting adapter, 1½-in. insertion, 1 in. x ¾ in.
23242-03	Mounting adapter, 1½-in. insertion (code 20), 1-in. conduit connection
23277-01	Mounting adapter, Foxboro®, PEEK Code 20, ⅝-11 UNC
33075-00	Viton® gasket for option 20
33075-03	Kalrez® gasket for option 20
9200276	Extension cable, unprepped (specify length) per ft.
9340065	Ball valve, full port 1½-in. female NPT (FMNPT) (to 392 °F [120 °C])

Spare Parts

Part number	Description
33080-01	Adapter insert, PEEK (code 20) for 23242-03
33121-01	Sensor tube, 316 stainless steel, valve insertion
33131-00	Collette, brass (for PN 2311-00 only)
33168-00	Cap (for PN 23311-00 only)
33180-00	Bushing, PTFE (for PN 23311-01 only)
33181-00	Bushing, PTFE (for PN 23311-00 only)
33182-00	Guard, PTFE
9555004	Cup seal, PTFE
9560279	Retaining ring for Rosemount 228 insertion assembly

Specifications

Sensor specifications

Cell constant (nominal) 3/cm

Wetted materials Body materials either glass-filled polyetheretherketone PEEK, glass-filled Tefzel®, or unfilled Tefzel.

Standard cable length 20 ft. (6.1 m)

Weight/shipping weigh 2 lb./3 lb. (1 kg/1.5 kg)

Table 1: Maximum operating temperature and pressure

Body material option	Maximum temperature	Maximum pressure	Maximum pressure (for CRN registration only)
-02	248 °F (120 °C)	295 psig (21.4 bar)	220 psig (16.2 bar)
-03	392 °F (200 °C)	295 psig (21.4 bar)	220 psig (16.2 bar)
-04	248 °F (120 °C)	200 psig (14.8 bar)	150 psig (11.3 bar)
-05	248 °F (120 °C)	(14.8 bar)	150 psig (11.3 bar)

Insertion adapter specifications

Table 2: Maximum operating temperature and pressure

Adapter part number	Sensor compatibility	Process connection	Wetted materials	Maximum temperature	Maximum pressure	Maximum pressure (for CRN registration only)	Weight/shipping weight
23242-02	For use with option 21	1½-in. male NPT (MNPT)	316 stainless steel, glass-filled PEEK, Viton	392 °F (200 °C)	295 psig (20.4 bar)	220 psig (16.2 bar)	3 lb./4 lb. (1.5 kg/2 kg)
23242-03	For use with option 20	1½-in. MNPT	316 stainless steel, glass-filled PEEK, Viton	392 °F (200 °C)	295 psig (20.4 bar)	220 psig (16.2 bar)	3 lb./4 lb. (1.5 kg/2 kg)
2001990	For use with option 21	2-in. MNPT	Chlorinated polyvinyl chloride (CPVC), Viton®	100 °F (38 °C)	100 psig (7.9 bar)	N/A	1 lb./2 lb. (0.5 kg/1 kg)
				185 °F (85 °C)	45 psig (412 kPa [abs])		

Retraction assembly specifications

Sensor compatibility The retraction assemblies are used with 228 –[]–20–54–62 only.

Wetted materials 316 stainless steel, ethylene, polypropylene (EP), unfilled PTFE, carbon-filled PTFE

Process connection 1½-inch MNPT

Maximum temperature

Process connection:

Maximum temperature: 392 °F (200 °C)

Maximum pressure: 295 psig (20.5 bar)

Table 3: Maximum retraction/insertion conditions

Description	Temperature	Pressure	Maximum insertion travel	Weight/shipping weight
23311-00 mechanical retraction assembly	392 °F (200 °C)	295 psig 20.4 bar	10.5 in. (267 mm)	12 lb./15 lb. (5.5 kg/7 kg)
23311-01, manual retraction assembly	130 °C (266 °F)	35 psig (3.4 bar)	12-in. (305 mm)	9 lb./12 lb. (4.5 kg/5.5 kg)

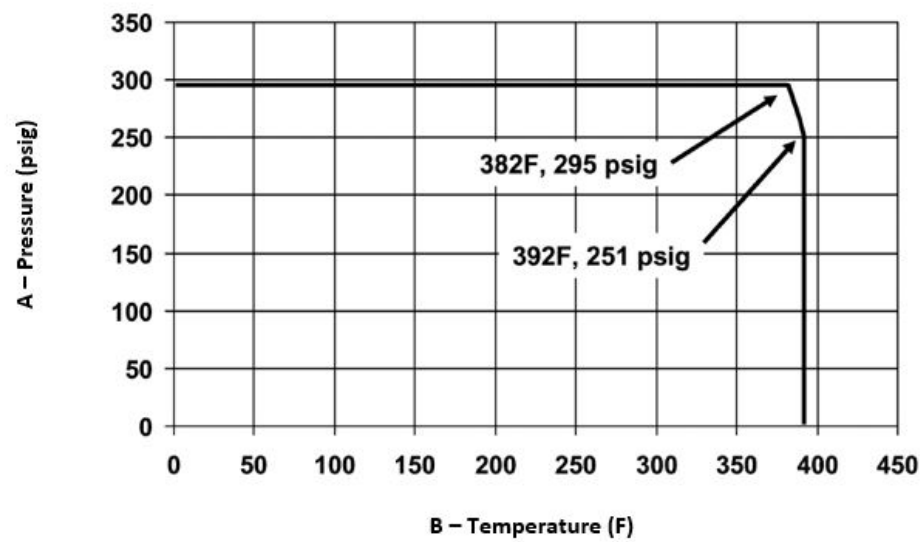
Ball valve specifications (sold separately)

Part number 9340065

Wetted materials 316 stainless steel, PTFE

Process connection 1½-in. female NPT (FNPT)

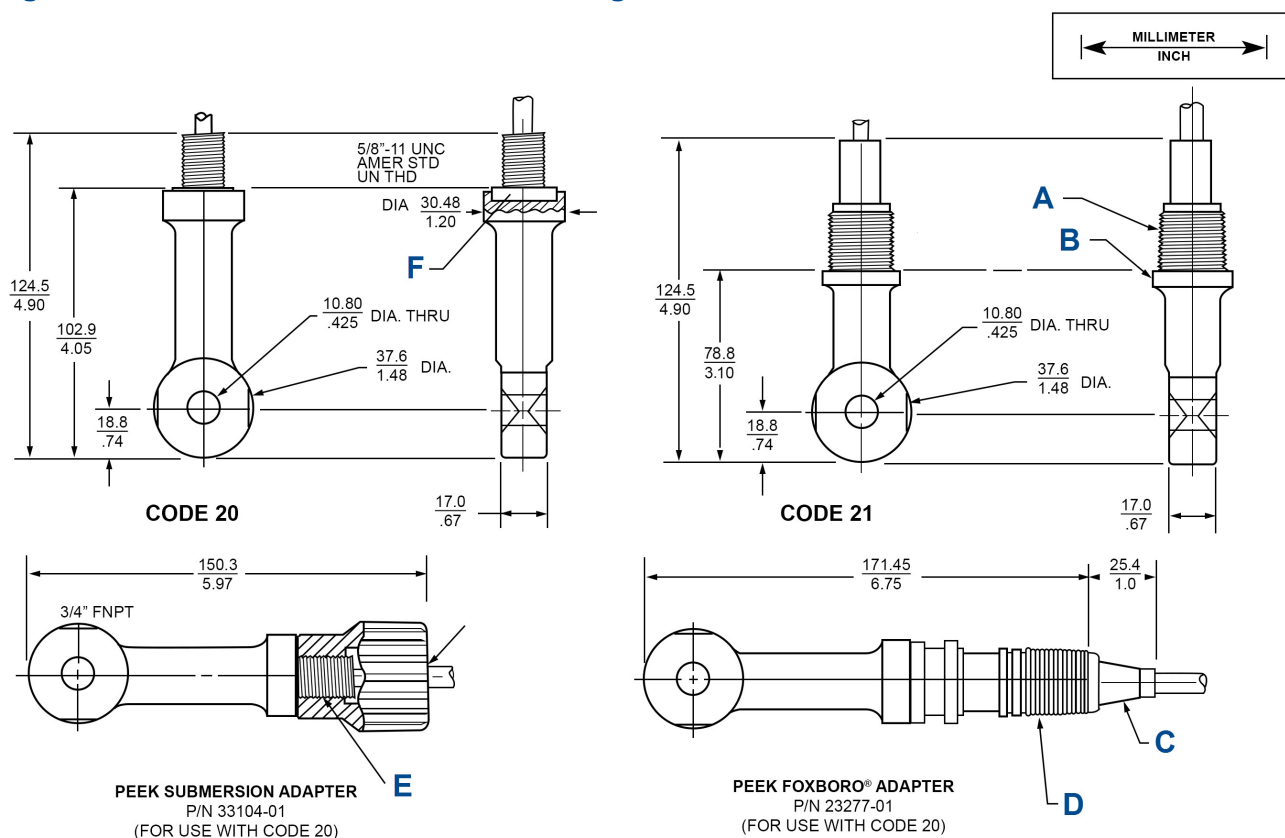
Weight/shipping weight 4 lb./5 lb. (2 kg/2.5 kg)

Figure 1: Pressure and temperature

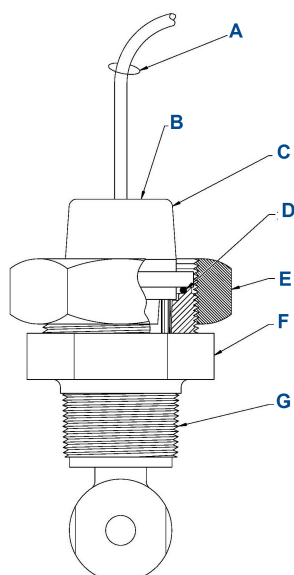
A. Pressure (psig)

B. Temperature (F)

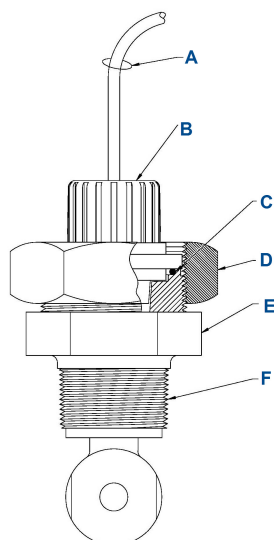
Dimensional drawings

Figure 2: Rosemount 228 dimensional drawing

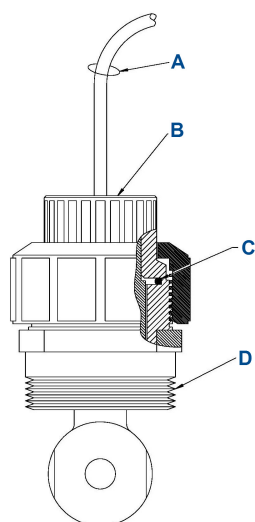
- A. 3/4-inch male NPT (MNPT)
- B. 1-inch wrench opening
- C. Strain relief boot
- D. Foxboro® 3/4-inch truncated pipe thread
- E. Typical thread cutaway for code 20
- F. Ethylene propylene diene monomer (EPDM) gasket

Figure 3: Insertion adapter 23242-02

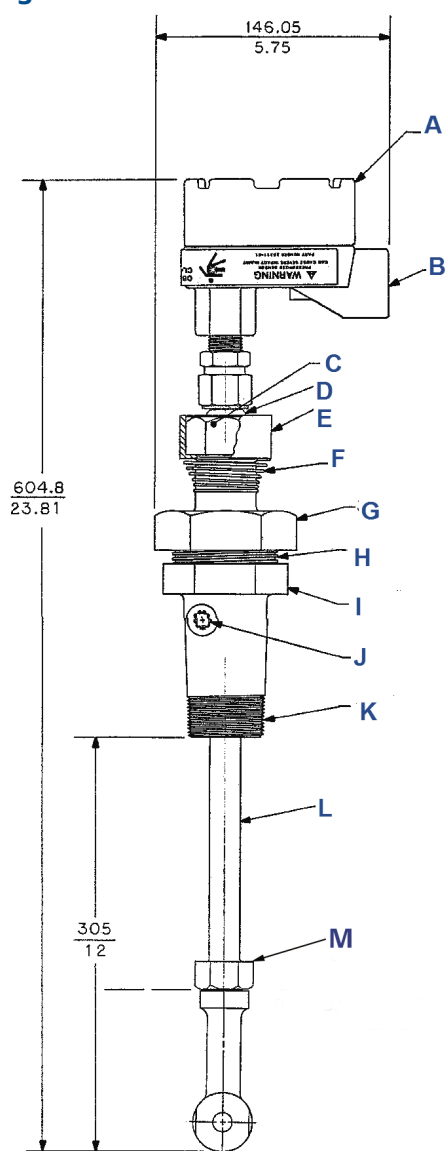
- A. Cable**
- B. 1-inch female NPT (FNPT)**
- C. Adapter 3/4-inch FNPT thread**
- D. 2-135 fluorkautschukmaterial (FKM) O-ring**
- E. Nut, hex union 2 inch**
- F. Neck, union fitting**
- G. 1 1/2-inch MNPT**

Figure 4: Insertion adapter 23242-03

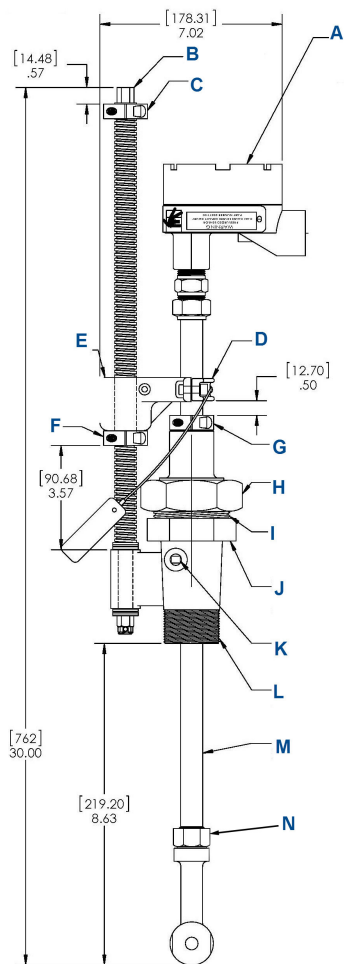
- A. Cable**
- B. 3/4-inch FNPT**
- C. 2-135 FKM O-ring**
- D. Nut, hex union 2 inch**
- E. Neck, union fitting**
- F. 1 1/2-inch MNPT**

Figure 5: Insertion adapter 2001990

- A. Cable**
- B. $\frac{3}{4}$ -inch FNPT**
- C. 2-135 Viton® O-ring**
- D. 2-inch MNPT**

Figure 6: Manual retraction assembly PN 2311-01 dimensional drawing

- A. Junction box with screw cap
- B. $\frac{3}{4}$ -inch FNPT
- C. Collet nut
- D. Collet
- E. Nut guard
- F. Nut guard spring
- G. 3-inch hex union nut
- H. 2.531-inch 8 ACME thread
- I. $2\frac{5}{8}$ -inch hex retraction chamber
- J. $\frac{1}{8}$ -in. MNPT plug
- K. $1\frac{1}{2}$ -inch MNPT
- L. 316 stainless steel $\frac{3}{4}$ -inch outer dimension (OD) tube
- M. Manual retraction assembly

Figure 7: Mechanical retraction assembly PN 23311-00 dimensional drawing

- A. Junction box with screw cap**
- B. Lead screw**
- C. Travel stop collar "B"**
- D. Cap**
- E. Nut housing**
- F. Travel stop collar "A"**
- G. Retraction stop collar**
- H. 3-inch hex union nut**
- I. 2.531-inch 8 ACME thread type**
- J. 2⁵/₈-inch hex retraction chamber**
- K. 1/8-inch MNPT plug type**
- L. 1¹/₂-inch MNPT**
- M. Ø 3/4-inch tube 316 stainless steel**
- N. Mechanical retraction assembly**

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

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