

Rosemount™ 499ACL-01

Free Chlorine Sensor



The simplest way to reliably measure free chlorine in water

The Rosemount 499ACL-01 sensor is designed to measure free chlorine in water without sample pretreatment. These amperometric sensors are ideal for use in drinking water applications.

Overview



A simple free chlorine design

- Measure free chlorine without having to deal with messy and expensive reagents.
- Continuous pH correction compatible when used with an auxiliary pH sensor.
- Integral Pt-100 resistance temperature device (RTD) allows for automatic temperature compensation.
- Operates in samples up to 122 °F (50 °C) and 65 psig.
- Sensor measures free chlorine consistent with EPA Regulation 334.0.

Ease of maintenance and installation

- 1-in. male national pipe thread (MNPT) process connections suitable for mounting in a low flow cell installed in a sidestream sample.
- Replacing the membrane and electrolyte solution is fast and easy and requires no special tools or fixtures.
- Variopol (VP6) cable connection options, for quick cable-to-sensor release, eliminates cable twisting.

Ordering information



Rosemount 499ACL-01 Free Chlorine Sensors are available with either an EMI protected integral cable or a Variopol (VP6) interconnecting cable (sold separately). These sensors are generally mounted in a flow cell installed in a sidestream sample. Three replacement membrane assemblies, three O-rings, and a 4 oz. (125 mL) bottle of electrolyte solution are provided with each sensor.

Contents

Overview.....	2
Ordering information.....	2
Specifications.....	3
Dimensional drawings.....	6
Accessories.....	11
Rosemount 499ACL-01 engineering specification.....	12

Table 1: Rosemount 499ACL-01 Ordering Information

Option	Description
499ACL	Chlorine Sensor
Sensor type	
01	Free chlorine
02	Total chlorine (used with Rosemount TCL)
03	Monochloramine
Transmitter compatibility	
54	Rosemount 1056, 1066-DO, 56, and 5081-A compatible
Cable options	
–	Integral 25-ft. (7.6 m) optimum EMI/RFI protected cable
VP	Sensor with VP6 fittings (requires VP interconnecting cable)
02	Integral 15-ft. (4.6 m) optimum EMI/RFI protected cable
03	Integral 33-ft. (10 m) optimum EMI/RFI protected cable
50	Integral 50-ft. (15 m) optimum EMI/RFI protected cable
06	Integral 100-ft. (30 m) optimum EMI/RFI protected cable
Special	
–	No selection
99	Special (consult factory)
Calibration and conformance certificates - optional level	
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)

Specifications

Table 2: Sensor Specifications

Physical characteristics	Specifications
Range	0 to 10 ppm (mg/L) as Cl ₂ . For higher ranges, consult the factory.
Pressure	0 to 65 psig (101 to 549 kPa abs)
Temperature (operating)	32 to 122 °F (0 to 50 °C)
Process connection	1-in. male national pipe thread (MNPT)
Wetted parts	Noryl [®] , Viton [®] , platinum, polyethersulfone, polyester, wood, and silicone
Accuracy	Accuracy depends on the accuracy of the chemical test used to calibrate the sensor.
pH range	6.0 to 9.5. For samples having pH between 9.5 and 10.0, consult the factory. Samples with ranges below 6.0 require no pH correction.

Table 2: Sensor Specifications (continued)

Physical characteristics	Specifications
pH correction	Use continuous pH correction (requires an auxiliary pH sensor) if sample pH varies more than 0.2 pH (peak to peak). If pH variability is less or seasonal, the pH sensor is generally not required.
Linearity	2% (typical)
Sample conductivity	> 50 $\mu\text{S}/\text{cm}$
Interferences	Peroxides, permanganate, and chloramines
Response time	22 sec to 95% of final reading at 77 °F (25 °C)
Electrolyte volume	0.8 oz. (25 mL), approximately
Electrolyte life	3 months (approximately); for best results, replace electrolyte monthly.
Cable length	See Table 1 for standard cable lengths.
Cable length (maximum)	300 ft. (91 m), up to 100 ft. (30.5 m) is standard.
Sample flow	Flow through: 2 to 5 gpm (3.8 to 19 L/min) Open channel: 1 ft./sec (0.3 m/sec) Low flow cell (PN 24091-00): 8 to 15 gph (30 to 57 L/hr) Low flow cell (PN 24091-01): 2 to 5 gph (7.6 to 19 L/hr)
Weight/shipping weight	1 lb./3 lb. (0.5 kg/1.5 kg)

Table 3: Other Specifications

Type	PN	Wetted materials	Process connection	Maximum temperature	Maximum pressure
1½-in. tee	23567-00	CPVC and Buna N; body is schedule 80 CPVC	1½-in. socket	122 °F (50 °C)	65 psig (549 kPa abs)
2-in. tee	915240-03	PVC and Buna N; body is schedule 80 PVC	¾-in. NFPT	120 °F (49 °C)	60 psig (515 kPa abs)
	915240-04		1-in. NFPT		
	915240-05		1½-in. NFPT		
Low flow cell ⁽¹⁾	24091-00 and 24091-01: contains a bubble sweeping nozzle to keep bubbles from accumulating against the membrane.	Polycarbonate/polyester, 316 stainless steel, and silicone	Compression fitting for ¼-in. O.D. tubing or ¼-in. female national pipe thread (FNPT)	158 °F (70 °C)	90 psig (722 kPa abs)
Valved rotameter	9390004 for use with low flow cell PN24091-01 Flow: 0.5 to 5 gph (1.4 to 19 L/hr)	Acrylic, 316 stainless steel, and Viton	¼-in. NFPT (316 stainless steel)	150 °F (65 °C)	100 psig (858 kPa abs)

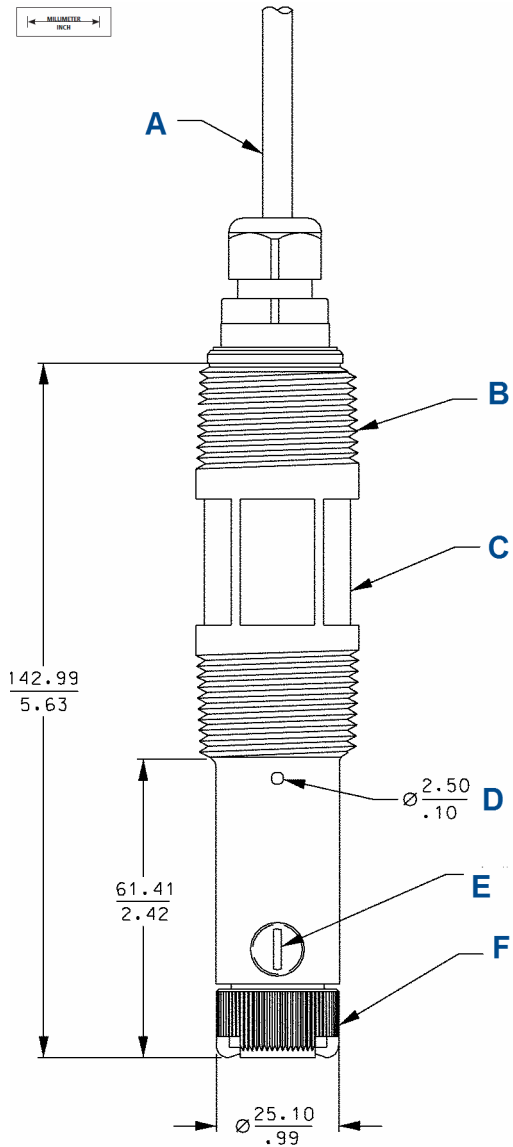
Table 3: Other Specifications (continued)

Type	PN	Wetted materials	Process connection	Maximum temperature	Maximum pressure
Valved rotameter	196-898754 Flow: 2 to 10 gph (7.6 to 76 L/hr)	Polycarbonate, 315 stainless steel, brass, and Buna N	1/8 in. NFPT (brass)	54 °C (130 °F)	100 psig (858 kPa abs)

(1) Temperature and pressure specifications for the low flow cell exceed the temperature and pressure specifications for the sensor.

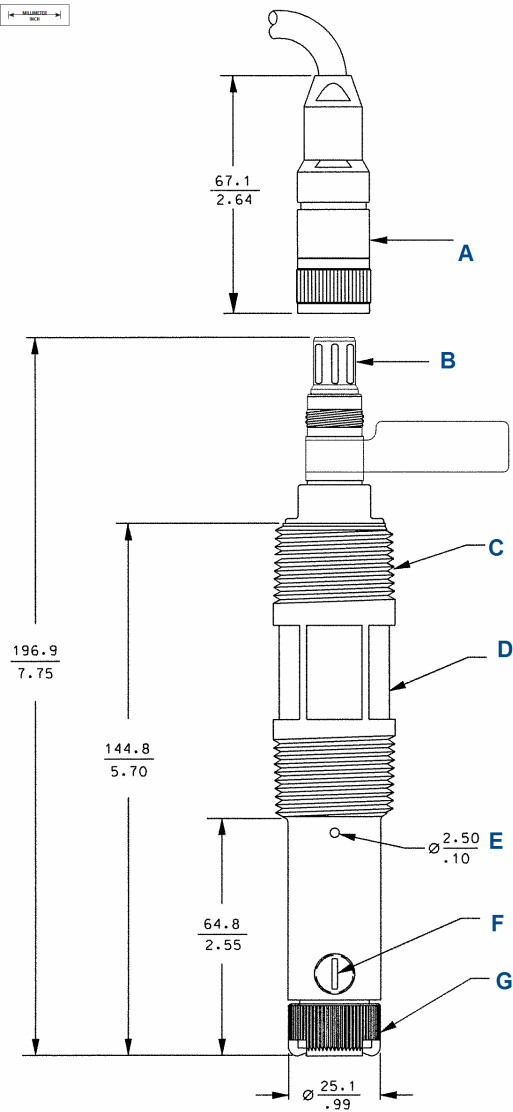
Dimensional drawings

Figure 1: Standard Sensor with Integral Cable



- A. Sensor cable
- B. 1-in. national pipe thread (NPT), two places
- C. 1-3/16-in.-wrench opening
- D. Pressure equalizing port, two places
- E. 1/8-in. NPT, electrolyte fill plug
- F. Membrane retainer

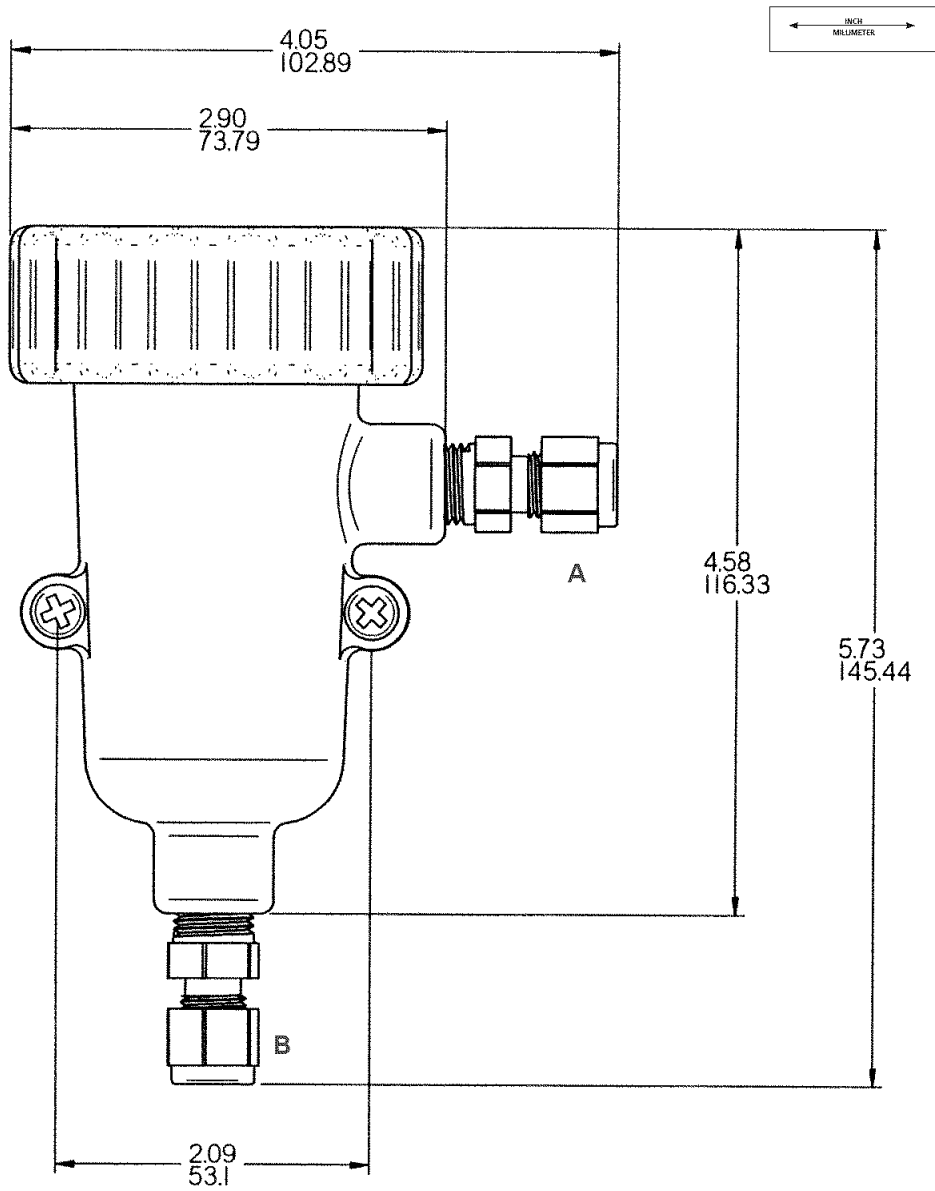
Figure 2: Sensor with Variopol Cable Connector



- A. Variopol receptacle (female connector)
- B. Variopol plug (male connector)
- C. 1-in. NPT, two places
- D. 1-3/16-in. wrench opening
- E. Pressure equalizing port, two places
- F. 1/8-in. NPT electrolyte fill plug
- G. Membrane retainer

Length of assembled sensor is 9.3 in. (236 mm).

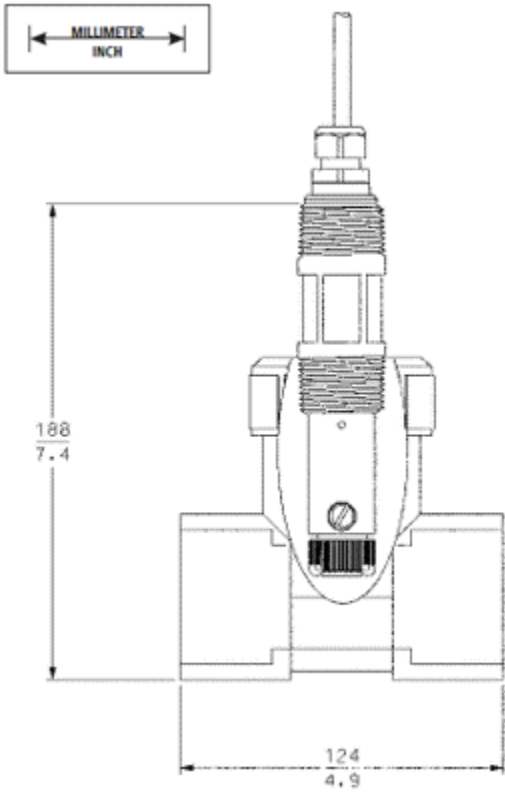
Figure 3: Low Flow Cell (PN 24091-00)



- A. Outlet
- B. Inlet

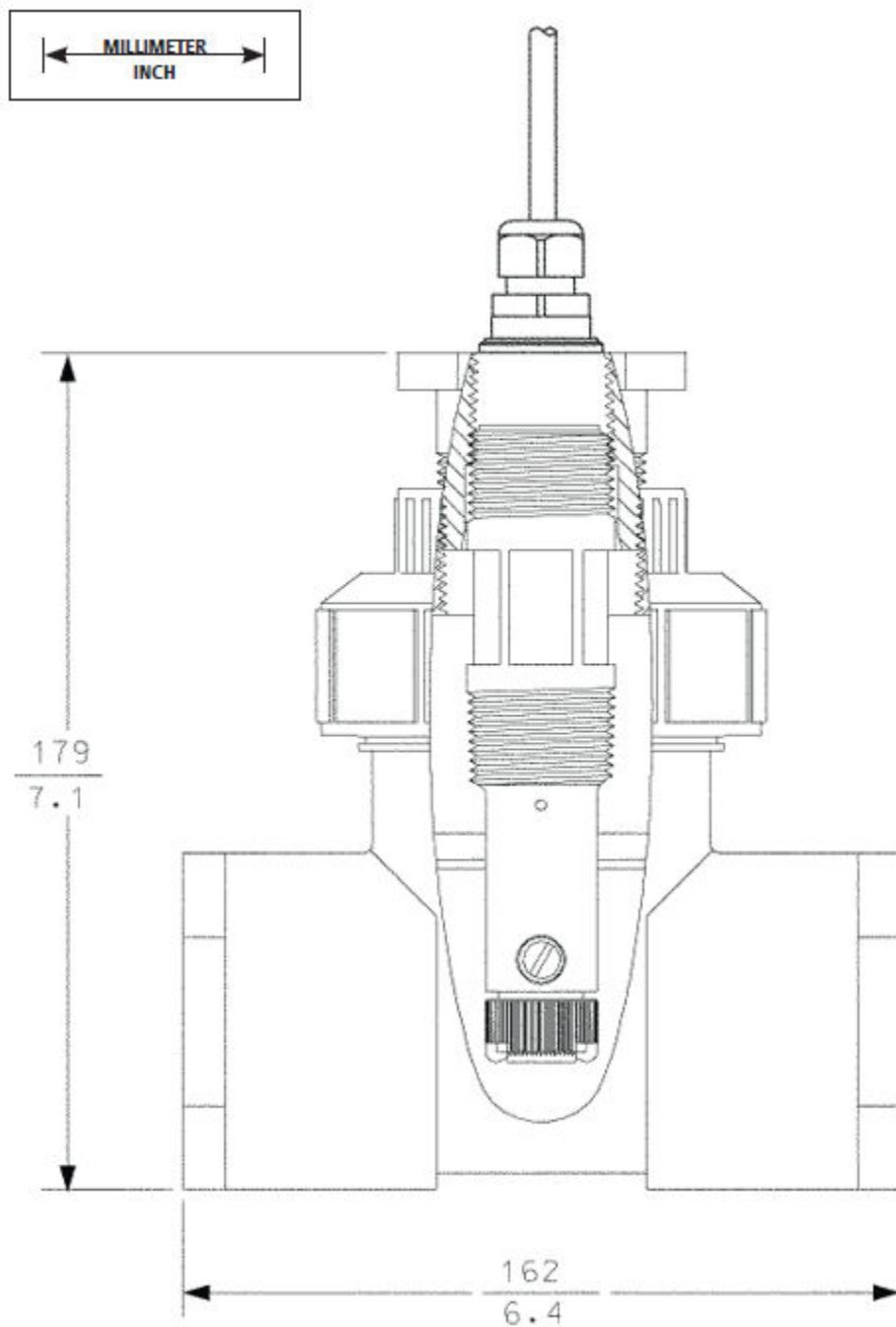
The bubble-sweeping nozzle in the inlet is not shown.

Figure 4: Flow-Through Tee (1½-in.) (PN 23567-00)



Allow at least 3.5 in. (90 mm) head room for sensor removal.

Figure 5: Flow-Through Tee (2 in.) (PN 915240-03, -04, -05)



Allow at least 6 in. (150 mm) head room for sensor removal.

Accessories

Table 4: Connector Cable (Required for All First Time Installations)

Part number	Description
23747-02	Cable, VP 6, conductivity/amperometric, 10-ft. (3.0 m)
23747-03	Cable, VP 6, conductivity/amperometric, 50-ft. (15.2 m)
23747-04	Cable, VP 6, conductivity/amperometric, 4-ft. (1.2 m)
23747-05	Cable, VP 6, conductivity/amperometric, 2.25-ft. (0.7 m)
23747-06	Cable, VP 6, conductivity/amperometric, 2.5-ft. (0.8 m)
23747-07	Cable, VP 6, conductivity/amperometric, 15-ft. (4.6 m)
23747-08	Cable, VP 6, conductivity/amperometric, 20-ft. (6.1 m)
23747-09	Cable, VP 6, conductivity/amperometric, 25-ft. (7.6 m)
23747-10	Cable, VP 6, conductivity/amperometric, 30-ft. (9.1 m)
23747-11	Cable, VP 6, conductivity/amperometric, 100-ft. (30.5 m)

Table 5: Other Accessories

Part number	Description
196-898754	Rotameter, 2.0 to 20 GPH
23567-00	Tee, flow-through, 1½-in.
23747-00	Interconnect cable, prepped, specify length, per foot
24091-00	Cell, low flow, ¼-in. inlet and outlet
24091-02	Cell, low flow, ¼-in. inlet and outlet, bubble-shedding nozzle
33211-00	Retrofit adapter PN 91524-xx tees
914240-03	Tee, flow-through, 2-in. PVC, ¾-in. national pipe thread (NPT)
914240-04	Tee, flow-through, 2-in. PVC, 1-in. NPT
915240-05	Tee, flow-through, 2-in. PVC, 1½-in. NPT
9200266-LQD	Cable, 5 conductors 2/22 GA 3/24 GA OD JKT PVC
9200275	Extension cable, shielded 9-cond, unprepped, specify length, per foot

Table 6: Spare Parts

Part number	Description
23501-02	Membrane assembly with O-ring, total chlorine (code -02), quantity-1
23501-05	Membrane assembly with O-ring, free chlorine, delta type (code -01-56), quantity-1
23501-08	Membrane assembly with O-ring, free chlorine (code -01-54), quantity-1
23501-09	Membrane assembly with O-ring, monochloramine (code -03), quantity-1
23502-02	Membrane assembly with O-ring, total chlorine (code -02), quantity-3
23502-05	Membrane assembly with O-ring, free chlorine delta type (code -01-56), quantity-3
23502-08	Membrane assembly with O-ring, free chlorine (code -01-54), quantity-3

Table 6: Spare Parts (continued)

Part number	Description
23502-09	Membrane assembly with O-ring, monochloramine (code-03), quantity-3
23750-00	Fill plug with wood osmotic pressure relief port (code -03)
33521-00	Membrane retainer
33523-00	Fill plug
9210356	Amperometric sensor fill #4, 4 oz. (125 mL) (code -01)
9210372	Fill solution for monochloramine sensor (code -03)
9210438	Fill solution for total chlorine sensor (code -02)
9550094	O-ring, Viton® 2-014

Rosemount 499ACL-01 engineering specification

1. The sensor shall be suitable for the determination of free chlorine in water without the use of sample conditioning agents. Sensors that require sample conditioning are not acceptable.
2. An auxiliary pH sensor to compensate for the effect of pH on the chlorine sensor response shall be required if the pH variability is more than 0.2 units (peak-to-peak). Otherwise, a pH sensor shall not be required.
3. The sensor shall be a two-electrode membrane-covered sensor with a silver/silver chloride anode and a platinum cathode. The fill solution shall be potassium chloride.
4. Flow cells designed for the sensor shall be available. A low flow cell requiring no more than about 2 gal/hour (8 L/hour) of sample shall be available.
5. The response time to a step change in free chlorine concentration shall be about 22 seconds to 95% of final value.
6. Sensor maintenance shall require no special tools or fixtures.
7. The sensor fill solution shall require replacing no more often than once a month.
8. The sensor shall be available with either integral cable or VP 6 quick disconnect fitting.
9. The sensor shall be Rosemount Model 499ACL-01-54 (optimum EMI/RFI resistant cable), 499ACL-01-54-VP (VP6 connection), or approved equivalent.

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