

# Rosemount™ MCL Monochloramine System



## A trusted system for making your monochloramine measurements

The Rosemount™ MCL monochloramine system is a complete system suitable for measuring monochloramine in fresh water. The system requires zero sample conditioning reagents.

## Overview



### Ease of Use and Maintenance.

- The Rosemount MCL features a Rosemount 499ACL-03 monochloramine sensor, a transmitter, and constant head flow controller mounted on a backplate for easy installation.
- Integrated constant head flow controller eliminates the need to install additional valves, rotameters, or pressure regulators.
- Easily replace and perform maintenance and calibration on the sensor with quick-disconnect Variopool fittings.
- Replacing sensor membrane and electrolyte solution requires no special tools or fixtures and takes only minutes.

### Reliable Transmitter Options

- Rosemount 56 and 1056 Transmitters are easy to use with simple and intuitive programming and calibration.
- Both transmitters have fully programmable analog outputs and fully programmable alarm relays.

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## Ordering Information



The Rosemount MCL Monochloramine System consists of a sensor, a transmitter, quick-disconnect Variopol cable, and constant head flow controller. All components are mounted on a backplate, and the cable is pre-wired to the transmitter. Three replacement membranes and a 4 oz (120 mL) bottle of electrolyte solution are shipped with the sensor.

**Table 1. Rosemount MCL Monochloramine System Ordering Information**

Model	Sensor type
MCL	Monochloramine System
Transmitter	
220	Rosemount 1056 transmitter, single input, with alarm relays (1056-03-24-38-AN)
240	Rosemount 56 Transmitter, single input (56-03-24-38-HT)
Typical model number: MCL-240	

## Specifications

**Table 2. General Specifications**




General	
Sample conductivity	> 10 $\mu$ S/cm at 25 °C (77 °F)
Process connection	1/4 in. OD tubing compression fitting (can be removed and replaced with barbed fitting for soft tubing).
Drain connection	1/4 in. barbed fitting. Sample must drain to open atmosphere.
Wetted parts	Acrylic, nylon, polycarbonate, polyester, Kynar <sup>1</sup> , silicone, Noryl <sup>2</sup> , Viton <sup>3</sup> , silicone, and Zitex <sup>4</sup> , PTFE, (gold mesh cathode - not normally wetted)
Response time to step change in monochloramine concentration	<60 sec to 95% of final reading for inlet sample flow of 17 gph (64 L/hr)
Weight/shipping weight (rounded up to the nearest 1 lb or 0.5 kg)	10 lb/143 lb (4.5 kg/6.0 kg))
Sample requirements	
Pressure	3 to 65 psig (122 to 549 kPa abs). Inlet check valve opens at 3 psig (122 kPa abs). If the check valve is removed, minimum pressure is 1 psig (108 kPa abs).
Flow	3 to 80 gal/hr (11 to 303 L/hr)
Temperature	0 to 50 °C (32 to 122 °F)

1. Kynar is a registered trademark of Elf Atochem North America.
2. Noryl is a registered trademark of General Electric.
3. Viton is a registered trademark of E.I. duPont de Nemours & Co.
4. Zitex is a registered trademark of Performance Plastic Corp.



**Table 3. Sensor Specifications**

Range	0 to 6 ppm as Cl <sub>2</sub> . For higher ranges, consult the factory.
pH range	Signal is practically independent of pH between pH 7.0 and 10.0. Sensor current at pH 10.0 is within 5% of sensor current at pH 7.0.
Accuracy	Accuracy depends on the accuracy of the chemical test used to calibrate the sensor.
Linearity	2% (typ.)
Interferences	Free chlorine and other oxidizing agents
Electrolyte volume	25 mL (approx.)
Electrolyte life	2 months (approx.)

**Table 4. Rosemount 1056 Transmitter Specifications**

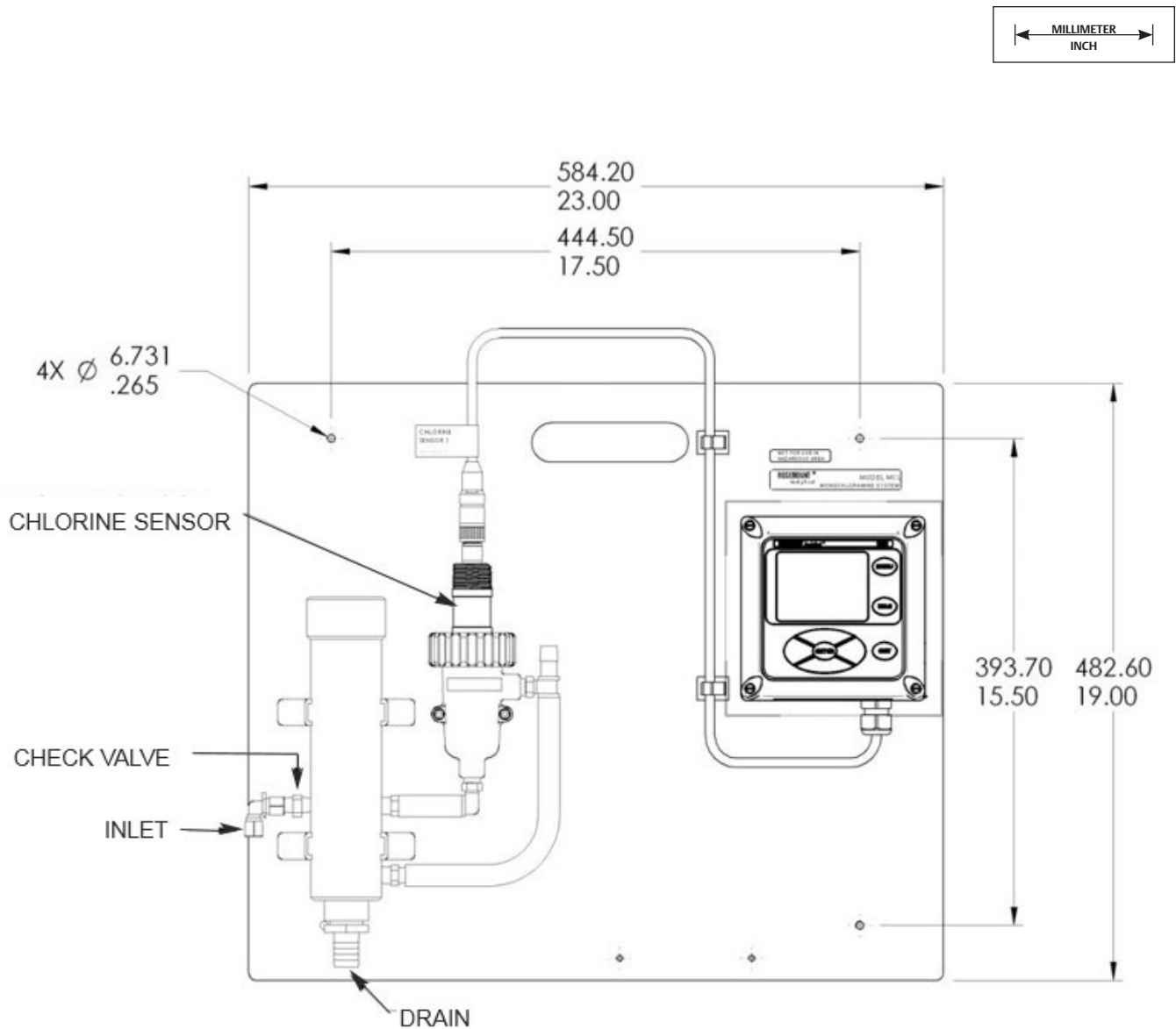
Display	Monochromatic back-lit LCD. Main character height 0.6 in. (15 mm). Display is user-programmable.
Languages	English, French, German, Italian, Spanish, Portuguese, and Chinese
Ambient temperature and humidity	0 to 55 °C (32 to 131 °F); relative humidity 5 to 95% (non-condensing)
Storage temperature	-20 to 60 °C (-4 to 140 °F)
Power	85 to 265 Vac, 47.5 to 65.0 Hz, switching, 15 W  Equipment protected by double insulation.
RFI/EMI LVD	EN 61326  EN 6101-01
Alarms	Four alarm relays. Any relay can be configured as a fault alarm instead of a process alarm. Each relay can be configured independently, and each can be programmed with interval timer settings.
Conduit openings	Accepts PG 13.5 or 1/2 in. conduit fittings
Terminal connections rating	Power connector (3-leads): 18-12 AWG wire size. Current output connectors (2-leads): 24-16 AWG wire size. Alarm relay terminal blocks: 18 - 16 AWG wire size
Relay contact ratings	 5A at 28 Vdc or 300 Vac (resistive) 1/8 HP at 120/240 Vac
Relays	Form C, SPDT, epoxy sealed
Case	Polycarbonate NEMA 4X/CSA 4 (IP65)
Hazardous location approvals	For more information, refer to the Rosemount 1056 product data sheet. Approvals apply to the transmitter only. The MCL is not suitable for use in hazardous areas.

**Table 5. Rosemount 56 Transmitter Specifications**

Display	Full color LCD, 3.75 x 2.20 in. (95 x 56 mm); display can be customized..
Languages	English, French, German, Italian, Spanish, Portuguese, Chinese, Russian, and Polish
Ambient temperature and humidity	-10 to 60 °C (14 to 140 °F); relative humidity 5 to 95% (non-condensing). Between -5 and 55 °C (23 and 131 °F) there is no visible degradation in display response or performance.
Storage temperature	-20 to 60 °C (-4 to 140 °F)
Power	85 to 265 Vac, 47.5 to 65.0 Hz, 20 W.
RFI/EMI LVD	EN 61326 EN 6101-01 
Alarms and timers	Four relays, fully configurable as a setpoint alarm, interval timer, TPC, bleed and feed timer, delay timer, date and time timer, and fault alarm
Outputs	Four 4-20 or 0-20 mA isolated current outputs; assignable to measurement or temperature; fully scalable; maximum load 550 Ω. HART digital signal is superimposed on output 1.
Control features	PID control (analog output) and time proportional control or TPC (relays) are standard.
Relay contact ratings	 5A at 28 Vdc or 300 Vac (resistive) 1/8 HP at 120/240 Vac
Relays	Form C, SPDT, epoxy sealed
Case	Polycarbonate
Hazardous location approvals	For more information, refer to the Rosemount 56 product data sheet. Approvals apply to the transmitter only. The MCL is not suitable for use in hazardous areas.
Data logger	Data automatically stored every 30 seconds for 30 days; older data removed to make room for new data. The following data are automatically stored: date and time, ppm, temperature, and raw sensor current.
Event logger	Stores up to 300 events with date and time stamps: faults, warnings, calibration data, calibration results (pass or fail), power on/off cycles, and hold on/off. Alarm relay activation and deactivation can also be stored. Older events are automatically removed to make room for new events.
Data and event downloading	Through USB port on front panel
Graphical display	Dual graphical display shows measurement data on the Y-axis and time on the X-axis. Y-axis is fully assignable and scalable. X-axis can be set to 1 hour, 1 day, 7 days, or 30 days.
Digital communication	HART digital communication is standard.

## Dimensional Drawings

Figure 1. Rosemount MCL-220 shown. All versions of the Rosemount MCL have the same overall dimensions.



## Rosemount MCL-1056 Engineering Specification

1. The system shall be suitable for the determination of monochloramine in water without sample conditioning reagents. Systems that use sample conditioning reagents are not acceptable.
2. The system shall consist of a transmitter, a monochloramine sensor, a flow cell for the sensor, and a flow controller. The components shall be mounted on a back plate. The sensor cable shall be pre-wired to the transmitter and shall plug into the cable using a Variopol quick disconnect fitting. The flow cell shall be clear plastic to allow the sensor to be easily inspected for fouling. The inlet shall be fitted with a check valve to ensure the sensors remain wet in the event sample flow is lost.
3. The system shall use no mechanical devices, such as pressure regulators, valves, or rotameters, to control flow. Instead, flow shall be regulated using a constant head flow controller. Minimum sample flow shall be not more than about 3 gallons per hour (11 liters per hour). Maximum flow can be as high as 80 gallons per hour (303 liters per hour). The flow controller shall be able to handle inlet pressure between 3 and 65 psig (122 and 549 kPa abs) and temperature between 0 and 50 °C (32 and 122 °F).
4. The monochloramine sensor shall be a two electrode membrane-covered sensor with a gold mesh cathode and a silver/silver chloride anode. The fill solution shall be a solution of potassium bromide in dilute acetic acid. The sensor shall be fitted with an RTD to allow continuous correction for changes in membrane permeability caused by temperature.
5. The effect of pH on sensor response shall be less than 5% between pH 7.0 and 10.0.
6. The linear range of the sensor shall be at least 0 to 6 ppm as Cl<sub>2</sub>.
7. The linearity shall be about 2%.
8. The transmitter shall receive the raw signal from the monochloramine sensor and automatically correct it for temperature effects. Results shall be displayed as ppm Cl<sub>2</sub>.
9. The transmitter shall require single point calibration if the expected monochloramine level is within the linear range of the sensor. A correction for the sensor zero current shall also be available.
10. The transmitter shall have a four line, back-lit display. The display shall show ppm monochloramine and temperature on one screen. The user shall be able to customize the main display to show additional information, such as raw sensor current.
11. The transmitter shall be capable of operating between 0 and 55 °C (32 and 131 °F) and between 5 and 95% relative humidity (non-condensing).
12. The transmitter shall have dual 0/4-20 isolated outputs. Outputs shall be fully scalable and assignable independent to monochloramine or temperature.
13. The transmitter shall have four alarm relays, fully programmable for logic (high or low operation), deadband, and set point. Relays can also be configured to energize when the transmitter detects a fault with the sensor or the transmitter.
14. All transmitter programming shall be through a front panel membrane keypad. The language (English, Spanish, Italian, Portuguese, German, or French) used in the menu screens shall be selectable by the user.
15. The transmitter shall have a security feature to prevent unauthorized tampering with calibration and configuration settings.
16. The transmitter shall be Rosemount Model MCL-220.

## Rosemount MCL - 56 Engineering Specification

1. The system shall be suitable for the determination of monochloramine in water without the use of reagents. Systems that use sample conditioning reagents are not acceptable.
2. The system shall consist of a transmitter, a monochloramine sensor, a flow cell for the transmitter, and a flow controller. The components shall be mounted on a back plate. The sensor cable shall be pre-wired to the transmitter, and the sensor shall plug into the cable using a Variopol quick disconnect fitting. The sensor flow cell shall be clear plastic to allow the sensor to be easily inspected for fouling. The inlet shall be fitted with a check valve to ensure the sensor remains wet if sample flow is lost. The inlet connector shall be a 1/4 inch tubing compression fitting.
3. The system shall use no mechanical devices, such as pressure regulators, valves, or rotameters, to control flow. Instead, flow shall be regulated using a constant head flow controller. Minimum sample flow shall be no more than about 3 gallons per hour (11 liters per hour). Maximum flow can be as high as 80 gallons per hour (303 liters per hour). The flow controller shall be able to handle inlet pressure between 3 and 65 psig (122 and 549 kPa abs) and temperature between 0 and 50 °C (32 and 122 °F).
4. The monochloramine sensor shall be a two-electrode, membrane-covered amperometric sensor using a gold mesh cathode and a silver/silver chloride anode. The fill solution shall be a solution of potassium bromide in dilute acetic acid. The sensor shall be fitted with a pt100 RTD to allow continuous correction for changes in membrane permeability caused by temperature.
5. The effect of pH on sensor response shall be less than 5% between pH 8.0 and 10.0.
6. The linear range of the sensor shall be at least 0 to 6 ppm as Cl<sub>2</sub>.
7. The linearity shall be about 2%.
8. Sensor electrolyte life shall be about four months.
9. The transmitter shall use a single point calibration based on the results of a test run on a grab sample. A correction for the zero current shall also be available.
10. The transmitter shall have a four line, back-lit display. The display shall show ppm chlorine, pH (if required), and temperature on one screen. The display shall be programmable to show additional information, such as raw sensor current.
11. The transmitter shall be capable of operating between -10 and 60 °C (14 and 140 °F) and between 5 and 95% relative humidity.
12. The transmitter shall have four 0/4-20 mA isolated outputs and HART digital communications. Outputs shall be fully scalable and assignable independently to chlorine, pH, or temperature. PID control shall be available as a standard feature.
13. The transmitter shall have four alarm relays, fully programmable as a high/low alarm with adjustable deadband or as a timer. Timer functions shall include an interval timer, bleed and feed timer, delay timer, and date and time timer. Time-proportional control shall also be available. In addition, relays shall be configurable to energize when the transmitter detects a fault with itself or the sensor.
14. All transmitter programming shall be through a front panel membrane keypad. The language (English, Spanish, Italian, Portuguese, German, French, Russian, Polish, or Chinese) used in the menu screens shall be selectable by the user.
15. The transmitter shall have a data logger that automatically stores data every 30 seconds for 30 days, with older data being discarded to make room for newer data. In addition to storing date and time, chlorine concentration, pH, and temperature, the transmitter shall store raw sensor current (chlorine sensor) and mV reading and glass and reference impedance (pH sensor). Stored data shall be downloadable through a USB port.
16. The transmitter shall have a dual graphic display that allows data to be viewed over 1 hour, 1 day, 7 days, and 1 month intervals.
17. The transmitter shall have a data logger that stores up to 300 events.
18. The transmitter shall have help screens, available at the touch of a button, that provide information about configuration, calibration, and troubleshooting.
19. The transmitter shall have a security feature to prevent unauthorized tampering with calibration and configuration settings.
20. The transmitter shall be Rosemount Model MCL-240 or approved equal.



## Component Parts

Transmitter model	Description
1056-03-38-AN	Rosemount 1056 Transmitter, single input, with alarm relays, 85 - 265 Vac, 47.5 - 65.0 Hz
56-03-24-38-HT	Rosemount 56 Transmitter, single input, 85 - 265 Vac, 47.5 - 65.0 Hz

Sensor model	Description
499ACL-03-54-VP	Monochloramine sensor with Variopol connector

Sensor cabler	Description
23747-04	Interconnecting cable, Variopol for Rosemount 499ACL sensor, 4 ft

## Accessories


Part number	Description
9240048-00	Tag, stainless steel (specify marking)
23750-00	Fill plug with wooden osmotic pressure relief port
9550094	O-ring, Viton 2-014
33521-00	Membrane retainer cap
23502-09	Monochloramine membrane kit: includes 3 membrane assemblies and 3 O-rings
9210372	Monochloramine sensor fill solution, 4 oz (120 mL)

## Notes

## Notes




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