

# Monochloramine Measuring System

- No reagents needed.
- Complete system includes sensor, connecting cable, analyzer, and flow controller.
- Variopool quick-disconnect fittings make replacing the sensor easy.
- Available with choice of three feature-packed analyzers.



## Features and Applications

The Model MCL monochloramine system is intended for the determination of monochloramine in fresh water.

The Model MCL uses a membrane-covered amperometric sensor. A polarizing voltage applied to a gold mesh cathode behind the membrane destroys the monochloramine diffusing through the membrane and keeps the concentration of monochloramine at the cathode equal to zero. The current generated by the cathode reaction is proportional to the diffusion rate. Because the concentration of monochloramine in the sensor is zero, the diffusion rate and the current are proportional to the concentration of monochloramine in the sample.

Diffusion rate also depends on membrane permeability, which is a function of temperature. An RTD in the sensor continuously measures the temperature of the sample, and the analyzer automatically corrects the raw sensor current for temperature changes.

Maintenance is fast and easy. Replacing a membrane requires no special tools or fixtures. A screw cap holds the pre-tensioned membrane in place. Replacing the electrolyte solution takes only minutes.

The MCL is available with either the Model 1056 or Model 56 analyzer. Both instruments are easy to use, with simple intuitive programming and calibration. All analyzers have fully programmable analog outputs and fully programmable alarm relays.

Valves, rotameters, and pressure regulators to control sample flow are things of the past with the Model MCL. A constant head overflow sampler ensures the correct sample flow to the sensor. To eliminate wiring hassles, quick-disconnect Variopool cable is standard.

Stable monochloramine standards do not exist. The monochloramine sensor must be calibrated using the results of a laboratory test run on a grab sample.

## Specifications — General

### 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).

Temperature: 32 to 122°F (0 to 50°)

Flow: 3-80 gal/hr (11-303 L/hr)

**Sample Conductivity:** >10  $\mu\text{S}/\text{cm}$  at 25°C

**Process connection:** ¼-in OD tubing compression fitting (can be removed and replaced with barbed fitting for soft tubing).

**Drain connection:** ¾-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:** 10 lb/13 lb (4.5 kg/6.0 kg)

[rounded to the nearest 1 lb. (0.5 kg)]

## Specifications — Sensor

**Range:** 0 to 6 ppm as  $\text{Cl}_2$ . 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.)

## Specifications — Model 1056 Analyzer

**Case:** Polycarbonate NEMA 4X/CSA 4 (IP65).

**Conduit openings:** Accepts PG13.5 or 1/2 in. conduit fittings

**Display:** Monochromatic back-lit LCD. Main character height 0.6 in (15mm). Display is user-programmable

**Languages:** English, French, German, Italian, Spanish, Portuguese, and Chinese.

**Ambient temperature and humidity:** 32 to 131°F (0 to 55°C); RH 5 to 95% (con-condensing)

**Storage temperature:** -4 to 140°F (-20°C and 60°C)

**Power:** 84-265 Vac, 47.5 to 65.0 Hz, switching, 15 W

Equipment protected by double insulation

**RFI/EMI:** EN-61326



**LVD:** EN-61010-1

**Outputs:** Two 4-20 mA or 0-20 mA isolated outputs. Continuously adjustable. Linear or logarithmic. Maximum load 550  $\Omega$ . Output dampening is user-adjustable.

**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.

**Relays:** Form C, SPDT, epoxy sealed

**Relay Contact ratings:**



5 A at 28 VDC or 300 VAC (resistive)

1/8 HP at 120/240 VAC.

**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

**Hazardous Location Approvals:** For more information refer to the Model 1056 product data sheet 71-1056. Approvals apply to the analyzer only. The MCL is not suitable for use in hazardous areas.

(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.

## Specifications — Model 56 Analyzer

**Case:** Polycarbonate

**Display:** Full color LCD, 3.75 x 2.20 in. (95 x 56 mm); display can be customized by the user.

**Languages:** English, French, German, Italian, Spanish, Portuguese, Chinese, Russian, and Polish.

**Ambient Temperature and Humidity:** 14 to 140°F (-10 to 60°C); RH 5 to 95% (non-condensing). Between 23 and 131°F (-5 to 55°C) there is no visible degradation in display response or performance.

**Storage temperature:** -4 to 140°F (-20 to 60°C)

**Power:** 85 to 265 VAC, 47.5 to 65.0 Hz, 20 W

**RFI/EMI:** EN-61326



**LVD:** EN-6101-01

**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.

**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.

**Relays:** Form C, SPDT, epoxy sealed.

**Relay Contact ratings:**



5 A at 28 VDC or 300 VAC (resistive)

1/8 HP at 120/240 VAC

**Control features:** PID control (analog output) and time proportional control or TPC (relays) are standard.

**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, raw sensor current

**Event logger:** Stores up to 300 events with data and time stamp: 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.

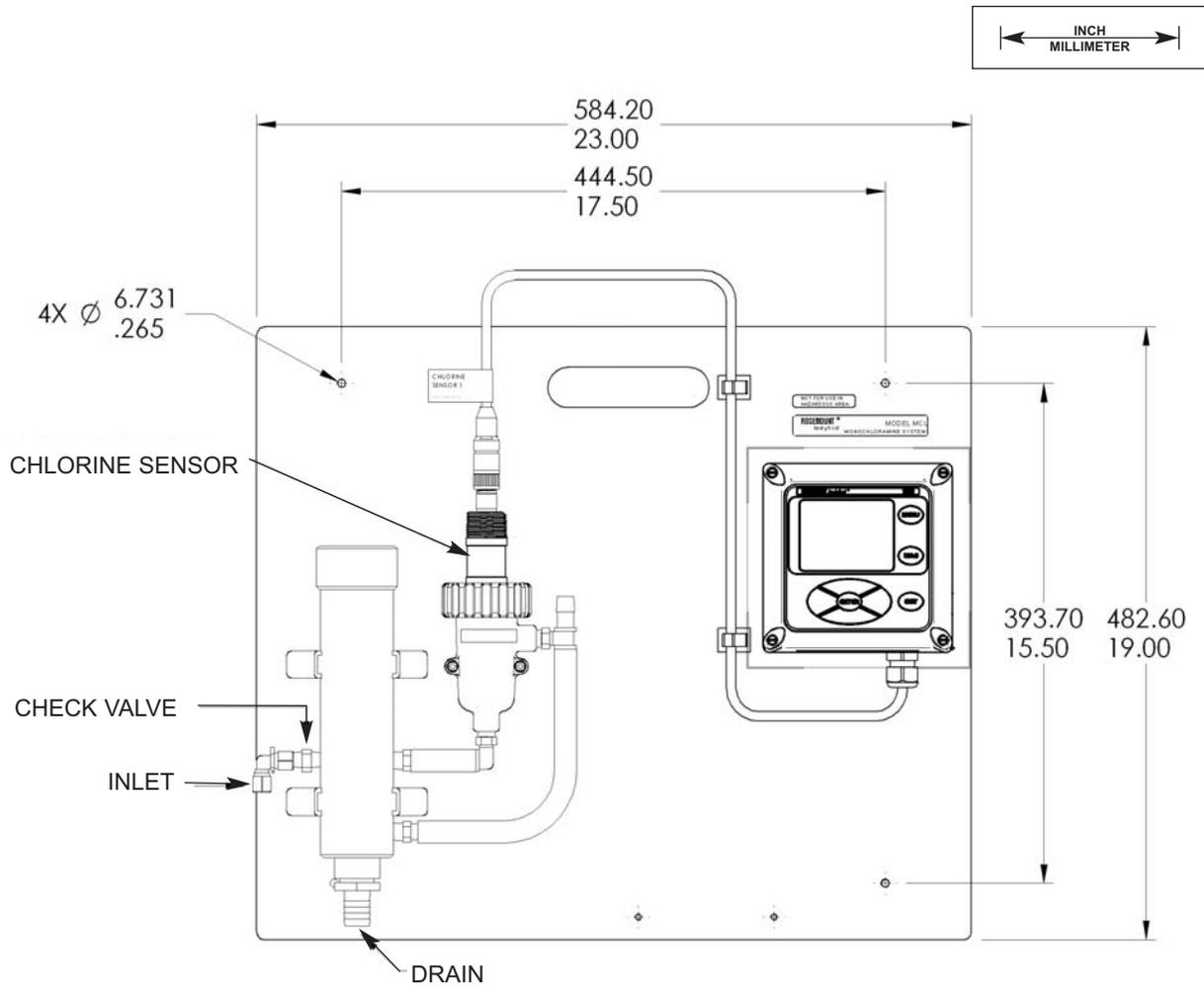
**Data and event downloading:** through USB port on front panel.

**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 one hour, one day, seven days, or 30 days.

**Digital communications:** HART digital communications is standard.

**Hazardous Location Approvals:** For more information refer to the Model 56 product data sheet 71-56. Approvals apply to the analyzer only. The MCL is not suitable for use in hazardous areas.

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



## Model 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 an analyzer, 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 analyzer and shall plug into the cable using a Variopool 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 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 to 549 kPa abs) and temperature between 32 and 122°F (0 and 50°C).
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 analyzer 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 analyzer 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 analyzer shall have a four line, back-lit display. The display shall show ppm monochloramine and temperature in one screen. The user shall be able to customize the main display to show additional information such as raw sensor current.
11. The analyzer shall be capable of operating between 32 and 131°F (0 and 55°C) and between 5 and 95% relative humidity (non-condensing).
12. The analyzer shall have dual 0/4-20 mA isolated outputs. Outputs shall be fully scalable and assignable independently to monochloramine or temperature.
13. The analyzer 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 analyzer detects a fault with the sensor or the analyzer.
14. All analyzer 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 analyzer shall have a security feature to prevent unauthorized tampering with calibration and configuration settings.
16. The analyzer shall be Rosemount Analytical Model MCL-220.

## Model 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 an analyzer, 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 analyzer 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 ¼-inch tubing compression fitting.
3. The system shall use no mechanical devices, such as pressure regulators, valves, or rotameters, to control flow. In-stead, 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 to 549 kPa abs) and temperature between 32 and 122°F (0 and 50°C).
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 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 analyzer shall receive the raw signal from the monochloramine sensor and automatically correct it for changes in membrane permeability caused by temperature. Results shall be displayed as ppm Cl<sub>2</sub>.
9. The analyzer shall use a single point calibration based on the results of a test run on a grab sample. A correction for the sensor zero current shall also be available.
10. The analyzer shall have a four line, full color 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 analyzer shall be capable of operating between 14 and 140°F (-10 and 60°C) and between 5 and 95% relative humidity (non-condensing).
12. The analyzer 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 analyzer 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 analyzer detects a fault with itself or the sensor.
14. All analyzer programming shall be through a front panel membrane keypad. The language (English, Spanish, Italian, Portuguese, German, French, Russian, Polish, or Chinese) shall be selectable by the user.
15. The analyzer shall have a data logger that automatically stores data every thirty seconds for thirty 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 analyzer will 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 analyzer shall have a dual graphical display that allows stored data to be viewed over one hour, one day, seven days, and one month intervals.
17. The analyzer shall have a data logger that stores up to 300 events.
18. The analyzer shall have help screens, available at the touch of a button, that provide information about configuration, calibration, and troubleshooting.
19. The analyzer shall have a security feature to prevent unauthorized tampering with calibration and configuration settings.
20. The analyzer shall be Rosemount Analytical Model MCL-240 or approved equal.

## Ordering Information

**Model MCL Monochloramine Measuring System.** The MCL is a complete system for the determination of monochloramine in water. It consists of the sensor, an analyzer, Variopol cable, and constant head flow controller. All components are mounted on a backplate, and the cable is pre-wired to the analyzer. Three replacement membranes and a 4-oz. (120 ml) bottle of electrolyte solution are shipped with the sensor.

Model	Description
MCL	Monochloramine Measuring System
Code	Analyzer (required Selection)
220	1056 analyzer, single input, with alarm relays
240	56 analyzer, single input
MCL-220	Example

## Component Parts

Analyzer Model	Description
1056-03-24-38-AN	1056 analyzer, single input, with alarm relays, 85-265 Vac, 47.5-65.0 Hz
56-03-24-38-HT	56 analyzer, single input, 85-265 Vac, 47.5-65.0 Hz
Sensor Model	Description
499ACL-03-54-VP	Monochloramine sensor with Variopol connector
Sensor Cable	Description
23747-04	Interconnecting cable, Variopol for 499ACL sensor, 4 ft

## Accessories

Part #	Description
9240048-00	Tag, stainless steel (specify marking)

## Spare Parts

Part #	Description
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)

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Scan with your smart phone for more information about Rosemount Analytical Model MCL.



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