

# CLF10 sc & CLT10 sc FREE & TOTAL REAGENTLESS CHLORINE ANALYZERS

## Applications

- Drinking Water
- Wastewater
- Power
- Industrial Water



## Hach's answer to reagentless amperometric chlorine measurement.

From the leaders in disinfection monitoring, the right instrument for reagentless chlorine analysis.

### Exclusive Self Diagnostics

The CLF10 sc and CLT10 sc analyzers leverage Hach's exclusive self diagnostics to alert users when the process has changed or the instrument needs servicing. Diagnostic features include the Cal Watch algorithm for warning of pH and chlorine calibration deviation and a non-contacting flow sensor for notification of insufficient sample flow.

### Real-Time Process Control

The CLF10 sc and CLT10 sc analyzers allow for real-time control of disinfection processes by providing continuous readings that indicate when treatment conditions have changed.

### No Reagent Replacement, No Waste Stream

Chlorine measurement with an amperometric analyzer such as the CLF10 sc or CLT10 sc does not require reagents, eliminating the need for routine reagent replacement and waste stream management.

### Compatible with Hach's "Plug and Play" Digital Controllers

The CLF10 sc and CLT10 sc analyzers can be used with any Hach sc digital controller. Just plug in the analyzer and it's ready to use without software configuration.

### EPA Compliant According to Method 334.0

The CL10 sc and CLT10 sc analyzers can be used for reporting chlorine residual measurements in accordance with EPA Method 334.0.



Be Right™

## Specifications\*

### Chlorine Sensor

<b>Measurement Range</b>	0 to 20 ppm
<b>Lower Limit of Detection (LOD)</b>	30 ppb (0.03 ppm) or lower
<b>Limit of Quantitation (LOQ)</b>	90 ppb (0.09 ppm) or lower
<b>Resolution</b>	0.001 ppm (1 ppb)
<b>Accuracy</b>	Free Chlorine: ±3% of the reference test** (DPD) at constant pH less than 7.2 (±0.2 pH unit)  ±10% of the reference test** (DPD) at stable pH less than 8.5 (±0.5 pH unit from the pH at calibration)  Total Chlorine: ±10% of the reference test** (DPD) at stable pH less than 8.5 (±0.5 pH unit from the pH at calibration)  ±20% of the reference test** (DPD) at stable pH greater than 8.5
<b>Repeatability</b>	30 ppb or 3%, whichever is greater
<b>Response Time</b>	Free Chlorine: 140 seconds or less for 90% change ( $T_{90}$ ) at a stable temperature and pH  Total Chlorine: 100 seconds or less for 90% change ( $T_{90}$ ) at a stable temperature and pH
<b>Sampling Time</b>	Continuous
<b>Interferences</b>	Free Chlorine: Monochloramine, chlorine dioxide, ozone, and chalk deposits  Total Chlorine: Chlorine dioxide, ozone, and chalk deposits
<b>Pressure Limit</b>	0.5 bar, no pressure impulses and/or vibrations
<b>Sample Flow Rate</b>	30 to 50 L/hour (7.9 to 13.2 gal/hour), Optimal is 40 L/hour (10.5 gal/hour)
<b>Sample pH</b>	4-9 (Use of pH electrode to control sample pH in analyzer is recommended)
<b>Sample Temperature (compensated for fluctuations)</b>	5 to 45°C (41 to 113°F)
<b>Temperature Compensation</b>	Internal temperature sensor
<b>Storage Temperature</b>	Sensor: 0 to 50°C (32 to 122°F) dry, without electrolyte  Electrolyte: 15 to 25°C (59 to 77°F)

<b>Power Requirements</b>	12 Vdc, 30 mA maximum (supplied by controller)
<b>Dimensions (sensor only)</b>	195 mm (7.68 in.)/25 mm (0.98 in.) (length/diameter)
<b>Cable Length</b>	1 m (between gateways and sc-controller)
<b>Cable Connection</b>	5 pin, M12 connector
<b>Measurement Method</b>	Reagentless, electrochemical, three-electrode amperometric system
<b>Calibration Methods</b>	1-point or 2-point (zero and slope) calibration
<b>Material</b>	Corrosion-resistant materials, (stainless steel, PVC, silicon rubber and polycarbonate)
<b>Warranty</b>	1-year warranty on the electrode body, includes the electronics

### Panel (including SS Panel, Gateway, Chlorine Sensor Flow Cell, pH Sensor Flow Cell)

<b>Operating Temperature</b>	0 to 45°C (32 to 113°F)
<b>Storage Temperature (panel only)</b>	-20 to 60°C (-4 to 149°F)
<b>Power Requirements</b>	12 Vdc ±10%, at 100 mA maximum (supplied by sc controller)
<b>Mounting</b>	Flat, vertical surface
<b>Connections</b>	Sample Line: 1/4-inch OD Drain Line (pH Flow Cell Outlet): 1/2-inch ID
<b>Panel Dimensions</b>	48.3 x 49.5 x 15.1 cm (19 x 19.5 x 5.95 in.) (with panel-mounted components)
<b>Weight</b>	Approximately 5.5 kg (12 lbs) (panel and empty panel-mounted components only)
<b>Controller Platform</b>	sc controller models

### Complete Analyzer (Panel + Sensor)

<b>Waterproof Rating</b>	Current rating for sc100/1000/200 controllers and gateway – IP65 (NEMA 4X)
<b>Certification</b>	CE / ETL, EMC
<b>Shipping Weight</b>	Approximately 9.1 kg (20 lbs)

\*Subject to change without notice.

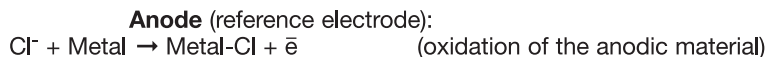
\*\*Reference measurement must be conducted at the analyzer sampling point.

## Principle of Operation

Amperometry is an electrochemical technique that measures the change in current resulting from chemical reactions taking place on the electrodes. The generated current is proportional to the analyte concentration. A typical amperometric sensor consists of two dissimilar electrodes—an anode and a cathode (i.e. silver/platinum or copper/gold, respectively).

Typically, the electrodes are covered with a membrane cap containing electrolyte, providing for better selectivity of the analysis. Additionally, a small constant electrical voltage is applied across the electrodes.

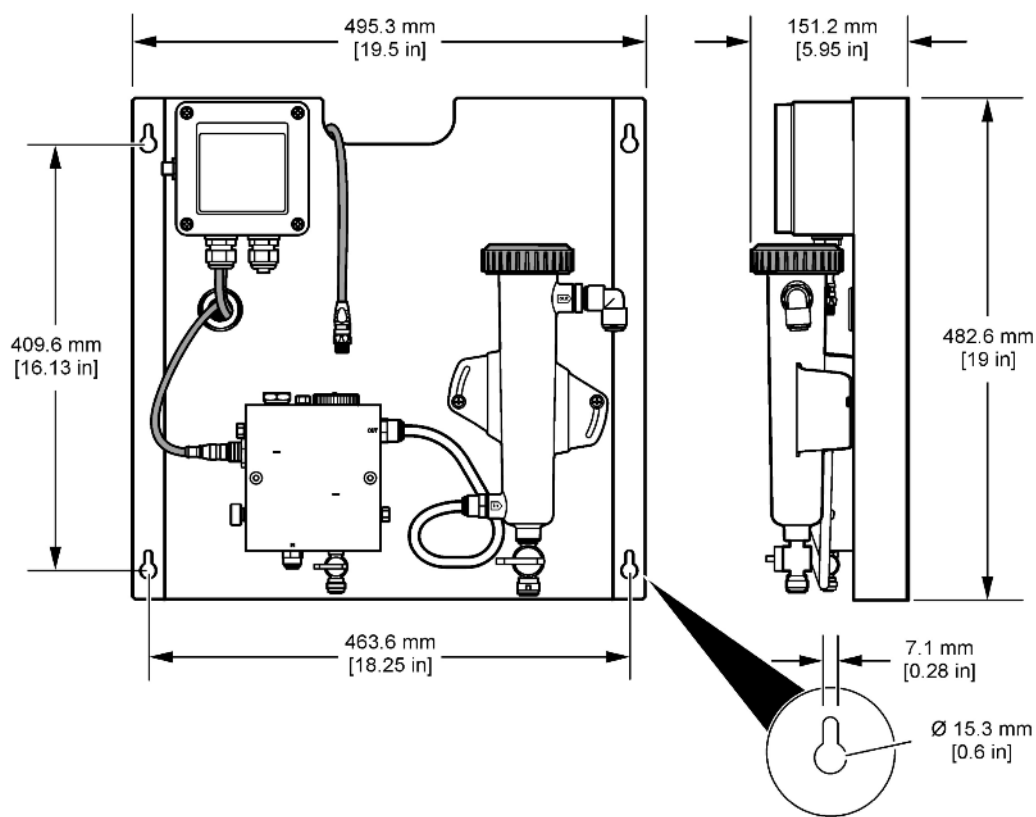
Below is a general schematic of the reduction-oxidation reaction taking place in a simple 2-electrode amperometric system:



In a three-electrode amperometric system, such as used in the CLF10 sc and CLT10 sc, the anode is essentially split into two parts—a reference and an auxiliary (or counter) electrode. These systems are always supported by special electrical circuit directing the voltage between all electrodes. The three-electrode design generally makes the measurements more stable and provides longer life for the working and reference electrodes.

## Dimensions

The analyzer should be installed in an accessible location.\* It can be mounted on a flat, vertical surface (such as a wall, panel, stand, etc.). It should allow for access for any checking or maintenance. Sample flow should meet the specifications on previous page.



\*Do not mount the panel in direct sunlight. Indoor or enclosed installation is recommended. Shield the panel and panel components from any condensing moisture or humidity, especially at the sensor/cable interface.

## Ordering Information

### CLF10 sc Free Chlorine Sensor with sc200 Controller and SS Panel

<b>2980900</b>	CLF10 sc, sc200 Single Input, pH/D
<b>2981000</b>	CLF10 sc, sc200 Single Input, Combo pH
<b>2981100</b>	CLF10 sc, sc200 Single Input, Grab Sample
<b>2982200</b>	CLF10 sc, sc200 Dual Input Combo pH
<b>2982100</b>	CLF10 sc, sc200 Dual Input, pH/D
<b>2982300</b>	CLF10 sc, sc200 Dual Input, Grab Sample
<b>2981200</b>	CLF10 sc, sc200 Single Input, pH/D, Metric
<b>2981300</b>	CLF10 sc, sc200 Single Input, Combo pH, Metric
<b>2981400</b>	CLF10 sc, sc200 Single Input, Grab Sample, Metric
<b>2982400</b>	CLF10 sc, sc200 Dual Input, pH/D, Metric
<b>2982500</b>	CLF10 sc, sc200 Dual Input, Combo pH, Metric
<b>2982600</b>	CLF10 sc, sc200 Dual Input, Grab Sample, Metric
<b>2987500</b>	CLF10 sc, sc200 Single Input, pH/D, 24 Vdc, Metric
<b>2987600</b>	CLF10 sc, sc200 Single Input, Combo pH, 24 Vdc, Metric
<b>2987700</b>	CLF10 sc, sc200 Single Input, Grab Sample, 24 Vdc, Metric

### CLT10 sc Total Chlorine Sensor with sc200 Controller and SS Panel

<b>2981500</b>	CLT10 sc, sc200 Single Input, pH/D
<b>2981600</b>	CLT10 sc, sc200 Single Input, Combo pH
<b>2981700</b>	CLT10 sc, sc200 Single Input, Grab Sample
<b>2982700</b>	CLT10 sc, sc200 Dual Input, pH/D
<b>2982800</b>	CLT10 sc, sc200 Dual Input, Combo pH
<b>2982900</b>	CLT10 sc, sc200 Dual Input, Grab Sample
<b>2981800</b>	CLT10 sc, sc200 Single Input, pH/D, Metric
<b>2981900</b>	CLT10 sc, sc200 Single Input, Combo pH, Metric
<b>2982000</b>	CLT10 sc, sc200 Single Input, Grab Sample, Metric
<b>2983000</b>	CLT10 sc, sc200 Dual Input, pH/D, Metric
<b>2983100</b>	CLT10 sc, sc200 Dual Input, Combo pH, Metric
<b>2983200</b>	CLT10 sc, sc200 Dual Input, Grab Sample, Metric
<b>2987400</b>	CLT10 sc, sc200 Single Input, pH/D, 24 Vdc, Metric
<b>2987800</b>	CLT10 sc, sc200 Single Input, Combo pH, 24 Vdc, Metric
<b>2987900</b>	CLT10 sc, sc200 Single Input, Grab Sample, 24 Vdc, Metric

Note: See LIT2665 for more information about the combinations possible with the sc200.

### CLT10 sc Total Chlorine Analyzer Panel Only

<b>LXV45B.99.13022</b>	w/ pH/D Differential Sensor
<b>LXV45B.99.12022</b>	w/ pH Combination Sensor
<b>LXV45B.99.11022</b>	Grab Sample Only

Metric sizing available for all configurations.

### Accessories

<b>LZY051</b>	Acidification/Cleaning Kit
<b>9159900</b>	Sample Conditioning Kit
<b>9181500</b>	pH/D Differential Analog pH Sensor, Ryton
<b>9181600</b>	Combination Analog pH Sensor, Ryton

### Replacement Parts

<b>8626200</b>	Sensor, Free Chlorine, SS Tip
<b>8628900</b>	Sensor, Total Chlorine, SS Tip
<b>8633100</b>	Membrane Replacement Kit, Free and Total Chlorine, SS Tip
<b>9160600</b>	Electrolyte, Free Chlorine Sensor 100 mL
<b>9181400</b>	Electrolyte, Total Chlorine Sensor 100 mL

### Lab Products for Method 334.0

<b>5870062</b>	Pocket Colorimeter II System, Chlorine MR/HR
<b>1426810</b>	Chlorine Standard Solution, 10-mL Voluette® Ampule, 50–75 mg/L 16/pkg
<b>2980500</b>	DPD Chlorine-MR Spec✓ Secondary Standards Kit

For more information on this method, please visit: [www.hach.com/method334](http://www.hach.com/method334)

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