

Capital Controls®

Chlorine Residual Analyzers

Series CL500, CL1000, and CL1000B



Series CL500



Series CL1000B



Series CL1000



Series CL500

Severn Trent Services' Capital Controls® CL500 Residual Analyzer is the part of the family of amperometric residual analyzers that have proven to be the world leaders in continuous, accurate residual analysis. This instrument combines innovative microprocessor-based electronics and reliable amperometric technology to provide continuous analysis of free or total chlorine or other oxidants in drinking water, wastewater, cooling water, and other process water applications.

The Capital Controls® CL500 Residual Analyzer features a large dot-matrix graphical display with automatic ranging capabilities from 0-20 mg/l. The analyzer includes on-screen instruction and self diagnostics. Display resolution is up to 0.001 mg/l with an optional graphical viewing mode.

Six adjustable alarm relays and dual 4-20 mA dc output signals are standard. All user controls are provided through four membrane buttons on the display face. The analyzer incorporates a constant, direct-drive electrode cleaning system which eliminates signal drift and the need for frequent recalibration.

The analyzer sample is gravity fed, eliminating the need for a sample pump. Reagents are added with a user-programmable solenoid valve to optimize the sample pH and reduce buffer consumption. Sample temperature variations are compensated with a thermistor.

The CL500 Residual Analyzers are constructed of corrosion resistant materials and are modular in design for serviceability and ease of maintenance. Each unit is pre-piped and pre-wired, requiring only field connection to service points. All components and controls are accessible from the front of the unit to permit ease of observation of solution level and sample flow.

PRINCIPLE OF OPERATION

A sample of liquid is delivered to the sample inlet chamber at an approximate rate of 350 ml/minute. The excess overflows to drain.

The sample then passes to a mixing chamber where pH 4 buffering solution is added via the user-programmable solenoid valve and mixed with the sample. The buffered sample then passes through an annular space between two electrodes in the sensing cell. As it passes, a small dc current is generated in direct linear proportion to the amount of residual present in the sample. The residual value is displayed on the dot-matrix display in a 4½-digit or graphical format. Residual units of ppb, mg/l, ppm or mg/l are user-selectable.

The surfaces of both electrodes are kept clean by the continuous action of PVC spheres agitated by a motor-driven rotating striker. This constant cleaning eliminates signal drift and recalibration, and provides an accurate residual measurement. A 100-ohm RTD compensates for temperature variations.

The liquid reagent is stored in a single bottle and is added to the sample with a user-programmable solenoid valve. The buffer feed rate can be increased or decreased as required to maintain the sample pH at 4.3-5.0 pH. The reagent bottle provides approximately 2 weeks of use before refilling is required, depending on the sample water quality.

- Continuous on-line operation
- Microprocessor-based
- Dot matrix graphical display
- Auto ranging to 20 mg/l
- Data logging and trending
- Optimized reagent feed
- On-screen instruction
- Six programmable alarm relays
- Direct measurement of free or total chlorine
- Universal power recognition

RESIDUAL REQUIREMENTS

Residual	Reagent
Chlorine - Free	pH Buffer
Chlorine - Total	pH Buffer & potassium iodide
Iodide	pH Buffer
Bromine	pH Buffer and potassium iodide
Other Oxidants	consult factory

DESIGN FEATURES

- **Data logging and trending:** Statistics for up to 28 days; previous 7 days; or previous 24 hours are logged and can be viewed in graphical format
- **Automatic ranging from 0-20 mg/l:** The analyzer provides automatic ranging capabilities from 0-20 mg/l without any hardware or software modifications
- **Optimized reagent feed:** A user-programmable solenoid valve provides for adjustable reagent addition to maintain the optimal sample pH and minimum reagent consumption
- **Six programmable alarm relays:** Each relay is independently configurable to be high, low, latch (out of range), attention, or fail
- **Universal power recognition:** The analyzer will operate on 100-250 Vac, 47-63 Hz
- **Dual output signals:** Dual 4-20 mAdc or 0-20 mAdc output signals are provided for residual level monitoring and control; each output signal is isolated into 1000 ohms maximum impedance
- **Removable electrode assembly:** The extra large gold and copper electrodes provide maximum signal strength; the electrode assembly is removable for serviceability and ease of maintenance
- **Accurate:** The 2% accuracy of the unit is ideal for monitoring and control of water, wastewater and industrial process water
- **Automatic cleaning:** A continuous direct-drive cleaning system maintains a constant level of electrode cleanliness
- **Mounting:** Easy mounting is accomplished through the mounting panel where all components are attached
- **NEMA 4X:** The electronics enclosure is NEMA 4X for protection

APPLICATIONS

- **Wastewater:** Feed-forward dechlorination control; Effluent monitoring
- **Industrial wastewater:** Effluent control
- **Drinking water disinfection:** Drinking waters require continuous monitoring of chlorine residual as specified by the U.S. Safe Drinking Water Act: Influent and finished water monitoring and control.
- **Food and beverage:** Zero verification after carbon filtration
- **Pharmaceuticals:** Zero verification after carbon filtration; Simplification of validation procedures
- **Swimming pool disinfection:** Accurate control of chlorine residual
- **Cooling water biofouling:** Cost effective control of slime and algae in piping and heat exchangers throughout the system
- **Industrial process water:** Verification and control of chlorine or other oxidants used in production processes

Series CL1000

Severn Trent Services' Capital Controls® CL1000 Residual Analyzer represents the latest advance in residual analysis. Through microprocessor-based electronics, this instrument offers precise control of the critical components in the measurement of chlorine. These include pH and temperature. The result is the most accurate analyzer on the market today.

The amperometric-based instrument is designed to continuously analyze free or total chlorine, iodine, bromine, or other oxidants for water, wastewater, cooling water, and other process water applications with a three-electrode arrangement. This arrangement establishes a constant potential on the working electrode to provide optimum accuracy, excellent stability, and sensitivity of one part per billion.

The Capital Controls® CL1000 Residual Analyzer features a large dot-matrix graphical display with automatic ranging capabilities from 0-60 mg/l. The analyzer includes on-screen instruction and self diagnostics. Display resolution is up to 0.001 mg/l with an optional graphical viewing mode.

Six adjustable alarm relays and dual 4-20 mAdc output signals are standard. All user controls are provided through four membrane buttons on the display face. The analyzer incorporates a constant, direct-drive electrode cleaning system which eliminates signal drift and the need for frequent recalibration.

The analyzer sample is gravity fed, eliminating the need for a sample pump. Reagents are added automatically with a solenoid valve controlled by a precise pH feedback control loop. Sample temperature variations are compensated with a 100 ohm RTD. Sample flow is monitored with an infrared flow detector.

The Capital Controls® CL1000 Residual Analyzers are constructed of corrosion resistant materials and are modular in design for serviceability and ease of maintenance. Each unit is pre-piped and pre-wired, requiring only field connection to service points. All components and controls are accessible from the front of the unit to permit ease of observation of solution level and sample flow.

PRINCIPLE OF OPERATION

A sample of liquid is delivered to the sample inlet chamber at an approximate rate of 350 ml/minute. The excess overflows to drain. The flow to the analyzer is monitored by a unique infrared flow detection system.

The sample then passes to a mixing chamber where pH 4 buffering solution is added and mixed with the sample. The sample pH is measured and used in a feedback control loop to adjust the reagent addition with a solenoid valve. A 100 ohm RTD compensates for temperature variation.

The buffered sample then passes through an annular space between two electrodes in the sensing cell. As it passes, a small direct current is generated in direct linear proportion to the amount of residual present in the sample. A third, reference electrode located downstream of the sensing cell establishes a constant potential on the working electrode to provide an accurate, stable residual indication. The surface of the two electrodes in the sensing cell are kept clean by the continuous action of PVC balls agitated by a motor-driven, rotating striker assembly. The constant cleaning action of the PVC balls minimizes signal drift and recalibration to provide an accurate residual measurement.

The residual value is displayed on the on the display in ppm, mg/l, ppb, µg/l or in graphical format.

- Continuous on-line operation
- Microprocessor-based
- Dot matrix graphical display
- 1 ppb sensitivity
- Auto ranging to 60 mg/l
- Automatic pH adjustment
- On-screen instruction and self-diagnostics
- Six programmable alarm relays
- Direct measurement of free or total chlorine

RESIDUAL REQUIREMENTS

Residual	Reagent
Chlorine - Free	pH Buffer
Chlorine - Total	pH Buffer & potassium iodide
Iodide	pH Buffer
Bromine	pH Buffer and potassium iodide
Other Oxidants	consult factory

DESIGN FEATURES

- **Data logging and trending:** Statistics for up to 28 days; previous 7 days; or previous 24 hours are logged and can be viewed in graphical format
- **Automatic ranging from 0-60 mg/l:** The analyzer provides automatic ranging capabilities from 0-60 mg/l without any hardware or software modifications
- **1 ppb sensitivity:** The three-electrode arrangement and feedback control of the sample pH and temperature enables accurate, low parts per billion dechlorination.
- **Automatic reagent addition:** A precise pH feedback control loop provides automatic adjustment of reagent addition to maintain the optimal sample pH and minimize reagent consumption.
- **Three electrode arrangement:** The three-electrode arrangement establishes a constant potential on the working electrode to provide optimum accuracy, excellent stability, and sensitivity of one part per billion.
- **Ease of use:** On-screen instruction and self diagnostics provide visual data to efficiently configure, operate, and maintain the analyzer.
- **Six programmable alarm relays:** Each relay is independently configurable to be high, low, attention, or fail.
- **Dual output signals:** Dual 4-20 mAdc or 0-20 mAdc output signals are provided for residual level monitoring and control; each output signal is isolated into 1000 ohms maximum impedance.
- **Accurate:** The 1% accuracy of the unit is ideal for precise monitoring and control of water, wastewater and industrial process water

- **Automatic cleaning:** A continuous direct-drive cleaning system maintains a constant level of electrode cleanliness
- **Mounting:** Easy mounting is accomplished through the mounting panel where all components are attached
- **NEMA 4X:** The electronics enclosure is NEMA 4X for protection

APPLICATIONS

- **Wastewater:** Feed-forward dechlorination control; Effluent monitoring
- **Drinking water disinfection:** Drinking waters require continuous monitoring of chlorine residual as specified by the U.S. Safe Drinking Water Act: Influent and finished water monitoring and control.
- **Food and beverage:** Zero verification after carbon filtration
- **Pharmaceuticals:** Zero verification after carbon filtration; Simplification of validation procedures
- **Cooling water monitoring and control:** Control of slime and algae in piping and heat exchangers
- **Industrial process water:** Verification and control of chlorine or other oxidants used in production processes

Technical Data

Series CL500/CL1000

GENERAL

Quality Standards: ISO 9001 Certified

Compliance: CE, UL (optional)

Residual Measured: free chlorine; total chlorine; bromine; iodine; (consult the factory for other oxidants)

Instrument Range:

CL500: Automatic ranging from 0-20 mg/l - For higher ranges, consult factory.

CL1000: Automatic ranging from 0-60 mg/l

Display: 3" x 4", dot-matrix graphical display

Data Logging: Up to 28 days; previous 7 days; previous 24 hours

Resolution:

CL500: Below 10 mg/l: 0.001 mg/l; 10-20 mg/l: 0.01 mg/l

CL1000: 0.001 mg/l for below 10 mg/l; 0.01 for 10-60 mg/l

Configurable Residual Units: mg/l; ppm; ppb or mg/l

Analyzer Location: As close as possible to sample point.

Speed of Response: Four (4) seconds from sample entry to display indication. 90% of full scale response within 1-1/2 to 2 minutes.

Ambient Temperature: 32° F-140°F (0°C - 60°C)

Languages: American English, U.K. English (for other languages, consult factory)

Power Requirements: Automatic power selection for 100-250 Vac, 47-63 Hz, single phase

Power Consumption: 50 Watts

Output Signal: Dual 4-20 mAdc or 0-20 mAdc, isolated into 1000 ohms maximum

Digital Output: RS232/485 communications capabilities

Relay Contacts: Six (6) independently configurable to be high, low, attention, or fail. The fail relay can be set by as hardware jumper to indicate power failure. There are also settings for hysteresis, delay and action. Alarm contacts rated 5 amps @ 240 Vac, resistive load.

Overall Dimensions:

18 1/2" (470 mm) L x 14 1/2" (368 mm) H x 7 9/16" (193 mm) D

SAMPLE

Sample Flow: 350-450 ml/min. at 5 psi minimum (10 psi max)

Sample Temperature: 32°F-120°F (0°C-50°C)

Sample Supply: Continuous. Where sample interruption may be required, provision must be made to keep electrodes wet.

Sample Limitations: Samples containing particles 100 microns (0.004 inches) in diameter and larger, may require pre-filtration. Samples containing high concentrations of metal ions, oils, or certain corrosion inhibitors may effect analyzer operation. At low residual levels (less than 0.1 mg/l), variations in sample dissolved oxygen level may affect the residual reading. Consult factory for specific applications.

Accuracy:

CL500: 2% of reading or ± 0.003 mg/l, whichever is greater (see sample limitations)

CL1000: 1% of reading or ± 0.002 mg/l, whichever is greater, for residual levels below 20 mg/l; 5% of reading for residual levels from 20-60 mg/l. (see sample limitations)

INSTRUMENT

Electronic Enclosure: NEMA 4X

Electrodes:

CL500: Measuring: Gold
Anode: Copper

CL1000: Measuring: Gold
Anode: Copper
Reference: Ag/AgCl

Shipping Weight: 22 lbs (10 kgs)

Equipment Options:

Sample Pump
Self-flushing Y-Strainer

Optional Accessories:

16 week supply of pH buffer
1 lb. (500g) Potassium Iodide
Pressure reducing valve
Patented purging circuit

Series CL1000B

Severn Trent Services' Capital Controls® CL1000B Bufferless Residual Analyzer represents the latest advance in residual analysis. Through microprocessor-based electronics, this instrument offers precise control of the critical components in the measurement of chlorine. The result is the most accurate bufferless analyzer on the market today.

Bufferless operation removes the growth and odour problems often associated with the waste from chlorine instruments. No buffer also reduces the cost of ownership and eliminates the handling of chemicals.

The amperometric-based instrument is designed to continuously analyse free chlorine, iodine, bromine, or other oxidants for water, wastewater, cooling water, and other process water applications with a three-electrode arrangement and without buffering. This arrangement establishes a constant potential on the working electrode to provide optimum accuracy, excellent stability, and sensitivity of one part per billion.

The Capital Controls® CL1000B Residual Analyzer features a large dot-matrix graphical display with automatic ranging capabilities from 0-60 mg/l. The analyzer includes onscreen instruction and self diagnostics. Display resolution is up to 0.001 mg/l with an optional graphical viewing mode.

Six adjustable alarm relays and dual 4-20 mA dc output signals are standard. All user controls are provided through four membrane buttons on the display face. The analyzer incorporates a constant, direct-drive electrode cleaning system which eliminates signal drift and the need for frequent recalibration.

The analyzer sample is gravity fed, eliminating the need for a sample pump. Sample temperature variations are compensated with a 100 ohm RTD. Sample flow is monitored with an infrared flow detector.

APPLICATIONS

- **Wastewater:** Feed forward dechlorination control; Effluent monitoring to parts per billion.
- **Drinking water disinfection:** Drinking waters require continuous monitoring of chlorine residuals as specified by the U.S. Safe Drinking Water Act; Influent and finished water monitoring and control
- **Food and beverage:** Zero verification after carbon filtration
- **Pharmaceuticals:** Zero verification after carbon filtration; simplification of validation procedures
- **Cooling water monitoring and control:** Control of slime and algae in piping and heat exchangers
- **Industrial process control:** Verification and control of chlorine or other oxidants used in production processes

Technical Data

Series CL1000B

GENERAL

Quality Standards: ISO9001 Certified

Compliance: CE

Residual Measured: Free Chlorine; Bromine; Iodine; (Consult Factory for other oxidants)

Instrument Range: Automatic ranging from 0-60 (mg/l)

Display: 3" x 4", dot-matrix, graphical display

Data Logging: Up to 28 day; previous 7 days; previous 24 hours

Resolution: 10mg/l: 0.001 mg/l; 10-60 mg/l: 0.01 mg/l

Sensitivity: 0.001 mg/l or 1 ppb

Configurable Residual Units: mg/l, ppm, ppb or mg/l

Analyzer Location: As close as possible to sample point

Speed of Response: Four (4) seconds from sample entry to display indication. 90% of full scale response within 1½ to 2 minutes

Ambient Temperature: 32°C-140°F (0°C-60°C)

Languages: (American) English, UK English (for other languages, consult factory)

Power Requirements: Automatic power selection for 100-250 Vac, 47-63 Hz, 1 phase

Power Consumption: 50 Watts

Output Signal: Dual 4-20 mAdc or 0-20 mAdc, isolated into 1000 ohms maximum

Digital Output: RS232/485 communication capabilities

Relay Contacts (Six): Each relay is independently configurable to be high, low, attention or fail. The fail relay can be set by a hardware jumper to indicate a power failure. There are also settings for hysteresis, delay, and action. Alarm contacts rated 5A @240 Vac, resistive load.

SAMPLE

Sample Flow: 350-450 ml/min at 5 psi minimum (10 psi maximum)

Sample Temperature: 32°F-120°F (0°C-50°C)

Sample Supply: Continuous. Where sample interruption may be required, provision must be made to keep electrodes wet.

Sample Limitations: Samples containing particles 100 microns (0.004 inches) in diameter and larger may require pre-filtration. Samples containing high concentrations of metal ions, oils, or certain corrosion inhibitors may effect analyzer operation. Consult factory for specific applications.

Accuracy: 1% of reading or ±0.002 mg/l, whichever is greater, for residual levels below 20 mg/l; 5% of reading for residual levels from 20-60 mg/l (see sample limitations)

INSTRUMENT

Electronics Enclosure: NEMA 4X

Electrodes:

Measuring – Gold

Anode – Copper

Reference – Ag/AgCl

Shipping Weight: 22 lbs (10 kg)

Dimensions: 19 x 15 x 8" (475 x 375 x 200 mm)

Equipment Options:

Sample Pump

Self Flushing Y-Strainer

Optional Accessories:

Pressure Reducing Valve

Patented Purging Circuit

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