

Modular Water Analysis System **Capital Controls[®] MicroChem[®]3**

The MicroChem[®]3 is a versatile multi-parameter instrument capable of being configured as a transmitter or PID controller.



Specifically designed for drinking and wastewater treatment plant applications, the MicroChem[®]3 instrument is able to measure up to three of the following parameters:

- pH
- ORP
- Chlorine
- Chlorine Dioxide
- Conductivity
- 4 - 20 mA

Capital Controls® MicroChem®3 Transmitter/Controller

Specifically designed for drinking and waste water treatment plants, the MicroChem®3 is able to measure up to three of the following parameters: pH, ORP, Chlorine, Chlorine Dioxide, Conductivity, and 4-20 mA. The MicroChem®3 can be configured as an Analyzer/Transmitter or a Controller.

Analyzer/Transmitter - The MicroChem®3 is capable of accepting signal(s) from up to three sensors representing a wide variety of measurements.

Controller - The MicroChem®3 can provide control of the measured parameter using a standard PID algorithm in conjunction with the sensor input signal, or as a PID Compound Loop controller utilizing the signal from the sensor and an optional 4-20 mA process flow signal. Two outputs are available from each channel card. One control output is available both as a 4-20 mA control signal or a pulse width modulation output. A second software configurable 4-20 mA output signal is available on each configured channel.

Design Features

- Color touch screen display provides an easy to use operator interface.
- Menu driven software design guides user through set-up and operation.
- Modularity & flexibility: Additional channels are easily added and field sensors can be changed to achieve new measurements.
- Capable of receiving inputs from up to three (3) sensors and/or 4-20 mA signals.
- Retransmits two (2) 4-20 mA signals per channel card. Up to six (6) total per instrument.
- Serial communications available via RS232/422/485 via MODBUS protocol.
- Full modem RS232 port available for connection to an external modem which allows e-mail messages to be sent from instrument. Messages provide current channel status and any alarms present.
- USB 2.0 connector to interface USB memory media to instrument. Capable of downloading data log file and instrument configuration.
- Simplicity of use is also assured by message driven menus displayed in one of the following software selectable languages: English, French, German, Spanish, Chinese and Italian.
- Up to eight (8) relay outputs available.
- On-screen Alarm and warning messages.
- Alarms and deadband can be freely changed via software.
- Automatic temperature compensation for Chlorine and pH measurements.
- Measures and indicates the sample temperature value for all cells with temperature compensation.
- Password protected menus.
- The MicroChem®3 Controller function utilizes specific PID algorithms for pH and Chlorine/ORP.
- Calibration is performed without opening the instrument cover via a color touch-screen display.
- Diagnostics screen available to aid in trouble shooting
- Housing suitable for outdoor installations (IP65/NEMA 4X protection)





Technical Data - Capital Controls® MicroChem®3 Instrument:

Display:

- LCD color display resolution 480x272
- Resistive touch panel
- LED backlight control

Power Supply: (2 options available)

- Nominal 110-240 Vac 50-60 Hz 65 VA (AC version)
- 24 Vdc \pm 10% 3.15 A (DC version)

Enclosure Classification: IP65/NEMA 4X suitable for outdoor mounting.

Analog Outputs: Two for each installed channel card. Output 1 is configurable as either 4-20 mA or PWM output. The output is then assigned in software to represent retransmission of the measured parameter, sample temperature or PID control signal. Output 2 is a 4-20 mA signal that is software assignable to represent retransmission of the measured parameter or sample temperature.

Relay Outputs: Eight (8) relay outputs, 230 Vac 8A (AC versions) or 24 Vdc 2A (DC versions). Contact output status can be selected as NO or NC separately for each contact by software.

Auxiliary Input: One channel configurable as 4-20 mA or pulse width modulation. To be used for connection of process flow meter for select control schemes.

Digital Inputs: Eight (8) digital inputs available, software assignable to the installed channel cards.

Serial Communication Interconnection: RS232/422/485 via MODBUS protocol.

External Connections:

- All wiring connections made by removable spring type terminals
- USB 2.0 connector for connection to USB type memory media
- Full modem RS232 terminals to allow connection to an external modem

Storage Temperature Limits: -20°C to 70°C (-4°F to 158°F)

Operating Temperature Limits: -10°C to 60°C (14°F to 140°F)

Maximum Relative Humidity: up to 95%

Accuracy: Depends upon wet end

Housing Dimensions: 220 mm x 250 mm x 120 mm (8.6" x 10" x 4.8")

Capital Controls® MicroChem®3 Series MC4000 Measure Cell

The MC4000, in conjunction with the MicroChem®3 transmitter/controller, forms a simple and reliable system for measuring free residual chlorine, chlorine dioxide and temperature.

Optional 12 mm Probe measurements are also available.

- Two concentric electrodes perform analysis
- Sand placed in measure cell provides constant cleaning action to electrodes
- Flow regulator maintains constant flow at the inlet with no external pressure reducing valves required
- Designed for multiple simultaneous measurements

The cell body can be mounted with the following options:

- ORP electrode
- pH electrode
- Conductivity electrode
- Combination of any two



Capital Controls® MicroChem®3 Series MC5000 Measure Cell and Probe

The MC5000 measure cell and probe, in conjunction with the MicroChem®3 transmitter/controller, form a simple and reliable system for measuring free residual chlorine WITHOUT the addition of reagent.

- 3-electrode amperometric design eliminates repeated zero adjustment
- Rugged design in durable PVC and stainless steel
- Lower pH dependence; does not require pH compensation
- No moving parts on probes means less maintenance
- Air bubble formation on the membrane surface is reduced using specifically designed measure cell for improved system reliability



Capital Controls® MicroChem®3 Series MC6000 Measure Cell

The MC6000 in conjunction with the MicroChem®3 instrument forms a complete system for measuring residual chlorine. The amperometric-based measure cell is designed to continuously analyze free or total chlorine over the range of 0-20 mg/L for waste water, drinking, cooling water and other process water applications.

The measure cell is panel mounted and comes complete with a built in pressure reducing valve to control sample inlet pressures up to 150 psi. Reagents are fed by a gravity fed system incorporating a seven (7) day supply of reagent. Extra-large gold and copper electrodes are used for maximum signal strength making this measure cell particularly well suited for sometimes difficult wastewater applications. Water sample temperatures are measured, displayed and allow for automatic compensation of the chlorine levels.

The MC6000 measure cell is constructed using corrosion resistant materials. Each measure cell is supplied with sample and drain tubing as well as extra connectors to make installation easy at site. A convenient wire tray is provided at the top of the panel to organize the wire connections to the MicroChem®3 Instrument.

Capital Controls® MicroChem®3 Series MC7000 Measure Cell

The MC7000 in conjunction with the MicroChem®3 instrument forms a complete system for measuring residual chlorine. The amperometric-based three electrode measure cell is designed to continuously analyze free or total chlorine over the range of 0-20 mg/L for drinking, waste water, cooling water and other process water applications.

The measure cell is panel mounted and comes complete with a built in pressure reducing valve to control sample inlet pressures up to 150 psi. A flow switch is included to alert the user in case of sample flow failure. A third electrode is utilized in the MC7000 cell to further bias and stabilize the chlorine readings. Reagents are fed by a peristaltic pump assembly for up to a maximum 5 week supply of reagent(s). Water sample temperatures are measured, displayed and allow for automatic compensation of the chlorine levels.

The MC7000 measure cell is constructed using corrosion resistant materials. Each measure cell is supplied with sample and drain tubing as well as extra connectors to make installation easy at site. Optionally, an additional 12 mm electrode can be inserted into the sample inlet area allowing for example the capability to measure pH as well. A convenient wire tray is provided at the top of the panel to organize the wire connections to the MicroChem®3 Instrument.



Capital Controls® MicroChem®3 Series MC2100 pH Probes and MC2300 ORP Probes

pH and ORP probes are available in two different sizes. 12 mm probes are available for use in select measure cells or in a standalone 12 mm flow cell. Insertion probes are available for direct tank mounting or into a 3/4" NPT pipe fitting. Consult the probe parts lists and price pages for available cable lengths and mounting options.

12 mm Probes:

The 12 mm probes can be installed in the MC4000, MC5000, MC7000 measure cells or in a standalone flow cell. Most pH probes include built in temperature sensor that compensates for changes in sample temperatures. The only exception are the probes used with the MC4000 that utilize the temperature sensor included with this cell. ORP probes do not utilize temperature compensation and are not provided with built in temperature sensors.

Immersion Probes:

Both the pH and ORP probes are mounted inside a robust Ryton housing. Immersion probes can be mounted directly to a 3/4" NPT pipe connection or submerged into a tank. The probes have flat surface electrodes that provide a self-cleaning action as the fluid sample passes over the element. pH probes include a built in temperature sensor to allow compensation of the measurement as the sample temperature changes. ORP probes do not utilize temperature compensation and are not provided with built in temperature sensors.



Capital Controls® MicroChem®3 Series MC2500 - Conductivity Probes

A conductivity measuring system incorporating the MC2500 conductivity probes, the conductivity amplifier and the MicroChem®3 transmitter, provides automatic measurement/control of conductivity.

The probes are suitable for mounting in the MC4000 chlorine cell (12 mm diameter), separate acrylic 12 mm flow cells or supplied in a robust housing for immersion or pipe mounting.

The conductivity probes contain two electrodes across which the electrical conductivity is measured.

The probes are connected to a conductivity amplifier where the amplified signal is sent as a 4 to 20 mA signal to the MicroChem®3 transmitter/controller.

Choose either: a) the 12 mm diameter probe which fits into a specially designed acrylic flow cell or b) 25 mm (1 inch) industrial housed dip probe which is fully water proof and can be used as an immersion probe.



Specifications:

Series	MC4000 Measure Cell	MC5000 Measure Cell & Probe	MC6000 Measure Cell	MC7000 Measure Cell	MC2100 & MC2300 Probes	MC2500 Probe
Measurement Type	Free Chlorine or Chlorine Dioxide	Free Chlorine	Free/Total Chlorine	Free/Total Chlorine	pH (2100)/ORP (2300)	Conductivity
Electrodes	Two: Gold (working), Copper (counter)	Three: Gold (working), Stainless Steel (counter), Silver/Silver Chloride (reference)	Two: Gold (working), Copper (counter)	Three: Gold (working), Copper (counter), Silver/Silver Chloride (reference)		
Range	0 - 10 ppm	0.01 - 2.0 ppm 0.01 - 5.0 ppm 0.01 - 10.0 ppm	0 - 20 ppm	0 - 20 ppm	0 - 14pH units (0 - 12pH w/o Na = error) 1500 to 1500 mV ORP	10 - 10000 μ S/cm
Accuracy	Chlorine/ Chlorine Dioxide \pm 5% of f.s.	\pm 5% of range	\pm 1% of range	\pm 1% of range	\pm 0.2 pH units. Accuracy decreases above 12 pH (sodium ion error occurs)	1% of range
Applications	Drinking/clean water where reagent-free measurements are required & pH of the sample is <7.5	Drinking/clean water where bufferless measurement is desired at up to 9.0 pH	Waste/Drinking/Process water with elevated or unstable pH levels	Drinking/Waste/Process water where three electrode measurements are required	All conventional applications	All conventional applications
Sample inlet pressure	0.2 - 4 bar (7.5 - 60 psi)	2 - 15 psi, sufficient to produce 0.5 L/min sample flow. Pressure up to 150 psi possible with optionally available pressure regulating valve	0.3 bar min to 10.4 bar (5 psi min up to 150 psi)	0.3 bar min to 10.4 bar (5 psi min up to 150 psi)	Immersion Probe 0 - 4.8 bar (0 - 70 psi) 12mm Probe 0 - 1 bar (0 - 14.7 psi)	Immersion probe: 0 - 8 bar (0 - 120 psi) 12mm probes in flow cell: 0 - 1 bar (0 to 14.7 psi)
Sample Temperature	Temperature compensation from 2°C to 50°C (36°F to 122°F)	0°C to 45°C (32°F to <113°F)	0°C to 50°C (32°F to 122°F)	0°C to 50°C (32°F to 122°F)	0°C to 70°C (32°F to 158°F)	0°C to 50°C (32°F to 122°F)
Sample Flow	60 L/h (16 g/h)	30 L/h (8 g/h)	9 L/h (2.4 g/h)	9 L/h (2.4 g/h)		
Sample Inlet	3/8" O.D Tube	1/4" O.D Tube	1/4" O.D Tube	1/4" O.D Tube	1/4" O.D Tube	
Sample Drain	3/8" Tube	1/2" Tube	1/2" Tube	1/2" Tube		
(Panel Mounting) Dimensions	269mm (h) x 160mm (l) x 143mm (d) [10 9/16" (h) x 6 5/16" (l) x 5 5/8" (d)]	470mm (h) x 457 mm (l) x 153 mm (d) [18.5"(h) x 18" (l) x 6"(d)]			Dip probes: 152mm x 25.9mm (d) (6" x 1" approx.) 12mm probes: 152mm x 12mm (d) (6" x 1/2" approx.) Flow cell: 380mm (h) x 80mm (w) x 55mm (d) [18" (h) x 3" (w) x 2 1/2" approx. (d)]	

Let our experts advise the best option for your application.



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