MicroChem®2 Series 4000

The MicroChem®2 is a versitile multiparameter instrument capable of being configured as a transmitter, PID controller, or swimming pool controller.

Specifically designed for drinking and wastewater treatment plants and swimming pool applications, the MicroChem®2 instrument is able to measure up to three of the following parameters:

- pH
- ORP
- Chlorine
- Chlorine Dioxide
- Conductivity
- 4-20 mA
- Dissolved Oxygen
- Temperature (PT100)

For more information on MicroChem®2 Series 4000 visit **www.severntrentservices.com**

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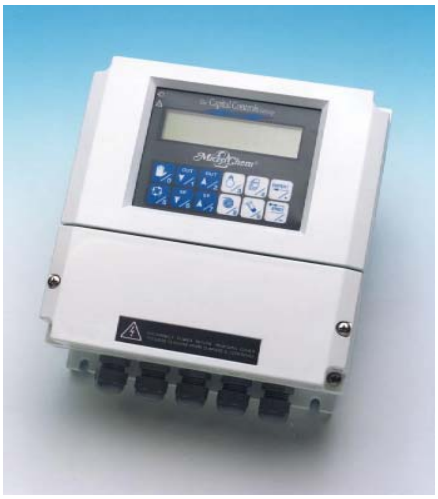
Series 4000 Transmitter/Controller

Specifically designed for drinking and water treatment plants and swimming pool applications, the MicroChem®2 is able to measure up to three of the following parameters: pH, ORP, Dissolved Oxygen, Chlorine, Chlorine Dioxide, Conductivity, 4-20 mA, and Temperature (PT100).

The MicroChem2 can be ordered in the following configurations:

ANALYZER/TRANSMITTER - The MicroChem2 is capable of accepting signal(s) from up to three sensors representing a wide variety of measurements.

CONTROLLER - The MicroChem2 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 flow signal. Control output is available both as a 4-20 mA control signal and as a time proportional contact output. PID control is available if the 4-20 mA output signal is used. Gain and cycle time are used if the instrument is configured to control using relay contacts. If so, 4-20 mA retransmission signal is available on each configured channel. Optionally, an additional 4-20 mA output is available to retransmit the measured value if a 4-20 mA output signal is used for control.



SWIMMING POOL CONTROLLER - The MicroChem2 receives signals from pH, ORP and/or chlorine sensors and displays the measured values. It performs specific PID algorithms on pH and chlorine or ORP. The control is performed via a 4-20 mA output signal or with relay contacts. PID control is available if the 4-20 mA output signal is used. Gain and cycle time are used if the instrument is configured to control using relay contacts. If so, 4-20 mA retransmission signal is available on each configured channel. The MicroChem2 is also able to display and retransmit the sample temperature.

Design Features

- Capable of receiving inputs from up to three (3) sensors and/or 4-20 mA signals.
- Retransmits up to three (3) 4-20 mA signals.
- Measures, indicates and retransmit the sample temperature value.
- Galvanic isolation between inputs and outputs.
- Two (2) digital inputs (contacts).
- Up to seven (7) relay outputs, Contact outputs can be individually set as NO or NC via software.
- Modularity & flexibility: Additional channels are easily added and field sensors can be changed to achieve new measurements.
- Simplicity of use is also assured by message driven menus displayed in one of the following software selectable languages: English, French, German, Spanish and Italian.
- Alarms and deadband can be freely changed via software.
- Automatic temperature compensation.
- Password protected menus.
- Alarm and warning messages.
- Output freezing capability.
- Ability to drive a cleaning sequence for the sensor via dedicated software and relay contact outputs.
- Single point calibration procedure available for pH.
- The MicroChem2 Controller is capable of accepting a 4-20mA input signal as a Feed Forward parameter in the PID algorithm.
- Housing suitable for outdoor installations (NEMA 4, IP65 protection)
- Configuration and calibration are performed without opening the instrument cover via a membrane keypad and display.
- The MicroChem2 Swimming Pool Controller utilizes specific PID algorithms for pH and Chlorine/ORP.
- Self diagnostics
- Sensor sensitivity check during calibration procedure.
- Variety of Measurements; Chlorine (Free & Total), pH, ORP, Dissolved Oxygen, Chlorine Dioxide, Conductivity, 4-20 mAdc signal and Temperature.

Technical Data - Series 4000 Transmitter/Controller

Instrument Specifications:

Display: 2 Line x 16 LCD display with back light

Power supply: 115/230 Vac (~), ±10%, 50/60 Hz

Housing construction material: Goodlac V0 532 ULSD F17 self extinguishing tested according UL 94 and classified V0 (material ABS plus 17% fiberglass)

Enclosure classification: NEMA 4, IP65 suitable for outdoor mounting

Mounting: Hardware is supplied for wall mounting

Analog outputs: one for each installed channel; separately selectable for each channel, as 4-20 mA. Outputs are galvanically isolated from inputs. Load 0-1000 ohms, protected against short circuits.

Relay outputs: 24 V … (Vdc), 115/230 V~ (Vac), 3A max. Contact output status can be selected as NO or NC separately for each contact.

Serial communication interconnection: RS485 or RS232 serial port.

Storage temperature limits:
-40°F to 150°F (-40°C to 65°C)

Operating temperature limits:
15°F to 122°F (-10°C to 50°C)

Thermal drift: within 0.2% of full scale for a 50°F (10°C) temperature change.

Maximum relative humidity: 80% with temperature up to 31°C (88°F), with linear decrease down to 50% with temperature 40°C (104°F)

Accuracy: Depends upon wet end

Transmitter response time: 100 ms

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

Weight: 6.6 lbs (3 kg)

Calibration procedures: for each channel and for each type of measurement a dual point calibration procedure is required. For pH a single point fast calibration procedure is also available. During dual point calibration procedure a sensor sensitivity check is performed.

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Measuring range: freely selectable for each channel, within the limits indicated for each parameter:

Parameter	Span Range
KC4000	
pH	0.00 - 14.00
Oxidation Reduction Potential (mV)	-1500 / +1500 mV
Chlorine, Free or Total	0 - 10 ppm
Chlorine Dioxide	0 - 10 ppm
Temperature	0 - 100 °C
Conductivity	10 - 10,000 µS
DO4000	0 - 20 ppm
CL4000	
Free	0 - 2 ppm
Free	0 - 5 ppm
Free	0 - 10 ppm
RX4000	
Oxidation Reduction Potential	-1500 -/+ 1500 mg
pH4000	0 - 14 ppm

Panel Mounted MicroChem®2 & Chlorine Probe Flow Cell (Recommended use with CL4000 probes)

The Panel mounted MicroChem2® & chlorine flow cell is fully assembled with all flow control components; and the instrument is set to the proper voltage, with a power cord (120V only) mounted on a polypropylene back board that is 20” (508mm) H x 24” (610mm) W. It provides a neat aesthetically pleasing way to install the MicroChem2 transmitter and CL4000 bufferless chlorine probe measuring system. Each panel has a built in sample point for calibration verification and comes complete with chlorine probe cable, sample and drain tubing. The flow cell will accept one 25mm chlorine probe and one 12 mm pH or ORP probe to allow for dual measurements in a single sample stream. When ordered with the optional pressure reducing valve the panel can accept water sample pressures up to 150 psig.

Installation is straight forward. Simply insert the CL4000 probe and/or 12mm probe into the flow cell, connect the probe(s) to the MicroChem, plug in the power cord, connect the sample and drain lines and the instrument is ready to go.

Series CL4000 Chlorine Probes used with MicroChem®2

The CL4000 chlorine probes, in conjunction with the microprocessor based MicroChem®2 transmitter/ controller, form a simple and reliable system for measuring free residual chlorine WITHOUT the addition of reagent.

The system is primarily used for measuring chlorine in clean water, such as in drinking water treatment plants and cooling systems.

The chlorine probes are 3-electrode amperometric cells covered with a permeable membrane. The 3-electrode design eliminates the need for repeated zero adjustment typical of some analyzers.

The probe exterior is manufactured from durable PVC and stainless steel and has a diameter of 25mm (1 inch). The probes are engineered to fit in a specially designed flow cell.

The 3-electrode probes have significantly lower pH dependence and can be used without the need for pH compensation.

All the CL4000 probes are designed to run bufferless.

The probes have no moving parts and are designed to require minimal maintenance. Typically the membranes are replaced annually.

Technical Data - Series CL4000

Probe Types and Ranges

Free CL_2 (3 electrode), ranges available 0-2, 0-5 and 0-10 ppm

Measurement Method: Amperometric

The amperometric method is EPA approved for on-line chlorine residual monitoring in drinking water.

Temperature Compensation: internal

Accuracy: ±5% of range

Applications: Drinking/clean water There should be no surfactants in the sample.

Sample Inlet Pressure: 2 to 15 psig, sufficient to produce 0.5 L/min

Sample temperature: 41° to 104°F (5° to 40°C)

Material of Construction

Working and Counter Electrodes: gold and stainless steel

Reference Electrodes: silver/silver chloride

Probe outer: PVC, stainless steel

pH: 4 to 9.0 signal change is less than 5% per step change

Sample Flow: 30 liters per hour (8 GPH)

Sample inlet:

1/4 OD tube

Sample Drain: 3/4” tube

Outline and mounting dimensions:

Flow through cell:

14.6” (h) x 2” (l) x 2.4” (d) (370mm x 50mm x 60mm)

Probe:

1”(d) x 9”(l) (25mm x 230mm)

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Series KC4000 Measuring Cell

The MicroChem®2 measuring cell Series KC4000, in conjunction with the microprocessor based MicroChem®2 transmitter/controller, forms a simple and reliable system for measuring residual chlorine (free and total) chlorine dioxide and temperature. Optional pH and ORP measurements are also available.

The system is primarily used for measuring chlorine or chlorine dioxide in clean water, such as in swimming pools, drinking water treatment plants and cooling systems, but can be also used in wastewater treatment plant applications when provided with the suitable filters (y strainer).

An amperometric cell composed of two concentric electrodes performs the analysis. The sensitivity of the cell is kept constant through the gritting action of a measured amount of Corundum sand placed in the electrode chamber at start up. The amperometric cell is furnished in a plexiglass body internally shaped as a reverse cone.

The cell body, with the exception of the KC4200, can be mounted with the following options:
- ORP electrode
- pH electrode
- Conductivity electrode
- Combination of any two

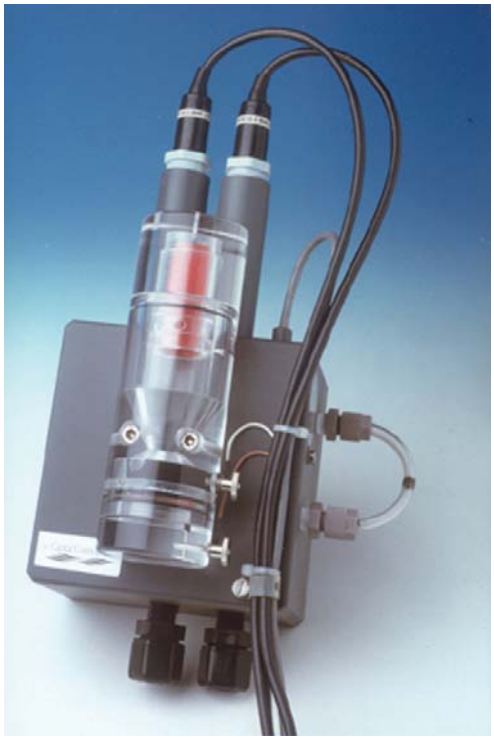
The flow regulator to which the KC cell is mounted maintains a constant flow at the inlet without any valves for samples with pressure varying inside the limits 7.5 to 60 PSI.

PVC flow regulator housing is suitable to fit a pH, conductivity and ORP electrode (optional) and a temperature sensor (included) of standard dimensions. This system is specially designed for multiple simultaneous measurements such as swimming pool applications. Under normal circumstances when measuring chlorine, sample pH correction is not usually required. The correction is only needed when measuring chlorine in a sample with a pH higher than 7.5 or highly variable.

Measuring cells can be supplied in different versions:
- standard (Model T17KC4100) for low sample pressure, with-out DP regulator, 0.1 to 0.5 bar (1.4 to 7 psig)
- standard (Model T17KC4200) includes: IP66 case, cell, electronics, cable, and PT thermistor. (IP66 case only available with 4200). (12mm probes not available for 4200). For indoor/outdoor installation. Provides protection against dust & water.
- standard (Model T17KC4400)
- standard (Model T17KC4500) with pH electrode
- standard (Model T17KC4600) with pH and ORP electrode
- standard (Model T17KC4700) for hot water 35.6°F to 149°F (2°C to 65°C)

Reagent Feed Options:

- Peristaltic Pump
- 120/240 Volts specified at time of order
- 19-liter reagent bottle(s)
  - one bottle shipped for free chlorine applications
  - two bottles shipped for total chlorine applications
- Reagent consumption - 10 liters/month
- Dimensions (reagent panel) 13.28” x 12.00” (337mm x 305mm)



Technical Data - Series KC4000

- Residual chlorine (free & total), chlorine dioxide and temperature
- Self cleaning electrodes
- Temperature compensation
- Swimming pools
- Wastewater treatment applications
- Potable water

Electrodes: gold measuring electrode, copper counter electrode

Type of measurements: free chlorine, total chlorine (with sample conditioning system), chlorine dioxide, ozone, pH and ORP, temperature, and conductivity

Chlorine Measurement Method: Amperometric

The amperometric method is EPA approved for on-line chlorine residual monitoring in drinking water.

Temperature compensation: standard, Pt 100 temperature element

Accuracy: chlorine/chlorine dioxide ± 5% of f.s.

pH: Accuracy is ± 0.2 pH units. When pH is higher than 12 the accuracy decreases.

Sample inlet pressure: 7.5 - 60 PSI (0.2 - 4 bar).

Sample temperature: temperature compensation from 36°F to 122°F (2°C to 50°C)

Limit of Detection: 10 ppb

Material of construction:
Electrodes: copper and gold
Cell: plexiglass
Pressure regulator: PVC

pH: no pH correction needed when measuring free chlorine if the pH is inside the limits of 4-7.5 and steady. The higher the pH the smaller the fluctuations allowed. The cell can be supplied with an optional reagent addition system.

Sample flow: 16 GPH (60 l/h)

Outline and mounting dimensions:
12.6” (h) x 7.9” (l) x 5.9” (d)
(320mm x 200mm x 150mm)

Weight: 6.6 lbs (3 Kg)

Measuring Ranges	
Chlorine	0 - 10 ppm
Chlorine Dioxide	0 - 10 ppm
pH	0 - 14
ORP (mV)	-1500/+1500
Temperature	0 - +100°C
Conductivity	0 - 99,999 µS

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Series pH4000 pH and RX4000 ORP Probes

pH4000 Electrode: pH electrodes are 12mm in diameter, not temperature compensated and are designed for use with the KC4000 cell (PT100 temperature sensor is provided with the KC4000 housing). They are also used in the pH4000 Immersion probes.

Pipe Insertion Electrode with Built-in Temperature Compensation: A flat surface probe used in conjunction with a saddle tap, 1" insertion assembly and a ball valve is also available. The probe self cleans using the sample-flow.

pH4000 Electrode with Built-in Temperature Compensation: Electrodes feature a built-in PT100 within the 12mm epoxy body for temperature compensation. The primary use for these electrodes are to run along side the Cl4000 chlorine electrode and have been designed to be used in the acrylic flow through cell.

pH4000 and RX4000 Immersion Probes: The pH4000 Immersion Probes are available with gel electrolyte for general applications. They are supplied in a durable PVC immersion housing with a built-in PT100. They can be inserted directly into tanks, channels, or the specially designed flow cell (P/N 1T811B012U03, UK P/N 01-4041) which is piped in-line. Optionally the probes can be provided with nozzle devices for water or chemical jet cleaning

For applications that may contain fouling or fat/grease substances an optional cleaning nozzle accessory is available for automatic cleaning.

Technical Data - Series 4000 pH Probes and ORP Probes

- Temperature compensated measurement
- Simple to install and requires infrequent maintenance
- Optional cleaning nozzle for automatic cleaning
- Gel filled probes for typical drinking water and waste water applications

Measuring Range: 0-14 pH units (0-12 pH w/o Na+ error), -1500 to 1500mV (ORP)

Reference Gel Electrode: Ag/AgCl, KCl gel

Accuracy: ± 0.2 pH units; accuracy decreases above 12 pH (sodium ion error occurs)

Temperature Compensation: PT100 via probe (KC) or built in sensor

Sample Temperature[1]: 32° to 212°F (0 to 100°C)

Sample Conductivity (pH): greater than 100 micro siemens for standard probes

Pressure: 0 to 2 bar (0 to 30 psi)

Wetted parts: glass, epoxy, Pellon (nylon mat)

Dimensions: 4.5" (115mm) L x 0.5" (12mm Ø)

Flow-through Cells for Immersion (Probe) Housing

Application: non-pressurized sampling lines

Hydraulic connections: 1/2 suitable for ½"NPT
Optional self cleaning available

Feeding line: PVC hose, 5M

Nozzle consumption: with 28psi water pressure, 250L/hr.

Temperature measurement: built-in PT100 sensor

Ambient temperature: 0-50°C

Wetted parts: PVC, hard rubber

Mounting Bracket, Immersion Probe: PVC

Length, Immersion Probe Housing: 15.75" (400mm)

Flow-through acrylic cell for pH4000 (with built-in PT100 sensor) or RX4000 ORP Probe

Ambient temperature: 0-50°C

Wetted parts: Acrylic

Sample inlet and outlet connections: 5/16" (8 mm) x ¼" (6mm) tubing

Hydraulic Connections: ¼" NPT

Dimensions: 13.75" x 3.125" x 3.375"D
(350 mm x 80 mm x 86 mm)

Insertion Assembly

Application: pH measurement within a pipe

Hydraulic Connections: 1 inch male NPT

Pressure: 0-6.9 bar (0-100 psi)

Temperature measurement: PT100 sensor built into the insertion assembly

Ambient temperature: 0-80°C

Wetted parts: CPVC, HDPE, and Viton® o-rings

Mounting: requires tapped pipe to which the insertion assembly is mounted

Probe Dimensions: 3 inches L x 0.9 inch dia.

Insertion Depth: 12 inches

Length, assembly: 18 inches

Cable length: must be specified at time of order

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Series DO4000 - DO Sensor

The Series DO4000 sensor, in conjunction with the MicroChem®2 Series 4000 transmitter is a simple and reliable Dissolved Oxygen measuring system. The immersion probes are designed for direct insertion into tanks, open channels and basins. A flow-through cell version allows measurements in continuous non-pressurized sampling systems.

The sensor cartridge is manufactured using a process that permanently encapsulates a solution of sodium chloride (common salt) behind a permanently bonded PTFE membrane. Since the electrolyte solution is common salt, there are no environmental or health & safety risks associated with the sensor. Unlike other systems that require membrane changes and electrolyte replacement, the DO4000 sensor is inexpensive and simple to install.

Dissolved oxygen passing through the membrane causes the electrodes to generate a current that is proportional to the concentration of dissolved oxygen in the sample. The sensor includes a thermistor to compensate the measurement for temperature variations.

The probes rugged design assures mechanical protection for the measuring cell and provides the IP68 ingress protection. The probe may be inserted to depths of 10 FT (3 m). When the measured sample contains suspended particles that may deposit on the membrane or bio fouling which can lower the probe sensitivity, a jet cleaning option is available. During the cleaning sequence the transmitter output is held at the last measurement.

Technical Data - DO Sensor

- Highly reliable and replaceable sensor cartridge eliminates membrane changes or electrolyte replacement.
- Large membrane surface provides for a higher gas exchange capability, ensuring reliability.
- Automatic temperature compensation corrects the measurement for temperature variations in the sample.
- Flow-through cell accommodates measurements in continuous non-pressurized sampling systems
- Optional cleaning nozzle
- Immersion and flow-through fittings are optionally supplied with a cleaning nozzle for aggressive coating applications.
- Sensor can be located up to 325 ft (100m) from the MicroChem®2 electronics

Sensor Cartridge: amperometric, with PTFE oxygen permeable membrane, maintenance free

Electrodes: Ag/Zn, with temperature sensor Pt100

Electrolyte: NaCl

Probes length: 320mm

Wetted parts: PPS/Teflon

Maximum immersion depth: 10 ft (3 m) (IP68 protection)

Sample temperature limits: 32 to 104°F (0 to 40°C)

Ambient temperature limits: 23 to 132°F (-5 to +50°C)

Sample flow: (minimal sample movement is required for accurate measurement) 0.2 ft/sec (60 mm/sec); visible water flow required

Measuring Range: 0 to 20 mg/L

Accuracy: ± 1 % of f.s.

Cable for the connection to the transmitter: 7 conductor, 0.2 mm diameter shielded cable, max length 100 m, with junction box (customer supplied).

Flow-though cell general specification

Wetted parts: PVC, hard rubber

Hydraulic connections: 1/2” Suitable for 1/2” NPT

Mounting: 2 brackets for wall mounting

Installation: for continuous non-pressurized sampling lines

Cleaning system general specification

Feed water tube: PVC hose, 16 ft (5 m)

Hydraulic connections: 1/4” NPT

Nozzle consumption: with a 28 PSI (2 bar) pressure water consumption is approximately 66 gal (250 l/h).

Series EC4000 - Conductivity Probes

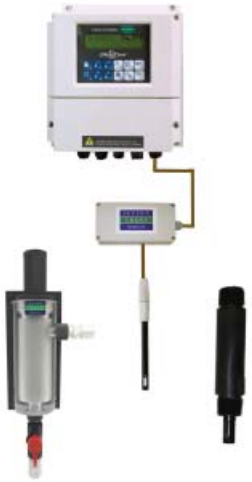
A conductivity measuring system incorporating the EC4000 conductivity probes, the conductivity amplifier and the MicroChem2 transmitter, provides automatic measurement/control of conductivity.

The probes are suitable for mounting in the KC4000 chlorine cell (12mm diameter), separate acrylic flow cells or supplied in a robust housing for immersion or pipe mounting (dip).

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 20mA signal to the Microchem 2 transmitter/controller.

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



EC4000 Conductivity Probe type	Range
EC4000 Standard Range Conductivity dip probe	10 - 10,000 µS/cm
EC4000 Conductivity Probe - 12mm Version	10 - 10000 µS/cm

Note: Each conductivIty probe must be used in conjunction with the amplifier box and with MicroChem2 analyzers/controllers with software version 2.8 or above.

Technical Data - Series EC4000

Sample Temperature: 32°F to 122°F (0 to 50°C)

Accuracy: Better than 1%

Reproducibility: Better than 1%

Recommended Siting: tanks or pipes

Pressure:
Dip probes 0 to 120psi (0 to 8 bar)
12mm probes in flow cell: 1 to 30 psi (0.1 to 2 bar)

Dimensions:
Dip probes: 6”x1” approx. (d) (150 x 25.9mm)
4” x ½” approx. (d) (120 x 12mm)
Flow cell: 18” (h) x 3” (w) x 2 ½” (d) approx. (380mm x 80mm x 55mm)

Sample inlet and outlet: Flow cell: 5/16” OD, 3/16” ID

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