



DEPOLOX[®] 3 PLUS RESIDUAL ANALYZER

WALLACE & TIERNAN[®] ANALYZERS/CONTROLLERS

The DEPOLOX[®] 3 plus residual analyzer continuously measures free or total (combined) chlorine, chlorine dioxide or ozone in drinking water applications. Utilizing proven and universally accepted amperometric measurement technology, this analyzer directly measures these disinfectant residuals and provides a 4-20 mA output signal for control or recording purposes. Integral alarm relays are provided. The analyzer is also available in an arrangement for measuring temperature and pH or fluoride.

FEATURES

Three electrode measuring cell

For disinfectant measurement, a three electrode technology measuring cell is used. This cell eliminates the need for the constant zero adjustment typical of other analyzers. Reliability and stability are vastly improved while maintenance is dramatically reduced. This technology is used in both the bare-electrode and membrane-type cells.

Reagentless chlorine measurement

The internally buffered membrane-type sensor measures free or total chlorine without the need for reagents. This includes samples with varying pH. With no chemical addition, the sample can be added back to the supply or simply drained without concern for discharge restrictions.

Flexible arrangements

There are two electronic control configurations: a single input version for disinfectant only measurement and a dual-input version for disinfectant and pH or fluoride measurement. In addition, a sample temperature output signal is available from both the single and dual input arrangements, dependent on the choice of flow cell. There are a total of five flow cell configurations: two that incorporate the integral bare-electrode measuring cell (DEPOLOX 3 plus and DEPOLOX 5 flow cell); two that accommodate the membrane-type measuring

Key Benefits

- Chlorine measurement without reagents
- Flexible arrangements - four flow cell and two electronic control units are available
- Advanced electronics housed in a NEMA 4X enclosure
- Reliable and stable measurement of residuals
- User-friendly menu driven access to set-up, calibration and diagnostics

cell (DEPOLOX 3 plus membrane-type and VariaSens™ flow cell); and a simple Y-type flow-thru probe holder for fluoride only measurement.

Advanced electronics

Housed in a NEMA 4X enclosure, the analyzer controls provide up to three isolated 4-20 mA output signals for disinfectant residual, temperature, and pH or fluoride. Configurable alarm relays and an RS 485 digital interface are also available. A backlit LCD display and a six-button keypad provide for a wide range of information, setup, calibration and diagnostic menus.

Choice of flow cell technology

To ensure a stable, representative measurement signal, a constant flow rate is required. This is provided by a choice of flow cells, dependant on the type of measurement technology that is used:

Bare-electrode type cell for free chlorine

This measurement technology features an integral, bare-electrode flow cell for free chlorine. Utilizing the three electrode cell design described above, this unique combination of analyzer/sensor provides a very quick response time (90% change < 20 sec.) with high accuracy ($\pm 2\%$ F.S.) to meet fluctuating disinfection demands or applications where there is a high degree of hardness, which prohibits the use of a membrane-type sensor. The well-proven principle of hydromechanical grit cleaning of the electrode surfaces maintains the sensitivity of the bare-electrode sensors extending the interval time between calibrations. A sample with a constant pH is required. Alternatively, the addition of a pH sensor, utilizing the dual input electronic package, provides for a pH-compensated free Cl_2 measurement without the need to buffer the sample.

DEPOLOX® 3 plus flow cell

This economical flow block assembly consists of a transparent Plexiglas body with an integral flow regulator to supply a consistent sample flow to the measuring electrodes. An integral PT 100 sensor provides for temperature compensation of the chlorine residual reading as well as a temperature measurement output signal. An additional sensor probe for pH or Fluoride can be added

through the flow cell cover.

DEPOLOX® 5 flow cell

This deluxe flow block assembly includes all of the features of the above DEPOLOX® 3 plus cell, except that an integral multi-sensor provides a PT 1000 temperature measurement and output and monitors sample flow to provide a loss-of-flow alarm contact.

Membrane-type cell

There are four disinfectant specific, membrane-type sensors available for measuring either free chlorine, total chlorine, chlorine dioxide, or ozone. Utilizing the three electrode measurement technology, these sensors incorporate a membrane for diffusion of the oxidant into the working electrode. An internal, buffered electrolyte reduces the effect of pH on chlorine measurement. Therefore, external pH buffering or pH compensation is not required for samples with a varying pH. Temperature compensation of the chlorine residual reading is built into the sensor.

DEPOLOX 3 plus membrane - type flow cell

This simple flow block housing is designed to provide a constant flow of water past the membrane surface of the removable sensor. Sensors can easily be changed to monitor different disinfectants. A water jet, designed into the flow block, removes any bubbles from the membrane surface, which can affect accuracy and stability. An additional sensor probe for pH or Fluoride can be added through the flow cell cover. Note that a measured temperature output is not available with this flow cell.

VariaSens™ Flow Cell

In addition to the above, this flow block assembly utilizes an integral flow regulator to maintain the sample flow at a constant 33 l/h. An integral multi-sensor provides a PT 1000 temperature measurement and output and monitors sample flow to provide a loss-of-flow alarm contact.

Fluoride-Only Measurement

If fluoride is the only parameter to be measured, then a simple, flowthrough probe assembly can be provided. This consists of a Y-type flow-thru probe holder and a sample valve. Note that temperature measurement and output is not available with this configuration.



BARE-EL. MEASURING CELL



DEPOLOX® 5 CELL



MEMBRANE MEASURING CELL



VARIASENS™ FLOW CELL

TECHNICAL DATA - DISINFECTANT MEASUREMENT

Measurand	Free Cl ₂ (membrane)	Total Cl ₂	ClO ₂	O ₃	Free Cl ₂ (bare electrode)
Range	0-0.20 to 0-20 mg/l	0-0.20 to 0-20 mg/l	0-0.20 to 0-20 mg/l	0-0.20 to 0-10 mg/l	0-0.20 to 0-20 mg/l
Accuracy	0.05 mg/l or ± 6% F.S. Whichever is greater	0.05 mg/l or ± 6% F.S. Whichever is greater	0.05 mg/l or ± 6% F.S. Whichever is greater	0.05 mg/l or ± 6% F.S. Whichever is greater	0.01 mg/l or ± 2% F.S. Whichever is greater
Sensitivity	0.01 mg/l or ± 1% F.S. Whichever is greater	0.01 mg/l or ± 1% F.S. Whichever is greater	0.01 mg/l or ± 1% F.S. Whichever is greater	0.01 mg/l or ± 1% F.S. Whichever is greater	0.01 mg/l or ± 1% F.S. Whichever is greater
Repeatability	0.02 mg/l or ± 3% F.S. Whichever is greater	0.02 mg/l or ± 3% F.S. Whichever is greater	0.02 mg/l or ± 3% F.S. Whichever is greater	0.02 mg/l or ± 3% F.S. Whichever is greater	0.01 mg/l or ± 2% F.S. Whichever is greater
Stability	± 5% F.S. under typ. Conditions for 1 month	± 5% F.S. under typ. Conditions for 1 month	± 5% F.S. under typ. Conditions for 1 month	± 5% F.S. under typ. Conditions for 1 month	2% F.S. under typ. Conditions for 1 month
Response Time	90% change < 5 minutes	90% change < 5 minutes	90% change < 20 seconds	90% change < 50 seconds	90% change < 20 seconds
Sample Temperature	41° to 113° F (+ 5° to 45° C)	41° to 113° F (+ 5° to 45° C)	41° to 113° F (+ 5° to 45° C)	41° to 113° F (+ 5° to 45° C)	41° to 122° F (+ 5° to 50° C)
Sample Flow (Potable Water Only)	6 l/h to 35 l/h constant	33 l/h ± 5 liter, constant			
Inlet Pressure	2 to 60 psi				
Outlet Pressure	0 psi				
Conductivity	> 10 mS/cm up to 2500 mS/cm	> 10 mS/cm up to 2500 mS/cm	> 1 mS/cm up to 40 mS/cm	> 1 mS/cm up to 40 mS/cm	> 250 mS/cm up to 100 mS/cm

pH dependence

Bare-Electrode sensor - pH 4 to pH 9 - must be stable;
pH compensation available with dual input unit membrane-type sensor (free and total chlorine) - usable range pH 6 to pH 10; maximum interference 5% per pH unit membrane-type sensor (ClO₂ and O₃) - none

pH Measurement

Measurement Range: pH 4 to 10 (standard);
pH 0 to 14 (optional)

Sample Temperature Range:

-23°F to 176°F (-5°C to 80°C)

Sensitivity: 0.01 pH

Conductivity: >300µS/cm

Fluoride Measurement

Measurement Range: 0.2 to 2.0 mg/l

Sample Temperature Range:

32°F to 176°F (0°C to 80°C)

Sensitivity: 0.01 mg/l fluoride

Conductivity: >300µS/cm

Electronics

Power Requirements: 115 V

±10%, 50/60 Hz, 14VA or 230 V

±10%, 50/60 Hz, 14VA

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

Enclosure Rating: NEMA 4X

Readout: 16-character, two-line, backlit LCD display

Electronics

Output Signal: 4-20 mA max. 1000 ohm load,
electrically isolated for up to 50 V to ground
1 for Disinfection Sensor

1 for Temperature (where available from flow cell)

1 for pH or Fluoride (dual input arrangement only)

External Alarms: Two electromechanical relays, user configurable (high, low, high/low, gen. fault, or off), for disinfectant. Selectable for N.O. or N.C. and latching or non-latching operation; (Optional)

Two electromechanical relays, user configurable for pH or fluoride.

Relay Contact Ratings: 5A 1/6 HP 125, 250 VAC or 5A 30 VDC 30 Watt max.

Digital Input: One dry contact input for sample water or circulating pump monitoring.

Digital Communication: RS485 interface for connection to programmable controller or central instrumentation and control systems via RS485 W&T protocol.

Access Code: A three-digit security code can be entered via the keypad to prevent unauthorized access to the operating parameters.



FLOW SWITCH



STOP VALVE



MICRO/2000® RESIDUAL ANALYZER



DEOX/2000® DECHLORINATION ANALYZER

Options

Sensor Cable Length: DEPOLOX® 3 plus bare-electrode and DEPOLOX® 5 flow cells: 3.3 ft (1 m) standard.

DEPOLOX® 3 plus membrane and VariaSens™ flow cells: Disinfectant membrane-type sensors - 6'6" ft (2 m) standard; 16'3" (5 m), 32'8" (10 m), 49'2" (15m), 82'0" (25 m) and 164'0" (50 m) optional; pH and Fluoride sensors - 4'10' (1.5 m) standard; 16'3" (5 m), 32'8" (10 m) and 49'2" (15 m) optional.

Flow Switch: Mounts on the inlet to the DEPOLOX® 3 plus bare-electrode and membrane flow cells. Provides alarm to electronic controls when there is a loss of sample to the flow cell. Not required with DEPOLOX® 5 and VariaSens flow cells.

Stop Valve: Mounts on the inlet to the wetside or on the flow switch. Provides easy shut-off of the sample flow for maintenance and service.

Chart Recorders: Available as circular chart type. Supplied with 400 24-hour or 100 7-day circular charts, one year's supply of fiber-tip pens. Available chart ranges: 0-0.2; 0-0.5; 0-1.00; 0-2.00; 0.5.00; 0-10.0; and 0-20.0.

Shipping Weight: Membrane wetside - 5 lbs.

Bare electrode wetside - 9 lbs.

Electronic enclosure (single or dual input) - 8 lbs.

Other residual analyzers available from Evoqua Water Technologies

Micro/2000® residual analyzer: A high-accuracy, extremely reliable monitoring and control instrument for potable water, wastewater, and cooling water treatment. Suitable for measuring free and total chlorine, chlorine dioxide, and potassium permanganate residuals.

Deox/2000® dechlorination analyzer: A precise instrument for accurately measuring both SO₂ and total chlorine residuals in wastewater effluent.



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