Liquid Analytical Instrumentation for Process Control

ELECTRO-CHEMICAL DEVICES

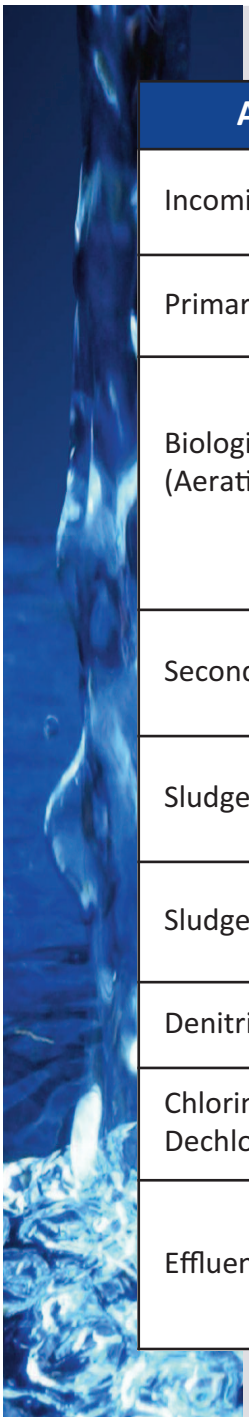
pH
ORP
Turbidity
Specific Ion
Conductivity
Water Analyzers
Dissolved Oxygen

INDUSTRIAL APPLICATIONS

Petro-Chemical Processing
Biotech & Pharmaceutical
Waste Water Treatment
Chemical Processing
Power Generation
Food & Beverage
Semi-Conductor
Industrial Water
Drinking Water

Electro-Chemical Devices (ECD), not only provides you access to a broad product line of application specific instruments and sensors .... you are also supported by a company with years of successful installations and application experience. This industry knowledge has been incorporated into each instrument and sensor design we manufacture. The following guide is a partial list and provides as an overview to various industrial applications that utilize ECD's products for a solution. Contact ECD and our worldwide sales representatives to solve your measurement requirements.

the liquid analytical instrument experts since 1977



Waste Water Treatment

Application	Measurements	Recommended Products
Incoming Sample	**pH, ORP AC10 Spray Cleaner**	Biofilm coating - use the AC10 spray cleaner, T80, S80 sensor with 2005145 pH electrode
Primary Clarifier	**Turbidity, Ammonium**	Turbidity - Triton®TR8 - High Range Ammonium Measurement - HYDRA NH4-N
Biological Treatment (Aeration Basin)	**Dissolved Oxygen, pH, Ammonium, Nitrate, Suspended Solids AC10 Spray Cleaner**	Dissolved Oxygen - Triton®DO8 with AC10 pH Measurement - T80 or C22 with S10 pH Sensor with 2005145 pH electrode Ammonium - Model HYDRA NH4-N Analyzer with AC10, Nitrate - Model HYDRA NO3-N Analyzer Suspended Solids - Triton®TR8, High Range
Secondary Clarifier	**Suspended Solids, Nitrate, Phosphate**	Activated Sludge Return-Triton®TR8-High Range Effluent from overflow or centrifuge Triton®TR8 Nitrate-HYDRA NO3-N, CA-6 Phosphate
Sludge Thickening	**Suspended Solids**	Sludge to Digester - Triton®TR8 - High Range Effluent from overflow - Triton®TR8
Sludge Digester	**Suspended Solids, pH, ORP**	Feed from Sludge Thickening - Triton®TR8, High range pH & ORP Sensors Model S10
Denitrification	**Nitrate**	Nitrate - Model HYDRA NO3-N Analyzer with AC10
Chlorination and Dechlorination	**Free Chlorine, Total Chlorine**	FCA-22 Free Chlorine Analyzer TCA-22 Total Chlorine Analyzer
Effluent	**pH, ORP, Conductivity, Dissolved Oxygen, Turbidity, Colorimetric**	pH & ORP Sensors Model S80 with T80 or C22 Toroidal Conductivity S10 Sensors with T80 or C22 Dissolved Oxygen-Triton®DO80, CA-6 Total Nitrogen, CA-6 Total Phosphorus Turbidity, suspended solids, Triton®TR8

S80, S10 & S17 Sensors

Multiple individual measurement parameters in the same mechanical configuration - **pH, ORP, Specific Ion, Dissolved Oxygen, Conductivity & Resistivity**. Features Include: application specific, replacable electrode cartridges, Various process fittings with adjustable insertion lengths, Industrial housing materials for compatibility with process fluid.

Petro-Chemical Processing

Application	Measurements	Recommended Products
Sour water/gas	**pH**	Sulfides poison electrodes - use T28 PHS10/17 and 2005130
Overhead crude	**pH**	Oil coating and sulfides - use T28 and PHS10/17 and 2005130
Waste Water Treatment	**pH, ORP, Turbidity Dissolved Oxygen, pION**	Coating and scaling - use T28 and PHS10/17 and 2005145, ORP for sulfide removal Turbidity - Triton®TR8 - High Range / Low Range Dissolved Oxygen - Triton®DO8 or S10 Sensor
Cooling Towers	**pH, ORP, Conductivity Cooling Tower Control Free Chlorine**	Biofilm coating - use AC10 spray cleaner, T28, S10 and 2005145 pH, 2005067 ORP and Toroidal Model 2122 Cooling Tower Controller, FCA-22 for oxidant control

Food and Beverage

Application	Measurements	Recommended Products
Concentration Control	**Conductivity**	For Highly Conductive Solutions use a T23 and a KYNAR toroidal sensor.
Waste Water Treatment	**pH, Ammonium Dissolved Oxygen**	Oily and Coating use a T23 with an S10/17 sensor and 2005145 electrode. Triton®DO8 dissolved oxygen, HYDRA NH4-N
CIP Control	**pH, Conductivity, Resistivity**	Two conductivity measurements on the C22, Toroidal for the wash cycle and resistivity for the rinse cycle.
Food Processing Sanitation, Vegetable or Fruit Rinse Wash Water	**Chlorine Dioxide Free Chlorine**	Use Model CDA-22 Chlorine Dioxide Analyzer The CDA-22 design avoids dirty rinse water from easily fouling or clogging the analyzer or if chlorine is used the FCA-22 will replace the CDA-22

Turbidity and Suspended Solids

The Triton®TR8 uses the nephelometric method for determining the turbidity of the sample. This method directs a light beam into the sample where it is scattered by suspended particles. The light is measured at an angle of 90°. The sensor uses a long lived near infrared LED source, has self monitoring diagnostics, and Factory Calibration stored in its memory that assures trouble free service.

Electronics and Semi Conductor

Application	Measurements	Recommended Products
Concentration Control	**Conductivity**	For Highly Conductive Solutions use a T80 and a S80 toroidal sensor
Rinsing	**pH, Resistivity**	The solutions are getting more dilute use T80 and S80resistivity, also possible pH neutralizations
Waste Treatment	**pH, ORP Dissolved Oxygen pION**	Possible Copper Ion, Fluoride Ion measurements, coating issues use a T80, S80 pH, ORP, pIon and dissolved oxygen sensors
De-ionized Water	**pH, Resistivity CA6 Colorimetric**	Resistivity is the control parameter, use T80 and S80resistivity, pH is a check, use S80 PH 2005145, CA6 for Silica break through on resin bed
Resin Regeneration	**Conductivity Resistivity**	Two measurements on the C22, Toroidal on the wash and resistivity on the rinse cycle.

Metals and Mining

Application	Measurements	Recommended Products
Chrome Reduction	**pH, ORP**	Easy application, but aggressive. Use T80 with S80 PH sensor with 2005130 electrode.
Cyanide Destruction	**pH, ORP**	Potential poisoning of the electrode. Use T80 with S80 PH sensor with 2005130 electrode.
Waste Water Treatment for Steel Manufacturing	**pH CA6 Colorimetric Analyzer**	Oily coatings use a T80 with an S80 sensor and 2005169 electrode. CA6 for monitoring metals content of effluent.
Floatation Separations	**pH**	Mineral coating, use AC10 spray cleaner and C22 with PHS10 sensor with 2005169 electrode
Chemical Concentration	**Conductivity pION**	Highly conductive, use T28 and a S10 KYNAR Torodial sensor
Rinse applications	**pH, Conductivity**	Wide pH swings, use T80 transmitter S80 PH and 2005145 electrode

Transmitters and Controllers

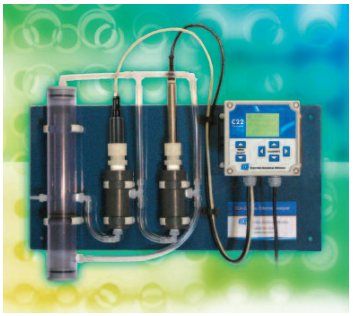
ECD manufactures a family of transmitters and controllers for multiple measurement parameters. The T80 Universal Transmitter is a loop powered 4 to 20 mA general purpose instrument. The Model T28 is a loop powered transmitter for use in hazardous locations. The C22 controller is a programmable instrument with numerous control functions.

Pulp and Paper

Application	Measurements	Recommended Products
Liquor Recovery	**pH, Conductivity**	Caustic and corrosive use T28, Titanium PHS17, 2005130 and 1" Toroidal
Head Box (Paper)	**pH**	The T80 with a S80 PH and 2005145 for variable insertion length and easy cleaning
Filtrate	**Turbidity**	Monitor cloudy filtrate and white water with high dry content - Triton®TR8
Pulp Stock	**pH, Conductivity**	Aggressive and Coating use T28 and PHS17 with 2005160 and Toroidal for conductivity

Chemical Processing

Application	Measurements	Recommended Products
Neutralizations	**pH**	Typically aggressive - use T28, PHS10/17 & 2005169
Concentration Control	**ORP, Conductivity**	Highly conductive - use T28 and KYNAR Toroidal P/N CS10/17
Waste Water Treatment	**pH, ORP, Turbidity Dissolved Oxygen Free & Total Chlorine pION**	Potential coating problems - use T80 and S80 PH and 2005145 electrode Turbidity - Triton®TR8 - High Range / Low Range Dissolved Oxygen - Triton®DO80 or S10 Sensor FCA-22 Free Chlorine Analyzer TCA-22 Total Chlorine Analyzer
Gas Scrubbers	**pH, ORP, Conductivity**	Caustic and corrosive - use T28, PHS17 and 2005130 pH and 2005067 for ORP.
Cooling Towers	**pH, ORP, Conductivity Cooling Tower Control**	Biofilm coating - use AC-10 spray cleaner on pH and ORP, C22 with 2 PHS10s and 2005145 pH, 2005067 ORP electrodes. T80 with S80 Toroidal. Model 2122 Cooling Tower Controller



Sanitizer and Water Analyzers

ECD manufactures several panel mounted analyzers that allow installation and commissioning to be completed in just a few simple steps. The disinfectant/sanitizer line of analyzers includes: the Model FCA-22 Free Chlorine Analyzer, TCA-22 Total Chlorine Analyzer, CDA-22 Chlorine Dioxide Analyzer and DCA-23 Seawater Chlorination/Dechlorination Analyzer.

Biotech & Pharmaceutical

Application	Measurements	Recommended Products
Product recovery	**pH Conductivity**	Solvents and high salt concentrations use T28 PHS10/17 with 2005169 and Toroidal sensor
Waste Treatment	**pH, ORP Dissolved Oxygen**	Oil coating and sulfides - use T28 and PHS10/17 and 2005130
High Purity Water	**pH, Resistivity CA6 Colorimetric**	Resistivity is the control parameter, use T80 and S80 resistivity, pH is a check, use T80 ans S80 PH, CA6 for SiO_2 break through in resin beds
Resin regeneration	**Conductivity Resistivity**	Two measurements on the C22, Toroidal on the wash and Resistivity on the rinse cycle.
Fermentation and Cell Culture	**pH, ORP Dissolved Oxygen**	SE Series Sterilizable/Autoclavable electrodes pH, ORP and DO and SF Series electrode fittings

Drinking Water

Application	Measurements	Recommended Products
Intake Water	**Chlorine Dioxide**	Use the CDA-22 Chlorine Dioxide Analyzer for color and odor control
Filtration	**pH Turbidity**	pH adjustment use T80 with S80 sensor and 2005145 electrode. Turbidity for filter backwash, use the Triton®TR8, Measure turbidity after filtration with Triton®TR8
Contact Tank	**pH Free & Total Chlorine Fluoride Ion**	For final pH adjust use T80 with S80 sensor and 2005145 electrode Monitor Chlorination, FCA-22, Monitor Chloramine, TCA-22 Analyzer Measure Fluoride Ion with T80 and S80 pION
Seawater Desalination	**Chlorination Dechlorination**	The DCA-23 is designed to monitor the Total Residual Oxidant and the pH of seawater and determine the equivalent chlorine concentration, to protect the RO membranes

Dissolved Oxygen Measurement

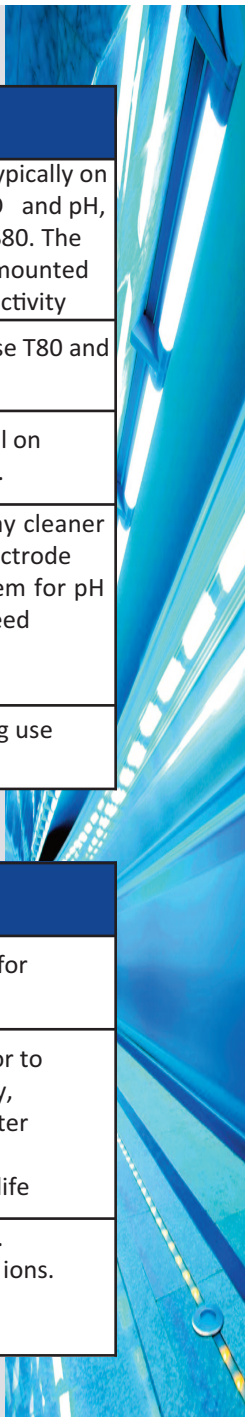
The ECD Triton®DO80 optical dissolved oxygen sensor combines the high technology of Fluorescence Quenching with a rugged, easy to install design, ideal for aeration applications. The Triton®DO9 amperometric DO sensor with auto polarization voltage optimization and 316 SS flow cell is ideal for the low level ppb measurements typical in boiler water.

Power Generation

Application	Measurements	Recommended Products
Boiler Water	**pH, Conductivity, Resistivity, pION, ppb DO, Boiler Blowdown System**	Each boiler will have 4-6 measurements typically on a water panel, conductivity, resistivity, DO and pH, Use 2 channel C-22 with S10 or T80 with S80. The Model 61 Boiler Blowdown System; rack mounted sludge trap and sample cooler with conductivity
De-mineralizers	**pH, Conductivity, Resistivity**	Noisy and expect shorter electrode life, use T80 and S80 PH sensor with 2005145 electrode
Resin Regeneration	**Conductivity Resistivity**	Two measurements with the C22, Toroidal on the wash and resistivity on the rinse cycle.
Cooling Towers	**pH, ORP, pION, Cooling Tower Control System, Free & Total Chlorine**	Biofilm coating is the problem use a spray cleaner with the C22 and PHS10 with 2005145 electrode Model 2122 Cooling Tower Control System for pH and conductivity to control acid or base feed Model FCA-22 Free Chlorine Analyzer Model TCA-22 Total Chlorine Analyzer
Gas Scrubbers	**pH, ORP Conductivity**	Coating with lime needing regular cleaning use T80 with S80 PH and 2005160 electrode

Aquaculture - Environmental

Application	Measurements	Recommended Products
Fish Farming	**Dissolved Oxygen**	The Triton®DO80 to maintain the oxygen for optimal growing conditions.
Aquatic Parks and Aquariums	**pH, ORP, pION Free Chlorine**	The T80 or C22 with S10/17/80 ORP sensor to control ozonation to improve water clarity, The FCA-22 Free Chlorine Analyzer for water sanitation at Aquatic Parks Monitor low level chlorine to protect sea life
Environmental Monitoring	**pH, ORP, pION Nitrate, Ammonium**	Monitor Streams, rivers, ponds, lakes, etc. Use T80 and S80 pION to monitor specific ions. The Hydra Analyzer to monitor Nitrate or Ammonium ions from agricultural runoff.



Industrial Applications

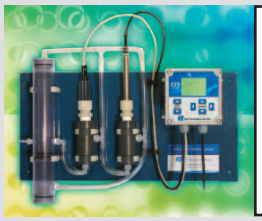
Model CA-6

The Model CA-6 Analyzers are a family of on-line sequential sampling colorimetric analyzers. These easy to use analyzers can perform most colorimetric analysis that use less than 4 reagents. 1-4 Analzer channels

The HYDRA Nutrient Analyzers are designed for monitoring nitrification and denitrification processes in a waste water treatment plant. The HYDRA-NH4 measures ammonium and the HYDRA-NO3, nitrate ion.

Model T80

The Model T80 Universal transmitter provides simplicity in a powerful package. This 24 VDC loop powered, 4-20 mA transmitter can measure pH, ORP, pION, Dissolved Oxygen, Conductivity or Resistivity.



Easy to use, plumb and play designs for measuring Chlorine. The FCA-22 for Free Chlorine, the TCA-22 for Total Chlorine and the CDA-22 for Chlorine Dioxide. Amperometric designs that require no reagents.

Model T28

The Model T28 microprocessor based two wire transmitter is FM and CSA approved for Class I, II, and III Division I Groups A through G environments allowing installation in intrinsically safe and explosion proof applications.

The Triton®TR8 is a nephelometric turbidity analyzer designed for use in water and wastewater. There are two versions, a Low Range for FNU values < 500 and a High Range for turbidities up to the % solids range.

C22 Controller

The C22 controller features a Multi-Bus architecture that allows up to (4) inputs and (4) 4-20 mA outputs and (8) field configurable SPDT relays, PID, PWM, timers and logic gates all in a 1/2 DIN NEMA 4X controller.

The Model 61 Automatic Boiler Blowdown Control System from ECD provides a reliable solution for the continuous control of the surface blowdown rate for commercial and industrial boilers.

Triton®DO80/DO9

TheTRITON® DO80 optical dissolved oxygen sensor combines high technology in a rugged reliable design for aerated water, while the TRITON®DO9 ppb dissolved oxygen sensor excels in boiler water.

The Model 2122 Cooling Tower Control System (CTCS) from ECD is an integrated system designed to control the acid feed, blow down and inhibitor/biocide feed to a Cooling Tower.

S80 / S10 / S17

The ECD sensors are ¾"O.D. with signal conditioner, temperature and replaceable sensing electrodes.Ball Valve Retractable and insertion, submersion designs are available in 316 SS, Titanium and Hastelloy C.

The rugged SE Series pH electrodes and SF Series fittings are in-situ steam sterilizable or autoclavable. The pH electrodes are a sealed gel filled design and the 316 SS fittings meet the EHEDG criteria.

Specifications subject to change without notice.

Represented by:

Electro-Chemical Devices
1500 North Kellogg Dr.
Anaheim, California, USA 92807
Phone: +1-714-695-0051
+1-800-729-1333
Fax: +1-714-695-0057
email: sales@ecdi.com
web: www.ecdi.com

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