Thermo Scientific Alpha Process Products

Thermo Scientific Alpha 2000 Series Controllers
• pH • ORP • Conductivity • Dissolved Oxygen

Part of Thermo Fisher Scientific

Thermo SCIENTIFIC

One Source. Total Solution

Recognised internationally for industry-leading quality and accuracy, companies all over the world choose Thermo Scientific Process Products for reliable process monitoring and control across a broad range of water and wastewater applications:

- Wastewater Treatment
- Drinking Water
- Chemical Processing
- F&B Manufacturing
- Seawater Desalination
- Pharmaceutical
- Power
- Electroplating
- Semiconductor

Consistent monitoring and control of water quality are vital in many industries. Thermo Scientific products are built to stand up to the demands of on-line continuous use, even under the most severe conditions. With the Alpha 2000 series, Thermo Scientific brings electrochemical processes in water and wastewater applications to a new level of reliability and versatility, offering flexible process control at an excellent price point.

Whether it's pH, ORP, Conductivity or Dissolved Oxygen you are measuring, the Alpha 2000 series delivers, accurately and consistently. Because at Thermo Scientific, reliability and ease-of-use aren't just features – they're fundamentals.

Reliability and ease-of-use aren't just features – they're fundamentals

Thermo Scientific Alpha 2000 Series Controllers/Transmitters:

The Controllers/Transmitters:
Thermo Scientific's Alpha 2000 Series controllers combine simple six-button operation with exceptional performance. Reliable and durable, each controller is built for ease-of-use and versatility, so it is easy to customise your processor according to your application needs. Meters come in ½ DIN wall and panel-mount or ¼ DIN panel-mount versions to suit your installation requirements.

- **Alpha pH 2000D** employs differential measurement technology, giving you a reliable system that measures pH/ORP accurately in harsh environments
- **Alpha pH 2000** features symmetrical mode of operation option for clear, accurate pH/ORP readings in electrically noisy environments
- With 4-cell and 2-cell electrode options, the **Alpha COND 2000** allows you to measure a broad conductivity range, from ultra-pure water to highly conductive samples
- **Alpha DO 2000** supports either galvanic or amperometric measurements, allowing a broad dissolved oxygen range of 0 to 20 ppm or 0 to 200 % saturation

The Electrodes:
Thermo Scientific offers a wide selection of process electrodes, buffers, standards and accessories to complement your process requirements.

- High-quality, double-junction **pH and ORP electrodes** with Kynar® or Annular PTFE reference junctions operate in environment from 0 °C up to 110 °C. Each electrode comes with integral low-noise semi-conductor cables (unless otherwise stated)
- 2-cell and 4-cell **Conductivity electrodes** that incorporate 3-wire Pt100 for automatic temperature compensation. Durable, low maintenance electrodes built with Titanium or SS316 give consistent performances in high temperature of up to 200 °C
- **Dissolved Oxygen electrodes** designed for minimal maintenance and quick, stable readings within short response time. Rugged and long-lasting galvanic electrodes require no warm-up time; low maintenance amperometric electrodes capture DO readings as low as 0.01 ppm

Main Features:

No Need for Recalibration After Power-Failure
Built-in non-volatile memory retains calibration and setup information even when power is cut off

Push-Button Calibration
Quick, convenient and easy

Menu-Driven Controls
With intuitive prompts and Electrode offset adjustment from keypad connectors

Advanced Switch Mode Power Supply (SMPS)
Auto-detection of power supply input from 80 V to 250 VAC/DC

Three Control Mode Options
Limit control mode for straightforward on/off operations, or proportional control mode and proportional integral control mode for processes that require finer controls

Front Panel

Three Layers of Password Protection
Greater security against unauthorized or accidental tampering of data and critical settings

Minimal Maintenance Required
Simply wipe occasionally with lint-free cloth to remove dust and dirt

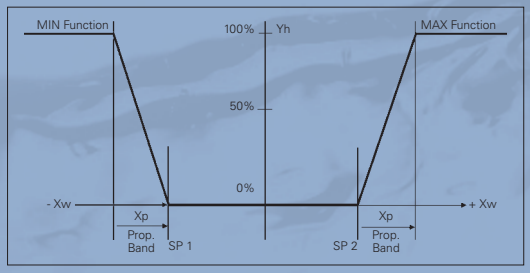
Large UV Light-Protected LCD Display with Backlight
For easy reading, even in dark places

IP66 (NEMA 4X) Rugged Housing Weatherproof and corrosion-resistant

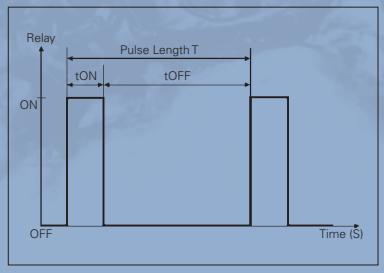
Bi-Colour LEDs
Clearly indicates relay status and mode of operation. Visible even from a distance

Manual Override
Facilitates quick processing with direct control on dosing pumps and cleaning system

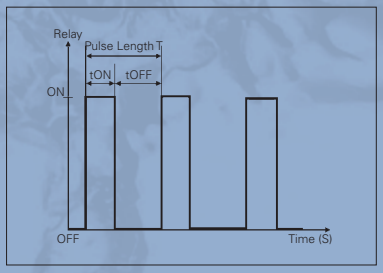
Proportional Integral, Proportional or Limit Control, Operation of Relays



Control Characteristic of Controller as Proportional Controller



Controller Signal of Pulse Length Control



Controller Signal of Pulse Frequency Control

Four Fully Programmable Relays

Two Independent Relays allow combination of high and low settings

Wash Relay for periodical, automated cleansing of sensors – essential for accurate measurements

Single-Pole-Double-Throw (SPDT) Alarm Relay alerts when readings fall outside set points. Comes with user-customisable time-delay for minimal false alarms

Liquid Ground caters for symmetrical mode of operation to prevent measurement error in an electrically noisy environment

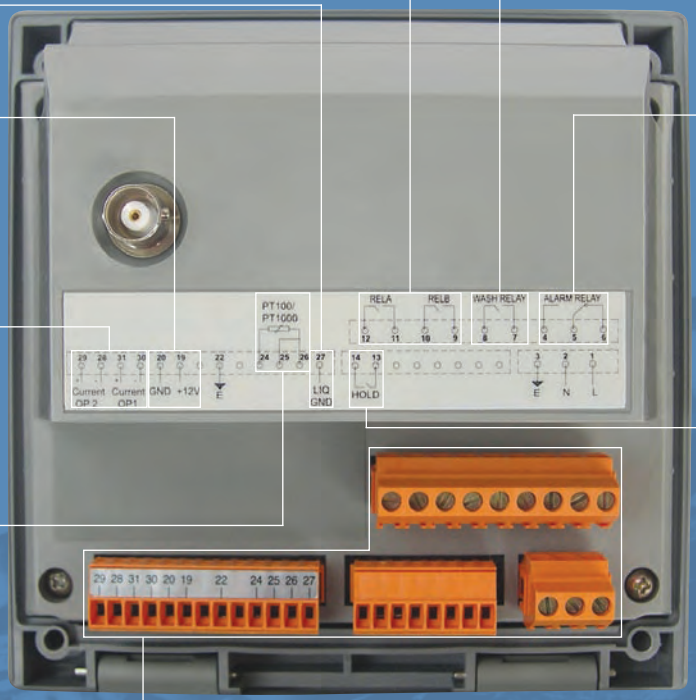
12 V DC Output
To power peripheral devices via controller

Two 4-20 mA or 0-20 mA Current Outputs
Fully scaleable, galvanically-isolated outputs for parameter and temperature measurements. Out-of-range current at 22 mA

Automatic Temperature Compensation
Or manual temperature compensation without ATC probe. 3-wire system compensates for cables line resistance errors. Independent settings for calibration and process temperatures for accurate temperature compensation

Installation and Wiring is Easy with pin terminals detachable blocks

Back Panel



Hold Function to tie in a float or flow switch or other control device to lock out control functions if chemical feed levels are low

Prevents "Chattering"
Separately adjustable high and low hystereses prevent relay from switching between on and off during rapid fluctuations around set-points

Multiple Mounting Options
Wall-mount, pipe-mount or panel-mount: Flexible mounting options to suit your environment

Rated to IP66 (Nema 4X), the rugged weather-proof casing simplifies installation outdoors or indoors

Pipe Mount

Wall Mount

Panel Mount

Thermo Scientific Alpha pH 2000D Differential pH/ORP Controller/Transmitter:

pH/ORP:

The Alpha pH 2000D Controller/ Transmitter and combination electrode system employs differential pH measurement technology.

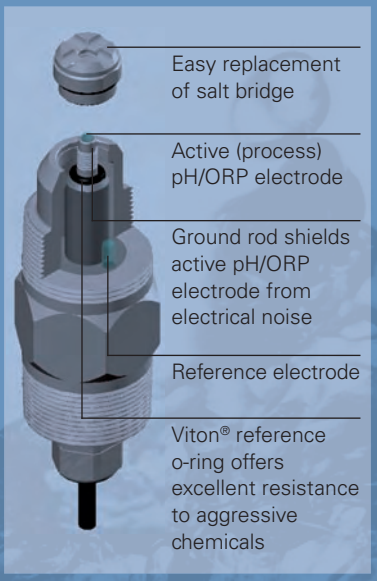
What's unique about this system is the differential electrode, which uses a pH glass bulb in place of the conventional reference system, making it more resistant to contamination or fouling in harsh wastewater applications. Replaceable salt bridge and reference solution add lifespan to the electrode when junction clogs.

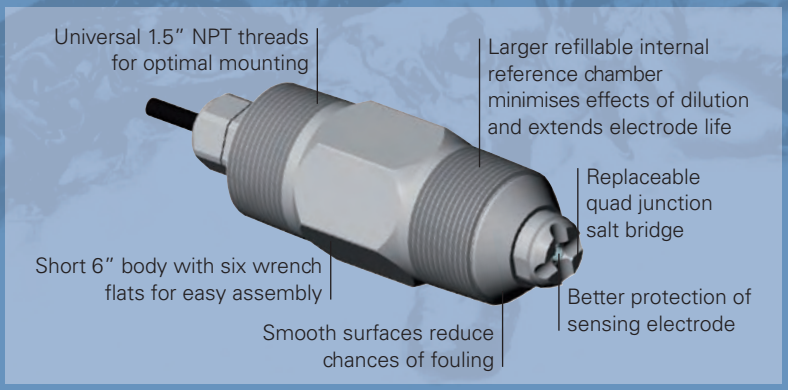
The result: a reliable, long-lasting and cost-saving pH measurement system for demanding environments.

- Wide pH range of -2.00 to 16.00 pH at two-decimal accuracy
- ORP mode measures in mV or % concentration, with independent calibration modes
- Control and measure pH and ORP simultaneously with master-slave operation by placing two controllers side by side
- Wall mount, pipe mount or panel mount options. Compact design of electrode with universal 1.5" NPT mounting threads enables optimal mounting positions

The pH Differential Electrode:

- **Cost Savings, Reduced Downtime and Maintenance Costs** – soiled salt bridge and buffer reference solution can easily be replaced at a fraction of the cost of a new combination electrode
- **Automatic Temperature Compensation** – built-in temperature electrode
- **Use Any Buffer Standard from 2 to 10 pH as a Reference** – very useful for applications that require adjustable isopotential points
- **Built-In Electronic Amplifier** provides a low impedance output from the electrode, and allows analyzers to be located up to 3000 feet away from the electrode
- **Ground Rod Minimizes Electrical Interference** from motors, pumps, transformers and ground currents





About Differential pH Measurement:

The Conventional Combination Electrode:

The conventional combination electrode consists of two parts: the glass electrode and the reference **(Figure 1)**.

The glass electrode contains a silver wire immersed in conductive solution. During measurement, the glass bulb and stem are the only parts which come in contact with the sample. Hence, contamination of the silver wire and conductive solution does not occur.

The reference electrode, on the other hand, is constructed simply with a porous junction and a silver wire. This porous junction allows the reference electrolyte to flow from its chamber to the sample, establishing a connection between the two. However, the porosity also allows contaminants to flow into the reference chamber, reacting with the electrolyte and/or silver wire.

The reference electrode is also susceptible to clogs. In the case of conventional combination electrodes, the entire electrode must be replaced due to a clogged reference electrode.

When contamination and clogging occurs, performance of the entire electrode is compromised.

The Differential Electrode:

The differential electrode replaces the exposed silver wire with a design built on the benefits of a pH glass electrode **(Figure 2)**. Quadraple junction salt bridges and an electrolyte-filled chamber act as barriers to prevent contaminants from entering the inner chamber, while at the same time, allowing connection between the reference electrolyte and the sample.

In the event of clogs, the salt bridges and electrolyte are easily replaceable, reducing downtime and cost of maintenance.

An individual liquid ground is also built into the electrode, effectively eliminating noises from ground loops potential **(Figure 3)**:

(E1 – E3) – (E2 – E3) = E1 – E3

With these design improvements, the differential electrodes enjoy a longer lifespan in harsh wastewater environments as compared to conventional electrodes.

Measurement of pH in wastewater poses several challenges, one of which is fouling of the reference electrode system

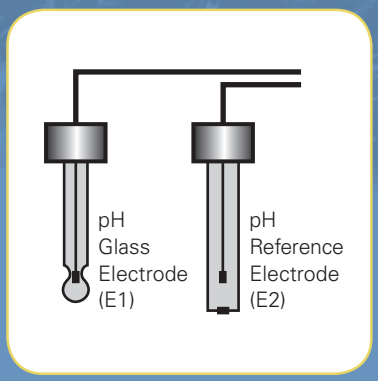


Figure 1: The conventional combination electrode is made up of a glass electrode and a reference electrode

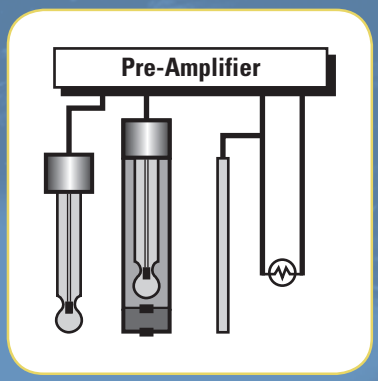


Figure 2: Differential electrode replaces porous reference electrode with a glass electrode

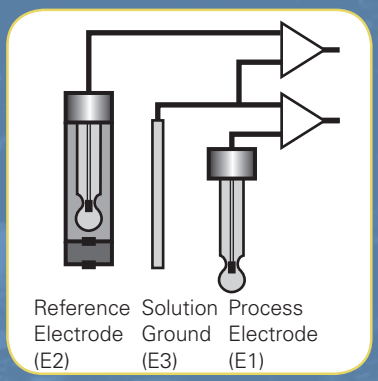


Figure 3: Individual liquid ground loop eliminates noises from ground loop potentials

Thermo Scientific Alpha pH 2000 pH/ORP Controller/Transmitter:

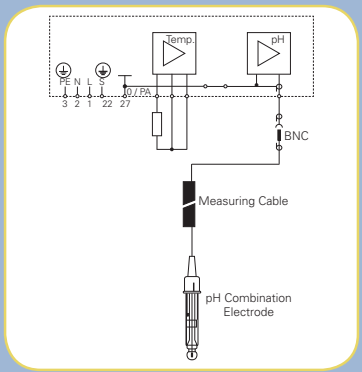
pH/ORP:

Built for the rugged industrial environment, the Alpha pH 2000 transmitter comes with an option for symmetrical mode of operation, making it ideal for electrically noisy environments. IP65 NEMA 4X casing is weatherproof and corrosion-resistant, protecting meter against harsh elements.

The Alpha pH 2000 is user-friendly and intuitive: controller alerts when meter or electrode requires maintenance, and provides trouble-shooting prompts in plain language.

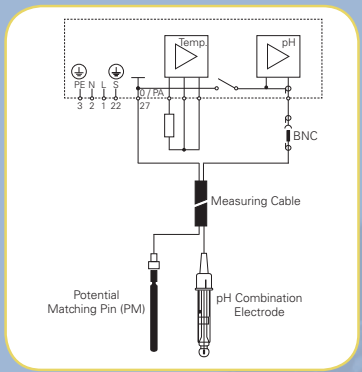
- Wide pH range of -2.00 to 16.00 pH at two-decimal accuracy
- ORP mode measures in mV or % concentration, with independent calibration modes
- Quick, easy push-button calibration with auto-buffer recognition. Meter displays electrode status after each calibration
- Accepts Antimony electrodes – useful in applications involving Hydrofluoric (HF) Acid
- Control and measure pH and ORP simultaneously with master-slave operation by placing two controllers side by side

Asymmetrical



Asymmetrical mode works well in environments with where there is little or no electrical noise. When there is electrical noise, the noise acts as a common signal and is picked up by both the pH and the reference electrodes. However, since the reference electrode is grounded to the ground potential of the amplifier, electrical noise will be present only on the pH electrode. This noise is amplified along with the pH signal, which causes reading fluctuations in an electrically noisy atmosphere. Electrical noise from a DC source (as in an electroplating tank) will typically result in stable but incorrect values.

Symmetrical



Symmetrical mode avoids grounding the reference electrode by reconfiguring the input to a floating differential mode. The electrical noise appears equally on the pH and reference electrodes, and is therefore rejected by the operational amplifier.

The Alpha pH 2000 transmitter offers an option for Symmetrical Mode of Operation. To take advantage of Symmetrical operation, you must have an electrode with a solution ground (potential matching) pin. If your electrode does not have a solution ground, be sure to set the controller to Asymmetrical mode.

Specification Information

pH/ORP Controller/Transmitter	Alpha pH 2000D (Wall mount)	Alpha pH 2000W (Wall mount)	Alpha pH 2000P (Panel mount)
Order Code	**TSPHCTP2000D**	**TSPHCTP2000W**	**TSPHCTP2000P**
Part No.	**01X275375**	**01X275373**	**01X275374**
pH:			
Range:	-2.00 to 16.00 pH		
Resolution:	0.01 pH		
Accuracy:	±0.01 pH		
ORP:			
Range:	-1000 to 1000 mV / 0 to 100 %		
Resolution:	1 mV / 0.1 %		
Accuracy:	±1 mV / ±0.2 %		
Temperature:			
Range:	-10.0 to 110 °C / 14.0 to 230.0 °F	-10.0 to 125.0 °C / 14.0 to 257.0 °F	
Resolution:	0.1 °C / 0.1 °F		
Accuracy:	±0.5 °C / ±1.0 °F		
Sensor:	NTC 300; 2 wire	Pt100 / Pt1000 (jumper selectable); 2 or 3 wire	
Compensation:	Auto/manual (independent process/CAL temperature)		
Set point & controller functions:			
Set point 1 (SP1) / set point 2 (SP2):	-2.00 to 16.00 pH or -1000 to 1000 mV or 0 to 100 %		
Switching pH hysteresis:	0.1 to 1 pH		
Switching ORP hysteresis:	10 to 100 mV or 1 to 10.0 %		
Function (switchable):	P/PI control (pulse length/pulse frequency/proportional integral); limit control; off		
Adjustable period with pulse length controller:	0.5 to 20 sec		
Adjustable period with pulse frequency controller:	60 to 120 pulse/min		
Integral action time (IAT):	0 to 999.9 min		
Pickup/dropout delay:	0 to 2000 sec		
Wash cycle:	0.1 to 200.0 hr		
Wash duration:	1 to 2000 sec		
Contact outputs:	1 SPDT, 3 SPST relays		
Switching voltage/current/power:	1/8 HP: at 125 VAC / max. 0.74 A / max. 93 VA 1/8 HP: at 250 VAC / max. 0.37 A / max. 93 VA		
Alarm functions:			
Function (switchable):	Steady or fleet (pulse)		
Pickup delay:	0 to 2000 sec		
Switching voltage/current/power:	1/8 HP: at 125 VAC / max. 0.74 A / max. 93 VA 1/8 HP: at 250 VAC / max. 0.37 A / max. 93 VA		
Electrical data & connections:			
Transmitter function:	Two 0/4 to 20 mA scalable outputs for pH/ORP and temperature, galvanically isolated		
CU 22 function:	22 mA current output		
Isolated output voltage:	12 V ±0.5 V (max. 50 mA)		
Hold function switch:	To freeze output current and deactivate control relays		
Load:	Max. 600 Ω		
pH/ORP input:	2-pin terminal (Differential)	BNC (10^{12} impedance); asymmetrical/symmetrical	
Connection terminal:	5-pin, 8-pin, 9-pin & 13-pin terminal, detachable blocks	3-pin, 8-pin, 9-pin & 13-pin terminal, detachable blocks	3-pin, 9-pin & 19-pin terminal, detachable blocks
Display:			
LCD:	UV coat, backlit 14 segments display with symbols for status information		
Backlight:	On/off selectable with four levels of brightness control		
Power supply:			
Input:	80 to 250 VAC/DC ; 50/60 Hz ; 10 VA		
Main fuse:	315 mA time delay, 250 V, Bussmann BK/GDC-315 mA	250 mA, anti-surge, S504 Bussmann	
Pollution degree:	2		
Transient overvoltage category:	II		
EMC specifications:			
Emitted interference:	According to EN 61326		
Immunity to interference:	According to EN 61326		
Environmental conditions:			
Operating temperature range:	0 to 40 °C		
Max. relative humidity:	80 % up to 31 °C decreasing linearly to 50 % at 40 °C		
Mechanical specifications:			
Dimensions (WxHxD):	144 x 144 x 110 mm		96 x 96 x 175 mm
Weight:	950 g (unit) / 1100 g (packed)	745 g (unit) / 1100 g (packed)	550 g (unit) / 950 g (packed)
Ingress protection:	IP66 (NEMA 4X)		IP54 (front panel)

pH/ORP Electrodes

Order Code		EC100GTSO20B	EC100GTSO10B	EC100GTSO05B	ECARGTSO05B	ECARHTTSO05B	ECARTSOHF05B	ECARTSO05B	ECFP21A1A1
Part No.		93X417005	93X417006	93X218865	93X218864	93X218860	93X218872	93X218859	93X218986
pH Electrodes									
Classification		pH							Differential pH
pH range		0 to 14					0 to 14, HF resistant	0 to 14	
Reference		Annular PTFE, double junction							Kynar®, differential pH electrode
Reference electrolyte		Saturated KCl, polymerized gel							pH buffer solution
Operating temperature		0 to 80 °C / 32 to 176 °F				0 to 110 °C / 32 to 230 °F high temp.	0 to 80 °C / 32 to 176 °F		-5 to 95 °C / 23 to 203 °F
Pressure tolerance		6 bars (87 psi)				9 bars (130 psi)	6 bars (87 psi)		6.9 bars (100 psi)
Temperature sensor		Pt100			–				NTC 300
Potential matching pin/liquid ground		Platinum				–			SS316
Material		PPS (Ryton®)							CPVC
Thread		¾" NPT							1½" NPT
Cable		Integral 20 m (65.6 ft) low-noise semi-conductor screened	Integral 10 m (32.8 ft) low-noise semi-conductor screened	Integral 5 m (16.4 ft) low-noise semi-conductor screened					Integral 3 m (9.8 ft) cables, tinned ends
Connector		BNC							–
Dimensions	Length	151 mm (excludes cable)							152.7 mm (excludes cable)
	Diameter	26 mm (external)							48.3 mm (external)
Weight		950 g	850 g	650 g	430 g				500 g

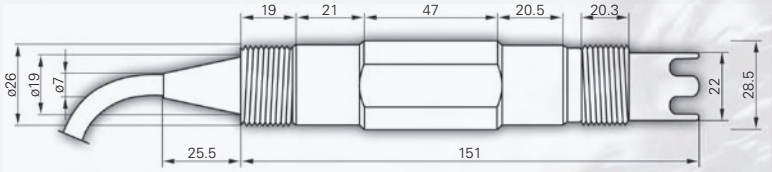
Order Code		ECHTAUTSO05B	ECHTPTTSO05B	ECFR21A1A1
Part No.		93X219128	93X219126	93X218987
ORP Electrodes				
Classification		ORP		Differential ORP
Sensor		Gold	Platinium	
ORP range		± 1000 mV		
Reference		Annular PTFE, double junction		Kynar®, differential pH electrode
Reference electrolyte		Saturated KCl, polymerized gel		pH buffer solution
Operating temperature		0 to 80 °C / 32 to 176 °F		-5 to 95 °C / 23 to 203 °F
Pressure tolerance		6 bars (87 psi)		6.9 bars (100 psi)
Potential matching pin/liquid ground		Platinum		SS316
Material		PPS (Ryton®)		CPVC
Thread		¾" NPT		1½" NPT
Cable		Integral 5 m (16.4 ft) low-noise semi-conductor screened		Integral 3 m (9.8 ft) cables, tinned ends
Connector		BNC		–
Dimensions	Length	151 mm (excludes cable)		152.7 mm (excludes cable)
	Diameter	26 mm (external)		48.3 mm (external)
Weight		430 g		500 g

Electrode Selection Guide

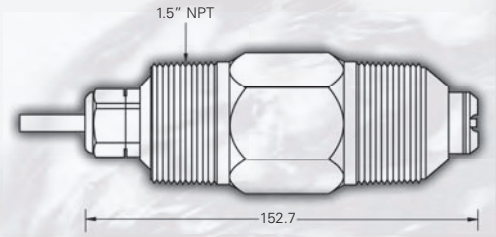
pH/ORP Electrodes	EC100GTSO20B 93X417005	EC100GTSO10B 93X417006	EC100GTSO05B 93X218865	ECARGTSO05B 93X218864	ECARHTTSO05B 93X218860	ECARTSOHF05B 93X218872	ECARTSO05B 93X218859	ECFP21A1A1 93X218986	ECHTAUTSO05B 93X219128	ECHTPTTSO05B 93X219126	ECFR21A1A1 93X218987
General pH measurement	•	•	•	•	•	•	•	•			
pH measurement with ATC	•	•	•					•			
pH measurement in noisy environment eg. electroplating	•	•	•	•				•			
pH measurement at high temperatures (up to 110 °C/230 °F ; 9 bar/130 psi)					•						
pH measurement in the presence of Hydrofluoric Acid (HF)						•					
Replaceable salt junctions & refillable reference electrolyte								•			•
General ORP/Redox measurement									•	•	•
ORP measurement in noisy environment									•	•	•
ORP measurement in Cyanide treatment									•		
ORP measurements in oxidising applications (above 500 mV)										•	
ORP measurements in reducing applications (below 500 mV)									•		

Line Diagram (All dimensions are in mm unless specified otherwise)

pH/ORP Electrodes
EC100GTSO20B
EC100GTSO10B
EC100GTSO05B
ECARGTSO05B
ECARTSOHF05B
ECARTSO05B
ECHTAUTSO05B
ECHTPTTSO05B



pH/ORP Differential Electrodes
ECFP21A1A1
ECFR21A1A1



Ordering Information

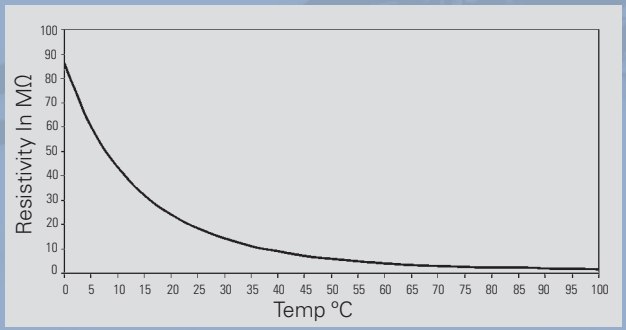
Order Code	Part Number	Description
TSPHCTP2000D	**01X275375**	Alpha pH 2000 wall-mount pH/ORP differential controller/transmitter. Incl. terminal blocks, cable glands, gasket etc
TSPHCTP2000W	**01X275373**	Alpha pH 2000 wall-mount pH/ORP controller/transmitter (unit only). Incl. elbow BNC connector, terminal blocks, cable glands, gasket, etc
TSPHCTP2000P	**01X275374**	Alpha pH 2000 panel-mount pH/ORP controller/transmitter (unit only). Incl. elbow BNC connector, terminal blocks, gasket, threaded rods, catch, etc
EC100GTSO20B	**93X417005**	Ryton®-body pH combi electrode with Pt100 RTD (ATC) & 20 m cable with BNC & PMP
EC100GTSO10B	**93X417006**	Ryton®-body pH combi electrode with Pt100 RTD (ATC) & 10 m cable with BNC & PMP
EC100GTSO05B	**93X218865**	Ryton®-body pH combi electrode with Pt100 RTD (ATC) & 5 m cable with BNC & PMP
ECARGTSO05B	**93X218864**	Ryton®-body pH combi electrode with 5 m cable with BNC & connector for PMP (no ATC)
ECARHTTSO05B	**93X218860**	Ryton®-body pH combi electrode with 5 m cable with BNC connector (no ATC); measures up to 110 °C
ECARTSOHF05B	**93X218872**	Ryton®-body pH combi electrode without ATC & 5 m cable with BNC connector. HF resistant glass
ECARTSO05B	**93X218859**	Ryton®-body pH combi electrode with 5 m cable with BNC connector (no ATC)
ECFP21A1A1	**93X218986**	PES-body differential pH combi electrode with NTC 300 (ATC) & 5 m tinned open-ended cable (Alpha pH 2000D only)
ECHTAUTSO05B	**93X219128**	Ryton®-body ORP gold electrode with 5 m cable with BNC & PMP (no ATC)
ECHTPTTSO05B	**93X219126**	Ryton®-body ORP platinum electrode with 5 m cable with BNC & PMP (no ATC)
ECFR21A1A1	**93X218987**	PES-body differential ORP platinum electrode with NTC 300 (ATC) & 20 ft tinned open-ended cable (Alpha pH 2000D only)
ECCBLO5SMK50	**01X222801**	Low-noise 50 m coaxial SMK cable for pH/ORP electrodes (without ATC), 5 mm, open-ended with no connectors
28X088001	**28X088001**	Male BNC connector for 5 mm extension cable; 1 unit (need BNC crimping tool to connect to extension cable)
ECCBL030510	**01X222802**	Low-noise 10 m coaxial cable for pH/ORP electrodes (without ATC; with PMP), 3 mm/5 mm, male-male BNC connectors (for extending ECARGTSO05, ECHTAUTSO05B & ECHTPTTSO05B)
ECCBL030520	**01X222803**	Low-noise 20 m coaxial cable for pH/ORP electrodes (without ATC; with PMP), 3 mm/5 mm, male-male BNC connectors (for extending ECARGTSO05, ECHTAUTSO05B & ECHTPTTSO05B)
ECCONBNCBNC	**01X243102**	BNC to BNC adapter (for extension of cable connection) – a pack of 10 units
ECAC021011	**81X220801**	CPVC electrode tee for pH/ORP electrodes with ¾" to 1" adapter
ECAK061014	**81X220802**	Kynar® electrode tee for pH/ORP electrodes with ¾" to 1" adapter
ECPREAMP	**01X228601**	Pre-amplifier (for cable length exceeding 25 m) with female-female BNC connectors at each side of the junction box; batteries included
ECPHSIMULATOR	**01X373301**	Precision hi-low impedance & multiple buffers pH simulator (with BNC-BNC cable provided)
15X403101	**15X403101**	Salt bridge for ECFP21A1A1 & ECFR21A1A1 differential pH or ORP electrode
01X211270	**01X211270**	Reference electrolyte for ECFP21A1A1 & ECFR21A1A1 differential pH or ORP electrode (500 ml)
01X278701	**01X278701**	Panel mount kit for Alpha 2000 controllers/transmitters

Thermo Scientific Alpha COND 2000 Conductivity Controller/Transmitter:

Conductivity:

Measure from ultra-pure water to highly conductive samples with the Alpha COND 2000 controller/transmitter: this conductivity controller accepts 4-cell and 2-cell electrodes, and features programmable temperature coefficients to give you precise temperature compensation.

- Measures seven ranges, from 0 to 2 µS/cm to 0 to 1000 mS/cm
- Readings of up to three-decimal resolution at ±1 % accuracy
- Adjustable temperature coefficients for more precise temperature compensation: Choose between programmable linear temperature compensation from 0.0 % to 10.0 %, and pure water temperature compensation to correct non-linearity of ultrapure water temperature correction curves
- Meter displays electrode status after each calibration
- User-adjustable cell constant values (k = 0.005 to k = 9.999)
- 4-cell electrode prevents polarizing effects and electrode fouling in samples with high conductivity
- Accepts 2- or 3-wire, Pt100 or Pt1000 RTD sensors for automatic temperature compensation
- Allows user to input cell constant corresponding to connecting electrode independently during calibration

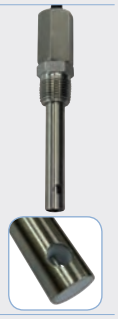


Resistivity Of Pure Water

Specification Information

Conductivity Controller/Transmitter	Alpha COND 2000W (Wall mount)	Alpha COND 2000P (Panel mount)
Order Code	**TSCONCTP2000W**	**TSCONCTP2000P**
Part No.	**01X275376**	**01X275377**
Conductivity:		
Range:	... to 2.000 µS/cm ; ... to 20.00 µS/cm ; ... to 200.0 µS/cm ; ... to 2000 µS/cm ; ... to 20.00 mS/cm ; ... to 200.0 mS/cm ; ... to 1000 mS/cm	
Resolution:	0.001 µS/cm ; 0.01 µS/cm ; 0.1 µS/cm ; 1 µS/cm ; 0.01 mS/cm ; 0.1 mS/cm ; 1 mS/cm	
Accuracy:	±1 % of full scale reading (±2 % >500 mS/cm)	
Temperature:		
Range:	-10.0 to 125.0 °C (14.0 to 257.0 °F)	
Resolution:	0.1 °C / 0.1 °F	
Accuracy:	±0.5 °C / ±1.0 °F	
Sensor:	Pt100/Pt1000 (jumper selectable); 2 or 3 wire	
Compensation:	Auto/manual (normalized at 25 °C)	
Set-point & controller functions:		
Set point 1 (SP1) / set point 2 (SP2):	... to 2.000 µS/cm or ... to 20.00 µS/cm or ... to 200.0 µS/cm or ... to 2000 µS/cm or ... to 20.00 mS/cm or ... to 200.0 mS/cm or ... to 1000 mS/cm	
Switching Conductivity hysteresis:	0 to 10 % of full scale	
Function (switchable):	P/PI control (pulse length/pulse frequency/proportional integral); limit control; off	
Adjustable period with pulse length controller:	0.5 to 20 sec	
Adjustable period with pulse frequency controller:	60 to 120 pulse/min	
Integral action time (IAT):	0 to 999.9 min	
Pickup/dropout delay:	0 to 2000 sec	
Wash cycle:	0.1 to 200.0 hr	
Wash duration:	1 to 2000 sec	
Contact outputs:	1 SPDT, 3 SPST relays	
Switching voltage/current/power:	1/8 HP: at 125 VAC / max. 0.74 A / max. 93 VA 1/8 HP: at 250 VAC / max. 0.37 A / max. 93 VA	
Alarm functions:		
Function (switchable):	Steady or fleet (pulse)	
Pickup delay:	0 to 2000 sec	
Switching voltage/current/power:	1/8 HP: at 125 VAC / max. 0.74 A / max. 93 VA 1/8 HP: at 250 VAC / max. 0.37 A / max. 93 VA	
Electrical data & connections:		
Transmitter function:	Two 0/4 to 20 mA scalable outputs for Conductivity and temperature, galvanically isolated	
CU 22 function:	22 mA current output	
Isolated output voltage:	12 V ±0.5 V (max. 50 mA)	
Hold function switch:	To freeze output current and deactivate control relays	
Load:	Max. 600 Ω	
Conductivity input:	2-cell/4-cell terminal	
Connection terminal:	5-pin, 8-pin, 9-pin & 13-pin terminal, detachable blocks	5-pin, 9-pin & 19-pin terminal, detachable blocks
Display:		
LCD:	UV coat, backlit 14 segments display with symbols for status information	
Backlight:	On/off selectable with four level of brightness control	
Power supply:		
Input:	80 to 250 VAC/DC ; 50/60 Hz ; 10 VA	
Main fuse:	315 mA, anti-surge, 250 V	
Pollution degree:	2	
Transient overvoltage category:	II	
EMC specifications:		
Emitted interference:	According to EN 61326	
Immunity to interference:	According to EN 61326	
Environmental conditions:		
Operating temperature range:	0 to 40 °C	
Max. relative humidity:	80 % up to 31 °C decreasing linearly to 50 % at 40 °C	
Mechanical specifications:		
Dimensions (WxHxD):	144 x 144 x 110 mm	96 x 96 x 175 mm
Weight:	745 g (unit) / 1100 g (packed)	550 g (unit) / 950 g (packed)
Ingress protection:	IP66 (NEMA 4X)	IP54 (front panel)

Conductivity Electrodes

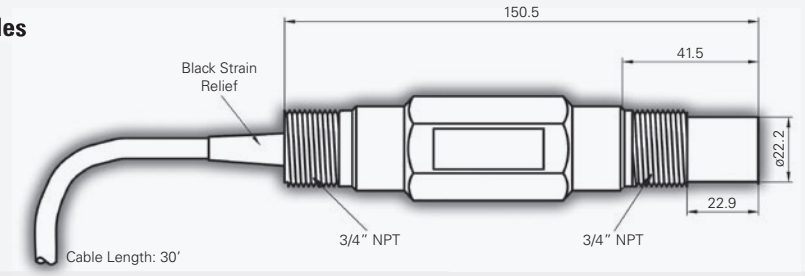
Order Code		EC91346S	ECCS10-0-01T	ECCS10-0-01TS	ECCS10-0-01S	ECCS10-0-01SS	ECCS10-0-1S	ECCS10-0-1SSP	ECCS10-1-0S	ECCS10-1-0SSP
Part No.		93X219048	93X219019	93X219054	93X219018	93X219053	93X219020	93X219055	93X219021	93X219056
Conductivity Electrodes										
Conductivity range		Up to 500 mS/cm	0.055 to 20 µS/cm				0.5 to 200 µS/cm		0.01 to 100 mS/cm	0.01 to 200 mS/cm
Cell constant, K		0.3, 4-cell	0.01, 2-cell				0.1, 2-cell		1.0, 2-cell	
Temperature sensor		Pt100, 3-wire								
Pressure rating at 25 °C		6 bar (87 psi)	3.4 bar (50 psi)	5.5 bar (80 psi)	3.4 bar (50 psi)	5.5 bar (80 psi)	3.4 bar (50 psi)	6.8 bar (100 psi)	3.4 bar (50 psi)	6.8 bar (100 psi)
Operating temperature		-5 to 100 °C / 23 to 212 °F	-5 to 50 °C / 23 to 122 °F	-5 to 80 °C / 23 to 176 °F	-5 to 50 °C / 23 to 122 °F	-5 to 80 °C / 23 to 176 °F	-5 to 50 °C / 23 to 122 °F	-5 to 150 °C / 23 to 302 °F	-5 to 50 °C / 23 to 122 °F	-5 to 120 °C / 23 to 248 °F
Material		Ryton®, SS316	Titanium		SS316					
Fitting material		–	Nylon plastic	Stainless steel	Nylon plastic	Stainless steel	Nylon plastic	Stainless steel	Nylon plastic	Stainless steel
Thread		¾" NPT	½" NPT							
Cable		Integrated 7.6 m (24.9 ft), 8-wire double-shielded, tinned ends	Integrated 7.5 m (24.6 ft), 6-wire double-shielded, tinned ends							
Dimensions	**Length**	150.5 mm (excludes cable)	168 mm (excludes cable)							
	Diameter	22.2 mm (external)	12.8 mm (external)							
Weight		430 g	600 g	680 g	680 g	660 g	560 g	660 g	590 g	660 g

Electrode Selection Guide

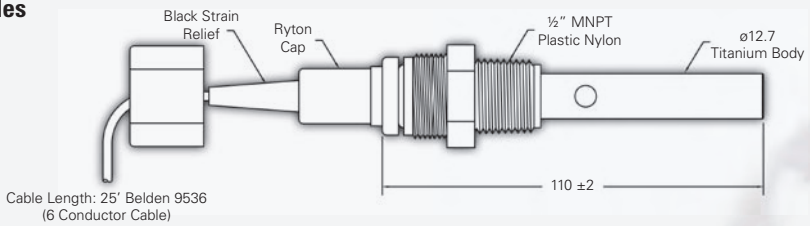
Conductivity Electrodes	EC91346S 93X219048	ECCS10-0-01T 93X219019	ECCS10-0-01TS 93X219054	ECCS10-0-01S 93X219018	ECCS10-0-01SS 93X219053	ECCS10-0-1S 93X219020	ECCS10-0-1SSP 93X219055	ECCS10-1-0S 93X219021	ECCS10-1-0SSP 93X219056
General Conductivity measurements	•	•	•	•	•	•	•	•	•
Low Conductivity measurements		•	•	•	•				
High Conductivity measurements (4-cell electrodes)	•								
Conductivity measurements with ATC	•	•	•	•	•	•	•	•	•
Conductivity measurements of ultrapure water		•	•						
Conductivity measurements of pure water				•	•				
Conductivity measurements of power plant & condensate water						•	•	•	•

Line Diagram (All dimensions are in mm unless specified otherwise)

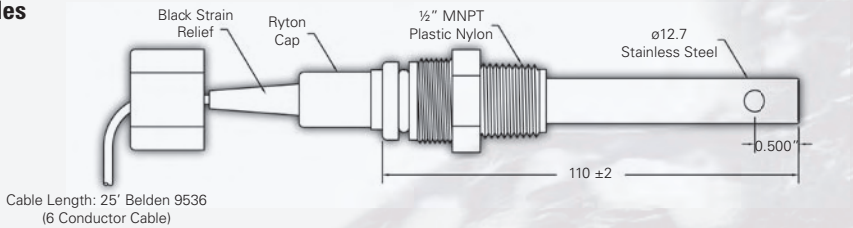
Conductivity Electrodes
EC91346S



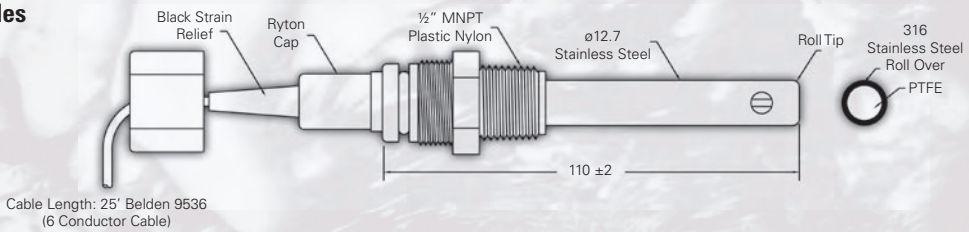
Conductivity Electrodes
ECCS10-0-01T
ECCS10-0-01S



Conductivity Electrodes
ECCS10-0-1S



Conductivity Electrodes
ECCS10-1-0S



Ordering Information

Order Code	Part Number	Description
TSCONCTP2000W	01X275376	Alpha COND 2000 wall-mount Conductivity controller/transmitter. Incl. terminal blocks, cable glands, gasket, etc
TSCONCTP2000P	01X275377	Alpha COND 2000 panel-mount Conductivity controller/transmitter. Incl. terminal blocks, gasket, threaded rods, catch, etc
EC91346S	93X219048	4-cell Conductivity electrode with 3-wire Pt100, 30 ft tinned open-ended cable
ECCS10-0-01T	93X219019	Conductivity/Resistivity electrode with Pt100, cell constant K=0.01, titanium with 25 ft tinned open-ended cable (with ½ inch nylon plastic cap threading)
ECCS10-0-01TS	93X219054	Conductivity/Resistivity electrode with Pt100, cell constant K=0.01, titanium with 25 ft tinned open-ended cable (with ½ inch stainless steel cap threading)
ECCS10-0-01S	93X219018	Conductivity/Resistivity electrode with Pt100, cell constant K=0.01, stainless steel with 25 ft tinned open-ended cable
ECCS10-0-01SS	93X219053	Conductivity/Resistivity electrode with Pt100, cell constant K=0.01, stainless steel with 25 ft tinned open-ended cable
ECCS10-0-1S	93X219020	Conductivity electrode with Pt100, cell constant K=0.1, stainless steel with 25 ft tinned open-ended cable (with ½ inch nylon plastic cap threading)
ECCS10-0-1SSP	93X219055	Conductivity electrode with Pt100, cell constant K=0.1, stainless steel with PEEK insert and 25 ft tinned open-ended cable (with ½ inch stainless steel cap threading)
ECCS10-1-0S	93X219021	Conductivity electrode with Pt100, cell constant K=1.0, stainless steel with 25 ft tinned open-ended cable (with ½ inch nylon plastic cap threading)
ECCS10-1-0SSP	93X219056	Conductivity electrode with Pt100, cell constant K=1.0, stainless steel with PEEK insert and 25 ft tinned open-ended cable (with ½ inch stainless steel cap threading)
ECAC021022	81X220803	CPVC electrode tee for Conductivity/Resistivity electrodes with ½" to 1" adapter
01X278701	01X278701	Panel mount kit for Alpha 2000 controllers/transmitters

Thermo Scientific Alpha DO 2000 Dissolved Oxygen Controller/Transmitter:

Dissolved Oxygen:

With a wide measuring range of 0 to 20 ppm or 0 to 200 % saturation, Alpha DO 2000 controller/transmitter is ideal for use in a variety of applications, ranging from water treatment and monitoring to pharmaceutical and food processing. Meter comes in both Galvanic and Amperometric versions.

- Readings values in mg/L or % air saturations, selectable from menu options
- Quick, easy calibration using atmospheric air as calibration media for 100 % air saturation
- Pressure, Salinity and Automatic Temperature Compensation

The Galvanic Electrode (ECDOGEN-S & ECDOTPII-S)

Rugged and long-lasting, the galvanic electrode requires no warm-up time and prevents zero drift by recreating H^2O within the electrode. This prevents change of pH to the electrode and allows it to recycle within the probe. The result: galvanic sensors have long lifespans and require low maintenance costs.

The Amperometric Electrode (EC237150 & EC237450)

The amperometric dissolved oxygen electrode contains special membranes that are designed to require almost zero maintenance. These unique membranes stay stable even under harsh ambient conditions and high pressure. This enables the sensors to capture accurate DO readings within short response time at required flow as low as 0.02 m/s.

Specification Information

Dissolved Oxygen Controller/Transmitter	Alpha DO 2000W (Galvanic) (Wall mount)	Alpha DO 2000WPG (Amperometric) (Wall mount)	Alpha DO 2000PPG (Amperometric) (Panel mount)
Order Code	**TSDOCTP2000W**	**TSDOCTP2000WPG**	**TSDOCTP2000PPG**
Part No.	**01X275378**	**01X275379**	**01X275380**
Dissolved Oxygen:			
Range:	0.00 to 25.00 mg/L or ppm; 0.0 to 300.0 %	0.00 to 20.00 mg/L or ppm; 0.0 to 200.0 %	
Resolution:	0.01 mg/L or ppm; 0.1 %		
Accuracy:	±1.5 % of full scale reading	±1 % of full scale reading	
Temperature:			
Range:	-10.0 to 125.0 °C / 14.0 to 257.0 °F		
Resolution:	0.1 °C / 0.1 °F		
Accuracy:	±0.5 °C / ±1.0 °F		
Sensor:	Pt100/Pt1000 (jumper selectable); 2 or 3 wire	NTC 22 kΩ thermistor	
Compensation:			
Temperature compensation:	Auto/manual		
Salinity compensation:	0.0 to 50.0 ppt (manual setting and automatic correction)		
Pressure compensation:	0.740 to 3.000 bar ; 555 to 2250 mmHg ; 10.73 to 43.51 psi (manual setting and automatic correction)		
Set point & controller functions:			
Set point 1 (SP1) / set point 2 (SP2):	0.00 to 25.00 mg/L or ppm; 0.0 to 300.0 %	0.00 to 20.00 mg/L or ppm; 0.0 to 200.0 %	
Switching DO hysteresis:	0 to 10.0 %	0.1 to 1.0 mg/L or 1.0 to 10.0 %	
Function (switchable):	P/PI control (pulse length/pulse frequency/proportional integral); limit control; off		
Adjustable period with pulse length controller:	0.5 to 20 sec		
Adjustable period with pulse frequency controller:	60 to 120 pulse/min		
Integral action time (IAT):	0.0 to 999.9 min		
Pickup/dropout delay:	0 to 1999 sec		
Wash cycle:	0.1 to 199.9 hr		
Wash duration:	1 to 1999 sec		
Contact outputs:	1 SPDT, 3 SPST relays		
Switching voltage/current/power:	1/8 HP: at 125 VAC / max. 0.74 A / max. 93 VA 1/8 HP: at 250 VAC / max. 0.37 A / max. 93 VA	Max. 250 VAC / max. 3 A / max. 600 VA	
Alarm functions:			
Function (switchable):	Steady or fleet (pulse)		
Pickup delay:	0 to 1999 sec		
Switching voltage/current/power:	1/8 HP: at 125 VAC / max. 0.74 A / max. 93 VA 1/8 HP: at 250 VAC / max. 0.37 A / max. 93 VA	Max. 250 VAC / max. 3 A / max. 600 VA	
Electrical data & connections:			
Transmitter function:	Two 0/4 to 20 mA outputs for Dissolved Oxygen values and temperature, galvanically isolated		
CU 22 function:	22 mA current output	–	
Isolated output voltage:	12 V ±0.5 V (max. 50 mA)		
Hold function switch:	To freeze output current and deactivate control relays		
Load:	Max. 600 Ω		
DO input:	2-pin terminal		
Connection terminal:	5-pin, 8-pin, 9-pin & 13-pin terminal, detachable blocks	2x 3-pin, 8-pin, 9-pin & 13-pin terminal blocks	3-pin, 9-pin & 19-pin terminal blocks
Display:			
LCD:	UV coat, backlit 14 segments display with symbols for status information		
Backlight:	On/off selectable with four level of brightness control		
Power supply:			
Input:	80 to 250 VAC/DC ; 50/60 Hz ; 10 VA		
Main fuse:	315 mA, anti surge, 250 V	250 mA, anti surge	
Electromagnetic compliance:			
Emitted interference:	According to EN 61326		
Immunity to interference:	According to EN 61326		
Environmental conditions:			
Operating temperature range:	0 °C to 50 °C		
Max. relative humidity:	80 % up to 31 °C decreasing linearly to 50 % at 40 °C		
Mechanical specifications:			
Dimensions (WxHxD):	144 x 144 x 111.5 mm	144 x 144 x 110 mm	175 x 96 x 96 mm
Weight:	745 g (unit) / 1100 g (packed)		700 g (unit) / 850 g (packed)
Ingress protection:	IP66 (NEMA 4X)		IP54 (front panel)

Dissolved Oxygen Electrodes

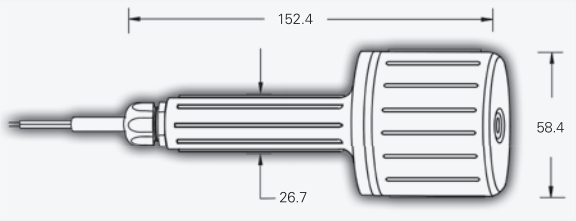
Order Code		ECDOGEN-S	ECDOTPII-S	EC237150	EC237450
Part No.		01X247507	01X247508	93X416401	93X416402
Dissolved Oxygen Electrodes					
Dissolved Oxygen range		0.50 to 20 ppm	0.03 to 20 ppm	0.04 ppm to saturation	0.01 ppm to saturation
Type		Galvanic		Amperometric	
Flow rate		50 mm/sec (dependent on temperature and O_2 level)		20 mm/sec	
Response time		40 to 50 sec to attain 95 % of actual reading		–	
Temperature sensor		Pt100		22 kΩ NTC	
Pressure rating		6 bar (87 psi)		4 bar (58 psi)	
Operating temperature		0 to 50 °C / 32 to 122 °F		0 to 60 °C / 32 to 140 °F	0 to 130 °C / 32 to 248 °F
Material		Delrin housing		Stainless steel	
Membrane		HDPE		Non-replaceable	FDA membrane
Cable		Integral 5 m (16.3 ft) water-resistant, tinned ends		5 m (16.4 ft) fixed and sealed	Optional detachable cable (sold separately)
Dimensions	**Length**	152.4 mm (excludes cable)		12 mm shaft diameter (excludes cable)	
	Diameter	58.4 mm (external)		178 (external)	
Weight		670 g		670 g	

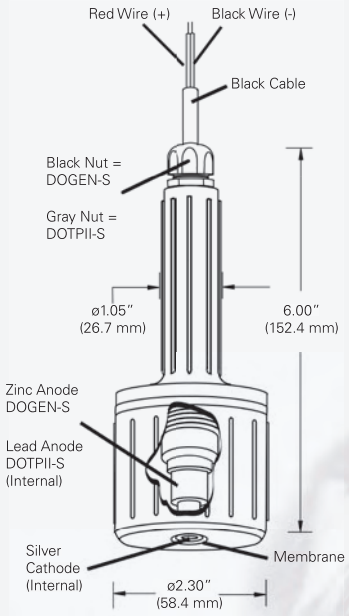
Electrode Selection Guide

Dissolved Oxygen Electrodes	ECDOGEN-S 01X247507	ECDOTPII-S 01X247508	EC237150 93X416401	EC237450 93X416402
DO measurements at low levels		•	•	•
Waterproof probes	•	•		
Galvanic DO measurements system for general purposes, eg. wastewater & aquaculture	•	•		
Galvanic DO measurements system for low DO level, eg. power plants, metal corrosion test facilities		•		
Biocompatible electrode materials			•	•
Amperometric DO measurements system for biotechnology, steam sterilisation & autoclaving, fermentation applications				•
Amperometric DO measurements system for general purposes, eg. wastewater, fish farms, composting facilities			•	

Line Diagram (All dimensions are in mm unless specified otherwise)

Dissolved Oxygen Electrodes
ECDOGEN-S
ECDOTPII-S





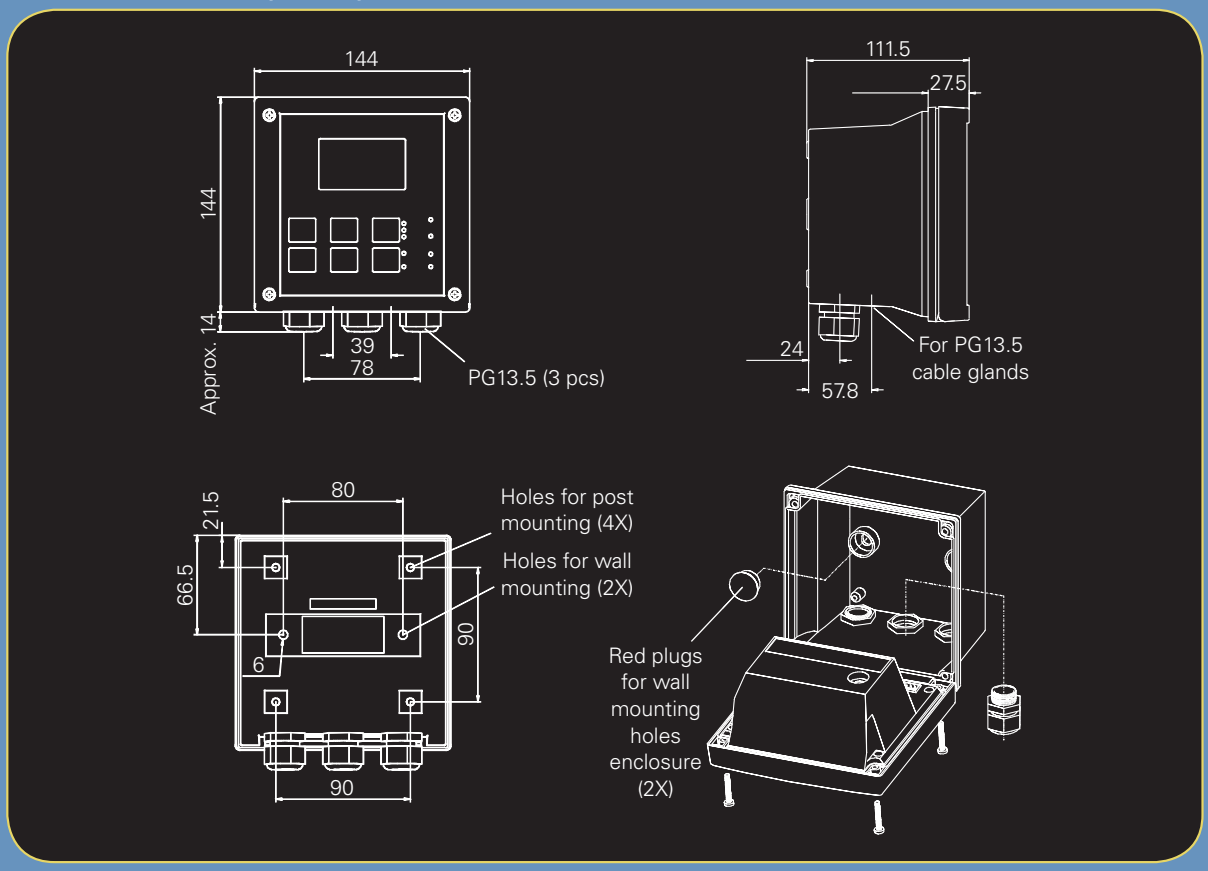
Galvanic Probe (Construction)

Dissolved Oxygen Electrode
EC237450

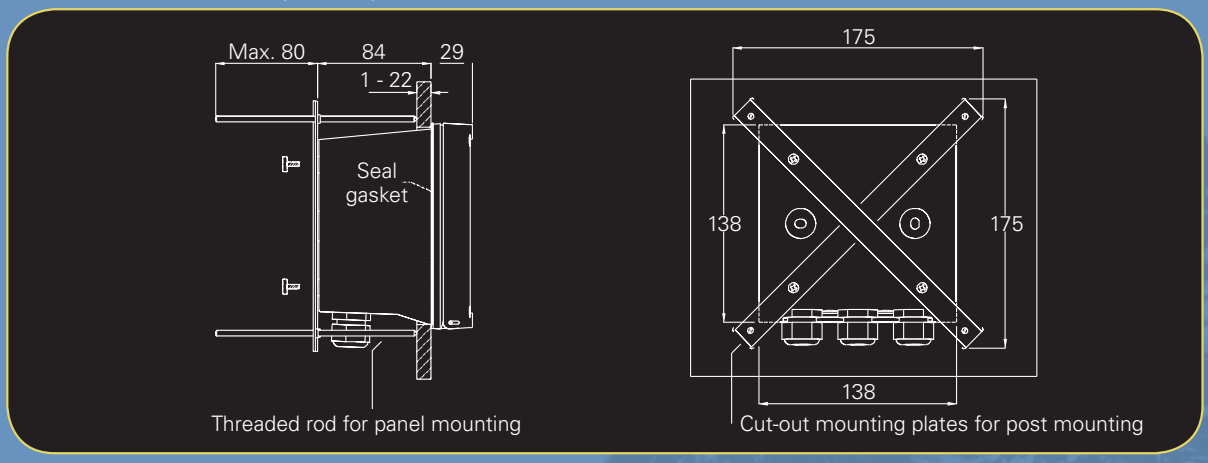
Ordering Information

Order Code	Part Number	Description
TSDOCTP2000W	**01X275378**	Alpha DO 2000 galvanic wall-mount Dissolved Oxygen controller/transmitter. Incl. terminal blocks, cable glands, gasket, etc
TSDOCTP2000WPG	**01X275379**	Alpha DO 2000 polarographic wall-mount Dissolved Oxygen controller/transmitter. Incl. terminal blocks, cable glands, gasket, etc
TSDOCTP2000PPG	**01X275380**	Alpha DO 2000 polarographic panel-mount Dissolved Oxygen controller/transmitter. Incl. terminal blocks, gasket, threaded rods, catch, etc.
ECDOGEN-S	**01X247507**	Delrin housing-body galvanic Dissolved Oxygen electrode with Pt100, 5 m tinned open-ended cable
ECDOTPII-S	**01X247508**	Delrin housing-body, galvanic Dissolved Oxygen electrode with Pt100, 5 m tinned open-ended cable
EC237150	**93X416401**	Polarographic probe with 22 KOhm NTC, 5 m tinned open-ended cable
EC237450	**93X416402**	Fermentation polarographic probe with 22 KOhm NTC, with extra membrane, without cable
01X241605	**01X241605**	Set of 5 o-rings & membranes (DOGEN-S)
01X241606	**01X241606**	Set of 5 o-rings & membranes (DOTPII-S)
32X246702	**32X246702**	Large o-ring (DOGEN-S/DOTPII-S)
15X241503	**15X241503**	Tool for membrane housing (DOGEN-S/DOTPII-S)
ECDOGENSOLNBT	**01X211228**	DO refilling electrolyte for ECDOGEN-S (480 ml bottle)
ECDOTPIISOLNBT	**01X211229**	DO refilling electrolyte for ECDOTPII-S (480 ml bottle)
EC237140	**01X416501**	3 FDA membrane bodies, electrolyte, pipette, spare o-ring, polishing strip (for EC237450)
EC237118	**01X416601**	Electrolyte for EC237450, 50 ml
EC237137	**15X416701**	Autoclavation connector cap for EC237450
EC355089	**30X416801**	5 m cable for EC237450
EC355136	**30X416802**	10 m cable for EC237450
01X278701	**01X278701**	Panel mount kit for Alpha 2000 controllers/transmitters

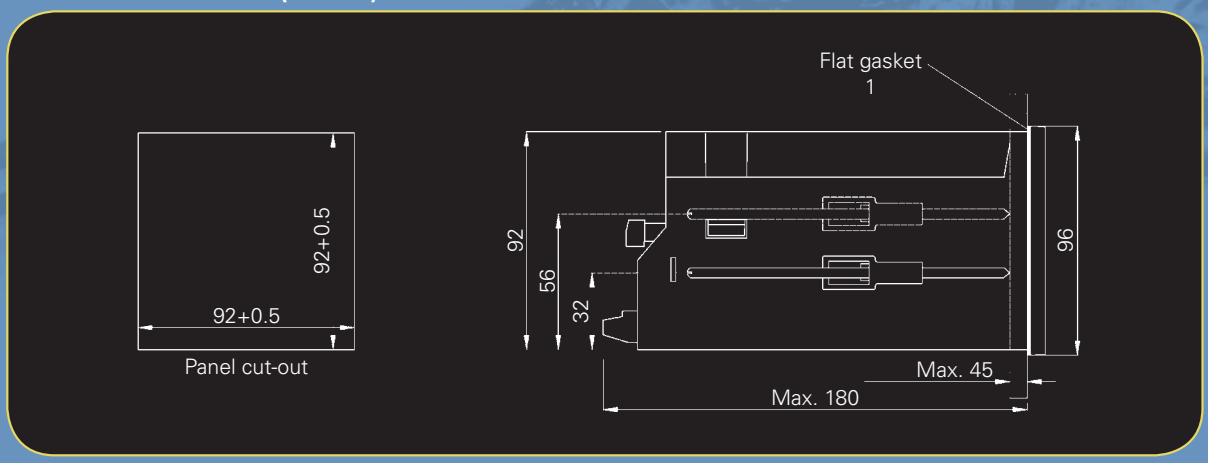
Wall Mount – ½ DIN (in mm)



Panel Mount – ½ DIN (in mm)



Panel Mount – ¼ DIN (in mm)



Sensor Installation Tips

There are two main sensor installation configurations:

1. **In-line Installation where electrodes are installed into the piping system**

- In-line installation is best in a location which is always flooded. It is recommended that the electrode be installed in the dead leg of a pipe tee fitting **(Figure 4)**. This reduces the velocity of the fluid as it flows into and around the electrode before flowing upwards and away
- Take into consideration the amount of cleaning and calibrating your application imposes on the electrode. In-line mounting may mean the process has to be shut down, or that a portion of the pipe must be drained in order to remove the electrode
- Remove cables before unscrewing electrodes from the pipes to avoid twisting and damaging wires or shielding

2. **Submersible Installation where electrodes are submerged in tanks**

- Use a baffle in submersible installation to avoid air bubbles from being trapped inside or around the electrode, distorting readings **(Figure 5)**. Install your electrode away from mixers, sparges and inlets
- Mount electrodes near outlets of the tank, away from points where reagents are introduced. This allows time for reagents to mix thoroughly and react with your effluent water. Some applications, such as neutralization processes that require pH control, are best executed with submersible configuration than with in-line configuration, where both pH and flow are variables
- Some sensors must be mounted at a ±30 ° angle **(Figure 6)**. This ensures that the electrolyte remains in contact with sensing tips, and prevents bubble entrapment within the electrode membrane. Some electrodes, however, like our DO Sensor, EC237450, can be installed even upside-down – very useful for measurements in tanks that are nearly empty
- Keep connection between electrode and preamplifier dry and clean at all times. Moisture in this area may cause permanent damage

Whether you're considering an in-line or submersible configuration, the principle considerations are to avoid air bubble entrapment, as well as to ensure maximum exposure of the sensor to your process water. In processes when temperature and pressure of the process liquid exceeds the sensor ratings, a side-stream system may be used, where a portion of the process liquid is constantly directed to the sensor.

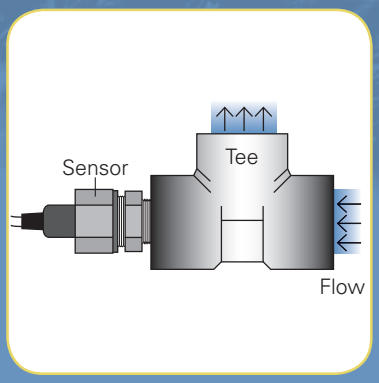


Figure 4: In-line installation

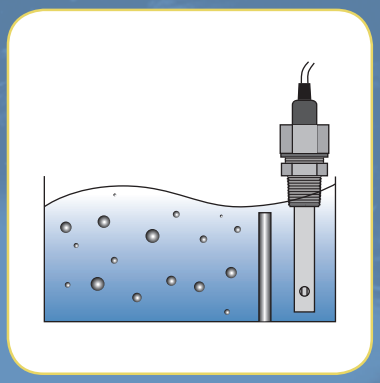


Figure 5: Submersible installation

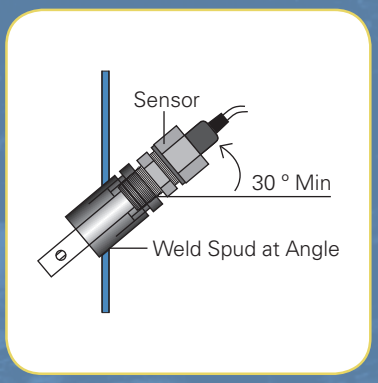


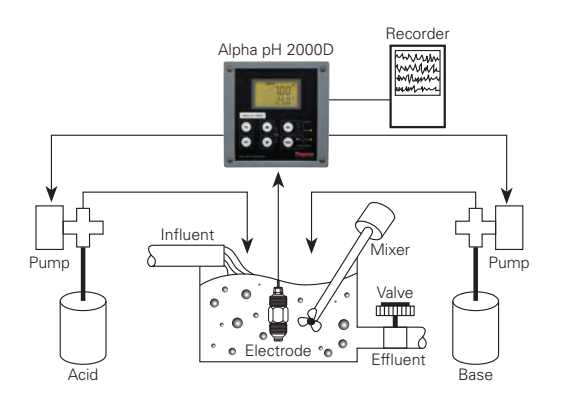
Figure 6: Angle mounting installation

Applications

pH Application

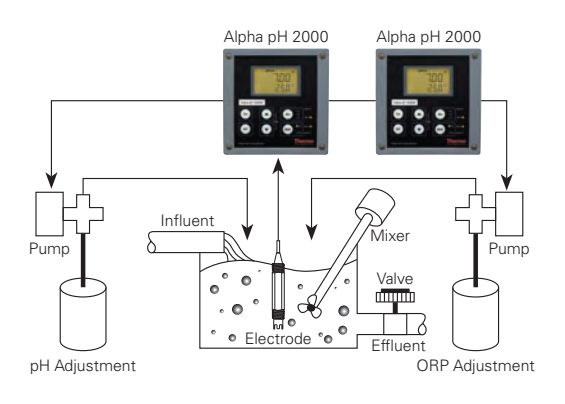
The pH neutralization system is crucial in the back-end process of treating effluent water in industries such as pharmaceutical, F&B manufacturing, electroplating and seawater desalination etc.

In a neutralization system, effluent water flows into a tank where a pH electrode picks up the pH level of the process water. When this pH level goes below or above set limits, the electrode sends a signal to the meter, which in turn, adjusts the pH level in the tank by operating two chemical pumps that release acid or alkali into the tank as needed.



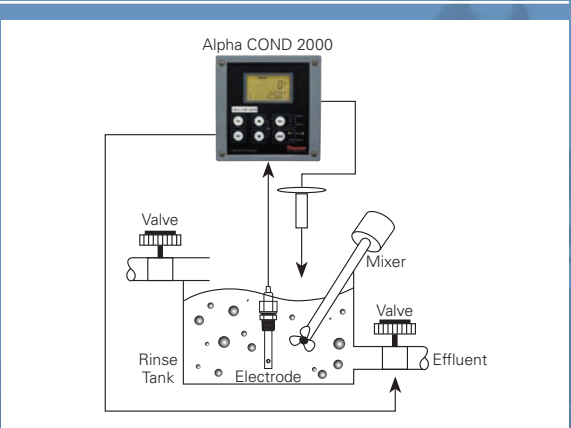
pH & ORP Application

In applications where pH and ORP must be measured and controlled simultaneously, two Alpha pH/ORP 2000 meters can be placed side by side where the pH meter acts as the primary controller – the ORP controller will only operate its pumps when pH is within set limits.



Conductivity Application

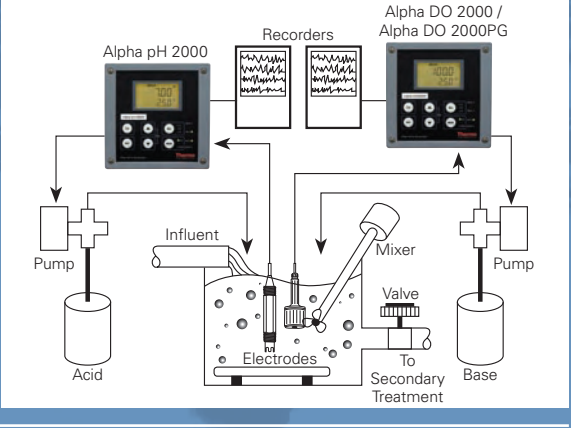
In the back-end process of the electroplating industry, conductivity monitoring systems monitor the conductivity of rinse water in metal finishing facilities, maintaining chemical concentrations at levels that provide adequate rinsing and at the same time, prevent excessive dragin to subsequent process tanks. When rinse water conductivity exceeds set limits, the meter activates a valve that introduces more water into the rinse tank, reducing conductivity of the rinse water.



pH & DO Application

In biological wastewater treatment, both dissolved oxygen level and pH level are vital in ensuring efficient breakdown of biological waste in the effluent water.

A dissolved oxygen sensor picks up the temperature and DO level of the process water in the biological wastewater tank. It then relates this information to the DO meter, which controls an air pump to increase or reduce the amount of oxygen level that goes into the effluent water.



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Warranty:
Thermo Fisher Scientific provides one year of warranty against manufacturing defects for meters, and six months for electrodes.

Disclaimers:
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