Conductivity / Resistivity Sensor Instruction Sheet

Conductivity/Resistivity Cell

Simple conductivity sensors are constructed of an insulating material imbedded with graphite, platinum, stainless steel or other metallic pieces. These metal contacts serve as sensing elements and are placed at a fixed distance apart to make contact with a solution whose conductivity is to be determined. The distance between the sensing elements as well as the surface area of the metallic piece, determine the cell constant, defined as length/area. The cell constant is a critical parameter affecting the conductance value produced by the cell and handled by the electronics circuitry.

A cell constant of 1.0 will produce a conductance reading approximately equal to the solution conductivity. For solutions of low conductivity, the sensing electrodes can be placed closer together, reducing the distance between them and producing cell constants of 0.1 or 0.01. This will raise the conductance reading by a factor of 10 to 100. Sensing electrodes can be placed further apart to create cell constants of 10 or 100 for use in highly conductive solutions. This also produces a conductance acceptable to the meter by reducing the conductance reading by a factor of 10 to 100.

In order to produce a measuring signal acceptable to the meter, it is highly important that the user chooses a cell with a cell constant appropriate for the sample. The table below lists the optimum conductivity range of cells with different cell constants.

Order Code	Cell constant	Optimum Conductivity Range	Cell Material
CS10-0-01T	0.01	0.055 – 20 μS/cm (Ultra-Pure Water)	Titanium
CS10-0-01S	0.01	0.055 - 20 μS/cm	SS 316
CS10-0-1S	0.1	0.5 - 200 μS/cm	SS 316
CS10-1-0S	1.0	0.01 - 200 mS/cm	SS 316

NB: All above cells have integrated Pt 100 ATC sensor. When used in "Pure Water" applications, select cells with cell constants, k = 0.01, and select in "temperature coefficient" option, "Pure Water Compensation", available in CONCTP1001/2, RESCTP1001/2, CONCTP2000P and CONCTP2000W.

Operating Instructions

Before use, rinse the cell in 50% Isopropanol to remove oil film. Connect the cell to the meter and follow the meter instruction for standardizing the cell for use at a given temperature. Rinse the cell sensing elements with distilled or deionised water between samples. The cell constant may change slightly with use and should be calibrated to the user's meter.

Cleaning and Storage

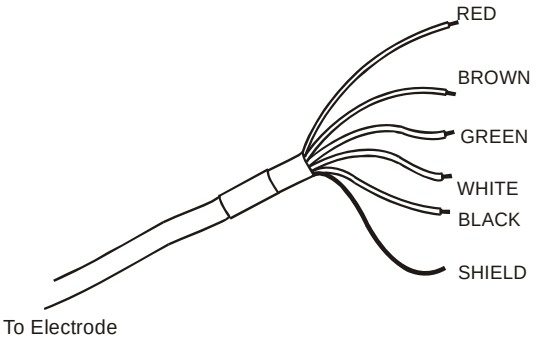
The single most important requirement of accurate and reproducible results in conductivity measurements is a clean cell. A dirty cell will contaminate the solution and cause the conductivity to change. Grease, oil, fingerprints, and other contaminants on the sensing elements can cause erroneous measurements and sporadic responses.

Clean cells with detergent and / or dilute nitric acid (1%) by dipping or filling the cell with cleaning solution and agitating for two or three minutes. Other diluted acids (e.g. sulfuric, hydrochloric, chromic) may be used for cleaning except for aqua regia. When a stronger cleaning solution is required, try concentrated hydrochloric acid mixed with 50% Isopropanol. Rinse the cell several times with distilled or deionised water and re-calibrate with meter.

Conductivity/Resistivity of Various Aqueous Solutions at 25°C

Application	Conductivity	Resistivity
Pure water	0.05 μS/cm	18 MΩ-cm
Power plant boiler water	0.05 – 1 μS/cm	1-18 MΩ-cm
Distilled water	0.5 μS/cm	2 MΩ-cm
Deionised water	0.1 – 10 μS/cm	0.1 – 10MΩ-cm
Demineralised water	1 – 80 μS/cm	0.01 – 1 MΩ-cm
Mountain water	10 μS/cm	0.1 MΩ-cm
Drinking water	0.5 – 1 mS/cm	1- 2 kΩ-cm
Wastewater	0.9 – 9 mS/cm	0.1 – 1 kΩ-cm
KCl solution (0.01 M)	1.4 mS/cm	0.7 kΩ-cm
Potable water maximum	1.5 mS/cm	0.1 kΩ-cm
Brackish water	1 – 80 mS/cm	0.01 – 1 kΩ-cm
Industrial process water	7 – 140 mS/cm	rarely stated
Ocean water	53 mS/cm	rarely stated
10% NaOH	355 mS/cm	rarely stated
31% HNO_3	865 mS/cm	rarely stated

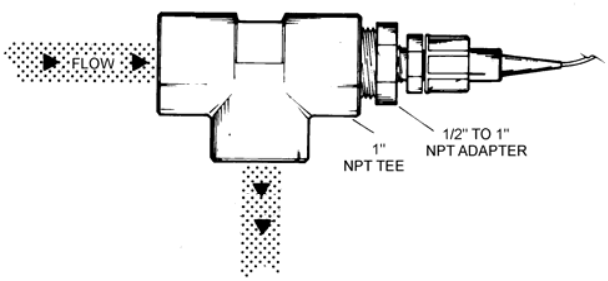
Wiring Connections for Eutech Instruments Conductivity/Resistivity cells



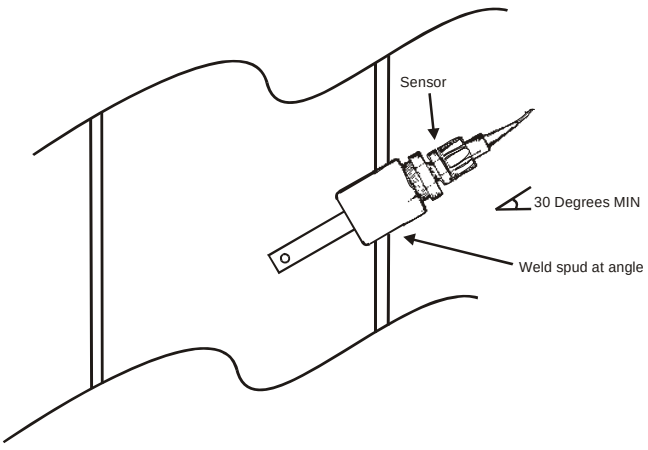
Conductivity / Resistivity Cells		Alpha CON1000	(Type A) Alpha CON2000P Alpha CON2000W	(Type B) Alpha CON2000W	Alpha CON/TDS200	Alpha RES1000	AlphaCON500 (for CS10-0-1S & CS10-1-0S only)	AlphaCON550 AlphaCON560 (for CS10-0-1S & CS10-1-0S only)
Model	Color Code	Pin No.	Pin No.	Pin No.	Pin No.	Pin No.	Pin No.	Pin No.
CS10-0-01S CS10-0-01T CS10-0-1S CS10-1-0S	RED	19	25	27	13	19	5	5
	GREEN	20	24	26	15	20	7	7
	BROWN	18	26	28	14	18	6	6
	BLACK	21	15-16	30-31	16	21	4	3
	WHITE	22	17-18	32-33	17	22	3	2
	**SHIELD	Gnd Tab	22	21	20 or 21	Gnd Tab	7	7

NOTE **: It is important to connect the SHIELD wire to the pin no as stated above to eliminate possible oscillation of the measured Conductivity/TDS/Resistivity and/or temperature reading due to electrical noise or interference.

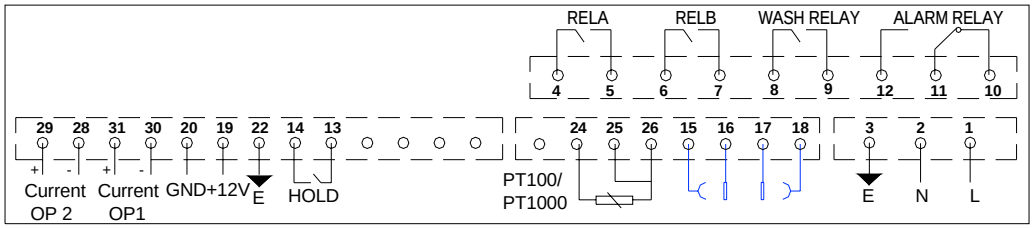
Technical Dimension of Cells



Typical Installation of Conductivity Electrode in In-Line Applications



Type A
Eutech Alpha CON2000P Alpha CON2000W



Type B
Eutech Alpha CON2000W