User's Guide

CDE-30 Series
Lab Conductivity Cells

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Application

Model	h x ø (mm)	Constant	Temp.	Type	Application
CDE-30-01	122 x 11.75	K=0.1 cm^{-1}	0 to 100 ºC	Platinum Plates	Low Concentration solutions
CDE-30-1	133 x 11.75	K=1 cm^{-1}	0 to 100 ºC	Platinum Disc	General use
CDE-30-10	119 x 11.75	K=10 cm^{-1}	0 to 100 ºC	Platinum Ring	Concentrated Solutions
CDE-30-01S	107 x 12.00	K=0.1 cm^{-1}	0 to 100 ºC	Stainless Steel	Paint and Sugar Industries

Service and Maintenance :

1 - For storage purpose, the cell must be kept in distilled water.

2 - After every reading, the cell must be cleaned. For cleaning, use a syringe filled with distilled water, injecting it through the holes located on the cell side, or dip it in a water solution made of detergent in a proportion of 1:1, for 30 minutes. Then rinse it with distilled water before using it.

3 - Never touch the Cell Electrodes, they contain Black platinum that with a minimum contact with a solid surface, will cause serious damages.

4 - When not in use, leave the cell always dip into deionized water.

5 - For a better cleaning, when the cell is really dirty, dip the cell in a water / alcohol solution in a proportion of 1:1at 50 ºC for 15 minutes. **Be Careful**, leave the cell to cool down, as any thermal shock will cause the glass to break.

6 - For Platinum Cells, do not attempt to perform any mechanical cleaning and do not touch the Platinum Cells. In case the boards are bended, replace the Cell immediately. If the Cell present cracks or is broken, replace it immediately.

7 - For Stainless Steel Cells, the cleaning must be performed using a sample solvent. Proceed by removing the SS protection, located in lower portion of the cell.

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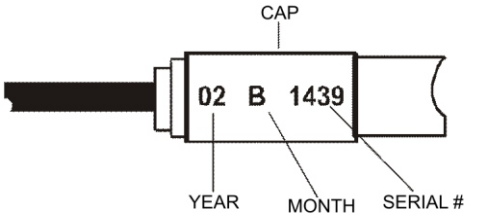
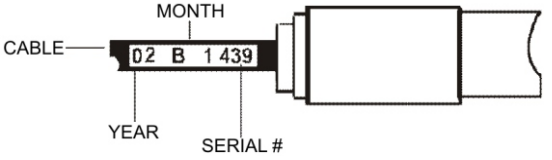
Connectors

Connectors

Conductivity Cells, are supplied with PA Connectors (Standard).



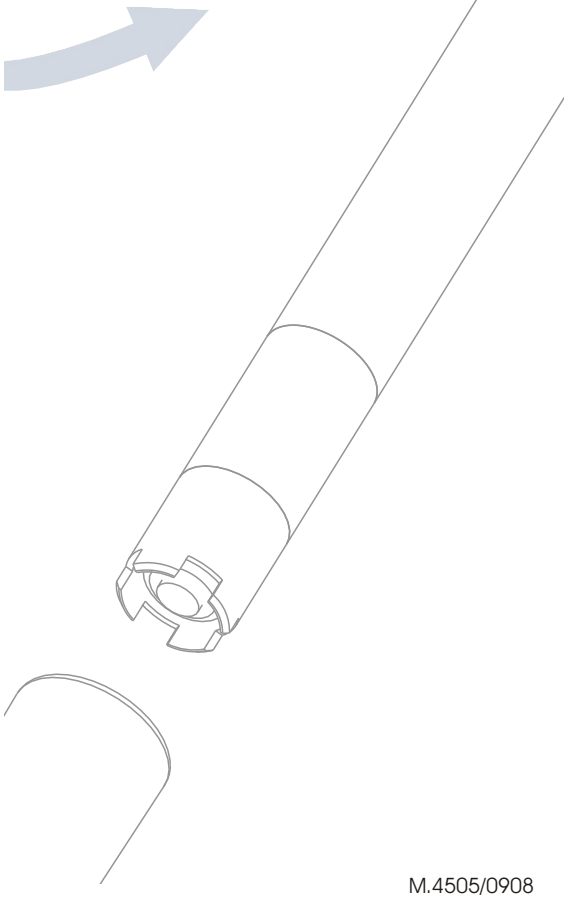


When a Cell is replaced under warranty, the new warranty will start counting from Date Code of the new replacement cell. This warranty does not cover any shipping charges, damages to Cell body, caused by eventual contaminations or mishandle.

Instruction Manual

Conductivity Cells

CDE-30 Series



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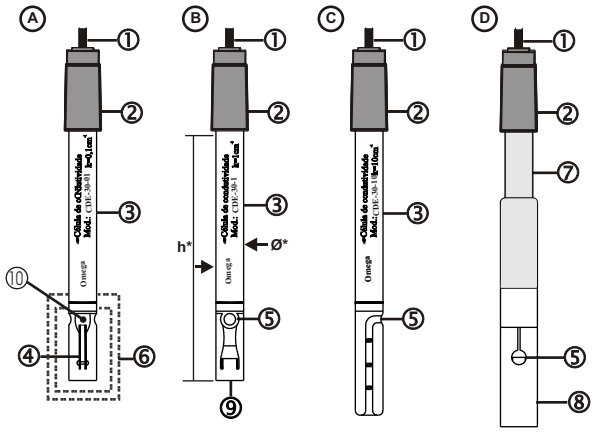
Conductivity Cells and Parts



(*) Consult dimensions at appliction table

Models:

A - CDE-30-01 - Platinum Board Cell, constant K=0.1 cm

B - CDE-30-1 - Platinum Disc Cell, constant K=1 cm

C - CDE-30-10 - Platinum Ring Cell, constant K=10 cm

D - CDE-30-01S - Stainless Steel Cell, constant K=0.1 cm

Characteristics:

1 - **Low Noise Cable:** assures stable Readings.

2 - **Polypropylene Cap:** chemically aggressiveness resistant.

3 - **Glass Body:** chemically inert.

4 - **Platinum Element** (boards, discs or rings).

5 - **Transfluency Holes:** for sample flowing

6 - **Transportation Cap:** contains distilled water for transport or storage.

7 - **Polypropylene Body**.

8 - **Stainless Steel Protection**: removable for a better cleaning.

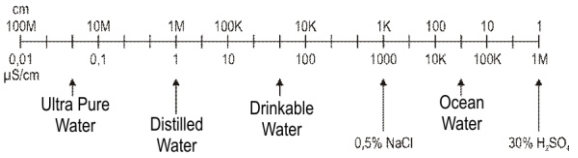
9 - Sample Opening.

10 - Temperature Sensor location.

Definitions

DEFINITIONS:

Electrolytic Conductivity, also known as Specific Conductance, is the solution capacity to conduct electrical current.
Electrical current conductance in electrolyte solutions differ from the one in metals. In metals, the electrical current is composed basically by "free electrons", in liquids the conductance is done by ions.
Specific Conductance results from the sum of contributions of all present ions. But, the transported current fraction depends on relative concentration and the freedom to move in the sample, where we can conclude that specific conductance of an electrolyte varies with concentration of present ions.
Specific Conductance is defined as reciprocal of Specific Resistance. In unit terms, Resistance is expressed in Ohm/cm that will have a reciprocal as Conductivity expressed in Mho/cm, also known as Siemens /cm.
Normally the submultiples are used: µS = 0,000001S and mS = 0,001S.
Conductance measure requires use of alternate current in order to minimize the electrosis effect, that alters the solution composition. The current frequency, in order to optimize the readings, must be situated within certain limits.



Temperature Compensation and Coefficient

Conductivity values obtained on readings will depend on Temperature. This relation between Conductivity / Temperature is linear, but strongly influenced by solution natures. In general, the relation Conductivity / Temperature, is expressed by a coefficient related specifically to each ionized substance, that could vary between 0,5% to 10% per °C. Because of this big variation, the user can observe that two Conductivity measurements, of same function during measurements, will only differ by some degrees (°C).
In order to guarantee correct measurement values, the first alternative would be to perform readings at a constant temperature (thermostat regulated at 25°C), method not very practical, but correct! Another alternative would be to automatically compensate all readings based on a reference temperature fixed at 25°C (ASTM Standard).
Inorganic Salt Solutions such as Chlorides, Nitrates, Sulfides, etc..., Are good electrical current conductors. Organic substances such as Phenol, Alcohol, Oils etc... Are the opposite, they are bad conductors.
So, when a reading of a solution indicates low conductivity value, that can mean "Low Inorganic Concentration", even with a high Concentration. In practice, it is introduced the concept of **Total Dissolved Solids** (T.D.S.) That, refers only to inorganic components.

Conductivity Cells

CONDUCTIVITY CELLS:

Conductivity Cells are composed typically of two boards or two concentric cylinders (electrodes) with a well known geometry. The gap between the boards will create a solution column, so the measurement is independent from the total solution volume.
The geometry type used will be related to the solution concentration, varying the distance or the boards section.
The relation "distance between platinum boards" over "section" will determine the CELL CONSTANT (K = 1/cm).
In order to obtain good results it is necessary to choose the specific cell for the desired application. Three factors are very important in order to make the selection: Electrical, Mechanical and Chemical.

Electrical

When reading an electrolyte of high resistance caused by the lower ions presence, a higher sensibility will be obtained with bigger electrodes and with a small distance between them. Consequently user must decrease capacitive reactance of the cell solution system, increasing the frequency tension supplied by the equipment.
It is necessary to invert when the electrolyte is very concentrated: smaller electrodes and with bigger distance in order to avoid saturation and the polarization effect of the electrodes.
Which means, the cell will have a low "K", for low conductivity electrolytes and a high "K", for high conductivity, considering that the equipment must offer automatic exchange of the adequate frequency.

Mechanical

These are significant factors: pressure, temperature, flow speed and solid suspension presence. Only when all these factors are considered, the performance achieved will be considered satisfactory with a minimum maintenance.
When the system's temperature and pressure are higher than the specified values, user must install a cooling system, with a valve, before cell contact.
But, in places where the speed is very low, user must generate an increase for the solution exchange. Solids presence will influence, caused by the obstruction that they can cause to electrodes or even a super-conductance (in metal cases).

Chemical

It is necessary to consider the aggressiveness and clogging of the electrodes, that will determine the geometry, altering the constant value.
In this cases, electrodes must be resistant to chemical aggressiveness And be cleaned periodically.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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