

User's Guide

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CDE-440 Series Conductivity Process Cells



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WARNING: These products are not designed for use in, and should not be used for, human applications.

Instructions Manual

Conductivity Cells

CDE-440-001/CDE-440-01/CDE-440-1/CDE-440-5/CDE-440-01T/CDE-442

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3. Conductivity Cells

Cell is composed basically by two boards or two concentric cylinders (electrodes), with well defined geometry. The space between the boards or cylinders creates a solution column, being so the measurement is independent from the total solution volume.

The boards or cylinders geometry used will be related to the solutions concentration for a better reading of different samples we vary the distance (and/or) the board section.

The relation "distance" (d) over the "section" (s) determines the Cell Constante (K) . $\frac{d}{s} = K$.

In order to obtain good results it is necessary to choose the specific cell for the desired application. Three factors are extremely important in order to choose the right cell: the Electrical, the Mechanical and the chemical.

Electrical

When reading an electrolyte concentration of high resistance, caused by low quantity of ions, the greater sensibility will be obtained with bigger electrodes and with a small distance between them. Consequently, we shall diminish the capacitive reactance of the cell-solution system, increasing the polarization tension frequency supplied by the equipment.

We will need the inverse when the electrolyte is very concentrate: small electrodes with long distances in order to avoid saturation and the polarization effect at the electrodes.

The Cell will present low "K" for low conductivity electrolytes and high "K" for those of high conductivity, considering that the equipment must have an automatic exchange of the adequate frequency.

Mechanical

Some significant factors are: the pressure, temperature, flow speed and the solid suspension presence. Only when all these factors are considered that will be achieved a satisfactory performance with a minimum maintenance. When the systems temperature and pressure are higher than the specified values, it must be installed a cooling system with a restraining valve before the cell contact.

In places where the flow speed is very low, it must be provided with a flow increase for a solution exchange. Solid presence will influence because of obstruction that they can cause at the electrodes or even a super conduction (in metal cases).

Chemical

It is necessary to consider the chemical aggressiveness and clogging caused at the electrodes, this can modify the geometry, altering the constant value.

In these cases, the electrodes must be chemically aggressive and must be cleaned periodically.

4. Mechanical Description

Based on process conditions, the cells must be build of material previously specified, such as: Stainless Steel 316, Epoxy or PTFE with radial electrodes or SS316 annulars, Platinum, Titanium or others depending on its resistance to the solutions chemical aggressiveness .

The electrical connection is done in isolated teminals with ceramic base located at the cast aluminum head, SAE 323, with low oxydation degree, treated against corrosion and finished with electrostatic epoxy paint. The head offers IP-67 protection, allowing the instrumentation cable to go thru by a ½" NPT threaded hole or a ½" cable knockout.



Insertion Cell CDE-440-01

Cell Models CDE-440-001, CDE-440-01, CDE-440-1, CDE-440-5 and CDE-440-01T are called Insertion or Immersion Cells.



Toroydal Cell CDE-442

Cell Model CDE-442 is called Toroydal or Electrodeless Cell, as it does not offer electrodes. The body material could be Epoxy or PTFE, where the Toroydal nucleus (2) are located, indulging an electromagnetic field, that will generate an electrical current (called Foucault Current) proportional to the sample concentration. This type of cell is recommended for high clogging concentration and highly chemically aggressive.

This Cell can only be used with Conductivity Analyzer Model# CDCN442.

5. Technical Specifications

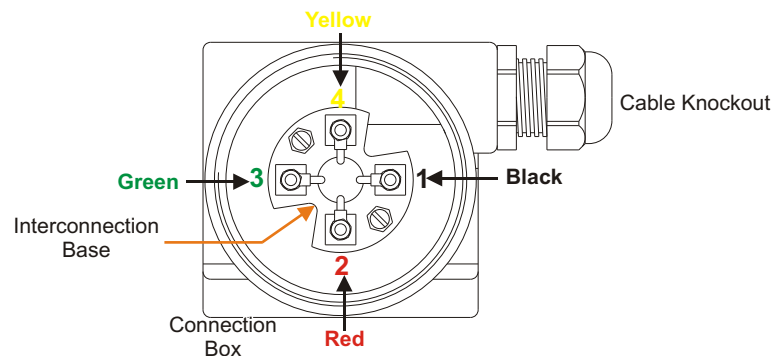
Model	CDE-440-001	CDE-440-01	CDE-440-1	CDE-440-5	CDE-440-1T	CDE-442
Type	Insertion					Torroid
Range (S/cm)	0.01 μ S to 2mS	0.1 μ S to 20mS	1 μ S to 100mS	10 μ S to 150 mS	0.1 μ S to 20mS	1mS to 1S
Cell Constant (K) cm ⁻¹	0.01	0.1	1	5	0.1	NA
Temperature(@ Atm Pressure)	0 to 100°C				0 to 200°C	0 to 100°C
Max. Pressure(@25°C)	10 Kgf/cm ²				20 Kgf/cm ²	10 Kgf/cm ²
Insetion length(mm)	54	42 to 2000	60		90	100
Process Connection	Threaded ¾ NPT				Threaded 1" ½ NPT	Threaded Point
Body Material	SS316	SS316	SS316	SS316	SS316	PTFE

6. Installation

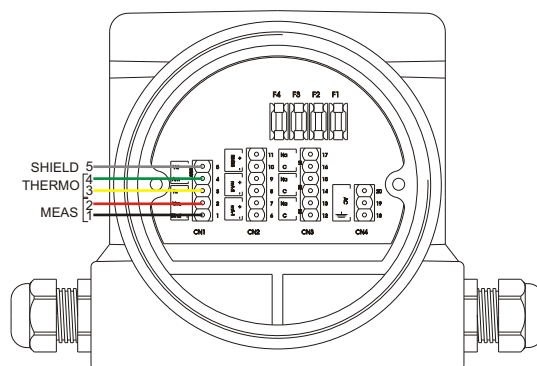
Before you install your conductivity cell, please verify for any possible bubbles and if the sample is constantly renewed.

ELECTRICAL CONNECTION

1. Prepare the cell installation point in area that offers good stirring; it is preferred to be close to the equipment (maximum of 10 meters -32 feet) and exempt of vibrations.
2. Verify if all threaded points are tied.
3. Proceed with the instrumentation cable connection originating from the equipment, going thru the cable knockout of the electrical connection box and connecting it to the interconnection base.



4. Electrical installation example between the equipment and the cell.



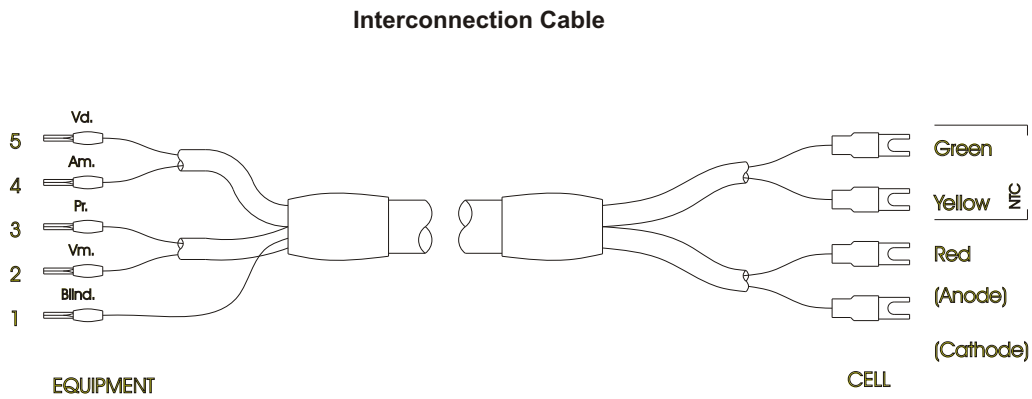
5. Verify if the cable knockouts are **firmly attached** to its respective interconnection cables. This is very important so the enclosure still offers IP-67. Sealing is crucial for a perfect performance
6. Be careful with humidity! It will diminish the impedance generating measuring errors. Verify the cable press and if necessary, dry the area using a hair dryer.
7. Be careful when tying threaded areas, depending on the cable position, it can be cut!

Note: Cell model CDE-442 do not offer a connection box and it is necessary a good instrumentation cable Sealing only at the equipment, as they do not offer connection cable.

6. Installation (cont.)

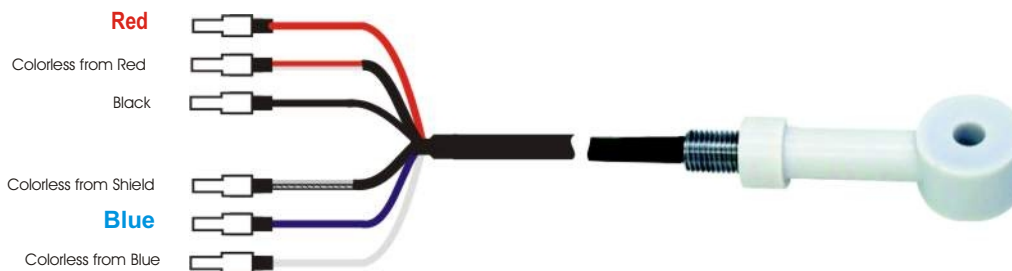
Interconnection Cable

a) Do not cut or mend the cell cables!



CDE-442 Cell Interconnection

This cell type is also connected directly to the equipment connection barr, so cable terminal pin type are used for some equipment cases.

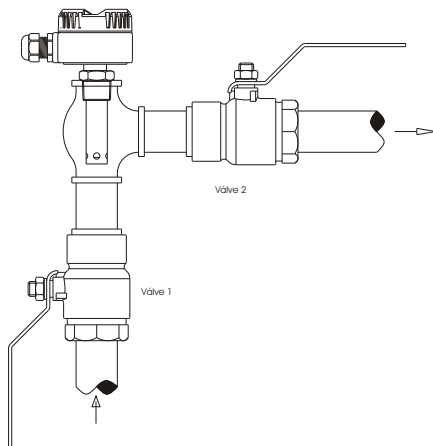


6. Installation (cont.)

Insertion Type

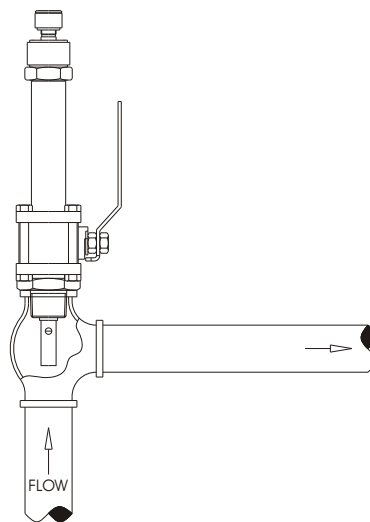
For a correct conductivity measurement, it is recommended to install the cell as shown on below Illustration.

The liquid flow must go thru the Sensor and exit thru the holes located at the upper portion of the sensor. See indicative arrows shown below, showing the recommended liquid flow.



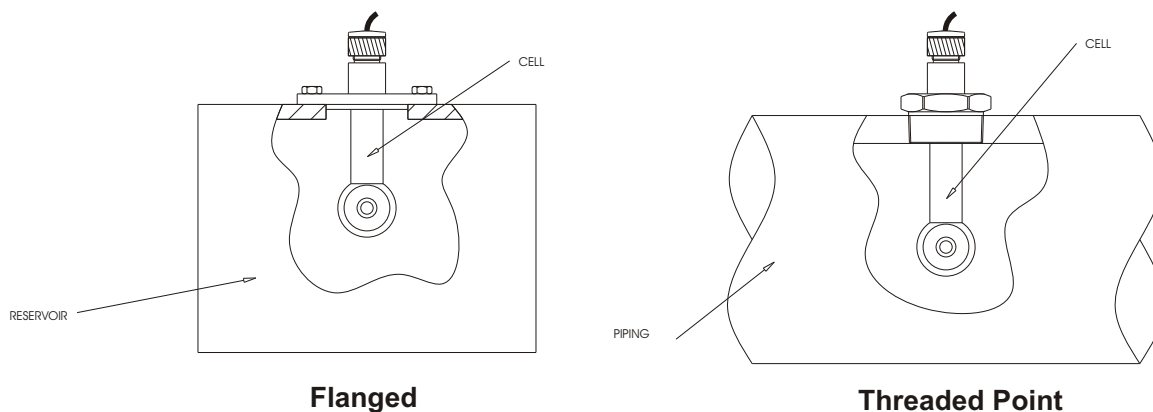
Retractable Insertion Cell

For Retractable Insertion Cell installation, allow the liquid to exit thru the holes located on the upper portion of the electrode or vice-versa.



Torroidal Type

Torroidal cell CDE-442 generally must be installed in a Transfluency Body made out of lower magnetic permeability material. Special attention must be observed regarding the sample flow being



7. Maintenance

All OMEGA equipments, are shipped from factory tested and calibrated. When under operation, the Conductivity Cell must be maintained periodically (the frequency will depend on the process), which would be basically cleaning, or if necessary, a new calibration.

Cleaning

Dip the electrodes in cleaning solution for 40 seconds, then wash thoroughly with deionized water to avoid standard contamination, when it is time to perform a calibration.

Calibration

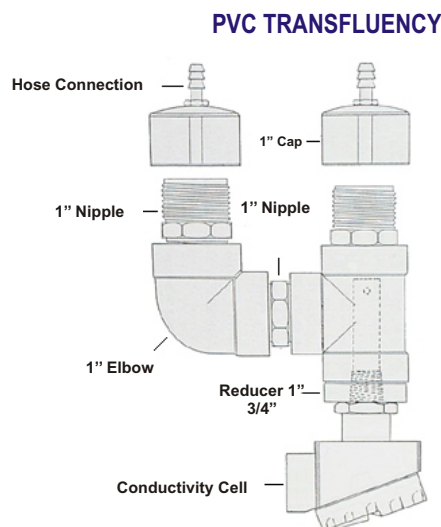
Equipments with range of 0 to 200 μ S or higher.

1. Dip cell 3 or 4 times in standard compatible with the equipment range. Wait 1 minute before you can adjust the A.T.C. (Automatic Temperature Compensation), If necessary, move it vertically (up and down) in order to eliminate any bubbles.
2. Proceed with the constant adjustment.
3. Repeat the operation "1" two or three times in order to confirm the value.

Calibration for Low Conductivity Reading(Ultra Pure Water)

Range 0.01 μ S thru 2 μ S

1. Assemble the Transfluency Cell and wash it well.



2. Using a 500 mL beaker, place approximately 400 mL of deionized or distilled water. Using a Conductivity Meter, adjust the conductivity value to approximately 50% of range value, "contaminating" with high conductivity water (example: tap water).
 3. Fill the transfluency with 146.9 μ S/cm standard and return to the beaker many times in order to rinse and eliminate contaminations. Finally leave the transfluency filled with the standard.
 4. Verify the standard conductivity value and thru "constant adjustment" reproduce the same read value at the equipment to be calibrated.
- Repeat this operation many times until you can reproduce at least three times the calibrated value.

8. Troubleshooting

1) When Calibrating the equipment, the function is not complete

Verify for humidity presence at probes header or at connection box of the equipment.
Another possibility could be the equipments interconnection cable and cell being cut or in short.

2) Reading above Range

First clean the cell and try to calibrate it. If this operation is not succesfull, verify the point where the cell is connected, making sure bubbles are not present and if the solution is flowing normally.

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2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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