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# User's Guide


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# CDE-45P
## Four-Electrode Conductivity Sensor

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# Part 1 - Introduction

## 1.1 General

The Model CDE-45P Conductivity Sensor measures the conductivity of aqueous solutions in industrial and municipal process applications. It is designed to perform in the harshest of environments. All seals are dual o-ring using multiple sealing materials. The sensor is designed for use with the Omega CDTX-45 Monitor/Analyzer.

## 1.2 Sensor Features

- 4-Electrode measurement system. Two of the electrodes are used to establish the sensor drive potential, while the other two sense the flow of current between the drive electrodes and maintain proper drive potential. In conventional 2-electrode sensors, as the process solution coats the electrode surfaces, the sensor output signal begins to decrease, producing an artificially low conductivity measurement. The Omega 4-Electrode system thus offers a high degree of accuracy for a longer period of time. The four electrodes are made of titanium for greater chemical resistance.

- The Omega 4-Electrode system compensates for the Effects of electrode fouling. As the electrodes become coated by the process solution, a feedback Mechanism detects the decrease in drive potential and automatically re-establishes the proper levels. When coating is such that compensation is no longer possible, and alarm signals the user that the sensor requires cleaning. The system also alerts the user in the event of integral temperature element failure.

- The Omega 4-Electrode system allows a single Sensor configuration to be used reliably over a wide Conductivity range. There is no need for multiple sensors with varying cell constants that are restricted to narrow operating ranges.

- Pt1000 RTD. The temperature element used in this Sensor is highly accurate and provides a highly linear output.

## 1.3 Sensor Specifications (CDE-45P)

| | |
|---|---|
| **Measuring Range** | 0.000 to 2.000 S/cm |
| **Wetted Materials** | Titanium, PEEK, FKM, EPR<br>(316SS when sensor is submersion mounted) |
| **Temperature Compensation** | Pt1000 RTD |
| **Sensor Cable** | 6 Conductor plus 2 shields, |
| **Temperature Pressure Range** | The choice of sensor material/ mounting option and the hardware used to mount the sensor will determine the temperature and pressure ratings. Please consult the factory for relevant temperature and pressure rating information. |
| **Maximum Flow Rate** | 10 feet (3 meters) per second |
| **Max. Sensor-Analyzer Distance** | 60 feet (18.2 meters) |
| **Weight** | 1 lb. (0.45 kg) |

Inches (mm)

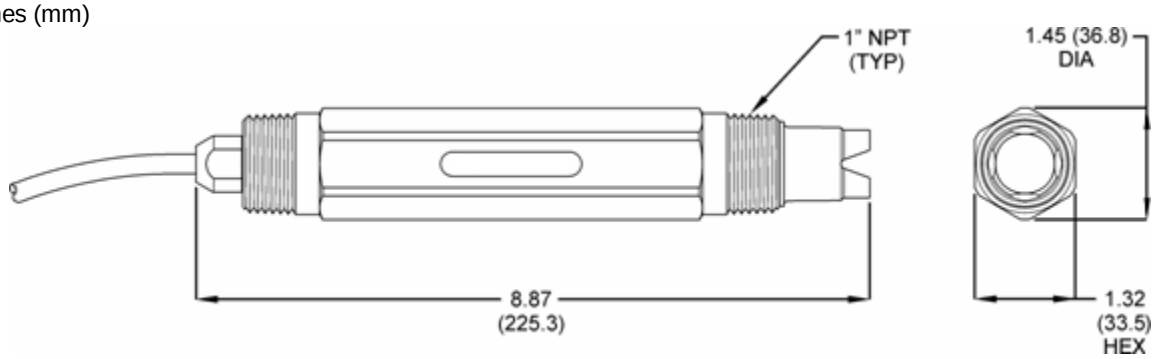



***Figure 1-1 CDE-45P Sensor Dimensions (standard, convertible style)***

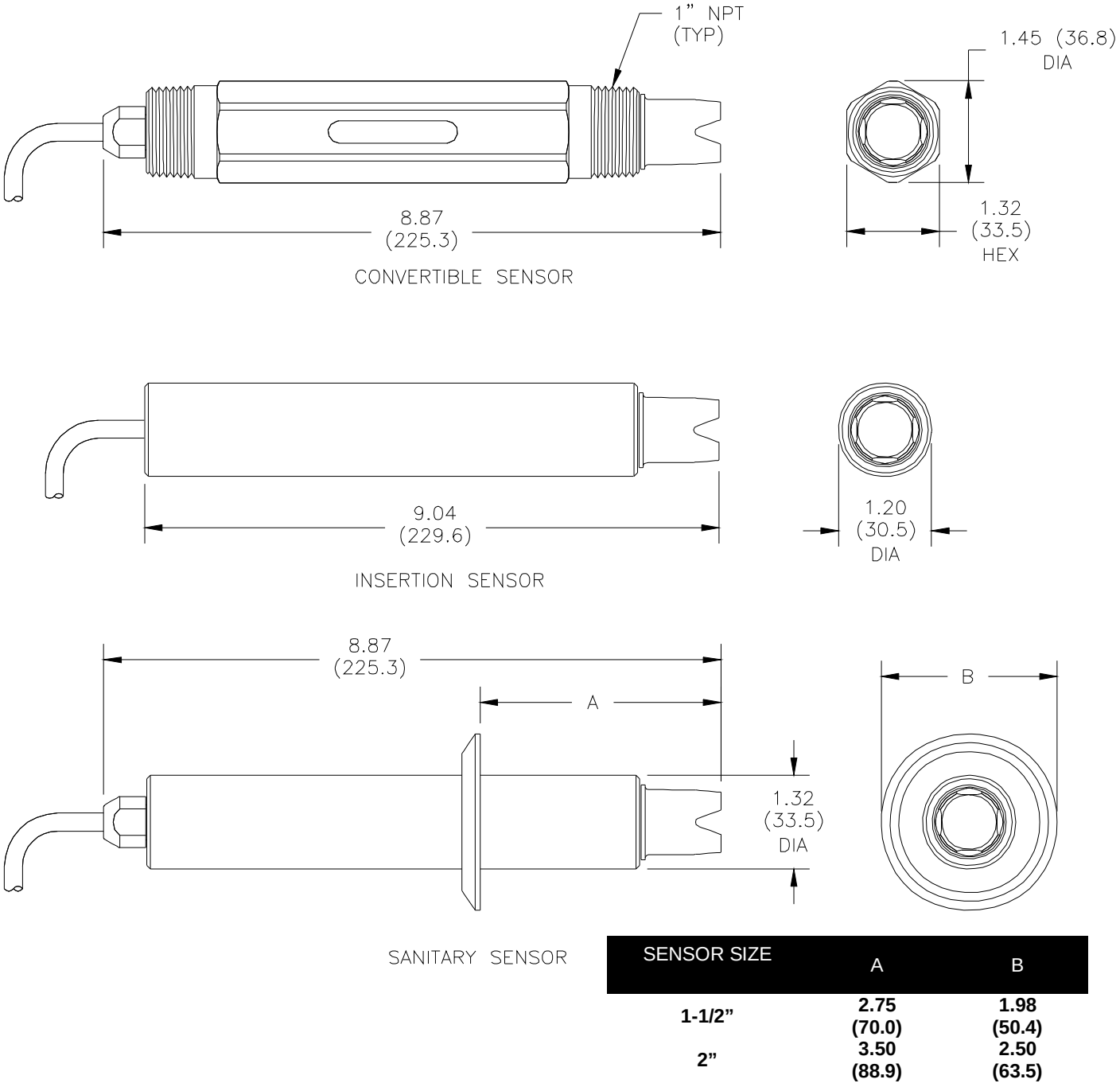
# Part 2 – Installation

## 2.1 General

The CDE-45P Conductivity Sensor is designed for industrial and municipal process applications. Mounting options include flow-through, submersion, insertion (special hardware required), or integral mount to the CDTX-45 Conductivity Monitor/Analyzer. The sensor-to-analyzer distance must not exceed 60 feet (18.2 meters).

Calibrate the sensor before placing it into the process. See Model CDTX-45 Monitor/Analyzer Instruction Manual for detailed calibration instructions.

The sensor comes with a removable guard that surrounds the electrode face. This guard minimizes interference effects in tight locations where the sensor face is close to surrounding objects. If it is removed, take care to leave at least 1 $in^3$ of space in front of the electrodes. If the guard is to be used, the sensor must be calibrated with it in place, since the guard affects the sensor cell constant.




| SENSOR SIZE | A | B |
|---|---|---|
| **1-1/2"** | **2.75 (70.0)** | **1.98 (50.4)** |
| **2"** | **3.50 (88.9)** | **2.50 (63.5)** |

***Figure 2-1 CDE-45P Sensor Types***

## 2.2 Electrical

The Model CDE-45P sensor comes standard with 15 feet of 6 conductor double shielded cable. The cable is permanently attached to the sensor, and a PEEK cordgrip is used to seal around the cable. Nevertheless, the cable should always be kept as clean and dry as possible.

**DANGER: DO NOT connect sensor cable to power lines. Serious injury may result.**

Take care to route sensor cable away from AC power lines, adjustable frequency drives, motors, or other noisy electrical signal lines. Do not run signal lines in the same conduit as AC power lines. Run signal cable in dedicated metal conduit if possible. For optimum electrical noise protection, run an earth ground wire to the ground terminal in the transmitter

Refer to Figure 2-2, Cable Description and Figure 2-3, Wiring Diagram for illustrative details on electrical installation.

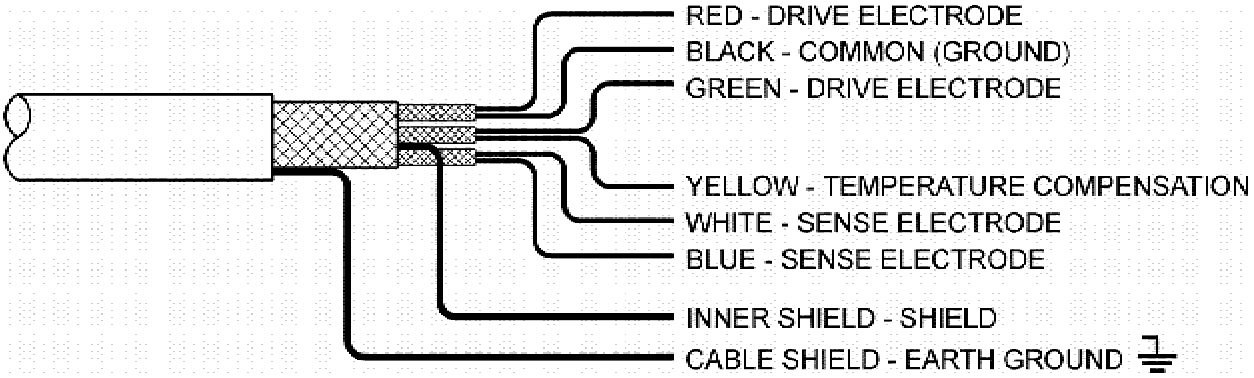



***Figure 2-2 Cable Description, Model CDE-45P***

Only 6-wire shielded interconnect cable must be used when connecting the Model CDE-45P sensor to the analyzer. This high-performance, double shielded, polyethylene jacketed cable is specially designed to provide the proper signal shielding for the sensor used in this system. No substitutions can be made. Substituted cables may cause problems with system performance

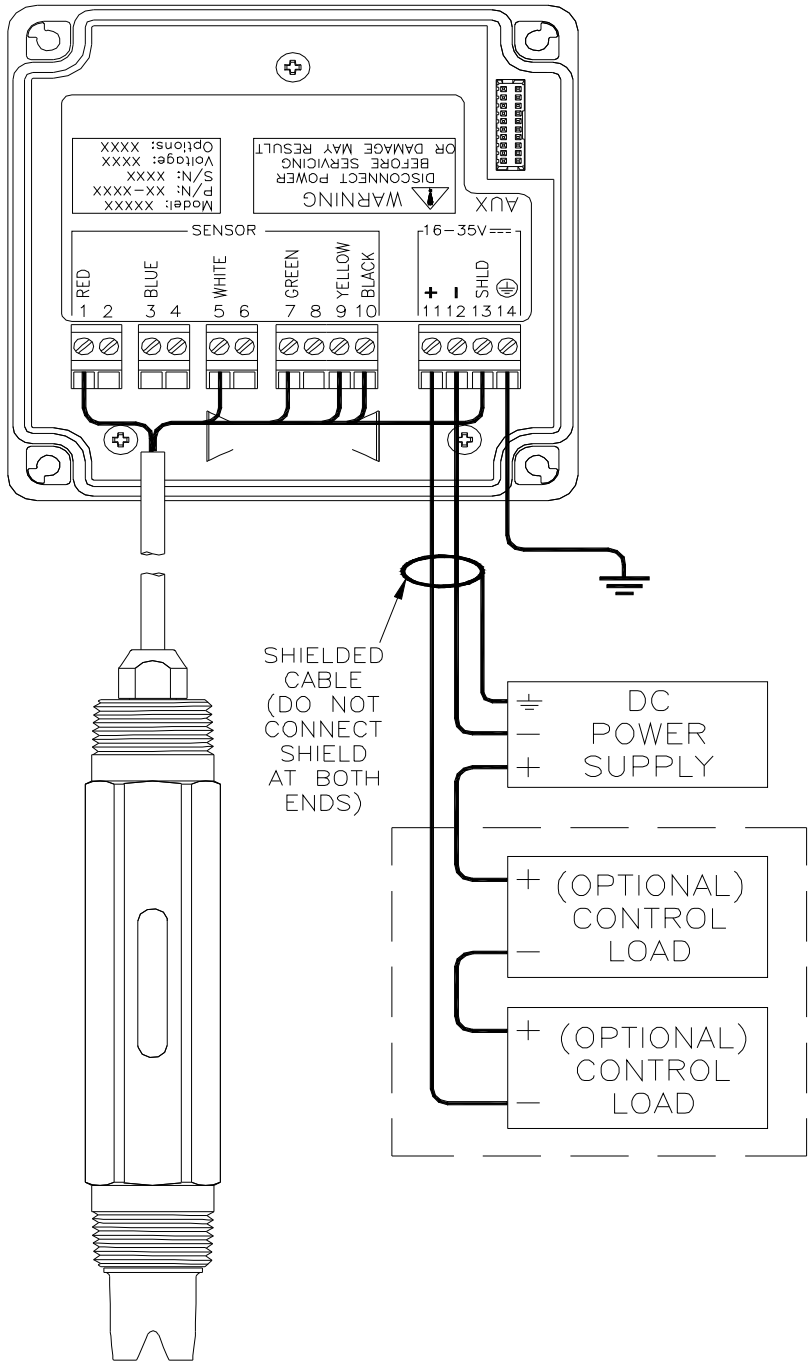



***Figure 2-3 Wiring Diagram, CDE-45P Sensor and CDTX-45 Monitor/Analyzer***

*Notes:* 1. Voltage between Terminals 11 and 12 MUST be between 16 and 35 VDC.

2. Earth ground into Terminal 14 is STRONGLY recommended. This connection can greatly improve stability in electrically noisy environments.

# Part 3 – Sensor Mounting

## 3.1 Cleaning the Sensor

Keep the sensor as clean as possible for optimum measurement accuracy. Frequency of cleaning depends upon the process solution.

*Note:* Mechanical cleaning of the electrode surfaces may harm measurement quality if not performed with care. Do NOT use wire brushes, sandpaper and the like to clean any conductivity electrode.

Wipe the measuring end of the sensor with a clean with a clean soft cloth. Then rinse with clean water (distilled or de-ionized if possible). This should remove most contaminate buildup.

If necessary, soak the sensor for several minutes in a mild soap solution. Use a small, extra-soft bristle brush (such as a mushroom brush) to thoroughly clean the electrode surfaces. If surface deposits are not completely removed after performing this step, a dilute acid may be used to dissolve the deposits. Soak for a few minutes, and then rinse the sensor thoroughly with clean water (distilled or de-ionized if possible).

*Note:* DO NOT soak the sensor in dilute acid solution for more than 5 minutes.

**WARNING: ACIDS ARE HAZARDOUS.** Always wear eye and skin protection when handling. Follow all Material Safety Data Sheet recommendations. A hazardous chemical reaction can be created when certain acids come in contact with process chemicals. Make this determination before cleaning with any acid, regardless of concentration. **DO NOT** use Hydrochloric Acid on any stainless steel portion of the sensor.

After cleaning the sensor, check measurement and re-calibrate the sensor.

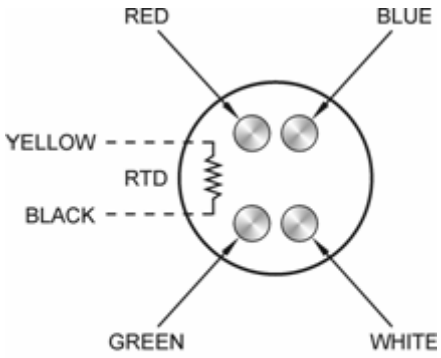
## 3.2 Troubleshooting

The first step in resolving any measurement problem is to determine whether the trouble lies in the sensor or the transmitter. Since measurement problems can often be traced to surface deposits coating the electrodes, cleaning the sensor using the method outlined in Section 3.1 should always be the first step in any troubleshooting.

If the sensor cannot be calibrated after cleaning, perform the following test. A multimeter will be needed.

1. Disconnect the sensor from the transmitter or junction box.

2. Using a multimeter, verify continuity between electrodes indicated below and the corresponding wire colors in the cable (red, blue, green and white, only).




SENSOR FACE

3. Verify that the sensor's temperature element (Pt1000 RTD) is functioning properly by measuring the resistance between the sensor's yellow and black wires. The nominal resistance value at 25 ºC is 1097 ohms. Use the following table as a guide to the approximate resistance value:

| ºC | RTD Ω |
|---|---|
| 20 | 1078 |
| 25 | 1097 |
| 30 | 1117 |
| 35 | 1136 |

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