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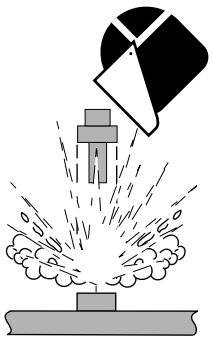


SAFETY INSTRUCTIONS

1. Do not remove from pressurized lines.
2. Do not exceed maximum temperature/pressure specifications.
3. Do not install/service without following installation instructions (see sensor manual).
4. Wear safety goggles and faceshield during installation/service.
5. Do not alter product construction.
6. Failure to follow safety instructions could result in severe personal injury!

-XX refers to electronic range options:

- *CDTX-80 = 0 to 20 µS, 0.5 cell*
- *CDTX-81 = 0 to 200 µS, 0.5 cell*
- *CDTX-82 = 0 to 2,000 µS, 2.0 cell*
- *CDTX-83 = 0 to 10,000 µS, 2.0 cell*

Unpacking and Inspection

The following items are included in your Conductivity transmitter package:

- CDTX-80 Series Conductivity Transmitter
- Instruction manual

Chapter 1
Introduction

This manual contains description, instructions and specifications for the installation, calibration and care of the CDTX-80 Series Conductivity Transmitter.

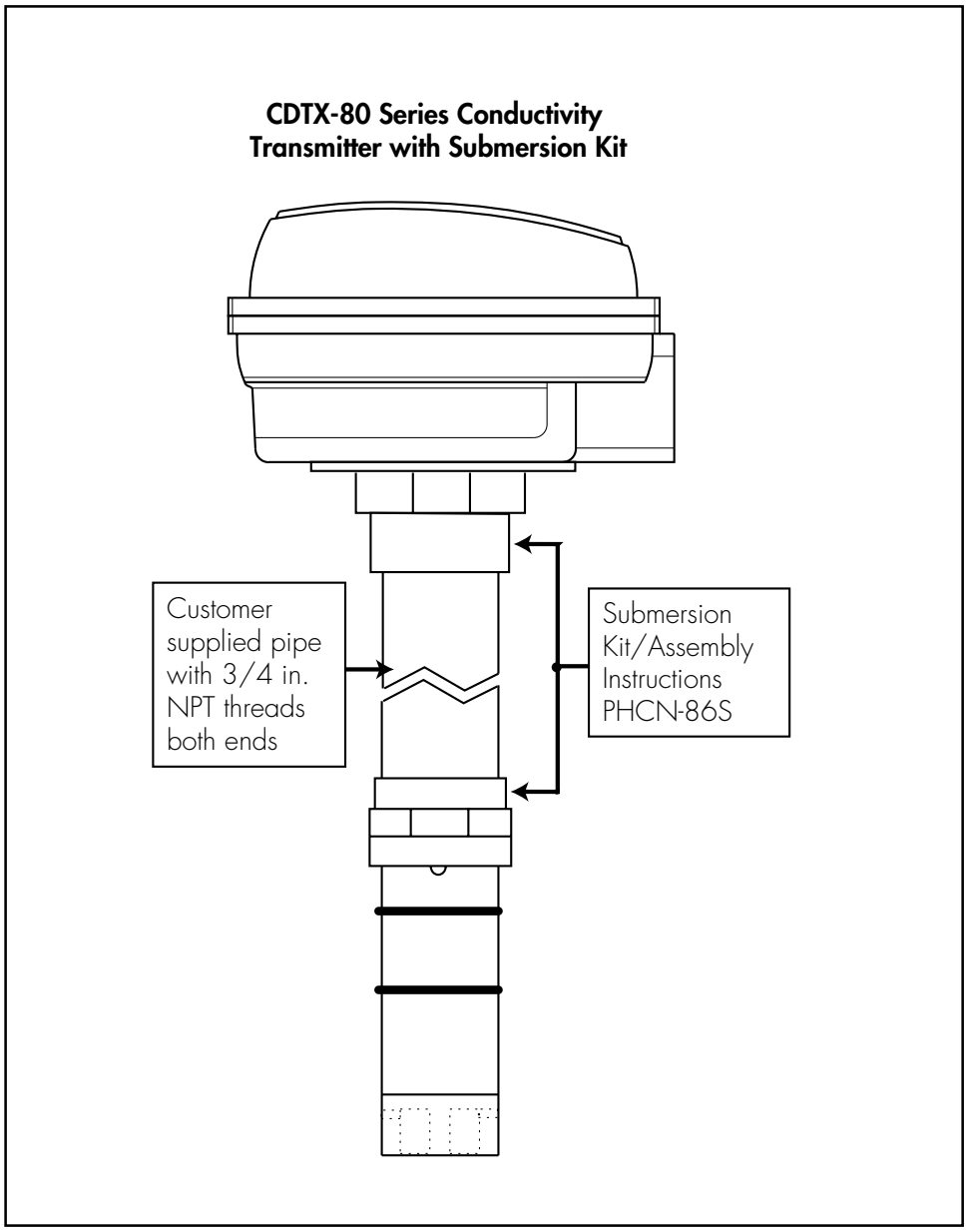
1.1 Description

The CDTX-80 Series Conductivity Transmitter is used in conjunction with an insertion type sensor that continuously measures the conductivity (total dissolved solids or gases) of a solution in a wide variety of process applications.

The Conductivity Transmitter consists of a conductivity sensor and an electronics package (transmitter). The electronics package is housed in a NEMA 4X/IP65 enclosure.

The CDTX-80 Series Condutivity Transmitter can be converted for submersible applications such as water wells, tanks etc. Optional submersion kit, PHCN-86S includes the necessary parts and assembly instructions for extending the sensor length up to 12 ft. The submersible kit requires a 3/4 inch pipe with male NPT threads on both ends, (customer supplied) that is used to physically extend the sensors' length (See figure 1 page 2).

Figure 1
Transmitter submersion kit and required extension cable.



Chapter 2
Calibration

2.1 Wet Calibration

Your CDTX-80 Series Conductivity Transmitter has been electronically calibrated at the factory before shipment. You will need to perform a wet calibration to compensate for electrode variations.

Wet calibration compares the output of the transmitter against the conductivity value of a test solution.

Wet Calibration should be performed while the CDTX-80 Series Conductivity Transmitter is being permanently installed. When done carefully, you can trim the transmitter accuracy to within ±1% of full scale.

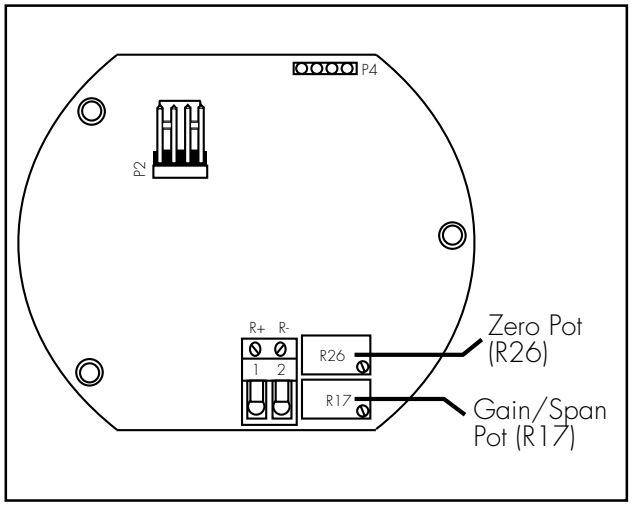


Figure 2
Adjustment pots and connectors

Equipment Required

- Small screwdriver
- Power supply (10 to 30 VDC)
- Ammeter

2.2 Calibration Procedure

1. Connect power supply to transmitter input placing an ammeter in series with the input power, see Figure 3.

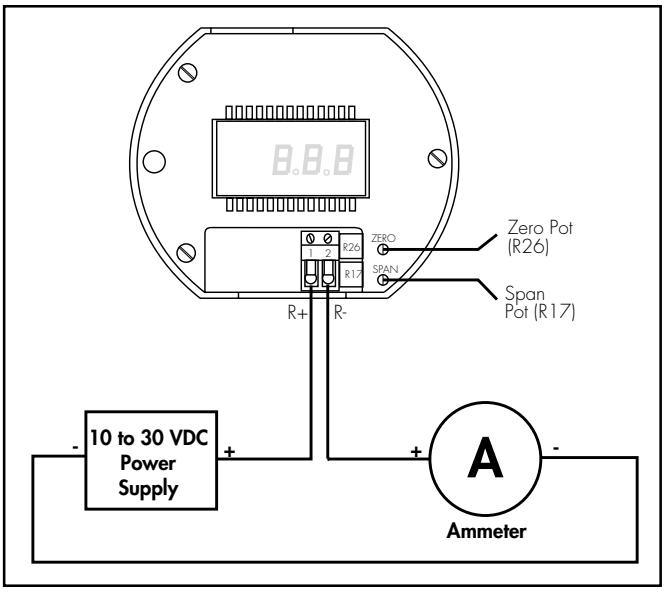


Figure 3
Transmitter Hook-up

NOTE:
The current output can be monitored in several ways (see Figure 8)

2. With the Conductivity electrode in the air (0 conductance) adjust the Zero pot (R26) for 4.00 mA.
3. Place the electrode into a solution of known conductance and adjust the Span pot (R17) for the corresponding mA value.

mA =
[(Known Cond./Full Scale Cond.) • 16 mA] + 4 mA

4. Remove the sensor from solution and verify that the sensor reads 4.00 mA.
5. Repeat steps 2 through 4 as necessary.

2.3 Installing Optional Display Board

The addition of the display board option (CDTX-80-D) to the conductivity transmitter is done in the following manner.

1. Remove snap-on cover allowing access to the P4 connector.
2. Plug the four conductor ribbon cable into the P4 connector, see Figure 4.

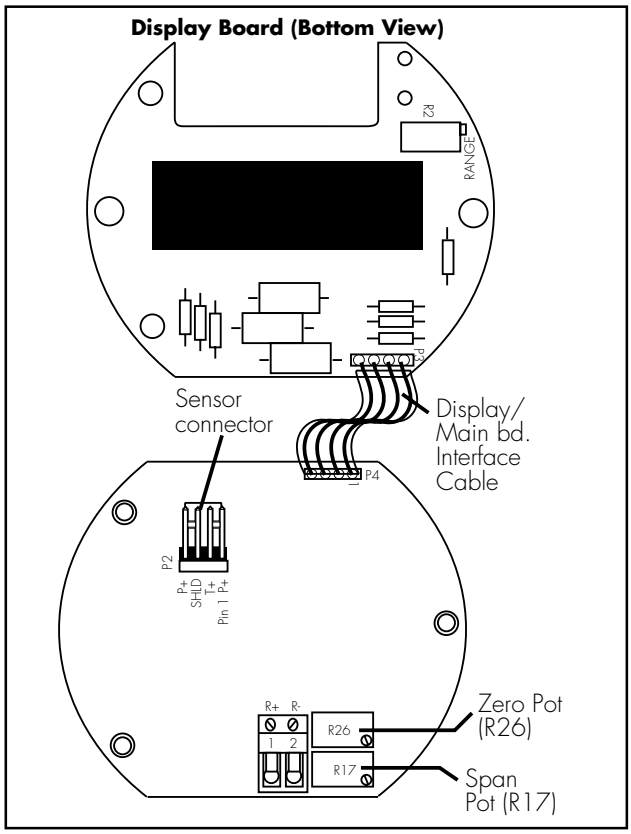


Figure 4
Display Board Installation Drawing part no. CDTX-80-D

3. If necessary use a small blade (e.g Exacto knife) to remove any conformal coating from the standoff holes or calibration pot access holes.
4. Carefully snap the display board onto the three standoffs.
5. Re-calibrate the instrument as explained in section 2.2.

2.4 Display Board Range Adjustment

The display board displays from zero to one hundred percent of range. This PCB has a one-point calibration which may need to be done at installation.

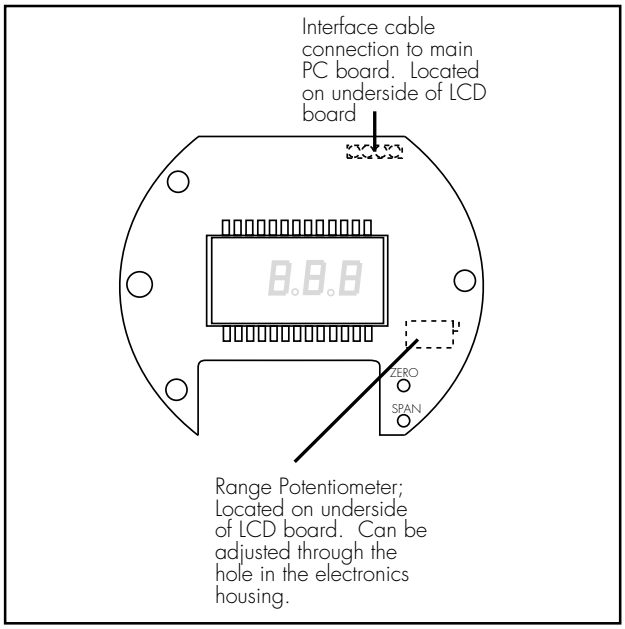
1. Re-calibrate per section 2.2

2. Calculate percentage of full scale and adjust Range pot on display board so that the display shows the proper percent of Full Scale.

Model no.	Full Range
CDTX-80	20 µS
CDTX-81	200 µS
CDTX-82	2,000 µS
CDTX-83	10,000 µS

(Solution value ÷ Full Range) • 100 = Percentage

Figure 5
Range Potentiometer Location



The display board draws approx. 200 µA of current. When added, the transmitter requires recalibration.

Chapter 3
Installation

3.1 General

This transmitter may be installed in harsh environmental locations. However, when possible the transmitter should be located so as to minimize the effects of temperature gradients and to avoid vibration and shock.

3.2 Positioning

In order to achieve good repeatable results care must be taken in the placement of the sensor. It is important that the sensor electrodes are fully immersed in the process fluid. Flow rates around the sensor must be limited so as not to produce air pockets which will affect the signal path through the fluid. We recommend that you do not mount completely upside-down as sediments may become trapped in the sensor and that you do not mount at the very top of the pipe because the pipe might not always be full.

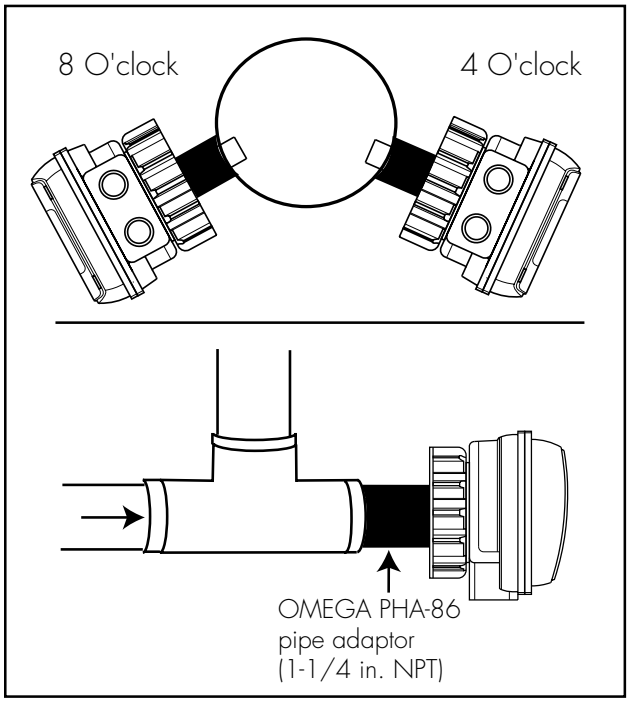


Figure 6
In-line Sensor Positioning Diagram

The information provided on sensor positioning are recommendations only. The primary consideration is that the electrodes are in full contact with the process fluid. If sediments are present we recommend avoiding the 6 O'clock position.

3.3 In-Line Installations

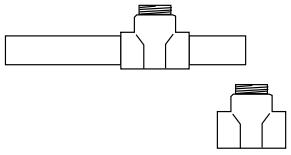
The CDTX-80 Series Conductivity Transmitter sensor system is designed for installation into a pipe using standard OMEGA Engineering fittings **(up to 4 inch),** or the optional PHA-86 pipe adaptor fitting. Refer to section 3.4 for additional information.

Caution: *When installing saddle fittings, depressurize and drain pipe before drilling fitting hole.*

3.4 In-line Fitting Options

These fittings provide the proper installation parameters that are critical to the calibration of the conductivity system.

Plastic "glue-on" Tee Fitting



Fitting Installation/Plastic Fittings

Tees:

- All tee fittings sold by OMEGA Engineering are "glue-on" type except for the PVDF tees which are thermally fused. Be aware that PVC and CPVC tees require different types of primer and cement.
- Tee fittings are available for pipes from 0.5 to 4 inches in diameter.

Plastic "glue-on" Saddle Fitting

Saddles:

- Plastic "glue-on" saddles are available for lines from 2 to 4 inches in diameter.
- 2 to 4 inch "glue-on" saddles require a 1-7/16 inch hole in the pipe. (O-ring not used with glue-on type)
- The hole must be completely deburred to be free of any projections.
- When assembling plastic saddles, the arrows on the wedges must match the direction of the arrows on the pipe saddle.

Misc:

OMEGA Engineering also offers a pipe adaptor specifically designed for installing

OMEGA Engineering analytical sensors into in-line applications (PHA-86). This pipe adaptor can be installed in any standard 1-1/4 inch FNPT pipe fitting.

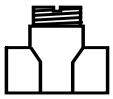
Fitting Installation/Metal Fittings
Welded fittings MUST be installed by a certified welder.

"Weld-on" Weldolet Fitting

The plastic sensor insert in the Weldolet fitting MUST be removed during the welding process. When reinstalled, it is important that the insert be threaded to the proper height "H" dimension to ensure full insertion of the sensor electrodes, see page 10.

- 2 to 4 inch Weldolet fittings require a 1-7/16 inch hole in the pipe.
- The hole must be completely deburred to be free of any projections before installing the Weldolet fitting.

Metal Pipe Tee Fitting

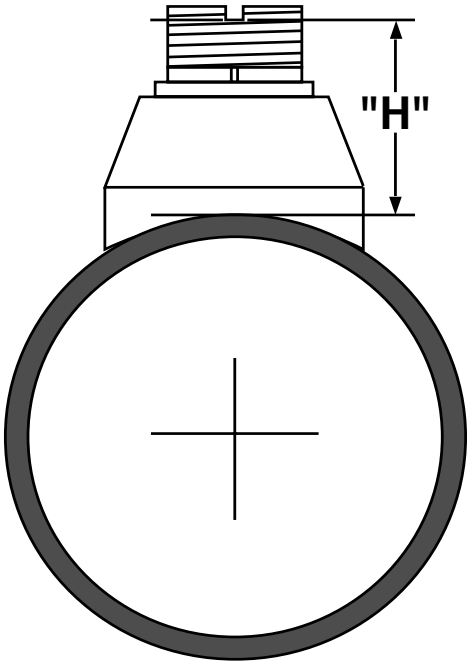


Pipe Tees: Metal Pipe Tees are available for 0.5 to 2 inch metal pipes. Materials include iron, carbon steel, stainless steel, and copper or bronze. All tees are threaded with NPT threads except for copper and bronze tees, which have solder or braze type fittings.

- Use thread sealant compound on fittings with threaded connections.

Weldolet part number	"H" dimension inches
FP-5325CS	2.33
FP-5330CS	2.32
FP-5340CS	2.30
FP-5325	2.33
FP-5330	2.32
FP-5340	2.30

Weldolet Fitting



3.5 Submersible Installations

CDTX-80 Series Conductivity Transmitter sensor system can be made submersible through the use of the submersible kit PHCN-86S and extension cable cable length from -01 to -12 ft. (see Figure 1 page 2).

3.6 Electrical Installation

The transmitter has a 1/2 inch conduit opening for power/signal wiring, see Figure 7.

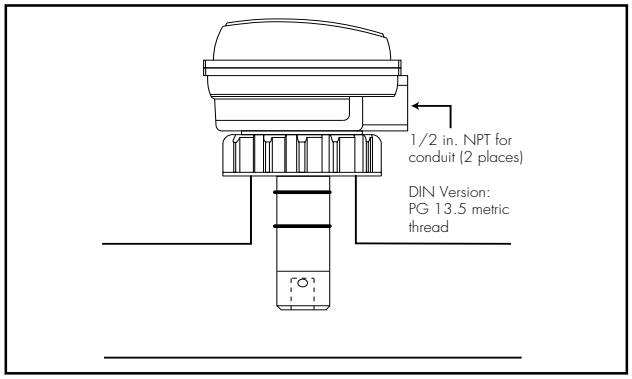
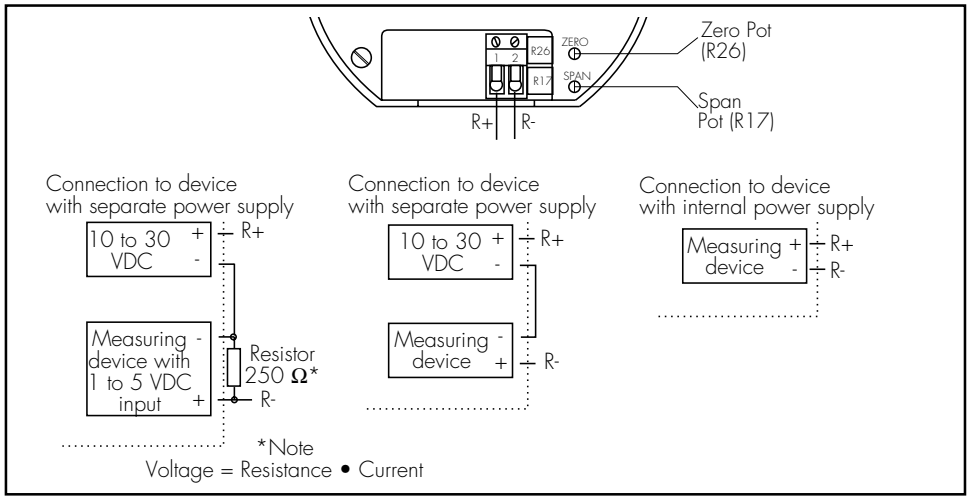


Figure 7
CDTX-80 Series Conductivity Transmitter In-line Installation

The sensor input connection is located on the lower PCB (below optional Display PCB). To access the connector, remove the housing cover followed by the electronics cover (snap on/off). The connector is now accessible between the Display PCB (if installed) and the Main PCB.

Signal wiring to the R+ and R- terminals need not be shielded, but 2-conductor shielded twisted-pair cable should be used for best results (Min. #22 AWG).

Figure 8
Transmitter Connection Diagram



Signal wiring should not run in conduit or in open trays with HVAC wiring and should not be run near heavy electrical equipment. Leads should be color coded for polarity identification. The conduit connection on the transmitter housing should be sealed or plugged to avoid accumulation of moisture in the housing. If the conduit is not sealed, the transmitter should be mounted with the opening downward for draining.

Signal wiring may be ungrounded or grounded at any place in the signal loop. Power supply regulation is not critical. Make sure that the power supply source conforms to the requirements of the transmitter and that the current rating of the supply is not exceeded, particularly if more than one transmitter is connected to the supply in parallel.

NOTE:
This transmitter is designed to eliminate ground loops and other electrical interactions between system components even if several transmitters are powered by a common supply in parallel.

Make sure that electrical characteristics of the remote output device are compatible with the transmitter output: Total load resistance must not exceed 700 ohms using a 24 VDC power supply. Total load resistance is the sum of the individual resistances of all devices which are connected in series with the signal output lead.

Equation:
$R_L = V_S$-10/0.02
where
R_L = Load Resistance in ohms
V_S = Supply Voltage
10 = Minimum operating voltage
0.02 = 20 mA (maximum current)

Chapter 4 Conductivity Sensor Maintenance

4.1 Maintenance Tips

The electrodes contact the solution and transfer a signal through the solution being measured. It is recommended that the electrodes maintain contact with fluid. If allowed to air dry, precipitates may form on the electrodes causing higher than normal readings and possibly contaminating the process fluid. If precipitates form, the electrodes may be cleaned by immersing the sensor in warm water and scrubbing the electrodes with a soft nylon brush.

It is important that the sensor is not exposed to oils which may coat the electrodes. This may seriously affect the readings.

In extreme cases it may be necessary to clean the sensor with alcohol to remove oils. We recommend using a cotton swab and brushing the electrode clean instead of dipping the entire sensor body in acetone.

In submersible applications the sensor should be located fully immersed and away from the presence of any bubbles.

In some instances it may be necessary to devise a periodic maintenance schedule to clean the electrodes and verify calibration.

4.2 Troubleshooting Guide

Problem	Cause	Action
Display/output reads off scale	•Application range exceeds the electronics range.	• Check unit model number, see Unpacking and Inspection section (opposite page #1)
	•Unit is not properly calibrated	• Re-calibrate, see page 4
	•Range pot misadjusted	• Re-calibrate display, see page 5
Display/output reads zero (4 mA)	•Application range below the electronics range	•Check unit model number, see Unpacking and Inspection section (opposite page #1)
	• Sensor not connected	•Check sensor connection
Display is blank/ no current	• System power or ground OPEN	• Check system wiring
Transmitter cannot be calibrated (insufficient Zero adjust)	• Gain pot set too high	• Reduce Gain/Span pot adjust
	• Incorrect operating range	• Check unit model number, see Unpacking and Inspection section (opposite page #1)
	• Excessive Quiescent current	• Send for repair
Transmitter cannot be calibrated (insufficient Gain adjust)	• Incorrect operating range	• Check unit model number, see Unpacking and Inspection section (opposite page #1)
	• Unit not calibrated	• Re-calibrate, see page 4
	• Output transistor damaged	• Send for repair
Transmitter output changes erratically	• Air bubbles contacting sensor	• Check installation
	• Coated electrodes	• Clean sensor, see page 11
	• Leaking submersion kit	• Clean/replace cable install new seal

Specifications

Optional Display:	0 - 100%, 2-1/2 digit LCD (factory installation recommended), CDTX-80-D
Loop power:	10 to 30 VDC

Loop impedance:
- 1Ω @ 10 VDC
- 100Ω @ 12 VDC
- 1000Ω @ 30 VDC

Electronics operating temp:
- -15 to 50 °C (5 to 122 °F)

Max sensor pressure/temperature:
- 7 bar @ 20 °C (100 psi @ 68 °F)
- 1.7 bar @ 90 °C (25 psi @ 194 °F)

Operating ranges:

• CDTX-80	0 to 20 µS	0.05 cell
• CDTX-81	0 to 200 µS	0.05 cell
• CDTX-82	0 to 2,000 µS	2.0 cell
• CDTX-83	0 to 10,000 µS	2.0 cell

Current output:	2-wire, 4 to 20 mA signal
Accuracy:	±1% of range
Relative Humidity:	0 to 95%, non-condensing

Enclosure materials:

• Electronics enclosure:	Glass-filled PP, NEMA 4X/IP65
• Enclosure seal:	Viton®
• Window:	Polycarbonate

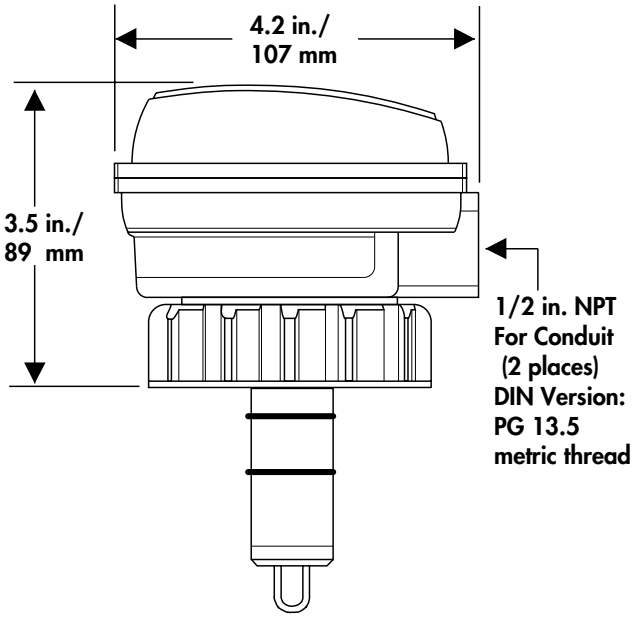
Wetted sensor materials:

• Sensor body:	Glass-filled PP
• Electrodes:	Titanium
• Sensor o-rings (2):	Viton®
• Optional o-rings:	EPR, FPP-1224-0021 Kalrez, FPP-1228-0021

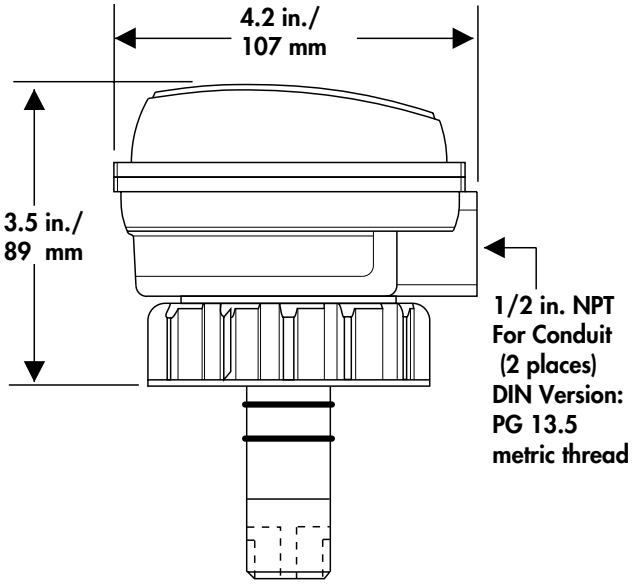
Immunity:	EN50082-1
Emissions:	EN55011
Agency Approvals:	CE

Figure 9
CDTX-80 Series Conductivity Transmitter Dimensional Views

0.05 Cell Constant
-1 (0 to 20 μS)
-2 (0 to 200 μS)



2.0 Cell Constant
-3 (0 to 2,000 μS)
-4 (0 to 10,000 μS)



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