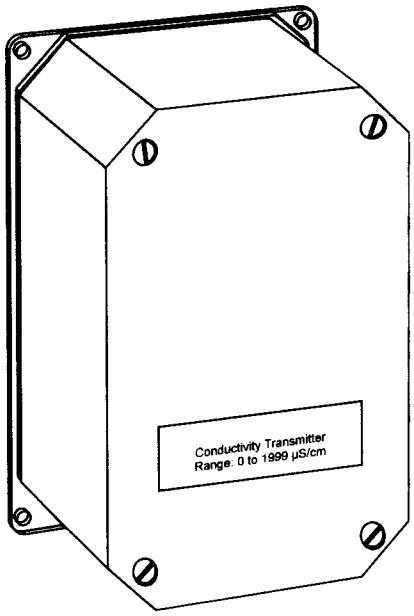
Instruction Manual

CDTX 1200 Series

Conductivity
Process Instrumentation



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It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives.
OMEGA will add the CE mark to every appropriate device upon certification.

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

Dear Customer,

Thank you for choosing an Omega Engineering Product.

Please read this instruction manual carefully before using the instrument.

This manual will provide you with all the necessary information for the correct use of the instrument, as well as a precise idea of its versatility in a wide range of applications.

These instruments are in compliance with the CE directives EN 50081-1 and EN 50082-1.

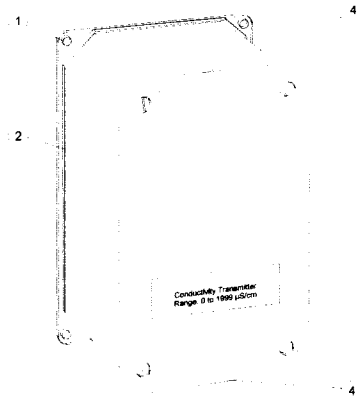
TABLE OF CONTENTS

PRELIMINARY EXAMINATION

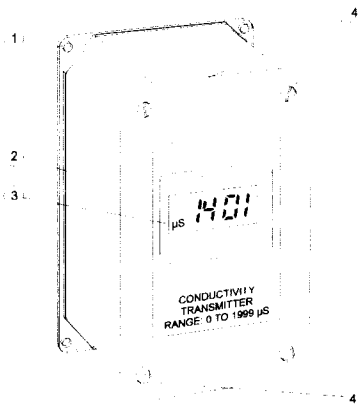
Remove the instrument from the packing material and examine it carefully to make sure that no damage has occurred during shipping. If there is any noticeable damage, notify Omega Customer Service.

Note: Save all packing materials until you are sure that the instrument functions correctly. All defective items must be returned in the original packing materials together with the supplied accessories.

FUNCTIONAL DESCRIPTION



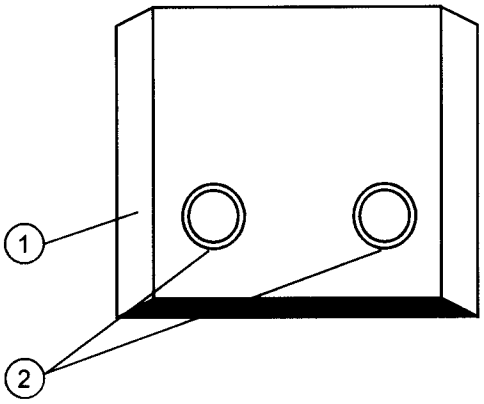
CDTX1201
CDTX1202
CDTX1203
CDTX1204



CDTX1201-D
CDTX1202-D
CDTX1203-D
CDTX1204-D

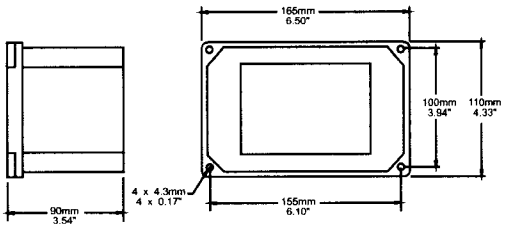
1. Back Cover
2. Top Plastic Cover
3. LCD Display (**-D models** only).
4. Screws for fastening the top cover.

SIDE VIEW

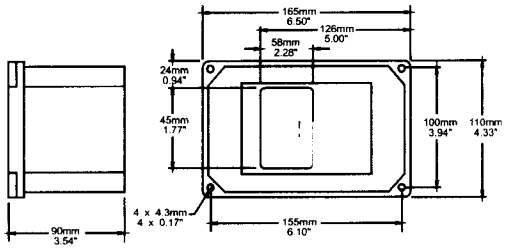


1. Top Plastic Cover
2. Wire cable glands.

MECHANICAL DIMENSIONS



MECHANICAL DIMENSIONS
(-D MODELS)



CONDUCTIVITY PROBES

CDE-1201 In-line Conductivity Probe

CDE-1201 is a one piece, molded conductivity probe with pipe threads (1" NPT) at both ends.

This allows the probe to attach to an in-line system, and to be used in conjunction with the **CDTX 1200** series conductivity transmitter.

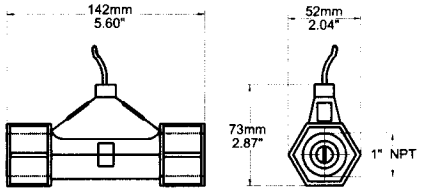
The **CDE-1201** uses a 4-ring potentiometric measuring method. This method is highly accurate and requires very little maintenance.

The construction of the housing is rugged, fiber-reinforced polypropylene.

The maximum working pressure of this unit is 5 BAR (72.5 psi).

Do not use in systems where the temperature exceeds 80°C (176°F).

CDE-1201



CDE-1202 Tank Conductivity Probe

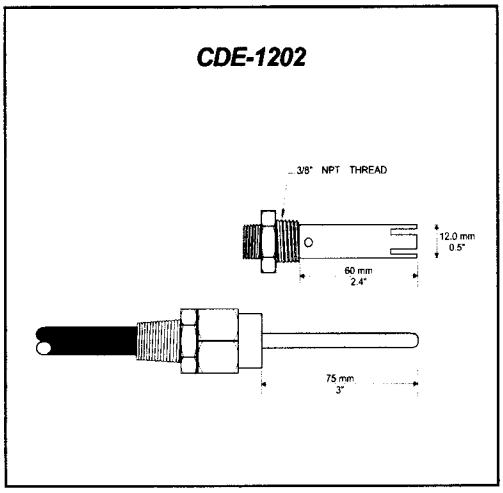
CDE-1202 conductivity probe combines the proven 4-ring potentiometric method of measuring conductivity with the platinum sensor and stainless steel external thread.

This method incorporates a series of four platinum rings into the probe shaft and is highly accurate requiring very little maintenance.

The removable cover is made of Ultem® which resists the harmful effect of most chemicals and can be unscrewed for quick and simple maintenance.

This probe can withstand temperatures of up to 120°C (248°F) and pressure of up to 5 bar (72.5 psi).

This probe is supplied complete with a 7-pin DIN connector.

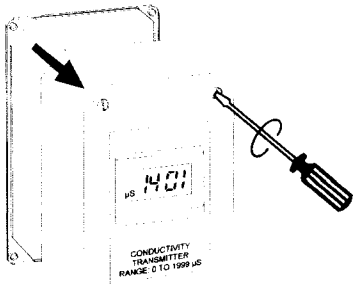


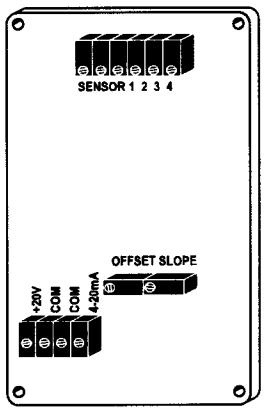
SPECIFICATIONS

Range **CDTX1201** **CDTX1202** **CDTX1203** **CDTX1204**	 0.0 to 199.9 mS/cm 0.00 to 19.99 mS/cm 0 to 1999 μS/cm 0.0 to 199.9 μS/cm
Accuracy **(@20°C/68°F)**	±2% of Full Scale excluding probe error
Typical EMC **Deviation**	±2% of Full Scale ±0.4 mA
Conductivity Probe	**CDE-1201** for in-line applications or **CDE-1202** for tank (not included)
Calibration	Manual 2-point through Offset and Slope trimmers
Temperature **Compensation**	Fixed or automatic from 0 to 50°C (32 to 122°F) with ß=2%
Output	4 to 20 mA not-isolated Max. 500 ohm
Power Supply **STANDARD** **"-D" MODELS**	 12 to 30 VDC 17 to 36 VDC
Protection	IP 65
Environment	0 to 50°C (32 to 122°F) 95% RH max
Dimensions	165 x 110 x 90 mm (LxWxH) (6.5 x 4.3 x 3.5")
Weight	1 Kg (2.2 lb.)

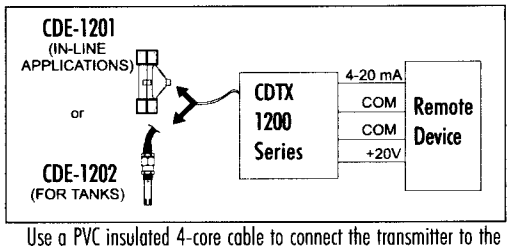
TERMINAL BOARD CONNECTIONS

- Remove the 4 screws and the top cover of the conductivity transmitter to obtain access to the terminal board connections.



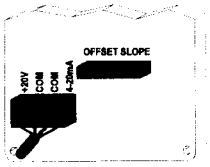


- **Used in conjunction with remote device**



Use a PVC insulated 4-core cable to connect the transmitter to the remote device.

The 4-core cable has to be connected to the transmitter according to the label instructions on the 4-terminal strip.



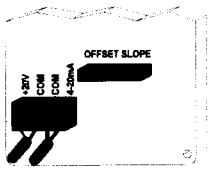
The regulated D.C. supply required for the proper operation of the transmitter is "+20V", labeled "+20V" and "COM". The current (mA) output terminals are labeled "4-20 mA" and "COM".

The transmitter is protected against inversion of supply voltage.

- **CDTX1200 Series used in conjunction with an external power supply**

Use 2 PVC insulated 2-core cables.

Connect a +20V DC power supply directly to the terminals labeled "+20V" and "COM", paying careful attention to polarity (see also page 24) or if necessary in series with the receiving device.



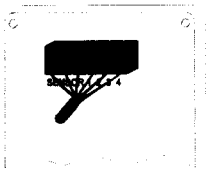
The regulated D.C. supply required for the proper functioning of the circuit is marked "+20V" and "COM", and the transmitter current output is indicated "4-20 mA" and "COM".

The transmitter is protected against inversion of supply voltage.

Max. current required: 40 mA.

- **Use of an amplifier**

The maximum permissible distance between the power supply unit and the amplifier is 300 m (1000'). It is not necessary to use a shielded cable.

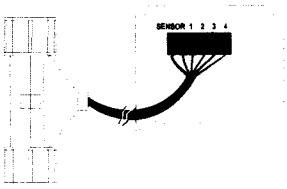


- **Probe Connection**

The conductivity probe is supplied with a 3 m (10'), 6 core cable. The cable is to be connected to the terminals provided (see also page 23 for proper connection scheme).

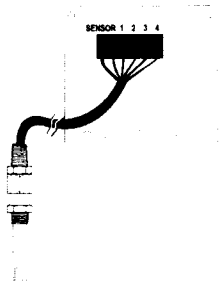
CONDUCTIVITY PROBE CONNECTIONS

The connections for **CDE-1201** are color coded for easy installation and are as follows:

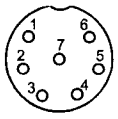


CDE-1201 cable	CDTX1200 series transmitter
Black or Grey	NTC
Red or Pink	SENSOR
Brown or Orange	probe pin 1
Blue	probe pin 2
White	probe pin 3
Green or Yellow	probe pin 4

The connections for **CDE-1202** are as follows:



CDE-1202	CDTX1200 series transmitter
#1	probe pin 1
#2	probe pin 2
#3	probe pin 3
#4	probe pin 4
#5	NTC
#6	SENSOR



connector inside view

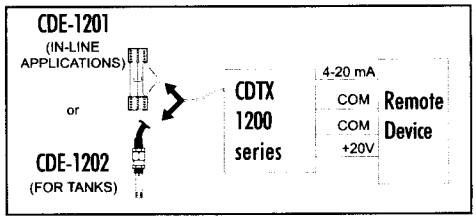
Note: NTC and SENSOR are equivalent and are both labeled SENSOR on the conductivity transmitter.

OPERATIONAL GUIDE

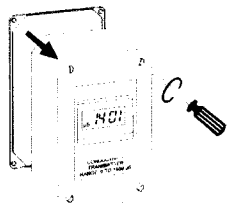
INITIAL PREPARATION & INSTALLATION:

Material needed:

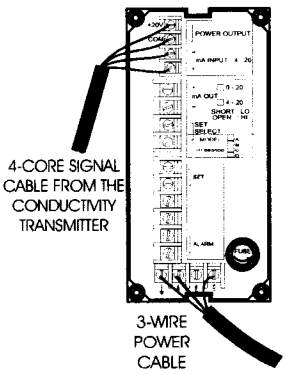
- **a PVC insulated 4-core cable** (as connection cable for **CDTX1200**)
- rubber seals and a pipe sealant (for installation of **CDE-1201**)



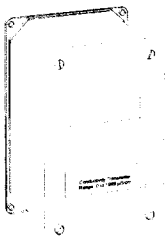
- Remove the 4 screws and the top of the **CDTX1200 Series** Process Conductivity transmitter.
- Connect the 2 wires connected to the 4-20 mA and COM terminals of the 4-core signal cable from the conductivity transmitter **CDTX1200 Series** to the terminals marked mA input paying careful attention to polarity. Connect the other 2 wires to the +20V and COM terminals while paying careful attention to polarity.



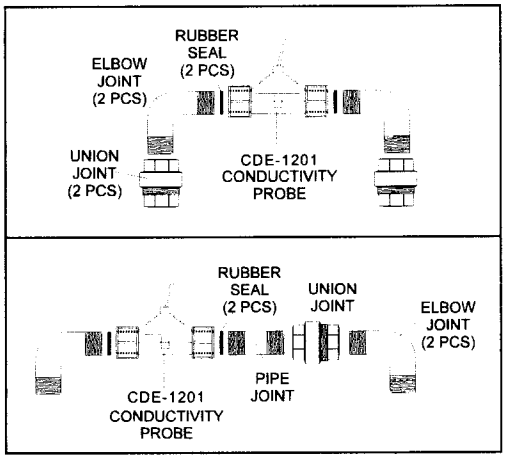
- Connect the 3-wire power cable to the 4-screw terminal strip according to the voltage level as indicated and pay particular attention to the correct live, earth and neutral terminal connections.
- The **CDTX1200 Series** transmitter may be wall-mounted at any convenient location close to the mea-



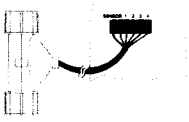
surement site. To minimize thermal drifts due to extreme temperature fluctuations, particularly if the measurement is conducted outdoors, it is recommended that the transmitter is protected in a casing.



- For the installation of the **CDE-1201** conductivity probe, it is necessary to use rubber seals between the probe and the pipe or elbow joints. A pipe sealant is also recommended to ensure a leak free joint. When screwing on the joints, take care not to overtighten as excessive pressures can cause the probe to be damaged.



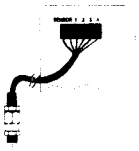
- The conductivity probe **CDE-1201** is supplied with a 3 m (10') length of cable. The six core cable from the probe is connected to the process conductivity transmitter as shown. The connections are color coded for an easy installation. See page 23 for the proper connection scheme.



- It is recommended that the **CDE-1201** is installed vertically. This is to ensure that trapped air bubbles or turbulent flows cause minimal interference to the measurement system. The maximum working pressure of this unit is 5 BAR (72.5 psi).

  CAUTION: do not use in systems where temperature exceeds 80°C (176°F).

- The **CDE-1202** process conductivity probe is also supplied with a 3m (10') length cable. The six core cable from this probe is connected to the process conductivity transmitter as shown.



  The 7-pin DIN connector has to be removed when this probe is used in conjunction with **CDTX1200 Series** transmitter. See page 23 for the proper connection scheme.

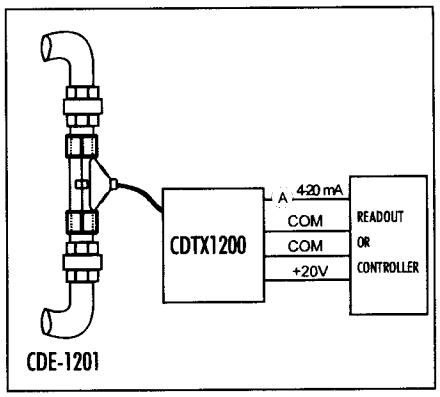
CALIBRATION PROCEDURE OF CDTX1200 AND CDE-1201

Material needed

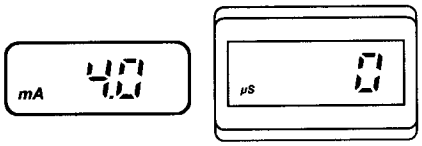
- Conductivity probe
- Conductivity transmitter
- A 20 mA f.s. ammeter (for transmitters without LCD)
- A reference conductivity meter with automatic temperature compensation accurately calibrated.

PROCEDURE

- Connect the **CDE-1201** probe to the transmitter (see page 23).
- Connect the transmitter to a controller or display readout.
- Connect the ammeter to the **CDTX1200** transmitter to monitor the signal current (see the following picture).

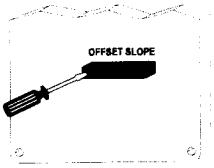


- Ensure that there is no solution inside the conductivity probe (dry probe).

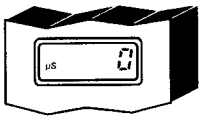


AMMETER ------ WITH LCD

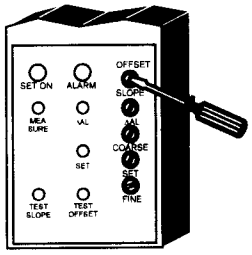
- When the power is on, the ammeter should read "4.0 mA". The transmitter with LCD should display "0".



- If not, adjust the OFFSET trimmer of the transmitter to obtain "4 mA" or "0" on the CDTX1200-D Series.

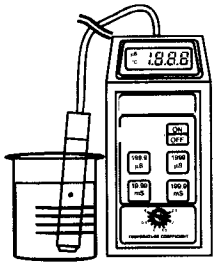


- The readout or controller should display "0" value.



- Switch the flow on and allow the sample solution to flow through the **CDE-1201** conductivity probe.

- Measure the conductivity of the solution with a portable conductivity meter with ATC. The value obtained will be used for the transmitter and controller calibration.



- The reading will be converted to mA by the following formula:

  mA = K (measured value x 16/2000) + 4

  K = conversion factor depending on the model

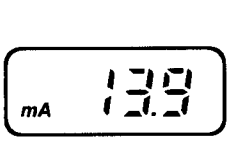
Model	Conversion factor K
CDTX1201 & -D	10
CDTX1202 & -D	100
CDTX1203 & -D	1
CDTX1204 & -D	10

For example, using a CDTX1201, if the measured value is 123.4 mS, then

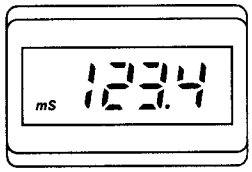
output current = 10 x (123.4 x 16/2000) + 4

= 13.9 mA

Adjust the SLOPE trimmer of the transmitter to read "13.9 mA" on the ammeter or the reading displayed by the reference conductivity meter on the **-D models** display. E.g. "123.4 mS".



AMMETER



CDTX1200-D

- The calibration is now complete and the instrument is ready for use. All subsequent measurements will now be compensated to 25°C (77°F).
- If the instrument will not calibrate refer to the Probe Maintenance and Cleaning section (see page 46).
- If the transmitter is not used in conjunction with a controller, connect the transmitter to an external power supply (see page 19). Connect the transmitter to the **CDE-1201** conductivity probe (see page 23) and to an ammeter (see page 19).

  The calibration of the transmitters with LCD do not require an ammeter.

  Follow the above calibration procedure performing the operations referred to the **CDTX1200** transmitter only.

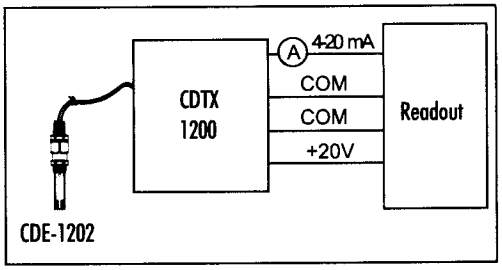
CALIBRATION PROCEDURE OF CDTX1200 WITH CDE-1202

Material needed

- **CDE-1202** conductivity probe
- **CDTX1200** conductivity transmitter
- An ammeter (for transmitters without LCD)
- Calibration solutions

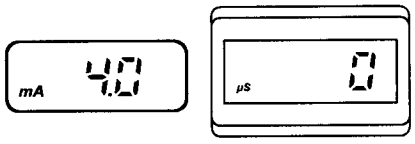
PROCEDURE

- Connect the **CDE-1202** to the **CDTX1200** transmitter.
- Connect the transmitter to a readout or controller.
- Connect the readout to the mains.
- Connect the ammeter to the **CDTX1200** transmitter to monitor the signal current (see the following picture).



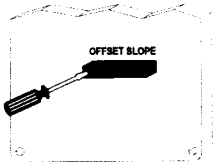
- Leave the **CDE-1202** conductivity probe in air (dry probe).

- When the power is on, the ammeter should read "4.0 mA" or the transmitter with LCD should display "0".



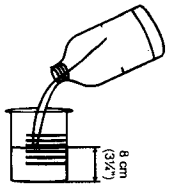
AMMETER CDTX1200-D

- If not adjust the OFFSET trimmer of the transmitter to obtain "4 mA" or "0" on the **-D models**.



- The controller readout should display "0" value.

- Pour enough conductivity solution into a plastic beaker to achieve at least 8 cm (3¼") of depth.
- Immerse the probe into the beaker with the conductivity solution. The holes on the sleeve must be completely submerged in the solution.
- Tap the probe repeatedly on the bottom of the beaker and stir it to ensure that no air bubbles are trapped inside the sleeve.



- If the temperature of the probe is close to that of the solution the display will stabilize quickly and provide a temperature compensated conductivity measurement. However, allow a few minutes if there is a temperature difference of 5°C (9°F) or more for the ATC circuitry to compensate completely.

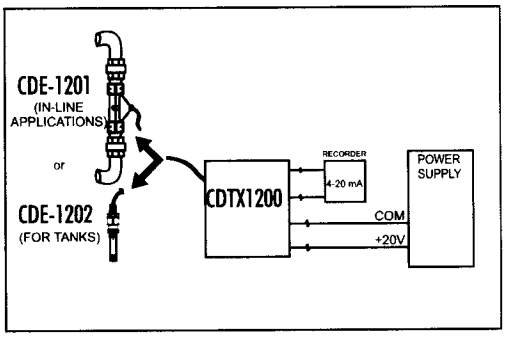
CDTX1200

Adjust the SLOPE trimmer of the **CDTX1200** transmitter to read on the ammeter.

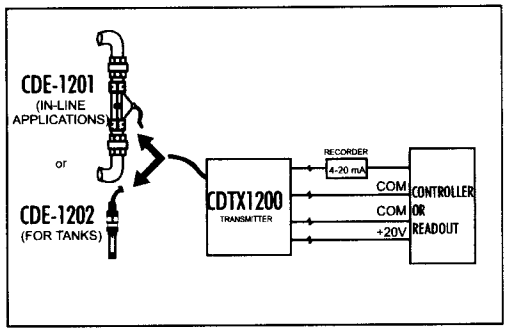
INSTALLATION EXAMPLES

Some typical installation setups are depicted in the following examples:

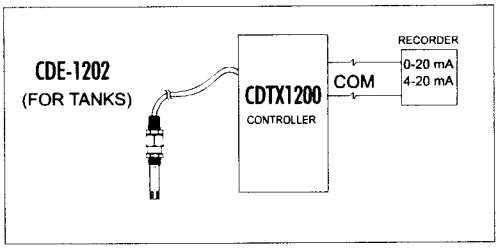
Example #1



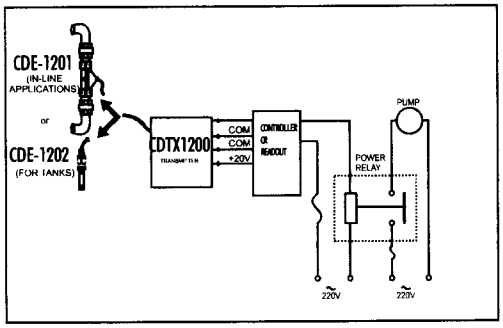
Example #2



Example #3



Example #4



PROBE MAINTENANCE & CLEANING

The probe can be compensated for normal contamination by a process of re-calibration. However, it is recommended that the process conductivity probe be removed from the system regularly for maintenance.

For **CDE-1201** only: Deposits on the conductivity probe can be removed by immersing the probe in 0.1 N Hydrochloric acid for about 30 minutes. Heavier deposits may demand longer immersion periods. Clean the electrode thoroughly with water prior to the reinstallation. On reinstalling, check the seals carefully to ensure that a leak connection is obtained.

For **CDE-1202** only: Rinse the probe with tap water. If a more thorough cleaning is desired, unscrew the Ultem sleeve and clean the sensors with a nonabrasive cloth or alcohol.

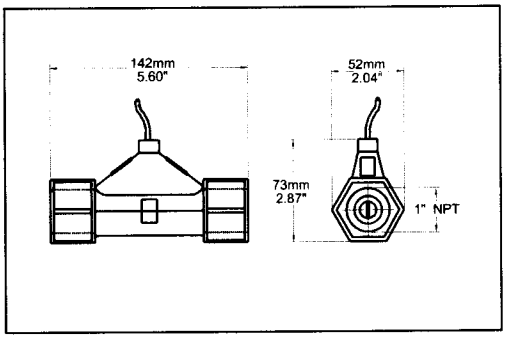
After cleaning the probe, re-calibrate the instrument. However, if the instrument will not re-calibrate with the clean probe, you must replace the probe.

Note: Always re-calibrate the meter when attaching a new probe.

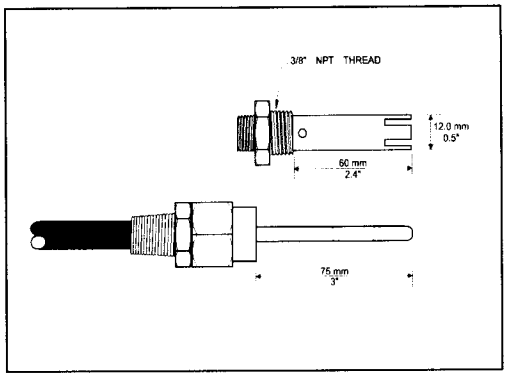
ACCESSORIES

CONDUCTIVITY PROBES

CDE-1201 In-line conductivity probe, 3 m (10') cable



CDE-1202 Tank conductivity probe, 3 m (10') cable



Recommendations for Users

Before using these products, make sure that they are entirely suitable for the environment in which they are used.

Operation of these instruments in residential area could cause unacceptable interferences to radio and TV equipments, requiring the operator to take all necessary steps to correct interferences.

The trimmers are sensitive to electrostatic discharges. It is recommended to use anti-static screwdrivers.

Unplug the instrument from the power supply before replacing the fuse. External cables to be connected to the rear panel should end with cable lugs.

To maintain the EMC performance of this equipment, use the recommended cables mentioned on this instruction manual.

Any variation introduced by the user to the supplied equipment may degrade the instruments' EMC performance.

To avoid electrical shock, do not use these instruments when voltages at the measurement surface exceed 24VAC or 60VDC.

To avoid damages or burns, do not perform any measurement in microwave ovens.

WARRANTY

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 which wear are not warranted, including but not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KID WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

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.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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