1 YEAR
WARRANTY

OMEGA®

User's Guide

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CDH-287-KIT
Portable Conductivity Meter

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Toll-Free: 1-800-826-6342 (USA & Canada only)
Customer Service: 1-800-622-2378 (USA & Canada only)
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CDH-287-KIT

SECTION 1

Introduction

Description

The OMEGA CDH-287-KIT microprocessor conductivity meter is a high accuracy, portable, instrument. Features include: conductivity; TDS; resistivity; salinity; concentration and temperature measurement, all with automatic temperature compensation.

Unpacking

Remove the Packing List and verify that you have received all equipment. If you have any questions about the shipment, please call the OMEGA® customer Service department at 1-800-622-2378 or (203) 359-1660

When you receive the shipment, inspect the container and equipment for any signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

Note

The carrier will not honor any claims unless all shipping material is saved for their examination. After examining and removing contents, save packing material in the event that re-shipment is necessary.

The following items are packed in the box:

- CDH-287 Meter
- Conductivity cell, K=1/cm
- Carrying case
- 9V Battery
- Operator's Manual

Setting Up

Battery Replacement

REFER TO FIGURE 1

- The instrument is supplied with a 9V battery.
- The battery will afford the user approximately 35 hours of continuous use. When the battery needs changing, the word BAT will appear on the display.
- To install or replace the battery slide the back cover off.
- Remove the old battery and insert a new one making sure that the polarity orientation is correct.
- Replace back cover.

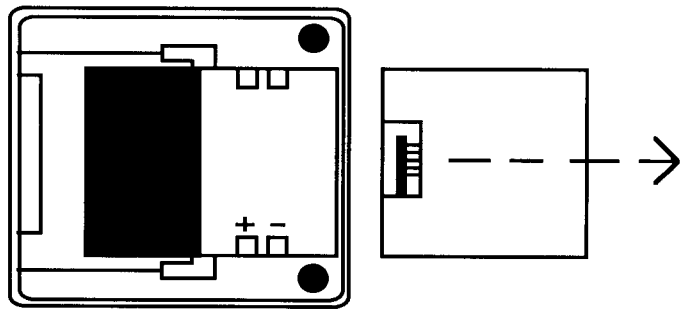


Figure 1. Battery Installation

Note: Calibration is retained in all modes even when instrument is off or battery removed

Instrument Test Procedure

REFER TO FIGURE 2

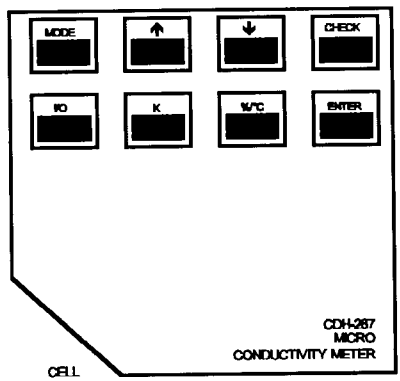
- Switch the instrument on by pressing the I/0 key. The meter should start up in conductivity mode.
- Clear any calibration data by first pressing the CHECK key and then holding the Enter key for 5 seconds.
- Display the cell constant by pressing K. The units should be /cm. If units are /m then press K again. Adjust the value of K (if necessary) to 1.000/cm using the ⇧⇩ keys.
- Press the Mode key to display each mode sequentially. With no cell connected, the values displayed should be as follows:

Conductivity	0.00 µS/cm (0.000mS/m)	±1 digit
TDS	0.00 mg/L	±1 digit
Resistivity	--- MΩ.cm	(over-range condition)
Salinity	-L	(Lower than measurement range)
Concentration	1000 c	
°C	O C	(open circuit, i.e. no probe)

- Select %/°C function. If the default value of 2.000% is not displayed, adjust using the ⇧⇩ keys.
- The meter is now ready for use.

Figure 2:

The Front Panel



Units of Measurement

With the CDH-287 conductivity meter, it is possible to express conductivity and resistivity values in two different units. The coherent system of units adopted by ISO (IUPAC) (known as the SI unit), defines conductivity and resistivity to be expressed as multiples of per meter, rather than the older c.g.s. units which expressed values as a multiple of per centimeter.

The relationship between units is as follows:-

Conductivity: 1mS/cm = 100mS/m and Resistivity: 10MΩ.cm = 0.10MΩ .m

To change the multiple

1. Display cell constant by pressing the K key
2. Set preferred units by pressing the K key to select either m or cm.
3. Exit with the correct units entered by pressing the mode key.

This facility to change the units can be used at any time

A NOTE ON CONDUCTIVITY CELLS

Platinum Plate Cells.

This type of cell uses two platinum cell plates, coated with a platinum oxide layer. It is important not to touch the surface of the plates while in use or when cleaning, as any surface damage could result in the linearity of the cell being affected. For this reason , these cells are not suitable for samples containing suspended solids.

Epoxy, Carbon Plate Cells

This type of cell has carbon cell plates in an epoxy housing. Its rugged construction makes it not only suitable for industrial and field applications but also easy to clean.

Setting The Cell Constant (K)

Before making any measurements, the cell constant must be entered. The constant may be entered in units of /cm or /m (see above).

- Connect the cell and turn the meter on by pressing the I/0 key.
- The instrument will automatically start up in conductivity mode.

Entering a Known Cell Constant

❶ Press K. Units are shown in the top right hand corner of the display. To change units from /cm to /m press K again. To go back to /cm, K again etc.

❷ Using the ⇩ ⇧ keys, scroll up or down until the correct value appears on the display. The cell constant is now set. Return to the function you require by using the mode key. (See contents page for functions).

Often the exact cell constant is not known. A nominal value is quoted and the instrument must be calibrated to find the exact constant of the cell being used.

Determining an Unknown Cell Constant

❶ Use a standard solution. e.g. 0.01M KCl has a conductivity of 1413µS @ 25°C

❷ Press the MODE key until the conductivity is displayed.

❸ Place cell in the standard and when the reading is stable, use the ⇧ ⇩ keys to adjust the displayed value to that of the standard. (The CAL flag will flash).

❹ Press K. The cell constant is now set and displayed. Return to the function you require by using the MODE key. (See contents page for functions)

Setting the Temperature Coefficient

The conductivity of a solution changes with temperature. The amount by which it changes for a particular electrolyte is described by the TEMPERATURE COEFFICIENT and expressed in %/°C. Entering the correct coefficient will increase the accuracy of measurements.

Temperature coefficients for simple electrolytes are published and may be entered directly.

If the coefficient is unknown then the user may enter a value of 2%/°C or calculate the coefficient (see below).

To Enter a Known Temperature Coefficient.

1. Press %/°C key.
2. Use ⇧⇩ keys to enter known value. Return to the function you require by using the MODE key. See contents page for functions)

The temperature coefficients of complex electrolytes are often unknown. If so, the CDH-287 may be used to calculate the coefficient as follows:

To Calculate and Enter an Unknown Temperature Coefficient

1. Place cell in sample with unknown temperature coefficient.
2. Press %/°C key. Press Enter key. (The %/°C sign will flash in all functions).
3. Raise or lower the temperature of the sample by at least 10°C. (The temperature change may be monitored by selecting temperature using the MODE key.) Select %/°C function again and press Enter.
4. The calculated temperature coefficient is now displayed.
5. Return to the function you require by using the MODE key. (See contents page for functions).

General Information.

Read before Proceeding with SECTIONS 2, 3, 4, 5 and 6.

Before calibrating or making a measurement in any mode it is important to note the following points.

1. The Cell Constant is correct (p 5).
2. The Temperature Coefficient is correct (p 6).
3. Any unnecessary calibration data is cleared. (***NB The cell constant is not calibration data but a physical constant. The value will not be erased by the clear procedure. The temperature coefficient will be erased by the clear procedure, so make a note of it and re-enter if necessary).*** Calibration data is indicated by the presence of the word CAL on the display. To check the data press the check key. Calibration points are shown in sequence. To clear data, remain in check mode and press and hold down the Enter key for 5 seconds.

NOTE: All measurements are automatically temperature compensated, based on a reference temperature of 25°C. If un-compensated results are required, then the temperature coefficient should be set to zero. (see p. 6)

SECTION 2

Conductivity

Please refer to p 7 before proceeding. The following procedure can only be carried out provided the instrument has not been calibrated in Concentration mode.

○Conductivity Measurement

❶ Connect cell

❷ Select conductivity mode by pressing the MODE key until the correct units are displayed.

❸ Place cell in sample. (The correct range will be selected automatically).

❹ Wait for a stable reading and record result, noting the units.

○Adjusting for cell non-linearity

Any non-linearity arising from polarization effects etc may be calibrated for as follows.

❶ Prepare up to four calibration solutions, each with known conductivity.

❷ Connect cell and select conductivity mode.

❸ Place cell in first standard. Wait for a stable reading. Using the ⇩ ⇧ keys, adjust the reading to the correct value (CAL flag will flash). Press ENTER. (CAL flag will stop flashing).

❹ Repeat ❸ for each standard.

❺ Place cell in sample and record value, noting units.

The calibration points may be inspected at any time as follows:

① Press CHK.

② First a number identifier is displayed and then the value of the standard.

③ This is repeated for all standards.

④ Return to the function you require by using the MODE key. (See contents page for functions).

SECTION 3

Total Dissolved Solids (TDS)

❍TDS Measurement

Read page 7 before proceeding.

❶ Connect cell

❷ Select TDS mode by pressing the MODE key until the correct units are displayed.

❸ Place cell in sample. (The correct range will be selected automatically).

❹ Wait for a stable reading and record result, noting the units.

❺ To adjust for any non-linearity of the cell see p7.

SECTION 4

Resistivity

❍Resistivity Measurement

Read page 7 before proceeding.

❶ Connect cell

❷ Select Resistivity mode by pressing the MODE key until the correct units are displayed.

❸ Place cell in sample. (The correct range will be selected automatically).

❹ Wait for a stable reading and record result, noting the units.

❺ To adjust for any non-linearity of the cell see p7.

SECTION 5

Salinity

❍Salinity Measurement

Read page 7 before proceeding.

❶ Connect cell

❷ Select Salinity by pressing the MODE key until the correct units are displayed.

❸ Place cell in sample. (The correct range will be selected automatically).

❹ Wait for a stable reading and record result, noting the units.

❺ To adjust for any non-linearity of the cell see p7.

❺ If sample is out of range then the display will show L for a low reading and H for a high reading.

SECTION 6

Temperature

❍Temperature Measurement

Read page 7 before proceeding.

❶ Connect cell and place in solution.

❷ Select Temperature by pressing the MODE key until the correct units are displayed then read displayed value.

❸ To read in Fahrenheit, press Enter.

❹ Return to the function you require by using the MODE key. (See contents page for functions).

SECTION 7

Concentration

Read page 7 before proceeding. The following procedure can only be carried out provided the instrument has not been calibrated in Conductivity mode.

❍Calibration in Concentration Mode

❶ Prepare up to four calibration solutions, each with known concentration.

❷ Connect cell and select concentration mode.

❸ Place cell in first standard. Wait for a stable reading. The ⇩ key can be used to adjust the value to the correct decade. The exact concentration value may then be entered by adjusting the reading using the ⇩⇧ keys (CAL flag will flash), and then pressing Enter. (CAL flag will stop flashing).

❹ Repeat ❸ for each standard.

❺ Place cell in sample and read concentration direct from the display.

The calibration points may be inspected at any time as follows:

① Press CHK.

② First a number identifier is displayed and then the value of the standard.

③ This is repeated for all standards.

④ Return to the function you require by using the MODE key. (See contents page for functions).

Zero Adjustment

Follow points ❶to ❹

❺ Place cell in background sample and enter 0

❻ Place cell in sample and read concentration.

SECTION 8

Use of the Recorder Output

REFER TO THE RECORDER INSTRUCTIONS

Connect the recorder via the red and black 4mm sockets at the top of the meter. (Red positive, Back negative).

Ensure that the recorder is set for the appropriate range, i.e.:

MODE	RANGE (mV)	DISPLAY	RECORDER
Cond	0-200	1000µS/cm	100.0mV
TDS	0-200	666mg/L	66.6mV
Res	0-200	10.0MΩ.cm	10.0mV
Sal	0-200	35.0	35.0mV
°C	±200	25°C	25.0mV

RANGE-HOLD FACILITY

The CDH-287 automatically selects the appropriate range for the sample being measured. This auto-ranging may be disabled when using the recorder as follows:

1. Connect cell and place in sample.
2. Select mode required
3. Press Enter key and hold for 5 seconds.
4. The range currently in use is now held.
5. To return to auto-ranging, press Enter again for 5 seconds.

SECTION 9

Troubleshooting

Symptom	Probable Cause(s)
No Display	**-Battery is flat or not installed**
"BAT" flag displayed	**-Battery is low**
Display reads	**-Disable Range Hold facility**
-- on left hand side	-Conductivity outside measurement range
Drifting readings	**-Cell contaminated**
Poor linearity and errors in readings	**-Cell requires re-platinizing.**

Error Codes

E6,E7	- Calibration point error
Sc, Oc	- Temperature probe short or open circuit
-H, -L	- Salinity value above or below measurement range

In the event of a malfunction, it is important to pinpoint the problem to either the meter or the cell. If a spare cell are available, substitute it for the one in use.

There are no user serviceable parts in this instrument. Please ensure that the meter together with all accessories is returned to OMEGA Engineering Inc. with a full description of the symptoms of the problem. No attempt should be made to repair the meter.

SECTION 10

Accessories

Available From OMEGA Engineering Inc

All cells listed have automatic temperature compensation (ATC). Standard lead length is 1 meter. Other lead lengths can be made to order.

Part No	Description	Measurement	Cell	Application
Dip Type Cells				
CDE-5001-GD1	Glass Dip K=1/cm	100µS-100mS	platinum plates	general
CDE-5002-ED1	Polymer Dip K=1/cm	100µS-100mS	platinum plates	general
CDE-5004-ED10	Epoxy Dip K=10/cm	100mS-2000mS	graphite plates	industrial &field
CDE-5010-ED1	Epoxy Dip K=1/cm	100µS-100mS	graphite plates	industrial &field
CDE-5011-ED01	Epoxy Dip K=0.1/cm	0.01µS-200mS	graphite plates	industrial &field
CDE-5014-GD01	Glass Dip K=0.1/cm	0.01µS-100µS	platinum plates	pure water
CDE-5019-ED1	Epoxy Dip K=1/cm	100µS-100mS	graphite plates	industrial &field
Sample Cells				
CDE-5015-GS01	Glass sample K=0.1/cm	0.01µS-100µS	platinum plates	pure water
Flow Cells				
CDE-5005-GF1	Glass Flow K=1/cm	100µS-100mS	platinum plates	lab use
CDE-5008-EF10	Epoxy Flow K=10/cm	100mS-2000mS	graphite plates	industrial flow line
CDE-5012-EF1	Epoxy Flow K=1/cm	100µS-100mS	graphite plates	industrial flow line
CDE-5013-ED01	Epoxy Flow K=0.1/cm	0.01µS-200mS	graphite plates	industrial flow line

SECTION 11

Specifications

Conductivity:	**Ranges and resolution:**	**0.00 - 19.99µS/cm or1.999mS/m**
		00.0 - 199.9µS/cm or 19.99 mS/m
		0000 - 1999 µS/cm or 199.9 mS/m
		0.00 - 19.99 mS/cm or 1999mS/m
		00.0 - 199mS/cm or 19.99S/m
	Accuracy:	**±0.3% of reading**
TDS:	**Ranges and resolution:**	**0 - 13.20 mg/L**
		0 - 132.0 mg/L
		0 - 1320 mg/L
		0 - 13.2g/L
		0 - 132g/L
	Accuracy:	**±0.3% of reading**
Resistivity:	**Ranges and resolution:**	**0.00 - 1.999MΩ.cm or 0. 019MΩ.m**
		0.00 - 19.99 MΩ.cm or 0.199 MΩ.m
Accuracy:		**±0.3% of reading**
Salinity:		**In accordance with UNESCO data, 2.0 - 42**
Accuracy:		**±0.3% of reading**
Salinity temperature compensation:		**-2.0 to +35°C**
Concentration:		**Automatic ranging, choice of units background off set function**
Temperature:	**Range:**	**-30 to +130°C**
	Resolution:	**0.1°C**
	Accuracy:	**±0.3°C**
Temperature Compensation:		**0 - 50°C**
Reference Temperature:		**25°C (Selectable to 20.0°C)**
Temperature Coefficient:		**Default 2%/°C. User adjustable 0 - 5%/°C**
Recorder Output:		**±200mV, 2x 4mm sockets**
Power:		**9V battery Instrument size:**
5.7" x 3.15" x 1.52"		
Instrument weight:		**0.6lb**

Appendix 1

Cell Constants

Conductivity cells with different cell constants can be used to achieve greater accuracy, or used to make difficult measurements easier. Selection of the correct cell constant is dependent on the conductivity range of your sample. Conductivities of various waters and common solutions, together with the most suitable cell constants are given below.

K = 0.1/cm (K = 10.0/m)

For measurements of solutions with very low conductivity. e.g. pure water, de-mineralized water, distilled water, boiler feed water.

K = 1.0/cm (K= 100/m)

For measurements of solutions with medium conductivity, e.g. surface water, waste water, diluted salt solutions, fertilizers, electroplating rinses.

K = 10/cm (K=1000/m)

For measurements of solutions with high conductivity, e.g. strong acid, strong alkali, strong salt solutions, sea water.

In order to obtain the absolute conductivity value, multiply the displayed reading by the cell constant.

Cell Conversion Table

c.g.s units	SI units
K =1.0/cm	K = 100.0/m
K = 0.1/cm	K = 10.0/m
K = 10.0/cm	K =1000/m

Appendix 2

Calibration Solutions

1413µS/cm @ 25°C 0.01M KCl

°C	µS/cm	mS/m	°C	µS/cm	mS/m
5	896	89.6	25	1413	141.3
10	1020	102.0	26	1441	144.1
15	1147	114.7	27	1468	146.8
16	1173	117.3	28	1496	149.6
17	1199	119.9	29	1524	152.4
18	1225	122.5	30	1552	155.2
19	1251	125.1	31	1581	158.1
20	1278	127.8	32	1609	160.9
21	1305	130.5	33	1638	163.8
22	1332	133.2	34	1667	166.7
23	1359	135.9	35	-	-

12.88mS/cm @ 25°C 0.1M KCl

°C	µS/cm	mS/m	°C	µS/cm	mS/m
5	896	89.6	25	1413	141.3
10	1020	102.0	26	1441	144.1
15	1147	114.7	27	1468	146.8
16	1173	117.3	28	1496	149.6
17	1199	119.9	29	1524	152.4
18	1225	122.5	30	1552	155.2
19	1251	125.1	31	1581	158.1
20	1278	127.8	32	1609	160.9
21	1305	130.5	33	1638	163.8
22	1332	133.2	34	1667	166.7
23	1359	135.9	35	-	-
24	1386	138.6	36	-	-

Calibration Solutions

2.765 mS/cm @ 25°C 0.02M KCl

°C	mS/cm	mS/m	°C	mS/cm	mS/m
5	1.752	175.2	25	2.765	276.5
10	1.994	199.4	26	2.819	281.9
15	2.243	224.3	27	2.873	287.3
16	2.294	229.4	28	2.927	292.7
17	2.345	234.5	29	2.981	298.1
18	2.397	239.7	30	3.036	303.6
19	2.449	244.9	31	3.091	309.1
20	2.501	250.1	32	3.146	314.6
21	2.553	255.3	33	3.201	320.1
22	2.606	260.6	34	3.256	325.6
23	2.659	265.9	35	3.312	331.2

111.8mS/cm @ 25°C 1.0 M KCl

°C	mS/cm	S/m	°C	mS/cm	S/m
5	74.14	7.414	25	111.80	11.180
10	83.19	8.319	26	113.77	11.377
15	92.52	9.252	27	115.74	11.574
16	94.41	9.441	28	-	-
17	96.31	9.631	29	-	-
18	98.22	9.822	30	-	-
19	100.01	10.014	31	-	-
20	102.07	10.207	32	-	-
21	104.00	10.400	33	-	-
22	105.54	10.554	34	-	-
23	107.89	10.789	35	-	-
24	109.84	10.984	36	-	-

Notes

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.

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 the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED 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.

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