



PHCL-33

pH/mV Calibrator

INSTRUCTION
SHEET

M0421/0395

UNPACKING INSTRUCTIONS

Remove the Packing List and verify that you have received all equipment, including the following (quantities in parentheses):

PHCL-33 pH/mV Calibrator (1)
Operator's Manual

If you have any questions about the shipment, please call the Omega Customer Service Department.

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

NOTE

The carrier will not honor damaged claims unless all shipping material is saved for inspection. After examining and removing contents, save packing materials and carton in the event reshipment is necessary.

INTRODUCTION

The Omega PHCL-33 Calibrator is a versatile tool in that it can be used in the following manner:

- A. To calibrate pH meters.
- B. To determine where the fault lies in a malfunctioning system: either in the pH electrode or in the meter.
- C. To determine the accuracy of manual and automatic temperature compensation networks.
- D. As a millivolt reference.

CONTROLS

1. Off-On Range Switch:

Switch Positions:	OFF	
	pH 7	0.0 MV @ 25°C
	pH 6-8	59.1 MV
	pH 4-10	177.4 MV
	pH 2-12	295.7 MV
	pH 0-14	413.9 MV

2. Acid/Base Switch:

Switch Positions: Acid/+MV Base/-MV

This switch changes the polarity of the millivolt signal to simulate an electrode in acidic or basic solutions.

3. Impedance Switch:

Switch positions: HI LO

The HI position has an impedance of 1000 Megohms. The high impedance simulates the high impedance of the pH electrode.

OPERATION**pH Meter Calibration****A. Meters with Manual Temperature Compensation:**

1. Attach the BNC connector of the PHCL-33 to your pH meter.
2. Turn the pH meter on and set the Manual Temperature Compensation control to °C.
3. Turn the PHCL-33 range switch to "ph 7" and set the impedance switch to "HI" and switch to "Base".
4. Adjust the standardize control on the pH meter until the meter reads pH 7.00.
5. Set the PHCL-33 range switch to "pH 12" and adjust the slope control until the meter reads a pH of 12.00.
6. Change the Acid/Base switch to "Acid". The meter should read a pH of 2.00.
7. Step through the PHCL-33's ranges and observe how closely the meter tracks the calibrated pH signals.

If you cannot calibrate your meter with the above procedures, repeat Steps 1 through 7 but this time set the impedance switch to "LO" (Step 3). If you are successful, this is an indication that the impedance of your meter is low (lower than 1000 megohms). A low input impedance is not necessarily a problem. The meter may have been designed to function properly only with low impedance electrodes. If the instrument calibrates with a low impedance electrode attached, you will have to remember to keep the impedance switch in the "LO" position. If the instrument fails to calibrate in either the "HI" or "LO" position, the meter has failed and must be repaired.

If the instrument calibrates in the "LO" position with the PHCL-33 but not with an electrode, it is most likely that the electrode is at fault. Either the electrode has malfunctioned or you are trying to use a high impedance electrode with a low impedance instrument.

B. Meters with Automatic Temperature Compensation

For meters with Automatic Temperature Compensation (ATC), proceed with the instructions for meters with manual temperature compensation, ignoring Step 2. As long as the ATC sensor is at room temperature, the slope control will adjust for the difference in temperature between the ATC sensor and 25°C.

VERIFICATION OF TEMPERATURE COMPENSATION**A. Meters with Manual Temperature Compensation (MTC)**

1. Calibrate the meter as previously explained under pH meter calibration, Section A: Meters with MTC.
2. Change the setting on the MTC control. As you do so the observed pH value will change. To determine the accuracy of your reading and thus the accuracy of the MTC network, use the following formula:

$$pH_o = 7 - [T1/T2 (7 - pH_c)]$$

where

pH_o is the pH observed

pH_c is the pH of calibration

T1 is the temperature of standardization in Kelvin (298°K for the PHCL-33 at 25°C)

T2 is the temperature set by the MTC control in degrees K

EXAMPLE

Calibrate the pH meter to a pH of 10.0 with the MTC control set at 25°C. Now adjust the MTC to 0°C and the observed pH should read 10.27 pH.

$$T1 = 298^{\circ}\text{K} (25^{\circ}\text{C})$$

$$T2 = 273^{\circ}\text{K} (0^{\circ}\text{C})$$

$$pH_c = 10.00$$

$$pH_o = 10.27$$

$$10.27 = 7 - [298/273 (7 - 10.00)]$$



With this formula, you can check the accuracy of the manual temperature compensator anywhere in its range of adjustment. If your meter does not read a pH of 10.27, note the difference between 10.27 and the value of your meter. This difference becomes a correction factor for your meter at 0°C.

B. Meters with Automatic Temperature Compensation (ATC)

1. Calibrate your meter as previously explained under pH meter calibration, Section B: Meters with ATC.
2. Place the temperature sensor in a bath of a known temperature and the PHCL-33 to pH 10. Note the pH value observed. It should agree with the value through the formula:

$$pH_o = 7 - [T1/T2 (7 - pH_c)]$$

where

T1 = 298°K (PHCL-33 at 25°C)

T2 = temperature in Kelvin of bath

pH_c = value of pH at calibration with PHCL-33

pH_o = value of pH observed on meter after change in temperature of ATC sensor

EXAMPLE

Calibrate the pH meter to a pH of 10.00 with the ATC at room temperature. Now place the ATC sensor in a bath at 30° C; the meter should read a pH of 9.95.

T1 = 298°K (25°C of PHCL-33)

T2 = 303°K (30°C of bath)

pH_c = 10.00

pH_o = 9.95

$$9.95 = 7 - [298/303 (7 - 10)]$$

If your meter does not agree with a pH of 9.95, note the difference between 9.95 and your meter reading. This difference value now becomes a correction factor for your pH meter and samples at 30°C.

MILLIVOLT REFERENCE

The PHCL-33 can be used as a millivolt reference to verify the accuracy of the millivolt function of your pH meter or to calibrate a recorder. There are limitations on using the millivolt signal from the PHCL-33. The impedance of the meter or the recorder must be greater than 200,000 ohms. With an impedance of 120,000 ohms, there will be a signal loss of 1/2% of the value of the signal. Be sure to have the PHCL-33 in the "LO" impedance position.

The following signal levels are available: +/-

0 Millivolts
59.1 Millivolts
177.4 Millivolts
295.7 Millivolts
413.9 Millivolts

BATTERY REPLACEMENT

The PHCL-33 takes a single, 9-volt battery and should be replaced when its level reaches 7.5 volts. Any volt-ohm meter can be used to test the battery. The battery is located on the bottom of the instrument.

CALIBRATION

The PHCL-33 can be calibrated in the following manner. First, make sure the battery is good. You will need a digital voltmeter. Remove the four screws which hold the case together. They will be found on the bottom of the case. On the left side of the OFF/ON switch you will find a potentiometer located on top of the circuit board. Attach the leads of the voltmeter to the BNC of the PHCL-33 and turn the range switch to pH 0-14 (414 MV). Now adjust the potentiometer until the digital voltmeter reads 414.0 millivolts. Now step through the ranges of the PHCL-33 and make sure the output agrees with the values printed on the front panel. They should agree within +/- 1% of the value. If the instrument cannot be calibrated, contact OMEGA Engineering.

SERVICE

If you are experiencing problems with your PHCL-33, please contact OMEGA Engineering Customer Service Department.

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.



MADE
IN THE
USA

WARRANTY/DISCLAIMER

OMEGA warrants this unit to be free of defects in materials and workmanship and to give satisfactory service for a period of 13 months from date of purchase. OMEGA 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 should malfunction, 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. However, this WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being 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 or which are damaged by misuse are not warranted. These include contact points, fuses and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. Nevertheless, OMEGA only warrants that the parts manufactured by it will be specified and free of defects.

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RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA ENGINEERING 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.

For **WARRANTY RETURNS**, please have the following information available BEFORE contacting OMEGA:

1. P.O. 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 related to the product.

For **NON-WARRANTY REPAIRS** or **CALIBRATION**, consult OMEGA for current repair/calibration charges. Have the following information available BEFORE contacting OMEGA:

1. P.O. number to cover the COST of the repair/calibration.
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems related to the product.

OMEGA'S policy is to make running changes, no model changes, wherever an improvement is possible. This affords our customer the latest in technology and engineering.

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