PHE-2700-DLA
pH/ORP Simulator and System Tester
It is the policy of OMEGA Engineering Inc. 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.

The information contained in this document is believed to be correct, but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

**WARNING:** These products are not designed for use in, and should not be used for, human applications.
1. Description
The Omega PHE-2700-DLA pH/ORP Simulator is a battery-powered millivolt generator that simulates pH values of 4, 7 and 10, plus ORP values of ± 700 mV. This device is useful as a troubleshooting aid and for general verification of system operation. It is not a substitute for periodic system calibration with pH buffers or test solutions. Accessory adapter cables enable the PHE-2700-DLA to connect directly to PHTX-275Y, PHEH-275G(ISO), PHEH-275Y(ISO) pH/ORP Sensor Electronics or PHEH-276Y(ISO), PHEH-276G(ISO) pH/ORP Preamplifier. The adapters include a selector switch for pH or ORP simulation. The switch triggers automatic sensor-recognition software in Omega pH/ORP instrumentation.

2. Features
A) Power OFF Button.
B) Output simulation buttons and indicators.
   Simulate pH and ORP output at five fixed values:
   pH 4, pH 7, pH 10, –700 mV and +700 mV.
   Pressing one of these buttons turns the PHE-2700-DLA on.
C) Low battery indicator.
D) High Ω switch:
   • Adds 1000 MΩ resistance in series with output.
   • Simulates high impedance of pH electrodes.
   • Used to verify proper preamplifier operation.
E) Adapter cable:
   For use with the PHTX-275Y, PHEH-275G(ISO), PHEH-275Y(ISO), PHEH-276Y(ISO), or PHEH-276G(ISO).
F) Bypass adapter cable.
G) Mode selector switch:
   Trigger automatic sensor recognition software in Omega pH/ORP instrumentation.
   • Top = 1K for a Omega DPU-90 or DPU-90P instrument needing PT1000 temperature compensation input.
   • Middle = 10K for ORP simulation.
   • Bottom = 3K for PHEH-276Y(ISO) or PHEH-276G(ISO) 3K temperature compensation input.
I) PHEH-276Y(ISO) or PHEH-276G(ISO) Preamplifier.

3. Specifications

<table>
<thead>
<tr>
<th>mV output accuracy ..........</th>
<th>± 0.6 mV (± 0.01 pH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH system temperature simulation:</td>
<td></td>
</tr>
<tr>
<td>w/PHTX-275Y(ISO), PHEH-276G (ISO) adapter.....1.1 KΩ = 25 ºC (± 4 ºC)</td>
<td></td>
</tr>
<tr>
<td>w/PHEH-276Y(ISO) adapter...........................................3 KΩ = 25 ºC (± 4 ºC)</td>
<td></td>
</tr>
<tr>
<td>High Ω resistor value............ 1000 MΩ</td>
<td></td>
</tr>
<tr>
<td>Battery .................................. 9V alkaline</td>
<td></td>
</tr>
<tr>
<td>Life: 400 hours</td>
<td></td>
</tr>
<tr>
<td>Dimensions...................... 100 x 75 x 23 mm</td>
<td></td>
</tr>
<tr>
<td>(3.94 x 2.95 x 0.91 in.)</td>
<td></td>
</tr>
<tr>
<td>Weight ............................ 120 grams (5 oz.)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>pH</th>
<th>mV Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>+177 mV</td>
</tr>
<tr>
<td>7</td>
<td>0 mV</td>
</tr>
<tr>
<td>10</td>
<td>-177 mV</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ORP</th>
<th>mV Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-700 mV</td>
<td></td>
</tr>
<tr>
<td>+700 mV</td>
<td></td>
</tr>
</tbody>
</table>
4. Troubleshooting PHEH-276Y(ISO) and PHEH-276G(ISO) Preamplifier

**Step 1: Routine maintenance and calibration using buffers**
- The most common problem in pH or ORP systems are related to electrode depletion or physical obstruction and fouling.
- Perform routine electrode maintenance, including cleaning and inspection of the electrode, then calibrate the system using buffer solutions. See the electrode and PHEH-276Y(ISO) and PHEH-276G(ISO) Preamplifier manuals for more information.

**Does the meter respond to buffers correctly?**
- Yes: Problem resolved by cleaning/calibration.
- No: Go to next step.

**Step 2: Electrode: Connect PHE-2700-DLA as in "A"**
- This step requires the adapter cable.
  - Connect the PHE-2700-DLA to the appropriate adapter cable, then insert adapter into PHEH-276Y(ISO) and PHEH-276G(ISO) preamplifier.
  - Slide the Mode selector switch to the proper position.
  - Press output simulation buttons and then HIΩ button.
    (The HIΩ button must be pressed after each output button.)
  - See Section 5: Response Chart for proper display.

**Does the meter read valid temp and pH/ORP?**
- Yes: The electrode is at fault. Replace the electrode.
- No: Go to next step.

**Connecting the PHE-2700-DLA directly to the meter with the Bypass cable simulates the output of the PHEH-276Y(ISO) and PHEH-276G(ISO) preamplifier.**

**Step 3: Verify meter calibration**
- Recalibrate the temperature, standard and slope in meter, using PHE-2700-DLA as input.
- Press output simulation buttons.
  See Section 5: Response chart for proper display.

**Does the meter display valid pH or ORP?**
- Yes: Problem resolved by meter calibration.
- No: Go to next step.

**Step 4: Check the meter and preamplifier:**
- Connect PHE-2700-DLA as in "B"
  - Connect the PHE-2700-DLA directly into the meter using the bypass adapter cable.
  - Connect a 3 kΩ resistor (not supplied) to the temp input of the meter.
  - Press output simulation buttons.

**Does the meter display a valid temperature (20 °C to 30 °C) and pH/ORP?**
- Yes: If there are no cable junctions from the preamplifier to the meter, replace the preamplifier. If there are junctions, go to next step.
- No: Problem is in meter. Repair or replace the meter.

**Step 5: Check interconnecting cable and junctions**
- Connect PHE-2700-DLA and bypass cable at any J-Box or cable splice between the preamplifier and the meter.
- Press output simulation buttons.
  See Section 5: Response chart for proper display.

**Does the meter read valid temp and pH/ORP?**
- Yes: Problem is preamplifier or cable from preamplifier to junction.
- No: Problem is in cable. Check all terminals and splices. Replace cable if necessary.

Before using the PHE-2700-DLA:
• The most common cause of pH/ORP system problems is electrode depletion.
• Perform routine electrode maintenance, including cleaning and inspection of the electrode, then calibrate the system.
• See the electrode and PHTX-275Y, PHEH-275G(ISO), PHEH-275Y(ISO) Sensor manuals for detailed information.

If the problem persists, or to verify general system operation:

This test procedure requires the adapter cable. Connecting the PHE-2700-DLA output to the adapter cable then connecting the adapter into the PHTX-275Y, PHEH-275G(ISO), PHEH-275Y(ISO) sensor electronics simulates the output of the pH/ORP electrode.

• Always use the HIΩ button with the adapter cable.
• Connect the PHE-2700-DLA to the adapter cable, then insert adapter into PHTX-275Y, PHEH-275G(ISO), PHEH-275Y(ISO) electronics.
• Monitor the PHTX-275Y, PHEH-275G(ISO), PHEH-275Y(ISO) output using current monitoring device.
• Slide the PHE-2700-DLA Mode selector switch to the proper position (pH or ORP).
• Press output simulation buttons and then HIΩ button.
  (The HIΩ button must be pressed after each output button.)
  See Section 5: Response Chart for proper display.

Does the meter read a valid temp and pH/ORP?
Yes: The system is working fine or there is a problem with the electrode. Replace the electrode if necessary.

• Press any output simulation button to turn the PHE-2700-DLA on.
• Press OFF button to turn the PHE-2700-DLA off.
### 5. pH and ORP System Response Chart

Current output for PHTX-275Y, PHEH-275G(ISO), PHEH-275Y(ISO)

<table>
<thead>
<tr>
<th>PHE-2700-DLA Button</th>
<th>pH System Response</th>
<th>ORP System Response*</th>
</tr>
</thead>
<tbody>
<tr>
<td>–700 mV</td>
<td>Current output: 20 mA (max. output)</td>
<td>Current output: 5.6 mA \nAll ORP displays: –700 mV</td>
</tr>
<tr>
<td>10 pH (–177 mV)</td>
<td>Current output: 15.4 mA \nAll pH displays: 10 pH</td>
<td>Current output: 8.4 mA \nAll ORP displays: –177 mV</td>
</tr>
<tr>
<td>7 pH (0 mV)</td>
<td>Current output: 12 mA \nAll pH displays: 7 pH</td>
<td>Current output: 9.3 mA \nAll ORP displays: 0 mV</td>
</tr>
<tr>
<td>4 pH (+177 mV)</td>
<td>Current output: 8.6 mA \nAll pH displays: 4 pH</td>
<td>Current output: 10.3 mA \nAll ORP displays: +177 mV</td>
</tr>
<tr>
<td>+700 mV</td>
<td>Current output: 4 mA (min. output)</td>
<td>Current output: 13.1 mA \nAll ORP displays: +700 mV</td>
</tr>
</tbody>
</table>

* 4 to 20 mA output values assume factory full span settings: pH: 0 to 14 (+414 mv to –414 mV) \nORP: –1000 to +2000 mV

### 6. Ordering Information

<table>
<thead>
<tr>
<th>Mfr. Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHE-2700-DLA</td>
<td>pH/ORP Simulator/System Tester (includes bypass adapter cable)</td>
</tr>
</tbody>
</table>
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.

**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 ENGINEERING, INC. is a registered trademark of OMEGA ENGINEERING, INC.

© Copyright 2012 OMEGA ENGINEERING, INC. All rights reserved. This document may not be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine-readable form, in whole or in part, without the prior written consent of OMEGA ENGINEERING, INC.
Where Do I Find Everything I Need for Process Measurement and Control? 
OMEGA...Of Course! 
Shop online at omega.comSM

TEMPERATURE
- Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- Wire: Thermocouple, RTD & Thermistor
- Calibrators & Ice Point References
- Recorders, Controllers & Process Monitors
- Infrared Pyrometers

PRESSURE, STRAIN AND FORCE
- Transducers & Strain Gages
- Load Cells & Pressure Gages
- Displacement Transducers
- Instrumentation & Accessories

FLOW/LEVEL
- Rotameters, Gas Mass Flowmeters & Flow Computers
- Air Velocity Indicators
- Turbine/Paddlewheel Systems
- Totalizers & Batch Controllers

pH/CONDUCTIVITY
- pH Electrodes, Testers & Accessories
- Benchtop/Laboratory Meters
- Controllers, Calibrators, Simulators & Pumps
- Industrial pH & Conductivity Equipment

DATA ACQUISITION
- Data Acquisition & Engineering Software
- Communications-Based Acquisition Systems
- Plug-in Cards for Apple, IBM & Compatibles
- Datalogging Systems
- Recorders, Printers & Plotters

HEATERS
- Heating Cable
- Cartridge & Strip Heaters
- Immersion & Band Heaters
- Flexible Heaters
- Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL
- Metering & Control Instrumentation
- Refractometers
- Pumps & Tubing
- Air, Soil & Water Monitors
- Industrial Water & Wastewater Treatment
- pH, Conductivity & Dissolved Oxygen Instruments