

1 YEAR
WARRANTY

Ω OMEGA™ User's Guide

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PHTX SERIES pH Transmitter



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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.

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

Unpacking

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

- 1 Operator's Manual
- 1 PHTX-014/212/ORP

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

When you receive the shipment, inspect the container and equipment for 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 damage claims unless all shipping material is saved for inspection. After examining and removing contents, save packing material and carton in the event reshipment is necessary.

General Description

The OMEGA® Model PHTX-014/212/ORP is a 2-wire, 4-20 mA, pH/ORP transmitter that features platinum RTD temperature compensation, encapsulated construction, high input impedance, and high performance. The PHTX-014/212/ORP accepts as its input any pH or ORP electrode via a BNC coaxial connector. It transforms the probe signal to a 4 to 20 mADC, proportional to the pH or ORP level. This output may be transmitted over two wires to a control location; the same 2 wires provide power to the transmitter. Any DC power supply from 12 to 80 volts and at least 25mA may be used. There are two adjustments on the transmitter to standardize probes for "slope" and "Cal". The output can be monitored with a loop powered meter or a loop resistor and a multimeter during the standardization procedure.

Temperature compensation is automatic with use of a combination pH/ATC electrode. This probe contains a thin film ultra stable platinum resistance temperature sensor. These sensors are laser trimmed and conform to the DIN 43 760 standard. ORP units do not require ATC.

Installation

Two mounting holes are provided. The transmitter can be mounted in a head, weather-proof box, or any suitable flat surface.

The input probe connector is a BNC jack. Use only a coaxial cable that has insulation around the shield. The shield is isolated from ground, and this isolation should be maintained for proper operation. For best results, the probe cable should not be longer than 10 feet. Long cables result in a slow response because the probe must charge the cable capacitance through the high probe source resistance.

If the combination pH/ATC probe is used, temperature compensation is automatic. Connect the two sensor wires to the terminal strip with the resistor symbol; polarity does not matter. If fixed compensation is used, connect a metal film ± 50 ppm/°C resistor to the resistor terminals. Refer to Table 1 for the value vs. temperature or use resistors supply by factory for 25°C.

The output wires are isolated from ground; connections are made to the terminal strip observing polarity to the terminals marked +, - out. These wires are to be connected to a DC power supply through a load resistor. The wires can be as long as necessary. Connect the ground terminal to earth ground.

The loop resistor can be either in the positive or negative power supply lead. The value of the loop resistor depends on the voltage required at the monitoring location.

**PHTX-014/212/ORP
pH Transmitter**

Calculate the required power supply voltage from the following equation: Minimum power supply voltage = $12 + (.02 \times RL)$. A convenient value for the loop resistor might be 250 ohms, $VO = 1V$ to $\%V$. Minimum supply voltage = $12 + (.02 \times 250) = 17V$. The maximum supply voltage is 80V.

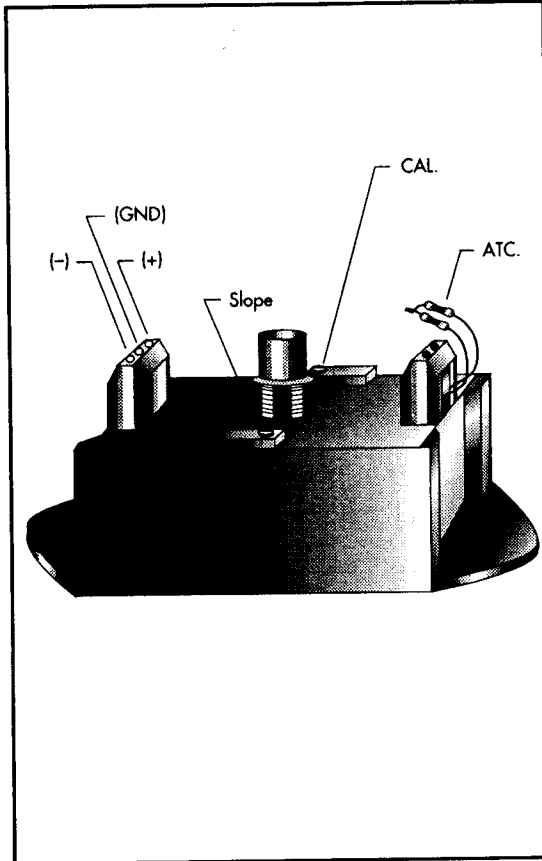
The output can be monitored at the transmitter location in several ways to facilitate probe adjustment. With the system in operation, place the electrode in a known buffer solution and monitor the transmitter in the following way:

A loop powered meter may be connected in series with the current loop and will read out directly in pH or ORP units. Adjust potentiometers as needed.

The "pH CAL" potentiometer is an offset adjustment for the pH probe. This adjustment allows standardization of different probes in 7.00 buffer.

The "Slope" potentiometer is a gain adjustment. This adjustment is used to standardize the output for probes with less than 100% efficiency and is used for 4.00 or 10.00 buffer.

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Table 1

Temp.	0°C	25°C	40°C	50°C	70°C	90°C	100°C
pH	mv.	mv.	mv.	mv.	mv.	mv.	mv.
0	+379.3	+414.0	+434.9	+448.8	+476.6	+504.4	+518.2
1	+325.1	+354.9	+372.8	+384.7	+408.5	+432.3	+444.2
2	+270.1	+295.8	+310.7	+320.6	+340.5	+360.3	+370.2
3	+216.8	+236.6	+248.5	+256.5	+272.4	+288.2	+296.1
4	+162.6	+177.5	+186.4	+192.4	+204.3	+216.2	+222.1
5	+108.4	+118.3	+124.2	+128.2	+136.2	+144.1	+148.1
6	+54.19	+59.15	+62.13	+64.12	+68.09	+72.05	+74.03
7	0	0	0	0	0	0	0
8	-54.19	-59.15	-62.13	-64.12	-68.09	-72.05	-74.03
9	-108.4	-118.3	-124.2	-128.2	-136.2	-144.1	-148.1
10	-162.6	-177.5	-186.4	-192.4	-204.3	-216.2	-222.1
11	-216.8	-236.6	-248.5	-256.5	-272.4	-288.2	-296.1
12	-270.1	-295.8	-310.7	-320.6	-340.5	-360.3	-370.2
13	-325.1	-354.9	-372.8	-384.7	-408.5	-432.3	-444.2
14	-379.3	-414.0	-434.9	-448.8	-476.6	-504.4	-518.2
Temp. Comp. Res.	1000Ω	1097Ω	1155Ω	1194Ω	1271Ω	1347Ω	1385Ω

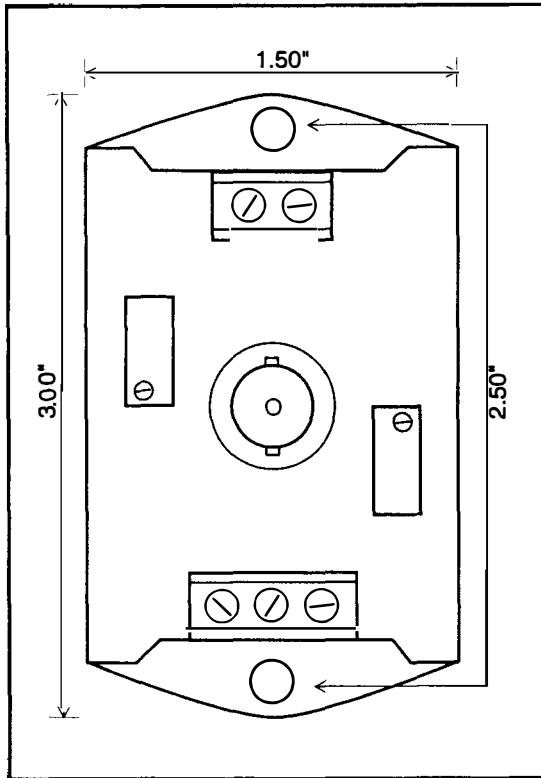
Table 2

PHTX-014 pH	0 to 14 mA	PHTX-212 pH	2 to 12 mA	PHTX-ORP pH	0 to 1000mV mA
0	4.00	2	4.00	0	4.00
1	5.14	3	5.60	100	5.60
2	6.28	4	7.20	200	7.20
3	7.43	5	8.80	300	8.80
4	8.57	6	10.40	400	10.40
5	9.71	7	12.00	500	12.00
6	10.66	8	13.60	600	13.60
7	12.00	9	15.20	700	15.20
8	13.14	10	16.80	800	16.80
9	14.28	11	18.40	900	18.40
10	15.43	12	20.00	1000	20.00
11	16.57				
12	17.71				
13	18.66				
14	20.00				

Specifications

- Input:** 0-14 pH, 2-12 pH, 0-1000mV
- Output:** 4-20 mA
- Power Supply:** 12 to 80 VDC/25 mA
- Load Resistor:** 0 to 3400 ohms
- Linearity:** ± .02 pH units
- Temperature Coefficient:** ± .0008 pH units/°C, -25 to +70°C
- Operating Temp. Range:** -25 to +70°C
- Automatic Temp. Range:** ± .005 pH units/°C, 0 to 100°V
- Temperature Compensation:** Manual or automatic
- Reverse Polarity Protection:** Internal diode
- Dimensions:** 2.25" x 1.5" x 1.5"

**PHTX-014/212/ORP
pH Transmitter**



Dimensions

**Where Do I Find Everything I Need for
Process Measurement and Control?
OMEGA...Of Course!**

TEMPERATURE

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

PRESSURE/STRAIN FORCE

- Transducers & Strain Gages
- Load Cells & Pressure Gauges
- 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 and 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