OPERATING MANUAL

PATHFINDER INSTRUMENTS

Model PHTM-1

I. General Description

The **Model PHTM-1** (encapsulated miniature transmitter) is a 2-wire, 4-20 mA pH transmitter featuring encapsulated construction, high performance and small size.

The transmitter accepts as its input any pH electrode via a BNC coaxial connector. It transforms the probe signal to a 4 to 20mA current proportional to the pH level. This output may be transmitted over two wires to a control location, the same 2 wires provide power to the transmitter. Any D.C. power supply from 12 to 36V 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, a loop resistor or a multimeter during the standardization procedure.

Temperature compensation is automatic with use of a platinum resistance temperature probe with an alpha of .0037Ω/Ω/ºC and 1000Ωat 0ºC. Manual temperature compensation is achieved with use of a fixed resistor on the transmitter terminal strip.

Specifications

Input:	0-14pH
Output:	4-20mA
Power Supply:	12 to 36VDC
Load Resistor:	0 to 750Ω at 24VDC
Linearity:	±.02 pH units
Operating Temperature Range:	-25 to +70ºC
Temperature Compensation:	Manual or automatic
Reverse Polarity Protection:	Internal diode
Dimensions:	1.5" × 2.0" × 1.0"

II. Installation

1. Two mounting holes are provided. The transmitter can be mounted in a head, weather-proof box, or DIN rail.

2. 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 25 feet. Long cables result in a slow response because the probe must charge the cable capacitance through the high probe source resistance.

3. If a 1000Ω temperature probe is used the 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/ºC (ie: RN55C 1%) resistor terminals (ATC Res). Refer to Table I for the value vs temperature.

4. 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 D.C. power supply through a load resistor. The wires can be as long as necessary. Connect the ground terminal to earth ground.

5. 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. Calculate the required power supply voltage from the following equation: Minimum power supply voltage = 12 + (.02 × RL). A convenient value for the loop resistor might be 250 ohms, VO = 1V to 5V. Minimum supply voltage = 12 + (.02 × 250) = 17V. The maximum supply voltage is 36V.

6. To calibrate the transmitter place the pH probe in a # 7 buffer and adjust the "Cal" pot for an output current of 12.00 mA **always adjust "Cal" first**. After the "Cal" pot has been set put the pH probe in a #10 buffer and adjust the "Slope" pot for an output current of 15.43 mA.

III. Table I

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	-216.3	-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
ATC Res.	1000Ω	1097Ω	1155Ω	1194Ω	1271Ω	1347Ω	1385Ω