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Congratulations ! You have purchased the latest in Instrumentation for low-powered pH monitoring. We hope that your new 93-BFPH-Alm will provide you with many years of reliable service.

This manual has extensive details. Please read carefully.

If at any stage we can be of assistance, please contact either your local T.P.S. representative or the T.P.S factory in Brisbane.

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C O N T E N T S

MODEL 93BFPH-L

pH to Frequency converter. The probes are fully isolated from the 12v DC supply galvanically.

NOMINAL : Specs: 0 - 14 pH produces 0 - 10 Hz square wave.
SEE CONFIGURATION

Power: 12 v DC at less than 1.5 mA.
Regulator dropout 10 v nominal.

In practice about .7 mA is achieved.

CONNECTIONS : (from Left to Right)

1:	pH Signal	WHITE
2:	pH Ref	BLACK
3:	BRAID	GREEN
4:	ATC	WHITE
5:	ATC	BLACK
	and Recorder Common.	(not isolated from probes)
6:	Recorder -ve Signal out	(see note below)
7:	GUARD	
8:	+12 v DC input	(isolated from the probes)
9:	Com DC input	(isolated from the probes)
10:	n/c	
11:	Common Output	(isolated from the probes) (Same as 9:)
12:	Pulse Output	(isolated from the probes)

CONTROLS:

RV1: Set SLOPE -- Bottom Left
RV2: Set Common Mode Rejection Ratio, CMRR -- Middle (FACTORY-set only)
RV3: CALIBRATE, Set pH 7 -- Top Left
RV4: Set Vreg, -3.7v -- Top Right (FACTORY-set only)

NOTES: The Analog signal output on Pins 5/6 is High Impedance.
Connection of a recorder of less than 1 Megohm Impedance will change output sensitivity of the frequency section. The Recorder outlet is NOT isolated from the Cell. Voltage is nominal 1.04v (-ve) at full scale.

NOTE: If the unit is modified or wet or covered in any potting material, NO warranty applies.

CONFIGURATION : pH for Hertz.

pH CALIBRATION ("ONE BUFFER METHOD")

New electrodes can be used immediately if they have been kept wet during transport. This is normally done by the use of a soft plastic "Wetting Cap" covering the pH-sensing glass bulb, containing a little water. This cap should be kept for later use. If the probe bulb is dry, it should be reconditioned by soaking the bulb in water for 24 hrs. Readings may not be stable unless this is done.
A shorter conditioning time may be achieved by soaking in dilute 1% Hydrochloric Acid. Wash the electrode thoroughly after the acid soak.

"pH Calibration" of an instrument is simple. The meter is adjusted to read the same value (on the digital readout) as the pH value of the standard solution being measured. This standard pH solution is known as a "buffer" solution, because it has the chemical ability to resist changes to its pH value.

1. Connect the pH electrode and ATC probe to the terminal strip. (See Page 1 or 8)
2. Remove the soft plastic "Wetting Cap" from the end of the probe. (This is used to keep the pH bulb wet during transport and storage.)
3. Place the probe into a small amount of pH 6.88 buffer solution. Use enough Buffer solution to cover the end of the pH probe to a depth of 15 mm or so.
4. Carefully adjust the RV-3 control for the correct output.

Output Range	6.88 pH equals
0-1 Volt	.49 volts
0-5 Volts	2.45
0-10 Volts	4.91
0-10 Hz	9.91 Hz

The meter is now calibrated and ready for use in the measurement of unknown pH samples with values near pH 7.

"TWO BUFFER" pH Calibration Method.

A slightly more-involved procedure should be carried out when using for the first time, and also repeated each month or so.
This procedure uses 2 standard pH solutions.

For normal day to day calibration the One Buffer Method (above) is sufficient using the "Slope" setting found from the following procedure, which uses two pH buffer solutions. [The "SLOPE" of a pH probe is how much the probe output changes for a change of sample solution pH.]

1. Connect the pH electrode and ATC probe to the terminal strip.
   (See Page 1 or 8)
2. Remove the soft plastic "Wetting Cap" from the end of the probe.
   (This is used to keep the pH bulb wet during transport and storage.)
3. Place the probe into a small amount of pH 6.88 buffer solution.
   Use enough Buffer solution to cover the end of the pH probe to a depth of 15 mm or so.
4. Carefully adjust the RV-3 control for the correct output.

Output Range	6.88 pH equals
0-1 Volt	.49 volts
0-5 Volts	2.45
0-10 Volts	4.91
0-10 Hz	9.91 Hz

5. Remove the electrode from the pH buffer solution 6.88.
6. Rinse off the probe with distilled water.
7. Now place the probe in buffer pH 4.00.
8. Adjust the unit to read the value of the second buffer, this time using the "SLOPE" screwdriver adjustment RV1.
   The "SLOPE", (or electrode response adjustment), is now set for weeks of normal use.

Output Range	4.00 pH equals
0-1 Volt	.28 volts
0-5 Volts	1.43
0-10 Volts	2.86
0-10 Hz	2.86 Hz

9. For best accuracy, re-do steps 3 to 8 above, once more.
   The unit is now fully calibrated and ready for use.

If solutions away from room temperature are to be used, time must be allowed for the interior temp. of the probe to reach that of the solution.

Distilled Water is NOT a BUFFER pH=7. Also, NEVER return buffers to stock.

pH ELECTRODE

A pH electrode actually consists of 2 electrodes in 1 body:

1. The centre pH sensing electrode with its glass end bulb, and
2. The "reference" electrode, which makes contact with the sample solution through the small white ceramic contact on the side of the outer plastic body near the bulb end.

There are 2 basic types of reference electrodes, which can be,
a: "GEL" filled, a sealed reference for low maintenance.
b: A "FLOW" type reference, where the filling solution is intended to leak slowly into the solution being measured.

The inner pH electrode is sealed, and needs no maintainance for the life of the electrode. The outer "reference" electrode is designed to make stable electrical contact with the sample.

The "FLOW" type reference electrode will occasionally require re-filling with saturated Potassium Chloride solution. This procedure is as follows.

(a) Unscrew the plug from the electrode side-arm.
(b) Use a syringe or eye dropper and fill the outer Reference electrode chamber with saturated KCl solution, to within 2 cm from the vent hole.
(c) No air bubbles must remain trapped in the inner pH electrode bulb. "Flick" the electrode to remove trapped bubbles.

If the electrode has been left dry for several days, its immediate use will sometimes give a slow response. The electrode should be immersed in a standard buffer solution or in distilled water for about 24 hours before its use. Immersing the electrode bulb in a little Dilute Hydrochloric Acid for a few minutes will speed up this rejuvination.

pH ELECTRODE DO's and DONT's.
DO store the pH electrode in water, or with the "wetting cap".
(Tap water will suffice for a storage solution.)
DO keep the pH electrode disconnected from the unit when not in use.
DO check that there are no air bubbles in the pH glass bulb before use.

DON'T allow the outer filling solution in the reference to empty.

Cracks in the Glass Bulb

If the meter indicates almost the same value when the electrode is placed in various standard solutions, there may be a crack in the glass membrane, or there simply may be no filling solution. A cracked bulb requires the replacement of the electrode.

Insulation and Internal Resistance

Because the glass electrode has a membrane resistance of several hundred million ohms, every part of the meter has been carefully insulated. If this insulation value is lowered, the needle will go off scale or become unstable.

Great care must be taken not to wet the printed circuit card or the connector strip. Only if nescessary, clean the connectors with pure alcohol and cotton wool. Blow dry with a heat gun, or hair dryer, set at a moderate temperature.

	REPLACEMENT PROBES, Buffers etc.	ORDER AS:
	pH probe, 5 mtr NON-FLOW	Part # 111226
or	pH probe, 5 mtr IJ reference	Part # 111227
or	pH probe, 5 mtr, Flow reference	Part # 121205 / 5m
	Re-filling solution for pH probe	Part # 121326
	ATC probe, 5 mtr	Part # 111275
	pH Buffer Solution 6.88	Part # 121306
	pH Buffer Solution 4.00	Part # 121381

Order from your local TPS distributor, or
TPS Pty. Ltd. 4 Jamberoo St., Springwood,
Brisbane, Australia, 4127.
Phone 07-32 900 400
FAX 07-3808-4871

TROUBLESHOOTING:

pH READINGS DRIFTING: Are the pH screw terminals tightened correctly ?
(Dont over-tighten or the PCB can be damaged.)

Does the outer barrel reference chamber of the pH probe require refilling ? See spares, page 5.

pH READINGS UNSTABLE: In low ionic strength solutions, such as rain water, pH readings may be unstable if the pH probe does not have sufficient flow of reference electrolyte from the white ceramic reference junction at near the glass bulb of the electrode. See the probe handbook for service and cleaning instructions.

pH DOESN'T CHANGE : Have you removed the plastic "wetting cap" from the end of the pH probe ?

Is the bulb of the pH probe cracked ?

If cracked, the pH probe must be replaced. See Page 5.

If you have to return the unit for service, ALWAYS send the probes back as well. This allows us to fully check the meter for correct operation.