DIGITAL

pH / mV

MONITOR

PTH-1

USERS GUIDE

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SPECIFICATIONS

pH Range:	0 to 14pH with 0.01pH resolution
Temp. Range:	0oC to 100oC
Temp Input:	2 input terminals provide connections for a PT100 or PT1000 temperature sensor
pH Input:	BNC, external of housing.
Calibration:	Connecting the programming board enables the operator to calibrate the pH/mV input and 4-20mA current output. The 4-20mA can be configured to span various pH/mV ranges. All calibration & configuration parameters are programmed into non-volatile memory.
Signal output:	4-20mA software configurable over the range of 0-14pH. Screw terminals for fully isolated 4-20mA output located by removing front cover.
Power:	240VAC 50Hz 7VA max.
Power (optional):	24VAC or 24DC *(non polarised inputs)* +12 VDC *(suitable for battery supply)*
Housing:	Thermoplastic with opaque lid.Rated IP 55
Dimensions:	(W)130mm x (H)94mm x (D)57mm.

INDRODUCTION

The PTH-1 is a universal front-end amplifier used to measure pH and temperature. The output signal is transmitted via the industrial standard 4-20mA current signal to a central processor or computer.

The pH electrode connects through a BNC socket. A PT100 or PT1000 temperature sensor also can be connected. The temperature has a low impedance 0-1V voltage output.

Automatic temperature compensation of the pH is also possible if a temp. sensor is connected.

The unique circuitry of the PTH-1 provides complete isolation between the pH and temperature inputs, also the 4-20mA and 0-1V outputs ensuring stable performance.

Using the optional programming board enables the operator to calibrate signal input & current output as well as change configurations for temperature and 4-20mA current ranges.

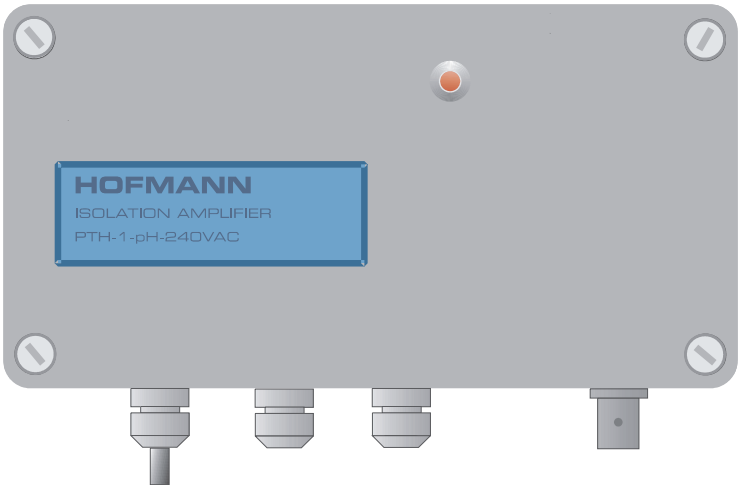


FIG 1 *PTH-1 FRONTEND AMPLIFIER*

WHY USE THE PTH-1

The use of computers as a central monitoring and control station especially in large industrial installations have increasingly gained acceptance as an economical and practical solution in manufacturing processes.

This concept also embraces the environmental industry with the ever more stringent pollution controls introduced in factories. The advantages of such a central processing system are immediately obvious especially when highly toxic chemicals are involved. The measurements of Temperature, pH, Oxidisation Reduction and Conductivity of these mediums provide the main link between a computer screen and the actual mediums held in tanks, containers or the presence of them in a manufacturing process.

The principle of pH, mV and Conductivity measurements require the electrode to be in electrical contact with water, a chemical or medium measured, unlike most sensors used in industrial applications. *(See Fig.2)*

A ground loop is created if no electrical isolation is provided between instrumentation, showing false measurements or noise at the computer monitor. A loop is also created if several front ends are powered with a common 24/12VDC supply.

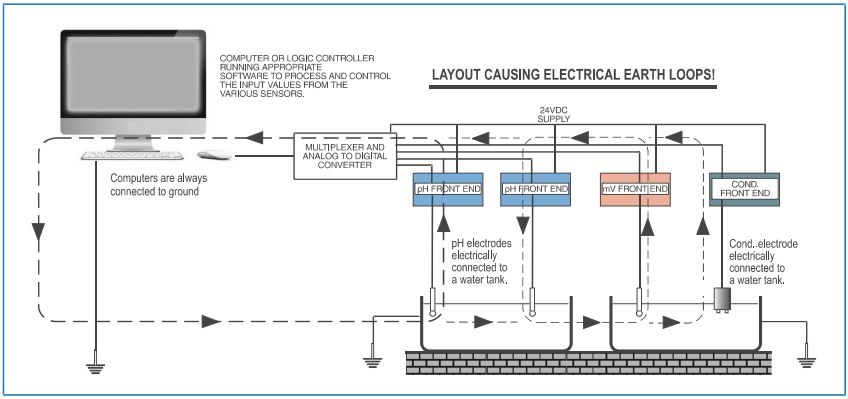


FIG 2 *Possible earth loops in an installation*

The PTH instrument provides electrical isolation between inputs and outputs to prevent earth loops. Isolation of the power supply and instrument allows the connection of several units to the same DC supply or battery. *(see Fig 3*

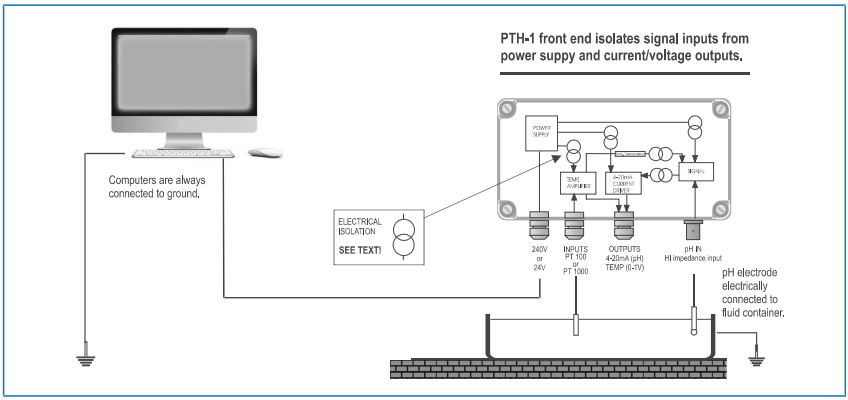


FIG 3 *Avoiding loop problems with the PTH-1*

INSTALLATION

Select a position for the controller to be mounted on a wall, not facing into direct sunlight and protected from the weather elements as much as possible. The instrument should be installed within the distance of the sensors *(pH and temparature)* cable lengths

The instrument is fastened to a wall or sub panel by means of four screws. The mounting holes are revealed after removal of the front cover. *(See Fig.4)*

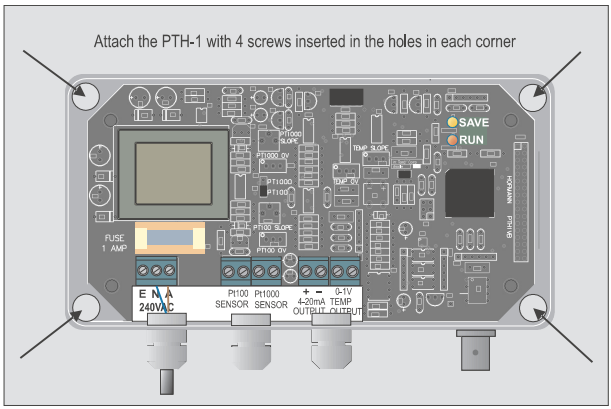


FIG 4 *Mounting the PTH-1 on a backing board.*

It is imperative that all connections are wired through the cable gland and the opaque lid is always tight to ensure that no corrosive liquids inadvertently splash into the instrument.

Polarity need not be observed when connecting a temperature electrode to the “PT100/1000 SENSOR” input terminals.

The 4-20 mA signal current output can be used for event recording. This output can be wired directly to a computer interface without causing earth loop problems. Correct polarity wiring is essential.

☞ *Correct polarity has to be observed when connecting the 4-20mA signal output.*

Installing the electrode and temp. sensor.

Select the appropriate position in the system for the electrode, and install the electrode so that it is vertical with the sensor tip facing down in the sample tee. Always install the sensor in a sample line that can be isolated, as the sensor has to be cleaned and checked regularly.

Polarity does not matter when wiring a PT100/1000 temp. sensor.

Starting up the Instrument.

Connect the appropriate power (240VAC, 24VAC/DC or 12VDC) depending on the PTH-1 model used.

The LED mounted on the front cover pulses at regular intervals if operating correctly. If the cover is removed the LED “RUN” indicator can be seen lit up green.

The 4 and 20 mA current and 0-1V output are also factory calibrated.

The pH is default calibrated in steps of 57mV/pH. pH 2.00 therefore is equal to +285mV, pH 12.00 is equal to -285mV.

Configuration and Calibration of the PTH-1

If a temp sensor is installed set the jumper *(see Fig.6)* according to the temp sensor used. (PT100 or PT1000)

Connecting a temp. sensor allows automatic compensation for pH.

To use automatic temp compensation for pH open the jumper marked "Int. Temp Comp disable" *(see Fig 5)*

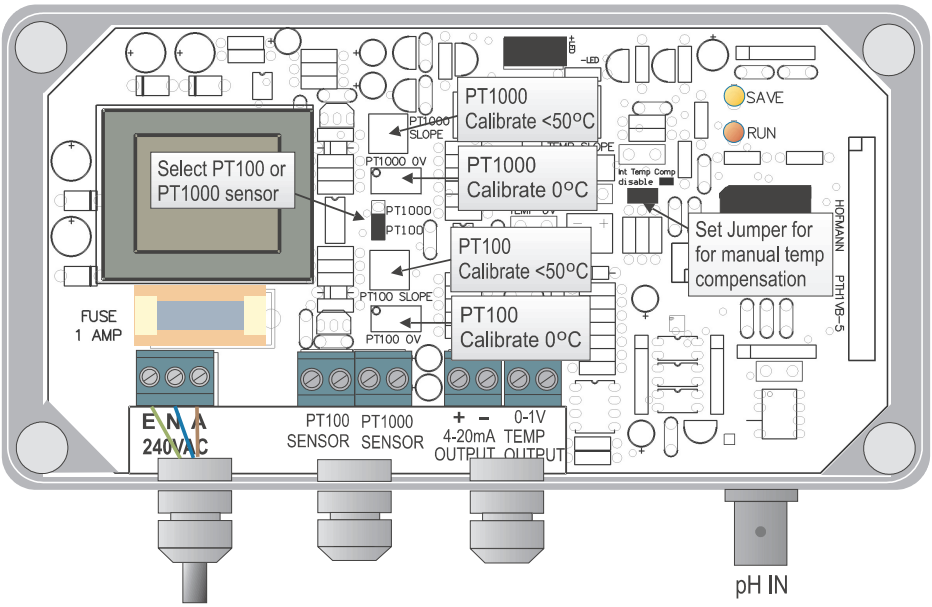


FIG 5 *Configurations for the PTH-1*

Closing the jumper sets manual compensation and with the optional programming board an operating temperature can be selected and set.

Connecting the optional "programming board" allows the operator to recalibrate pH and 4-20mA signal current if necessary. *(see Fig.6)*

☞ *The optional Programming board is required to carry out all pH and 4-20mA current calibrations. It is also used to set the operating temperature when manual compensation is selected.*

Calibrating the PTH-1 with a Programming Board and a SMH-2 Simulator.

A programming board is necessary to carry out this operation.

The operator should be familiar with the different effects if OFFSET and SLOPE calibrations are carried out. Offset adjustments increase or decrease the reading regardless of the absolute measured value. pH7 is a prefixed iso-potential and increasing the slope always moves the reading away from pH7. Readings below pH7 therefore decrease in the displayed

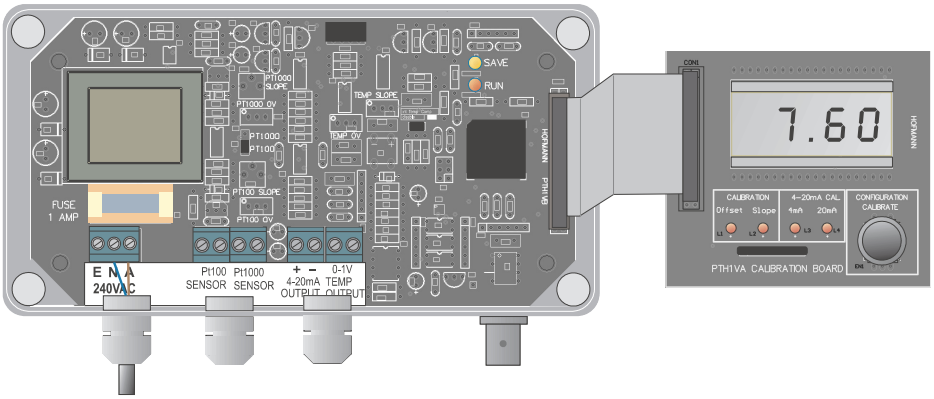


FIG 6 *Using the Programming Board for Calibrations*

value. Readings above pH7 increase in the displayed value.

OFFSET calibrations should be carried out first, however offset and slope calibrations can be performed separately and need not be done consecutively.

Set the simulator to pH 7.00 'PRESS' and 'Rotate CCW' to go to CAL. 'PRESS' turns on the offset LED. 'PRESS' again, the offset LED now flashes and the display shows "live" pH input. 'Rotate' until 7.00 *shows on the display and 'SAVE'.* Offset is now calibrated.

☞ *An offset calibration can only be performed if the pH is between 6.00 and 8.00.*

An offset calibration is performed within the pH range 6.00 and 8.00. The display shows ***Err*** if a value outside these parameters is present. If this happens 'PRESS' two times, the display shows "live" pH and allows the operator to correct for a valid offset pH value. 'PRESS' now returns to the offset calibration menu to repeat the procedure.

Rotate 'CCW' ends the calibration then 'PRESS' to exit. Rotate 'CW' proceeds to the slope calibration.

SLOPE calibration.

Set the simulator lower than pH 5.50 or higher than pH 8.50

'PRESS' turns on the slope LED. 'PRESS' again, the slope LED now flashes and the display shows "live" pH input. 'Rotate' until the correct pH value shows on the display and 'SAVE'. Slope is now calibrated.

An accurate slope calibration can only be performed if the pH is lower than 5.50 or higher than 8.50 The display shows Err if a value inside these parameters is present. If this happens 'PRESS' two times, the display shows "live" pH and allows the operator to correct for a valid pH value. 'PRESS' now returns to the slope calibration menu to repeat the procedure.

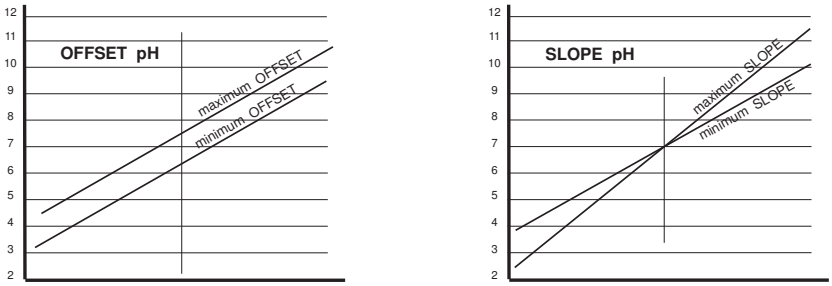


FIG. 7 *THE DIFFERENT EFFECTS OF OFFSET AND SLOPE.*

Rotate 'CCW' two times ends the calibration then 'PRESS' to exit. Rotate 'CW' proceeds to mA calibrations. *(See 4-20mA output)*

Calibrating the PTH-1 and electrodes with buffers.

A programming board is necessary to carry out these operations.

☞ *Allow several minutes before trying to calibrate the instrument to allow for a settling period of the sensor in the water.*

The electrode should be left in a KCL solution preferably overnight, to condition the glass membrane of the electrode. This is especially important for unused electrodes that have been in storage for extended periods.

You will need at least 2 buffer solutions. One buffer should have its value near the pH7 point, the other near the range to be measured. This will mean a buffer of pH4 or lower for the acid range and pH9-10 or above for the alkali range.

The temperature compensation must be set as close as possible to the actual temperature of the buffer solution.

☞ *The pH values of the buffers are also temperature dependent. It is therefore important for an accurate calibration to take note of the buffer pH values versus temperature usually printed onto the buffer container label.*

1.) Insert electrode into the buffer with its value near pH7 or 7 precisely. Check the displayed value of the instrument and calibrate the offset as mentioned in OFFSET calibration previously.

2.) Rinse the electrode thoroughly with distilled water and insert into the second buffer.

3.) Check the displayed value of the PTH-1 and adjust any errors with the slope calibration as mentioned in SLOPE calibration previously. The whole procedure may be repeated for assured accuracy. Rinse electrodes with water between measurements. Always throw away any used buffers.

☞ *Never attempt to calibrate an electrode directly taken from a treatment plant without proper rinsing and storing in a KCL solution or distilled water.*

Automatic temperature compensation with a PT100/1000 sensor.

There is only a moderate dependence of pH on sample temperature. In most cases manually setting the temperature of the water will suffice but if very accurate measurements are required or large temperature fluctuations are present a PT100/1000 sensor should be used. Once connected, remove the "Temp enable/disable" jumper and automatic compensation can be selected. *(with optional programming board)*

Select **A.°C** for the display to show "live" °C. 'SAVE' to accept automatic compensation or exit by 'ROTATE' and 'PRESS'

4-20mA signal output.

A programming board is necessary to carry out this operation.

The span of the 4-20mA signal is configured by selecting a low pH for 4mA and a high pH for the 20mA current. The 4mA point is selected between 0.00 and 7.00 pH. The 20mA point is selected between 8.00 and 14.00 pH. This shows that the mA signal current can track the entire pH range or as little as 1.00 pH. *(See Fig.8)*

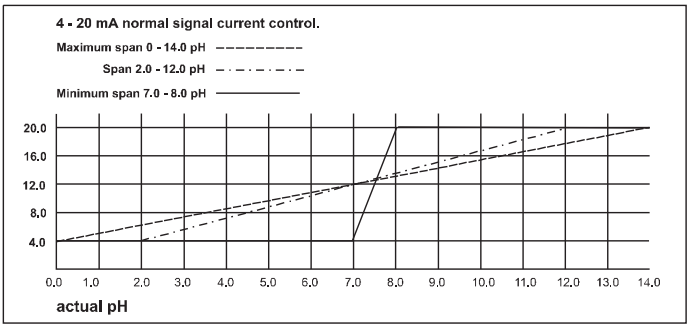


FIG 8 *4-20mA normal Signal current control.*

Factory default setting is4.00mA for pH 0.00 and 20mA for pH 14.00.

4mA and 20mA calibration with a multimeter.

A real current calibration is carried out by connecting a multi meter across the terminals (no termination resistor is required) to measure the mA current.

The meter can also be connected in series in an already existing installation. *(See Fig.9)*

Enter calibration ***[CAL]*** and 'Rotate' until the 4mA LED lights up. 'PRESS' to enter 4mA calibration. The display shows 4.00. Dial the measured mA with 'Rotate'. 'SAVE' and the actual current is corrected to 4.00mA. Move to 20mA and proceed the same way. If a calibration is not exactly accurate the first time simply repeat the procedure until the current output reads correctly.

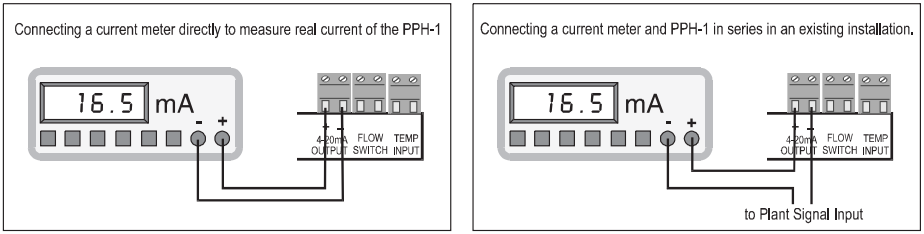
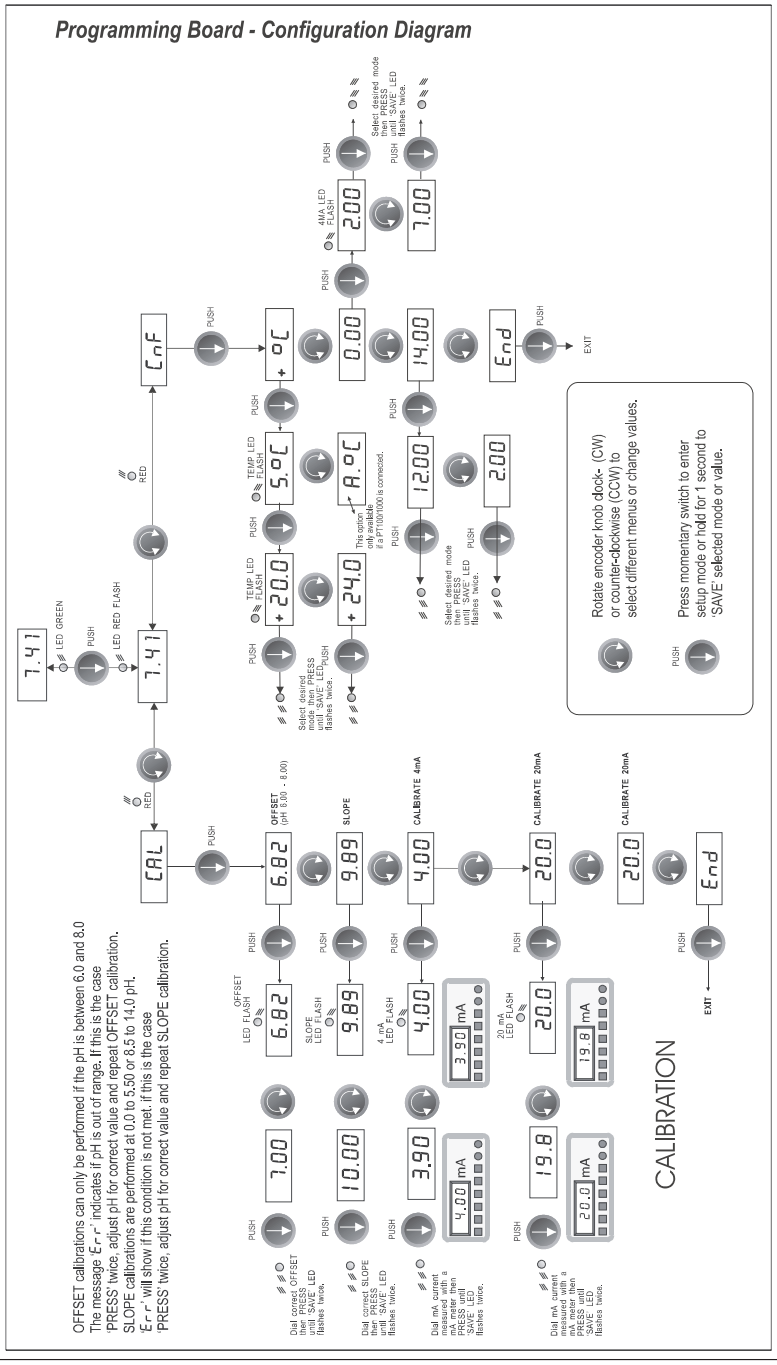


FIG 9 *Calibrating 4-20mA with a multimeter.*


Programming Board - Configuration Diagram
CALIBRATION
OFFSET calibrations can only be performed if the pH is between 6.0 and 8.0
The message 'Err' indicates if pH is out of range. If this is the case
'PRESS' twice, adjust pH for correct value and repeat OFFSET calibration.
SLOPE calibrations are performed at 0.0 to 5.50 or 8.5 to 14.0 pH.
'Err' will show if this condition is not met. if this is the case.
'PRESS' twice, adjust pH for correct value and repeat SLOPE calibration.
Rotate encoder knob clock- (CW) or counter-clockwise (CCW) to select different menus or change values.
Press momentary switch to enter setup mode or hold for 1 second to 'SAVE' selected mode or value.
EXIT
PUSH
LED GREEN
LED RED FLASH
RED
CAL
End
CnF
OFFSET (pH 6.00 - 8.00)
SLOPE
CALIBRATE 4mA
CALIBRATE 20mA
TEMP. LED FLASH
4MA LED FLASH
Dial correct OFFSET then PRESS until 'SAVE' LED flashes twice.
Dial correct SLOPE then PRESS until 'SAVE' LED flashes twice.
Dial mA current measured with a mA meter then PRESS until 'SAVE' LED flashes twice.
Select desired mode then PRESS until 'SAVE' LED flashes twice.
The option mode must be set if a PT100/1000 is connected.

WARRANTY

We, **HOFMANN ELECTRONICS,** guarantee this unit against defects due to faulty manufacture or breakdown of components for a period of twelve month from the date of purchase, subject to the following provisions:

- The guarantee will cover original failure of parts and natural defects due to manufacturing causes. Otherwise repair charges are to be to the owners cost.
- The warranty does not cover any carriage costs.

The warranty is void if:

- The instrument is damaged due to rough handling or transport after purchase.
- The article has not been used in accordance with the operating instructions.
- Any parts in the instrument have been changed or have been altered in any way.
- The serial number is removed or defaced.

All other warranties and conditions, express or implied, are void.

° PTH-1 SERIAL No.

Due to a continuing effort to improve the product the manufacturer reserves the right to change or alter the product without notices.