Model HH

Signal-Conditioner / Indicator

SENSOTEC

2080 Arlingate Lane, Columbus, Ohio 43228 USA • (614)850-5000

Sensotec, Inc.
2080 Arlingate Lane
Columbus, Ohio 43228 USA

Telephone: (614)850-5000
FAX: (614)850-1111
Toll Free: 1-800-848-6564
E-mail: service@sensotec.com
WWW: http://www.sensotec.com

Model HH Instruction Manual
Document Part Number: 008-0139-00
Rev. A: January, 2002

IMPORTANT! IT IS RECOMMENDED THAT YOU READ THIS DOCUMENT THOROUGHLY BEFORE APPLYING POWER TO THIS UNIT. THIS DOCUMENT CONTAINS INFORMATION ON WIRING, CALIBRATION, AND USE OF FEATURES.

Sensotec continually improves its products, and thus the information herein is subject to change without notice.

Chapter 1
INTRODUCTION

1.1 Overview

The Sensotec Model HH is a complete hand-held portable signal-conditioner/indicator for use with strain-gage transducers. The instrument provides an excitation power supply for such transducers, amplifies the transducer's output, and indicates this reading in engineering units. It can indicate this reading in a continuous fashion (tracking mode) or display only the highest reading (peak mode) using a switch to make the selection.

Other features of the instrument include:

- 3-1/2 digit liquid-crystal display
- use of a standard, 9-volt battery
- low-battery warning indication

Though the instrument is small, it is a full signal-conditioner, providing adjustment for zero, span, scaling and switch-selected gain. It is usable with a wide variety of strain-gage transducer types, and is the ideal instrument for the those who must travel and take readings from a wide variety of transducers.

1.2 Specifications

SIGNAL CONDITIONER

Excitation Voltage to transducer:	2.46 VDC
Minimum Transducer Impedance:	120 ohms
Input Signal Sensitivity for Full-Scale Indication:	0.5 to 8.0 mV/V
Peak Detector Bleed-Off Rate	< 0.01% per second

DISPLAY

Type:	3½ LCD, plus optional dummy zero
Low-Battery Indicator:	yes
Over-Range Indicator	blinking digits
Digit Height:	0.5”
Conversion Rate:	3 readings / second

PHYSICAL

Size:	3.6” W x 6.75” L x 1.75” H
Enclosure Material:	ABS impact-resistant plastic
Transducer Connector:	four color-coded binding posts capable of spade lugs, banana plugs, alligator clips and stranded or solid wire
Power Supply:	9-volt battery (NEDA 1604)
Battery Life:	15 hours minimum with 350-ohms transducer impedance

1.3 Layout

1.3.1 Front Panel Controls / Indicators

[ON/OFF] Switch
This switch controls power to the instrument from the battery.

[SHUNT CAL] Switch
This switch connects the instrument's shunt calibration resistor to the transducer and is used during setup. See "SETUP" on page 11 for more information.

[PEAK/TRACK] Switch
This switch selects the mode of operation of the instrument. In the TRACK mode, the instrument's display will continuously follow the transducer reading. In the PEAK position, the instrument will retain and display the value of the most positive reading detected during operation. To reset the peak, switch the [PEAK/TRACK] switch to the TRACK position. (A slight decay of the peak value displayed over an extended period of time is normal).

[ZERO] Potentiometer
This control is used to obtain a zero indication, thus cancelling drifts or offsets that could exist in the instrument or transducer.

[SPAN] Potentiometer
This control adjusts the fine gain of the amplifier. It is used to be certain that the reading obtained from any transducer can be scaled to the proper level on the display.

"LO BAT" Indicator
This indication appears in the upper-left of the display and indicates when the battery voltage is getting low.

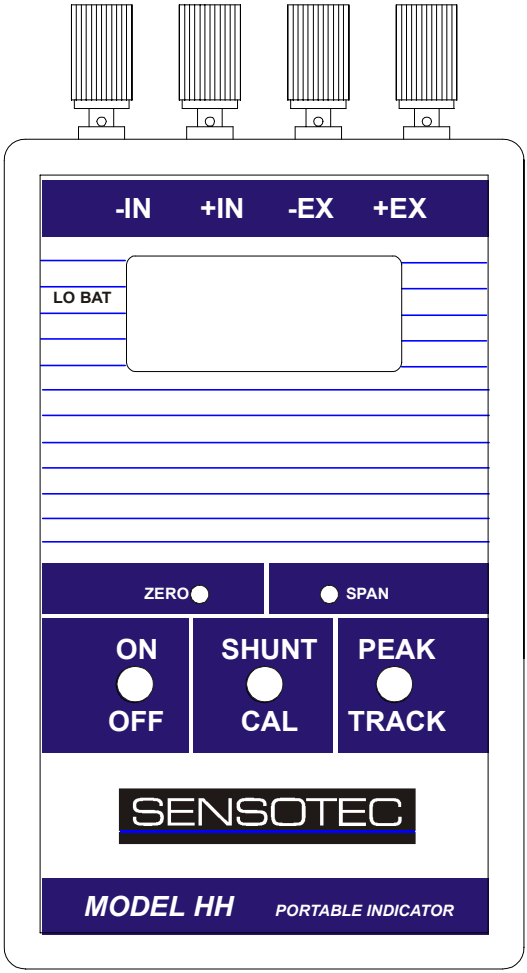

Figure 1-1: Layout

1.3.2 Connection Terminals

On the top of the instrument are four binding-post connectors for the transducer connections. Labels describe the function of each of the terminals.

Table 1: Transducer Hookup

Instrument	Transducer
+EX	(+)Excitation
-EX	(-)Excitation
+IN	(+)Output
-IN	(-)Output

1.3.3 Battery Replacement

The access door for the battery is located on the rear of the instrument. To replace the battery, slide this door in the direction indicated by the arrow. When changing batteries, remove the clip from the battery carefully, in order to protect the wiring.

Chapter 2
SETUP

2.1 Initial Setup

If your instrument was purchased simultaneously with a Sensotec transducer, it has already been calibrated to that transducer; you may skip this section.

1) Remove Cover: Remove the rear panel from the instrument by removing the four corner screws and carefully lifting the rear cover. Use caution not to strain the wires running to the battery compartment.

2) Decimal Point Setting: Determine the desired location for the decimal point on the digital display. See “Printed Circuit Board” on page 14. Connect the proper decimal point jumper as shown. CAUTION! Use only one jumper!

3) Extra (Dummy) Zero: It is possible to have an extra, non-active zero digit at the end of the displayed value. Decide if the extra zero is required on the display. Connect a jumper so that this digit is on or off, as shown in “Printed Circuit Board” on page 14.

4) Coarse Gain: Determine the transducer's full-scale output in milliVolt-per-Volt. “Printed Circuit Board” on page 14 indicates the selections for eight selector switches which set the coarse gain of the instrument. The following table indicates the switch positions needed to accommodate the various mV/V inputs.

This completes the initial setup of the instrument. Do not replace the rear panel, yet.

Table 2: Coarse Gain Switch Settings

mV/V Value	Switches on
0.5	1, 2, 3, 7
0.75	1, 3, 7
1.0	1
1.5	3, 5, 7
2.0	2
2.5	4, 7
3.0	3
3.5	6, 8
4.0	4
5.0	5
6.0	6
7.0	7
8.0	8

2.2 Transducer Hookup

Connect the transducer to the instrument using the binding post connectors shown in “Layout” on page 8. Observe the proper color coding as shown on the Transducer Information Sheet provided with your transducer. Turn the instrument on and allow the transducer a few seconds to warm up, thus stabilizing any zero shift.

2.3 Calibration

1) Locate the internal SCALING potentiometer (see "Printed Circuit Board" on page 14). Turn it fully clockwise (about 25 turns).

2) With no load applied to the transducer, adjust the front-panel [ZERO] potentiometer to give a zero indication on the display.

3) Known Load Method:
With a known load close to full-scale applied to the transducer, adjust the [SPAN] potentiometer so that the display reads 1999 (or 19990 if the extra digit is turned on).

   Shunt Calibration Method:
   An alternative to this step is to use the [SHUNT CAL] switch to simulate a load, adjusting the [SPAN] potentiometer so that the display reads the value calculated by the following formula.

If an extra zero digit is selected, the display should read:

$$\frac{\text{Shunt Cal Output (mV/V)} \times 19990}{\text{Full Scale Ouput mV/V}}$$

If the extra zero digit is NOT selected, the display should read:

$$\frac{\text{Shunt Cal Output (mV/V)} \times 1999}{\text{Full-Scale Output (mV/V)}}$$

These values are normally found on the calibration sheets which are delivered with transducers by most manufacturers. The value of the Shunt Calibration resistor that the manufacturer recommends is also on this sheet. It is important to use the same value of resistor when using the Shunt Calibration Method.

4) Recheck the ZERO and again apply the known-load or Shunt Calibration.

5) With the full-load applied, adjust the internal SCALING potentiometer to the desired full-scale engineering unit value. If the SHUNT CAL technique is being used, adjust for the value calculated by:

$$\frac{\text{Shunt Cal Output (mV/V)} \times \text{Full-Scale Engineering Units}}{\text{Full-Scale Output (mV/V)}}$$

6) Replace the rear panel.

Calibration and setup are now complete.

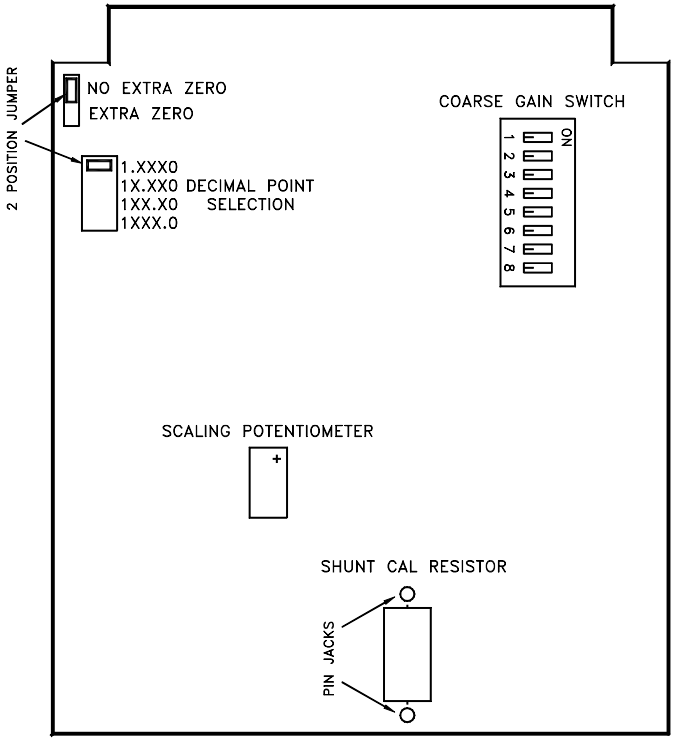

Figure 2-1: Printed Circuit Board

WARRANTY

Limitation of Remedy and Disclaimer of Warranty
Any of our products which, under normal operating conditions, proves defective in material in workmanship within one year from the date of shipment by Sensotec, Inc., will be repaired or replaced free of charge, provided that the buyer (1) promptly notifies Sensotec, Inc. of any such defect; (2) provides Sensotec, Inc. with satisfactory proof of the defect and that the product was properly installed, maintained, and operated within the limits of rated and normal usage; and (3) obtains from Sensotec, Inc. authorization to return the product. Any such product shall be returned with transportation charges prepaid. The replacement product will be shipped F.O.B. our plant.

The remedy set forth herein does not extend to any product or part thereof which, under normal usage, has an inherently shorter useful life than one year. The remedy set forth herein does not apply to damage or to defects in any product caused by the buyer's misuse or neglect, nor does it apply to any product which has been repaired or disassembled which, in the sole judgement of Sensotec, Inc. affects the performance of the product.

The remedy set forth herein is the buyer's exclusive remedy, and will satisfy all obligations of Sensotec, Inc. whether based on contract, negligence, or otherwise. Sensotec, Inc. is not responsible for any incidental or consequential loss or damage which might result from a failure of any Sensotec, Inc. product.

THIS EXPRESS WARRANTY IS MADE IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE.

Obtaining Service Under Warranty
Advanced authorization is required prior to the return to Sensotec, Inc. Before returning the items, either write to the Repair Department c/o Sensotec, Inc., 2080 Arlingate Lane, Columbus, Ohio 43228, or call (800) 848-6564 with: 1) a part number; 2) a serial number of the defective product; 3) a technical description* of the defect; 4) a no-charge purchase order number (so products can be returned to you correctly); and 5) ship and bill addresses. Shipment to Sensotec, Inc. shall be at Buyer's expense and repaired or replacement items will be shipped F.O.B. our plant in Columbus, Ohio. Non-verified problems or defects may be subject to an evaluation charge. Please return the original calibration data with the unit.

Obtaining Non-warranty Service
Advance authorization is required prior to the return to Sensotec, Inc. Before returning the item, either write to the Repair Department c/o Sensotec, Inc., 2080 Arlingate Lane, Columbus, Ohio 43228, or call (800) 848-6564 with: 1) a part number; 2) a serial number of the defective product; 3) a technical description* of the malfunction; 4) a purchase order number to cover Sensotec, Inc.'s repair cost; and 5) ship and bill addresses. After the product is evaluated by Sensotec, Inc., we will contact you to provide the estimated repair costs before proceeding. The minimum evaluation charge is $95. Shipment to Sensotec, Inc. shall be at Buyer's expense and repaired items will be shipped to you F.O.B., our plant in Columbus, Ohio. Please return the original calibration data with the unit.

Repair Warranty
All repairs of Sensotec, Inc. products are warranted for a period of 90 days from date of shipment. This warranty applies only to those items which were found defective and repaired. It does not apply to products in which no defect was found and returned as is or merely re-calibrated. Out of warranty products may not be capable of being returned to the exact original specifications or dimensions.

*Technical description of the defect: In order to properly repair a product, it is necessary for Sensotec, Inc. to receive information specifying the reason the product is being returned. Specific test data, written observations on the failure and specific corrective action you require is needed.

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Fax: (614)850-1111
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