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MODEL HX93 RELATIVE HUMIDITY AND TEMPERATURE TRANSMITTER

Operator's Manual

RH CALIBRATION

Refer to Figure 1 for location of trim pots A, B and C.

1. Remove cover. Connect supply wires to Terminal Pins as follows:

   HX93C: (1) Negative, (2) Positive
   HX93V: (3) Negative, (4) Positive, (1) RH Output

2. Place sensor in "LOW" RH environment (eg. Lithium Chloride solution, 11.3% RH)

   a. Adjust trim pot A so that output decreases to a minimum value and further adjustment produces no change.
   (Output will be approximately 4 mA, 0 volts for HX93V).

   b. If output is not at 4mA, adjust trim pot C, otherwise continue to next step. (Skip this step for HX93V).

   c. Adjust trim pot A until output just starts to increase from 4 mA (0 volts).

3. Place sensor in "HIGH" RH environment (eg. Sodium Chloride solution, 75.3% RH)

   a. Adjust trim pot B until output reading is equivalent to the difference between the "LOW" and "HIGH" RH environments.
   Example: 75.3 RH—11.3% RH = 64%, which is equivalent to 14.24 mA, or .64 volts for the HX93V.
   16 mA (20-4) represents 0 to 100% RH, or 0.16 mA = 1% RH.
   Therefore: 4mA offset + (64% RH x 0.16mA/%) = 14.24mA.
   For the HX93V, there is no offset and scale is 10 mV = 1%RH.

   b. Adjust trim pot A to increase output until it is equivalent to the "HIGH" RH reading (eg. 75.3% RH is 16.05 mA (.753 volts)
   As above, 4mA offset + (75.3 RH X 0.16mA/%) = 16.05 mA

MAINTENANCE

If the HX93 is operated in a dusty environment, the protective sensor filter, if clogged, may be removed for cleaning. Unscrew filter and gently blow compressed air through screen. If necessary, use a soft brush to remove lint from sensors.

If the sensors are subjected to 100% condensation, they must be dried to obtain correct readings. There is no permanent calibration shift, nor is recalibration necessary if 100% condensation occurs.

The instrument should not be exposed to high concentrations of ammonia or alcohol vapors. However, any environment that is breathable under normal HVAC applications should not affect the sensors. To maintain original specifications, it is generally recommended that the RH sensor be recalibrated on an annual basis depending upon operating conditions. The temperature sensor does not require recalibration.

GENERAL DESCRIPTION

The OMEGA® Model HX93 is a relative humidity and temperature transmitter that provides temperature compensated RH output and linearized RH and temperature outputs. A thin film polymer capacitor senses relative humidity, and the temperature sensor is a thin film permalloy RTD. The sensors are protected by a stainless filter that is easily removable for cleaning. The case and entry connectors provide weathertight protection, and screws are provided for mounting the unit via internal holes. An unusually low compliance voltage (6 volts) allows the use of large impedances for longer wire runs.

UNPACKING

Remove the packing list and verify that all equipment has been received. If there are any questions about the shipment, please call OMEGA Customer Service Department at (203) 359-1660.

Upon receipt of the shipment, inspect the container and equipment for any signs of damage. Take particular note of any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

NOTE

The carrier will not honor any claims unless all shipping material is saved for their examination. After examining and removing contents, save packing material and carton in the event reshipment is necessary.

THEORY OF OPERATION

A 4 to 20 milliamp loop is a series current loop in which a transmitter will vary the current flow depending on the input to the transmitter. In the HX93C the amount of current allowed to flow will vary depending on the relative humidity. Some of the advantages of a current output over a voltage output is that it is less susceptible to noise interference and it allows the connection of more than one meter or recorder to the loop as long as the maximum resistance is not exceeded.

The typical current loop will consist of a power supply, a transmitter and a meter to measure the current flow. The loop resistance is the sum of the impedance of the meter(s) and the lead wire. The maximum allowable loop impedance for the HX93C is found by the formula:

R_{max} = (power supply voltage—6 volts)/.02 amps

EXAMPLE: When using a 24 VDC power supply:
R_{max} = (24-6)/.02 = 900 ohms

If the meter or recorder being used accepts only voltage, then the current can be converted to a voltage using a shunt resistor and Ohm's law (voltage = current x resistance). By installing a 250 ohm resistor across the input terminals of the recorder, the input voltage would equal 1-5 volts.

TERMINAL CONNECTIONS
(Refer to Figure 1)

HX93C TERMINAL CONNECTIONS

1 RH Negative
2 RH Positive
3 Temperature Negative
4 Temperature Positive

HX93V TERMINAL CONNECTIONS

1 RH Voltage Output
2 Temperature Voltage Output
3 Negative Power Supply
4 Positive Power Supply

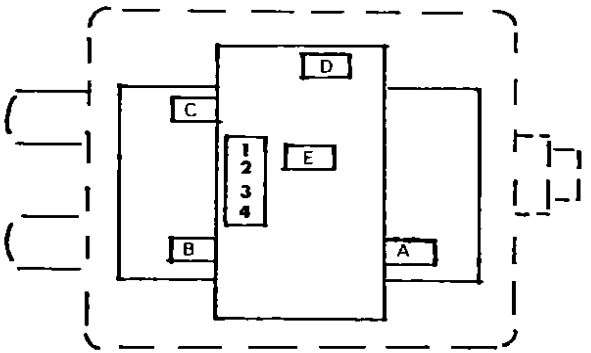

Figure 1. HX93 Terminal Connections/Trim Pot Locations

TRIM POTS

A RH Zero
B RH Full Scale
C RH (factory adjustment only)
D TEMP (factory adjustment only)
E TEMP (factory adjustment only)

WIRING EXAMPLES

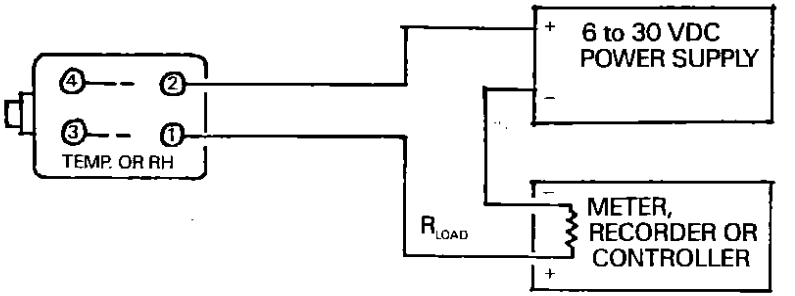

Figure 2. Typical 2-Wire HX93C Hookup
(Use twisted pairs to reduce noise interference)

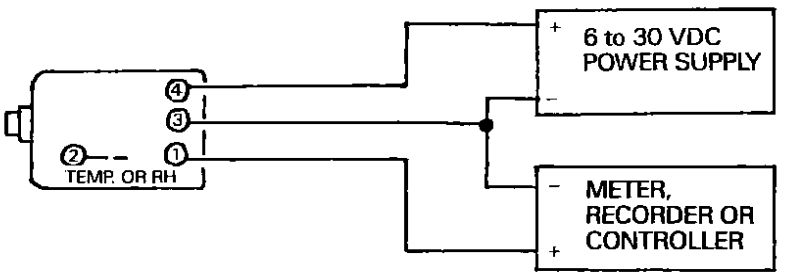

Figure 3. Typical 3-Wire HX93V Hookup

RH/TEMPERATURE CALCULATIONS

To find max. loop impedance:
$R_{max} = (V_{supply} - 6)/.02$

HX93C

To calculate RH by measuring current output in milliamperes (I):
%RH = (I-4)/0.16

To calculate temperature in °C or °F:
°C = (I-4) x (95/16)−20
°F = (I-4) x (171/16)−4

HX93V

To calculate temperature in °C or °F from voltage outputs (V):
°C = (V) x (95)−20
°F = (V) x (171) -4

WARRANTY

OMEGA warrants this unit to be free of defects in materials and workmanship and to give satisfactory service for a period of 13 months from date of purchase. OMEGA 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 our customers receive maximum coverage on each product. If the unit should malfunction, it must be returned to the factory for evaluation. Our 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. However, this WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being 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 which wear or which are damaged by misuse are not warranted. These include contact points, fuses, and triacs.

THESE UNITS ARE INHERENTLY DANGEROUS AND ARE INTENDED TO BE INSTALLED AND USED ONLY BY QUALIFIED PERSONNEL. NO WARRANTY EXTENDED HEREIN WILL APPLY IF SUCH UNIT IS INSTALLED OR USED BY UNQUALIFIED PERSONNEL. THERE ARE NO WARRANTIES EXCEPT AS STATED HEREIN. THERE ARE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND OF FITNESS FOR A PARTICULAR PURPOSE. OMEGA ENGINEERING, INC. IS NOT RESPONSIBLE FOR ANY DAMAGES OR LOSSES CAUSED TO OTHER EQUIPMENT, WHETHER DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL, WHICH THE PURCHASER MAY EXPERIENCE AS A RESULT OF THE INSTALLATION OR USE OF THE PRODUCT. THE BUYER'S SOLE REMEDY FOR ANY BREACH OF THIS AGREEMENT BY OMEGA ENGINEERING, INC. OR ANY BREACH OF ANY WARRANTY BY OMEGA ENGINEERING, INC. SHALL NOT EXCEED THE PURCHASE PRICE PAID BY THE PURCHASER TO OMEGA ENGINEERING, INC FOR THE UNIT OR UNITS OR EQUIPMENT DIRECTLY AFFECTED BY SUCH BREACH.

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Return Requests/Inquiries

Direct all warranty and repair requests/inquiries to OMEGA Customer Service Department, telephone number (203) 359-1660. BEFORE RETURNING ANY INSTRUMENT, PLEASE CONTACT THE OMEGA CUSTOMER SERVICE DEPARTMENT TO OBTAIN AN AUTHORIZED RETURN (AR) NUMBER. The designated AR number should then be marked on the outside of the return package.

To avoid processing delays, also please be sure to include:

1. **Returnee's name, address, and phone number.**
2. **Model and Serial numbers.**
3. **Repair instructions.**

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. That way our customers get the latest in technology and engineering.

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SPECIFICATIONS

A. RELATIVE HUMIDITY

INPUT VOLTAGE RANGE:	6 to 30 VDC (polarity protected)
RH RANGE:	3% RH to 95% RH
ACCURACY:	±2% RH
RH TEMPERATURE COMPENSATION RANGE:	−4°F to +167°F (-20°C to +75°C)
HX93C RH OUTPUT:	4 to 20 mA for 0 to 100% RH
HX93V RH OUTPUT:	0 to 1.0 volt for 0 to 100% RH
RH TIME CONSTANT:	(for 90% response at 25°C; in moving air, 1M/sec) Less than 10 seconds, 10% RH to 90% RH Less than 15 seconds, 90% RH to 10% RH
REPEATABILITY:	±1% RH

B. TEMPERATURE

INPUT VOLTAGE RANGE:	6 to 30 VDC (polarity protected)
TEMPERATURE RANGE:	-4°F to +167°F (-20°C to +75°C)
ACCURACY:	±1°F (±0.6°C)
HX93C TEMPERATURE OUTPUT:	4 to 20 mA for -20°C to +75°C
HX93V TEMPERATURE OUTPUT:	0 to 1.0 volt for -20°C to +75°C
TEMPERATURE TIME CONSTANT:	(for 63.2% response) Less than 9 seconds in moving air (1M/sec); Less than 30 seconds in still air
REPEATABILITY:	±.5°F (±0.3°C)

C. MECHANICAL

HOUSING:	ABS plastic watertight enclosure; meets NEMA 1, 2, 3, 3R, 4, 4X, 5, 12, and 13 specifications.
CONNECTORS:	Liquid-tight nylon with neoprene gland, for .09" to .265" diameter cables. Internal 4-pin terminal block accepts #14-22 AWG wires.
BASIC DIMENSIONS:	3.14" (80mm) x 3.22" (82mm) x 2.16" (55mm)
WEIGHT:	8 oz. (227 grams) max.