RoHS 2 Compliant

User's Guide

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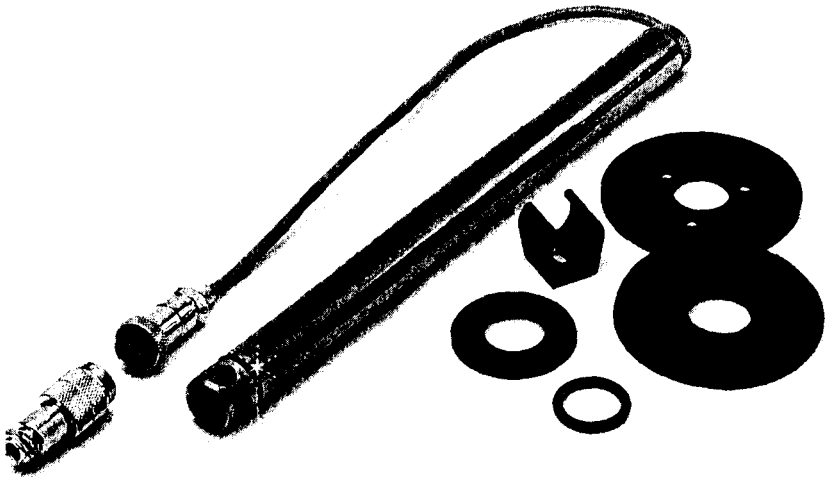

HX94
SS RH Probe

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship 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 OMEGA's customers receive maximum coverage on each product.

If the unit should malfunction, it must be returned to the factory for evaluation. OMEGA's 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. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. 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 are not warranted, including but not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. P.O. number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. P.O. number to cover the COST of the repair,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

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

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HX94

RELATIVE HUMIDITY/TEMPERATURE PROBE TRANSMITTER

A. GENERAL DESCRIPTION

The stainless steel probe provides temperature compensated relative humidity as well as temperature outputs. A thin film polymer capacitor senses relative humidity, while temperature is monitored by a 100 ohm platinum RTD. The sensors are protected by a stainless steel filter cap that is easily removable for cleaning. The sealed probe has an end cap that may be removed for access to calibration trimmers when necessary. Signal and power connections are made via a 4 pin connector at the end of a 12" cable. An adjustable, removable duct flange, allows mounting at any depth between 1 and 9 inches. Also provided is a mating cable connector and a clip for wall mounting.

The current output version of the probe is a true 2-wire transmitter with an unusually low compliance voltage (6 volts), allowing for long wire runs. The voltage version has internal voltage regulation so that any low power source (3.5ma) over a wide voltage range (6 to 30 volts) will operate the unit. Both current and voltage versions are polarity protected.

B. UNPACKING

Verify that the following parts have been received.

1. Probe transmitter
2. 2-piece duct flange, with o-ring, (3) flat head screws, and gasket.
3. 4-pin mating connector
4. Wall mounting clip and screw
5. Instruction manual

C. THEORY OF OPERATION

A 4 to 20 milliamp loop is a series current loop in which a transmitter will vary the current flow depending upon the parameter being measured (Relative Humidity or Temperature). Advantages of a current output over a voltage output is that is less susceptible to noise interference and 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, 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 of the probe is found by the Formula:

Rmax = (power supply voltage−6 volts)/.02 amps

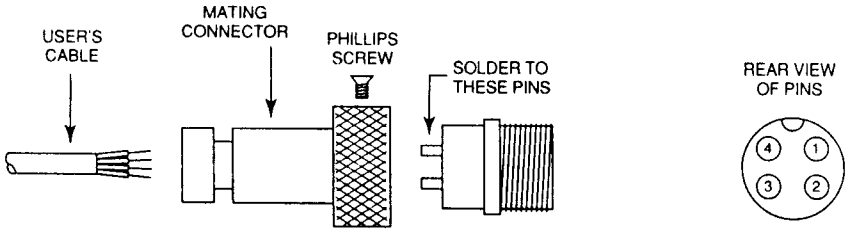
Example: when using a 24 VDC power supply:
Rmax = (24-6) / .02 = 900 ohms (for total wire length to and from the transmitter).

The following chart shows various resistance of lead wire:

AWG WIRE SIZE	RESISTANCE PER 1000 FEET
24	25 ohms
22	15 ohms
20	10 ohms
18	6 ohms
16	4 ohms

If the meter or recorder being used accepts only voltage, than either the voltage version of the probe (0 to 1 volt) should be used, or convert the current to voltage by installing a 250 ohm resistor across the input terminals of the recorder to obtain a 1 to 5 volts input.

D. TERMINAL CONNECTIONS



1. Remove small phillips head screw from mating connector.
2. Pull out pin section from front.
3. Insert cable end thru connector before soldering to solder-cup pins.
4. The terminals will accept No. 26 to 18 AWG wires

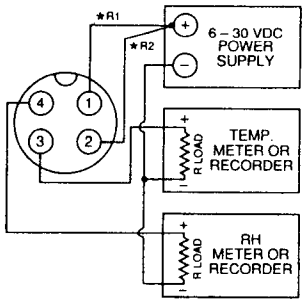
PROBE CABLE WIRE COLOR	CONNECTOR PIN NO.	HX94C CURRENT DESIGNATIONS	HX94V VOLTAGE DESIGNATIONS
BLACK	1	+V TEMPERATURE	+V POWER SUPPLY
WHITE	2	+V RH	–V GROUND
RED	3	–V TEMPERATURE	VT TEMP. OUTPUT
GREEN	4	–V RH	VRH RH OUTPUT

E. WIRING EXAMPLES

1. TYPICAL CURRENT HOOKUP

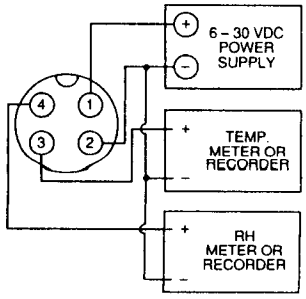
* Wires R1 and R2 can be combined into one single wire with a jumper at pins (1) and (2). This will mean 3 wires instead of 4.

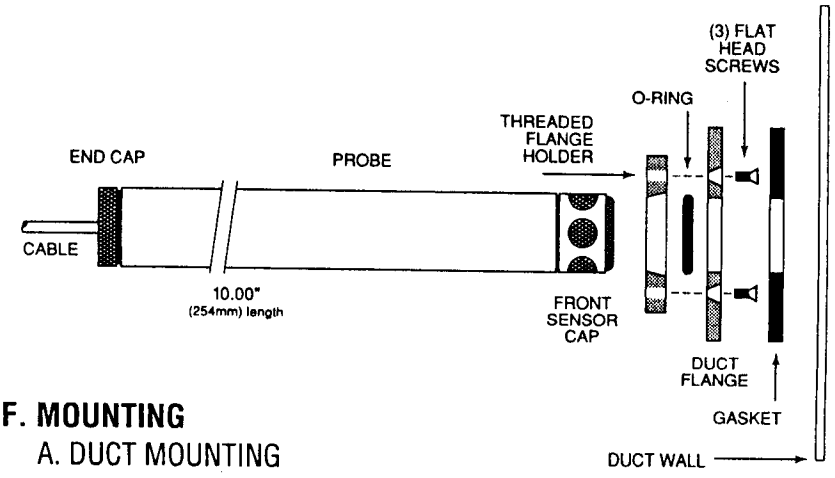
HX94C



2. TYPICAL VOLTAGE HOOKUP

HX94V





F. MOUNTING

A. DUCT MOUNTING

STEPS

1. Slide flange holder onto probe with countersink hole facing front of probe as shown.
2. Position o-ring on probe at desired position. (for depth into duct).
3. Slide duct flange onto probe with countersink of screw holes facing front of probe as shown.
4. Fasten with (3) 6/32 flat head screws and tighten evenly until secure.
5. Position gasket between duct flange and duct wall and fasten assembly to duct with (4) #6 sheet metal screws (not included).

   The duct wall requires a 13/16"d. (.812" or 21mm) hole for probe, with (4) mounting holes (for #6 sheet metal screws) evenly spaced on a 2.0" (51mm) circle. Use duct flange as template.

B. WALL MOUNTING

1. Fasten plastic clip to wall with included screw.
2. Snap probe into clip.

G. RH AND TEMPERATURE CALCULATIONS

1. Max current loop impedance for RH or Temperature

   Rmax = (V supply – 6 volts) / .02 amps

2. RH current output: (i = current output in milliamperes)

   %RH = (i – 4)/.16 ^{i}RH = (%RH) x (.16) + 4

3. Temperature current output

   °C = (i – 4) x (100/16) ^{i}C = (°C) x (16/100) + 4

   °F = (i – 4) x (180/16) + 32 ^{i}F = (°F – 32) x (16/180) + 4

4. RH voltage output: (V = voltage outage in millivolts)

   %RH = V/10 ^{v}RH = (%RH) x (10)

5. Temperature voltage output

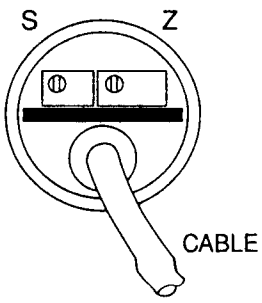
   °C = V/ 10 ^{v}C = (°C) x (10)

   °F = (V/10) x (1.8) + 32 ^{v}F = (°F – 32) x (10/1.8)

H. RH CALIBRATION

1. Unscrewing cable endcap will expose two trimpots, S (SPAN) on the left, and Z (ZERO) on the right.

2. Place sensor end of probe in "low" RH environment (e.g. Lithium chloride solution, 11.3%RH)



3. Adjust trimpot Z so that output decreases to a minimum value and further adjustment produces no change. Output will be approximately 4ma for current version, (0 volts for voltage version).

4. Adjust trimpot Z until output just starts to increase from 4ma (0 volts)

5. Place sensor end of probe in "high" RH environment (e.g. Sodium Chloride solution, 75.3%RH).

6. Adjust trimpot S until output reading is equivalent to the difference between the "low" and "high" RH environments. Example: 75.3% RH−11.3%RH = 64%RH, which is equivalent to 14.24 milliamperes (640 millivolts for voltage version).
(See calculation section formulas.)

7. Adjust trimpot Z until output reading is equivalent to the "high" RH environment (e.g. 75.3%RH is 16.05 milliamperes (753 millivolts) as determined by formulas).

I. TEMPERATURE CALIBRATION

Temperature is factory calibrated only, and does not require any further calibrations.

J. MAINTENANCE

If the probe 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.

K. SPECIFICATIONS

1. RELATIVE HUMIDITY: Thin film polymer capacitor
   INPUT VOLTAGE RANGE: 6 to 30VDC (Polarity protected)
   RANGE/ACCURACY/REPEATABILITY: 3%RH to 95%RH/
   ±2%RH/±1%RH
   TEMPERATURE COMPENSATION: –20°C to 85°C
   CURRENT OUTPUT: 4 to 20ma for 0 to 100%RH
   VOLTAGE OUTPUT: 0 to 1.0 volt for 0 to 100%RH
   TIME CONSTANT: (for 90% responses at 25°C; in moving air, IM/sec)
   Less than 20 seconds, 10%RH to 90%RH
   Less than 30 seconds, 90%RH to 10%RH

2. TEMPERATURE: Thin film 100 ohm platinum RTD (DIN 43760)
   INPUT VOLTAGE RANGE: 6 to 30 VDC (polarity protected).
   RANGE: 0°C TO 100°C (32°F TO 212°F)
   ACCURACY/REPEATABILITY: ±0.6°C (±1°F)/±0.3°C (±0.5°F)
   CURRENT OUTPUT: 4 to 20ma for 0°C to 100°C
   VOLTAGE OUTPUT: 0 to 1.0 volt for 0°C to 100°C
   TIME CONSTANT: (for 60% response) less than 2 seconds in
   moving air (1M/sec); less than 10 seconds in
   still air.

3. MECHANICAL
   HOUSING: Stainless steel water tight enclosure meets
   NEMA 4 specifications.
   DIMENSIONS: PROBE; 10.00" (254mm long), .75" (19mm) diameter,
   12" cable. DUCT FLANGE; variable 1" to 9" (25.4 to
   227mm) depth. 2.75" (70mm) diameter, duct hole .812"
   (21mm) diameter, with 4 mounting holes .156" (4mm)
   diameter (for #6 sheet metal screws) on 2.00" (51mm)
   circle.
   CONNECTIONS: 4 pin mating connector accepts 26 to
   18 AWG wires.
   WEIGHT: 7 ounces (198 grams) with duct flange.

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