

**1 YEAR**  
WARRANTY

# **Ω OMEGA™** **User's Guide**



**HX71-NB  
MODEL**

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**HX71 MODEL**

## **HX71 SERIES RH Probe/Transmitter**



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## 1. General Description

The OMEGA® HX71 Series Relative Humidity Transmitter's provide a linearized and temperature compensated output signal of 4 to 20 mA, 0 to 1 Vdc or 0 to 5 Vdc depending upon the model selected. The output signal has been calibrated and scaled 0 to 100% for Relative Humidity. A thin film polymer capacitor senses relative humidity and is protected by a stainless steel cap that is easily removed for cleaning. The Nema-4 stainless steel enclosure and cable entry connection provides weathertight protection.

## 2. Unpacking

Remove the packing list and verify that you have received all your equipment. If you have any questions about the shipment, please call our Customer Service Department at:

1-800-622-2378 or 203-359-1660. On the web you can find us at:  
[omega.com](http://omega.com) e-mail: [cservice@omega.com](mailto:cservice@omega.com)

When you receive the shipment, inspect the container and equipment for any signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

### NOTE

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

The following items are supplied in the box with your HX71 transmitter.

- This Manual, # M-4543 (1 ea.)
- Dewpoint Card (1 ea.)

### Recommended Power Supply

For HX71-MA and HX71-MA-NB, Omega Model PST-10  
For HX71-V1, HX71-V2, HX71-V1-NB and HX71-V2-NB: Omega Model FPW-15

### Complimentary Instruments

iSeries® Panel Meters and Controllers

### Recommended Accessories

Duct/Wall Mounting Kit, OMEGA® Part No.: IND-KIT (For HX71-MA, HX71-V1, HX71-V2)

Transmitter Cable, OMEGA® Part No.: TX4-100 (100 ft)

RH Calibration Kit, OMEGA® Part No.: HX92-CAL

### 3. Theory of Operation

A 4-20 mA loop is a series loop in which a transmitter will vary the current flow depending on the input to the transmitter. In the HX71 Series the amount of current allowed to flow in the loop will vary depending on the relative humidity or temperature being measured by the sensor(s). Some advantages of a current output over a voltage output is that the signal measured is less susceptible to electrical noise interference and the loop can support more than one measuring instrument as long as the maximum loop resistance is not exceeded.

A typical application utilizing a current loop will normally consist of a power supply, the transmitter and a meter, recorder or controller to measure the current flow. The loop resistance in the sum of the measuring instruments and wire used. The maximum allowable loop resistance for the HX71 to function properly is found by using the following formula:

$$R_{\max} = (\text{power supply voltage} - 8 \text{ volts}) \div 0.02 \text{ amps}$$

**EXAMPLE: (When using a 10 Vdc power supply).**

$$R_{\max} = (10 - 8) \div 0.02 \text{ amps} = 800 \text{ ohms max loop resistance}$$

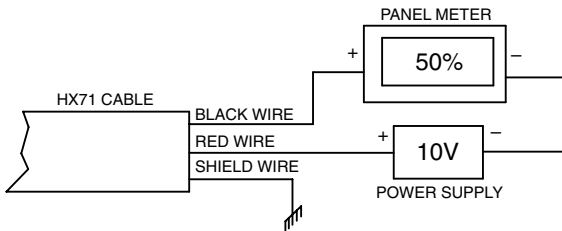


Figure 1 - Basic Transmitter Set-up With Current Loop Output

## 4. Installation and Mounting

### NOTE

Your HX71 Series RH Probe/Transmitter needs to be installed in applications that allow for well circulated air flow to meet the published specifications outlined here in this manual in Section 10.

OMEGA's HX71 transmitter's are designed for either wall or duct mounting. A wall/duct mounting kit is available, OMEGA® Part No.:HX90DM-KIT.

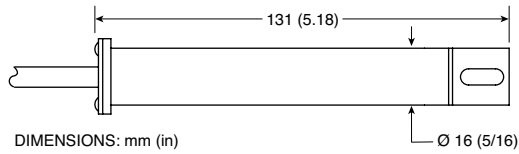


Figure 1-3. - RH-USB Dimensions

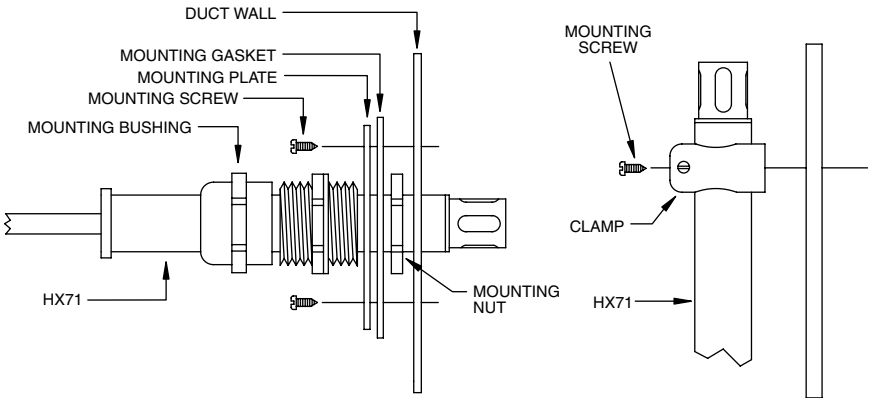


Figure 3 - HX71 Mounting

# 4

## Installation and Mounting

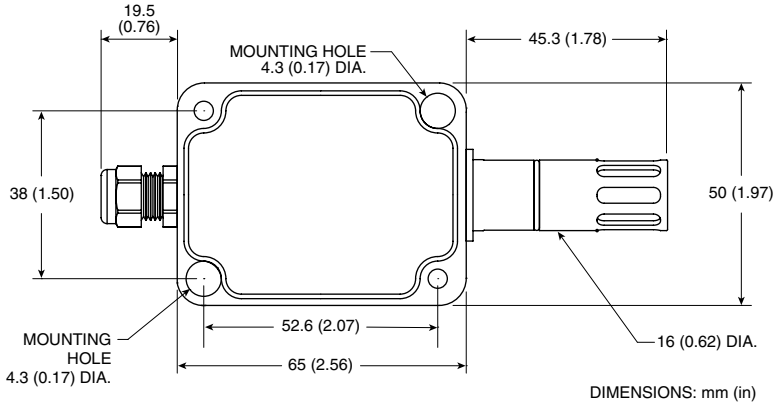


Figure 4 - HX71-NB Dimensions and Mounting



### 5. Electrical Connections

#### CAUTION

All electrical connections and wiring should be performed by a suitably trained professional only.

**Model: HX71-MA, HX71-MA-NB**

**(2-Wire Current Output)**

Red Wire: + Power Supply

Black Wire: 4-20 mA Output

Bare Wire: Shield, Earth Ground

**Model: HX71-V1, HX71-V2, HX71-V1-NB, HX71-V2-NB**

**(3-Wire Voltage Output)**

Red Wire: + Power Supply

Black Wire: - Power/-Output

Wire: + Output

White Bare Wire: Shield, Earth Ground

#### CAUTION

Your HX71 Series RH Probe/Transmitter has not been designed for, nor is it recommended for, use in medical or nuclear applications.

Your HX71 Series RH Probe/Transmitter should never be installed in or anywhere near explosive or flammable materials.

## 6. Wiring Examples

Current output model HX71-MA, HX71-MA-NB (4 to 20 mA)

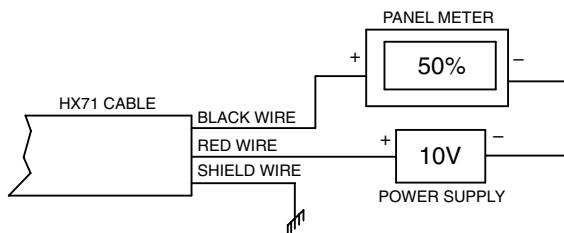


Figure 5 - Current Transmitter Wiring Example

Voltage output models HX71-V1, HX71-V2, HX71-V1-NB, HX71-V2-NB (0 to 1 Vdc or 0 to 5 Vdc)

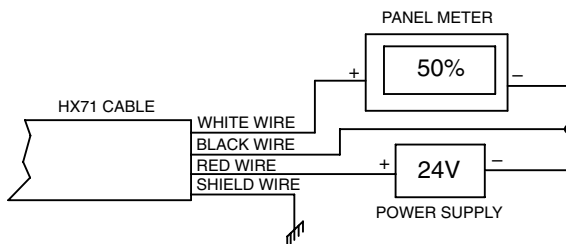


Figure 6 - Voltage Transmitter Wiring Example

## 7. Relative Humidity Output Calculations

To calculate % Relative Humidity by measuring the current or voltage output use the following formulas.

**For 4-20 mA output:**

$$\% \text{ RH} = (\text{Current measured in milliamps} - 4) \div 0.16$$

**EXAMPLE:**  $(11.04 \text{ mA} - 4) \div 0.16 = 44\% \text{ RH}$

**For 0 to 1 Vdc output:**

$$\% \text{ RH} = (\text{Voltage measured in volts} \times 100)$$

**EXAMPLE:**  $0.44 \text{ Vdc} \times 100 = 44\% \text{ RH}$

**8. RH Measured Vs Output Reading Table**

| % Relative Humidity | Output  |               |
|---------------------|---------|---------------|
|                     | 4-20 mA | 0-1 (0-5) Vdc |
| 5                   | 4.8     | 0.05 (.25)    |
| 10                  | 5.6     | 0.10 (.50)    |
| 15                  | 6.4     | 0.15 (.75)    |
| 20                  | 7.2     | 0.20 (1.00)   |
| 25                  | 8.0     | 0.25 (1.25)   |
| 30                  | 8.8     | 0.30 (1.50)   |
| 35                  | 9.6     | 0.35 (1.75)   |
| 40                  | 10.4    | 0.40 (2.00)   |
| 45                  | 11.2    | 0.45 (2.25)   |
| 50                  | 12.0    | 0.50 (2.50)   |
| 55                  | 12.8    | 0.55 (2.75)   |
| 60                  | 13.6    | 0.60 (3.00)   |
| 65                  | 14.4    | 0.65 (3.25)   |
| 70                  | 15.2    | 0.70 (3.50)   |
| 75                  | 16.0    | 0.75 (3.75)   |
| 80                  | 16.8    | 0.80 (4.00)   |
| 85                  | 17.6    | 0.85 (4.25)   |
| 90                  | 18.4    | 0.90 (4.50)   |
| 95                  | 19.2    | 0.95 (4.75)   |

## **9. Calibration and Maintenance**

### **Calibration**

Your transmitter has been factory calibrated to meet or exceed the specifications outlined in this manual. The economical design of the HX71 Series does not allow for field adjustment. Contact our Customer Service Department if you believe your unit is not functioning correctly.

### **Maintenance**

If your Humidity transmitter will be used in a dusty environment, the protective sensor cover may be removed for cleaning. Unscrew the protective cover and gently blow compressed air through the cap. A soft brush may also be used to remove dirt particles.

If the sensor is subjected to 100% condensation, it must be dried to obtain correct readings. There will be no permanent damage or calibration shift to the unit.

Units should not be exposed to high concentrations of ammonia or alcohol vapors.

## 10. Specifications

### Relative Humidity

|                  |   |
|------------------|---|
| Measuring Range: | 5 - 95% (non-condensing)  |
| Accuracy:*       | ±4%RH @ 22°C (72°F) from 15 to 85% RH;<br>±4.5%RH @ 22°C (72°F) below 15 and above 85% RH |

#### \* EMC (Electro Magnetic Compatibility)

Some of these devices may be subject to an additional reading error of up to 2% by RFI (Radio Frequency Interference) when subjected to a field strength of 3V/m between 625MHz and 725MHz.

|                |         |
|----------------|---------|
| Repeatability: | ± 1% RH |
|----------------|---------|

|                              |                            |
|------------------------------|----------------------------|
| Operating Temperature Range: | -25 to 85°C (-13 to 185°F) |
|------------------------------|----------------------------|

#### Output

|                               |                                      |
|-------------------------------|--------------------------------------|
| Model HX71-MA,<br>HX71-MA-NB: | 4 to 20 mA (Scaled for 0 to 100% RH) |
| Model HX71-V1,<br>HX71-V1-NB: | 0 to 5 Vdc (Scaled for 0 to 100% RH) |
| Model HX71-V2,<br>HX71-V2-NB: | 0 to 1 Vdc (Scaled for 0 to 100% RH) |

#### Power

|   |                   |
|---|-------------------|
| Model HX71-MA,<br>HX71-MA-NB:                     | 8 – 12 Vdc @ 20mA |
| Model HX71-V1, HX71-V2<br>HX71-V1-NB, HX71-V2-NB: | 8 – 24 Vdc @ 20mA |

|                      |                                |
|----------------------|--------------------------------|
| Max Loop Resistance: | Ohms = (V supply – 8 V)/0.02 A |
|----------------------|--------------------------------|

|              |                             |
|--------------|-----------------------------|
| Sensor Type: | Thin Film Polymer Capacitor |
|--------------|-----------------------------|

#### Enclosure Housing

|                    |                             |
|--------------------|-----------------------------|
| Tube Version:      | 316 Stainless Steel, NEMA 4 |
| Enclosure Version: | Polycarbonate, NEMA 4       |

|                         |   |
|-------------------------|---|
| Electrical Connections: | 2 m (6') 4-conductor shielded PVC cable with stripped wire leads. |
|-------------------------|---|

|             |                        |
|-------------|------------------------|
| Dimensions: | See "Mounting" Section |
|-------------|------------------------|

|         |              |
|---------|--------------|
| Weight: | 200 g (7 oz) |
|---------|--------------|

|            |           |
|------------|-----------|
| Approvals: | CE Marked |
|------------|-----------|

**NOTES:**

**HX71 SERIES  
RH Probe/Transmitter**

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**NOTES:**

## 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's 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 malfunctions, 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 having been 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 in which wear is not warranted, include but are 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 the company 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. Purchase Order 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. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the 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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