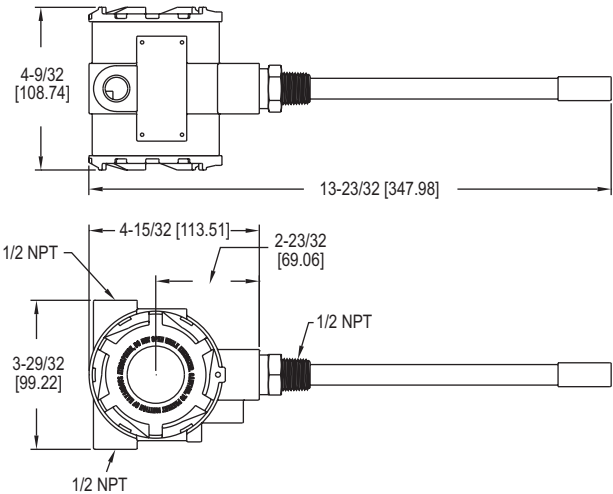




# Series HHT Hazardous Area Humidity/Temperature Transmitter

## Specifications - Installation and Operating Instructions



The Series HHT Hazardous Area Humidity/Temperature Transmitter takes accurate measurements in the harshest of environments. The transmitter is offered in explosion-proof and intrinsically-safe versions depending on the applications requirements. The explosion-proof model is offered with 4 to 20 mA outputs for humidity only. The intrinsically-safe version is offered with 4 to 20 mA output for humidity and temperature. Both versions have an optional two line alphanumeric display to show the current humidity and temperature.

The Series HHT humidity/temperature transmitter is excellent for offshore HVAC applications, dust and grain applications.

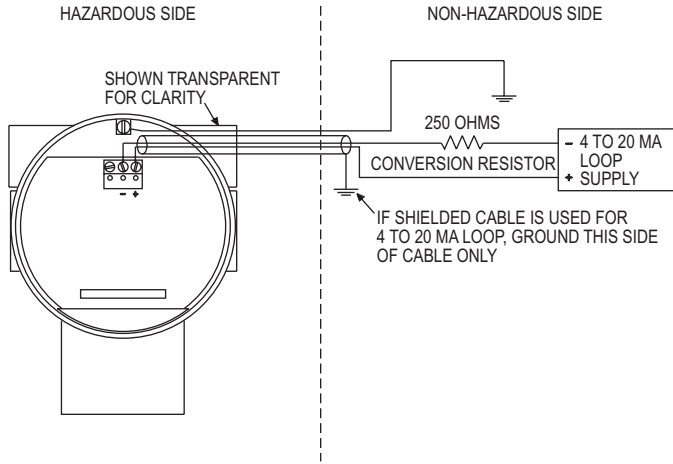
MODEL CHART			
Model	Protection	Description	Display
HHT-EU	Explosion-Proof	Humidity	No
HHT-IU	Intrinsically Safe	Humidity	No
HHT-IT	Intrinsically Safe	Humidity/Temperature	No
HHT-EU-LCD	Explosion-Proof	Humidity	Yes
HHT-IT-LCD	Intrinsically Safe	Humidity/Temperature	Yes

SPECIFICATIONS
<b>Relative Humidity Range:</b> 0 to 100% RH.
<b>Temperature Range:</b> -40 to 140°F (-40 to 60°C).
<b>Accuracy:</b> ±2% 10-90% RH, ±0.9°F at 72°F (±0.3°C at 25°C).
<b>Hysteresis:</b> ±1%.
<b>Repeatability:</b> ±0.1% typical.
<b>Temperature Limits:</b> -40 to 140°F (-40 to 60°C).
<b>Storage Temperature:</b> -40 to 176°F (-40 to 80°C).
<b>Compensated Temperature:</b> -40 to 140°F (-40 to 60°C).
<b>Power Requirements:</b> For intrinsically safe models HHT-IX, 9.5 to 28 VDC. For explosion-proof models HHT-EX, 16.5 to 28 VDC.
<b>Output Signal:</b> 4 to 20 mA, 2 channels for humidity/temperature models (loop power on RH).
<b>Response Time:</b> 15 s.
<b>Electrical Connections:</b> Screw terminal block.
<b>Conduit Connection:</b> 1/2 female NPT.
<b>Drift:</b> <1% RH/year.
<b>RH Sensor:</b> Capacitance polymer.
<b>Temperature Sensor:</b> Solid state band gap.
<b>Housing Material:</b> Aluminum.
<b>Display:</b> Optional 2 line alpha numeric, 8 characters/line. Temperature display is °F/°C selectable.
<b>Display Resolution:</b> RH: 0.1%: Temperature 0.1°F (0.1°C).
<b>Weight:</b> 2 lb 8 oz (1134 g).
<b>Agency Approvals:</b> FM Approved to: XP-IS / I / 1 / BCD / T5 Ta = -40°C to 60°C, DIP / II, III / T5 Ta = -40°C to 60°C; TYPE 4X, IP66; IS / I, II, III / 1 / ABCDEFG / T4 Ta = -40°C to 60°C - 01-001467-00; ENTITY; TYPE 4X, IP 66; I / 0 / AEx ia / IIC / T4 Ta = -40°C to 60°C - 01-001467-00; ENTITY; TYPE 4X, IP 66, CE.

**Wiring Diagram – Humidity Only**

**Explosion Proof Installation Notes:**

1. Install in accordance with any applicable national electric code.
2. Plug unused conduit openings. Plug must engage a minimum of 5 threads.
3. Use conduit seal within 18 inches of conduit entry.
4. Disconnect power before servicing.
5. Control equipment voltage on hazardous side is 250 Vrms/DC maximum.
6. Do not substitute any components. The intrinsic safety of the sensor may be compromised.
7. Shielded cable for 4 to 20 mA loop is necessary to meet CE requirements or when used in electrically noisy environments.



**Figure 1**

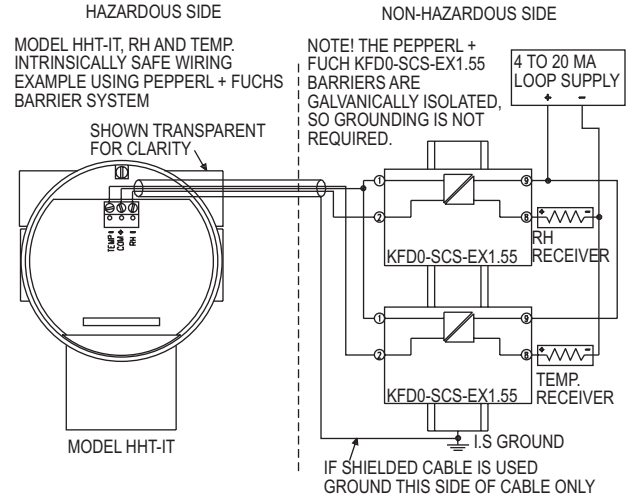
**Entity Parameters:**

V<sub>max</sub> = 28 VDC  
 I<sub>max</sub> = 100 mA  
 C<sub>i</sub> = 62 nF  
 L<sub>i</sub> = 7.7 μH  
 P<sub>i</sub> = 651 mW

**Wiring Diagram – Humidity and Temperature**

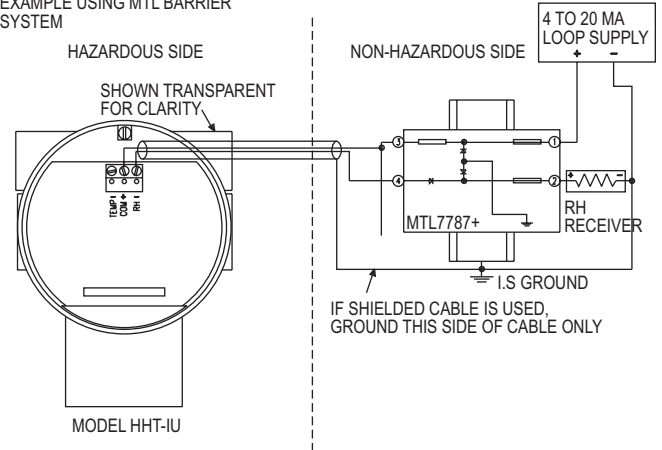
**Intrinsically Safe Installation Notes:**

1. Remove power from the instrument before carrying out any servicing.
2. Use only FM approved Associated Apparatus. When installing the Associated Apparatus, the manufacturer's instructions must be followed.
3. The earth terminal on the housing must be wired to a local earth ground in the hazardous area.
4. Refer to FM control drawing, Dwyer number 03-001467-00.
5. For Model HHT-IT, use ONLY Pepperl + Fuchs KFD0-SCS-EX1.55 Galvanically Isolated Barriers.



**Figure 2**

**MODEL HHT-IU, RH ONLY  
 INTRINSICALLY SAFE WIRING  
 EXAMPLE USING MTL BARRIER  
 SYSTEM**



**Figure 3**

### Power Supply Requirements:

The maximum DC Power Supply is 28 VDC. The minimum required DC Power Supply required is based upon the following:

1. Minimum DC voltage requirement of the Model HHT.
2. Total load resistance.
3. Total leadwire resistance.
4. Zener barrier voltage drop ( Model HHT-IX only).

The formula for calculating the DC Power Supply is:

$$VDC = VHHT + VLOAD + VLEADWIRE + VBARRIER$$

Where VHHT = 9.5 V for Models HHT-IX and 16.5 V for Models HHT-EX.

$$VLOAD = \text{Total load resistance} \times 20 \text{ mA}$$

$$VLEADWIRE = \text{Total leadwire resistance} \times 20 \text{ mA}$$

$$VBARRIER = 8.1 \text{ V}$$

(Typical zener barrier voltage drop for this application)

### Example 1. Calculate minimum DC Power Supply for Model HHT-EX (Explosion Proof)

Step 1. VHHT = Minimum voltage required by Model HHT-EX = 16.5 V

Step 2. Calculate VLOAD. Using the industry standard 250 OHM conversion resistor,  
 $VLOAD = 250 \times 20 \text{ mA} = 5 \text{ V}$ .

Step 3. Calculate VLEADWIRE. For this example assume a leadwire resistance of 10 OHMS.  $VLEADWIRE = 10 \times 20 \text{ mA} = 0.2 \text{ V}$

Step 4.  $VDC = VHHT + VLOAD + VLEADWIRE = 16.5 + 5 + 0.2 = 21.2 \text{ V}$

### Example 2. Calculate minimum DC Power Supply for Model HHT-IU (Intrinsically Safe)

Step 1. VHHT = Minimum voltage required by Model HHT-IX = 9.5 V

Step 2. Calculate VLOAD. Using the industry standard 250 OHM conversion resistor,  
 $VLOAD = 250 \times 20 \text{ mA} = 5 \text{ V}$ .

Step 3. Calculate VLEADWIRE. For this example assume a leadwire resistance of 10 OHMS.  $VLEADWIRE = 10 \times 20 \text{ mA} = 0.2 \text{ V}$

Step 4.  $VBARRIER = 8.1 \text{ V}$

Step 5.  $VDC = VHHT + VLOAD + VLEADWIRE + VBARRIER = 9.5 + 5 + 0.2 + 8.1 = 22.8 \text{ V}$

For Model HHT-IT, follow instructions with Pepperl + Fuchs KFDØ-SCS-Ex1.55 Barrier.

### INSTALLATION

**Location:** Select a location where the ambient temperature is between -40 to +140°F (-40 to +60°C)

**Position:** The transmitter is not position sensitive. Units with the optional display should be mounted for ease of viewing the display.

**Caution:** Use electrostatic discharge precautions (e.g. use of wrist straps) during installation and wiring to prevent equipment damage.

Avoid locations where severe shock or vibration, excessive moisture or corrosive fumes are present.

Do not exceed ratings of this device. Permanent damage not covered by the warranty may result.

**Display:** The temperature indicated on the display, if equipped with the LCD option, is field selectable via a jumper located on the circuit board just above the display. To change the jumper position, remove the housing cover and position the jumper for °F or °C according to Figure 4.

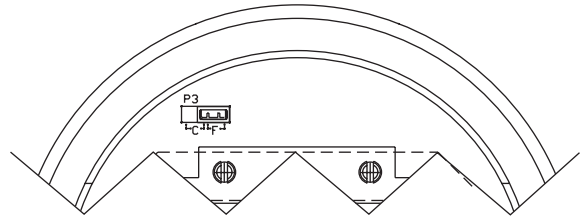


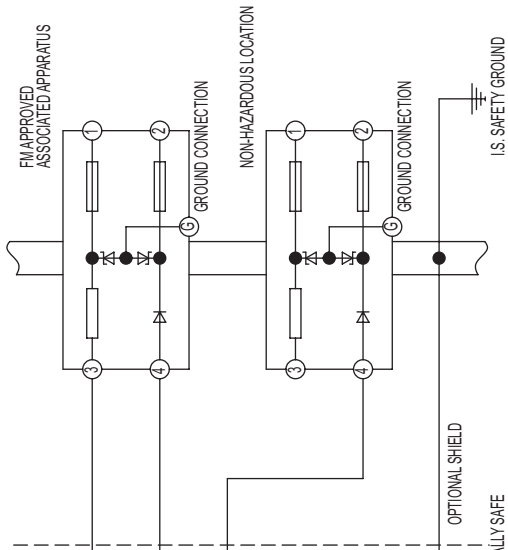
Figure 4

### MAINTENANCE

Upon final installation of the Series HHT Hazardous Area Humidity / Temperature Transmitter, a periodic check of system calibration is recommended. The Series HHT is not field serviceable and should be returned if repair is needed (field repair should not be attempted and may void warranty). Be sure to include a brief description of the problem plus any relevant application notes. Contact customer service to receive a return goods authorization number before shipping.

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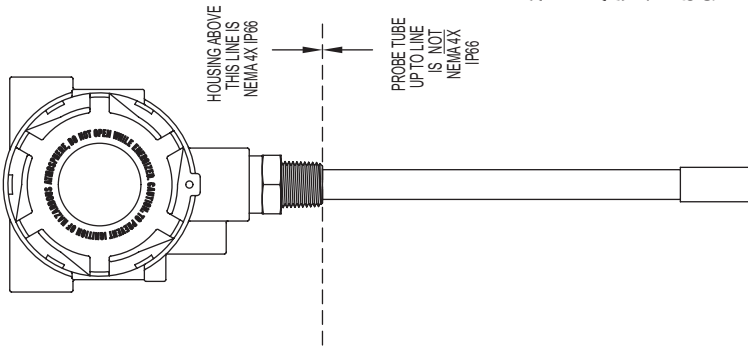


CATALOG NUMBERS:  
HHT-JU AND HHT-TT

HHT SERIES  
TRANSMITTER

$V_{max} = 28VDC$   
 $I_{max} = 100mA$   
 $C_t = 620PF$   
 $L_t = 77mH$   
 $P_t = 66mW$

HAZARDOUS (CLASSIFIED) LOCATION  
INTRINSICALLY SAFE FOR:  
CLASS I DIV. 1 GROUPS A, B, C, D  
CLASS II DIV. 1 GROUPS E, F, G  
CLASS III DIV. 1  
T4 TB = -40°C TO 60°C TYPE 4X, IP 66  
OR  
CLASS I, ZONE 0, GROUPS IC  
T4 TB = -40°C TO 60°C TYPE 4X, IP 66



1. THE INTRINSIC SAFETY ENTITY CONCEPT ALLOWS THE INTERCONNECTION OF TWO FM APPROVED INTRINSICALLY SAFE DEVICES WITH ENTITY PARAMETERS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM WHEN:
  - 1. THE DEVICES ARE OF THE SAME TYPE, CLASS, OR GROUP.
  - 2. THE DEVICES ARE OF THE SAME TYPE, CLASS, OR GROUP AND ARE OF THE SAME MANUFACTURER.
2. EQUIPMENT CONNECTED TO THE ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms OR VDC.
3. DIVISION I HAZARDOUS (CLASSIFIED) LOCATIONS INSTALLATIONS MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) ARTICLE 504. ZONE 0 HAZARDOUS LOCATIONS MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC) ARTICLE 505. ALL INSTALLATIONS MUST BE IN ACCORDANCE WITH ISARP-12.6.
4. NO REVISIONS WITHOUT PRIOR APPROVAL FROM FM RESEARCH.
5. THE ASSOCIATED APPARATUS MANUFACTURERS INSTALLATION INSTRUCTIONS MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.
6. DUST TIGHT CONDUIT SEAL MUST BE USED IN CLASS II AND CLASS III ENVIRONMENTS.
7. WARNING - ENCLOSURE PARTS ARE CONSTRUCTED OF ALUMINUM. ENCLOSURE MUST BE PROTECTED FROM MECHANICAL FRICTION AND IMPACT WITH IRON/STEEL TO PREVENT IGNITION CAPABLE SPARKS.
8. SUBSTITUTION OF PARTS MAY IMPAIR INTRINSIC SAFETY. RETURN TO MANUFACTURER FOR ANY REPAIRS.
9. ADDITIONAL SUFFIX LCD (LCD DISPLAY) DOES NOT IMPAIR INTRINSIC SAFETY.

FM CONTROL DRAWING

Ⓜ = CRITICAL DIMENSION  
STANDARD TOLERANCES UNLESS NOTED:  
DIMENSIONS IN MILLIMETERS ± .050  
ALL ANGLES ± 1°

SCALE 1:2

DATE		08-25-08	
DRAWN BY		R/S	
CHKD		CAT	
BY DATE		R/A 6/24	
LRR		APFD	
CHANGES		BY DATE	
1		UPDATED PER DWG 6-13-11 ECR 15460	
NO.		ACAD002	
NAME		FM CONTROL DRAWING HHT-JU AND HHT-TT	
MATERIAL		FINISH	
FR. NO.		03-001467-00	
DWYER INSTRUMENTS, INC.		MICHIGAN CITY, INDIANA 46360 U.S.A.	

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