

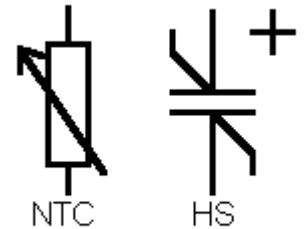
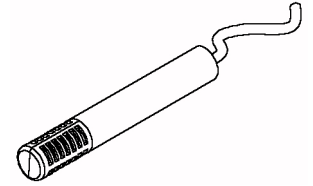
## RELATIVE HUMIDITY/ TEMPERATURE MODULE

HTM2500

Based on the rugged HTS2010 humidity / temperature sensor , HTM2500 is a dedicated humidity and temperature transducer designed for OEM applications where a reliable and accurate measurement is needed. Direct interface with a micro-controller is made possible with the module's humidity linear voltage output.

## MAIN FEATURES

- Small size
- Not affected by water immersion
- Full interchangeability
- High reliability and long term stability
- Typical 1 to 4 Volt DC output for 0 to 100% RH at 5 V DC supply
- Humidity calibrated within +/- 2% RH @ 55% RH
- Temperature measurement through NTC 10kohm +/- 3% direct output
- Ratiometric to voltage supply
- Suitable for 3 to 10 Volts supply voltage



## HUMIDITY SENSOR SPECIFIC FEATURES

- Instantaneous de-saturation after long periods in saturation phase.
- Patented solid polymer structure.
- High resistance to chemicals.
- Fast response time.

## MAXIMUM RATINGS

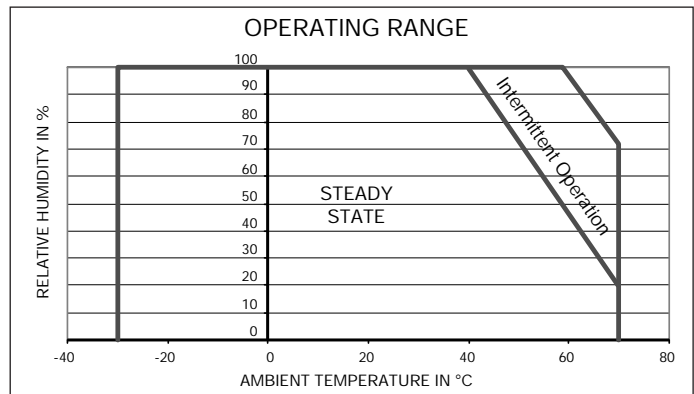
Ratings	Symbol	Value	Unit
Storage Temperature	Tstg	-40 to 85	°C
Supply Voltage (peak)	Vs	12	Vdc
Humidity Operating Range	RH	0 to 100	% RH
Temperature Operating Range	Ta	-30 to 70	°C

Peak conditions: less than 10% of the operational time.

## CHARACTERISTICS

(Ta = 23°C, Vs = 5Vdc, RL > 1MΩ otherwise stated)

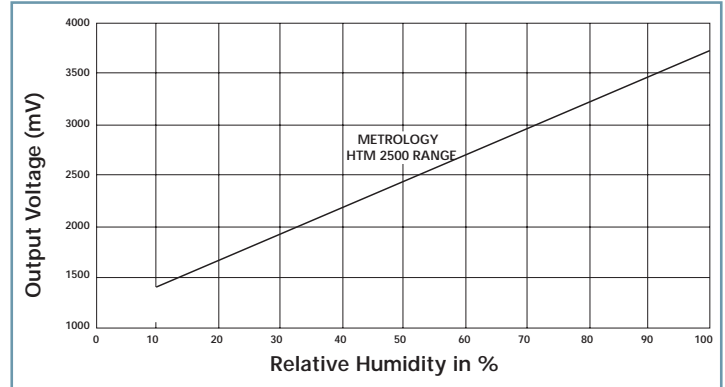
Characteristics	Symbol	Min	Typ	Max	Unit
Humidity measuring range	RH	1		99	% RH
Relative Humidity accuracy (10 to 95% RH)	RH		+/-3	+/- 5	% RH
Voltage supply	Vs	4.75	5.00	5.25	V
Nominal output @ RH = 55%	Vout	2.42	2.48	2.54	V
Current consumption	Ic		0.4	0.8	mA
Temperature coefficient (10 to 50 °C)	Tcc		+ 0.1		% RH/°C
Averaged Sensitivity from 33% to 75% RH	ΔmV/% RH		+25		mV/% RH
Sink current capability (RL = 15 kΩ)	Is			300	μA
Recovery time after 150 hours of condensation	t		10		s
Humidity Hysteresis			+/-1.5		% RH
Long term stability			0.5		%RH/yr
Response time (33 to 76% RH, static, @ 63%)	τ		5		s
Output impedance	Z		70		Ω



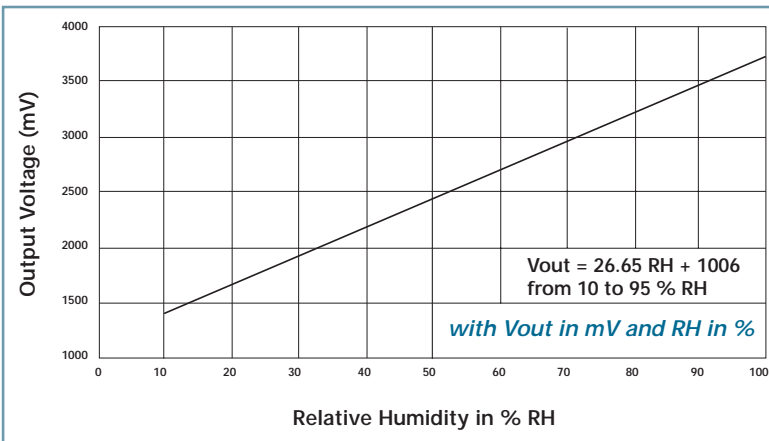
## MEASUREMENT CONDITIONS

- HTM2500 is specified for accurate measurements within 10 to 95% RH.
- Excursion out of this range (< 10% or > 95% RH, including condensation) does not affect the reliability of HTM2500 characteristics.

HTM 2500 Typical Measuring Ranges in Humidity



## HTM2500 MODELLED LINEAR VOLTAGE OUTPUT (Vs = 5V)



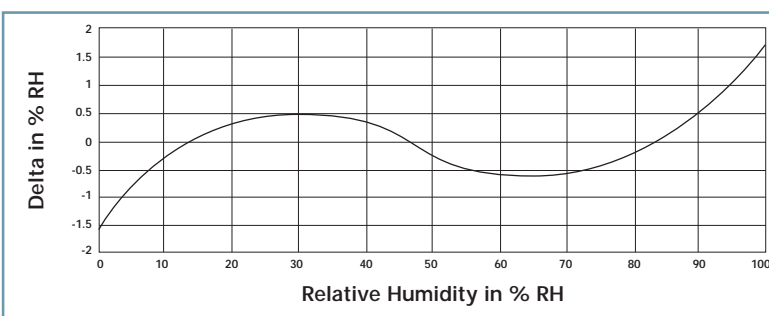
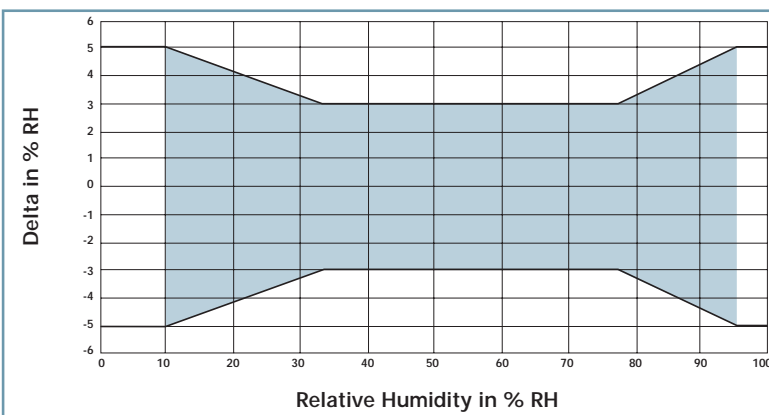
REFERENCE OUTPUT VALUES

RH (%)	V <sub>out</sub> (mV)	RH (%)	V <sub>out</sub> (mV)
10	1235	55	2480
15	1390	60	2605
20	1540	65	2730
25	1685	70	2860
30	1825	75	2990
35	1960	80	3125
40	2090	85	3260
45	2220	90	3405
50	2350	95	3555

### Reversed Polynomial Equation

$$V_{out} = 1.05E^{-3}RH^3 - 1.76E^{-1}RH^2 + 35.2RH + 898.6$$

## ERROR BUDGET AT 23°C



### HTM2500 ERROR LIMITS

### Temperature coefficient compensation

$$RH_{Cor}\% = RH\%_{Read} * (1 - (Ta - 23) * 2.4E^{-3})$$

### Non linearity and temperature compensation

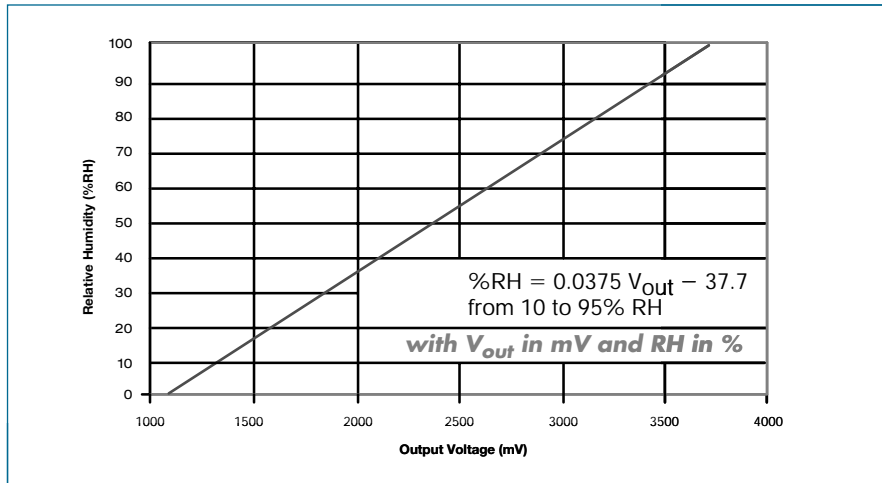
$$RH\% = \frac{-1.9206E^{-9}V_{out}^3 + 1.437E^{-5}V_{out}^2 + 3.421E^{-3}V_{out} - 12.4}{1 + (Ta-23) * 2.4E^{-3}}$$

All equations V<sub>out</sub> in mV, RH in %, Ta in °C.

### LINEARITY ERROR OF HTM2500

## Humidity Measurement using HTM2500

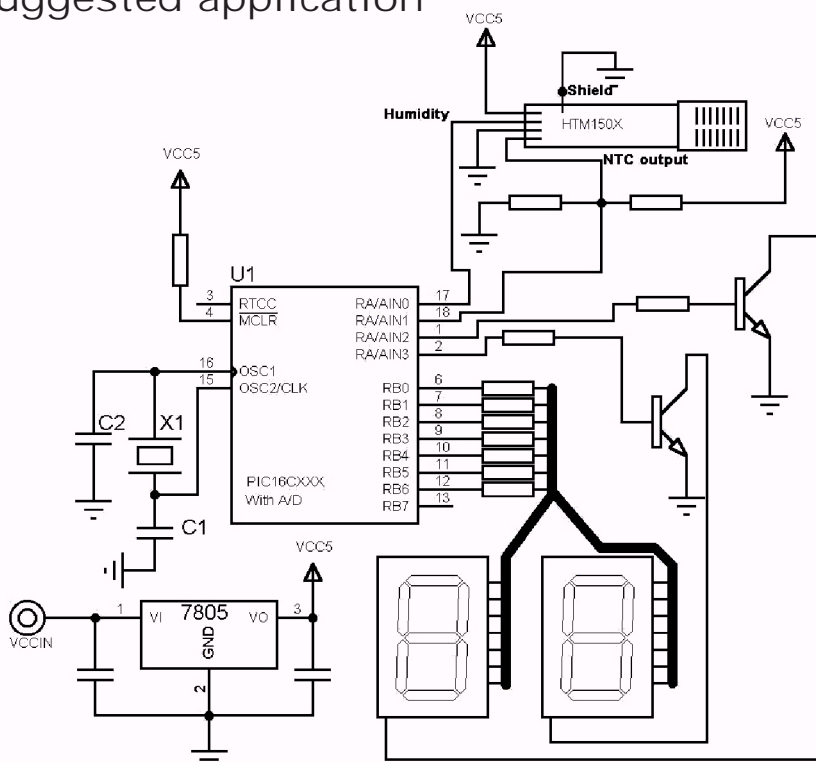
Typical HTM 2500 relative Humidity measurement



## Temperature Measurement using HTM2500 (NTC output values)

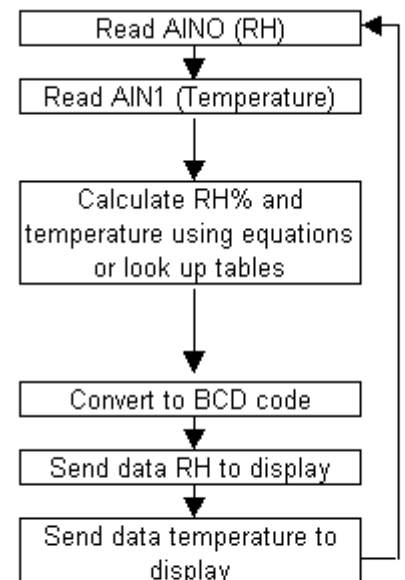
Temp in °C	R in ohms	Temp in °C	R in ohms
-30	169149	+20	12474
-25	125546	+25	10000
-20	94143	+30	8080
-15	71172	+35	6569
-10	54308	+40	5372
-5	41505	+45	4424
0	32014	+50	3661
+5	25011	+55	3039
+10	19691	+60	2536
+15	15618	+65	2128

## Suggested application

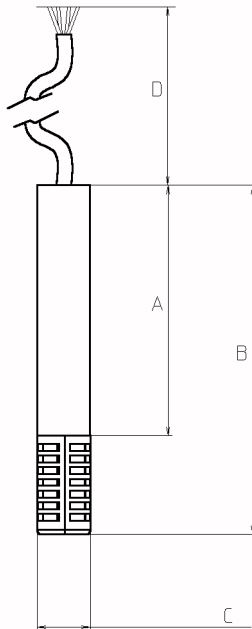


Steps of 1% RH are achievable by using 8-bit A/D.

If more resolution is required a 10-bit A/D needs to be used and a third display will be added, giving steps of 0.2% RH



- RESISTANCE TO PHYSICAL AND CHEMICAL STRESSES.
  - HTM2500 has passed through qualification processes of HUMIREL including vibration, shock, storage, high temperature and humidity, ESD.
  - Additional tests under harsh chemical conditions demonstrate good operation in presence of salt atmosphere, SO<sub>2</sub> (0.5%), H<sub>2</sub>S (0.5%), O<sub>3</sub>, NO<sub>x</sub>, NO, CO, CO<sub>2</sub>, Softener, Soap, Toluene, acids (H<sub>2</sub>SO<sub>4</sub>, HNO<sub>3</sub>, HCl), HMDS, Insecticide, Cigarette smoke, a non exhaustive list.
  - HTM1500 is not light sensitive.
- SPECIFIC PRECAUTIONS
  - HTM2500 is not protected against reversed polarity - Check carefully when connecting the device.
  - If you wish to use HTM1500 in a chemical atmosphere not listed above, consult us.



PACKAGE  
OUTLINE  
HTM2500

Dim	Min (mm)	Max (mm)
<b>A</b>	53	55
<b>B</b>	74.3	76.3
<b>C</b>	11.2	11.6
<b>D*</b>	200	250

\* specific lenght available on request

Wire	Color	Function
<b>W1</b>	Brown	Ground
<b>W2</b>	White	Supply Voltage
<b>W3</b>	Yellow	Humidity Voltage
<b>W4</b>	Green	NTC Resistance
<b>W5</b>	Black	Shield

ORDERING INFORMATION (MULTIPLE PACKAGE QUANTITY OF 10 PIECES).  
HTM 2500 HUMIDITY ANALOG VOLTAGE OUTPUT MODULE.



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