RELATIVE HUMIDITY MODULE

HM 1504

*Based on the rugged HS1101 capacitive humidity sensor, HM1504 is a dedicated humidity transducer designed for **measurements at high temperature**. Direct interface with a micro-controller is made possible with the module's linear voltage output.*

MAIN FEATURES

- **Small size**
- Not affected by water immersion
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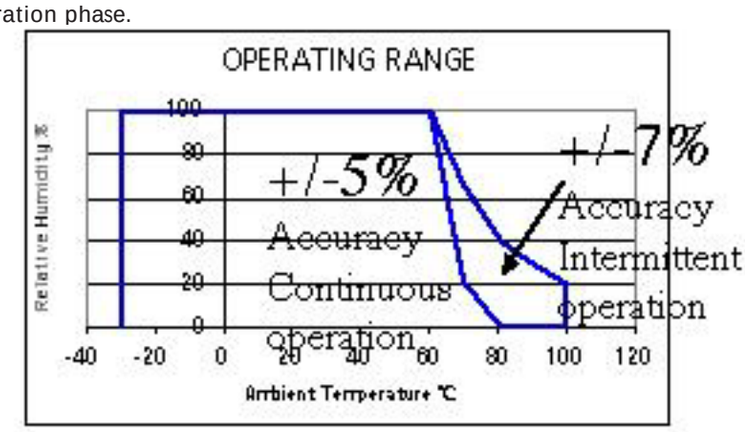
- High reliability and long term stability
- **Typical 1 to 4 Volt DC output for 0 to 100 % RH at 5 V DC supply**
- **Calibrated within +/- 3 % RH @ 55 % RH**
- Very low temperature dependence
- Ratiometric to voltage supply within the specified range
- Suitable for 3 to 7 Volts supply voltage

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	-30 to 85	°C
Supply Voltage (Peak)	Vs	7	Vdc
Humidity Operating Range	RH	0 to 100	% RH
Temperature Operating Range	Ta	-30 to 80	°C

Peak conditions up to 100°C : less than 10% of the operational time.

CHARACTERISTICS

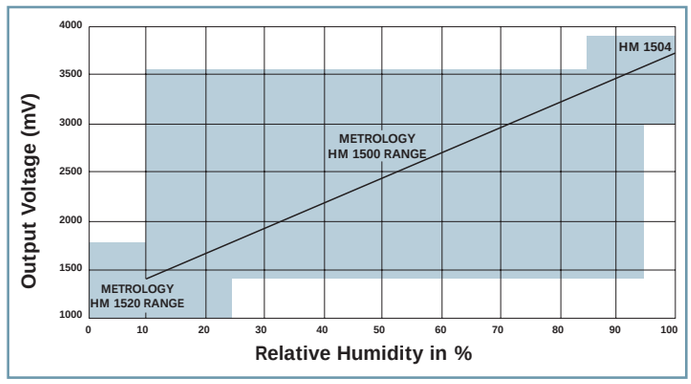
(Ta = 23°C, Vs = 5Vdc, R_L > 1MΩ unless otherwise stated)

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 % / Ta 23°C	Vout	2.40	2.55	2.70	V
Nominal output @ RH = 30 % / Ta 90°C	Vout	1.80	2.00	2.20	V
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 (R_L = 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		10		s
Output impedance	Z		70		Ω

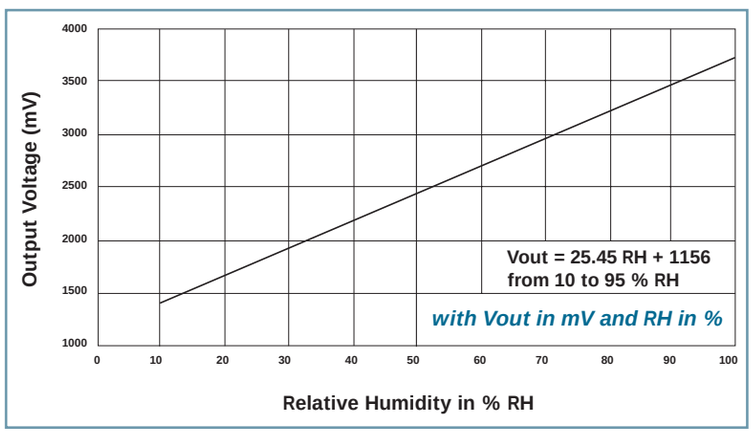
MEASUREMENT CONDITIONS

- HM1504 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 HM1504 characteristics.

HM 1504 Typical Measuring Ranges in Humidity



HM1504 MODELLED LINEAR VOLTAGE OUTPUT (VS = 5V)



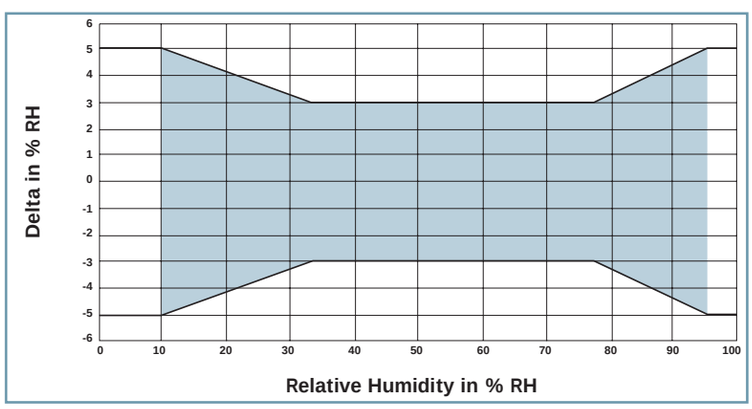
REFERENCE OUTPUT VALUES

RH (%)	V_{out}(mV)	RH (%)	V_{out}(mV)
10	1400	**55**	2550
15	1535	**60**	2675
20	1670	**65**	2800
25	1800	**70**	2925
30	1930	**75**	3055
35	2055	**80**	3185
40	2180	**85**	3315
45	2305	**90**	3455
50	2430	**95**	3595

Reversed Polynomial Equation

$$Vout = 6.43E^{-4}RH^3 - 9.73E^{-2}RH^2 + 29.6RH + 1112$$

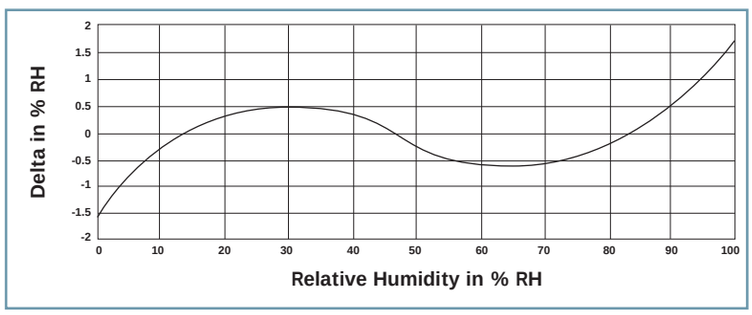
ERROR BUDGET AT 23°C



HM1504 ERROR LIMITS at 23°C

Temperature coefficient compensation

$$RH_{Cor}\% = RH\%_{\ Computed} + (23 - Ta) * 0.15$$



Non linearity compensation

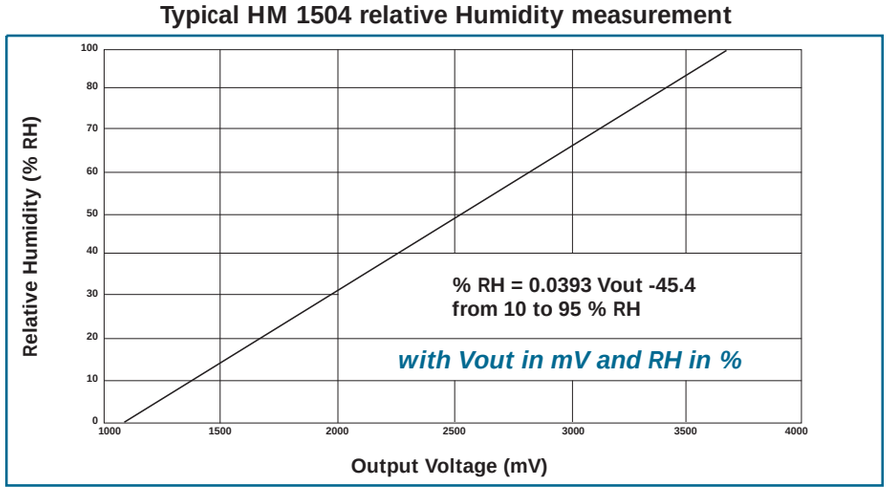
$$RH\% = -1.464E^{-9}V_{out}^3 + 1.072E^{-5}V_{out}^2 + 1.430E^{-2}V_{out} - 27$$

All equations V_{out} in mV, RH in %, Ta in °C.

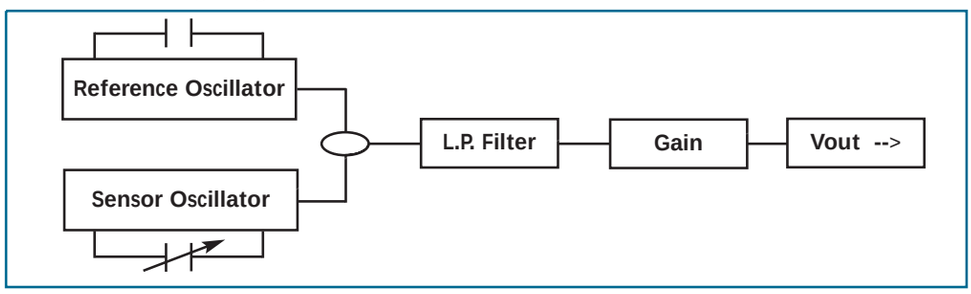
LINEARITY ERROR OF HM1504 MODULE

HUMIDITY MEASUREMENT USING HM1504

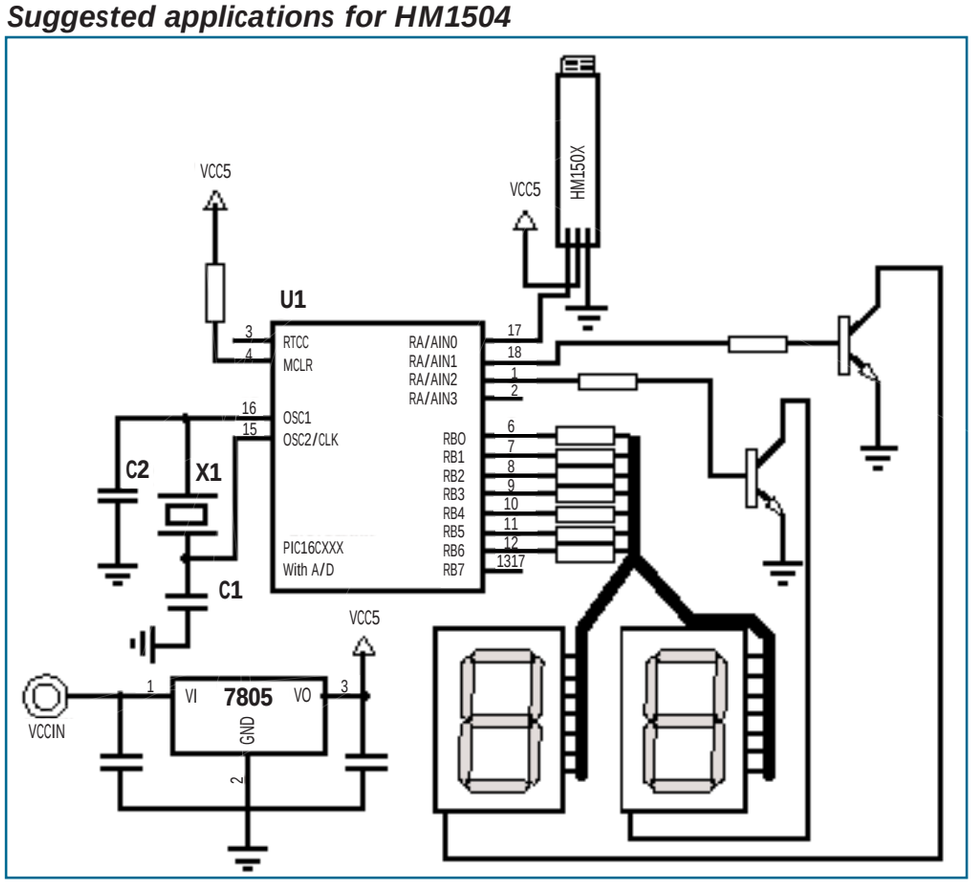
Typical HM 1504 relative Humidity measurement



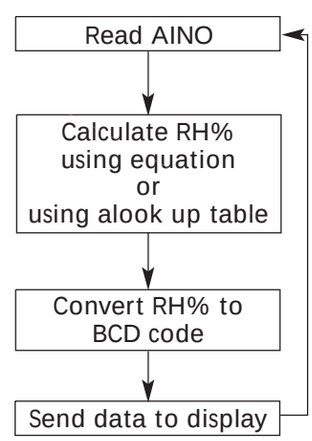
Internal block diagram of HM1504



Suggested applications for HM1504



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

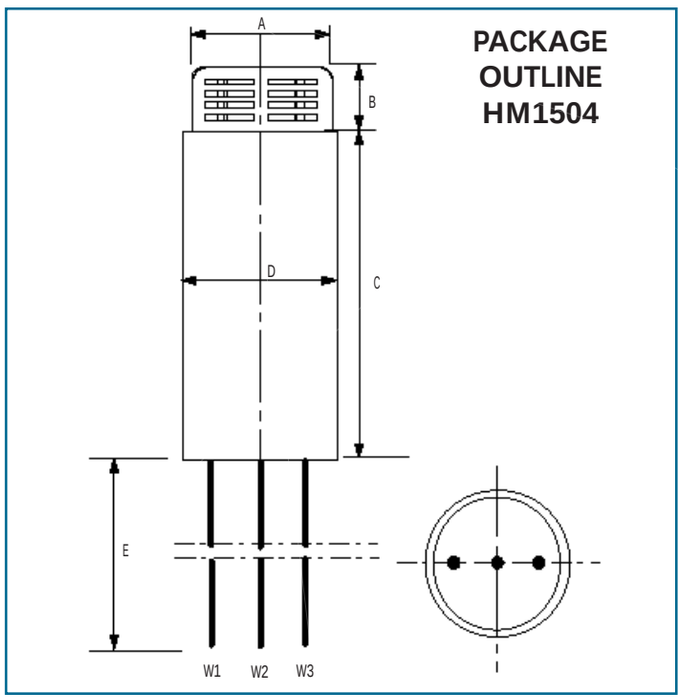


RESISTANCE TO PHYSICAL AND CHEMICAL STRESSES

- HM1504 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_2 (O.5%), H_2S (0.5%), O_3, NO_X, NO, CO, CO_2, Softener, Soap, Toluene, acids (H_2SO_4, HNO_3, HCl), HMDS, Insecticide, Cigarette smoke, a non exhaustive list.
- HM1500 is not light sensitive.

SPECIFIC PRECAUTIONS

- HM1504 is not protected against reversed polarity - Check carefully when connecting the device.
- If you wish to use HM1504 in a chemical atmosphere not listed above, consult us.



Dim	Min (mm)	Max (mm)
A	9.70	10.20
B	5.00	5.50
C	52	54
D	11.2	11.6
E*	200	250

** specific length available on request*

Wire	Color	Function
W1	White	GROUND
W2	Blue	SUPPLY VOLTAGE
W3	Yellow	OUTPUT VOLTAGE

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