

# RELATIVE HUMIDITY MODULE

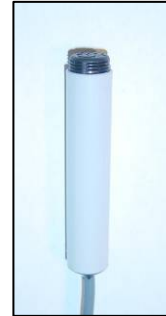
# HM1500LF

*Compliant with RoHS recommendations*

Based on the rugged HS1101LF capacitive humidity sensor, HM1500LF is a dedicated humidity 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 linear voltage output.

## MAIN FEATURES

- Small size.
- **Product free from Lead, Cr(6+), Cd and Hg.**
- Not affected by water immersion.
- Full interchangeability.
- High reliability and long term stability.
- Typical 1 to 3.6 Volts DC output for 0 to 100 % RH at 5 V DC supply.
- Calibrated within +/- 2 % RH @ 55 % RH.
- Very low temperature dependence.
- Ratiometric to voltage supply from 4.75Vdc to 5Vdc.
- Able to operate from 3 to 7 Volts supply voltage

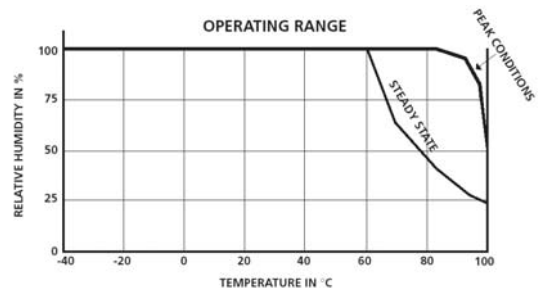


## HUMIDITY SENSOR SPECIFIC FEATURES

- **Instantaneous de-saturation after long periods in saturation phase.**
- **Fast response time.**
- Not affected by water immersion.
- Part could be washed with distilled water.
- Patented solid polymer structure.

## MAXIMUM RATINGS

Ratings	Symbol	Value	Unit
Storage Temperature	Tstg	-30 to 70	°C
Storage Humidity Range	RHstg	0 to 100	% RH
Supply Voltage (Peak)	Vs	7	Vdc
Humidity Operating Range	RH	0 to 100	% RH
Temperature Operating Range	Ta	-30 to 60	°C



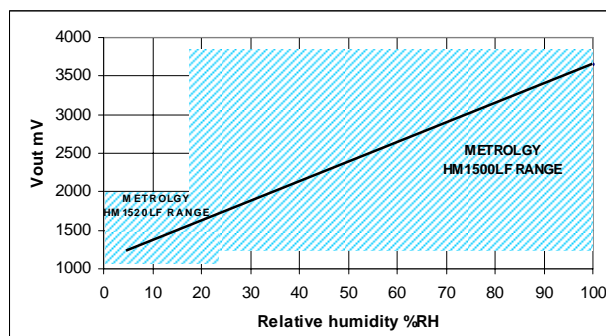
## CHARACTERISTICS

( $T_a = 23^\circ\text{C}$ ,  $V_s = 5.0\text{Vdc}$ ,  $R_L > 1\text{M}\Omega$  unless otherwise stated)

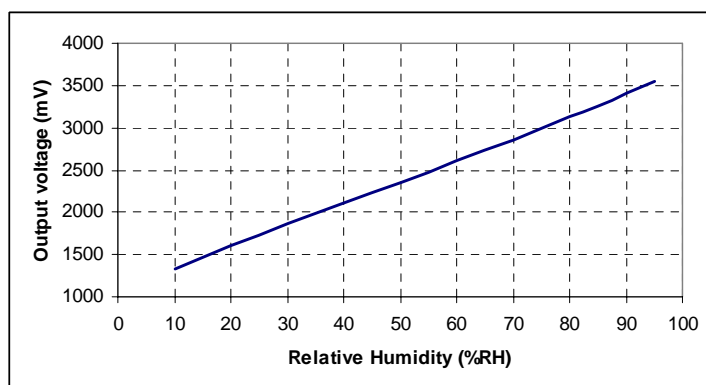
Characteristics	Symbol	Min	Typ	Max	Unit
Humidity Measuring Range	RH	0		100	%RH
Relative Humidity Accuracy (10% to 95%RH)			$\pm 3$	$\pm 5$	%RH
Voltage Supply(regulated at 5Vdc)	$V_{cc}$		5		V <sub>dc</sub>
Nominal Output @55%RH	$V_{out}$	2.42	2.48	2.54	V
Current Consumption	$I_{cc}$		2.8	4	mA
Temperature coefficient (10 to 50°C)	$T_{cc}$		-0.05	-0.1	%RH/°C
Humidity Average Sensitivity	$\Delta\text{mV/RH}$		+26		mV/%RH
Response time ( at 63% of signal) 33%RH to 75%RH	$\tau$			10	s
Humidity hysteresis				$\pm 1$	%RH
Output impedance	Z		70		$\Omega$
Sink current capability ( $R_L = 33\text{ kOhms}$ )	I			150	$\mu\text{A}$
Warm up time(electronic)	$t_w$		150		ms
Humidity Resolution			0.4		%RH

## MEASUREMENT CONDITIONS

- HM1500LF is specified for accurate measurements within 10% RH to 95%RH.
- Excursion out of this range (< 10% or > 95% RH, including condensation) does not affect the reliability of HM1500LF Characteristics.
- Dedicated HM15XX Products are available for extreme RH Conditions (as HM1520 for low Dew points) Consult HUMIREL for further information.



## MODELED SIGNAL OUTPUT



### Reference Output Values

RH (%)	Vout (mV)	RH (%)	Vout (mV)
10	1325	55	2480
15	1465	60	2605
20	1600	65	2730
25	1735	70	2860
30	1860	75	2990
35	1990	80	3125
40	2110	85	3260
45	2235	90	3405
50	2360	95	3555

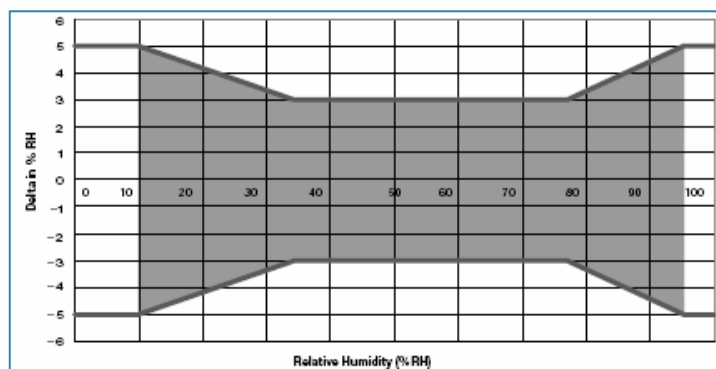
**LINEAR EQUATION:** (with  $V_{out}$  in mV and RH in %)

- $V_{out} = 25.68RH + 1079$
- $RH = 0.03892 V_{out} - 42.017$

**POLYNOMIAL EQUATION:** (with  $V_{out}$  in mV and RH in %)

- $V_{out} = 9E^{-4}RH^3 - 1.3E^{-1}RH^2 + 30.815RH + 1030$
- $RH = -1,91E-09 V_{out}^3 + 1,33E-05 V_{out}^2 + 9,56E-03 V_{out} - 2,16E+01$

## ERROR BUDGET at 23°C



## TEMPERATURE COMPENSATION

$$RH_{\text{compensated}} = RH_{\text{actual at T}} + (T - 23) \cdot (0.05)$$

T: Temperature °C / RH: Relative humidity in %

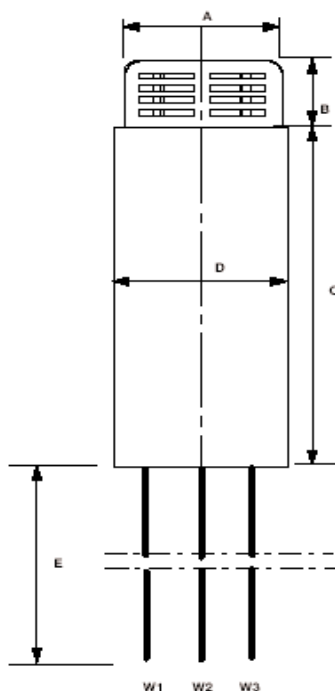
## RESISTANCE TO PHYSICAL AND CHEMICAL STRESS

- HM1500LF 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.
- HM1500LF is not light sensitive.

## SPECIFIC PRECAUTIONS

- HM1500LF is protected against reversed polarity
- If you wish to use HM1500LF in a chemical atmosphere not listed above, consult us.

## PACKAGE OUTLINE



\* Specific length available on request

Dim	Min (mm)	Max (mm)
A	9.75	10.25
B	4.00	4.50
C	53	55
D	10.9	11.4
E*	200	250

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

**ORDERING INFORMATION (MULTIPLE PACKAGE QUANTITY OF 10 PIECES).**  
**HM1500LF: HUMIDITY ANALOG VOLTAGE OUTPUT MODULE.**  
**ORDERING REFERENCE: HPP805A036**

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