Based on the rugged HS1101 capacitive humidity sensor, HM1500 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
- 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
- Calibrated within +/- 2 % 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**

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

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

**Characteristics**

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

- HM1500 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 HM1500 characteristics.
- Dedicated HM15XX products are available for extreme RH conditions (as HM1520 for low dewpoints). Consult HUMIREL for further information.

**HM1500 Modelled Linear Voltage Output (Vs = 5V)**

- **REFERENCE OUTPUT VALUES**
  
<table>
<thead>
<tr>
<th>RH (%)</th>
<th>Vout (mV)</th>
<th>RH (%)</th>
<th>Vout (mV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1325</td>
<td>55</td>
<td>2480</td>
</tr>
<tr>
<td>15</td>
<td>1465</td>
<td>60</td>
<td>2605</td>
</tr>
<tr>
<td>20</td>
<td>1600</td>
<td>65</td>
<td>2730</td>
</tr>
<tr>
<td>25</td>
<td>1735</td>
<td>70</td>
<td>2860</td>
</tr>
<tr>
<td>30</td>
<td>1860</td>
<td>75</td>
<td>2990</td>
</tr>
<tr>
<td>35</td>
<td>1990</td>
<td>80</td>
<td>3125</td>
</tr>
<tr>
<td>40</td>
<td>2110</td>
<td>85</td>
<td>3260</td>
</tr>
<tr>
<td>45</td>
<td>2235</td>
<td>90</td>
<td>3405</td>
</tr>
<tr>
<td>50</td>
<td>2360</td>
<td>95</td>
<td>3555</td>
</tr>
</tbody>
</table>

**Reversed Polynomial Equation**

\[
Vout = 9 \times 10^{-4}R^{3} - 1.3 \times 10^{-1}R^{2} + 30.815R + 1030
\]

**Error Budget at 23°C**

- **Temperature Coefficient Compensation**
  
  \[
  RH_{Cor} = RH_{Read} \cdot (1 - (Ta - 23) \cdot 2.4 \times 10^{-3})
  \]

- **Non Linearity and Temperature Compensation**
  
  \[
  RH_{%} = \frac{-1.919E9V_{out}^{3} + 1.335E5V_{out}^{2} + 9.607E3V_{out} - 21.75}{1 + (Ta - 23) \cdot 2.4 \times 10^{-3}}
  \]

All equations \( V_{out} \) in mV, RH in %, Ta in °C.
HUMIDITY MEASUREMENT USING HM1500

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

Typical HM 1500 relative Humidity measurement

% RH = 0.0391 Vout -42.5
from 10 to 95 % RH

with Vout in mV and RH in %

Internal block diagram of HM1500

Suggested applications for HM1500

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
- HM1500 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, SO₂ (0.5%), H₂S (0.5%), O₃, NOₓ, NO, CO, CO₂, Softener, Soap, Toluene, acids (H₂SO₄, HNO₃, HCl), HMDS, Insecticide, Cigarette smoke, a non exhaustive list.
- HM1500 is not light sensitive.

SPECIFIC PRECAUTIONS
- HM1500 is not protected against reversed polarity - Check carefully when connecting the device.
- If you wish to use HM1500 in a chemical atmosphere not listed above, consult us.

ORDERING INFORMATION (MULTIPLE PACKAGE QUANTITY OF 10 PIECES).
HM1500 : HUMIDITY ANALOG VOLTAGE OUTPUT MODULE.

SAMPLE KIT OF HM1500 IS AVAILABLE THROUGH HUMIREL WEB SITE
www.humirel.com
email : sales@humirel.com

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