

## TEMPERATURE AND HUMIDITY MODULE

**HTF 3100**

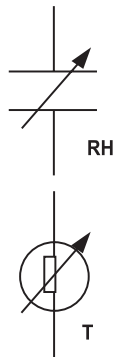
Based on the rugged HTS2010SMD humidity sensor, HTF 3100 is a dedicated **humidity and temperature transducer** designed for OEM applications where a reliable and accurate measurement is needed. It features a very small size for easy, cost-effective mechanical mounting. Direct interface with a micro-controller is made possible with the module's linear **frequency output**.

### MAIN FEATURES

- One of the smallest humidity / temperature modules on the market.
- Stable, linear proportional frequency output from 0 to 99% RH.
- Calibrated within +/- 3% RH @ 55% RH.
- High quality thermistor
- Stable characteristics with temperature.
- High reliability and long term stability.

### HUMIDITY SENSOR SPECIFIC FEATURES

- Instantaneous de-saturation after long periods in saturation phase.
- Fast response time.
- High resistance to chemicals.
- Not affected by water immersion.
- Patented solid polymer structure.



### TEMPERATURE SENSOR SPECIFIC FEATURES

- 10 K +/- 3% NTC temperature sensor
- Stable
- High sensitivity

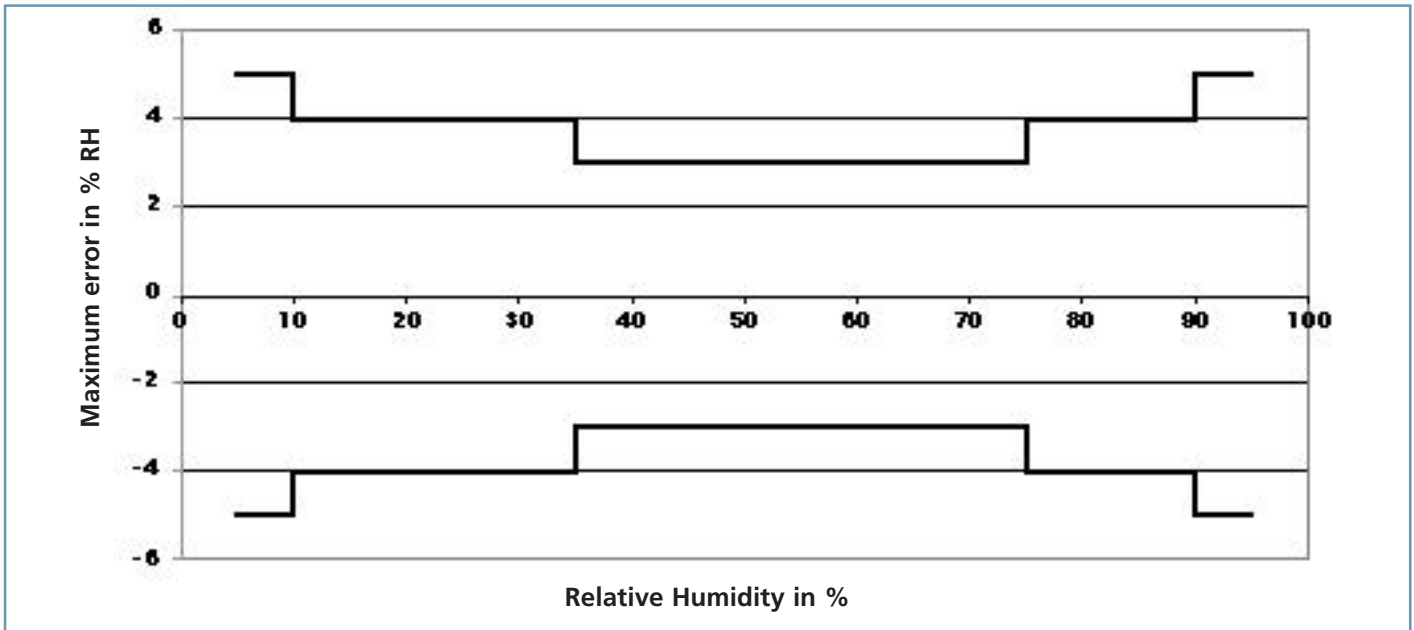
### MAXIMUM RATINGS

Ratings	Symbol	Value	Unit
Storage Temperature	T <sub>stg</sub>	-40 to 105	°C
Storage Humidity Range	RH <sub>stg</sub>	0 to 100	% RH
Supply Voltage (Peak)	V <sub>s</sub>	16	Vdc
Humidity Operating Range	RH	0 to 99	% RH
Temperature Operating Range	T <sub>a</sub>	-40 to 85	°C

### CHARACTERISTICS

**Humidity sensor** (T<sub>a</sub> = 25°C, V<sub>s</sub> = 13.5 Vdc, R<sub>L</sub> > 100 KΩ unless otherwise stated)

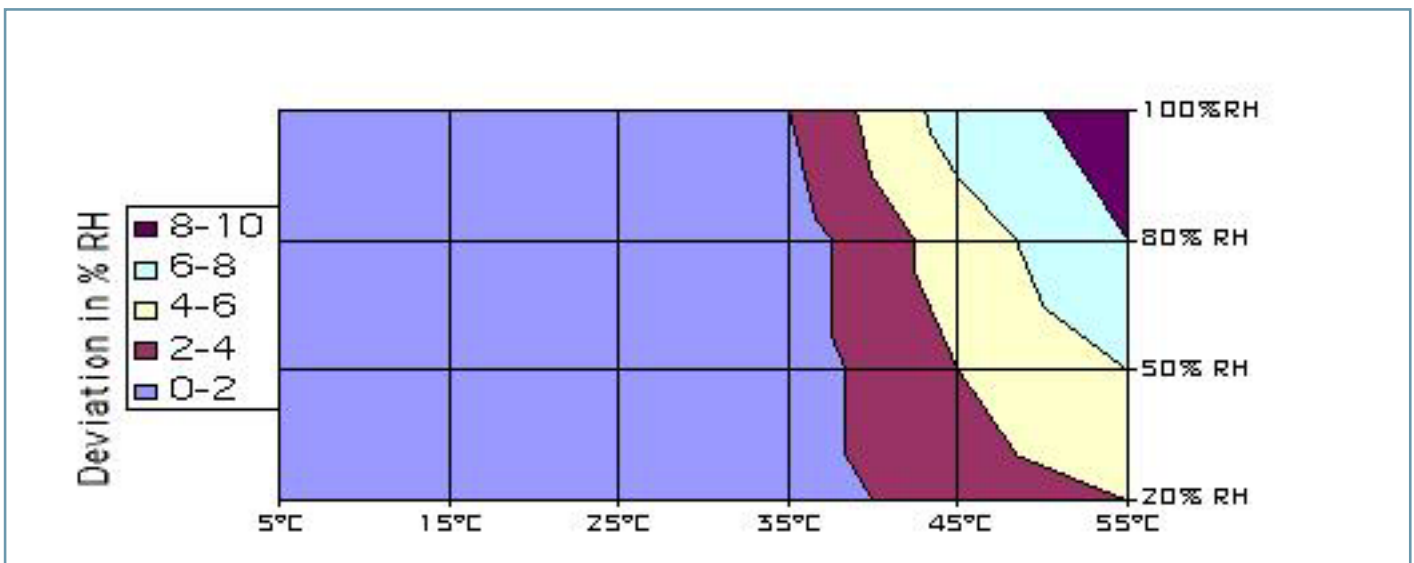
Characteristics	Symbol	Min.	Typ.	Max.	Unit.
Humidity metrology range	RH	10		95	% RH
Relative Humidity accuracy (10 to 95 % RH)	RH		+/- 3	+/- 5	% RH
Voltage supply	V <sub>s</sub>	5	13.5	16	Vdc
Nominal output @ RH = 55 %	F <sub>out</sub>	6560	6600	6640	Hz
Current consumption	I <sub>c</sub>			0.1	mA
Temperature coefficient (5 to 55°C)	T <sub>cc</sub>		+ 0.1		% RH/°C
Averaged Sensitivity from 33 % to 75 % RH	ΔF <sub>out</sub> / ΔRH	-11	- 12.5	-14	Hz/% RH
Sink current capability	I <sub>s</sub>		100		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

**Relative Humidity Accuracy of HTF 3100 @ 25°C**


**Modeled Signal output (Linear reference curve) :**  $F_{out} = 7277 - 12.5 \cdot RH$  with  $F_{out}$  in Hz and RH in %

**Typical response look-up table (Polynomial Reference curve)**

RH (%)	0	5	10	15	20	25	30	35	40	45	50
F <sub>out</sub> (Hz)			7145	7085	7030	6970	6910	6845	6785	6725	6660
RH (%)	55	60	65	70	75	80	85	90	95	100	
F <sub>out</sub> (Hz)	6600	6535	6470	6410	6340	6275	6210	6145	6075		

**Temperature influence on HTF3100 humidity measurement**


Calibration data are traceable to NIST standards through CETIAT laboratory.

## CHARACTERISTICS

### Temperature sensor (T<sub>a</sub> = 25°C)

Characteristics	Symbol	Min.	Typ.	Max.	Unit.
Nominal resistance @ 25°C			<b>10</b>		<b>kΩ</b>
Beta value : B25/100	<b>B</b>	<b>3600</b>	<b>3730</b>	<b>3800</b>	
Temperature measuring range	<b>Ta</b>	<b>- 40</b>		<b>85</b>	<b>°C</b>
Nominal Resistance Tolerance at 25°C	<b>Rn</b>		<b>2</b>	<b>3</b>	<b>%</b>
B value tolerance	<b>B</b>		<b>3</b>		<b>%</b>
Response Time	<b>τ</b>		<b>10</b>		<b>s</b>

### Typical temperature output

Depending on the needed temperature measurement range and associated accuracy, we suggest two methods to access to the NTC resistance values.

$$\textcircled{1} \quad R_T = R_N * e^{B \left( \frac{1}{T} - \frac{1}{T_N} \right)}$$

- $R_T$  NTC resistance in Ω at temperature T in K
- $R_N$  NTC resistance in Ω at rated temperature in K
- T, T<sub>N</sub> Temperature in K
- B B value, material-specific constant of the NTC thermistor
- e Base of natural logarithm (e = 2.71828)

The actual characteristic of an NTC thermistor can, however, only be roughly described by the exponential relation, as the material parameter B in reality also depends on temperature. So this approach is only suitable for describing a restricted range around the rated temperature or resistance with sufficient accuracy.

$\textcircled{2}$  For practical applications a more precise description of the real R/T curve may be required. Either more complicated approaches (e.g. the Steinhart-Hart equation) are used or the resistance/temperature relation as given in tabulated form. The below table has been experimentally determined with utmost accuracy for temperature increments of 1 degree.

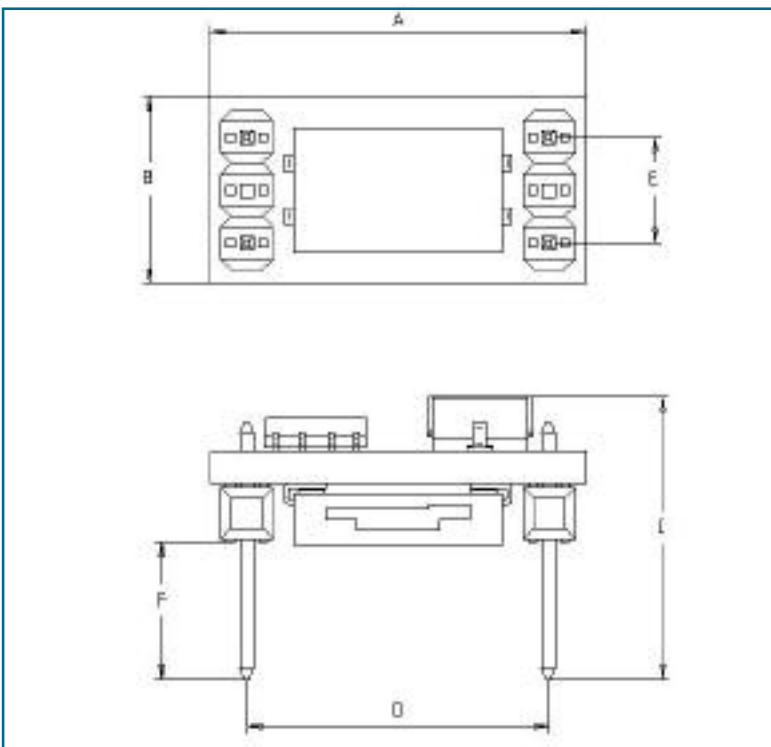
Temperature °C	Resistance (ohm)	Max. Deviation	Temperature °C	Resistance (ohm)	Max. Deviation	Temperature °C	Resistance (ohm)	Max. Deviation	Temperature °C	Resistance (ohm)	Max. Deviation
-40	262960	35403	-2	33100	2230	26	9600	300	54	3360	213
-38	232539	30358	-1	31557	2078	27	9218	300	55	3237	208
-36	206064	26075	0	30029	1932	28	8853	299	56	3126	204
-34	182852	22416	1	28627	1799	29	8506	297	57	3019	200
-32	162498	19290	2	27299	1675	30	8178	296	58	2917	197
-30	144790	16636	3	26042	1560	31	7866	294	59	2819	193
-28	129054	14343	4	24852	1452	32	7568	292	60	2720	189
-26	115243	12383	5	23773	1355	33	7283	290	61	2629	185
-24	103115	10705	6	22708	1261	34	7011	287	62	2542	182
-22	92354	9257	7	21698	1174	35	6734	284	63	2458	178
-20	82923	8020	8	20739	1093	36	6484	281	64	2378	175
-19	78581	7463	9	19829	1017	37	6244	278	65	2304	171
-18	74497	6947	10	18959	946	38	6015	275	66	2229	168
-17	70655	6468	11	18128	879	39	5796	271	67	2158	165
-16	67039	6023	12	17338	817	40	5575	267	68	2089	161
-15	63591	5606	13	16588	759	41	5373	264	69	2022	158
-14	60381	5222	14	15876	705	42	5180	260	70	1960	155
-13	57356	4865	15	15207	654	43	4995	257	71	1898	152
-12	54503	4533	16	14569	607	44	4817	253	72	1839	149
-11	51813	4225	17	13962	563	45	4636	248	73	1782	146
-10	49204	3932	18	13384	522	46	4473	245	74	1727	143
-9	46767	3662	19	12834	484	47	4316	241	75	1673	140
-8	44467	3411	20	12280	447	48	4166	237	77	1573	135
-7	42296	3177	21	11777	413	49	4021	233	79	1480	130
-6	40247	2960	22	11297	382	50	3874	229	81	1390	124
-5	38279	2756	23	10840	353	51	3737	225	83	1310	119
-4	36455	2568	24	10404	325	52	3606	221	85	1235	115
-3	34731	2393	<b>25</b>	<b>10000</b>	<b>300</b>	53	3481	217			

## QUALIFICATION PROCESS

### Resistance to physical and chemical stresses

- HTF3100 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.
- HTF3100 is not light sensitive.

## PACKAGE OUTLINE HTF3100



Dim	A	B	C	D	E	F	G
<b>Min</b>	17.5	8.5	13.4	14.37	4.88	6.1	
<b>Max</b>	18.5	9.5	14.4	14.77	5.28	7.1	

Dimensions in millimeters

**Connector type :** upon request, customized connectors are available to be mated with your female connector or PCB

### ORDERING INFORMATION :

**HTF3100 : Humidity Frequency output + NTC (Temperature direct output)**

**HUMIREL WEB SITE**

**[www.humirel.com](http://www.humirel.com)**

email : [sales@humirel.com](mailto:sales@humirel.com)

The information in this sheet has been carefully reviewed and is believed to be accurate; however, no responsibility is assumed for inaccuracies. Furthermore, this information does not convey to the purchaser of such devices any license under the patent rights to the manufacturer. Humirel reserves the right to make changes without further notice to any product herein. Humirel makes no warranty, representation or guarantee regarding the suitability of its product for any particular purpose, nor does Humirel assume any liability arising out of the application or use of any product or circuit and specifically disclaims any and all liability, including without limitation consequential or incidental damages. « Typical » parameters can and do vary in different applications. All operating parameters, including « Typical » must be validated for each customer applications by customer's technical experts. Humirel does not convey any license under its patent rights nor the rights of others. Humirel products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other application intended to support or sustain life, or for any application in which the failure of the Humirel product could create a situation where personal injury or death may occur. Should buyer purchase or use Humirel products for any such unintended or unauthorized application, Buyer shall indemnify and hold Humirel and its officers, employees, subsidiaries, affiliates and distributors harmless against all claims, costs, damages and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Humirel was negligent regarding the design or manufacture of the part. Humirel is a registered trade mark of Humirel.