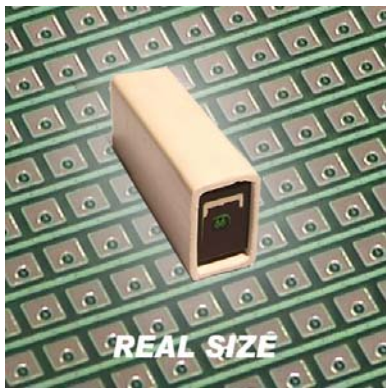
HUMIDITY AND TEMPERATURE
Miniature parallelepipedic probe F-TUCN.33N

PRELIMINARY SPECIFICATIONS

This module, intended to quantify the ***relative humidity level and temperature*** in the ambient atmosphere, is made of a micro-system ***SPSI UPSICAP* MSS Bi-Face G-TUCN.32** type that delivers a variable frequency proportional to ***humidity***, and a resistive ***temperature*** sensor (thermistor NTC).

The micro-system making this probe, ***integrates*** a humidity cell ***created in-situ*** on the upper side of the substrate, while the lower side carries the temperature sensor, the electronic transmitter and the plug-in connector. This functional module is associated to a support with output connection. ***The surface electrode cell which is directly in contact with water vapor is connected to ground (0V).***
It can be associated with modules H-TUTA.32 or H-UTA.32 (output 4-20 mA two wires by independant channel). The micro-system module and the substrate of the connector-supply are protected from harsh environment by full moulding, and the sensig side to humidity, can be covered with high efficient atmospheric filter to reduce electrical effects of condensation.
This technology is a major step forward in the field of sensor-transmitters with long-term stability and reduction of mass production cost.

MSS Bi-Face original concept
Exclusive SPSI technology
Micro-system with digital output
High accuracy - High reliability
Complementary atmospheric filter
Operating from 0 % to 100 % RH, -40°C to +85°C
Ultra fast response
Output current up to ± 2 mA
Total interchangeability without recalibration
Instantaneous desaturation
Best quality-price ratio on the world market
Integrated production



MAIN CHARACTERISTICS

- Qualified measurement range: 2% RH to 98% RH, -40° C to + 85° C
- Time constant: 0.25 sec. to 20 sec. depending on model Rx or Lx
- Operating temperature: -40° C to +100° C
- Accuracy (calibration–interchangeability): ± 3% RH, ± 1° C (option ± 2% RH, ± 0.25°C)
- Nominal internal power consumption: < 1 mW
- Humidity recovery time 100 % RH 150 h: 2 sec. to 100 sec. depending on model Rx or Lx
- Output signals: 0-5 V Variable frequency square waves, NTC
- Rated power supply voltage: 4 VDC to 10 VDC
- Humidity basic transfer function: $F = F_{55}\ (1.108 – 0.002\%\ RH)$
- Temperature basic transfer function: $R = 0.119.e^{3380\ /\ (T+273)}$
- Standard calibration ($F_{55,}\ T_{25}$): 6500 Hz at 55 % RH, 10 KΩ at 25 ° C
- Thermal sensitivity RH: ± 0.05 % RH / °C
- Dimensions: L W H : 30 x 13 x 11 mm^3

ORIGINAL TECHNOLOGY UPSICAP – MSS BI-FACE

UPSI product range are based on two fundamental concepts ***UPSICAP*** and ***MSS Bi-Face*** elabored and developed by the *Société d'applications électroniques pour la Physique, la Science et l'Industrie* (international patent http://www.patentstorm.us/patents/6450026-claims.html)

The MSS Bi-Face concept incorporates on the same substrate both, the humidity sensor on the main face and electronic device, including connections, on the opposite side.

The humidity cell is not added on the substrate but carried out directly ***in situ*** .

Accuracy, stability and reliability are inproved, connecting the sensor to the aquisition electronic circuit with continuum solid vias excluding link wires or printed circuit.

The surface electrode in contact with water vapor is connected to 0V (ground) provides shielding against surrounding electrical field and its thickness provide high robustness atmospheric filter.

The absence of electrical connections on the sensitive face does away with a barrier irregularity reducing the airborn dust on this side and enhancing realibility in the event mechanical action affecting the cell.

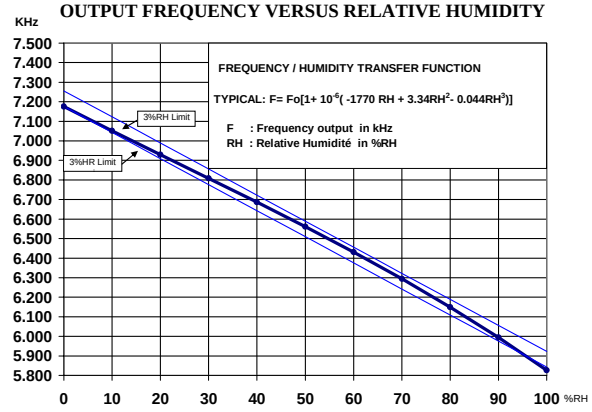
For harsh environnment, a complementary filter could be placed on the sensing side.

The additional function (transmitter) component quantity is devided by 2 using some multifunction device increasing the realibility and decreasing area and cost (original electronic concept).
This technology allow to supply an analogic or digital sensor transmitter with 100 µW - 20 µA.

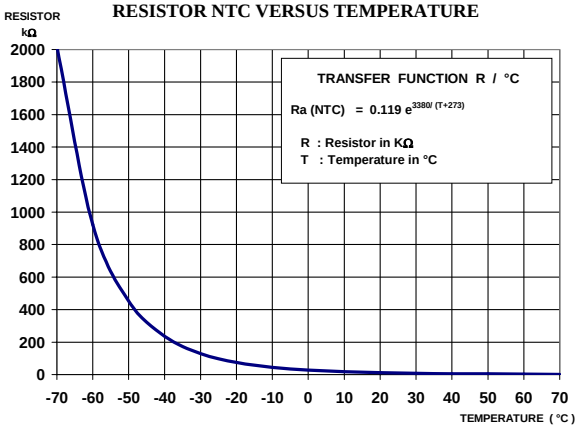
The operating range until 100% RH is insured by a specific treatment (substrate and components impregnation).

TRANSFER FUNCTIONS

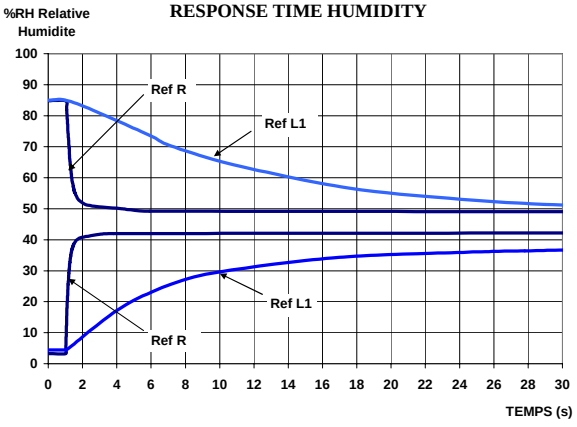
OUTPUT FREQUENCY VERSUS RELATIVE HUMIDITY



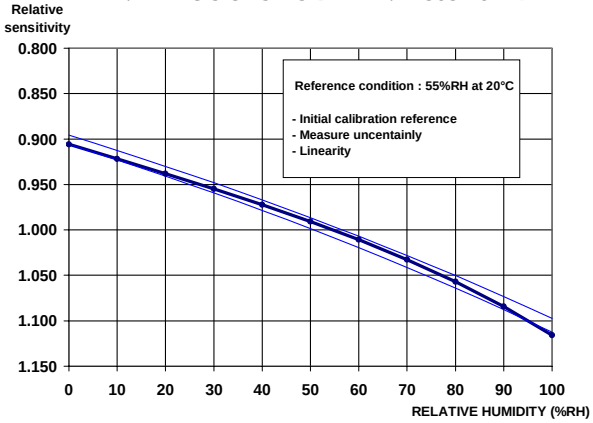
RESISTOR NTC VERSUS TEMPERATURE



RESPONSE TIME HUMIDITY



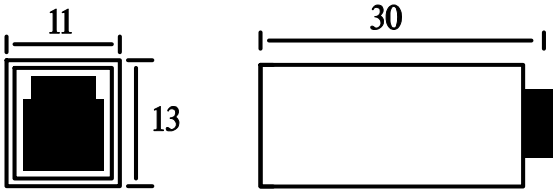
RELATIVE PRECISION SENSIBILITY VERSUS HUMIDITY



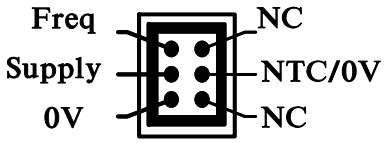
ELECTRICAL AND MEASURING SPECIFICATIONS

Measured or influencing values	Definition	Values			Unit
		Min.	Nom.	Max.	
Relative humidity RH	RH measuring range	2	→	98	% RH
	RH operating range	0	→	100	% RH
	Hysteresis		< 1,5		% RH
	Accuracy according to reference conditions	2	3		% RH
	Conformity error (2 % RH to 98 % RH)		1.5		% RH
	Time constant Fast version R	0.25 ↑	0.30	0.40 ↓	sec.
	Version L	30 ↑	40	50 ↓	sec.
	Recovery time (100% RH 150 hours)	2 (R)		100 (L_1)	sec.
	Absolute humidity Specified metrology		0.12		Kg/Kg
	Maximum Metrology outside tolerance		0.35		Kg/Kg
	Degraded metrology		0.5		Kg/Kg
Output signal Hz / %RH	Nominal Variable frequency Square wave / RH	7 176	→	5 826	Hz
	Cyclic ration High level time / Low level time	1.15	1.18	1.21	H/L
	Square waves amplitude (output current = 0)	0.99 Vcc		Vcc	V
	Source resistance		250		Ω
Transfer	$F(Hz) = 7176 – 12.7\ RH + 0.024\ RH^2 - 0.00032\ RH^3$				
	Standard calibration 12 % RH	6 970	7 027	7 080	Hz
	F55 = 6500 Hz ***55 % RH***	***6 460***	***6 500***	***6 540***	***Hz***
	97.5 % RH	5 790	5 870	5 950	Hz
	Sensitivity (33 % RH to 76 % RH)	12.7	13.1	13.5	Hz/%Hr
Electrical power supply	Supply voltage Vcc	4	5	10	V
	Supply current Icc (output current excluded)	0.15	0.17	0.25	mA
Stability	Instantaneous modulation (noise)	0.005	0.01	0.05	% RH
	Sensitivity to supply voltage (Vcc)		0.1	0.2	% RH/V
	Thermal sensitivity	0.03	0.04	0.05	%RH/°C
	Thermal stability from 0° C to 50° C		± 1.5		% RH
	Capacitive sensitivity (line capacitor Cp)	0.03	0.01	0.05	%RH/nF
Ambient Ta temperature	Range of measurement **Ta**	- 40	+ 80	+ 100	° C
	Accuracy to the reference conditions	0.25	1		° C
Output signal Ω / °C	Nominal resistive value at 25° C		10		KΩ
	Maximum current		0.3		mA
Transfer	$R = 0.119\ e^{3380\ /\ (T+273)}$ (accuracy 1°C)				Ω
	$T = 1/[A+B.lnR+C.(lnR)^3]$ (accuracy 0.25°C)				
Temperature range	Long term storage	- 50	+ 25	+ 85	°C
	Specified operating range	- 30	+ 25	+ 85	°C

MECHANICAL SPECIFICATIONS - ELECTRICAL CONNECTION



Receptacle : Molex milli-grid 79107-7002



APPLICATIONS

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