



HUMIDITY AND TEMPERATURE 4-20 mA Humidity transmitter

H-UTA.32

This miniature module is intended to be associated to a probe of humidity and temperature measurement F-TUCN.33N or P. It provides a stabilized power supply for the probe, performs the signal acquisition of measurement in frequency and delivers a **DC linear current proportional to the relative humidity level according to the 4-20 mA two wires standard system and a variable resistor proportional to the temperature (thermistor NTC or platinum PT1000)**.

This system is characterized by an operating voltage and a measurement current carried by the same two wires without decoding. The measurement current which is mixed with the consumption current, is regourously independent from the voltage supply in a proportion of 600 % and the charge resistance could reach 1500 Ω.

This internationally patented technology is a major step forward in the field of sensor-transmitters with long-term stability and reduction of mass production cost.

Linear from 0 % RH to 100 % RH

4-20 mA two wires output

Power supply voltage from 7.5V to 40V

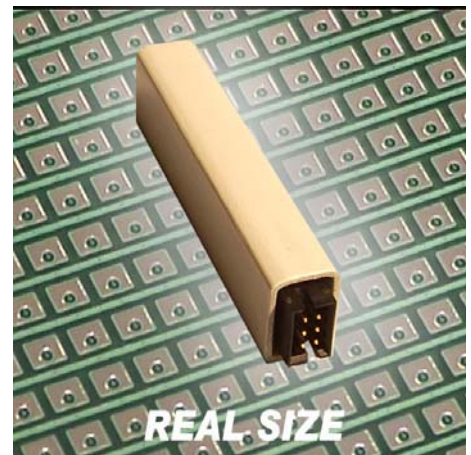
Insensitive to both voltage supply and load resistor

Measured temperature from -40°C to +100°C

High accuracy - High reliability

Total interchangeability without recalibration

Best quality-price ratio on the world market



MAIN CHARACTERISTICS

Associated to the probe F-TUCN.33N or P

- Qualified measurement range: 2 % RH to 98 % RH, -20°C to +85°C
- Time constant humidity: 0,25 sec. to 20 sec. depending on model R or L
- Operating temperature: -40° C to + 100° C
- Accuracy according to reference conditions: ± 3 % RH option 2 % RH
- Nominal internal power consumption: 0,024 W to 0,72 W depending on current & voltage
- Output signals: 4-20 mA DC current
- Rated power supply voltage: 7.5 VDC to 40 VDC without metroly effect
- Humidity basic transfer function: $I \text{ (mA)} = 4,0 + 0,16 \% \text{ RH}$
- Temperature transfer function F-TUCN.33N: $R \text{ (}\Omega\text{)} = 0,119 \cdot e^{3380 / (T+273)}$
- Temperature transfer function F-TUCN.33P : $R \text{ (}\Omega\text{)} = 1000 + 3913T - 0,6 \cdot 10^{-3}T^2$
- Standard calibration (RH₅₅) : 12,8 mA at 55 % RH
- Standard calibration sensor N : 10 KΩ at 25°C
- Standard calibration sensor P : 1000 Ω at 0°C
- Thermal sensitivity RH: ± 0,05 % RH / ° C
- Parallelepipedic dimensions: 9 mm (l) x 16 mm (L) x 5 mm (p)

ORIGINAL TECHNOLOGY UPSICAP – MSS BI-FACE

UPSI product range are based on two fundamental concepts *UPSICAP* and *MSS Bi-Face* elaborated 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 improved, connecting the sensor to the acquisition 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 airborne dust on this side and enhancing realibility in the event mechanical action affecting the cell.

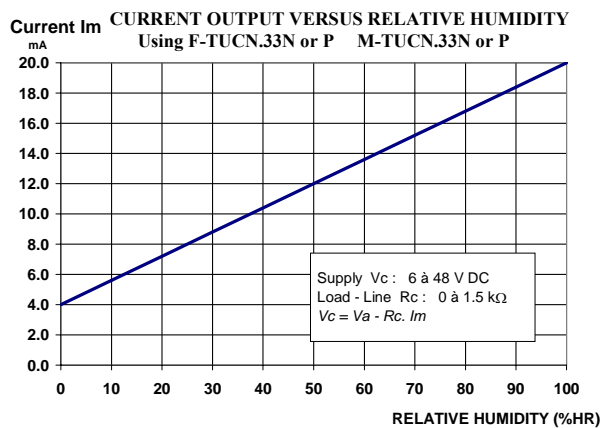
For harsh environment, a complementary filter could be placed on the sensing side.

The additional function (transmitter) component quantity is divided 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.

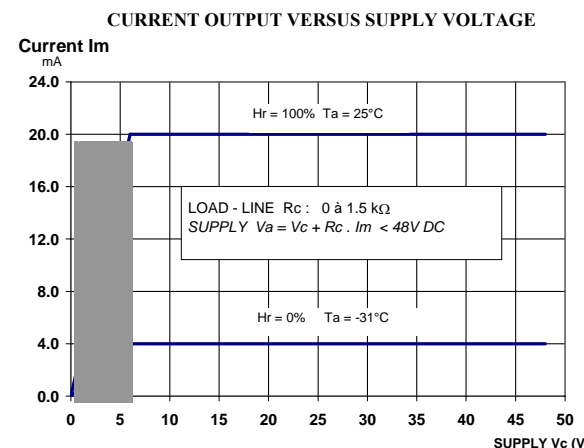
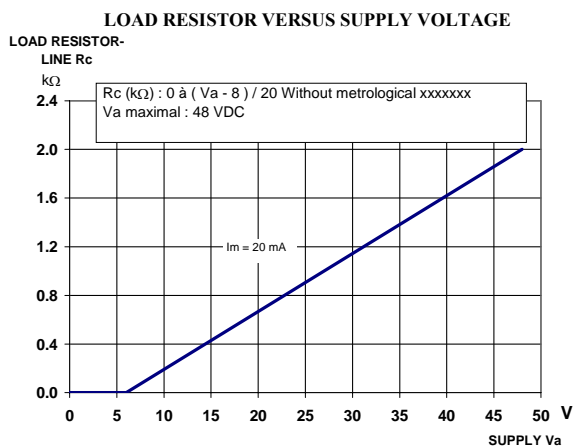
The operating range until 100% RH is insured by a specific treatment (substrate and components impregnation).

TRANSFER FONCTIONS



RESISTOR VERSUS TEMPERATURE

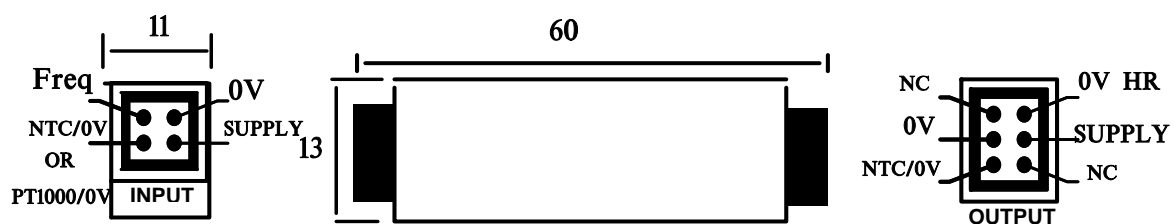
Sensor NTC : See M-TUCN.33N
Sensor platinum 1K : See M-TUCN.33P



ELECTRICAL AND MEASURING SPECIFICATIONS

Measured or influencing values	Definition associated to probe F-TUCN.33N	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 references conditions		3		% RH
	Linearity error (2 % RH to 98 % RH)			2	% RH
	Time constant Fast version R	0.20 ↑	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	
<i>Output signal</i> mA / %RH	Measurement DC current – voltage supply Linearly variable as a function of the relative humidity level RH	4.0	→	20.0	mA
<i>Transfer</i>	I (mA) = 4.0 + 0.16 . % RH Standard calibration 12 % RH 55 % RH 97.5 % RH Sensitivity (33 % RH à 76 % RH)	5.60 12.5 19.0	5.92 12.8 19.6 0.16	6.24 13.1 20.2	mA mA mA mA/%RH
<i>Electrical power supply</i>	Supply voltage Vcc Consumption-measurement current	7.5 4.0	→ →	40 20.0	V mA
<i>Stability</i>	Instantaneous modulation (noise) Sensitivity to power supply voltage (Vcc) Sensitivity to line resistance – charge Rc Thermal sensitivity Thermal stability from 0° C to 50° C Line resistance Rc	0.005 0.03 0	0.01 0.005 0.1 0,04 ± 1.5 →	0.05 0.05 1.5 K	% RH %RH/V %RH/KΩ %RH/°C % RH Ohm
Ambient Ta temperature	Range of measurement Ta Accuracy according to reference conditions	- 40 0.25	+ 80 1	+ 100	° C ° C
<i>Output signal</i> Ω / °C	Variable resistance NTC / Ta or PT1000 / Ta Nominal resistive value at 25° C (sensor N) Nominal resistive value at 0° C (sensor P) Maximum current		10 1 0,3		KΩ KΩ mA
<i>Transfer</i>	R = 0.119.e ^{3380 / (T+273)} (sensor N) R = 1000 + 3913T – 0,6.10 ⁻³ T ² (sensor P)				Ω Ω
Temperature range	Long term storage Specified operating range	- 50 - 30	+ 25 + 25	+ 85 + 85	°C °C

MECHANICAL SPECIFICATIONS - ELECTRICAL CONNECTION



Recept. : Molex milli-grid 79107-7001

Recept. : Molex milli-grid 79107-7002

APPLICATIONS

UNITE DE PRODUCTION DE SYSTEMES INDUSTRIELS

S.A.R.L au capital de 660 000 € RCS Créteil B 433 547 643 Siret 433 547 643 00018 Code NAF 321 C

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DESCRIPTION

The relative humidity and temperature measurement devices are made of two ultra-miniature units having the following functions :

Micro-systems for humidity and temperature measurement ***F-TUCN.33N or P***

These micro-modules based on the *SPSI MSS Bi-Face* concept, are made of a substrate which has two active sides constituting the base of a moulded- sealed module. One of its sides is sensitive to humidity and the other side holds the temperature sensor and all the electronic functions and connection required for the application link (printed circuit, mobile probe).

The cell sensitive to humidity is not a separate component added to the substrate but is directly implemented on it, increasing the reliability by eliminating the use of external wiring conventionally used to connect the sensor to the electronic conditioning.

The surface electrode in contact with moisture is grounded providing shielding against surrounding electrical fields and eliminating the risks of short-circuit during the condensation phase.

For harsh environments, a complementary filter is placed on the sensing side, leading to a response time Lx depending on the protection level.

Micro-system for conditioning-transmission 4-20mA ***H-UTA.32***

This micro-module contains the whole electronic functions composed of a stabilised power supply operating from 6 to 36 V, a unit for acquisition-linearisation and a circuit for signal to frequency conversion derived from the measurement micro-system, which delivers a measurement-supply current according the ***4-20 mA two wires*** technology.

The 4-20 mA conditioning micro-system performances eliminate any metrological error as a function of unspecified and non stabilised supply voltage, of the charge resistance corresponding to the line resistance (wire, connection...) and the charge resistance (appreciation of the current of measurement)

The value of the charge resistance transforming the current of measurement into voltage makes it possible to define a standard of conversion between the relative humidity and the electrical signal of measurement (full scale) according to the user needs.

These two modules probe and converter transmitter are associated to realized a measurement channel. The link between the two modules could reach several tens of meters.

APPLICATIONS

- Automotive
- Air conditioning with very short response time (0.2 sec.)
- Home appliances
- Ground-based or airborne meteorology
- Food production
- Pharmacy