Innovative Sensor Technology

physical. chemical. biological.

HYT 271/939/221

Digital modules for low humidity and temperature

Optimal for dew point monitoring

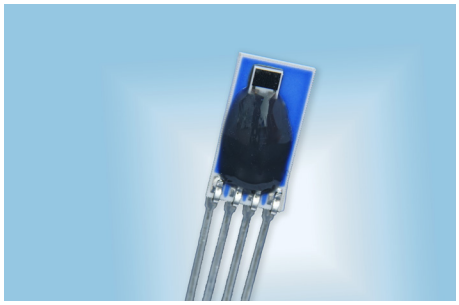
Benefits & Characteristics

- Very stable under low humidity conditions
- Highly accurate relative humidity and temperature measurement
- Custom assembly and housing options
- Simple system integration with digital signal outputs
- Custom housing and assembly options for compact sensor solutions

The HYT humidity module family

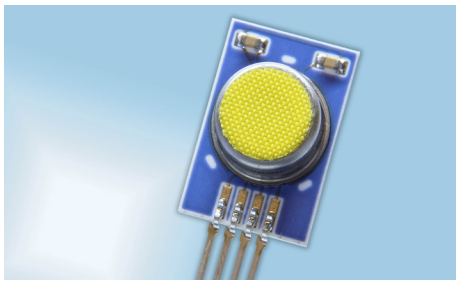
HYT 271

This planar module with a fast response time allows for optimal positioning of the sensor and is therefore favored by manufacturers of HVAC transmitters, monitoring and analytical equipment.



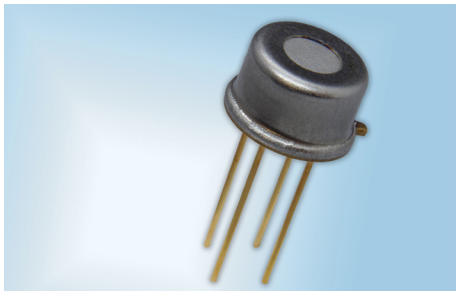
HYT 221

The round stainless-steel casing can easily be fitted into housing openings and sealed against a wall with the use of an O-Ring. The hydrophobic/oleophobic PTFE membrane filter protects the sensor from dust and liquids while providing a high dynamic responsiveness.



HYT 939

This mechanically robust module with a standard TO39 housing is easy to integrate into various flow cells and probes. The welded cap with a stainless steel mesh filter and glass sealed wires is pressure-tight up to 16 bar.



Custom HYT Modules

The modular design of HYT allows for high flexibility – the humidity sensor, its calibration and assembly can easily be adapted to develop tailor-made modules fulfilling individual requirements.

Technical Data

	Humidity			Temperature		
Accuracy:	±0.5 % RH at +23 °C (0 % RH to 5 % RH) ± 1 % RH at + 23 °C (5 % to 10 % RH) See Fig.1 for typical accuracies in the temperature measuring range. Custom specific alternatives available.			±0.2 °C (0 °C to +60 °C)		
Reproducibility:	±0.2 % RH			±0.1 °C		
Resolution:	0.03 % RH			0.015 °C		
Response time t_{63}[1]:	HYT271	HYT221	HYT939	HYT271	HYT221	HYT939
	< 4 s	< 10 s	< 10 s	< 5 s	< 10 s	< 10 s
Long-term drift:	< 0.5 % RH/a (at 23 °C and 0 % RH to 10 % RH in synthetic air) Exposure to VOCs can lead to higher values. Please read HYT application note for more details.			< 0.05 °C/a		
Measurement principle:	Capacitive polymer humidity sensor			PTAT (integrated)		

Measuring temperature range[2]:	0 °C to 50 °C
Measuring humidity range[2]:	0 % RH to 10 % RH Please refer to HYT application note for a procedure after exposure to higher humidity or condensation.
Hysteresis:	< ±1 % RH at 25 °C
Operating voltage:	2.7 V to 5.5 V
Current consumption (nominal):	< 22 µA at 1 Hz measuring rate; 850 µA max.
Current consumption (sleep):	< 1 µA
Digital interface:	I²C, standard address 0x28, or custom alternative(s)
Operating voltage (limits):	-0.3 V to 6 V
Operating range[3]:	-40 to 125 °C, 0 to 100 % RH Non-condensing. For usage in condensing environment please refer to HYT application note.
Storage conditions:	+5 to 30 °C, < 30 % RH Please refer to HYT application note for procedure after exposure to condensing conditions.

Typical accuracies in the standard application range

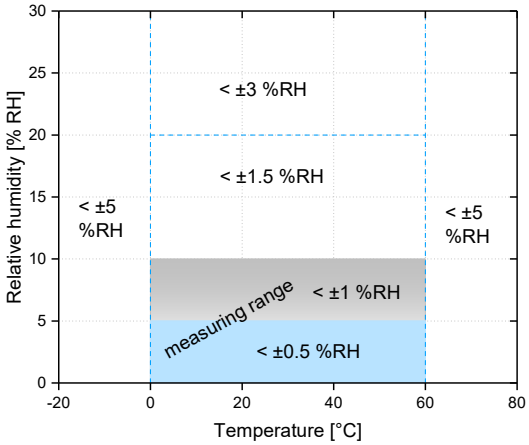


Fig. 1: Typical tolerance of the % RH measurement

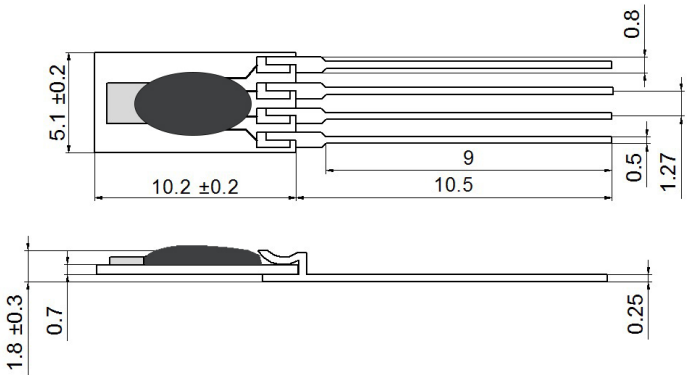
[1]The response time is often measured for increasing humidity steps, whereas physics predicts that decreasing humidity leads to generally far longer response times for capacitive humidity sensors. IST AG always measures response times for decreasing humidity values, since this is the worst case.

[2]In the specified range the modules measure within typical accuracies demonstrated in Fig.1. At T > +50°C and/or high humidity over a longer period, an offset in the % RH signal can occur. Measuring with this calibration at 25 to 35°C operational temperature, a dew point range from -40°C to 0°C can be analysed with +/-4°C accuracy.

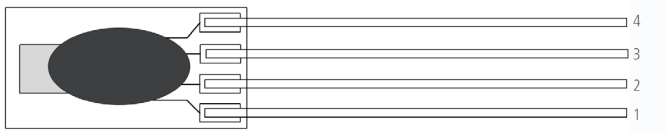
[3]Specifies the temperature range the modules work without permanent damage. Operation/storage above +50 °C can lead to an offset in the % RH signal

HYT 271

Mechanical Dimensions



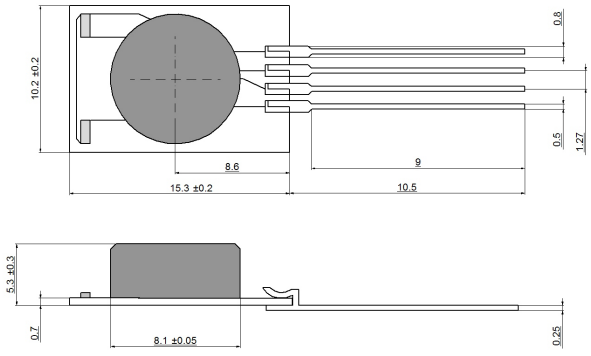
Pin Assignement



1	2	3	4
SDA	GND	VCC	SCL

HYT 221

Mechanical Dimensions



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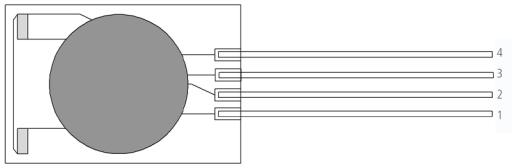
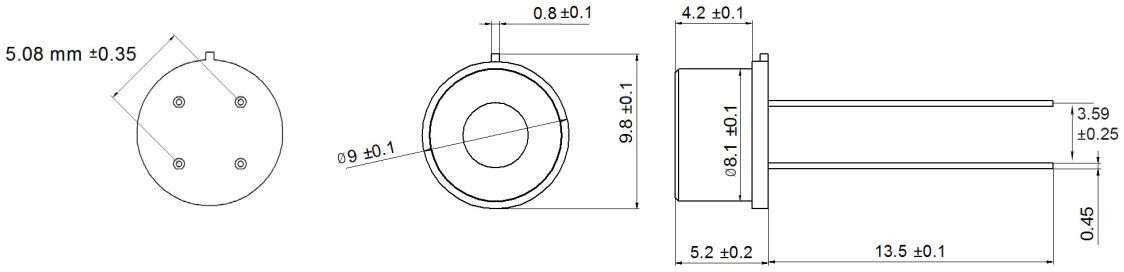


1	2	3	4
SDA	GND	VCC	SCL

HYT 939

Mechanical Dimensions



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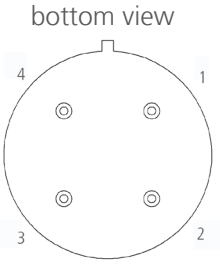

1	2	3	4
SCL	VCC	GND	SDA

Exposure to >10 % RH

These modules are highly accurate in the range between 0.1 – 10 % RH. To take advantage of the outstanding performance at low humidity conditions, follow the guidelines below:

Opening the package exposes the sensor to the environment and ambient humidity conditions. Consequently, the sensitive layer (polymer) absorbs water molecules from the surrounding atmosphere due to its hygroscopic properties. Returning to very low humidity conditions, this effect can initially result in a positive offset of the % RH output (up to 1.5 % RH, ≈30°C dewpoint increase).

The underlying physics of that effect is a hysteresis behavior of the humidity sensor. It is a result of the time required by the sensitive layer to settle in extreme conditions (high or low humidity) and to recover when conditions are returned to normal. It means, that the % RH value depends on the past and current ambient humidity. State of the art humidity sensor basic knowledge is that hysteresis behavior is temperature dependent.
The module is calibrated for extremely low humidity conditions. Exposure to conditions >10 % RH may result in an increase of the humidity reading due to water absorption. Returning into low humidity conditions, the module may show too high % RH values (out of the specified accuracy). The recovery time depends on the ambient temperature and humidity conditions.

Reconditioning procedure for too high humidity readout:
If a humidity module shows a positive offset, the following reconditioning procedure brings the sensor back into its initial calibration state.

- Baking the whole assembly at 80 °C for 72 h (<2 % RH)
- Afterwards, store the sensors in low humidity conditions (<10 % RH).

For packaging only use tested materials and procedure.

After a maximum storage time of 3 months, it is recommended to perform the reconditioning procedure described above.

Order Information

Version	HYT 271	HYT 221	HYT 939
Order code	153385	on request	153398

Additional Documents

	Document name
Application Note	AHHYTM_E
Datasheet HYT Modules	DHHYT_Modules_E

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