HC1000/ HC101

High End Humidity Sensors

Typical Applications

hand held instruments
data loggers
meteorology
HVAC
medical applications

Features

working range 0-100 %RH
linearity error < 1.5 %RH
wettable
long term stable
highest repeatability
good resistance to pollutants

Technical Data

| Sensor	HC1000	HC101
Nominal capacitance C_{76} (at 20 degC)	500 ± 50 pF	200 ± 20 pF
Sensitivity	1.40 pF / %RH	0.56 pF / %RH
Working range humidity	0 ... 100 %RH	
temperature	-40 ... +120 degC	
Linearity error (0 ... 98 %RH)	< ± 1.5 %RH	
Hysteresis (at 70 %RH)	1.7 ± 0.15 %RH	
Response time t_{90}	< 6 sec.	
Temperature dependence [%RH / degC]	$\Delta RH = g * RH * (T - 20)$	g = -0.003 ± 10 %
Long term stability at 20-30 degC /20-80 %RH	drift < 1 % / year	
Loss tangent	< 0.05 typical	
Maximum supply voltage (no DC voltage)	5 V max (UPP)	
Maximum DC voltage	<5 mV	
Operating frequency	10 ... 100 kHz, recommended 20kHz	
Material connection leads	phosphor bronze with tin/lead coating	

Characteristics

The average increase of capacitance over the working range is 140 pF for the HC1000 and 56 pF for the HC101. For the range of 0–98 %RH, linear approximation is possible, errors will be lower than ± 1.5 %RH.

The sensor characteristic is described by the following linear formula:

$C(RH) = C_{76} * [1 + HK * (RH - 76)]$
with HK = 2800 ± 120 ppm / %RH
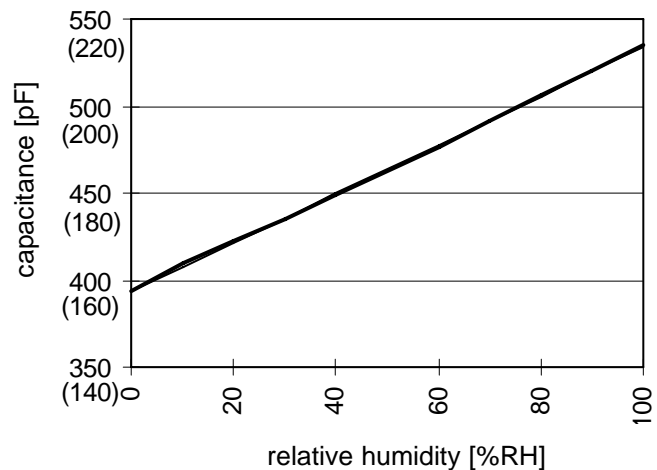
For high accuracy requirements, the sensitivity is described by the following polynom:

$$C(RH) = C_{76} * [1 + HK * (RH - 76)+K(RH)]$$

where:

$K(RH) = A_1*RH+A_2*RH^{1.5}+A_3*RH^2 +A_4*RH^{2.5}$
$A_1=2.1159E^{-3}$ $A_2=-7.6305E^{-4}$
$A_3=8.9470E^{-5}$ $A_4=-3.4130E^{-6}$

Working Range

The working range for the humidity sensors HC1000/HC101 is shown in terms of humidity / temperature limits.

Although the sensors would not fail beyond the limits, the specification is guaranteed only within the working range.
In applications with high humidity at high temperature the time factor shall be considered.

Dimensions (mm)

HC1000

HC1000/H

HC1000/L

HC101

HC101/H
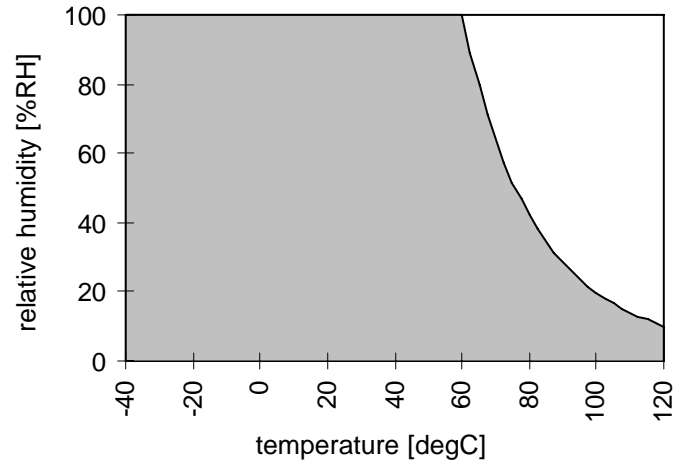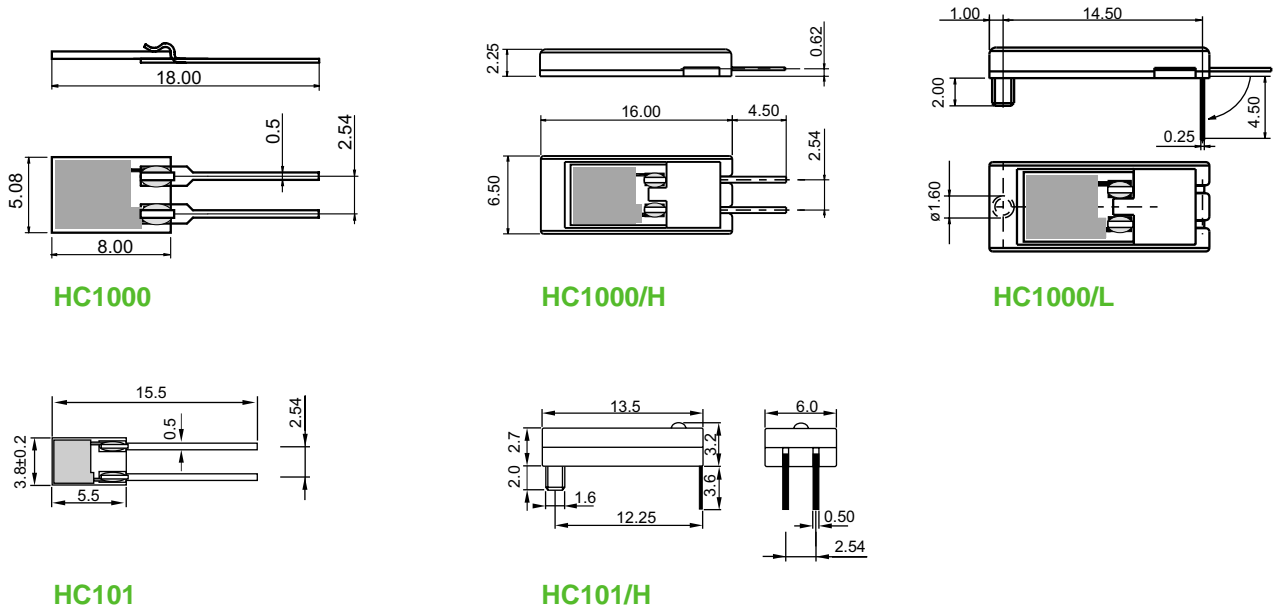
Ordering Guide

| MODEL	TYPE	
HC	capacitive humidity sensor 500 pF	**(1000)**
	capacitive humidity sensor 500 pF with PC housing	**(1000/H)**
	capacitive humidity sensor 500 pF with PC housing for direct PCB mounting	**(1000/L)**
	capacitive humidity sensor 200 pF	**(101)**
	capacitive humidity sensor 200 pF with PC housing for direct PCB mounting	**(101/H)**
HC		

Handling Instructions

Cleaning

If necessary, the HC sensors can be cleaned by shaking them in pure isopropylalcohol, industrial grade. Do not touch or rub the sensor surface. After cleaning with isopropylalcohol, immerse them in water and let them dry.

Test Circuitry

This test circuitry is in fact an oscillator. Changes of the sensor capacitance modify the frequency of the output signal. The operating frequency can be selected by the R1[1] resistor (trimmer).

For example, an operating frequency of appr. 50kHz at 76 %RH can be set with the following values of R1:

HC101 HC103	R1=appr. 56kΩ...68kΩ
HC104	R1=appr. 68kΩ
HC200	R1=appr. 51kΩ...75kΩ
HC1000	R1=appr. 22kΩ...27kΩ
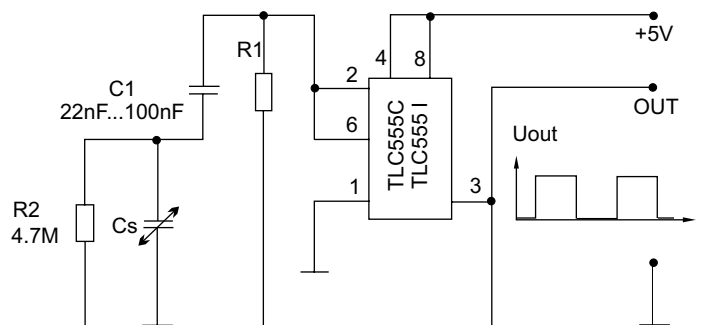
[1] Please note that the exact value of R1 depends on the tolerances of Humidity Sensors, the PCB Layout, and the TLC555 tolerances.

Calibration

Each sensor is tested at reference conditions for humidity. The calibration point for the humidity circuitry should be chosen according to the application and typical operation range. If the circuitry has no linearisation we recommend calibration at 33 and 76%. High humidity levels should not be chosen, as wetting of the element can cause misreadings during the calibration procedure.

For reliable check the E+E special calibration set is available. (refer to data for „calibration set")

As a professional alternative for check and calibration we recommend the use of the E+E high accuracy humidity generator HUMOR10/10S.
(refer to data for „HUMOR10/10S")