# SOC-H1T Outdoor Humidity Transmitter and Temperature Sensor

## Features

- Replaceable sensor element
- Outdoor humidity and temperature measurement
- Minimum and maximum value memory
- 0…10 V, 0…20 mA or 2…10 V, 4…20 mA output selectable with jumpers
- Optional alternative signal ranges programmable
- Selectable averaging signal
- Optional LCD display (OPC-S) or external display (OPU-S)
- Status LED



## Applications

- Outdoor humidity & temperature measurement for HVAC applications.
- Recording of minimum and maximum values for critical environments
- Supervision of critical humidity and temperatures

## Humidity transmitter

A unique capacitive sensor element is used for measuring relative humidity. The applied measuring technology guarantees excellent reliability and long term stability. The microprocessor samples the humidity once per second. It calculates an averaging signal over a preset number of seconds and generates the output signal. Standard output signal range and types may be selected by jumpers. Standard signal ranges are: 0…10 VDC, 0…10 VDC, 4…20 mA and 0…20 mA. Other ranges can be defined by using a programming tool (OPU-S or OPC-S). A version with display is possible by ordering the integrated display accessory OPC-S.

### Minimum and maximum values

Using the programming tool, the user has the option to read out and reset minimum and maximum values. The minimum and maximum values may as well be used as output signals. The minimum and maximum values are saved into the EEPROM and are available after a power interruption.

## Temperature sensor

The sensor measures the temperature by use of a NTC, PT, or NI-sensing element. The sensing element is either a glass packed thermistor with a negative temperature coefficient, a platinum film or a nickel thin layer based probe. Its resistance changes according to the temperature. The change follows a specified curve. Contact our sales department for curves not yet listed below.

# Ordering

Per default a sensor element with 3% RH accuracy, a NTC 10kΩ temperature sensor and a PG9 cable gland for cables ∅ 4 – 8 mm (AWG 6 – 1) is included. Contact your local sales contact to order sensing elements with different accuracies and temperature curves or if you prefer a sensor with conduit connectors or a built in display module.

## Humidity transmitter and temperature sensor

| Item name | Item code | Description/option |
|---|---|---|
| SOC-H1Tn10-A3-1 | 40-30 0155 | Signal converter for humidity sensor with temperature probe, incl. cable gland AMC-1 and a temperature sensor element AES3-HTn10-A3 |

## Sensor element (for replacement only)

| Item name | Item code | Humidity sensor | Temperature Sensor |
|---|---|---|---|
| AES3-HTn3 | 40-50 0117-x | -x:<br>2% rH 40-50 00XX-2<br>3% rH 40 50 00XX-3<br>5% rH 40 50 00XX-5 | NTC 3kΩ at 25°C (77°F) $B_{25/50}$ 3935 |
| AES3-HTn10 | 40-50 0118-x | | NTC 10kΩ at 25°C (77°F) $B_{25/50}$ 3935 |
| AES3-HTn11 | 40-50 0119-x | | NTC 10kΩ at 25°C (77°F) $B_{25/50}$ 3630 |
| AES3-HTn12 | 40-50 0127-x | | NTC 10kΩ at 25°C (77°F) $B_{25/50}$ 3380 |
| AES3-HTn20 | 40-50 0120-x | | NTC 20kΩ at 25°C (77°F) $B_{25/50}$ 4200 |
| AES3-HTn100 | 40-50 0121-x | | NTC 100kΩ at 25°C (77°F) $B_{25/50}$ 4200 |
| AES3-HTp1 | 40-50 0123-x | | PT100 EN60751 |
| AES3-HTp2 | 40-50 0124-x | | PT1000 EN60751 |
| AES3-HTk5 | 40-50 0125-x | | NI1000, 5000 ppm/K |

## Accessories

| Item name | Item code | Description/option |
|---|---|---|
| OPC-S | 40-50 0029 | Built in display and programming module |
| OPU-S | 40-50 0006 | External display module |
| AMS-1 | 20-10 0116 | Weather shield to protect the sensor element |
| AMC-2 | 40-50 0074 | Conduit connector NPT 1/2 |

# Technical Specification

**Warning! Safety advice!** This device is intended to be used for comfort applications. Where a device failure endangers human life and/or property, it is the responsibility of the owner, designer and installer to add additional safety devices to prevent or detect a system failure caused by such a device failure. The manufacturer of this device cannot be held liable for any damage caused by such a failure. Failure to follow specifications and local regulations may endanger life, cause equipment damage and void warranty.

| | | |
|---|---|---|
| Power supply | Operating voltage<br>Transformer | 24 V AC 50/60 Hz ± 10%, 24 VDC ± 10%<br>SELV to HD 384, Class II, 48 VA max. |
| | Power consumption | Max. 2 VA |
| | Terminal connectors | For wire 0.34…2.5 mm² (AWG 24…12) |
| Sensing probe | Humidity sensor:<br>Range<br>Measuring accuracy<br>Hysteresis<br>Repeatability<br>Stability | Capacity sensor element<br>0…100 % rH<br>See figure 1<br>± 1%<br>± 0.1%<br>< 0.5% / year |
| | Thermistor:<br>Accuracy: -40…0°C (-40…32°F):<br>0…50°C (32…122°F):<br>50…70°C (122…158°F): | <br><br>0.5 K<br>0.2 K<br>0.5 K |
| | Platinum-film:<br>Range: (Probe only)<br>Accuracy | PT according EN 60751<br>-40…70 °C (-94…158 °F)<br>EN 60751, Class B |
| | Nickel thin layer:<br>Range: (Probe only)<br>Accuracy | 1000 Ω at 0 °C, 5000 ppm/K<br>-40…70 °C (-76…158 °F)<br>DIN 43760 |
| Signal outputs | Analog outputs<br>Output signal<br>Resolution<br>Maximum load | <br>DC 0-10 V or 0…20 mA<br>10 Bit, 9.7 mV, 0.019.5 mA<br>Voltage: ⩾1kΩ Current: ⩽250Ω |
| Environment | Operation<br>Climatic conditions<br>Temperature<br>Humidity | To IEC 721-3-3<br>class 3 K5<br>-40…70 °C (-40…158 °F)<br><95% R.H. non-condensing |
| | Transport & storage<br>Climatic conditions<br>Temperature<br>Humidity<br>Mechanical conditions | To IEC 721-3-2 and IEC 721-3-1<br>class 3 K3 and class 1 K3<br>-40…80 °C (-40…176 °F)<br><95% R.H. non-condensing<br>class 2M2 |
| Standards | CE conformity<br>EMC directive<br>Low voltage directive | <br>2014/30/EU<br>2014/35/EU |
| | Product standards automatic electrical controls for household and similar use | EN 60 730 –1 |
| | Electromagnetic compatibility for domestic and industrial sector | Emissions: EN 60 730-1<br>Immunity: EN 60 730-1 |
| | Degree of protection to EN 60529 | IP63 if correctly mounted with AMS-1 |
| | Safety class | III (IEC 60536) |
| General | Housing materials Cover, back part<br>Filter material | PC+ABS (UL94 class V-0)<br>PTFE coated 1µm pores |
| | RoHS compliant according to | 2011/65/EU |
| | Dimensions (H x W x D): | 150 x 91 x 47mm (5.9” x 3.7” x 1.9”) |
| | Weight (including package) | 220 g (7.8 oz.) |

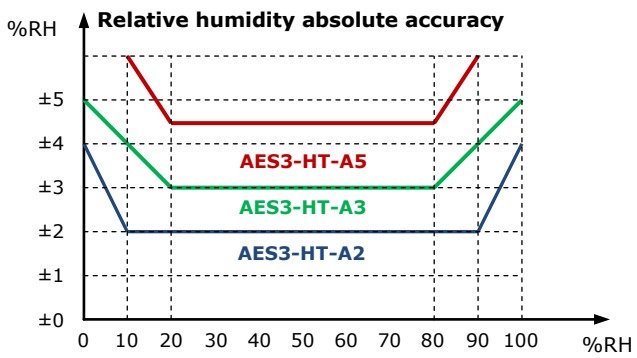
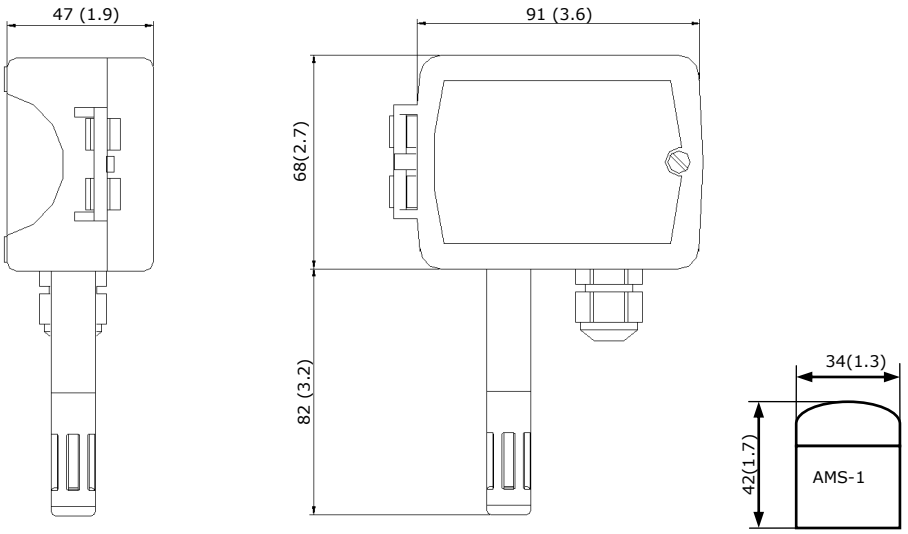



Figure 1: Max RH-tolerance at 25°C (77°F) per sensor type

### Dimensions mm (inch)




## Mechanical Design and Installation

The unit consists of two parts: (a) The back part with the probe and (b) the cover.

### Warning about storage, packaging and usage environment

The sensing part is a polymer, which measures the humidity in the ambient air. For proper sensor operation some mandatory precautions need to be taken during storage, packaging and usage.
The transmitter and its sensing element should not be packaged, stored or used in out-gassing plastic materials, which could cause sensor contamination. In particular, it is recommended not to use any glue or adhesive tapes (Sellotape, Scotch-Tape, Tesa-Film, etc.)within the package or close proximity of the sensor. Foamed materials often cause contamination problems and should not be used to package the transmitter. Best packaging material is a simple cardboard box or a deep-drawn plastic case in a cardboard box.

### Mounting instruction / replacing the sensor element

See installation sheet no. 70-000530 (www.vectorcontrols.com)

# Configuration Parameters

The transmitter can be adapted to fit perfectly into any application by adjusting the software parameters. The parameters are set with the operation terminals OPU-S or OPC-S. The OPU-S may also be used as remote indicator.

### Input configuration

| Parameter | Description | Range | Default |
|---|---|---|---|
| IP 00 | H1: Show percent | ON, OFF | ON |
| IP 01 | H1: Samples taken for averaging control signal | 1…255 | 10 |
| IP 02 | H1: Calibration | -10…10% | 0 |

### Output configuration

| Parameter | Description | Range | Default |
|---|---|---|---|
| OP 00 | AO1: Humidity: Configuration of output signal:<br>0 = Feedback humidity input,<br>1 = Feedback humidity minimum value<br>2 = Feedback humidity maximum value | 0 – 2 | 0 |
| OP 01 | AO1: Humidity: Minimum limitation of output signal | 0 – Max % | 0% |
| OP 02 | AO1: Humidity: Maximum limitation of output signal | Min – 100% | 100% |

### Output signal configuration

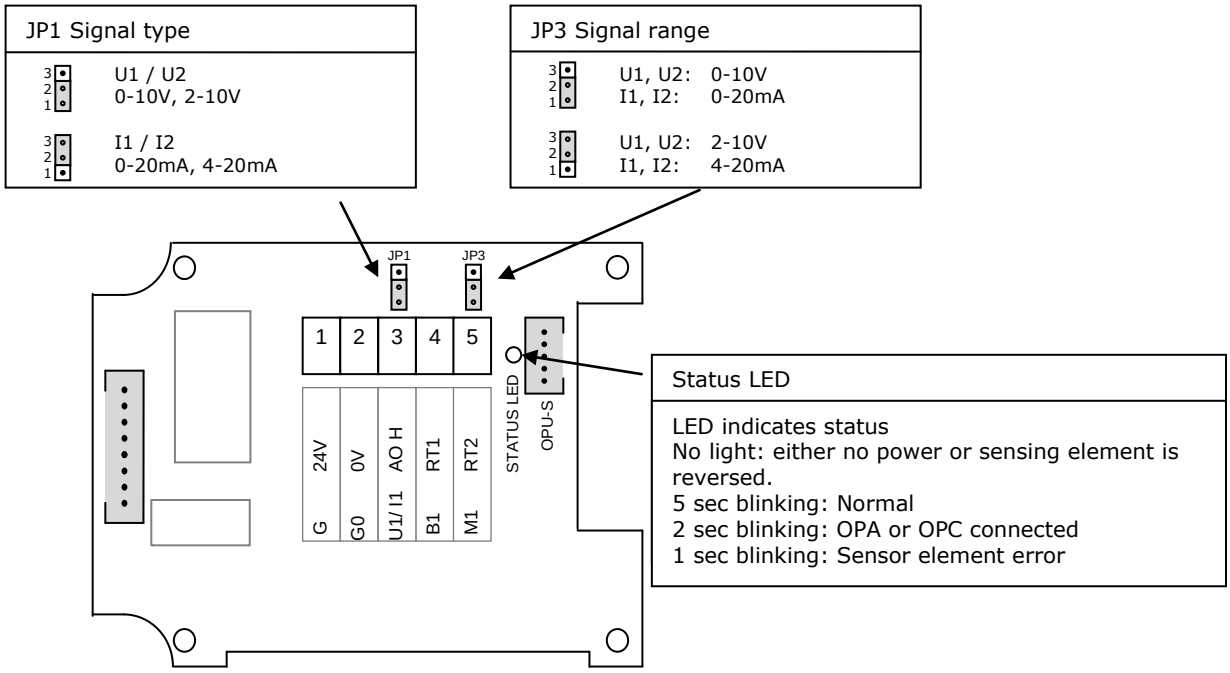
The analog output signal type may be configured with a jumper for 0-10 VDC or 0-20 mA control signals. The jumpers are located next to the terminal connector of each analog output. See table below for jumper placement. The factory setting is to 0-10 VDC.

| Signal Type | JP1 |
|---|---|
| 0 – 10 V | (1-2) |
| 0 – 20 mA | (2-3) |

The signal range may be set with JP3 for both analog outputs. JP3 will only operate if the output range specified with OP01 and OP02 is left at the default position of 0…100%. With any other setting the position of JP3 has no influence and the range defined with the output parameters applies.

| Signal Range | JP3 |
|---|---|
| 0 – 10 V, 0 – 20 mA | (1-2) |
| 2 – 10 V, 4 – 20 mA | (2-3) |

### Jumper Settings



## Resistance table for thermistors (NTC)

| °C | °F | Tn3 [kΩ] | Tn5 [kΩ] | Tn10 [kΩ] | Tn11 [kΩ] | Tn12 [kΩ] | Tn20 [kΩ] | Tn100 [kΩ] |
|---|---|---|---|---|---|---|---|---|
| $B_{25/50}$ | | 3935 | 3470 | 3935 | 3630 | 3380 | 4200 | 4200 |
| $B_{25/85}$ | | 3974 | 3535 | 3974 | 3687 | 3435 | 4260 | 4260 |
| $B_{25/100}$ | | 3988 | 3526 | 3988 | 3715 | 3455 | 4285 | 4285 |
| Signal type → | | NTC 3k | NTC 5k | NTC 10k-2 | NTC-10k-3 | | NTC 20k | NTC 100k |
| -50 | -58 | 201,1 | 161,9 | 670,2 | 441,3 | 329,2 | 1711 | 8558 |
| -40 | -40 | 100,9 | 89,49 | 336,4 | 239,7 | 188,4 | 814,0 | 4095 |
| -30 | -22 | 53,09 | 54,07 | 177,0 | 135,3 | 111,3 | 415,6 | 2077 |
| -20 | -4 | 29,12 | 33,21 | 97,08 | 78,91 | 67.74 | 220,6 | 1105 |
| -10 | 14 | 16,60 | 21,07 | 55,33 | 47,54 | 42.45 | 122,4 | 612,4 |
| 0 | 32 | 9,795 | 13,73 | 32,65 | 29,49 | 27.28 | 70,20 | 351,0 |
| 10 | 50 | 5,969 | 9,041 | 19,90 | 18,79 | 17.96 | 41,56 | 207,8 |
| 20 | 68 | 3,747 | 6,064 | 12,49 | 12,26 | 12.09 | 25,34 | 126,7 |
| 25 | 77 | 3,000 | 5,000 | 10,00 | 10,00 | 10,00 | 20,00 | 100,00 |
| 30 | 86 | 2,417 | 4,139 | 8,057 | 8,194 | 8,313 | 15,88 | 79,43 |
| 40 | 104 | 1,598 | 2,875 | 5,327 | 5,592 | 5,828 | 10,21 | 51,06 |
| 50 | 122 | 1,081 | 2,032 | 3,603 | 3,893 | 4,161 | 6,718 | 33,60 |
| 60 | 140 | 0,746 | 1,463 | 2,488 | 2,760 | 3,021 | 4,518 | 22,59 |
| 70 | 158 | 0,525 | 1,069 | 1,751 | 1,990 | 2,229 | 3,100 | 15,50 |
| 80 | 176 | 0,376 | 0,792 | 1,255 | 1,458 | 1,669 | 2,168 | 10,84 |
| 90 | 194 | 0,275 | 0,601 | 0,915 | 1,084 | 1,266 | 1,542 | 7,707 |
| 100 | 212 | 0,203 | 0,464 | 0,678 | 0,817 | 0,973 | 1,114 | 5,571 |
| 110 | 230 | 0,536 | 0,354 | 0,512 | 0,624 | 0,752 | 0,818 | 4,092 |
| 120 | 248 | 0,123 | 0,272 | 0,410 | 0,481 | 0,605 | 0,609 | 3,046 |
| 130 | 266 | 0,097 | 0,212 | 0,322 | 0,380 | 0,487 | 0,460 | 2,298 |
| 140 | 284 | 0,077 | 0,169 | 0,257 | 0,300 | 0,395 | 0,351 | 1,755 |
| 150 | 302 | 0,063 | 0,137 | 0,210 | 0,240 | 0,325 | 0,271 | 1,356 |

## Resistance table for platinum film and NI1000 elements

| °C | °F | Tp1 [Ω] | Tp2 [Ω] | Tk5 [Ω] | Tk6 [Ω] |
|---|---|---|---|---|---|
| | | PT100<br>DIN 60751 | PT1000<br>DIN 60751 | NI1000,<br>K=5000 | NI1000<br>K=6180 |
| -50 | -58 | 80,28 | 803,0 | 790,88 | 742,55 |
| -40 | -40 | 84,27 | 843,0 | 830,84 | 791,31 |
| -30 | -22 | 88,22 | 882,0 | 871,69 | 841,46 |
| -20 | -4 | 92,16 | 922,0 | 913,48 | 892,96 |
| -10 | 14 | 96,09 | 961,0 | 956,24 | 945,82 |
| 0 | 32 | 100,00 | 1000,0 | 1000 | 1000 |
| 10 | 50 | 103,90 | 1039,0 | 1044,79 | 1055,52 |
| 20 | 68 | 107,79 | 1078,0 | 1090,65 | 1111,36 |
| 30 | 86 | 111,67 | 1117,0 | 1137,62 | 1170,56 |
| 40 | 104 | 115,54 | 1155,0 | 1185,71 | 1230,11 |
| 50 | 122 | 119,40 | 1194,0 | 1234,98 | 1291,05 |
| 60 | 140 | 123,24 | 1232,0 | 1285,45 | 1353,40 |
| 70 | 158 | 127,07 | 1270,5 | 1337,15 | 1417,21 |
| 80 | 176 | 130,89 | 1309,0 | 1390,12 | 1482,50 |
| 90 | 194 | 134,70 | 1347,0 | 1444,39 | 1549,34 |
| 100 | 212 | 138,50 | 1385,0 | 1500,00 | 1617,79 |
| 110 | 230 | 142,29 | 1423,0 | 1556,98 | 1687,89 |
| 120 | 248 | 146,06 | 1460,5 | 1615,37 | 1759,72 |
| 130 | 266 | 149,80 | 1498,0 | 1675,19 | 1833,35 |
| 140 | 284 | 153,60 | 1536,0 | 1736,48 | 1908,87 |
| 150 | 302 | 157,30 | 1573,0 | 1799,27 | 1986,35 |
| 160 | 320 | 161,05 | 1610,5 | 1863,60 | 2065,89 |
| 170 | 338 | 164,75 | 1647,5 | 1929,50 | 2147,58 |
| 180 | 356 | 168,45 | 1684,5 | 1997,00 | 2231,53 |
| 190 | 374 | 172,15 | 1721,5 | 2066,15 | 2317,83 |
| 200 | 392 | 175,85 | 1758,5 | 2136,96 | 2406,60 |