

SOC-H1T Outdoor humidity transmitter & temperature sensor

Features

- Outdoor humidity and temperature measurement
- Sensor reconditioning function against contamination
- Anti-Creep function for high humidity environments
- Replaceable sensor element
- Minimum and maximum value memory
- 0...10 V, 0...20 mA or 2...10 V, 4...20 mA measuring signals selectable with jumpers
- Optional alternative signal ranges programmable
- Selectable averaging signal
- Optional LCD display (OPC-S) or external display (OPA-S)
- Status LED



Applications

- Outdoor humidity & temperature measurement for heating, ventilation and air conditioning applications
- Recording of minimum and maximum values for critical environments
- Supervision of critical humidity and temperatures
- Measurements in high humidity environments

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, 2...10 VDC, 0...20 mA and 4...20 mA. Other ranges can be defined by using a programming tool (OPA-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.

Safety



DANGER! Safety advice

This device is for use as a humidity transmitter and temperature sensor. It is not a safety device. Where a device failure could endanger human life and property, it is the responsibility of the client, installer and system designer to add additional safety devices to prevent such a device failure. Ignoring specifications and local regulations may cause equipment damage and endangers life and property. Tampering with the device and misapplication will void warranty.

Types and Ordering

Per default a sensor element with 3% RH accuracy, an NTC 10kΩ temperature sensor and a PG9 cable gland for cables Ø 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 with temperature sensor

Product Name	Product No.	Description/Option
SOC-H1Tn10-A3	40-300155	Signal converter for humidity sensor with temperature probe, incl. cable gland AMC-1 and a temperature sensor element AES4-HTn10-A3

Sensor element (for replacement only)

Product Name	Product No.	Description/Option	
AES4-HTn18-Ax	40-500164-x	NTC 1.8kΩ at 25°C (77°F)	B _{25/50} 3470
AES4-HTn3-Ax	40-500160-x	NTC 3kΩ at 25°C (77°F)	B _{25/50} 3935
AES4-HTn10-Ax *	40-500145-x	NTC 10kΩ at 25°C (77°F)	B _{25/50} 3935
AES4-HTn11-Ax	40-500161-x	NTC 10kΩ at 25°C (77°F)	B _{25/50} 3630
AES4-HTn12-Ax	40-500169-x	NTC 10kΩ at 25°C (77°F)	B _{25/50} 3380
AES4-HTn20-Ax	40-500162-x	NTC 20kΩ at 25°C (77°F)	B _{25/50} 4200
AES4-HTn100-Ax	40-500163-x	NTC 100kΩ at 25°C (77°F)	B _{25/50} 4200
AES4-HTp1-Ax	40-500165-x	PT100, 100Ω at 0°C (32°F)	EN60751
AES4-HTp2-Ax	40-500166-x	PT1000, 1kΩ at 0°C (32°F)	EN60751
AES4-HTk5-Ax	40-500167-x	NI1000, 1kΩ at 0°C (32°F) 5000 ppm/K	DIN 43760
AES4-HTk6-Ax	40-500168-x	NI1000, 1kΩ at 0°C (32°F) 6180 ppm/K	DIN 43760

Accuracy option of humidity sensor element:

x = 2: 2% rH

x = 3: 3% rH

x = 5: 5% rH

* Vector Controls standard sensor

Accessories

Product Name	Product No.	Description/Option
OPC-S	40-500029	Built in display and programming module
OPA-S	40-500006	External display module
AMS-1	20-100116	Weather shield to protect the sensor element
AMC-2	40-500074	Conduit connector NPT 1/2

Technical Specifications

Power supply	Operating voltage	24 VAC 50/60 Hz $\pm$ 10%, 24 VDC $\pm$ 10%
	Transformer	SELV to HD 384, Class II, 48 VA max.
	Power consumption	Max. 2 VA
	Terminal connectors	For wire 0.34...2.5 mm ² (AWG 24...12)
Sensing probe	Humidity sensor:	Capacity sensor element
	Range	0...100 % rH
	Measuring accuracy	See figure 1
	Hysteresis	$\pm$ 1%
	Repeatability	$\pm$ 0.1%
	Stability	< 0.5% / year
	Thermistor:	NTC
	Accuracy: -40...0°C (-40...32°F):	0.5 K
	0...50°C (32...122°F):	0.2 K
	50...70°C (122...158°F):	0.5 K
Signal outputs	Platinum-film:	PT according EN 60751
	Range: (Probe only)	-40...70 °C (-94...158 °F)
	Accuracy	EN 60751, Class B
	Nickel thin layer:	1000 Ω at 0 °C, 5000 ppm/K
	Range: (Probe only)	-40...70 °C (-76...158 °F)
	Accuracy	DIN 43760
Environment	Operation	To IEC 721-3-3
	Climatic conditions	class 3 K5
	Temperature (no display) / with display (OPC-S)	-40...70°C (-40...158°F) / 0-50°C (32-122°F)
	Humidity	<95% RH non-condensing
Standards	Transport & storage	To IEC 721-3-2 and IEC 721-3-1
	Climatic conditions	class 3 K3 and class 1 K3
	Temperature (no display) / with display (OPC-S)	-40...80°C (-40...176°F) / 0-50°C (32-122°F)
	Humidity	<95% R.H. non-condensing
	Mechanical conditions	class 2M2
	Degree of protection to EN 60529	IP63 if correctly mounted with AMS-1
General	Safety class	III (EN 60730-1)
	Housing materials	Flame retardant PC+ABS plastic (UL94 class V-0)
	Cover, back part	PTFE coated 1 μ m pores
	Filter material	
Dimensions (H x W x D):	Dimensions (H x W x D):	150 x 91 x 47 mm (5.9 x 3.7 x 1.9 in)
	Weight (including package)	220 g (7.8 oz.)

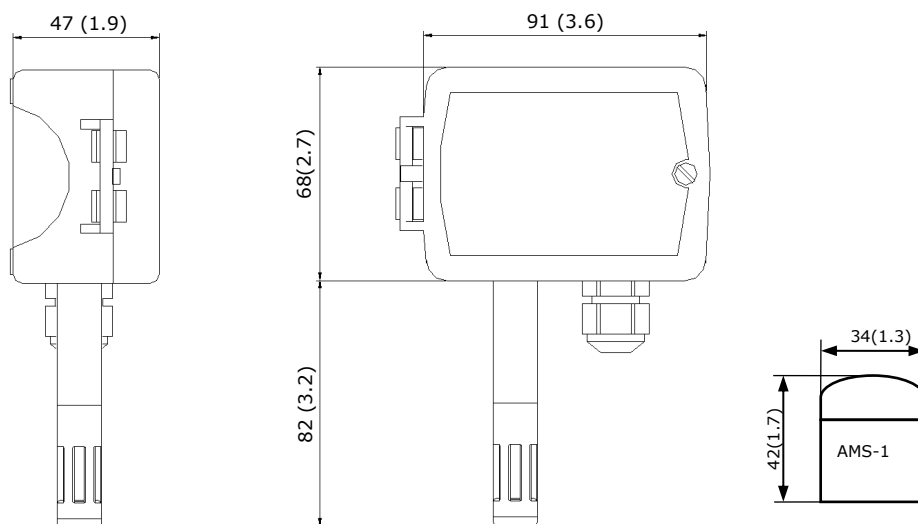
Product testing and certification



Declaration of
Conformity

Information on the conformity of our products can be found on our website
www.vectorcontrols.com on the corresponding product page under "Downloads".

Dimension mm (inch)



Mounting and Installation

Mounting location



Important

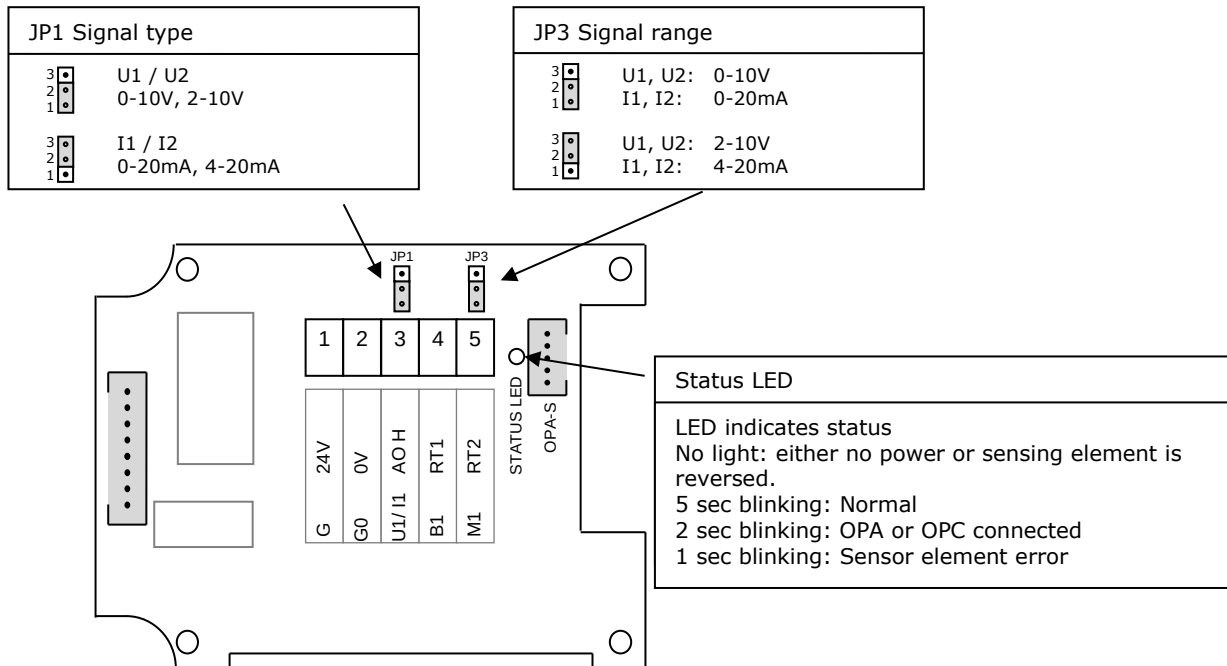
Observe local regulations!

Mounting instruction / replacing the sensor element



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

Jumper settings



Recondition the sensing element



Important

If the sensor has been exposed to chemical contamination or prolonged exposure to very humid climates (> 80%), we recommend running the "Sensor Reconditioning Function" once prior to continuous use to remove contamination and creep effect. This will ensure that the sensor operates at its specified accuracy.



For details on how to activate the sensor reconditioning function see chapter "Sensor reconditioning function" on page 6.

Information about storage, packaging and usage environment



NOTE:

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.

Operation of the –OP type transmitter

Standard display

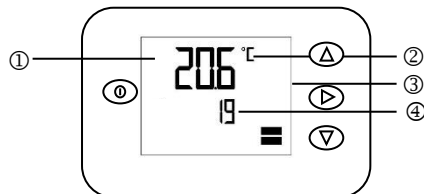
Single input transmitters: The current, minimum or maximum value is shown in the large digits. The small digits indicate the active input (IN 1). The vertical bar on the right side indicates the actual output voltage or current in 10% steps.

Indication and reset of minimum and maximum values

Activate the desired transmitter for dual transmitter by pressing the RIGHT key. Press UP to display maximum values, press DOWN key to display minimum values.

Resetting minimum or maximum values: Pressing either UP or DOWN keys for longer than 3 seconds while the minimum or maximum values are displayed.

Display



Legend:

- 1: 4-digit display of current value, minimum, maximum or control parameter
- 2: Unit of displayed value, °C, °F, % or none
- 3: Vertical display of output or input signal with a resolution of 10%
- 4: 4-digit display of current value or control parameter

Operation keys

Key	Function	Description
①	LEFT key:	Exit from parameter menu
△	UP key:	Display maximum values, Press for more than 2 seconds resets maximum value
▽	DOWN key:	Display minimum values, Press for more than 2 seconds resets minimum value
▷	RIGHT key:	Select transmitter, for transmitters with more than one input.

Sensor

Accuracy of Temperature & Humidity sensor in -H, -T and -HT type AES4-HT-A3 standard sensor

Relative humidity absolute accuracy

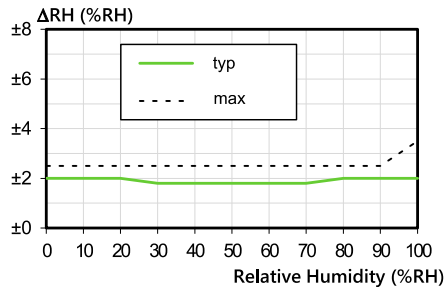


Figure 1: Typical and maximal RH accuracy at 25°C (77°F)

Temperature accuracy

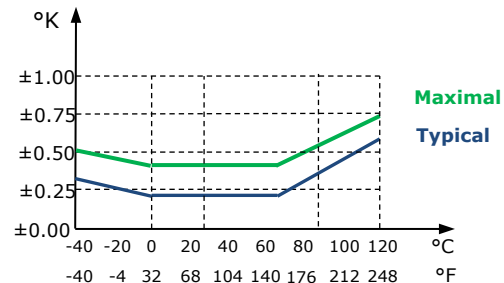


Figure 2: Typical and maximal temperature accuracy

Anti-creep function for devices with AES4 sensors

Ensuring high accuracy of humidity measurement

When the AES4 sensor is exposed to very humid environments for extended periods of time, an anti-creep function is activated in the background to ensure that the sensing element remains accurate. While the anti-creep function is active, the RH value will appear to be frozen for short periods of time.

Sensor reconditioning function

Reconditioning the humidity sensing element eliminates chemical contamination and creep effects on the sensor and ensures that it operates at its specified accuracy.

Reconditioning can be configured to run once, periodically, or only at power-up.

Parameter **IP03** allows for sensor reconditioning of AES4 sensors.

Per default the value of this parameter is 0. If a number is entered the reconditioning procedure is started:

- The sensor is reconditioned for the number of minutes entered in **IP03**. During this time the status LED blinks in 1 second rhythm.
- If no interval is defined with **IP04**, the number in **IP03** is set to 0, once the recondition has started.
- If an interval is set with **IP04**, the value remains unchanged. When the internal counter reaches 0, reconditioning stops. The interval in hours defined in **IP04** determines the waiting time for the next reconditioning. The interval is stopped during a power failure and resumed when power is restored.

Parameter **IP05** allows reconditioning at each power-up. This reconditioning interval is independent of **IP03** or **IP04** settings. At each power up, the sensor will perform the reconditioning function according to the time in minutes defined with **IP05**.



Recommendation

We recommend to set the **IP03** value to **80** minutes recondition time if the sensor is out of its accuracy range.



Note

The display will freeze during reconditioning.



Important

Reconditioning will not continue if interrupted by a power cycle!

Resistance table for thermistors (NTC)

°C	°F	Tn18 [kΩ]	Tn3 [kΩ]	Tn5 [kΩ]	Tn10 [kΩ]	Tn11 [kΩ]	Tn12 [kΩ]	Tn20 [kΩ]	Tn100 [kΩ]
B25/50		3470	3935	3470	3935	3630	3380	4200	4200
B25/85		-	3974	3535	3974	3687	3435	4260	4260
B25/100		-	3988	3526	3988	3715	3455	4285	4285
Signal type →		NTC 1.8k	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	40,58	100,9	89,49	336,4	239,7	188,4	814,0	4095
-30	-22	22,938	53,09	54,07	177,0	135,3	111,3	415,6	2077
-20	-4	13,462	29,12	33,21	97,08	78,91	67,74	220,6	1105
-10	14	8,177	16,60	21,07	55,33	47,54	42,45	122,4	612,4
0	32	5,115	9,795	13,73	32,65	29,49	27,28	70,20	351,0
10	50	3,301	5,969	9,041	19,90	18,79	17,96	41,56	207,8
20	68	2,189	3,747	6,064	12,49	12,26	12,09	25,34	126,7
25	77	1,8	3,000	5,000	10,00	10,00	10,00	20,00	100,00
30	86	1,488	2,417	4,139	8,057	8,194	8,313	15,88	79,43
40	104	1,033	1,598	2,875	5,327	5,592	5,828	10,21	51,06
50	122	0,731	1,081	2,032	3,603	3,893	4,161	6,718	33,60
60	140	0,528	0,746	1,463	2,488	2,760	3,021	4,518	22,59
70	158	0,386	0,525	1,069	1,751	1,990	2,229	3,100	15,50
80	176	0,286	0,376	0,792	1,255	1,458	1,669	2,168	10,84
90	194	0,215	0,275	0,601	0,915	1,084	1,266	1,542	7,707
100	212	0,163	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 DIN 60751	PT1000 DIN 60751	NI1000, K=5000	NI1000 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

Configuration

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

Configuration parameters

The parameters are password protected. The parameters can be changed as follows:

1. Press UP and DOWN key simultaneously for three seconds. The display will indicate CODE.
2. Select a password using UP or DOWN keys. Dial **09** in order to get access to the configuration parameters. Press the RIGHT key after selecting the correct password.
3. Once logged in, choose IP for input configuration or OP for output configuration using UP or DOWN. Press the RIGHT key after selection.
4. The parameters are now displayed. The small digits show the parameter number, the large one its value.
5. Select the parameters with the UP/DOWN keys. Change a parameter by pressing the RIGHT key. The MIN and MAX symbols show up and indicate that the parameter may be modified now. Use UP and DOWN key to adjust the value.
6. After you are done, press RIGHT or LEFT key in order to return to the parameter selection level.
7. Press the LEFT key again so as to leave the menu. The unit will return to normal operation if no key is pressed for more than 5 minutes.
8. The parameters and its values depend on the transmitter. Please use the respective datasheet for the list of parameters.

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
IP 03	Duration of the AES4-HT sensor reconditioning. This value will be cleared if periodic reconditioning is not active. It will remain if periodic reconditioning is enabled. 0: Not active	0-240 min	0 (not active)
IP 04	Interval period for AES4-HT sensor reconditioning 0: Periodic reconditioning disabled 1-240: Period reconditioning enabled (repeats every xxx hours)	0-240 hours	0 (not active)
IP 05	Power up reconditioning for AES4-HT sensor. The sensor is reconditioned each time it is power up. Periodic reconditioning settings have no effect. 0: Not active.	0-240 min	0 (not active)

Output configuration

Parameter	Description	Range	Default
OP 00	AO1: Humidity: Configuration of output signal: 0 = Feedback humidity input, 1 = Feedback humidity minimum value 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



For jumper settings see chapter "Jumper settings" on page 4.

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