Duct sensor Humidity / Temperature

Active sensor (0...10 V) for measuring the relative or absolute humidity and temperature in duct applications. Instead of the humidity signal, the enthalpy or the dewpoint can be selected as an output signal. NEMA 4X / IP65 rated enclosure.

5-year warranty

Type Overview

Type	Output signal active humidity	Output signal active temperature
22DTH-51M	0...5 V, 0...10 V	0...5 V, 0...10 V

Technical data

Electrical Data	Nominal voltage	AC/DC 24 V
	Remark about nominal voltage range	AC 21.6...26.4 V / DC 13.5...26.4 V
	Power consumption AC	0.8 VA
	Power consumption DC	0.4 W
	Electrical connection	Pluggable spring loaded terminal block max. 2.5 mm²
	Cable entry	Cable gland with strain relief ø6...8 mm (1/2" NPT conduit adapter included)
Functional Data	Sensor technology	polymer capacitive sensor with stainless steel wire mesh
	Application	air
	Multirange	4 measuring ranges selectable
	Voltage output	2 x 0...5 V, 0...10 V, min. resistance 10 kΩ
	Output signal active note	output 0...5/10 V with jumper adjustable
Measuring Data	Measured values	relative humidity Absolute humidity Dew point Enthalpies Temperature
Specification Temperature	Measuring range	Active sensor: range selectable Attention: max. measuring temperature is restricted by max. fluid temperature (see Safety data)

Setting	Range [°C]	Range [°F]	Factory setting
S0	-40...60	-40...160	
S1	0...50	40...140	
S2	-15...35	0...100	
S3	-20...80	0...200	✓

Accuracy temperature active	±0.3°C @ 25°C [±0.54°F @ 77°F]
Long term stability	±0.09°F p.a. @ 70°F [±0.05°C p.a. @ 21°C]
Time constant τ (63%) in the air duct	Typical 125 s @ 3 m/s

Technical data

Specification Humidity	Measuring range	0...100% RH non-condensing
	Measuring range absolute humidity	adjustable at the transducer: 0...50 g/m³ (default setting) 0...80 g/m³
	Measuring range enthalpy	0...85 kJ/kg
	Measuring range dew point	adjustable at the transducer: 40...140°F [0...50°C] (default setting) 0...200°F [-20...80°C]
	Accuracy	±2% between 0...80% RH @ 77°F [25°C]
	Long term stability	±0.3% RH p.a. @ 70°F [21°C] @ 50% RH
	Time constant τ (63%) in the air duct	Typical 10 s @ 3 m/s
Materials	Cable gland	PA6, black
	Housing	Cover: PC, orange Bottom: PC, orange Seal: NBR70, black UV resistant UL94 5VA
Safety Data	Protection class IEC/EN	III, Safety Extra-Low Voltage (SELV)
	Power source UL	Class 2 Supply
	Degree of protection IEC/EN	IP65
	Degree of protection NEMA/UL	NEMA 4X
	Enclosure	UL Enclosure Type 4X
	EU Conformity	CE Marking
	Certification IEC/EN	IEC/EN 60730-1
	Quality Standard	ISO 9001
	UL 2043 Compliant	Suitable for use in air plenums per Section 300.22(C) of the NEC and Section 602 of the IMC
	Type of action	Type 1
	Rated impulse voltage supply	0.8 kV
	Pollution degree	3
	Ambient humidity	Max. 95% RH, non-condensing
	Ambient temperature	-35...50°C [-30...122°F]
	Fluid humidity	short-term condensation permitted
	Fluid temperature	-40...175°F [-40...80°C]
	Operating condition airflow	max. 40 ft/s [12 m/s]

Safety Notes

This device has been designed for use in stationary heating, ventilation and air-conditioning systems and must not be used outside the specified field of application. Unauthorized modifications are prohibited. The product must not be used in relation with any equipment that in case of a failure may threaten humans, animals or assets.

Ensure all power is disconnected before installing. Do not connect to live/operating equipment.

Only authorized specialists may carry out installation. All applicable legal or institutional installation regulations must be complied with during installation.

The device contains electrical and electronic components and must not be disposed of as household refuse. All locally valid regulations and requirements must be observed.

Remarks

General Remarks Concerning Sensors

Sensing devices with a transducer should always be operated in the middle of the measuring range to avoid deviations at the measuring end points. The ambient temperature of transducer electronics should be kept constant. The transducers must be operated at a constant supply voltage (±0.2 V). When switching the supply voltage on/off, onsite power surges must be avoided.

Remark: Occurring draft leads to a better carrying-off of dissipative power at the sensor. Thus temporally limited fluctuations might occur upon temperature measurement.

Build-up of self-heating by electrical dissipative power

Temperature sensors with electronic components always have a dissipative power which affects the temperature measurement of the ambient air. The dissipation in active temperature sensors shows a linear increase with rising operating voltage. The dissipative power should be taken into account when measuring temperature.

In case of a fixed operating voltage (±0.2 V), this is normally done by adding or reducing a constant offset value. As Belimo transducers work with a variable operating voltage, for reasons of production engineering only one operating voltage can be taken into consideration. Transducers 0...10 V / 4...20 mA have a standard setting at an operating voltage of DC 24 V. This means that at this voltage, the expected measuring error of the output signal will be the least. For other operating voltages, the offset error will be increased by a changing power loss of the sensor electronics.

If a readjustment directly at the active sensor should be necessary during later operation, this can be done with the following adjustment methods.

- For sensors with NFC or dongle with the corresponding Belimo app
- For sensors with a trimming potentiometer on the sensor board
- For bus sensors via bus interface with a corresponding software variable

Application notice for humidity sensors

The humidity sensor is extremely sensitive. Touching the sensor element or exposing it to aggressive substances like chlorine, ozone, ammonia, hydrogen peroxide or ethanol (i.e. as a cleaning agent) may affect the measurement accuracy.

Long term operation outside the recommended conditions (5...60°C and 20...80% RH) can result in a temporary offset. After returning into the recommended range, this effect disappears.

Parts included

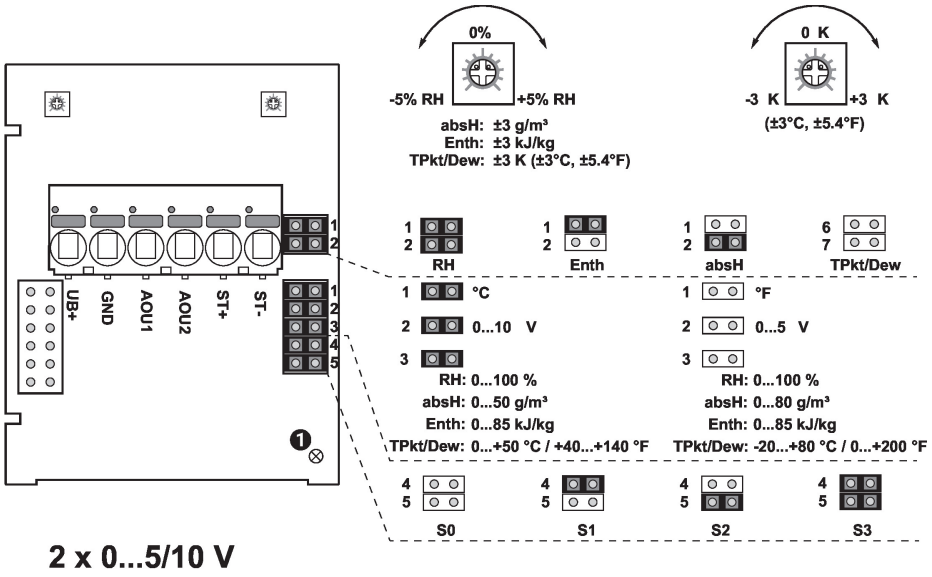
Description	Type
Mounting flange for duct sensor 19.5 mm, up to max. 120°C [248°F], Plastic	A-22D-A34
1/2" NPT conduit adapter	

Accessories

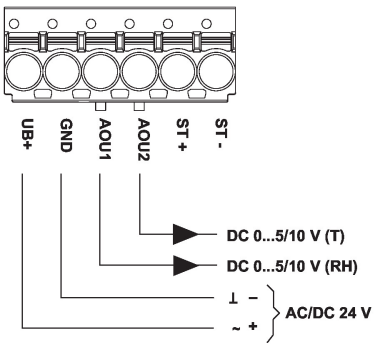
Optional accessories

Description	Type
Replacement filter sensor probe tip, wire mesh, Stainless steel	A-22D-A06

Wiring Diagram



2 x 0...5/10 V

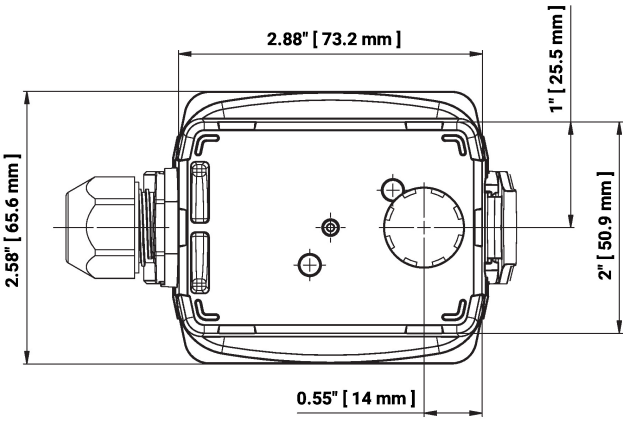


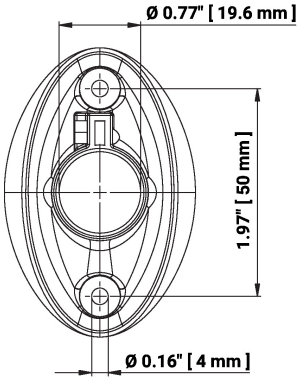
① Status LED
RH Relative humidity
absH Absolute humidity
EntH Enthalpy
TPkt/Dew Dew point
(Measured value available on output AOU1)

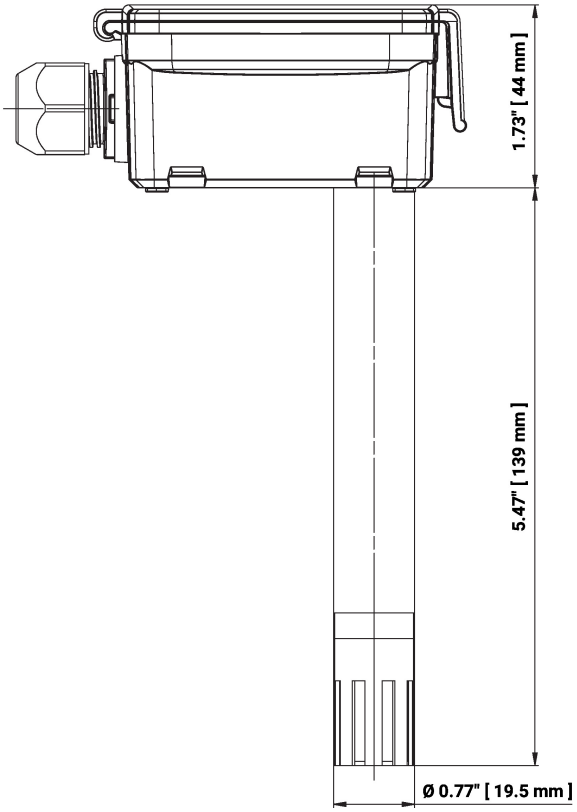
Connectors ST+ / ST- are only used for sensor types which additionally have a passive resistance sensor element for temperature measurement.
The adjustment of the measuring ranges is made by changing the bonding jumpers.
The output value in the new measuring range is available after 2 seconds.

Setting	Range [°C]	Range [°F]	Factory setting
S0	-40...60	-40...160	
S1	0...50	40...140	
S2	-15...35	0...100	
S3	-20...80	0...200	✓

Dimensions







Type	Probe length	Weight
22DTH-51M	5.5" [140 mm]	0.31 lb [0.14 kg]

Further documentation

• Installation instructions