

## Duct sensor Humidity / Temperature

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. With Modbus RTU communication and integrated 0...10V outputs. Nema 4X / IP65 rated enclosure.



5-year warranty



## Type Overview

Type	Communication	Output signal active temperature	Output signal active humidity
22DTH-55M	Modbus RTU	0...5 V, 0...10 V	0...5 V, 0...10 V

## Technical data

<b>Electrical Data</b>	Nominal voltage	AC/DC 24 V
	Nominal voltage range	AC 19...29 V / DC 15...35 V
	Power consumption AC	4.3 VA
	Power consumption DC	2.3 W
	Electrical connection	Pluggable spring-loaded terminal block max. 2.5 mm <sup>2</sup>
	Cable entry	Cable gland with strain relief 2x ø6 mm (1/2" NPT conduit adapter included)
<b>Data bus communication</b>	Communication	Modbus RTU
	Number of nodes	Modbus see interface description
<b>Functional Data</b>	Application	Air
	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
<b>Measuring Data</b>	Measured values	relative humidity Absolute humidity Dew point Enthalpies Temperature
	<b>Specification Temperature active</b>	
	Sensing element technology	Polymer-based capacitive sensor with stainless steel wire mesh filter
	Measuring range	Adjustable via Modbus -5...175°F [-20...80°C] (default setting) Attention: The maximum measuring range listed does not indicate the allowable fluid temperature for the sensor. Refer to safety data for the maximum fluid temperature limits.
	Accuracy temperature	±0.3°C @ 25°C [±0.5°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	Sensing element technology	Polymer-based capacitive sensor with stainless steel wire mesh filter
	Measuring range	adjustable via Modbus Default setting: 0...100% RH
	Measuring range absolute humidity	adjustable via Modbus default setting: 0...80 g/m <sup>3</sup>
	Measuring range enthalpy	adjustable via Modbus default setting: 0...85 kJ/kg
	Measuring range dew point	adjustable via Modbus default setting: -5...175°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 $\tau$ (63%) in the air duct	Typical 10 s @ 3 m/s
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	-30...120°F [-35...50°C]
	Fluid humidity	short-term condensation permitted
	Fluid temperature	-40...175°F [-40...80°C]
	Operating condition airflow	max. 40 ft/s [12 m/s]
Materials	Housing	Cover: PC, orange Bottom: PC, orange Seal: NBR70, black UV resistant UL94 5VA
	Cable gland	PA6, black

## 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 ( $\pm 0.2$  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 ( $\pm 0.2$  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
Cable Gland with strain relief $\varnothing 6...8$ mm	
1/2" NPT conduit adapter	

## Accessories

Optional accessories	Description	Type
	Replacement filter sensor probe tip, wire mesh, Stainless steel	A-22D-A06
	Mounting plate L housing	A-22D-A10

## Wiring Diagram



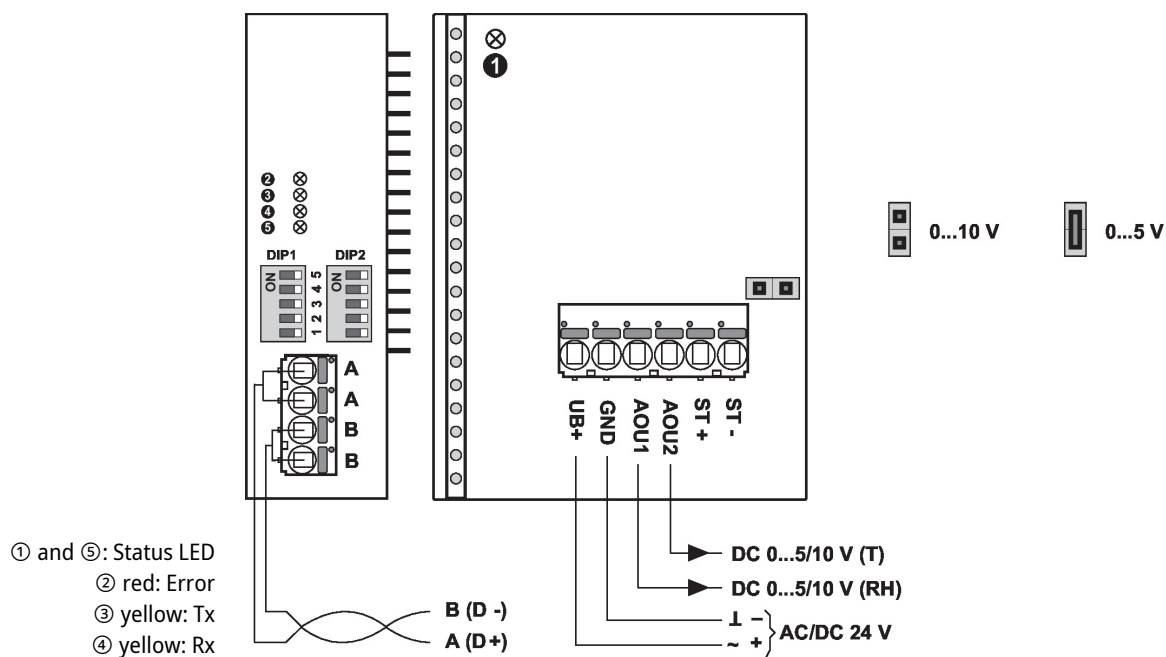
Notes

Supply from isolating transformer.

The wiring of Modbus RTU (RS-485) is to be carried out in accordance with applicable regulations ([www.modbus.org](http://www.modbus.org)). The device has switchable resistors for bus termination.

Modbus / BACnet: Supply and communication are not galvanically isolated. Connect earth signal of the devices with one another.

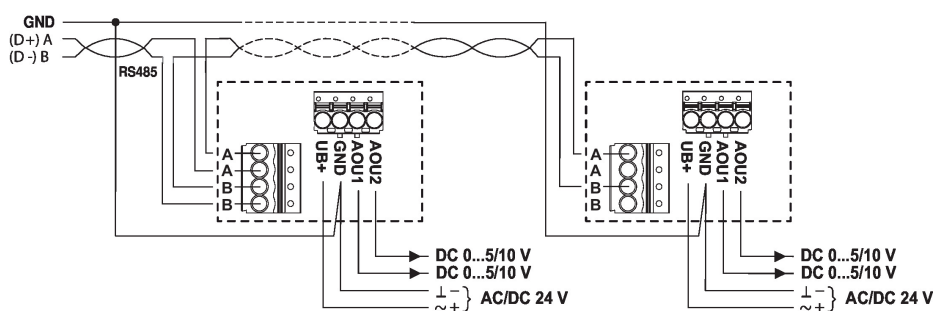
## Wiring Diagram



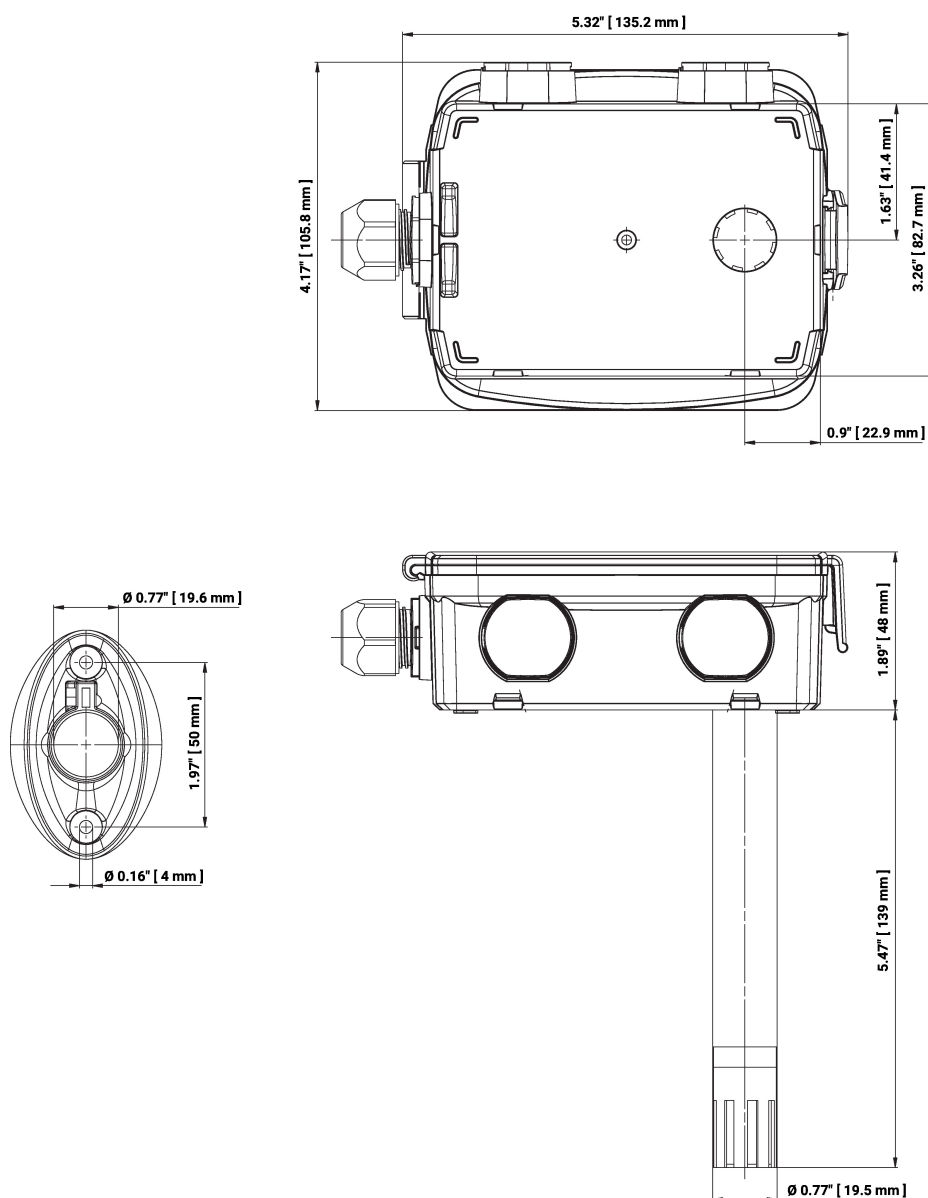
## Detailed documentation

The separate document Sensor Modbus-Register informs about Modbus register, addressing, parity and bus termination (DIP1: address, DIP2: baud rate, parity, bus termination)

## Wiring RS485 Modbus RTU



## Dimensions



Type	Probe Length	Weight
22DTH-55M	5.5" [140 mm]	0.57 lb [0.26 kg]

## Further documentation

- Modbus Interface description
- Installation instructions