Room sensor CO_2 / Humidity / Temperature

For measuring the temperature, humidity and CO_2 in the room and adjusting temperature and ventilation setpoints. The high-contrast ePaper touch display ensures best readability and intuitive operation. Thanks to MP-Bus, Modbus RTU and BACnet MS/TP communication, the room operating units can be seamlessly connected to existing third-party controllers. Commissioning and configuration of the device is conveniently done with the Belimo Assistant App.

5-year warranty

Modbus

BACnet

NFC

Technical data

Electrical Data	Nominal voltage	AC/DC 24 V
	Nominal voltage range	AC 19.2...28.8 V / DC 19.2...28.8 V
	Power consumption AC	1 VA
	Power consumption DC	0.5 W
	Electrical connection	Spring-loaded terminal 0.25...1.5 mm²
	Electrical connection note	Cable type USA and Canada: CL2 or higher
	Cable entry	Back side Top side Bottom side
Data bus communication	Communication	Modbus RTU BACnet MS/TP
Functional Data	Medium	Air
	Display	ePaper touch display, 2.72x2.44" [69x62 mm]
Measuring Data	Measured values	CO_2 relative humidity Dew point Temperature
Specification CO_2	Sensing element technology	Non-dispersive infrared (NDIR) dual channel
	Measuring range	default setting: 0...2000 ppm
	Accuracy	±(50 ppm + 2% of measured value)
	Long term stability	±20 ppm p.a.
Specification temperature active	Measuring range	32...122°F [0...50°C] (default setting)
	Accuracy temperature	±0.3°C @ 25°C [±0.5°F @ 77°F]
	Wall coupling factor	52 %
Specification Humidity	Measuring range	Default setting: 0...100% RH
	Measuring range dew point	Default setting: -58...122°F [-50...50°C]
	Accuracy	±2% between 0...90% RH @ 77°F [25°C]
	Long term stability	±0.25% RH p.a. @ 77°F [25°C]@ 50% RH

Technical data

Safety Data	Protection class IEC/EN	III, Protective Extra-Low Voltage (PELV)
	EU Conformity	CE Marking
	Certification IEC/EN	IEC/EN 60730-1 and IEC/EN 60730-2-9
	Quality Standard	ISO 9001
	Ambient humidity	Max. 95% RH, non-condensing
	Ambient temperature	32...122°F [0...50°C]
	Storage temperature	-40...160°F [-40...70°C]
Materials	Housing	PC, white, RAL 9003

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.

Product Features

CO_2 dual-duct technology

All CO_2 sensors are subject to drift, which is caused by the ageing process of the components and requires regular calibration and adjustment or replacement of the sensors. The dual-duct technology minimizes this drift by compensating for the majority of the ageing effects of the measuring duct through adjustment with a reference duct.

This makes it possible to use dual-channel sensors in applications with 24/7 occupancy. Regular calibration with fresh outdoor air, as is the case with sensors with ABC logic, is not necessary with dual-duct sensors. Recalibration of the sensor is recommended after 5 years of operation.

Remarks

General Remarks Concerning Sensors

The measuring result is influenced by the thermal characteristics of the wall. A solid concrete wall responds to thermal fluctuations within a room more slowly than a light-weight structure wall. A room sensor always detects a mixture of air and wall temperature. This means that the radiant heat of the wall, which is important for comfort, is also included in the measurement result.

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.

Belimo room sensors have adaptive temperature compensation for the entire supply voltage range. This ensures that the ambient temperature is detected with the highest accuracy at all times.

Remarks

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...50°C and 20...80% RH) can result in a temporary offset. After returning into the recommended range, this effect disappears.

Digital input

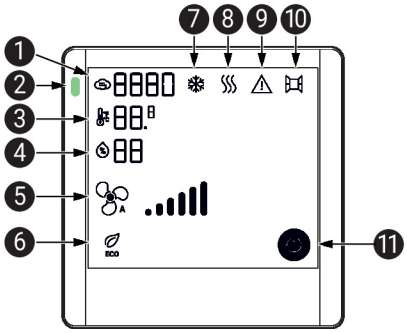
The Auxiliary Digital Input can be used with third-party sensors and switches such as window alarms, occupancy detectors, light switches, etc. The input values can be monitored and transmitted through the BACnet and ModBus communication protocol.

Indicators and Operation

Indicators

The operating display is an ePaper display that reflects light like normal paper. It is, therefore, a non-illuminated display with an integrated touch control panel.

The representation on the display can be designed freely, depending on the requirements. Function blocks can be switched on or off by using Belimo Assistant 2. By default, all actual values and temperature setpoint adjustments are visible on the display.



1. **Current CO_2 concentration: 0...2000 ppm**
2. **CO_2 TLF (traffic light function), available on the (P-)22RTM-.. sensor**

   Colors: green, yellow and red. LED can be configured and deactivated via Belimo Assistant 2.
3. **Current temperature: 0...50°C or -32...122°F**
4. **Current relative humidity: 0...99%**
5. **Fan speed display: 6 levels**
6. **Eco mode: Symbol is displayed if this mode is activated**
7. **Cooling mode: Information provided by controller via bus**
8. **Heating mode: Information provided by controller via bus**
9. **Warning / Error**

   Symbol is displayed if an internal error occurred or if warning is transmitted by the controller via the connected bus (external error).
10. **External input, information provided by controller via bus**
11. **HVAC system status**

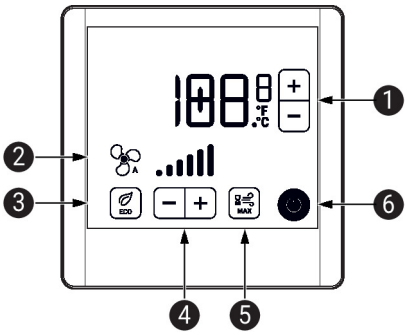
    Symbol is displayed if the HVAC system is either completely off or in building protection mode. If this symbol is activated, the rest of the display is blank.

Indicators and Operation

Operation

The operating elements on the ePaper display are touch fields that can be operated with the finger. The touch fields are only active if the corresponding element is also displayed.

Indicators and Operation



1 Temperature setpoint: Set the desired temperature

Absolute setpoint:	10...40.0°C or 50...104.0°F
Relative setpoint:	-5...5°C / °F

Adjustable and restrictable via Belimo Assistant 2

2 Fan speed display: 6 levels

3 Eco mode: Symbol is displayed if this mode is activated

4 Fan speed setpoint: Set the desired fan level

5 Max mode: Symbol is displayed if this mode is activated

6 HVAC system status

Symbol can be displayed if the HVAC system is either completely off or in building protection mode. If this symbol is activated, the rest of the display is blank.

Parts included

Screws

Accessories

Tools	Description	Type
	Service tool for wired and wireless setup, on-site operation and troubleshooting.	Belimo Assistant 2
	Belimo Assistant Link Bluetooth and USB to NFC and MP-Bus converter for configurable and communicative devices	LINK.10

Service

NFC connection

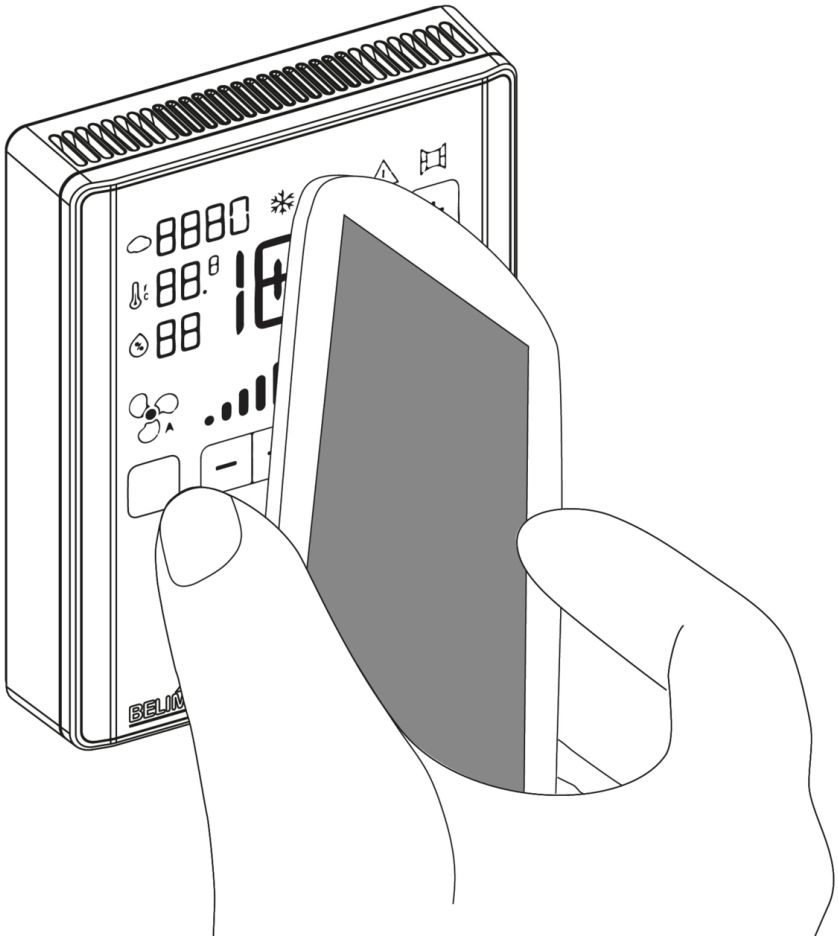
Belimo devices marked with the NFC logo can be operated with the Belimo Assistant 2.

Requirement:

- NFC- or Bluetooth-capable smartphone
- Belimo Assistant 2 (Google Play and Apple AppStore)

Align NFC-capable smartphone on the device so that both NFC antennas are superposed.

Connect Bluetooth-enabled smartphone via the Bluetooth-to-NFC converter ZIP-BT-NFC to the device. Technical data and operating instructions are shown in the ZIP-BT-NFC data sheet.



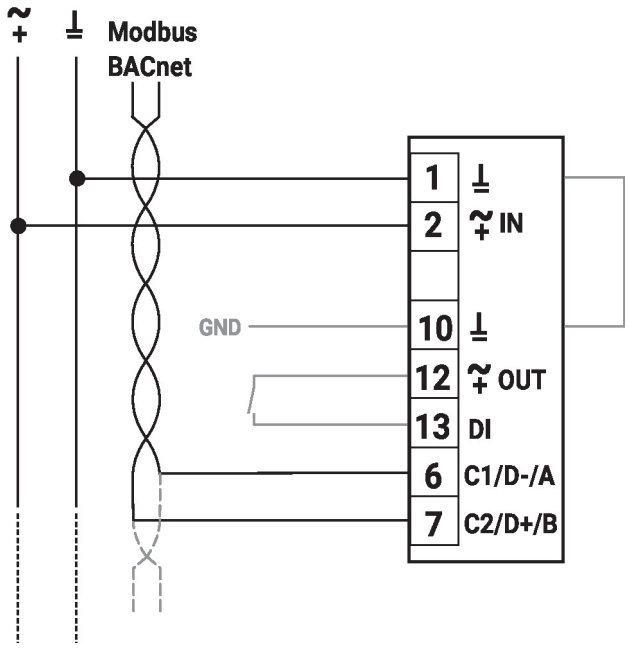
Wiring Diagram

Supply from isolating transformer.

The wiring of the line for BACnet MS/TP / Modbus RTU is to be carried out in accordance with applicable RS485 regulations.

Modbus / BACnet: Supply and communication are not a galvanic dry contact. Connect earth signal of the devices with one another.

Wiring Diagram



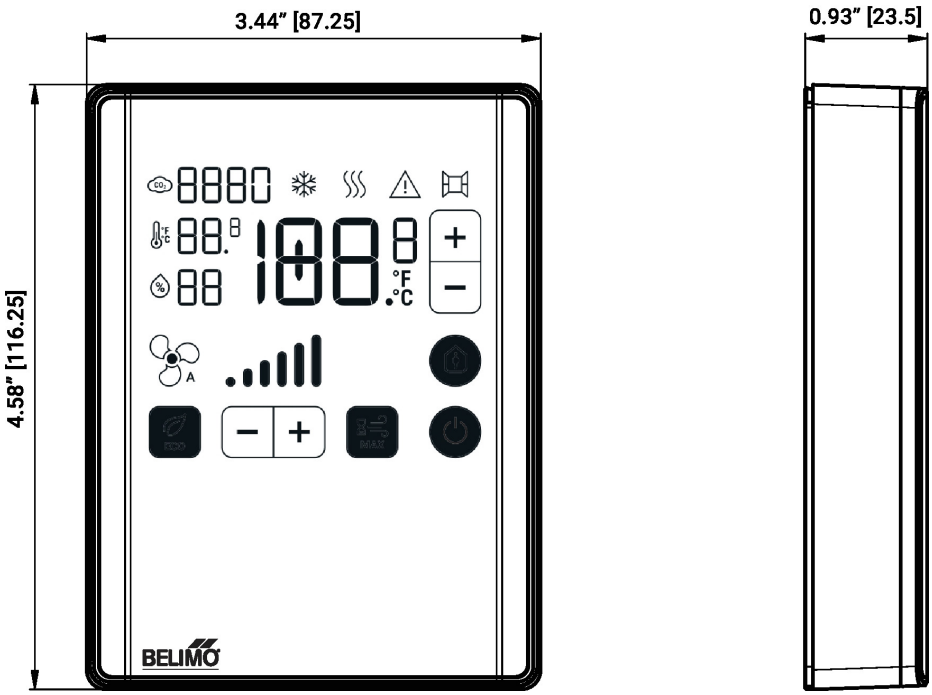
GND = 1
AC/DC 24 V = 2
GND = 10
AC/DC 24 V out, max. 100 mA = 12
Digital input, e.g. occupancy switch = 13
C1/D-/A = 6
C2/D+/B = 7

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)

The separate document, BACnet PICS, informs about the PICS, MAC addressing and bus termination (DIP1 & DIP2).

Dimensions



Further documentation

- BACnet Interface description
- Modbus Interface description
- Installation instructions
- Quick Guide – Belimo Assistant 2