Pressure sensor, room controller and damper actuator as part of pressure-independent or -dependent VAV-based room solutions

- Integrated control loop for room temperature or indoor air quality (CO_2).
- Communication via BACnet MS/TP or Modbus RTU
- Connection of peripheral devices with MP-Bus or analogue and digital I/O
- Inbuilt NFC antenna for commissioning and maintenance

Technical Data

Electrical data	Nominal voltage	AC/DC 24 V
	Nominal voltage frequency	50/60 Hz
	Nominal voltage range	AC 19.2...28.8 V
	Power consumption in operation	2.5 W
	Power consumption in rest position	1.5 W / 2.5 VA
	Power consumption for wire sizing	5.0 VA
	Connection supply / control	Screw terminal 0.5...2.5 mm²
Data bus communication	Communicative control	BACnet MS/TP / Modbus RTU
	Number of nodes	See interface description
Functional data	Torque motor	10 Nm
	Vmax adjustable	20...100% of V'nom
	Vmin adjustable	0...100% of V'nom (<V'max)
	Manual override	Gear disengagement (lockable)
	Angle of rotation	95°
	Angle of rotation note	adjustable mech. or el. limitation
	Mechanical interface	Universal shaft clamp 6...20 mm
	Position indication	Mechanical
Measuring data	Measuring principle	Belimo Δp sensor 0...500 Pa
	Installation position	position-independent, no zero-adjustment required
	Measuring range pressure	0...500 Pa
	Functional range differential pressure	0...500 Pa
	Maximum system pressure	1500 Pa
	Burst pressure	+/- 3 kPa

Measuring data	Altitude compensation	Adjustment of system altitude (0...3000 m ASL)
	Condition measuring air	0...50°C / 5...95% RH, non-cond.
	Pressure tube connection	Nozzle diameter 5.3 mm
Safety data	Protection class IEC/EN	III, Safety Extra Low Voltage (SELV)
	Degree of protection IEC/EN	IP20
	EMC	CE acc. to 89/336/EEC, EN60730-1:2000 + A2:2008, EN60730-2-14:1997 + A2:2008 EN61000-6-2:05 and EN61000-6-3:07 + A1:11, EN60730-2-9:2010
	Certification IEC/EN	IEC/EN 60730-1 and 60730-2-14
	Type of action	Type 1
	UL Approval	cRUus recognized UL component UL 60730-1
	Rated impulse voltage supply / control	0.8 kV
	Pollution degree	2
	Ambient humidity	Max. 95% RH, non-condensing
	Ambient temperature	0...50°C [32...122°F]
	Storage temperature	-20...80°C [-4...176°F]
	Servicing	maintenance-free
Weight	Weight	0.7 kg

Safety Notes

- The device must not be used outside the specified field of application, especially not in aircraft or in any other airborne means of transport.
- Outdoor application: only possible in case that no (sea) water, snow, ice, insolation, or aggressive gases interfere directly with the device and that it is ensured that the ambient conditions remain within the thresholds according to the data sheet at any time.
- Only authorised specialists may carry out installation. All applicable legal or institutional installation regulations must be complied during installation.
- The device may only be opened at the manufacturer's site. It does not contain any parts that can be replaced or repaired by the user.
- Cables must not be removed from the device.
- To calculate the torque required, the specifications supplied by the damper manufacturers concerning the cross-section, the design, the installation situation, and the ventilation conditions must be observed.
- 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

Communicative actuators
All ZoneEase VAV actuators feature a BACnet MS/TP (BTL-listed) and Modbus RTU interface over RS-485. The protocol can be selected by a parameter.

Cloud- and NFC-based engineering and commissioning
ZoneEase VAV actuators and the connected peripherals are engineered and commissioned through a Cloud-based workflow (https://zoneease.cloud.belimo.com) in connection with NFC (Near Field Communication) access to room units and ZoneEase actuators. For more details, please see the section "Engineering, Manufacturing, and Commissioning" below.

VAV-based room temperature and indoor air quality control (CO_2)
ZoneEase VAV Actuators contain control loops for room temperature and indoor air quality (based on the CO_2 measurement) which can be activated separately or combined. Room units with integrated sensors can be connected to the integrated MP-Bus port. One active sensor can be connected to the analogue input. Variants with I/O extension (..-BAC-002) allow for the connection of electric or hot-water reheaters and series or parallel fans.

Selection of configurable applications
ZoneEase VAV actuators are delivered with 19 pre-installed configurable applications for flow control, pressure-dependent by-pass control, indoor air quality control, or heating / cooling control optionally in combination with indoor air quality control.

Sensor technology and application fields
The integrated differential pressure sensor is highly accurate and long-term stable and allows for an installation independent of the device orientation. The sensor is suitable for comfort HVAC applications, like offices, public buildings, hotels, hospitality in health care, cruise ships, residential buildings, etc.

Demand Control Ventilation (DCV)
When using the actual values for flow and damper position over the BMS interface, Demand-Controlled Ventilation can be implemented by an AHU fan optimizer function.

High functional reliability
The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.

Accessories

Tools

Description	
Interface converter (ZIP-USB function) for ZoneEase VAV actuators when connected to the MFT-P PC-Tool	ZTH EU
Converter Bluetooth / NFC	ZIP-BT-NFC
Belimo PC-Tool, Software for adjustments and diagnostics	MFT-P (Download)
Belimo ZoneEase App (Android smartphones)	Google Play
Belimo Display App (Android / iOS)	Google Play Apple AppStore

Electrical Installation

Supply from isolating transformer.

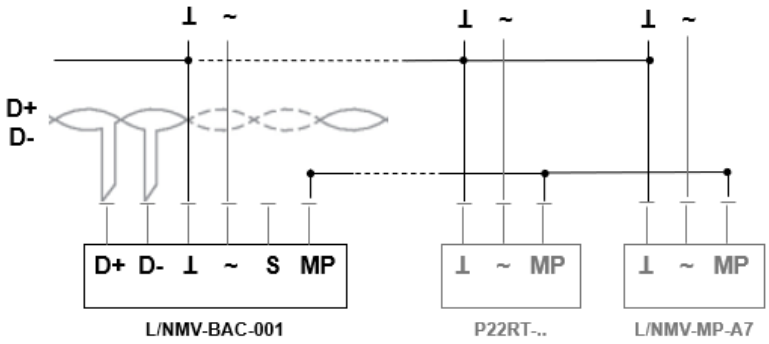
The wiring of the line for BACnet MS/TP / Modbus RTU is to be carried out in accordance with applicable RS-485 regulations.

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

Terminal connector layout

RS-485	**D+**	BMS (BACnet MS/TP or Modbus RTU)
	D-	
AC 24 V	**⊥**	Power supply for actuators / room units
	~	
AI	**S**	Active sensor
MP	**MP**	Room unit / 2nd VAV controller / Reheat valve actuator

Wiring diagram



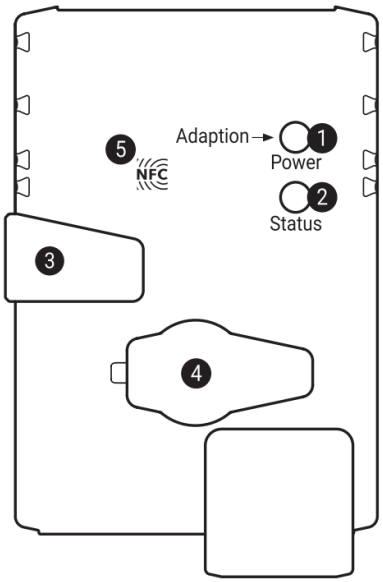
Settings and tool function

Designation	Setting values, limits, explanations	Units	PC-Tool	Cloud [1]	ZoneEase App	Remarks
System-specific data						
Position	120 char., e.g. Office 4 6F SUP	String	-	r/w	r/w	Not stored in the actuator
Designation	120 char., e.g. VRS1400-55	String	-	r/w	r/w	Not stored in the actuator
Bus Address	BACnet: 1...127 (default: 1), Modbus: 1...247 (default: 1)		-	r/w	r/w	
Vmax	20...100% [Vnom]			r/w	r/w	
Vmid	Vmin...Vmax			r/w	r/w	
Vmin	0...100% [Vnom]			r/w	r/w	
Altitude of installation	0...3000	m				
Controller Settings						
Application selection	1...20		r	r/w	r/w	Cf. Application description doc.
Enable sec. damper	0 (Disabled) / 1 (Enabled)		-	r/w	r/w	
AirFlowGainSec	0...2 (Default 1)	100%	-	r/w	r/w	
Unit-specific settings						
Vnom	0...99'999 m^3/h	m^3/h / l/s / cfm	r/w [2]	-	r/w [2]	Set by the OEM
Δp@Vnom	38...450	Pa	r/w [2]	-	r/w [2]	Set by the OEM
Calibration Height	0...4000	m	r/w [2]	-	r/w [2]	Set by the OEM
Height Compensation	Compensated / not compensated		r/w [2]	-	r/w [2]	Set by the OEM
Other settings						
Direction of rotation	cw / ccw		r/w	r/w	r/w	
Range of rotation	95°, mechanically adjustable	°	-	-	-	
Torque	100 / 75 / 50 / 25	%	-	-	-	
Operating data						
Actual value / Setpoint Damper position	0...99'999 / 0...27'777 / 0...58'857 / 0...100%	m^3/h / l/s / cfm / %	r	r	r	
Simulation	Open / Close / Vmax / Vmin / Stop / Pos. % / Flow % / Flow m^3/h		w	w	w	
Running times	Operating time, running time Ratio (relation)		-	-	-	
Serial number	Device ID		r	-	r	
Type	Type Designation		r	-	r	
Version display	Firmware, config. table D		r	-	r	

1 Includes offline editing with XLS template

2 Write function accessible only with OEM Release Code

Operating Controls and Indicators



❶ Push-button and LED display green

Off: No power supply or malfunction

On: In operation

Press button: Triggers angle of rotation adaptation

When starting: Resets to factory setting (communication)

❷ Push-button and LED display yellow

Off: Standard mode

On: Adaptation or synchronisation process active

Flickering: BACnet/Modbus communication active

When starting (>5 s): Resets to factory setting (communication)

❸ Manual override button (lockable)

Press button: Gear train disengages, motor stops, manual override possible

Release button: Gear train engages, synchronisation starts, standard mode

❹ Service plug

For connecting parametrisation and service tools

Check power supply connection

LED 1 Off and LED 2 On: Possible wiring error in power supply

❺ NFC Antenna

Touch field for Belimo ZoneEase App, Belimo Display App, or ZIP-BT-NFC interface converter

Arrows at the NFC logo indicate lower right corner of the NFC antenna.

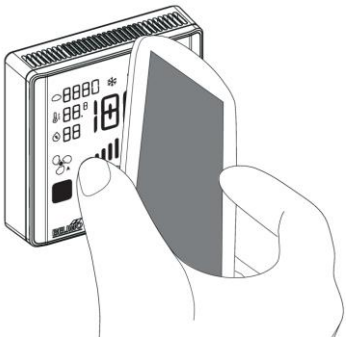
NFC Access through Room Unit

NFC read/write is possible directly at the ZoneEase actuator, but also through the connected room unit. Access through the room unit might be more convenient because of the installation situation.

The Smartphone with the Belimo ZoneEase App is held against the room unit and the app display guides the user through the read / write process.

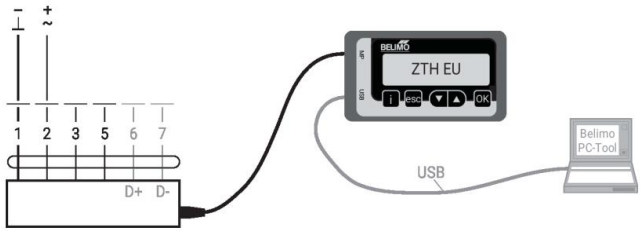
Note: Only compatible room units can be used with ZoneEase VAV.

- With e-paper display: P-22RT(RTH/RTM)-1T00D-1
- With virtual display: P-22RT(RTH/RTM)-1T-1



Connection of Belimo PC-Tool

Setting and diagnostics of the ZoneEase VAV actuators can be carried out with the Belimo PC-Tool which is connected through the ZTH EU service tool to the actuators. The ZTH EU acts as the interface converter and can't be used standalone with ZoneEase actuators.



Engineering, Manufacturing, and Commissioning

Cloud-based engineering and commissioning

Engineering and commissioning of the ZoneEase systems consists of six phases which run subsequently or in parallel:

1) Cloud-based project engineering. This can either be done via the Cloud interface at https://zoneease.cloud.belimo.com or with the Excel template which can be downloaded inside the Cloud application. After filling in the Excel template, the configuration data is uploaded to the Cloud application where the data is imported into the Cloud project.
2) Export of the project data into Smartphones running the ZoneEase app (currently for Android™ smartphones only). These Smartphones are connected to the ZoneEase project by their login data.
3) The VAV boxes are being manufactured in the OEM factory based on the flow and optional reheater specification from the ZoneEase project data. The OEM takes responsibility for the correct air flow measurement and control behaviour of the VAV boxes.
4) Installation and configuration upload on site. If changes on the project data are being made on site, these changes are updated in the Cloud project.
5) The commissioning status is reported back to the Cloud project for centralized tracking and steering of the commissioning process.
6) When finished, a handover report can be generated to document the project status.

VAV box manufacturing at the OEM factory

The VAV boxes are manufactured and calibrated in the VAV OEM factory, where the VAV OEM is a contract partner in the ZoneEase VAV project.

The OEM calibration data is protected against unauthorized write access. This applies especially to the parameters dp@Vnom and Vnom.
To obtain write access to these parameters, an OEM Release Code needs to be obtained through the local Belimo contact.

Dimensions [mm]