

**Dynacraft**

# **Flat Oval VAV Terminal Unit DVFO-CCB**

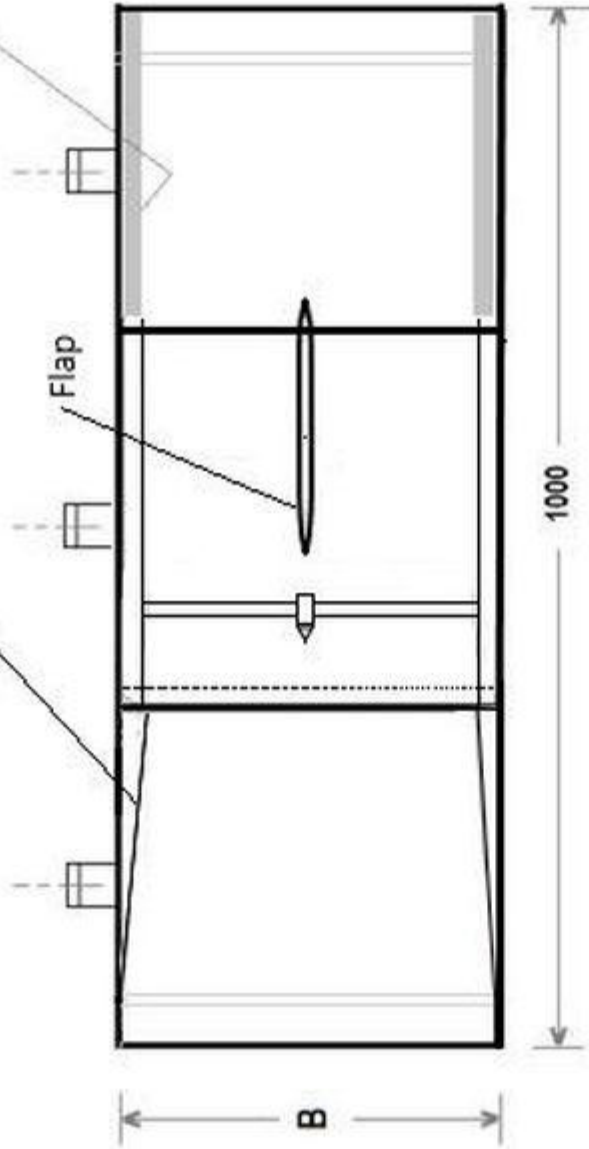


**Dynacraft Air Controls**

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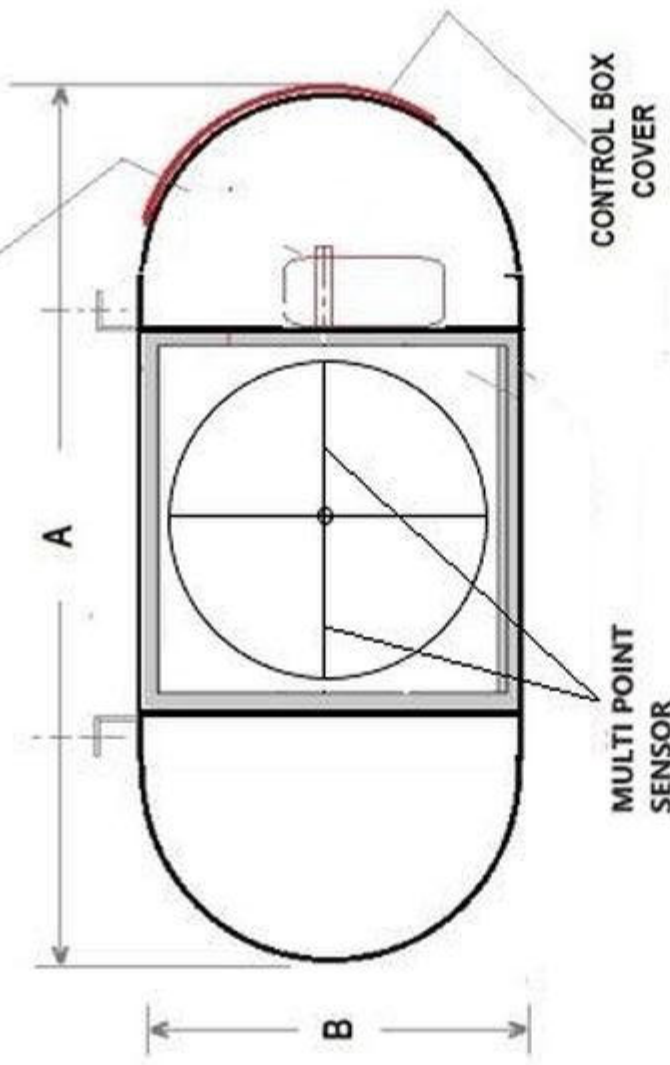
NITRILE RUBBER  
ACOUSTIC LINING

TRANSITION PIECE



- \* SINGLE SKIN 22G GALVANISED STEEL FLAT OVAL CONSTRUCTION
- \* MECHANICALLY SEALED LEAK PROOF DESIGN
- \* CONCEALED CONTROLS GIVE A BLEMISH FREE APPEARANCE
- \* ACOUSTICALLY LINED WITH CLASS O NITRILE RUBBER INSULATION
- \* PRESSURE INDEPENDENT

CONCEALED  
CONTROL ASSEMBLY



TOLERANCE: +/- 4mm

**FLAT OVAL VAV TERMINAL WITH CONCEALED  
CONTROL ASSEMBLY**

MAT OF CONSTRUCTION	SCALE	DRAWN BY	CHKD BY	APPROVED
GALVANISED STEEL	NTS			
				DT: 15/5/2021

**Dynacraft Air Controls**

Cloud VAV Controller set with Room Unit of Choice and Integrated pressure sensor, controller and damper actuator for pressure-independent temperature control VAV, Simple VAV and Demand Control Ventilation applications in the comfort zone.



22RT-A001



LMV-BAC-001



- NFC interface for Smartphone Powerless Commissioning
- Workforce Efficiency Improvement with Cloud operation
- BACnet MS/TP Integration
- With AI for CO<sub>2</sub> sensor
- Standardized Control Applications for easy implementations.

Set Type	ZoneEase VAV Controller Actuator	Room Unit
ZE-SET001	LMV-BAC-001	22RT-A001

**Brief description**

<b>Application</b>	The ZoneEase VAV has PI control characteristics and is used for pressure-independent temperature control of VAV units in the comfort zone.
<b>Pressure measurement</b>	The integrated maintenance-free Belimo D3 pressure valve sensor is also suitable for very small volumetric flows. It is for this reason that it enables versatile applications in the comfort zone, e.g. in offices, hospitals, hotels, residential construction, cruise ships, etc.
<b>VAV – Temperature control</b>	For pressure-independent temperature control VAV applications, room temperature is obtained from Room Unit. Room Temperature Setpoint is obtained from the Room Unit through manual buttons (22RT-A001 only) or APP or from command through BACnet MS/TP. The operating range $\dot{V}_{min} \dots \dot{V}_{max}$ or reheating valve or electric reheater are controlled based on heating demand or cooling demand, depending on temperature difference (setpoint minus actual), P-Band value (adjustable) and Tn value (adjustable Integral gain)
<b>VAV/CAV – variable/constant volumetric flow control</b>	For variable volumetric flow applications with a modulating reference variable, The operating range $\dot{V}_{min} \dots \dot{V}_{max}$ can be controlled via BACnet, APP or Room Unit (22RT-A001)
<b>VAV – Demand Control Ventilation (DCV)</b>	For DCV applications, The operating range $\dot{V}_{min} \dots \dot{V}_{max}$ are controlled based on demand, depending on CO <sub>2</sub> difference (setpoint minus actual), Tn_CO <sub>2</sub> value (adjustable) and Tn_CO <sub>2</sub> value (adjustable)
<b>Integration</b>	BACnet MS/TP integration
<b>BACnet function</b>	Addressable from 1 to 127 in a singular BACnet MS/TP network. Recommended to have repeater for every 32 BACnet Devices. Entire BACnet internetwork address limited by 4194303 device, as according to BACnet Limitation.
<b>Additional Sensor integration</b>	A CO <sub>2</sub> Sensor can be connected to the ZoneEase Compact Controller for data collection purpose in Temperature controlled applications and as an control input for DCV application.
<b>Operating and service devices</b>	Actuator and Room Unit NFC interface for Android Smartphone Belimo Assistant App.
<b>Test function / test display</b>	The ZoneEase VAV features two LEDs which shows power status, bus communication, adaptation
<b>OEM factory settings</b>	The ZoneEase VAV is mounted on the VAV box unit by the unit manufacturer, who adjusts and tests it according to the application.

Remark: \*To be available in Q1/2018

## System Technical Data

### Electrical Data

Nominal voltage	AC 24V, 50/60Hz
Operating range	AC 19.2 ... 28.8 V
Power consumption	7 VA (with LMV-BAC-002 and Room Unit), DO Full load connected 5 VA (with LMV-BAC-001 and Room Unit)

### Ambient Conditions

Operating Temperature/Humidity	0...50°C / 5% tp 95% non-condensing
Storage Temperature	-40...80°C (LMV-BAC-001 / LMV-BAC-002 / 22RT-A002 / 22RT-A003) 0...60°C (22RT-A001)

### Control function (application number)

- VAV-Demand Control Ventilation by CO2 (8)
- VAV-CAV (9)
- VAV-Temperature Control
No Application Selected (1)
Cooling Only (2)
Cooling/Heating Only (3)
Cooling with Reheat 1 Stage (4)
Cooling with Reheat 2 Stage (5)
Cooling with on-off Reheat Valve (6)
cooling with Modulating Reheat Valve (7)
Cooling with Parallel Fan (10)
Cooling with Parallel Fan+Reheat 1 Stage (11)
Cooling with Parallel Fan+Reheat 1/2 Stage (12)
Cooling with Parallel Fan+Reheat on-off Valve (13)
Cooling with Parallel Fan+Reheat Modulating Valve (14)
Cooling with Series Fan (15)
Heating or Cooling with Series Fan (16)
Cooling with Series Fan plus Reheat 1 Stage (17)
Cooling with Series Fan plus Reheat 1/2 Stage (18)
Cooling with Series Fan plus Reheat On-Off valve (19)
Cooling with Series Fan plus Reheat Modulating valve (20)

### Safety

Protection class	III Safety extra-low voltage
Degree of protection	IP20 (overall), IP30 (Room unit)
EMC	CE according 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
Mode of operation	Type 1 (in acc. with EN 60730-1)
Rated impulse voltage	0.8 kV (in accordance with EN 60730-1)
Control pollution degree	2 (in accordance with EN 60730-1)
Maintenance	Maintenance-free

### Data for BACnet

Protocol	BACnet MS/TP (RS-485), not galvanically isolated
Number of nodes	Addressable from 1 to 127, 32 nodes per repeater
Baudrates	9 600, 19 200, 38 400 (Default), 76 800, 115 200 Bd
End of Line Termination Resistor	Required, 120 Ω typical
Parameterisation	Belimo Cloud Business Application (Access by <a href="http://www.ZoneEase.com">www.ZoneEase.com</a> or <a href="http://ZoneEase.Cloud.Belimo.com">ZoneEase.Cloud.Belimo.com</a> ) Belimo ZoneEase VAV App (Google Play Store ( <a href="http://www.google.xx">www.google.xx</a> ) or Baidu Mobile Assistant ( <a href="http://shouji.baidu.com">shouji.baidu.com</a> ) or 360 Mobile Assistant ( <a href="http://sj.360.cn">sj.360.cn</a> ))
	BACnet MS/TP (Please refers to datapoint list)
Protocol Implementation Conformance Statement (PICS)	Please refers to BACnet Testing Laboratories. <a href="http://www.bacnetinternational.net/btl/index.php?m=87">http://www.bacnetinternational.net/btl/index.php?m=87</a>

### ZoneEase VAV Controller Actuator

<b>Actuator</b>	Brushless, non-blocking actuator with power-save mode
Torque	5Nm
Inputs / Outputs	Analogue Input for CO2 sensor connection, 0-10V 3 x Digital Triac Output, 24VAC, max. 500 mA@room temperature
Speed	60s max full span (Boost, Manual Override), 150s max full span
Direction of rotation	cw / ccw (configurable)
Adaptation	Capture of setting range and resolution to control range
Gear disengagement	Push-button lockable/self-resetting
Sound power level	max. 35 dB (A) normal operation, max 50 dB (A) in boost mode and manual override, adaptation/ Synchronization
Angle of rotation	95° , adjustable mechanical
Spindle holder	- Spindle clamp, spindle round 10 ... 20 mm / spindle square 8 ... 16 mm - Form fit in OEM variant versions, e.g. 8 x 8 mm
NFC Communication	Yes
Connection	Pluggable terminals 0.5mm <sup>2</sup> to 2.5 mm <sup>2</sup> (20AWG to 14 AWG), 0.33 mm <sup>2</sup> (22AWG) with bullet terminal or cable lug

### Differential pressure sensor

Type, principle of operation	Belimo D3 sensor, dynamic response
Operating range	-20 ... 500 Pa
Accuracy	-20Pa to 20Pa (±1Pa), 20Pa to 500Pa (±5% of measured value)
Overload capability	±3000 Pa
Measuring air conditions	0...+50 °C / 5...95% rH, non-condensating
Installation position	Any, no reset necessary
Materials in contact with medium	Glass, epoxy resin, PA, TPE
Operation and servicing	Actuator and Room Unit NFC interface for Android Smartphone ZoneEase VAV App
Push-button	Adaption
LED display	Display Power, Status and Communication

### Room Unit Wall / Room Unit Ceiling

Operation Mode	Active, Off, Eco, Boost, Anti-frost (built-in, self triggered), Occupancy (triggered by external occupancy sensor if available)#
Color	White
LCD Display	Backlight (White)&
Setpoint range	10...30 °C (High/low limit configurable)
Sensing element accuracy	+/-0.3 °C at 15...30 °C
Display resolution	+/-0.5 °C
NFC Communication	Yes
Wiring terminals	toolless push-in terminal, 0.5mm <sup>2</sup> to 1.5 mm <sup>2</sup> (20 AWG to 16 AWG)
Power supply for external device	10W, such as presence detector

<b>Datapoint list (BACnet, APP, Cloud)</b>	Refers to Datapoint list document
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# Technical data sheet - Wiring of Dynacraft - Belimo ZonEase VAV

## Connection

**Connecting terminals** The connection is made using the pluggable terminals to the ZoneEase VAV device.

**Note**

- Supply via safety isolating transformer!
- Connections 1 and 2 (AC 24V) and 5 (MP signal) are routed to accessible terminals (ZoneEase Wall Unit, 22RT-A001) for temperature sensing in order to enable access with the tool for diagnostic and service work.



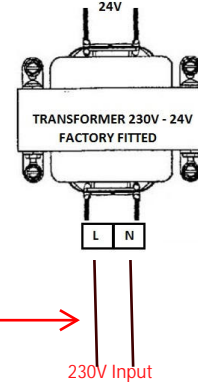
LMV-BAC-001



Designation	Function
D+	BACnet +
D-	BACnet -
⊥	} AC 24V supply
~	
S	CO2 input
MP	-MP-Bus connection

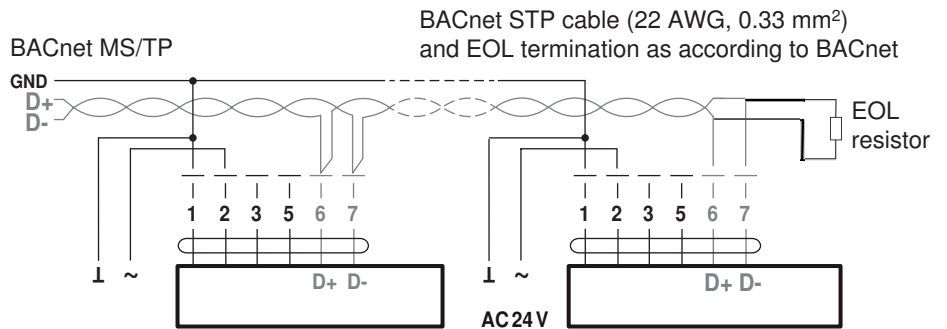
D+ D- 24V- 24V+ MP

FIELD WIRING



22RT-A001

**NOTE:** As per the EIA-RS-485 wiring protocol, for MS/TP communication over BACnet, the number of devices per daisy-chain loop should be restricted to 32 and the wiring length restricted to 1000 Rmts. Any increase in no of devices / wiring length may result in network issues.



## Dimensioning of supply and connecting cable

In addition to the actual wire sizing, attention must also be paid to the surrounding area and the cable routing. Signal cables must not be laid in the vicinity of load cables, objects liable to cause EMC interference etc. If possible Shielded Paired or Shielded layer stranded cables improve immunity to interference, refers to BACnet Standard and recommendations



**Tool connection****Settings and diagnostics**

For Portable Testing and Commissioning of the VAV unit, the ZoneEase VAV can be operated via the integrated NFC interface using the Smartphone ZoneEase APP.

Belimo Cloud Business Application support workforce efficiency improvement by creating a working platform for OEMs, SIs, Project Managers, Consultants and Building Owners to prepare, configure, calibrate, manage, review and maintain VAV system throughout the product lifecycle.

**Smartphone – Belimo Assistant App****NFC-capable devices**

- LMV-BAC-001, LMV-BAC-002, 22RTA001, 22RTA002, 22RTA003, with NFC mark

The NFC antenna range of the ZoneEase VAV is located between Belimo or the OEM logo and the NFC mark.

Align NFC-capable Android Smartphone, with Assistant App loaded, in such a way on the ZoneEase VAV that the two NFC antennas are above one another.



Depending on the model of the Smartphones, its antenna could be located at a different position (see documentation for the Smartphone).

**Compatibility**

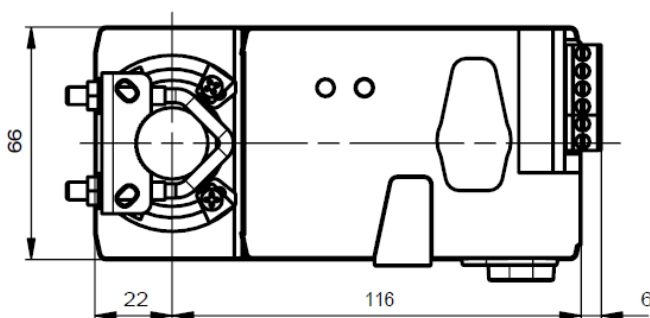
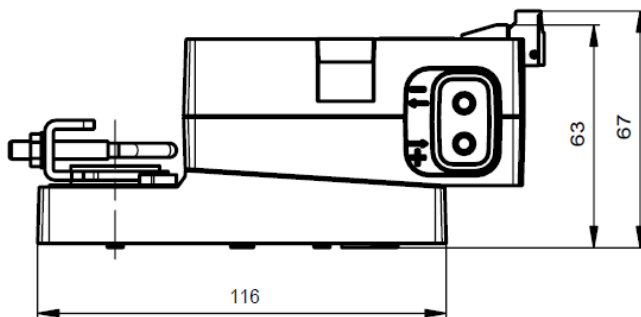
**Replacement devices** When replacement devices are ordered, they are parameterised with Mobile APP in accordance with the installed system.

**Safety notes**

- The device is not allowed to be used outside the specified field of application, especially in aircraft or in any other airborne means of transport.
- It may only be installed by suitably trained personnel. Legal regulations and regulations issued by authorities must be observed 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.
- When calculating the torque required, the specifications supplied by the damper manufacturers (cross-section, construction, place of installation), and the ventilation conditions must be observed.
- The device contains electrical and electronic components and is not allowed to be disposed of as household refuse. All locally valid regulations and requirements must be observed.

**Dimensions [mm]**

Dimensional drawings LMV-BAC-001










**LCD Room Unit for ZoneEase Cloud  
VAV Controller Actuator**

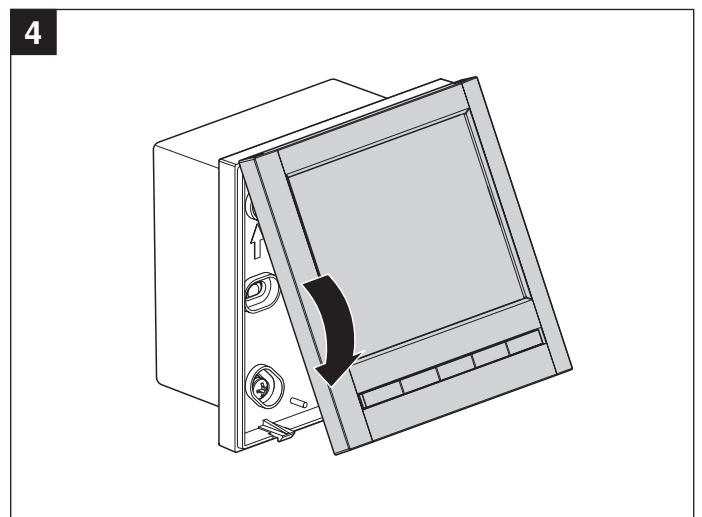
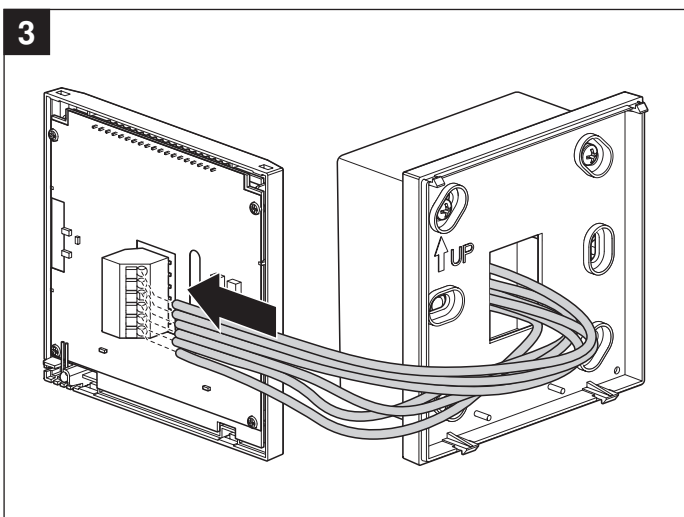
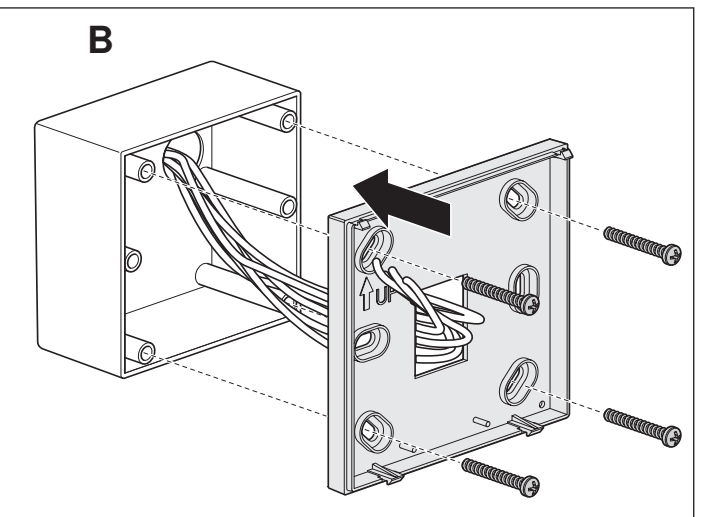
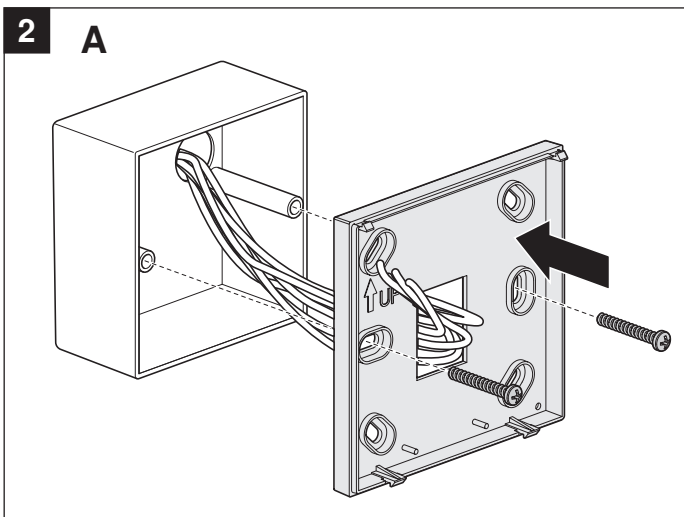
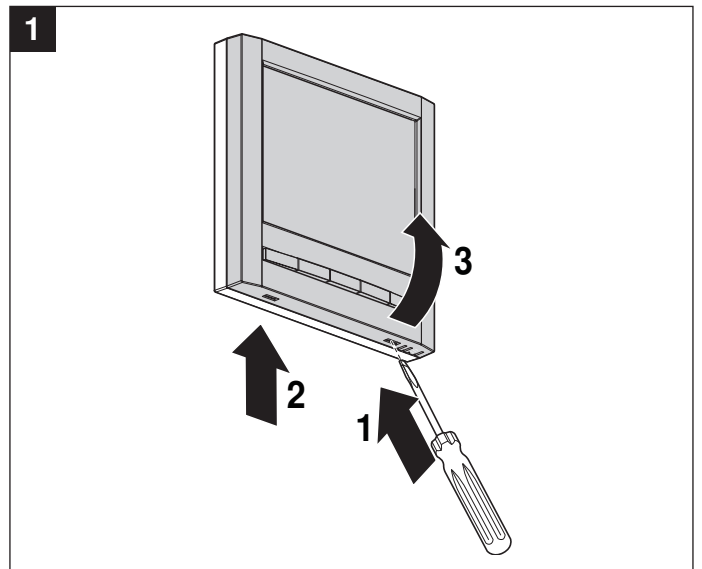
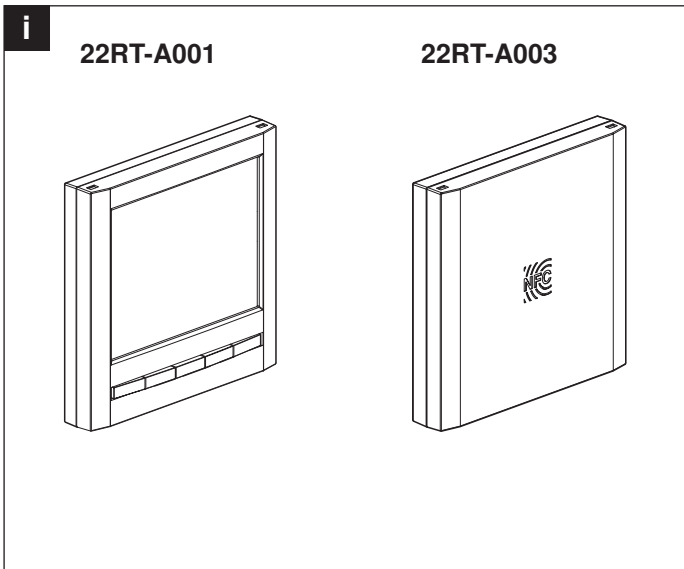
- NFC interface for Smartphone Commissioning
- Workforce Efficiency Improvement with Cloud operation
- On/Off/Eco/Boost modes
- With additional switch-on option for occupancy contact
- Summer/Winter/CAV modes


**22RT-A001**
**Brief description**

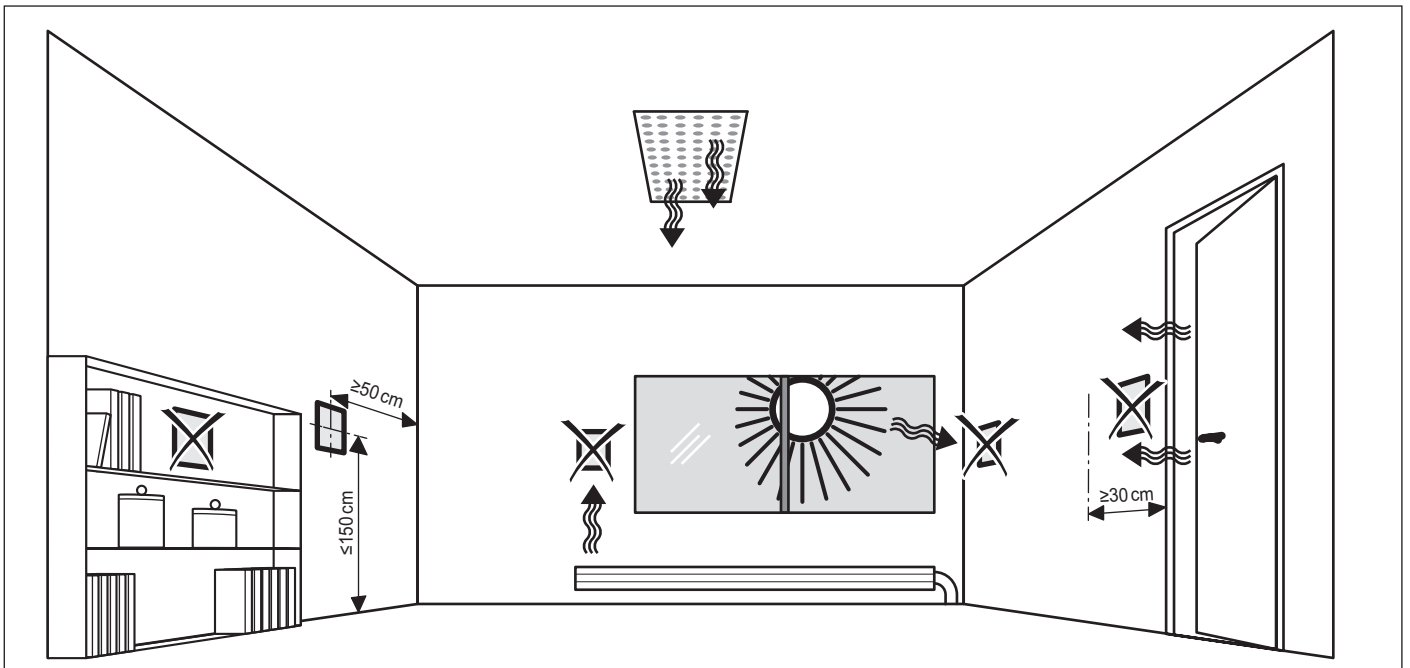
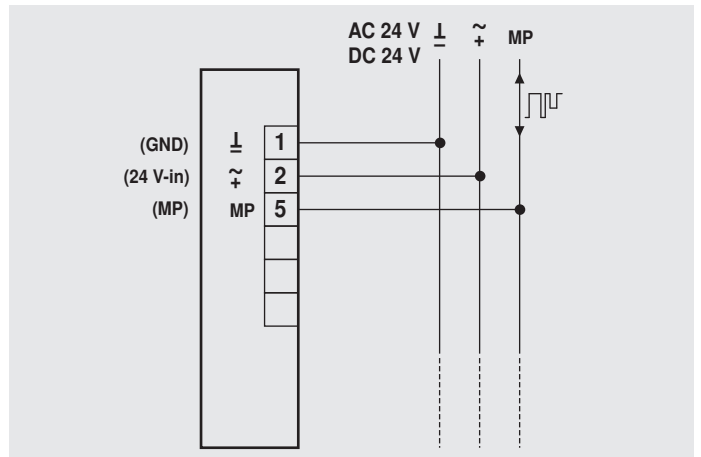
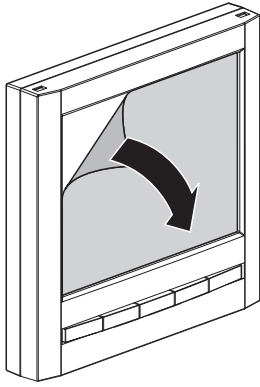
**Application** The Room Unit provide on/off control, change of modes, temperature setpoint. It displays room temperature reading / temperature setpoint and various status such as modes. It serves as an NFC interface to provide prompt access of data at an accessible level

**Technical Data**
**Supply**

Nominal voltage	AC 24V, 50/60 Hz
Operating range	AC 19.2 ... 28.8 V
Power Consumption	1W max without occupancy device. 10W max to power occupancy device
Operating Temperature/Humidity	0...50 °C / 5% tp 95% non-condensing
Storage Temperature	0...60 °C
Sensing element accuracy	+/-0.3 °C at 15...30 °C
Operation Mode	On, Off,  Eco,  Boost, Anti-frost (built-in, self triggered),  Occupancy (triggered by external occupancy sensor if available),  Winter/Summer Mode (APP/BACnet triggered),  CAV mode (APP/BACnet triggered)
Display resolution	+/-0.5 °C, 0...50 °C (Display Reading/Setpoint)
Wiring terminals	6x 0.5-1.5mm sq. diameter cable
<b>Safety</b>	
Protection class	III Safety extra-low voltage
Degree of protection	IP30
EMC	CE according to 2014/30/EU, EN60730-2-9:2010, EN60730-1:11, EN61000-6-2:05, EN61000-6-2:05, EN61000-6-3:07+A1:11, ETSI EN 301 489-1: 2011 (V1.9.2), ETSI EN 301 489-3: 2017 (V2.1.1), ETSI EN 300 330: (V2.1.1)
Mode of operation	Type 1 (in acc. with EN 60730-1)
Rated impulse voltage	0.8 kV (in accordance with EN 60730-1)
Control pollution degree	2 (in accordance with EN 60730-1)
Dimension (W x H X D)	85.4 x 84.4 x 15



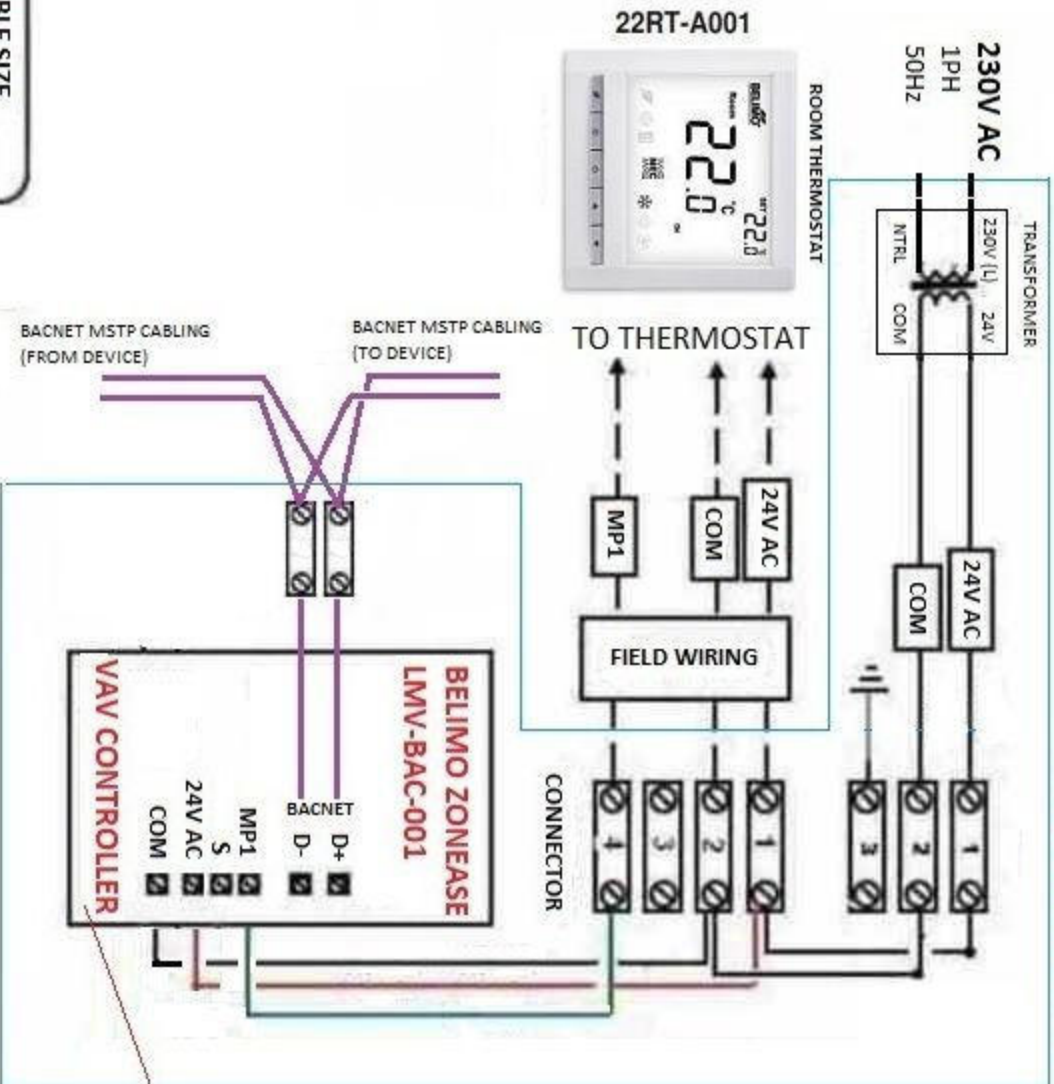
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Description	Actuator BACnet	enum	BACnet			
			BACnet Object Name	Instance Number	BACnet Object Type	Description
<b>Application parameters</b>						
System Mode	RW	1=OFF, 2=active,	SystemMode	1	MV	System Mode
Boost Mode: Time	RW	-	BoostModeTime	1	AV	Boost Mode Time
Winter / Summer changeover	RW	false=Summer	Changeover	1	BV	Winter / Summer Changeover
Application Number	RW	1=no sel.,2=c,3=c or	ApplicationSel	2	MV	Application Selection
ECO Mode: Heating Setpoint Shift	RW	-	EcoModeHeatSpShift	2	AV	ECO Mode Heating Setpoint Shift
ECO Mode: Cooling Setpoint Shift	RW	-	EcoModeCoolSpShift	3	AV	ECO Mode Cooling Setpoint Shift
OFF Mode: Damper Position	RW	false=damper closed,	OffModeDmpPos	21	BV	OFF Mode Damper Position
Nominal Airflow in m <sup>3</sup> h <sup>-1</sup>	R	-	Vnom_m3h	112	AV	Nominal Airflow in m3/h
Nominal Airflow in {unit sel}	R	-	Vnom_UnitSel	119	AV	Nominal Airflow in selected unit
Maximum Airflow in m <sup>3</sup> h <sup>-1</sup>	RW	-	Vmax_m3h	87	AV	Maximum Airflow in m3/h
Maximum Airflow in {unit sel}	R	-	Vmax_UnitSel	89	AV	Maximum Airflow in selected unit
Minimum Airflow in m <sup>3</sup> h <sup>-1</sup>	RW	-	Vmin_m3h	86	AV	Minimum Airflow in m3/h
Minimum Airflow in {unit sel}	R	-	Vmin_UnitSel	88	AV	Minimum Airflow in selected unit
Unit selection Airflow	RW	1=m3/h, 2=l/s, 3=cfm	UnitSelAirFlow	122	MV	Unit Selection Airflow
Display setting for Room Unit	RW	1=Room temp. and	RUDisplaySet	10	MO	Display Setting for Room Unit
Room Unit operating rights	RW	false= room unit	RUOpRights	1	BO	Room Unit Operating Rights
Occupancy sensor available	RW	false=disabled,	OccupSensEn	13	BV	Enable Occupancy Sensor
<b>Override</b>						
Override Control	RW	1=None, 2=Close	Override	1	MO	Override Control
Override Control: Value	RW	-	OverrideValue	10	AO	Override Control Value
<b>Control Parameters (CP)</b>						
Temp Controller Kp	RW	-	TCtrlKp	31	AV	Temperature Controller Proportional
Temp Controller Tn	RW	-	TCtrlTn	32	AV	Temperature Controller Integral Time
Deadband Temp	RW	-	DeadbandT	33	AV	Deadband Temperature
CO2 Controller Kp	RW	-	CO2CtrlKp	34	AV	CO2 Controller Kp
CO2 Controller Tn	RW	-	CO2CtrlTn	35	AV	CO2 Controller Tn
Deadband CO2	RW	-	DeadbandCO2	36	AV	Deadband CO2
<b>Actual operating Values</b>						
Setpoint Room Temperature in °C	RW	-	SpRmT_C	108	AV	Room Temperature Setpoint in
Setpoint high lim Room Temperature in °C	RW	-	SpRmTHL_C	84	AV	High Limit for Room Temperature
Setpoint low lim Room Temperature in °C	RW	-	SpRmTLL_C	85	AV	Low Limit for Room Temperature
Setpoint Airflow Absolute in m <sup>3</sup> h <sup>-1</sup>	RW	-	SpAbsAirFlow_m3h	102	AV	Setpoint Absolute Airflow in m3/h
Setpoint Airflow Absolute in {unit sel}	R	-	SpAbsAirFlow_UnitSel	109	AI	Setpoint Absolute Airflow in selected
Setpoint CO2 Absolute in ppm	RW	-	SpCO2	111	AV	CO2 Setpoint in ppm
Room Temperature	R	-	RmT_C	20	AI	Room Temperature in degree C
El. Heater 1 / on/off-valve	R	false=off, true=on	Heater1State	10	BI	Electrical Heater 1 / On-Off Valve Sta
Modulating valve state	R	-	RelPosValve	7	AI	Relative Position of modulating Rehe
El. Heater 2 state	R	false=setting OFF,	Heater2State	11	BI	Electrical Heater 2 State
Fan state	R	false=setting OFF,	FanState	12	BI	Fan State
Damper position	R	-	RelPosDmp	1	AI	Relative Damper Position in %
damper rotation angle	R	-	AbsPosDmp	2	AI	Absolute Damper Position in degree
Relative Airflow in % (based on Vmax)	R	-	RelAirFlow	10	AI	Relative Airflow in % based on Vmax
Absolute Airflow in m <sup>3</sup> h <sup>-1</sup>	R	-	AbsAirFlow_m3h	12	AI	Absolute Airflow in m3/h
Absolute Airflow in {unit sel}	R	-	AbsAirFlow_UnitSel	19	AI	Absolute Airflow in selected unit
current differential pressure (noise filtered)	R	-	DeltaP_Pa	29	AI	Differential Pressure in Pa
Current CO2 value	R	-	CO2Concentration	61	AI	CO2 Concentration in ppm
Current room occupancy (presence sensor)	R	false=not occupied,	RmOccupState	15	BI	Presence Sensor State
<b>OperationStates</b>						
Frost Mode	R	false=inactive,	FrostModeState	4	BI	Frost Mode State
<b>State Informations</b>						
System State	R	1=System OK, 2=No	StatusSystem	101	MI	Status System
Actuator State	R	1=Actuator OK,	StatusActuator	106	MI	Status Actuator
Pressure State	R	1=Pressure OK,	StatusPressure	109	MI	Status Pressure
MP Bus State	R	1=MP Bus OK, 2=MP	StatusMPBus	108	MI	Status MP Bus
<b>LC_Actuator</b>						
Start Sync	RW	false=no Sync,	SyncStart	2	BO	Start Sync procedure
Sync Position	RW	false=0% (damper	SyncPos	10	BV	Position for Sync

Power-on Mode	RW	1=no action,	PowerOnMode	3	MV	Power On Mode
BACnet						
BAC_instanceNumber	R	-	DEV Propertie	-	-	-
BAC_ObjectName	RW	-	DEV Propertie	-	-	-
BAC_Location	RW	-	DEV Propertie	-	-	-
BAC_Description	RW	-	DEV Propertie	-	-	-
BAC_modelName	R	-	DEV Propertie	-	-	-
BAC_APDUTimeout	RW	-	DEV Propertie	-	-	-
BAC_nOfAPDURetries	RW	-	DEV Propertie	-	-	-
BAC_MaxMaster	RW	-	DEV Propertie	-	-	-
BAC_MaxInfoFrames	R	-	DEV Propertie	-	-	-
BAC_DatabaseRevision	R	-	DEV Propertie	-	-	-
BACnet_Trunk_Number_Cloud	R	-	TrunkNoCloud	200	AV	BACnet Trunk Number Cloud

VAV CONTROL BOX



Designation	Function
D+	BACnet +
D-	BACnet -
L	AC 24V supply
-	
S	CO2 Input
MP	MP-Bus connection



LMV-BAC-001



CABLE SIZE  
1. sqmm

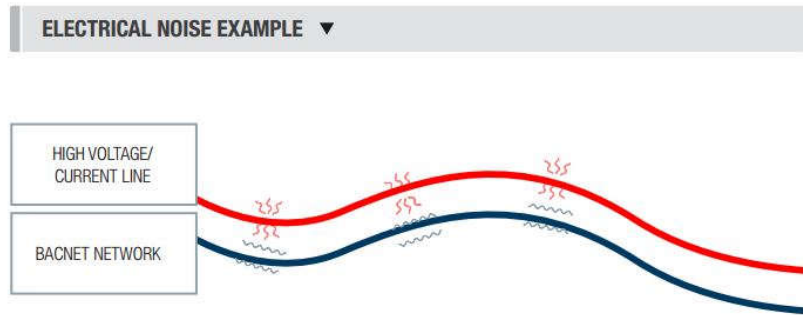
VAV Wiring Diagram

## Electrical Noise

Electrical noise can affect both analog signal and digital communications such as BACnet. Therefore do not route high voltage lines next to the BACnet network! Avoid noisy electrical sources such as:

- Variable Frequency Drives
- High current power lines (main panel feeds)
- Fluorescent light fixtures

If you must pass near noisy electrical lines cross at right angles. This will help reduce the amount of noise coupled to the network wires.



## Termination

BACnet MS/TP networks must be terminated to ensure proper operation. A network should be terminated twice, once at the beginning and once at the end. Termination helps reduce reflections and noise. The terminating can be done with a 100 ohm resistor across the D+ and D- lines.

**Note:** The BACnet MS/TP to IP Router may have a built in termination and it is enabled by default (since the router is typically the beginning of the entire MS/TP network). Now you only have to go and find/terminate that last device.

## BACnet MS/TP Speeds

The default speed for Belimo ZonEase BACnet MS/TP controller is 38400. The BACnet standard REQUIRES a device to support at least 9600 baud.

BACnet MS/TP supports 4 standard speeds which are:

- 9600
- 19200
- 38400
- 76800

All controls on the same network segment MUST be set to the SAME speed.

## Addressing

Just like phone numbers having 2 that are the same isn't recommended. Each device on an MS/TP segment must have a unique MAC (media access control) address. (Typically 1 – 99).

The device instance (software address) must be unique for the building network. In the Belimo ZonEase - addresses (both MAC and Device Instance) are set in via a software, uploaded to the cloud and can be downloaded on any NFC enabled device (Smartphone/ Tablet) through the Belimo ZonEase App and written onto the controller.



## Troubleshooting

1. Check all your 24 VAC + ( $\sim$ ) / - ( $\perp$ ) (polarities). While there ensure COMMON is EARTH GROUNDED.
2. Ensure all MAC addresses are unique for that MS/TP segment. If you have 2 addresses that are the same that means 2 devices are talking at the same time.
3. Ensure all SOFTWARE (device instances) are unique for that BACnet network.
4. Ensure all devices are running at the same baud rate. The ZonEase default is 38,400. Confirm this someone may have changed it.
5. Chop network in half. Does it start to work? Keep chopping until network comes online. This will help narrow down the problem.