BACnet Interface Description

ASHRAE BACnet®

Room Operating Units 22RT...-5U00...

Edition 2023-04 / V2.2/V3.0

BELIMO®

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Protocol Implementation Conformance Statement — PICS

General information

Date	03.04.2023
Vendor Name	BELIMO Automation AG
Vendor ID	423
Product Name	Room Operating Unit (ROU)
Product Model Number	22RT…-5U00… (with virtual display) 22RT…-5U00… (with ePaper touch display)
Protocol	BACnet MS/TP over RS-485
Application Software Version	ROUS1_V2.2/V3.0
Firmware Revision	BTL:0001 B:0002
BACnet Protocol Revision	14
Product Description	Room Operating Unit for measurement of temperature, humidity and CO_2 BACnet Application Speci ic Controller
BACnet Standard Device Profile	(B-ASC)
Segment Capability	No
Data Link Layer Options	MS/TP Manager Node
Device Addressing Binding	No static device binding supported None
Networking Options	ISO 10646 (UTF-8)
Character Sets Supported	None
Gateway Options	Non-secure device
Network Security Options	BTL listing pending
Conformance	

BACnet Interoperability Building Blocks supported (BIBBs)

Data sharing — ReadProperty-B (DS-RP-B)
Data sharing — ReadPropertyMultiple-B (DS-RPM-B)
Data sharing — WriteProperty-B (DS-WP-B)
Data sharing — COV-B (DS-COV-B)
Device management — DynamicDeviceBinding-B (DM-DDB-B)
Device management — DynamicObjectBinding-B (DM-DOB-B)
Device management — DeviceCommunicationControl-B (DM-DCC-B)

BACnet MS/TP

Baud Rates	9'600, 19'200, 38'400 76'800, 115'200 (Default: 38'400)
Address	0…127 (Default: 1)
Number of Nodes	Max. 32 (without repeater), 1 full bus load
Terminating Resistor	120 Ω (Default: Off)

Parametrisation

Tool	Belimo Assistant App

All writable objects which are persistent are **not** supposed to be written on a regular basis.

Standard object types supported

Object type	Optional properties	Writable properties
Device	Description Location Active COV Subscriptions Max Master Max Info Frames Profile Name	Object Identifier Object Name Description APDU Timeout (1'000...60'000) Number of APDU Retries (0...10) Max Master (1...127) Max Info Frames (1...255)
Analog Input [AI]	Description COV Increment	COV Increment
Analog Value [AV]	Description COV Increment	Present Value COV Increment
Multi-state Value [MV]	Description State Text	–
Binary Input [BI]	Description Active Text Inactive Text	–

The device does not support the services CreateObject and DeleteObject.

The specified maximum length of writeable strings is based on single-byte characters.
– Object name 32 char
– Location 64 char
– Description 64 char

Service processing

The device supports the DeviceCommunicationControl service.
No password is required.

A maximum of 5 active COV subscriptions with a lifetime of 1...28'800 s (max. 8 hours) are supported.

BACnet object description

Device object

Object name	Object type [Instance]	Description Comment Status_Flags	Values	COV increment	Access
Device	Device [Inst.No]	–	0...4'194'302 Default: 1	–	W

Sensor values

Object name	Object type [Instance]	Description Comment Status_Flags	Values	COV increment	Access
Temperature	AI[1]	**Room temperature** Unit can be selected by MV[127].	0...297 (Exact range determined by selected unit)	0.01...122 Default: 0.1	R
Relative_Humidity	AI[2]	**Room relative humidity in %**	0...100	0.01...100 Default: 1	R
Co2Value	AI[3]	**CO_2 value of the room in ppm**	1...2'000	0.1...2'000 Default: 10	R
DewPointTemperature	AV[12]	**Dew point temperature** Unit can be selected by MV[127].	-50...283 (Exact range determined by selected unit)	0.01...122 Default: 0.1	R

Offset/correction values

These registers can be used to specify offset/correction values for the individual measured values.

Object name	Object type [Instance]	Description Comment Status_Flags	Values	COV increment	Access
TemperatureOffset	AV[100]	**Room temperature offset** Offset for actual temperature value in K	-15...15	0.01...15 Default: 0.1	W
HumidityOffset	AV[101]	**Relative humidity offset** Offset for actual humidity value in %	-20...20	0.01...20 Default: 1	W
Co2Offset	AV[102]	**CO_2 value offset** Offset for actual CO_2 concentration value in ppm	-500...500	1...500 Default: 1	W

Temperature unit selection

The units of the room unit can be selected by the following multistate value objects:
MV[127] affects the unit of the room temperature (AI[1]), the dew point temperature (AV[12]) and the room temperature setpoint (AV[110]).
MV[100] only affects the temperature unit shown on the display.
MV[128] affects the relative room temperature setpoint (AV[111]).

Object name	Object type [Instance]	Description Comment Status_Flags	Values	Access
UnitSelTemperature	MV[127]	**Unit selection temperature sensors** Temperature unit used for Bus communication	1: °C 2: K 3: °F	W
UnitSelTemperature-Display	MV[100]	**Unit selection for temperature on display** Temperature unit shown on display of room unit	1: °C 2: - 3: °F	W
UnitSelDeltaT	MV[128]	**Unit selection delta T** Temperature unit for the relative temperature setpoint (see figure 1, right)	1: °C 2: K 3: °F	W

Temperature setpoint

Using the following registers, the temperature setpoint can be configured and read out.

Figure 1: Left: Room temperature setpoint (in °C). Right: Relative room temperature setpoint

Object name	Object type [Instance]	Description Comment Status_Flags	Values	COV increment	Access
SetpointTemperature	AV[110]	**Room/zone temperature setpoint** Set desired room temperature in room/zone in selected unit. Unit can be selected by MV[127].	-5.6...113 (Exact range determined by selected unit)	0.01...113 Default: 0.1	W
SetpointRelTemperature	AV[111]	**Relative room/zone temperature setpoint** Set desired room temperature setpoint shift in room/zone in selected unit. Unit can be selected by MV[127].	-5.6...42 (Exact range determined by selected unit)	-5.6...42 (Exact range determined by selected unit)	W
SetpointType	MV[103]	**Room temperature setpoint type** Select between absolute (e.g. 23°C) and relative setpoint, i.e. offset to default setpoint (e.g. +3°C), see figure 1.	0: Absolute setpoint 1: Relative setpoint	–	W
SetpointTemperatureDefault	AV[112]	**Default room temperature setpoint** Set the center of the setpoint adjustment range.	15...35	0.01...35 Default: 0.1	W
AdjustmentRangeSetpoint	AV[113]	**Adjustment range temperature setpoint** Set the permissible setpoint adjustment range (e.g. 3 = +-3°C).	0...5	1...10 Default: 1	W

Ventilation setpoint

Using the following registers, the ventilation setpoint can be configured and read out.

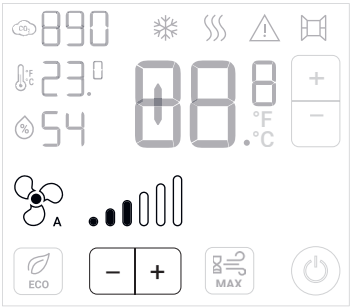


Figure 2: Ventilation setpoint

Object name	Object type [Instance]	Description Comment Status_Flags	Values	COV increment	Access
VentilationSetpoint	AV[15]	**Setpoint ventilation** Setpoint for room/zone ventilation in percent	0…100	0.01…100 Default: 1	W

Object name	Object type [Instance]	Description Comment Status_Flags	Values	Access
ManualAutomatic-Control Mode	MV[10]	**Manual or automatic airflow control** Set ventilation mode to automatic control or manual control (applies if hybrid control mode is activated, see MV[105])	1: Manual ventilation stages control 2: Automatic ventilation stages control	W
VentControlMode	MV[105]	**Ventilation control mode** Set the ventilation control functionality to manual mode or automatic and manual, depending on MV[10]. Auto mode can be accessed by presssing "-" at 0% or "+" at 100% ventilation setpoint.	1: Manual mode only 2: Automatic or manual	W
NumberVentilation-Stages	MV[106]	**Number of ventilation stages** Set the number of ventilation stages on the display.	1: 3 stages 2: 4 stages 3: 7 stages	W

Display configuration

The display content and the options for interaction are fully customisable according to the needs of the HVAC application and the building owner. The following registers describe how to configure the display layout.

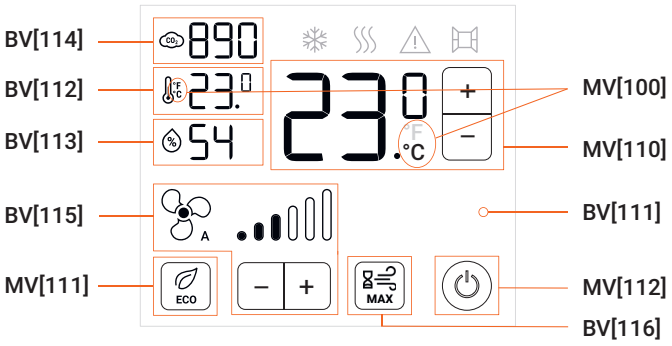
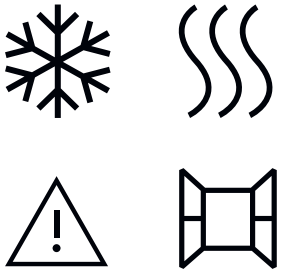


Figure 3: Display configuration options

Object name	Object type [Instance]	Description Comment, Status_Flags	Values	Access
EnLocalAdjustment	BV[110]	**Enable local adjustment** Allow or prohibit the room occupant to make adjustments (Setpoints, Eco Mode, Boost Mode, On/Off) on the room operating unit.	0: Disabled 1: Enabled	W
ColorScheme	BV[111]	**Light/dark color scheme** Set the display background color either to white (0) or black (1).	0: Black on white 1: White on black	W
ShowTemperature	BV[112]	**Display room or zone temperature** Show or hide room temperature value on the display	0: Invisible 1: Visible	W
ShowRelHumidity	BV[113]	**Display relative humidity** Show or hide relative humidity value on the display.	0: Invisible 1: Visible	W
ShowCo2	BV[114]	**Display CO_2** Show or hide CO_2 value on the display.	0: Invisible 1: Visible	W
TempDisplayMode	MV[110]	**Temperature display mode** Show room temperature or temperature setpoint on the large temperature indicator (see fig. 3 MV[110]).	1: Invisible 2: Display actual room temperature 3: Room temperature setpoint	W
ShowVentilationStages	BV[115]	**Display ventilation stages** Show or hide ventilation stages.	0: Invisible 1: Visible	W
ShowBoostButton	BV[116]	**Display boost button** Show or hide boost function.	0: Invisible 1: Visible	W
ModeEcoButton	MV[111]	**Eco button mode** Functionality of the Eco mode icon on the display	1: Invisible 2: Display status 3: Selection eco mode on/off	W
ModeOnOffButton	MV[112]	**On/off button mode** Functionality of the on/off button (off clears display and inverts button)	1: Invisible 2: Display status 3: Selection on/off	W

Status icons on display

The display offers additional icons which can be used to give additional status information to a facility manager or room occupant. The following registers describe how to configure the status icons.



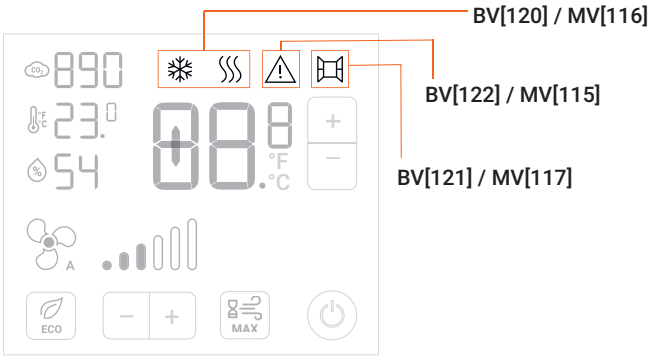


Figure 4: Status icons configuration options

Objectname	Object type [Instance]	Description Comment, Status_Flags	Values	Access
ShowWarningIcon	BV[120]	**Display warning icon** Show or hide warning icon on the display. (Applies if MV[116] is set to 2: According to display warning icon.)	0: Invisible 1: Visible	W
ShowWindowIcon	BV[121]	**Display window icon** Show or hide window icon on the display. (Applies if MV[117] is set to 2: According to display window icon.)	0: Invisible 1: Visible	W
DispHeatCoolSt	MV[115]	**Display heating and cooling application status** Show heating or cooling status icons on the display. (Applies if BV[122] is set to: 1: Visible.)	1: None 2: Heating 3: Cooling	W
ShowHeatingCooling Icon	BV[122]	**Display heating/cooling icon** Show heating and cooling icons.	0: Invisible 1: Visible	W
WarningIconFunction	MV[116]	**Display warning icon function** Set the functionality of the warning icon on the display.	1: Invisible 2: According to display warning icon 3: According to device error status	W
WindowIconFunction	MV[117]	**Display window icon function** Set the functionality of the window icon on the display. 3: According to digital input Window icon is visible if DI (digital input) is closed (BI[10] equals 1).	1: Invisible 2: According to display window icon 3: According to digital input	W

Building operation mode

The display offers the possibility to switch between different building operation modes, but only when the dedicated button has been activated.

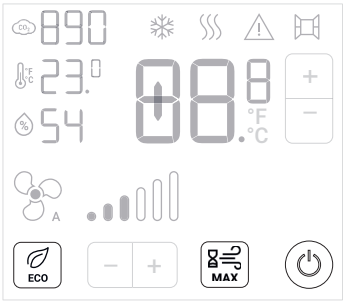


Figure 5: Using the "ECO", "MAX" and "On/Off" buttons, the user can switch between different building operation modes.

BACnetOutOfService
BACnetClearedOverridden

Object name	Object type [Instance]	Description Comment, Status_Flags	Values	Access
OperationMode	MV[118]	**Operation mode** HVAC building operation mode	1: Off/protection 2: On/comfort 3: Eco mode 4: Boost mode	W
BoostModeDuration	AV[117]	**Boost mode duration** Set the time the boost mode shall be activated.	60...3'600	W

Digital input

Object name	Object type [Instance]	Description Comment, Status_Flags	Values	Access
DigitalInput	BI[10]	**Digital input** Feedback of logical level at digital input	0: False 1: True	R

Bus watchdog and termination resistor

Object name	Object type [Instance]	Description Comment, Status_Flags	Values	Access
BusWatchdog	AV[130]	**Timeout for bus watchdog in s** For monitoring only	30...3'600 Default: 120	W
BusTermination	BV[99]	**Bus termination** Indicates if bus termination (120 Ω) is enabled. Bus termination can be set with the Belimo Assistant App.	0: Disabled 1: Enabled Default: Disabled (0)	R

Air quality traffic light

The devices that feature a CO_2 sensor have a built-in traffic light that indicates the status of the CO_2 concentration in the room. The following registers describe how to configure the CO_2 traffic light.

Figure 6: CO_2 traffic light for different models.

Object name	Object type [Instance]	Description Comment, Status_Flags	Values	Access
AirQualityStatus	MV[119]	**Air quality status** Status of measured air quality in the room/zone Corresponds to EN 16798-3 notation: 1: Good IAQ (green) 2: Moderate IAQ (yellow) 3: Poor IAQ (red)	1: Deactivated 2: Ok 3: Warning 4: Alarm	R
ShowAirQuality-Indication	BV[125]	**Air quality indication** Show CO_2 traffic light.	0: Disabled 1: Enabled	W

Object name	Object type [Instance]	Description Comment, Status_Flags	Values	COV increment	Access
AirQualityGoodLimit	AV[115]	**CO_2 limit for good air quality** Set threshold for CO_2 concentration to switch between “good” (green LED) and “moderate ” (yellow LED) state.	600...1'249	1...1'249 Default: 1	W
AirQualityMediumLimit	AV[116]	**CO_2 limit for moderate air quality** Set threshold for CO_2 concentration to switch between “moderate ” (yellow LED) and “poor” (red LED) state.	1'250...2'000	1...2'000 Default: 1	W

All inclusive.

Belimo as a global market leader develops innovative solutions for the controlling of heating, ventilation and air-conditioning systems. Damper actuators, control valves, sensors and meters represent our core business.

Always focusing on customer value, we deliver more than only products. We offer you the complete product range for the regulation and control of HVAC systems from a single source. At the same time, we rely on tested Swiss quality with a five-year warranty. Our worldwide representatives in over 80 countries guarantee short delivery times and comprehensive support through the entire product life. Belimo does indeed include everything.

The "small" Belimo devices have a big impact on comfort, energy efficiency, safety, installation and maintenance.

In short: Small devices, big impact.

- 5-year warranty
- On site around the globe
- Complete product range
- Tested quality
- Short delivery times
- Comprehensive support

EN – 2023-04/A – Subject to technical modifications

BELIMO Automation AG
Brunnenbachstrasse 1, 8340 Hinwil, Switzerland
+41 43 843 61 11, info@belimo.ch, www.belimo.com

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