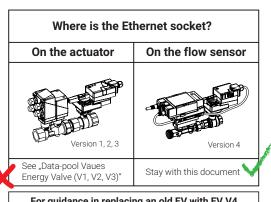


BACnet Interface Description



For guidance in replacing an old EV with EV V4 -> see "Replacement Guide V1, V2, V3 vs. V4"



Energy Valve DN 15...50 (Version 4)

Edition 2024-09 / V4.2.0



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BACnet object description

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Protocol Implementation Conformance Statement – PICS

General information Date 25.04.2024

Vendor Name BELIMO Automation AG

Vendor ID 423

Product Name Energy Valve

Product Model Number EV..R2+(K)BAC (Version 4, DN 15...50)

EV..R2+MID (Version 4, DN 15...50)

EV..R3+BAC (Version 4, DN 15...50)

Application Software Version 04.01.0000 Firmware Revision 14.10.0002

BACnet Protocol Revision 1.14

Product Description Electronic pressure-independent

characterised control valve with

energy monitoring

BACnet Standard Device Profile BACnet Application Specific Controller

(B-ASC)

Segment Capability No

Data Link Layer Options MS/TP Manager

BACnet IP, (Annex J)

BACnet IP, (Annex J), Foreign Device No static device binding supported

Networking Options None

Device Address Binding

Character Sets Supported ISO 10646 (UTF-8)

Gateway Options None

Network Security Options Non-secure device
Conformance Listed by BTL

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

BACnet IP Port open (Default: 47'808)

ParametrisationToolBelimo Assistant 2 or
integrated webserver



All writeable objects with instance number ≥90 which are persistent are **not** supposed to be written on a regular basis.

Standard object types supported

Object type	Optional properties	Writeable properties
Device	Description Location Active COV Subscriptions Max Manager Max Info Frames Profile Name	Object Identifier Object Name Location Description APDU Timeout (1'00060'000) Number of APDU Retries (010) Max Manager (1127) Max Info Frames (1255)
Analog Input [AI]	Description COV Increment	COV Increment
Analog Output [AO]	Description COV Increment	Present Value COV Increment Relinquish Default
Analog Value [AV]	Description COV Increment	Present Value COV Increment
Binary Input [BI]	Description Active Text Inactive Text	_
Binary Value [BV]	Description Active Text State Text	Present Value
Multi-state Input [MI]	Description State Text	_
Multi-state Output [MO]	Description State Text	Present Value Relinquish Default
Multi-state Value [MV]	Description State Text	Present Value
Positive Integer Value [PIV]	Description	-

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 services. No password is required.

A maximum of 6 active COV subscriptions with a lifetime of 1...28'800 s. (max. 8 hours) are supported.

BACnet object description

Object name	Object type [Instance]	Description Comment, Status_Flags	Values	COV increment	Access
Device	Device [Inst.No]	BACnet internetwork-wide unique number for device identification.	04'194'302 Default: 1	-	W
		BACnet MS/TP: This value plus the parameterized MAC address (0127) define the Device-ID.			
RelPos	AI[1]	Relative position in % Overridden = true, if the gear train is disengaged	0100	0.01100 Default: 1	R
SpAnalog	AI[6]	Analog setpoint in % Shows setpoint in % if actuator is controlled by analog signal (SpSource MV[122] is analog (1)). If SpSource MV[122] is Bus (2) then Out_Of_Service is TRUE Overridden = true, if forced control (bus, tool and analog forced control) is active	0100	0.01100 Default: 1	R
Sens1Active_Volt	AI[20]	Sensor 1 as voltage in V If Sens1Type MV[220] is not 2: Active then Out_Of_Service is TRUE	015	0.0115 Default: 0.1	R
Sens1Passive_Ohm	AI[21]	Sensor 1 as resistance in Ω If Sens1Type MV[220] is not 4: Passive then Out_Of_Service is TRUE	0.11'000'000	0.11'000'000 Default: 1	 R
T1_UnitSel	AI[22]	Temperature 1 (remote) in selected unit → Unit can be selected by MV[127]	-20150°C 253.15423.15 K -4302°F	0.01306 Default: 1	R
T2_UnitSel	AI[23]	Temperature 2 (flow body) in selected unit → Unit can be selected by MV[127]	-20150°C 253.15423.15 K -4302°F	0.01306 Default: 1	R
SpRel	AO[1]	Setpoint relative in % The setpoint is related to either the position, the volumetric flow (of V' _{min} , V' _{max}) or the power (of P' _{max}). See also AV[90], AV[94], AV[100], AV[110] Overridden = true, if forced control (bus MV[1], tool and/or analog forced control) is active	0100 Default: 0	0.01100 Default: 1	С
AbsPos	AV[2]	Absolute position in ° Overridden = true, if the gear train is disengaged	096	0.0196 Default: 1	R
RelFlow	AV[10]	Relative volumetric flow in % Related to V' _{max} "Maximum Volumetric Flow Limit" (AV[94], [AV97])	0150	0.01150 Default: 1	R
SpAbsFlow_ UnitSel	AV [17]	Setpoint absolute volumetric flow in selected unit → Unit can be selected by MV[123] Overridden = true, if forced control (bus, tool and/or analog forced control) is active	01,5*V' _{nom}	01,5*V'nom Default: 1	R
AbsFlow_ UnitSel	AV[19]	Absolute volumetric flow in selected unit → Unit can be selected by MV[123]	01,5*V' _{nom}	01,5*V' _{nom} Default: 1	R
Sens1Temp_ UnitSel	AV[20]	Sensor 1 as temperature in selected unit → Unit can be selected by MV[127] If Sens1TempType MV[221] is 1: None or Sens1Type MV[220] is not 4: Passive then Out_Of_Service is TRUE	-20150°C 253.15423.15 K -4 248 °F	0.01252 Default: 1	R

Object name	Object type [Instance]	Description Comment, Status_Flags	Values	COV increment	Access
DeltaT_UnitSel	AV[22]	Delta Temperature in selected unit → Unit can be selected by MV[128]	0450°C 0450 K 0810°F	0.01810 Default: 1	R
RelPower	AV[40]	Relative power in % Related to P' _{max} "Maximum Power Limit" (AV[110], AV[113])	0300	0.01300 Default: 1	R
CoolingPower_ UnitSel	AV[45]	Cooling power in selected unit → Unit can be selected by MV[124]	021'500'000 W 021'500 kW 021.5 MW 073'361'045.1 BTU/h 073'361 kBTU/h 06'113.4 ton	0.173'361'050 Default: 1	R
HeatingPower_ UnitSel	AV[46]	Heating power in selected unit → Unit can be selected by MV[124]	021'500'000 W 021'500 kW 021.5 MW 073'361'045.1 BTU/h 073'361 kBTU/h 06'113.4 ton	0.173'361'050 Default: 1	R
CoolingEnergy_ UnitSel	AV[47]	Cooling energy in selected unit → Unit can be selected by MV[125] See also MV[200]	02'147'483'647	12'147'483'647 Default: 1	R
HeatingEnergy_ UnitSel	AV[48]	Heating energy in selected unit → Unit can be selected by MV[125] See also MV[200]	02'147'483'647	12'147'483'647 Default: 1	R
Volume_UnitSel	AV[52]	Accumulated volume in selected unit → Unit can be selected by MV[126] See also MV[200]	042'000'000 m ³ 042'000'000'000 l 011'095'226'199 gal 01'483'216'002.3 cf	142'000'000'000 Default: 1	R
AbsDiffPressure	AV[55]	Absolute differential water pressure in selected unit → Unit can be selected by MV[131]	0600'000.00 Pa 06.00 bar 058.01 psi 06'000.00 mbar 0600.00 kPa	0.01600'000 Default: 0.1	R
RelDiffPressure	AV[56]	Feedback value of differential water pressure Relative to dp setpoint max	0100	0.01100 Default: 0.1	R
Glycol Concentration	AV[60]	Glycol concentration in % Measured value or override value in settings	0100	0.01100 Default: 1	R
Vmin	AV[90]	Minimum volumetric flow limit in %	0100	0.01100 Default: 1	W
Vmin_UnitSel	AV[93]	Minimum volumetric flow limit in selected unit → Unit can be selected by MV[123]	00.1 m ³ /s 0360 m ³ /h 0100 l/s 06'000 l/min 0360'000 l/h 01'585.03 gpm 0211.888 cfm Default: 0 m ³ /s	0.001360'000 Default: 1	W

Object name	Object type [Instance]	Description Comment, Status_Flags	Values	COV increment	Access
Vmax	AV[94]	Maximum volumetric flow limit in % The maximum volumetric flow limit can be set between 25% and 100% of V' _{nom} . "Nominal Volumetric Flow" (AV[100]) and is considered when Control Mode = Flow Control or Power Control. Values below 25% will be adjusted to 25%.	0100 %	0.01100 Default: 1	W
Vmax_UnitSel	AV[97]	Maximum volumetric flow limit in selected unit → Unit can be selected by MV[123]	00.1 m³/s 0360 m³/h 0100 l/s 06'000 l/min 0360'000 l/h 01'585.03 gpm 0211.888 cfm Default: 0 m³/s	0.001360'000 Default: 1	W
Vnom_UnitSel	AV[100]	Nominal volumetric flow in selected unit → Unit can be selected by MV[123]	00.1 m ³ /s 0360 m ³ /h 0100 l/s 06'000 l/min 0360'000 l/h 01'585.03 gpm 0211.888 cfm	0.001360'000 Default: 1	R
Pmax	AV[110]	Maximum power limit in % Related to P'max	0100	0.01100 Default: 1	W
Pmax_UnitSel	AV[113]	Maximum power limit in selected unit Related to P'max → Unit can be selected by MV[124]	021'500'000 W 021'500 kW 021.5 MW 073'361'045.1 BTU/h 06'113.4 ton Default: 50'000 W	0.173'361'045 Default: 1	W
Pnom_ UnitSel	AV[116]	Nominal power in selected unit → Unit can be selected by MV[124]	021'500'000 W 021'500 kW 021.5 MW 073'361'045.1 BTU/h 073'361 kBTU/h 06'113.4 ton	0.173'361'045 Default: 1	R
SpDeltaT_UnitSel	AV[120]	Setpoint delta temperature in selected unit → Unit can be selected by MV[128]	055°C 055 K 099°F Default: 0 K	0.0199 Default: 1	W
SpAbsFlow DeltaT_UnitSel	AV[127]	Setpoint absolute flow at Delta T in selected unit → Unit can be selected by MV[123]	00.1 m ³ /s 0360 m ³ /h 0100 l/s 06'000 l/min 0360'000 l/h 01'585.03 gpm 0211.888 cfm Default: 0 m ³ /s	0360'000 Default: 1	W
BusWatchdog	AV[130]	Timeout for bus watchdog in s If no write request is received within the timeout, the device will execute the action defined in MV[130] (Bus fail action).	53'600 Default: 120	13'595 Default: 1	W

Object name	Object type [Instance]	Description Comment, Status_Flags	Values	COV increment	Access
AbsDiffPressure	AV[135]	Absolute differential water pressure setpoint in selected unit Value range is related to selected dP sensor type → Unit can be selected by MV[131]	10'000 400'000 Pa 0.14 bar 1.4558.02 psi 1004'000 mbar 10400 kPa Default: 40'000 Pa	0390'000 Default: 0.1	W
NomDiffPressure	AV[136]	Nominal differential water pressure setpoint in selected unit Value range is related to selected dP sensor type Unit can be selected by MV[131]	0600'000.0 Pa 06.0 bar 087.0 psi 06'000.0 mbar 0600.0 kPa	0.01600'000 Default: 0.1	R

Object name	Object type [Instance]	Description Comment, Status_Flags	Values	COV increment	Access
ErrorState	AV[140]	Error State Value is bit-coded. More than one bit can be set to 1. Not all bits mentioned in the enumeration are		116'383 Default: 0	R
		used for this product range.	Bitmask =		
		O: No communication to actuator: Communication with actuator not possible. I: Gear train disengagement: Gear train	No communication to actuator Gear train disengaged		
		disengaged button is pressed 2: Actuator cannot move: Mechanical overload due to blocked valve, etc. (only available for EVR+KBAC)	2: Actuator cannot move		
		3: Reverse flow: Reverse flow is detected 4: Flow setpoint not reached: Setpoint cannot be reached within 15 min during flow control	3: Reverse flow 4: Flow setpoint not reached		
		5: Flow with closed valve: Flow is measured but position of valve is closed	5: Flow with closed valve		
		6: Flow actual exceeds flow nominal: Actual flow exceeds the designed nominal flow	6: Flow actual exceeds flow nominal		
		7: Flow measurement error: Air in the system, error occurred during flow measurement	7: Flow measurement error		
		8: Remote temperature error: No connection to external temperature sensor	8: Remote temperature error		
		9: Flowbody temperature error: Error with embedded temperature sensor	9: Flowbody temperature error		
		Communication to sensor interrupted: Internal communication to flow sensor interrupted	10: Communication to Sensor interrupted		
		11: Freeze warning: Measured temperature & glycol concentration indicate that grease ice can build up	11: Freeze warning		
		12: Glycol detected: Glycol was detected in a MID application	12: Glycol detected		
		13: Power setpoint not reached: Setpoint cannot be reached within 15 min during power control	13: Power setpoint not reached		
		14: Device End of life reached: MID only. The sensor module must be replaced.	14: Device end of life reached		
		15: Bus watchdog triggered: Timeout for the bus watchdog expired	15: Bus watchdog triggered		
		16: No differential pressure detected: No differential pressure detected within 5 min during pressure control	16: No differential pressure detected		
		17: Differential pressure setpoint can not be reached: Differential pressure setpoint can not be reached within 15 min during pressure control mode	17: Differential pressure set- point can not be reached		
		18: Minimum position applied: Minimum position (27%) is applied if: - The valve is restartet - After a power failure - The manual override was previously operated	18: Minimum position applied		
		 Switching from another control mode (e.g. flow control) to control mode differential pressure control No differential pressure is present at a flow rate <0.7% V'_{nom} 			

Definition Access: R = Read, W = Write, C = Commandable with priority array

Object name	Object type [Instance]	Description Comment, Status_Flags	Values	Access
Sens1Switch	BI [20]	Sensor 1 as switch If Sens1Type MV[220] is not 5: Switch then Out_Of_Service is TRUE	0: Inactive 1: Active	R
BusTermination	BV[99]	Bus termination Indicates if bus termination (120 Ω) is enabled. Bus termination can be set with Belimo Assistant 2	0: Disabled 1: Enabled	R
Override	MV[1]	Override control Overrides setpoint with defined values	1: None 7: Nominal 2: Open Valve 8: - 3: Close Valve 9: - 4: Minimum 10: - 5: - 11: Motor stop 6: Maximum Default: 1	С
SummaryStatus	MV[99]	Summary status Summarises all status MV[102] – MV[107], MV[140], MV[141]	1: OK 2: Warning 3: Not OK	R
ControlMode	MV[100]	Control mode This value defines the interpretation of the setpoint A reset will be performed, if the state of this object is changed.	1: Position control 2: Flow control 3: Power control 4: Differential pressure control Default: 2	W
DeltaT_Limitation	MV[101]	DeltaT limitation	1: Disabled	W
		Disabled: dT-Manager not active dT-Manager: dT-Manager active with no restriction to flow dT-Manager scaling: dT-Manager active with restriction of flow → AV[120]	2: dT-Manager 3: dT-Manager scaling Default: 1	
StatusDeltaTMgr	MV[102]	Status DeltaT manager 1: Not selected: dT-Manager deactivated 2: Standby: dT-Manager activated but not active 3: Active: dT-Manager active 4: Scaling standby: dT-Manager active with no limitation to the flow 5: Scaling active: dT-Manager active with limitation to the flow → AV[120]	1: Not selected 2: Standby 3: Active 4: Scaling standby 5: Scaling active	
StatusSensor	MV[103]	Status sensor Indicates informations within the flow sensor and both temperature sensors 2: Flow measurement error: Air in the system, error occurred during flow measurement. 3: Flowbody temperature not OK: Error with embedded temperature sensor 4: Remote temperature not OK: No connection to external temperature sensor 5: Communication to sensor interrupted: Internal communication to flow sensor interrupted	1: OK 2: Flow measurement error 3: Flowbody temperature not OK 4: Remote temperature not OK 5: Communication to flow sensor interrupted	
StatusFlow	MV[104]	Status flow 2:Actual flow exceeds nominal flow: Actual flow exceeds the designed nominal flow. 3: Flow in closed position: Flow is measured but position of valve is closed 4: Flow not reached: Setpoint cannot be reached within 3 min. during flow control 5: Reverse flow detected: Energy Valves detected a reverse flow	1: OK 2: Actual flow exceeds nominal flow 3: Flow with closed valve 4: Flow setpoint cannot be reached 5: Reverse flow	

Object name	Object type [Instance]	Description Comment, Status_Flags	Values	Access
StatusMedia	MV[105]	Status media 2: Glycol detected: Glycol was detected in a MID application 3: Freeze warning: Measured temperature & glycol concentration indicate that grease ice can build up	1: OK 2: Glycol detected 3: Freeze warning	R
StatusActuator	MV[106]	Status actuator 2: Actuator cannot move: Mechanical overload due to blocked valve, etc. (only available for EVR+KBAC) 3: Gear train disengaged: Gear train disengaged button is pressed 4: No communication to actuator: Communication with actuator not possible	1: OK 2: Actuator cannot move 3: Gear train disengaged 4: No communication to actuator	R
StatusPower	MV[107]	Status power 2: Power not reached: Setpoint cannot be reached within 15 min. during power control	1: OK 2: Power not reached	R
Command	MV[120]	Initiate function Initiation of actuator functions for service and test. After command is sent, value returns to None(1).	1: None 2: – 3: Synchronization Default: 1	W
SpSource	MV[122]	Setpoint source If Analog(1) then actuator is controlled by analog signal 010 V on wire 3. If Bus(2) then setpoint via bus SpRel AO[1]	1: Analog 2: Bus Default: 1	W
UnitSelFlow	MV[123]	Unit selection flow The selected unit is valid for AV[17], AV[19], AV[93], AV[97], AV[100], AV[127]	1: m³/s 5: l/h 2: m³/h 6: gpm 3: l/s 7: cfm 4: l/min Default: 5	W
UnitSelPower	MV[124]	Unit selection power The selected unit is valid for AV[45], AV[46], AV[113], AV[116]	1: W 5: kBTU/h 2: kW 6: ton 3: MW Default: 2 4: BTU/h	W
UnitSelEnergy	MV[125]	Unit selection energy The selected unit is valid for AV[47], AV[48], PIV[31], PIV[32]	1: J 7: MWh 2: kJ 8: BTU 3: MJ 9: kBTU 4: GJ 10: tonh 5: Wh Default: 6 6: kWh	W
UnitSelVolume	MV[126]	Unit selection volume The selected unit is valid for AV[50], AV[52], PIV[50]	1: m³ 4: Cubic foot 2: Litre Default: 1 3: Gallon	W
UnitSelTemperature	MV[127]	Unit selection temperature sensors The selected unit is valid for AI[20], AI[22], AI[23]	1: °C 2: K 3: °F Default: 1	W
UnitSelDeltaT	MV[128]	Unit selection delta T The selected unit is valid for AV[22]	1: °C 2: K 3: °F Default: 1	W
BusFailAction	MV[130]	Bus fail action In the event of a breakdown in communication, the actuator enables the bus watchdog fail action	1: None 5: Min 2: Open 6: – 3: Close 7: Stop 4: Max Default: 1	W

Object name	Object type [Instance]	Description Comment, Status_Flags	Values		Access
UnitSelPressure Difference	MV[131]	Unit selection pressure difference	1: Pa 2: bar 3: psi	4: mbar 5: kPa Default: 2	W
DiffPressure SensorStatus	MV[140]	Status of the differential water pressure sensor	1: OK 2: Differential pre Default: 1	essure not detected	R
DiffPressure ControlStatus	MV[141]	Differential water pressure control status	1: OK 2: Differential precannot be read 3: Minimum posi Default: 1	hed	R
SelectMeter Registers	MV[200]	Select meter registers Select between certified meter register and lifetime register. Value 1 only available for models with MID certification EVR2+MID. For non MID certificied models value 2 is defined as default.	1: Certified meter 2: Lifetime meter Default: 1 (2)		W
		1: The certified meter register will be reset when the sensor module is replaced. 2: The lifetime register is compensated for glycol (if applicable).			
		Avoid toggling between the two registers as this will affect data logging.			
Sens1Type	MV[220]	Sensor 1 type Additional sensor input. Only selectable if SpSource MV[122] is set to bus.	1: None 2: Active volt 3: –	4: Passive 5: Switch Default: 1	W
Sens1TempType	MV[221]	Sensor 1 passive type Values related to selected units on MV[127]. Only available if MV[220] Sensor 1 type is set to value 4 "Passive".	1: None 2: PT1000 3: Ni1000EU 4: – 5: –	6: - 7: - 8: NTC10k2 9: NTC10k3 Default: 1	W
		-	-		

Definition Access: R = Read, W = Write, C = Commandable with priority array

Object name	Object type [Instance]	Description Comment, Status_Flags	Values	COV Increment	Access
CoolingEnergyPIV_UnitSel	PIV[31]	Cooling energy in selected unit → Unit can be selected by MV[125] See also MV[200]	02'147'483'647	12'147'483'647	R
HeatingEnergyPIV_UnitSel	PIV[32]	Heating energy in selected unit → Unit can be selected by MV[125] See also MV[200]	02'147'483'647	12'147'483'647	R
VolumePIV_UnitSel	PIV[50]	Accumulated volume in selected unit → Unit can be selected by MV[126] See also MV[200]	042'000'000 m ³ 042'000'000'000 l 011'095'226'199 gal 01'483'216'002 cf	-	R
MeterSerialNo_Part1	PIV[201]	Energy meter serial number first digits	_	_	R
MeterSerialNo_Part2	PIV[202]	Energy meter serial number last digits			R
		-	_		

Definition Access: R = Read, W = Write, C = Commandable with priority array

Note: According to the present configuration settings of the Energy Valve (e.g. DN size) the HVAC application may perform a size limitation within the indicated BACnet value range.

Each Energy Valve may have different HVAC value size limitations.

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

