



## Electronic pressure-independent characterised control valve with energy monitoring

### Contents

Protocol Implementation Conformance Statement - PICS	2
BACnet object description	5

## Protocol Implementation Conformance Statement - PICS

General information	<b>Date:</b>	7. November 2014
	<b>Vendor Name:</b>	BELIMO Automation AG
	<b>Vendor ID:</b>	423
	<b>Product Name:</b>	Energy Valve
	<b>Product Model Number:</b>	EV...R+BAC, e.g. EV015R+BAC P...W...EV-BAC, e.g. P6150W4500EV-BAC
	<b>Applications Software Version:</b>	1.33.5
	<b>Firmware Revision:</b>	1.0.4
	<b>BACnet Protocol Revision:</b>	1.6
	<b>Product Description:</b>	Electronic pressure-independent characterised control valve with energy monitoring.
	<b>BACnet Standard Device Profile:</b>	BACnet Application Specific Controller (B-ASC)
	<b>BACnet Interoperability Building Blocks supported:</b>	
		Data Sharing - ReadProperty-B (DS-RP-B)
		Data Sharing - ReadPropertyMultiple-B (DS-RPM-B)
		Data Sharing - WriteProperty-B (DS-WP-B)
	Device Management - DynamicDeviceBinding-B (DM-DDB-B)	
	Device Management - DynamicObjectBinding-B (DM-DOB-B)	
	Device Management - DeviceCommunicationControl-B (DM-DCC-B)	
<b>Segmentation Capability:</b>	No	
<b>Data Link Layer Options:</b>	BACnet IP, (Annex J) BACnet IP, (Annex J), Foreign Device  MS/TP master, baud rates: 9'600, 19'200, 38'400, 76'800, 115'200	
<b>Device Address Binding:</b>	No static device binding supported	
<b>Networking Options:</b>	None	
<b>Character Sets Supported:</b>	ANSI X3.4	

## Standard objects

The device provides datapoints for common operation as well as datapoints for parameterization.

Datapoint	BACnet Object	Access
Setpoint Relative in %	AO [1]	RW
Override	MO [1]	RW
Relative Position in %	AI [1]	R
Absolute Position in °	AI [2]	R
Setpoint Position reached	BI [1]	R
DeltaT Manager Status	MI [102]	R
Relative Flow in %	AI [10]	R
Absolute Flow in l/s	AI [14]	R
Absolute Flow in l/min	AI [11]	R
Absolute Flow in m <sup>3</sup> /h	AI [12]	R
Absolute Flow in gpm	AI [13]	R
Temperature 1 (remote) in °C	AI [20]	R
Temperature 1 (remote) in °F	AI [25]	R
Temperature 2 (embedded) in °C	AI [21]	R
Temperature 2 (embedded) in °F	AI [26]	R
Delta Temperature in °C	AI [22]	R
Delta Temperature in °F	AI [27]	R
Relative Power in %	AI [40]	R
Absolute Power in kW	AI [30]	R
Absolute Power in kBTU/h	AI [35]	R
Absolute Power in RT	AI [45]	R
Cooling Energy in kWh	AI [31]	R
Cooling Energy in MJ	AI [33]	R
Cooling Energy in kBTU	AI [36]	R
Cooling Energy in ton-h	AI [46]	R
Reset Cooling Energy	BO [31]	RW
Heating Energy in kWh	AI [32]	R
Heating Energy in MJ	AI [34]	R
Heating Energy in kBTU	AI [37]	R
Heating Energy in ton-h	AI [47]	R
Reset Heating Energy	BO [32]	RW
Vmax in %	AV [100]	W
Vmax in l/min	AV [90]	W
Vmax in gpm	AV [91]	W
Vnom in l/min	AV [101]	R
Vnom in gpm	AV [102]	R
Pmax in%	AV [105]	W
Pmax in kW	AV [95]	W
Pmax in kBTU/h	AV [96]	W
Pnom in kW	AV [106]	R
Pnom in kBTU/h	AV [107]	R
ControlMode	MV [100]	RW
DeltaT Limitation	MV [101]	RW
Setpoint DeltaT in °C	AV [103]	W
Setpoint DeltaT in °F	AV [104]	W
Setpoint Flow at DeltaT in l/min	AV [108]	W
Setpoint Flow at DeltaT in gpm	AV [109]	W
Error State	AI [100]	R
Reset Error Counters	BV [100]	RW

## Writable-only Objects

The Present\_Value property does not reflect the current setting in cases where the parameter was changed via other objects, tools or web server.



Access: R read-only  
RW readable / writable  
W writable-only

## PICS

(continued)

## Object processing

Object type	Optional properties	Writeable properties
Analog Input	Description	
Analog Output	Description	Present_Value
Analog Value	Description	Present_Value
Binary Input	Description Active_Text Inactive_Text	
Binary Value	Description Active_Text Inactive_Text Relinquish_Default <sup>1)</sup> Priority_Array <sup>1)</sup>	Present_Value
Binary Output	Description Active_Text Inactive_Text	Present_Value
Device	Description Location	Object_Identifier Object_Name Location APDU_Timeout Number_Of_APDU_Retries Max_Master <sup>2)</sup> Max_Info_Frames <sup>2)</sup>
Multi-state Input	Description State_Text	
Multi-state Value	Description State_Text Relinquish_Default <sup>1)</sup> Priority_Array <sup>1)</sup>	Present_Value
Multi-state Output	Description State_Text Relinquish_Default <sup>1)</sup> Priority_Array <sup>1)</sup>	Present_Value

1) Only if object commandable

2) Only in MS/TP mode

- The properties Object\_Name and Location of the Device Object support up to 255 characters (all other character strings are read-only).
- The device does not support the CreateObject and DeleteObject service.
- The writable Present\_Value of Value objects may be changed in different ways: web page, service tool and BACnet service. The value stored in the Present\_Value represents the last value written via BACnet and doesn't reflect the actual setting in use.

## Service processing

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

## BACnet object description

Object Name	Object Type / Instance	Description	Values	Default
<i>Device_Name</i>	Device [x]			
SpRel	Analog Output [1]	Setpoint Relative in %  The set point is related either to the position, the flow (Vmax) or the power (Pmax). See ControlMode for more information.	0 ... 100	0
Override	Multi-state Output [1]	Override Control	Auto Close Open Vnom Vmax MotStop Pnom Pmax	Auto
RelPos	Analog Input [1]	Relative Position in %	0 ... 100	-
AbsPos	Analog Input [2]	Absolute Position in °	0 ... 90	-
SpPosReached	Binary Input [1]	Setpoint Position reached	No Yes	-
DeltaT_MgrStatus	Multi-state Input [102]	DeltaT Manager Status	Not selected Standby Active Scaling standby Scaling active	-
RelFlow	Analog Input [10]	Relative Flow in %	0 ... 100	-
AbsFlow_SI1	Analog Input [11]	Absolute Flow in l/min	0 ... 100'000	-
AbsFlow_SI2	Analog Input [12]	Absolute Flow in m3/h	0 ... 600	-
AbsFlow_SI3	Analog Input [14]	Absolute Flow in l/s	0 ... 100'000	-
AbsFlow_US	Analog Input [13]	Absolute Flow in gpm	0 ... 100'000	-
T1_SI	Analog Input [20]	Temperature 1 (remote) in °C	-10 ... +120	-
T1_US	Analog Input [25]	Temperature 1 (remote) in °F	14 ... 248	-
T2_SI	Analog Input [21]	Temperature 2 (embedded) in °C	-10 ... +120	-
T2_US	Analog Input [26]	Temperature 2 (embedded) in °F	14 ... 248	-
DeltaT_SI	Analog Input [22]	Delta Temperature in °C	-500 ... +500	-
DeltaT_US	Analog Input [27]	Delta Temperature in °F	-500 ... +500	-
RelPower	Analog Input [40]	Relative Power in %	0 ... 300	-
AbsPower_SI	Analog Input [30]	Power in kW	0 ... 2.147e+9	-
AbsPower_US1	Analog Input [35]	Power in kBTU/h	0 ... 2.147e+9	-
AbsPower_US2	Analog Input [45]	Power in RT	0 ... 2.147e+9	-
E_Cooling_SI1	Analog Input [31]	Cooling Energy in kWh	0 ... 2.147e+9	-
E_Cooling_SI2	Analog Input [33]	Cooling Energy in MJ	0 ... 2.147e+9	-
E_Cooling_US1	Analog Input [36]	Cooling Energy in kBTU	0 ... 2.147e+9	-
E_Cooling_US2	Analog Input [46]	Cooling Energy in ton-h	0 ... 2.147e+9	-
ResetCooling_E	Binary Output [31]	Reset Cooling Energy	None Reset	None

## BACnet object description

(continued)

Object Name	Object Type / Instance	Description	Values	Default
E_Heating_SI1	Analog Input [32]	Heating Energy in kWh	0 ... 2.147e+9	-
E_Heating_SI2	Analog Input [34]	Heating Energy in MJ	0 ... 2.147e+9	-
E_Heating_US1	Analog Input [37]	Heating Energy in kBTU	0 ... 2.147e+9	-
E_Heating_US2	Analog Input [47]	Heating Energy in ton·h	0 ... 2.147e+9	-
ResetHeating_E	Binary Output [32]	Reset Heating Energy	None Reset	None
Vmax	Analog Value [100]	Maximum Flow Limit in %	0 ... 100	100
Vmax_SI	Analog Value [90]	Maximum Flow Limit in l/min	0 ... 4000	-
Vmax_US	Analog Value [91]	Maximum Flow Limit in gpm	0 ... 1000	-
Vnom_SI	Analog Value [101]	Nominal Volume Flow in l/min (read-only)	0 ... 100'000	-
Vnom_US	Analog Value [102]	Nominal Volume Flow in gpm (read-only)	0 ... 100'000	-
Pmax	Analog Value [105]	Maximum Power Limit in %	0 ... 100	100
Pmax_SI	Analog Value [95]	Maximum Power Limit in kW	0 ... 5000	-
Pmax_US	Analog Value [96]	Maximum Power Limit in kBTU/h	0 ... 15'000	-
Pnom_SI	Analog Value [106]	Nominal Power Limit in kW (read-only)	0 ... 2.147e+9	-
Pnom_US	Analog Value [107]	Nominal Power Limit in kBTU/h (read-only)	0 ... 2.147e+9	-
ControlMode	Multi-state Value [100]	Control Mode  The value defines the interpretation of the setpoint.	PosCtrl FlowCtrl PowerCtrl	FlowCtrl
DeltaT_Limitation	Multi-state Value [101]	DeltaT Limitation	Disabled dT-Manager dT-Mgr scaling	Disabled
SpDeltaT_SI	Analog Value [103]	Setpoint DeltaT in °C	4 ... 20	0
SpDeltaT_US	Analog Value [104]	Setpoint DeltaT in °F	7 ... 36	0
SpFlow_DeltaT_SI	Analog Value [108]	Setpoint Flow at DeltaT in l/min	0 ... 4000	0
SpFlow_DeltaT_US	Analog Value [109]	Setpoint Flow at DeltaT in gpm	0 ... 1000	0
ErrorState	Analog Input [100]	Error State	<i>see table</i>	-
RstErrCount	Binary Value [100]	Reset Error Counters	None Reset	None

**Error State**

Bit 0 (1):	Error Sensor T1
Bit 1 (2):	Error Sensor T2
Bit 2 (4):	Error Flow Sensor
Bit 3 (8):	Actuator cannot move
Bit 4 (16):	Flow with closed valve
Bit 5 (32):	Air bubbles
Bit 6 (64):	Flow not reached
Bit 7 (128):	Power not realized
Bit 8 (256):	Gear disengaged

Example: "Flow not reached" + "Gear disengaged" = 64 + 256 = 320