



Electronic pressure-independent characterised control valve with energy monitoring

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Protocol Implementation Conformance Statement - PICS

General information	Date:	24.02.2017
	Vendor Name:	BELIMO Automation AG
	Vendor ID:	423
	Product Name:	Energy Valve
	Product Model Number:	EV...R+BAC, e.g. EV015R+BAC P...W...EV-BAC, e.g. P6150W4500EV-BAC
	Applications Software Version:	3.01-0000
	Firmware Revision:	12.25
	BACnet Protocol Revision:	1.12
	Product Description:	Electronic pressure-independent characterised control valve with energy monitoring.
	BACnet Standard Device Profile:	BACnet Application Specific Controller (B-ASC)
	BACnet Interoperability Building Blocks supported:	
		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)
	Segmentation Capability:	No
	Data Link Layer Options:	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 Max. 32 nodes (without repeater)
	Device Address Binding:	No static device binding supported
	Networking Options:	None
	Character Sets Supported:	ISO 10646 (UTF-8)

Object processing

Object type	Optional properties	Writeable properties
Analog Input [AI]	Description COV Increment	COV Increment
Analog Output [AO]	Description COV Increment	Present Value Relinquish Default COV Increment
Analog Value [AV]	Description	Present Value
Binary Input [BI]	Description Active Text Inactive Text	
Binary Value [BV]	Description Active Text Inactive Text	Present Value
Device	Description Location Active COV Subscriptions Max Master Max Info Frames Profile Name	Object Identifier Object Name Location Description APDU Timeout Number Of APDU Retries Max Master Max Info Frames
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

- The specified maximum length of writable strings in the Device Object are based on single-byte characters and support up to 252 characters.
- The device does not support the CreateObject and DeleteObject service.

Service processing

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

BACnet object description

Object Name	Object Type / Instance	Description	Values	Relinquish Default	Access
<i>Device_Name</i>	Device[x]				
SpRel	AO [1]	Setpoint Relative in % The set point is related either to the position, the flow (of Vmax) or the power (of Pmax). See ControlMode for more information → MV[100]	-2'147'483...2'147'483 (0...100)	0	C
Override	MO [1]	Override Control	None Close Open Vnom Vmax MotStop Pnom Pmax	None	C
RelPos	AI [1]	Relative Position in %	0 ... 100	-	R
AbsPos	AI [2]	Absolute Position in °	0 ... 90	-	R
SpPosReached	BI [1]	Setpoint Position reached	No Yes	-	R
DeltaT_MgrStatus	MI [102]	DeltaT Manager Status Not selected: dT-Manager deactivated Standby: dT-Manager activated but not active Active: dT-Manager active Scaling standby: dT-Manager active with no limitation to the flow Scaling active: dT-Manager active with limitation to the flow → AV[108]	Not selected Standby Active Scaling standby Scaling active	-	R
RelFlow	AI [10]	Relative Flow in %	0 ... 100	-	R
AbsFlow_ls	AI [14]	Absolute Flow in l/s	0 ... 100'000	-	R
AbsFlow_lmin	AI [11]	Absolute Flow in l/min	0 ... 100'000	-	R
AbsFlow_lh	AI [15]	Absolute Flow in l/h	0 ... 100'000	-	R
AbsFlow_m3h	AI [12]	Absolute Flow in m3/h	0 ... 600	-	R
AbsFlow_gpm	AI [13]	Absolute Flow in gpm	0 ... 100'000	-	R
SpAbsFlow_ls	AI [114]	Setpoint Absolute Flow in l/s	0 ... 100'000	-	R
SpAbsFlow_lmin	AI [111]	Setpoint Absolute Flow in l/min	0 ... 100'000	-	R
SpAbsFlow_lh	AI [115]	Setpoint Absolute Flow in l/h	0 ... 600	-	R
SpAbsFlow_m3h	AI [112]	Setpoint Absolute Flow in m3/h	0 ... 600	-	R
SpAbsFlow_gpm	AI [113]	Setpoint Absolute Flow in gpm	0 ... 100'000	-	R
SpAnalog_V	AI [5]	Setpoint Analog in Volt	0 ... 10.00	-	R
T1_C	AI [20]	Temperature 1 (remote) in °C	-10 ... +120	-	R
T1_F	AI [25]	Temperature 1 (remote) in °F	14 ... 248	-	R
T2_C	AI [21]	Temperature 2 (embedded) in °C	-10 ... +120	-	R
T2_F	AI [26]	Temperature 2 (embedded) in °F	14 ... 248	-	R
DeltaT_K	AI [22]	Delta Temperature in K	0 ... 130	-	R
DeltaT_F	AI [27]	Delta Temperature in °F	0 ... 266	-	R
RelPower	AI [40]	Relative Power in %	0 ... 300	-	R
AbsPower_kW	AI [30]	Power in kW	0 ... 2.147e+9	-	R
AbsPower_kBTUh	AI [35]	Power in kBTU/h	0 ... 2.147e+9	-	R
AbsPower_ton	AI [45]	Power in tons refrigeration	0 ... 2.147e+9	-	R
E_Cooling_kWh	AI [31]	Cooling Energy in kWh	0 ... 2.147e+9	-	R
E_Cooling_MJ	AI [33]	Cooling Energy in MJ	0 ... 2.147e+9	-	R
E_Cooling_kBTU	AI [36]	Cooling Energy in kBTU	0 ... 2.147e+9	-	R

Object Name	Object Type / Instance	Description	Values	Relinquish Default	Access
E_Cooling_tonh	AI [46]	Cooling Energy in ton·h	0 ... 2.147e+9	-	R
E_Heating_kWh	AI [32]	Heating Energy in kWh	0 ... 2.147e+9	-	R
E_Heating MJ	AI [34]	Heating Energy in MJ	0 ... 2.147e+9	-	R
E_Heating_kBTU	AI [37]	Heating Energy in kBTU	0 ... 2.147e+9	-	R
E_Heating_tonh	AI [47]	Heating Energy in ton·h	0 ... 2.147e+9	-	R
GlycolConcentration	AI [60]	Glycol concentration in % If measurement is locked, constant value -1	0 ... 100	-	R
SummaryStatus	BI [101]	Summary Status Summarizes all status from MI 103 - 107	OK Not OK	-	R
StatusSensor	MI [103]	Status Sensor Indicates informations within the flow sensor and both temperature sensors	OK Flow Sensor not OK T1 not OK T2 not OK	-	R
StatusFlow	MI [104]	Status Flow Setpoint cannot be reached within 3min during flow control Flow is measured but position of valve is closed Reverse flow is detected	OK Reverse flow detected Flow not reached Flow in closed position	-	R
StatusMedia	MI [105]	Status Media <i>Airbubbles in the hydronic system</i>	OK Airbubbles Freeze warning	-	R
StatusActuator	MI [106]	Status Actuator Mechanical overload due to blocked valve, etc. Gear disengaged button pressed	OK Actuator cannot move Gear disengaged	-	R
StatusPower	MI [107]	Status Power Setpoint cannot be reached within 3min during power control	OK Power not reached	-	R
Vmax	AV [100]	Maximum Flow Limit in %	0 ... 655 (0...100)	-	W
Vmax_lmin	AV [90]	Maximum Flow Limit in l/min	-12'884'901...12'884'901 (0...4'000)	-	W
Vmax_gpm	AV [91]	Maximum Flow Limit in gpm	-3'403'841...3'403'841 (0...1'000)	-	W
Vnom_lmin	AV [101]	Nominal Volume Flow in l/min	0 ... 100'000	-	R
Vnom_gpm	AV [102]	Nominal Volume Flow in gpm	0 ... 100'000	-	R
Pmax	AV [105]	Maximum Power Limit in %	-2'147'483...2'147'483 (0...100)	-	W
Pmax_kW	AV [95]	Maximum Power Limit in kW	-214'748...214'748 (0...5000)	-	W
Pmax_kBTUh	AV [96]	Maximum Power Limit in kBTU/h	-733'405...733'405 (0...15'000)	-	W
Pnom_kW	AV [106]	Nominal Power Limit in kW	0 ... 2.147e+9	-	R
Pnom_kBTUh	AV [107]	Nominal Power Limit in kBTU/h	0 ... 2.147e+9	-	R
ControlMode	MV [100]	Control Mode This value defines the interpretation of the setpoint	Position Control Flow Control Power Control	-	W
DeltaT_Limitation	MV [101]	DeltaT Limitation 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 108]	Disabled dT-Manager dT-Mgr scaling	-	W
SpDeltaT_K	AV [103]	Setpoint DeltaT in K	-2'147'483...2'147'483 (1 ... 55)	-	W
SpDeltaT_F	AV [104]	Setpoint DeltaT in °F	-3'865'470...3'865'470 (2 ... 100)	-	W
SpFlow_DeltaT lmin	AV [108]	Setpoint Flow at DeltaT in l/min	-12'884'901...12'884'901 (0...4000)	-	W
SpFlow_DeltaT gpm	AV [109]	Setpoint Flow at DeltaT in gpm	-3'403'841...3'403'841 (0 ... 1000)	-	W

Object Name	Object Type / Instance	Description	Values	Relinquish Default	Access
ErrorState ¹⁾	AI [100]	Error State	1)	-	R
RstErrCount	BV [100]	Reset Error Counters	None Reset	-	W
SpSource	MV [122]	Setpoint Source The actuator has the possibility to be controlled from an analog input and at the same time being integrated on BACnet (Monitoring). Depending on this setting the setpoint by bus or analog input is valid. Analog: Setpoint from analog signal 0..10V on wire 3 Bus: Setpoint from BACnet → AO [1]	Analog Bus	-	W

Indication to the value section in the PICS: 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. The additional HVAC value ranges are indicated in parentheses. Each Energy Valve may have different HVAC value size limitations.

¹⁾ Error State (please do not use for new implementations!)

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
Bit 9	(512):	Reverse flow detected
Bit10	(1024):	MP communication faulty
Bit11	(2048):	Freeze warning

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

Description:

Error Sensor T1: Error with remote temperature sensor

Error Sensor T2: Error with embedded temperature sensor

Error Flow Sensor: Error with the flow sensor

Actuator can't move: Mechanical overload due to blocked valve, etc.

Flow with closed valve: Flow is measured but position of valve is closed

Airbubbles: Air bubbles in the hydronic system

Flow not reached: Setpoint cannot be reached within 3min during flow control

Power not realized: Setpoint cannot be reached within 3min during power control

Gear disengagement active: Gear disengaged button is pressed

Reverse flow detected: Reverse flow is detected

MP communication faulty: Internal communication between sensor and actuator faulty

Freeze warning: Measured temperature & glycol concentration indicate that grease ice can build up