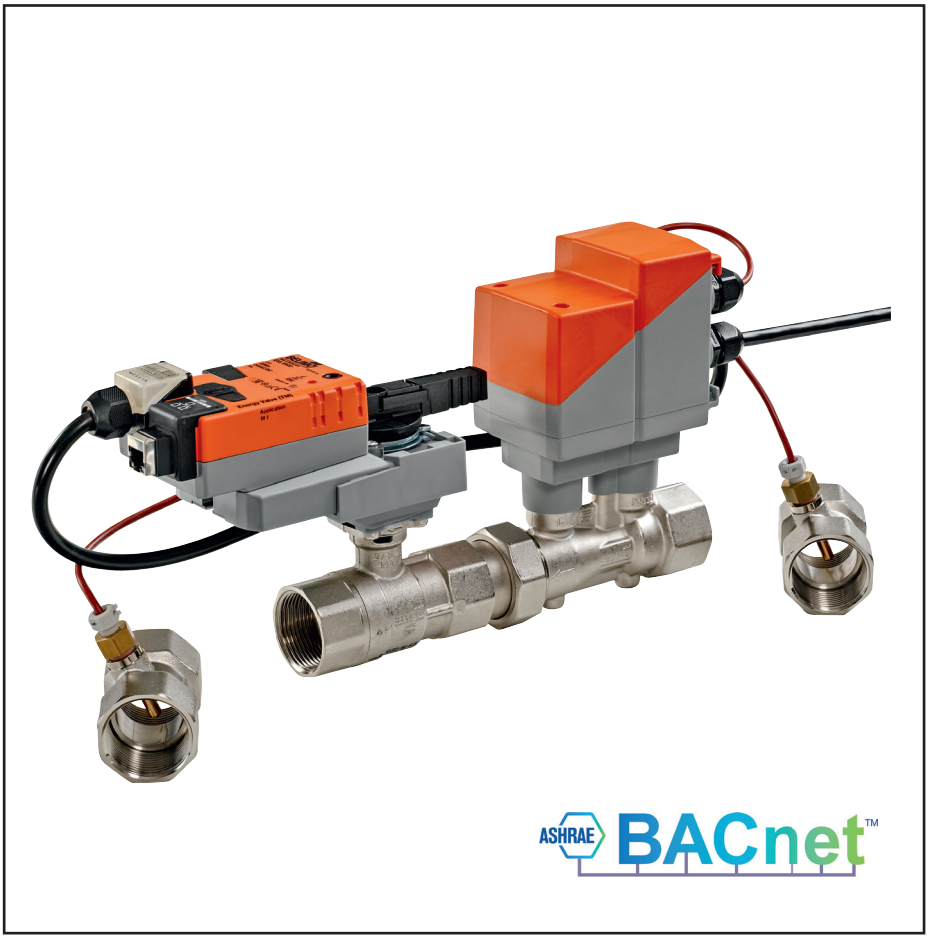

# Energy Valve

## Contents

## Protocol Implementation Conformance Statement – PICS

| | | |
|---|---|---|
| **General information** | Date | 26.01.2018 |
| | Vendor Name | BELIMO Automation AG |
| | Vendor ID | 423 |
| | Product Name | Energy Valve |
| | Product Model Number | EV..R+(K)BAC, EV..R3+BAC, EV..F+(K)BAC |
| | Applikations Software Version | 03.02-0000 |
| | 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) |
| | Segmentation capability | No |
| | Data Link Layer Options | MS/TP master<br>BACnet IP, (Annex J)<br>BACnet IP, (Annex J), Foreign Device |
| | Device Address Binding | No static device binding supported |
| | Networking Options | None |
| | 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)<br>Data sharing – ReadPropertyMultiple-B (DS-RPM-B)<br>Data sharing – WriteProperty-B (DS-WP-B)<br>Data sharing – COV-B (DS-COV-B)<br>Device management – DynamicDeviceBinding-B (DM-DDB-B)<br>Device management – DynamicObjectBinding-B (DM-DOB-B)<br>Device management – DeviceCommunicationControl-B (DM-DCC-B) | |
| **BACnet MS/TP** | Baud rates | 9’600, 19’200, 38’400, 76’800 (Default: 38’400) |
| | Address | 0...127 (Default: 1) |
| | Number of nodes | Max 32 (without repeater), 1 full busload |
| | Terminating resistor | 120 Ω |
| **BACnet IP** | Port | open (Default: 47’808) |
| **Parameterisation** | Tool | through the integrated webserver |

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

## Protocol Implementation Conformance Statement - PICS

**Standard Object Types Supported**

| Objekt type | Optional properties | Writeable properties |
|---|---|---|
| Device | Description<br>Location<br>Active COV Subscriptions<br>Max Master<br>Max Info Frames<br>Profile Name | Object Identifier<br>Object Name<br>Location<br>Description<br>APDU Timeout (1'000…60'000)<br>Number of APDU Retries (0...10)<br>Max Master (1...127)<br>Max Info Frames (1...255) |
| Analog Input [AI] | Description<br>COV Increment | |
| Analog Output [AO] | Description<br>COV Increment | Present Value |
| Analog Value [AV] | Description | Present Value |
| Binary Input [BI] | Description<br>Active text<br>Inactive Text | |
| Binary Valve [BV] | Description<br>Active text<br>Inactive Text | Prresent Value |
| Multi-state Input [MI] | Description<br>State Text | |
| Multi-state Output [MO] | Description<br>State Text | Present Value |
| Multi-state Value [MV] | Description<br>State Text | Present Value |

The device does not support the services CreateObject and DeleteObject.
The specified maximum length of writable strings is based on single-byte characters and support up to 252 characters.

**Service processing**

The device supports the DeviceCommunicationControl and ReinitializeDevice services. No password is required.
A maximum of 5 active COV subscriptions with a lifetime of 1…43'200 sec. (12 hours) are supported.

## BACnet Object Description

| Object Name | Object Type [Instance] | Description<br>Comment<br>*Status_Flags* | Values | COV Increment | Access |
|---|---|---|---|---|---|
| Device | Device [Inst.Nr] | | 0…4'194'302<br>*Default: 1* | – | W |
| RelPos | AI[1] | Relative Position in % | 0...100 | 5 | R |
| AbsPos | AI[2] | Absolute Position in degree | 0...90 | 5 | R |
| SpAnalog_V | AI[5] | Analog Setpoint in Volt | 0...10.00 | 1 | R |
| RelFlow | AI[10] | Relative Flow in % | 0...100 | 5 | R |
| AbsFlow_lmin | AI[11] | Absolute Flow in l/min | 0...100'000 | 1 | R |
| AbsFlow_m3h | AI[12] | Absolute Flow in m3/h | 0...600 | 0.1 | R |
| AbsFlow_gpm | AI[13] | Absolute Flow in gpm | 0...100'000 | 1 | R |
| AbsFlow_ls | AI[14] | Absolute Flow in l/s | 0...100'000 | 0.1 | R |
| AbsFlow_lh | AI[15] | Absolute Flow in l/h | 0...100'000 | 100 | R |
| T1_C | AI[20] | Temperature 1 (remote) in C | -10...+120 | 1 | R |
| T2_C | AI[21] | Temperature 2 (embedded) in C | -10...+120 | 1 | R |
| DeltaT_K | AI[22] | Delta Temperature in K | 0...130 | 1 | R |
| T1_F | AI[25] | Temperature 1 (remote) in F | 14...248 | 1 | R |
| T2_F | AI[26] | Temperature 2 (embedded) in F | 14...248 | 1 | R |
| DeltaT_F | AI[27] | Delta Temperature in F | 0...266 | 1 | R |
| AbsPower_kW | AI[30] | Power in kW | 0...2.147e+6 | 10 | R |
| E_Cooling_kWh | AI[31] | Cooling Energy in kWh | 0...2.147e+9 | 10 | R |
| E_Heating_kWh | AI[32] | Heating Energy in kWh | 0...2.147e+9 | 10 | R |
| E_Cooling_MJ | AI[33] | Cooling Energy in MJ | 0...2.147e+9 | 10 | R |
| E_Heating_MJ | AI[34] | Heating Energy in MJ | 0...2.147e+9 | 10 | R |
| AbsPower_kBTUh | AI[35] | Power in kBTU/h | 0...2.147e+6 | 10 | R |
| E_Cooling_kBTU | AI[36] | Cooling Energy in kBTU | 0...2.147e+9 | 10 | R |
| E_Heating_kBTU | AI[37] | Heating Energy in kBTU | 0...2.147e+9 | 10 | R |
| RelPower | AI[40] | Relative Power in % | 0...300 | 5 | R |
| AbsPower_ton | AI[45] | Power in ton refrigeration | 0...2.147e+6 | 1 | R |
| E_Cooling_tonh | AI[46] | Cooling Energy in ton*h | 0...2.147e+9 | 1 | R |
| E_Heating_tonh | AI[47] | Heating Energy in ton*h | 0...2.147e+9 | 1 | R |
| GlycolConcentration | AI[60] | Glycol concentration in %<br>Measured value or override value from webserver | Measured value: 0...40<br>Override value: 0...80 | 1 | R |
| ErrorState [1)] | AI[100] | Error State<br>Error Sensor T1: Error with remote temperature sensor<br>Error Sensor T2: Error with embedded temperature sensor<br>Error Flow Sensor: Error with the flow sensor<br>Actuator can't move: Mechanical overload due to blocked valve, etc.<br>Flow with closed valve: Flow is measured but position of valve is closed<br>Airbubbles: Air bubbles in the hydronic system<br>Flow not reached: Setpoint cannot be reached within 3min during flow control<br>Power not realized: Setpoint cannot be reached within 3min during power control<br>Gear disengagement active: Gear disengaged button is pressed<br>Reverse flow detected: Reverse flow is detected<br>MP communication faulty: Internal communication between sensor and actuator faulty<br>Freeze warning: Measured temperature & glycol concentration indicate that grease ice can build up | Bit 0: Error Sensor T1<br>Bit 1: Error Sensor T2<br>Bit 2: Error Flow Sensor<br>Bit 3: Actuator cannot move<br>Bit 4: Flow with closed valve<br>Bit 5: Air bubbles<br>Bit 6: Flow not reached<br>Bit 7: Power not realized<br>Bit 8: Gear disengaged<br>Bit 9: Reverse flow detected<br>Bit 10: MP communication faulty<br>Bit 11: Freeze warning | 1 | R |
| SpAbsFlow_lmin | AI[111] | Setpoint Absolute Flow in l/min | 0...100'000 | 1 | R |
| SpAbsFlow_m3h | AI[112] | Setpoint Absolute Flow in m3/h | 0...600 | 0.1 | R |
| SpAbsFlow_gpm | AI[113] | Setpoint Absolute Flow in gpm | 0...100'000 | 1 | R |
| SpAbsFlow_ls | AI[114] | Setpoint Absolute Flow in l/s | 0...100'000 | 0.1 | R |
| SpAbsFlow_lh | AI[115] | Setpoint Absolute Flow in l/h | 0...600 | 100 | R |
| SpRel | AO[1] | Setpoint Relative in %<br>The set point is related either to the position, the flow (of Vmax) or the power (of Pmax).<br>See ControlMode for more information → MV[100] | 0...100<br>*Default: 0* | 1 | C |
| Vmax_lmin | AV[90] | Maximum Flow Limit in l/min | 30%Vnom…Vnom<br>*Default: Vnom* | - | W |
| Vmax_gpm | AV [91] | Maximum Flow Limit in gpm | 30%Vnom…Vnom<br>*Default: Vnom* | - | W |
| Pmax_kW | AV [95] | Maximum Power Limit in kW | 0.5%Pnom…Pnom<br>*Default: Pnom* | - | W |
| Pmax_kBTUh | AV [96] | Maximum Power Limit in kBTU/h | 0.5%Pnom…Pnom<br>*Default: Pnom* | - | W |
| Vmax | AV [100] | Maximum Flow Limit in % | 30…100<br>*Default: 100* | - | W |

## BACnet Object Description

| Object Name | Object Type [Instance] | Description<br>Comment<br>*Status_Flags* | Values | COV Increment | Access |
|---|---|---|---|---|---|
| Vnom_lmin | AV [101] | Nominal Volume Flow in l/min | Vnom | - | W |
| Vnom_gpm | AV [102] | Nominal Volume Flow in gpm | Vnom | - | W |
| SpDeltaT_K | AV [103] | Setpoint DeltaT in K | 1…55<br>*Default: 10* | - | W |
| SpDeltaT_F | AV [104] | Setpoint DeltaT inF | 2…100<br>*Default: 18* | - | W |
| Pmax | AV [105] | Maximum Power Limit in % | 0.5…100<br>*Default: 100* | - | W |
| Pnom_kW | AV [106] | Nominal Power in kW | Pnom | - | R |
| Pnom_kBTUh | AV [107] | Nominal Power in kBTU/h | Pnom | - | R |
| SpFlow_DeltaT lmin | AV [108] | Setpoint Flow at DeltaT in l/min | 0...Vnom<br>*Default:Vnom* | - | W |
| SpFlow_DeltaT gpm | AV [109] | Setpoint Flow at DeltaT in gpm | 0...Vnom<br>*Default:Vnom* | - | W |

| Object Name | Object Type [Instance] | Description<br>Comment<br>*Status_Flags* | Values | Access |
|---|---|---|---|---|
| SpPosReached | BI [1] | Setpoint Position reached | 1: No<br>2: Yes | R |
| SummaryStatus | BI [101] | Summary Status<br>Summarizes all status from MI 103 - 107 | 1: OK<br>2: Not OK | R |
| RstErrCount | BV [100] | Reset Error Counters | 1: None<br>2: Reset | R |
| DeltaT_ MgrStatus | MI [102] | DeltaT Manager Status<br>Not selected: dT-Manager deactivated<br>Standby: dT-Manager activated but not active<br>Active: dT-Manager active<br>Scaling standby: dT-Manager active with no limitation to the flow<br>Scaling active: dT-Manager active with limitation to the flow → AV[108] | 1: Not selected<br>2: Standby<br>3: Active<br>4: Scaling standby<br>5: Scaling active | R |
| StatusSensor | MI [103] | Status Sensor<br>Indicates informations within the flow sensor and both temperature sensors | 1: OK<br>2: Flow sensor not OK<br>3: T1 not OK<br>4: T2 not OK | R |
| StatusFlow | MI [104] | Status Flow<br>Reverse flow detected: Energy Valves detected a reverse flow<br>Flow not reached: Setpoint cannot be reached within 3min during flow control<br>Flow in closed position: Flow is measured but position of valve is closed | 1: OK<br>2: Reverse flow detected<br>3: Flow not reached<br>4: Flow in closed position | R |
| StatusMedia | MI [105] | Status Media<br>Airbubbles: Airbubbles in the hydronic system. As long as there are airbubbles in the system, position control mode is active, regardless off control mode setting (ControlMode MV[100]).<br>Freeze warning: Measured temperature & glycol concentration indicate that grease ice can build up | 1: OK<br>2: Airbubbles<br>3: Freeze warning | R |
| StatusActuator | MI [106] | Status Actuator<br>Actuator cannot move: Mechanical overload due to blocked valve, etc.<br>Gear disengaged: Gear disengaged button is pressed | 1: OK<br>2: Actuator cannot move<br>3: Gear disengaged | R |
| StatusPower | MI [107] | Status Power<br>Power not reached: Setpoint cannot be reached within 3min during power control | 1: OK<br>2: Power not reached | R |

| | | | | |
|---|---|---|---|---|
| Override | MO [1] | Override Control<br>Overrides setpoint with defined valves. It will change back to None (1) after 2 hours. | 1: None<br>2: Close<br>3: Open<br>4: Vnom<br>5: Vmax<br>6: MotStop<br>7: Pnom<br>8: Pmax<br>*Default: None(1)* | C |
| ControlMode | MV [100] | Control Mode<br>This value defines the interpretation of the setpoint | 1: Position Control<br>2: Flow Control<br>3: Power Control<br>*Default: Flow control(2)* | W |
| DeltaT_Limitation | MV [101] | DeltaT Limitation<br>Disabled: dT-Manager not active<br>dT-Manager: dT-Manager active with no restriction to flow<br>dT-Manager scaling: dT-Manager active with restriction of flow → AV 108] | 1: Disabled<br>2: dT-Manager<br>3: dT-Manager scaling<br>*Default: Disabled(1)* | W |
| SpSource | MV [122] | Setpoint Source<br>*If Analog(1) then actuator is controlled by analog signal 0...10 V on wire 3.*<br>*If Bus(2) then setpoint via bus SpRel AO[1]* | 1: Analog<br>2: Bus<br>*Default: Analog(1)* | W |