Belimo Energy Valve™
Communication Document

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Measures Energy
Controls Power
Manages Delta T

EXPERIENCE EFFICIENCY

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A MechTronics Controls Company
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Phone (877) 632-4876
Actuator Communication

The Energy Valve has multiple communication platforms and tool capabilities:

- **BACnet IP or BACnet MS/TP**
- **ZTH US with MP Protocol**
- **Analog Signal**
- **Web View**

For more information, visit [www.hvacusa.com](http://www.hvacusa.com) or call (877) 632-4876.
The Energy Valve Web View is a built-in web server that is used to configure the valve settings and view current and historical data. It can be accessed from a computer with a web browser. The Energy Valve must be connected to a TCP/IP network.

Connecting the Energy Valve to Ethernet:

To configure the Energy Valve using Web View, the Energy Valve must be connected to a TCP/IP network. If connecting the Energy Valve to a laptop computer directly without connecting to a LAN, configure the laptop IP address to 192.168.0.200 before connecting to the Energy Valve.

Open a web browser. Then, type one of the following addresses in the web browser address bar:
- http://belimo.local:8080
- http://192.168.0.10:8080

Compatible Browsers

Browsers must be capable of running Javascript.
- Internet Explorer 8 or newer
- Firefox 27 or newer
- Chrome 33 or newer
- Safari 5.17 or newer
- Android browser
- Windows Phone
Login

- Access to the actuator is protected by the user name and password.
- Three default user types are available to login. Each user type has different security rights to the Web View. Refer to Web View user table below.
- Belimo cannot recover IP address. IP address can be viewed with ZTH US tool.

Web View User Table

<table>
<thead>
<tr>
<th>Username:</th>
<th>Guest</th>
<th>Maintenance</th>
<th>Admin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Password*</td>
<td>guest</td>
<td>belimo</td>
<td>Contact Belimo Tech Support</td>
</tr>
</tbody>
</table>

Web View Page

<table>
<thead>
<tr>
<th></th>
<th>Read</th>
<th>Read/Write</th>
<th>Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dashboard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overview</td>
<td>Read</td>
<td>Read/Write</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Override and Trend Control</td>
<td>Read</td>
<td>Read/Write</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Data Log Chart</td>
<td>Read</td>
<td>Read/Write</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Settings</td>
<td>Read</td>
<td>Read/Write</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Status</td>
<td>Read</td>
<td>Read/Write</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Date &amp; Time Settings</td>
<td>--</td>
<td>Read/Write</td>
<td>Read/Write</td>
</tr>
<tr>
<td>IP Settings</td>
<td>--</td>
<td>Read/Write</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Version Information</td>
<td>--</td>
<td>Read/Write</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Mobile</td>
<td>Read</td>
<td>Read/Write</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Data Logging</td>
<td>Read</td>
<td>Read/Write</td>
<td>Read/Write</td>
</tr>
<tr>
<td>BACnet / MP Settings</td>
<td>Read</td>
<td>Read/Write</td>
<td>Read/Write</td>
</tr>
</tbody>
</table>

*Password is case sensitive
The Energy Valve Web View is a graphical user interface accessed via a network or internet to set up, calibrate and change the parameters of the Belimo Energy Valve. The Web View consists of the following page views:

### Dashboard

Provides a dynamic view of the current flow, power and temperature values.

### Overview

Similar to the dashboard view along with the ability to see the set point and accumulated total to the power, flow, and heating and cooling energy. It also shows current critical modes of operation.
Overview and Live Trends:

An analytical view of the historical data with the ability to select the type of data to analyze; primarily used for maintenance and troubleshooting. This view also provides an override to the actuator. Any override will be reverted to auto after 2 hours.

Override:
- Auto (Default)
- Open
- Close
- V’max
- Motor Stop
- V’nom
- Setpoint Simulation: When using the override option, consider the relationship between voltage and equal percent flow characteristic
- Setpoint Position Override: Entered as a % of V’max

Data Log Chart

An analytical view of the historical data with the ability to select the type and monthly period to be analyzed.
**Status**

Provides an error count by type and time elapsed of last occurrence.
- T1 error
- T2 error
- Flow sensor error
- Actuator cannot move
- Flow with closed valve
- Too many air bubbles
- Flow not realized
- Power not realized

These errors can be reset to zero.

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**Settings**

Access and adjust the operating settings. Refer to Web View Settings table on page 30.

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**Current status**

**Occurrences**

<table>
<thead>
<tr>
<th>Error Type</th>
<th>Counter</th>
<th>Days</th>
<th>Hrs</th>
<th>Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 error</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>T2 error</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Flow sensor error</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Actuator cannot move</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Flow with closed valve</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Too many air bubbles</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Flow not realized</td>
<td>1</td>
<td>6</td>
<td>5.9</td>
<td></td>
</tr>
<tr>
<td>Power not realized</td>
<td>1</td>
<td>6</td>
<td>5.9</td>
<td></td>
</tr>
</tbody>
</table>

An error is detected when a problem lasts for at least:
- 5s for “T1 error”, “Flow sensor error” and “Too many air bubbles”
- 600s for “Flow not realized” and “Power not realized”
- 180s for “Actuator cannot move” and “Flow with closed valve”

The error is then displayed for at least 5s.

1) Time since last occurrence
Date and Time Settings

Provides different ways to set the date and time. It allows the time to be entered manually, synchronized through a computer, or synchronized with a Time Server.

If BACnet communication is enabled, Local Client Date and Time will be automated through BACnet.

IP Settings

To configure the valve communication on a TCP/IP network. It allows the valve to have a dynamic IP address (requires an active DHCP server) or a static IP address (requires an IP address, Network Mask, Gateway, and Broadcast addresses (DNS)).

Version Info

Displays current software version.
Mobile

This page is an optimized overview for smart phones and tablets providing similar data as the Overview page.

- **Energy Valve**
- **Web View**

![Diagram of Energy Valve](image)

- **Power**
  - 4.4 kBTU/h Feedback
  - 3.1 kBTU/h Setpoint

- **Flow**
  - 0.15 GPM Feedback
  - 0.1 GPM Setpoint

- **Valve position**
  - 23.9 % Feedback
  - 24.1 % Setpoint

- **Differential temp.**
  - 59.6 °F
  - dT-Manager not selected

- **Total heating energy**
  - 4623 kBTU

- **Total cooling energy**
  - 0 kBTU

- **Control Mode**
  - Power control
  - Override setpoint DDC
  - Auto

- **Setpoint**
  - 0.0 V
  - 0.0 ° (Source: BACnet / MP)

- **dT-Limiting Status**
  - dT-Manager not selected

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Data Logging

An area to download all the historical data in a generic spreadsheet format (.csv) that can be uploaded to the Data Analysis Tool™ for further analysis and commissioning settings. See Data Analysis Tool™ on page 34.

BACnet/MP Settings

This page is used to set the type of communication and settings for the Energy Valve.

- **BACnet** is a building automation communication protocol worldwide standard.
- **MP** is a Belimo protocol that allows for communication to multiple Belimo devices at the same time.

BACnet Device Object Settings

**Instance ID**: A 32 bit device with a unique ID in the BACnet network. A read-only value.

**Device Name**: Name used to represent the device in the BACnet system.

**System Status**: Indicates that the valve is operational. A read only value.

**Protocol Version and Revision**: These are read only values to show the BACnet protocol version and revision that the communication software follows.
**BACnet IP Settings**

- **Port**: The UDP port value defaulted to 47808
- **Simple/Foreign Device**: A Simple Device communicates over the local network only. A Foreign Device communicates across multiple networks and requires the IP BBMD to be set.
- **IP BBMD**: IP address applies to devices set as Foreign Device only. IP entered must be the IP of the BBMD router.
- **Time to Live**: The frequency of the Energy Valve address broadcasting. This setting must match the BBMD router TTL setting.

**BACnet MS/TP Settings**

- **Baud Rate**: The transmission speed within the MS/TP network. All devices on the same network must be set to the same baud rate.
- **MS/TP Address**: The MAC address on the MS/TP network. This number must be unique within the network. Available values range from 1 to 127.
- **120 Ohm Termination**: In some cases, a physical RS485 termination using a resistor may be required. Checking this box may provide a solution. Hardwired termination resistor will provide a permanent solution.
Field Programming and Commissioning Options

All Energy Valve actuators can be field programmed with either the ZTH US handheld tool or with an Ethernet cable connected to a computer with web browser to access the actuators web page (Web View). Refer to the table below for a list of settings than can be changed in the field.

### Web View Settings

<table>
<thead>
<tr>
<th>TAB</th>
<th>SETTING</th>
<th>FUNCTION</th>
<th>DEFAULT / RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Application</td>
<td>Valve Size</td>
<td>Defines the full flow cataloged capacity (V’nom) of the valve.</td>
<td>(Default factory set to the valve size)</td>
</tr>
<tr>
<td></td>
<td>Install Position</td>
<td>Identify the installed water service location of the valve and its embedded temperature sensor, or sensor piped in series with the valve (T2). The sensor w/ longer cable is remote (T1) and will be assigned the opposite water service of the valve.</td>
<td>½” – 6” [DN 15 – DN 150]</td>
</tr>
<tr>
<td></td>
<td>Media</td>
<td>Water or water/glycol composition used with glycol concentration to accurately calculate: flow, thermal power and energy.</td>
<td>Water</td>
</tr>
<tr>
<td></td>
<td>Glycol Concentration</td>
<td>Percent of glycol .</td>
<td>Monoethylene Glycol</td>
</tr>
<tr>
<td></td>
<td>Cable Length Remote Temp. Sensor</td>
<td>Cable length selection. (For proper operation do not cut cables.) Remote sensor cable length setting adjusts wire resistance to accurately calculate thermal power and energy.</td>
<td>(User defined) 0-60%</td>
</tr>
<tr>
<td>2. User</td>
<td>Temperature</td>
<td>Units: water supply, return, and delta T</td>
<td>Fahrenheit</td>
</tr>
<tr>
<td></td>
<td>Flow</td>
<td>Units: water flow rate through the valve</td>
<td>Celsius</td>
</tr>
<tr>
<td></td>
<td>Power</td>
<td>Units: thermal power rate of the heat exchanger</td>
<td>GPM</td>
</tr>
<tr>
<td></td>
<td>Energy</td>
<td>Units: total thermal power of heating and cooling.</td>
<td>kW/h, MW/h, Ton/h</td>
</tr>
</tbody>
</table>

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### 3. Configuration Control Function

**Control Mode**
- Controlled variable assigned to the actuator analog input y-signal, wire #3.
- **Default**: Flow Control
  - Power Control
  - Position Control

**Control Signal Range**
- Signal range options for the Control Mode.
- **Default**: 2-10 VDC
  - 0.5 - 10 VDC

**Invert Control Signal**
- “No” valve modulate open when a 10 VDC is received. “Yes” 10 VDC signal closes the valve.
- **Default**: No
  - Yes

**Control Signal Characteristic**
- Setting when Control Modes is set to Flow or Position.
  - Equal Percentage flow yields coil thermal power roughly equal to the control signal. (Refer to Equal Percentage Flow table).
  - “Linear” 50% controller command yields 50% flow output or position.
- **Default**: Equal Percentage
  - Linear

### 4. Configuration Feedback Function

**Feedback Information**
- Actuator analog feedback signal output on wire #5, u-signal.
- **Default**: Flow
  - Power, T supply
  - T return, delta T, Valve position

**Feedback Signal Range**
- Actuator analog feedback linear signal range.
- **Default**: 2-10 V
  - 0.5-10 V

**Set Maximum Feedback**
- Setting to equate 10 VDC or maximum feedback Information. Setting must match the DDC range maximum setting.
- **Default**: Flow
  - Position: 0 to V’nom
  - Power: 0 to P’nom

**Set Minimum Feedback**
- Setting to equate 0, 0.5, or 2 VDC or the minimum feedback Information. Setting must match the DDC range minimum setting.

### 5. Configuration Delta T Manager

**Delta T Limiting Function**
- Setting to disabled or enabled with limiting logic: dT Manger or dT Manager Scaling. Both use settings “Delta T Limiting Value” but only dT Manager Scaling uses the “Flow Saturation Value”.
- **Default**: Disabled = “-“
  - dT Manager
  - dT Manager Scaling

**Delta T Limiting Value**
- Low limit parameter for dT setpoint:
  - For dT Manger this is the dT setpoint.
  - For dT Manager Scaling this will reset so the dT setpoint is scaled, or variable.
- Use the Energy Valve Analysis Tool to select this setting. See Data Analysis Tool on page 34.
- **Default**: 10°F
  - 7-60°F
  - 4-33°C

**Flow Saturation Value**
- Parameter used with dT Manager Scaling to reset the Delta T Limiting Value.
- When dT Manager Scaling is active:
  - If actual flow is less than this parameter the dT setpoint will be reset below the Delta T Limiting Value.
  - If actual flow is equal to this parameter the dT setpoint will be equal to Delta T Limiting Value.
  - If actual flow is greater than this parameter the dT setpoint will be reset above the Delta T Limiting Value.
- Use the Energy Valve Analysis Tool to select this setting. See Data Analysis Tool on page 34.
- **Default**: (User defined)
  - >30%-100% of V’max

**6. Flow**

**V’max**
- Used with Flow Control mode, this is the maximum flow setting of the valve with a full flow output signal from the controller. Value can be changed manually using the Adaption button.
- **Default**: V’nom
  - 30%-100% of V’nom*

**7. Power**

**P’max**
- Used with Power Control Mode, this is the maximum power setting with a full flow output signal from the controller.
  - Power = (500)*Flow*ΔT = coil design load.
- **Default**: (User defined)
The ZTH US is a tool created to easily adapt the flow settings of the Energy Valve in the field. It directly connects to the Belimo actuator.

**CONNECTION PROCESS:**

**LR, NR, AR, GR, AKR, GKR Series**
Use the interface on the top of the actuator. Quarter turn to lock in place. Connect the other end of the cable into the ZTH US. The actuator must be powered for the ZTH US to function. (Leave all of the wires of the actuator installed.)

**REPROGRAMMING PROCESS:**

**Initial Screen**
When connected the display will show “Startup Progress” this process will take approximately 30 seconds.

**Screen 1**
Start Energy Valve process by pressing the down arrow. The first screen displays setpoint relative in % (SpRel). Press the down arrow to advance.

### Technical Information

<table>
<thead>
<tr>
<th>Supply</th>
<th>24 VAC/DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>PP</td>
</tr>
<tr>
<td>Used with actuator types</td>
<td>LR, NR, AR, GR, AKR, GKR</td>
</tr>
</tbody>
</table>

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### ZTH US SETTINGS

Move through the displays. The chart below shows the complete list.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
<th>Range and UOM</th>
<th>Capability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write</td>
<td>Analog input signal as a % of full signal</td>
<td>0 – 100%</td>
<td>Read Only</td>
</tr>
<tr>
<td>RelPos</td>
<td>Valve position as a % of full opening</td>
<td>0 – 100%</td>
<td>Read Only</td>
</tr>
<tr>
<td>RelFlow</td>
<td>Current flow as % of V’max</td>
<td>0 – 100%</td>
<td>Read Only</td>
</tr>
<tr>
<td>AbsFlow</td>
<td>Flow in GPM</td>
<td>GPM</td>
<td>Read Only</td>
</tr>
<tr>
<td>T1 remote</td>
<td>Temperature opposite valve side</td>
<td>F</td>
<td>Read Only</td>
</tr>
<tr>
<td>T2 embedded</td>
<td>Temperature at valve</td>
<td>F</td>
<td>Read Only</td>
</tr>
<tr>
<td>DeltaT</td>
<td>Supply and return temperature differential</td>
<td>F</td>
<td>Read Only</td>
</tr>
<tr>
<td>RelPower</td>
<td>Current power as % of P’max</td>
<td>%</td>
<td>Read Only</td>
</tr>
<tr>
<td>Abs power</td>
<td>Current power output</td>
<td>KBTU/h</td>
<td>Read Only</td>
</tr>
<tr>
<td>Cooling Energy</td>
<td>Total cooling power since last reset</td>
<td>KBTU</td>
<td>Read Only</td>
</tr>
<tr>
<td>Heating Energy</td>
<td>Total heating power since last reset</td>
<td>KBTU</td>
<td>Read Only</td>
</tr>
<tr>
<td>Override</td>
<td>1=Auto, 2=Close, 3=Open, 4=V’nom, 5=V’max, 6=MotorStop, 7=P’nom, 8=P’max, 9=Set Point Position Override</td>
<td>1-9</td>
<td>Read/Write</td>
</tr>
<tr>
<td>SpPos Override</td>
<td></td>
<td>0 – 100%</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Mode</td>
<td>(0 = 0.5 – 10 V, 1= 2 – 10 V)</td>
<td>0 - 1</td>
<td>Read/Write</td>
</tr>
<tr>
<td>ModeY Inv</td>
<td>(0 = not inverted, 1= inverted)</td>
<td>0 - 1</td>
<td>Read/Write</td>
</tr>
<tr>
<td>V’max</td>
<td>Can be a percentage or flow.</td>
<td>30 – 100%</td>
<td>Read/Write</td>
</tr>
<tr>
<td>P’max</td>
<td>Can be a percentage or power</td>
<td>1 – 100%</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Control Mode</td>
<td>0=Position Control, 1=Flow Control, 2=Power Control</td>
<td>0 - 2</td>
<td>Read/Write</td>
</tr>
<tr>
<td>Install Pos</td>
<td>0= Return Flow, 1= Supply Flow</td>
<td>0 - 1</td>
<td>Read/Write</td>
</tr>
<tr>
<td>IP-Address</td>
<td>Valve IP on LAN</td>
<td></td>
<td>Read Only</td>
</tr>
<tr>
<td>DeltaT Limit</td>
<td>0 = Disabled, 1 = dT-Manager, 2 = dT-Manager Scaling</td>
<td>0 - 2</td>
<td>Read/Write</td>
</tr>
<tr>
<td>SpDeltaT</td>
<td>Delta T Limiting Valve</td>
<td>7 – 60 F</td>
<td>Read/Write</td>
</tr>
<tr>
<td>SpFlowDeltaT</td>
<td>Flow Saturation Value</td>
<td>0 – 1000 GPM</td>
<td>Read/Write</td>
</tr>
<tr>
<td>SensorStatus</td>
<td>0 = OK, 1 = Not OK, 2 = OK Air bubbles</td>
<td>0 - 2</td>
<td>Read Only</td>
</tr>
<tr>
<td>IP-Address</td>
<td>Valve IP on LAN</td>
<td></td>
<td>Read Only</td>
</tr>
<tr>
<td>DeltaT Limit</td>
<td>0 = Disabled, 1 = dT-Manager, 2 = dT-Manager Scaling</td>
<td>0 - 2</td>
<td>Read/Write</td>
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<td>Read Only</td>
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</table>