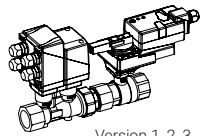
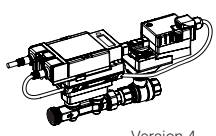


# Modbus Interface Description

Where is the Ethernet socket?	
On the actuator	On the flow sensor
 <p>Version 1, 2, 3</p>	 <p>Version 4</p>
<p><b>X</b> See „Modbus-Register Energy Valve (V1, V2, V3)“</p>	<p>Stay with this document <b>✓</b></p>
<p><b>For guidance in replacing an old EV with EV V4 -&gt; see “Replacement Guide V1, V2, V3 vs. V4”</b></p>	

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

Edition 2024-12 / V4.2.1

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## Register description

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# Modbus general notes

## General information

Date	05.07.2024
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)
Protocol	Modbus RTU over RS-485, Modbus TCP over Ethernet

## Power-on behaviour

The initialization of the data after power fail takes up to 190 seconds.  
All values remain 0 during power-on.

## Modbus RTU

Transmission Formats	1-8-N-2, 1-8-N-1, 1-8-E-1, 1-8-O-1 (Default: 1-8-N-2)
Baud Rates	9'600, 19'200, 38'400, 76'800, 115'200 Bd (Default: 38'400 Bd)
Address	1...247 (Default: 1)
Number of Nodes	Max. 32 (without repeater)
Terminating Resistor	120 Ω

## Modbus TCP

Port	Open (Default: 502)
------	---------------------

## Configuration

Tool	Belimo Assistant 2 or web browser
------	-----------------------------------

## Register implementation

All data is arranged in a table and addressed by 1..n (Register No.) or 0..n-1 (Address). No distinction is made between data types (Discrete Inputs, Coils, Input Registers and Holding Registers). As a consequence, all data can be accessed with the two commands for Holding Register. The commands for Discrete Inputs and Input Registers can be used as an alternative.

## Supported commands

Standard commands:	Optional Commands:
Read Holding Registers [3]	Read Discrete Inputs [2]
Write Single Register [6]	Read Input Registers [4]
	Write Multiple Registers [16]

## Command

### “Read Discrete Inputs”

The command reads one or more bits and can alternatively be used for Register No. 105: Malfunction and Service Information.

Example:

---

The start address to be used is 1664 → **104** (Register No.) \* **16** (Bit) = **1664**

## Interpret values in the registers

All values in the register are unsigned integer data types. Exceptions are marked with \*\*. Signed integers are represented as two's complement.

Example unsigned integer:	Example signed integer:
Read (Function 03, 1 Register) Value Register No. x = 0001 1010 1100 1000 <sub>2</sub> = 6,856 <sub>10</sub>	Read (Function 03, 1 Register) Value Register No. x = 1111 1101 1111 0010 <sub>2</sub> = -526 <sub>10</sub>
Actual value = value * scaling factor * unit = 6,856 * 0.01 * unit = <b>68.56 unit</b>	Actual value = value * scaling factor * unit = -526 * 0.01 * unit = <b>-5.26 unit</b>

## 32-bit values in two registers

Values that exceed 65,535 are stored in two consecutive registers and have to be interpreted as "little endian byte swap" / LSW (Least Significant Word) first. Note: While the regular "little endian" interpretation refers to the each byte (8 bit Word) per register, the additional "byte swap" interpretation leads to where "little endian" refers to the 16 bit Word of one register.

Both registers have to be written at once with function „Write Multiple Registers [16]“. It cannot be written together with other registers.

Example:

Register No. x (Value LowWord)	Register No. x + 1 (Value HighWord)
= 14,551 <sub>10</sub>	= 19 <sub>10</sub>
= 0011 1000 1101 0111 <sub>2</sub>	= 0000 0000 0001 0011 <sub>2</sub>

<b>Value LowWord</b> = 14,551 = 0011 1000 1101 0111 <sub>2</sub>	<b>Value HighWord</b> = 19 = 0000 0000 0001 0011 <sub>2</sub>
--	---

32-bit value  
= 0000 0000 0001 0011 0011 1000 1101 0111<sub>2</sub>  
= 1,259,735<sub>10</sub>  
= **1,259.735 unit**

Math formula:

32-bit value = (Value HighWord \* 65,536) + Value LowWord  
32-bit value = (19 \* 65,536) + 14,551  
= 1,259,735  
= **1,259.735 unit**

## Deactivated registers

If a register is not supported by a device or by a device setting, this is indicated by 65,535 (1111 1111 1111 1111<sub>2</sub>).

# Register overview

## Operation

No.	Address	Register	Access
1	0	Setpoint Relative [%]	R / W
2	1	Override Control	R / W
3	2	Command	R / W
4	3	Device Type	R
5	4	Relative Position [%]	R
6	5	Absolute Position [°] [mm]	R
7	6	Relative Volumetric Flow [%]	R
8	7	Absolute Volumetric Flow [l/s]	R
9	8	Absolute Volumetric Flow [gpm]	R
10	9	Absolute Volumetric Flow [selected unit]	LowWord
11	10		HighWord
12	11	Setpoint Analog [%]	R
13	12	Sensor 1 Value [mV] [Ω] [-]	R
14	13	Sensor 1 Temperature [°C] **)	R
15	14	Sensor 1 Temperature [°F] **)	R
16	15	Setpoint Absolute Volumetric Flow [l/s]	R
17	16	Setpoint Absolute Volumetric Flow [gpm]	R
18	17	Setpoint Absolute Volumetric Flow [selected unit]	LowWord
19	18		HighWord
20	19	Temperature 1 (remote) [°C] **)	R
21	20	Temperature 1 (remote) [°F] **)	R
22	21	Temperature 2 (flow body) [°C] **)	R
23	22	Temperature 2 (flow body) [°F] **)	R
24	23	Delta Temperature [K]	R
25	24	Delta Temperature [°F]	R
26	25	Glycol Concentration [%]	R
27	26	Relative Power [%]	R
28	27	Absolute Power Cooling [kW]	LowWord
29	28		HighWord
30	29	Absolute Power Cooling [kBTU/h]	LowWord
31	30		HighWord
32	31	Absolute Power Cooling [selected unit]	LowWord
33	32		HighWord
34	33	Absolute Power Heating [kW]	LowWord
35	34		HighWord
36	35	Absolute Power Heating [kBTU/h]	LowWord
37	36		HighWord

\*\*) signed integer

No.	Address	Register	Access
38	37	Absolute Power Heating [selected unit]	LowWord
39	38		HighWord
40	39	Setpoint Delta Temperature [K]	R / W
41	40	Setpoint Delta Temperature [°F]	R / W
42	41	Setpoint Absolute Flow at DeltaT [l/s]	LowWord
43	42		HighWord
44	43	Setpoint Absolute Flow at DeltaT [gpm]	LowWord
45	44		HighWord
46	45	Setpoint Absolute Flow at DeltaT [selected unit]	LowWord
47	46		HighWord
48	47	Absolute Differential Water Pressure [selected unit]	LowWord
49	48		HighWord
50	49	Relative Differential Water Pressure [%]	LowWord
51	50		HighWord
52	51	Absolute Differential Water Pressure [psi]	LowWord
53	52		HighWord
58	57	Absolute Differential Water Pressure [kPa]	LowWord
59	58		HighWord
60	59	Accumulated Volume [m <sup>3</sup> ]	LowWord
61	60		HighWord
62	61	Accumulated Volume [gal]	LowWord
63	62		HighWord
64	63	Accumulated Volume [selected unit]	LowWord
65	64		HighWord
66	65	Absolute Energy Cooling [kWh]	LowWord
67	66		HighWord
68	67	Absolute Energy Cooling [kBTU]	LowWord
69	68		HighWord
70	69	Absolute Energy Cooling [selected unit]	LowWord
71	70		HighWord
72	71	Absolute Energy Heating [kWh]	LowWord
73	72		HighWord
74	73	Absolute Energy Heating [kBTU]	LowWord
75	74		HighWord
76	75	Absolute Energy Heating [selected units]	LowWord
77	76		HighWord

Definition Access: R = Read, W = Write

## Service

No.	Address	Register	Access
100	99	Bus Termination	R
101	100	Series Number 1 <sup>st</sup> Part	R
102	101	Series Number 2 <sup>nd</sup> Part	R
103	102	Series Number 4 <sup>th</sup> Part	R
104	103	Firmware Version	R
105	104	Malfunction and Service Information	R
106	105	Minimum Volumetric Flow Limit ( $V'_{min}$ ) [%]	R / W
107	106	Maximum Volumetric Flow Limit ( $V'_{max}$ ) [%]	R / W
..	..	-	-
109	108	Bus Fail Action	R / W
110	109	Timeout for Bus Watchdog [s]	R / W
111	110	Nominal Volumetric Flow [l/s]	R
112	111	Nominal Volumetric Flow [gpm]	R
113	112	Nominal Volumetric Flow [selected unit]	LowWord
114	113		HighWord
..	..	-	-
117	116	Control Mode	R / W
118	117	-	-
119	118	Setpoint Source	R / W
120	119	-	-
121	120	Sensor 1 Type	R / W
122	121	Sensor 1 Passive Type	R / W
..	..	-	-
130	129	Minimum Volumetric Flow Limit ( $V'_{min}$ ) [l/s]	R / W
131	130	Minimum Volumetric Flow Limit ( $V'_{min}$ ) [gpm]	R / W
132	131	Minimum Volumetric Flow Limit ( $V'_{min}$ ) [selected unit]	LowWord
133	132		HighWord
134	133	Maximum Volumetric Flow Limit ( $V'_{max}$ ) [l/s]	R / W
135	134	Maximum Volumetric Flow Limit ( $V'_{max}$ ) [gpm]	R / W
136	135	Maximum Volumetric Flow Limit ( $V'_{max}$ ) [selected unit]	LowWord
137	136		HighWord
..	..	-	-
148	147	Unit Selection Flow	R / W
149	148	Unit Selection Power	R / W

No.	Address	Register	Access
150	149	Unit Selection Volume	R / W
151	150	Unit Selection Energy	R / W
152	151	Unit Selection Differential Water Pressure	R / W
..	..	-	-
158	157	Error State	LowWord
159	158		HighWord
160	159	Nominal Power (P' <sub>nom</sub> ) [kW]	LowWord
161	160		HighWord
162	161	Nominal Power (P' <sub>nom</sub> ) [kBTU/h]	LowWord
163	162		HighWord
164	163	Nominal Power (P' <sub>nom</sub> ) [selected unit]	LowWord
165	164		HighWord
166	165	Maximum Power Limit (P' <sub>max</sub> ) [%]	R / W
167	166	Absolute Maximum Power Limit (P' <sub>max</sub> ) [kW]	LowWord
168	167		HighWord
169	168	Absolute Maximum Power Limit (P' <sub>max</sub> ) [kBTU/h]	LowWord
170	169		HighWord
171	170	Absolute Maximum Power Limit (P' <sub>max</sub> ) [selected units]	LowWord
172	171		HighWord
173	172	Setpoint Absolute Differential Water Pressure [selected unit]	LowWord
174	173		HighWord
175	174	Setpoint Absolute Differential Water Pressure [psi]	LowWord
176	175		HighWord
177	176	Setpoint Absolute Differential Water Pressure [kPa]	LowWord
178	177		HighWord
..	..	-	-
180	179	Delta T Limitation	R / W
181	180	Delta T manager Status	R
182	181	Status Differential Water Pressure Sensor	R
183	182	Status Differential Water Pressure Control	R
..	..	-	-
185	184	Nominal Differential Water Pressure [selected unit]	LowWord
186	185		HighWord
187	186	Nominal Differential Water Pressure [psi]	LowWord
188	187		HighWord
189	188	Nominal Differential Water Pressure [kPa]	LowWord
190	189		HighWord
..	..	-	-



No.	Address	Register	Access
201	200	Energy Meter Serial Number First Digits	LowWord
202	201		HighWord
203	202	Energy Meter Serial Number Last Digits	LowWord
204	203		HighWord
205	204	Select Meter Registers	R / W

Definition Access: R = Read, W = Write



All writeable registers >100 are persistent and are not supposed to be written on a regular basis. Designated data points are highlighted in colour in the document.

# Register descriptions

## Control and general settings

These registers can be used to control and configure the fundamental functionalities and read the corresponding feedback values of the Energy Valve.

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
1	0	<b>Setpoint relative</b> The setpoint is related to either the position, the volumetric flow (of $V'_{min}$ , $V'_{max}$ ) or the power (of $P'_{max}$ ). It is scaled between Min and Max limits. The setpoint is active, if the setpoint is controlled by Register No. 119: Setpoint Source = 1: Bus See also Register No. 106, 107, 166.	0...10'000 Default: 0	%	0.01	R / W
12	11	<b>Setpoint analog</b> Shows the setpoint in % if actuator is controlled by Register No. 119: Setpoint Source = 0: Analog. Not considered if forced control (bus, tool and/or analog forced control) is active.	0...10'000	%	0.01	R
5	4	<b>Relative position</b>	0...10'000	%	0.01	R
6	5	<b>Absolute position</b>	0...9'600	°	0.01	R
119	118	<b>Setpoint source</b> Analog: Setpoint from analog signal 0.5...10 V on wire 3 Bus: Setpoint via Modbus Register No. 1: Setpoint Relative	0: Analog 1: Bus Default: 0	–	–	R / W
117	116	<b>Control mode</b> This value defines the interpretation of the setpoint. A reset will be performed, if the state of this object is changed.	0: Position control 1: Flow control 2: Power control 3: Differential pressure control Default: 1	–	–	R / W
2	1	<b>Override control</b> Overrides setpoint with defined values.	0: None 1: Open valve 2: Close valve 3: Minimum flow 4: – 5: Maximum flow 6: Nominal flow 7: – 8: – 9: – 10: Motor stop Default: 0	–	1	R / W
3	2	<b>Command</b> Initiation of actuator functions for service. After command is sent, value changes back to 0: None.	0: None 1: – 2: Sync. Default: 0	–	–	R / W
109	108	<b>Bus fail action</b> In the event of a breakdown in communication, the actuator enables the bus fail action. The bus monitoring controls the Modbus communication. If neither Register No. 1: Setpoint Relative nor Register No. 2: Override Control is renewed before Register No. 110: Timeout for Bus Watchdog, the actuator controls to the Bus Fail Position. Triggered bus monitoring is indicated in Register No. 158/159: ErrorState	0: None 1: Open 2: Close 3: Max 4: Min 5: – 6: – Default: 0	–	–	R / W
110	109	<b>Timeout for bus watchdog</b> If no write request is received within the timeout, the device will execute the action defined in Register No. 109: Bus fail action.	5...3'600 Default: 120	s	1	R / W
100	99	<b>Bus termination</b> Indicates if bus termination (120 Ω) is enabled. Bus termination can be set with Belimo Assistant 2 or web browser.	0: Disabled 1: Enabled Default: 0	–	–	R

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
4	3	<b>Device type</b>	0: Device not connected 1: Air/Water 2: VAV / EPIV 3: Fire 4: <b>Energy Valve / Flow Sensor</b> 5: 6-way EPIV	–	1	R
101	100	<b>Series number 1<sup>st</sup> part</b> Each device has an unambiguous series number, which is either impressed on or glued to the housing. The series number consists of 4 segments, although only parts 1, 2 and 4 are displayed on Modbus.  Example: 00839-31324-064-008 1 <sup>st</sup> part: 00839 2 <sup>nd</sup> part: 31324 4 <sup>th</sup> part: 008	–	–	–	R
102	101	<b>Series number 2<sup>nd</sup> part</b>	–	–	–	R
103	102	<b>Series number 4<sup>th</sup> part</b>	–	–	–	R
104	103	<b>Firmware version</b> Firmware version of communication module Example: 400, version 4.00 For details see Release Notes	–	–	–	R

## Flow

These registers can be used to configure and read values related to Flow control.  
For setpoint see Register No. 1: Setpoint relative in section "Control and general settings".

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
16	15	<b>Setpoint absolute volumetric flow</b>	0...6'300	l/s	0.01	R
17	16	<b>Setpoint absolute volumetric flow</b>	0...998.5	gpm	0.1	R
18	17	<b>Setpoint absolute volumetric flow in selected unit</b>	0...6 0...22'700 0...6305	m <sup>3</sup> /s m <sup>3</sup> /h l/s	0.001	R
19	18	→ Unit can be selected by Register No. 148: Unit selection flow	0...378'333 0...22'700'000 0...99'945 0...13'360	l/min l/h gpm cfm		
7	6	<b>Relative volumetric flow</b> Related to V <sub>max</sub> Register No. 107: Maximum Volumetric Flow Limit	0...15'000	%	0.01	R
8	7	<b>Absolute volumetric flow</b> Sensor reading up to 2,5* V <sub>nom</sub> possible. Make sure to use the device within the specified parameters (see datasheet).	0...1'576	l/s	0.01	R
9	8	<b>Absolute volumetric flow</b> Sensor reading up to 2,5* V <sub>nom</sub> possible. Make sure to use the device within the specified parameters (see datasheet).	0...2'498	gpm	0.1	-
10	9	<b>Absolute volumetric flow in selected unit</b> Sensor reading up to 2,5* V <sub>nom</sub> possible. Make sure to use the device within the specified parameters (see datasheet).	0...15 0...56'750 0...15'762	m <sup>3</sup> /s m <sup>3</sup> /h l/s	0.001	R
11	10	→ Unit can be selected by Register No. 148: Unit selection flow	0...945'832 0...56'750'000 0...249'862 0...33'400	l/min l/h gpm cfm		
106	105	<b>Minimum volumetric flow limit (V<sub>min</sub>)</b>	0...V <sub>max</sub> Default: 0	%	0.01	R / W
130	129	<b>Minimum volumetric flow limit (V<sub>min</sub>)</b>	0...630.5	l/s	0.01	R / W
131	130	<b>Minimum volumetric flow limit (V<sub>min</sub>)</b>	0...999.4	gpm	0.1	R / W
132	131	<b>Minimum volumetric flow limit (V<sub>min</sub>)</b>	0...6 0...22'700 0...6'305	m <sup>3</sup> /s m <sup>3</sup> /h l/s	0.001	R / W
133	132	Minimal volumetric flow in selected unit → Unit can be selected by Register No. 148: Unit selection flow	0...378'333 0...22'700'000 0...99'945 0...13'360	l/min l/h gpm cfm		
107	106	<b>Maximum volumetric flow limit (V<sub>max</sub>)</b> Maximum volumetric flow related to V <sub>nom</sub> "Nominal Volumetric Flow" Considered when Register No.117: Control Mode = 1: Flow Control or = 2: Power Control Values below 25% will be adjusted to 25%.	2'500...10'000 Default: 10'000	%	0.01	R / W
134	133	<b>Maximum volumetric flow limit (V<sub>max</sub>)</b> Values below 25% will be adjusted to 25%.	10.4...630.5	l/s	0.01	R / W
135	134	<b>Maximum volumetric flow limit (V<sub>max</sub>)</b> Values below 25% will be adjusted to 25%.	1.04...63	gpm	0.1	R / W

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
136	135	<b>Absolute maximum volumetric flow limit in selected unit</b> (V <sub>max</sub> )	0.1...6 375...22'700 104...6'305	m <sup>3</sup> /s m <sup>3</sup> /h l/s	0.001	R / W
137	136	Values below 25% will be adjusted to 25%. → Unit can be selected by Register No. 148: Unit selection flow	6'250...378'333 374'994...22'700'000 1'651...99'945 221...13'360	l/min l/h gpm cfm		
111	110	<b>Nominal volumetric flow</b> (V <sub>nom</sub> )	0...10'000	l/s	0.01	R
112	111	<b>Nominal volumetric flow</b> (V <sub>nom</sub> )	0...15'850	gpm	0.1	R
113	112	<b>Nominal volumetric flow in selected unit</b> (V <sub>nom</sub> )	0...6 0...22'700 0...6'305	m <sup>3</sup> /s m <sup>3</sup> /h l/s	0.001	R
114	113	→ Unit can be selected by Register No. 148: Unit selection flow	0...378'333 0...22'700'000 0...99'945 0...13360	l/min l/h gpm cfm		
148	147	<b>Unit selection flow</b>	0: m <sup>3</sup> /s 1: m <sup>3</sup> /h 2: l/s 3: l/min 4: l/h 5: gpm 6: cfm Default: 4	–	–	R / W
60	59	<b>Accumulated volume</b>	0...2'147'483'600	m <sup>3</sup>	0.01	R
61	60					
62	61	<b>Accumulated volume</b>	0...2'147'483'647	gal	1	R
63	62					
64	63	<b>Accumulated volume in selected unit</b>	0...42'000'000 0...42'000'000'000	m <sup>3</sup> l	1	R
65	64	→ Unit can be selected by Register No. 150: Unit selection flow	0...11'095'226'199 0...1'483'216'002.3	gal cf		
150	149	<b>Unit selection volume</b>	0: m <sup>3</sup> 1: Litre 2: Gallon 3: cf Default: 0	–	–	R / W
26	25	<b>Glycol concentration</b>	0...10'000	%	0.01	R

## Power

These registers can be used to configure and read values related to the Power Management.  
For setpoint power see Register No. 1: Setpoint relative in section "Control and general settings".

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
27	26	<b>Relative power</b> Related to $P'_{max}$ "Maximum power limit" Register No. 166, 167/168, 169/170, 171/172	0...30'000	%	0.01	R
28	27	<b>Absolute power cooling</b>	0...3'990'000	kW	0.001	R
29	28					
30	29	<b>Absolute power cooling</b>	0...136'140	kBTU/h	0.001	R
31	30					
32	31	<b>Absolute power cooling in selected unit</b> → Unit can be selected by Register No. 149: Unit selection power	0...39'900'000 0...39'900 0...39.9 0...136'144'440 0...136144 0...11'340	W kW MW BTU/h kBTU/h ton	0.1	R
33	32					
34	33	<b>Absolute power heating</b>	0...3'990'000	kW	0.001	R
35	34					
36	35	<b>Absolute power heating</b>	0...13'614'000	kBTU/h	0.001	R
37	36					
38	37	<b>Absolute power heating in selected unit</b> → Unit can be selected by Register No. 149: Unit selection power	0...39'900'000 0...39'900 0...39.9 0...136'144'440 0...136144 0...11'340	W kW MW BTU/h kBTU/h ton	0.1	R
39	38					
149	148	<b>Unit selection power</b>	0: W 1: kW 2: MW 3: BTU/h 4: kBTU/h 5: ton Default: 1	-	-	R / W
160	159	<b>Nominal power</b> ( $P'_{nom}$ )	0...1'330'000	kW	0.001	R
161	160					
162	161	<b>Nominal power</b> ( $P'_{nom}$ )	0...4'538'000	kBTU/h	0.001	R
163	162					
164	163	<b>Nominal power in selected unit</b> ( $P'_{nom}$ ) → Unit can be selected by Register No. 149: Unit selection power	0...13'300'000 0...13'300 0...13.3 0...45'381'480 0...45'380 0...3'780	W kW MW BTU/h kBTU/h ton	0.1	R
165	164					
166	165	<b>Maximum power limit</b> ( $P'_{max}$ ) The maximum power limit setpoint in % is related to $P'_{nom}$ (Register No. 160/161,162/163, 164/165) and considered when Register No. 117: Control Mode = 2: Power Control.	0.5...100%	%	0.01	R / W
167	166	<b>Absolute maximum power limit</b> ( $P'_{max}$ )	6'650...1'330'000	kW	0.001	R / W
168	167					
169	168	<b>Absolute maximum power limit</b> ( $P'_{max}$ )	22'690...4'538'000	kBTU/h	0.001	R / W
170	169					

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
171	170	<b>Absolute maximum power limit in selected unit</b> (P <sub>max</sub> )	665'000...133'000'000 665...133'000 0.665...133	W kW MW	0.01	R / W
172	171	→ Unit can be selected by Register No. 149: Unit selection power	2'269'074...453'814'800 2269...453'800 189...37'800	BTU/h kBTU/h ton		

## Energy

These registers can be used to configure and read values related to the energy monitoring function.

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
66	65	<b>Absolute energy cooling</b>	0...2'147'483'647	kWh	1	R
67	66					
68	67	<b>Absolute energy cooling</b>	0...2'147'483'647	kBTU	1	R
69	68					
70	69	<b>Absolute energy cooling in selected unit</b>	0...2'147'483'647	–	1	R
71	70	→ Unit can be selected by Register No. 151: Unit selection energy				
72	71	<b>Absolute energy heating</b>	0...2'147'483'647	kWh	1	R
73	72					
74	73	<b>Absolute energy heating</b>	0...2'147'483'647	kBTU	1	R
75	74					
76	75	<b>Absolute energy heating in selected unit</b>	0...2'147'483'647	–	1	R
77	76	→ Unit can be selected by Register No. 151: Unit selection energy				
151	150	<b>Unit selection energy</b>	0: J 1: kJ 2: MJ 3: GJ 4: Wh 5: kWh 6: MWh 7: BTU 8: kBTU 9: ton Default: 5	–	–	–

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
205	204	<p><b>Select meter register</b> Select between certified meter register and lifetime register. Value 0 only available for models with MID certification: EV..R2+MID. For non MID certified models value 1 is defined as default.</p> <p>0: The certified meter register will be reset when the sensor module is replaced. 1: The lifetime register is compensated for glycol (if applicable).</p> <p>Avoid toggling between the two registers as this will affect data logging.</p> <p>Following registers depend on the selected meter register: Register No. 60/61: Accumulated Volume [m<sup>3</sup>] Register No. 62/63: Accumulated Volume [gal] Register No. 64/65: Accumulated Volume [selected unit] Register No. 66/67: Absolute Energy Cooling [kWh] Register No. 68/69: Absolute Energy Cooling [kBTU] Register No. 70/71: Absolute Energy Cooling [selected unit] Register No. 72/73: Absolute Energy Heating [kWh] Register No. 74/75: Absolute Energy Heating [kBTU] Register No. 76/77: Absolute Energy Heating [selected units]</p>	<p>0: Certified meter register 1: Lifetime meter register Default: 0</p>	-	-	R / W
201	200	<b>Energy meter serial number first digits</b>	-	-	1	R
202	201	ProductionOrderNumber				
203	202	<b>Energy meter serial number last digits</b>	-	-	1	R
204	203	ProductionSequenceNumber				



## Differential pressure

These registers can be used to configure and read values related to the differential pressure control functionality. Differential pressure control is only available for 2-way applications.

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
173	172	<b>Setpoint absolute differential water pressure in selected unit</b>	1'000'000...40'000'000 10...400	Pa		
174	173	Unit selection differential water pressure → Unit can be selected by Register No. 152:	145.04...5'801.51 10'000...400'000 1'000...40'000 Default: 4'000'000 Pa	bar psi mbar kPa	0.01	R / W
175	174	<b>Setpoint absolute differential water pressure</b>	145.04...5'801.51	psi	0.01	R / W
176	175		Default: 580.15			
177	176	<b>Setpoint absolute differential water pressure</b>	1'000...40'000	kPa	0.01	R / W
178	177		Default: 4'000			
48	47	<b>Absolute differential water pressure in selected unit</b>	0...60'000'000 0...600	Pa		
49	48	Unit selection differential water pressure → Unit can be selected by Register No. 152:	0...5'801.51 0...600'000 0...60'000	bar psi mbar kPa	0.01	R
50	49	<b>Relative differential water pressure</b>	0...10'000	%	0.01	R
51	50	Relative to dp setpoint max				
52	51	<b>Absolute differential water pressure</b>	0...5'801.51	psi	0.01	R
53	52					
58	57	<b>Absolute differential water pressure</b>	0...60'000	kPa	0.01	R
59	58					
152	151	<b>Unit selection differential water pressure</b>	0: Pa 1: bar 2: psi 3: mbar 4: kPa Default: 1	–	–	R / W
185	184	<b>Nominal differential water pressure in selected unit</b>	0...6'000'000 0...60	Pa		
186	185	Value range is related to selected differential water pressure sensor type → Unit can be selected by Register No. 152	0...870 0...60'000 0...6'000	bar psi mbar kPa	0.1	R
187	186	<b>Nominal differential water pressure</b>	0...870	psi	0.1	R
188	187	Value range is related to selected dP sensor type				
189	188	<b>Nominal differential water pressure</b>	0...6'000	kPa	0.1	R
190	189	Value range is related to selected dP sensor type				
182	181	<b>Status differential water pressure sensor</b>	0: OK 1: Differential pressure not detected Default: 0	–	1	R
183	182	<b>Status differential water pressure control</b>	0: OK 1: Differential pressure setpoint cannot be reached 2: Minimum position applied Default: 0	–	1	R

## Temperature

The measured temperature values can be read out via the registers below.

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
20	19	<b>Temperature 1 (remote)</b>	-2'000...15'000	°C	0.01	R
21	20	<b>Temperature 1 (remote)</b>	-400...30'200	°F	0.01	R
22	21	<b>Temperature 2 (flow body)</b>	-2'000...15'000	°C	0.01	R
23	22	<b>Temperature 2 (flow body)</b>	-400...30'200	°F	0.01	R

## Conversion of sensor signals

These registers can be used to configure the additional Sensor 1 Input on Y3 and read values related to.

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
13	12	<b>Sensor 1 value</b> The conversion of passive sensors can be selected by Register No. 122: Sensor 1 passive type  Scaling depends on the sensor type PT1000 / Ni1000 → 1 NTC10K → 10	0...65'535	mV Ω -	1 1 / 10 0 / 1	R
14	13	<b>Sensor 1 temperature</b>	-2000...15'000	°C	0.01	R
15	14	<b>Sensor 1 temperature</b>	-400...24'800	°F	0.01	R
121	120	<b>Sensor 1 type</b> Additional sensor input Only selectable if Register No. 119: Setpoint source = 1: Bus.	0: None 1: Active 2: - 3: Passive 4: Switch Default: 0	-	-	R / W
122	121	<b>Sensor 1 passive type</b> Only available if Register No. 121: Sensor 1 type = 3: Passive.	0: None 1: PT1000 2: Ni1000 3: - 4: - 5: - 6: - 7: NTC10k2 8: NTC10k3 Default: 0	-	-	R / W

## Delta T manager

These registers can be used to specify the delta T manager functionality and read the corresponding values.

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
40	39	<b>Setpoint delta temperature</b> Considered when delta T limitation active (not disabled). Check datasheet for further information.	0...5'500	K	0.01	R / W
41	40	<b>Setpoint delta temperature</b> Considered when delta T limitation active (not disabled). Check datasheet for further information.	0...9'900	°F	0.01	R / W
24	23	<b>Delta temperature</b>	0...14'000	K	0.01	R
25	24	<b>Delta temperature</b>	0...25'200	°F	0.01	R
42	41	<b>Setpoint absolute flow at delta T</b> Considered when delta T limitation is set to delta T manager-scaled. Check datasheet for further information.	0...100'000	l/s	0.001	R / W
43	42					
44	43	<b>Setpoint absolute flow at delta T</b> Considered when delta T limitation is set to delta T manager-scaled. Check datasheet for further information.	0...158'503	gpm	0.01	R / W
45	44					
46	45	<b>Setpoint absolute flow at delta T in selected unit</b> Considered when delta T limitation is set to delta T manager-scaled. Check datasheet for further information.	0...100 0...360'000 0...100'000 0...6'000'000 0...360'000'000	m <sup>3</sup> /s m <sup>3</sup> /h l/s l/min l/h	0.001	R / W
47	46	→ Unit can be selected by Register No. 148: Unit selection flow	0...1'585'030 0...211'887.997	gpm cfm		
180	179	<b>Delta T limitation</b> 0: Delta T manager not active 1: Delta T manager active with no restriction to flow 2: Delta T manager active with restriction to flow Register No. 42/43, 44/45, 46/47: Setpoint absolute flow at delta T	0: Disabled 1: dT-manager 2: dT-manager scaling Default: 0	-	-	R / W
181	180	<b>Delta T manager status</b> 0: Delta T manager deactivated 1: Delta T manager activated but not active 2: Delta T manager active 3: Delta T manager active with no limitation to the flow 4: Delta T manager active with limitation to flow Register No. 42/43, 44/45, 46/47: Setpoint absolute flow at delta T	0: Not selected 1: Standby 2: Active 3: Scaling standby 4: Scaling active	-	-	R

## Health state

These register values allow to determine malfunctions, service information and error states of the Energy Valve.

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
105	104	<b>Malfunction and service information</b> Bit 0...15 of Register No. 158/159 corresponds with Register No.105 for legacy devices. See also Interface Description for older versions of this device.		–	–	R
158	157	<b>Error state</b> Value is bit-coded. More than one bit can be set to 1. Not all bits mentioned in the enumeration are used for this product range.		–	–	R
159	158	0: Communication with actuator not possible. 1: Gear train disengaged button is pressed 2: Mechanical overload due to blocked valve, etc. 3: Reverse flow is detected 4: Setpoint cannot be reached within 15 min during flow control 5: Flow is measured but position of valve is closed 6: Actual flow exceeds the designed nominal flow 7: Air in the system, error occurred during flow measurement 8: No connection to external temperature sensor 9: Error with embedded temperature sensor 10: Internal communication to flow sensor interrupted 11: Measured temperature & glycol concentration indicate that grease ice can build up 12: Glycol was detected in a MID application 13: Setpoint cannot be reached within 15 min during power control 14: MID only. The sensor module must be replaced. 15: Timeout for the Bus watchdog expired. 16: No differential pressure detected within 5 min during pressure control 17: Differential pressure setpoint can not be reached within 15 min during pressure control mode 18: Minimum position (27%) is applied if: – The valve is restartet – After a power failure – The manual override was previously operated – 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' <sub>nom</sub>	Bitmask = 0: No communication to actuator 1: Gear train disengaged 2: Actuator cannot move 3: Reverse flow 4: Flow setpoint not reached 5: Flow with closed valve 6: Flow actual exceeds flow nominal 7: Flow measurement error 8: Remote temperature error 9: Flowbody temperature error 10: Communication to Sensor interrupted 11: Freeze warning 12: Glycol detected 13: Power setpoint not reached 14: Device end of life reached 15: Bus watchdog triggered 16: No differential pressure detected 17: Differential pressure setpoint can not be reached 18: Minimum position applied			

Definition Access: R = Read, W = Write

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 Modbus value range.  
Each Energy Valve may have different HVAC value size limitations.

# All inclusive.

Belimo is the global market leader in the development, production, and sales of field devices for the energy-efficient control of heating, ventilation and air-conditioning systems. The focus of our core business is on damper actuators, control valves, sensors and meters.

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.

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5-year warranty



On site around the globe



Complete product range



Tested quality



Short delivery times



Comprehensive support



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