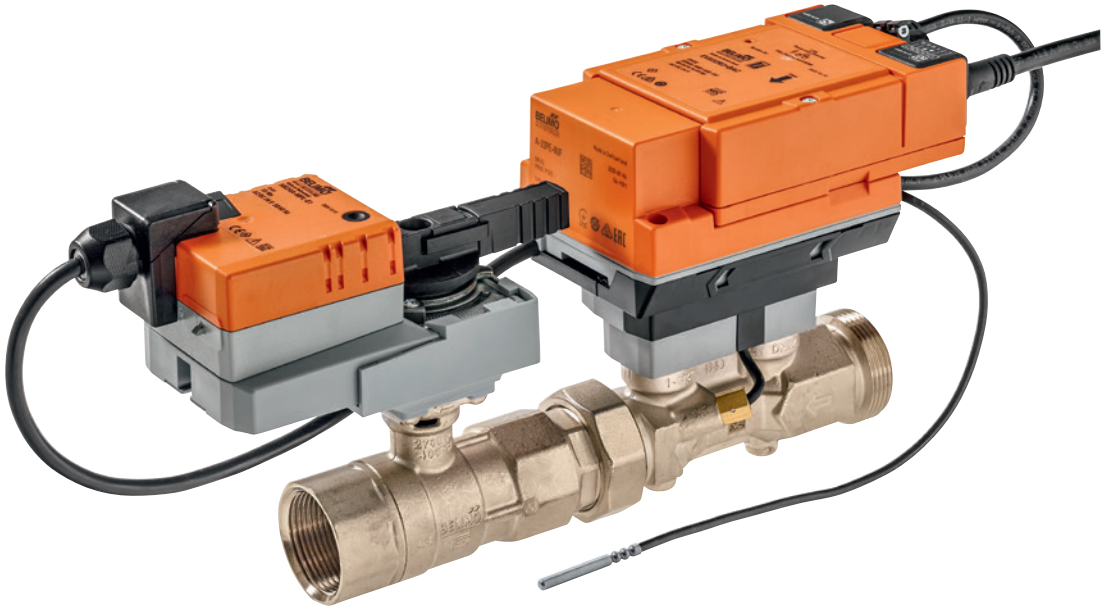
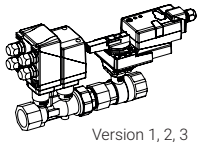
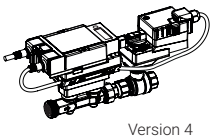


Modbus Interface Description

Where is the Ethernet socket?	
On the actuator	**On the flow sensor**
 Version 1, 2, 3	 Version 4
See „Modbus-Register Energy Valve (V1, V2, V3)"	Stay with this document
For guidance in replacing an old EV with EV V4 -> see "Replacement Guide V1, V2, V3 vs. V4"	

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

Edition 2025-01 / V4.2.1

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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_2 = $6{,}856_{10}$	Read (Function 03, 1 Register) Value Register No. x = 1111 1101 1111 0010_2 = -526_{10}
Actual value = value * scaling factor * unit = 6,856 * 0.01 * unit = **68.56 unit**	Actual value = value * scaling factor * unit = -526 * 0.01 * unit = **-5.26 unit**

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)
= $14{,}551_{10}$ = 0011 1000 1101 0111_2	= 19_{10} = 0000 0000 0001 0011_2

Value LowWord	**Value HighWord**
= 14,551 = 0011 1000 1101 0111_2	= 19 = 0000 0000 0001 0011_2

32-bit value
= 0000 0000 0001 0011 0011 1000 1101 0111_2
= $1{,}259{,}735_{10}$
= **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 ($1111\ 1111\ 1111\ 1111_2$).

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	R
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	R
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	R
29	28		HighWord	
30	29	Absolute Power Cooling [kBTU/h]	LowWord	R
31	30		HighWord	
32	31	Absolute Power Cooling [selected unit]	LowWord	R
33	32		HighWord	
34	33	Absolute Power Heating [kW]	LowWord	R
35	34		HighWord	
36	35	Absolute Power Heating [kBTU/h]	LowWord	R
37	36		HighWord	

**) signed integer

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

Definition Access: R = Read, W = Write

Service

No.	Address	Register		Access
100	99	Bus Termination		R
101	100	Series Number 1st Part		R
102	101	Series Number 2nd Part		R
103	102	Series Number 4th 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	R
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	R / W
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	R / W
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	R
159	158		HighWord	
160	159	Nominal Power (P'$_{nom}$) [kW]	LowWord	R
161	160		HighWord	
162	161	Nominal Power (P'$_{nom}$) [kBTU/h]	LowWord	R
163	162		HighWord	
164	163	Nominal Power (P'$_{nom}$) [selected unit]	LowWord	R
165	164		HighWord	
166	165	Maximum Power Limit (P'$_{max}$) [%]		R / W
167	166	Absolute Maximum Power Limit (P'$_{max}$) [kW]	LowWord	R / W
168	167		HighWord	
169	168	Absolute Maximum Power Limit (P'$_{max}$) [kBTU/h]	LowWord	R / W
170	169		HighWord	
171	170	Absolute Maximum Power Limit (P'$_{max}$) [selected units]	LowWord	R / W
172	171		HighWord	
173	172	Setpoint Absolute Differential Water Pressure [selected unit]	LowWord	R / W
174	173		HighWord	
175	174	Setpoint Absolute Differential Water Pressure [psi]	LowWord	R / W
176	175		HighWord	
177	176	Setpoint Absolute Differential Water Pressure [kPa]	LowWord	R / W
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	R
186	185		HighWord	
187	186	Nominal Differential Water Pressure [psi]	LowWord	R
188	187		HighWord	
189	188	Nominal Differential Water Pressure [kPa]	LowWord	R
190	189		HighWord	
..	..	–		–

No.	Address	Register		Access
201	200	Energy Meter Serial Number First Digits	LowWord	R
202	201		HighWord	
203	202	Energy Meter Serial Number Last Digits	LowWord	R
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	**Setpoint relative** 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	**Setpoint analog** 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	**Relative position**	0...10'000	%	0.01	R
6	5	**Absolute position**	0...9'600	°	0.01	R
119	118	**Setpoint source** 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	**Control mode** 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	**Override control** 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	**Command** 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	**Bus fail action** 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	**Timeout for bus watchdog** 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	**Bus termination** 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	**Device type**	0: Device not connected 1: Air/Water 2: VAV / EPIV 3: Fire 4: **Energy Valve / Flow Sensor** 5: 6-way EPIV	–	1	R
101	100	**Series number 1st part** 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 1st part: 00839 2nd part: 31324 4th part: 008	–	–	–	R
102	101	**Series number 2nd part**	–	–	–	R
103	102	**Series number 4th part**	–	–	–	R
104	103	**Firmware version** 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	**Setpoint absolute volumetric flow**	0...6'300	l/s	0.01	R
17	16	**Setpoint absolute volumetric flow**	0...998.5	gpm	0.1	R
18 19	17 18	**Setpoint absolute volumetric flow in selected unit** → Unit can be selected by Register No. 148: Unit selection flow	0...6 0...22'700 0...6305 0...378'333 0...22'700'000 0...99'945 0...13'360	m^3/s m^3/h l/s l/min l/h gpm cfm	0.001	R
7	6	**Relative volumetric flow** Related to V'_{max} Register No. 107: Maximum Volumetric Flow Limit	0...15'000	%	0.01	R
8	7	**Absolute volumetric flow** Sensor reading up to 2,5* V'_{nom} possible. Make sure to use the device within the specified parameters (see datasheet).	0...1'576	l/s	0.01	R
9	8	**Absolute volumetric flow** Sensor reading up to 2,5* V'_{nom} possible. Make sure to use the device within the specified parameters (see datasheet).	0...2'498	gpm	0.1	–
10 11	9 10	**Absolute volumetric flow in selected unit** Sensor reading up to 2,5* V'_{nom} possible. Make sure to use the device within the specified parameters (see datasheet). → Unit can be selected by Register No. 148: Unit selection flow	0...15 0...56'750 0...15'762 0...945'832 0...56'750'000 0...249'862 0...33'400	m^3/s m^3/h l/s l/min l/h gpm cfm	0.001	R
106	105	**Minimum volumetric flow limit** (V'_{min})	0...V'_{max} Default: 0	%	0.01	R / W
130	129	**Minimum volumetric flow limit** (V'_{min})	0...630.5	l/s	0.01	R / W
131	130	**Minimum volumetric flow limit** (V'_{min})	0...999.4	gpm	0.1	R / W
132 133	131 132	**Minimum volumetric flow limit** (V'_{min}) Minimal volumetric flow in selected unit → Unit can be selected by Register No. 148: Unit selection flow	0...6 0...22'700 0...6'305 0...378'333 0...22'700'000 0...99'945 0...13'360	m^3/s m^3/h l/s l/min l/h gpm cfm	0.001	R / W
107	106	**Maximum volumetric flow limit** (V'_{max}) Maximum volumetric flow related to V'_{nom} "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	**Maximum volumetric flow limit** (V'_{max}) Values below 25% will be adjusted to 25%.	10.4...630.5	l/s	0.01	R / W
135	134	**Maximum volumetric flow limit** (V'_{max}) 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
136 137	135 136	**Absolute maximum volumetric flow limit in selected unit** (V'_{max}) Values below 25% will be adjusted to 25%. → Unit can be selected by Register No. 148: Unit selection flow	0.1...6 375...22'700 104...6'305 6'250...378'333 374'994...22'700'000 1'651...99'945 221...13'360		m^3/s m^3/h l/s l/min l/h gpm cfm	0.001	R / W
111	110	**Nominal volumetric flow** (V'_{nom})	0...10'000		l/s	0.01	R
112	111	**Nominal volumetric flow** (V'_{nom})	0...15'850		gpm	0.1	R
113 114	112 113	**Nominal volumetric flow in selected unit** (V'_{nom}) → Unit can be selected by Register No. 148: Unit selection flow	0...6 0...22'700 0...6'305 0...378'333 0...22'700'000 0...99'945 0...13360		m^3/s m^3/h l/s l/min l/h gpm cfm	0.001	R
148	147	**Unit selection flow**	0: m^3/s 1: m^3/h 2: l/s 3: l/min	4: l/h 5: gpm 6: cfm Default: 4	–	–	R / W
60 61	59 60	**Accumulated volume**	0...2'147'483'600		m^3	0.01	R
62 63	61 62	**Accumulated volume**	0...2'147'483'647		gal	1	R
64 65	63 64	**Accumulated volume in selected unit** → Unit can be selected by Register No. 150: Unit selection flow	0...42'000'000 0...42'000'000'000 0...11'095'226'199 0...1'483'216'002.3		m^3 l gal cf	1	R
150	149	**Unit selection volume**	0: m^3 1: Litre 2: Gallon	3: cf Default: 0	–	–	R / W
26	25	**Glycol concentration**	0...6'000		%	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	**Relative power** Related to P'_{max} "Maximum power limit" Register No. 166, 167/168, 169/170, 171/172	0...30'000	%	0.01	R
28 29	27 28	**Absolute power cooling**	0...3'990'000	kW	0.001	R
30 31	29 30	**Absolute power cooling**	0...136'140	kBTU/h	0.001	R
32 33	31 32	**Absolute power cooling in selected unit** → 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
34 35	33 34	**Absolute power heating**	0...3'990'000	kW	0.001	R
36 37	35 36	**Absolute power heating**	0...13'614'000	kBTU/h	0.001	R
38 39	37 38	**Absolute power heating in selected unit** → 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
149	148	**Unit selection power**	0: W 1: kW 2: MW 3: BTU/h 4: kBTU/h 5: ton Default: 1	–	–	R / W
160 161	159 160	**Nominal power** (P'_{nom})	0...1'330'000	kW	0.001	R
162 163	161 162	**Nominal power** (P'_{nom})	0...4'538'000	kBTU/h	0.001	R
164 165	163 164	**Nominal power in selected unit** (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
166	165	**Maximum power limit** (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
167 168	166 167	**Absolute maximum power limit** (P'_{max})	6'650...1'330'000	kW	0.001	R / W
169 170	168 169	**Absolute maximum power limit** (P'_{max})	22'690...4'538'000	kBTU/h	0.001	R / W

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

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 67	65 66	**Absolute energy cooling**	0...2'147'483'647	kWh	1	R
68 69	67 68	**Absolute energy cooling**	0...2'147'483'647	kBTU	1	R
70 71	69 70	**Absolute energy cooling in selected unit** → Unit can be selected by Register No. 151: Unit selection energy	0...2'147'483'647	–	1	R
72 73	71 72	**Absolute energy heating**	0...2'147'483'647	kWh	1	R
74 75	73 74	**Absolute energy heating**	0...2'147'483'647	kBTU	1	R
76 77	75 76	**Absolute energy heating in selected unit** → Unit can be selected by Register No. 151: Unit selection energy	0...2'147'483'647	–	1	R
151	150	**Unit selection energy**	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	**Select meter register** 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. 0: The certified meter register will be reset when the sensor module is replaced. 1: The lifetime register is compensated for glycol (if applicable). Avoid toggling between the two registers as this will affect data logging. Following registers depend on the selected meter register: Register No. 60/61: Accumulated Volume [m^3] 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]	0: Certified meter register 1: Lifetime meter register Default: 0	–	–	R / W
201	200	**Energy meter serial number first digits** ProductionOrderNumber	–	–	1	R
202	201					
203	202	**Energy meter serial number last digits** ProductionSequenceNumber	–	–	1	R
204	203					

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
173 174	172 173	**Setpoint absolute differential water pressure in selected unit** →► Unit can be selected by Register No. 152: Unit selection differential water pressure	1'000'000...40'000'000 10...400 145.04...5'801.51 10'000...400'000 1'000...40'000 Default: 4'000'000 Pa	Pa bar psi mbar kPa	0.01	R / W
175 176	174 175	**Setpoint absolute differential water pressure**	145.04...5'801.51 Default: 580.15	psi	0.01	R / W
177 178	176 177	**Setpoint absolute differential water pressure**	1'000...40'000 Default: 4'000	kPa	0.01	R / W
48 49	47 48	**Absolute differential water pressure in selected unit** →► Unit can be selected by Register No. 152: Unit selection differential water pressure	0...60'000'000 0...600 0...5'801.51 0...600'000 0...60'000	Pa bar psi mbar kPa	0.01	R
50 51	49 50	**Relative differential water pressure** Relative to dp setpoint max	0...10'000	%	0.01	R
52 53	51 52	**Absolute differential water pressure**	0...5'801.51	psi	0.01	R
58 59	57 58	**Absolute differential water pressure**	0...60'000	kPa	0.01	R
152	151	**Unit selection differential water pressure**	0: Pa 1: bar 2: psi 3: mbar 4: kPa Default: 1	–	–	R / W
185 186	184 185	**Nominal differential water pressure in selected unit** Value range is related to selected differential water pressure sensor type →► Unit can be selected by Register No. 152	0...6'000'000 0...60 0...870 0...60'000 0...6'000	Pa bar psi mbar kPa	0.1	R
187 188	186 187	**Nominal differential water pressure** Value range is related to selected dP sensor type	0...870	psi	0.1	R
189 190	188 189	**Nominal differential water pressure** Value range is related to selected dP sensor type	0...6'000	kPa	0.1	R
182	181	**Status differential water pressure sensor**	0: OK 1: Differential pressure not detected Default: 0	–	1	R
183	182	**Status differential water pressure control**	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	**Temperature 1 (remote)**	–2'000...15'000	°C	0.01	R
21	20	**Temperature 1 (remote)**	–400...30'200	°F	0.01	R
22	21	**Temperature 2 (flow body)**	–2'000...15'000	°C	0.01	R
23	22	**Temperature 2 (flow body)**	–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	**Sensor 1 value** 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	**Sensor 1 temperature**	-2000...15'000		°C	0.01	R
15	14	**Sensor 1 temperature**	-400...24'800		°F	0.01	R
121	120	**Sensor 1 type** 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	**Sensor 1 passive type** 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 manger functionality and read the corresponding values.

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
40	39	**Setpoint delta temperature** Considered when delta T limitation active (not disabled). Check datasheet for further information.	0...5'500	K	0.01	R / W
41	40	**Setpoint delta temperature** Considered when delta T limitation active (not disabled). Check datasheet for further information.	0...9'900	°F	0.01	R / W
24	23	**Delta temperature**	0...14'000	K	0.01	R
25	24	**Delta temperature**	0...25'200	°F	0.01	R
42 43	41 42	**Setpoint absolute flow at delta T** 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
44 45	43 44	**Setpoint absolute flow at delta T** 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
46 47	45 46	**Setpoint absolute flow at delta T in selected unit** Considered when delta T limitation is set to delta T manager-scaled. Check datasheet for further information. →► Unit can be selected by Register No. 148: Unit selection flow	0...100 0...360'000 0...100'000 0...6'000'000 0...360'000'000 0...1'585'030 0...211'887.997	m^3/s m^3/h l/s l/min l/h gpm cfm	0.001	R / W
180	179	**Delta T limitation** 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	**Delta T manager status** 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	**Malfunction and service information** 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
158 159	157 158	**Error state** 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. 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'_{nom}	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	–	–	R

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.

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BELIMO Automation AG
Brunnenbachstrasse 1, 8340 Hinwil, Switzerland
+41 43 843 61 11, info@belimo.ch, www.belimo.com

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