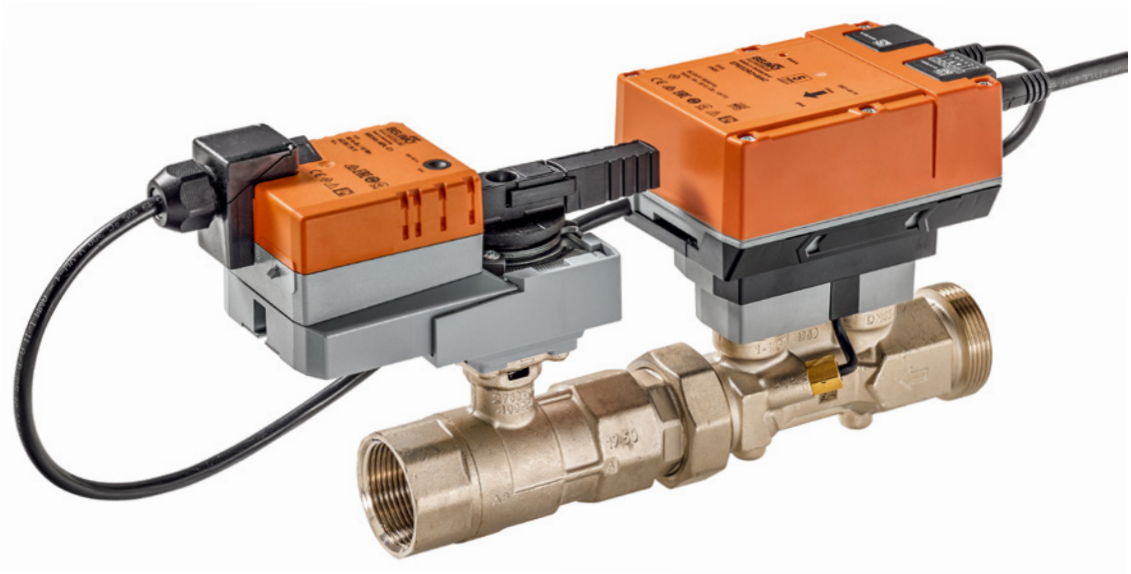

Modbus Interface Description

2-way EPIV, DN 15…150 / V4.3.0
Electronic pressure-independent characterized control valve

Edition 2026-04

Table of contents

BELIMO

General notes

General information

Date	22/04/2026
Product Name	2-way EPIV
Product Model Number	EP..R2+(K)BAC EP..F2-16+(K)BAC EP..F2-25+(K)BAC
Protocol	Modbus RTU over RS-485

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)
Address	1...247 (Default: 1)
Number of Nodes	Max. 32 (without repeater)
Terminating Resistor	120 Ω

Configuration

Tool	Belimo Assistant 2

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

Read Holding Registers [3]
Write Single Register [6]
Read Discrete Inputs [2]
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.
Exeptions 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 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)
= $14{,}551_{10}$	= 19_{10}
= $0011\ 1000\ 1101\ 0111_2$	= $0000\ 0000\ 0001\ 0011_2$

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

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 [°]		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] [-]		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	
22	21	Temperature (flow body) [°C] **)		R
23	22	Temperature (flow body) [°F] **)		R
26	25	Glycol Concentration [%]		R
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	

**) signed integer

Configuration

No.	Address	Register		Access
100	99	Bus Termination		R
101	100	Series Number 1st part		
102	101	Series Number 2nd part		R
103	102	Series Number 4th part		
104	103	Firmware Version		R
105	104	Malfunction and Service Information		R
106	105	Minimum Volumetric Flow [%]		R / W
107	106	Maximum Volumetric Flow [%]		R / W
108	107	Bus Fail Action After Startup		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
119	118	Setpoint Source		R / W
121	120	Sensor 1 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
150	149	Unit Selection Volume		R / W
201	200	Flow Meter Serial Number First Digits	LowWord	R
202	201		HighWord	
203	202	Flow Meter Serial Number Last Digits	LowWord	R
204	203		HighWord	

Definition Access: R = Read, W = Write

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

Register description

Control and general settings

These registers can be used to control and configure the fundamental functionalities and read the corresponding values of the 2-way EPIV.

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
1	0	**Setpoint relative** The setpoint is related to either the position or the volumetric flow (of V'_{min}, V'_{max}). Is is scaled between Min and Max limits. The data point is active if the setpoint is controlled by Register No. 119: Setpoint source = 1: Bus. See also: Register No. 106: Minimum volumetric flow Register No. 107: Maximum volumetric flow	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 override control (bus, tool, and/or 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: Relative setpoint via Bus 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 Default: 1	–	–	R / W
2	1	**Override control** Override the setpoint with definded values Override minimum and maximum flow correspond to Position or Flow control mode. → Unit can be selected by Register No. 117: Control mode	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	–	–	R / W
3	2	**Command** Initiation of actuator functions for service and test. After command is sent, value changes back to 0: None.	0: None 1: – 2: Sync Default: 0	–	–	R / W
108	107	**Bus Fail Action After Startup** If enabled, the Bus Fail Action is immediately applied on startup. Otherwise the configured Register No. 110 : Timeout for bus watchdog is taken into account. Triggered Bus Fail Action After Startup is indicated in Register No.158: Error State.	0: Disabled 1: Enabled	–	1	R / W

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
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 bus 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 moves to the bus fail position. Triggered bus monitoring is indicated as error in Register No. 158 Error State information.	0: None 1: Open 2: Close 3: Max 4: Min 5: – 6: Stop Default: 0	–	–	R / W
110	109	**Timeout for communication watchdog** If no write request is received within the timeout, the device will execute the action defined in Register No. 109: Bus watchdog 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 by with Belimo Assistant 2.	0: Disabled 1: Enabled Default: 0	–	–	R
4	3	**Device type**	0: Device not connected 1: Air / Water **2: VAV / EPIV / Flow sensor** 3: Fire 4: Energy valve / Energy meter 5: 6-way EPIV	–	–	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	–	–	1	R
102	101	**Series number 2nd part**	–	–	1	R
103	102	**Series number 4th part**	–	–	1	R
104	103	**Firmware version** Firmware version of communication module. Example: 400, version 4.00. For details see Release notes.	–	–	1	R

Access definition: R = Read, W = Write

Note: According to the present configuration settings of the EPIV (e.g. DN size), the HVAC application may perform a size limitation within the indicated Modbus value range. Each EPIV may have different HVAC value size limitations. See corresponding product datasheet.

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...5'000	l/s	0.01	R
17	16	**Setpoint absolute volumetric flow**	0...7925	gpm	0.1	R
18 19	17 18	**Setpoint absolute volumetric flow** → Unit can be selected by Register No. 148: Unit selection flow	0..50 0..180'000 0..50'000 0..3'000'000 0...180'000'000 0..792'500 0..105'900	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** Actual measuring range depends on device type (see datasheet).	0...10'416.7	l/s	0.01	R
9	8	**Absolute volumetric flow** Actual measuring range depends on device type (see datasheet).	0...16'510.0	gpm	0.1	R
10 11	9 10	**Absolute volumetric flow** Actual measuring range depends on device type (see datasheet). → Unit can be selected by Register No. 148: Unit selection flow	0..104.167 0..375'000 0...104'167 0...6'250'000 0..375'000'000 0..1'651'075 0..220'716	m^3/s m^3/h l/s l/min l/h gpm cfm	0.001	R
106	105	**Minimum volumetric flow** Minimum flow limitation can be set from 2.5% of V'_{nom} to V'_{max}. Minimum flow limit deactivated if V'_{min} = 0.	0...V'_{max} Default: 0	%	0.01	R / W
130	129	**Minimum volumetric flow limit** Minimum Flow limitation can be set from 2.5% of V'_{nom} to V'_{max}. Minimum Flow limit deactivated if V'_{min} = 0.	0...125	l/s	0.01	R / W
131	130	**Minimum volumetric flow limit** Minimum Flow limitation can be set from 2.5% of V'_{nom} to V'_{max}. Minimum Flow limit deactivated if V'_{min} = 0.	0...198.1	gpm	0.1	R / W
132 133	131 132	**Minimal volumetric flow in selected unit** → Unit can be selected by Register No. 148: Unit selection flow Minimum Flow limitation can be set from 2.5% of V'_{nom} to V'_{max}. Minimum Flow limit deactivated if V'_{min} = 0.	0..1.250 0..4'500 0..1'250 0..75'000 0..4'500'000 0..19'812.500 0..2'647.500	m^3/s m^3/h l/s l/min l/h gpm cfm	0.001	R / W
107	106	**Maximum volumetric flow** Maximum flow limit in % between 25% and 100% of V'_{nom}. Values below 25% will be adjusted to 25%. The Maximum flow setpoint is related to V'_{nom} "Nominal volumetric flow" (Register No. 111,112, 113/114)) and is considered when Control mode Register No. 117 = Flow control.	2'500...10'000 Default: 10'000	%	0.01	R / W

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
134	133	**Maximum volumetric flow limit** (V'_{max}) Values below 25% will be adjusted to 25%.	10.4...5'000	l/s	0.01	R / W
135	134	**Maximum volumetric flow limit** (V'_{max}) Values below 25% will be adjusted to 25%	1.04...7'925	gpm	0.1	R / W
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...50 375...180'000 104...50'000 6'250...3'000'000 374'994...180'000'000 1'651...792'500 221...105'900	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...5'000	l/s	0.01	R
112	111	**Nominal volumetric flow** (V'_{nom})	0...7'925	gpm	0.1	R
113 114	112 113	**Nominal volumetric flow** (V'_{nom}) → Unit can be selected by Register No. 148: Unit selection flow	0..50 0..180'000 0..50'000 0..3'000'000 0...180'000'000 0..792'500 0..105'900	m^3/s m^3/h l/s l/min l/h gpm cfm	0.001	R
148	147	**Unit selection flow** The selected unit is valid for Register No. 10: Absolute volumetric flow Register No. 18: Setpoint absolute volumetric flow Register No. 113: Nominal volumetric flow Register No. 132: Minimal volumetric flow in selected unit Register No. 136: Maximal volumetric flow in selected unit	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** (cannot be reset)	0...2'147'483'600	m^3	0.01	R
62 63	61 62	**Accumulated volume** (cannot be reset)	0...2'147'483' 647	gal	1	R
64 65	63 64	**Accumulated volume in selected unit** (cannot be reset) → Unit can be selected by Register No. 150: Unit selection volume	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

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
26	25	**Glycol concentration** Effective measuring range depends on device type (see datasheet)	0...6'000	%	0.01	R
201	200	**Flow meter serial number first digits** ProductionOrderNumber	–	–	1	R
202	201					
203	202	**Flow meter serial number last digits** ProductionSequenceNumber	–	–	1	R
204	203					

Access definition: R = Read, W = Write

Note: According to the present configuration settings of the EPIV (e.g. DN size), the HVAC application may perform a size limitation within the indicated Modbus value range. Each EPIV may have different HVAC value size limitations. See corresponding product datasheet.

Temperature

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

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
22	21	**Temperature (flow body)**	-2'000...15'000	°C	0.01	R
23	22	**Temperature (flow body)**	-400...30'200	°F	0.01	R

Conversion of sensor signals

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

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
13	12	**Sensor 1 value** Current value of sensor 1, depending on Register No. 121: Sensor 1 type	0...65'535	mV –	1	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: – 4: Switch Default: 0	–	–	R / W

Access definition: R = Read, W = Write

Note: According to the present configuration settings of the EPIV (e.g. DN size), the HVAC application may perform a size limitation within the indicated Modbus value range. Each EPIV may have different HVAC value size limitations. See corresponding product datasheet.

Health state

These registers allow to determine malfunctions, service information and error state of the 2-way EPIV.

No.	Address	Description Comment	Range, enumeration	Unit	Scaling	Access
105	104	**Malfunction and service information** Bit 0...15 of Register No. 158/159: Error state corresponds with Register No.105 for legacy devices. See also Interface Description for older versions of this device.	–	–	–	R
158	157	**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.	Bitmask =	–	–	R
159	158	0: Communication with actuator not possible. Defective components, cable disconnected.	0: No communication to actuator			
		1: Manual override button is pressed	1: Gear train disengaged			
		2: Mechanical overload due to blocked valve, etc.	2: Actuator cannot move			
		3: Reverse flow is detected. Pump pressure too low; high resistance in the flow circuit; flushing bypass open; V'_{max} setting too high.	3: Reverse flow			
		4: Setpoint cannot be reached within 15 min during flow control. Pump pressure too low; high resistance in the flow circuit; flushing bypass open; V'_{max} setting too high.	4: Flow setpoint not reached			
		5: Flow is measured but valve position is closed. Actuator incorrectly mounted.	5: Flow with closed valve			
		6: Actual flow exceeds the designed nominal flow.	6: Flow actual exceeds flow nominal			
		7: Air in the system, error occurred during flow measurement. Water contamination, not specified fluid used.	7: Flow measurement error 8: –			
		9: Error with embedded temperature sensor.	9: Flowbody temperature error			
		10: Internal communication to flow sensor interrupted.	10: Communication to sensor interrupted			
		11: Measured temperature and glycol concentration indicate that grease ice can build up.	11: Freeze warning			
		12: Medium contains glycol.	12: Glycol detected 13: – 14: –			
		15: Timeout for the Bus watchdog expired. No update of Setpoint / Override within specified time.	15: Bus watchdog triggered 16: – 17: – 18: – 19: – 20: – 21: Bus Fail Action After Startup active			

Access definition: R = Read, W = Write

Note: According to the present configuration settings of the EPIV (e.g. DN size), the HVAC application may perform a size limitation within the indicated Modbus value range. Each EPIV may have different HVAC value size limitations. See corresponding product datasheet.

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.

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- On site around the globe
- Complete product range
- Tested quality
- Short delivery times
- Comprehensive support

EN – 2026-04 – Subject to technical modifications

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