



## 6-way EPIV

### Contents

Modbus General Notes	2
Modbus Register Overview	3
Modbus Register Description	4

## Modbus General Notes

General information	Date	16.12.2019						
	Product Name	6-way EPIV						
	Actuator type	EP..R-R6+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 Bd)						
	Address	1...247 (Default: 10)						
	Number of nodes	Max. 32 (without repeater)						
	Terminating resistor	120 Ω (to be done with external resistor)						
Parameterisation	Tool	Belimo Assistant App						
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.							
Commands	Standard commands:							
	Read Holding Registers [3]							
	Write Single Register [6]							
	Optional commands:							
	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 → <b>104</b> (Register Address) * <b>16</b> (Bit) = <b>1664</b>							
Interpret values in the registers	All values in the register are unsigned integer datatypes.							
Example	Read (Function 03, 1 Register) Value Register No. 12 = 0001'1010'1100'10002 = 6'85610 Actual Value = Value * Scaling factor * Unit = 6'856 * 0.01 * m3/h = <b>68.56 m³/h</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“ / LSW (Least Significant Word) first							
Example	Register No. 10 (AbsFlow LowWord) = 14'551 = 0011'1000'1101'01112							
	Register No. 11 (AbsFlow HighWord) = 19 = 0000'0000'0001'00112							
	<table><tr><th>AbsFlow HighWord</th><th>AbsFlow LowWord</th></tr><tr><td>19</td><td>14'551</td></tr><tr><td>0000'0000'0001'00112</td><td>0011'1000'1101'01112</td></tr></table>	AbsFlow HighWord	AbsFlow LowWord	19	14'551	0000'0000'0001'00112	0011'1000'1101'01112	
AbsFlow HighWord	AbsFlow LowWord							
19	14'551							
0000'0000'0001'00112	0011'1000'1101'01112							
	AbsFlow = 0000'0000'0001'0011'0011'1000'1101'01112 = 1'259'735 = <b>1259.735 l/h</b>							
	Math formula: AbsFlow = ( AbsFlow HighWord * 65'536 ) + AbsFlow LowWord AbsFlow = ( 19 * 65'536 ) + 14'551 = 1'259'735 = <b>1259.735 l/h</b>							
Deactivated registers	If a register is not supported by a device or by a device setting it is indicated with 65'535 (1111'1111'1111'11112).							



All writeable registers on registers >100 are persistent and are **not** supposed to be written on a regular base.

## Modbus Register Overview

## Operation

No.	Address	Register	Access
1	0	Setpoint [%]	R / W
2	1	Override control	R / W
3	2	-	-
4	3	Actuator type	R
5	4	Relative position [%]	R
6	5	Absolute position [°]	R
7	6	Relative volumetric flow [%]	R
8	7	Absolute volumetric flow [UnitSel]	LowWord
9	8		HighWord
10	9	Absolute volumetric flow [l/h]	LowWord
11	10		HighWord
12	11	Absolute volumetric flow [gpm]	LowWord
13	12		HighWord
14	13	Setpoint Absolute volumetric flow [UnitSel]	LowWord
15	14		HighWord
16	15	Setpoint Analog [V]	R
17	16	Active Sequence	R

## Service

No.	Address	Register	Access
101	100	Series number 1 <sup>st</sup> part	R
102	101	Series number 2 <sup>nd</sup> part	
103	102	Series number 4 <sup>th</sup> part	
104	103	Firmware version	R
105	104	Malfunction and service information	R
106	105	Vmax Sequence 1 [%]	R / W
107	106	Vmax Sequence 2 [%]	R / W
108	107	-	-
109	108	-	-
110	109	-	-
111	110	Absolute Vnom [UnitSel]	LowWord
112	111		HighWord
113	112	Absolute Vnom [l/h]	LowWord
114	113		HighWord
115	114	Absolute Vnom [gpm]	LowWord
116	115		HighWord
117	116	Control Mode	R / W
118	117	Unit Selection Flow	R / W
119	118	Setpoint Source	R / W

## Modbus Register Description

No.	Address	Description Comment	Range Enumeration	Unit	Scaling	Access
1	0	Setpoint Setpoint for actuator between Min (Register No. 106) and Max (No. 107) Position Control Setpoint 0...100% refers to relative position 0...100% Flow Control Setpoint 0...33% refers to range Vmax1...0 l/h i.e. Setpoint 0% = Vmax1 / Setpoint 33% = 0 l/h Setpoint 67...100% refers to 0 l/h...Vmax2 i.e. Setpoint 67% = 0 l/h / Setpoint 100% = Vmax2	0...10'000 Default: 0	%	0.01	R / W
2	1	Override Control Override setpoint with defined values	0: None 1: Open Sequence 1 (0%) 2: Open Sequence 2 (100%) 3: Close (50%) 4: Vmax Sequence 1 5: Vmax Sequence 2 Default: None(0)	-	-	R / W
3	2	-	-	-	-	-
4	3	Actuator Type	0: Actuator not connected 1: Air / Water 2: VAV / EPIV 3: Fire 4: Energy Valve 5: 6way EPIV	-	-	R
5	4	Relative Position	0...10'000	%	0.01	R
6	5	Absolute Position	0...max angle	°	0.01	R
7	6	Relative volumetric flow Relative volumetric flow of active Vmax (Vmax1 or Vmax2)	0...10'000	%	0.01	R
8	7	Absolute volumetric flow Absolute flow in unit selected (Register No. 118) LowWord Lower 16 bit of 32 bit value	-	UnitSel	0.001	R
9	8	Absolute volumetric flow Absolute flow in unit selected (Register No. 118) HighWord Upper 16 bit of 32 bit value				
10	9	Absolute volumetric flow Absolute flow in l/h LowWord Lower 16 bit of 32 bit value	-	l/h	0.001	R
11	10	Absolute volumetric flow Absolute flow in l/h HighWord Upper 16 bit of 32 bit value				
12	11	Absolute volumetric flow Absolute flow in gpm LowWord Lower 16 bit of 32 bit value	-	gpm	0.001	R
13	12	Absolute volumetric flow Absolute flow in gpm HighWord Upper 16 bit of 32 bit value				
14	13	Setpoint absolute volumetric flow Absolute flow in unit selected (Register No. 118) LowWord Lower 16 bit of 32 bit value	-	UnitSel	0.001	R
15	14	Setpoint absolute volumetric flow Absolute flow in unit selected (Register No. 118) HighWord Upper 16 bit of 32 bit value				
16	15	Setpoint Analog Shows the setpoint in V if actuator is controlled by analog signal (Setpoint Source (Register No. 119) is Analog(0))	0...1'000	V	0.01	R
17	16	Active Sequence Indicates active sequence	0: Sequence 1 (0...33%) 1: Sequence 2 (67...100%) 2: Dead Band (34...66%)	-	-	R

## Modbus Register Description

No.	Address	Description Comment	Range Enumeration	Unit	Scaling	Access
101	100	Series Number 1 <sup>st</sup> 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 Modus 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	Series Number 2 <sup>nd</sup> part	-	-	-	R
103	102	Series Number 4 <sup>th</sup> part	-	-	-	R
104	103	Firmware Version Firmware version of communication module Example: 302, Version 3.02	-	-	-	R
105	104	Malfunction and Service Information Value is bit-coded. More than one bit can be set to 1 All bits not mentioned in the enumeration are not used for this actuator range Error flow sensor: Error with the flow sensor Actuator can't move: Mechanical overload due to blocked valve, etc. Flow with closed valve: Flow is measured but position of valve is closed (Dead Band) Airbubbles: Airbubbles in the hydronic system. As long as there are airbubbles in the system, position control mode is active, regardless of control mode setting (Register No. 117). Flow not reached: Setpoint cannot be reached within 3min during flow control Gear disengaged active: Gear disengaged button is pressed	Bit2: Error flow sensor Bit3: Actuator cannot move Bit4: Flow with closed valve Bit5: Airbubbles Bit6: Flow not reached Bit9: Gear disengaged	-	-	R
106	105	Vmax Sequence 1	500...10'000 Default: 10'000	%	0.01	R / W
107	106	Vmax Sequence 2	500...10'000 Default: 10'000	%	0.01	R / W
108	107	-	-	-	-	-
109	108	-	-	-	-	-
110	109	-	-	-	-	-
111	110	Nominal volumetric flow Vnom in unit selected (Register No. 118) LowWord Lower 16 bit of 32 bit value	-	UnitSel	0.001	R
112	111	Nominal volumetric flow Vnom in unit selected (Register No. 118) HighWord Upper 16 bit of 32 bit value	-			
113	112	Nominal volumetric flow Vnom in l/h LowWord Lower 16 bit of 32 bit value	-	l/h	0.001	R
114	113	Nominal volumetric flow Vnom in l/h HighWord Upper 16 bit of 32 bit value	-			
115	114	Nominal volumetric flow Vnom in gpm LowWord Lower 16 bit of 32 bit value	-	gpm	0.001	R
116	115	Nominal volumetric flow Vnom in gpm HighWord Upper 16 bit of 32 bit value	-			

## Modbus Register Description

No.	Address	Description Comment	Range Enumeration	Unit	Scaling	Access
117	116	Control Mode	0: Position control 1: Flow control <i>Default: Flow control(1)</i>	–	–	R / W
118	117	Unit Selection Flow	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 <i>Default: l/h(4)</i>	–	–	R / W
119	118	Setpoint Source Analog: Setpoint from analog signal 0...10 V on wire 3 Bus: Setpoint from Modbus (Register 1)	0: Analog 1: Bus <i>Default: Analog(0)</i>	–	–	R / W