



6-way PI zone valve (C6..QP...+BAC)

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Modbus General Notes

General information	Date	25.03.2022						
	Product Name	6-way PI zone valve						
	Actuator type	C6..QP(T)-...+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: 1)						
	Number of nodes	Max. 32 (without repeater)						
Parameterisation	Terminating resistor	120 Ω (to be done with external resistor)						
	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]							
Command „Read Discrete Inputs“	Read Input Registers [4]							
	Write Multiple Registers [16]							
	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 Address) * 16 (Bit) = 1664							
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 * m ³ /h = 68.56 m³/h							
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 = 0011'1000'1101'0111 ₂ Register No. 11 (AbsFlow HighWord) = 19 = 0000'0000'0001'0011 ₂							
	<table border="1"> <thead> <tr> <th>AbsFlow HighWord</th> <th>AbsFlow LowWord</th> </tr> </thead> <tbody> <tr> <td>19</td> <td>14'551</td> </tr> <tr> <td>0000'0000'0001'0011₂</td> <td>0011'1000'1101'0111₂</td> </tr> </tbody> </table>		AbsFlow HighWord	AbsFlow LowWord	19	14'551	0000'0000'0001'0011 ₂	0011'1000'1101'0111 ₂
AbsFlow HighWord	AbsFlow LowWord							
19	14'551							
0000'0000'0001'0011 ₂	0011'1000'1101'0111 ₂							
	AbsFlow = 0000'0000'0001'0011'0011'1000'1101'0111 ₂ = 1'259'735 = 1259.735 l/h							
	Math formula: AbsFlow = (AbsFlow HighWord * 65'536) + AbsFlow LowWord AbsFlow = (19 * 65'536) + 14'551 = 1'259'735 = 1259.735 l/h							
Deactivated registers	If a register is not supported by a device or by a device setting it is indicated with 65'535 (1111'1111'1111'1111 ₂).							



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	-	-
		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 st part	R
		102	101	Series number 2 nd part	
		103	102	Series number 4 th 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
		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 Vmax1 (Register No. 106) and Vmax2 (No. 107) Setpoint 0...33% refers to range Vmax1...0 l/h i.e. Setpoint 0% = Vmax1 Setpoint 67...100% refers to 0 l/h...Vmax2 i.e. 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: 6-way EPIV / PI zone valve	-	-	R
5	4	Relative Position Combined Relative Position Relative Position 0...33% refers to range Vmax1...0 l/h i.e. Setpoint 0% = Vmax1 / Setpoint 33% = 0 l/h Relative Position 67...100% refers to 0 l/h...Vmax2 i.e. Setpoint 67% = 0 l/h / Setpoint 100% = Vmax2	0...10'000	%	0.01	R
6	5	-	-	-	-	-
7	6	Relative volumetric flow Calculated relative volumetric flow of active Vmax (Vmax1 or Vmax2)	0...10'000	%	0.01	R
8	7	Absolute volumetric flow Calculated 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 Calculated absolute flow in unit selected (Register No. 118) HighWord Upper 16 bit of 32 bit value	-	UnitSel	0.001	R
10	9	Absolute volumetric flow Calculated absolute flow in l/h LowWord Lower 16 bit of 32 bit value	-	l/h	0.001	R
11	10	Absolute volumetric flow Calculated absolute flow in l/h HighWord Upper 16 bit of 32 bit value	-	l/h	0.001	R
12	11	Absolute volumetric flow Calculated absolute flow in gpm LowWord Lower 16 bit of 32 bit value	-	gpm	0.001	R
13	12	Absolute volumetric flow Calculated absolute flow in gpm HighWord Upper 16 bit of 32 bit value	-	gpm	0.001	R
14	13	Setpoint absolute volumetric flow Calculated 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 Calculated absolute flow in unit selected (Register No. 118) HighWord Upper 16 bit of 32 bit value	-	UnitSel	0.001	R
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 st 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 st part: 00839 2 nd part: 31324 4 th part: 008	-	-	-	R
102	101	Series Number 2 nd part	-	-	-	R
103	102	Series Number 4 th 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 Not all bits mentioned in the enumeration are used for this actuator range. Actuator can't move: Mechanical overload due to blocked valve, etc. Valid for 6 way and 2 way valve	Bit0: No communication to 2-way valve Bit1: - Bit2: - Bit3: Actuator cannot move Bit4: - Bit5: - Bit6: - Bit7: - Bit8: - Bit9: Gear disengaged Bit10: - Bit11: - Bit12: - Bit13: - Bit14: - Bit15: - Bit16: -	-	-	R
106	105	Vmax Sequence 1 Related to Vnom 1)	190...10'000 Default: 10'000	%	0.01	R / W
107	106	Vmax Sequence 2 Related to Vnom 1)	190...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: - 1: Flow control <i>Default: Flow control(1)</i>	-	-	R
118	117	Unit Selection Flow	0: m ³ /s 1: m ³ /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

1) Minimum V'max values may vary, related to Device type

	min V'max [l/h]	min V'max [%]
C615QP-B+BAC	40	19
C615QP-D+BAC	100	23
C615QP-F+BAC	190	19
C620QPT-G+BAC	600	28