Air Water Actuators

Contents

Modbus General Notes

General information	Date	25.03.2019
	Product Name	Air Water Actuator
	Actuator type	..M(C)24A-MOD, ..R24A-MOD, ..V(K)24A-MOD, ..F24A-MOD, ..RF24A-MOD
Modbus RTU	Protocol	Modbus RTU over RS-485
	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
Parameterisation	Tool	ZTH EU

Quick adressing
Actuators support quick addressing via the „Address" and „Adaption" buttons.
For detailed, information please see product datasheet (chapter Service).

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 → **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 = $0001'1010'1100'1000_2$ = $6'856_{10}$
Actual Value = Value * Scaling factor * Unit = 6'856 * 0.01 * m3/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) = $14,551_{10}$ = $0011'1000'1101'0111_2$
Register No. 11 (AbsFlow HighWord) = 19_{10} = $0000'0000'0001'0011_2$

AbsFlow HighWord	AbsFlow LowWord
19	14,551
$0000'0000'0001'0011_2$	$0011'1000'1101'0111_2$

AbsFlow = $0000'0000'0001'0011'0011'1000'1101'0111_2$ = $1,259,735_{10}$ = **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	Command	R / W
4	3	Actuator type	R
5	4	Relative position [%]	R
6	5	Absolute position [°] [mm]	R
7	6	–	–
8	7	–	–
9	8	Sensor value 1 [mV] [Ω] [–] [°C] [°F]	R
10	9	–	–
11	10	–	–
12	11	–	–
13	12	Setpoint analog [%]	R

Service

No.	Address	Register	Access
100	99	Bus termination	R
101	100	Series number 1st part	R
102	101	Series number 2nd part	
103	102	Series number 4th part	
104	103	Firmware version	R
105	104	Malfunction and service information	R
106	105	Min [%]	R / W
107	106	Max [%]	R / W
108	107	Sensor type 1	R / W
109	108	Bus fail position	R / W
110	109	Communication Watchdog	R / W
111	110	–	–
112	111	–	–
113	112	–	–
114	113	–	–
115	114	–	–
116	115	–	–
117	116	–	–
118	117	–	–
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)	0…10000 *Default: 0*	%	0.01	R / W
2	1	Override Control Override setpoint with defined values	0: None 1: Open 2: Close 3: Min 4: Mid 5: Max *Default: None(0)*	–	–	R / W
3	2	Command Initiation of actuator functions for service and test After command is sent, register returns to None(0) With Reset(4) all Malfunction and Service Information (Register No. 105) Information can be reset.	0: None 1: Adaption 2: Test 3: Sync 4: Reset *Default: None(0)*	–	–	R / W
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 The unit depends on the device: [°] for actuators with rotary movement [mm] for actuators with linear movement	0...max angle / stroke	° mm	1 1	R
7	6	–	–	–	–	–
8	7	–	–	–	–	–
9	8	Sensor 1 Value Current value of sensor 1, depending on the setting of the Sensor 1 Type (Register No. 108) [mV] if Sensor 1 Type (Register No. 108) is Active(1) [Ω] if Sensor 1 Type (Register No. 108) is Passive_1K(2) or Passive_20K(3) [0 / 1] if Sensor 1 Type (Register No. 108) is Switch(4) [°C] if Sensor 1 Type (Register No. 108) is PT1000_C(5) or NI1000_C(6) or NTC10K_C(7) [°F] if Sensor 1 Type (Register No. 108) is PT1000_F(8) or NI1000_F(9) or NTC10K_F(10)	0...65'535	mV Ω 0 / 1 °C °F	1 1 0.1 0.1	R
10	9	–	–	–	–	–
11	10	–	–	–	–	–
12	11	–	–	–	–	–
13	12	Setpoint Analog Shows the setoint in % if actuator is control by analog signal	0...10'000	%	0.01	R

Modbus Register Description

No.	Address	Description Comment	Range Enumeration	Unit	Scaling	Access
100	99	Bus Termination Indicates if bus termination (120 Ω) is enabled Bus termination can be set with the configuration tools	0: inactive 1: active *Default: inactive(0)*	–	–	R / W

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 Modus
		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: 302, Version 3.02 for details see Firmware history	–	–	–	R
105	104	Malfunction and Service Information Value is bit-coded. More than one bit can be set to 1 All bits not montioned in the enumeration are not used for this actuator range Mechanical travel increased: The actuator has been moved outside the adapted working range Actuator cannot move: Mechanical overload e.g. blocked actuator, etc. Internal activity: Actuator performs a test run, adaption, etc. Gear disengaged: The gear disengaged button is pressed Bus Watchdog triggered: Timeout for the Bus Watchdog expired	Bit1: Mech travel increased Bit2: Actuator cannot move Bit8: Internal activity Bit9: Gear disengaged Bit10: Bus Watchdog triggered	–	–	R
106	105	Min Min has to be ≤ Max -20%	0...Max -20% *Default: 0*	%	0.01	R / W
107	106	Max Max has to be ≥ Min +20%	Min +20%...100 *Default: 100*	%	0.01	R / W
108	107	Sensor 1 Type If Setpoint Source (Register 119) is analog (Hybrid mode) the sensor type 1 can be set to Active(1) in order to see the Setpoint Analog in mV	0: None 1: Active / Hybrid 2: Passive_1K 3: Passive_20K 4: Switch 5: PT1000_C 6: NI1000_C 7: NTC10K_C 8: PT1000_F 9: NI1000_F 10: NTC10K_F	–	–	R / W
109	108	Bus Fail Position Modbus communication is not monitored as standard. In the event of a breakdown in communication, the actuator retains the current setpoint The bus implementation tracks the Modbus communication. If neither the Setpoint (Register No. 1) nor the Override Control (Register No. 2) is renewed before the Timeout for Bus Watchdog (Register No. 110) expires, the actuator controls to the Bus Fail Position Triggered bus watchdog is indicated in the Malfunction and Service Information (Register No. 105) In Hybrid Mode (SpSource (Register 119) = Analog) bus monitoring is not activated.	0: None / Last setpoint 1: Fast close 2: Fast open 3: Mid position (parameterized) *Default: None(0)*	–	–	R / W
110	109	Timeout for Bus Watchdog in s Time until Bus Fail will be detected. If Bus Watchdog = 0 then deactivated If Bus Fail Position (Register No. 109) different from 0, the Bus Fail Position becomes active after the Timeout for Bus Watchdog is expired	0...3600 *Default: 0* *If Bus Fail Position (Register No. 109) not None(0), then Default: 120*	s	1	R / W

Modbus Register Description

No.	Address	Description Comment	Range Enumeration	Unit	Scaling	Access
111	110	–	–	–	–	–
112	111	–	–	–	–	–
113	112	–	–	–	–	–
114	113	–	–	–	–	–
115	114	–	–	–	–	–
116	115	–	–	–	–	–
117	116	–	–	–	–	–
118	117	–	–	–	–	–
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 *Default: Bus(1)*	–	–	R / W