



## VAV-Compact

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**Modbus General Notes**

<b>General information</b>	Date	25.03.2019
	Product Name	VAV-Compact
	Actuator type	..MV-D3-MOD, LHV24A-D3-MOD
	Protocol	Modbus RTU over RS-485
<b>Modbus RTU</b>	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
<b>Parameterisation</b>	Tool	ZTH EU

**Quick addressing** 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 = 0001'1010'1100'10002 = 6'85610  
 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) = 14,55110 = 0011'1000'1101'01112  
 Register No. 11 (AbsFlow HighWord) = 1910 = 0000'0000'0001'00112

AbsFlow HighWord	AbsFlow LowWord
19	14,551
0000'0000'0001'0011 <sub>2</sub>	0011'1000'1101'0111 <sub>2</sub>

AbsFlow = 0000'0000'0001'0011'0011'1000'1101'0111<sub>2</sub> = 1,259,73510 = **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<sub>2</sub>).



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	Relative volumetric flow [%]	R
	8	7	Absolute volumetric flow [m <sup>3</sup> /h]	R
	9	8	Sensor value 1 [mV] [-]	R
	10	9	–	–
	11	10	Absolute volumetric flow in unit selected	LowWord
	12	11		HighWord
	13	12	Setpoint analog [%]	R

Service	No.	Address	Register	Access
	100	99	Bus termination	R
	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	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	Nominal volumetric flow [m <sup>3</sup> /h]	R
	112	111	–	–
	113	112	Nominal volumetric flow in unit selected	LowWord
	114	113		HighWord
	115	114	–	–
	116	115	–	–
	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)	0...10'000 <i>Default: 0</i>	%	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 <i>Default: None(0)</i>	–	–	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 <i>Default: None(0)</i>	–	–	R / W
4	3	Actuator Type	0: Actuator not connected 1: Air / Water <b>2: VAV / EPIV</b> 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	Relative volumetric flow Relative volumetric flow of Vnom	0...10'000	%	0.01	R
8	7	Absolut volumetric flow	0...Vnom	m <sup>3</sup> /h Pa	1	R
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) [0 / 1] if Sensor 1 Type (Register No. 108) is Switch(4)	0...65'535	mV 0 / 1	1	R
10	9	–	–	–	–	–
11	10	Absolute volumetric flow Absolute flow in unit selected (Register No. 118) LowWord Lower 16 bit of 32 bit value	–	UnitSel	0.001	R
12	11	Absolute volumetric flow Absolute flow in unit selected (Register No. 118) HighWord Upper 16 bit of 32 bit value	–	UnitSel	0.001	R
13	12	Setpoint Analog Shows the setpoint 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 <i>Default: inactive(0)</i>	–	–	R / W
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 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	Vmin Min has to be ≤ Max	0...Vmax <i>Default: 0</i>	%	0.01	R / W
107	106	Vmax Max has to be ≥ Min and > 20%	Vmin...10'000 <i>Default: 10'000</i>	%	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: – 3: – 4: Switch <i>Default: None(0)</i>	–	–	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)	0: None / Last setpoint 1: Fast close 2: Fast open 3: Mid position (parameterized) <i>Default: None(0)</i>	–	–	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. 110) different from 0, the Bus Fail Position becomes active after the Timeout for Bus Watchdog is expired	0...3'600 <i>Default: 0</i> <i>If Bus Fail Position (Register No. 110) not None(0), then Default: 120</i>	s	1	R / W

## Modbus Register Description

No.	Address	Description Comment	Range Enumeration	Unit	Scaling	Access
111	110	Nominal volumetric flow	–	m <sup>3</sup> /h	1	R
112	111	–	–	–	–	–
113	112	Nominal volumetric flow Vnom in unit selected (Register 118) LowWord Lower 16 bit of 32 bit value	–	UnitSel	0.001	R
114	113	Nominal volumetric flow Vnom in unit selected (Register 118) HighWord Upper 16 bit of 32 bit value				
115	114	–	–	–	–	–
116	115	–	–	–	–	–
117	116	Control Mode	0: Position control 1: Flow control	–	–	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: m<sup>3</sup>/h(1)</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: Bus(1)</i>	–	–	R / W