MODBUS MANUAL

327VM

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Contents

GENERAL 2

TECHNICAL DATA & DEFAULT SETTINGS 2

MODBUS REGISTERS 3

OVERVIEW 3

OVERRIDE CONTROL REGISTER (1) 5

COMMAND REGISTER (2) 5

STATUS REGISTER (104) 5

BUS FAIL FUNCTION REGISTER (108) 6

SETPOINT SOURCE REGISTER (122) 6

UNIT REGISTER (201) 6

START UP REGISTER (235) 6

MODBUS COMMUNICATION SETTINGS (568) 7

CLOSING VOLTAGE 2…10 VDC REGISTER (572) 7

STATUS OVERRIDE CONTROL REGISTER (769) 8

GENERAL

TECHNICAL DATA & DEFAULT SETTINGS

Technical data	Protocol	Modbus RTU
	Cable	Cable 1000 mm, 2 x 0,38 mm2 (halogen-free) RS-485, not electrically isolated
	Number of nodes	Max. 128 (4x32)
	Baudrates	1200 / 2400 / 4800 / 9600 / 19200 / 38400 / 76800 / 115200 Bps
	Byte sequence	MSB / LSB
	Byte formats	1 start bit, 8 data bits, 2 stop bits, no parity 1 start bit, 8 data bits, 1 stop bit, even parity 1 start bit, 8 data bits, 1 stop bit, odd parity
	Termination	external (120 Ω)
	Response time	≤ 10 ms + delay
	Delay	Configurable 0...765 ms (3 ms * 0...255)
Default settings	Transmission mode	RTU
	Address	1
	Transfer rate	19200 bps
	Data bits	8
	Parity	Even
	Stop bits	1
	Delay	0ms
	Response time	10ms + delay

MODBUS REGISTERS

OVERVIEW

Register	Name	Memory	Data type	Value range	Read / Write	Description	Default
0	Setpoint	RAM	WORD	0…10000	R / W	Shows / sets Setpoint [%] Value 0 = 0% = Vmin Value 10000 = 100% = Vmax This register is read-only, if register 122 = 0 or 3	-
1	Override control	RAM	WORD	0…8	R / W	Sets override control See “override control register” table	0
2	Command	RAM	WORD	0…5	R / W	Sets specific actuator commands See “command register” table	0
4	Relative position	RAM	WORD	0…10000	R	Shows relative position [%] Value 0 = 0% Value 10000 = 100%	-
5	Absolute position	RAM	WORD	0…9500	R	Shows absolute position [°] Value 0 = 0° Value 9500 = 95°	-
6	Relative flow (VAV) Relative pressure (VAP)	RAM	WORD	0…10000	R	Shows relative flow / pressure [%] Value 10000 = 100% = Vnom / Pnom	-
7	Absolute flow (VAV) Absolute pressure (VAP)	RAM	WORD	0…65535	R	Shows absolute flow / pressure in selected unit See register 201 for selected unit	-
8	Analog input Y	RAM	WORD	0…10000	R	Shows signal value of analog input Y [mV] Value 0 = 0,00VDC Value 10000 = 10,00VDC	-
20	Setpoint absolute	RAM	WORD	Vmin…Vmax (VAV) Pmin…Pmax (VAP)	R / W	Shows / set setpoint in selected unit. The value is limited between Vmin/Pmin and Vmax/Pmax See register 201 for selected unit The register is valid only, if register 122 = 1 or 2	-
103	Software version	EEPROM	WORD	0…65535	R	Shows software version	116
104	Status register	RAM	WORD	0…65535	R	Shows status of the actuator See “status register” table	-
105	Vmin relative (VAV) Pmin relative (VAP)	EEPROM	WORD	0…10000	R / W	Sets Vmin / Pmin value [%] Value 10000 = 100% = Vnom / Pnom	-
106	Vmax relative (VAV) Vmax relative (VAP)	EEPROM	WORD	0…10000	R / W	Sets Vmax / Pmax value [%] Value 10000 = 100% = Vnom / Pnom	-

Register	Name	Memory	Data type	Value range	Read / Write	Description	Default
108	Bus fail function	EEPROM	WORD	0…5	R / W	Sets actuator operation when there is no communication on the bus for 120 seconds See “bus fail function register” table	0
109	Time out for "Bus fail position"	EEPROM	WORD	0…65535	R / W	Delay time for "Bus fail function"	120
120	Vmin absolute (VAV) Pmin absolute (VAP)	EEPROM	WORD	0…65535	R / W	Sets Vmin / Pmin value in selected unit See register 201 for selected unit	-
121	Vmax absolute (VAV) Pmax absolute (VAP)	EEPROM	WORD	0…65535	R / W	Sets Vmax / Pmax value in selected unit See register 201 for selected unit	-
122	Setpoint source and analog output mode	EEPROM	WORD	0…9	R / W	Sets setpoint source and analog output mode. See "setpoint source register" table	0
130	Modbus address	EEPROM	WORD	1…247	R / W	Sets device Modbus address	1
131	Sensor pressure	RAM	WORD	0…65535	R	Shows actual measured pressure Value 10 = 1Pa	-
201	Selected unit	EEPROM	WORD	0…6	R / W	Sets selected unit for airflow or pressure See " unit register" table	1 (VAV) 2 (VAP)
226	Height correction (VAV) Correction value (VAP)	EEPROM	WORD	0…6000	R / W	Height correction for VAV [m] Height & tube length correction for VAP [m]	0
231	Mode configuration	EEPROM	WORD	0…65535	R / W	Sets selected mode 0…10VDC or 2…10VDC and rotation direction See “mode configuration register” table	2…10VDC Inverse
235	Start-up function	EEPROM	WORD	0…3	R / W	Actuator start-up function See "start-up" table"	0 (5Nm) 1 (10Nm)
568	Modbus communication settings	EEPROM	BYTE	0…31	R / W	Sets Modbus communication settings. See “Modbus communication register” table	13
569	Modbus delay setting	EEPROM	BYTE	0…255	R / W	Sets Modbus response delay. The delay time is adjustable in steps of 3ms x 0…255	0
572	Closing voltage mode 2-10VDC	EEPROM	BYTE	5…45	R / W	Sets voltage at which the "Close" command is detected in mode 2…10 VDC	20
769	Override control status	RAM	WORD	0…65535	R	Shows active overrides and certain actuator settings. See “status override control register” table.	-

RAM registers are non-permanent, EEPROM registers are permanent (max. 1 million write cycles).

OVERRIDE CONTROL REGSITER (1)

The “override control register” makes it possible to execute “forced control” functions via the Modbus.

Register	Value	Description
1	0 [1)]	-
	1	Open
	2	Close
	3	Vmin (VAV) / Pmin (VAP)
	4	Vmax (VAV) / Pmax (VAP)
	5	Vbtw (VAV) / Pbtw (VAP)
	6	Fast open
	7	Fast close
	8	Stop

[1)] Default setting

COMMAND REGISTER (2)

The "command register" allows to perform some specific actuator operations via the Modbus.

Register	Value	Description
2	0 [1)]	-
	1	Adaption drive
	2	Test
	3	Reference drive
	4	Controller reset
	5	Reset without reference drive

[1)] Default setting

STATUS REGISTER (104)

The "status register" provides specific information about the state of the actuator / VAV.

Register	Value	Bit value	Description
104	Bit 0	0	Everything ok
		1	EEPROM error checksum 1
	Bit 1	0	Everything ok
		1	EEPROM error checksum 2
	Bit 4	0	Everything ok
		1	The actuator effective position is outside the adapted range. It is necessary to perform an adaption drive first. See the “command register” how to execute an adaption drive.
	Bit 5	0	Normal operation
		1	The actuator is blocked between the mechanical end stops. This bit is not triggered when the actuator “hits” one of the mechanical end stops.
	Bit 6	0	Normal operation
		1	When the measured pressure is lower than 0.5Pa, bit 6 is activated. The air flow rate is too low to measure, the actuator will close the damper blade.
	Bit 7	0	Actuator is stationary
		1	Motor is driving
	Bit 8	0	Normal operation
		1	Actuator is performing a test, reference or adaption drive.
	Bit 9	0	Normal operation
		1	The measured pressure is exceeding the measuring range of the pressure sensor.
	Bit 11	0	Everything ok
		1	Maximum running time actuator has expired.
	Bit 12	0	The actual position of the actuator is somewhere between the mechanical end stops.
		1	The actuator "hits" the mechanical end stop. In case of CCW direction, the damper blade is open. In case of CW direction, the damper blade is closed.
	Bit 13	0	The actual position of the actuator is somewhere between the mechanical end stops.
		1	The actuator "hits" the mechanical end stop. In case of CCW direction, the damper blade is closed. In case of CW direction, the damper blade is open.
	Bit 15	0	Control loop not in dead band
		1	Control loop in dead band

BUS FAIL FUNCTION REGISTER (108)

The "bus fail function register" allows to configure the position of the actuator when there is no communication on the bus for 120 sec. The 120 seconds are adjustable, see register 109.

Register	Value	Description
108	0 [1]	Last setpoint, this function is deactivated in analog control (register 122 = 0).
	1	Closed position
	2	Open position
	3	Operates at Vmin
	4	Operates at Vbtw
	5	Operates at Vmax

[1] Default setting

SETPOINT SOURCE REGISTER (122)

The "setpoint source register" determines the setpoint reference and analog output mode.

Register	Value	Signal input	Feedback signal
122	0 [1]	Analog (0)2...10 VDC	Analog (0)2...10 VDC
	1	Modbus via register 0	Analog (0)2...10 VDC
	2	Modbus via register 0	Value from register 10
	3	Analog (0)2...10 VDC	Value from register 10

[1] Default setting

UNIT REGISTER (201)

The "unit register" allows to select a desired unit.

Register	Value	Description
201	0	l/s (VAV)
	1 [1]	m^3/h (VAV)
	2 [1]	Pa (VAP)
	3	WC (VAP)
	4	° (Open loop)
	5	Cfm (VAV)

[1] Default setting

MODE CONFIGURATION REGISTER (231)

The "mode configuration registers" allows to configure the desired mode (Y = 0...10 or 2...10 VDC), rotation direction and the function of the feedback signal U.

Register	Value	Bit value	Description
231	Bit 0	0	0...10 VDC
		1 [1]	2...10 VDC
	Bit 1	0	Normal rotation to open (CW)
		1 [1]	Inverse rotation to open (CCW)
	Bit 4	0 [1]	Feedback signal: actual measured airflow (VAV) or pressure (VAP)
		1	Feedback signal: Actual angle (position)

[1] Default setting

START-UP REGISTER (235)

The "start-up register" allows to set specific commands during actuator startup (power on).

Register	Value	Description
235	0 [1]	Normal operation (operates according to the desired setpoint, analog or Modbus)
	1	Reference drive open
	2	Reference drive close
	3 [2]	Adaption drive

[1] Default setting 5Nm
[2] Default setting 10Nm

MODBUS COMMUNICATION SETTINGS (568)

Register	Display value	Register Value	Baudrate	Parity	Stop bits
568	1	0	1200	none	2
	2	1	1200	even	1
	3	2	1200	odd	1
	4	3	2400	none	2
	5	4	2400	even	1
	6	5	2400	odd	1
	7	6	4800	none	2
	8	7	4800	even	1
	9	8	4800	odd	1
	10	9	9600	none	2
	11	10	9600	even	1
	12	11	9600	odd	1
	13	12	19200	none	2
	14 [1)]	13	19200	even	1
	15	14	19200	odd	1
	16	15	38400	none	2
	17	16	38400	even	1
	18	17	38400	odd	1
	19 [2)]	18	1200	none	1
	20 [2)]	19	2400	none	1
	21 [2)]	20	4800	none	1
	22 [2)]	21	9600	none	1
	23 [2)]	22	19200	none	1
	24 [2)]	23	38400	none	1
	25 [2)]	24	76800	none	1
	26 [2)]	25	115200	none	1
	27	26	76800	none	2
	28	27	76800	even	1
	29	28	76800	odd	1
	30	29	115200	none	2
	31	30	115200	even	1
	32	31	115200	odd	1

[1)] Default setting
[2)] not Modbus standard, only Gruner.

CLOSING VOLTAGE 2…10 VDC REGISTER (572)

The "closing voltage 2…10 VDC register" can be used to configure the desired range at which the "Close" command is detected in mode 2...10 VDC.

Register	Value	Description
572	5	Close command set to 0.2 VDC
	10	Close command set to 0.4 VDC
	15	Close command set to 0.6 VDC
	20 [1)]	Close command set to 0.8 VDC
	25	Close command set to 1.0 VDC
	30	Close command set to 1.2 VDC
	35	Close command set to 1.4 VDC
	40	Close command set to 1.6 VDC
	45	Close command set to 1.8 VDC

[1)] Default setting

STATUS OVERRIDE CONTROL REGISTER (769)

The "status override control register" allows monitoring of active overrides and certain actuator settings.

Register	Value	Bit value	Description
769	Bit 0	0	0 = 0…10 VDC mode selected
		1	1 = 2…10 VDC mode selected
	Bit 1	0	0 = Setpoint from analog input Y
		1	1 = Setpoint from Modbus
	Bit 2	0	0 = Override control “Close” not active
		1	1 = Override control “Close” active
	Bit 3	0	0 = Override control “Open” not active
		1	1 = Override control “Open” active
	Bit 4	0	0 = Override control “Between” not active
		1	1 = Override control “Between” active
	Bit 5	0	0 = Override control “Vmax” not active
		1	1 = Override control “Vmax” active
	Bit 6	0	0 = Normal rotation direction (CW)
		1	1 = Inverse rotation direction (CCW)
	Bit 7	0	0 = Override control “Stop” not active
		1	1 = Override control “Stop” active
	Bit 8	0	0 = Override control “Vmin” not active
		1	1 = Override control “Vmin” active
	Bit 9	0	0 = Override control “Between” not active
		1	1 = Override control “Between” active due to negative rectified half-wave connected to analog input Y.
	Bit 10	0	0 = Override control “Open” not active
		1	1 = Override control “Open” active due to positive rectified half-wave connected to analog input Y.
	Bit 11	0	0 = Override control “Vmax” not active
		1	1 = Override control “Vmax” active due to full-wave or 24VDC connected to analog input Y.
	Bit 12	0	0 = Override control “Vmin” not active
		1	1 = Override control “Vmin” active due to analog input Y disconnected or analog signal 0(2)VDC at analog input Y.
	Bit 13	0	0 = Analog input not equal to 10VDC
		1	1 = Analog input equal to 10VDC
	Bit 14	0	0 = Override control “Close” not active
		1	1 = Override control “Close” active due to analog input Y connected to ground in mode 2…10VDC.