GRUNER
Schalten und Bewegen

Technical data sheet

227VM-024-05-MB

Rotary actuator for pressure and volumetric flow control

Description

Rotary actuator for adjusting air dampers for pressure and volumetric flow control in HVAC installations

- **Running time** **100 s / 90°**
- **Torque** **5 Nm**
- **Nominal voltage** **24 VAC/DC**
- **Control** **(0)2...10 VDC**
- **Sensor** **250 Pa (dynamic)**
- **Damper size** **up to approx. 1 m²**
- **Communication** **Modbus RTU**
- **Shaft coupling** **clamp**
  ◊ 8-15 mm / Ø 8-20 mm

Technical data

Electrical data		
	Nominal voltage	24 VAC/DC, 50/60 Hz
	Nominal voltage range	19...29 VAC/DC
	Power consumption motor (motion)	2,5 W
	Power consumption standby (end position)	1,0 W
	Wire sizing	4,0 VA
	Control	Modbus RTU / analog (0)2...10 VDC / Ri > (100 kΩ) 50 kΩ (0)4...20 mA / Rext. = 500 Ω
	Feedback signal	Modbus RTU / analog (0)2...10 VDC, max. 0,5 mA
	Priority control	closed / Vmin / Vbtw / Vmax / open
	Connection motor	cable 1000 mm, 4 x 0,75 mm² (halogen free)
Modbus		
	Protocol	Modbus RTU
	Medium	cable 1000 mm, 2 x 0,38 mm² (halogen free) RS-485, not electrically isolated
	Number of nodes	max. 128
	Baud rates	1200 / 2400 / 4800 / 9600 / 19200 / 38400 Bd
	Byte sequence	MSB / LSB
	Byte format	1 start bit, 8 data bits, 2 stop bits, none 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
	Standard parameter	19200 Bd 1 start bit, 8 data bits, 1 stop bit, even parity delay 0 ms
Sensor		
	Calibration	250 Pa, height adjustment necessary (300 Pa = 1,2 in H2O), dynamic measurement principle

Technical data

Sensor		
	Measuring range	0...300 Pa
	Burst pressure	1 bar
	Nominal value	damper manufacturer specific value Vmin / Vbtw / Vmax based on Vnom
	Media	air 0...70°C / 5...95% r.H., non condensing
	Mounting position	independent of position
	Connection	Ultem 2200 / tube clip Ø 4-6 mm
Functional data		
	Torque	> 5 Nm
	Damper size	up to approx. 1 m²
	Synchronised speed	±5%
	Direction of rotation	adjustable
	Manual override	gearing latch disengaged with pushbutton, self-resetting
	Angle of rotation	0°...max. 95° can be limited with adjustable mechanical end stops
	Running time	< 100 s / 90° (adjustable 20...120 s / 90°)
	Sound power level	< 35 dB(A)
	Shaft coupling	clamp ◊ 8-15 mm / Ø 8-20 mm
	Position indication	mechanical with pointer
	Service life	> 100 000 cycles (0°...95°...0°) > 1 500 000 partial cycles (max. ±5°)
Safety		
	Protection class	III (safety extra-low voltage)
	Degree of protection	IP 54 (cable downwards, tube clip plugged)
	EMC	CE (2014/30/EU)
	LVD	CE (2014/35/EU)
	RoHS	CE (2011/65/EU - 2015/863/EU - 2017/2102/EU)
	Mode of operation	Typ 1 (EN 60730-1)
	Rated impulse voltage	0,5 kV (EN 60730-1)
	Control pollution degree	3 (EN 60730-1)
	Ambient temperature normal operation	0°C...+50°C
	Storage temperature	-20°C...+80°C
	Ambient humidity	5...95% r.H., non condensing (EN 60730-1)
	Maintenance	maintenance free
Dimensions / Weight		
	Dimensions	117 x 67 x 66 mm
	Weight	500 g

Operating mode / Properties

Operating mode

Connect power supply to wire 1+2 and a reference signal Y to wire 3 in range of (0)2...10 VDC, actuator regulates to its specified setpoint. The actual flow in % of Vnom is provided as a feedback signal U on wire 4 for other actuators.

CAV modes / override controls:
-AC*/DC signal wire 3
-Modbus RTU wire 5/6

The actuator is overload-proof, requires no limit switches and automatically stops when the end stop is reached.

Direct mounting

Simple direct mounting on the damper shaft with a clamp, protection against rotating with enclosed anti-rotation lock or rather at intended attachment points.

Manual override

Manual override with self-resetting pushbutton possible (the gear is disengaged as long as the button is pressed).

Edit

The selector allows the changing of values. The position of the arrow shows the value set. The changes are displayed as soon as the selector is moved ±10° from the position.

Flow / Unit

Setting the desired actual volume flow unit in m³/h and l/s.

Vmin

Adjust the desired flow Vmin (setpoint Y = 0 / 2 VDC).

Vmax

Adjust the desired flow Vmax (setpoint Y = 10 VDC).

Diag

Diagnostic menu:
off - diagnostic mode is off
on - diagnostic mode is on, motor off
oP - open the damper
cL - close the damper
Lo - activate Vmin
Hi - activate Vmax
Adp - adaption drive
123 - software version

Mode

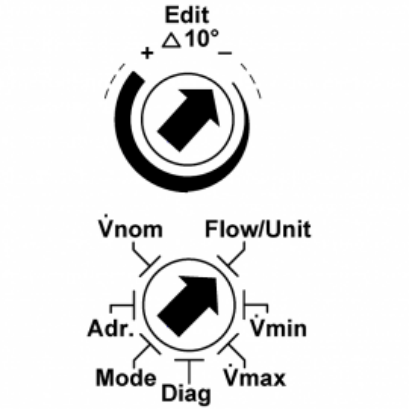
Setting the direction of rotation:
0-n...0-10 VDC normal
2-n...2-10 VDC normal
0-i ...0-10 VDC invers
2-i ...2-10 VDC invers

Adr

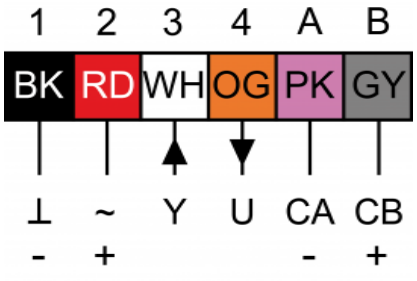
Setting the address of the Modbus (1...247) and Modbus parameter.

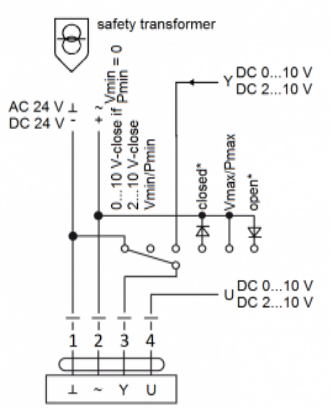
Vnom

Setting the nominal volumetric flow depending on the VAV-box.



Connection / Safety remarks

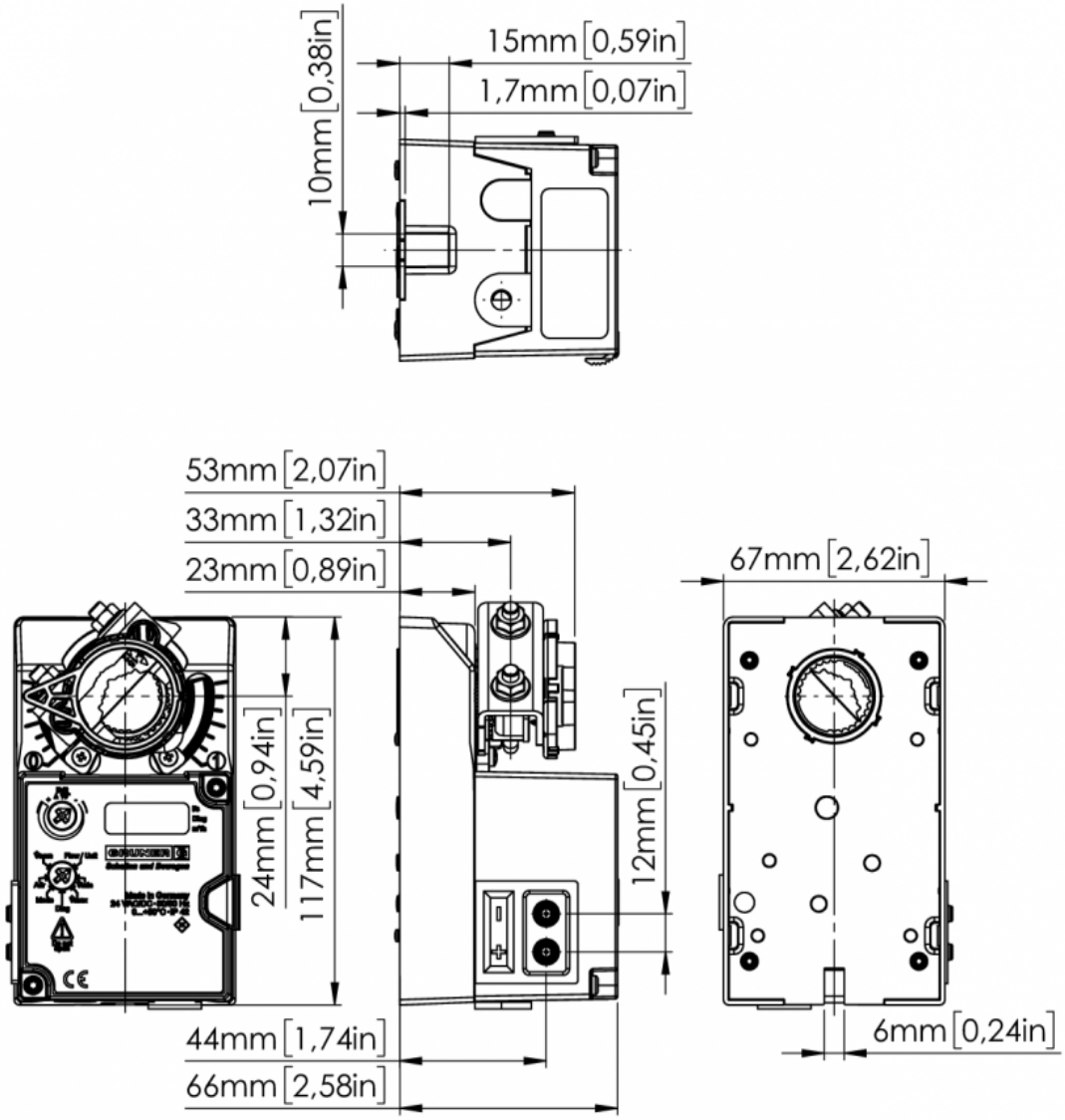




Safety remarks

-Connect via safety isolation transformer!
-The device is not allowed to be used outside the specified field of application, especially in airplanes.
-It may only be installed by suitably trained personnel. Any legal regulations or regulations issued by authorities must be observed during assembly.
-The device may only be opened at the manufacturer´s site.
-The device is not allowed to be disposed of as household refuse. All locally valid regulations and requirements must be observed.
-When calculating the required torque, the specifications supplied by the damper manufacturer´s (cross-section, design, installation site), and the air flow conditions must be observed.

Technical drawing



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Modbus register

No.	Register	Memory
0	**Setpoint 0…100.00 [%]**	RAM
1	**Override control**	RAM
2	**Command**	RAM
3	Actuator type	EEPROM
4	Relative position 0…100.00 [%]	RAM
5	Absolute position 0…650.00 [°][mm]	RAM
6	Relative value 0…100.00 [%]	RAM
7	Absolute value 0…65535 [m³/h][l/s][Pa]	RAM
10	**Feedback signal 0…10000 [mV]**	RAM
103	Software version	EEPROM
105	**Min. value 0…100.00 [%]**	EEPROM
106	**Max. value 0…100.00 [%]**	EEPROM
108	**Bus fail function**	EEPROM
109	**Timeout 0…65535 [s]**	EEPROM
120	**Min. value 0…65535 [m³/h][l/s][Pa]**	EEPROM
121	**Max. value 0…65535 [m³/h][l/s][Pa]**	EEPROM
122	**Interface mode**	EEPROM
130	**Address 1 - 247**	EEPROM
200	**Nominal value 0…300.00 [Pa]**	EEPROM
201	**Unit**	EEPROM
551	**Mode**	EEPROM
568	**Modbus settings**	EEPROM
569	**Modbus response time**	EEPROM

- Registers in bold can be written
- RAM registers are non-permanent
- EEPROM registers are permanent (max. 1 Mio. write cycles)

Register 1:

Override control	
0	-
1	Open
2	Close
3	Min
4	Max

Register 2:

Command	
0	-
1	Adaption drive
2	-
3	-
4	Controller reset

Modbus register

Register 3:

Actuator type	
0	No actuator
1	HVAC / water actuator
2	VAV actuator
3	Fire protection actuator
4	GUAC VAV
5	GUAC CM
6	GT

Register 108:

Bus fail function*		
0	Last setpoint (function deactivated in analog control)	
1	Close by bus timeout	timeout >120s (default setting)
2	Open by bus timeout	
3	Vmin by bus timeout	
4	Vbtw by bus timeout	
5	Vmax by bus timeout	

*retriggered by any read/write command to actuator´s address

Register 122:

Interface mode		
Value	**Signal input**	**Feedback signal**
0	Analog (0)2…10 V	(0)2…10 V
1	Modbus via register 0	(0)2…10 V
2	Modbus via register 0	Register 10
3	Analog (0)2…10 V	Register 10

Register 201:

Unit	
0	[l/s]
1	[m^3/h]
2	[Pa]
3	[in H_2O]
4	[°]
5	[mm]

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Modbus register

Register 551:

Mode	
Bit	**Function**
0	1 = 2-10V
1	1 = Override control Modbus
2	1 = Override control close
3	1 = Override control open
4	1 = Override control Vbtw
5	1 = Override control Vmax
6	1 = option reversal activ (change direction of rotation)
7	1 = Motor off
8	1 = Override control Vmin

Register 568:

Modbus parameter				
Display	**Value**	**Baudrate**	**Parity**	**Stop bits**
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*

1) default setting

2) not Modbus standard, only Gruner

Register 569: **Repsonse time:** 10 ms + "delay"

"Delay": 3 ms x 0...255

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