327 VAV Compact

Compact controller for
pressure and volumetric air flow control

- Pressure senor, controller and damper actuator in one
- Sensor signal conversion
- Parametrization via service connector

Short description

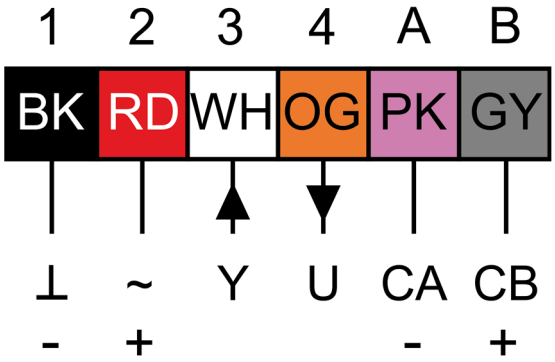
Application	The compact VAV controller of 327 series is used for pressure and volumetric air flow control of VAV dampers in HVAC installations.
Sensor	The differential pressure sensor is available as dynamic version (500|1500 Pa) or static version (400|600|1000 Pa).
Actuator	There are three different gearboxes available (5|10|15 Nm).
Control function	Pressure, volumetric air flow or „Open-Loop“ (continuous control)
Volumetric air flow control	Target of value (min…max) via analogue setpoint value or digital communication protocol (for example BMS).
Building management system	Modbus-System for example with itaMAX system
Bus operation	Controller is with Modbus RTU protocol available. The device get a setpoint via system and communicate the actual status. Different hybrid kinds possible.
Parametrization	Settings via Service connector possible.
Operating and service devices	Setting tool GUIV3-M , PC interface GUIV3-S + setting software WIN-VAV2-Bundle
Electrical connection	See electrical installation
Sales, mounting & setting	The controllers will be mounted by the VAV manufacturer (OEM), the application will be preset and calibrated accordingly. Therefore the 327 VAV is sold exclusively to VAV manufacturers (OEM).

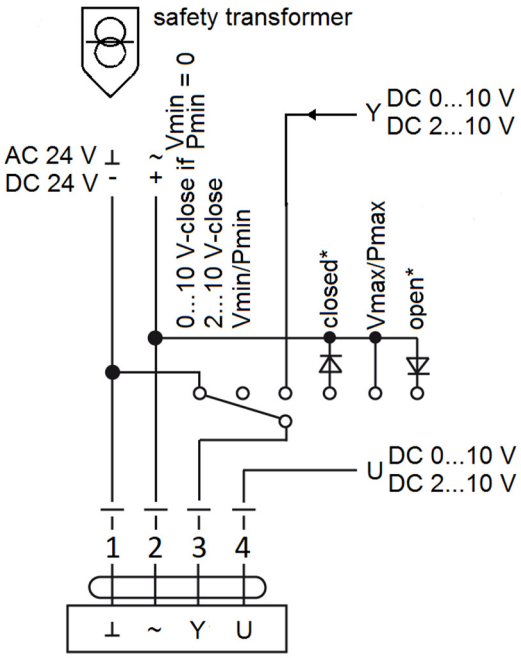
Safety notes

- Connect via safety isolation transformer!
- The device is not allowed to be used outside the specified filed of application, especially in airplanes.
- The device may only be installed by suitably trained personnel. Any legal regulations o 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 (cross-section, construction, place of installation) and the ventilation conditions must be observed.

Electrical installation

No.	Designation	Wire colour	Function
1	-	black	Power supply 24 VAC/DC
2	+	red	
3	Y	white	Setpoint signal 0-10 VDC
4	U	orange	Feedback signal 0-10 VDC
A	CA -	pink	Modbus RTU Connection (RS485)
B	CB +	grey	



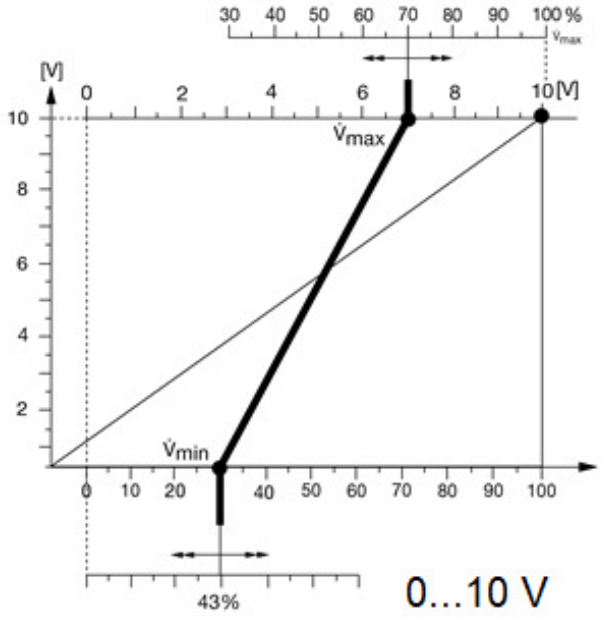


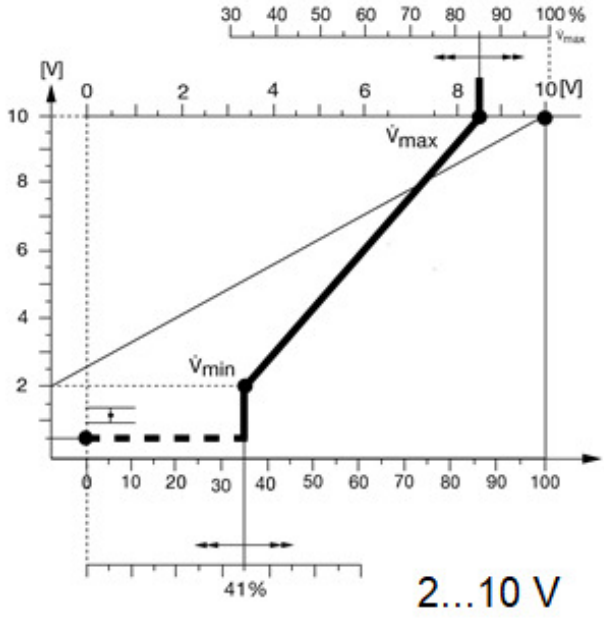
Technical data

Electrical data	Nominal voltage	24 V AC/DC, 50/60 Hz
	Operating range	19…29 V AC/DC
	Power consumption motor	< 3,0 W
	Power consumption standby	< 1,0 W
	Wire sizing	< 5,0 VA
	Control	(0)2…10 VDC / Ri > (100 kΩ) 50 kΩ (0)4…20 mA / Rext. = 500 Ω
	Feedback signal	(0)2…10 VDC, max. 5 mA
	Priority control	close / Vmin / Vbtw / Vmax / open / stop
	Connection motor	cable 1000 mm, 4 x 0,75 mm² (halogen free)
	Connection GUIV	via service plug
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 / 76800 / 115200 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, 0 ms delay
Sensor	Sensor	differential pressure sensor dynamic version (500|1500 Pa) static version (400 | 600 | 1000 Pa)
	Burst pressure	1 bar
	Nominal value	damper manufacturer specific value Vmin / Vbtw / Vmax based on Vnom
	Media	air -40°C…85°C / 5…95% r.H., non condensing
	Mounting position	independent of position
	Connection	PA, glas, LCPT (dynamic version) Tygon-ST (R-3607), PA66 GF25 V0 (static version) tube clip Ø 4-6 mm

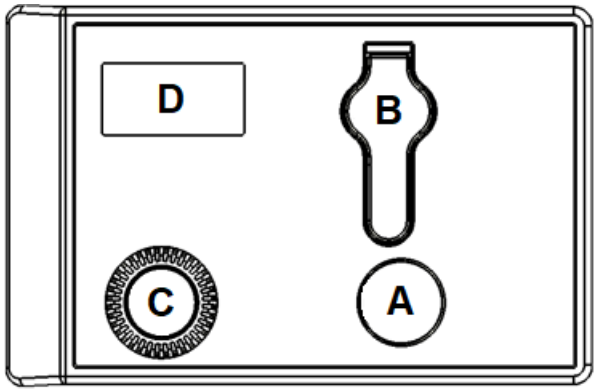
Functional data	Torque	5 | 10 | 15 Nm
	Synchronized speed	±5%
	Direction of rotation	adjustable
	Manual override	gearing latch disengaged with pushbutton, lockable
	Angle of rotation	0°…max. 95° can be limited with adjustable mechanical end stops
	Running time	5 Nm version < 100 s / 90° (adjustable 20...120 s / 90°) 10 & 15 Nm Version < 150 s / 90° (adjustable 70...420 s / 90°)
	Sound power level	< 35 dB(A)
	Shaft coupling	universal clamp or form fit
	Position indication	mechanical with pointer
	Service life	> 100 000 cycles (0°…95°…0°) > 1 500 000 cycles (max. ±5°)
Safety	Protection class	III (safety extra-low voltage)
	Degree of protection	IP 54 (cable downwards, tube clip connected)
	EMC	CE (2014/30/EU)
	LVD	CE (2014/35/EU)
	RoHS	CE (2011/65/EU – 2015/863/EU – 2017/2101/EU)
	Mode of operation	Type 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	155 x 67 x 66 mm
	Weight	approx. 500 g

Control function





Display

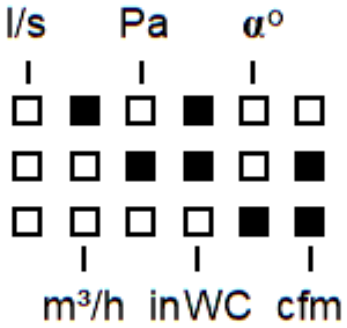


LED button (A)
LED off - no power supply
LED on - actuator is on position
LED blinks - actuator drives on position, hasn´t reached his desired values

Service connector (B)
The service connector serves in combination with GUIV, for parameterization and diagnostic of the controller.

Value selector (C)
The value selector serves for setting single values, that are shown in the display.

Display (D)
The backlighted display serves for setting different values directly on the actuator without additional setting tools.
The unit matrix can read out on label / can check with desired values in display.



l/s (Volumetric)	=	No square is shown in display
m³/h (Volumetric)	=	Only upper square is shown in display
Pa (Pressure)	=	Only middle square is shown in display
inWC (	=	Upper & middle square is shown in display
Winkel	=	Only lower square is shown in display
Cfm	=	Middle & lower square is shown in display

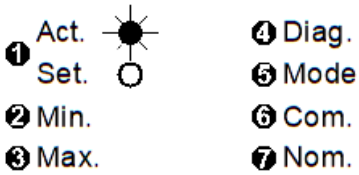
Operation 327V

Push LED button (< 3sec) start reference drive.
Keep press LED button (> 3sec) start adaption drive can edit the menu point.

Operation 327VM

Push LED button (< 3sec) can select the next menu point.
Keep press LED button (> 3sec) can edit the menu point.
Push LED button after changing required value.

Menu points 327VM:



1.Act / Set

Shows actual value / setpoint (override function).

2.Min

Adjust the desired min value (setpoint Y = 0 / 2 V DC).

3.Max

Adjust the desired max value (setpoint Y = 10 V DC).

4.Diag

Diagnostic menu:
y/u – shows setpoint / feedback signal
oP – open the damper
cL – close the damper
Hi – activates max. value
Lo – activates min. value
bE – activates between value
St – Diagnose mode is on, motor off
Adp – adaption drive (only 15 Nm or Modbus version)
123 - Software Version

5.Mode

Analogue control:
0An (0-10 VDC | normal direction of rotation)
2An (2-10 VDC | normal direction of rotation)

6.COM

Setting the address of the Modbus (1...247) and communication parameters (if Modbus version).

7.Nom

Shows & setting the nominal value depending on the VAV-Box
(setting only by volumetric air flow control possible).

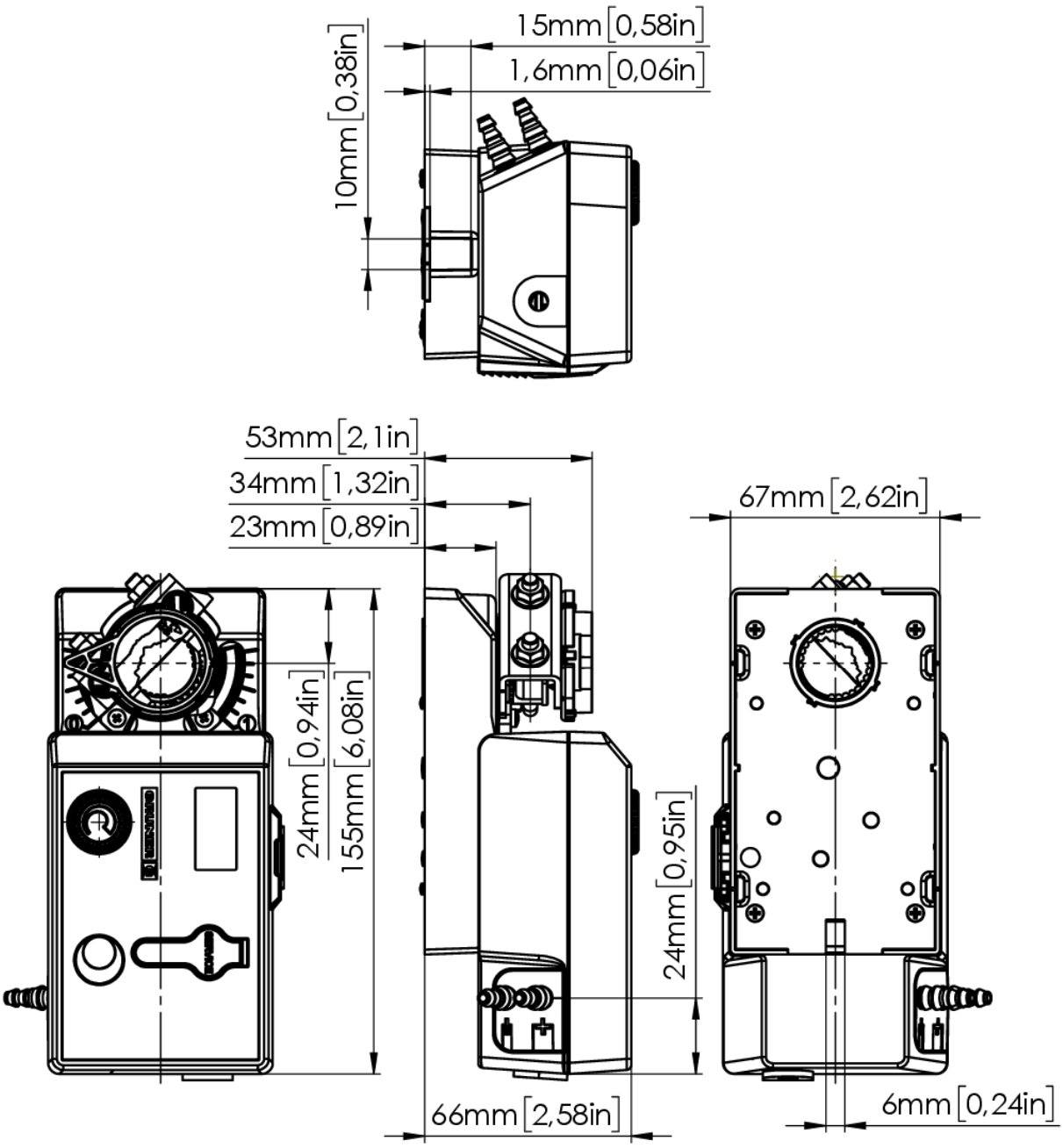
Settings

327 VAV controller could set directly on display.
All 327 VAV controller could communicate via service connector with setting tool GUIV3-M or with setting software WIN-VAV2.
GUIV3-S is used as interface for setting software WIN-VAV2.

Accessories

GUIV3-M – service connector + handheld tool GUIV3-M
WIN-VAV2-Bundle – service connector + PC interface GUIV3-S + setting software WIN-VAV2.

Technical drawing



How to order

Basic type		
327	-	Controller
V	-	Volumetric air flow control
M	-	Manually parameterization via display
Z	-	Flange plate

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Supply voltage		
024	-	24VAC/DC supply voltage

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Torque		
05	-	> 5 Nm torque
10	-	> 10 Nm torque
15	-	> 15 Nm torque

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Sensor		
	-	Pressure sensor dynamic with 500 Pa measurement range (no extra code / standard)
DD15	-	Pressure sensor dynamic with 1500 Pa measurement range
DS4	-	Pressure sensor static with 400 Pa measurement range
DS6	-	Pressure sensor static with 600 Pa measurement range
DS10	-	Pressure sensor static with 1000 Pa measurement range

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Protocol		
MB	-	Modbus RTU Protocol

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Shaft coupling		
RE20	-	Universal clamp with 20mm diameter maximum wave cross section
8E08	-	Form fit insert 8x8 mm
8E10	-	Form fit insert 10x10 mm
8E12	-	Form fit insert 12x12 mm

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Configuration		
C0	-	Setpoint 2…10 VDC
C1	-	Setpoint 0…10 VDC
C2	-	Setpoint 4…20 mA
C3	-	Setpoint 2…20 mA
Cxx0	-	Direction of rotation right
Cxx1	-	Direction of rotation left
Cx0	-	Feedbacksignal like setpoint
CCOL	-	Control **O**pen **L**oop
CCPC	-	**P**ressure **c**ontrol

Example:

327VMZ-024-05-MB/RE20

Modbus register list

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 [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
5	Between
6	Fast open
7	Fast close
8	Stop

Register 2:

Command	
0	-
1	Adaptions drive
2	-
3	Reference drive
4	Controller reset

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]
6	[cfm]

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*
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

Modbus parameter				
Display	**Value**	**Baudrate**	**Parity**	**Stop bits**
30	29	115200	none	2
31	30	115200	even	1
32	31	115200	odd	1

1) default setting

2) not Modbus standard, only Gruner

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

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