VARd

Installation - Commissioning - Maintenance

20111011

Contents

Swegon

Installation - Wiring

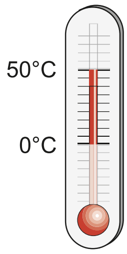


Figure 1. Permitted ambient temperature.

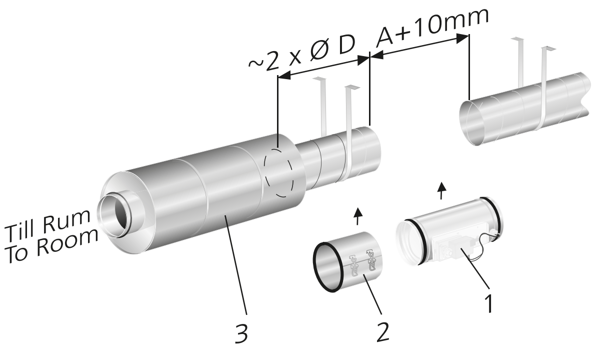


Figure 2. Variable-flow commissioning damper, VAR (1) with FSR fixing clamp (2) and sound attenuator (3).

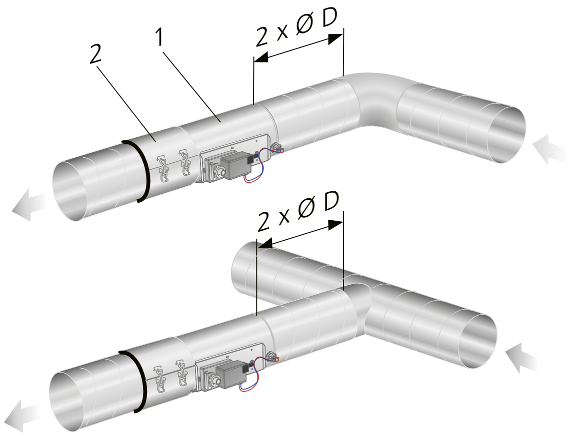


Figure 3. Variable-flow commissioning damper, VAR (1) with FSR fixing clamp (2).

If the sound attenuator is equipped with a sound baffle or centre body, it should be installed at a distance 2 x the duct diameter (ØD) upstream or downstream of the VAR. This applies to both supply air and extract air.

Installation dimensions

Size	A	Size	A
100	472	250	522
125	472	315	552
160	472	400	684
200	472	500	810

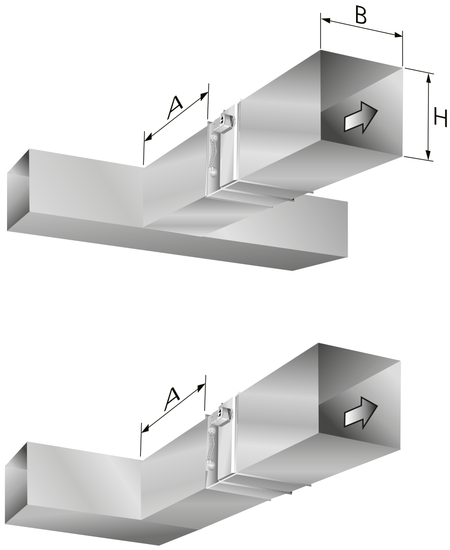


Figure 4. Installation demands a length of straight duct A > 2 x B
1. VAR Variable-flow commissioning damper

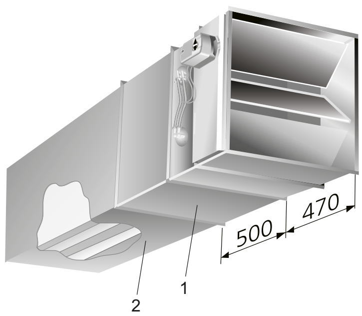


Figure 5. Installation with a length of straight duct applies to both the supply air and the extract air. The figure shows the extract air variant. In an arrangement for supply air, the length of straight duct should be 500 mm downstream of the VAR. 1 = A ≥500 mm length of straight duct. 2 = Sound attenuator with sound baffles

Lengths of straight duct upstream of the VAR for rectangular ducts

Type of obstruction	For m_2 = 5%	For m_2 = 10%
One 90° bend	3 x B	2 x B
T piece	3 x B	2 x B
Baffle-type sound attenuator	3 x t	2 x t

t = Thickness of the baffle

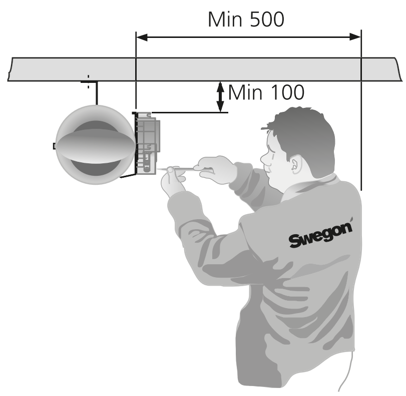


Figure 6. Open space for installation

Electrical data

VAR 1 (Belimo compact)

Supply voltage	24 V AC ±20%, 50-60 Hz
Supply voltage	24 V DC ±10%
Controller and motor	6 VA
Input 3, resistance	100 kOhm
Input 3, control signal	0-10 alt. 2-10 V DC
Output 5, true value	2-10 V DC max. 0.6 mA
Ambient air temperature, operation	0 °C - +50 °C

VAR 2 (Belimo Universal)

Supply voltage	24 V AC ±20%, 50-60 Hz
Supply voltage	24 V DC ±10%
Controller and motor	9.5 VA
Input 3, resistance	100 kOhm
Input 3, control signal	0-10 alt. 2-10 V DC
Output 5, true value	2-10 V DC max. 0.6 mA
Ambient air temperature, operation	0 °C - +50 °C

VAR 4 (Siemens)

Supply voltage	24 V AC ±20%, 50-60 Hz
Controller and motor	6 VA
Input YC, resistance	100 kOhm
Input YC, control signal	0-10 V DC
Input YC if DC = -1.5 to -0.2 V closes the damper	
Input YC, limitations, max.	11 V DC
Output UC, true value	0-10V DC max 1 mA
Ambient air temperature, operation	0 °C - +50 °C

Controller configuration

VAR 1 = Belimo LMV-D3-MP SWN, NMV-D3-MP SWN
VAR 2 = Belimo VRD 3 SWN
VAR 4 = Siemens GLB181.1E/3

Wiring diagrams

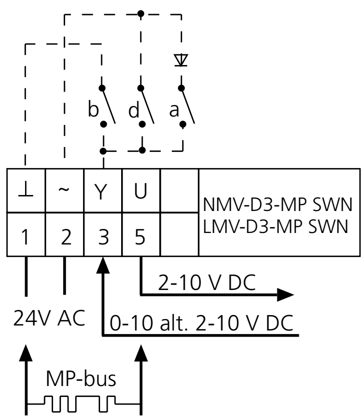


Figure 7. Wiring diagram for VAR 1.
Colour codes: 1 = Black, 2 = Red, 3 and 5 = White
Insulate any conductors not in use.

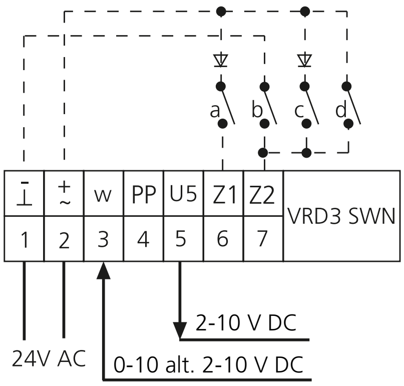


Figure 8. Wiring diagram for VAR 2.

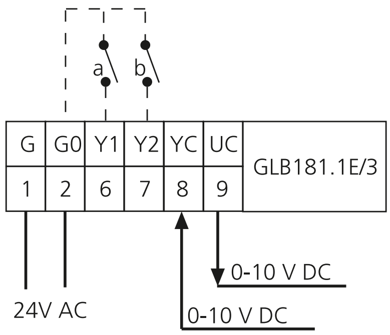


Figure 9. Wiring diagram for VAR 4.
Colour codes: 1 = Red, 2 = Black, 8 = grey, 9 = Pink
Insulate any conductors not in use.

Key to Figures 7-9.
a = fully open damper
b = fully closed damper
c = preset min. airflow
d = preset max. airflow

Important!
It is important to connect system ground correctly. On the Belimo products system ground is on wiring terminal (conductor) 1 and on the Siemens products it is on terminal (conductor) 2. For all of these, the neutral conductor has black insulation.

Wiring example

If the VAR is used as a constant-flow commissioning damper, only 24 V AC current should be connected to the controller. A number of different wiring examples with various types of control are shown on the following pages.

Room thermostat

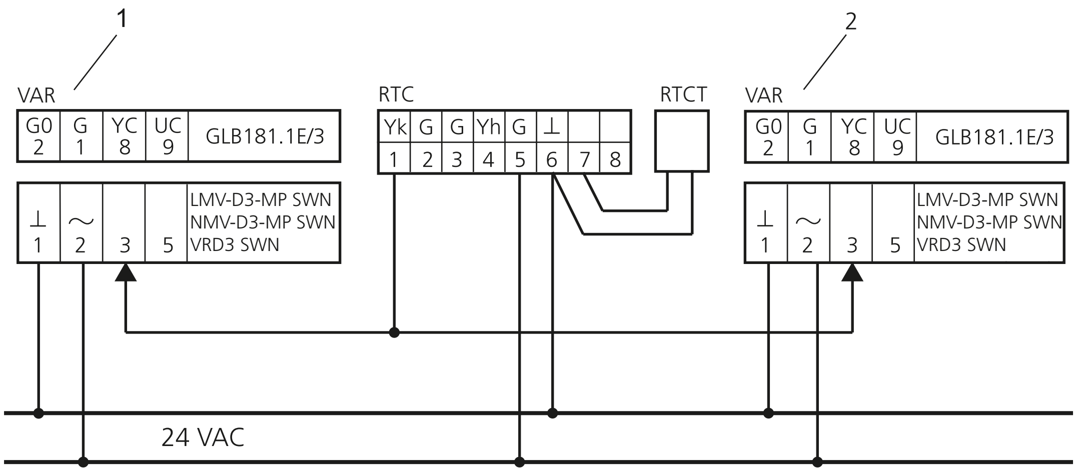


Figure 10. The diagram shows how to wire the VART room thermostat with simultaneous control of the extract air. The figure also shows an alternative with RTCT duct temperature sensor.
1 = VAR Supply air.
2 = VAR Extract air.

CO_2 and temperature control

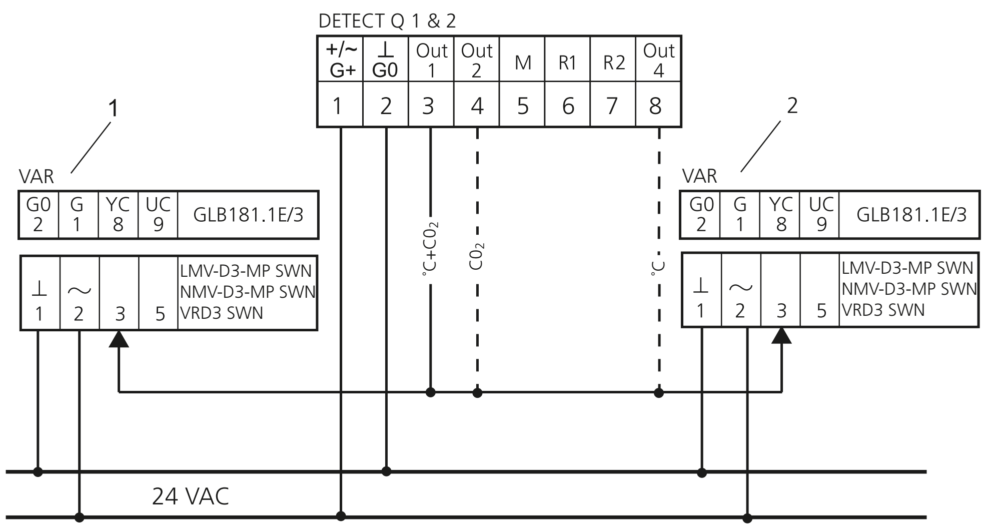


Figure 11. The diagram shows how to wire the CO_2 sensor with combined DETECT Q temperature control and simultaneous control of the extract air.
1 = VAR Supply air.
2 = VAR Extract air.

Two-flow control with presence detector

The diagram shows how to wire the DETECT O presence detector with simultaneous control of the extract air. Two-flow control, min. or max. airflow.

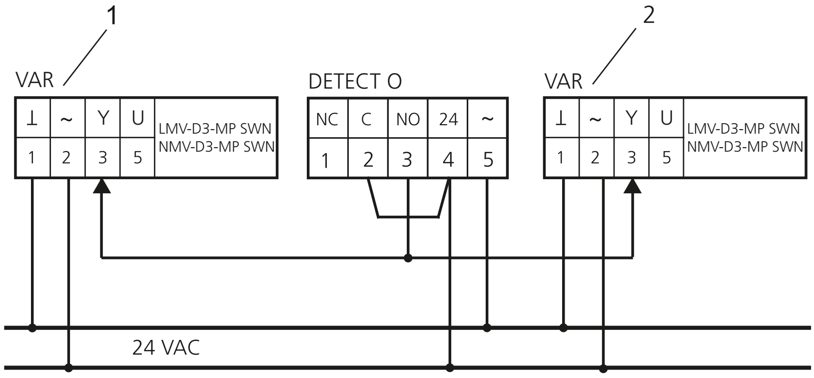
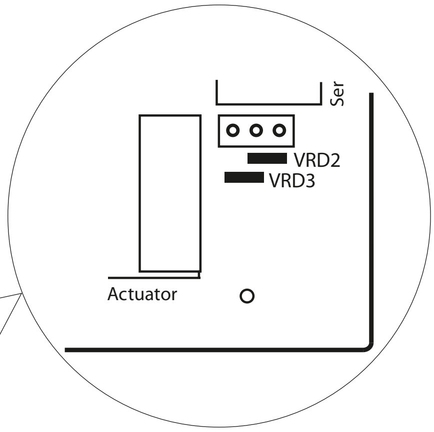


Figure 12. Wiring diagram, VAR 1 (Belimo Compact).
1 = VAR Supply air.
2 = VAR Extract air.



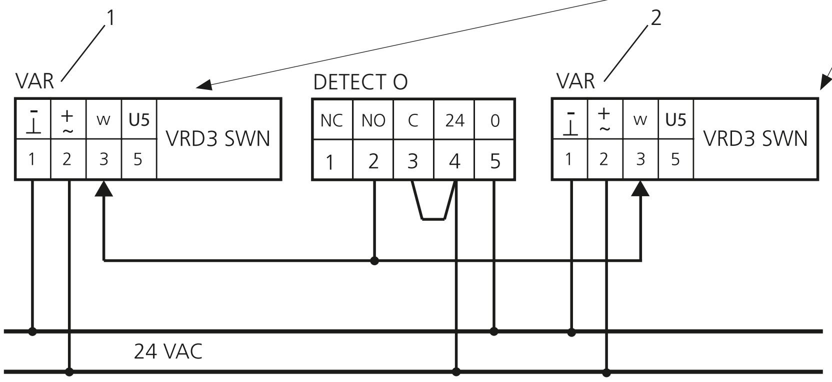


Figure 13b. Jumper configuration, VAR 2 (Belimo Universal).
VRD2 = DETECT O controls to fully open damper
VRD3 = DETECT O controls to preset flow for V-max.

Figure 13a. Wiring diagram, VAR 2 (Belimo Universal).
1 = VAR Supply air.
2 = VAR Extract air.

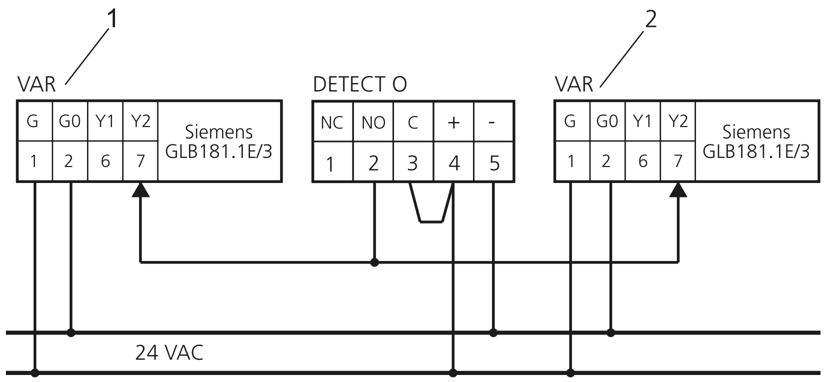
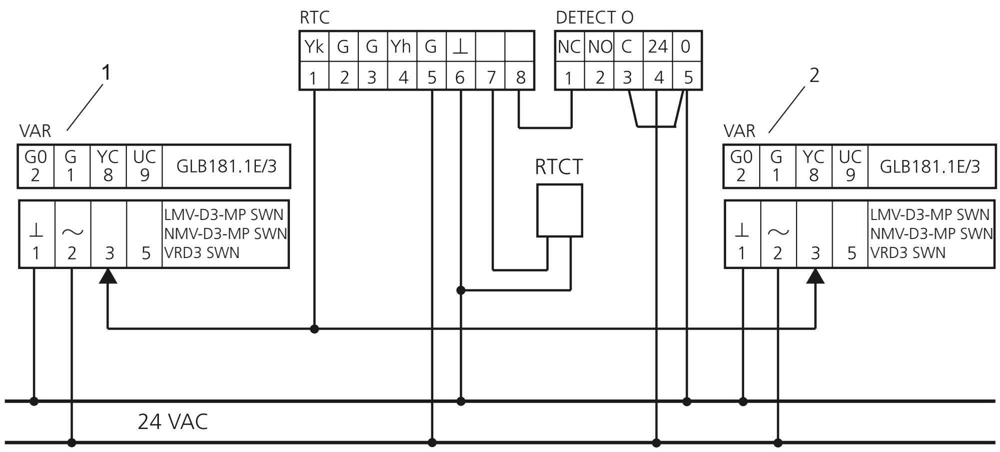


Figure 14. Wiring diagram, VAR 4 (Siemens).
1 = VAR Supply air.
2 = VAR Extract air.

VAV regulation with room thermostat and presence detector



1 = VAR Supply air.
2 = VAR Extract air.

Figure 15. The diagram shows how to wire the RTC room thermostat, DETECT O with simultaneous control of the extract air. VAV is used for occupancy, otherwise min. airflow. The figure also shows the alternative with RTCT duct temperature sensor.

Slave control with VART 5 as master

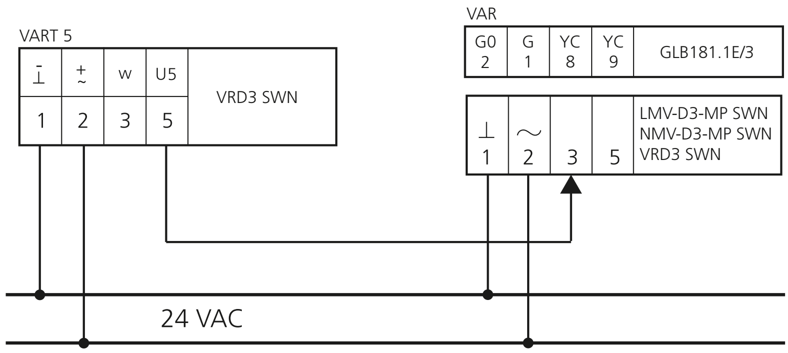
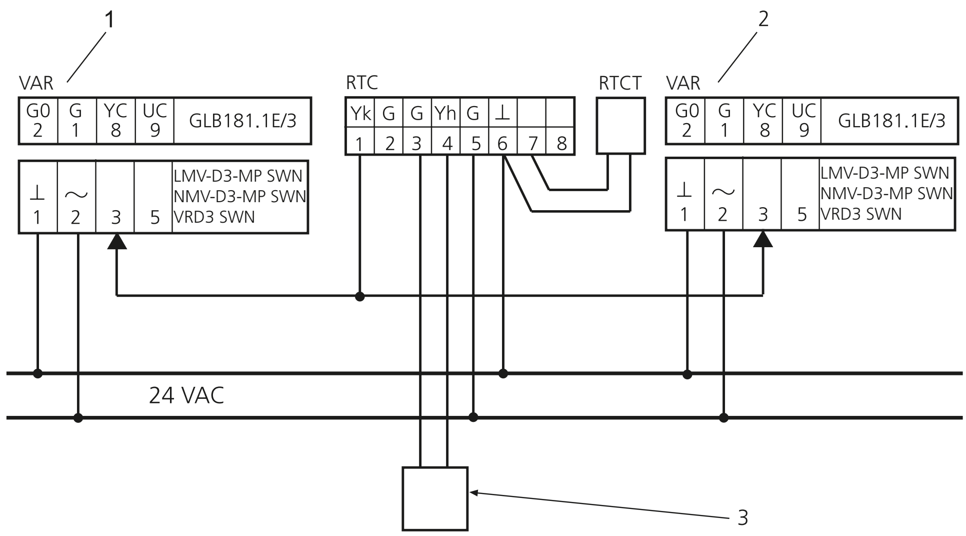


Figure 16. The diagram shows the connections between master – slave unit. In this wiring configuration, the VAR slave controller should be set to a flow range of 0-100% of the nominal airflow.

VAV regulation and heat regulation with thermo-actuators



1 = VAR supply air.
2 = VAR Extract air.
3 = Thermo-actuator, heating.

Figure 17. The diagram shows how to wire and refit jumpers of the RTC room thermostat enabling operation of the on/off 24 V VAC thermo-actuator on output YH (4).

Jumper connection - RTC

The jumper connection in the RTC must be changed when you wire the thermo-actuator (3) to the system. See the figures below. A maximum of 4 thermo-actuators are permitted to be wired to the same output.

N.B.! The unit must be de-energized before you reconnect any jumpers!

More information on the RTC can be read in its Installation – Commissioning Instructions.

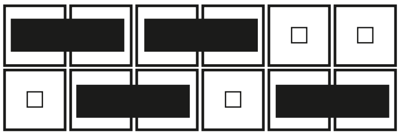


Figure 18. Jumper connection, Delivery settings.
YK = Cooling energy regulation: 0-10V DC
YH = Heat regulation: 0-10V DC

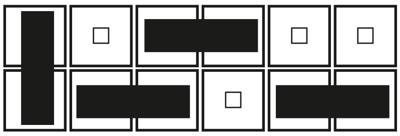


Figure 19. Jumper connection for thermo-actuator, heat.
YK = Cooling energy regulation: 0-10V DC
YH = Heat regulation: 024V DC

Commissioning - Flows

General points for all types

The VAR variable-flow commissioning dampers are factory-calibrated and are normally preset for the airflow range specified for the project. The setting values can be read on the product rating plate affixed on both sides of the product. Installation info and electrical connections are described in these instructions. For the best performance, it is extremely important that the requirement for lengths of straight duct upstream or downstream of the VAR is complied with. If you arrange only half of the required length of straight duct, this may increase the control tolerance from 5 up to 20%. The airflow direction should always be such that the damper is fitted downstream of the flow measuring device. The unit's rating plate includes air direction arrows.

Control signals

All the electronic VAR devices are designed for a signal range of 0-10V DC. Any deviation from this range is indicated on the product rating plate. If a direct-wired room thermostat is used for controlling the airflow requirements, then a control voltage of <0.5V implies the min. airflow that is preset in the controller and 10 V then produces the max. airflow. It is common that the control is carried out via a controller that then manages the min./max. airflow setting by limiting the control signal e.g. from 2.3 – 7.6 Volt DC. If wired to a controller, the VAR is normally set to 0-100% of its operating range. N.B. In some cases, high airflows can generate increased sound levels.

Airflows

The VAR has a nominal air flow, Q_{nom} for each size.

The maximum air flow can be set to between 30 and 100% of Q_{nom}.

The minimum air flow can be adjusted in relation to Q_{nom} and can be set to between 0 and 100% of Q_{nom}.

The regulators cannot manage air flows less than Q_{min}, as the manometer reading then becomes too low and regulation ceases.

VAR 1, 2 and 4 can be supplied in special versions with larger max. flow, up to 200 Pa read on the manometer. The consequence of this is less accuracy in the lower range.

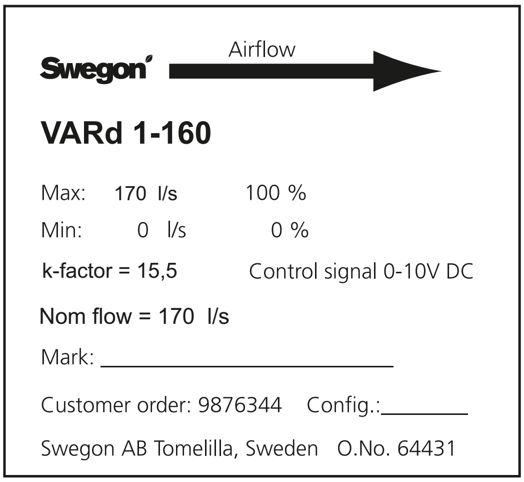


Figure 20. Shows the product rating plate.

Formulas for calculating airflows.

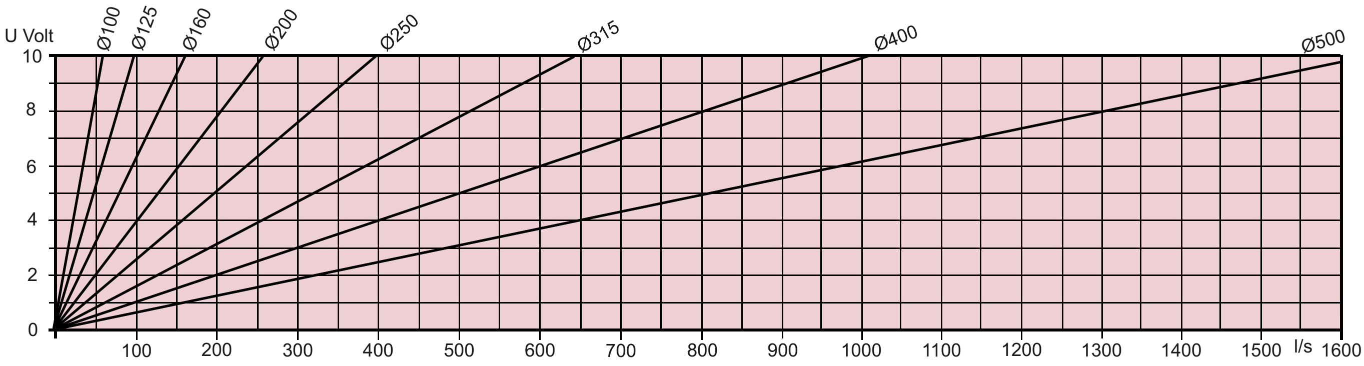
Formula 1, where Q = l/s and Y = control voltage.

$$Q = \frac{Q_{max} \cdot Y}{10}$$

Formula 2, where Q = l/s and U = true value voltage. If the true value signal is used, the airflow should be worked out with $Q_{nom.}$

$$Q = \frac{Q_{nom} \cdot U}{10}$$

Diagram, true value voltage/airflow
The diagram is applicable only to factory-calibrated products for nominal airflow according to the Airflow and K-factor (COP) Table.



Airflow and K-factor

Size	Airflows (l/s)		
	Qmin (5Pa)	Qnom/max (120Pa)	K-factor
100	12	58	5.3
125	19	95	8.7
160	35	170	15.5
200	55	272	24.8
250	89	438	40.0
315	142	695	63.4
400	228	1117	102.0
500	367	1797	164.0
200 x 200	75	367	33.5
300 x 200	112	548	50.0
400 x 200	149	728	66.5
500 x 200	187	915	83.5
600 x 200	224	1095	100.0
700 x 200	262	1282	117.0
800 x 200	297	4157	133.0
1000 x 200	373	1829	167.0
300 x 300	170	833	76.0
400 x 300	228	1117	102.0
500 x 300	284	1391	127.0
600 x 300	340	1665	152.0
700 x 300	398	1950	178.0
800 x 300	454	2224	203.0
1000 x 300	568	2782	254.0
400 x 400	304	1490	136.0
500 x 400	382	1873	171.0
600 x 400	458	2246	205.0
700 x 400	534	2618	239.0
800 x 400	610	2991	273.0

Size	Airflows (l/s)		
	Qmin (5Pa)	Qnom/max (120Pa)	K-factor
1000 x 400	762	3735	341.0
1200 x 400	915	4480	409.0
1400 x 400	1069	5236	478.0
1600 x 400	1221	5981	546.0
500 x 500	479	2344	214.0
600 x 500	575	2815	257.0
700 x 500	671	3286	300.0
800 x 500	767	3757	343.0
1000 x 500	959	4699	429.0
1200 x 500	1149	5631	514.0
1400 x 500	1342	6573	600.0
1600 x 500	1534	7515	686.0
600 x 600	691	3385	309.0
700 x 600	807	3955	361.0
800 x 600	921	4513	412.0
1000 x 600	1152	5642	515.0
1200 x 600	1382	6770	618.0
1400 x 600	1614	7909	722.0
1600 x 600	1845	9037	825.0
700 x 700	944	4623	422.0
800 x 700	1078	5280	482.0
1000 x 700	1348	6606	603.0
1200 x 700	1617	7920	723.0
1400 x 700	1887	9246	844.0
1600 x 700	2156	10560	964.0

VAR 1

Checking the performance

Start

A 3-minute warm-up period is required when you switch on the voltage (cold start) before the controller will operate normally.

Important!

The motor section on the LMV-/NMV D3 MP SWNP has a release button that in the depressed position enables you to turn the shaft by hand, but in doing so the controller loses control over the damper blade position. When you release the button, the controller automatically synchronises the damper blade position.

Checking the min. airflow

This can be done most simply by disconnecting the white cable marked 3. The damper will then move to the closed position. This position is conditional on the bearing pressure and the preset min. airflow rate. Measure the voltage U and calculate the airflow using Formula 2 on page 7.

Checking the max. airflow

Use the room thermostat or some other control equipment to override the system so that the control voltage will be a 10 V input on white cable 3. As an alternative you can short circuit between cables 2 and 3. This will steer the controller to the preset max. airflow setting. Before short circuiting, you must disconnect the cable from the room controller. If this is not done, you will destroy the output on the control equipment. The damper will move to the open position. Measure the voltage U and calculate the airflow using Formula 2 on page 7.

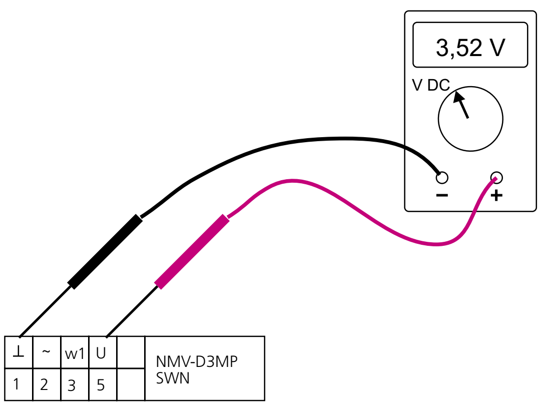


Figure 21. Shows how to connect a voltmeter for checking the true value.

VAR 1 as a constant-flow controller

VAR 1 can be used as a constant-flow controller in two ways. It is most appropriate to use the min. flow setting as the set point for the constant airflow. 24 V AC only should be connected to cable pair 1 and 2. You can also use the max. airflow setting, however you must then provide for a short circuit between cables 2 and 3. See under: Checking the max. airflow.

Changing the LMV-/NMV D3 MP SWN settings

The min./max. airflow should be calculated and set as follows:

Q_{max} % required max. airflow (Q_{max}) divided by nominal airflow (Q_{nom}).

Qmin % required min. airflow (Q_{min}) divided by maximum airflow (Q_{max}).

Example:
VAR, dim. Ø160, required min./max. airflows: 51/119 l/s.

Q_{max} % = Q_{max} / Q_{nom} => 119/170 = 0.70 = 70%

Q_{min} % = Q_{min} / Q_{nom} => 51/170 = 0.30 = 30%

Q_{nom} can be read in Table 1 on page 9

The min./max. settings and the 0-10 or 2-10 signal level settings can be changed by means of various instruments.

ZTH-GEN hand-held micro terminal

It is simple to check and change the preset airflows with the hand-held micro terminal. The hand-held micro terminal has a configuration menu for setting the language and the units.

Figur. 22 ZTH-GEN hand-held micro terminal.

Configuration menu of the ZTH-GEN

Start:	Hold the (OK) button depressed and at the same time connect to the VAV controller.
Answer:	"Configuration menu"appears in the display window
Select setting	Press the ▼ button (see selection below)
Choice of language	**German***/English
Choice of unit	**m³/h** *, l/s, cfm
Voltage	DC/AC 24 V (shows current supply voltage)
MP test	Shows the pulse train in the network (for system integrator)
Expert mode	0 */ 1 (provides expanded access to settings)
Advanced mode	0 */ 1 (provides expanded access to settings)
Exit	Via menu selection (returns automatically to the mode for configuring the VAV controller) or for removing the connection to the VAV controller. The selected settings are automatically stored in the ZTH.

Start menu of the VAV controller

Start:	Connect the cable provided to the VAV controller
Reply:	The type of controller connected appears in the display window
"OK" button	The serial number of the controller is shown
"+" button	The program version of the controller is shown
Select function:	▼▲ Navigate forward/backward to scroll between the various menu positions (see table below)
Exit:	Disconnect the cable to the VAV controller

PC-TOOL
A PC-based program can be used for checking performance and changing settings. PC-Tool version 3.0 or later is required. This is simpler since contact with the controller takes place with a separate bus cable, no reconnection is required (Plug And Play). Contact Swegon's representative for further info.

Trouble shooting

Incorrect polarity on control signal zero conductor
It is important that the neutral conductor follows the entire chain of connections from thermostat to controller. Check this by measuring the control voltage between cables 1 and 3 on the VAR. Correctly wired it should be possible to vary the signal between 0-10 V DC. If incorrectly wired the signal will be ~ 8 - 14 V DC. The following values apply to the RTC: ~ 5-10 V DC.

Airflow does not correspond
This is almost always due to that the requirements for lengths of straight ducting upstream/downstream of the VAR have not been met. If the ducting deviates from these requirements, the error can be as much as 20%. The flow measurement sensor may become fouled in systems with considerable dusty air (most often extract air systems).

This however doesn't occur until the system has been operating for 3-5 years. The sensor can be cleaned by blowing it with clean air in the opposite direction, i.e. in the minus tube connection. We recommend compressed air in a low-pressure aerosol tube. The duct must also be cleaned so that the flow measurement stick and the pressure tappings are not clogged.

VAR 2

Checking the performance

Start
A 3-minute warm-up period is required when you switch on the voltage (cold start) before the controller will operate normally.

Checking the min. airflow
This can be done by disconnecting the control signal cable from terminal 3. The damper will then move to the closed position. This position is conditional on the bearing pressure and the preset min. airflow rate. Measure the voltage U and calculate the airflow using Formula 2 on page 7.

Checking the max. airflow
Use the room thermostat or some other microprocessor substation equipment to override the system so that the control voltage will be a 10 V input on terminal 3. As an alternative you can short circuit between terminals 2 and 7. This will steer the controller to the preset max. airflow setting. The damper will move to the open position. Measure the pressure in the pressure tapping and calculate the airflow using the K-factor for the relevant size. Measure the voltage U and calculate the airflow using Formula 2 on page 7.

The VAR 2 as a constant-flow controller
The VAR 2 can be used as a constant-flow controller in two ways. It is most appropriate to use the min. flow setting as the set point for the constant airflow. 24 V AC only should be connected to cable pair 1 and 2. You can also use the max. airflow setting, however you must then provide for a short circuit between cables 2 and 7. See under: Checking the max. airflow.

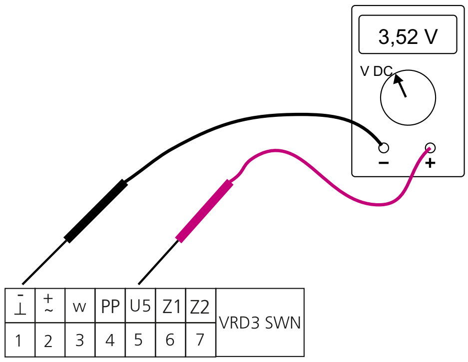


Figure 23. Shows how to connect a voltmeter for checking the true value.

Changing the settings

The min./max. airflow values are calculated and set as follows:

Q_{max} % required max. airflow (Q_{max}) divided by nominal airflow (Q_{nom}).

Q_{min} % required min. airflow (Q_{min}) divided by nominal airflow (Q_{nom}).

Example:
VAR, dim. Ø160, required min./max. airflows: 51/119 l/s.

Q_{max} % = Q_{max} / Q_{nom} =>119/170 = 0.70 = 70%

Q_{min} % = Q_{min} / Q_{nom} => 51/170 = 0.30 = 30%

Q_{nom} is read from Table 1 on page 9.

Enter the settings directly in the controller. No external instrument is needed but the settings can also be adjusted with Belimo's instrument, ZTH-GEN.

Configuration menu ZTH-GEN

Start:	Hold the (OK) button depressed and at the same time connect to the VAV controller.
HW Version SW Version	Indicates which hardware or software version the unit runs
Reply:	"Configuration menu"appears in the display window
Select setting	Press the ▼ button (see selection below)
Choice of language	**German***/English
Choice of unit	**m³/h** *, l/s, cfm
Voltage	DC/AC 24 V (shows current supply voltage)
MP test	Shows the pulse train in the network (for system integrator)
Expert mode	0 */ 1 (provides expanded access to settings)
Advanced mode	0 */ 1 (provides expanded access to settings)
Exit	Via menu selection (returns automatically to the mode for configuring the VAV controller) or for removing the connection to the VAV controller. The selected settings are automatically stored in the ZTH.

Start menu of the VAV controller

VRD3 SWN	Indicates to which controller the ZTH-GEN is connected.
Volume 0% Setpoint 0%	Shows the true value in % of the nominal fl ow Shows the calculated set point
Volume 0% Pressure 0Pa	Shows the true value in % of the nominal flow Shows the manometer pressure in Pa
Volume 0% CAV-Step	Shows the true value as a percentage of the nominal **Auto**, Open, Close, Vmax, Vmin, Stop
Mode 0.0-10.0 -new:	Shows the current operating range for control signalRange for control signal 0-10V or 2-10 V
Vmin -new	Set point for min. flow in % Set point (potentiometer in tool area)
Vmax -new	Set point for max. flow in % Set point (potentiometer in tool area)
Vnom	Shows nominal flow in %
p@Vnom	Shows nominal flow in Pa

Trouble shooting

Incorrect polarity on control signal zero conductor

It is important that the neutral conductor follows the entire chain of connections from thermostat to controller. Check this by measuring the control voltage between cables 1 and 3 on the VAR. Correctly wired it should be possible to vary the signal between 0.5-10 V DC. If incorrectly wired the signal will be ~ 8 - 14 V DC; for the RTC the signal will be ~ 2 - 8 V DC.

The airflow does not agree

This is almost always due to that the requirements for lengths of straight ducting upstream/downstream of the VAR have not been met. If the ducting deviates from these requirements, the error can be as much as 20%. The flow measurement sensor may become fouled in systems with considerable dusty air (most often extract air systems). This however doesn't occur until the system has been operating for 3-5 years. The sensor can be cleaned by blowing it with clean air in the opposite direction, i.e. in the tube connection. We recommend compressed air in a low-pressure aerosol tube. The duct must also be cleaned so that the measurement flange and the pressure tappings are not clogged.

VAR 4

Checking the performance

Start

After energizing the system, the VAV unit calibrates the pressure sensor as illustrated in the diagram below. Each calibration takes 90 seconds and the unit is then idle. This means that the user should not precision adjust the min. and max. airflows with the AST 10 hand-held micro terminal, if required, until after three hours after energizing to avoid that the unit is idle too often. There is no in-operation indicator that shows that zero calibration is in progress.

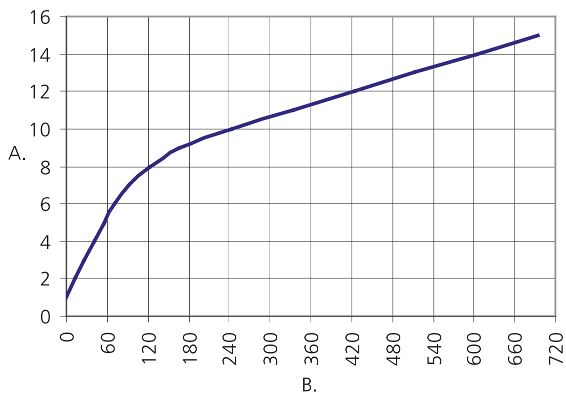


Figure 24. Shows the calibration time diagram.
A = Calibration no.
B = Time after energizing (min).

Important!

The release button on the unit must not be used when the unit is energized. If this occurs, the controller will lose its positioning capability and you will have to de-energize the unit for at least five seconds to remedy the situation. If you want to test or force the commissioning damper, use the jumper connections shown below or use the AST 10 hand-held micro terminal.

Checking the min. flow:

If possible, zero volt is transmitted from the room unit or the main control system. If this possibility is lacking, then disconnect YC (grey cable, marked 8). Measure the pressure in the pressure tapping and calculate the airflow using the K-factor for the relevant size. Check also the max. airflow.

Regulating the commissioning damper to max. flow:

If possible, 10 volt is transmitted from the room unit or the main control system. If this possibility is lacking, then disconnect YC (grey cable, marked 8), fit a jumper on G0 (black cable marked 2) with Y2 (orange cable marked 7) and Y1 (violet cable marked 6).

Forcing the commissioning damper to the fully closed position:

Fit a jumper on G0 (black cable marked 2) with Y2 (orange cable marked 7). The actuator should close for a maximum period of 150 seconds.

To force the commissioning damper to the fully open position:

Fit a jumper on G0 (black cable marked 2) with Y1 (violet cable marked 6). This is most easily done by disconnecting the grey cable for the control signal marked 9.

To override with the AST setting instrument

The Y signal can also be set from the AST 10 hand-held micro terminal. Press Y button and change the signal to 10 V with the – or + keys on the side of the display. To acknowledge by pressing SET. When you disconnect the Setting instrument, you also remove the means of overriding the system.

The VAR 4 as a constant-flow controller

When the VAR 4 is to be used as a constant flow controller,this can be done in two ways . It is appropriate to use the min. flow setting as the set point for the constant airflow. 24 V AC only should be connected to the cable pair 1 and 2. You can also use the max. airflow setting, however in this case you must make a short circuit between 2 and 3, see under Checking the max. airflow.

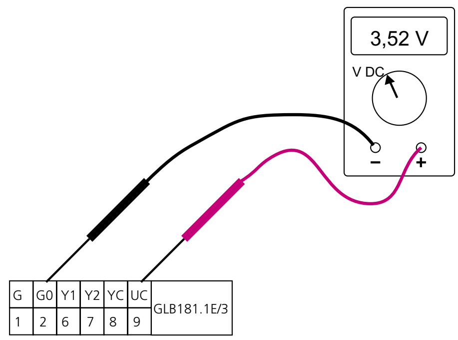


Figure 25. Shows how to connect a voltmeter for checking the true value.

To change the settings

The min./max. airflow should be calculated and set as follows:

Q_{max} % required max. airflow (Q_{max}) divided by nominal airflow (Q_{nom}).

Q_{min} % required min. airflow (Q_{min}) divided by nominal airflow (Q_{nom}).

Example:
VAR, dim. Ø160, required min./max. airflows: 51/119 l/s.
Q_{max} % Q_{max} / Q_{nom} = 119/170 = 0.70 = 70%
Q_{min} % Q_{min} / Q_{nom} = 51/170 = 0.30 = 30%
Q_{nom} can be read in Table 1 on page 9.

AST 10 Hand-held micro terminal

The AST 10 enables you to read the current data in airflow and control signal form. The user can easily change the min./max. settings in the AST 10. Connect the cable provided to the hand-held micro terminal and to the actuator. Be careful when connecting the contact pins to avoid damaging them. Older actuator models lack a quick-fit connector. Therefore use the triple wire and connect it to the same terminal that the motor conductors are connected to. See the wiring diagram for the AST 10 supplied in the instrument case.

1. Press on $\mathbf{V_{max}}$ change to the required value % with the + / - buttons - press **SET** to confirm the change.
2. Press on $\mathbf{V_{min}}$ change to the required value % with the + / - buttons - press **SET** to confirm the change.
3. With **Y** you can read the control voltage (set point) transmitted from the room thermostat.
4. By pressing the arrow keys under the display, you can navigate between the various signal values. U shows the true value voltage.
5. By pressing on **Factory set** you can reset the factory preset values.

Figure 26. AST 10 hand-held micro terminal.

Trouble shooting

Incorrect polarity on control signal zero conductor

It is important that the neutral conductor follows the entire chain of connections from thermostat to controller. Check this by measuring the control voltage between cables 2 (black) and 8 (grey) on the VAR. Correctly wired it should be possible to vary the signal between 0-10 V DC. If incorrectly wired, the signal will be ~ 6.5 - 14 V DC. The following values apply to the RTC: ~ 3-10 V DC. N.B.! This must be measured with a voltmeter. The AST instrument shows other values on the display for Y.

No regulation

This may occur when the controller is in a calibration phase. During the calibration phase, the letter S is visible in the upper right corner of the display. If still nothing happens, disconnect the red pressure tube and carefully blow in the controller tapping. As a final measure, interrupt the voltage supply for about one minute. If the controller still will not operate, replacing it is inavoidable.

VART 5

Checking the performance

Start

A 3-minute warm-up period is required when you switch on the voltage (cold start) before the controller will operate normally.

Checking signals

Since the VART 5 uses only the controller's airflow measurement feature, no settings are needed. It is the true value signal from terminal 5 that must be wired further to the slave unit. This is not affected by the settings on the min./max. potentiometers.

Measure the voltage, U, and calculate the airflow using the formulas below for the relevant signal system; 0-10 or 2-10 V DC. VART 5 is normally supplied with a 0-10 true value signal. Check the marking to see whether it should be set for 2-10 V.

For Q_{nom} see the table on page 8.

$$Q_{is} = \frac{Q_{nom} \cdot U}{10} \quad \text{l/s for 0-10 V}$$

$$Q_{is} = \frac{Q_{nom} \cdot (U-2)}{8} \quad \text{l/s for 2-10 V}$$

Figure 27. Formula for calculating the airflow

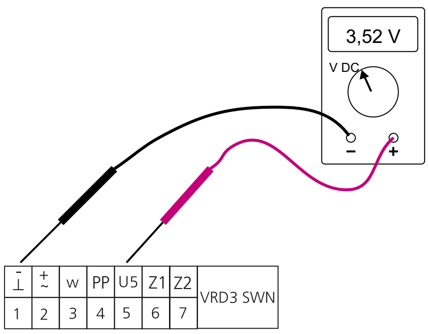


Figure 28. Shows how to connect a voltmeter for checking the true value.

Dimensions and weights

VAR 1, 2 and 4

Size	Ød mm	A mm	B mm	C mm	E mm	H mm	L mm	Weight, kg Uninsulated VAR	Weight, kg Insulated VAR
100	99	472	245	61	90	180	401	2.6	3.9
125	124	472	245	61	77	180	401	2.9	4.0
160	159	472	285	61	60	215	401	3.3	4.8
200	199	472	335	61	40	255	401	4.0	5.8
250	249	522	395	61	15	305	452	4.9	7.8
315	314	552	465	61	-	370	452	6.5	9.7
400	399	684	553	61	-	462	614	10.7	14.9
500	499	810	653	61	-	565	740	15.7	21.3

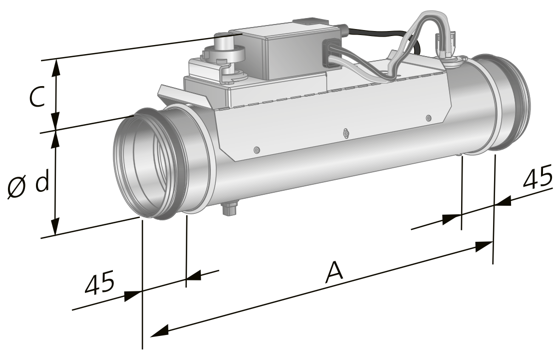


Figure 29. VAR 1, circular.

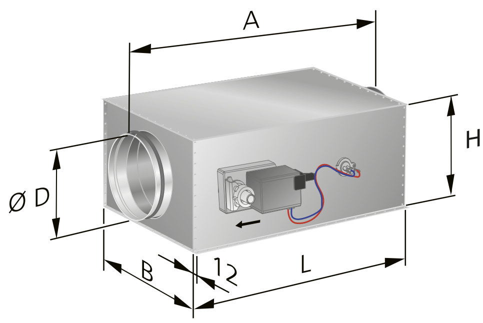


Figure 32. VAR 1-IR, rectangular (insulated casing).

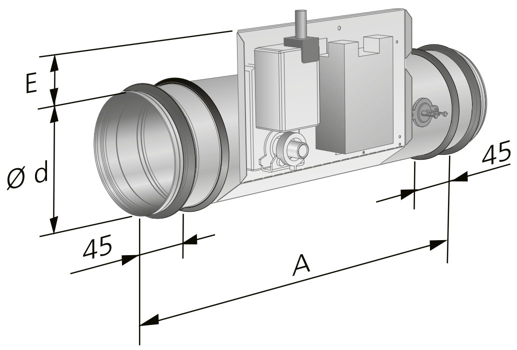


Figure 30. VAR 2, circular.

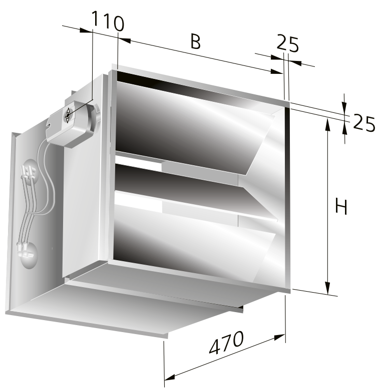


Figure 33. VAR 4, circular.

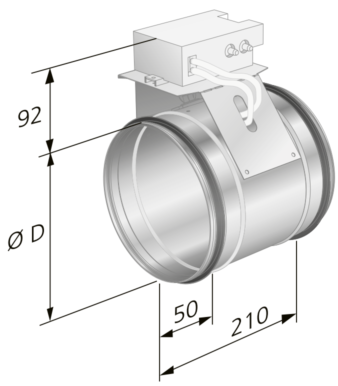


Figure 31. VART 5, circular.

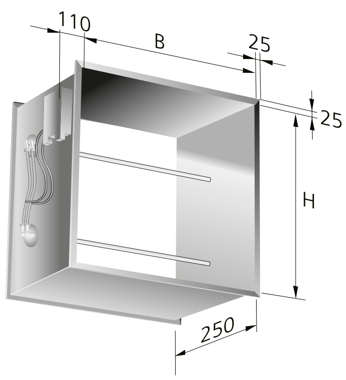


Figure 34. VART 5, rectangular.