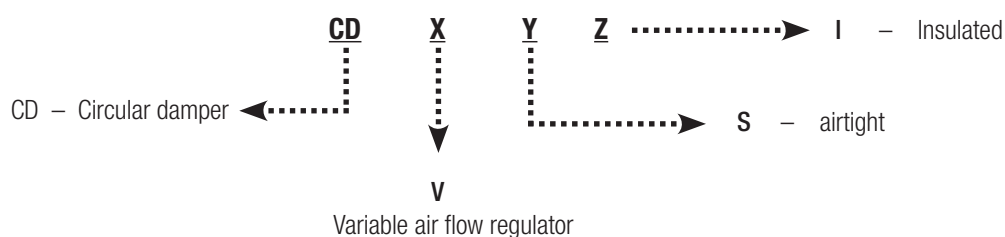


VARIABLE AIR FLOW REGULATOR

RCVS / RCVS-I

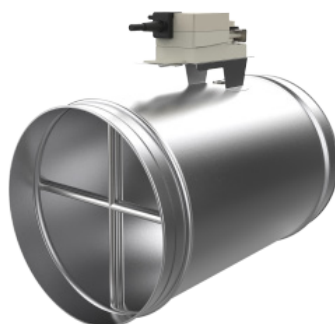
The RCV regulator is a variable air flow self-regulated system (VAV type). It is used to regulate the air flow in an area or room of a building according to a setpoint. The RCV regulator is also available in heat-insulated version.

CODIFICATION



CONSTRUCTION

Blades
Galvanised steel
EPDM gasket



Casing
Galvanised steel
EPDM gasket
Mineral wool, thickness 50 mm (Insulated version I)

PERFORMANCE

	RCVS
Upstream-downstream airtightness (EN1751)	Class 3
Frame airtightness (EN 1751)	Class C
Bearings	Nylon
Shaft	Galvanised steel
Operating range	0 - 450 Pa
Operating temperatures	-20 °C to +80 °C
Control	2-10 V signal by Belimo type actuator (24 V AC/DC) Option: 0-10 V, communicating servomotor
Accessories	Remote control supplied to modify the regulation range on site = ZTH - EU Circular silencers to be installed downstream from the regulator: CONFORT or OPTIMUM (See FT 1-3-1B and 1-3-2B)

VARIABLE AIR FLOW REGULATOR

RCVS / RCVS-I

OPERATING PRINCIPLE

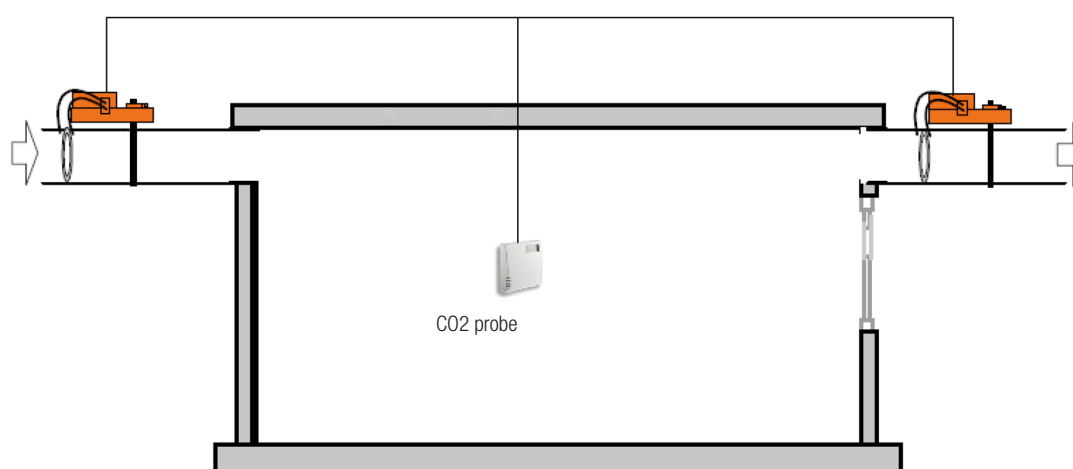
The air volume requirement of a room is identified by a probe and then converted into a 2-10 V signal.

This signal, or setpoint, allows the regulator to adapt its position independently of upstream flow or pressure variations.

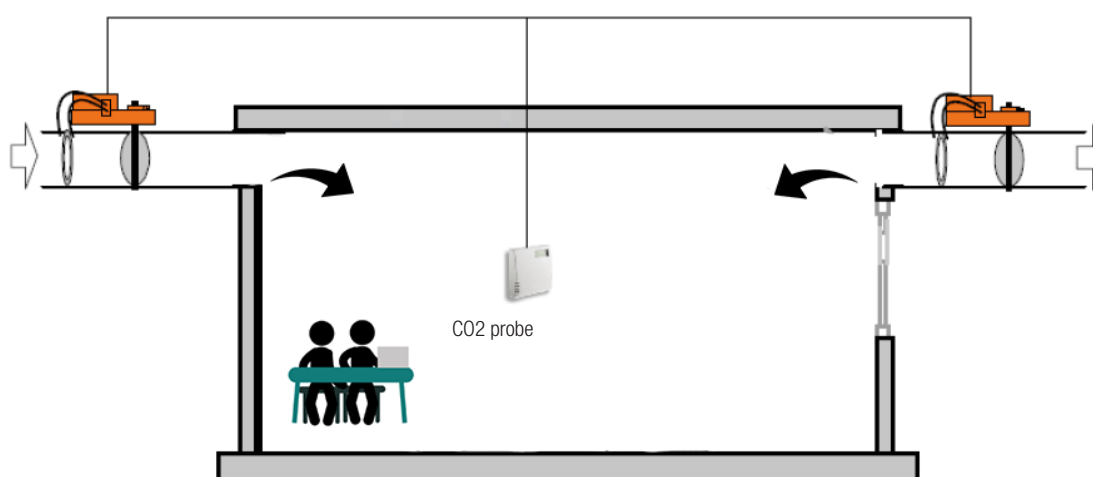
Example:

Meeting room with an RCVS $\varnothing 200$ set between 200 and 1400 m³/h, wired in 2-10 V and slaved to a CO₂ probe:

- 0 person: setpoints between 0 and 0.5 V - Closure



- 2 persons: setpoint 2 V - Minimum flow rate 200 m³/h



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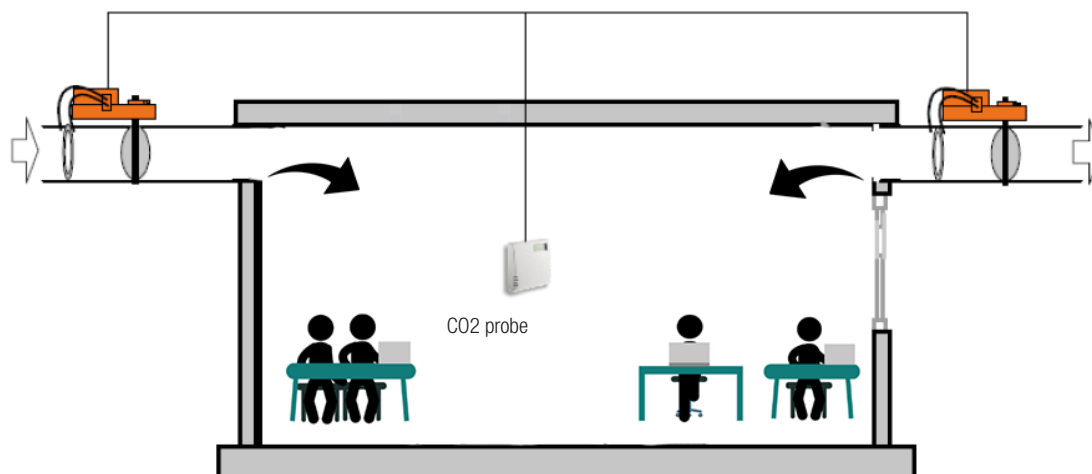
VARIABLE AIR FLOW REGULATOR

RCVS / RCVS-I

2.5.2

AIR CONTROL

- 10 persons: setpoint 10 V - Maximum flow rate 1400 m³/h



If the fan flow rate or pressure changes upstream from the regulator (e.g. second room supplied by the same fan), the servomotor will adapt the blade opening to respect the setpoint.

Slaving accessories can be supplied (on option, please contact us):

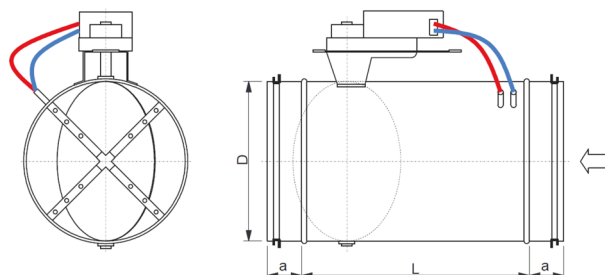
Ambience regulator

- CO2 probe

- Wall positioner 0 -> 100 %

DIMENSIONS AND WEIGHT (kg)

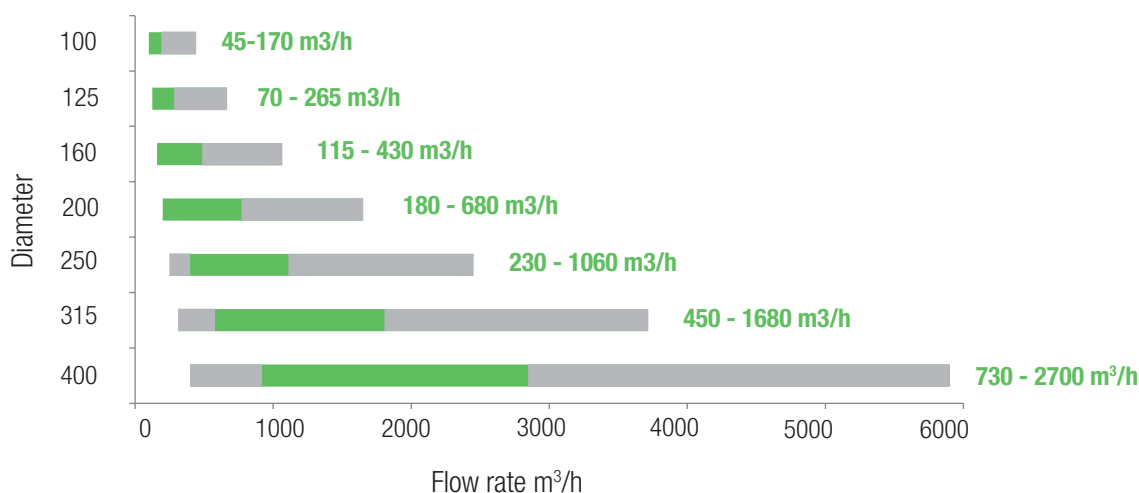
	Ø D (mm)	a (mm)	L (mm)	Weight (kg)	Insulated version (I)		Qv min (m ³ /h)	Qv max (m ³ /h)
					Ø Dy (mm)	Weight (kg)		
RCV 100	99	35	300	1.4	200	2.8	45	340
RCV 125	124	35	300	1.7	225	4.0	70	540
RCV 160	159	35	340	2.2	260	3.3	115	900
RCV 200	199	35	370	2.7	300	4.1	180	1450
RCV 250	249	40	390	4.1	350	5.8	230	2200
RCV 315	314	40	450	5.4	415	10.2	450	3400
RCV 400	399	60	490	9.3	500	17.5	730	5500



VARIABLE AIR FLOW REGULATOR

RCVS / RCVS-I

DIAMETER SELECTED DEPENDING ON FLOW RATE



 Recommended flow range for acceptable sound level

FLOW RATE CONTROL

The flow rate measured can be obtained using the following formula and a coefficient K specific to each diameter. To do this, connect to the regulator (+) and (-) pressure taps.

$$Q_v = K \sqrt{\Delta P}$$

Q_v : Flow rate (m³/h)
 K : Factor K
 ΔP : (total pressure (+) - Static pressure (-))

Model	Factor K
RCV 100	28
RCV 125	44
RCV 160	73
RCV 200	118
RCV 250	180
RCV 315	278
RCV 400	449



Airflow control accuracy from setpoint value is about $\pm 10\%$ at minimum airflow and $\pm 5\%$ at maximum rflow.

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VARIABLE AIR FLOW REGULATOR

RCVS / RCVS-I

2.5.2

DRIVE

The motors are installed in the factory and set according to the air flow range required for the installation.



The regulator control signal is 2-10 V on RCVS (0-10 V signal possible upon request or can be modified on site with optional remote control ZTH-EU, please contact us).

Model	Servomotor reference	Torque N.m
RCV 100	LMV-D3	5
RCV 125	LMV-D3	5
RCV 160	LMV-D3	5
RCV 200	LMV-D3	5
RCV 250	LMV-D3	5
RCV 315	LMV-D3	5
RCV 400	LMV-D3	5

AIR CONTROL

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VARIABLE AIR FLOW REGULATOR

RCVS / RCVS-I

ELECTRICAL CONNECTIONS

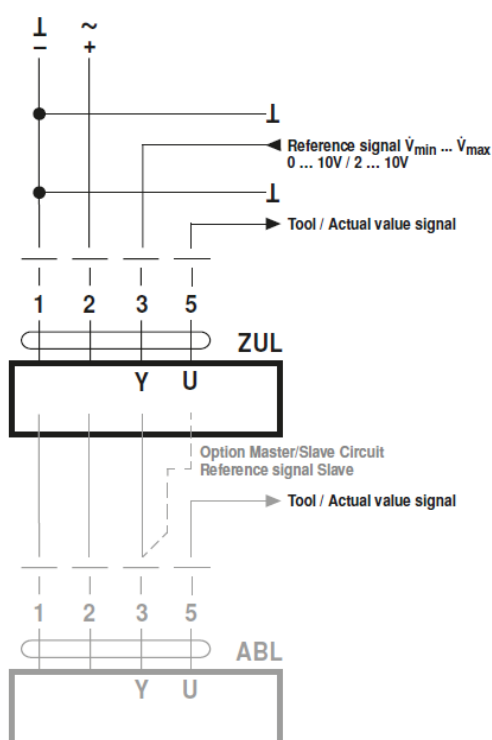
- MF version servomotor: non-communicating (standard)

The MF version does not allow communication. The air flow regulator operates independently using the configuration data. The output signal "U" can be used to display various operating parameters (blade opening, setpoint value).

• VARIABLE AIR VOLUME VAV OPERATION

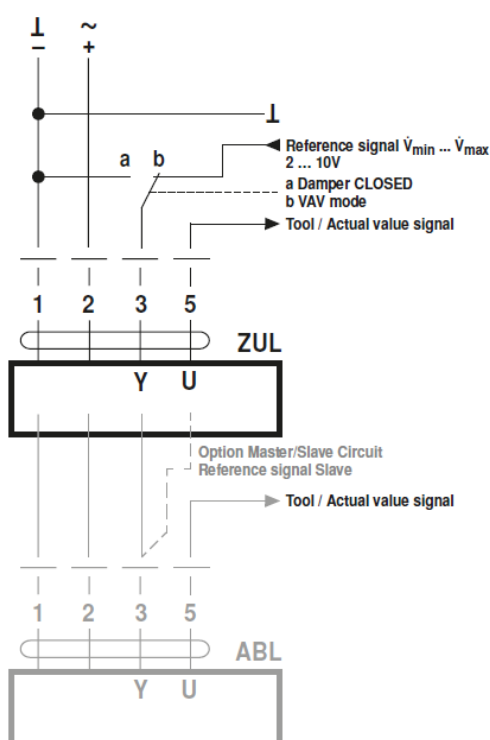
Example 1:

VAV, analogue reference signal



Example 2:

VAV with shut-off (CLOSED), 2 ... 10V mode



Description:

Damper CLOSED via 0 ... 10 V reference signal
(Mode 2 ... 10 V)

Setting parameters:

Mode 2 ... 10 V, Shut off level 0.1 V or 0.5 V

If the required switching threshold of 0.1 V cannot be attained, the value can be switched to 0.5 V with PC-Tool.

Function: Standard 0.1 V: Shut-off level 0.5 V:

Damper

CLOSED <0.1 V <0.5 V

$\dot{V}_{\min}$ >0.1 ... 2 V >0.5 V ... 2 V

$\dot{V}_{\min} \dots \dot{V}_{\max}$ 2 ... 10 V 2 ... 10 V

In CAV applications shut-off level must not be set to 0.5 V, otherwise the open connection 3 is interpreted as damper CLOSED.

The control signal Y is calculated on the air flow range $Q_v \min / Q_v \max$ set in the factory.

The output signal U is calculated on the nominal air flow range of the selected ϕ .

RCVS dampers can also be used for constant air flow operation.

• CONSTANT AIR VOLUME CAV OPERATION

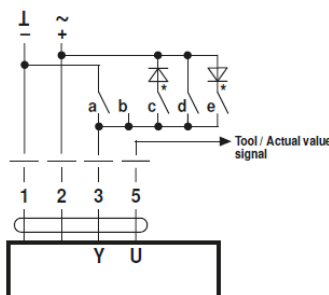
CAV control VAV-Compact can be adapted to the desired CAV function pattern for constant volumetric flow applications with PC-Tool by using the "CAV function":

- Damper CLOSED – $\dot{V}_{min}$ – $\dot{V}_{max}$ – damper OPEN (standard)
- Damper CLOSED – $\dot{V}_{min}$ – $\dot{V}_{mid}$ – $\dot{V}_{max}$ – damper OPEN (NMV-D2M compatible)

Wiring diagrams

Notes

- Note that the contacts are mutually interlocking.
- DC supply: * c and e are not available with DC 24 V.
- Setting parameters in CAV applications:
Mode 2 ... 10 V, Shut-off level 0.1 V
In CAV applications shut-off level must not be set to 0.5 V, otherwise the open connection 3 is interpreted as damper CLOSED.



PC-Tool "CAV Function" setting:
2 ... 10 V, Shut-off level 0.1 V

CAV Function CLOSED – $\dot{V}_{min}$ – $\dot{V}_{max}$ – OPEN (standard)

	a	b	c	d	e
Signal	$\perp$		$\sim$	$\sim$	$\sim$
	–			+	
Switching terminal 3	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$
Mode 2 ... 10 V	CLOSED	$\dot{V}_{min}$	CLOSED *	$\dot{V}_{max}$	OPEN *
Mode 0 ... 10 V	$\dot{V}_{min}$	$\dot{V}_{min}$	CLOSED *	$\dot{V}_{max}$	OPEN *

PC-Tool "CAV Function" setting:
CLOSED – $\dot{V}_{min}$ – $\dot{V}_{max}$. Shut-off level CLOSED: 0.1 V

CAV function CLOSED – $\dot{V}_{min}$ – $\dot{V}_{mid}$ – $\dot{V}_{max}$ – OPEN

	a	b	c	d	e
Signal	$\perp$		$\sim$	$\sim$	$\sim$
	–			+	
Switching terminal 3	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$
Mode 2 ... 10 V	CLOSED	$\dot{V}_{min}$	$\dot{V}_{mid}$ *	$\dot{V}_{max}$	OPEN *
Mode 0 ... 10 V	$\dot{V}_{min}$	$\dot{V}_{min}$	$\dot{V}_{mid}$ *	$\dot{V}_{max}$	OPEN *

PC-Tool "CAV Function" setting:
CLOSED – $\dot{V}_{min}$ – $\dot{V}_{mid}$ – $\dot{V}_{max}$ (NMV-D2M compatible)

- MP version servomotors: communicating (on option)

The MP versions allow communication between the flow regulator and the centralised management unit via various regulation protocols. A communication protocol defines all rules and specifies the operating conditions between several independent devices. This type of regulation architecture is based on a supervisor managing a set of data and interpreting it according to a programme by relaying the instructions to interfaces which synchronise the devices.

Communication protocols available are:

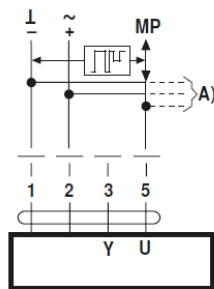
- MP BUS
- BACnet
- LON
- KNX

VARIABLE AIR FLOW REGULATOR

RCVS / RCVS-I

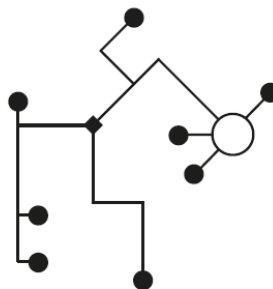
• MP BUS VARIABLE OPERATION

Raccordement au MP-Bus



A) Actionneurs et capteurs supplémentaires (max. 8)

Topologie de câblage

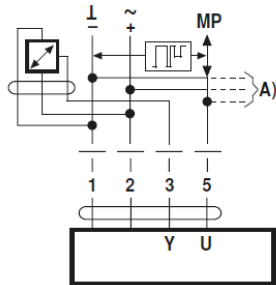


Il n'y a pas de restrictions pour la topologie du réseau (les formes en étoile, en anneau, en arbre ou mixtes sont autorisées).

Alimentation et communication dans un seul et même câble à 3 fils

- aucun blindage ou torsion nécessaire
- aucune résistance de terminaison nécessaire

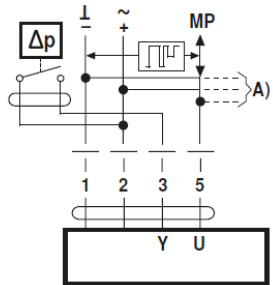
Raccordement de sondes actives



A) Actionneurs et capteurs supplémentaires (max. 8)

- Alim. AC/DC 24 V
- Signal de sortie DC 0...10 V (max. DC 0...32 V)
- Résolution 30 mV

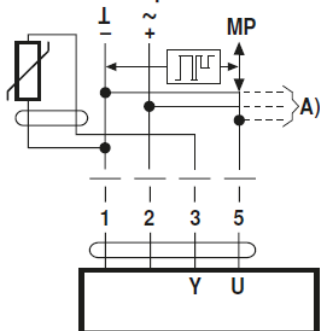
Raccordement avec contact externe



A) Actionneurs et capteurs supplémentaires (max. 8)

- Pouvoir de coupure 16 mA @ 24 V
- Le point de départ de la plage de fonctionnement doit être paramétré sur le servomoteur à ≥ 0.5 V

Connection of passive sensors



Ni1000	-28...+98 °C	850...1600 Ω ²⁾
PT1000	-35...+155 °C	850...1600 Ω ²⁾
NTC	-10...+160 °C ¹⁾	200 Ω ...60 k Ω ²⁾

A) Additional actuators and sensors (max. 8)

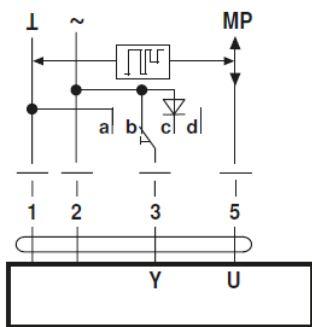
- 1) Depending on the type
- 2) Resolution 1 Ohm

Local override control

If no sensor is integrated, then connection 3 (Y) is available for the protective circuit of a local override control.

Options: CLOSED – $\dot{V}_{\text{Max}}$ – OPEN

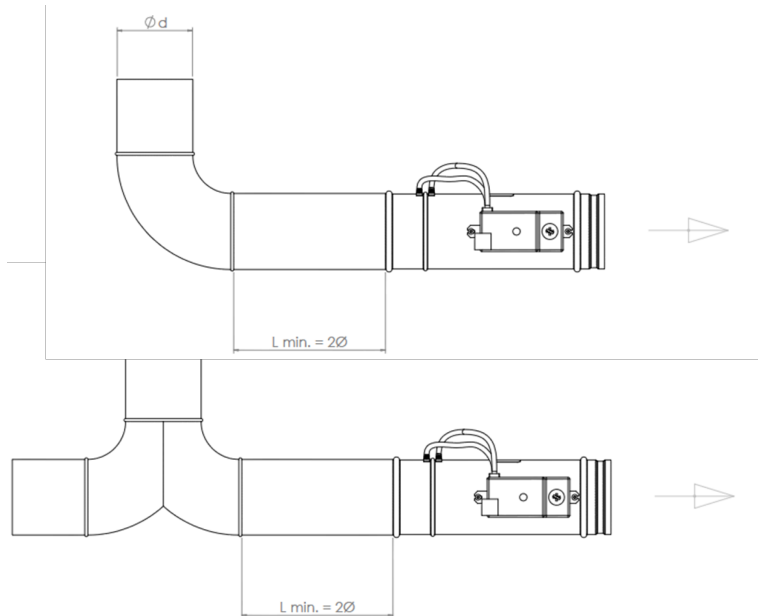
Note: Functions only with AC 24V supply!



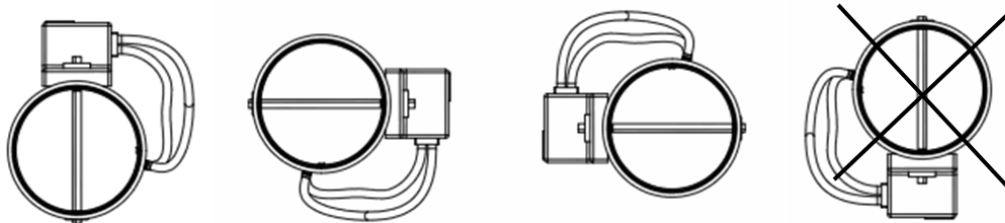
a Damper CLOSED
b $\dot{V}_{\text{Max}}$
c Damper OPEN
d Bus mode

INSTALLATION RECOMMENDATIONS

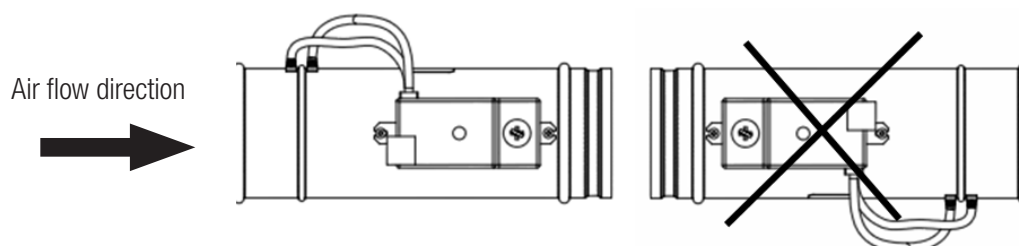
Plan a minimum pressure regulator of 2 to 3 x $\varnothing$ between the regulator and the singularity of the nearest network.



Never position the servomotor in the lower part of the regulator.



Make sure to install the pressure taps upstream from the blade.



VARIABLE AIR FLOW REGULATOR

RCVS / RCVS-I

Diameter 160

Pressure loss (Pa)	Speed (m/s)	63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz	Global (dB)	Global (dB(A))
50	2	58.2	49.8	43	38.9	33.4	27.2	23.7	24.2	58.9	41.4
50	5	65.6	56.9	54.1	48.6	45.7	36.5	33.2	27.4	66.5	51.4
50	8	61.5	58.1	57	55.7	52.5	43.1	41.1	35.1	64.9	56.9
50	12	60.5	60.7	62.1	60.9	55.9	48.8	47.9	40.2	67.5	61.5
100	2	62.5	55.7	49.7	45.2	40.5	36.4	36.1	27.6	63.6	48.1
100	5	70.6	63.5	60.5	52.5	49.6	42.4	42.3	34	71.8	56.6
100	8	75.1	68.7	63.1	59.5	56.7	48.3	47.3	41	76.4	62
100	12	71.3	66.8	65.5	63.3	62.3	53.9	53	47.2	74.1	66
250	2	63.1	60.2	57.7	53.4	50.3	47.5	51	45	66.2	57.6
250	5	76.1	70.1	69.9	59.1	55.3	50.9	53.8	48.7	78	64.7
250	8	80.7	76	71.2	66	61.2	55	57.2	52.2	82.4	68.8
250	12	84.5	78.7	74.6	69.8	66	58.8	58.5	53.2	86	72.3

Diameter 200

Pressure loss (Pa)	Speed (m/s)	63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz	Global (dB)	Global (dB(A))
50	2	56	50.5	43.7	39.8	37.1	30.8	25	24.5	57.4	42.8
50	5	65.2	58.2	54.3	49.1	47.8	41	36.6	29.1	66.4	52.6
50	8	67.4	62.9	59.1	55.6	54.7	45.2	42.6	36	69.5	58.5
50	12	63.8	61.6	61.8	59.9	60.5	51.6	50.4	44.3	68.9	63.4
100	2	61.6	57	50.2	45.8	42.9	41.2	38.3	32.8	63.3	49.8
100	5	69.4	63.6	58.8	52.7	50.1	47.1	46.6	40.3	70.8	57
100	8	72.6	69	63.9	58.6	56.6	50	48.7	42.8	74.8	62.1
100	12	73	70.9	67.8	64.6	63.4	55.4	54.1	48.9	76.5	67.5
250	2	63	61.8	58	53.6	52.5	51.5	53.4	50.4	67	59.9
250	5	75.3	69.9	65.2	58.5	55.5	53.5	55.4	53.2	76.9	63.7
250	8	79	73.4	69	62.8	59.4	55.9	57.3	54.8	80.6	67
250	12	81.8	78.1	72.9	69.8	65.5	59.7	59.9	56.6	84	71.9

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VARIABLE AIR FLOW REGULATOR

RCVS / RCVS-I

Diameter 250

Pressure loss (Pa)	Speed (m/s)	63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz	Global (dB)	Global (dB(A))
50	2	54.1	50.7	45.8	40.1	33.7	27.2	23.8	24.6	56.3	42.4
50	5	62.2	59	55.1	50.4	41.7	39.3	34.1	28.5	64.7	51.8
50	8	64	61.5	58.2	55	48.3	46	42.1	34.4	67	56.3
50	12	60.6	61.4	59.7	56.9	56.2	51.5	48.3	41.9	66.6	60.4
100	2	59.8	55.7	50.8	45.7	41.1	37.9	36.2	33.2	61.8	48.7
100	5	67.8	63.5	59.7	55.1	46.5	44.5	42	38.1	69.8	56.6
100	8	70.7	67.1	63.9	60.2	51.7	50.3	47.5	42.1	73.2	61.4
100	12	71.5	69.8	67.5	64.7	58.9	56.3	53.8	48	75.3	66.2
250	2	63.4	62.4	57.7	53.2	51.1	50.1	52.4	48.8	67.2	58.9
250	5	73.9	71.6	65.8	60.8	54.5	52.6	52.9	51.2	76.5	63.8
250	8	77.9	76.2	70.5	66.1	58.3	56.6	56.4	54.4	80.8	68.3
250	12	78.7	77.4	73.7	71	62.7	60.8	59.6	56.7	82.3	72

Diameter 315

Pressure loss (Pa)	Speed (m/s)	63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz	Global (dB)	Global (dB(A))
50	2	50.5	45	39.1	34.6	29.7	26.2	23.5	24.7	52	37.4
50	5	59.1	54.9	48.4	44.3	41.2	40.9	33.1	28.4	61	48.1
50	8	65.3	60.6	54.3	51.4	45	42.2	37.4	32.8	67	53.1
50	12	69.9	66	60.6	58	50.5	47.2	43.1	38.5	72	59
100	2	54.1	50.1	44.8	41.2	37.8	34.3	31.1	28.6	56.2	44
100	5	62.6	58.4	52.2	47.3	43	44.4	40	34.5	64.5	51.5
100	8	69	64	58.2	53.4	48.2	48.3	45	40	70.6	56.8
100	12	74.9	69.5	64.2	60	53.6	51.8	49	45.4	76.4	62.3
250	2	57.2	55.6	53.6	51.9	50.4	50.4	48.5	47.9	62.1	57.1
250	5	67.8	64.4	58.6	54.2	50.4	49.3	48.6	46.4	70.1	58.2
250	8	74.5	69.5	63.8	58.7	53.8	52.7	52.5	50.1	76.1	62.5
250	12	78.9	74.1	68.1	63	57.2	56.5	55.9	52.8	80.5	66.4

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REGULAR SILENCERS REGULATION ACCESSORIES

CO2 SENSOR

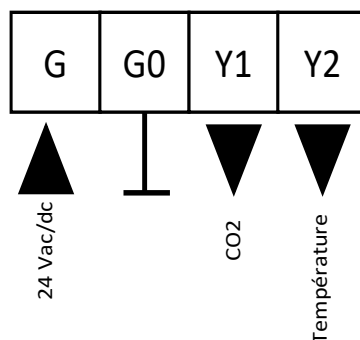
2 versions : environment installation or duct assembly.
The sensor measures CO2 emission and the temperature.

Two control output (0...10V ou 2...V) can be controlled either with only one measurement value or with the maximum section of all the values. An output enables to regulate the CO2 emissions and the other temperature output. The parameters of the controller can be changed thanks to a configuration tool.

Technical characteristics

Power	24 Vca/cc (22...28 V), < 2 W
Carbon dioxide measure	
Track	0...2000 ppm
Precision (25 °C)	gen. ±40 ppm +3 % of the read values (ABCLogic™)
Long term stability / year	< 2 % FS (ABCLogic™)
Time constant	< 2 min
Temperature measure	
Track	0...50 °C
Precision (25 °C)	±0.5 °C
Outputs	0...10 V < 2 mA
Operating conditions	
Temperature	0...+50 °C
Humidity	0...85 % Hr (without cond.)
Box	Plastic ABS IP20
Environment installation version	
Assembly on wall surface or on standard flush-mounting box (distant holes of 60 mm)	
Sizes (Wi x H x D)	87 x 86 x 30 mm
Duct assembly version	
Box IP54	
Sizes (Wi x H x D)	105 x 104 x 155 mm

Wiring



TEMPERATURE SENSOR, IN THE ENVIRONMENT

The temperature detected by a Pt100 sensor with a nominal resistance of 100 Ω at 0°C.

White plastic box.

Surface or flush-mounting box assembly.

Technical characteristics

Sensor	Pt100 EN 60751/B
Box	IP 20, ABS
Track	0...50°C
Precision	$\pm 0,3$ °C / 0 °C
Sizes (Wi x H x D)	86 x 85 x 30 mm

TEMPERATURE SENSOR, IN DUCT

The temperature detected by a Pt100 sensor with a nominal resistance of 100 Ω at 0°C.

The screwed cover and the terminal block inclined to 45° facilitate the installation.

The box is made in plastic that withstand heat.

The sensor is mounted on the duct thanks to an adjustable connection flange for an optimal detection of the temperature.

The installation depth can be adjusted between approximately 100... 220 mm

Technical characteristics

Sensor	Pt100 EN 60751/B
Rod	$\varnothing$ 8 mm x 220 mm
Duct connection	Flange
Box	Plastic (< 120 °C)
Protection class	IP 54
cable entry or rod to the bottom	
Cable entry	M16
Track	-50...70 °C
Précision	$\pm 0,3$ °C (à 0 °C)

PRESENCE DETECTOR

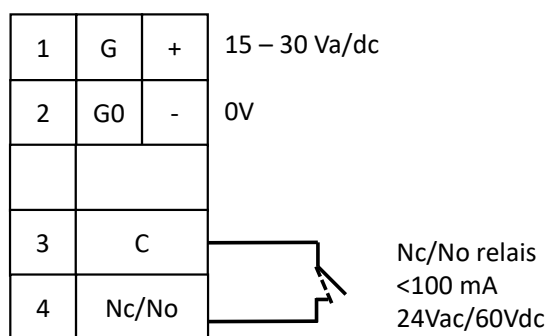
The presence detector possesses 2 functions : presence detection (busy, S4 = on) and motion detector (S4 = off). As soon as a movement is detected, the sensor toggles in presence detection mode. An adjustable deadline of 1 to 20 min hold the detector in a presence mode once the motion detection is confirmed.

The relays functions (nc/no), indicator lamp and sensibility setting are configurable by means of riders S1...S4. The red led stays on for 2 sec once the movement is detected.

Technical characteristics

Power	24Vac / dc, 15...30V ac/dc <0,5W
Functions	movement / presence
Output	NC* / NO, <100mA 24Vac / 60Vdc
Relay contact	2s, 2 min, 10 min or 20 min*
Box	Plastique blanc, IP20
Flush-mounting or front assembly	
Indicator lamp on 2sec from the movement detection.	

Wiring



ENVIRONMENT REGULATOR

- Temperature regulator and/or air quality (CO2 emissions)
- Applications :
 - Hot and cold with VAV
 - Hot with radiator and cold with VAV
 - Cold only
 - Air quality control (CO2)
- Reheating battery steering
- Modbus RTU communication (RS485)
- LCD display

VARIABLE AIR FLOW REGULATOR

RCVS / RCVS-I

2.5.2

Technical characteristics

Power		24 Vac/cc (20...28 V) < 1 VA
Set point	- day mode	18...26 °C, *21 °C, ±3 °C
	- night mode	Freeze protection 8...50 °C, *17 °C
Precision (measure inaccuracy)		±0.5 °C
Outputs		4x 0...10 V, 2 mA
		2x triac outputs 24 Vac1 A for thermal actuator
Allowed atmospheric humidity		0...85 % HR (sans condensation)
Connecting terminal		1,5 mm ²
ABS Plastic Box		IP20
Sizes (Wi x H x D)		87 x 86 x 32 mm

Connecting terminal

G	G0	Y1	Y2	DI1	A1	Y3	A2	Y4	U1	A+	B-	C	S/DIZ	G0
		Output	Output	Input	Output	Output	Output	Output	Input	Com.	Com.	Com.	Input	
Pow. 24 Vac	0 Vac	0...10V VAV	0...10V VAV	PIR/Card	24 Vac 1A cold valve	0...10V Cold valve	24Vac 1A hot valve	0...10V Hot valve	0...10V (CO2 ou Compens.)	RS485	RS485	RS485 Common	Contact sensor	0 Vac

CIRCULAIR SILENCERS

F2A also proposes circular silencers (high acoustic requirements, tested in independent laboratories, 400 °C/2h, etc.).

For further information, see the data sheets of the COMFORT and OPTIMUM ranges (1-3-1B, 1-3-2B).

DATA TO SUPPLY

For each RCV unit, various items of information must be supplied to ensure that the programming and marking match the requirements of your information as closely as possible:

Identification mark (in your installation)

Operating type:

- Variable air flow
- Constant air flow

Operating flow rate (within the ranges defined according to the diameter; see table of dimensions and weights):

- Qv min (m3/h)
- Qv max (m3/h) (at least 30 % of the maximum flow rate of the selected diameter)