

RLP 100: Pneumatic air volume controller

How energy efficiency is improved

Allows demand-based volume flow control for fume cupboards, laboratories and clean rooms

Features

- Suitable for explosion hazard zone 1 II 2 G T6
- Conformity tested as per EN 13463-1 and EN 1127-1 (ex zone 1 II 2 G T6)
- Controls constant, switchable or variable air volumes
- Accurate, static differential pressure sensor with large measuring range (1...160 Pa)
- Front plate printed with circuit diagrams for easy identification of the controller functions
- Compressed-air connections with Rp1/8" female thread
- Special measuring connection for detecting the air volume
- Low-pressure connections with dual-diameter connector for soft plastic tubing (internal Ø 4 and 6 mm)
- 2 inputs
 - Command variable
 - Setpoint shift $\Delta\dot{V}$
- 2 outputs
 - Actual value
 - Control of damper actuator
- 1 adjuster for calibrating the sensor measuring range
- 3 setpoint adjusters for maximum and minimum limitation of volume flow and for limiting the setpoint shift $\Delta\dot{V}$ to max. $\pm 20\%$

Technical data

Parameters		
Output pressure		0.2...1.0 bar
Setting range, volume flow		20...100% \dot{V}
Measuring range Δp		6.4...160 Pa (factory setting), can be reduced to 1...25 Pa
Response sensitivity		0.1 Pa
Supply pressure ¹⁾		1.3 bar ± 0.1
Integral action time		1 s (F123)
Input, setpoint shift w		20...100% $\dot{V} \pm 0.2...1.0$ bar
Operating range P_{stat}		0...3000 Pa
Low-pressure connections		3000 Pa
Air consumption		44 l _n /h (F123 = 90 l _n /h)
Air consumption l _n /h with setpoint shift $\Delta \dot{V}$		60

Ambient conditions		
Admissible ambient temperature		0...55 °C

Inputs/Outputs		
Linearity and accuracy of root extraction ²⁾		2%

Construction		
Housing material		Glass-fibre-reinforced thermoplastic
Fitting		Wall/top-hat rail (rail as per EN 60715)
Weight		0.6 kg

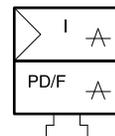
Standards and directives		
Type of protection		IP 30

¹⁾ For regulations concerning the quality of the supply air, particularly at low ambient temperatures, see www.sauter-controls.com/en/pneumatic_plants

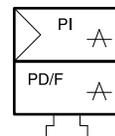
²⁾ The percentages given are based on 100% volume flow



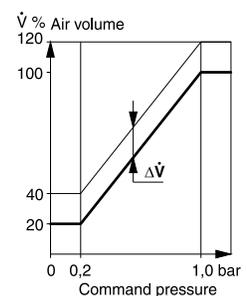
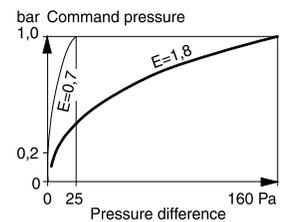
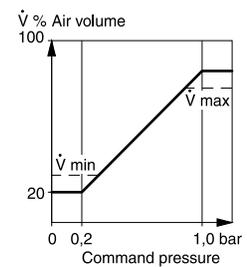
RLP100F003



RLP100F003, RLP100F914



RLP100F123



Overview of types

i Air capacity: the integration time can be extended for dynamically unfavourable control loops (accessory 0297653)

Type	Direction of operation	Setpoint shift $\Delta \dot{v}$	Air capacity
RLP100F003	B/A	3...20% \dot{v}	330 l _N /h
RLP100F123	A	–	900 l _N /h
RLP100F914	A	3...20% \dot{v}	330 l _N /h

 RLP100F003: for supply air and return air (integral indoor-air control)

 RLP100F123: for return air with aggressive gases (PI fume-cupboard control)

 RLP100F914: for return air with aggressive gases, with interface relay (integral indoor-air control)

Accessories

Type	Description
0297354000	Short screw-in connector R $\frac{1}{8}$ " , for soft plastic tubing \varnothing 4 mm (internal)
0297653000	Resistance 10 Ω , for air capacity 180 l _N /h (not for F123)
0297762001	Restrictor \varnothing 0.8 mm for damping turbulent low-pressure signals
0274571000	Restrictor \varnothing 0.5 mm for damping turbulent low-pressure signals
0297772001	Screw-in connector M4 with seal for soft hose, internal - \varnothing 4 mm
0297838001	Manometer bracket for 2 XMP manometers
0297091000	Cover for unused manometer apertures
0297680001	Specification \dot{v} min., \dot{v} max. set and labelled
0297680002	Influence E set and labelled
0297870001	Bracket for fixing to ceilings, floors or in panels

 0297354000: F003, F123, F914 - 5 of each required

 0297680001: not for F123

 0297762 001: Can be plugged into soft plastic hose, inner \varnothing 4 mm. If the attenuation is insufficient, instead of the \varnothing 0.8 mm restrictor, the \varnothing 0.5 mm restrictor can be used. (Accessory 0274571; this is not suitable for RLP 100 F908, F914, F123)

 0274571 000: Can be plugged into soft plastic hose, inner \varnothing 4 mm. Suitable for extreme cases when the \varnothing 0.8 mm restrictor (accessory 0297762) does not provide sufficient attenuation. Not suitable for volume flow controllers (RLP 100 F914, F123) and transducers (RLP 100 F908) where the "+" and "-" low pressure line is constantly supplied with a very small quantity of air, because the pressure signals in the lower measuring range are falsified and the positioning time of 1...2 s (RLP 100 F123) is not achieved.

 0297838 001: Also supplied: 2 screws, 1 reduction piece (0297596) for hose with inner \varnothing 1.7 / \varnothing 4; 1 connector (0297112) with seal M4/plug nipple for hose with inner \varnothing 1.7; 1 m hose with inner \varnothing 1.7. Use cover 0297091 for unused pressure gauge aperture.

Additional information

Fitting instructions	
RLP100F003	MV 505804
RLP100F123	MV 505546
RLP100F914	MV 505337; MV 505263

Description of operation

RLP100F003

A square root transducer converts the pressure difference produced at an orifice plate or pitot tube into a standard signal (0.2...1.0 bar) that is linear to the flow. The command variable w at connection 6 (e.g. TSP 80 temperature controller) is limited using the minimum and maximum adjusters and is compared to the actual value. With fixed-value control, no command variable w is connected and the "min" adjuster is used for the setpoint. The integral controller compensates for the control deviations with no persistent error. The measuring range (as a pressure difference) is changed using the E adjuster ($E = 0.7...1.8$).

We recommend using temperature controllers without amplifiers (TS.P 80, TK.P 80). The temperature controller is fed via the internal \varnothing 0.14 mm restrictor.

On the $\Delta \dot{v}$ adjuster, the set value (3...20% \dot{v}) is added to the setpoint quantity. It can be adjusted externally via connection 8, and the value set using the $\Delta \dot{v}$ adjuster is used as the minimum limit.

The direction of action can be changed from B (factory setting) to A using a switch.

Additional RLP100F914 function

To protect the measuring membranes from corrosive gases, a very small quantity of air is constantly fed to the “+ and –” low-pressure line.

In order to control a device, such as a supply air volume flow controller with a return air volume controller (RLP100F914), an interface relay is installed at connection 7 for decoupling the pneumatic signal. If a passive element, such as a pressure gauge to display the actual value, is connected to connection 7, this must be supplied with air via an external \varnothing 0.2 mm restrictor.

RLP100F123

A square root transducer converts the pressure difference produced at an orifice plate or pitot tube into a standard signal (0.2...1.0 bar) that is linear to the flow. The command variable (connection 6) from the vertical sash sensor (TUP224F901 continuous travel sensor) and the command variable (connection 8) from the horizontal sash sensor (EVM131F01-01S 2-point micro-switch, SMC third-party manufacture) are limited using the minimum and maximum adjusters and are compared to the actual value. The controller uses the higher of the two sash sensor signals as the setpoint. The PI controller compensates for the control deviations with no persistent error. The measuring range (as a pressure difference) is changed using the E adjuster ($E = 0.7...1.8$).

To increase the ability of fume cupboards to prevent noxious or toxic gases escaping, the volume flow must be supplied proportionally to the opening of the sash, within 1...2 seconds. In other words, when the sash is opened, the damper has a short positioning time. When the sash is closed, the positioning time is around 5 seconds, so that positive pressure is not generated in the room.

The vertical sash sensor (connection 6) is supplied via the internal \varnothing 0.2 mm restrictor in the RLP, while the horizontal sash sensor (connection 8) is supplied by the internal \varnothing 0.14 mm restrictor. If connection 8 is closed, the system is automatically controlled to \dot{v}_{max} . If connection 8 is open, the system is automatically controlled to the value of the vertical sash sensor. If no horizontal sash sensor is required, connection 8 must not be sealed.

The output signal at connection 7 (volume flow deviation of the command variables at connections 6 and 8 from the actual value) is 0.6 ± 0.4 bar and is either sent to a pressure gauge or to the RXP 210 alarm unit. If the command variable (connection 6) of the vertical sash sensor is higher than the set maximum limit, the output signal at connection 7 is $0.6 - 0.4$ bar.

To protect the measuring membranes from corrosive gases, a very small quantity of air is constantly fed to the “+ and –” low-pressure line.

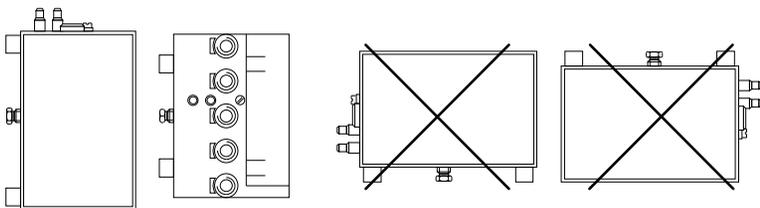
Intended use

This product is only suitable for the purpose intended by the manufacturer, as described in the “Description of operation” section.

All related product documents must also be adhered to. Changing or converting the product is not admissible.

Engineering and fitting notes

Crosswise mounting is not permitted.

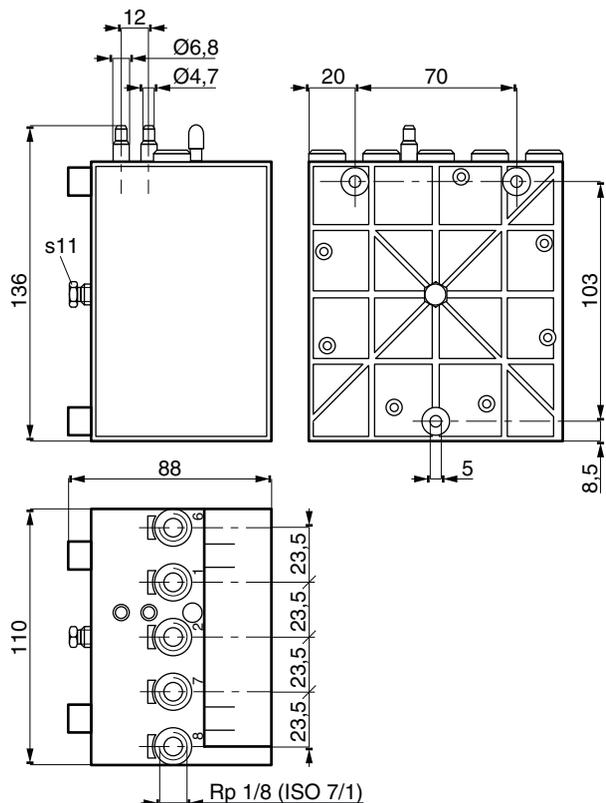


A positioner may not be installed between the integral controller and the positioning or valve actuator. The output pressure must go directly to the actuator.

To prevent turbulent flow causing vibrations that affect the low pressure signal, there must be a smoothing sector in front of the cross meter for measuring the differential pressure.

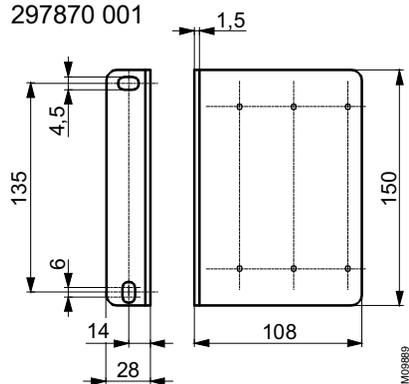
Where there are unfavourable inflows – bends, elbows or branches immediately in front of the cross meter – a restrictor (accessory 0297762 or 0274571) must be installed in the plastic hose of the + and – connection to attenuate turbulent low pressure signals.

Dimension drawing

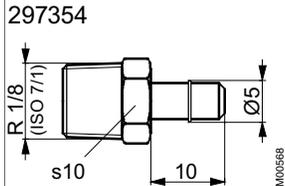


Accessories

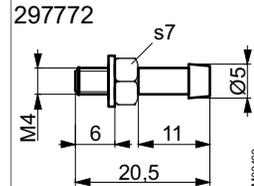
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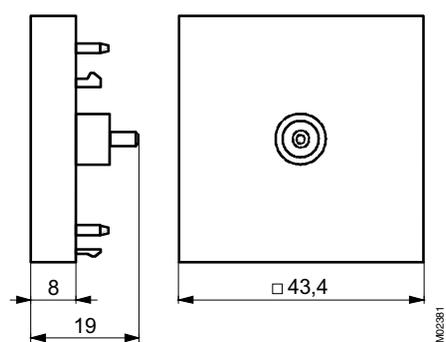
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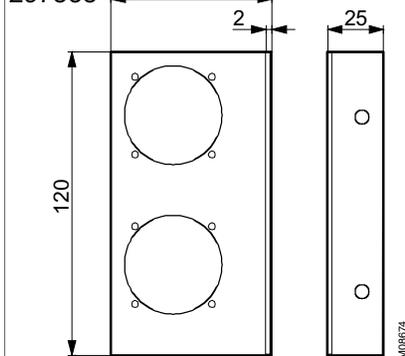
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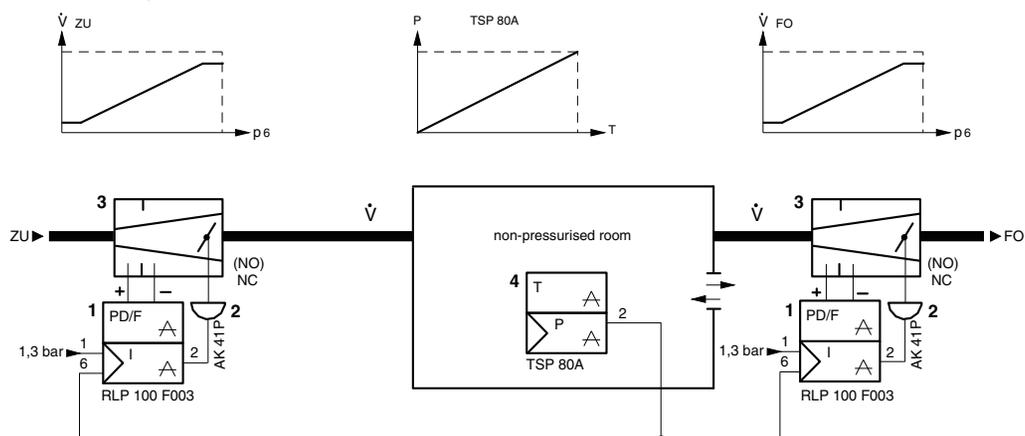


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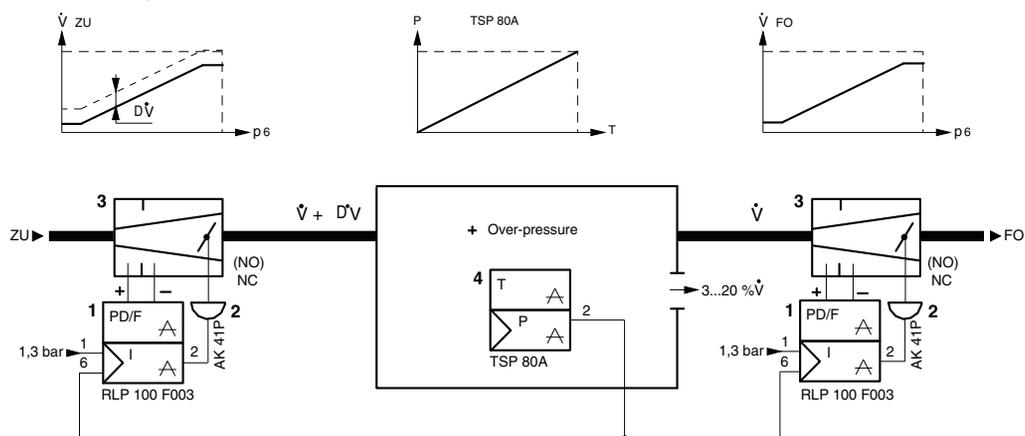


Example applications

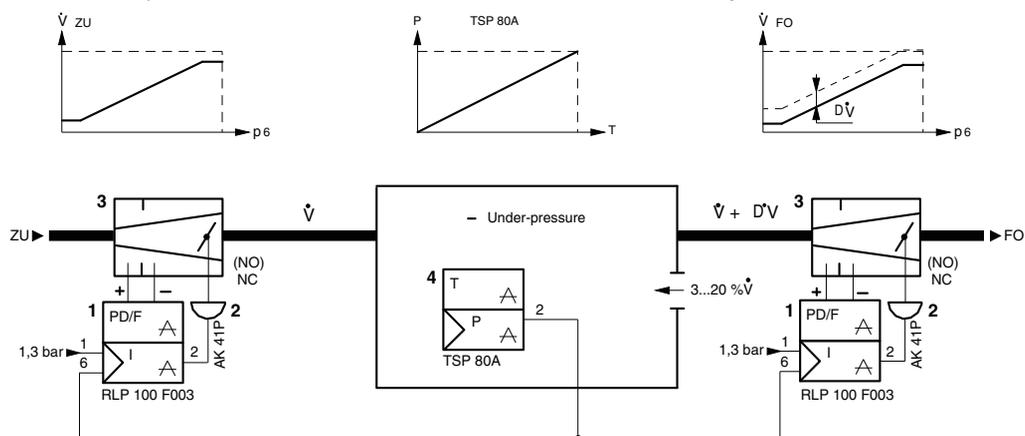
1. Control facility for variable volume flow without reheater for open rooms.



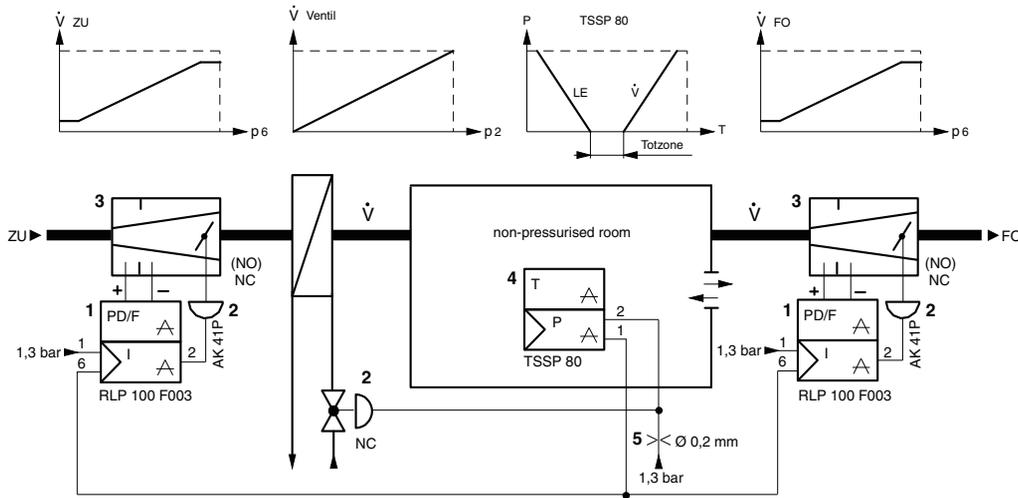
2. Control facility for variable volume flow without reheater for open rooms with positive pressure.



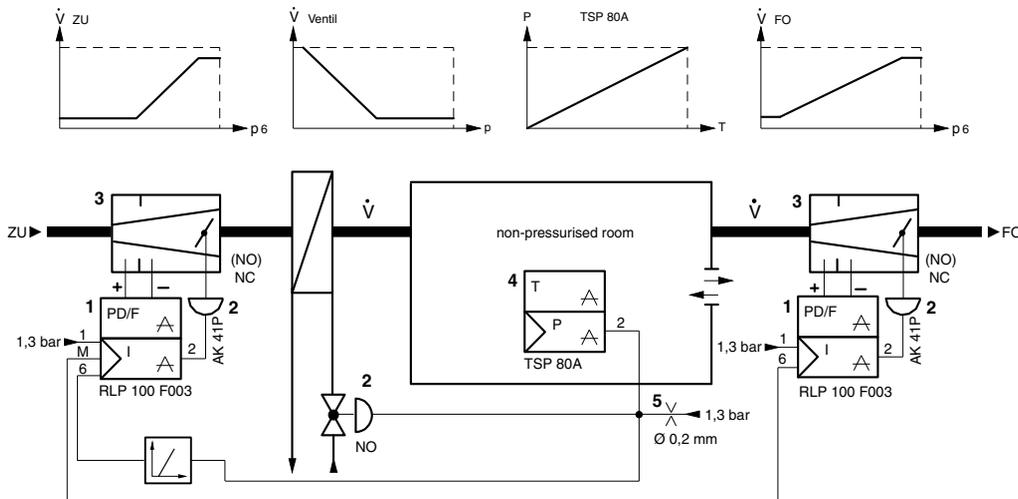
3. Control facility for variable volume flow without reheater for open rooms with negative pressure.



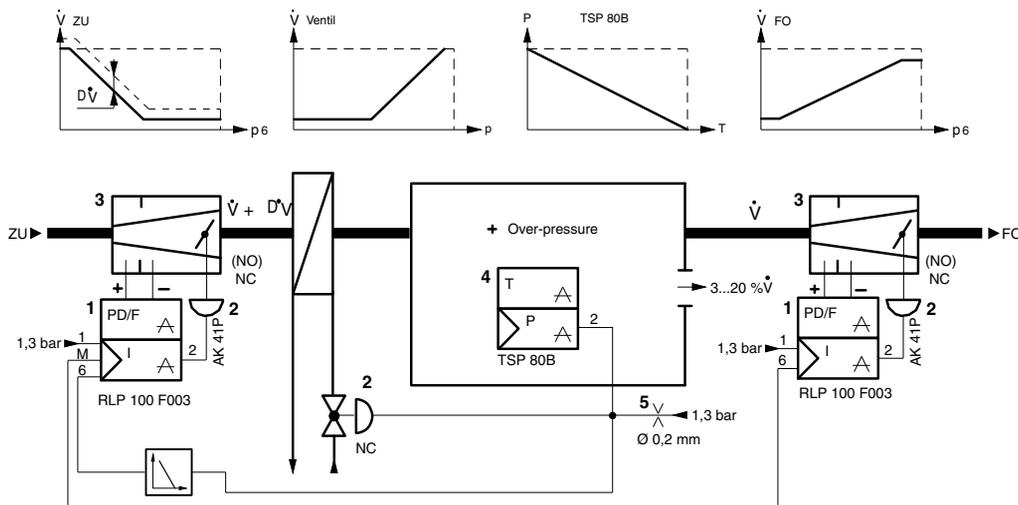
4. Control facility for variable volume flow with reheater for open rooms with dead zone, reheater normally closed, room temperature controller direction of action A and B



5. Control facility for variable volume flow with reheater for open rooms, reheater normally open, room temperature controller direction of action A



6. Control facility for variable volume flow with reheater for open rooms, reheater normally closed, room temperature controller direction of action B



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