

## Series 3755

# Pneumatic Volume Booster Type 3755



Fig. 1 · Type 3755, low-noise exhaust port fitted with sintered polyethylene filter disc



Fig. 2 · Type 3755  
Version with flanged-on exhaust port

## Mounting and Operating Instructions

**EB 8393 EN**

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**General safety instructions**



- ▶ *The device may only be mounted, started up or operated by trained and experienced personnel familiar with the product. According to these Mounting and Operating Instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible dangers due to their specialized training, their knowledge and experience as well as their knowledge of the relevant standards.*
- ▶ *Any hazards that could be caused by the process medium, the operating pressure, the signal pressure or by moving parts of the valve are to be prevented by means of the appropriate measures.*
- ▶ *If inadmissible motions or forces are produced in the actuator as a result of the supply pressure, the supply pressure must be restricted by means of a suitable supply pressure reducing station.*

To avoid damage to any equipment, the following also applies:

- ▶ *Proper shipping and appropriate storage are assumed.*

## 1 Design and principle of operation

The volume booster is used together with positioners to increase the positioning speed of pneumatic actuators.

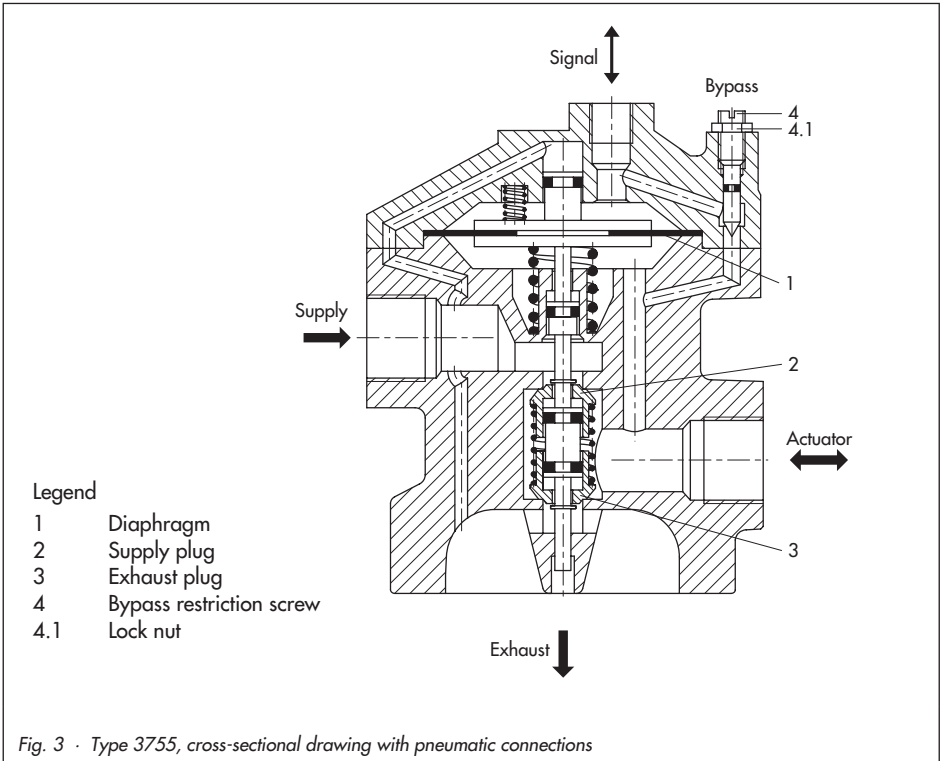
The pneumatic volume booster supplies an air flow output at the actuator port whose pressure corresponds exactly with the signal pressure, except that it has a much higher volume output.

If the positioner signal increases to supply air to the actuator, the pressure above the

diaphragm (1) increases. The differential pressure at the diaphragm causes the supply plug (2) to open, providing supply air up to a maximum of 10 bar to the actuator.

In contrast, a positioner signal to vent the actuator causes the exhaust plug (3) to open. The pressure in the actuator is relieved over the exhaust port.

The fail-safe action upon signal pressure failure always causes the actuator to be vented!



The bypass restriction screw (4) is used to adjust the response of the pneumatic volume booster to match the closed control loop requirements. The setting of the bypass restriction screw can be locked in position to prevent it from being turned and additionally lead-sealed.

**Note:** Never completely close the bypass restriction screw. This prevents the system from hunting and allows the positioner to position the valve properly.  
Only hand-tighten the bypass restriction screw (4) using the lock nut (4.1). The maximum permissible tightening torque is 3 Nm.

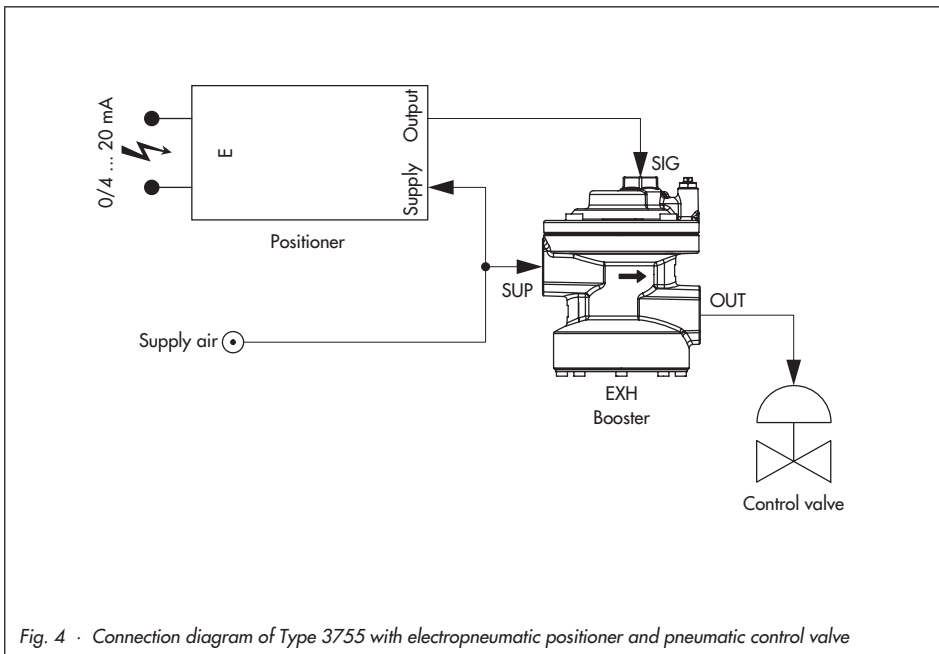


Fig. 4 · Connection diagram of Type 3755 with electropneumatic positioner and pneumatic control valve

## 1.1 Versions

Pneumatic volume booster	Type	3	7	5	-	x	x	0	0	x	x	0	0	x	0	0	0	0
Version																		
Standard: low-noise exhaust over sintered polyethylene filter disc	1	0																
Flanged-on exhaust port	2	3/5																
Pneumatic connections																		
Standard: Supply and Actuator ISO 228 - G 3/4, Signal ISO 228 - G 1/4	1																	
Supply and Actuator 3/4-14 NPT, Signal 1/4-18 NPT	2																	
Exhaust connection																		
Standard: sintered polyethylene filter disc	0																	
Flanged-on exhaust port ISO 228 - G 1	3																	
Flanged-on exhaust port 1-11 1/2 NPT	5																	
Flow capacity																		
Standard: Supply $K_{VS} = 2.5 \text{ m}^3/\text{h}$ , Exhaust $K_{VS} = 2.5 \text{ m}^3/\text{h}$	0																	
Dynamic response																		
Standard	0																	
Body material																		
Standard, aluminum	0																	
Color																		
Standard: Gray-beige, RAL 1019, structured finish	0																	
Temperature range																		
Standard: -40 ... 80 °C	0																	

## 1.2 Technical data

<b>Type 3755 Pneumatic Volume Booster</b>	
<b>Flow capacity</b>	
K <sub>VS</sub> Supply	2.5 m <sup>3</sup> /h
K <sub>VS</sub> Exhaust	2.5 m <sup>3</sup> /h
K <sub>VS</sub> Bypass	0.8 m <sup>3</sup> /h
<b>Control performance</b>	
Pressure ratio	Signal : Output = 1 : 1
Reversing pressure	80 mbar
Dynamic versions	Standard (options in preparation)
<b>Pressure</b>	
Supply	max. 10 bar · max. 150 psi
Actuator	max. 7 bar · max. 105 psi
Signal	max. 7 bar · max. 105 psi
Air quality according to ISO 8573-1	Maximum particle size and density: Class 4 · Oil content: Class 3 Pressure dew point: Class 3 or at least 10 K below the lowest ambient temperature to be expected
<b>Connecting thread</b>	
Supply (SUP)	G ¾ (optionally ¾ NPT)
Output (OUT)	G ¾ (optionally ¾ NPT)
Signal (SIG)	G ¼ (optionally ¼ NPT)
Flanged-on exhaust port (EXH)	G1 or G ¾ (optionally 1 NPT or ¾ NPT)
<b>Other operating parameters</b>	
Permissible ambient temperature	-40 to 80 °C
Service life	≥ 1 x 10 <sup>7</sup> full strokes
Degree of protection	IP 42 (with the exhaust port facing downwards)
Safety instrumented systems	Use in SIS acc. to IEC 61508/SIL 2 (in preparation)
Weight	2.1 kg · Version with flanged-on exhaust port: 2.4 kg
<b>Material</b>	
Body	Cast aluminum, gray-beige, RAL 1019 powder paint coated
Flanged-on exhaust port	Aluminum, gray-beige, RAL 1019 powder paint coated
Silencer	Sintered polyethylene filter disc (not for version with flanged-on exhaust port)
Diaphragm	VMQ
Other external parts	Stainless steel 1.4301

## 2 Mounting on control valves

Mount the pneumatic volume booster so that the compressed air between Supply and Actuator ports flows in the direction indicated on the body.

Mount the device between the positioner and pneumatic actuator (Fig. 5).

To meet the requirements of safety instrumented systems (SIS), a solenoid valve can also be connected between the pneumatic volume booster and the pneumatic actuator (Fig. 6).

**Note:** Do not mount the device with the exhaust port facing upwards!

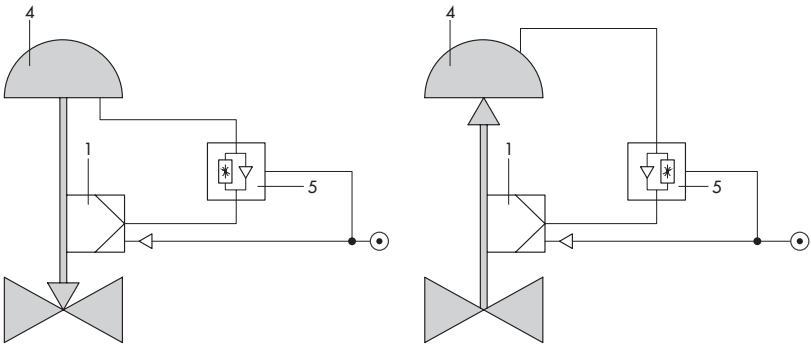
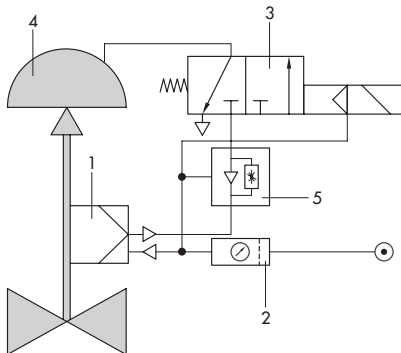


Fig. 5 · Standard connection of the pneumatic volume booster for both fail-safe positions



Legend for Figs. 5 and 6

- 1 Positioner
- 2 Supply air station
- 3 Solenoid valve
- 4 Pneumatic actuator
- 5 Pneumatic volume booster

Fig. 6 · Installation of the pneumatic volume booster with an additional solenoid valve



**Caution concerning risk of icing or snowing up**

Protect the low-noise version with noise-reducing element (sintered polyethylene filter disc or silencer) against icing up and/or snow.

When mounting the device, the exhaust port (EXHAUST) **must** face downwards or be fitted with a suitable cover to protect it against adverse weather conditions.

Also during mounting, transporting or storage of the device, make sure that no medium can enter the device. Otherwise, this may affect the functioning of the device at a later stage.

### 3 Pneumatic connections

The air connections for Signal, Supply, Actuator and for the version with flanged-on exhaust port are designed with G or NPT threads depending on the pipe female thread selected (see article code).

The tapped holes with G threads correspond with the Form X of DIN 3852-2 in the normal version.

The tapped holes with NPT threads are designed according to ANSI/ASME B1.20.1 for mounting using a wrench.

Before mounting, all pipes must be free of dirt and foreign matter.

The screw fittings must be mounted properly using suitable tools and sealant to prevent thread galling (seizure). Thread lubricants or thread sealants can be used.

The use of Teflon tape as a sealant for the fittings is **not** permitted.

All screw fittings must be securely tightened.

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**Note:** To ensure that the control valve can use the complete signal pressure range, the supply pressure (SUPPLY) must be sufficiently higher than the maximum signal pressure. The pipes for hook-up and the actuator must be sized correspondingly if higher dynamic requirements are to be met.

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#### 3.1 Air pressure reducing station

When using the pneumatic volume booster together with an air pressure reducing station, make sure that the reducing station's  $K_{VS}$  coefficient and connections are at least

the same as the  $K_{VS}$  coefficient and thread size of the pneumatic volume booster.

The supply air must be dry and free of oil and dust. It must meet the specifications in the technical data.

### 3.2 Silencer

The version with flanged-on exhaust port can optionally be fitted with a screwed-on silencer.

See Accessories for order number.

## 4 Start-up

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### NOTICE

*Prior to start-up, mount the pneumatic volume booster between an electropneumatic positioner and a pneumatic actuator. Connect the supply air.*

*Read the general safety instructions at the beginning of these instructions.*

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### Adjusting the bypass restriction

For a stable loop performance, the bypass restriction must be adjusted to meet the control loop requirements.

Undo the lock nut (4.1 in Fig. 3) and use a 4 mm Allen key to turn the bypass restriction screw (4) clockwise into the restriction seat as far as it will go. Make sure that the lock nut does not get tightened.

From this position, turn the bypass restriction screw counterclockwise by three turns.

Keep the bypass restriction screw stationary and secure its position with the lock nut. Remove the Allen key.

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**Note:** *Hand-tighten the bypass restriction screw and lock nut with a tightening torque of 3 Nm at the maximum.*

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Adjust the control parameters of the positioner as specified in the corresponding mounting and operating instructions and, if necessary, initialize the positioner. Observe safety instructions.

Assess the closed control loop performance and adjust the bypass restriction, if required.

To do this, change the position of the bypass restriction screw gradually by half turns and correct the control parameters of the positioner accordingly or re-initialize it.

Turning the bypass restriction screw clockwise into the restriction seat reduces the bypass cross-section, which causes the volume booster to respond more dynamically.

Turning the bypass restriction screw counterclockwise out of the restriction seat enlargens the bypass cross-section, which causes the booster dynamic response to become weaker.

### Note:

*If the actuator is to reach its fail-safe position by fully venting very quickly, the actuator sizing and the bypass setting must be performed with great care:*

- A bypass with a too small cross-section (for a dynamic booster response) may cause the entire system to hunt.
- A bypass with a too large cross-section (for a weaker dynamic booster response) may stop the booster responding. Or it may even prevent the actuator from completely venting over the booster due to the minimum actuator signal pressure.

## 5 Replacing the sintered polyethylene filter disc



*The volume booster **must** first be put out of operation before the sintered polyethylene filter disc can be replaced!*

1. Unscrew the eight fillister head screws M5 x 16 and remove the perforated plate from the body.
2. Remove sintered polyethylene filter disc and replace it with a new one.

**Note:** To keep the degree of protection, make sure the disc is installed correctly. The smooth side of the sintered polyethylene filter disc must face downwards and the open-pored rough side must face towards the device.

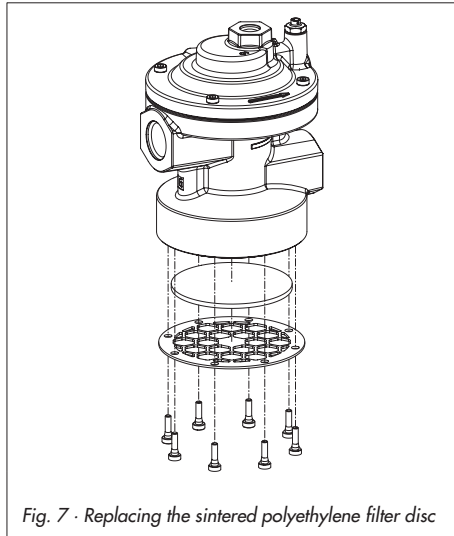


Fig. 7 · Replacing the sintered polyethylene filter disc

3. Refasten the perforated plate onto the body, tightening the screws in a criss-cross pattern with 4.2 Nm tightening torque at the maximum.

## 6 Upgrading Type 3755-1 to Type 3755-2

The exhaust with sintered polyethylene filter disc can be removed and fitted with a flanged-on exhaust port in its place.



*The volume booster **must** be put out of operation during this upgrading work!*

1. Unscrew the eight fillister head screws M5 x 16 and remove the perforated plate from the body.
2. Remove the sintered polyethylene filter disc.

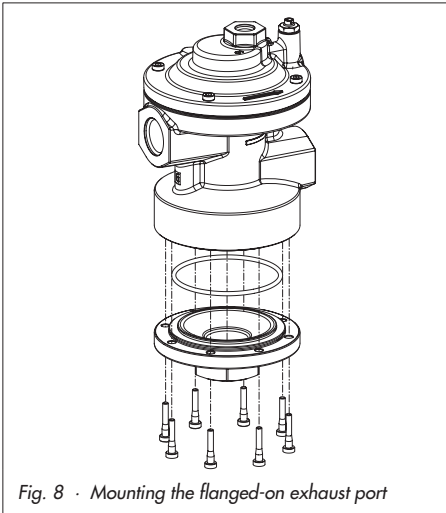


Fig. 8 · Mounting the flanged-on exhaust port

3. Insert the supplied O-ring into the groove.
4. Fasten the flanged-on exhaust port onto the body, tightening the screws in a criss-cross pattern with 4.2 Nm tightening torque at the maximum.

## 7 Troubleshooting

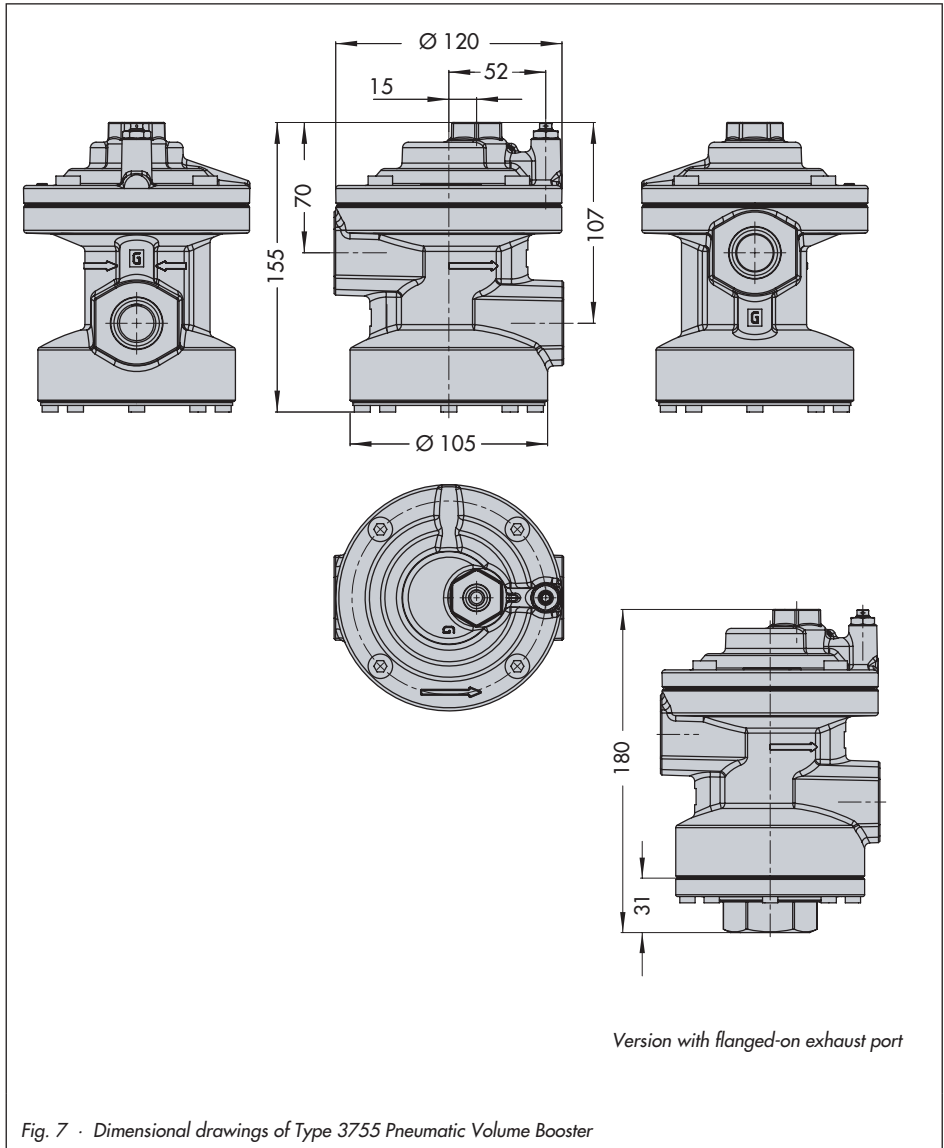
The pneumatic volume booster is maintenance-free.

- ▶ Leakage between pneumatic volume booster and air connections -> Check whether pipe screw fitting leaks and is screwed on properly.
  - ▶ Reduced flow volume
    - > Check supply filter and exhaust filter disc to make sure they are not clogged. Inspect supply filter at the opening of the supply port and clean, if necessary.
    - > Replace sintered polyethylene filter disc.
- Note:** To replace the sintered polyethylene filter disc, the volume booster must first be put out of operation.
- ▶ If other malfunctions occur, contact SAMSON.

## 8 Accessories/spare parts

Accessories	
Screwed-on silencer G1	8504-0070
Weather protection cover for version with low-noise exhaust fitted with a sintered polyethylene filter disc	In preparation
Spare parts	
Lock nut M8x1 for bypass restriction	8350-0469
Spare parts for Type 3755-1 (sintered polyethylene filter disc)	
Sintered polyethylene filter disc	0550-0825
Stainless steel perforated plate	0500-1200
Stainless steel fillister head screw M5x16	8333-2501
Spare parts for Type 3755-2 (flanged-on port)	
O-ring 74x3 NBR 70 Shore A	8421-0513
Fillister head screw M5 x 25	8333-2503
Conversion kits including mounting parts (see sections 5 and 6)	
Conversion to Type 3755-1 with sintered polyethylene filter disc	1400-9991
Conversion to Type 3755-2 with flanged-on port G 1	1400-9988
Conversion to Type 3755-2 with flanged-on port 1 NPT	1400-9989

## 9 Dimensions in mm









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