Hot Air Valves VLF45...

- Single valve for use in the supply air line of heat generating equipment
- Valves used in connection with SKPx5... actuators open slowly and close rapidly
- 2-port valves of the normally closed type
- DN40...DN80
- Driven by electrohydraulic SKPx5... actuators or electromotoric SAX31... actuators
- The valves must be fitted with SKPx5.../SAX31... actuators
- Supplementary Data Sheets on actuators (see Use)

The VLF45... and this Data Sheet are intended for use by OEMs which integrate the hot air valves in their products!

Use

The hot air valves are designed for use
- with air having a maximum temperature of 450 °C
- primarily as shutoff or control valves in the supply air line of industrial combustion plant with or without heat recovery systems

The valves provide the following functions:
- Shutoff valve (in connection with SKP15...)
- Control valve with shutoff feature (in connection with SKP25..., SKP55... or SKP75...)

All types of VLF45... valves can be combined with any type of SKPx5... actuator.
Warning notes

To avoid injury to persons, damage to property or the environment, the following warning notes should be observed!

Do not open, interfere with or modify the valves except when installing the service replacement kit!

Any opening of the valve, replacement of parts or modifications to the original product is the user’s responsibility and is done at his own risk.

- All activities (mounting, installation and service work, etc.) must be performed by qualified staff
- When combined with the SAX31... actuator, the valves must not be used for safety shutoff functions
- Fall or shock can adversely affect the safety functions. Such valves must not be put into operation, even if they do not exhibit any damage
- Medium temperatures ≥80 °C: The spacers between valve body and spring housing act as heat dissipators and must not be insulated. With higher medium temperatures, fit a mesh or something similar to provide protection against physical contact and possible burns

Example:
The illustration shows the expected temperatures under the following conditions:
- Medium temperature 400 °C
- Ambient temperature 28 °C
- Valve body not insulated and mounted in the vertical position

Engineering notes

Protect the actuator against high temperatures resulting from radiation, for instance, to ensure the actuator's maximum permissible ambient temperatures will not be exceeded.
Mounting notes

- Ensure that the national safety regulations are complied with
- No special tools are required to assemble valve and actuator
- The actuator can be mounted or replaced while the system is under pressure

Sealings

- No sealing materials are required to assemble valve and actuator
- Check to ensure that the valve is tight when all components are connected
- Check to make certain that the bolts of the flanges are properly tightened
- Check to ensure that the gaskets between the flanges are fitted

Mounting position

The valve can be installed in the air train in any position. The permissible mounting positions of the associated actuator must be observed, however (see the relevant Data Sheet).

Direction of flow

The direction of air flow must be in accordance with the direction of the arrow on the valve body.

Function

Stem retracts → valve opens
Stem extends → valve closes

Installation notes

Air pressure

If the air pressure exceeds the valve's maximum permissible operating pressure, it must be lowered by an upstream pressure controller.

Commissioning notes

- In case of corrosive ambient conditions (e.g. when used near the sea), the valve body should be coated with protective lacquer

Standards and certificates

Conformity to EEC directives
- Electromagnetic compatibility EMC (immunity) 2004/108/EC
- Directive for gas appliances 2009/142/EC
- Directive for pressure devices 97/23/EC

ISO 9001: 2008 Cert. 00739
ISO 14001: 2004 Cert. 38233

Service notes

- Each time a valve has been replaced, check to ensure that the valve operates correctly and that it is tight
- Siemens valves may only be overhauled by Siemens AG Repair Centers

Disposal notes

Local and currently valid legislation must be observed.
## Mechanical design

The valves can be combined with electrohydraulic SKPx... actuators or electromotoric SAX31... actuators plus AGA60 adapter.

The valves are of the normally closed type only when used in connection with SKPx5... actuators.

Valves with nominal sizes DN40...80 correspond to the standard sizes of single valves (conforming to EN 558).

### Plug

Flat, non profiled valve plug, metal-to-metal seating.

### Closing spring

The spring housing has Teflon bearings. The reset spring is located outside the medium in the spring housing. 4 spacers between valve and spring housing ensure a rigid connection.

### Actuators

The valves can be combined with the following types of actuators:

<table>
<thead>
<tr>
<th>Type reference</th>
<th>Data Sheet</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKP15...</td>
<td>N7643</td>
<td>ON/OFF</td>
</tr>
<tr>
<td>SKP25...</td>
<td>N7643</td>
<td>ON/OFF with constant pressure control/zero pressure control</td>
</tr>
<tr>
<td>SKP25.7... with SQS37...</td>
<td>N7643</td>
<td>ON/OFF with pressure control and electric setpoint adjustment</td>
</tr>
<tr>
<td>SKP55...</td>
<td>N7643</td>
<td>ON/OFF differential pressure control, signal input (\rightarrow) differential pressure</td>
</tr>
<tr>
<td>SKP75...</td>
<td>N7643</td>
<td>ON/OFF with ratio control, signal input (\rightarrow) static pressure</td>
</tr>
<tr>
<td>SKL25... (only for air)</td>
<td>N7643</td>
<td>ON/OFF with constant pressure control, slow closing 4...6 seconds</td>
</tr>
<tr>
<td>SAX31... with AGA60</td>
<td>N4501</td>
<td>Modulating position control</td>
</tr>
</tbody>
</table>
## Type summary (other types of actuators on request)

| Valve size | Type reference for medium: (max.) with flanges to ISO 7005 450 °C | Operating pressure (inlet pressure) (max.) mbar | Air flow rate in m³/h at Δp = 1 mbar at 20 °C 450 °C | Number of connections ¹) ²) Rp ¼ Inlet side Outlet side Rp ¼ Inlet side |
|------------|---------------------------------------------------------------|---------------------------------------------|---------------------------------------------|-----------------|-----------------|-----------------|
| DN40       | VLF45.404                                                     | 1500                                        | 32                                          | 50              | 2               | 2               |
| DN50       | VLF45.504                                                     | 1500                                        | 48                                          | 75              | 2               | 2               |
| DN65       | VLF45.654                                                     | 700                                         | 77                                          | 120             | 1               | 1               | 2               |
| DN80       | VLF45.804                                                     | 700                                         | 82                                          | 129             | 1               | 1               | 2               |

¹) Exclusively for medium inlet and outlet
²) If 2 connections, then 1 on each side

### Ordering

When ordering, please give type reference.

Please order the actuators as separate items. Valve and actuator are always supplied unassembled.

**Example: VLF45.804**
- Hot air valve
- Max. 450 °C
- DN80

### Accessories

**Manual adjuster**

- AGA61

**Adapter for SAX31... actuators**

- AGA60

- Consisting of 2 stem parts and a connecting flange
Technical data

General valve data

Perm. medium temperature
- VLF45...
For temperatures below 60 °C, VG... valves can be used (Data Sheet N7641)

Weight
See Dimensions

Connecting flanges
PN16 to ISO 7005-2

Required flow rate
See Flow chart

Perm. mounting position
(see Mounting notes)

Operating pressure
See Type summary

Leakage rate
- Internally at Δp 100 mbar Max. 0.3 m³/h
- Externally at a medium pressure of 100 mbar Max. 0.7 m³/h

Stroke
- DN40 Approx. 16 mm
- DN50 Approx. 16 mm
- DN65 Approx. 16 mm
- DN80 Approx. 18 mm

Environmental conditions

Storage
DIN EN 60721-3-1
Climatic conditions Class 1K3
Mechanical conditions Class 1M2
Temperature range -10...+60 °C
Humidity <95% r.h.

Transport
DIN EN 60721-3-2
Climatic conditions Class 2K2
Mechanical conditions Class 2M2
Temperature range -20...+60 °C
Humidity <95% r.h.

Operation
DIN EN 60721-3-3
Climatic conditions Class 3K5
Mechanical conditions Class 3M2
Temperature range -20...+60 °C
Humidity <95% r.h.

Materials

Valve components VLF45...
Valve body + cover GG20 cast iron
Plugs Galvanized steel
Sealing compounds Metallically tight
Stem Stainless steel
Stem seal Graphite bearing
Stem bushing Stainless steel
Screws Galvanized steel
Reset spring Stainless spring steel
External spring housing Aluminium sand-casting
Spacers Stainless steel
Safety disk and spring washers Coated spring steel NiSn
Valve plug Stainless steel
Function

VLF45...

Functioning principle

Sectional view

Reset spring

Valve stem

Application example

VLF45..., DN80 complete with SKP25... actuator
Flow chart

Only for fully open valves

Legend

Maximum flow (valve fully open)
Flow chart (cont’d)

1. **Hot air temperatures of 450 °C**

1.1 Determine the hot air volume $V_H$ required to supply the burner with the same amount of oxygen that would be needed with air at 20 °C:

$$V_H = F_H \cdot V_{20 \degree C}$$

where

$$F_H = \frac{273 + TH}{293}$$

- $V_H$ (m³/h) Hot combustion air volume at the respective hot air temperature
- $V_{20 \degree C}$ (m³/h) Combustion volume at 20 °C
- $TH$ (°C) Hot air temperature
- $F_H$ (-) Factor according to the hot air temperature $(TH)$

<table>
<thead>
<tr>
<th>$TH$ (°C)</th>
<th>$F_H$</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 °C</td>
<td>1.5</td>
</tr>
<tr>
<td>450 °C</td>
<td>2.5</td>
</tr>
</tbody>
</table>

1.2 Determine pressure drop $\Delta p$ with the help of the flow chart, based on the calculated $V_H$ from the relevant hot air volume scale.

**Example**

- Air volume required at 20 °C: 100 m³ / h
- Air temperature $(TH)$: 450 °C
- Corresponding air volume $V_H$ at $TH = 450 °C$
- Air temperature: 2.5 x 100 m³/h = 250 m³ / h
- From the flow chart with the help of the scale Air 450 °C:
  - $\Delta p$ for a DN50 valve: 13.5 mbar

2. **Other hot air temperatures**

Using the flow chart, determine the pressure drop $\Delta p$ 20 °C of the air volume at 20 °C.

Use the following formula and calculate the pressure drop $\Delta p_H$ of the air volume at $TH$ after it has been heated up to the hot air volume.

**Formula:**

$$\Delta p_H = \Delta p\ 20 \degree C \cdot \frac{273 + TH}{293}$$

- $\Delta p_H$ (mbar) Pressure drop at the hot air temperature
- $\Delta p\ 20 \degree C$ (mbar) Pressure drop at 20 °C, using the scale Air 20 °C of the flow chart
- $TH$ (°C) Hot air temperature

**Example:**

Valve DN80

- Volumetric flow at 20 °C = 100 m³/h
  - Determine from the flow chart:
    - $\Delta p\ 20 \degree C = 1.5$ mbar

Wanted:

- Pressure drop at 300 °C to obtain the same mass flow rate as at 20 °C.

**Solution:**

$$\Delta p_H = 1.5 \text{ mbar} \cdot \frac{273 + 300 \degree C}{293} = 2.9 \text{ mbar}$$
Dimensions (cont’d)

Dimensions in mm

VLF45... DN65/DN80

Table of dimensions

<table>
<thead>
<tr>
<th>Type reference</th>
<th>DN</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
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<td>158</td>
<td>22</td>
</tr>
</tbody>
</table>

DN  Nominal size, dimensions for connection of medium
R   Number of boreholes
SW  Width across flats
1)  Flanges conforming to ISO 7005-2
▼  Mounting surface SKPx5.../SKLx5... actuator or AGA60 adapter

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