



ISO 9001



VRF... with SKP20... actuator



VRH... with SKP20... actuator

Valves for Biogases and Recycling Gases

Actuators

VRF10... VRH10...

Gas valves designed for gas trains for use with slightly aggressive biogases or recycling gases.

The two-port valves are of the normally closed type.

They can be combined with electrohydraulic actuators type SKP... or electromechanical actuators type SQX...

The VRF10... / VRH10... and this data sheet are intended for use by OEMs which integrate the gas valves in their products.

Use

The VR... gas valves are designed for use with the following types of slightly aggressive gases:

- Biogases
- Waste gases
- Digester gases
- Other recycling gases
- Air

They are used primarily in gas-fired combustion plant.

The valves operate as safety shutoff valves, gas pressure governor and air / gas ratio controller (for details, refer to «Actuators»).

The chemical composition or aggressiveness of each type of biogas or recycling gas is different and depends on a number of factors.

Aggressiveness increases especially:

- as the hydrogen sulfide content H_2S increases
- the higher the moisture content of the gas, if condensation takes place inside the valve

If is not possible to provide general information about the resistance and life expectancy of the VR... valves when used with recycling gases.

The user must decide for himself whether the valve materials are suited for use with the relevant type of recycling gas (for details, refer to «Mechanical design / Materials»).

For safety reasons, we strongly recommend to:

- install 2 valves in series
- install a gas valve proving device
- visually inspect the valves at 6- to 12-month intervals

Warning notes



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

It is not permitted to open, interfere with or modify the valve, with one exception: when mounting the service replacement set.

- Fall or shock can adversely affect the safety functions. Such valves may not be put into operation even if they do not exhibit any damage.

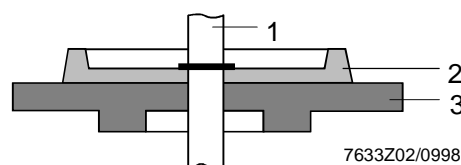
Engineering notes

Contour

Owing the contour of their disks, the VRF... valves are especially suited for control functions.

Benefit

Good control performance and hardly prone to hunting in low fire operation.



Legend

- 1 Stem
- 2 Contour
- 3 Valve disk

Mounting notes

The relevant national safety regulations must be complied with.

No special tools are required to assemble valve and actuator.

The actuator can be mounted or replaced while the valve is under pressure.

There are no sealing materials required.

Mounting orientation

The valve's orientation on the gas train is optional.

The actuator's permissible mounting positions must be observed, however (for details, refer to the relevant data sheets).

Strainer

The VRH... valves are supplied without strainer and may therefore only be used in plants equipped with a gas filter.

A suitable strainer is available as an accessory item (refer to «Accessories»).

Make certain the valves are used either with a gas filter in the direction of gas flow upstream of the valve or with a strainer at the valve's inlet.

Direction of flow

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

Function

Stem retracts → Valve opens

Stem extends → Valve closes

Installation notes

Prior to commissioning, check wiring carefully.

Gas pressure

If the available gas pressure exceeds the maximum permissible operating pressure of the valve, the gas pressure must be reduced by a pressure regulator upstream of the valve.

Commissioning notes

Commissioning and maintenance work may only be carried out by qualified staff.

Service notes

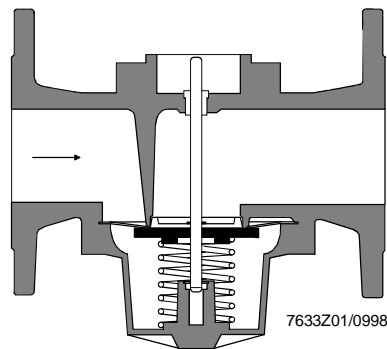
- For the VRF... valves, there are service replacement sets available (for details, refer to «Accessories»)
- Each time a set has been replaced, check to make certain the valve operates correctly and there is no internal or external leakage
- VRH... valves may only be overhauled by Landis & Staefa Repair Centers
- Replacement of the valve disk as well as installation and commissioning work may only be carried out by qualified staff

The valves can be combined with electrohydraulic actuators type SKP... or electromechanical actuators type SQX...

VRF... valves

The VRF... valves are of the normally closed one-way type and feature a flat disk. Their stem is guided on both sides of the disk, ensuring precise axial stroke and tight shutoff. The closing force of the return spring is supported by the prevailing gas pressure. The VRF... valves are supplied with a contoured disk and with no stroke limitation (for details, refer to «Type summary»). A removable strainer made of stainless steel protects seat and disk as well as downstream components against contamination.

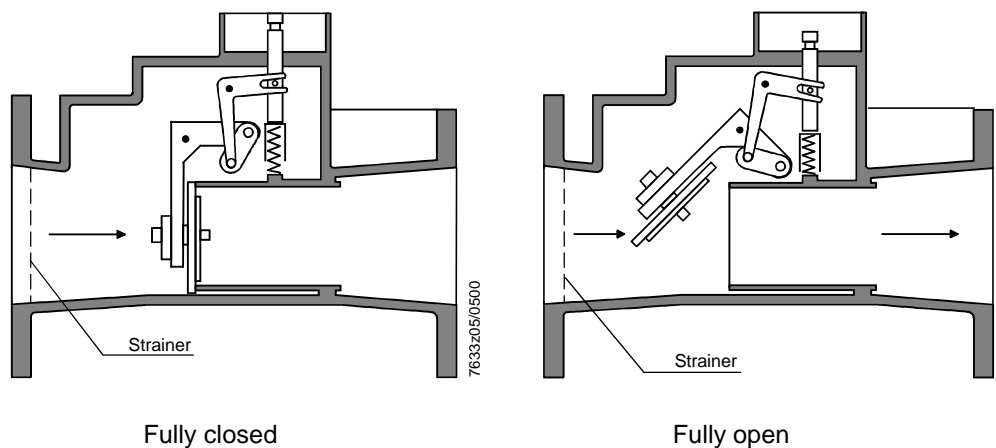
Function principle



VRH... valves

The VRH... valves are of the normally closed one-way high flow types. The swing type flap has no contour. The high closing force of the return spring is supported by the prevailing gas pressure (valve class «A» to EN 161). A strainer is available as an accessory item. The valves are supplied without strainer (refer to «Engineering notes»).

Function principle



Type summary

DN (mm)	Type reference without stroke limitation		Permissible operating pressure mbar	Air flow rate m ³ /h at Δp = 1 mbar	Number of test points Rp ¹ / ₄ 1)	Number of ignition gas connections G ³ / ₄ 2)
	Non- contoured	Contoured				
40	---	VRF10.404	600	29.6	4	---
50	---	VRF10.504	600	48.8	4	---
65	---	VRF10.654	600	72.3	2	2
80	---	VRF10.804	600	85.4	2	2
Flap type valves: high-flow with swing type flap						
80	VRH10.805	---	300	122.2	4	1
100	VRH10.905	---	300	197.3	4	1
125	VRH10.915	---	300	281	4	1

¹⁾ Half on the inlet and half on the outlet side

²⁾ Inlet side, VRF... one on each side

Ordering

When ordering, please give type reference.

For example:

VRF10.504

Flanged valve DN50 for biogas



Actuators are to be ordered as separate items.
Valve and actuator are supplied unassembled.

Accessories

Service replacement
sets for VRF... valves

DN (mm)	Part no.	DN (mm)	Part no.
VRF10.404	4 679 1556 0	VRF10.654	4 679 9504 0
VRF10.504	4 679 9503 0	VRF10.804	4 679 1557 0

No service replacement sets are available for the VRH... valves.

The service replacement sets for the VRF... valves include the following items: stem, flap, strainer, screws, washers and gaskets.

Valve springs for re-
placement

Type reference	DN (mm)	Part no.
VRF10...	40...80	4 215 1641 0

Strainer for VRH...
valves with circlip, mesh
size 1 mm

Strainer insert	Type reference	DN (mm)
AGA80	VRH10.805	80
AGA90	VRH10.905	100
AGA91	VRH10.915	125

The strainer inserts can be fitted on either the gas inlet or outlet side of the valves.

Technical data

General valve data	Valve	conforming to class A of EN 161 → exception: with SQX...
	Perm. medium temperature	0...60 °C
	Weight	refer to «Dimensions»
	Connecting flanges	PN16, to ISO 7005-2
	Min. flow rate required	same as VG... valves refer to data sheets on «actuators»
	Mounting orientation	refer to «Mounting notes»
	Operating pressure	refer to «Type summary»
	Types of gas	refer to «Use»

Norms and standards

Environmental conditions

Transport	IEC 721-3-2
Climatic conditions	class 2K2
Temperature range	-15...60 °C
Humidity	< 95 % r.h.
Operation	IEC 721-3-3
Climatic conditions	class 3K5
Mechanical conditions	class 2M2
Temperature range	-20...+60 °C
Humidity	< 95 % r.h.



Condensation, formation of ice and ingress of water are not permitted.

Valve components	Materials used	
	VRF... valves	VRH... valves
Valve body and cover	GG20 cast iron	GG20 cast iron
Plug	Phosphated steel	Phosphated steel
Plug seal	Novapress 200	Novapress 200
Sealing material	Viton	Viton
Stem	SB machining steel X12 CrNi S18 8	RS machining steel X12 CrMo S17
Stem seal	Viton	Viton
Stem bushing	RS machining steel X12 CrMo S17	RS machining steel X12 CrMo S17
Screws	Phosphated steel	Phosphated steel
Return spring	Nimonic 90 spring steel NiCr20 Co18 Ti	Nimonic 90 spring steel NiCr20 Co18 Ti
Safety washer + lockwasher	NiSn spring steel, coated	NiSn spring steel, coated
Levers	---	Phosphated or nitrated steel
Axles	---	RS machining steel X12 CrMo S17
Contour of valve disk	PBT polyester, glass ball reinforced	---
Strainer	St V2a wire mesh	---

Actuators

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

Type reference	Date sheet	Function
SKP10	7641	ON / OFF
SKP20	7641	ON / OFF with constant pressure control
SKP27/SQS27	7644	ON / OFF with pressure control and setpoint adjustment by electric signal
SKP50	7648	ON / OFF with ratio control , signal input → differential pressure
SKP70	7651	ON / OFF with ratio control , signal input → static pressure
SQX31/AGA60	4551	Modulating 3-position control ⇒ Not suited as a safety shutoff valve

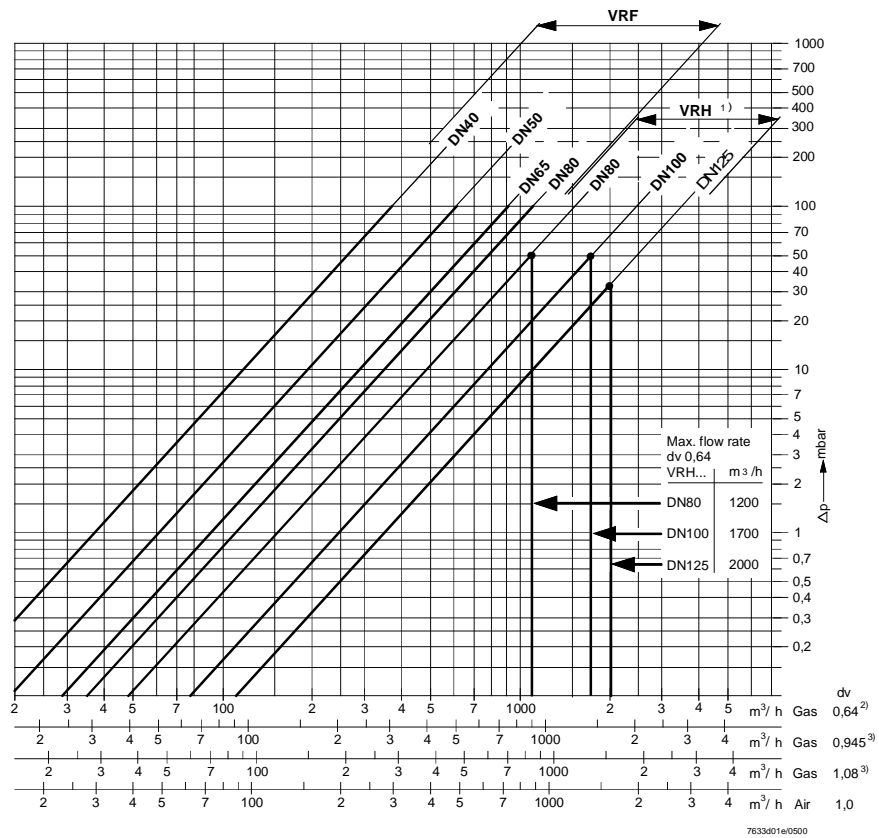
The valves are also suited for use with the SKL... actuators.

In that case however, the valves cannot be employed as safety shutoff valves and are only permitted in connection with air or non-hazardous gases.

⇒ Cosing time 4...6 s

Flow chart

For fully open valves



The bold lines correspond to the recommended pressure drop ranges.
Valves with higher pressure drops can cause noise.

- 1) The VRH... flow rate curves correspond to valves with no strainer.
Each strainer used reduces the flow rate by 8 %
- 2) Natural gas
- 3) Typical biogas

$$dv \text{ density ratio to air at } +22^\circ\text{C} = \frac{x \text{ kg / m}^3 \text{ gas}}{1.22 \text{ kg / m}^3 \text{ (air)}}$$

When used in connection with actuators having an integrated governor, the nominal valve size should not be chosen too large, the reason being control performance.

This applies especially to burners with small low fire rates and to burners where the change from high fire to low fire takes no more than 5 s.

Determination of pressure drop for gases having a density ratio «dv» other than that of the chart scales above.

Required variables

p(gas) Gas density in kg/m³
V(gas) Gas volume in m³/h

Procedure

a) Calculation of gas density ratio «dv(gas)»:

$$dv(\text{Gas}) = \frac{\text{Density (gas) in kg / m}^3}{1.22 \text{ kg / m}^3 \text{ (= density of air)}}$$

b) Determination of air volume «V(air)» that produces the same pressure drop «Δp» as «V(gas)»:

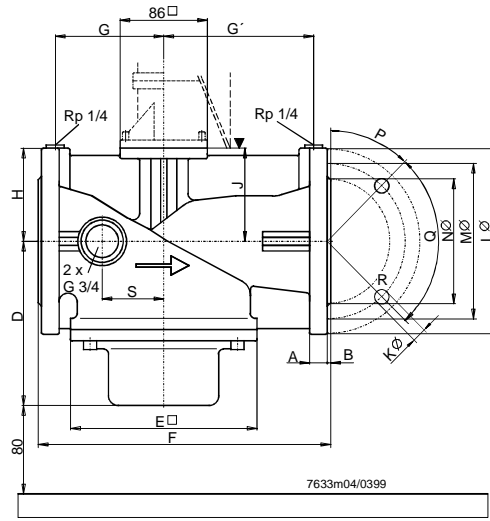
$$V(\text{air}) = \frac{V(\text{gas}) \text{ in m}^3 / \text{h}}{\sqrt{dv(\text{gas})}} = \text{m}^3 / \text{h}$$

c) Determination of gas pressure drop «Δp» with the help of the flow chart based on the calculated «V(air)» of the chart scale.

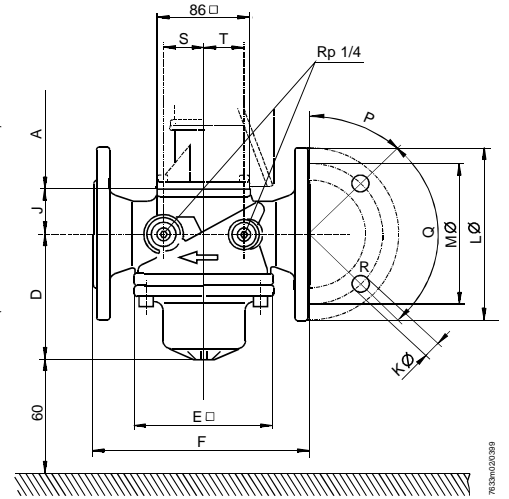
Dimensions

Dimensions in mm
(dimensions and weights of valves without actuators)

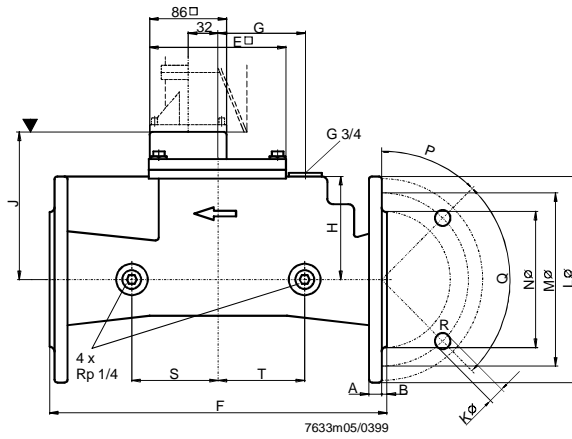
VRF... / DN65...DN80



VRF...DN40, DN50



VRH... / DN80...DN125



▼ Mounting surface for actuator

Table of dimensions

Type	DN 1)	A	B	D	E □	F	G	G'	H	J	K Ø	L Ø	M Ø	N Ø	P	Q	R	S	T	kg
VRF...	40	13	---	102	126	200	---	---	---	41	19	150	110	88	45°	90°	4	36	36	6
	50	13	---	107	126	230	---	---	---	50	19	165	125	102	45°	90°	4	42	42	7.5
	65	16.5	3	163	185	290	108	148	95	92	19	185	145	120	45°	90°	4	62	---	15.3
	80	19	3	163	185	310	118	158	102	100	19	200	160	131	22.5°	45°	8	62	---	17.9
VRH...	80	15	3	---	160	310	102	---	105	159	19	200	160	131	22.5°	45°	8	95	95	16.3
	100	16	3	---	160	350	102	---	105	166	19	220	180	157	22.5°	45°	8	95	95	18.6
	125	17	3	---	160	400	102	---	121	174	19	250	210	187	22.5°	45°	8	95	95	23.4

A From mounting surface for actuator (refer to relevant data sheet on actuator)

DN Nominal valve size (for connection of medium)

R Number of bore-holes

1) Flanges to ISO 7005-2