



Electrohydraulic Actuators Gas Pressure Governors Gas Valves

SKP10...
SKP20...
VGG... / VGF... /
VGH... / VGD...



SKP20...VGF...



SKP20...VGG...



SKP10...VGG...



SKP20...VGH...

On / off safety shutoff valves; two-stage or with integrated constant or balanced gas pressure governor; for natural gas, town gas or liquefied petroleum gas in the low pressure range.

Electrohydraulic actuators featuring delayed opening and rapid closing.

The SKP10... / SKP20... and this data sheet are intended for use by OEMs which integrate the actuators and gas valves in their products!

Use

The VG... gas valves with their electrohydraulic SKP... actuators are designed for the gas families I, II, III and air. They are used primarily in gas-fired combustion plant. The valves open slowly and close rapidly.

All types of VG... gas valves can be combined with the available types of actuators. The actuator is mounted onto the valve body by means of the 4 screws contained in the terminal compartment. The square flange can be turned in steps of 90°, thus allowing 4 different mounting positions.

The actuator can be mounted or replaced while the valve is under pressure. Sealing materials are not required.

Actuator type SKP20... features an integrated precision gas pressure governor. This actuator is to be mounted downstream from the minimum gas pressure monitor so that the burner can be started up only when sufficient gas pressure is available. This type of actuator with integrated gas pressure governor not only reduces the length of the gas train, but usually also permits selection of a smaller valve size.

For detailed information on valve sizing, refer to «Flow chart».

The actuator is also available with limit or auxiliary changeover switches, e.g. for indicating the fully closed position or for stroke limitation in connection with two-stage gas release.



When used in conjunction with the SKP20... actuator with integrated gas pressure governor, the minimum gas pressure monitor **must always be mounted upstream of the valve!**

Warning notes



To 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 actuators and valves!

- Before performing any wiring changes in the connection area of the SKP..., completely isolate the actuator from the mains supply!
- Ensure protection against electric shock by properly mounting the SKP... and by providing adequate protection for the connection terminals!
- Check wiring and all safety functions!

Mounting notes

The relevant national safety regulations must be complied with!

Installation notes

Installation and commissioning work may only be carried out by qualified staff!

Service notes

- VGH... valves may only be overhauled by Landis & Staefa Repair Centers!
- VGH... valves are supplied without strainer. They must be installed with either a gas filter upstream of the valve or an AGK... strainer (refer to «Accessories») on the valve's gas inlet side.

Technical data

Actuators

Operating voltage ¹⁾	AC 220 V -15 %...AC 240 V +10 % AC 100 V -15 %...AC 110 V +10 %	Switching capacity of switches 6 (2) A, AC 250 V Setting range of switches 4...96 % stroke Closing time < 1 s Degree of protection IP54 On time 100 %
¹⁾ For details, refer to «Type summary»		
Mains frequency	50...60 Hz	Opening time for full stroke
Power consumption (depending on operating voltage)		²⁾ depending on nominal size
- A-series	13.5...18 VA	approx. 2 mm / s 6...12 s
- B-series	9...13.5 VA	²⁾ Extended opening time at temperatures below 0 °C!
Environmental conditions		Perm. mounting orientation horizontal or vertical with actuator at the top
Transport	IEC 721-3-2	
Climatic conditions	class 2K2	
Temperature range	-15...+60 °C ²⁾	Weight
Humidity	< 95 % r.h.	- Without governor approx. 1250 g - With governor approx. 1650 g
Mechanical conditions	class 2M2	
Operation	IEC 721-3-3	CE conformity
Climatic conditions	class 3K5	According to the directives of the European Union
Temperature range	-15...+60 °C ²⁾	Electromagnetic compatibility EMC
Humidity	< 95 % r.h.	89 / 336 EEC incl. 92 / 31 EEC
Condensation, formation of ice and ingress of water are not permitted!		Directive for gas appliances 90 / 396 EEC



Gas pressure governor

Control class	A to DIN EN 88	Recommended min. distance between impulse pipe connection and gas valve 5 x nominal size
Balanced pressure governor	EN 12067-1	
Vent pipe	not required with inlet pressures up to 100 mbar, to DIN	Dia. of impulse pipe min. 4 mm Impulse pipe connection internally threaded, Rp ¼ Perm. vacuum 200 mbar Perm. test pressure «PG» 1000 mbar Max. inlet pressure same as valve
Setting ranges	0...250 mbar, refer to «Type summary»	

Valves

Valve class	A	Types of gas to DVGW
Valve group	2	gas families I, II, III and air
Perm. medium temperature	max. +60 °C	
Operating pressure, etc. refer to «Type summary»		Weight refer to «Dimensions»

Mechanical design

SKP10... actuator

The actuator's hydraulic drive system consists of a cylinder filled with oil and an electric oscillating pump with piston and relief valve.

The relief valve is located in the bypass between the suction and pressure side of the pump. With the actuators of the B-series, it is a valve hydraulically actuated by the pump pressure; with the two-stage actuators of the A-series, it is a normally open solenoid valve.

The cylinder carries a seal which hydraulically separates the inlet from the outlet side of the pump, also serving as a guidance for the piston. The piston is also guided by a rod which is rigidly connected to it. This rod transfers the piston's travel directly to the valve stem.

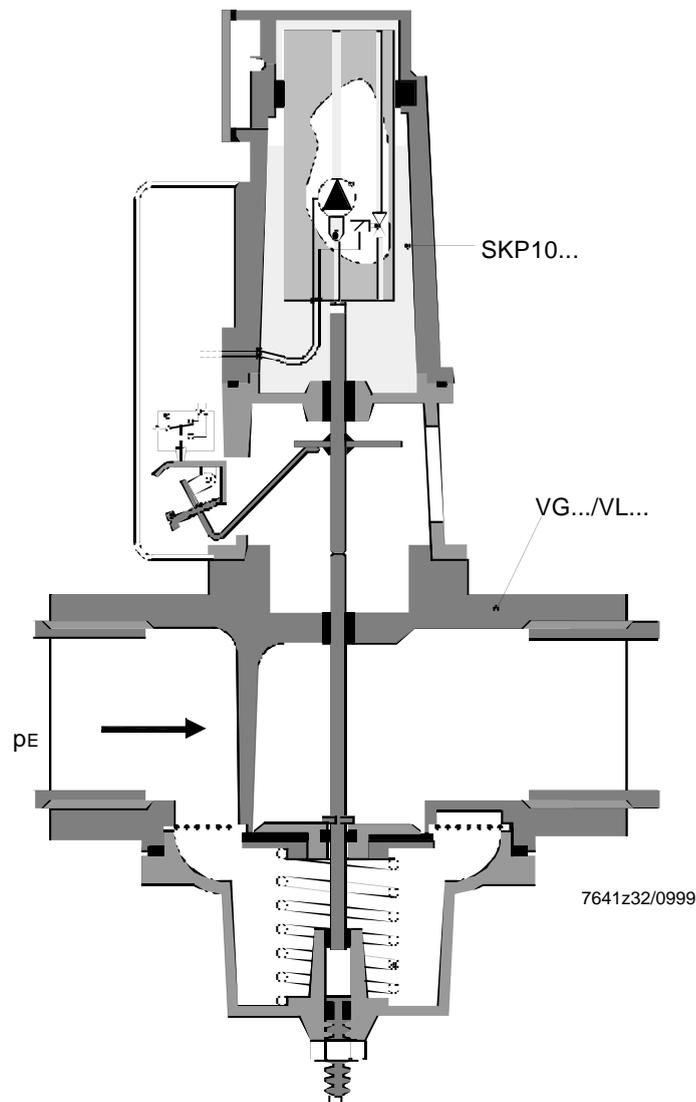
The rod is provided with a disk the position of which is visible through a window in the console (indication of stroke).

Using a lever system, the disk also actuates

- the auxiliary switch for indicating the fully closed position, or
- other positions, as well as the limit changeover switches for positioning the low- and high-fire stroke with the two-stage actuators

The switching points of these switches are adjustable over the entire stroke. The adjusting screws are located in the terminal compartment.

Basic design



SKP20... actuator with gas pressure governor

- The gas pressure governor consists of
- working diaphragm
 - safety diaphragm
 - lever system for actuating a ball valve located in the bypass between the suction and pressure side of the hydraulic system (refer to «Function»)

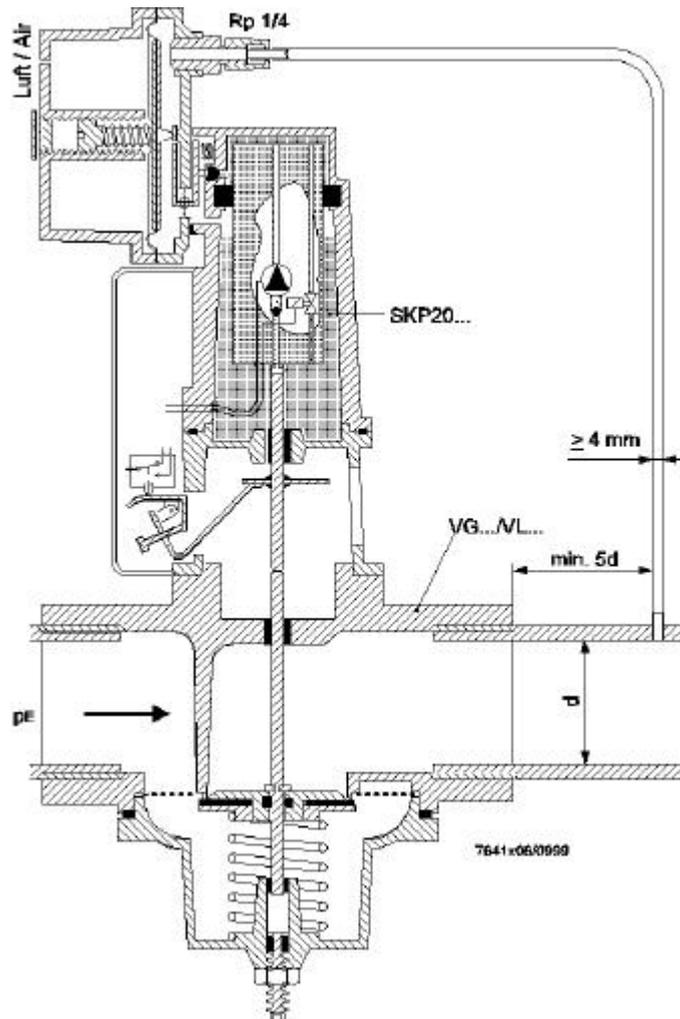
The setpoint adjustment can be sealed.

The impulse pipe connection is Rp 1/4.

Owing to the use of a safety diaphragm, a vent pipe is not required with inlet pressures up to 100 mbar.

When used in connection with a gas valve proving system, the permissible vacuum is 200 mbar. The housings of actuator and governor are made of die-cast aluminium and the seals are made of elastomer.

Basic design



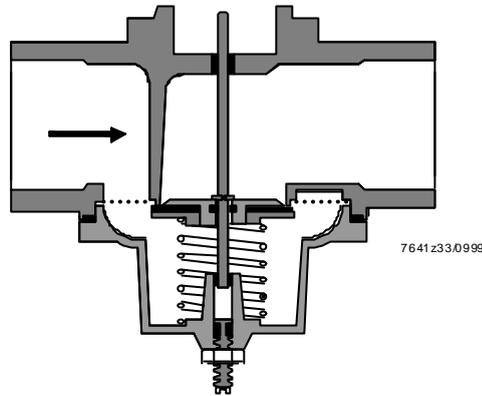
VGG... and VGF... valves

These valves are of the normally closed one-way disk type. Their stem is guided on both sides of the disk, thus ensuring precise alignment of the stroke as well as tight shutoff.

The closing force of the return spring is supported by the prevailing gas pressure. The valves are available with profiled or flat disks and with or without stroke limitation (refer to «Type summary»).

An interchangeable strainer made of stainless steel protects seat and disk as well as downstream controls from dirt.

Basic design of VGG... and VGF... valves



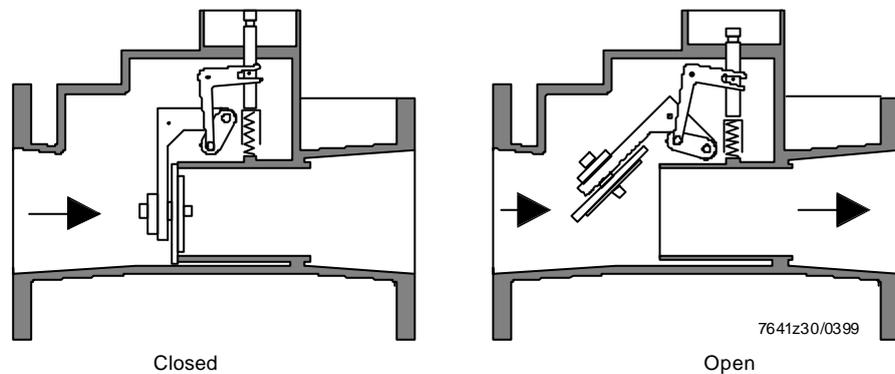
VGH... valves

These valves are of the normally closed one-way high-flow types. The swing-type flap has no profile.

The great closing force of the return spring is supported by the prevailing gas pressure.

An AGA... strainer is available as an accessory item (refer to «Accessories»)

Basic design of VGH... valves



Type summary

SKP10... / SKP20... for use with VG... valves

Operating voltage	Without governor	With governor up to 22 mbar	Balanced pressure governor
	Type reference	Type reference	Type reference
Single-stage opening and closing; without limit and auxiliary changeover switches			
AC 100...110 V	SKP10.110B17	SKP20.110B17	SKP20.130B27
AC 220...240 V	SKP10.110B27	SKP20.110B27	
Single-stage opening and closing; one auxiliary changeover switch			
AC 100...110 V	SKP10.111B17	SKP20.111B17	
AC 220...240 V	SKP10.111B27	SKP20.111B27	
Two-stage opening and closing; with two limit and one auxiliary changeover switch			
AC 100...110 V	SKP10.123A17	---	
AC 220...240 V	SKP10.123A27	---	

Accessories for gas pressure governor

Setpoint spring		
15...120 mbar	(Yellow)	AGA22
100...250 mbar	(Red)	AGA23
Damping throttle		
Refer to «Charts»		AGA25

VG... valves

Nominal size	Valve body material	Perm. operating pressure in mbar		Flow rate of air at $\Delta p = 1 \text{ mbar}$ / m^3/h	Number of connections		Type reference				Replacement set order no.	
		Europe and Australia (to EN)	Other countries		Test point ⁵⁾ Rp 1/4	Pilot gas ⁶⁾ G 3/4	With profile		Without profile			
								Without adjustable stroke limitation	With adjustable ¹⁾ stroke limitation	Without adjustable stroke limitation	With adjustable ¹⁾ stroke limitation	
Internally threaded to ISO 7/1												
1/2"	Die-cast Al	1200	1200	4.8	4	---	VG10.154P	VGG10.1541P ²⁾	---	---	---	4 679 1560 0
3/4"	Die-cast Al	1200	1200	8.9	4	---	VGG10.204P	VGG10.2041P ²⁾	VGG10.204	VGG10.2041 ²⁾	---	4 679 1492 0
1"	Die-cast Al	1200	1200	13.3	4	---	VGG10.254P	VGG10.2541P ²⁾	VGG10.254	VGG10.2541 ²⁾	---	4 679 1493 0
1 1/2"	Die-cast Al	600	600	32.3	4	---	VGG10.404P	VGG10.4041P	VGG10.404	VGG10.4041	---	4 679 1494 0
2"	Die-cast Al	600	600	47.4	4	---	VGG10.504P	VGG10.5041P	VGG10.504	VGG10.5041	---	4 679 1495 0
3"	Cast iron	600	600	85.4	2	2	VGG10.804P	VGG10.8041P	VGG10.804	VGG10.8041	---	4 679 1559 0 ³⁾
Flanged, PN16, to ISO 7005												
DN40	Cast iron	600	600	32.3	4	---	VG10.404P	VGF10.4041P	VGF10.404	VGF10.4041	---	4 679 1494 0
DN50	Cast iron	600	600	47.4	4	---	VGF10.504P	VGF10.5041P	VGF10.504	VGF10.5041	---	4 679 1495 0 ³⁾
DN65	Cast iron	600	600	74	2	2	VGF10.654P	VGF10.6541P	VGF10.654	VGF10.6541	---	4 679 1558 0 ³⁾
DN80	Cast iron	600	600	85.4	2	2	VGF10.804P	VGF10.8041P	VGF10.804	VGF10.8041	---	4 679 1559 0
Disk type valves, high-flow, with swing-type flap. Great closing force. Without strainer, to DIN, can only be used in plants having a gas filter. These valves may only be overhauled by Landis + Staefa Repair Centers												
DN80	Cast iron	300	600	128.4	4	1	VGH10.18050	---	---	---	---	---
DN100	Cast iron	300	400	199.2	4	1	VGH10.19050	---	---	---	---	---
DN125	Cast iron	300	300	277.6	4	1	VGH10.19150	---	---	---	---	---

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- 1) Not for use with integrated gas pressure governor
 2) Flow rate 20 % lower
 3) Refer to notes under «Replacement sets»!
 4) Only available with profile
 5) Equal share on inlet and outlet side
 6) On inlet side, VGG... and VGF...: one connection on each side

Accessories for valves

Strainers for VGH... valves, with compression fitting, mesh size 1 mm

For VGH10.18050	DN80	AGA80
For VGH10.19050	DN100	AGA80
For VGH10.19150	DN125	AGA91

Replacement sets consisting of:
Stem, disk, filter, screws, washers and gaskets



For ordering no., refer to «Type summary / Valves»
No replacement sets are available for VGH... valves!

All service replacement sets can also be used with the predecessor types, with the exception of:

Type reference	DN / Dim.	Ordering no.
VGF10.1655...	65	4 679 9501 0
VGG10.1805...	3"	4 679 9502 0
VGF10.1805...	80	4 679 9502 0



When used with gas, the valves constitute part of the safety equipment.
 Any opening, exchanging parts or modifying the original equipment is undertaken at the user's own responsibility and risk!

Functions

Single-stage actuators

When an opening command is given, the pump is switched on and the relief valve closed. From the nearly filled reservoir below the piston, the oil is now pumped into the chamber above the piston, causing the piston to move downward and thus opening the valve – against the force of the return spring. The pump remains activated until a closing command is given. When closing, or in the event of a power failure, the pump stops and the relief valve opens the bypass, allowing the return spring to push the piston upward again. The relief valve is sized such that the gas valve fully closes within about 0.6 seconds.

Two-stage actuators

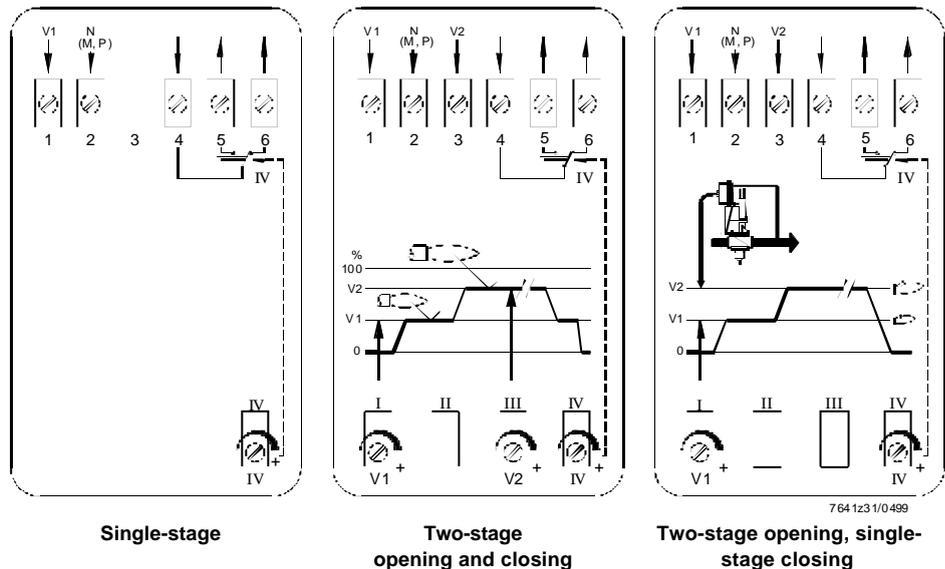
With these valves, opening starts in the same manner as with the single-stage valves. However, when the low-fire position is reached, the disk actuates switch «V1» via a lever system, which is adjusted for the low-fire stroke. The pump is now switched off so that the valve disk maintains its present position. The pump will not be activated again until the burner control feeds power to terminal 3 of the actuator – be it directly or via the load controller. High-fire stroke is reached when switch «V2» switches over, thus cutting the power supply to the pump. If the load controller cuts the power supply to terminal 3, the relief valve is opened until the low-fire position is reached. If terminals 1 and 3 are without power, the actuator returns to its fully closed position in less than 1 second.

Actuators with gas pressure governor

When using a gas pressure governor, the outlet pressure acting on the diaphragm represents the actual value. The diaphragm is supported by a spring the force of which is adjustable, representing the setpoint. The movements of the diaphragm are transferred to a lever system which acts on a ball valve located in the bypass between the suction and pressure side of the pump. If the actual value lies below the setpoint, the bypass is closed so that the actuator can open the gas valve. If the actual value exceeds the setpoint, the bypass is opened to some degree so that a certain amount of oil can return from the pressure side to the reservoir. The piston travels upward and the gas valve closes a little bit more.

This counter-movement ends as soon as the actual value equals the setpoint. In this position, the opening of the bypass is such that the return flow through the bypass corresponds to the current oil output of the pump. Control accuracy is very good since small movements of the diaphragm are sufficient to trigger the control functions described above. The control characteristic is that of a P-controller with a very small proportional band.

Assignment of terminals



Single-stage

Two-stage opening and closing

Two-stage opening, single-stage closing

Legend

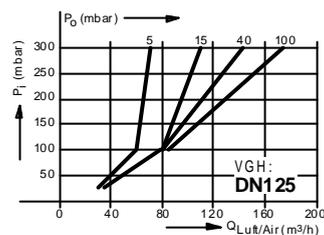
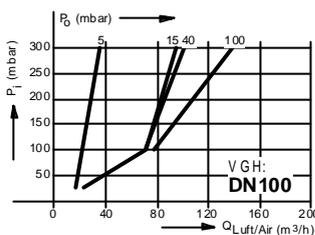
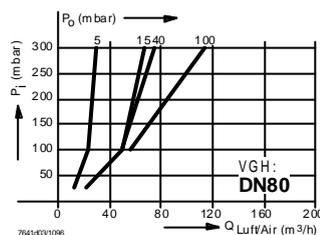
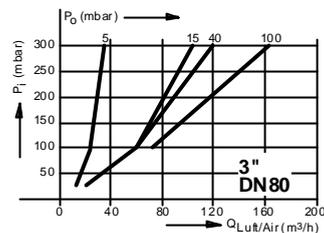
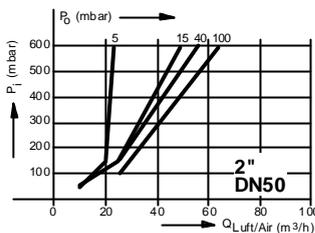
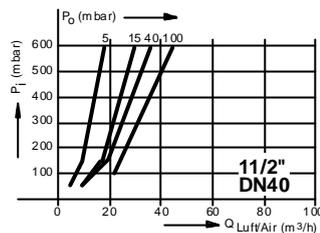
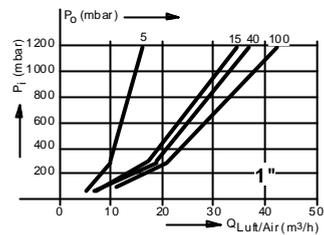
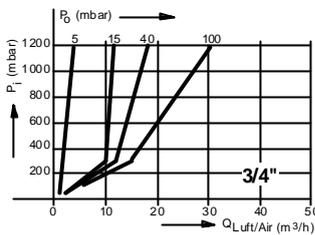
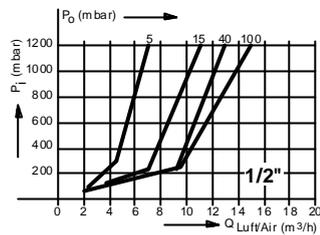
V	Control input	V2	Control input stage 2
V1	Control input stage 1	IV	Auxiliary changeover switch

Minimum flow rate required when using the SKP20... actuator

The charts below show the minimum flow rates «Q» required, depending on the inlet pressure «Pi» and outlet pressure «Po» adjusted on the gas pressure governor. The flow rate must never fall below these minimum levels because too small flow rates at high inlet pressures cause the pressure control to hunt.

By screwing the AGA25 damping throttle into the governor's vent opening, oscillations can be suppressed to a certain degree (start-up characteristic with low-fire loads). The limit values are thus lower than those given in the charts below.

All curves for the VGG... and VGF... are only applicable to the valve types with profile (VG...)



Example for 2" valves

P_i = 300 mbar

P_o = 100 mbar

Q_{min} = 40 m³ / h air
 = 40 x 1.24 m³ / h natural gas
 = 49.6 m³ / h natural gas

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Flow chart 1)

For control performance reasons, when using the SKP20... actuators with integrated governor, the nominal valve size should not be too large. This applies in particular to burners burning small amounts of gas in the low-fire position and to burners changing from high-fire to low-fire in less than 5 s.

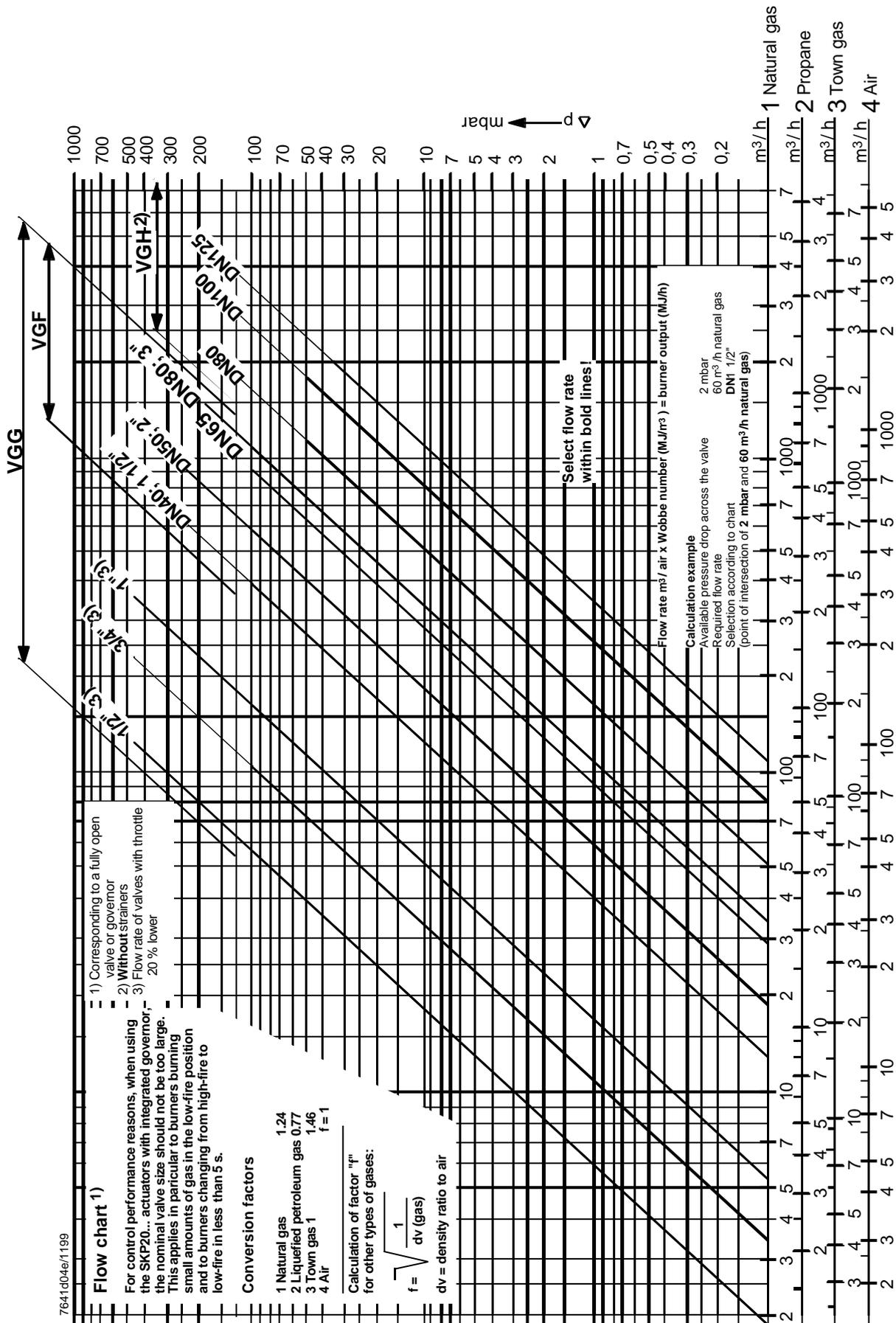
Conversion factors

- 1 Natural gas 1.24
- 2 Liquefied petroleum gas 0.77
- 3 Town gas 1.46
- 4 Air f = 1

Calculation of factor "f" for other types of gases:

$$f = \sqrt{\frac{1}{d_v(\text{gas})}}$$

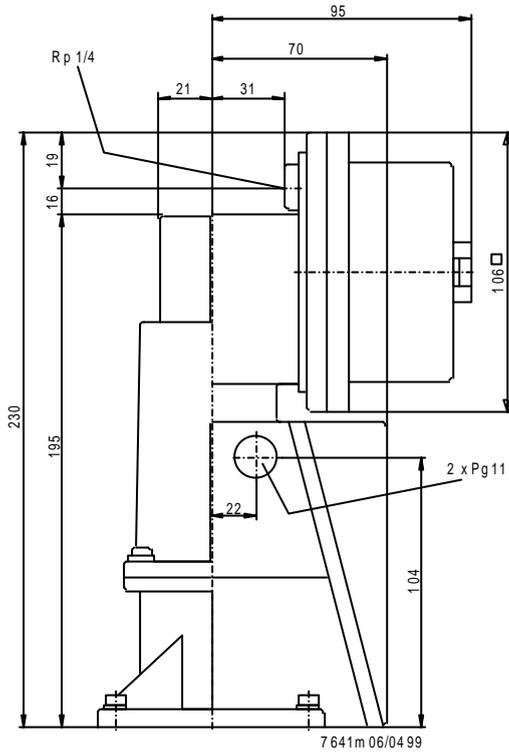
d_v = density ratio to air



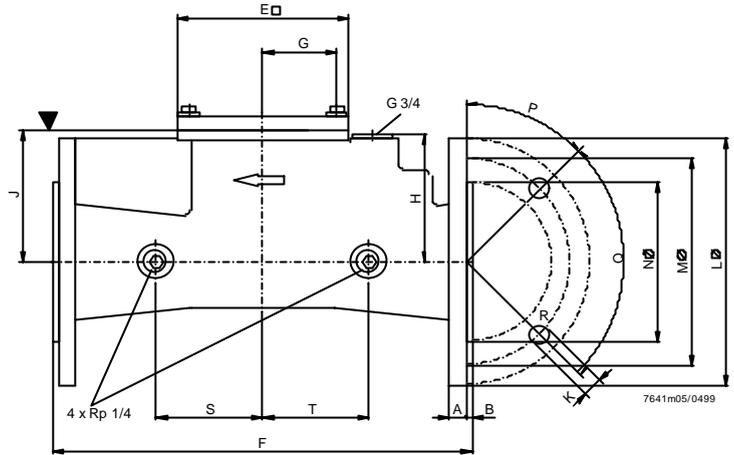
Dimensions

Dimensions in mm

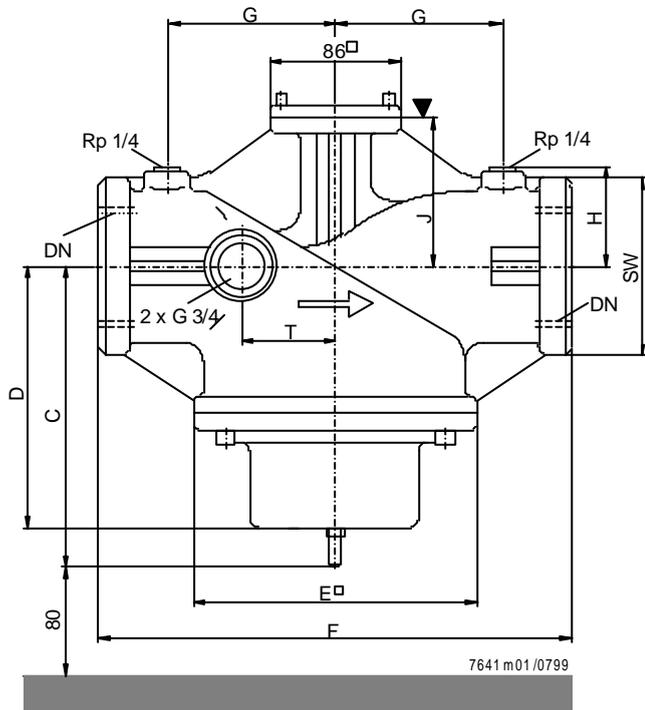
SKP20...



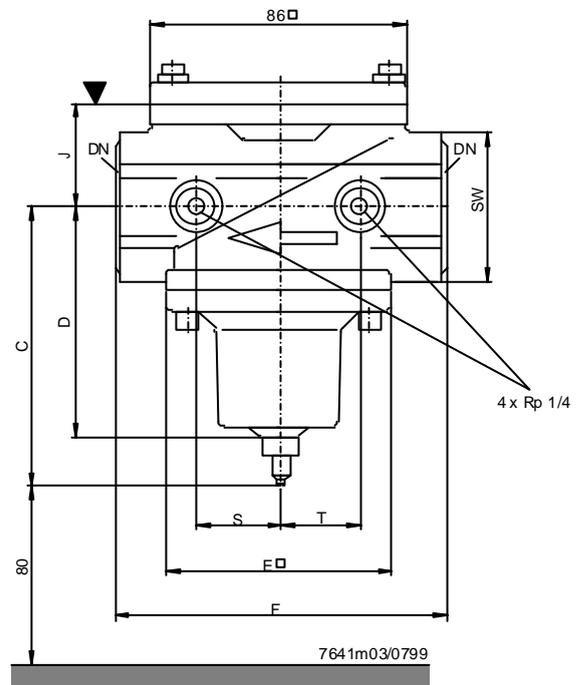
VGH... / DN80...125



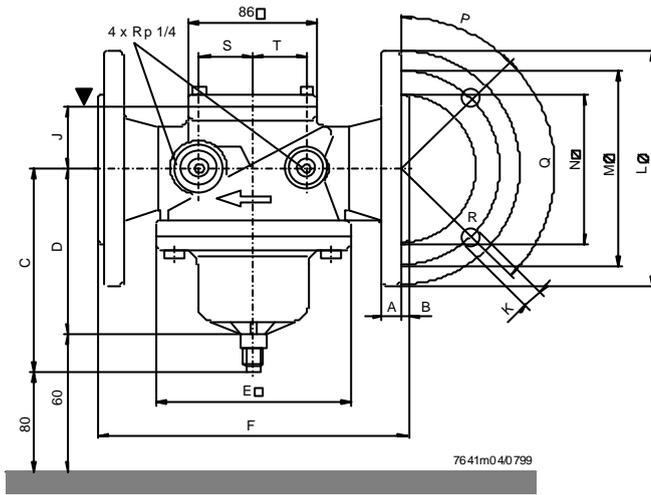
VGG 3"



VGG 1/2" ...2"

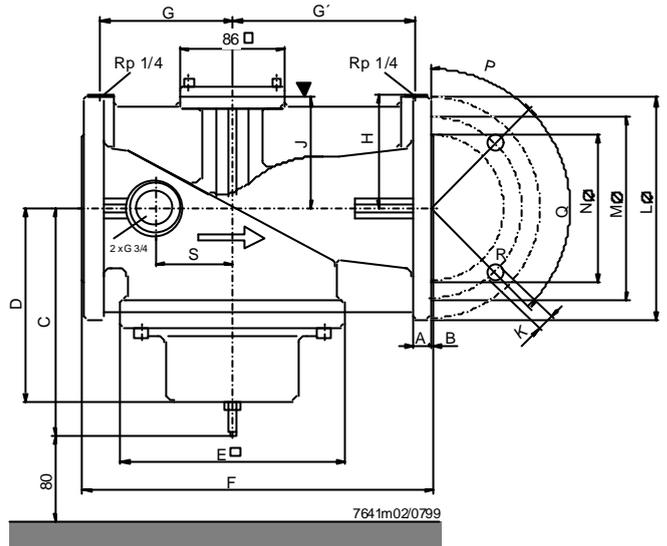


VG... / DN40...50



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VG... / DN65...80



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t Mounting surface for SKP... actuator or AGA60 adapter flange

Dimensions and weights of valves without actuator

Type		A	B	C	D	E □	F	G	G'	H	J	K	L ∅	M ∅	N ∅	P	Q	R ¹⁾	S	T	SW*	kg
VGG...	1/2"	---	---	96	79	80	109	---	---	---	32	---	---	---	---	---	---	---	28	31	46	0.8
	3/4"	---	---	96	79	80	109	---	---	---	32	---	---	---	---	---	---	---	28	31	46	0.8
	1"	---	---	96	79	80	109	---	---	---	32	---	---	---	---	---	---	---	28	31	46	0.75
	1 1/2"	---	---	126	102	126	150	---	---	---	41	---	---	---	---	---	---	---	34	34	60	1.4
	2"	---	---	130	107	126	170	---	---	---	50	---	---	---	---	---	---	---	34	34	75	1.95
3"	---	---	191	163	185	310	110	---	68	100	---	---	---	---	---	---	---	---	62	120	13.4	
VGF...	DN40	13	3	126	102	126	200	---	---	---	41	19	150	110	88	45°	90°	4	36	36	---	6
	DN50	13	3	130	107	126	230	---	---	---	50	19	165	125	102	45°	90°	4	42	42	---	7.5
	DN65	16.5	3	191	163	185	290	108	148	95	92	19	185	145	120	45°	90°	4	---	---	---	15.3
	DN80	19	3	191	163	185	310	118	158	102	100	19	200	160	131	22.5°	45°	8	---	---	---	17.9
VGH...	DN80	15	3	---	---	160	310	102	---	105	159	19	200	160	131	22.5°	45°	8	95	95	---	16.3
	DN100	16	3	---	---	160	350	102	---	105	166	19	220	180	157	22.5°	45°	8	95	95	---	18.6
	DN125	17	3	---	---	160	400	102	---	121	174	19	250	210	187	22.5°	45°	8	95	95	---	23.4

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1) Number of holes

For standards for flanges and threads, refer to «Type summary / Valves»

* Width across flats