

SKP Series

SKP25...U.. Pressure Regulating Gas Valve Actuator with Safety Shut-off Function



ISO 9001 and 14000
REGISTERED FIRM



Only when assembled to Series VG... Gas valves

Description

SKP25... pressure regulating electro-hydraulic actuators are used in combination with VG... series gas valve bodies to provide safety shut-off and gas pressure regulation for industrial and commercial burners. The SKP25... can also be applied as a 1:1 air/gas ratio regulator or zero governor.

Since a single valve performs two or more functions, fewer gas train components and fittings are required. This significantly reduces both the size and weight of the gas train. In addition, smaller diameter gas valves can be used.

The compact SKP25... actuator opens slowly and closes immediately when power is interrupted. The modular design allows the SKP25... to be used in combination with all VG... series gas valve bodies from 1/2-inch to 6-inch in size. The actuator is easily mounted on the square flange of any VG... valve with four pre-mounted screws. A visible position indicator on the front of the actuator displays the entire stroke of the valve. A light indicates when the actuator is powered.

Features

- UL listed, FM approved, CSA certified for USA and Canada, IRI approvable, ISO 9001 certified. European, Australian and Japanese approved versions available.
- Certified as a ventless pressure regulator.
- Safety shut-off function and pressure regulating function in one compact unit.
- Proof of Closure with Over Travel (POC) versions are available.
- Optional NEMA 4 protection.
- Visual position indication.
- "Power on" indication light
- Quick connect wiring terminals
- Optional adjustable auxiliary switch available.
- Applicable as 1:1 air/gas ratio regulator or zero governor.
- Accurate pressure control characteristics, and zero offset (droop).
- Modular design with 360° actuator rotation for easy field wiring and installation.
- Low, 13.5 VA power consumption.

Application SKP25... series actuators are combined with 1/2-inch to 6-inch VG... series gas valve bodies. VG... series gas valves must be ordered separately (See *VG...U... Technical Instructions*, P/N 155-512P25).

Product Numbers **Table 1.**

Product Number ¹	Operating Voltage	Function	Proof of Closure Switch ⁵	Auxiliary Switch ⁵	Type of Switch
SKP25.011U1	110 to 120 Vac	regulator	x	–	SPDT
SKP25.012U1		regulator	x	x	SPDT SPDT
SKP25.013U1		regulator	–	–	–
SKP25.411U1 ²		regulator	x	–	SPDT
SKP25.611U1 ³		ratio regulator	x	–	SPDT
SKP25.011U1P ⁴		ratio regulator	x	–	SPDT
SKP25.012U2	220 to 240 Vac	regulator	x	x	SPDT SPDT
SKP25.013U2		regulator	–	–	–

- NOTES:**
1. European, CE certified models are available (see *data sheet 7643*)
 2. High outlet pressure model for 1.5 to 20 psi outlet pressure regulation
 3. High bias air/gas ratio regulator with factory installed spring for 0" to –4" WC bias.
 4. Low bias air/gas ratio regulator with factory installed spring for 0" to –0.6" WC bias.
 5. Proof of closure and auxiliary switches cannot be field installed.

Accessories **Table 2.**

Product Number	Description
AGA22	Yellow setpoint spring for 6" to 48" WC (1.5 to 10 psi for SKP25.411U1)
AGA23	Red setpoint spring for 40" to 100" WC (8.5 to 20 psi for SKP25.411U1)
AGA25	Damping orifice for mounting into vent connection of SKP25.0... models
AGA28	Black bias spring to install if SKP25.0... is used as air/gas ratio regulator or zero governor
AGA29	Unpainted setpoint spring for 0" to 8.5" WC (included in SKP25.0... as standard)
AGA66	Sealing gasket to provide NEMA 3, 3R, and 4 protection (for VGG.../VGD... valves)

Specifications	As a safety shut-off valve	UL/429, FM/7400, ANSI Z21.21/CGA 6.5 C/I Agency marks apply only for SKPxx.xxxU actuators assembled with VGxxx.xxxU series gas valve bodies.
Agency approvals	As a pressure regulator	ANSI Z21.18/CGA 6.3
Power supply	Operating voltage	110 to 120 Vac + 10% to -15% 220 to 240 Vac + 10% to -15%
	Operating frequency	50 to 60 Hz ±6%
	Power consumption	13.5 VA
	Duty cycle	continuous
	Operating environment	Ambient operating temperature
Mounting position		Any position
Maximum inlet gas pressure		Same as VG... series

Specifications, Continued Physical characteristics	Weight	3.5 lb (1.6 kg)	
	Enclosure	NEMA 1, 2, 5 and 12 for indoor use NEMA 3, 3R, and 4 with optional AGA66 gasket	
	Dimensions	See Figure 4	
	Specification for valve bodies	See <i>gas valve Technical Instructions</i> , P/N 155-512P25	
Connections	Conduit connection	Two 1/2-inch NPSM threaded knock-outs	
	Electrical connection	Spring loaded terminals for 14 AWG wires	
	Gas connection	1/4" NPT	
	Air connection	1/4" NPT	
	Gas pressure test connection	Hose barb with close-off screw	
Operating characteristics	Output force	100 lb (450 N)	
	Maximum stroke	1 inch (26 mm)	
	Opening time for maximum stroke	Varies with valve size, 14 seconds for max. stroke	
	Closing time	< 0.8 seconds	
Operation/installation	Outlet pressure spring range SKP25.0...	0" to 8.5" WC (factory-installed, unpainted spring, AGA29) 6" to 48" WC (yellow spring, AGA22) 40" to 100" WC (red spring, AGA23)	
	SKP25.411U1	1.5 to 10 psi (factory-installed, yellow spring, AGA22) 8.5 to 20 psi (red spring, AGA23)	
	SKP25.0... (1:1 air/gas ratio regulator or zero governor)	± 0.4" WC bias (replace with black spring AGA28)	
	SKP25.611U1 (1:1 air/gas ratio regulator)	0" to -4.0" WC bias (factory installed, white spring)	
	SKP25.011U1P (1:1 air/gas ratio regulator)	0" to -0.6 " WC (factory installed, lavender spring)	
	Maximum sensing line pressure	20 psi	
	Maximum sensing line vacuum	3 psi for SKP25.0... models	
	Minimum sensing line diameter	1/4" inside diameter	
	Minimum distance between sensing line and gas valve outlet	5 times the pipe diameter	
	Minimum time required for high to low fire load changes	5 seconds	
	Auxiliary features	Proof of closure switch	Non-adjustable
		Setting range of auxiliary switch	40% to 100% of stroke
Switch rating		6A/250 Vac resistive; 3A/120 Vac pilot duty	

Operation

(See Figure 1)

Safety Shut-off Function

The electro-hydraulic actuator consists of a cylinder filled with oil, a piston containing an electric oscillating pump, and a relief system. When power is supplied to the actuator, the relief system closes, and the pump moves oil from the reservoir into the pressure chamber. This action causes the piston to move downward in the cylinder, opening the gas valve. When power to the actuator is interrupted, the relief system opens and the gas valve closes in less than 0.8 seconds.

A position indicator, visible through the transparent portion of the terminal cover, shows the entire stroke range of the actuator. A light, which is visible through the lower left transparent portion of the terminal cover, indicates when the actuator receives power. An optional, non-adjustable SPDT proof of closure over travel switch signals the closed position after the gas valve has closed. An optional SPDT auxiliary switch is adjustable between 40% and 100% of the stroke. The adjustment screw and scale are located on the right side in the terminal box, and are visible through the transparent portion of the terminal cover.

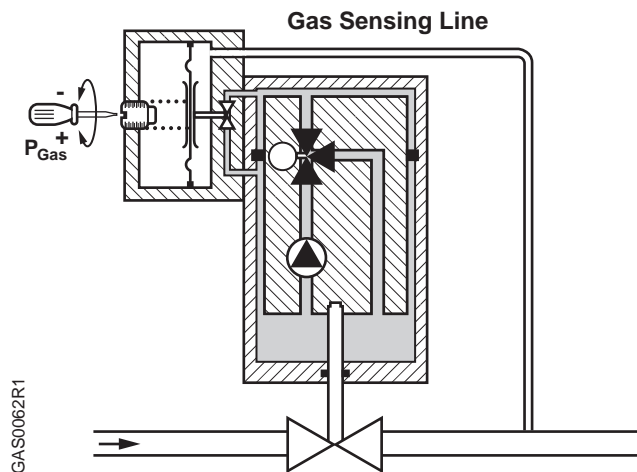


Figure 1. SKP25... Operation.

Constant Pressure Regulation Function

(See Figure 1)

The outlet gas pressure sensing line is connected to the 1/4" NPT port marked GAS on the back of the pressure regulator housing. The outlet pressure acts on the regulator diaphragm. The diaphragm is opposed by an adjustable setpoint spring force, which represents the desired gas pressure value. The movement of the diaphragm modulates a hydraulic bypass valve connecting the pressure chamber to the hydraulic fluid reservoir. When the outlet gas pressure is lower than the desired value, the bypass valve is closed by the movement of the diaphragm, causing the actuator piston to open the gas valve. The opposite occurs when the outlet gas pressure is higher than the desired value; the diaphragm moves to open the bypass causing the actuator piston to close the gas valve. The movement of the actuator piston stops once the outlet gas pressure is equal to the setpoint. In this position the bypass valve is partially open so that the oil flow supplied by the pump is identical to the return flow. Unlike the conventional direct acting regulators, the SKP25... servo operated regulating system displays virtually zero droop (offset) across the turndown range.

**Air/Gas Ratio Regulator
Function**

The SKP25.0... models may be applied as a 1:1 air/gas ratio regulator or as a zero governor. For either application, the standard spring has to be replaced with the black AGA28 spring, which allows to bias the gas pressure between 0.4" and -0.4" WC.

The low bias model SKP25.011U1P air/gas ratio regulator is designed as 1:1 air/gas ratio regulator which allows to bias the gas pressure between 0" and -0.6" WC. with the factory installed lavender spring. The actuator has a built in proof of closure switch.

The high bias model SKP25.611U1 air/gas ratio regulator model is designed as 1:1 air/gas ratio regulator which allows to bias the gas pressure between 0" and -4" WC. with the factory installed white spring. The actuator has a built in proof of closure switch.

For air/gas ratio regulation, the air pressure sensing line must be connected to the port marked "AIR".

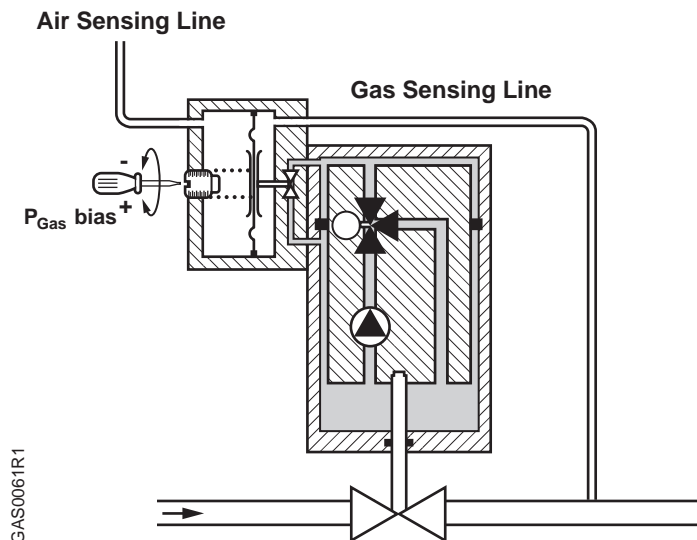


Figure 2. SKP25... Operation as 1:1 Air/Gas Ratio Regulator.

NOTES:

1. The gas bias has the greatest effect at low fire.
2. To adjust the gas pressure or bias, remove the brass cap in the center of the regulator cover.
3. To increase the downstream gas pressure, turn the adjustment screw clockwise.
4. SKP25.4... models must not be used as air/gas ratio regulator.
5. When using the double valve VGD..., mount the SKP2... on the downstream valve.
6. To avoid oscillation, do not oversize the VG... valve body. (See *Technical Instructions*, P/N 155-512P25.)

Installation



WARNING:

- Personal injury or loss of life may occur if procedures are not followed as specified.
- All installations must be performed by qualified personnel only.
- Do not pull the actuator shaft.
- If minimum gas pressure detection is required, the pressure switch must be mounted upstream of the regulating gas valve to ensure sufficient gas pressure before starting the burner. If maximum gas pressure detection is required the pressure switch must be mounted downstream.
- The AGA66 gasket must be installed between the actuator and the gas valve body to provide NEMA 3, 3R, and 4 protection rating for VGG... and VGD... valves.
- The gas pressure sensing line must be at least 1/4-inch inside diameter.
- The gas pressure sensing line connection must be flush with the inner wall of the gas pipe in order to sense turbulence free pressure. The gas sensing line connection should be located at least five pipe diameters downstream of the valve, elbow, coupling, or other flow disturbing fitting.
Do not use the taps on the valve body for the gas sensing line connection since these locations typically have strong turbulence. The pressure connection pipe should be as short as possible to allow the regulator to react to sudden changes.
- The SKP25... actuator is directly coupled to the VG... series valve body by four pre-mounted 4 mm Allen key screws.
- The square mounting flange can be rotated in steps of 90° to provide four different mounting positions. The SKP25... actuator can be mounted in any position with the diaphragm vertical, except upside down.
- The actuator can be mounted or replaced while the valve body is under pressure.
- The SKP25... actuator has two knock-outs for the installation of 1/2"-14 NPSM conduit connections.
- When conduit routing is connected, flexible conduit must be used.
- Liquid tight conduit must be used in combination with AGA66 to provide NEMA 3, 3R, and 4 protection.
- The terminal marked GND, located above the wiring terminals, must be connected to the electrical ground.

NOTE: Wiring must meet all relevant electrical codes.

**Start-up
Regulator**

The gas outlet pressure setpoint adjustment screw is located at the center of the regulator cover. Clockwise rotation of the setpoint adjustment screw increases the outlet gas pressure. The hexagonal cap must be tightened after the setpoint screw has been adjusted and may be sealed from tampering by means of a wire and lead seal. The outlet gas pressure can be measured at the hose barb at the back of the regulator housing. Turn the screw 1/2 turn counterclockwise before attaching the hose and tighten the screw after removing the hose.

The SKP25.0... models are available with three interchangeable setpoint springs for an adjustable range outlet pressure range of 0" to 100" WC. The factory-installed unpainted spring ranges from 0" to 8.5" WC. Other springs need to be ordered separately. (See Table 2.)

The SKP25.411U... models are available with two interchangeable setpoint springs for an adjustable range of 1.5 to 20 psi. The factory installed yellow spring ranges from 1.5 to 10 psi. The red spring (AGA23) for an adjustable range of 8.5 to 20 psi needs to be ordered separately.

**Air/Gas Ratio
Regulators**

For SKP25.0... models used as 1:1 air/gas ratio regulator connect the air sensing line to the port marked AIR and replace the factory installed spring with the black spring (AGA28) which needs to be ordered separately. The gas bias can be adjusted at the center of the regulator housing. For bias pressure ranges of all 1:1 air/gas ratio regulators see *Operation, Specifications* or Tables 1 and 2.

**WARNING:**

When firing at maximum burner capacity, ensure that the SKP25... /VG... is not in the fully open position. If this is the case, either the gas valve is sized too small or the gas supply pressure is too low.

**Wiring and Switch
Adjustment**

(See *Terminal Designations*)

- The actuator is equipped with spring-loaded terminals for 14 AWG wires.
- The actuator has two line and two neutral terminals.
- Insert one wire into the opening of the terminal while pressing the lever downward with a screwdriver or hard object. Make sure that all strands insert into the opening.
- Adjust the auxiliary switch (if provided) according to the wiring diagram on the label below the terminals (see Figure 3). The adjustment screw and scale are located on the right side of the terminal box, and are visible through the transparent portion of the terminal cover.

NOTES:

1. The auxiliary switch is adjustable between 40% and 100% of the stroke. The factory setting is at 40%.
 2. The auxiliary switch must not be used for proof of closure detection or other safety interlock functions.
 3. The Proof of Closure Switch is non-adjustable.
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Service

There are no serviceable parts on the SKP25... series actuators. If inoperative, replace the actuator. Tag wires before servicing.

Terminal Designations

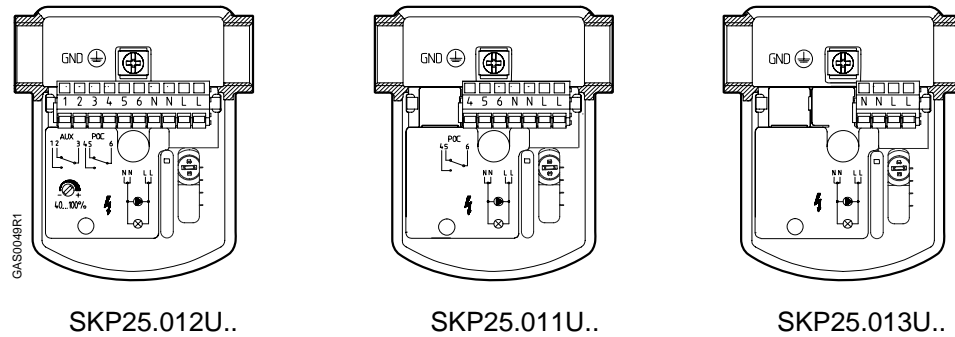


Figure 3. Terminal Designations.

Dimensions

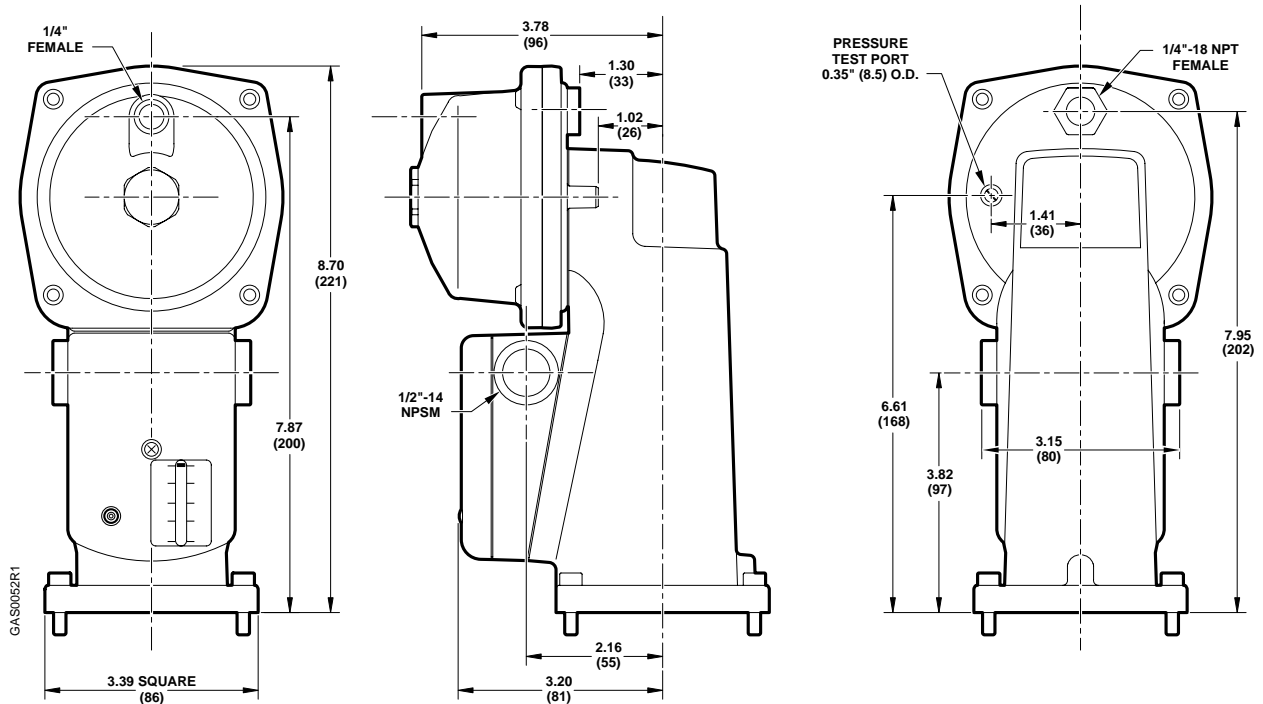


Figure 4. SKP25...U.. Dimensions in Inches, Millimeters in Parentheses.

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