

Safety Shut-off Valve
Slam Shut Valve
Emergency Shut-down Valve
APF-SSV, APF-EDS



APADANA PETRO FARAYAND

Safety shut-off valve

For safety reasons, gas lines must be equipped with valves that shut off the gas flow in the event of an unacceptable rise of the output pressure. Contrary to safety blow-off valves, safety shut-off valves thus block off the gas flow. In addition, shut-off valves have an emergency stop button that closes the valve manually or by remote control in a critical situation, blocking the gas flow regardless of any increase in the pressure. Safety shut-off valves can be used for all non-aggressive gases, such as natural gas, nitrogen, etc. (suitability in biogas plants subject to checking). Safety shut-off valves are available as stand-alone devices or in combination with a gas pressure regulator as a controller-integrated valve.

Apadana Petro Farayand safety shut-off valves come with many accessories such as position indicator (open/closed) and remote triggering.

Introduction

Safety shut-off valve is usually installed in gas distributing plants and units in front of the pressure regulator and provides control of the output pressure received behind the regulator. The signal about the deviation of the gas pressure from the set value is sent to the safety shut-off valve through the impulse tube connected to the output pressure gas pipeline. The value of the monitored pressure is adjusted by regulating the spring in the safety shut-off valve. When the set value of pressure behind the regulator is exceeded, the safety shut-off valve closes and shuts off the gas supply in the pipeline. The valve can only be opened manually after eliminating the cause of gas pressure excess above the controlled one.

The safety shut-off valve monitors the outlet gas pressure and interrupts the gas flow when the pressure exceeds the set point either way. In the larger versions, the triggering mechanism operates an intermediate blocking mechanism which closes the valve disk in the actuator housing. The valve is also used in combination with gas pressure regulators fitted with a safety shut-off valve.



Application

- Safety device for gas pressure regulating stations
- Suitable for natural gas according to IGS-M-CH-033, other gases on request

Characteristics

- Compact design, small face-to-face dimensions
- Low pressure drop due to valve seat diameter equal to pipe size diameter
- Easy maintenance due to interchangeable cartridge assemblies (plug-in system)
- Four tripping facilities; manual release as standard feature
- Can be provided with various measuring units for different response pressure ranges
- Electromagnetic release and remote indication of valve position as special features

Components

- Ball Valve
- Scotch-yoke actuator
- Control unit



Types of actuators

As shut-off valves form part of an SIS, it is necessary to operate the valve by means of an actuator. These actuators are normally fail safe fluid power type and typical examples of these are:

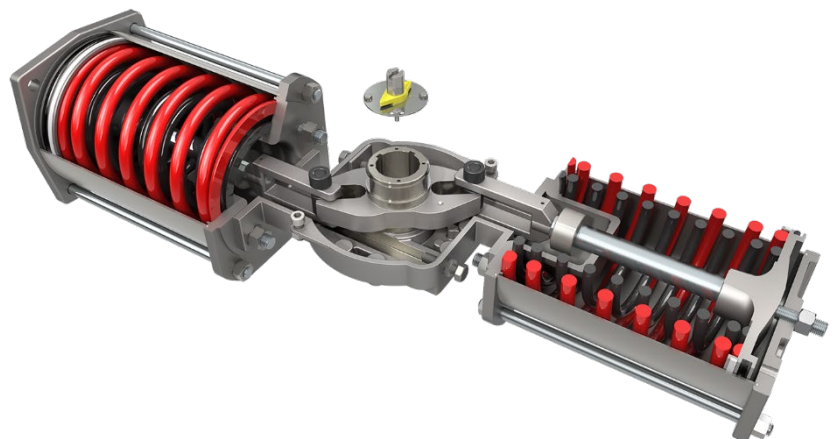
- Pneumatic cylinder actuator
- Hydraulic cylinder actuator
- Electro-hydraulic actuator

In addition to the fluid type, actuators also vary in the manner in which the energy is stored to operate the valve on demand as follows:

- Single-acting cylinder or spring return: Energy is stored by means of a compressed spring
- Double-acting cylinder: Energy is stored using a volume of compressed fluid

Very common and good types of actuators are the scotch-yoke types. Apadana Petro Farayand safety shut off valves are normally equipped with the pneumatic double acting scotch-yoke type actuators, though the other types are also available upon request. The scotch-yoke is a mechanism for converting the linear motion of a slider into rotational motion or vice-versa. The piston or other reciprocating part is directly coupled to a sliding yoke with a slot that engages a pin on the rotating part. The shape of the motion of the piston is a pure sine wave over time given a constant rotational speed. When pneumatic or hydraulic pressure is applied to the piston, a linear force is generated. The force is applied to the yoke, through the power transfer pin, at a distance from the center of the output shaft. As the yoke moves in a rotary fashion, torque is generated at the output shaft to provide the turning force required to cycle a valve. Some advantages of scotch-yoke mechanism are as below:

- Scotch-yoke actuators provide powerful open and close torque outputs; this closely matches the required torque for practical valve operation.
- Compact design and size
- Extremely long cyclic life
- Adjustable center stopper for both open & close positions



Principle of operation

Safety shut off valve consists of a ball valve complete with actuator and control system supplied in a self-contained and compact unit. All control components are installed in a weatherproof box with IP65 protection. This valve is installed in the pipeline and the required power supply is taken directly from the pipeline and is filtered, pressure regulated inside the control system and feed to the actuator itself or by the means of a medium fluid. A pressure signal line is taken from pipeline to the control system. The system holds the ball valve in the open position when the controlled pressure is within set values. When this pressure varies beyond setting limits, due to an equipment or operational malfunction or failure in its own system, it will react by shutting off the supply of gas by changing the position of the actuator. If required, the speed of closing is adjustable. The control system is equipped with a manual release push button to quickly close the valve in case of emergency or during the maintenance or checking operations. Once the valve is shut, it cannot be reopened without manual intervention for the safety of the system.

Design Standards

The safety shut off valves are designed base on the latest edition of following standards:

- IGS – MS – IN - 301
- IGS- MS - PL- 010 Parts 1, 2, 3
- API 6D
- API 6FA
- API 607
- BS 6755 Part 2
- BS 5351
- DIN/ISO 5211
- DIN 3337

Additional standards depend on customer specifications.



Mechanical features

- Outdoor installation
- Nominal diameters available NPS 2 to NPS 24 (Other sizes available upon request)
- ANSI Rating 150, 300, 600, 900
- Operating Temperature $-10^{\circ}\text{C} \sim +60^{\circ}\text{C}$
- Ambient temperature $-29^{\circ}\text{C} \sim +80^{\circ}\text{C}$
- Fail safe system under all failure conditions
- Adjustable pressure settings
- Manual closing push button
- Emergency storage tank
- High and/or Low pressure shut-off
- Shut-off at signal lost
- Shut-off at actuator power supply lost
- Adjustable open/close speed
- Open / Close travel stops minimum $\pm 5^{\circ}$
- Local position indication
- Supply line filtration prior entrance to control system

Optional features

- Design, Material and control functions to suit customers specific requirements
- Special standards requirements
- High or Low temperature services
- Sour gas service
- Valve type
- End connection type (F.E., W.E., ...)
- Actuator type
- Other nominal diameter and/or pressure rating required



Points that should be considered during installation

- Equipment group is "II category, Zone 0"
- Any electrical equipment is not used
- Static electrification is prevented
- Warning for safety

In case of valve's operation in the field, gas will be exhausted to the environment. Eliminate the objects which may cause fire and spark. During operation, 1 meter surrounding of valve should be considered as " Zone 0".

SSOV should be calibration tested once a year, latest 14 months without exceeding. We can provide spare parts for SSOVs by having the information from datasheet. Filter cartridge used in control box should be changed frequently enough in order to inhibit creation of pressure difference, depending on operation frequency and foreign materials carried by the gas.

Ball valves for SSOVs

- Trunnion ball valves
- Design according to API 6D
- Tight shut-off isolating
- Flanged ends or butt-welded ends
- Metal to metal seating and soft seat closure with emergency lubricant sealant
- Anti blow out, antistatic devices, fire test certificated
- NPS 2 ~ 56 size range
- Class 150, 300, 600
- Operating temperature -29 do +80 deg C

Features of ball valves

- Through conduit; suitable for pigging or hot tapping
- Bubble tight shut-off for low pressure and high pressure
- Double block and bleed
- Double isolating and bleed (optional)
- Split body, 3 pieces for easy dismantling
- Bi-directional
- Stem seal replacement possible under pipeline pressure
- Emergency stem sealing with lubricant
- Self-relief of body cavity
- Low operating torque, easy operation

Slam-shut valves

Slam-shut valves are designed to rapidly shut off the gas flow when the pipeline pressure exceeds or falls below predefined levels. Apadana Petro Farayand offers both standalone slam-shuts and integral regulator/slam-shut combinations that utilize a common body where the slam-shut is able to act independently of the regulator.

Applications

- Transmission
- Distribution
- City Gate
- Commercial Service
- Industrial Service
- Residential Service

Benefits

- **System Protection:** Under-pressure and/or overpressure protection of your downstream systems and equipment
- **Easy In-Line Maintenance:** Internal parts can be inspected and replaced without removing the body from the pipeline
- **Reliability:** Trip mechanism designed with accuracy and vibration resistance to avoid unintentional trips

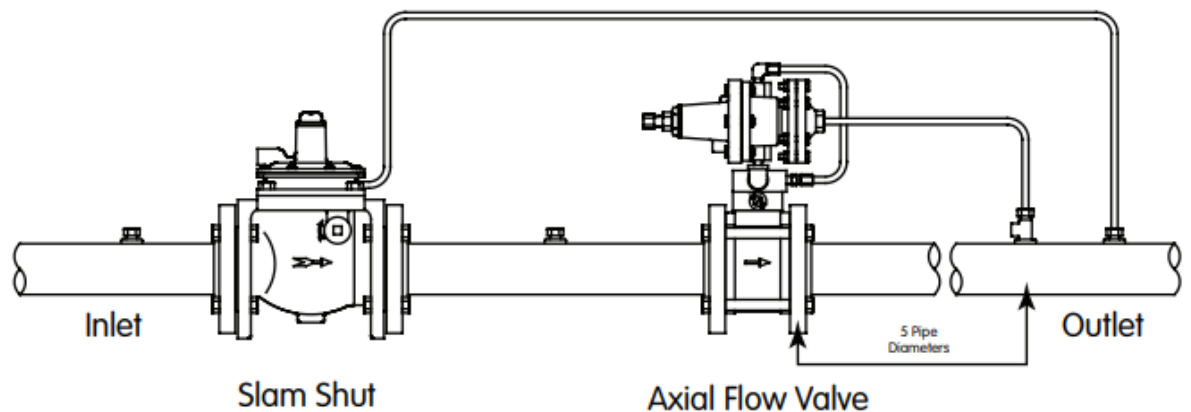
Key features

- **Tight shut off capability:** Special trim design eliminates wear and erosion of seating, providing excellent tight shut off capability over long working life.
- **Manual re-setting:** Manual re-setting with the lever mechanism
- **Local position indication:** Open/Close position indicator dial indicates slam shut device position.
- **Remote Signal devices option:** Slam shut off can be provided with remote Signal devices (like contact switches or proximity switches).



Typical Installation

The Slam Shut is used as a safety device where positive protection against excessive pressure is required. The Slam Shut is placed upstream of the gas pressure regulator. A sense line is installed from the connection on the Slam Shut to the gas piping downstream from the regulator. This brings the pressure downstream of the regulator back to the Slam Shut. In the event that the line pressure or static pressure downstream of the regulator increases to the overpressure setting of the Slam Shut, positive automatic shutoff of the gas flow occurs. The Slam Shut is manually reset after the cause of the overpressure is corrected. When the actuating mechanism is triggered, a snap action spring drives the Slam Shut closed making it possible to install the Slam Shut in any position. To prevent water from entering the vent, the vent should be positioned to face downward.



Emergency shut down valve

Reliable intelligent emergency shutdown valves and actuators with Apadana Petro Farayand intelligent valve controllers improve your plant safety cost-efficiently. At APF, we have combined our know-how of valves, actuators, safety standards, applications, system operability and partial stroke test devices with intelligent prediction tools.

An emergency shutdown valve (ESDV) is part of a safety instrumented system (SIS). It is a vital part of the safety system and often described as the final element. Normally, the term ESD valve refers to all types of safety system valves, such as shutdown, emergency shutdown, emergency ventilation or blowdown valves.

The selection of emergency shutdown valves is crucial for any industrial process. The right valve and actuator paired with an accurate valve controller will ensure compliance with standards and regulations (such as IEC 61508/61511) as well as ensure the safety and reliability of your process and plant. We provide the valves as well as all the other needed components for your reliable ESD valve assembly.

An ESD valve must act fast to minimize the effect of a hazardous operating condition. The quarter-turn ball valve design provides an inherently fast operation. Additionally, with its equal percentage flow characteristic (high gain), it not only can close fast but it can significantly decrease the amount of process fluid passing through. Also, the actuator must be able to close the valve. Often used actuator type is single acting spring return.

A shutdown valve with equal percentage characteristic (most ball valve will have this feature) is the preferred type. Also, full bore ball valve is used in order to minimize unnecessary energy lost in open position.

It is very important that every instrument engineer must know where the shutdown valve is installed, what fluid flow through it and what standard is used as the design reference.



Office: Unit 201, No 1917, North Karegar Street, Tehran, Iran

Factory: Industry-First St, Industrial Blvd, Imam Khomeini Blvd, Caspian Industrial State, Qazvin Province, Iran

Phone Number: +9821-88336671

E-mail: info@apadanapetro.com



