

Instromet®

SECURITY SHUT-OFF VALVES



INSTROMET SECURITY SHUT-OFF VALVES

GENERAL

The Instromet security shut-off valves are shut-off valves for the control of liquid or gases. Thousands of security shut-off valves have already been installed in gas distribution systems, factories, hospitals and public buildings, where they have served years with complete satisfaction and safety. The present line is the most precise and complete type that is available to industry today. In contrast to the great majority of shut-off valves currently on the market, the Instromet security shut-off valves are designed for application as an independent unit. They are engineered to perform a vital task in gas distribution. Standard models in a variety of types and designs are available, in sizes from $\frac{3}{4}$ " through 3", with shut-off ranges from just a few mbar up to 12.5 bar. Valves with even higher shut-off ranges, up to 50 bar, are also available on special request. Instromet security shut-off valves can be installed either upstream or downstream of a regulator or meter. They can be controlled directly or from a remote pressure source by means of an external control line.

Instromet security shut-off valves are designed in strict accordance with the DIN or ANSI standards.

DESIGN

Dependability has been engineered into the complete line of Instromet security shut-off valves. The present design has evolved over many years of experience and guarantees long life and trouble-free operation.

The resilience of the seating surface of the valve disc provides an optimized shut-off. The "O"-ring seal on the resetting shaft is incorporated to provide ease of resetting and a positive seal to

atmosphere. The "thru-flow" design permits installation of these valves in existing pipelines with negligible pressure drop. The latching mechanism is positive and floats with minor variations, preventing premature shut-off due to minor pressure fluctuations.

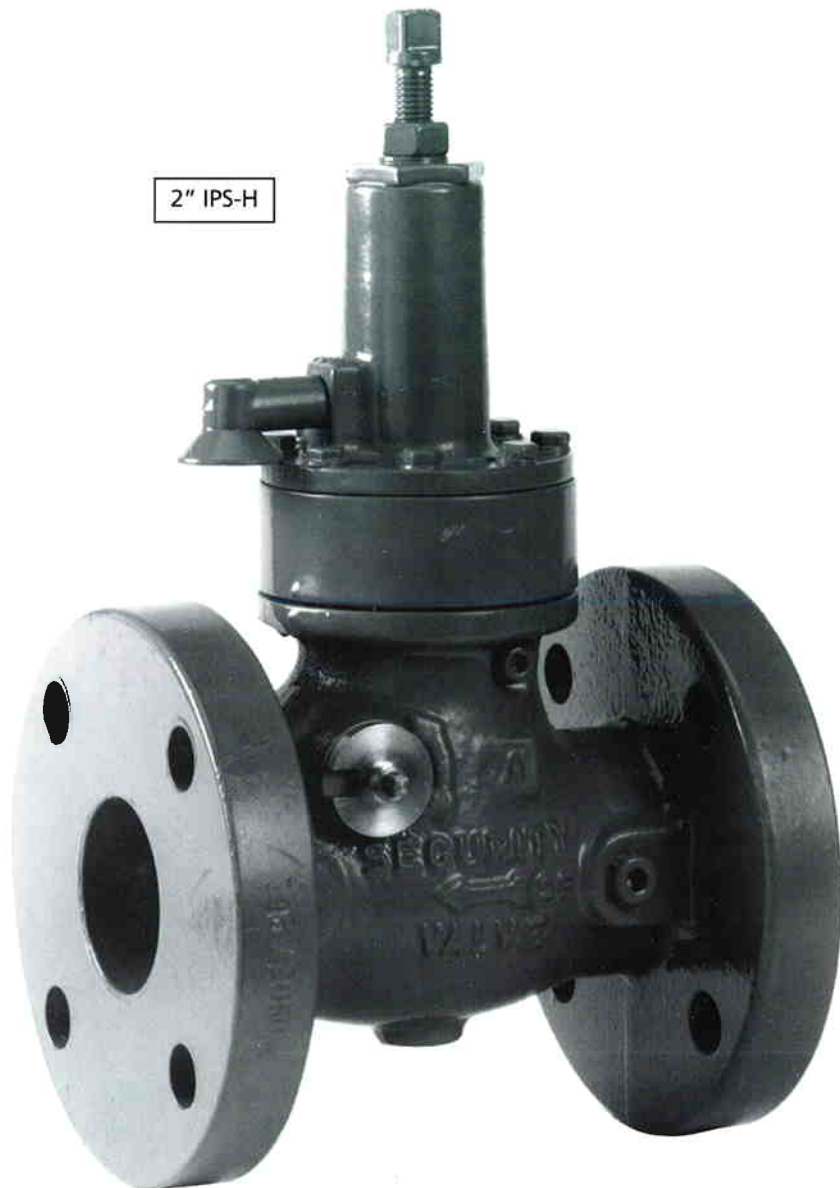
CONSTRUCTION

Instromet security shut-off valves are constructed of the finest materials available for each component. In standard models the

body is made of ductile iron. All internal components are made from aluminium, brass or stainless steel to minimize the effect of corrosion.

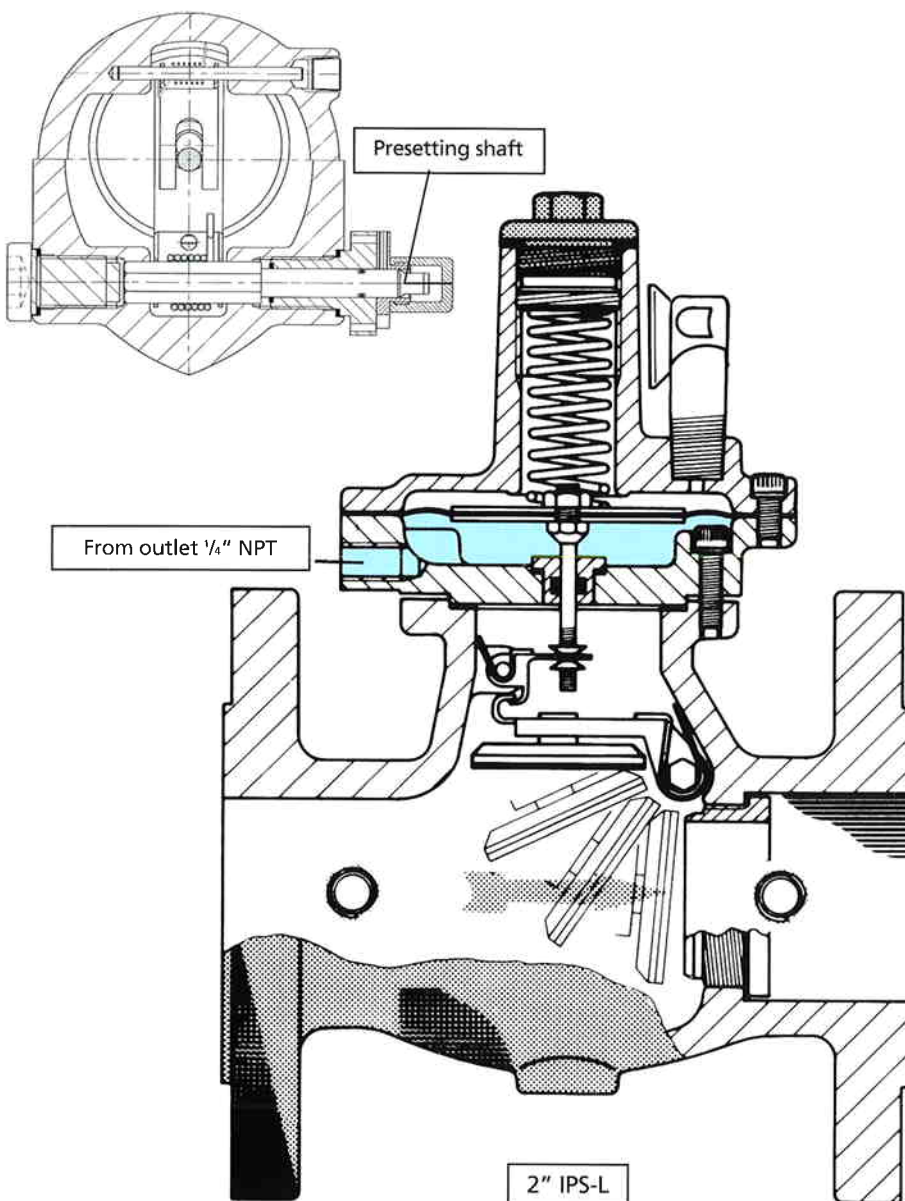
The seating surface of the valve disc is poly-U. The diaphragm is made from Buna-N.

The springs are either stainless steel or spring steel, heat treated. Valve bodies made from steel can be supplied on request. Special internal trims for chemical or corrosive gas service will also be quoted on request.



FUNCTION

Instromet security shut-off valves are either internally controlled or are controlled from an external control line. In the event of an increase or decrease in pressure, they will automatically shut-off at a specified preset value. This shut-off value, which should be specified with your order, is normally set at the manufacturer's but it can easily be readjusted in the field. If the pressure increases or decreases to the preset shut-off pressure - depending on the model of valve - the latch lever attached to the spring loaded diaphragm linkage assembly disengages from the valve disc arm. The spring loaded valve disc snaps automatically, and can only be reset manually.



APPLICATIONS

OVERPRESSURE PROTECTION

For many years gas distribution companies have studied various means of controlling overpressure.

Three approved methods are:

1. shut-off valves;
2. monitoring regulators;
3. relief valves.

UNDERPRESSURE PROTECTION

Safety engineers are aware of the hazards which can occur in the case of fractured or leaking gas lines in factories and building. In many plants, we see that lines run overhead, underground and through walls. In case of break or failure, it may not be possible to trace the line to the manual shut-off valve, or its location may not be accessible to the person discovering the leak.

The pressure drop caused by leakage may be caused by leakage, line break, freezing or breakdown of regulator or other equipment.

ADVANTAGES OF THE SHUT-OFF VALVE

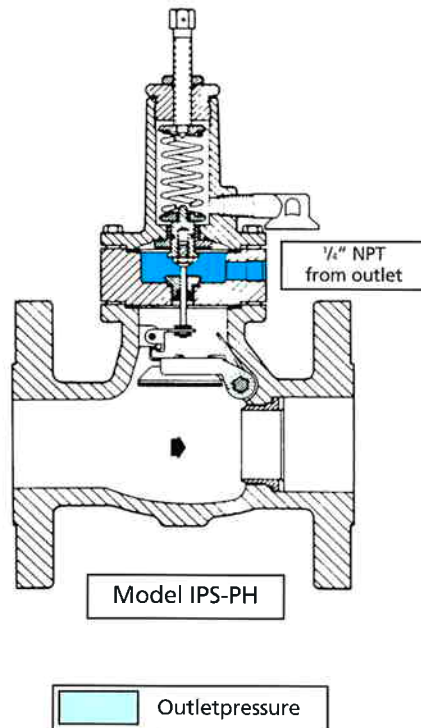
1. Shut-off valves are relatively small and therefore require little space.
2. Shut-off valves are simple to install and can easily be fitted into existing facilities.
3. Complete shut-off avoids the problem of escaping gas released by relief devices.
4. Maintenance cost of shut-off valves is considerably lower than on comparable monitoring regulators or relief valves.

SPECIAL TYPES

HIGH PRESSURE PISTON ACTUATED VALVES

Many applications require the use of shut-off valves for shut-off ranges which cannot normally be standard models with a spring loaded diaphragm assembly. In order to meet this demand, Instromet security shut-off valves are available with a piston actuated assembly instead of the standard diaphragm assembly, thereby extending the shut-off range to 50 bar. The piston actuating assembly can be incorporated into overpressure or underpressure shut-off models. The operation of the piston actuated valve is the same as the standard model.

- shut-off valves with remote signalling
- shut-off valves with stainless steel internal trims.



FEATURES

1. COMPLETE LINE

Many possibilities as to sizes, working pressures or shut-off ranges.

- sizes 1" to 3" (larger sizes on request);
- working pressures up to 100 bar;
- shut-off ranges up to 50 bar.

2. INSTALLATION

They may be installed at any point in the line.

3. POSITIVE ACTION

Specially designed to perform a single task, not a remodelled version of a regulator or a valve.

- does not vent to atmosphere;
- bubble tight shut-off;
- no border-line leakage;
- will not fluctuate on and off.

4. NO MAGNETS

Shut-off valves contain no magnets or other parts which may collect material thereby obstructing flow or affecting operation.

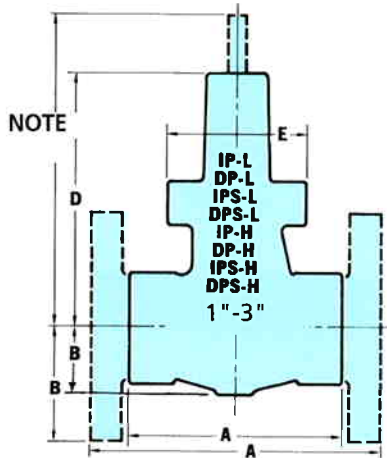
MODEL NUMBER INDEX

| APPLICATION | MODEL | SHUT-OFF FUNCTION | MEANS OF ACTUATION | SIZE AND CONNECTIONS | SHUT-OFF RANGE |
|--|--------|------------------------------------|----------------------|--------------------------|-----------------|
| INCREASED PRESSURE CLOSES VALVE | IP-L | Increase pressure internal control | Diaphragm and spring | 1" screwed | 5 - 750 mbar |
| | IPS-L | Increase pressure external control | Diaphragm and spring | 2"-3" flanged | 5-750 mbar |
| | IP-H | Increase pressure internal control | Diaphragm and spring | 1" screwed | 0.42 - 12.5 bar |
| | IPS-H | increase pressure external control | Diaphragm and spring | 2"-3" flanged | 0.42 -12.5 bar |
| | IPS-PH | increase pressure external control | Piston and spring | 1" screwed 2" flanged | max. 50 bar |
| DECREASED PRESSURE CLOSES VALVE | DP-L | Decrease pressure internal control | Diaphragm and spring | 1" screwed | 5-750 mbar |
| | DPS-L | Decrease pressure external control | Diaphragm and spring | 2"-3" flanged | 5-750 mbar |
| | DP-H | Decrease pressure internal control | Diaphragm and spring | 1" screwed | 0.42 - 12.5 bar |
| | DPS-H | Decrease pressure external control | Diaphragm and spring | 2"-3" flanged | 0.42-12.5 bar |

DIMENSIONS AND WEIGHTS

| CONNECTION | A | B |
|---------------------|-----|----|
| 1" screwed NPT | 108 | 35 |
| 2" flanged ANSI 150 | 178 | 84 |
| 2" flanged ANSI 250 | 190 | 84 |
| 2" flanged ANSI 300 | 190 | 84 |
| 2" flanged PN 10/16 | 188 | 84 |
| 2" flanged PN 25 | 190 | 84 |
| 3" flanged ANSI 150 | 241 | 98 |
| 3" flanged PN 16/25 | 254 | 98 |

| Model | | WEIGHTS IN KG | | |
|-------|-------|---------------|---------|----|
| | | Screwed | Flanged | |
| | | 1" | 2" | 3" |
| IP-L | DP-L | 2.5 | 9.5 | 19 |
| IPS-L | DPS-L | 2.5 | 9.5 | 19 |
| IP-H | DP-H | 2.5 | 9.5 | 19 |
| IPS-H | DPS-H | 2.5 | 9.5 | 19 |



| CONNECTION | D | D | D | D | E | E |
|------------|--------------|----------------|--------------|-----------------------------|----------------------------|---------------|
| | IP-L DP-L | IPS-L DPS-L | IP-H DP-H | IPS-H DPS-H -L(diam.) | All models -H(diam.) | All models |
| 1" | 135 | 135 | 195 | 195 | 122 | 92 |
| 2" | 185 | 185 | 260 | 260 | 122 | 92 |
| 3" | 235 | 235 | 289 | 290 | 122 | 92 |

Note: If the adjusting screw is removed, for dimension D 38 mm must be added for models IP-H, DP-H, IPS-H and DPS-H.

SHUT-OFF RANGES

MODELS IPS-L, IP-L, DPS-L, DP-L

| Shut-off ranges | Colour | Part No. |
|-----------------|-------------|-----------------|
| 15 - 15 mbar | Brown | 210-019-021-304 |
| 15 - 35 mbar | Red | 210-019-021-314 |
| 18 - 50 mbar | Green | 210-019-021-324 |
| 33 - 75 mbar | Yellow | 210-019-021-334 |
| 50 - 110 mbar | Grey-Black | 210-019-021-364 |
| 85 - 240 mbar | Blue | 210-019-021-344 |
| 185 - 600 mbar | Green-black | 210-019-021-394 |
| 375 - 750 mbar | White-black | 210-019-021-404 |

MODELS IPS-H, IP-H, DPS-H, DP-H

| Shut-off ranges | Colour | Part No. |
|------------------|--------------|-----------------|
| 0.42 - 1.20 bar | Red-black | 210-019-021-384 |
| 0.91 - 2.11 bar | Green-black | 210-019-021-394 |
| 1.78 - 3.52 bar | White-black | 210-019-021-404 |
| 2.46 - 4.22 bar | Orange-black | 210-019-021-414 |
| 3.16 - 4.57 bar | Yellow-black | 210-019-021-424 |
| 4.57 - 7.03 bar | Blue-black | 210-019-021-434 |
| 6.33 - 12.50 bar | Brown-black | 210-019-021-444 |

NOTES:

- switching time after pressure exceedance < 2 sec.
- shut-off pressures up to 50 bar available (see page 4).
- the control pressure of internally controlled valves (DP-L, DP-H, IP-L and IP-H) is equal to the pressure in the valve casing (line pressure).
- standard temperature range from -20° to +60° C.
- maximum allowed velocity in the valve casing not higher than 60 m/sec.

FORMULAE FOR CALCULATING FLOW RATE AND PRESSURE LOSS

1" SCREWED CONNECTIONS

| DIAMETER | ORIFICE | K-FACTOR |
|----------|----------|----------|
| 1" | 16.76 mm | 490 |

2"-3" FLANGED CONNECTIONS

| DIAMETER | ORIFICE | K-FACTOR |
|----------|----------|----------|
| 2" | 40.64 mm | 2850 |
| 3" | 65.78 mm | 8820 |

The following formulae can be used for:

a. calculating the capacity

$$Q = K \sqrt{P_u (P_l - P_u)}$$

b. pressure loss

$$P_l - P_u = \left(\frac{Q}{K}\right)^2 \times \frac{1}{P_u}$$

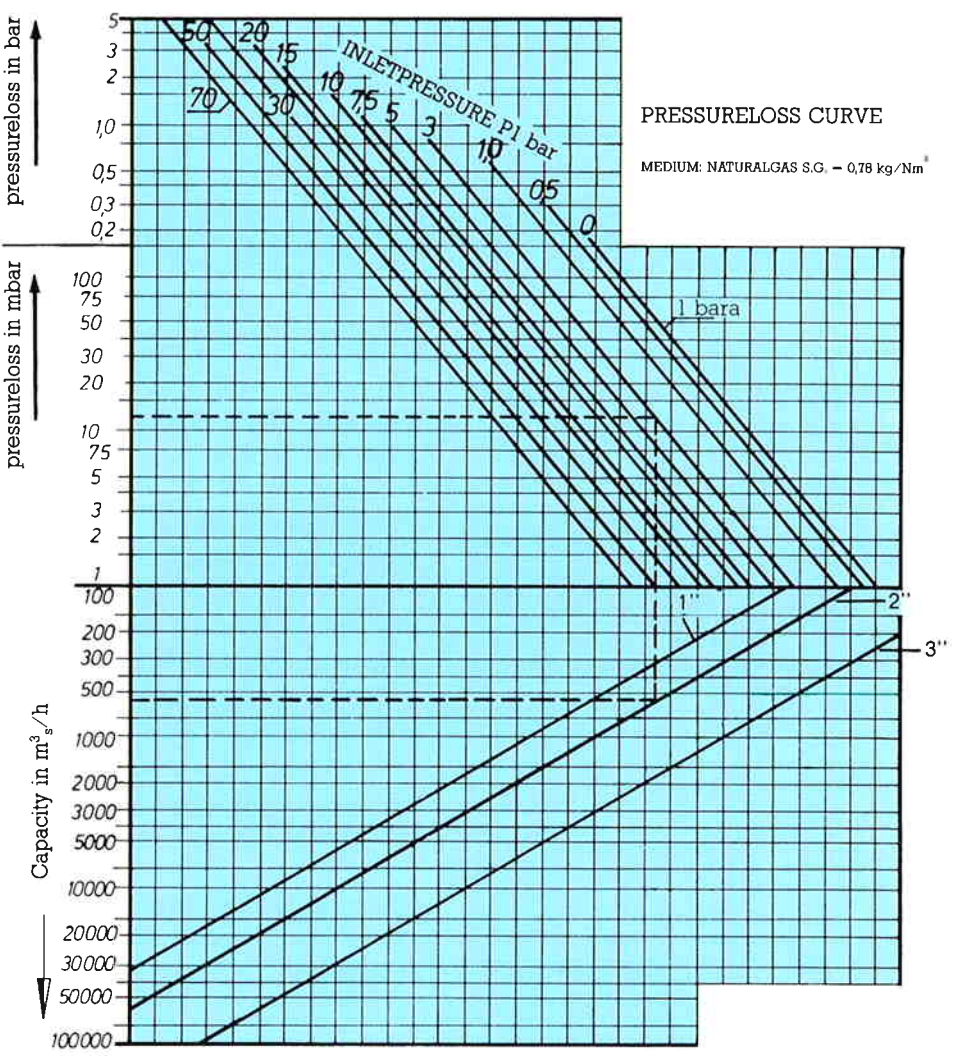
Q = capacity in m³/h

P_l = inlet pressure in bar absolute

P_u = outlet pressure in bar absolute

K = flow constant (see table opposite)

PRESSURE LOSS CURVE



EXAMPLE:

Capacity Q = 600 m³/h of natural gas

Working pressure: 3 bar

Shut-off valve used: 2"

From the table there follows a pressure loss of 12 mbar (see dotted line)

CONVERSION FOR OTHER GASES

The capacity Q (taken from the table for natural gas) is adjusted by a factor K.

$$Q_{kor} = \frac{Q}{K}$$

$$K = \sqrt{\frac{0.78}{SG}}$$

SG = specific gravity of the flowing gas under atmospheric conditions.

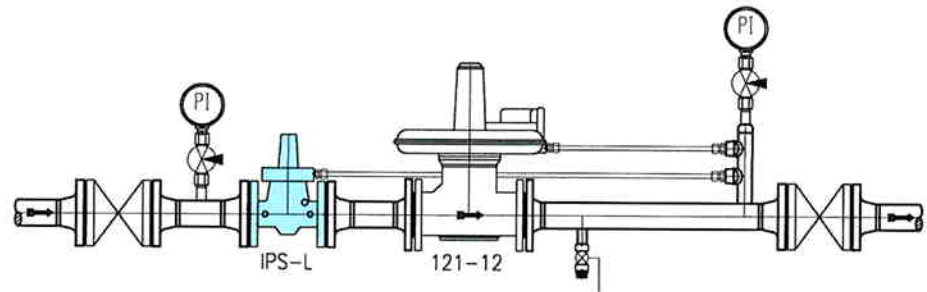
INSTALLATION

The diagram alongside shows an installation example of an Instromet security shut-off valve IPS-L complete with external control line and bypasses. In this configuration the IPS-L model protects the outlet pressure of the regulator against overpressure.

The types 1" to 3" can be assembled in any position in both horizontal and vertical lines.

BYPASS

In the event that the shut-off valve has closed, the upstream and downstream pressure must first be



equalized before opening the valve manually. By installing a bypass with push button valve between the inlet and outlet side of the shut-off valve, by opening the push button valve, the upstream and downstream pressure can be equalized. The valve can be opened by means of the resetting shaft using a standard spanner or key which is supplied

with each security valve. In the case of small pressure differences, a bypass is not necessary (max. 0.5 bar). 2" and 3" connections are fitted standard with connecting points (1/4" NPT) and at extra charge can be provided with a bypass. 1" connections can be fitted with connection points on special request.

MATERIALS SPECIFICATION

| Valve Body* | Ductile | Cast Steel |
|---|--|--|
| Upper Diaphragm Case 1" Screwed and 2" - 3" flanged Low Pressure Models-L High Pressure Models-H | Aluminum / CI Ductile | Aluminum / CI Ductile |
| Chamber Adaptor 3" flanged Model | Steel | Steel |
| Control Chamber External Control Models A Screwed- Low Pressure-L Screwed-High-pressure-H B 2" - 3" Flanged-Low Pressure-L 2" - 3" Flanged-High Pressure-H | Aluminum / CI Ductile Aluminum / CI Ductile | Not available Ductile Not available Ductile |
| Valve disc** A 1" Screwed B 2" - 3" Flanged | Aluminum / CI Aluminum / CI | Aluminum / CI Aluminum / CI |
| Diaphragm | Buna-N with nylon re-enforcement | Buna-N with nylon re-enforcement |
| Orifice | Brass | Brass |
| Disc Arm A 1" Screwed B 2" - 3" Flanged | Steel Steel | Steel Steel |
| Latch Lever A 1" Screwed B 2" - 3" Flanged | Steel Steel | Steel Steel |
| Resetting Shaft | Steel | 18-8 SS Steel |
| O-Rings*** | Buna-N | Buna-N |

* The valve bodies of the 1" screwed models are only available in cast steel.

** The poly-U red on the valve discs has a strength of 70 -80° shore or higher, when depends on the pressure.

*** On request available in viton.

**INSTROMET
SECURITY
SHUT-OFF
VALVES
ARE NOT
SUITABLE FOR
OXYGEN DUTY.**

HOW TO ORDER

In order to supply the best security shut-off valve for your application, please provide the following information:

1. Type of shut-off valve
2. Dimensions and connections
3. Working pressure and temperature
4. Shut-off pressure required
5. Flow rate
6. Liquid or gas
7. Flow direction (left-right is standard)
8. Options required