RAPHAEL

G-FPV PISTON VALVE

Piston Actuated Control Valve

PRODUCT BROCHURE

RAPHAEL VALVES INDUSTRIES

RAPHAEL VALVES INDUSTRIES (1975) LTD.

Raphael is leading the international market valve industry with its wide and innovative product range for water flow control.

Founded in 1949, Raphael Valves Industries Ltd., is a manufacturer of high-quality control valves. With an extensive and pioneering product lineup, Raphael leads the global market in valve technology.

Our product range includes hydraulic control valves, butterfly valves, gate valves, check valves and more, specifically designed to meet the needs of the Irrigation, Waterworks, and Fire Protection sectors. Each valve undergoes thorough quality control testing and manufacturing procedures, holding prestigious certifications such as ISO 9001, UL and FM approval.

Motivated by our passion for innovation, we have invested significant resources to Smart Solutions, aimed at improving the management of water networks and facilitating access to real-time data for technical and logistical operations around the world. As part of this effort, Raphael experts have introduced the revolutionary "ULTRAF PRO" Ultrasonic Hydrometer, a revolutionary integration of ultrasonic flow measurement and hydraulic valve technology, setting new benchmarks in the industry.

In the field of Fire Protection, Raphael offers a wide range of elastomeric diaphragm-type valves in streamlined globe and angle patterns. These valves are essential components in fixed fire extinguishing systems using water, foam, or seawater media. Our Fire Protection range includes Deluge and Preaction systems, Pressure control valves, Monitors and Hydrants, suitable for various environments such as Petrochemical, Oil & Gas, Offshore, and Marine applications.

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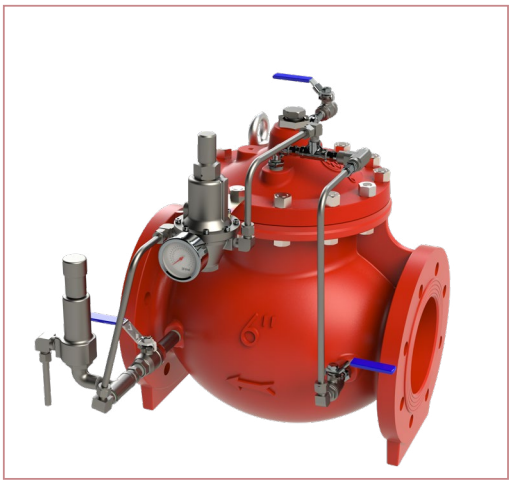
TYPE G-FPV

G-FPV PISTON ACTUATED CONTROL VALVE DN50-900 PN 16-64



The hydraulic control valve is the most effective device for automation of industrial and municipal water supply systems or for any other system that requires control over changing operating conditions.
The hydraulic valve is actuated by pipeline pressureand does not require any outside energy source.

DESCRIPTION

- G-FPV Piston Actuated Hydraulic Control Valve for use in waterworks for pressure reducing, pressure sustaining, pressure relief, flow control, surge anticipation, level control and other control applications.
- Excellent for use in large diameter pipe mains, operation at wide flow range, cavitation conditions and high pressure.
- Piston actuation design ensures exceptional valve reliability with long term maintenance free operationand vertical serviceability. Solid piston design ensures stable and vibration-free valve operation.
- V shaped throttling plug provides precise control capability with wide rangeability that allows stable operation at high and as well low flow rates. Internal components made of resistant materials; –Stainless Steel and bronze.
- Resistant to cavitation at both high and low flows.
- Body made of high-strength, with fusion-bonded epoxide coating or vitreous enamel, providing enhanced corrosion resistance.
- Complies with ISO, DIN, EN and GOST-R standards.

CHARACTERISTICS

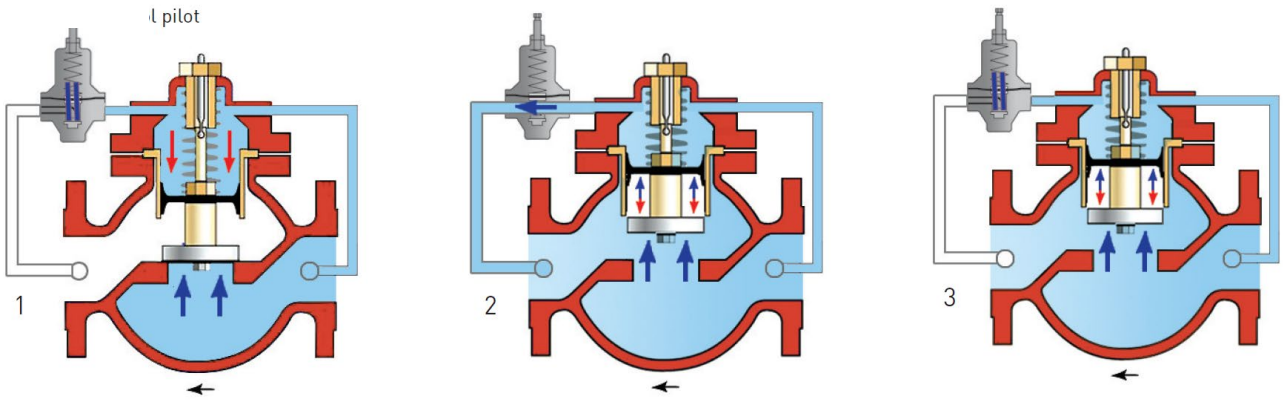
- DN 50 - 900
- PN 16-64
- Operational temperature: -29°C – +90°C
- Impermeability: Class A according to the ISO 5208 standard.
- Flange bores drilling in accordance with EN 1092-2 and ISO 7005-2

TYPICAL APPLICATIONS

- Water supply and waterworks mains
- Pumping stations, water treatment stations, water reservoirs
- Firefighting systems

PRINCIPLES OF OPERATION

CONTROL PILOT



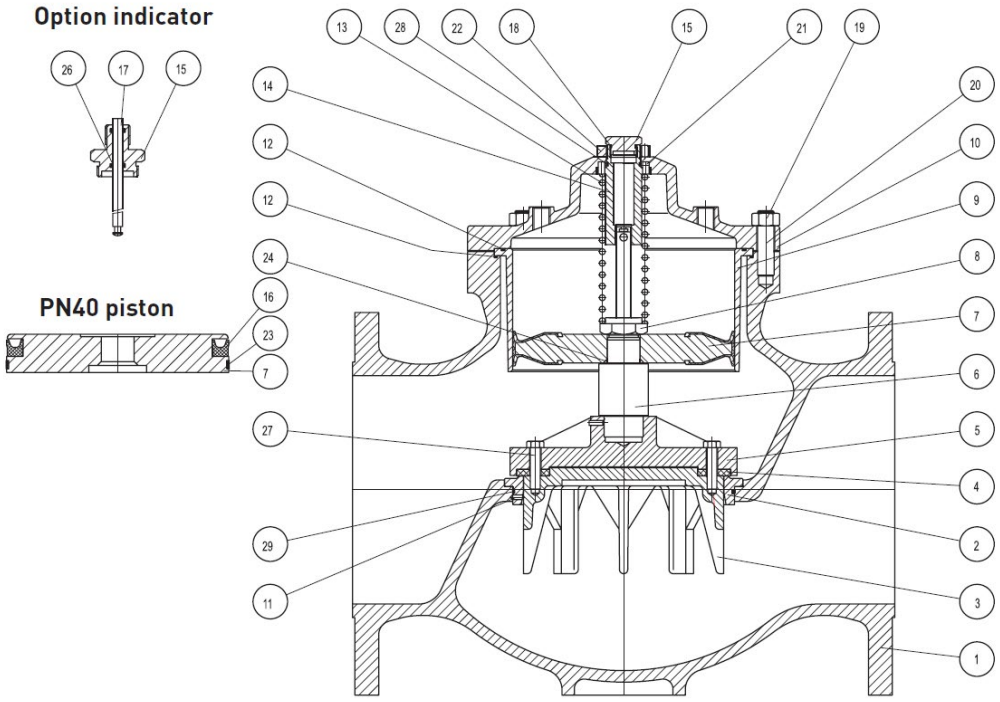
The body of the hydraulic valve is divided into a main valve and a control chamber.

When via the control pilot the pipeline pressure connected to the control chamber, the force acting on the piston from above is greater than the force acting on the throttling plug (due to the larger surface area) and the piston valve will stay in a closed position.

When the pressure in the control chamber is directed by the control pilot to the atmosphere or to the pipeline outlet, the valve is opened by the force acting upon the throttling plug from below.

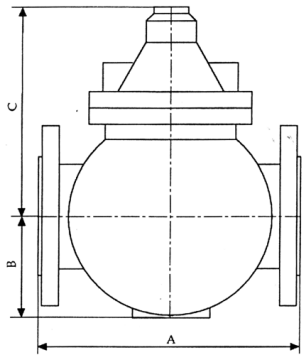
When the pilot throttleis and pressurizing of the control chamber is repeated, closing of the valve takes place due to the force acting upon the piston from above, which is greater than the force acting on the throttling plug from below.

CONSTRUCTION OF MATERIALS



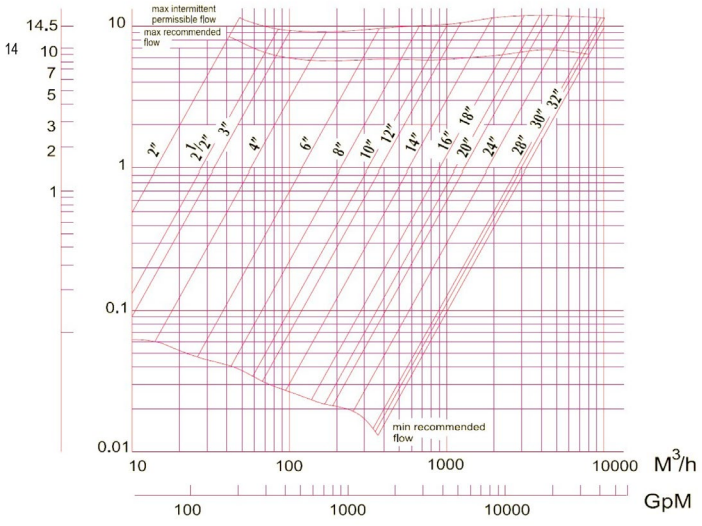
	NANE	DN 50	DN 80-100	DN 150-600	DN 600-900
1	Body	Bronze	High-strength cast iron with spherical graphite	High-strength cast iron with spherical graphite	Steel
2	Saddle	Stainless Steel	Bronze/Stainless Steel	Bronze/Stainless Steel	Stainless Steel
3	Plug	Bronze	Bronze/Stainless Steel	Bronze/Stainless Steel	Stainless Steel
4	Disk	NBR/EPDM	Stainless Steel	Steel	Stainless Steel
5	Stem	-	Brass	Brass	-
6	Piston	-	Stainless Steel	Stainless Steel	Steel/ Stainless Steel
7	Nut	Brass	Brass	Brass	-
8	Cylinder	-	Bronze	Bronze	Stainless Steel
9	Top cover	-	High-strength cast iron with spherical graphite	High-strength cast iron with spherical graphite	Steel
10	Screw	Steel	Stainless Steel	Stainless Steel	Stainless Steel
11	Liner	-	NBR/EPDM	NBR/EPDM	NBR/EPDM
12	Spring	NBR/EPDM	Stainless Steel	Stainless Steel	-
13	Plug	Stainless Steel	Brass	Brass	-
14	Stopper plug	-	Brass	Brass	Brass
15	Liner of piston	Brass	NBR/EPDM	NBR/EPDM	NBR/EPDM
16	Indicator	NBR/EPDM	Stainless Steel	Stainless Steel	Stainless Steel
17	Indicator	Stainless Steel	NBR/EPDM	NBR/EPDM	NBR/EPDM
18	Liner	NBR/EPDM	Steel	Steel	Steel
19	Nut	Steel	Steel	Steel	Steel
20	Screw	Steel	-	Stainless Steel	-
21	Stub	-	-	Brass	Brass
22	Nut	-	-	Teflon	Teflon
23	Plug	-	NBR/EPDM	NBR/EPDM	NBR/EPDM
24	Liner	NBR/EPDM	NBR/EPDM	NBR/EPDM	NBR/EPDM
26	Liner	NBR/EPDM	-	Stainless Steel	NBR/EPDM
27	Screw	-	Stainless Steel	Stainless Steel	-
28	Liner	NBR/EPDM	NBR/EPDM	NBR/EPDM	-

OVERALL DIMENSIONS



DN		A	B	C	Weight
inch	mm	mm	mm	mm	Kg
2	50	210	100	410	15
2.5	65	310	120	240	54
3	80	310	120	240	54
4	100	356	150	300	62
6	150	458	200	350	104
8	200	510	187	413	167
10	250	660	250	400	250
12	300	860	290	400	280
14	350	980	395	525	400
16	400	1100	400	580	790
18	450	1250	430	650	1150
20	500	1250	430	650	1370
24	600	1450	500	800	1690
28	700	1570	620	930	2300
30	750	1620	700	1050	2900
32	800	1710	750	1090	3460
36	900	1930	850	1190	4050

HEADLOSS AT MAXIMUM OPENING



DN		Flow Rate
inch	mm	Kv
2	50	45
2.5	65	87
3	80	105
4	100	180
6	150	380
8	200	670
10	250	1010
12	300	1200
14	350	2100
16	400	2770
18	450	4170
20	500	4740
24	600	6700
28	700	10300
30	750	10750
32	800	11600
36	900	12900

RECOMMENDED MODE OF OPERATION

Zone 1: Zone of valve normal operation with a standard plug

Zone 2: Large pressure drop with cavitation risk; it is recommended to use a valve with lower passagerestricted plug

Zone 3: Cavitation. Valve use only upon recommendation by the manufacturer

ΔP = (Pupstream – Pdownstream) in kg/cm2

Q – Flow in m3/hour

Kv – Flow rate in m3/hour specified for

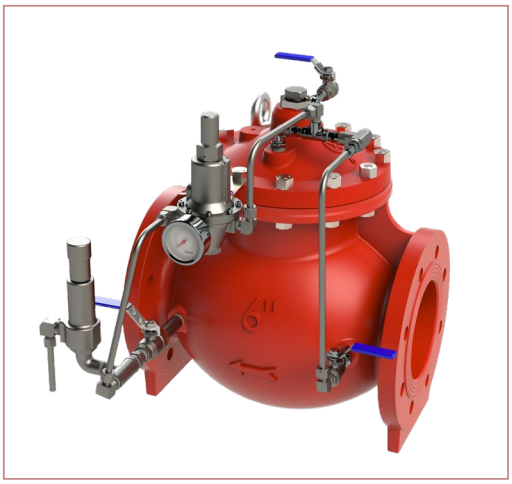
PN10/16 locks

RD – Relative Density, (water = 1)

$$Q = Kv.\sqrt{\Delta P}$$

G-FPV-60

PRESSURE REDUCING VALVE



The **G 60/62 and G 63**, hydraulic pressure reducing valves.

The main valve is controlled by an adjustable pilot valve preset to the required downstream set pressure.

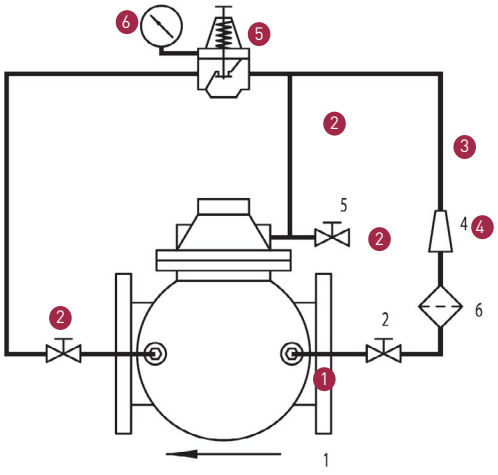
The valve maintains constant downstream pressure at varying pipeline inlet pressure or downstream flow demand.

The operation of the valve does not require additional power source; it is actuated by pipeline pressure.

PRINCIPLE OF OPERATION

When the pressure falls below the value set by the pilot spring (7) due to increasing flow demand, the pilot is activated and releases the pressure from the main valve (1) control chamber. The main valve opens, thus increasing the outletput pressure.

When the outletput pressure becomes higher than the pilot spring's preset value (2), the pilot is activated, which causes higher pressure in the main valve's control chamber (1). The main valve closes, thus decreasing the outlet input pressure back to set pressure.



G-FPV-60 Pressure Reducing Control Valve

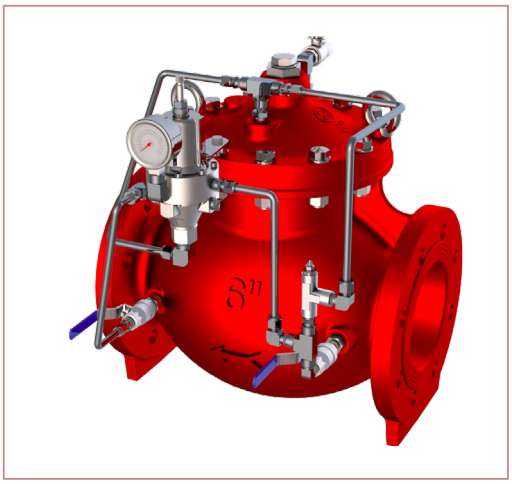
TYPICAL APPLICATIONS

The Pressure Reducing **G-FPV-60** type valve is used for controlling pressure in distribution pipelines of municipal and main water supply lines and heating main lines.

Ref	Name
1	Main valve
2	Cock Valve
3	Filter
4	Needle Valve
5	Pressure Reducing Pilot
6	Manometer

G-FPV-80

PRESSURE SUSTAINING VALVE



The **G-FPV-80** hydraulic valves for sustaining constant upstream pressure.

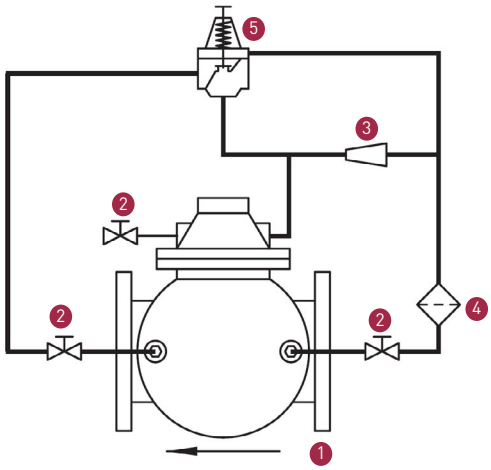
The upstream set pressure is effected by autonomous adjustable control pilot valve, which is set to the required pressure.

The valve maintains constant upstream pressure regardless of flow demand or with varying outlet pressure.

PRINCIPLE OF OPERATION

When the inlet pressure becomes higher than the preset value, the pilot (4) is activated to open and releases the pressure from the main valve's control chamber. The main valve opens, thus reducing the inlet pressure.

When the inlet output pressure falls below preset the value. the pilot is activated to close, which causes higher pressure in the main valve's control chamber. The main valve closes, thus increasing the inlet pressure.



G-FPV-80 Sustaining/Relief Control Valve

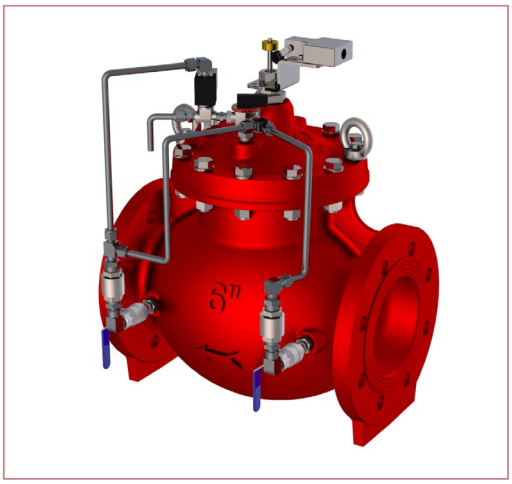
Ref	Name
1	Main valve
2	Cock Valve
3	Filter
4	Control pilot
5	Manometer

TYPICAL APPLICATIONS

The Sustaining /Relief **G-FPV-80** type is used for pressure control of pipelines, municipal and main water supply lines and heating main lines, as well as for protection of pumping equipment and the pipelines against low or high pressure.

G-FPV-20

PUMP CONTROL VALVE



The **G-FPV-20** hydraulic valve is intended for gradual pump startup and shutdown, as well as hydraulic check valve for protection of pumping equipment and pipeline networks against damage due to excessive operation below intended pump curve as well as preventing backflow.

The **G-FPV-20** valves can be used with any pump type. The valve is linked to the pump's electric control panel.

PRINCIPLE OF OPERATION WITH A BOOSTER PUMP

Prior to startup, the valve is closed. When the pump is energized, the solenid valve (8) is activated and gradually relieves the pressure of the control chamber, leading to a gradual opening of the main valve (1). The flow and the pressure gradually increase to the nominal value of the main line. When the pump shuts down, the solenid valve (6) is inactivated, leadings to a gradual closing of the main valve. The pump's power supply is turned off via the limit switch (11) only after the complete closure of the valve.

In the event of an emergency shutdown of the pump or in a sudden power outage, the valve is hydraulically closed, performing the function of a check valve to prevent returning flow.

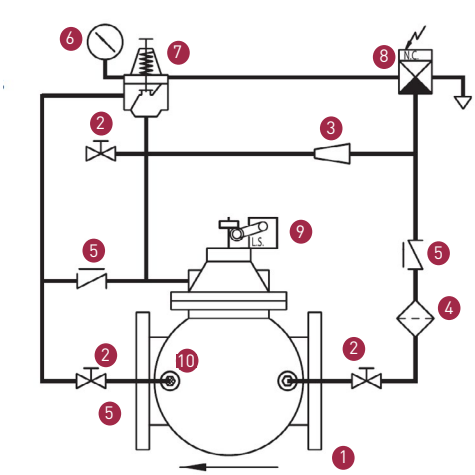
PRINCIPLE OF OPERATION WITH A SUBMERGED VERTICAL PUMP

The valve is mounted on T pipeline open to atmosphere, thus ensuring the start at low-head and gradually closing. When the pump is shut down, the valve opens gradually, thus gradually reducing the pressure in the pipeline.

The inlet pressure sustaining pilot (7) is set to perform, as a safety valve if pressure surges above the set point.

TYPICAL APPLICATIONS

The Pump Control Valve. **G-FPV-20** type valve is used for optimizing pumping stations operation leads to more effective exploitation of the equipment, lower costs and preventing damage.

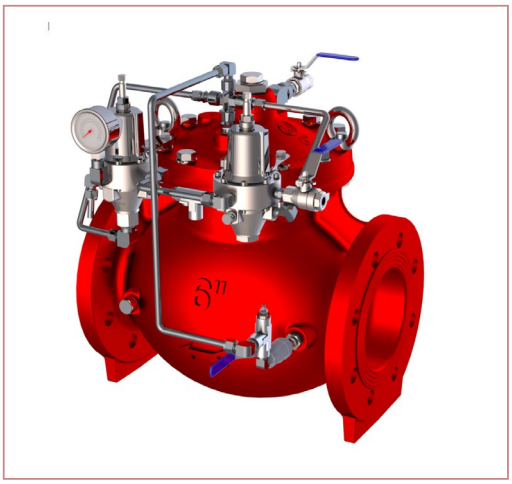


G-FPV-20 Pressure Reducing & Sustaining Control Valve

Ref	Name
1	Main valve
2	Cock Valve
3	Needle Valve
4	Filter
5	Non-return Valve
6	Manometer
7	Pressure Sustaining Pilot
8	3-W Solenoid Valve
9	Limit Switch
10	Finger Filter

G-FPV-88

HYDRAULIC SURGE ANTICIPATING VALVE



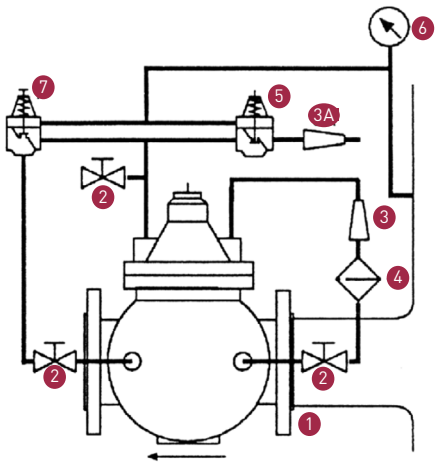
The G-FPV-88 is intended for protecting the pipeline against hydraulic shock. Hydraulic shock can be caused by emergency shutdown of the pump due to power outage or by abrupt closure of the stop valve alog the main line. Thereby rapid pressure drop front is followed by a reverse wave with extremely high pressure.

The low and high-pressure waves alternate within a short time interval. The G-FPV is controlled by two pilots – for high and low-pressure. Under normal conditions the G-FPV is closed. When the pressure in the line increases or drops outside of the preset limits, the valve quickly opens to discharge water into atmosphere.

PRINCIPLE OF OPERATION

When line pressure rises above preset value, the pilot (7) is activated and releases extra pressure from the main valve's control chamber. The main valve opens, thus eliminating the overpressure.

If hydraulic shock wave develops, the pressure in the pipeline falls sharply. The low-pressure pilot (5) is actuated releasing pressure from the main valve's control chamber. The main valve opens in anticipation of the high surge to follow. The high surge will find a fully open valve capable of discharging the full flow into atmosphere and prevent the high surge development. As the pressure drops back to normal, both pilots closes and the main valve closes as a result.



G-FPV-88 Hdyraulic Surge Anticipating

Ref	Name
1	Main valve
2	Cock Valve
3	Needle Valve
4	Filter
5	Low Pressure Control Pilot
6	Manometer
7	High Pressure Control Pilot

TYPICAL APPLICATIONS

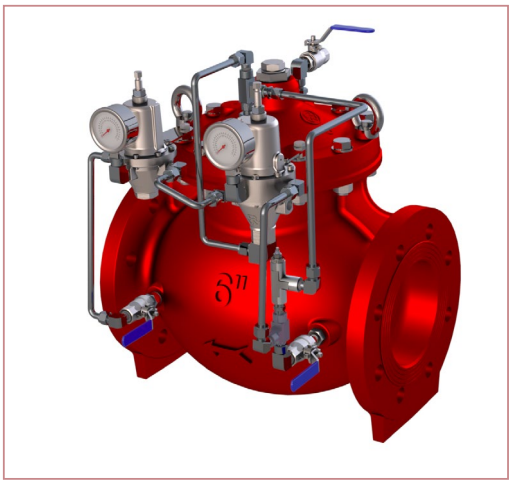
The Hydraulic Surge Anticipating **G-FPV-88** type is used for protection of pipelines, municipal and main water supply lines as well as for protection of pumping equipment against possible damage in locations of pressure surge

G-FPV-68

PRESSURE REDUCING & SUSTAINING VALVE

The **G-FPV-68** is controlled by two pilots for regulating the upstream and downstream pressure.

As a result of the serial operation of the two pilots, maximum constant downstream set pressure is maintained, while at the same time mantianing minimum set pressure the valve inlet

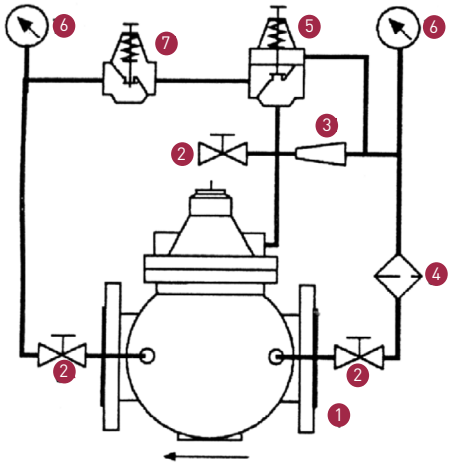


PRINCIPLE OF OPERATION

When the outlet pressure becomes lower than the pilot spring's preset value (7), the pilot is activated and releases the pressure from the main valve's control chamber. The main valve opens, thus increasing the outlet pressure.

When the outlet pressure becomes higher than the pilot springs's preset value (7), the pilot is activated, which leads to higher pressure in the main valve's control chamber. The main valve closes, thus decreasing the outlet pressure.

When the inlet pressure in the pipeline falls to a level that is lower than the pilot springs preset value (5), the pilot (5) is activated, which leads to higher pressure in the main valve's control chamber.



G-FPV-68 Pressure Reducing & Sustaining Control Valve

Ref	Name
1	Main valve
2	Cock Valve
3	Needle Valve
4	Filter
5	Control Pilot (upstream)
6	Manometer
7	Control Pilot (downstream)

TYPICAL APPLICATIONS

The Pressure Reducing & Sustaining **G-FPV-68** type valve is used for controlling pressure in distribution pipelines of municipal and main water supply lines.

RAPHAEL, founded in 1949, is the first Israeli manufacturer of water control valves. RAPHAEL´s research department constantly strives to introduce new and innovative products and solutions for water control systems including water works, fire-protection and irrigation systems.

RAPHAEL

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