RAF GENERAL PURPOSE HYDRAULIC VALVES

Technical Information

Contents

RAF Valves are used for general water supply and irrigation. The RAF valves are made of only three parts, each one is made of durable materials.

The inner flow passages are streamlined and coated with low-friction materials.

This provides quiet flow in both directions, low head-loss and minimal wear.

Technical Specifications

- Body and Cover: Cast Iron with Rilsan (Nylon 11) coating. Epoxy or enamel coating are available by request.
- Bolts, Nuts and Washers: Zinc plated Steel.
- Diaphragm: Natural Rubber reinforced with Nylon Fabric.

Working Pressure: Up to 16 bars.

Temperature Rating: -10°C to 80°C.

Recommended Working Conditions Range

Nom. Dia.		Inlet Pressure, Bar		*Kv factor Fully opened Valve		Control Chamber Volume	
mm	inch	Min.	Max.	RAF	RAF -A	Liter	Gallon
40	1.5	0.8	16	40	—	0.06	0.016
50	2	0.7	16	70	62	0.08	0.021
65	2.5	0.7	16	100	90	0.16	0.042
80-50-80	3-2-3	0.7	16	72	62	0.08	0.021
80-65-80	3-2.5-3	0.7	16	130	100	0.16	0.042
80	3	0.6	16	170	155	0.3	0.079
100-80-100	4-3-4	0.6	16	170	155	0.3	0.079
100	4	0.4	16	290	200	0.7	0.185
125-100-125	5-4-5	0.4	16	290	200	0.7	0.185
150-100-150	6-4-6	0.4	16	300	220	0.7	0.185
150	6	0.4	16	490	470	1.5	0.396
200	8	0.4	16	790	—	3.5	0.924
250	10	0.3	16	1400	—	7.6	2.006
300	12	0.3	16	1800	—	7.6	2.006

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

Q = Flow rate, m^3/h

ΔP = Head loss across the valve,bars

Cv = 1.16Kv

SPECIALLY DESIGNED

Cross section of RAF valve

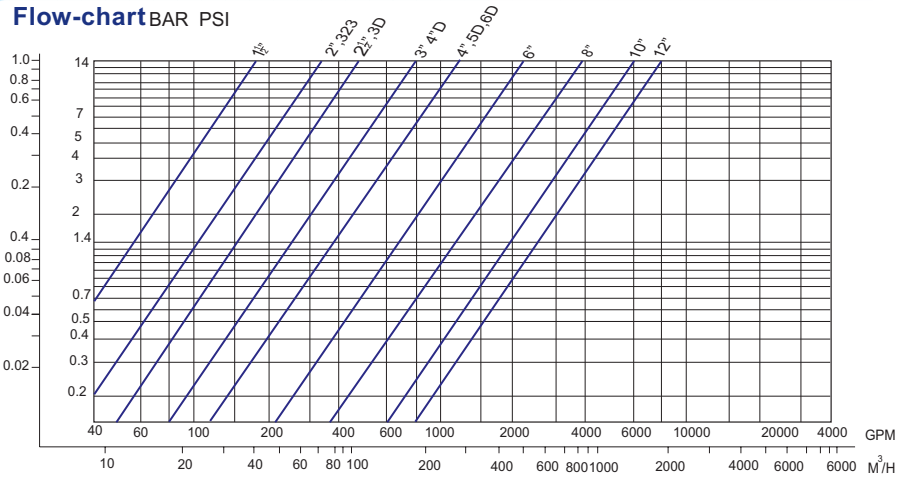
RAF valves operate with a patented reinforced diaphragm, which eliminates the need for a retaining metal spring.

The special elastic design enables gradual and precise opening or closing of the valve.

By eliminating a metal spring, the RAF is virtually maintenance free.

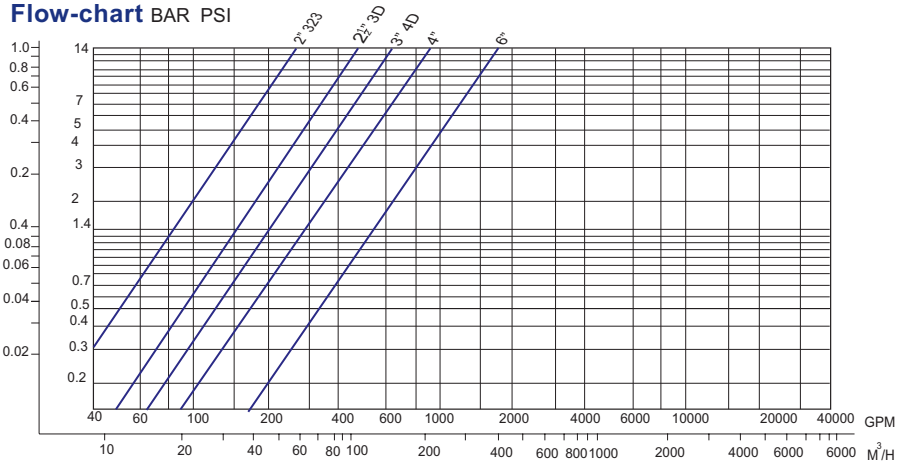
PRESSURE-LOSS CHART FOR VALVES TYPE RAF IN LINE

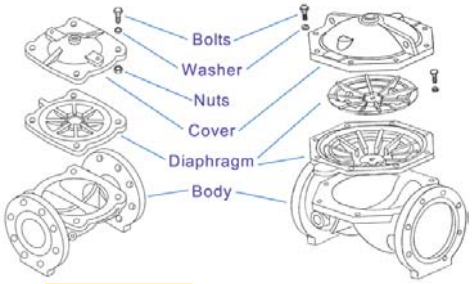
Flow-chart BAR PSI



PRESSURE-LOSS CHART FOR VALVES TYPE RAF A

Flow-chart BAR PSI





1 1/2"- 6" 8"- 12"

RAF In Line

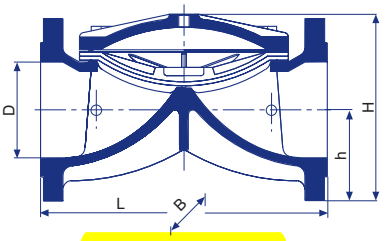
Nom. Dia. mm	Nom. Dia. inch	L mm	H mm	B mm	h mm	Weight kg.	Connections
40	1 1/2	159	80	96	29	1.8	Thread / Grooved
50	2	190	100	125	38	3.9	Thread / Grooved
50	2	190	159	165	76	7.9	Flange
65	2 1/2	216	110	125	46	5.0	Thread / Grooved
65	2 1/2	216	173	185	80	10.1	Flange
80-50-80	3-2-3	230	125	125	50	5.0	Thread / Grooved
80-50-80	3-2-3	230	175	200	100	11.0	Flange
80-65-80	3-2 1/2-3	244	127	138	50	5.4	Thread / Grooved
80-65-80	3-2 1/2-3	216	192	200	92	11.4	Flange
80	3	290	138	200	50	10.4	Thread / Grooved
80	3	283	200	200	100	17.5	Flange
100-80-100	4-3-4	283	222	222	111	20.1	Flange
100	4	346	220	230	60	16.5	Thread / Grooved
100	4	305	220	230	99	25.5	Flange
125-100-125	5-4-5	305	243	250	120	29.5	Flange
150-100-150	6-4-6	325	285	285	143	35.8	Flange
150	6	406	295	300	142	49.5	Flange
200	8	470	383	354	160	71.0	Flange
250	10	635	430	464	197	109.0	Flange
300	12	749	474	480	234	140.0	Flange

RAF Angle

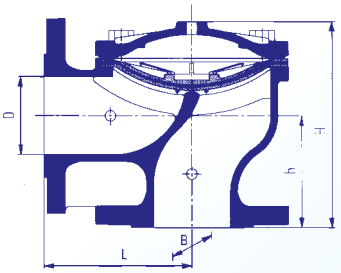
50	2	90	150	125	81	4.2	Thread / Grooved
50	2	112	159	165	77	8.1	Flange
65	2 1/2	117	160	125	83	7.0	Thread / Grooved
65	2 1/2	122	160	185	83	11.0	Flange
80-50-80	3-2-3	110	146	125	72	4.9	Thread / Grooved
80-50-80	3-2-3	140	200	200	100	12.0	Flange
80-65-80	3-2 1/2-3	130	170	140	86	6.2	Thread / Grooved
80-65-80	3-2 1/2-3	130	215	200	115	12.4	Flange
80	3	148	205	200	107	12.0	Thread / Grooved
80	3	154	210	200	115	19.0	Flange
100-80-100	4-3-4	155	225	220	110	21.0	Flange
100	4	150	227	230	118	15.9	Thread / Grooved
100	4	177	230	230	113	26.5	Flange
150	6	218	315	300	148	48.7	Flange

Dimensions of RAF & RAF-A

RAF



RAF (Inline)



RAF-A (Angle)

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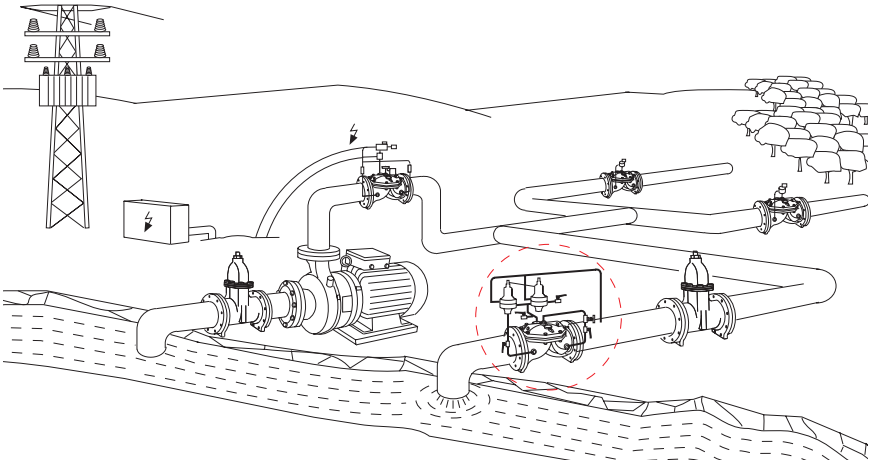
RAF GENERAL PURPOSE HYDRAULIC VALVES

RAF 88 Surge Anticipating Control Valve

Description

RAF 88 is adjusted to eliminate hazardous pressure surges typical of water hammer conditions. A water hammer is caused by an abrupt shutoff of a pump or rapid closure of a main valve, causing a fast propagation of low-pressure front, followed by an extremely high-pressure back-wave. A series of pressure waves, each one composed of alternating low and high pressure is created within a few seconds.
RAF 88 is a piloted hydraulic valve activated by line pressure. The valve has two pilots, for high and low pressure. Under normal conditions the RAF 88 is closed. It opens when the line pressure drops below a preset pressure, in anticipation to the following surge, and remains open until the fluctuations subside.

Typical Application



RAF 88 is located next to a booster pump to protect the supply line downstream of the pump from water hammer damages.

Use a surge-anticipating valve to protect water lines against water hammer damages. Uphill supply lines of considerable length and large diameter pipes are more susceptible to water hammer damages.
For more info or hazard analysis of a particular network consult Raphael Engineers.

Recommended Flow

Nominal Diameter		Flow Rate M^3/h
mm	Inch	Max.
40	1.5	35
50	2	60
65	2.5	80
80-50-80	3-2-3	60
80-65-80	3-2.5-3	100
80	3	120
100-80-100	4-3-4	120
100	4	180
125-100-125	5-4-5	200
150-100-150	6-4-6	200
150	6	400
200	8	750
250	10	1150
300	12	1700

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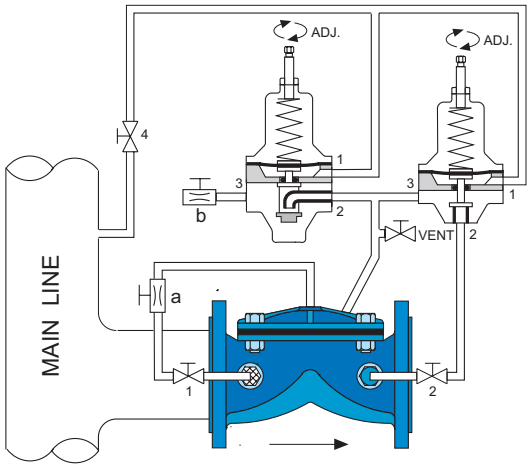

RAF 88 - Surge Anticipating Hydraulic Valve

RAF 88 control mode

RAF Surge Anticipating hydraulic Valve is activated by line pressure and controlled by two pilot valves. Both pilots include spring-loaded membranes. The low-pressure pilot (the left one in the drawings) is preset to open the RAF 88 gradually when the line pressure drops about 10m below normal.
The high-pressure pilot (on the right) is preset to open the RAF 88 when the line pressure rises about 10m above normal. The RAF is normally closed. Only when the line pressure drops below or rises above the preset limits, the RAF 88 is piloted to open. A water hammer event starts with a considerable pressure drop, which cause the RAF 88 to open. Then, as the water wave rolling backward, the valve remains open and let the pressure out to diminish its impact.

RAF 88- control mode

Manual: To open the RAF 88, close cocks 1,2 and 4 and open the Vent.
Automatic: The RAF 88 is normally closed. Ensure that all cock valves (except the vent) are fully open. Normally, line pressure is higher than the set point of the low-pressure pilot (the left one), but lower than that of the high-pressure pilot (the right one). Thus, ports 2 in both pilots are closed. There is no flow from the main line to the pilots. The RAF control chamber is connected directly to the line pressure through needle valve a. The RAF is closed.
When line pressure drops below the lower set point, the spring of the low-pressure pilot (left) push the pilot's membrane downward and on the way opens port 2, as shown in the drawing. The right pilot does not change. The RAF control chamber drains out through port 2 -Vent b of the left pilot. The RAF 88 opens in anticipation to a surge. The pressure drop is soon followed by a surge, which closes the left pilot but opens the right one (the high pressure pilot) at the same time. The RAF control chamber now drains through ports 2-3 of the right pilot and thus remains open. The high-pressure wave is allowed to flow through. After the surges subside, and the line pressure returns to normal level, both pilots close and the RAF 88 follows suit.

Adjustment

Use needle valve **a-b** to control the RAF operational speed. Adjust the low and high pilot's set points by the adjusting screws. See list of available springs below.

Standard RAF 88:	Special Features:
Basic RAF valve Rilsan Coated	Enamel coating
Self-cleaning screen filter	Large capacity external filter
2 way pilot P-181	2 way high capacity pilot P-181-3/4
2 way pilot P-161B	2 way high capacity pilot P-161B-3/4
Brass needle valves	-
Reinforced plastic tubing	Copper or stainless steel tubing
60mm pressure gauge	Glycerinated 60mm pressure gauge

Spring Selection (bar)

RAF 88

Green	Blue	red	Yellow
Standard			
2-10	0.5-4	0.5-6	2-16

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