

Forbes Marshall Pilot Operated Pressure Reducing Valve

Description:

The Forbes Marshall Pilot Operated Pressure Reducing Valve, FMPRV41 is an SG iron pilot operated pressure reducing valve suitable for steam or compressed air.

Sizes and End Connections:

½", ¾", 1", 1½" & 2"

BSPT / NPT for ½", ¾", 1"

Flanged: BS 10 table "F/H" for 1½" and 2"

1/2" FMPRV41 LC versions available

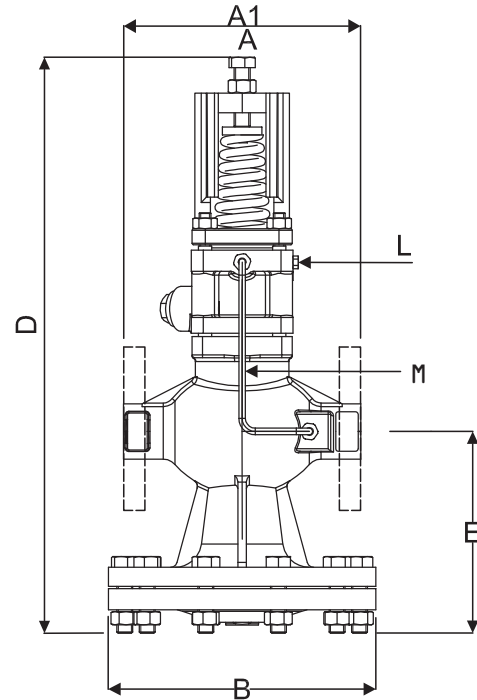
Limiting Conditions:

PMO-Maximum allowable pressure	247 Psig
TMO-Maximum allowable temperature	450°F
Cold hydraulic test pressure	493 Psig
Spring range	4 to 247 Psig

Pressure Sensing Pipe:

The FMPRV41 controls the pressure by sensing the downstream pressure through a pressure sensing pipe taken to the union (item L) or through the internal sensing pipe (item M). Fitting of the external pressure sensing pipe is described in the user manual supplied with the valve.

Note: Capacity is reduced and there is a possibility of hunting if an external pressure sensing pipe is not fitted.



FMPRV41 STEAM

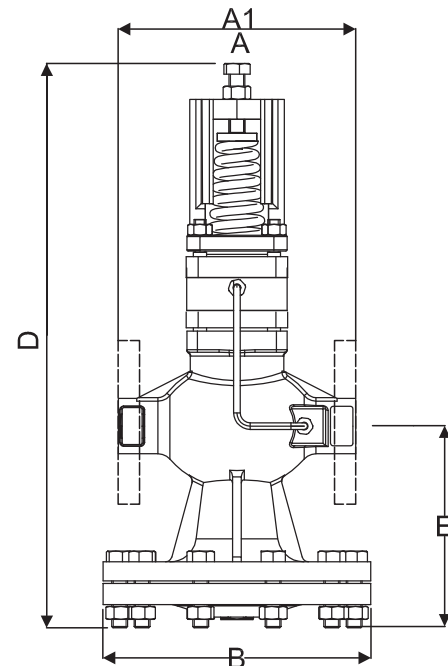
Dimensions (approx. in Inches)

FMPRV41 (Steam)

Size	Screwed A	Flanged A1	B	D	E
1/2"	6.3	.....	7.1	16.1	5.1
1/2" LC	6.3	.....	7.1	16.1	5.1
3/4"	6.3	.....	7.1	16.1	5.1
1"	7.1	.....	8	17	5.7
1½"	.....	8.3	9.9	17.7	5.9
2"	.....	9.1	9.9	18.9	6.9

FMPRV41 (Air)

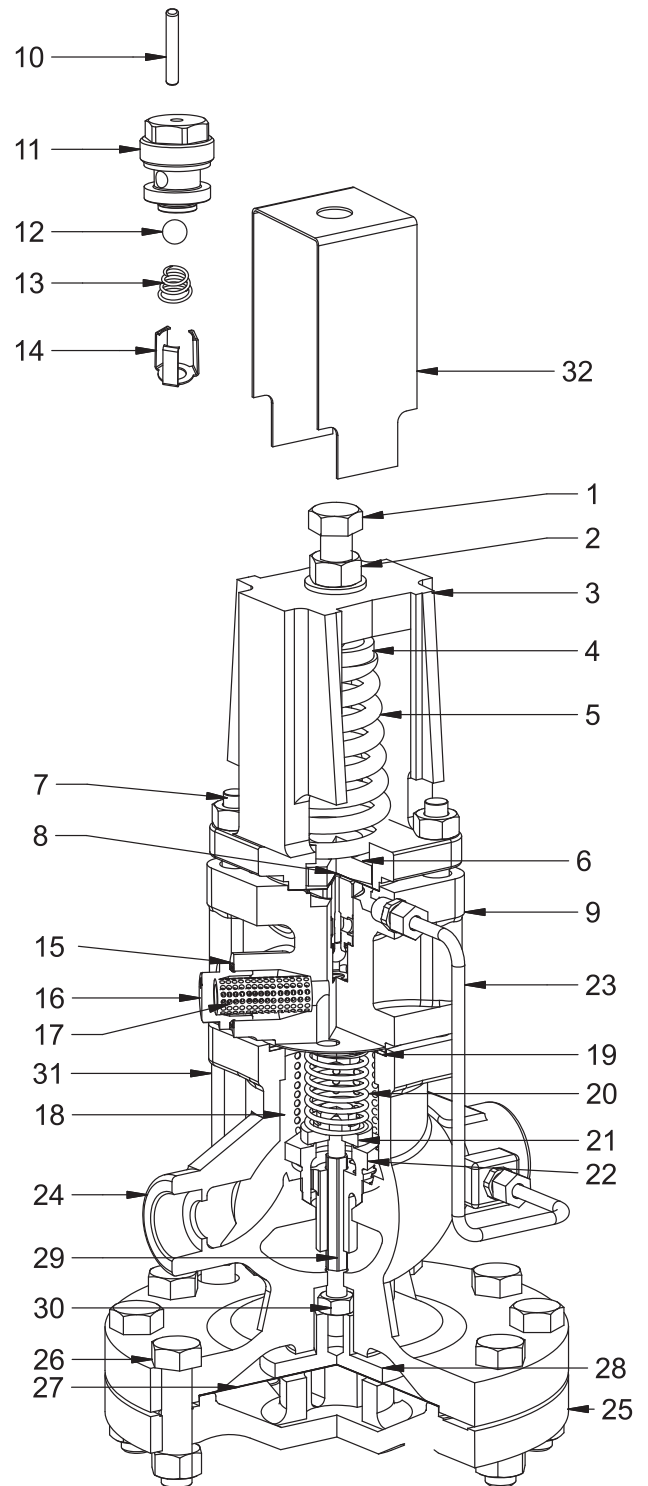
Size	Screwed A	Flanged A1	B	D	E
1/2"	6.3	.....	7.1	14.1	5.1
1/2" LC	6.3	.....	7.1	14.1	5.1
3/4"	6.3	.....	7.1	14.1	5.1
1"	7.1	.....	8	15	5.7
1½"	.....	8.3	9.9	16.3	5.9
2"	.....	9.1	9.9	16.3	6.9



FMPRV41 AIR

Materials:

No	Part	Material	Standard
1	Adjustments screw	Carbon Steel	IS1367Gr14
2	Adjustment lock nut	Stainless Steel	Type 304
3	Spring housing	SG iron	EN-JS1025 DIN EN 1563
4	Top spring pad	C-20	IS2062
5	Pressure adjustment Spring	Stainless Steel	IS4454 Part IV Gr.1, Type 302
6	Bottom spring pad	Stainless Steel	ASTM A276, Type 304
7	Spring housing Securing nut Securing studs	Carbon Steel Carbon Steel 1/2" - 1 1/4" 1 1/2" - 2"	HT IS 1364, Gr. 8.8 HT IS 1364, Gr. 8.8 3/8" x 4" Long 1/2" x 4" Long
8	Pilot diaphragms	Stainless Steel	ASTM A240, Type 304
9	Pilot valve chamber	SG iron	EN-JS1025 DIN EN1563
10	Pilot valve plunger	Stainless Steel	Type 304
11	Pilot valve seat with integral seal	Stainless Steel +PTFE	BS 970 431 S29
12	Pilot valve ball	Stainless Steel	AISI 420
13	Pilot valve Spring	Stainless Steel	BS 2057 302 S26
14	Pilot Valve clip	Stainless Steel	ASTM A240 Type 301
15	Pilot filter cap gasket	Stainless Steel	BS 1449-304-S16
16	Pilot filter cap	Stainless Steel	ASTM A743Gr. CA 40
17	Pilot filter element	Bronze	
18	Internal strainer	Stainless Steel	ASTM A240 Type 304
19	Body gasket	SS forced exfoliated graphite	
20	Main valve return spring	Stainless Steel	BS 2056 302 S26
21	Main valve	Stainless Steel	ASTM A276 Type 420
22	Main valve seat	Stainless Steel	ASTM A276 Type 420
23	Balance pipe assembly	Stainless Steel	ASTM A213 Type 304
24	Main Valve body	SG iron	EN JS1025 DIN EN 1563
25	Lower diaphragm chamber	SG iron	EN-JS1025 DIN EN 163
26	Lower diaphragm chamber Securing nuts Securing Bolts	Carbon steel Carbon steel 1/2" - 1", 1 1/2", 2"	IS1364, Gr. 8.8 IS1364, Gr. 8.8 1/2" x 2", Long 1/2" x 2", Long
27	Main diaphragm pad	Stainless Steel	ASTM A240, Type 304
28	Lower diaphragm pad	Stainless Steel	ASTM A276, Type 304
29	Pushrod	Stainless Steel	Type 431
30	Lock nut	Stainless Steel	Type 316
31	Control pipe assembly	Stainless Steel	ASTM A213, Type 304
32	Name plate	Stainless Steel	



FMPRV41 STEAM

Note : Item 10,11,12,13 and 14 are shown on the exploded view, as they are hidden by the pilot filter on the main illustration.

Steam Capacity Chart:

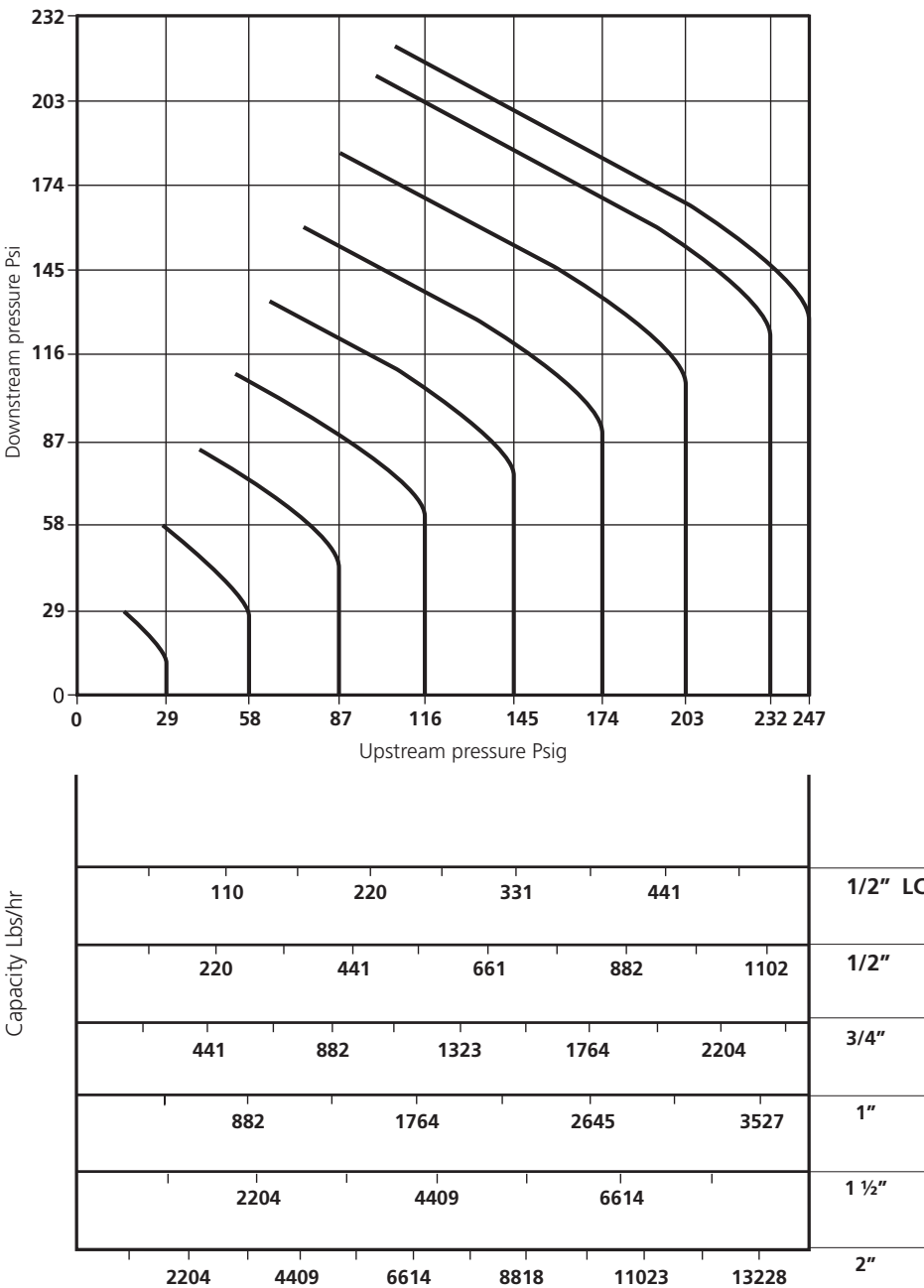
Note:
The capacities quoted below are based on valves fitted with an external pressure sensing pipe. Reliance on the internal pressure sensing pipe will mean that capacities may be reduced. In the case of low downstream pressure this reduction could be up to 30% of the valve capacity.

How to Use the Chart :

Saturated Steam:
A valve is required to pass 1323 Lbs/hr reducing from 87 Psig to 58 Psig. Find the point at which the curved 87 Psig upstream pressure line crosses the horizontal 58 Psig downstream pressure

line. A perpendicular dropped from this point gives the capacities of all FMPRV41 sizes under these conditions.

Superheated steam:
Because of the higher specific volume of superheated steam a correction factor must be applied to the figure obtained from the chart above. For 131°F of superheat the factor is 0.95 and for 212°F of superheat the factor is 0.9.
Using the example given for saturated steam, the 1½" valve would pass 2535X0.95=2408 Lbs/hr. if the steam had 131°F superheat. It is still big enough to pass the required load of 1323 Lbs/hr.



How to Use the Chart :

Capacities are given in CFM of free air. The use of the capacity chart can be best explained by an example.

Required, a valve to pass 212 CFM of free air reducing from 174 Psig to 116 Psig.

Find the point at which the curved 174 Psig upstream pressure line crosses the horizontal 116 Psig downstream pressure line. A perpendicular dropped from this point shows that, a 1/2" valve will pass approximately 254 CFM under these conditions and is the correct valve size to choose.

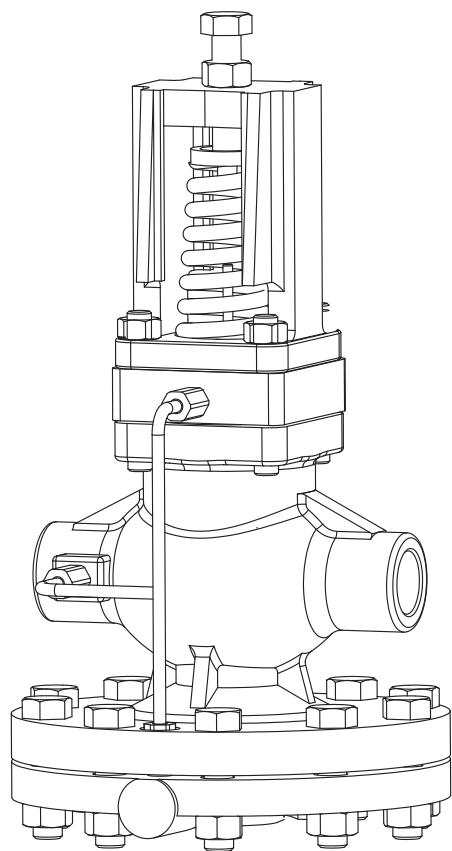
Cv(US) Values:

The Cv values are full capacities and should be used for safety valve sizing purpose only.

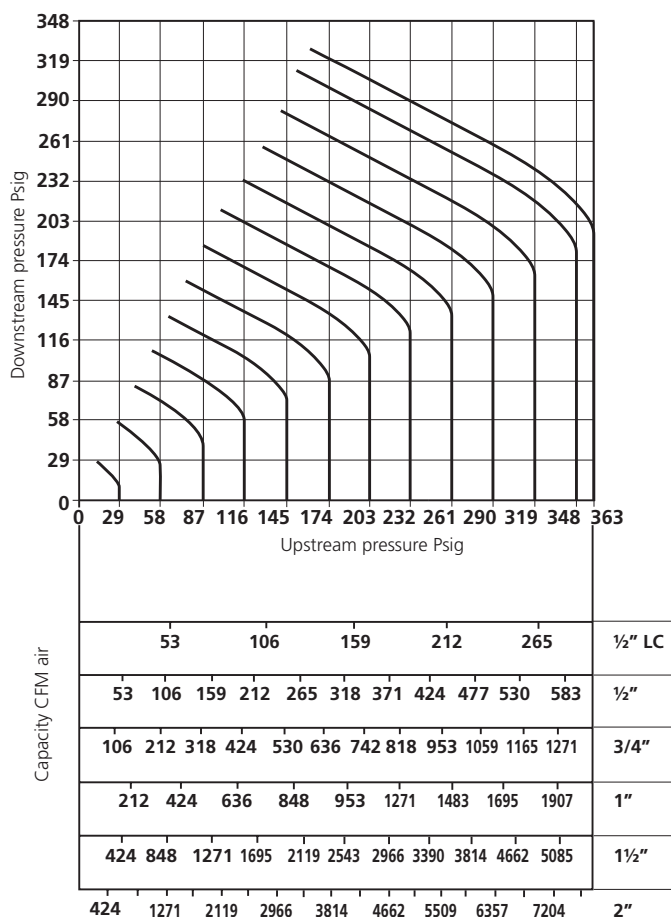
SIZE	1/2"	3/4"	1"	1 1/2"	2"
Cv	3.2	6.6	9.4	19.7	32.4

For conversion $C_v(\text{UK}) = K_v \times 0.963$

$C_v(\text{US}) = K_v \times 1.156$



Compressed Air Capacity Chart:



How to Order :

Forbes Marshall Pilot Operated Pressure Reducing Valve, 1 1/2" FMPRV41 having a 3 to 247 Psig spring and flanged BS10 table "F/H" connections.

Installation note:

The pilot operated pressure reducing valve should be installed in a horizontal pipeline, protected by a strainer and a separator, with the direction of flow as indicated by the arrow on the valve body.

Safety Information, Installation and Maintenance:

For full details see the user manual supplied with the product.

Spare Parts:

For spares refer user manual.

Forbes Marshall Pilot Operated Pressure Reducing Valve

Description

The Forbes Marshall Pilot Operated Pressure Reducing Valve, FMPRV53, is a cast steel pilot operated pressure reducing valve suitable for steam or compressed air.

Sizes and Pipe Connections

½", ¾", 1", 1½", 2" and 3"
Flanged to BS table – J and K*
ANSI 300 and 600
DIN - 1" * and 1½"

Note: *3" has these flanges only.
Also available for air applications.

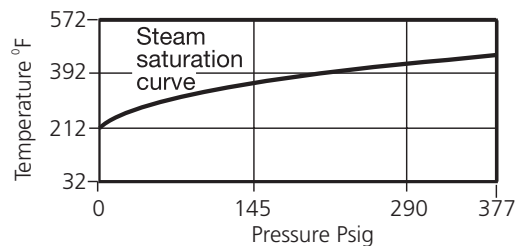
Limiting Conditions

Maximum working conditions	377 Psig at 572 °F
Body design conditions	609 Psig at 797 °F
Cold hydraulic test pressure without internals	754 Psig

Two color coded pressure adjustment springs are available for the following down stream pressure ranges:

Natural	3 to 247 Psig (conical spring)
Grey	232 to 348 Psig

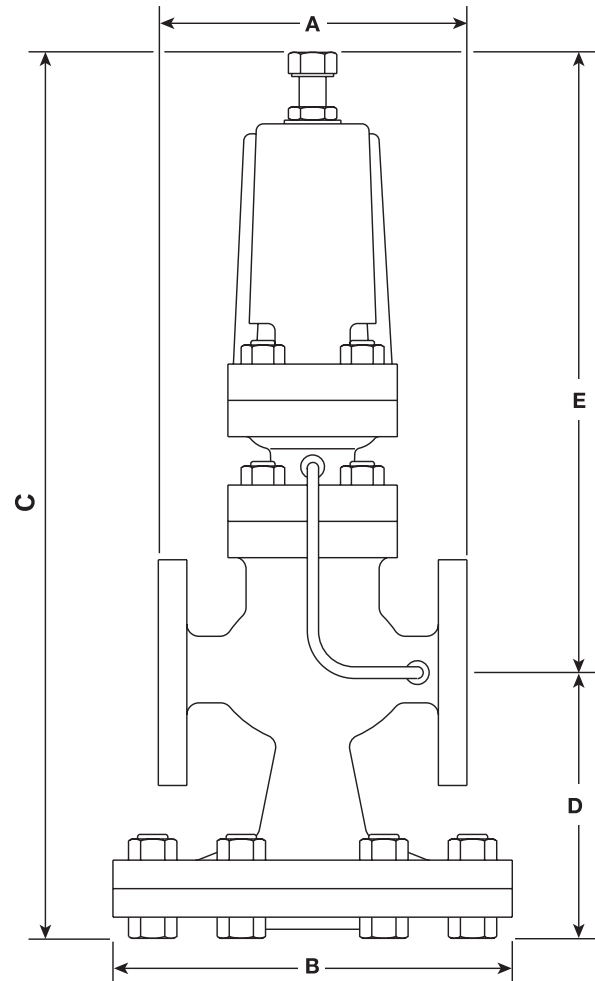
Operating range



Pressure Sensing Pipe

The FMPRV53 valve controls the downstream pressure by sensing the downstream pressure through an external sensing pipe taken from downstream to the pilot valve chamber (10). Fitting of this external pressure sensing pipe is described in the user manual.

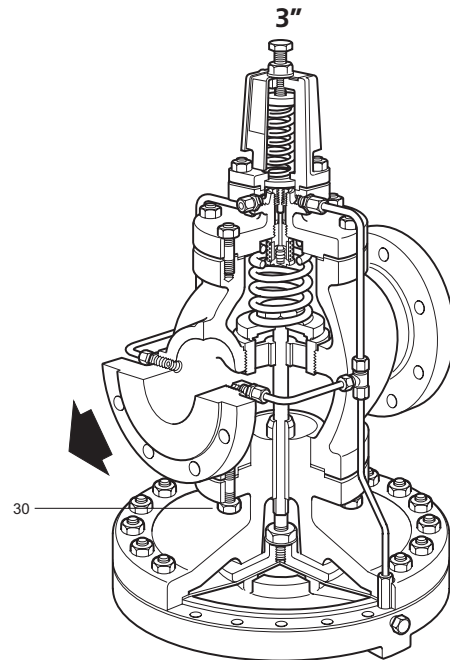
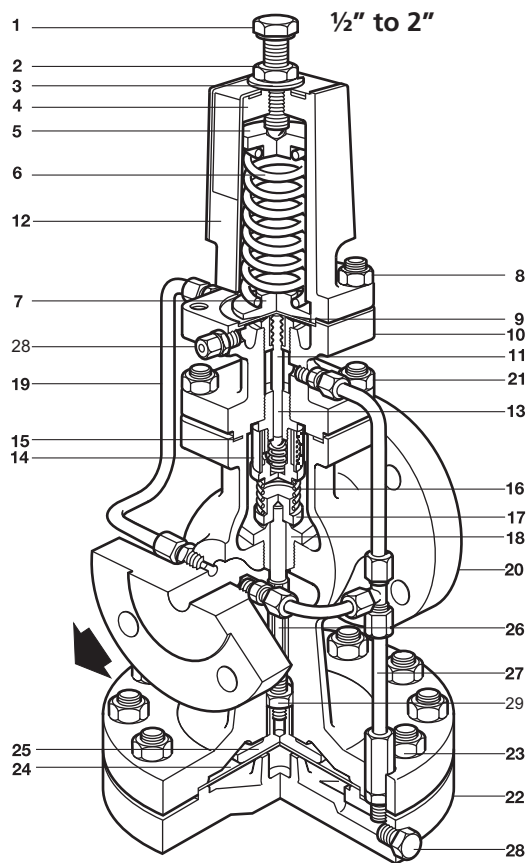
If the external sensing pipe is not provided then the valve controls by internal pressure sensing pipe (19). However the capacity in this case will be reduced.



Dimensions (approx. in Inches and Lbs):

Size	A	B	C	D	E	Weight
½	5.8	6.9	15.7	5.1	10.6	33
¾	6.6	6.9	16.1	5.1	11.0	33
1	7.2	8.5	16.7	6.1	10.7	51
1½	10.0	11.0	19.3	7.3	12.0	88
2	10.0	11.0	19.3	7.3	12.0	93
3	13.0	13.8	22.8	10.1	12.7	227

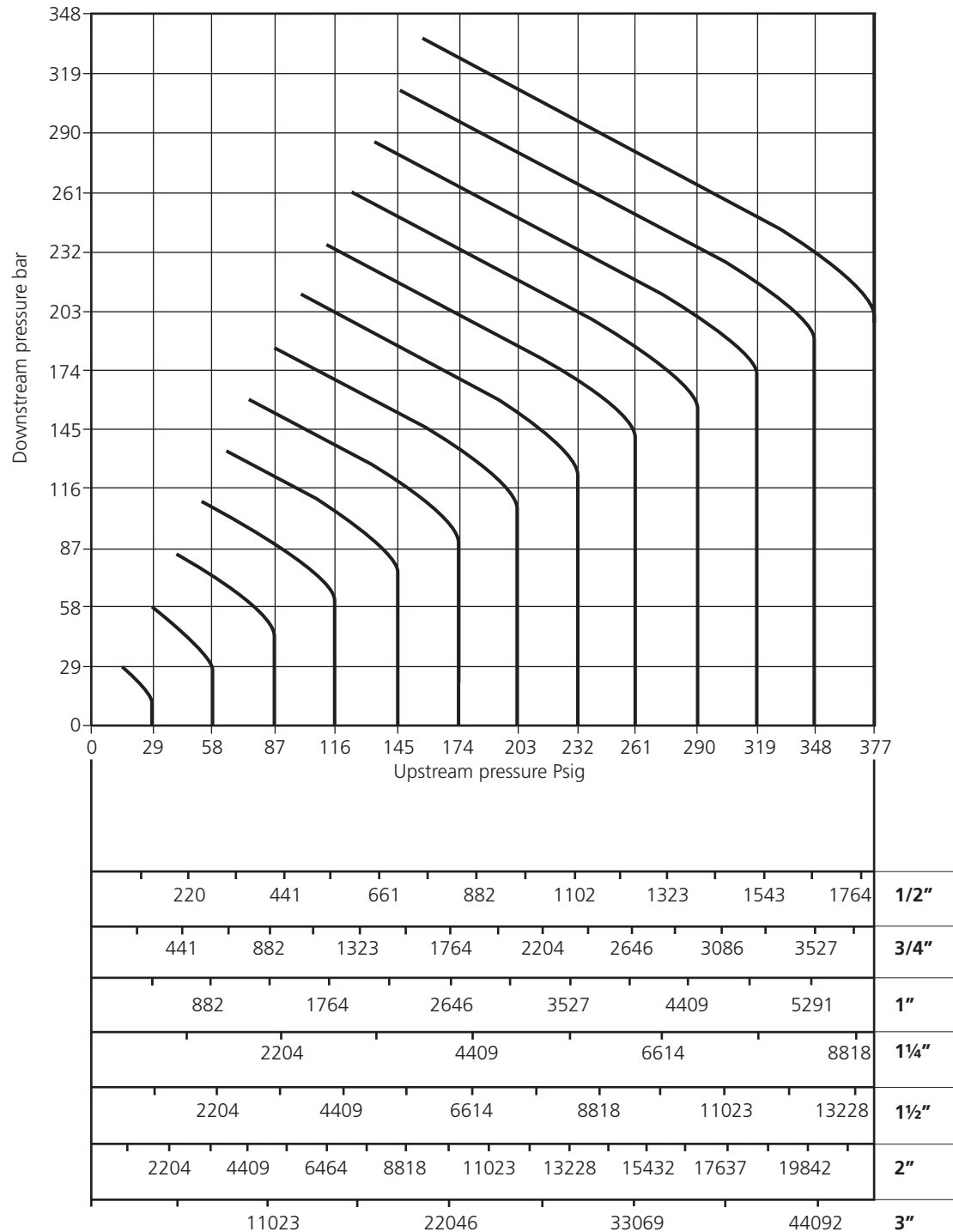
General tolerance: up to ±5/32"



Material

Sr. No.	Description	Material	Standard	Sr. No.	Description	Material	Standard
1	Adjustment screw	Carbon Steel	H.T.IS 1367 Gr. 8.8	16	Main valve Return spring	Spring Steel	IS 4454 part IV Gr. 1
2	Adjustment lock nut	Carbon Steel Gr. 8.0	H.T.IS 1367	17	Main valve	Stainless Steel	ASTM A276, Type 304
3	Washer	Stainless Steel	ASTM A 240, Type 304	18	Main valve seat	Stainless Steel	ASTM A276, Type 420
4	Spring housing	SG iron	EN-JS1025	19	Pressure sensing pipe	Stainless Steel	ASTM A213, Type 304
5	Top spring plate	C-20	IS 2062	20	Main valve body	Cast Steel	ASTM A216 Gr. WCB
6	Pressure adjustment spring	Spring steel	IS 4454 Part IV Gr. 1	21	Pilot valve securing studs nuts	Carbon Steel Carbon Steel	H. T IS 1367 Gr. 8.8 H. T IS 1367 Gr. 8
7	Bottom spring plate	Stainless Steel	ASTM A276 Type 304	22	Main diaphragm chamber	Cast Steel	ASTM A216 Gr. WCB
8	Spring housing securing studs nuts	Carbon Steel Carbon Steel	H.T. IS 1367 Gr. 8.8 H. T IS 1367 Gr. 8	23	Main diaphragm securing studs nuts	Carbon Steel Carbon Steel	H.T. IS 1367 Gr. 8.8 H. T IS 1367 Gr. 8
9	Pilot diaphragm	Stainless Steel	ASTM A240, Type 304	24	Main diaphragms	Stainless Steel	ASTM A240, Type 304
10	Pilot valve chamber	Cast Steel	ASTM A216 Gr. WCB	25	Main diaphragm plate	Stainless Steel	ASTM A276, Type 304
11	Pilot valve plunger	Stainless Steel	ASTM A276, Type 304	26	Push rod	Stainless Steel	ASTM A276, Type 431
12	Spring housing cover	Stainless Steel	ASTM A240, Type 304	27	Pipe assembly	Stainless Steel	ASTM A213, Type 304
13	Pilot valve and seat unit	Stainless Steel	ASTM A276, Type 304	28	Plug 1/8" BSP	Carbon Steel	ASTM A105
14	Internal strainer	Stainless Steel	ASTM A240, Type 304	29	Lock nut	Stainless Steel	H T IS 1367, Type 304 Gr. 8
15	Body gasket	Reinforced exfoliated graphite		30	Body stud nut	Carbon Steel Carbon Steel	H T IS 1367 Gr. 8.8 HT IS 1367 Gr. 8

Steam Capacity Chart



Note: The capacities quoted on the above charts are based on valves fitted with external pressure sensing pipes. Reliance on the internal pressure sensing pipe will mean that capacities may be reduced. In the case of low downstream pressure this reduction could be up to 30% of the valve capacity.

How to Use the Chart

Saturated Steam

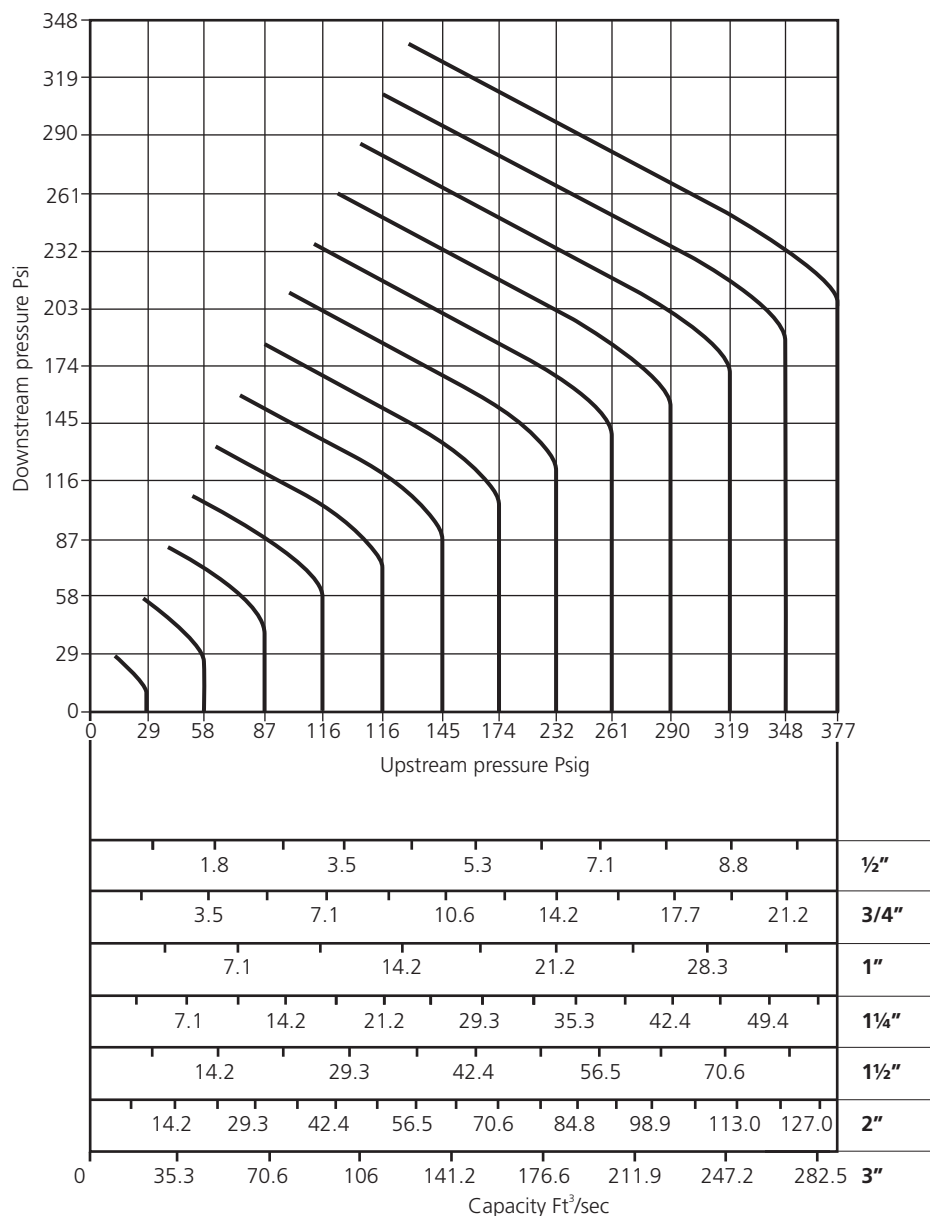
Required a valve to pass 882 Lbs/hr reducing from 87 Psig to 58 Psig Find point at which curved 87 Psig upstream pressure line. A perpendicular drop from this point gives the capacities of all FMPRV53 sizes under these conditions. A 1" valve is the smallest size which will carry the required load.

Superheated Steam

Because of the higher specific volume of superheated steam correction factor must be applied to the figure obtained from this chart. For 131 °F of superheat the factor is 0.95 and for 212 °F of superheat is 0.9.

Using the example given for saturated steam, the 1" valve would pass $1138 \times 0.95 = 1082$ Lbs/hr if the steam had 131 °F of superheat. It is still big enough to pass the required load of 882 Lbs/hr.

Compressed Air Capacity Chart



Compressed Air

Capacities are given in cubic feet per second (ft³/sec). The use of the capacity chart can be best explained by an example. Required a valve to pass 3.53 ft³/sec of free air reducing from 174 Psi to 116 Psi. Find the point at which the curve 174 Psi upstream line crosses the horizontal 116 Psi downstream pressure line. A perpendicular dropped from this point shows that 1/2" line will pass about 4.24 ft³/sec under these conditions and is the correct valve size.

How to Order

Example

3/4" Forbes Marshall Pilot Operated Pressure Reducing Valve, FMPRV53, for steam, flanged to BS 10 table 'K'.

or

1/4" Forbes Marshall Pilot Operated Pressure Reducing Valve, FMPRV53, for air, flanged to ANSI 300

Installation

See user manual supplied with the valve.



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