FORBES MARSHALL

The Products that your Process Needs

Energy Conservation | Environment | Process Efficiency

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CIN No U28996PN1985PTC037806

10th April 2019

TO WHOME IT MAY CONCERN :

In March 2015, Forbes Marshall purchased the entire share holding pf Spirax Sarco in Spirax Marshall Pvt Ltd and company name was changed from Spirax Marshall Pvt Ltd to Forbes Marshall Steam Systems Pvt Ltd. Thereafter,Forbes Marshall Steam Systems Pvt Ltd got amalgamated with Forbes Marshall Pvt Ltd in June 2017.

If you have any question please do not hesitate to contact me.

Yours truly

Narinder Sharma
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AUTHORISED STOCKIST LETTER

Effective: April 2018

To whom it may concern:

This letter is to **CERTIFY**, that **BHARMAL TRADERS**. is an AUTHORISED STOKIST in the Western region of PAKISTAN. For any assisstance please contact:

Address:
Shop # 10, Sharjah Trade Centre, Altaf Hussain Road,
New Challi,
Karachi,
Pakistan
Tel : +92 300 3734873 / +92 322 2205282
E Mail : adnanbharmal@hotmail.com

BHARMAL TRADER. has the responsibility to stock, promote, sale and offer technical assisstance for **FORBES MARSHALL PVT LTD.**

This agreement is valid until March 2019

If you have any questions please do not hesitate to contact me.

Yours truly

Narinder Sharma
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PSVAL

Forbes Marshall
Trusted Partners.
Innovative Solutions.

Piston Valve

Description
Forbes Marshall Piston Valves, PSVAL, provide perfect tightness and durable stability on different media such as steam, superheated steam, heat transfer fluid, water and compressed air.

Sizes and Pipe Connection
1. DN 15 / 20 / 25 / 32 / 40
   Screwed BSPT / NPT, socket weld ends, flanged to class 150 / 300 / 600 available on special request
2. DN 50 / 65 / 80 / 100 / 125 / 150 / 200 / 250
   Flanged to class 150 / 300
3. DN 50 / 65 / 80 / 100 / 125 / 150 / 200 / 250
   Flanged to PN16 / PN25 / PN40

For higher sizes DN 250 and 300 contact Forbes Marshall

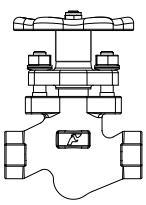
Limiting Conditions

For DN 15 / 20 / 25 / 32 / 40 Socket weld ends	
Maximum operating pressure	78 bar g
Maximum operating temperature	425 deg c
Maximum hydraulic test pressure	156 bar g (IBR requirement)

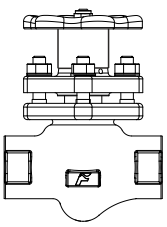
For DN 15 / 20 / 25 Screwed ends	
Maximum operating pressure	78 bar g
Maximum operating temperature	425 deg c
Maximum hydraulic test pressure	156 bar g (IBR requirement)

For DN 32 / 40 Screwed ends	
Maximum operating pressure	41.5 bar g
Maximum operating temperature	425 deg c
Maximum hydraulic test pressure	83 bar g (IBR requirement)

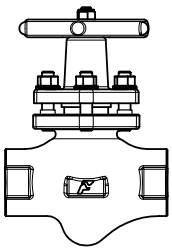
Body design conditions : DN 15/20/25/32/40 Class 600 Flanged ends	
Maximum allowable pressure	102 bar g @ 38 °C
Maximum operating pressure	78 bar g @ 295 °C
Maximum operating temperature	425 °C @ 57.5 bar g
Maximum hydraulic test pressure	156 bar g



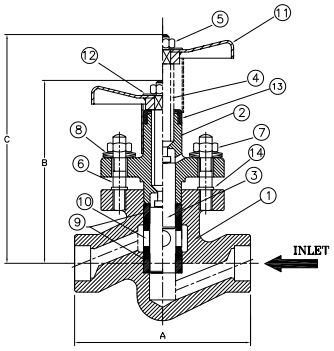
DN 15 / 20



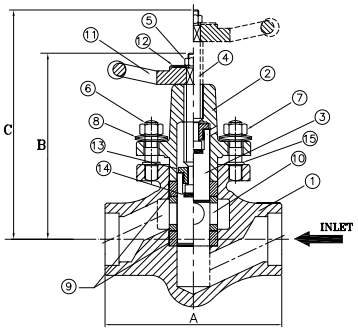
DN 25



DN 32 / 40



DN 15, 20, 25



DN 32, 40

Material: DN 15-40

Sr.No.	Description	Material
1	Body	Forged Carbon Steel ASTM A105N
2	Bonnet	Forged Carbon Steel ASTM A105N
3	Piston	Stainless Steel ASTM A 276 TYPE 304
4	Spindle	Stainless Steel ASTM A 276 TYPE 410
5	Nyloc Nut	Carbon Steel
6	Stud	Carbon Steel ASTM A193 Gr. B7
7	Nut	Carbon Steel ASTM A 194 Gr.2H
8	Belleville Washer	Spring Steel 50CrV4
9	Sealing stack	S.S. Reinforced Graphite
10	Spacer	Stainless Steel ASTM A 276 TYPE 410
11	*Handwheel	Sheet Metal / SG Iron
12	Gap rings	Stainless Steel 410

***Note : For DN 15-25 Handwheel - Sheet Metal**
For DN32-40 Hand wheel-S.G. Iron

Additional material: DN 40

Sr.No.	Description	Material
13	Split Nut	Brass DIN En12164
14	Thrust Plate	Stainless Steel ASTM A 275 TYPE 420

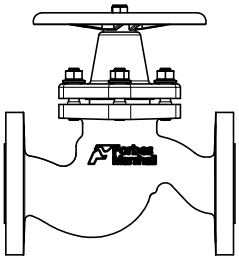
Dimensions (approx. in mm)

Size (DN)	A	B	C
15	110	118	146
20	110	118	146
25	126	133	165
32	165	175	215
40	165	175	215

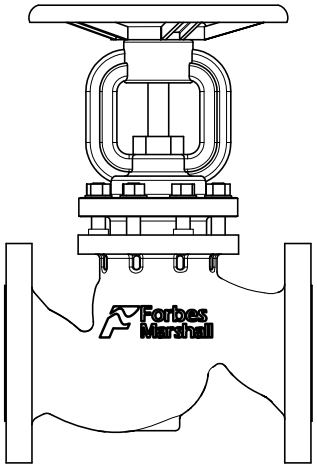
Flange Class

***Tol ±1mm**

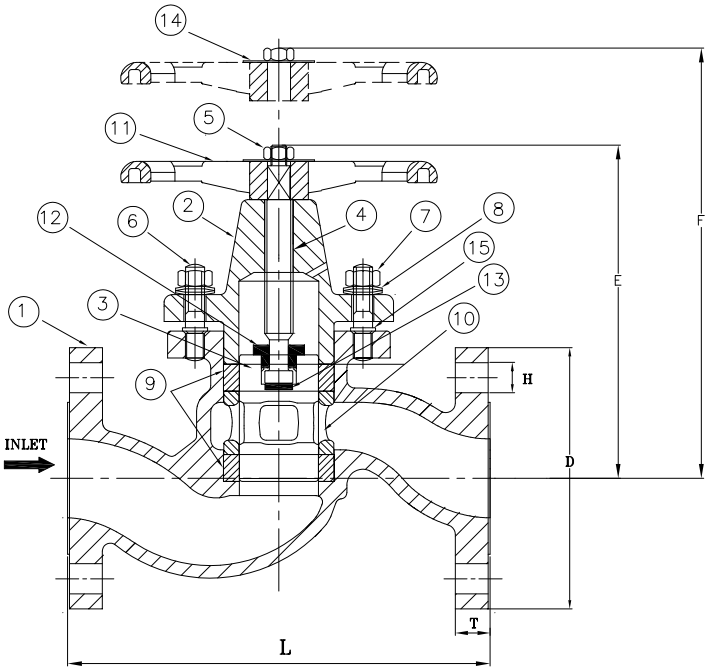
Size (DN)	A*			B	C
	Class 150	Class 300	Class 600		
15	252	265	265	118	146
20	252	265	265	118	146
25	260	278	278	133	165
32	305	317	320	175	215
40	305	317	320	175	215



DN 50



DN 65 to 250



DN 50 Piston valve : always open /close valve fully
do not use valve key

Body design conditions : DN 50-200 PN 16 Flanged End	
Maximum allowable pressure	16 bar g at 38 deg C
Maximum operating pressure	16 bar g at 204 deg C
Maximum operating temperature	425 deg C at 9.1 bar g
Cold hydraulic test pressure	24 bar g

Body design conditions : DN 50-150 PN 25 Flanged End	
Maximum allowable pressure	25 bar g at 38 deg C
Maximum operating pressure	25 bar g at 226 deg C
Maximum operating temperature	425 deg C at 14 bar g
Cold hydraulic test pressure	38 bar g

Body design conditions : DN 50-200 PN 40 Flanged End	
Maximum allowable pressure	40 bar g at 38 deg C
Maximum operating pressure	39 bar g at 250 deg C
Maximum operating temperature	425 deg C at 22.8 bar g
Cold hydraulic test pressure	60 bar g

Body design conditions : DN 50/65/80/100/150/200/250Class 150 Flanged ends	
Maximum allowable pressure	19.6 bar g at 38 deg C
Maximum operating pressure	14 bar g at 197 deg C
Maximum operating temperature	425 deg C at 5.5 bar g
Cold hydraulic test pressure	28 bar g (IBR requirement)

Body design conditions : Class 300 Flanged End	
Maximum allowable pressure	51 bar g at 38 deg C
Maximum operating pressure	41.5 bar g at 253 deg C
Maximum operating temperature	425 deg C at 28.8 bar g
Cold hydraulic test pressure	83 bar g (IBR requirement)

Material: DN 50

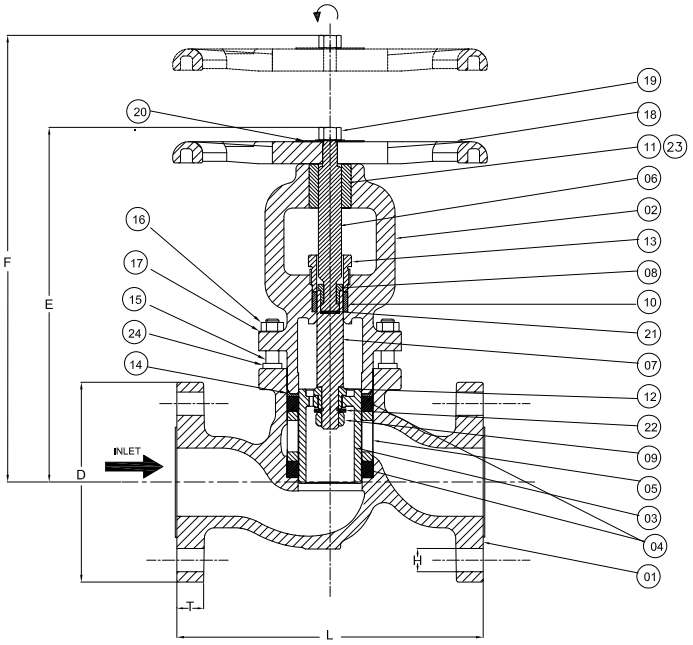
Sr.No.	Description	Material	
1	Body	Cast Steel	ASTM A 216 Gr.WCB
2	Bonnet	Cast Steel	ASTM A 216 Gr.WCB
3	Piston	Stainless Steel	ASTM A 276 TYPE 304
4	Spindle	Stainless Steel	ASTM A 276 TYPE 410
5	Nyloc Nut	Carbon Steel	
6	Stud	Carbon Steel	ASTM A193 Gr. B7
7	Nut	Carbon Steel	ASTM A 194 Gr.2H
8	Belleville Washer	Spring Steel	50CrV4
9	Sealing stack	S/S Reinforced Graphite	
10	Spacer	Stainless Steel	ASTM A 743 Gr.CA15
11	Handwheel	SG Iron	
12	Thrust Plate	Stainless Steel	ASTM A 276 TYPE 420
13	Name Plate	Stainless Steel	ASTM A 240 TYPE 304
14	Split Nut	Brass	DIN EN 12164
15	Gap Rings	Stainless Steel	SS 420

Dimensions (approx. in mm) : Size DN 50

ANSI Class	L	D	PCD	H	No. of Holes	T	E	F	Approx Wt
150	203	152	121	19	4	19	210	262	14.5 kg
200	267	165	127	19	8	22	210	262	17.5 kg
PN 16	230	165	125	18	4	18	210	262	14.5 kg
PN 40	230	165	125	18	4	20	210	262	17.5 kg

Material: DN 65-250

Sr.No.	Description	Material	
1	Body	Cast Steel	ASTM A 216 Gr.WCB
2	Bonnet	Cast Steel	ASTM A 216 Gr.WCB
3	Piston	Stainless Steel	ASTM A 351 CF8
4	Body sealing stack	S/S Reinforced Graphite	
5	Spacer	Stainless Steel	ASTM A 743 CA 15
6	Spindle	Stainless Steel	ASTM A 276 Type 410
7	Stem	Stainless Steel	ASTM A 276 Type 304
8	Split Nut	Brass	DIN EN 12164
9	LH Nut	Stainless Steel	ASTM A 276 Type 304
10	Gland Sealing Stack	S/S Reinforced Graphite	
11	Threaded Bush	Ph. Bronze	
12	Back Seat	Stainless Steel	ASTM A 276 Type 410
13	Gland Nut	Stainless Steel	ASTM A 194 Gr.2H
14	Bonnet Sealing Ring	Graphite	
15	Stud	Carbon Steel	ASTM A 193 Gr.B7
16	Nut	Carbon Steel	ASTM A 194 Gr.2H
17	Beleville Washer	Spring Steel	50CrV4
18	Handwheel	S.G. Iron	
19	Nyloc Nut	Carbon Steel	



DN 65-250 : always open / close valve fully
Do not use 'F' Key

20	Washer	Stainless Steel	ASTM A 240 TYPE 304
21	Name Plate	Stainless Steel	ASTM A 240 TYPE 304
22	Thrust Plate	Stainless Steel	ASTM A 276 TYPE 420
23	Gap Rings	Stainless Steel	SS420

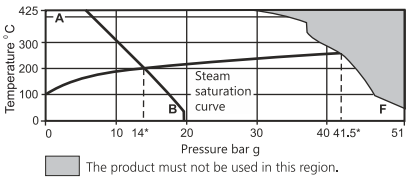
Dimensions (approx. in mm) : Size DN 65 to 250

Sizes (DN)	Pressure Class	L	D	PCD	H	NO. OF HOLES	T	E	F	Approx. Weight (Kg)
65	CLASS 300	292	191	149	22	8	25	335	400	31
65	CLASS 150	216	178	140	19	4	22	335	400	27
65	PN 16 / 25	290	185	145	18	8	18	335	400	27
65	PN40	290	185	145	18	8	22	335	400	31
80	CLASS 300	318	210	168	22	8	28	320	384	37
80	CLASS 150	241	191	152	19	4	24	320	384	31
80	PN 16 / 25	310	200	160	18	8	24	320	384	31
80	PN 40	310	200	168	18	8	20	320	479	37
100	CLASS 300	356	254	200	22	8	32	395	479	58
100	CLASS 150	292	229	191	19	8	24	395	479	47
100	PN 16 / 25	350	220	180	20	8	18	395	479	47
100	PN 40	350	235	190	24	8	22	395	479	58
125	CLASS 300	400	280	235	22	8	35	446	540	87
125	CLASS 150	356	254	216	22	8	24	446	540	70
125	PN 16 / 25	400	250	210	18	8	22	446	540	70
125	PN 40	400	270	220	26	8	26	446	540	87
150	CLASS 300	445	318	270	22	12	37	486	598	117
150	CLASS 150	406	279	241	22	8	26	486	598	90
150	PN 16 / 25	480	285	240	22	8	22	486	598	90
150	PN 40	480	300	250	26	8	28	486	598	117
200	CLASS 300	559	381	330	25	12	41	591	728	210
200	CLASS 150	495	343	298	22	8	28	591	728	164
200	PN 16 / 25	600	340	295	22	12	24	591	728	164
200	PN 40	600	375	320	30	12	34	591	728	210
250	CLASS 300	622	455	381	26	16	48	653	813	340
250	CLASS 150	622	405	362	25	12	31	653	813	300
*250	PN 16 / 25	730	405	355	26	12	26	653	813	340
*250	PN 40	730	450	385	33	12	38	653	813	370

*For DN250 Class PN16 / 25 and PN40, please contact Forbes Marshall

Operating Range

50-250 NB

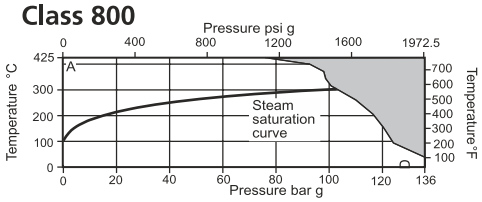


The product must not be used in this region.

A - B Flanged ANSI 150 A - F Flanged ANSI 300

* PMO- Maximum operating Pressure

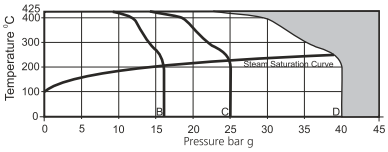
Class 800



The product must not be used in this region.

A - D Screwed and socket weld

DIN PSVAL



The product must not be used in this region.

A - B Flanged PN 16 A - C Flanged PN 25 A - D Flanged PN 40

How to Order

Example: DN 15 Piston Valve with socket weld ends.

Installation

The valve is designed for installation in a vertical or horizontal line with inlet as per the arrow direction. To open the valve turn hand wheel till it stops at the top and to close, turn hand wheel till it touches the bonnet. Do not use "F" key. If any leakage is observed during operation at the outlet, close valve fully and tighten opposite nuts equally half or one turn until leakage stops.

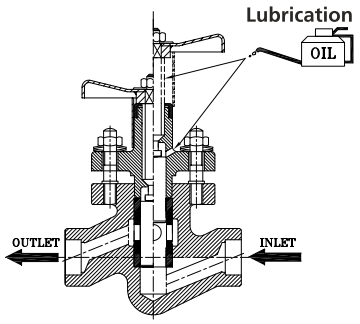
Safety Information

Pressure : Before attempting any maintenance of the valve, ensure that pressure is isolated and safely vented to atmosphere. Do not assume that the system is depressurized even when a pressure gauge indicates zero.

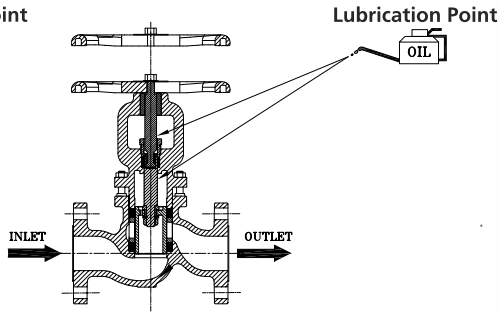
Maintenance

Use Molykote M30 oil for lubrication. For DN 15-50 sizes lubricate spindle regularly through bonnet hole and spindle threads. For DN 65-250 lubricate frequently through spindle threads, split nut and stem.

Operate the valve once or twice after lubrication.



Lubrication Details
DN 15-50



Lubrication Details
DN 65 - 250

Available Spares

DN 15-50	Sealing stacks
DN 65-250	Body sealing stack set, bonnet sealing ring and gland sealing stack

How to Order Spares

Order spares as per the code no. specified in the user manual.

Kv Values

Size (DN)	15	20	25	32	40	50	65	80	100	125	150	200	250
Kv	2.5	2.5	5.8	13	13	41	51	77	131	194	221	438	675

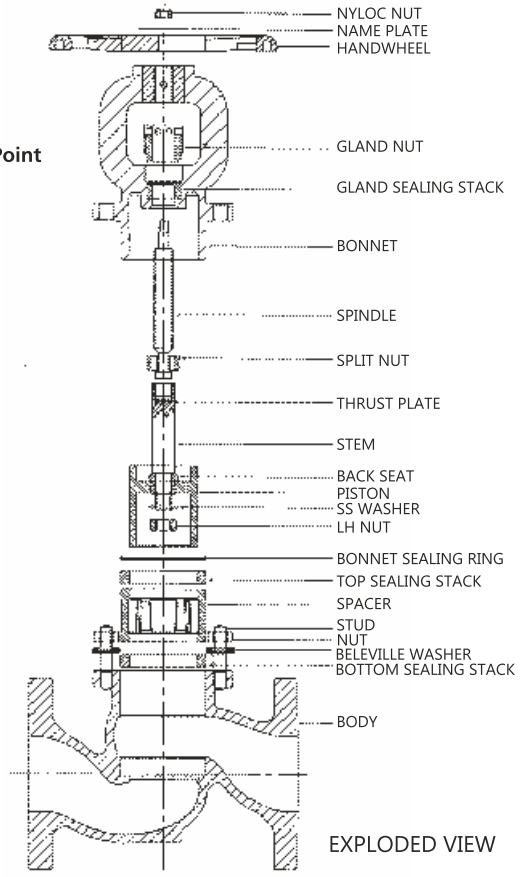
Recommended Tightening Torques

For Bonnet Nut

Sr. No.	Size (DN)	Torque (Nm)
1	15	3 - 5
2	20	
3	25	5 - 7
4	32	18 - 20
5	40	
6	50	20 - 25
7	65	50 - 60
8	80	
9	100	70 - 80
10	125	
11	150	80 - 90
12	200	
13	250	

For Gland Nut

Sr. No.	Size (DN)	Torque (Nm)
1	65	35 - 45
2	80	35 - 45
3	100	75 - 85
4	125	75 - 85
5	150	85 - 95
6	200	95 - 110
7	250	95 - 110



EXPLODED VIEW

FMSS/0415/TIS-PSVAL/V1.R0

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Email : seg@forbesmarshall.com

www.forbesmarshall.com

Piston Valve (DN15-40)

Description

Forbes Marshall Piston Valves, PSVAL, provide perfect tightness and durable stability on different media such as steam, superheated steam, heat transfer fluid, water and compressed air.

Sizes and Pipe Connection

DN 15 / 20 / 25 / 32 / 40
Screwed BSPT / NPT, socket weld ends, flanged to class 150 / 300 / 600 available on special request

Limiting Conditions

For DN 15 / 20 / 25 / 32 / 40 Socket weld ends	
Maximum operating pressure	78 bar g
Maximum operating temperature	425 deg c for DN15-25 232 deg c for DN32-40
Maximum hydraulic test pressure	156 bar g (IBR requirement)

For DN 15 / 20 / 25 Screwed ends	
Maximum operating pressure	78 bar g
Maximum operating temperature	425 deg c
Maximum hydraulic test pressure	156 bar g (IBR requirement)

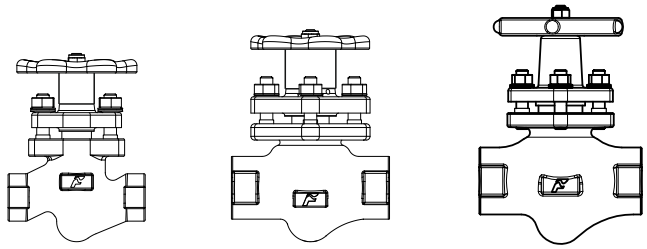
For DN 32 / 40 Screwed ends	
Maximum operating pressure	41.5 bar g
Maximum operating temperature	232 deg c
Maximum hydraulic test pressure	83 bar g (IBR requirement)

Body design conditions : DN 15-40 Class 150 Flanged ends	
Maximum allowable pressure	19.6 bar g at 38 deg C
Maximum operating pressure	14 bar g at 197 deg C
Maximum operating temperature	425 deg C at 5.5 bar g for DN15-25 232 deg C at 12.7 bar g for DN32-40
Cold hydraulic test pressure	28 bar g (IBR requirement)

Body design conditions : DN 15-40 Class 300 Flanged ends	
Maximum allowable pressure	51 bar g at 38 deg C
Maximum operating pressure	41.5 bar g at 253 deg C for DN15-25 41.5 bar g at 232 deg C for DN32-40
Maximum operating temperature	425 deg C at 28.8 bar g for DN15-25 232 deg C at 41.5 bar g for DN32-40
Cold hydraulic test pressure	83 bar g (IBR requirement)

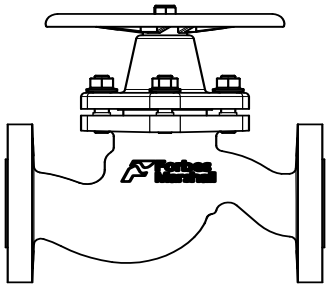
Body design conditions : DN 15-40 Class 600 Flanged ends	
Maximum allowable pressure	102 bar g @ 38 deg C
Maximum operating pressure	78 bar g at 295 deg C for DN15-25 78 bar g at 232 deg C for DN32-40
Maximum operating temperature	425degC at 57.5 bar g for DN15-25 232degC at 78 bar g for DN32-40
Maximum hydraulic test pressure	156 bar g

DN15-40 PSVAL (SCRD & SWE ENDS)



DN 15 / 20 DN 25 DN 32 / 40

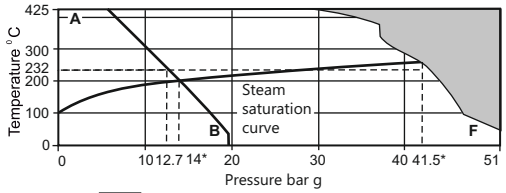
DN15-40 PSVAL (FLGD ENDS)



DN 15 - 40

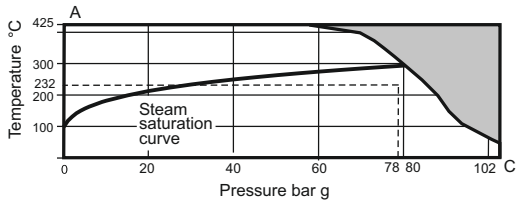
Operating Range

ASME Class 150-300



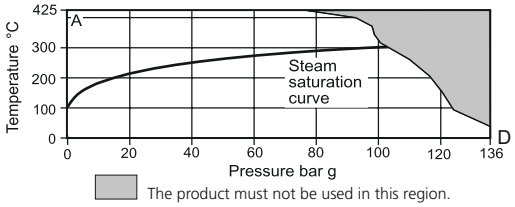
The product must not be used in this region.
A - B Flanged Class 150 A - F Flanged Class 300
* PMO- Maximum operating Pressure

ASME Class 600



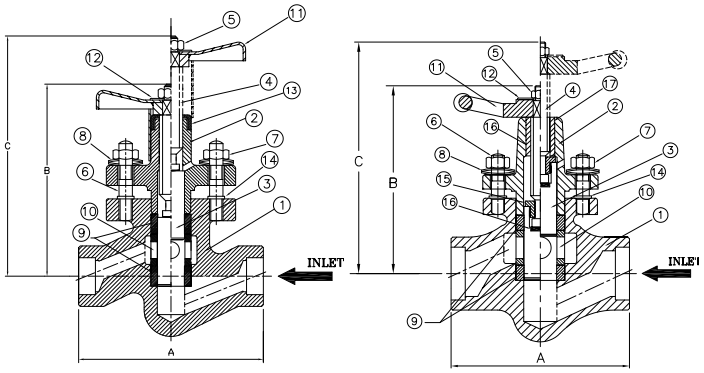
The product must not be used in this region.
A - C Flanged Class 600

ASME Class 800 - Body design condition



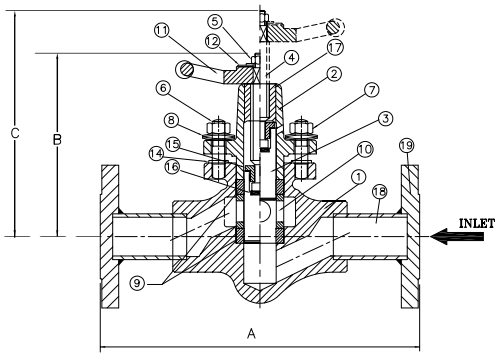
The product must not be used in this region.
A - D Screwed and socket weld

DN15-40 SCRD & SWE ENDS

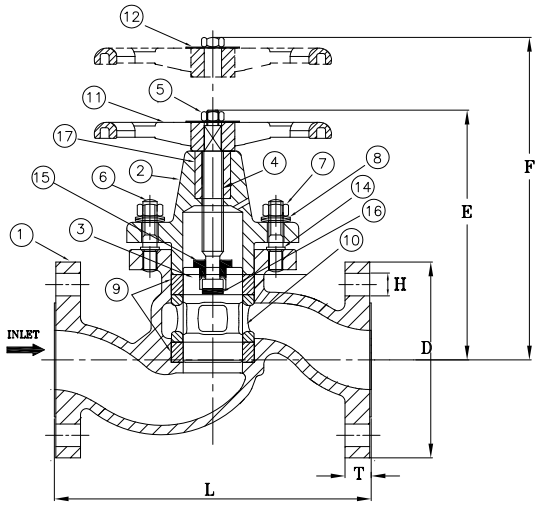


DN 15, 20, 25 DN 32, 40

DN15-40 WELD ON FLANGES



DN15-40 AS CAST FLANGES



As Cast Flanges Dimensions(mm) and Weights(Kg)-approx.

Size & Class	L	D	PCD	H	No. of Holes	T	E	F	Weight
DN15#150	108	90	60.3	16	4	9.6	118	146	4
DN15#300	152	95	66.7	16	4	12.7	118	146	4.8
DN20#150	117	100	69.9	16	4	11.2	118	146	4.6
DN20#300	178	115	82.6	19	4	14.3	118	146	6.3
DN25#150	127	110	79.4	16	4	12.7	133	165	5
DN25#300	203	125	88.9	19	4	15.9	133	165	6.5
DN32#300	216	135	98.4	19	4	17.5	180	220	10.8
DN40#150	165	125	98.4	16	4	15.9	180	220	9.25
DN40#300	229	155	114.3	22	4	19.1	180	220	12.2

For DN 32 only class 300 is available in integral Flange ends.

Material: DN 15-40:

No.	Description	Material	Standard
1	Body	Forged Carbon Steel/Cast Steel	ASTM A105N/ASTM A216 WCB
2	Bonnet	Forged Carbon Steel	ASTM A105N
3	Piston	Stainless Steel	ASTM A 276 TYPE 304
4	Spindle	Stainless Steel	ASTM A 276 TYPE 410
5	Nyloc Nut	Carbon Steel	
6	Stud	Carbon Steel	ASTM A193 Gr. B7
7	Nut	Carbon Steel	ASTM A 194 Gr.2H
8	Belleville Washer	Spring Steel	50CrV4
9	Sealing stack	S.S. Reinforced Graphite	
10	Spacer	Stainless Steel	ASTM A 276 TYPE 410
11	*Handwheel	Sheet Metal / SG Iron	
12	Name Plate	Stainless Steel	ASTM A 240 TYPE 304
13	Grease Cap	Stainless Steel	SS 304
14	Gap ring	Stainless Steel	ASTM A 276 TYPE 410

***Note : For DN 15-25 Handwheel - Sheet Metal**
For DN32-40 Hand wheel-S.G. Iron

Additional material: DN32-40

Sr.No.	Description	Material	Standard
15	Split Nut	Brass	DIN EN12164
16	Thrust Plate	Stainless Steel	ASTM A 276 TYPE 420
17	Bush	Bronze	

Additional material: DN15-40 Weld on Flanges

Sr.No.	Description	Material	Standard
18	Pipe	Carbon Steel	ASTM A106 GR B
19	Flange	Forged Carbon Steel	ASTM A 105

Dimensions (approx. in mm)

Screwed & Socket weld ends

Size (DN)	A	B	C	Weight (kg)
15	110	118	146	2
20	110	118	146	2
25	126	133	165	4
32	165	175	215	7.5
40	165	175	215	8

Dimensions (approx. in mm)

Weld on Flanges ***Tol ±1mm**

Size (DN)	A*			B	C
	Class 150	Class 300	Class 600		
15	252	265	265	118	146
20	252	265	265	118	146
25	260	278	278	133	165
32	305	317	320	175	215
40	305	317	320	175	215

Weights (approx. in Kg)

Weld on Flanges

Size (DN)	Class		
	Class 150	Class 300	Class 600
15	3	3.5	4
20	4	5	5.5
25	6	7.5	8
32	10.7	12	13
40	11	13.5	14.5

How to Order
Example: DN 15 Piston Valve with socket weld ends.

Installation
The valve is designed for installation in a vertical or horizontal line with inlet as per the arrow direction. To open the valve turn hand wheel till it stops at the top and to close, turn hand wheel till it touches the bonnet. Do not use "F" key. If any leakage is observed during operation at the outlet, close valve fully and tighten opposite nuts equally half or one turn until leakage stops.

Safety Information
Pressure : Before attempting any maintenance of the valve, ensure that pressure is isolated and safely vented to atmosphere. Do not assume that the system is depressurized even when a pressure gauge indicates zero.

Maintenance
Use Molykote M30 oil for lubrication. For DN 15-40 sizes lubricate spindle regularly through bonnet hole and spindle threads.

Operate the valve once or twice after lubrication.

Piston Valve Operating Guidelines
1.Flush the line properly before taking the Piston Valve in operation

2.Do not use valve "F" key for opening & closing the valve

3.Please do oiling of valve as shown in below figure with Molykote M30 oil or high temperature lubricating oil to ensure smooth operation of valve

Available Spares
Refer Piston Valve user manual for available spares.

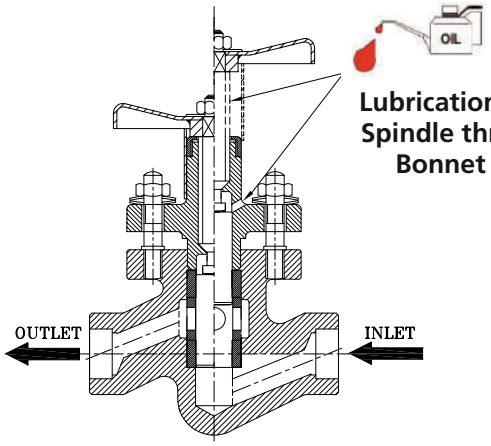
How to Order Spares
Order spares as per the code no. specified in the user manual.

Kv Values

Size (DN)	15	20	25	32	40
Kv	2.5	2.5	5.8	13	13

Recommended Tightening Torques
For Bonnet Nut

Sr. No.	Size (DN)	Torque (Nm)
1	15	3 - 5
2	20	
3	25	5 - 7
4	32	8 - 12
5	40	



Lubrication Points Spindle threads & Bonnet hole

Lubrication Details
DN 15-40

FMSTR31

Forbes Marshall Cast Strainer

Description

The Forbes Marshall Cast Strainer FMSTR31 is available in cast iron with stainless steel screen having 0.8mm dia. perforations as standard in screwed end connections.

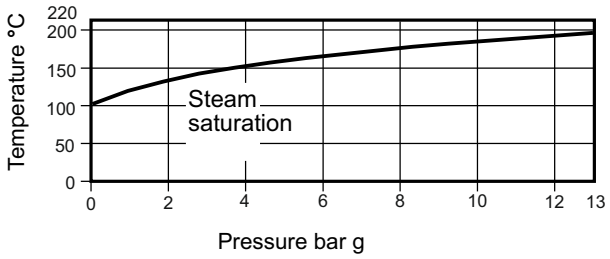
Available Sizes and Pipe Connections

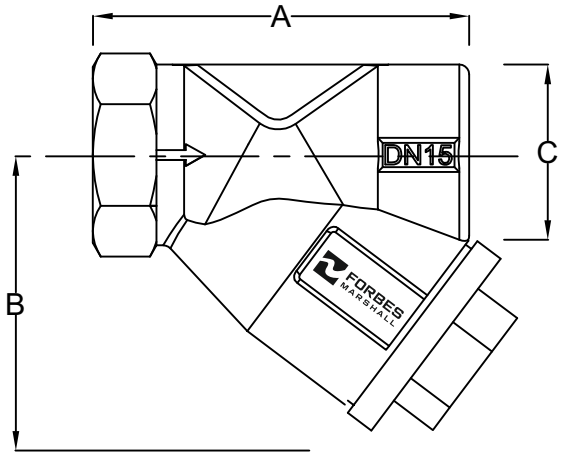
DN 15,20, 25, 40 and 50
Screwed BSPT/NPT/BSP
Available with IBR certificate on request
(all except DN 50)

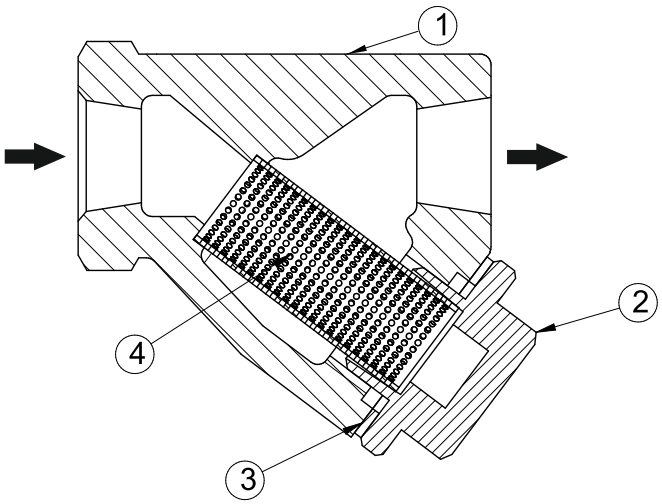
Limiting Conditions

PMO Maximum operating pressure	13 bar g
TMO Maximum operating temperature	220 °C
Cold hydraulic test pressure	26 bar g
Min. Operating temperature	0°C

Operating Range







Material

No	Part	Material	Standard
1	Body	Cast Iron	S 210 Gr. FG 260
2	Cap DN15,20 and 25 DN 40 and 50	 Cast Steel Forged steel	 ASTM A 216 Gr. WCB ASTM A 105
3	Gasket DN15,20 and 25 DN 40 and 50	 Reinforced ex-foliated graphite Asbestos free synthetic fibre	
4	Screen	Stainless steel	ASTM A 240 Type 304

Dimensions : (Approx) mm

Size DN	A	B	C	Weight
15	73	53	35	2 kg
20	90	65	40	2 kg
25	105	75	47	3 kg
40	154	125	66	7 kg
50	188	150	80	9 kg

GEN. TOL ± 3.0

Installation

The strainer should be installed in the direction of flow, as indicated on the body. On applications involving steam or gases the pocket should be in the horizontal plane. On liquid systems the pocket should point downwards. Suitable isolation valves must be installed to allow for safe maintenance and trap replacement.

Maintenance

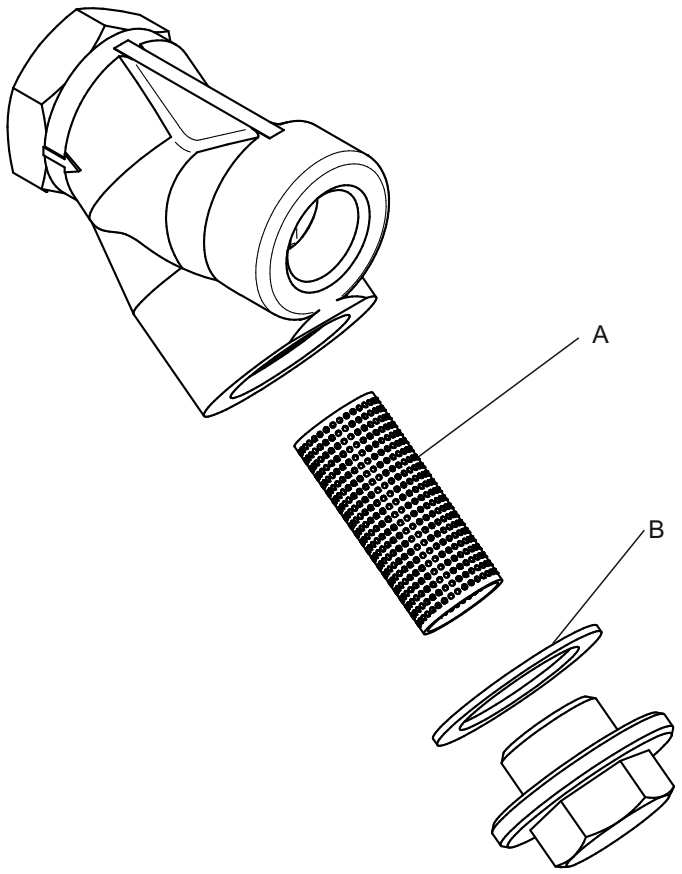
Maintenance can be completed with the strainer in the pipeline.

How to Order

Example : 1 No. DN 40 Forbes Marshall Cast Strainer FMSTR31, screwed BSPT IBR

Recommended Tightening Torques

Size (DN)	Torque (Nm) For Cap
15	38-40
20	42-48
25	70-80
40	170-185
50	190-210



The spare parts available are shown, in the figure alongside, in heavy outline. Parts drawn in broken line are not supported as spares.

Available Spares

Strainer screen ..... A+B

How to Order Spares

Always order spares by using the description given in the column headed Available spares and stating the size and type of strainer where perforation or mesh required .

Example: 1 No. strainer screen, stainless steel 304, 0.8mm perforation and gasket for DN40 Forbes Marshall Cast Strainer FMSTR31.

Screen Details

Fitted as standard with SS 304 screen having perforation of 0.8mm dia and other perforations are available to special order.

FORBES MARSHALL

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FMSTR34, FMSTR54, FMSTR54# 600

Forbes Marshall Cast Strainer

Description

Forbes Marshall Cast Strainers, FMSTR34, FMSTR54 / FMSTR54#600 are available in cast iron / cast steel with SS screen having 0.8mm dia perforation as standard.

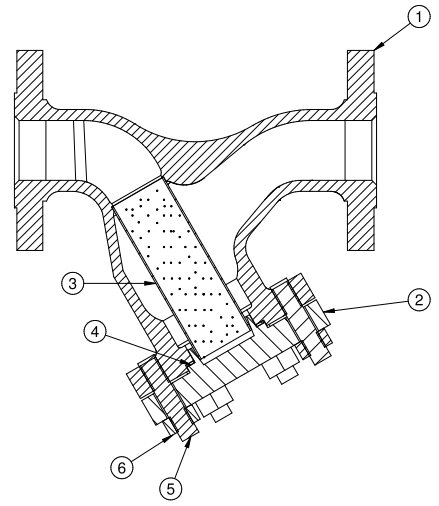
Sizes and End Connections

CI : DN 40, 50, 65, 80, 100, 125, 150 and 200

CS : DN 40, 50, 65, 80, 100, 125, 150, 200, 250 and 300

Note :

1. Also available with IBR certificate on request



Limiting Conditions

For CI Strainer - FMSTR34

PMO	Maximum operating pressure for saturated steam service	EN 1092 PN	13 bar g
		BS10 Table F	13 bar g
		ANSI 125	10 bar g
		ANSI 150	10 bar g
TMO	Maximum operating temperature		220°C
	Minimum operating temperature		-10°C
	Designed for a maximum cold hydraulic test pressure of 26 bar g		

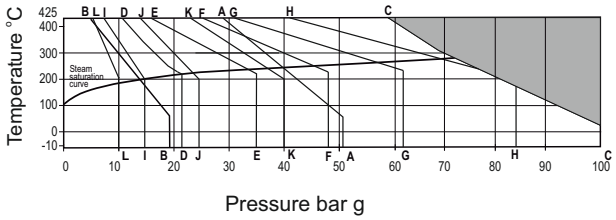
For CS Strainer - FMSTR54

Flange Type	Max Working Pressure bar g	Temperature Deg C
BS 10 Table F	10.5	425
BS 10 Table H	17.6	425
BS 10 Table J	24.6	425
BS 10 Table K	31.6	425
BS 10 Table R	42	425
Class 150	13	220
Class 300	28	425
Class 600	58	425
PN 10	7	425
PN 16	11.5	425
PN 25	20	425
PN 40	30	425

Material

Sr.No	Part	Material	Standard
1	Body	Cast Iron Cast Steel	IS 210 FG 260 ASTM A 216 Gr WCB
2	Cap	Cast Iron Carbon Steel	IS 210 FG 260 SA 516 Gr.70
3	Screen	Stainless Steel	ASTM A 240 Gr. 304
4	Gasket	SS exfoliated graphite	-
5	Stud	Carbon Steel	ASTM A 193 Gr. B7
6	Nut	Carbon Steel	ASTM A 194 Gr. 2H

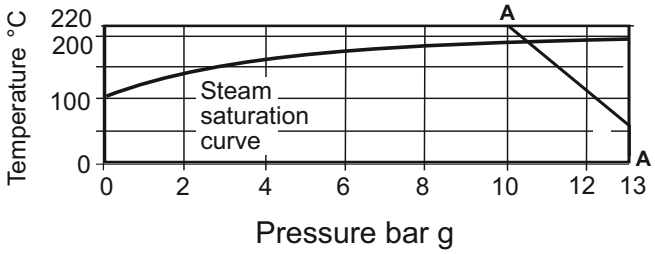
Operating Range : For CS Strainer - FMSTR54



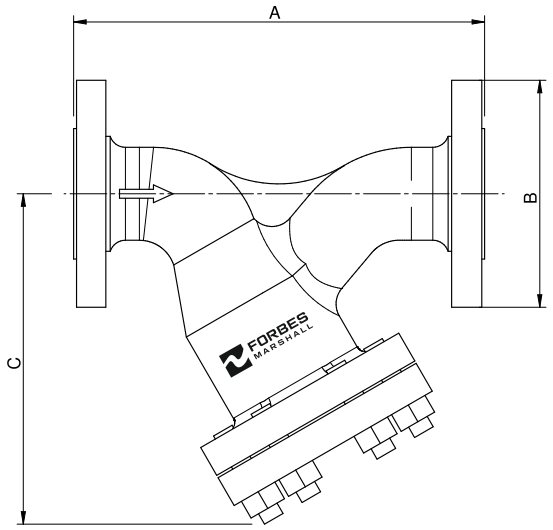
This product must not be used in this region.

A-A	Flanged ANSI 300	G-G	BS10 Table K
B-B	Flanged ANSI 150	H-H	BS10 Table R
C-C	Flanged ANSI 600	I-I	PN16
D-D	BS10 Table F	J-J	PN25
E-E	BS10 Table H	K-K	PN40
F-F	BS10 Table J	L-L	PN10

Operating Range : For CI Strainer - FMSTR34



A-A Flanged ANSI 150



CI Strainer - FMSTR34
Dimensions and Weight (approx) in mm and kg

DIM→ SIZE↓	A	B					Weight Kg
		BS TABLE ANSI		DIN			
DN		F	150	PN10	PN16	C	
40	230	140	127	150	150	159	8
50	242	165	152	165	165	179	10
65	292	185	178	185	185	229	12
80	298	203	190	200	200	225	18
100	348	229	229	220	220	267	30
125	400	279.5	254	250	250	316	40
150	484	305	279	285	285	367	90
200	604	368	343	340	340	470	118

Screen Details

SS screen having 0.8mm dia perforation as standard up to DN 125 sizes. Size DN 150 and above are available with 20 mesh lined perforated screens as standard. 40, 60, 100 mesh screens are available on special request.

How to Order

Example- 1 No. DN 40 Forbes Marshall Cast Strainer, FMSTR34 strainer flanged to table F, IBR

Optional

DN 15 BSPT plug on strainer cap is available on request.

Installation

The arrow on the casting indicates flow direction.

C.S Strainer - FMSTR54
Dimensions and Weight (approx) in mm and kg

DIM→ SIZE↓	A	BS 10 TABLE					B ANSI			DIN				C	Wt. (Kg)
DN		F	H	J	K	R	150	300	600	PN10	PN16	PN25	PN40		
40	235	….	140	….	152	152	127	155	155	150	150	150	150	187	9
50	254	….	165	….	165	….	152	165	165	165	165	165	165	203	15
65	292	184	184	184	184	184	177.8	190.5	190.5	185	185	185	185	229	19
80	330	203	203	203	203	203	190	210	210	200	200	200	200	245	23
100	381	….	….	….	241	….	229	254	273	220	220	235	235	299	33
125	400	279	279	279	279	279	254	279	330	250	250	270	270	316	70
150	540	….	304.8	304.8	304.8	304.8	279.4	317.4	355.6	285	285	300	300	370	96
200	668	….	368.3	368.3	368.3	368.3	343	381	419.1	340	340	360	375	470	160
250	813	….	….	….	431.8	….	406.4	444.5	508	395	405	425	450	650	200
300	894	….	489	489	489	508	482.6	520.7	558	445	485	485	515	800	350

Servicing

With suitable isolation, repairs can be carried out online. Dismantle bolted joint and remove strainer cap to remove muck and clean the screen thorougly. Fit the screen carefully and fit cap with new gasket.Tighten nuts uniformly. Open up the isolation valve to check for gasket leakage if any and tighten if required.

Recommended Tightening Torque

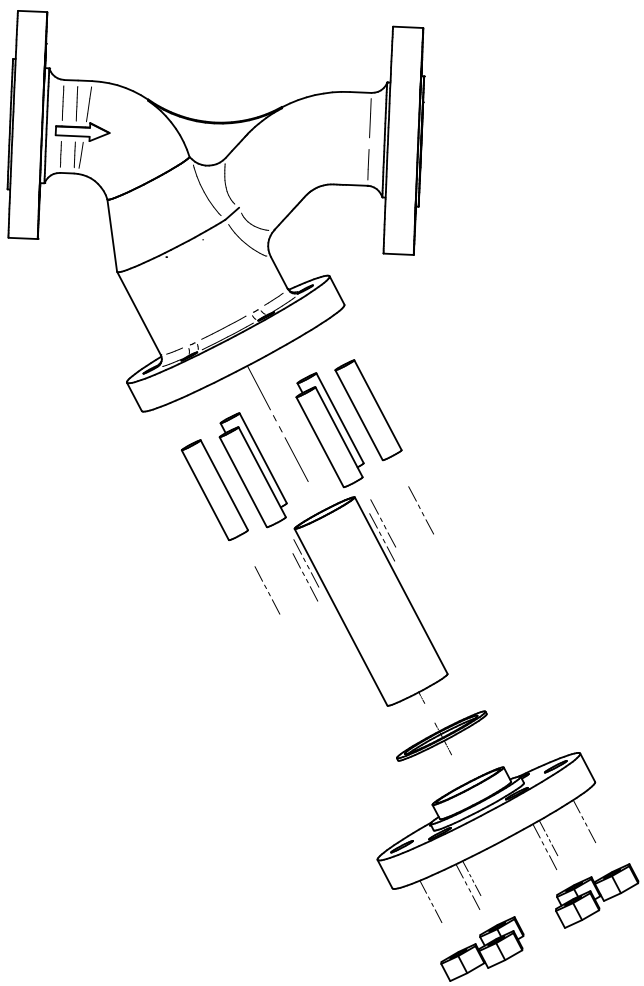
Size (A/F)	FMSTR34 (A/F)	FMSTR54	Torque(Nm)
40	19	10	170-185
50	19	10	190-210
65	19	19	25-35
80	19	13	25-35
100	24	19	55-65
125	19	19	55-65
150	19	19	80-100
200	30	30	80-100

How to Order Spares

Always order spares by using the description given in the column headed “Available Spares” in user manual

Available spares (refer fig. below)

Screen	A
Gasket	B



SOFT31 (1/2”-1”)

Single Orifice Float Trap with SLR and/or TV

Description

The Forbes Marshall Single Orifice Float Trap, SOFT31, is a cast iron single orifice float trap available with an integral automatic air venting facility. It is available with horizontal or vertical connections with downwards flow. As an alternative a manual needle valve can be added and used as a steam lock release.

Sizes and Pipe Connection

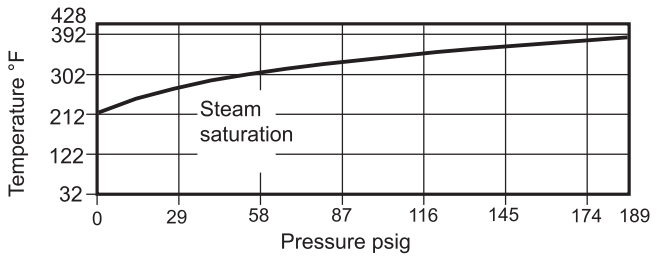
1/2”, 3/4”, and 1” Screwed BSPT/NPT

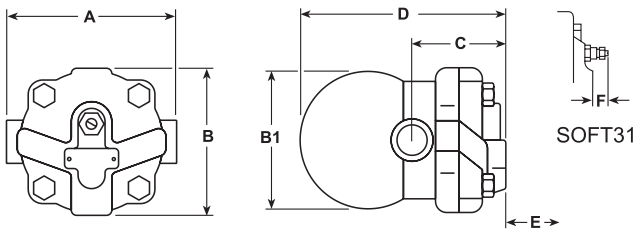
Available Types

SOFT31-T TV with Thermostatic air Vent (TV)
SOFT31-S with Steam Lock Release (SLR)
SOFT31-ST combined TV and SLR

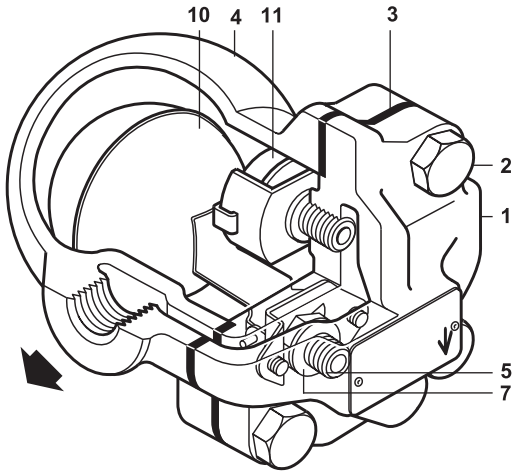
Limiting Conditions	
PMA Maximum allowable pressure	189 Psig at 428° F
TMA Maximum allowable temperature	428° F at 189 Psig
PMO Maximum operating pressure	189 Psig
TMO Maximum operating temperature	428° F at 189 Psig
Minimum operating temperature	32° F
DPMX Maximum differential pressure	
SOFT31-4.5	65 Psig
SOFT31-10	145 Psig
SOFT31-13	189 Psig
Cold hydraulic test pressure	377 Psig

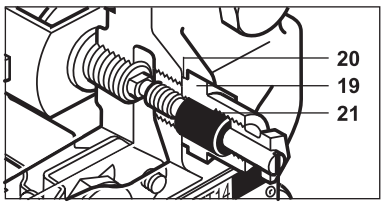
Operating range





SOFT31



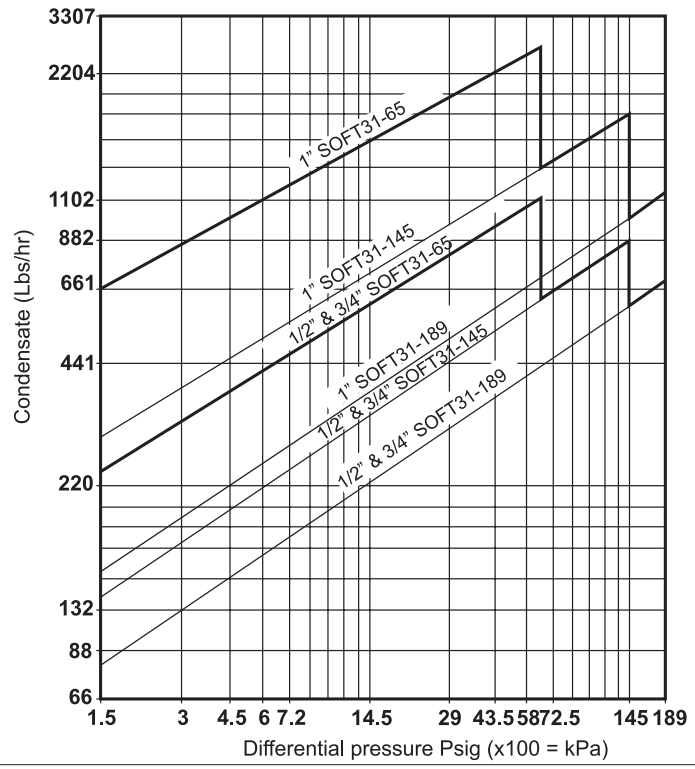


Material			
Sr.No	**Part**	**Material**	**Standard**
1.	Cover	Cast Iron	IS 210 FG 260 (ASTM A48 d.35)
2.	Cover bolts	Carbon Steel	H.T. IS1367, Gr. 8.8 (ASTM A193 B7)
3.	Cover gasket	Asbestos free synthetic fibre	(ASTM F 104)
4.	Base	Cast Iron	IS 210 FG 260 (ASTM A48 d.35)
5.	Main valve seat	Stainless Steel	ASTM A743 Gr. CA40, Type 304
6.	Main valve seat gasket	(ASTM F 104)	
7.	Main valve assembly screws	Stainless Steel	IS-1364, Type 304 (UNSS 43100)
8.	Ball float & lever	Stainless Steel	ASTM A240, Type 304
9.	Air vent element	Stainless Steel	ASTM A240, Type 316
10.	SLR unit	Stainless Steel	ASTM A276, Type 410
11.	SLR unit gasket	Stainless Steel	ASTM A240, Type 304
12.	Pivot frame	Stainless Steel	ASTM A240, Type 304
13.	SLR Seal	Graphite	

Note: Material specification mentioned in bracket are for reference only.

Dimensions (approx.) Inches							
Size	**A**	**B**	**C**	**D**	**E**	**F**	**Wt. (Lbs)**
1/2, 3/4	4.8	4.2	2.6	5.8	4.1	1.2	5.5
1	5.6	4.3	2.8	6.3	5.3	0.8	8.8
General Tol: ± 1/8"							

Capacity Chart



How to Order
1/2" Single Orifice Float Trap, SOFT31-T-65 Psig, TV, NPT

Available Spares
The parts available as spares are shown in heavy outline.
Parts drawn in dotted line are not available as spares.

Main valve assembly with Float	A, B, C, D, (2 of) E, F
Air Vent Assembly	H, J, L, M, N
Steam Lock Release Unit	O, P
Cover Gasket (packet of 5)	T
Float	C
Screen (Packet of 5)	-

How to Fit - General
With suitable isolation, repairs can be carried out with the trap on line. When reassembling it is advisable to make sure that all joint faces are clean.

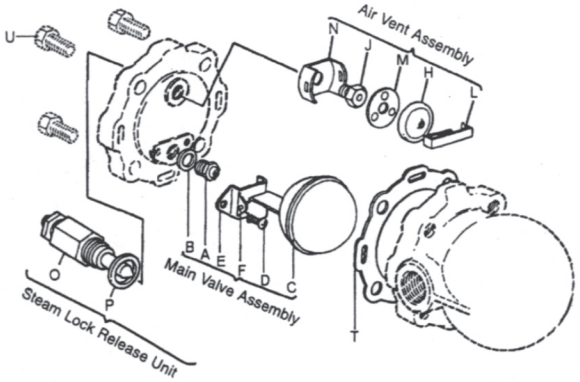
How to fit Main Valve Assembly
- Remove cover bolts and lift off cover
- Remove complete float assembly by undoing the two srews D.
- Remove main valve seat A and replace with a new one supplied with a new gasket B.
- Fit complete new float assembly by tightening the assembly set screws D.
- Refit the cover using new gasket T.

How to fit Air Vent Assembly
- Remove spring clip L, element H and spacer place M.
- Unscrew seat, frame N assemble spacer plate, fit element and di.
- Align complete air vent horizontally to that the frame clears the cover.

Recommended Tightening Torques

Part	Inches	Torque (Ft-Lbs)
Main Valve Seat (A)	11/16 A/F	37-41
Main Valve Assembly Screws (D)		2-3
Air Vent Seat (J)	11/16 A/F	37-41
Steam Lock Release Seat (S)	11/16 A/F	37-41
Cover Bolts	11/16 A/F	30-41

How to Order Spares
Always order spares by using the description given in the column above and stating the size of the trap.
Example: Main valve assembly for 1/2" Single Orifice Float Trap SOFT31-T-65



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FMBT50

Forbes Marshall Bucket Trap

Description

The Forbes Marshall Bucket Trap FMBT50, is designed to fit into horizontal pipelines. It is maintainable in line and is complete with integral strainer screen.

Size and End Connections

DN 15, DN20, and DN25

Screwed BSPT/NPT

Socket weldable ends

Limiting Conditions

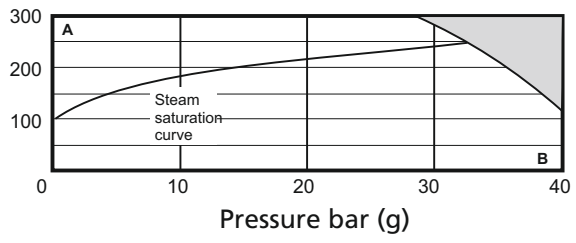
Body design conditions	42 barg
PMA Maximum Allowable Pressure	32 barg
TMA Maximum Allowable Temperature	300°C
Maximum Operating Pressure	32 barg
Maximum Operating Temperature	300°C
Cold Hydraulic Test pressure	64 barg
Minimum Operating Temperature	0°C

Note : Maximum operating conditions depend upon orifice size.

ΔPMX - maximum differential pressure

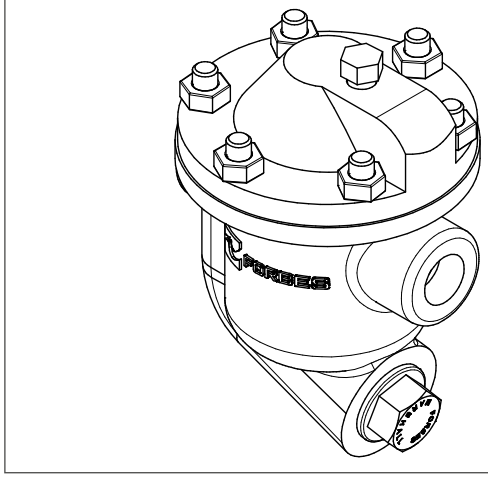
DN 15	DN 20	DN 25	ΔPMX (bar) g
FMBT 50/4	FMBT 50/5	FMBT 50/5	32.0
FMBT 50/5	FMBT 50/6	FMBT 50/6	20.0
FMBT 50/6	FMBT 50/7	FMBT 50/8	12.0
FMBT 50/7	FMBT 50/8	FMBT 50/10	8.5
FMBT 50/8	FMBT 50/10	FMBT 50/12	4.0

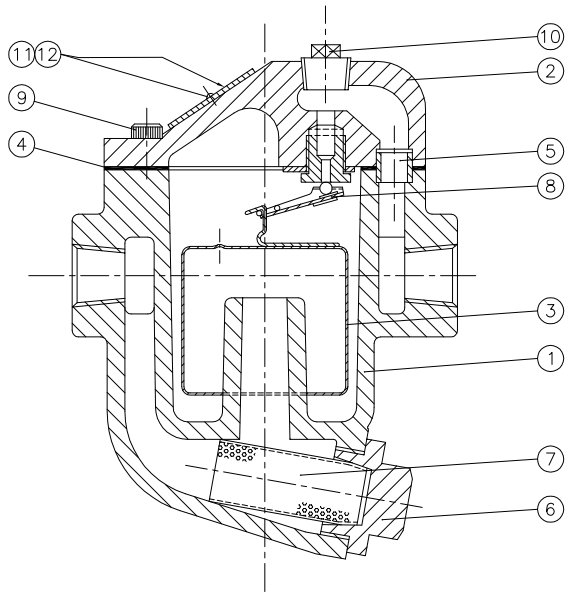
Operating Range



The Product must not be used in this region

A-B Screwed socket weld





Material

S.No.	Description	Material	Standard
1	Body	Cast Steel	ASTM A216 Gr WCB
2	Cover	Cast Steel	ASTM A216 Gr WCB
3	Bucket Assembly	Stainless Steel	S.S. 304
4	Cover Gasket	SS Exfoliated Graphite	
5	Ferrule	Stainless Steel	S.S. 304
6	Strainer Cap	Stainless Steel	BS 3146 ANC2
7	Strainer Screen	Stainless Steel	S.S. 304
8	Valve and Seat Assly. 10 BAR Valve and Seat Assly. 8.5 BAR Valve and Seat Assly. 4.0 BAR	Stainless Steel	S.S. 304
9	Socket HD. CAP SCREW	Alloy Steel	ASTM A 193 Gr B7
10	Plug 3/8" BSPT	Carbon Steel	ASTM A 105
11	Name plate	Stainless Steel	SS304
12	Name plate Rivet	Aluminum	

How to Order

Example: 1No. DN15 FMBT50 Forbes Marshall Bucket trap with screwed BSPT connections, IBR

Installation

The Trap must be installed with the body upright so that the bucket is rising and falling vertically. The inlet and outlet connections should be in a horizontal plane, with the trap installed below the drain point so that a water seal can be maintained around the open end of the bucket.

Recommended Tightening Torques

Size (DN)	Seat (B)	Stud and Nuts (J)	Strainer Cap
15, 20	23-27 Nm	25-28 Nm	90-100 Nm
25	80-88 Nm	85-95 Nm	125-145 Nm

Spare Parts

The spare parts available are shown in heavy outline.

Parts drawn in broken line are not supplied as spares.

Available Spares

Valve And Seat Assembly	A, B, C, D (2 Nos.)
Strainer Screen	F
Bucket	G
Cover Gasket	E
Set of cover Studs and Nuts	J

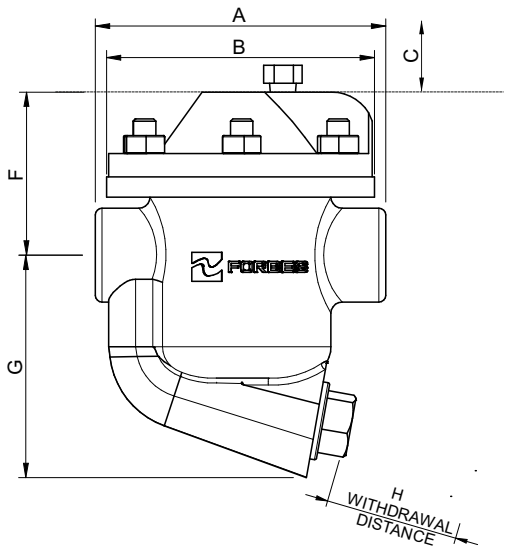
How to Order Spares

Always order spares by using the description given in the column headed “Available Spares” and stating the size and series of the trap. For codes refer user manual.

Example :1 No. valve and seat assembly for DN15 Forbes Marshall Bucket Trap FMBT50

How to Fit Valve and Seat Assembly

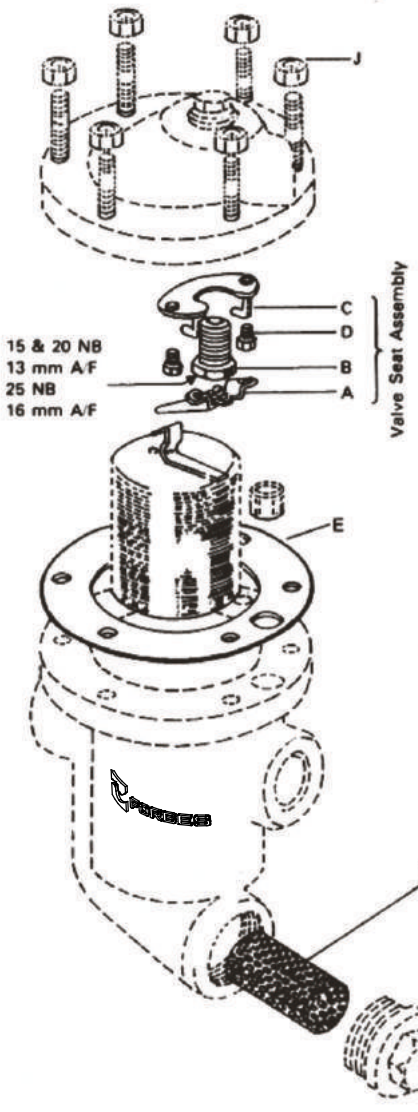
Isolate trap, remove cover by undoing cover nuts. Unhook the bucket from the valve lever **A.** Remove the valve seat **B.** Remove the valve guide plate **C.** by undoing the two screws **D.** Screw in new valve seat, using a little jointing paste on the threads and making sure the joint faces are clean. Fix new valve guide plate in position with new screws supplied, hook new valve lever over pins on valve guide plate and centralise valve to the orifice and tighten screws.



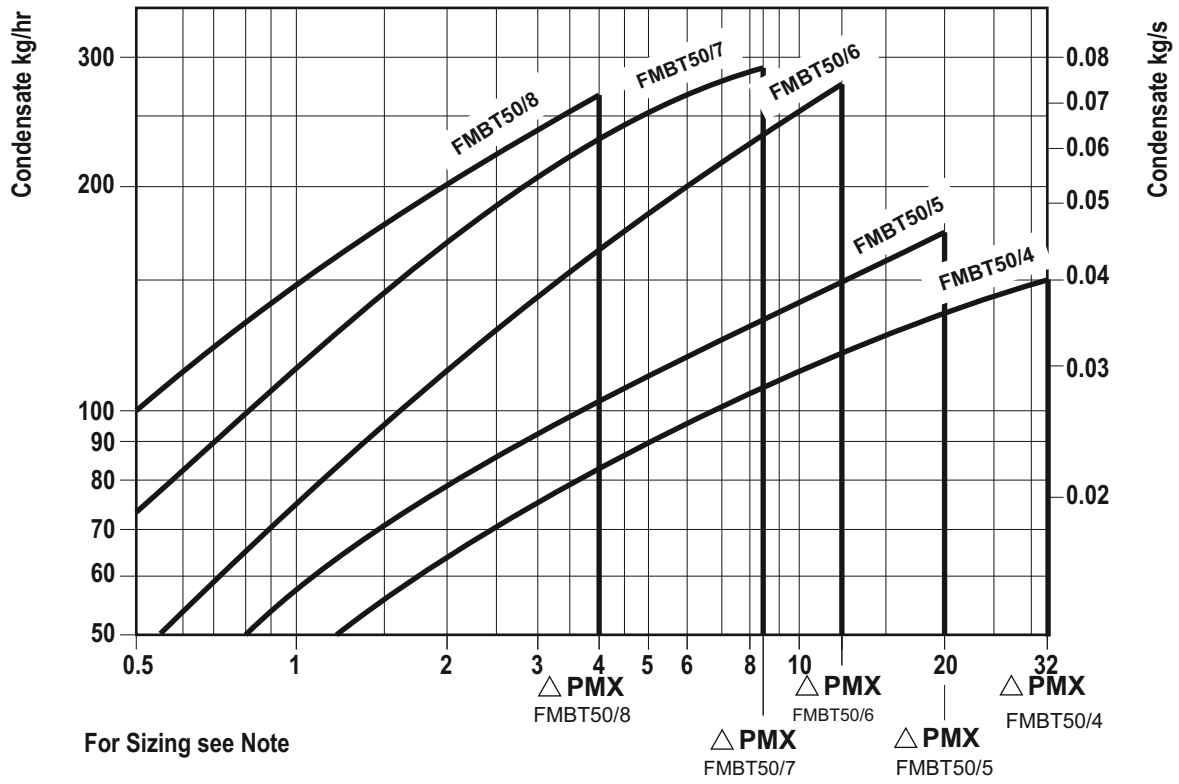
Dimensions(approx.)in mm

Size(DN)	A	B	C	F	G	H	WT.(Kg)
15	130	120	110	75	100	65	5.50
20	130	120	150	93	117	65	6.25
25	180	165	170	132	127	85	2.25

GENTOL ± 3.0

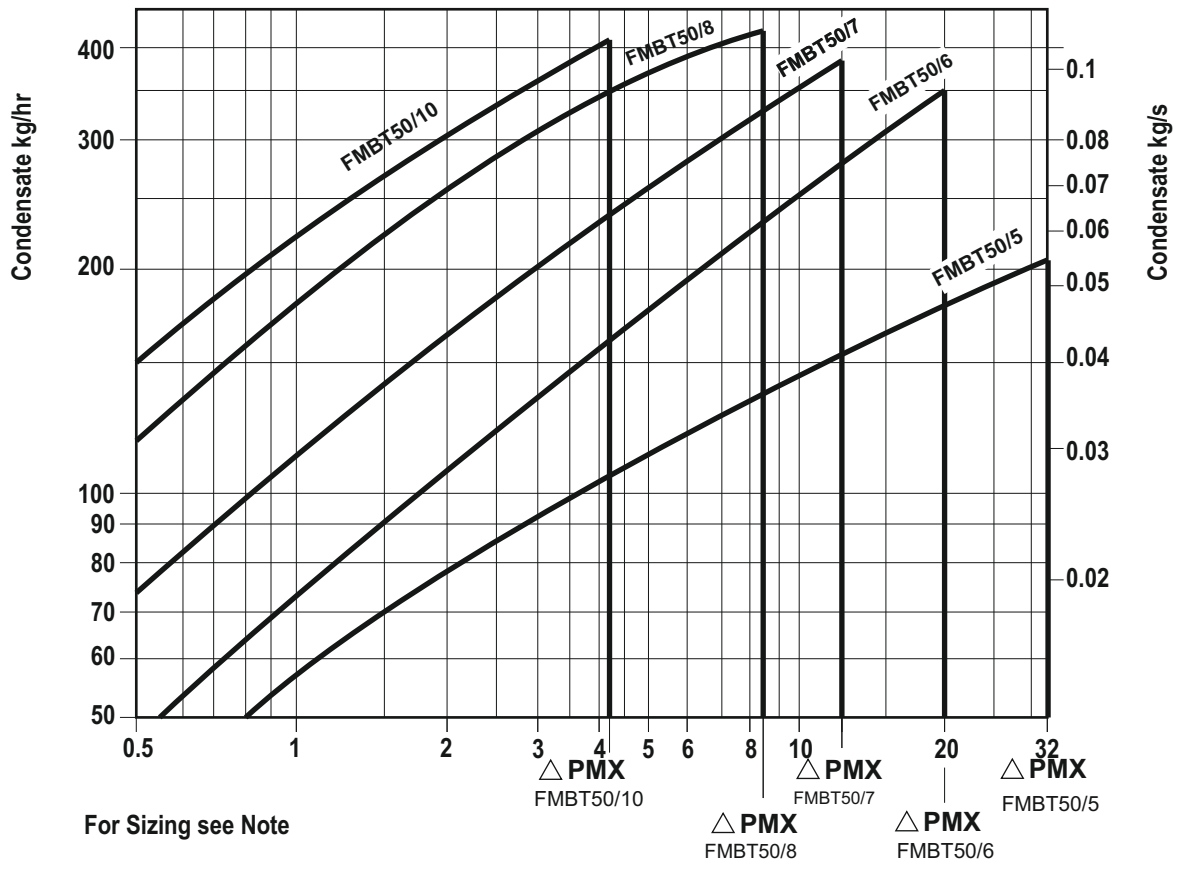


Capacity Chart (DN15)



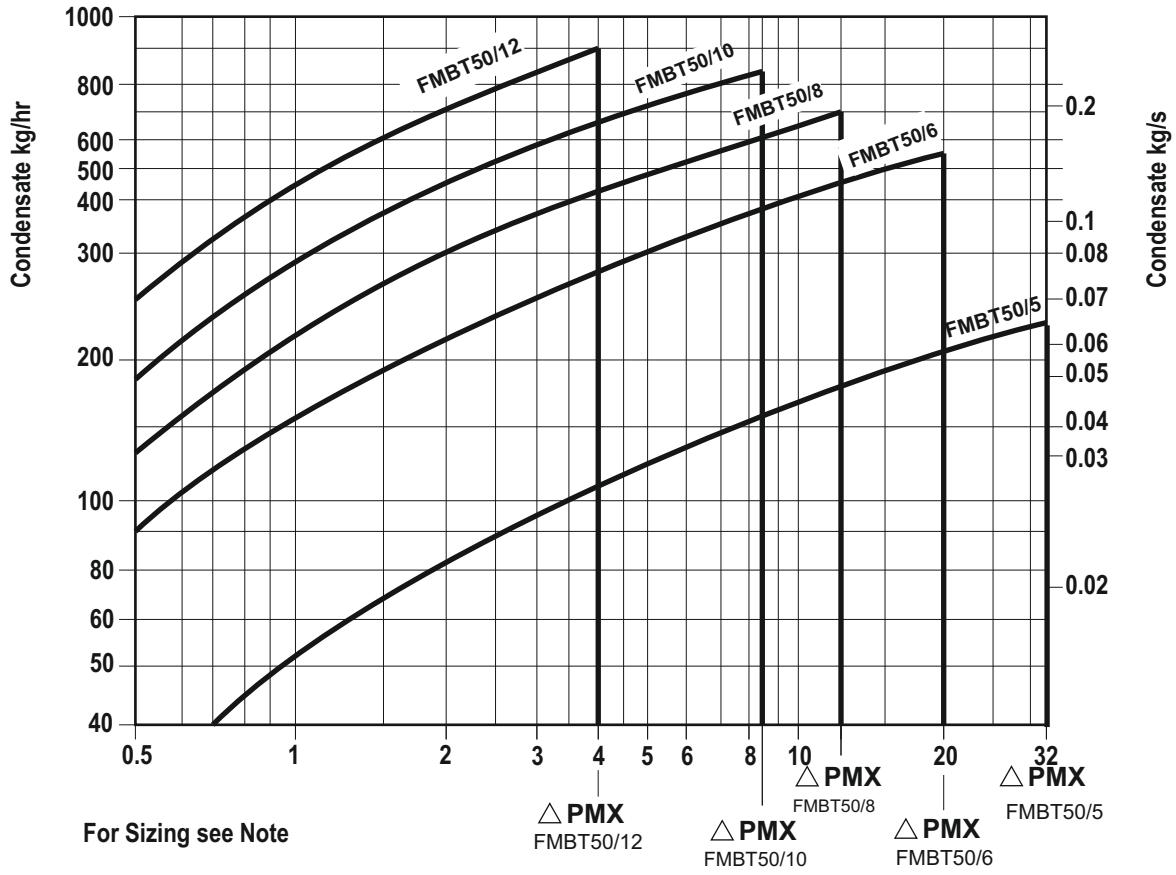
Differential Pressure bar g { x 100 = kPa }

Capacity Chart (DN20)



Differential Pressure bar g { x 100 = kPa }

Capacity Chart (DN25)



Note :
Trap should be selected for the most appropriate working differential pressure and not on the basis of load e.g.DN25 FMBT50, 80 Kg/h at 7 bar differential should be handled by FMBT50/10 and not FMBT50/5

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FMBT50

Forbes Marshall Bucket Trap

Description

The Forbes Marshall Bucket Trap FMBT50, is designed to fit into horizontal pipelines. It is maintainable in line and is complete with integral strainer screen.

Size and End Connections

DN 15, DN20, and DN25

Screwed BSPT/NPT

Socket weldable ends

Limiting Conditions

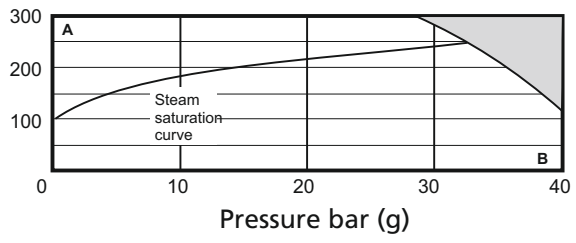
Body design conditions	42 barg
PMA Maximum Allowable Pressure	32 barg
TMA Maximum Allowable Temperature	300°C
Maximum Operating Pressure	32 barg
Maximum Operating Temperature	300°C
Cold Hydraulic Test pressure	64 barg
Minimum Operating Temperature	0°C

Note : Maximum operating conditions depend upon orifice size.

ΔPMX - maximum differential pressure

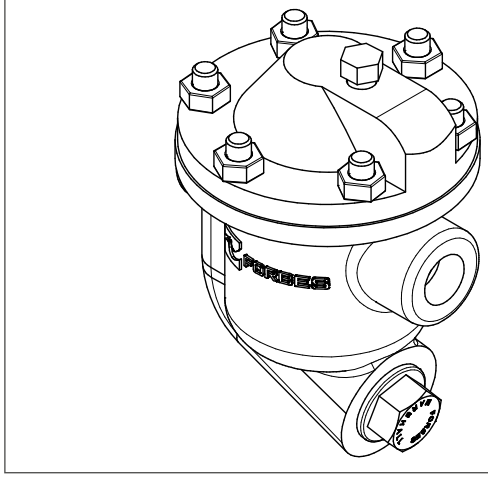
DN 15	DN 20	DN 25	ΔPMX (bar) g
FMBT 50/4	FMBT 50/5	FMBT 50/5	32.0
FMBT 50/5	FMBT 50/6	FMBT 50/6	20.0
FMBT 50/6	FMBT 50/7	FMBT 50/8	12.0
FMBT 50/7	FMBT 50/8	FMBT 50/10	8.5
FMBT 50/8	FMBT 50/10	FMBT 50/12	4.0

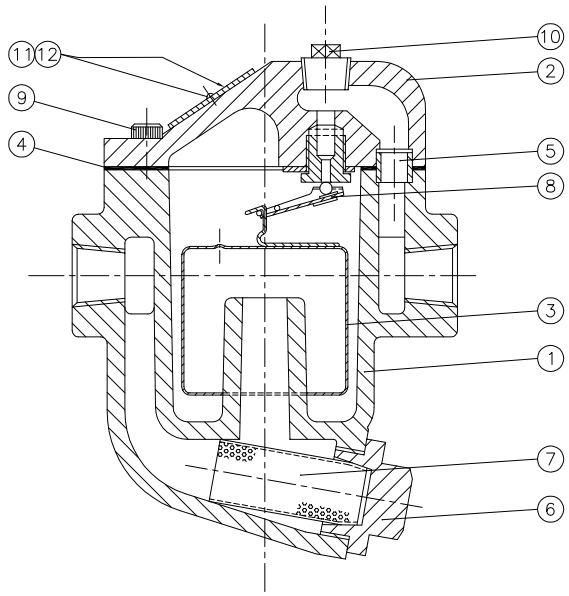
Operating Range



The Product must not be used in this region

A-B Screwed socket weld





Material

S.No.	Description	Material	Standard
1	Body	Cast Steel	ASTM A216 Gr WCB
2	Cover	Cast Steel	ASTM A216 Gr WCB
3	Bucket Assembly	Stainless Steel	S.S. 304
4	Cover Gasket	SS Exfoliated Graphite	
5	Ferrule	Stainless Steel	S.S. 304
6	Strainer Cap	Stainless Steel	BS 3146 ANC2
7	Strainer Screen	Stainless Steel	S.S. 304
8	Valve and Seat Assly. 10 BAR Valve and Seat Assly. 8.5 BAR Valve and Seat Assly. 4.0 BAR	Stainless Steel	S.S. 304
9	Socket HD. CAP SCREW	Alloy Steel	ASTM A 193 Gr B7
10	Plug 3/8" BSPT	Carbon Steel	ASTM A 105
11	Name plate	Stainless Steel	SS304
12	Name plate Rivet	Aluminum	

How to Order

Example: 1No. DN15 FMBT50 Forbes Marshall Bucket trap with screwed BSPT connections, IBR

Installation

The Trap must be installed with the body upright so that the bucket is rising and falling vertically. The inlet and outlet connections should be in a horizontal plane, with the trap installed below the drain point so that a water seal can be maintained around the open end of the bucket.

Recommended Tightening Torques

Size (DN)	Seat (B)	Stud and Nuts (J)	Strainer Cap
15, 20	23-27 Nm	25-28 Nm	90-100 Nm
25	80-88 Nm	85-95 Nm	125-145 Nm

Spare Parts

The spare parts available are shown in heavy outline.

Parts drawn in broken line are not supplied as spares.

Available Spares

Valve And Seat Assembly	A, B, C, D (2 Nos.)
Strainer Screen	F
Bucket	G
Cover Gasket	E
Set of cover Studs and Nuts	J

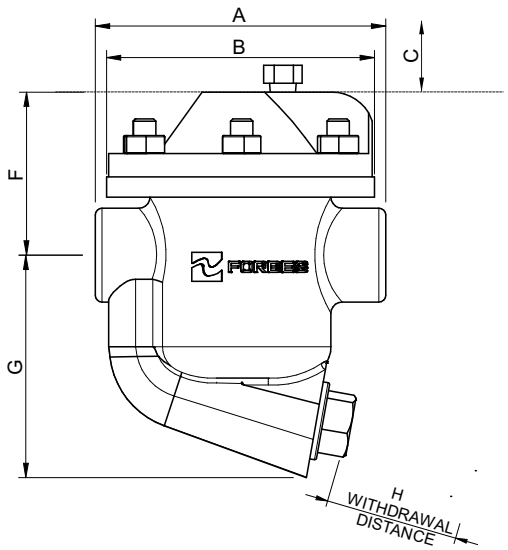
How to Order Spares

Always order spares by using the description given in the column headed “Available Spares” and stating the size and series of the trap. For codes refer user manual.

Example :1 No. valve and seat assembly for DN15 Forbes Marshall Bucket Trap FMBT50

How to Fit Valve and Seat Assembly

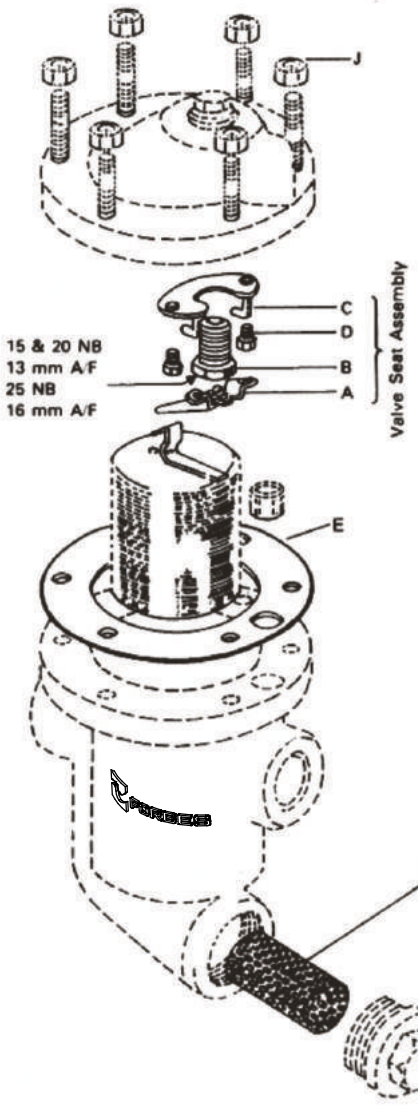
Isolate trap, remove cover by undoing cover nuts. Unhook the bucket from the valve lever **A.** Remove the valve seat **B.** Remove the valve guide plate **C.** by undoing the two screws **D.** Screw in new valve seat, using a little jointing paste on the threads and making sure the joint faces are clean. Fix new valve guide plate in position with new screws supplied, hook new valve lever over pins on valve guide plate and centralise valve to the orifice and tighten screws.



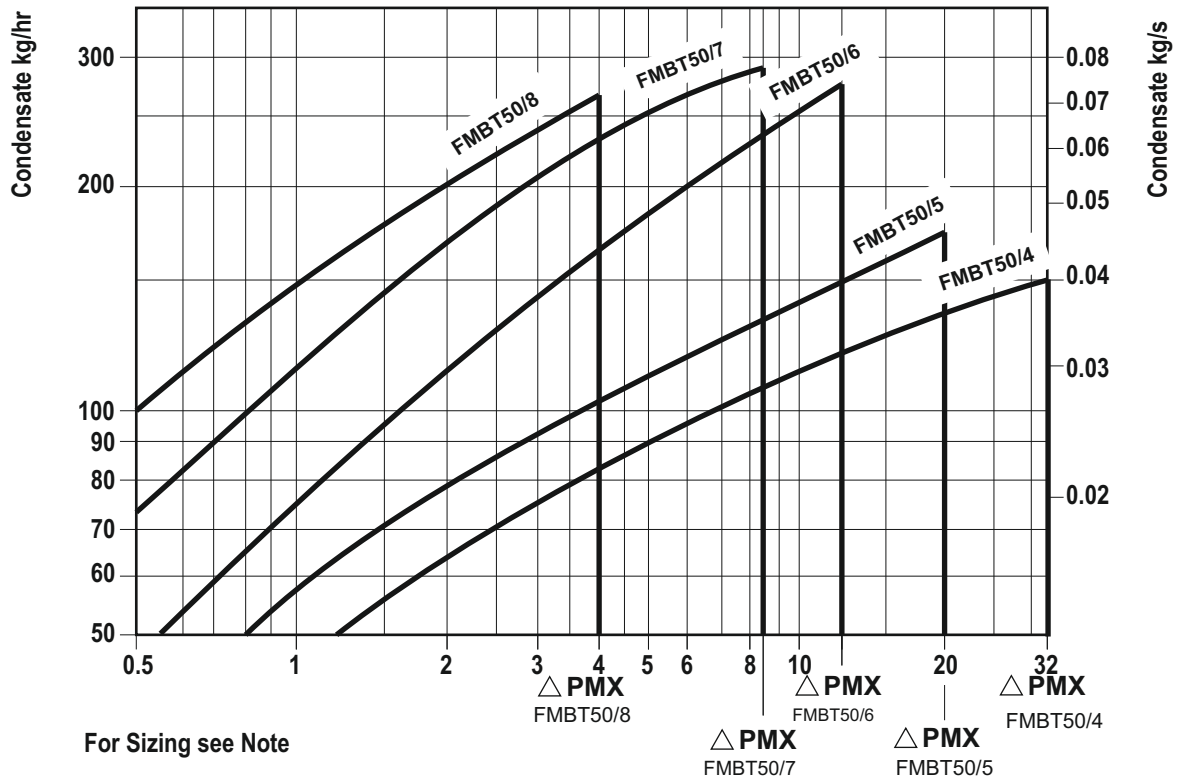
Dimensions(approx.)in mm

Size(DN)	A	B	C	F	G	H	WT.(Kg)
15	130	120	110	75	100	65	5.50
20	130	120	150	93	117	65	6.25
25	180	165	170	132	127	85	2.25

GENTOL ± 3.0

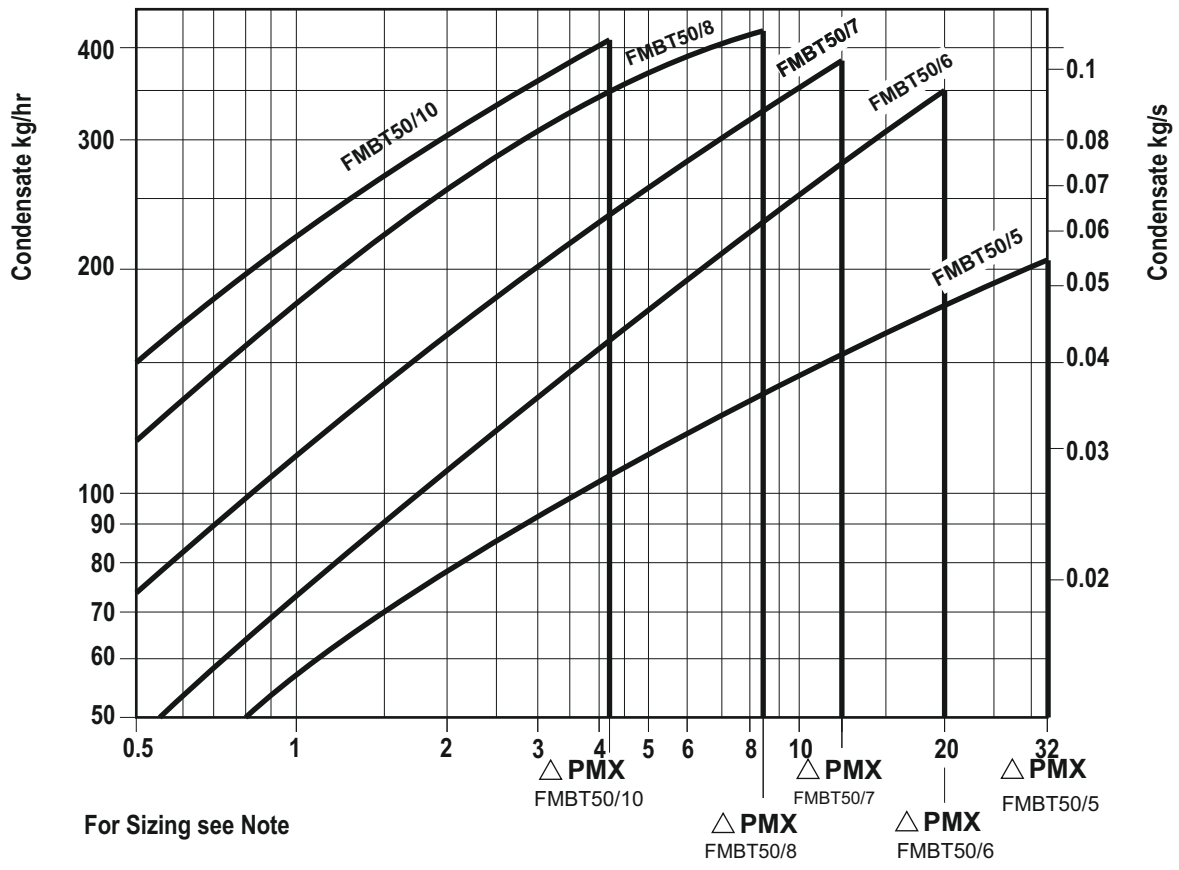


Capacity Chart (DN15)



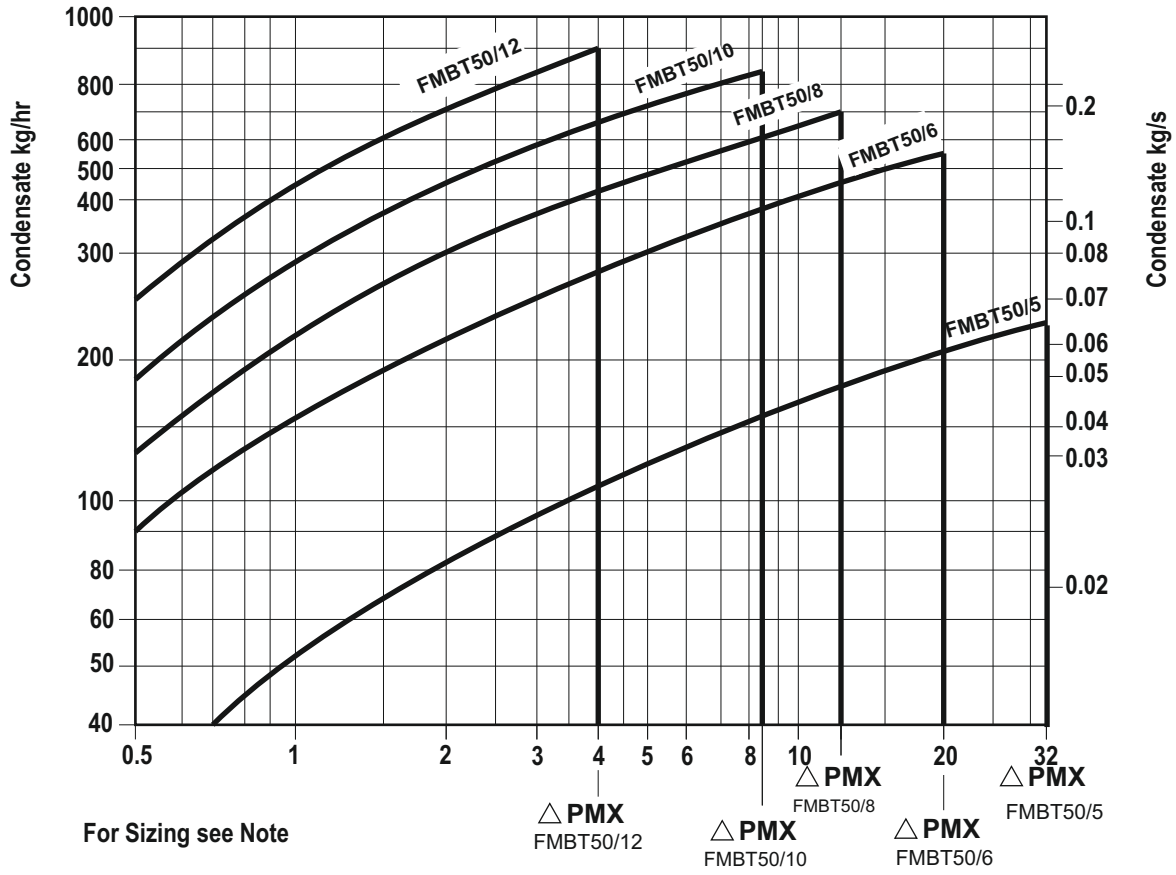
Differential Pressure bar g { x 100 = kPa }

Capacity Chart (DN20)



Differential Pressure bar g { x 100 = kPa }

Capacity Chart (DN25)



Note :
Trap should be selected for the most appropriate working differential pressure and not on the basis of load e.g.DN25 FMBT50, 80 Kg/h at 7 bar differential should be handled by FMBT50/10 and not FMBT50/5

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FMTD64

Forbes Marshall Thermodynamic Trap

Description
The Forbes Marshall Thermodynamic Trap FMTD64, with inbuilt strainer and full stainless steel construction, is best suited for header and mainline drains.

Size and Pipe Connections
1/2"and 3/4"
Screwed BSPT/NPT and socket weldable ends

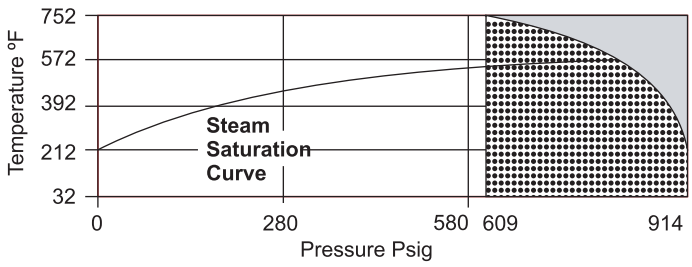
Notes
Available with Class 150,300 and 600 weld on flanges on request

Limiting Conditions

Body design conditions	914 Psig
PMA Maximum allowable pressure	914 Psig @212°F
TMA Maximum allowable temperature	752°F @ 609 Psig
Minimum allowable temperature	32°F
PMO Maximum operating pressure	609 Psig recommended
TMO Maximum operating pressure	752°F @ 609 Psig
Minimum operating temperature	32°F
Minimum operating differential pressure for satisfactory operations	3.6 Psig
Designed for a maximum cold hydraulic test pressure of	1378 Psig

Note : For lower operating temperatures consult Forbes Marshall PMOB : Maximum back pressure should not exceed 80% of the inlet pressure under any conditions of operation otherwise the trap may not shut-off.

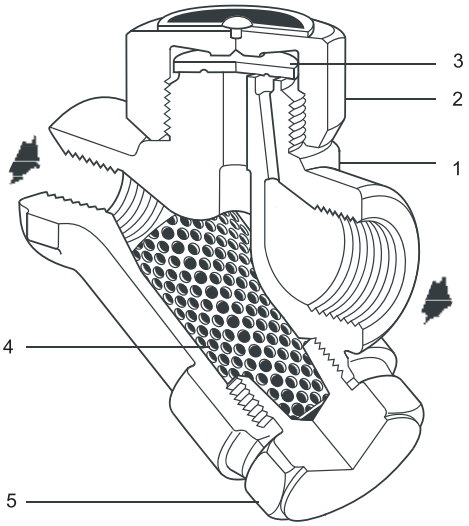
Operating Range



The product must on be used in this region.

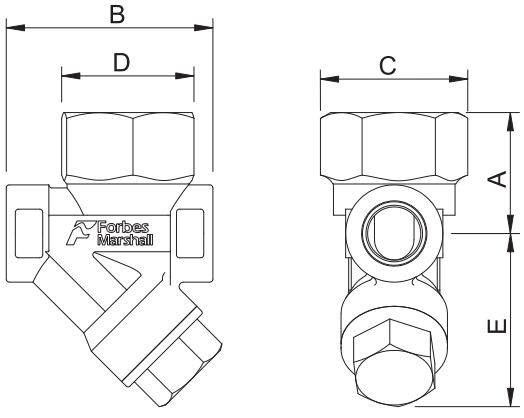
The product should not be used in this region or beyond its operating range as damage may occur to the internals.

Optional extras
Isotub- An insulating cover which prevents the trap from being unduly influenced by excessive heat loss such as when subjected to low outside temperature, wind, rain, etc.



Material

No	Part	Material	Standard
1.	Body	Stainless Steel	ASTM A 743 Gr-CA40
2.	Cap		
3.	Disc		
4.	Strainer Screen	Stainless steel	ASTM A 240, Type 304
5.	Strainer cap	Stainless steel	ASTM A 743 Gr-CA40



Dimensions (approx. in inches)

Size	A	B	C	D	E	Wt. (Lbs)
1/2						
3/4	1.7	3.1	2.0	1.7	2.2	1.8

Salient Features

1. Complete stainless steel construction ensures better mechanical and corrosion resistant properties.
2. The disc and seat, hardened by induction hardening process to about 45RC can withstand continuous water hammering conditions.
3. Seat integral part of the body, eliminates leakage- prone joints and gaskets.
4. Condensate entry below the disc concentric to disc/seat ensures clean and parallel lift to disc with reference to seat, eliminating any localized wear and tear.
5. An inbuilt strainer screen of adequately large area ensures long and trouble free operation.

How to Order

Example: 1/2" Forbes Marshall Thermodynamic Trap FMTD64

Available Spares	
Strainer Screen and Disc (pkt. of 3)	A+B
Isotub	C

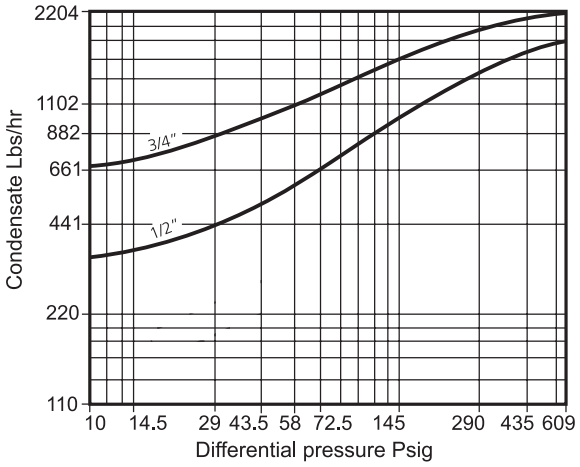
The spare parts available are shown in heavy outline. Parts drawn in broken line are not supplied as spares:

How to Order Spares

Always order spares by using the description given in the column headed "Available Spare" and stating the size and type of trap.

Example: Strainer Screen for 1/2" Forbes Marshall Thermodynamic Trap FMTD64

Capacity Chart



Installation

Preferably on horizontal pipe with cover on top. The trap can be fitted in other positions if unavoidable.

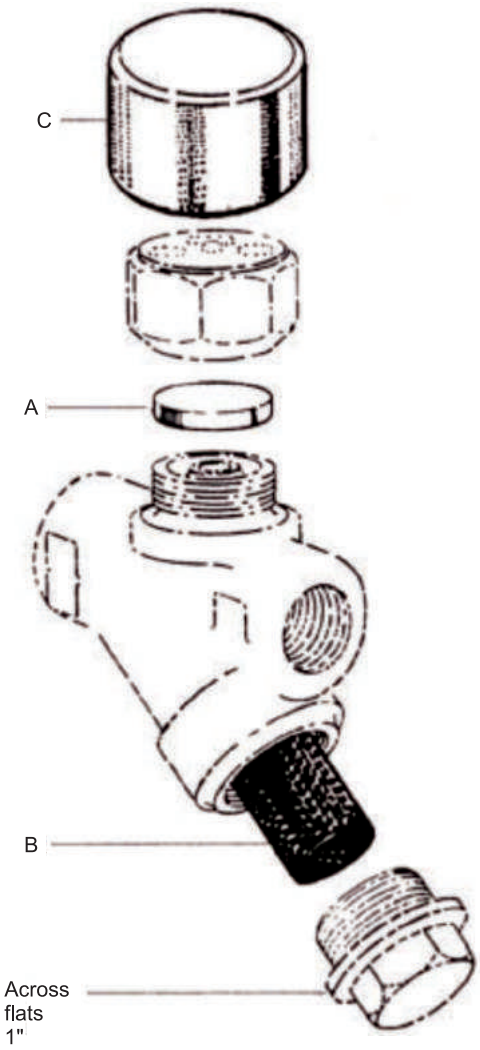
Maintenance

Remove the Isotub if fitted and unscrew cap using spanner. Do not use pipe wrench which may cause distortion of the cap. If the disc and body seating faces are only slightly worn they can be refaced by lapping individually on a flat surface such as a surface plate. A figure of eight motion and a diluted 1:6 lapping compound such as 6 micron Aluminium Oxide gives the best results.

If the wear is too great to be rectified by simple lapping, the seating faces on the body must be ground flat and then lapped and the disc replaced by a new one. The total amount of metal removed in this way should not exceed 0.010".

When re-assembling, the disc is normally placed in position with the grooved side in contact with the body seating face. Screw on the cap; no gasket is required but suitable high temperature anti-seize grease should be applied to the threads.

To clean or replace the strainer, unscrew the strainer cap using a spanner, withdraw the screen and clean or replace with a new one if damaged. To re-assemble, insert the screen in cap, then screw cap into place. No gasket is required but a fine smear of Molybdenum Disulphide grease should be applied to the threads.



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FMDCV (DIN)

Forbes Marshall Disc Check Valve (Metal-Metal/Soft/Viton Seating)

Description

The Forbes Marshall Disc Check Valve, FMDCVD, is of the wafer pattern designed to be sandwiched between flanges. The FMDCV is suitable for use on a wide range of fluids for applications in process lines, Hot water systems, steam and condensate system etc. face-to face dimensions conform to EN558 part 1 series 49

Sizes and Pipe Connections

DN 15, 20, 32, 40, 50, 65, 80, 100 suitable for installation between PN 6, 10, 16, 25,40

Certification

Available with IBR
All certification / inspection requirement must be stated at the time of order placement.

Standard

Designed and manufactured in accordance with BS 7438

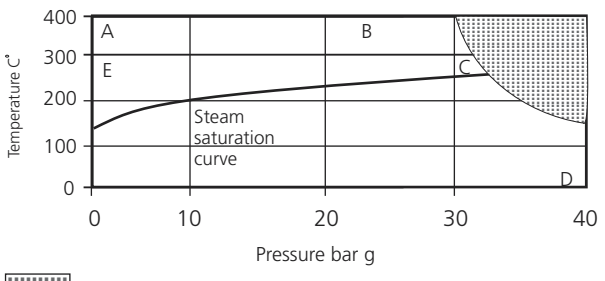
Optional Extras

Viton soft seats for oil, gas and steam applications
EPDM soft seats for water applications

Limiting Conditions

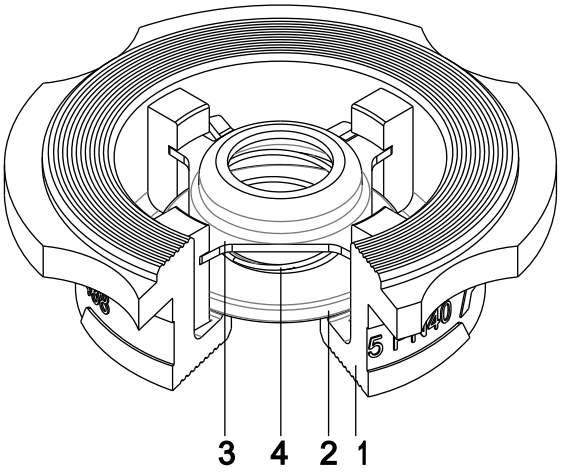
Body design condition		PN 40
PMO - Maximum operating pressure		40 bar g
TMO- Maximum operating temperature	Standard spring	300°C
	Without spring	400°C
Minimum operating temperature (standard disc)		-10°C
Temperature Limits	Viton Seat	-10°C to +180°C
	EPDM Seat	-10°C to +150°C
Maximum cold hydraulic test pressure		80 bar g

Operating Range



The product must not be used in this region.

E - C - D FMDCV with standard spring.
A - B - D FMDCV without spring



Materials

No	Part	Material	Standard
1	Body	Austentic stainless steel	ASTM A 351 CF8M
2	Disc	Austentic stainless steel	ASTM A 351 CF3M
3	Spring retainer	Austentic stainless steel	ASTM A 240 SS2316L
4	Heavy duty	Austentic stainless steel	IS4454:IV:GR. 3 SS316

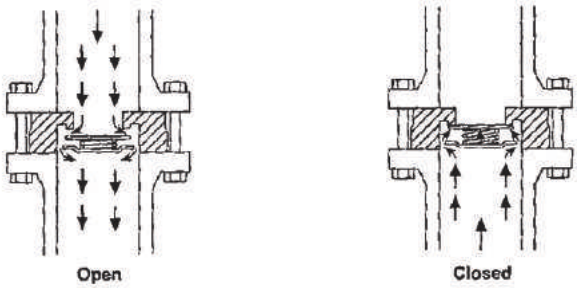
Standard Shut-off

Standard valves conform to DIN 3230 part 3, BN2 Valves conforming to DIN 3230 part 3, BO3 available on request.

Soft seated versions meet DIN3230 part 3 BN 1 and BO1 provided a differential pressure exists.

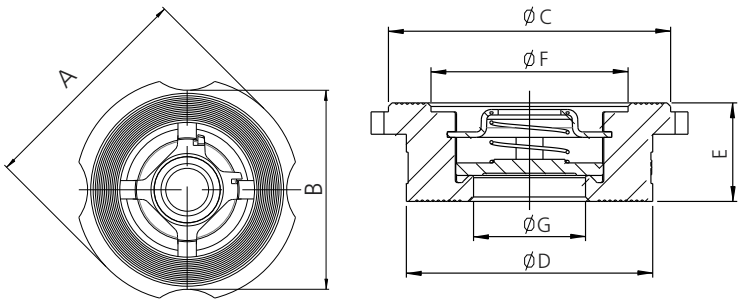
Operation

Forbes Marshall spring-loaded disc check valves are opened by the pressure of the fluid and closed by the spring as soon as flow ceases and before the reverse flow occurs.



Dimensions / Weights (approximate) in mm and kg

SIZE	A	B	C	D	E	F	G	Weight
DN15	60	45	43	38	16	29	15	0.13
DN20	69.5	55	53	45	19	35.7	20	0.19
DN25	80.5	65	63	55	22	44	25	0.32
DN32	84	78	75	68	28	54.5	32	0.53
DN40	101	88	85	79	31.5	65.5	40	0.74
DN50	115	98	95	93	40	77	50	1.25
DN65	129	118	115	113	46	97.5	65	1.84
DN80	154	134	133	128	50	111.5	80	2.42
DN100	184	154	154	148	60	130	100	3.81



Kv Values

DN	15	20	25	32	40	50	65	80	100
Kv	4.4	6.8	10.8	17	26	43	60	80	113

For conversion : Cv (UK)=Kv x 0.963 Cv(US)=kv x 1.158

Opening Pressures in mbar

Differential pressures with zero flow for standard

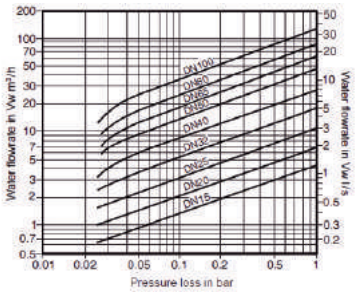
→ Flow direction

DN	15	20	25	32	40	50	65	80	100
↑	24	24	24	24	27	29	29	30	30
→	22	22	22	22	23	25	25	25	25
↓	19	19	19	19	19	19	19	19	19

Where lowest opening pressures are required, valves without springs can be installed in vertical pipes with bottom-to-top flow **without spring**

↑	2.5	2.5	3	3	4.0	4.5	4.5	5	6

Pressure Loss Diagram



Pressure loss diagram with open valve at 20°C. The values indicated are applicable to spring loaded valves with horizontal flow. With vertical flow, insignificant deviations occur only within the range of partial opening.

The curves given in the chart are valid for water at 20°C to determine the pressure for other fluids the equivalent water volume flowrate must be calculated and used in the graph.

$$Vw = \sqrt{\frac{r}{1000}} \times V$$

Where : Vw = Equivalent water volume flow in l/s or m^3/h

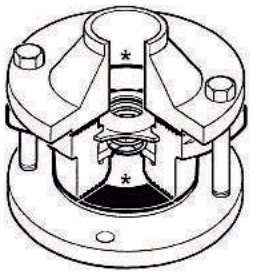
r = Density of fluid kh/cm

V = Volume of fluid l/s or m^3/h

Pressure loss information for steam, compressed air and gases is available from Forbes Marshall.

Safety Information, Installation and Maintenance

For full details see the user manual(99-001-1178327)supplied with the product. FMDCVD spring loaded disc check valves must be fitted in accordance with the indicating correct fluid flow direction. When fitted with a spring they can be installed in any plane. When supplied without a spring they must be fitted in a vertical flow line with the flow from bottom-to-top.



Note : Flanges, bolts (or studs), nuts and joint gaskets are to be provided by the installer. Forbes Marshall disc check valves are non-maintainable (no spares are available) and are not suitable for use where heavily pulsating flow exists, such as close to a compressor.

The available options are denoted by a marking on the valve body

W.	Without spring	Standard metal disc
'V'	Standard spring	Viton soft faced disc
'E'	Standard spring	EPDM soft faced disc
'WV'	Without spring	Viton soft faced disc
'WE'	Without spring	EPDM soft faced disc
No identification indicates a standard spring with a metal disc		

Disposal

If a product containing a viton component has been subjected to a temperature approaching 315°C or higher, then it may have decomposed and formed hydrofluoric acid. Avoid skin contact and inhalation of any fumes as the acid will cause deep skin burns and damages to the respiratory system.

How to Order

Example : 1 No. Forbes Marshall disk check valve DN 50 FMDCV (DIN) austenitic stainless steel for fitting between PN 40 flanges.

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Vu10

Forbes Marshall View Glass

Description

The Forbes Marshall View Glass, VU10, is a range of single and double window view glasses available in cast iron screwed connections.

Sizes and End Connections

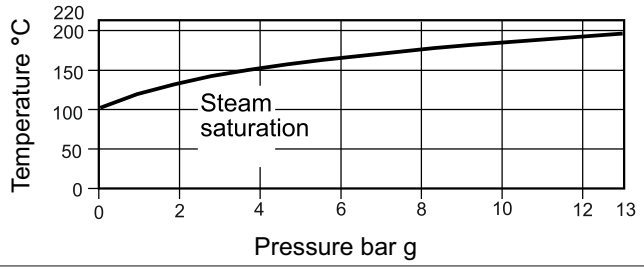
Single Window DN 15, 20 and 25 screwed BSPT / NPT / BSP

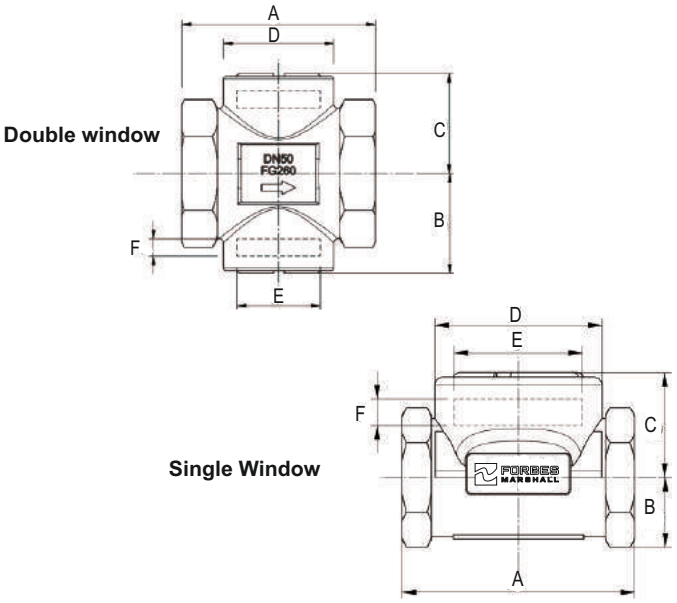
Double window DN 40 and DN 50 screwed BSPT / NPT/ BSP

Limiting Conditions

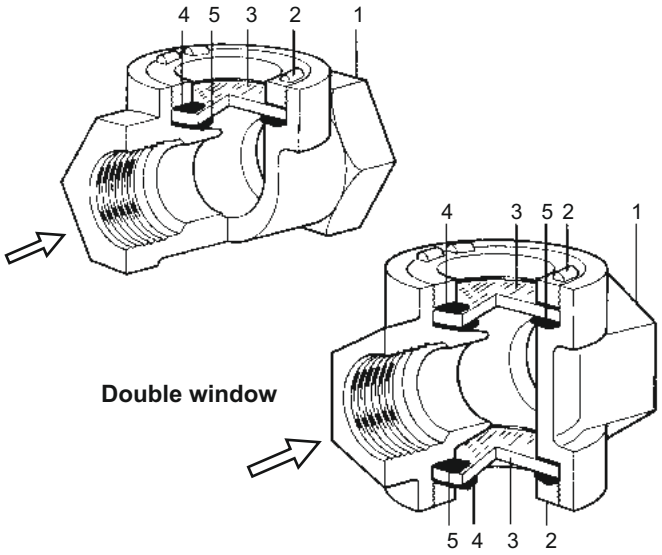
PMO - Max. working pressure	13 bar g
TMO – Max. working pressure	220°C
Cold hydraulic test pressure	26 bar g
Minimum operating temperature	0°C

Operating Range





Single window



Material

Sr.No.	Part	Material	Standard
1.	Body	Cast iron	IS 210 Gr. FG260
2.	Bazel	Brass	BSS 218
3.	Glass	Toughened glass	
4.	Top gasket	Ss304 Exfoliated graphite	
5.	Bottom gasket	Ss304 Exfoliated graphite	

Dimensions / Weights (approx.) in mm

Single Window

Size	A	B	C	D	E	F	Weight
DN 15	89	18	34	64	50	10	0.8 Kg
DN 20	89	18	35	64	50	10	0.8 Kg
DN 25	89	24	38	64	50	10	1 Kg

Double window

Size	A	B	C	D	E	F	Weight
DN 40	107	51	51	64	50	10	2 kg
DN 50	114	57	57	64	50	10	2.5 kg

How to Order

Example: 1 No. DN 25 Forbes Marshall View Glass VU10 screwed BSPT connection

Safety Information, Installation and Maintenance

Safe operation of these units can only be guaranteed if they are properly installed, commissioned and maintained by a qualified person in compliance with the operating instructions. General installation and safety instructions for pipeline and plant constructions, as well as the proper use of tools and safety equipment must also be complied with.

Warning

Under certain conditions corrosive elements in condensate can affect the inner face of the window(s), particularly where caustic alkali and hydrofluoric acid are present. It is recommended that the sight glass is periodically checked. If there is evidence of thinning or erosion damage then the window(s) should be replaced immediately. Always wear eye protection when viewing the contents of the view glass.

Installation and Maintenance Note

View glasses should have stop valves fitted on both inlet and outlet. It is imperative that the upstream stop valve is closed first in order to prevent over pressurization.

View glasses can be fitted in either a horizontal or vertical line on the outlet side of a steam trap. Where the trap is a blast discharge type e.g. thermodynamic, the view glass must be fitted at least 1m from the trap. This is to ensure that the glass is not subjected to thermal shock or pressure. Reasonable steps should be taken to protect personnel from injury in the unlikely event that the glass breaks.

Ensure access is available for maintenance purposes.

Disposal

The product is recyclable. No ecological hazard is anticipated with disposal of this product providing due care is taken.

Spare Parts

The spare parts available are shown in heavy outline. Parts drawn in broken line are supplied as spares.

Available Spares

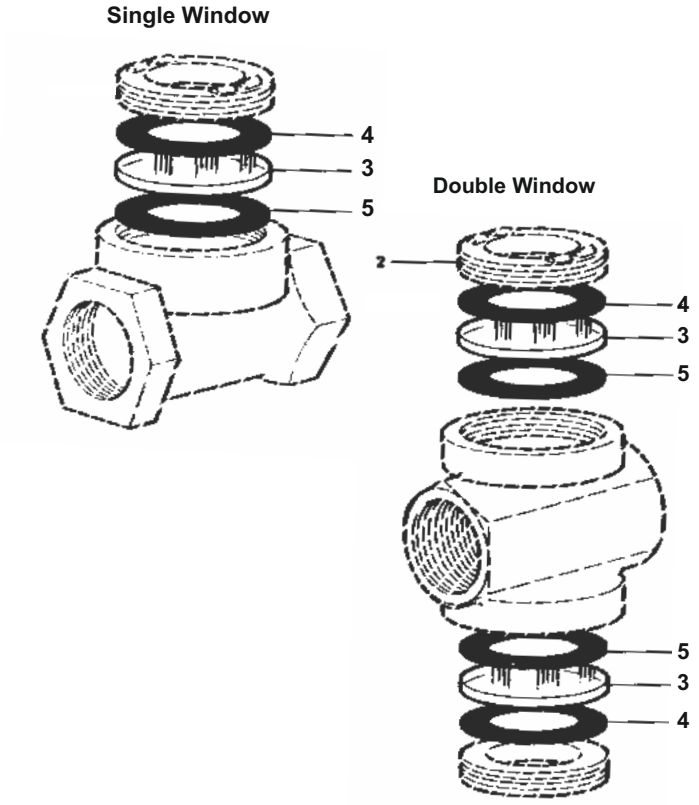
Set of glass and gasket (pack of 2)3, 4, 5

How to Order Spares

Always order Spares by using the description given in the column headed “Available Spares” and state the size and type of view glass.

Recommended Tightening Torque for Bazel (Brass Ring)

Size (DN)	Torque (Nm)
15 TO 50	15



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FMPRV41

Forbes Marshall Pilot Operated Pressure Reducing Valve

Description

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

Sizes and End Connections

DN 15, 20, 25, 40 and 50
Screwed: BSPT / NPT / BSP for DN 15, 20, 25
Flanged: BS 10 table "F/H", PN10, PN 16, Class 150, Class 125 for DN 40 and 50
DN15 FMPRV41 LC (low capacity) versions available

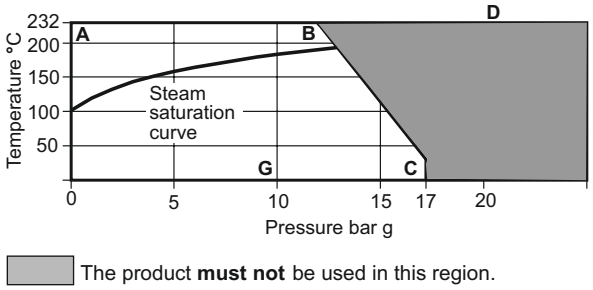
Limiting Conditions

PMO-Maximum operating pressure	17 bar g
TMO-Maximum operating temperature	232°C
Cold hydraulic test pressure	34 bar g
Spring range	0.3 to 17 bar g

Pressure Sensing Pipe

The FMPRV41 controls the pressure by sensing the downstream pressure through a pressure sending 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.

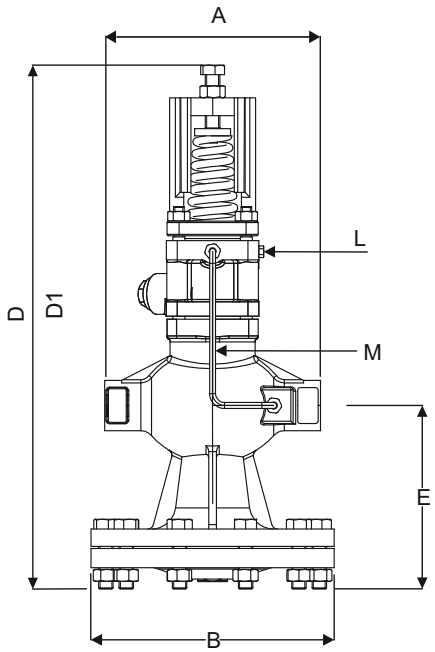
Operating Range:



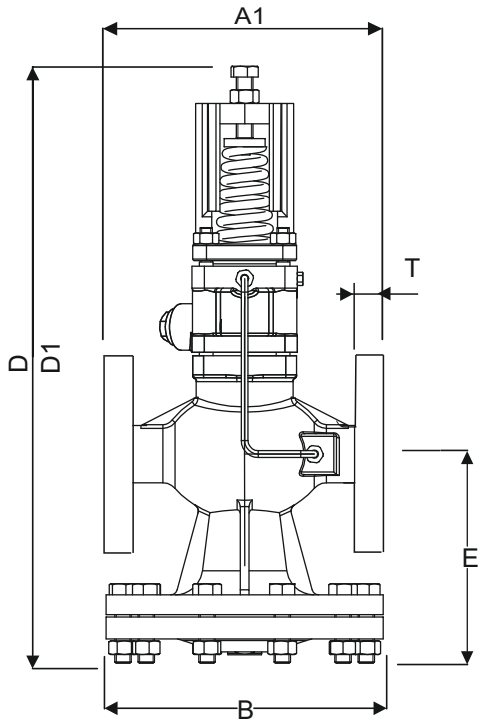
The product **must not** be used in this region.

Dimensions (approx.) in mm — FMPRV41 (Steam)

Size (DN)	A	A1	B	D	D1(Air)	E	T	Wt.
15	160	....	180	409	358	129	....	13kg
15 LC	160	....	180	409	358	129	....	13kg
20	160	....	180	409	358	129	....	13kg
25	180	....	203	432	381	178	....	14kg
40	....	211	251	450	414	149	22	30kg
50NB	....	231	251	480	414	173	25	32kg



FMPRV41 SCREWED



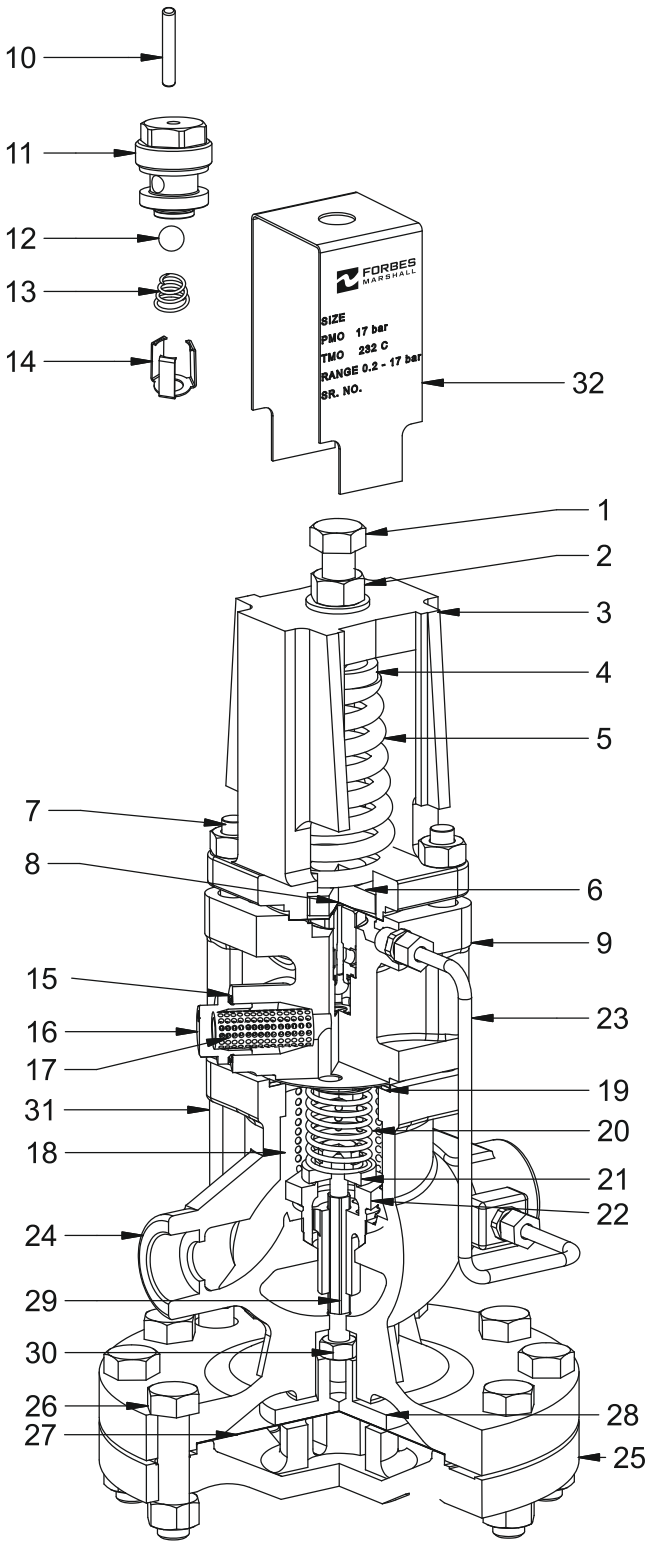
FMPRV41 FLANGED

Materials

No	Part	Material	Standard
1	Adjustments screw	Carbon Steel	IS1367 Gr14
2	Adjustment lock nut	SS Type 304	
3	Spring housing	SG iron	EN-JS1025 DIN EN 1563
4	Top spring pad	C-20	IS2062
5	Pressure adjustment Spring	SS Type 302	IS4454 Part IV Gr.1
6	Bottom spring pad	SS Type 304	ASTM A276
7	Spring housing Securing nut Securing studs	 Carbon Steel Carbon Steel DN 15-32 DN 40, 50	 ASTM A 194 Gr. 2H BS970 EN9 M10x95mm M12x95mm
8	Pilot diaphragms	SS Type 304	ASTM A240
9	Pilot valve chamber	SG iron	EN-JS1025 DIN En1563
10	Pilot valve plunger	SS 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 DN 15 - 25 DN 40, 50	 ASTM A 194 Gr. 2H ASTM A 193 B7 M12x50mm M12x50mm
27	Main diaphragm pad	SS Type 304	ASTM A240
28	Lower diaphragm pad	SS Type 304	ASTM A276
29	Pushrod	SS Type 431	
30	Lock nut	SS Type 316	
31	Control pipe assembly	SS Type 304	ASTM A213
32	Name plate	Stainless Steel	

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.

FMPRV41 STEAM



Steam Capacity Chart

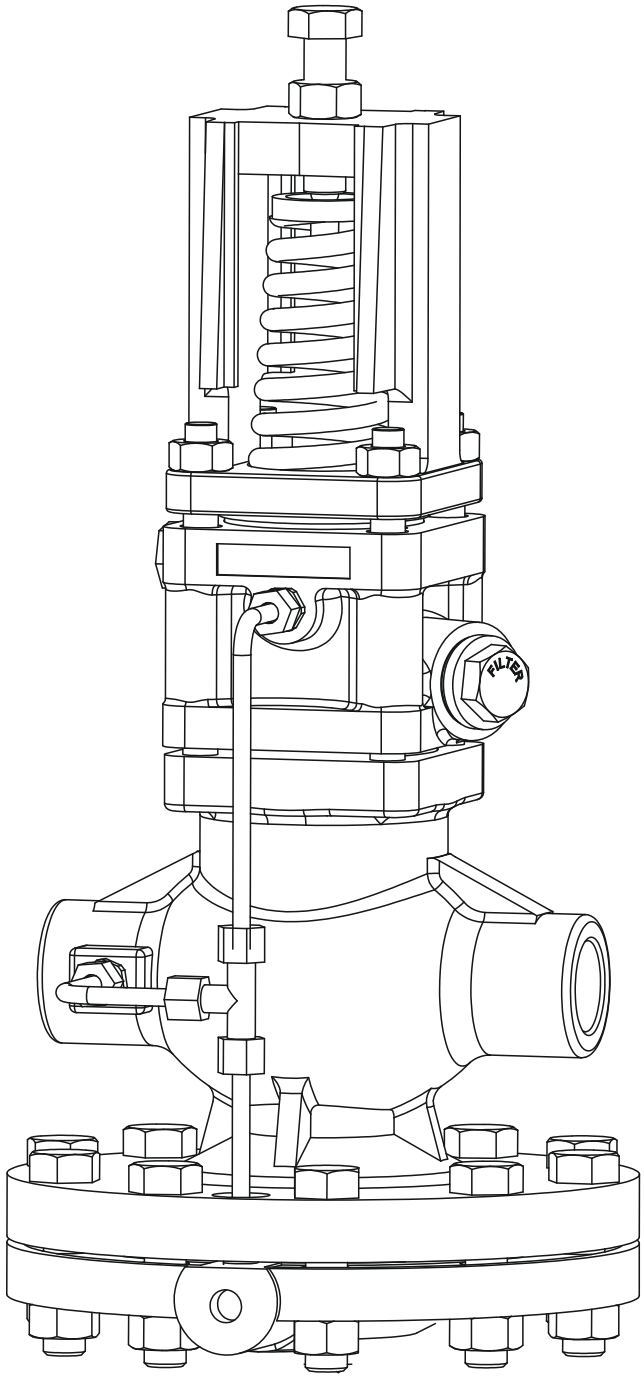
Note
The capacities quoted below are based on valves fitted with an external pressure sensing pipe. Reliance on the internal pressure sensing pipe will mean that capacities may be reduced. In the case of low downstream pressure this reduction could be up to 30% of the valve capacity.

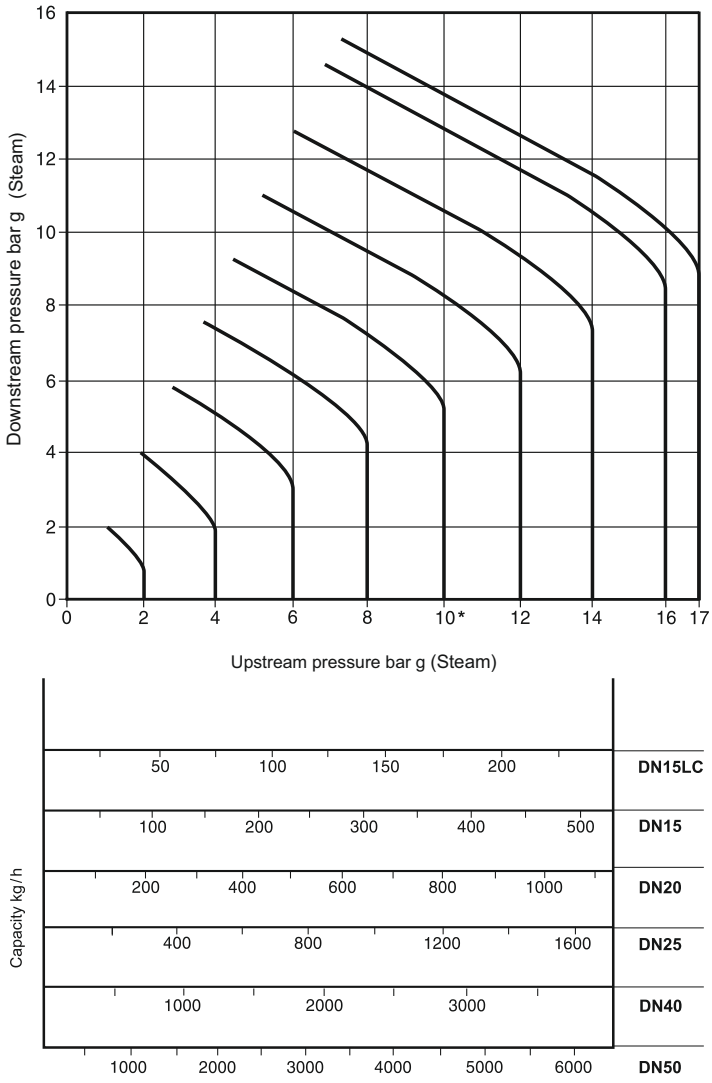
How to Use the Chart

Saturated Steam
A valve is required to pass 600kg/h reducing from 6 bar g to 4 bar g. Find the point at which the curved 6 bar g upstream pressure line crosses the horizontal 4 bar g 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 55°C of superheat the factor is 0.95 and for 100°C of superheat the factor is 0.9.
Using the example given for saturated steam, the DN40 valve would pass 1150X0.95=1092kg/hr. if the steam had 55°C superheat. It is still big enough to pass the required load of 600kg/hr.

FMPRV41 Steam Version





How to Use the Chart

Capacities are given in cubic decimeters of free air per second (dm^3/s). The use of the capacity chart can be best explained by an example.

Required, a valve to pass 100dm^3/s of free air reducing from 12 bar g to 8 bar g.

Find the point at which the curved 12 bar g upstream pressure line crosses the horizontal 8 bar g downstream pressure line. A perpendicular dropped from this point shows that, a DN15 valve will pass approximately 120 dm^3/s under these conditions and is the correct valve size to choose.

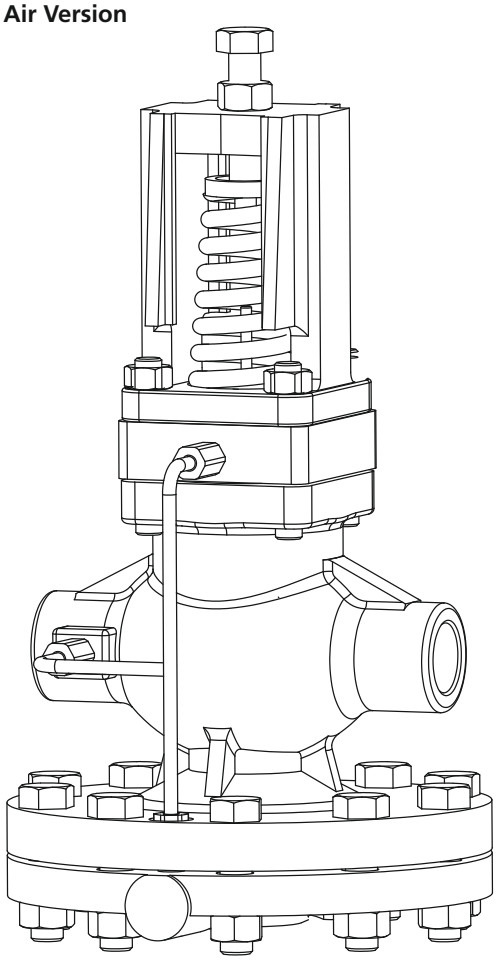
KV Values

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

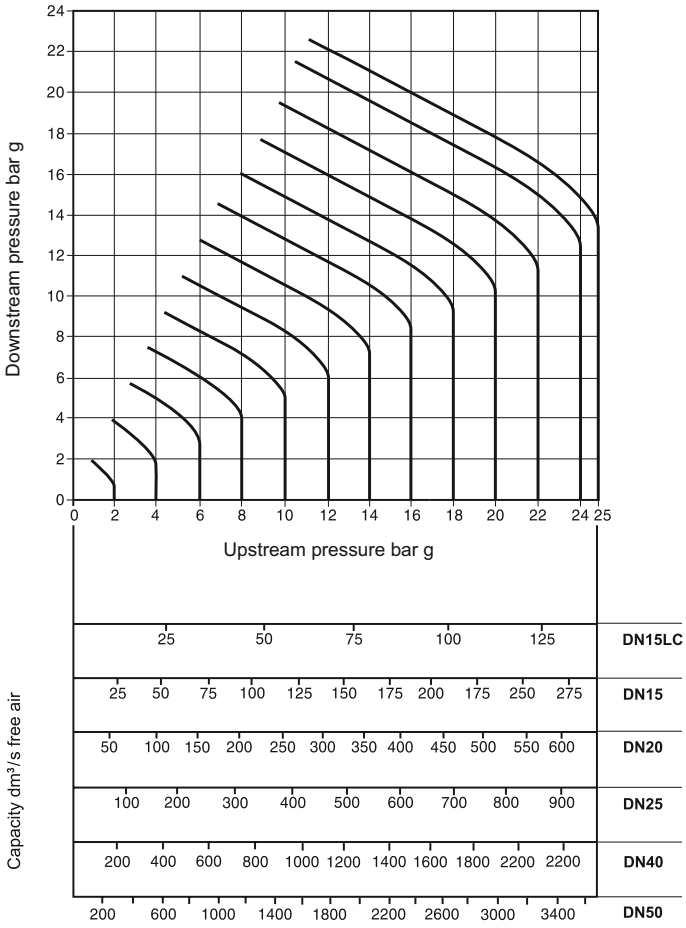
SIZE	DN 15LC	DN15	DN20	DN25	DN40	DN50
KV	1	2.8	5.5	8.1	17	28

For conversion Cv (UK)=Kv x 0.963
Cv (US)=Kv x 1.156

FMPRV41 Air Version



Compressed Air Capacity Chart



How to Order

1 no. Forbes Marshall Pilot Operated Pressure Reducing Valve, DN 40 FMPRV41 having a 0.2-17 bar g 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.

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FMSRV (DN20-50)

Forbes Marshall Safety Relief Valve

Description

The Forbes Marshall Safety Relief Valve FMSRV is a high lift safety valve with gun metal seat, valve and brass internals suitable for use on steam, air and water.

Size and Pipe Connections

DN 20, 25, 40 and 50
Screwed BSPT/BSP/NPT
Available with IBR certificate

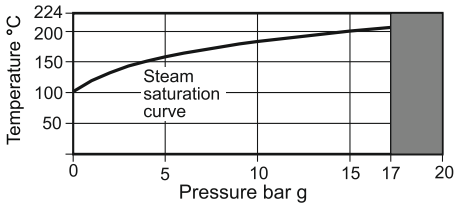
Limiting Conditions

PMA maximum operating pressure	17.5 bar g
TMA maximum operating temperature	220°C
Cold hydraulic test pressure	35 bar g

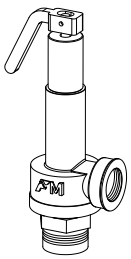
For following set pressure ranges 6 colour coded springs are available

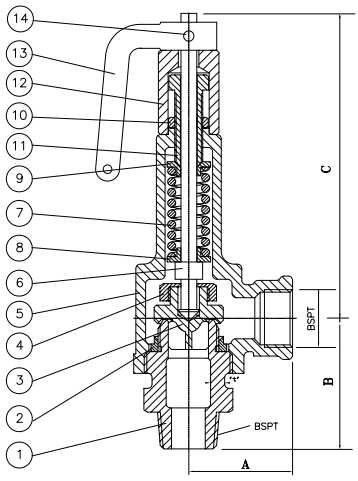
05 to 15 psi (0.344 to 1.03 bar g)	White
15 to 35 psi (1.03 to 2.41 bar g)	Yellow
35 to 75 psi (2.41 to 5.17 bar g)	Green
75 to 125 psi (5.17 to 8.62 bar g)	Blue
125 to 175 psi (8.62 to 12.06 bar g)	Red
175 to 250 psi (12.06 to 17.24 bar g)	Black

Operating Range



The product must not be used in this region.





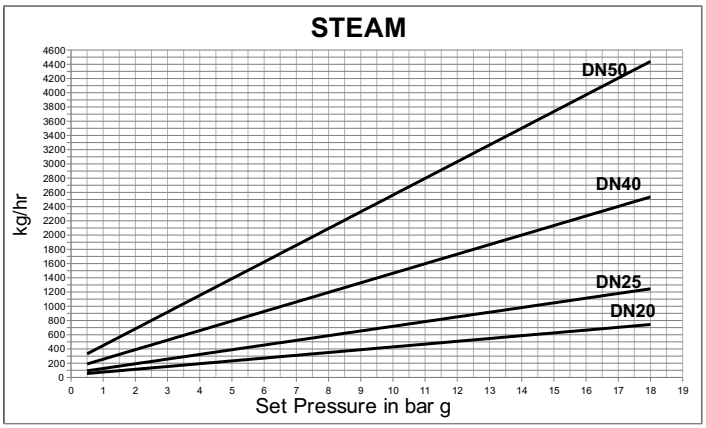
Material

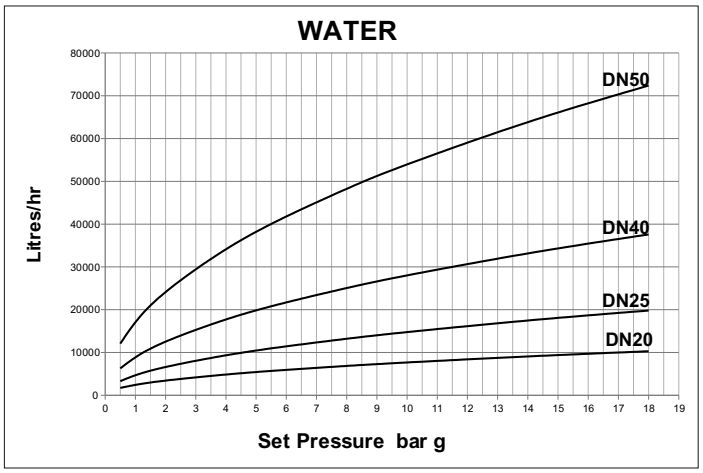
No.	Part	Material	Standard
1	Seat	Gun metal	BS1400
2	Seat ring	Gun metal	BS1400
3	Valve	Gun metal	BS1400
4	Spindle lock nut	Brass	IS 4170
5	Bonnet	Cast Iron	IS 210 Gr FG260
6	Spindle	Brass	IS 4170
7	Spring	Stainless steel 302	IS 4454
8	Bottom spring guide	C 20	-
9	Top spring guide	C 20	-
10	Adj. locking nut	Brass	IS 4170
11	Adj. Bolt	Brass	IS 4170
12	Cap	C20	-
13	Lever	Aluminium	-
14	Lever fulcrum pin	C20	-
15	Seat ring locking screw and nut (not shown)	Brass	IS 4170

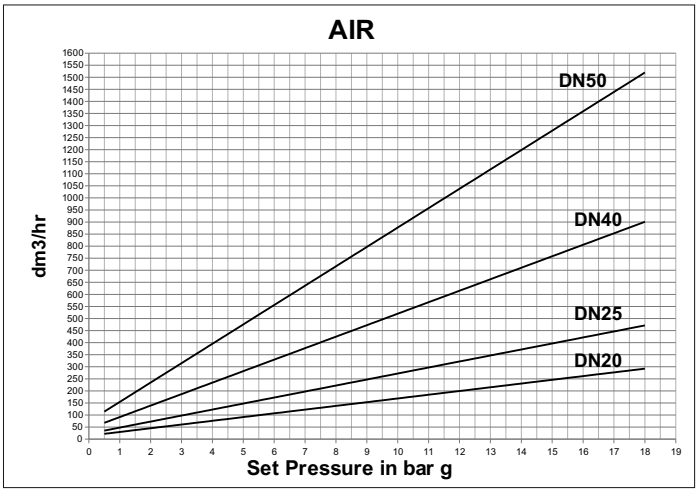
Dimensions: (approx.) in mm

Size DN	A	B	C	Wt (kg)
20	48	60	145	1.4
25	60	65	160	2.1
40	73	84	205	4.5
50	80	108	250	6.5

Capacity Chart







Installation

The safety relief valve should always be fitted with the centre line of the spring housing vertically above the valve. If the discharge pipe is not self-draining then a separate drain pipe with continuous fall should be provided.

The outlet from the safety relief valve should be arranged to discharge to a safe place where it is visible but cannot cause damage or injury to persons.

These valves are not suitable for mounting on boilers

How to Order

Example: 1 No. Forbes Marshall Safety Relief Valve, FMSRV, DN20 with BSPT ends and a set pressure of 6 bar g.

Available Spares

Valve head and spindle kit

Spring kit

How to Order Spares

Always order spares by using the description given in the column headed available spares. For codes refer user manual.

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SS Case Process Pressure Gauge (SP)

Catalogue and offer manual

Introduction

The SS Case Bourdon Pressure Gauge (SP) model is designed for measuring pressure in tough conditions, for example in chemical manufacturing plants.

This gauge offers glycerin filling as an option. The glycerin fill ensures ease of readability even in applications with high vibration levels and extreme loads. Glycerin lubricates the gauge internals and also protects the gauge from wear and tear.

The fully welded construction guarantees long service life and stable operation of the gauge, along with tried and tested safety.

This gauge is available in

Nominal Sizes:	4” (100mm), 6” (150mm), 8” (200mm), 10” (250mm)
Ranges:	-15 to 0 Psi 10 Psi to 10,000 Psi

Features

Compliance with latest EN837-1

Standard ranges : 0 to 10 Psi upto 10,000 Psi

Overload capacity 130 % of FSD

Protection to IP67***

Accuracy class ±1.0% of FS

Stainless steel casing

Dry or liquid filled version

External zero adjustment (optional)

Socket to case - TIG argon welded

CE marking as per PED 97/23/EC

Applications

Chemical and fertilizer industries

Petrochemical industries

Thermal, nuclear and hydroelectric power stations

Pharmaceutical industries

Food process industries

Water treatment plants

Iron and steel industries

Rubber molding / processing plants

Hydraulics and pneumatics

Sugar industries

Refineries

Hydraulic power packs

Cryogenics

*** Enclosure Protection to IP67 for 4” & 6” Dial Sizes

Specifications

Standards	Description
Reference standard	EN837-1
Mounting	Direct bottom
Connection	½” NPT (M) (as standard)
Case and bezel	SS 304 (Bayonet type bezel)
Bourdon	SS 316
Socket	SS 316 L
Movement	SS 304
Dial	Aluminum, white background with black marking
Pointer	Aluminum, black color micrometer pointer with zero adjustable
Accuracy	±1% of FS (as standard.)
	± 0.5% of FS *
Dampening liquid	Glycerin up to 149°F**
	Silicon oil -40 to 392°F**
Over pressure limit	As per EN standard
	From 0 to 1500 Psi, 125% of maximum scale
	From 1500 to 8550 Psi, 115% of maximum scale value
Window	Toughened glass
Protection	IP67 ***
Blow off disc and filling plug	Neoprene
Gasket	Silicon
Ambient temperature	-40º F to 140º F (for dry version)
	-4º F to 190º F (for glycerin filled version)
Process temperature	Max. 392°F (for dry gauge)
	Max. 149°F (for glycerin filled gauges)

* On customer request, consult factory / engineering team

** Applicable for 4” and 6” dial size only. Consult factory / engineering team

*** Enclosure protection to IP67 for dial sizes 4” and 6” only
Enclosure protection to IP65 for 8” and 10” and above dial sizes respectively

BALL VALVE TECHNICAL COMPARAITIVE STATEMENT			
S.No	Descripcation	Spirax Sarco	Forbes Marshall
1	2	3	4
1	Make	Spirax Sarco	
2	Country of Origin	UK	
3	Figure/Model No.	M10S	
4	Pressure Drop	70 Bar g	
5	Tempreture	230	
6	body	Zinc plated Carbon Steel	
7	Cap	Zinc plated Carbon Steel	
8	Ball	Stainless Steel	
9	Stem	Stainless Steel	
10	Seat	Virgin PTFE	
11	Stem Seal	Reinforced PTFE antistatic	
12	Separator	Zinc plated Carbon Steel	
13	Spring washers	Stainless Steel	
14	Nut	Zinc plated Carbon Steel	
15	Name-plate (DN)	Stainless Steel	
16	Stem nut	Zinc plated Carbon Steel	
17	Lever	Zinc plated Carbon Steel	
18	Grip	Vinyl	
19	Nuts	Zinc plated Carbon Steel	
20	Studs	Zinc plated Carbon Steel	

CHECK VALVE TECHNICAL COMPARAITIVE STATEMENT			
S.No	Descripcation	Spirax Sarco	Forbes Marshall
1	2	3	4
1	Make	Spirax Sarco	Forbes Marshall
2	Country of Origin	UK	India
3	Figure/Model No.	DCV41	FMDCV
4	Pressure Drop	50 Bar g	40 bar g
5	Tempreture	300	300 Deg
6	body	Austenitic Stainless Steel	Stainless Steel 316
7	Seat	Austenitic Stainless Steel	Stainless Steel 316
8	Disc	Austenitic Stainless Steel	Stainless Steel 316
9	Standard Spring	Austenitic Stainless Steel	Stainless Steel 316
10	Heavy duty Spring	Austenitic Stainless Steel	Stainless Steel 316
11	High temp. Spring	Nickel alloy	Stainless Steel 316

FLANGE STRAINER TECHNICAL COMPARAITIVE STATEMENT			
S.No	Descripcation	Spirax Sarco	Forbes Marshall
1	2	3	4
1	Make	Spirax Sarco	Forbes Marshall
2	Country of Origin	UK	India
3	Figure/Model No.	33	FMSTR
4	Pressure Drop	16	16 Bar g
5	Tempreture	300	425 Deg C
6	body	Cast Iron	Carbon Steel
7	Cap	SG Iron	Cast Iron
8	Cap Gasket	Reinforced Exfoliated Graphite	SS Expholiated Graphite
9	strainer screen	Austenitic Stainless Steel	Stainless Steel
10	cap studs	Carbon Steel	Carbon Steel
11	cap nuts	Carbon Steel	Carbon Steel

FLOAT STEAM TRAP TECHNICAL COMPARAITIVE STATEMENT			
S.No	**Descripcation**	**Spirax Sarco**	**Forbes Marshall**
1	**2**	**3**	**4**
1	Make	Spirax Sarco	Forbes Marshall
2	Country of Origin	UK	India
3	Figure/Model No.	FT-14	TOFT
4	Pressure Drop	16 Bar g	17 Bar g
5	Tempreture	250	232 Deg C
6	body	SG Iron	SG Iron
7	Cover Bolts	Steel	Stainless Steel
8	Cover Gasket	Reinforced Exfoliated Graphite	Reinforced Exfoliated Graphite
9	Cover	SG Iron	SG Iron
10	Main Valve Seat	Stainless Steel	Stainless Steel
11	Main valve / air vent seat	Stainless Steel	Stainless Steel
12	Main Valve Assembly Screws	Stainless Steel	Stainless Steel
13	Ball Float and Lever	Stainless Steel	Stainless Steel
14	Air Vent Assembly	Stainless Steel	Stainless Steel
15	Pivot frame	Stainless Steel	Stainless Steel
16	Pivot Pin	Stainless Steel	Stainless Steel
17	SLR Assembly	Stainless Steel	Stainless Steel
18	SLR Gasket	Stainless Steel	Stainless Steel
19	SLR Seal	Graphite	Stainless Steel
20	Erosion Deflector	Stainless Steel	Stainless Steel
21	Valve Spring	Stainless Steel	Stainless Steel

FLANGE GATE VALVE TECHNICAL COMPARAITIVE STATEMENT			
S.No	Descripcation	Spirax Sarco	Forbes Marshall
1	2	3	4
1	Make	Spirax Sarco	Forbes Marshall
2	Country of Origin	UK	India
3	Figure/Model No.	BSA1	PSVAL
4	Pressure Drop	16 bar g	78 bar g
5	Tempreture	300	425 Deg C
6	body	Cast iron	Cast Steel
7	bonnet bolts	Steel	Carbon Steel
8	Handwheel	Pressed steel	Sheet Metal/SG Iron
9	bellows	Stainless Steel	Piston Type
10	stem	Stainless Steel	Stainless Steel
11	Soft Seat Disc	Stainless Steel	Stainless Steel
12	Soft Seat Insert	R-Ptfe 25% carbon filled	SS Reinforce Graphite

SCREWED GATE VALVE TECHNICAL COMPARAITIVE STATEMENT			
S.No	Descripcation	Spirax Sarco	Forbes Marshall
1	2	3	4
1	Make	Spirax Sarco	Forbes Marshall
2	Country of Origin	UK	India
3	Figure/Model No.	HV3	PSVAL
4	Pressure Drop	25 Bar g	25 Bar g
5	Tempreture	260	425 Deg C
6	body	Gunmetal	Carbon Steel
7	Valve Seat	stainless steel	Stainless Steel
8	Valve	stainless steel	Cast Steel
9	Lock-nut	Gunmetal	Carbon Steel
10	Bonnet	Gunmetal	Cast Steel
11	Washer	Gunmetal	Spring Steel
12	Gland Packing	PTFE	SS Reinforced Graphite
13	Gland	Gunmetal	Cast Steel
14	Packing nut	Gunmetal	Carbon Steel
15	Handwheel	Aluminium	SG Iron
16	Handwheel Nut	Brass	Carbon Steel

SAFETY VALVE TECHNICAL COMPARAITIVE STATEMENT			
S.No	Descripcation	Spirax Sarco	Forbes Marshall
1	2	3	4
1	Make	Spirax Sarco	Forbes Marshall
2	Country of Origin	UK	India
3	Figure/Model No.	SV615	FMSRV
4	Pressure Drop	18 Bar g	17.5 Bar g
5	Tempreture	230	220 Deg C
6	Body	Bronze	Cast Iron
7	Nozzle	Stainless Steel	
8	Disc	Stainless Steel	
9	Lever Housing	Bronze	Aluminum
10	Spring	Chrome-vanadium alloy steel	Stainless Steel 302
11	Stem guide	Brass	Gunmetal
12	Spring end plate	Brass	Gunmetal
13	Stem	Stainless Steel	Gunmetal
14	Adjustment Screw	Brass	Brass
15	Lever	SG Iron	Aluminum
16	Pivot Pin	Stainless Steel	C20
17	Circlip	Stainless Steel	
18	Adjuster lock-nut	Brass	Brass
19	Soft Seal Disc	Stainless Steel / nitrile insert	Gunmetal
20	Sealed Cap	Bronze	C20
21	Cap Seal	Nitrile	
22	Skirt	Brass	
23	Grub Screw	Steel	Brass
24	Ball	Stainless Steel	

SCREW STRAINER TECHNICAL COMPARAITIVE STATEMENT			
S.No	Descripcation	Spirax Sarco	Forbes Marshall
1	2	3	4
1	Make	Spirax Sarco	Forbes Marshall
2	Country of Origin	UK	India
3	Figure/Model No.	12	FMSTR51
4	Pressure Drop	25 Bar g	31.5 Bar g
5	Tempreture	210	425 Deg C
6	body	Brass / Bronze	Carbon Steel
7	Cap	Brass / Bronze	Carbon Steel
8	Cap Gasket	Reinforced exfoliated graphite	Stainless Steel
9	strainer screen	Stainless Steel	Stainless Steel
10	cap studs	Carbon Steel	Steel
11	cap nuts	Carbon Steel	Steel

SINGLE WINDOWS SIGHT GLASS TECHNICAL COMPARAITIVE STATEMENT			
S.No	**Descripcation**	**Spirax Sarco**	**Forbes Marshall**
1	**2**	**3**	**4**
1	Make	Spirax Sarco	Forbes Marshall
2	Country of Origin	UK	India
3	Model No.	TI-P022-05	VU10
4	Pressure Drop	5 Bar g	13 Bar g
5	Tempreture	148	220 Deg
6	Body	Brass (1/2" to 1") Bronze (1-1/4" to 2")	Cast Iron
7	Bezel	Brass	Brass
8	Window	Toughened Soda Lime Graphite	Toughened Glass
9	Top Gasket	Reinforced Exfoliated Graphite	SS 304 Exfoliated Graphite
10	Bottom Gasket	Reinforced Exfoliated Graphite	SS 304 Exfoliated Graphite

SCREW THERMODYNAMIC TRAP TECHNICAL COMPARAITIVE STATEMENT			
S.No	Descripcation	Spirax Sarco	Forbes Marshall
1	2	3	4
1	Make	Spirax Sarco	Forbes Marshall
2	Country of Origin	UK	India
3	Figure/Model No.	TD42L	FMTD64
4	Pressure Drop	63 Bar g	42 Bar g
5	Tempreture	400	425 Deg
6	Body	Stainless Steel (With ENP Finish)	Stainless Steel
7	Cap	Stainless Steel	Stainless Steel
8	Disc	Stainless Steel	Stainless Steel
9	Strainer Screen	Stainless Steel	Stainless Steel
10	Strainer Cap	Stainless Steel	Stainless Steel
11	Strainer Cap Gasket	Stainless Steel	Stainless Steel
12	Insulating Cover (Optional Extrat)	Aluminium	
13	Inner Gaskit		Spiral Wound Gaskit
14	Outer Gaskit		Spiral Wound Gaskit
15	Retaining Ring		Spring Steel
16	Bolts		Carbon Steel

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