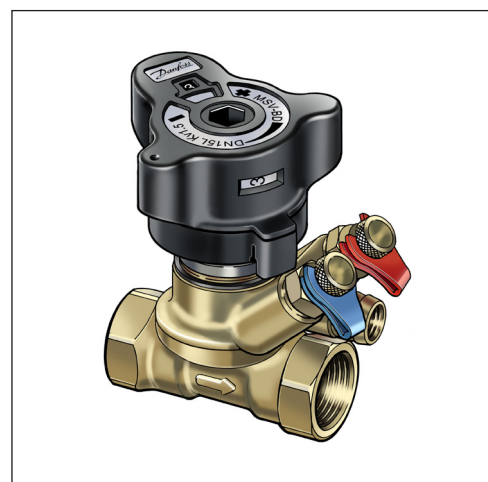


## Description

LENO™ MSV-BD is a new generation of manual valves for balancing flow in heating, cooling and domestic hot water systems.

LENO™ MSV-BD is a combined presetting and shut off valve with a range of unique features:

- Removable hand wheel for easy mounting.
- 360° rotating measuring station for convenient measuring and draining.
- Numeric presetting scale, visible from more angles.
- Easy locking of presetting.
- Built-in measuring nipples for 3mm needles.
- Built-in drain cock with separate flow/return draining.
- Open-close with Allen key in emergency.
- Open-closed colour indicator.

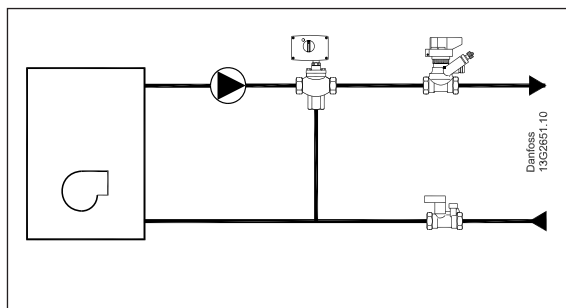


It is recommended to use LENO™ MSV-BD in constant flow systems. The valve may be mounted in flow or return.

Danfoss PFM 3000/4000 measuring instruments contain valve data for LENO™ MSV-BD in memory.

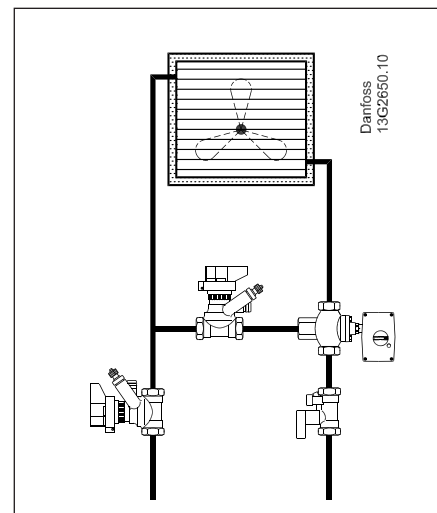
DN 15 and 20 valves are available with internal or external thread. Other dimensions with internal thread.

## Application



Boiler, flat station or heat pump in 1-family houses.

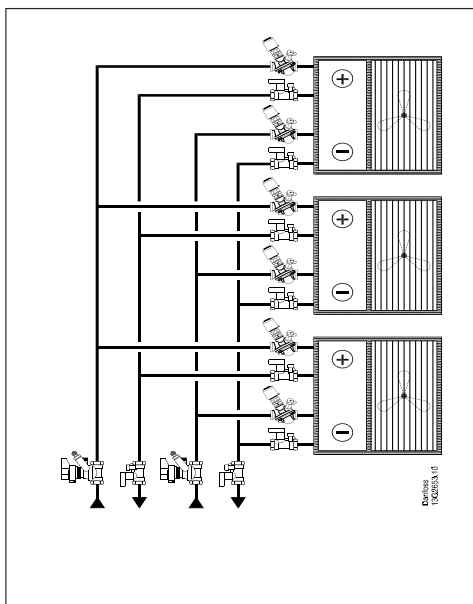
- For balancing.
- Shut-off function for service/repair.



Air handling unit

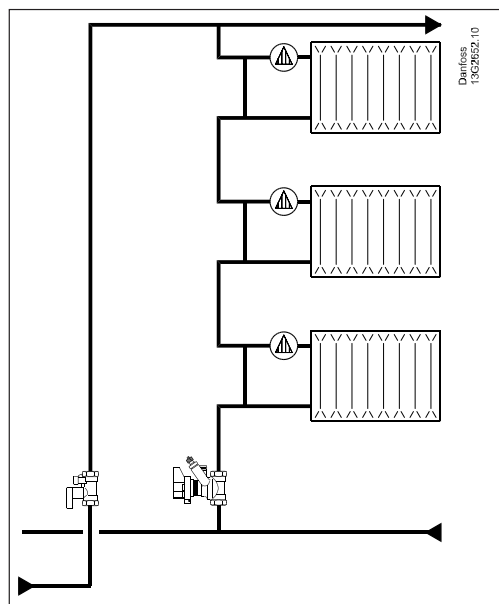
- For constant flow.
- For balancing.
- Shut-off function for service/repair.

Application



Fan coils

- For flow verification.
- Shut-off function for service/repair.



1-pipe system

- For balancing.
- Shut-off function for service/repair.

Ordering

LENO™ MSV-BD valve with internal thread

Type	Material	Size	$k_{VS}(m^3/h)$	Connection	Code no.
	DZR* Brass	DN 15 LF	2.5	R <sub>p</sub> 1/2"	<b>003Z4000</b>
		DN 15	3.0	R <sub>p</sub> 1/2"	<b>003Z4001</b>
		DN 20	6.0	R <sub>p</sub> 3/4"	<b>003Z4002</b>
		DN 25	9.5	R <sub>p</sub> 1"	<b>003Z4003</b>
		DN 32	18	R <sub>p</sub> 1 1/4"	<b>003Z4004</b>
		DN 40	26	R <sub>p</sub> 1 1/2"	<b>003Z4005</b>
		DN 50	40	R <sub>p</sub> 2"	<b>003Z4006</b>

LENO™ MSV-BD valve with external thread

Type	Material	Size	$k_{VS}(m^3/h)$	Connection	Code no.
	DZR* Brass	DN 15 LF	2.5	G 3/4 A**	<b>003Z4100</b>
		DN 15	3.0	G 3/4 A**	<b>003Z4101</b>
		DN 20	6.0	G 1 A	<b>003Z4102</b>

\*Corrosion resistant brass \*\*Eurocone DIN V 3838

LENO™ MSV-BD/S set solution

Type	Material	Size	$k_{VS}(m^3/h)$	Drain flow* (l/h)	Connection	Code no.
	DZR**brass	DN 15	3.0	281	R <sub>p</sub> 1/2"	<b>003Z4051</b>
		DN 20	6.0	277	R <sub>p</sub> 3/4"	<b>003Z4052</b>
		DN 25	9.5	316	R <sub>p</sub> 1"	<b>003Z4053</b>
		DN 32	18	305	R <sub>p</sub> 1 1/4"	<b>003Z4054</b>
		DN 40	26	208	R <sub>p</sub> 1 1/2"	<b>003Z4055</b>
		DN 50	40	308	R <sub>p</sub> 2"	<b>003Z4056</b>

\*Drain flow is measured at 1 bar static pressure and 0.1 bar differential pressure.

Ordering


Accessories

Type	Code no.
Standard measuring nipples, 2 pcs.	003Z4662
Extended measuring nipples, 60 mm, 2 pcs.	003Z4657
Operating handle	003Z4652
Drain cock, 1/2"	003Z4096
Drain cock, 3/4"	003Z4097
Flow measuring instrument PFM 4000	003L8200
Flow measuring instrument PFM 4000 Multi Source	003L8202
Identification tag & strips, 10 pcs.	003Z4660
Insulation cap, DN 15	003Z4781
Insulation cap, DN 20	003Z4782
Insulation cap, DN 25	003Z4783
Insulation cap, DN 32	003Z4784
Insulation cap, DN 40	003Z4785
Insulation cap, DN 50	003Z4786

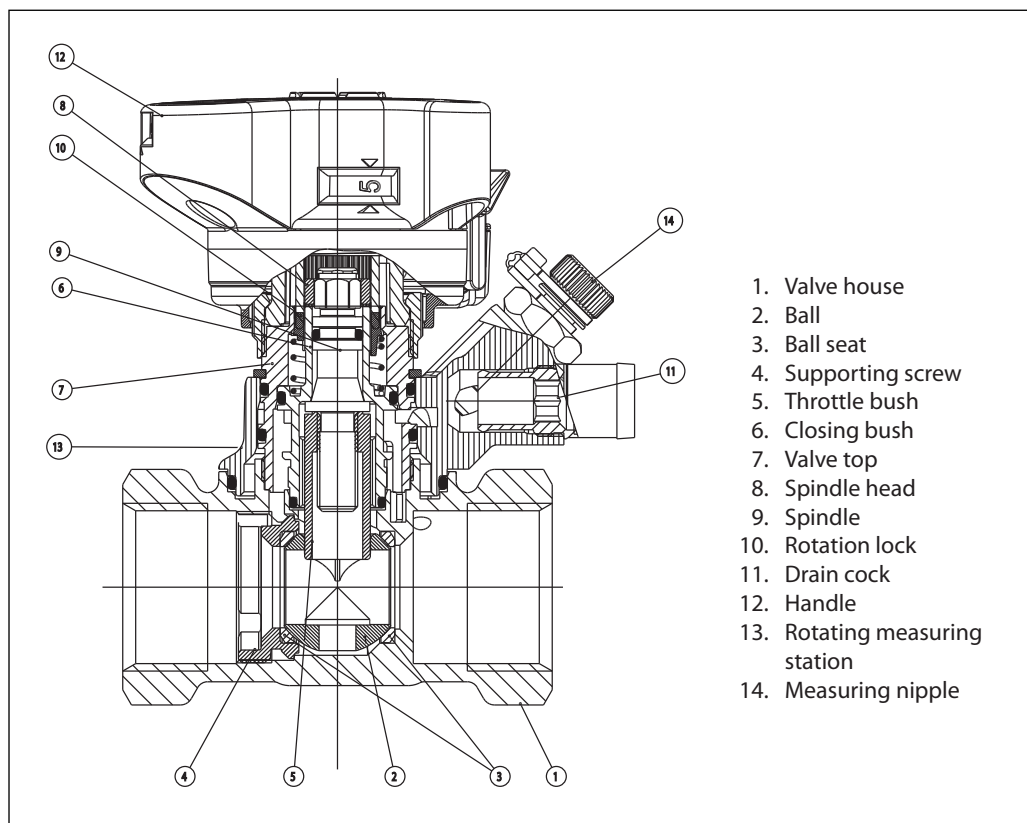
Compression fittings for valves with external thread

Pipe (mm)	Valve thread	PEX fittings, code no.	Alupex fittings, code no.
12 x 1.1	G 3/4	013G4150	
12 x 2	G 3/4	013G4152	013G4182
13 x 2	G 3/4	013G4153	
14 x 2	G 3/4	013G4154	013G4184
15 x 1.7	G 3/4	013G4165	
15 x 2.5	G 3/4	013G4155	013G4185
16 x 1.5	G 3/4	013G4157	
16 x 2	G 3/4	013G4156	013G4186
16 x 2.25	G 3/4		013G4187
17 x 2	G 3/4	013G4162	
18 x 2	G 3/4	013G4158	013G4188
18 x 2.5	G 3/4	013G4159	
20 x 2	G 3/4	013G4160	013G4190
20 x 2.5	G 3/4	013G4161	013G4191

Compression fittings for valves with external thread

Steel/copper pipes	Dimension	Code no.
	G 3/4 x 15	013G4125
	G 3/4 x 16	013G4126
	G 3/4 x 18	013G4128
	G 1 x 18	013U0134
	G 1 x 22	013U0135

Design



Technical data

*Materials and parts in contact with water*

Valve body	DZR brass
O-rings	EPDM
Ball	Brass/chromium plated
Ball sealing	Teflon

Max. static working pressure	20 bar
Static test pressure	30 bar
Max. differential pressure across valve	2.5 bar (250 kPa)
Max. flow temperature	120 °C
Min. temperature	-20°C
Cooling liquids	Ethylene glycol / propylene glycol and HYCOOL (max. 30 %)

**Fitting**

Before fitting the valve the installer must ensure that the pipe system is clean and:

1. the valve can be turned 360 degrees (if threaded pipe is used).
2. the valve is fitted according to the flow direction arrow.

**Removal of the handle**

1. Set the handle at 0 / 0.
2. Release the setting lock (green).
3. Unscrew the union nut.

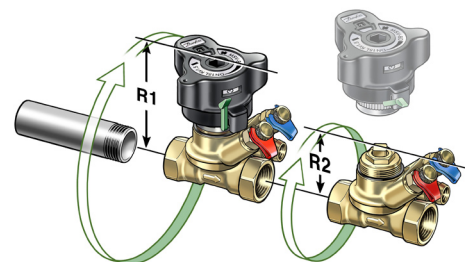
**Calibration of the handle**

Before refitting, ensure that the handle setting is 0 / 0.

**For DN 15 - 20 valves with external thread**

Danfoss offers a complete range of compression fittings for steel, copper and PEX pipes.

DN	R1/R2 (mm)
15	86/67
20	89/69
25	91/71
32	118/84
40	118/84
50	124/90



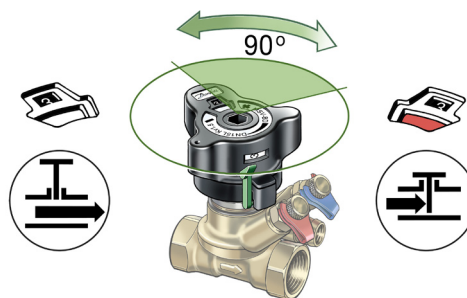
**Shut-off**

In order to shut-off the valve the handle must be pressed down.

The shut-off function features a ball valve, which only requires a 90 degree turn to shut the valve completely.

An indicator window shows the actual setting:

- red = closed
- white = open



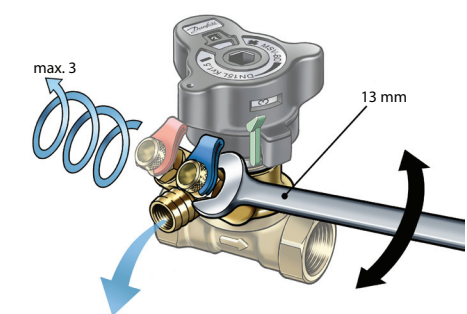
**Draining**

The drain cock can rotate 360 degrees for convenient operation.

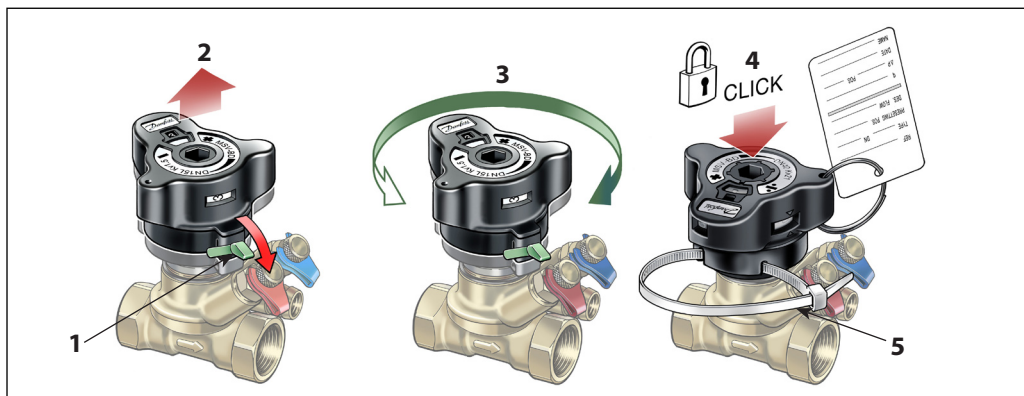
Draining the system pipes can be done selectively:

When the red measuring nipple is opened, the valve inlet pipe is drained.

Opening the blue nipple will drain the pipe on the valve outlet side.



Setting and locking



The valve has a built-in presetting feature for accurate flow ratings.

Setting the required flow is made in 5 steps:

1. In open position, release the lock using the green lever or a 3 mm Allen key.

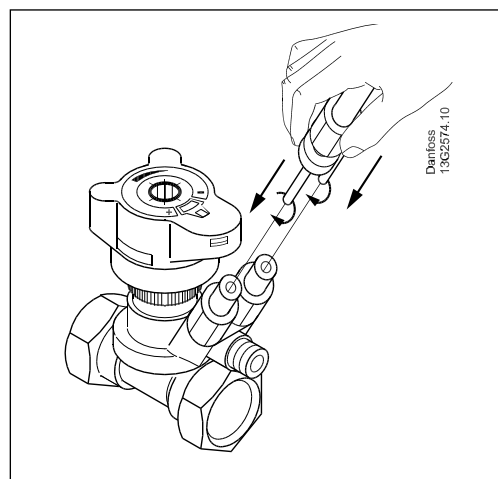
2. The handle pops up automatically.
3. The calculated value can now be set.
4. The setting is locked when the handle is pressed to click.
5. Seal - the setting can be protected by using a strip as shown.

Measuring

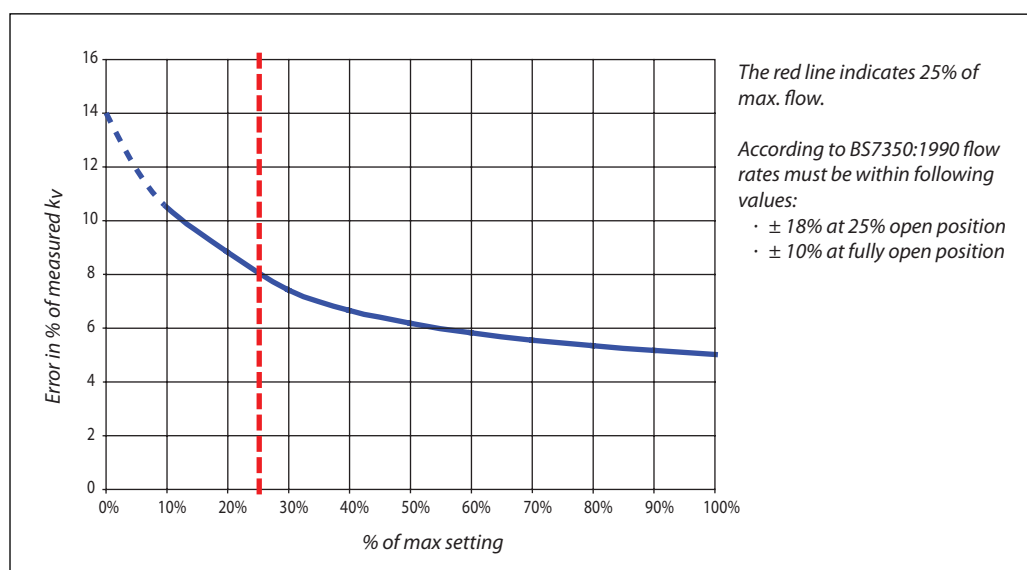
The flow through the LENO™ MSV-BD valve can be measured using Danfoss PFM 3000/4000 or other brands of measuring instruments. The LENO™ MSV-BD valve is supplied with two measuring nipples for 3 mm needles. A twin bracket enables the user to connect both needles simultaneously.

Procedure for flow measuring:

1. Select flow measuring
2. Select valve brand
3. Select valve type and dimension
4. Enter presetting
5. Connect valve and instrument
6. Calibrate static pressure
7. Measure the flow



Measuring accuracy



LENO™ MSV-BD is very accurate, due to the separate functions for presetting and shut-off.

**K<sub>v</sub>-signal**

k<sub>v</sub>-signal values are used for non-Danfoss measuring instruments. Danfoss PFM 3000\*/4000 have all data in memory, and the instruments are using this formula:

$$\Delta P_{val} = \Delta P_{sig} \left( \frac{k_{v-sig}}{k_{v-val}} \right)^2$$

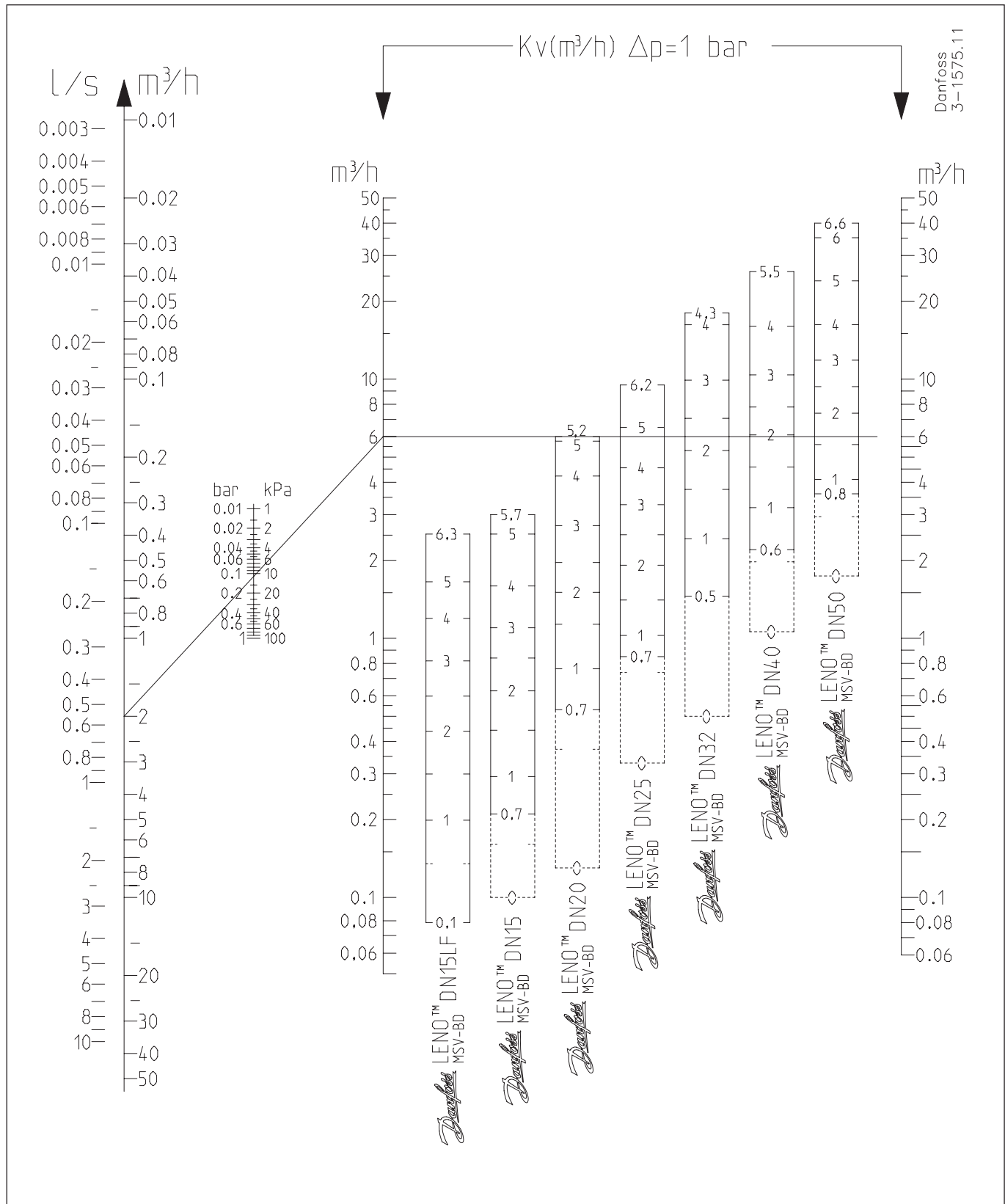
Δp across the measuring nipples (k<sub>v</sub>-sig) and Δp across the valve (k<sub>v</sub>-val) is not the same due to turbulence influence for pressure measuring.

\* with software 9.4 or higher.

**K<sub>v</sub>-signal values**

Setting	DN 15LF	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50
0.0	0.07	0.10	0.12	0.34	0.51	1.05	1.75
0.1	0.08	0.11	0.16	0.44	0.73	1.20	2.01
0.2	0.09	0.12	0.20	0.53	0.92	1.36	2.25
0.3	0.11	0.13	0.26	0.61	1.10	1.55	2.47
0.4	0.12	0.14	0.32	0.67	1.26	1.74	2.69
0.5	0.13	0.16	0.38	0.73	1.43	1.95	2.91
0.6	0.15	0.19	0.45	0.79	1.60	2.17	3.12
0.7	0.16	0.21	0.53	0.84	1.78	2.40	3.35
0.8	0.17	0.24	0.60	0.90	1.97	2.64	3.58
0.9	0.19	0.26	0.67	0.95	2.18	2.88	3.82
1.0	0.20	0.29	0.74	1.01	2.39	3.13	4.07
1.1	0.21	0.32	0.82	1.08	2.62	3.39	4.33
1.2	0.23	0.34	0.89	1.14	2.87	3.64	4.60
1.3	0.25	0.37	0.96	1.22	3.12	3.90	4.89
1.4	0.27	0.40	1.03	1.29	3.38	4.16	5.18
1.5	0.30	0.44	1.09	1.37	3.64	4.43	5.49
1.6	0.32	0.47	1.16	1.46	3.92	4.69	5.80
1.7	0.35	0.51	1.23	1.55	4.19	4.96	6.13
1.8	0.37	0.54	1.30	1.65	4.48	5.24	6.46
1.9	0.40	0.58	1.38	1.75	4.76	5.51	6.80
2.0	0.43	0.61	1.45	1.85	5.05	5.80	7.14
2.1	0.46	0.65	1.53	1.96	5.35	6.08	7.49
2.2	0.49	0.69	1.61	2.07	5.65	6.38	7.84
2.3	0.52	0.73	1.69	2.18	5.96	6.68	8.19
2.4	0.56	0.77	1.78	2.29	6.27	6.99	8.55
2.5	0.59	0.80	1.87	2.41	6.60	7.30	8.91
2.6	0.62	0.85	1.97	2.53	6.94	7.63	9.27
2.7	0.66	0.89	2.07	2.65	7.29	7.98	9.64
2.8	0.69	0.93	2.17	2.77	7.67	8.33	10.00
2.9	0.73	0.97	2.29	2.89	8.06	8.70	10.37
3.0	0.76	1.01	2.40	3.01	8.48	9.08	10.74
3.1	0.80	1.04	2.52	3.13	8.92	9.48	11.11
3.2	0.83	1.08	2.65	3.25	9.38	9.90	11.49
3.3	0.87	1.12	2.78	3.37	9.87	10.33	11.88
3.4	0.90	1.16	2.91	3.49	10.38	10.79	12.27
3.5	0.94	1.20	3.05	3.62	10.91	11.26	12.67
3.6	0.97	1.25	3.19	3.74	11.46	11.74	13.09
3.7	1.01	1.30	3.33	3.87	12.02	12.25	13.51
3.8	1.06	1.35	3.47	4.00	12.58	12.77	13.95
3.9	1.10	1.41	3.61	4.13	13.12	13.30	14.41
4.0	1.14	1.47	3.75	4.26	13.64	13.85	14.88
4.1	1.18	1.53	3.89	4.39	14.12	14.41	15.38
4.2	1.23	1.59	4.02	4.53	14.52	14.98	15.89
4.3	1.27	1.66	4.15	4.68	14.84	15.55	16.44
4.4	1.31	1.73	4.28	4.82		16.13	17.00
4.5	1.35	1.81	4.40	4.98		16.69	17.59
4.6	1.39	1.91	4.52	5.13		17.25	18.21
4.7	1.43	2.00	4.62	5.29		17.80	18.86
4.8	1.47	2.08	4.72	5.46		18.32	19.54
4.9	1.51	2.16	4.82	5.64		18.80	20.24
5-0	1.54	2.23	4.90	5.81		19.25	20.97
5.1	1.60	2.30	4.97	6.00		19.65	21.73
5.2	1.66	2.36	5.04	6.19		19.98	22.51
5.3	1.72	2.41		6.38		20.24	23.30
5.4	1.79	2.46		6.57		20.41	24.12
5.5	1.87	2.50		6.77		20.48	24.94
5.6	1.93	2.54		6.96			25.76
5.7	1.99	2.57		7.15			26.58
5.8	2.04			7.34			27.38
5.9	2.09			7.52			28.16
6.0	2.14			7.69			28.90
6.1	2.18			7.85			29.59
6.2	2.22			7.98			30.21
6.3	2.26			8.09			30.74
6.4				8.17			31.17
6.5				8.22			31.47
6.6							31.61

Sizing





Correction factors

Temp. °C	Correction factors, ethylene glycol / propylene glycol percentage (max. 30 %)						
	25	30	40	50	60	65	100
-40.0	<sup>1)</sup>	<sup>1)</sup>	<sup>1)</sup>	<sup>1)</sup>	0.89	0.88	<sup>1)</sup>
-17.8	<sup>1)</sup>	<sup>1)</sup>	0.93	0.91	0.90	0.89	0.86
4.4	0.95	0.95	0.93	0.92	0.91	0.90	0.87
26.6	0.96	0.95	0.94	0.93	0.92	0.91	0.88
48.9	0.97	0.96	0.95	0.94	0.93	0.92	0.90
71.1	0.98	0.98	0.96	0.95	0.94	0.94	0.95
93.3	1.00	0.99	0.97	0.96	0.95	0.95	0.92
115.6	<sup>2)</sup>	<sup>2)</sup>	<sup>2)</sup>	<sup>2)</sup>	<sup>2)</sup>	<sup>2)</sup>	0.94

<sup>1)</sup> Below freezing point

<sup>2)</sup> Above boiling point

**Example:** Flow needed = 30 m<sup>3</sup>/h  
 Flow after correction:  
 30 x 0.95 = 28 m<sup>3</sup>/h

Valve size and presetting

Example:

Given Max. pipe flow Q = 2.0 m<sup>3</sup>/h  
 $\Delta p_r = 15 \text{ kPa}$   
 $\Delta p_a = 45 \text{ kPa}$   
 $\Delta p_m = 10 \text{ kPa}$   
 $\Delta p_i = \Delta p_a - \Delta p_v - \Delta p_m$   
 $\Delta p_i = 45 \text{ kPa} - 15 \text{ kPa} - 10 \text{ kPa} = 20 \text{ kPa}$

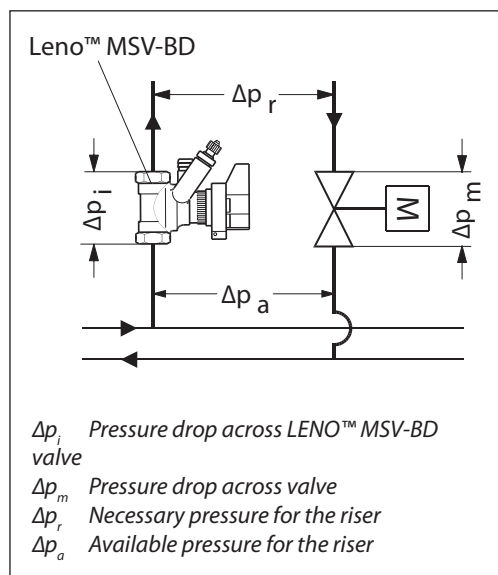
Correct valve size and presetting is found in flow diagramme, page 7.  
 Q = 2.0 m<sup>3</sup>/h and  $\Delta p_i = 20 \text{ kPa}$

On page 11 intersect guides and presetting is found to be 4.2 (DN 20 valve)

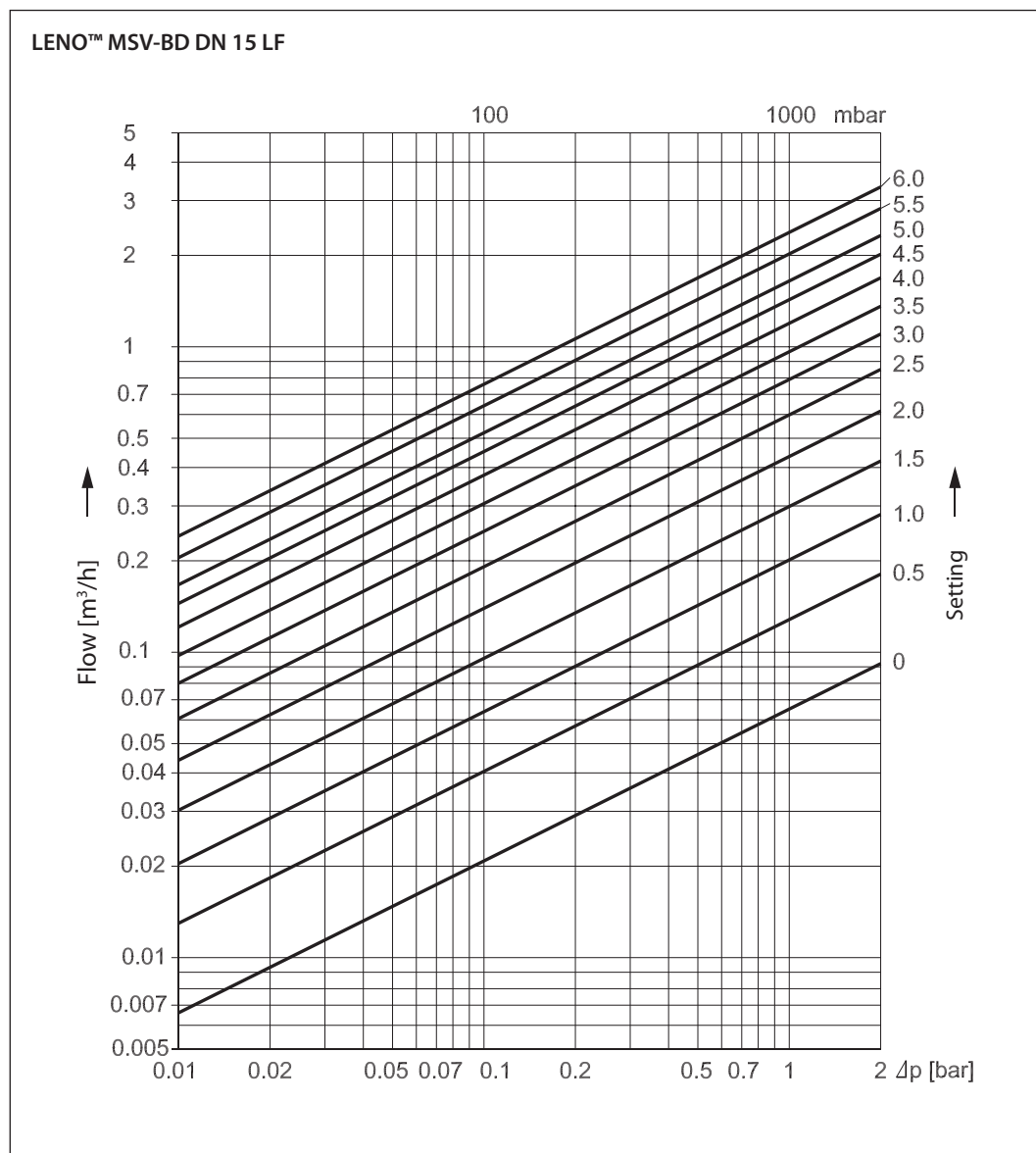
Setting can be also calculated from the formula:

$$k_v = \frac{Q[\text{m}^3/\text{h}]}{\sqrt{\Delta p_i[\text{bar}]}} = \frac{2.0}{\sqrt{0.20}} = 4.5 \text{ m}^3/\text{h}$$

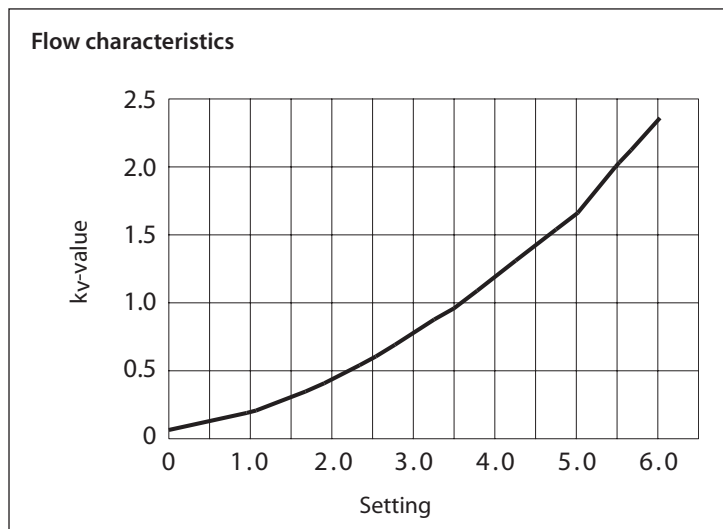
which corresponds to presetting 4.2 as shown on pages 7 and 11.



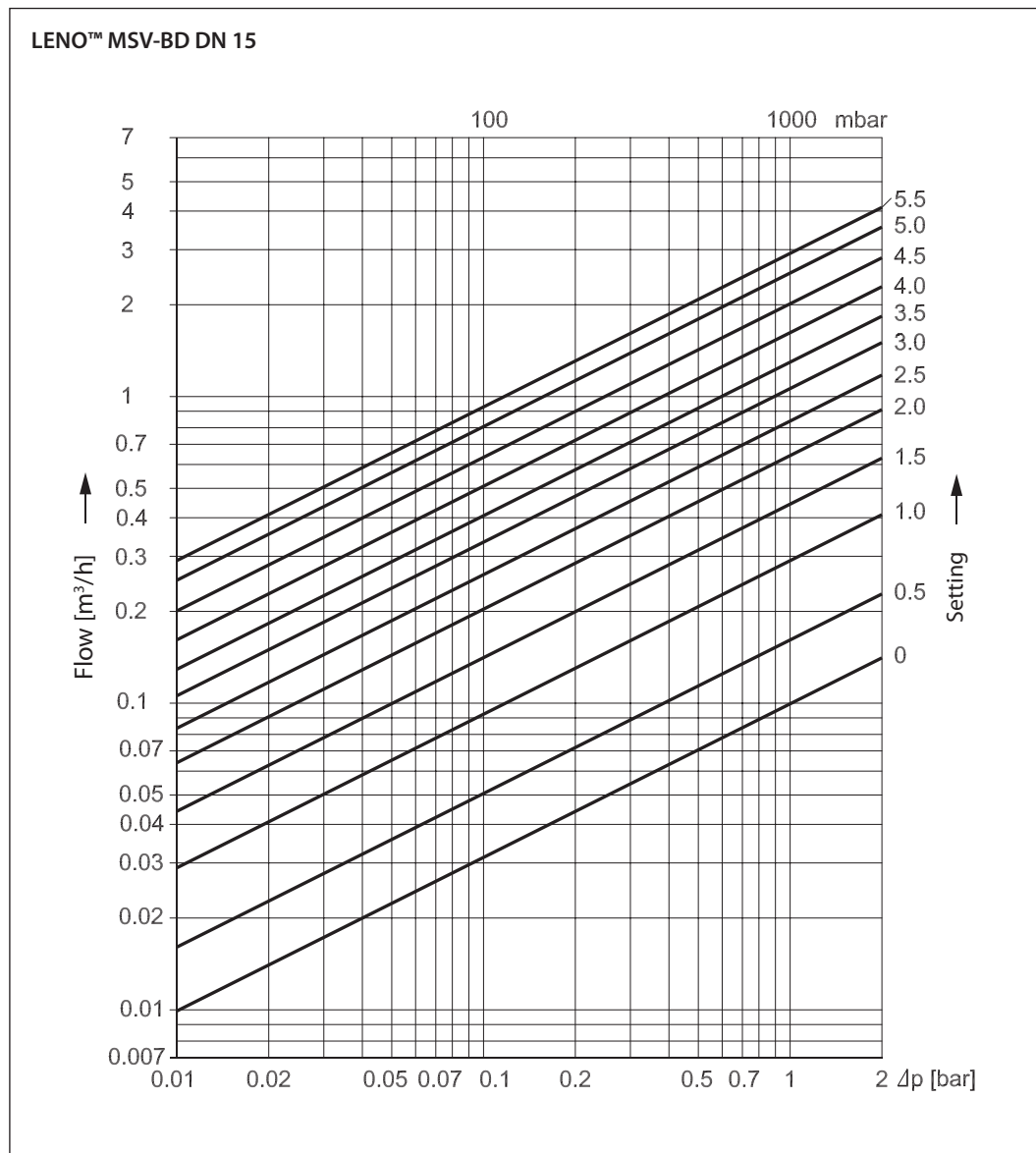
Flow diagrammes, DN 15 LF



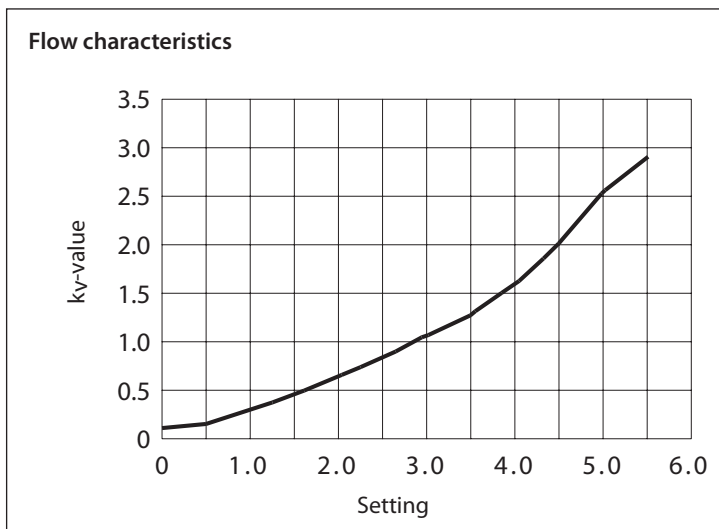
Setting	k <sub>v</sub> -value
0.0	0.07
0.1	0.08
0.2	0.09
0.3	0.11
0.4	0.12
0.5	0.13
0.6	0.15
0.7	0.16
0.8	0.17
0.9	0.19
1.0	0.20
1.1	0.22
1.2	0.23
1.3	0.25
1.4	0.28
1.5	0.30
1.6	0.32
1.7	0.35
1.8	0.38
1.9	0.41
2.0	0.44
2.1	0.47
2.2	0.50
2.3	0.53
2.4	0.56
2.5	0.60
2.6	0.63
2.7	0.67
2.8	0.71
2.9	0.74
3.0	0.78
3.1	0.82
3.2	0.86
3.3	0.89
3.4	0.93
3.5	0.97
3.6	1.01
3.7	1.05
3.8	1.10
3.9	1.15
4.0	1.19
4.1	1.24
4.2	1.29
4.3	1.33
4.4	1.38
4.5	1.43
4.6	1.48
4.7	1.52
4.8	1.56
4.9	1.61
5.0	1.65
5.1	1.72
5.2	1.78
5.3	1.86
5.4	1.94
5.5	2.03
5.6	2.10
5.7	2.17
5.8	2.23
5.9	2.30
6.0	2.36
6.1	2.42
6.2	2.47
6.3	2.53



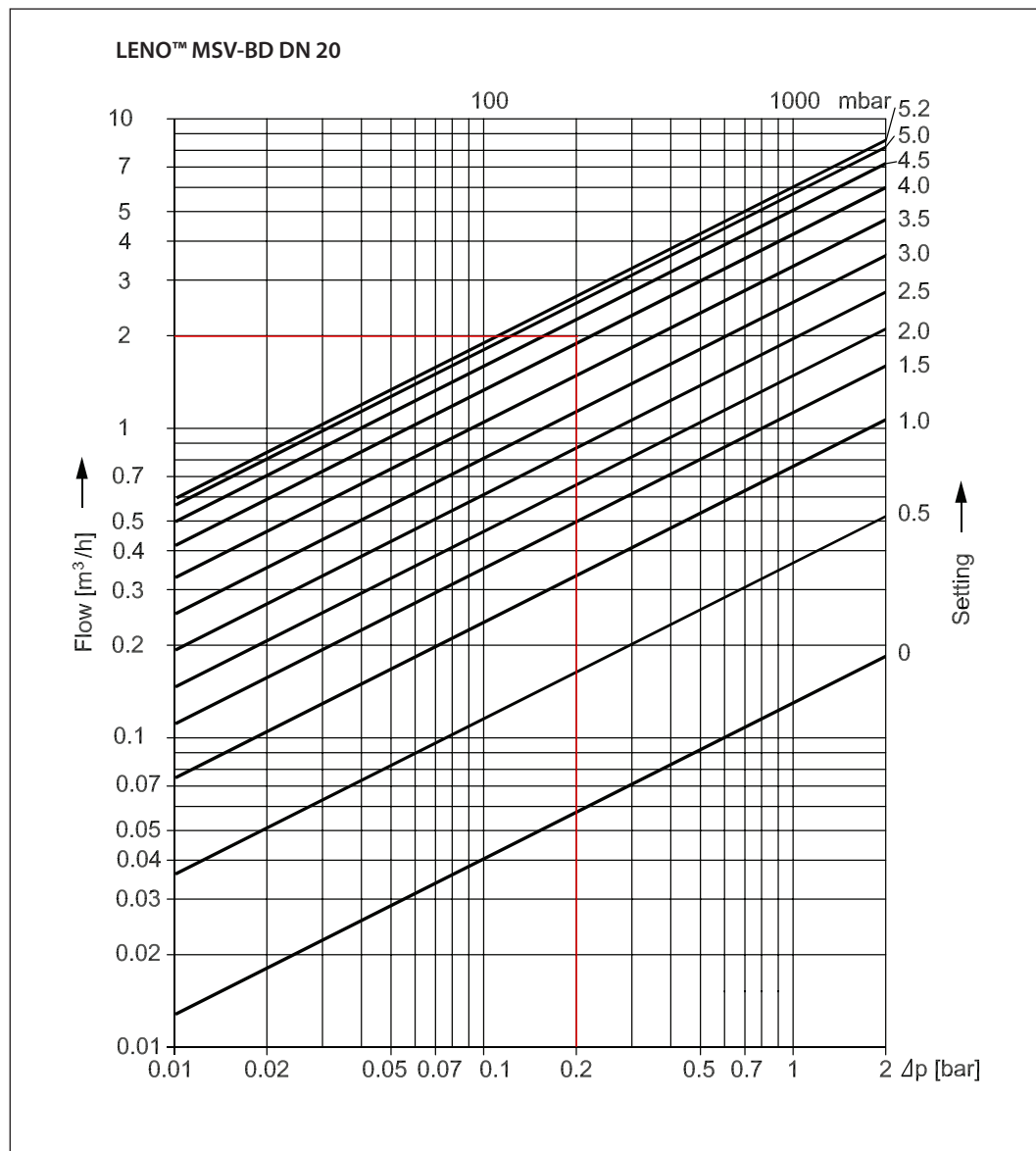
Flow diagrammes, DN 15



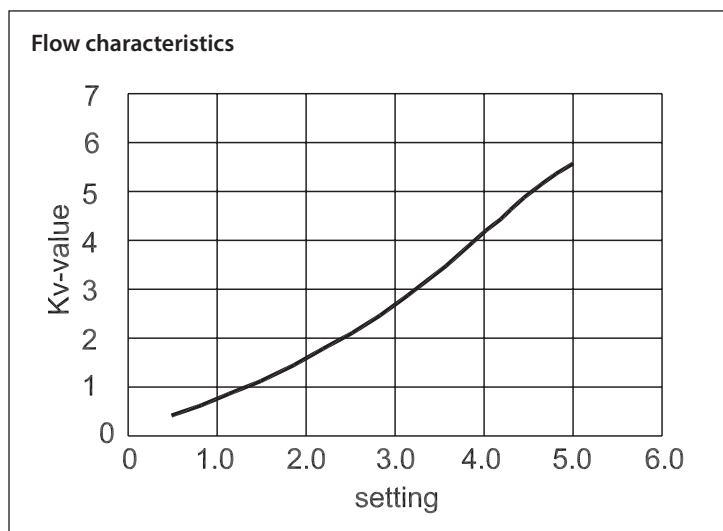
Setting	k <sub>v</sub> -value
0.0	0.10
0.1	0.11
0.2	0.12
0.3	0.13
0.4	0.14
0.5	0.16
0.6	0.19
0.7	0.21
0.8	0.24
0.9	0.27
1.0	0.29
1.1	0.32
1.2	0.35
1.3	0.38
1.4	0.41
1.5	0.44
1.6	0.48
1.7	0.51
1.8	0.55
1.9	0.59
2.0	0.63
2.1	0.67
2.2	0.71
2.3	0.75
2.4	0.80
2.5	0.84
2.6	0.88
2.7	0.93
2.8	0.97
2.9	1.02
3.0	1.06
3.1	1.10
3.2	1.14
3.3	1.19
3.4	1.23
3.5	1.28
3.6	1.34
3.7	1.40
3.8	1.46
3.9	1.52
4.0	1.59
4.1	1.66
4.2	1.74
4.3	1.82
4.4	1.91
4.5	2.00
4.6	2.12
4.7	2.23
4.8	2.33
4.9	2.43
5.0	2.53
5.1	2.61
5.2	2.70
5.3	2.77
5.4	2.84
5.5	2.90
5.6	2.95
5.7	3.00



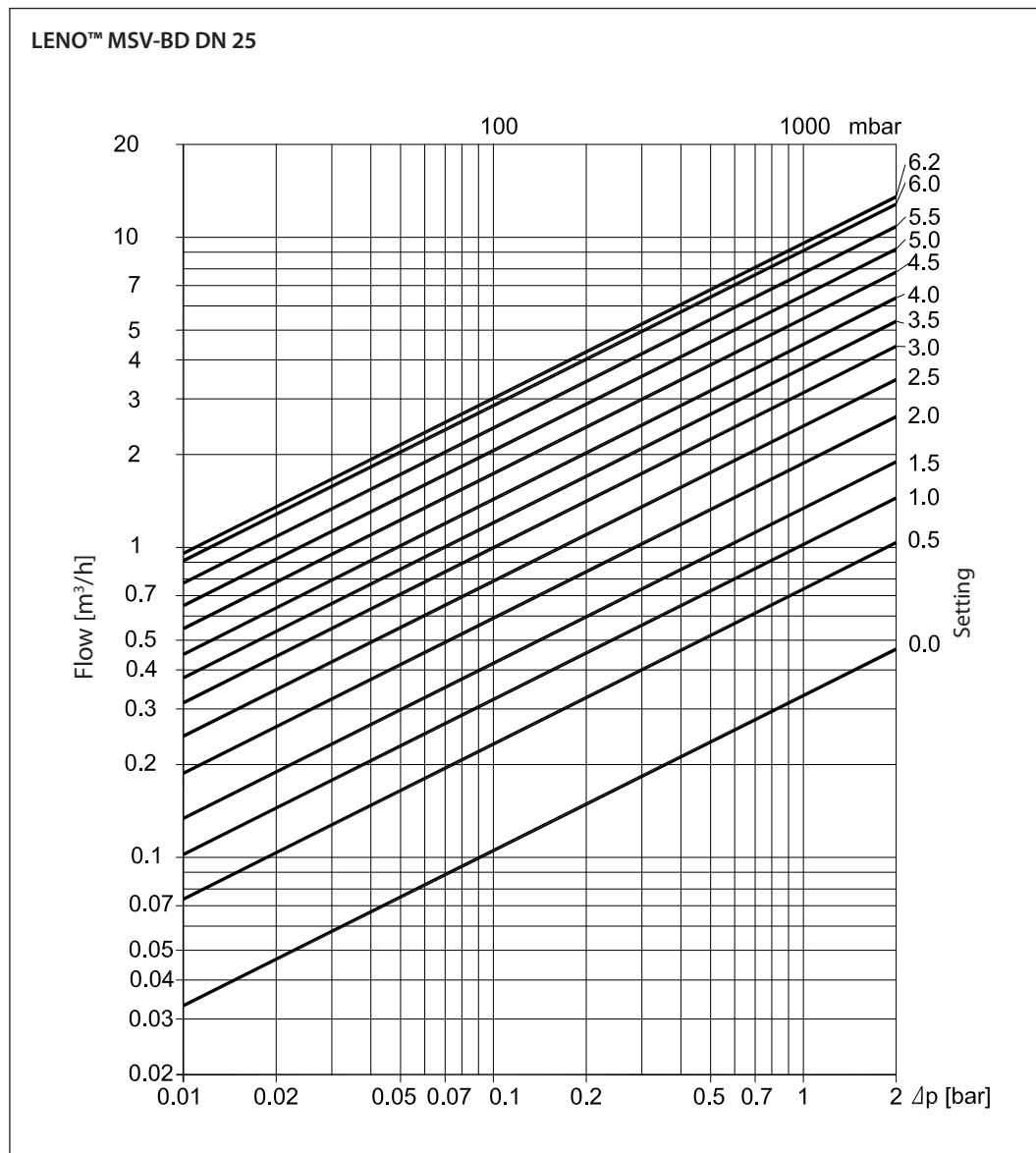
Flow diagrammes, DN 20



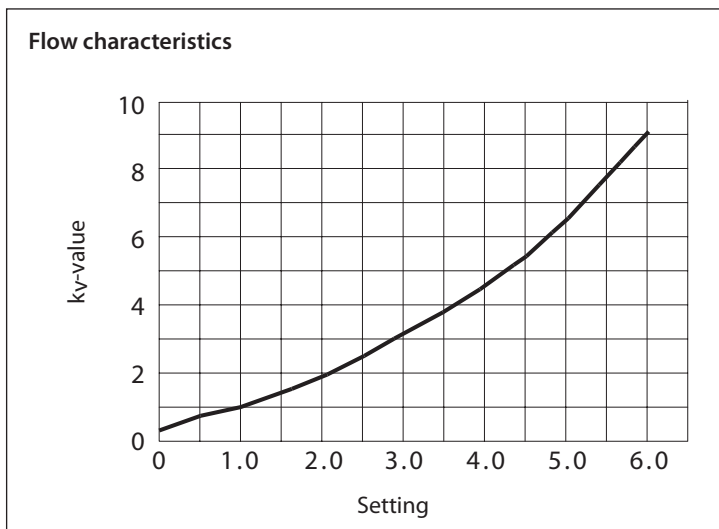
Setting	$k_v$ -value
0.0	0.13
0.1	0.15
0.2	0.19
0.3	0.24
0.4	0.30
0.5	0.37
0.6	0.45
0.7	0.53
0.8	0.61
0.9	0.68
1.0	0.76
1.1	0.84
1.2	0.92
1.3	0.99
1.4	1.06
1.5	1.13
1.6	1.21
1.7	1.28
1.8	1.35
1.9	1.43
2.0	1.50
2.1	1.59
2.2	1.67
2.3	1.76
2.4	1.86
2.5	1.96
2.6	2.07
2.7	2.19
2.8	2.31
2.9	2.44
3.0	2.58
3.1	2.72
3.2	2.87
3.3	3.03
3.4	3.19
3.5	3.36
3.6	3.53
3.7	3.70
3.8	3.87
3.9	4.05
4.0	4.23
4.1	4.40
4.2	4.58
4.3	4.75
4.4	4.91
4.5	5.07
4.6	5.22
4.7	5.37
4.8	5.51
4.9	5.64
5.0	5.77
5.1	5.88
5.2	6.00



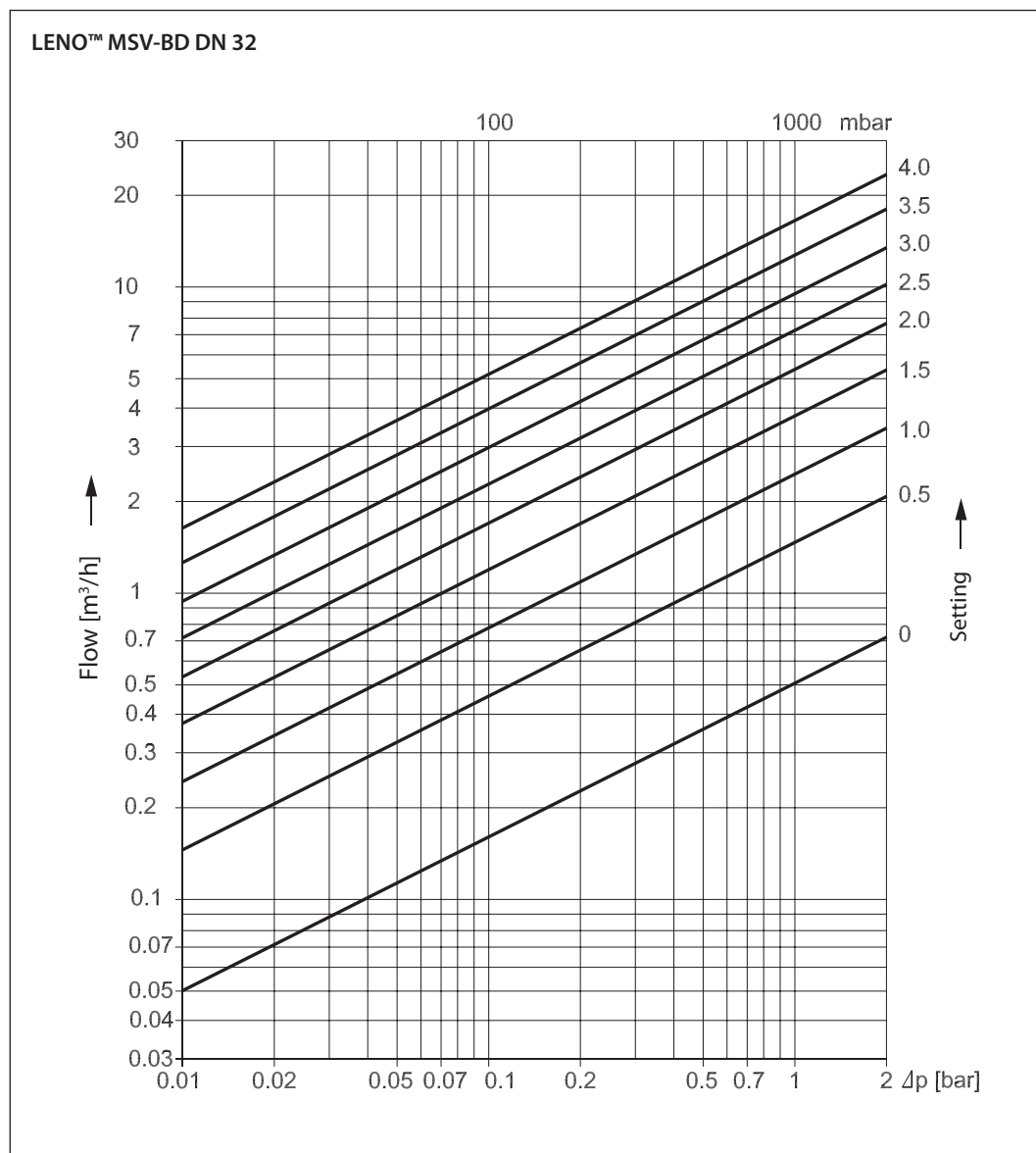
Flow diagrammes, DN 25



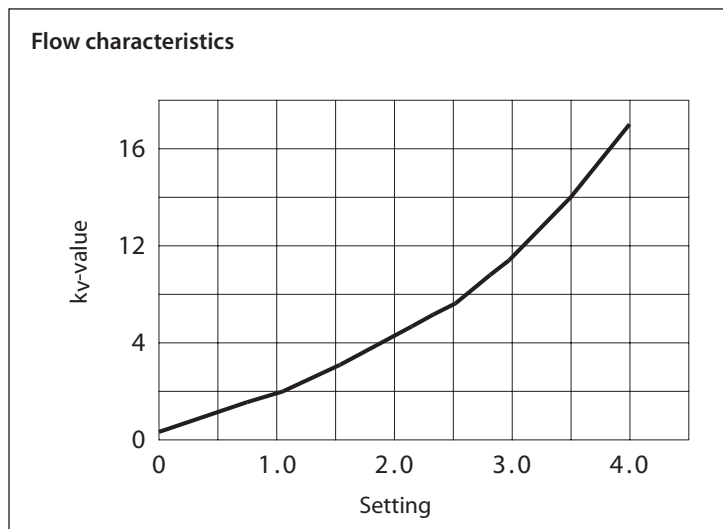
Setting	k <sub>v</sub> -value
0.0	0.33
0.1	0.44
0.2	0.53
0.3	0.61
0.4	0.68
0.5	0.74
0.6	0.79
0.7	0.85
0.8	0.91
0.9	0.96
1.0	1.03
1.1	1.09
1.2	1.16
1.3	1.24
1.4	1.32
1.5	1.41
1.6	1.50
1.7	1.60
1.8	1.70
1.9	1.80
2.0	1.91
2.1	2.03
2.2	2.15
2.3	2.26
2.4	2.39
2.5	2.51
2.6	2.64
2.7	2.76
2.8	2.89
2.9	3.02
3.0	3.15
3.1	3.28
3.2	3.41
3.3	3.54
3.4	3.68
3.5	3.81
3.6	3.95
3.7	4.09
3.8	4.24
3.9	4.39
4.0	4.55
4.1	4.71
4.2	4.88
4.3	5.05
4.4	5.23
4.5	5.42
4.6	5.62
4.7	5.83
4.8	6.05
4.9	6.27
5.0	6.51
5.1	6.75
5.2	7.00
5.3	7.26
5.4	7.53
5.5	7.80
5.6	8.06
5.7	8.33
5.8	8.59
5.9	8.84
6.0	9.08
6.1	9.30
6.2	9.50



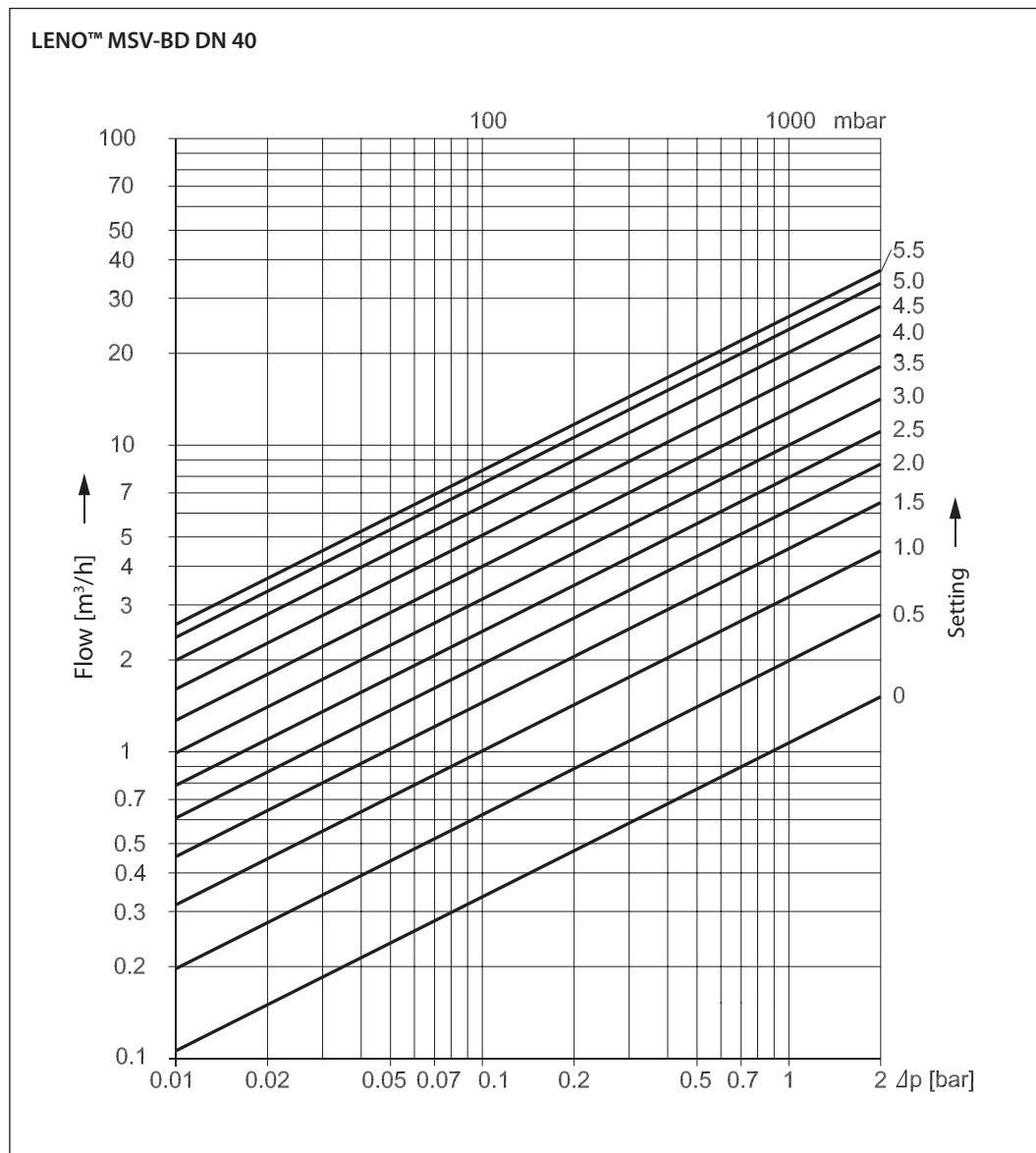
Flow diagrammes, DN 32



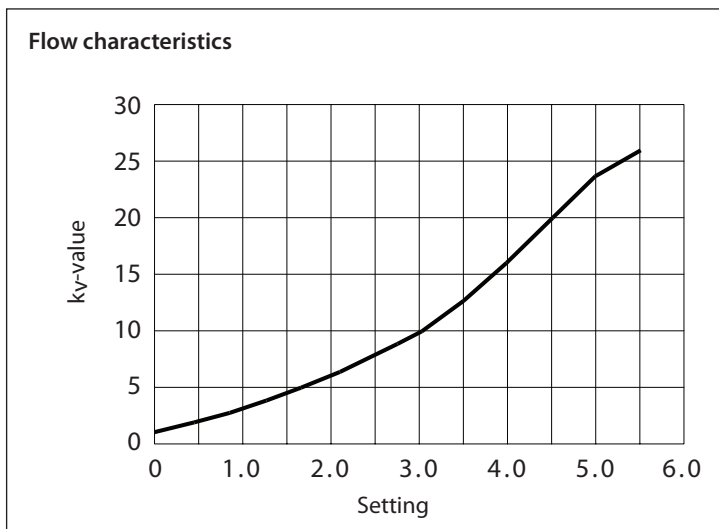
Setting	$k_v$ -value
0.0	0.50
0.1	0.75
0.2	0.95
0.3	1.13
0.4	1.29
0.5	1.45
0.6	1.62
0.7	1.80
0.8	1.99
0.9	2.20
1.0	2.42
1.1	2.66
1.2	2.92
1.3	3.19
1.4	3.47
1.5	3.75
1.6	4.05
1.7	4.36
1.8	4.67
1.9	4.98
2.0	5.30
2.1	5.63
2.2	5.97
2.3	6.32
2.4	6.68
2.5	7.06
2.6	7.46
2.7	7.89
2.8	8.34
2.9	8.83
3.0	9.35
3.1	9.92
3.2	10.52
3.3	11.16
3.4	11.85
3.5	12.51
3.6	13.23
3.7	13.98
3.8	14.74
3.9	15.49
4.0	16.23
4.1	16.91
4.2	17.51
4.3	18.00



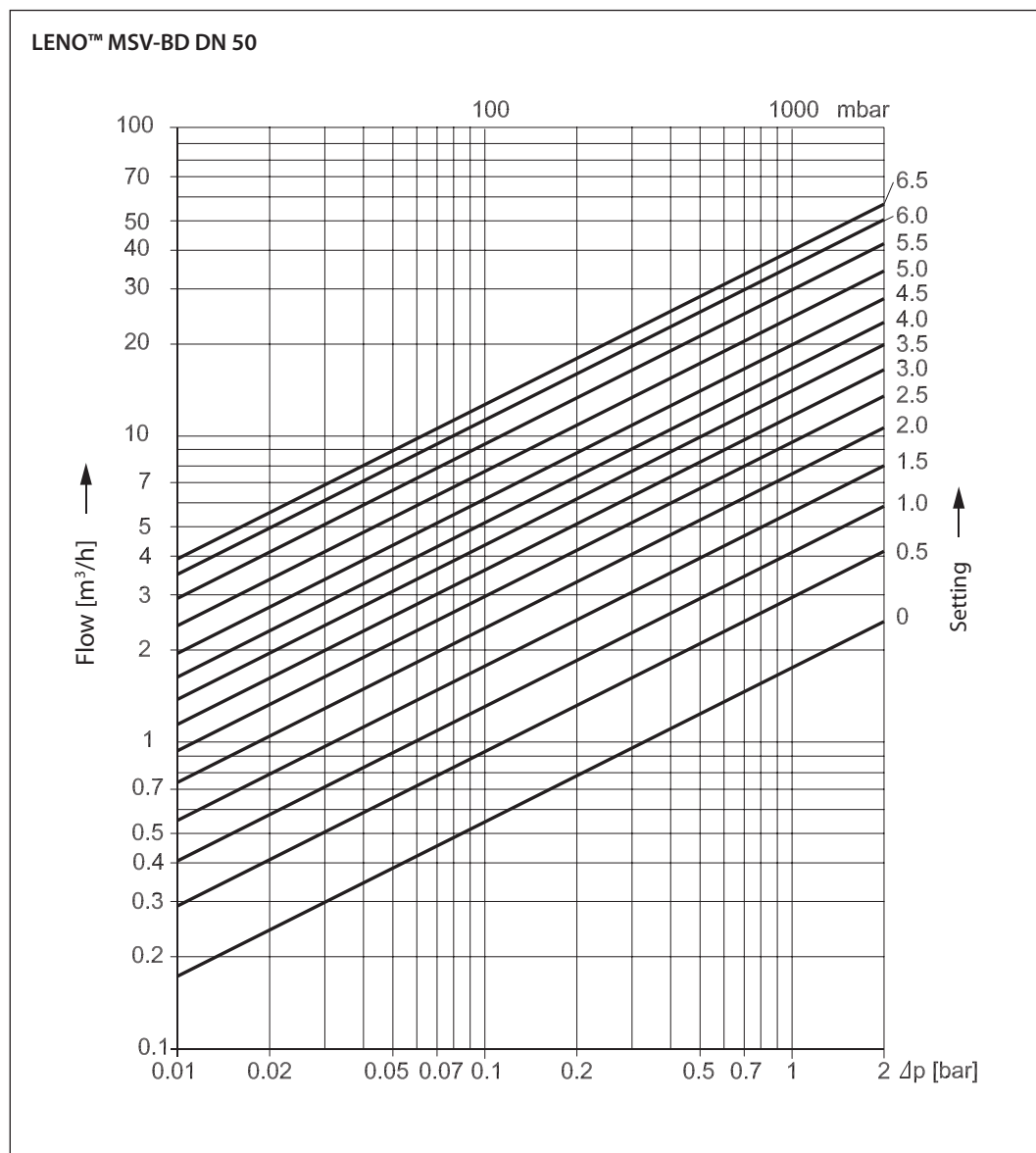
Flow diagrammes, DN 40



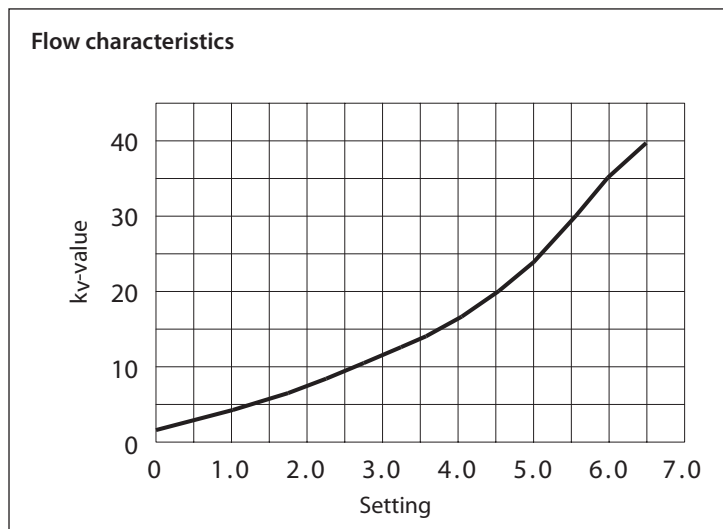
Setting	k <sub>v</sub> -value
0.0	1.06
0.1	1.21
0.2	1.38
0.3	1.56
0.4	1.76
0.5	1.97
0.6	2.20
0.7	2.43
0.8	2.68
0.9	2.93
1.0	3.19
1.1	3.46
1.2	3.73
1.3	4.01
1.4	4.29
1.5	4.58
1.6	4.87
1.7	5.17
1.8	5.47
1.9	5.78
2.0	6.09
2.1	6.41
2.2	6.74
2.3	7.09
2.4	7.44
2.5	7.80
2.6	8.18
2.7	8.58
2.8	9.00
2.9	9.44
3.0	9.90
3.1	10.38
3.2	10.89
3.3	11.43
3.4	12.00
3.5	12.60
3.6	13.22
3.7	13.88
3.8	14.56
3.9	15.28
4.0	16.02
4.1	16.79
4.2	17.57
4.3	18.38
4.4	19.19
4.5	20.02
4.6	20.82
4.7	21.61
4.8	22.38
4.9	23.12
5.0	23.81
5.1	24.44
5.2	25.00
5.3	25.46
5.4	25.80
5.5	26.00



Flow diagrammes, DN 50

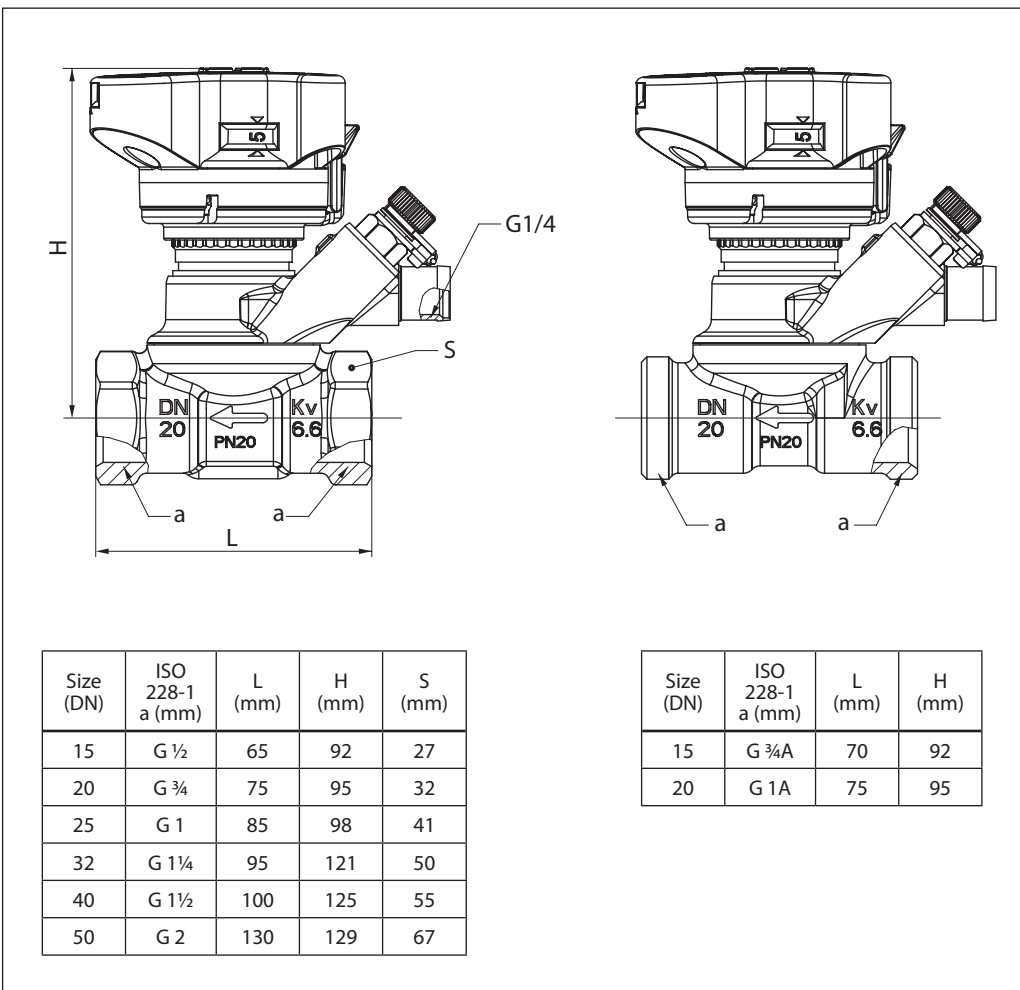


Setting	k <sub>v</sub> -value
0.0	1.74
0.1	2.03
0.2	2.28
0.3	2.51
0.4	2.73
0.5	2.95
0.6	3.16
0.7	3.38
0.8	3.61
0.9	3.85
1.0	4.10
1.1	4.37
1.2	4.65
1.3	4.95
1.4	5.26
1.5	5.59
1.6	5.93
1.7	6.28
1.8	6.64
1.9	7.01
2.0	7.39
2.1	7.78
2.2	8.17
2.3	8.56
2.4	8.96
2.5	9.36
2.6	9.76
2.7	10.17
2.8	10.58
2.9	10.99
3.0	11.41
3.1	11.84
3.2	12.27
3.3	12.71
3.4	13.16
3.5	13.62
3.6	14.10
3.7	14.60
3.8	15.12
3.9	15.66
4.0	16.23
4.1	16.84
4.2	17.47
4.3	18.14
4.4	18.84
4.5	19.59
4.6	20.38
4.7	21.21
4.8	22.08
4.9	23.00
5.0	23.96
5.1	24.96
5.2	26.00
5.3	27.07
5.4	28.17
5.5	29.30
5.6	30.44
5.7	31.64
5.8	32.83
5.9	34.01
6.0	35.14
6.1	36.23
6.2	37.24
6.3	38.14
6.4	38.93
6.5	39.56
6.6	40.00





Dimensions



**Tender specifications**

*LENO™ MSV –BD can be used in heating, cooling and domestic hot water systems.*

<b>Features</b>	<b>LENO™ MSV-BD</b>
Balancing / Commissioning	•
Presetting	•
Fixed orifice	
Self sealing measuring nipples	•
Digital visible scale from more sides	•
Shut-off function (ball valve)	•
Draining / filling	•
Draining / filling on both sides of the valve	•
Removable handle	•
Closing indicator	•
Allen key for ball valve	•
Parallel measuring nipples	•
360° rotating measuring station (drain cock and measuring nipples)	•

*Presetting values are visible on top of the valve and from all sides.*

*Presetting is locked by pressing down the handle. When locked, the shut-off function can be used without changing the presetting.*

*The handle is released with the green key or with a 3 mm Allen key.*

*To prevent unintended changes of the presetting, the handle can be sealed by using a strip.*

*The system can be drained and filled on both sides of the ball valve.*

*External thread versions comes in sizes DN 15 and DN 20 and are prepared for Danfoss standard fittings. DN 15 is designed with Euro cone, according to DIN V 3838.*

*LENO™ MSV-BD has a leakage rate A according to BS 7350 : 1990, the ball valve is 100% tight.*

*The LENO™ MSV-BD measuring accuracy is 8% up to 25% of max. setting.*

*Accuracy is according to BS 7350 : 1990.*

*Measuring instruments must be equipped with 3 mm measuring needles. Danfoss measuring instruments PFM 3000/4000 contain all relevant valve data.*

*Valve sizes ..... DN 15 (LF) – DN 50*

*Pressure class .....PN20*

*Static test pressure .....30 bar*

*Working temperature ..... -20°C to 120°C*

*Working area ..... 10-100% of the  $k_{VS}$ -value*

*The valve body is made of DZR brass.*

*The ball is made of chromium plated brass.*

*O-rings are made of EPDM rubber.*

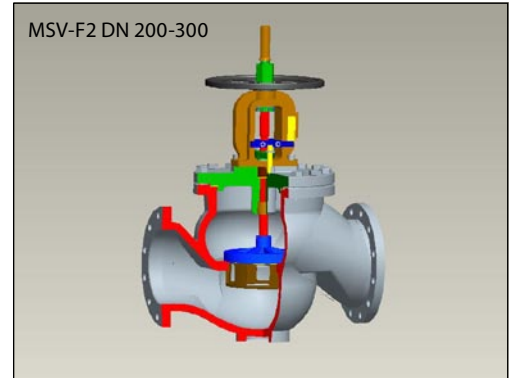
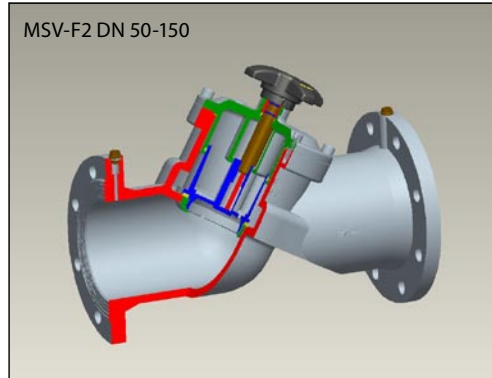




## Data sheet

# Manual presetting valves MSV-F2, PN 16/25, DN 50 - 300

### Description



MSV-F2 valves are manual presetting valves. They are used for balancing the flow in heating and cooling installations.

The valves have position indicator and stroke limiter as standard. Hood of spindle is integrated with stroke limiter.

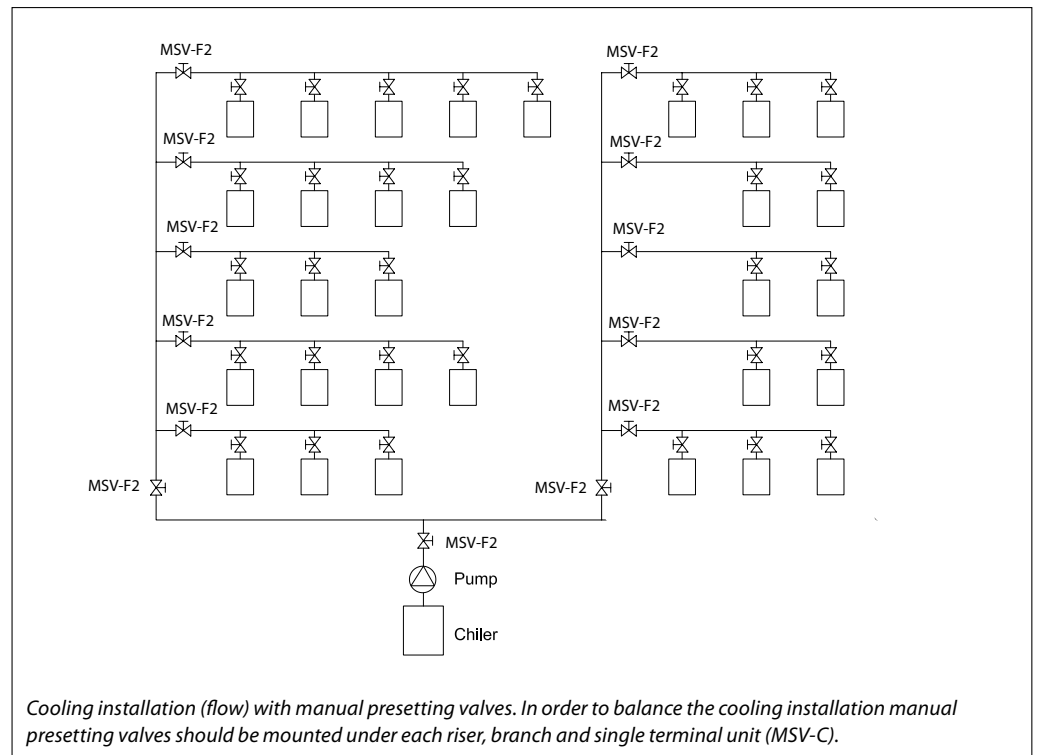
Setting can be locked. Valve characteristics are set up in measuring unit PFM.

Valves are free of asbestos.

### Main data:

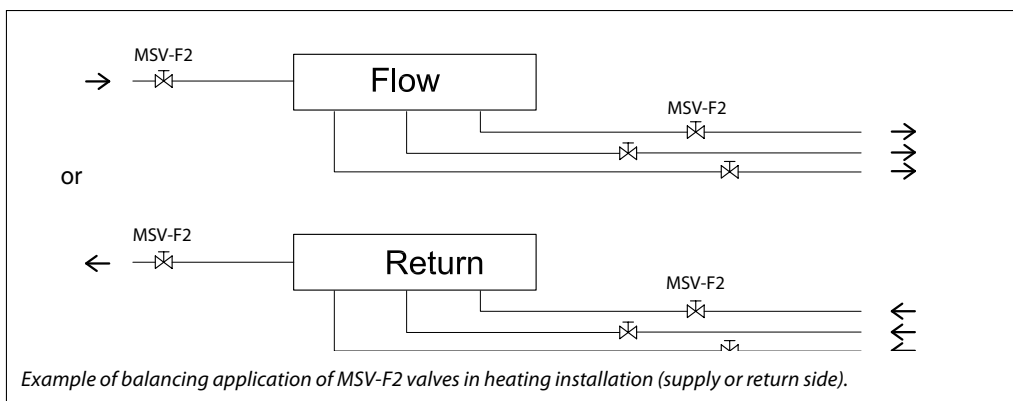
- DN 50 - 300
- PN 16
  - Flow temperature -10 °C ... 130 °C
- PN 25 (available after June 2006)
  - Flow temperature -10 °C ... 150 °C
- Valves are mounted on flow or return pipe.

### Applications



Cooling installation (flow) with manual presetting valves. In order to balance the cooling installation manual presetting valves should be mounted under each riser, branch and single terminal unit (MSV-C).

Applications (continuous)



In constant flow installations MSV valves keeps constant pressure drop. Its value may be set on several levels depending on presetting.

Ordering

MSV-F2 valves - PN 16

Picture	DN mm	$k_{vs}$ m <sup>3</sup> /h	T <sub>max.</sub> °C	PN	Code No.
	50	53.8	130	16	003Z0161
	65	93.4			003Z0162
	80	122.3			003Z0163
	100	200.0			003Z0164
	125	304.4			003Z0165
	150	400.8			003Z0166
	200	685.6	130	16	003Z0167
	250	952.3			003Z0168
	300	1380.2			003Z0169

MSV-F2 valves - PN 25\*

Picture	DN mm	$k_{vs}$ m <sup>3</sup> /h	T <sub>max.</sub> °C	PN	Code No.
	50	53.8	150	25	003Z0170
	65	93.4			003Z0171
	80	122.3			003Z0172
	100	200.0			003Z0173
	125	304.4			003Z0174
	150	400.8			003Z0175
	200	685.6	150	25	003Z0176
	250	952.3			003Z0177
	300	1380.2			003Z0178

\* available after June 2006

Note: Flange valves dimension DN 15-40, 350 and 400 available on request.

**Ordering (continuous)**
**Accessories**

Type	Code No.	
Rectus nipple, 2 pcs.	<b>003Z0108</b>	
Needle nipple, 2 pcs.	<b>003Z0104</b>	
Extension of measuring nipple 45 mm, 2 pcs.	<b>003Z0103</b>	
Extension of measuring nipple 80 mm, 2 pcs.	<b>003Z0105</b>	
Measuring needle, 2 pcs.	<b>003Z0107</b>	
PFM 3000 measuring unit	<b>003L8230</b>	
Hand-wheel	DN 50	<b>003Z0179</b>
	DN 65 - 150	<b>003Z0180</b>

**Technical data**
**MSV-F2 valves - PN 16**

Nominal diameter	DN	50	65	80	100	125	150	200	250	300
$k_{vs}$	(m <sup>3</sup> /h)	53.8	93.4	122.3	200.0	304.4	400.8	685.6	952.3	1380.2
Nominal pressure	(PN)	16								
Max. pressure drop	(bar)	1.5								
Leakage rate		According to ISO 5208, Table 5								
Water quality acc. to DIN 3440		Water in heating and cooling systems								
Max. flow temperature	(°C)	130								
Connections		Flanges according to EN 1092-2								
Weight	(kg)	10	16	20	29	42	54	196	358	464
Material of body		Cast iron EN-GJL 250 (GG 25)								
Seat sealing		EPDM	PTFE							
Material of cone		CW602N		CuSn5Zn5Pb5				Casted stainless steel		

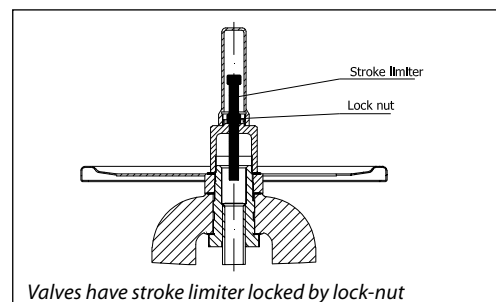
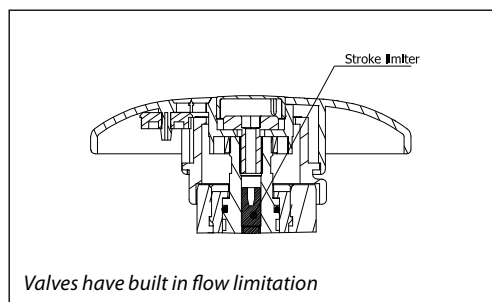
**MSV-F2 valves - PN 25\***

Nominal diameter	DN	50	65	80	100	125	150	200	250	300
$k_{vs}$	(m <sup>3</sup> /h)	53.8	93.4	122.3	200.0	304.4	400.8	685.6	952.3	1380.2
Nominal pressure	(PN)	25								
Max. pressure drop	(bar)	2.0								
Leakage rate		According to ISO 5208, Table 5								
Water quality acc. to DIN 3440		Water in heating and cooling systems								
Max. flow temperature	(°C)	150								
Connections		Flanges according to EN 1092-2								
Weight	(kg)	10	16	20	29	42	54	196	358	464
Material of body		Ductile iron EN-GJS 400-15 (GGG 40.3)								
Seat sealing		PTFE								
Material of cone		Stainless steel							Casted stainless steel	

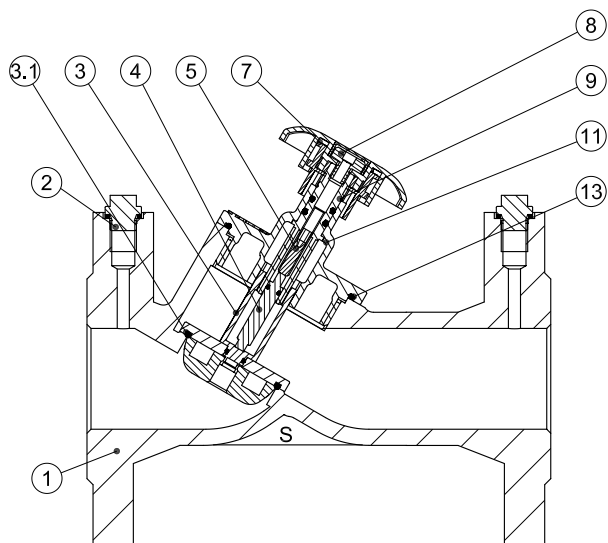
\* available after June 2006

**Pressure-temperature classification (flanges according to EN 1092-2)**

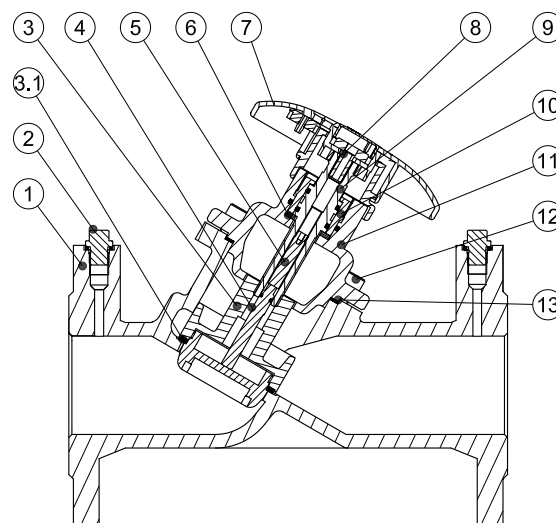
Material	PN	Temperature			
		-10 °C	120 °C	130 °C	150 °C
EN-GJL 250 (MSV-F2 DN 50-150)	16	16 bar	16 bar	15.5 bar	-
EN-GJL 250 (MSV-F2 DN 200-300)	16	16 bar	16 bar	15.5 bar	-
EN-GJS 400-15 (MSV-F2 DN 50-150)	25	25 bar	25 bar	-	24.3 bar
EN-GJS 400-15 (MSV-F2 DN 200-300)	25	25 bar	25 bar	-	24.3 bar



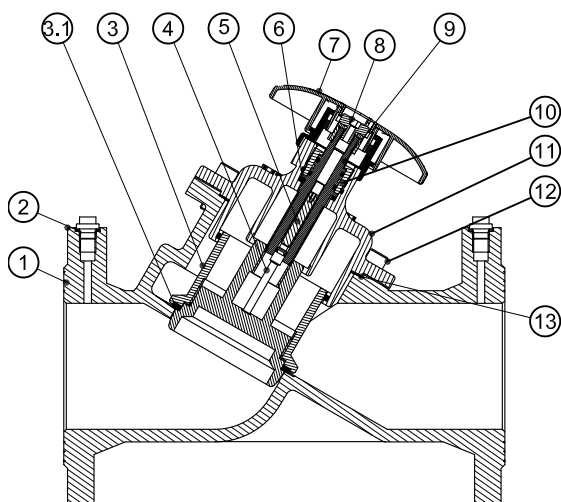
Design



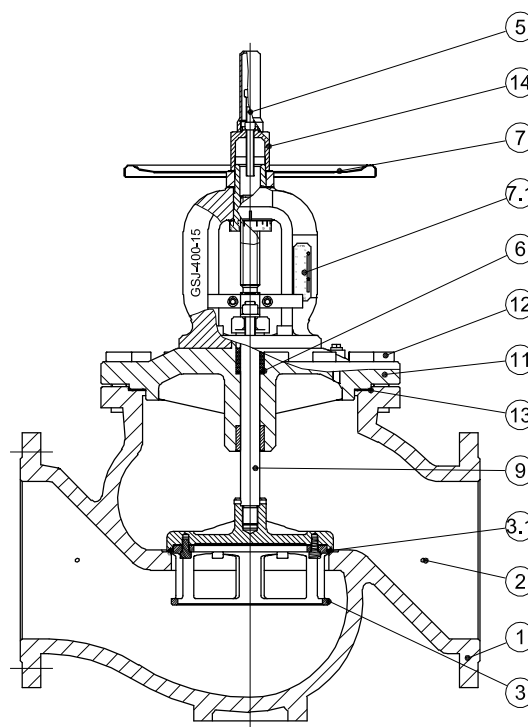
MSV-F2 DN 50



MSV-F2 DN 65



MSV-F2 DN 80 - 150



MSV-F2 DN 200 - 300

- 1 Body EN-GJL250
- 2 Plug G 1/4"
- 3 Valve cone
- 3.1 Seat soft sealing
- 4 Rod
- 5 Stroke limiter/Allen screw
- 6 Gasket
- 7 Handwheel with digital display
  - DN 50-150 plastic
  - DN 200-300 metal

- 7.1 Display
- 8 Fixed screw
- 9 Spindle
- 10 Stuffing box
- 11 Bonnet
- 12 Allen screw /Hexagon screw
- 13 Flat gasket
- 14 Hood with stroke



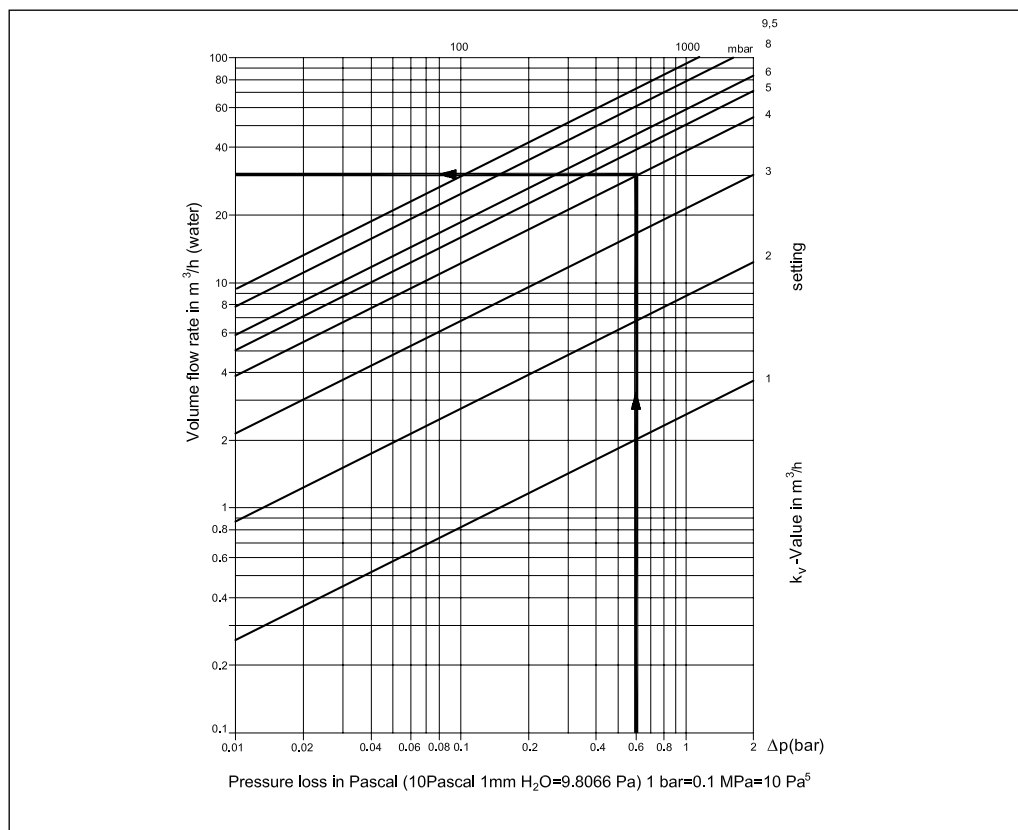
Setting

Ethylenglycol correction factor

Formula:  $C_2H_6O_2$   
 Density at 20 °C:  $\rho_{water} = 1 \text{ kg/dm}^3$   
 $\rho_{glycol} = 1.338 \text{ kg/dm}^3$

$$Q_{corr.} = \frac{Q_{water}}{\sqrt{\text{Share of water} \times \rho_{water} + \text{Share of glycol} \times \rho_{glycol}}}$$

Ethylenglycol part xg (%)	0	10	20	30	40	50	60	70	80	90	100
Correction factor	1.0	0.983	0.968	0.953	0.939	0.925	0.912	0.899	0.887	0.876	0.864

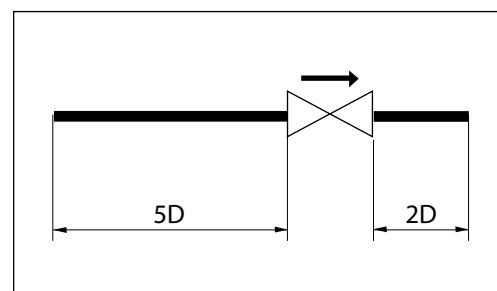


MSV-F2 DN 65  
 Δp = 0.6 bar  
 Hand wheel setting: 3.0  
 Flow: 16.7 m<sup>3</sup>/h  
 30% solution of glycol  
 $Q_{corr.} = 16.4 \text{ m}^3/\text{h} \times 0.953 = 16.0 \text{ m}^3/\text{h}$   
 It refers to all types of valves.

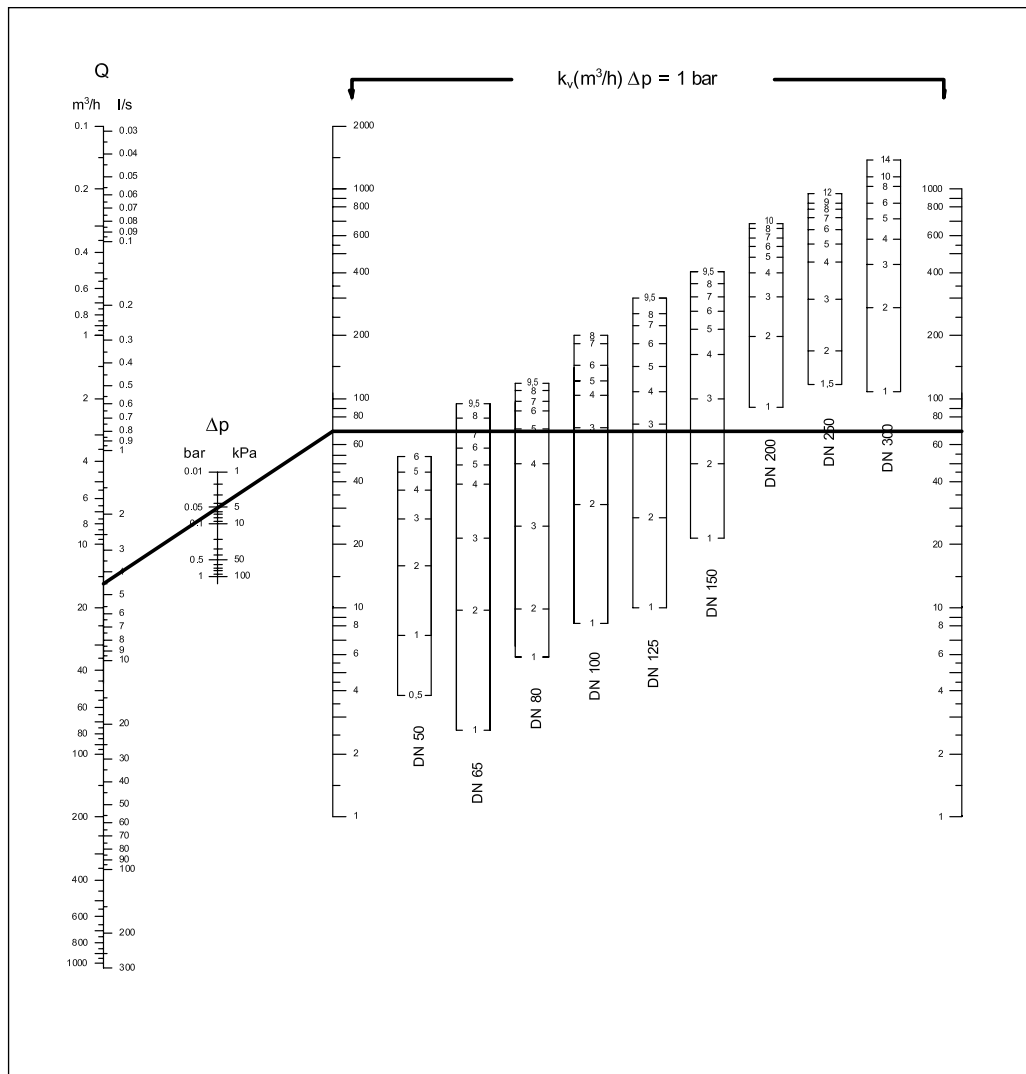
Installation

Always install the valve with the arrow on the body in the same direction as the flow. In order to avoid turbulence, which will affect the measuring accuracy, it is recommended to have a straight length of pipe up and down stream from the valve as shown (D - diameter of pipe).

The influence of turbulence, if our recommendations are not adhered to, can influence the flow up to 20%.



Sizing



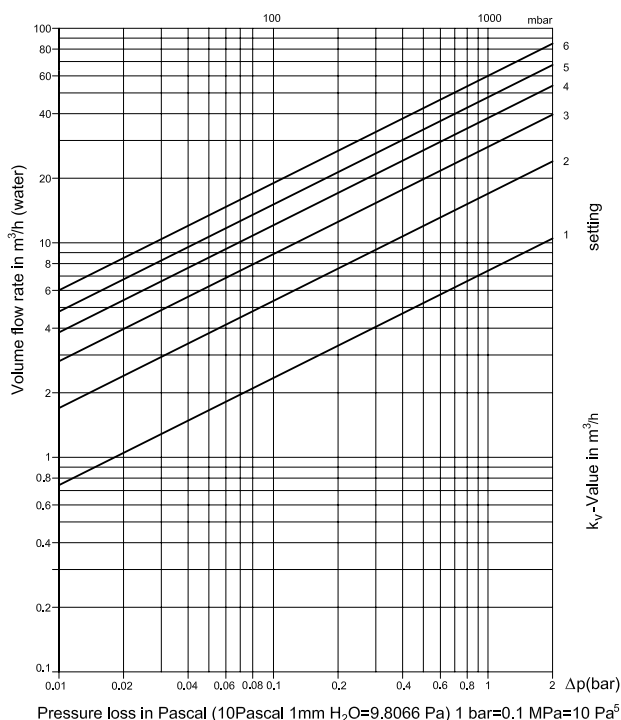
*Example:*  
 MSV-F2 DN 65  
 $Q = 16 \text{ m}^3/h$   
 $\Delta p = 5 \text{ kPa}$

*Calculation of setting for valve:*  
 In the diagram a straight line connecting the bars for flow  $16 \text{ m}^3/h$ , differential pressure  $5 \text{ kPa}$  and  $k_v$  value shows the relationship between these three variables.

A horizontal line from intersection with the  $k_v$  bar shows the presetting value for each valve size.

*Result:*  
 presetting 7.0

Flow diagrams



DN 50 / PN 16 / PN 25

Setting	$k_v$ -value
1	7.4
2	15.8
3	26.7
4	36.9
5	46.2
6	53.8

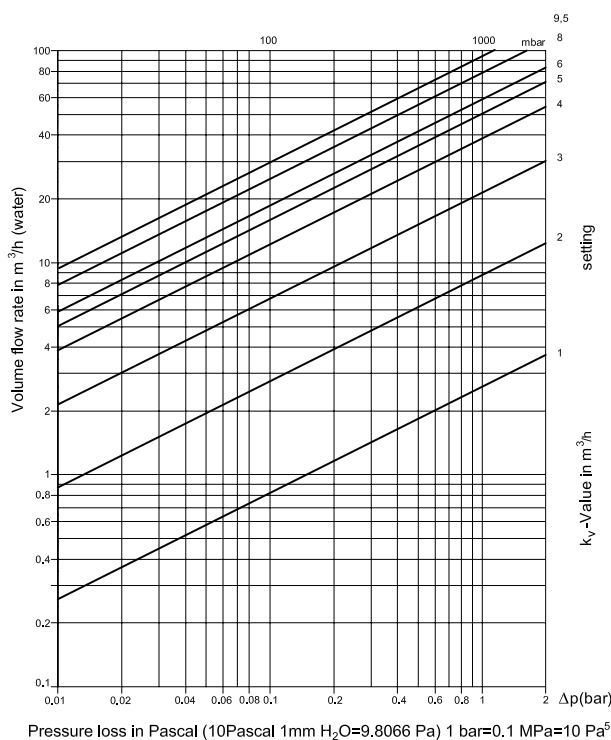
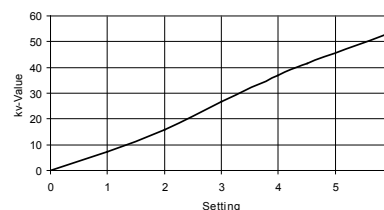
Max. permissible differential pressure in throttling function 1.5/2.0 bar.

Max. permissible flow speed:  $\leq 4$  m/s

Condition:

- The flow must be free of cavitation.

Flow characteristic



DN 65 / PN 16 / PN 25

Setting	$k_v$ -value
1	2.6
2	8.8
3	21.6
4	39.0
5	49.8
6	58.5
7	69.3
8	79.0
9	87.8
9.5	93.4

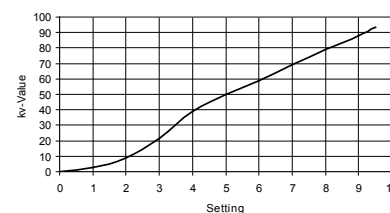
Max. permissible differential pressure in throttling function 1.5/2.0 bar.

Max. permissible flow speed:  $\leq 4$  m/s

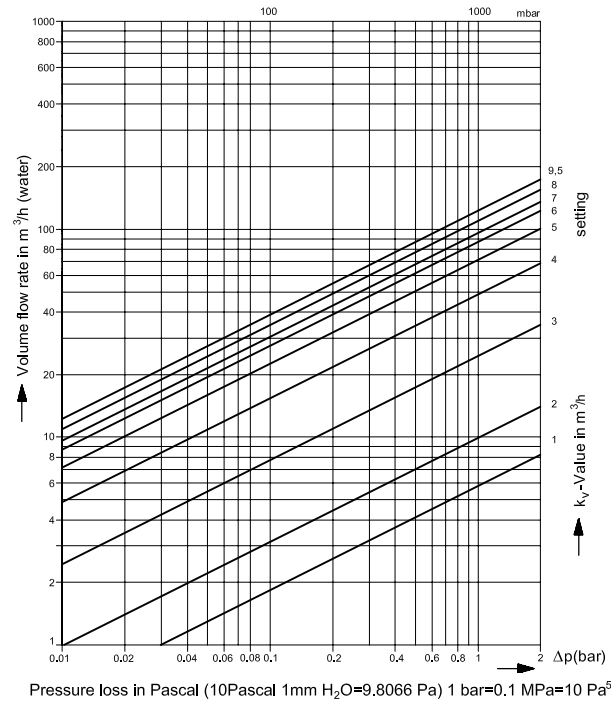
Condition:

- The flow must be free of cavitation.

Flow characteristic



Flow diagrams (continuous)



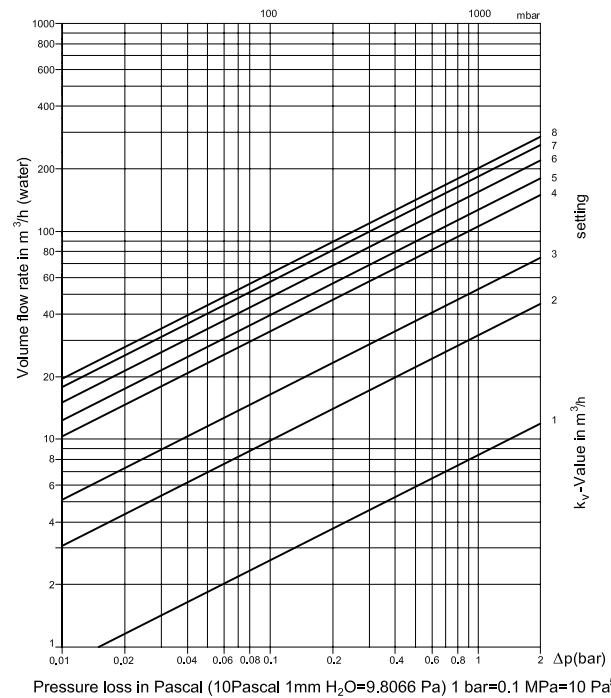
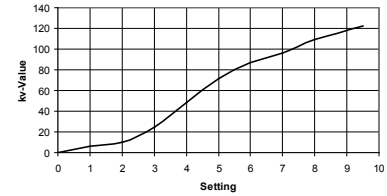
DN 80 / PN 16 / PN 25

Setting	$k_v$ -value
1	5.8
2	9.9
3	24.5
4	48.5
5	71.3
6	87.0
7	96.4
8	109.3
9.5	122.3

Max. permissible differential pressure in throttling function 1.5/2.0 bar.  
 Max. permissible flow speed:  $\leq 4$  m/s  
 Condition:

- The flow must be free of cavitation.

Flow characteristic



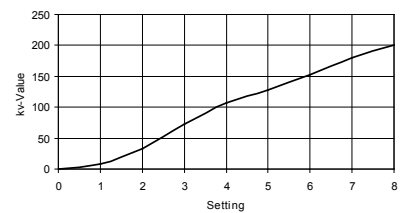
DN 100 / PN 16 / PN 25

Setting	$k_v$ -value
1	8.3
2	32.4
3	72.9
4	107.2
5	128.2
6	152.8
7	180.0
8	200.0

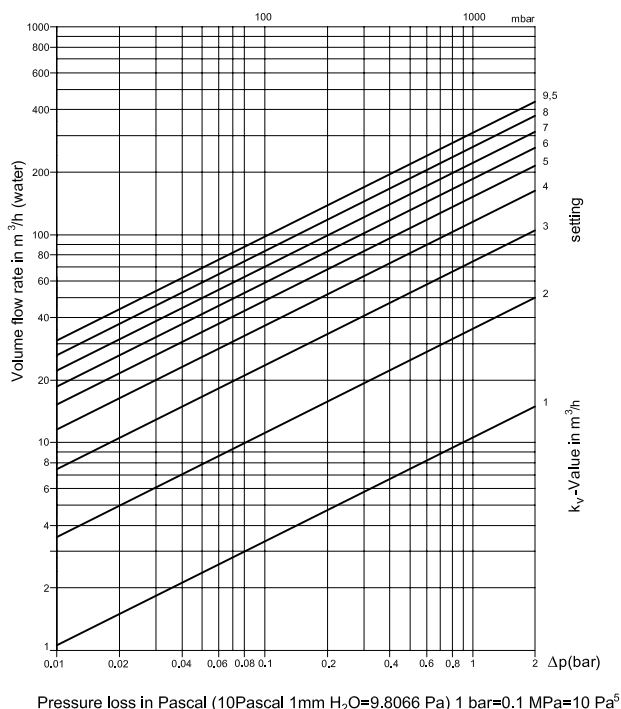
Max. permissible differential pressure in throttling function 1.5/2.0 bar.  
 Max. permissible flow speed:  $\leq 4$  m/s  
 Condition:

- The flow must be free of cavitation.

Flow characteristic



Flow diagrams (continuous)



DN 125 / PN 16 / PN 25

Setting	k <sub>v</sub> -value
1	10.3
2	35.4
3	73.0
4	114.9
5	150.5
6	185.2
7	225.1
8	261.1
9	294.2
9.5	304.4

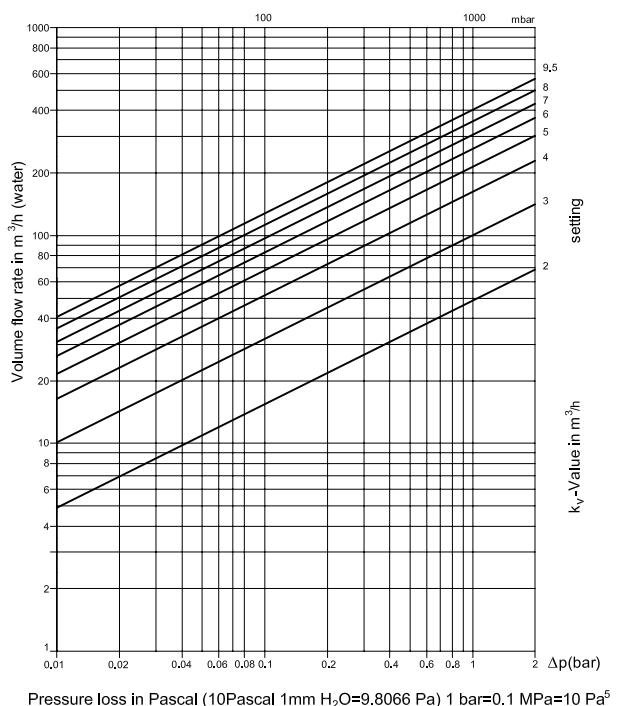
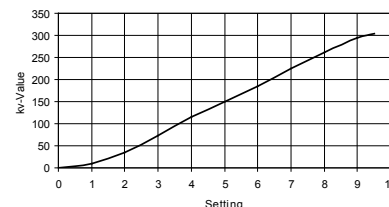
Max. permissible differential pressure in throttling function 1.5/2.0 bar.

Max. permissible flow speed: ≤ 4 m/s

Condition:

- The flow must be free of cavitation.

Flow characteristic



DN 150 / PN 16 / PN 25

Setting	k <sub>v</sub> -value
1	21.4
2	48.5
3	99.8
4	162.0
5	214.0
6	260.9
7	304.1
8	354.6
9.5	400.8

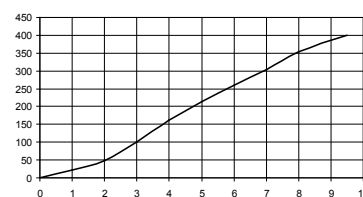
Max. permissible differential pressure in throttling function 1.5/2.0 bar.

Max. permissible flow speed: ≤ 4 m/s

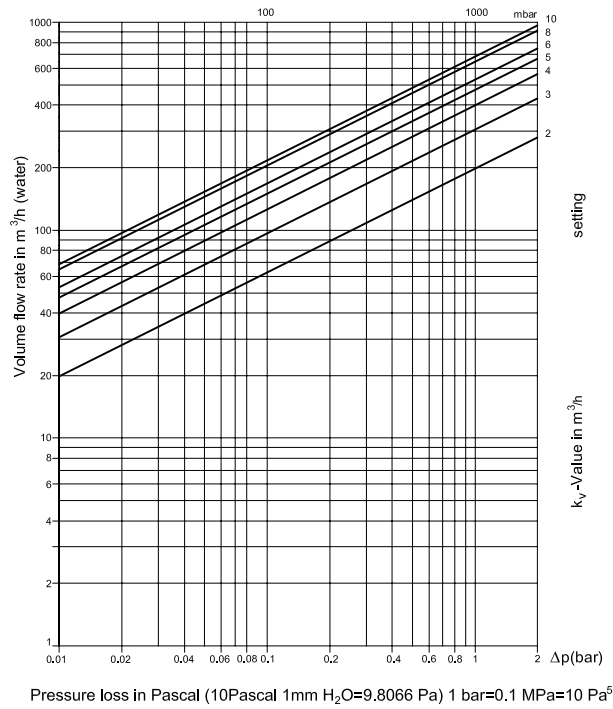
Condition:

- The flow must be free of cavitation.

Flow characteristic



Flow diagrams (continuous)



DN 200 / PN 16 / PN 25

Setting	k <sub>v</sub> -value
2	198.2
3	305.3
4	397.5
5	474.0
6	530.4
7	586.8
8	645.9
10	685.6

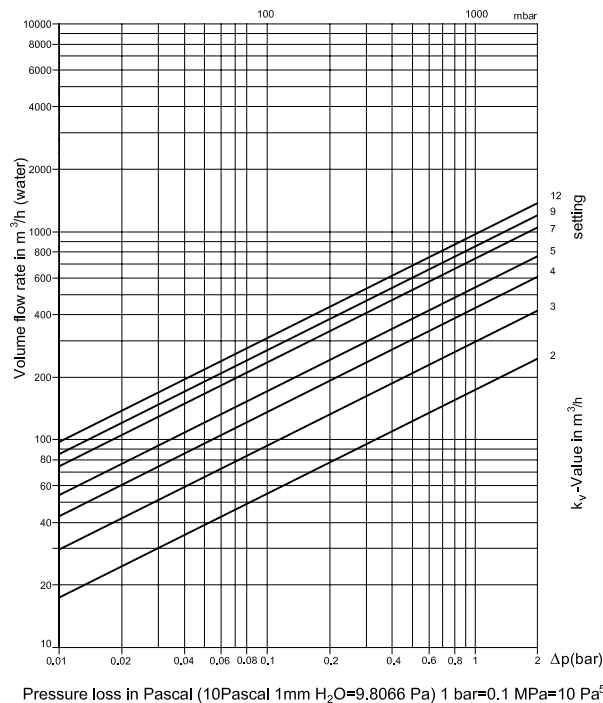
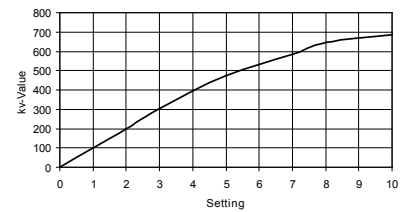
Max. permissible differential pressure in throttling function 1.5/2.0 bar.

Max. permissible flow speed: ≤ 4 m/s

Condition:

- The flow must be free of cavitation.

Flow characteristic



DN 250 / PN 16 / PN 25

Setting	k <sub>v</sub> -value
3	299.4
5	553.1
7	721.2
8	788.1
9	851.1
10	926.1
12	952.3

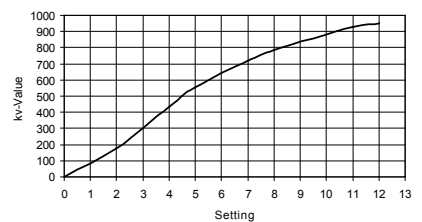
Max. permissible differential pressure in throttling function 1.5/2.0 bar.

Max. permissible flow speed: ≤ 4 m/s

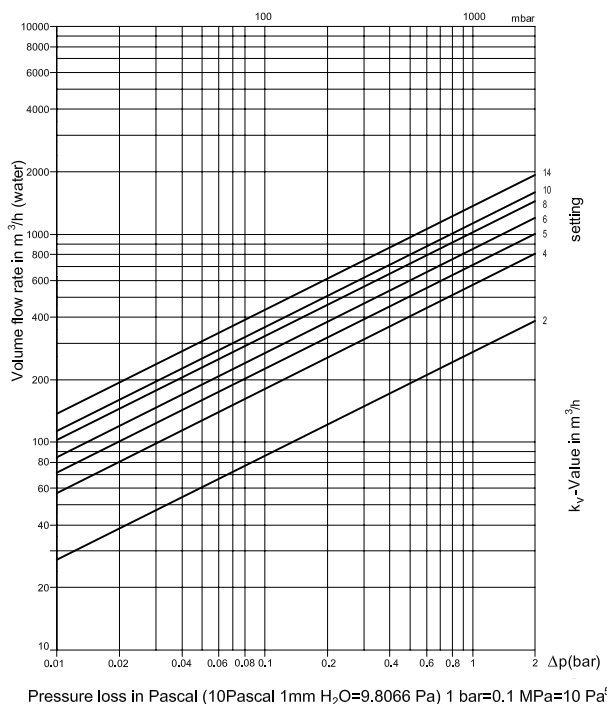
Condition:

- The flow must be free of cavitation.

Flow characteristic



Flow diagrams (continuous)



DN 300 / PN 16 / PN 25

Setting	k <sub>v</sub> -value
2	270.9
4	575.8
6	856.0
8	1035.9
10	1142.8
12	1273.7
14	1380.2

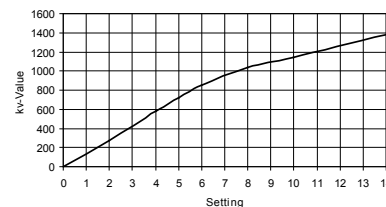
Max. permissible differential pressure in throttling function 1.5/2.0 bar.

Max. permissible flow speed: ≤ 4 m/s

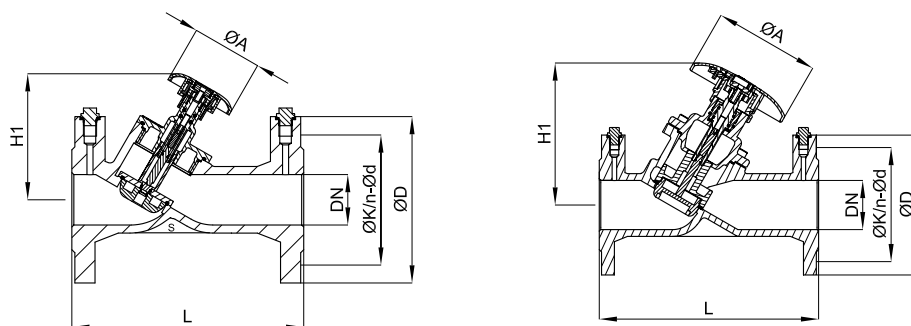
Condition:

- The flow must be free of cavitation.

Flow characteristic

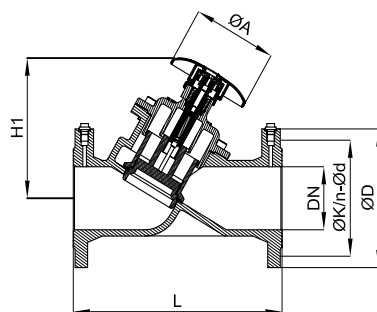


Dimensions

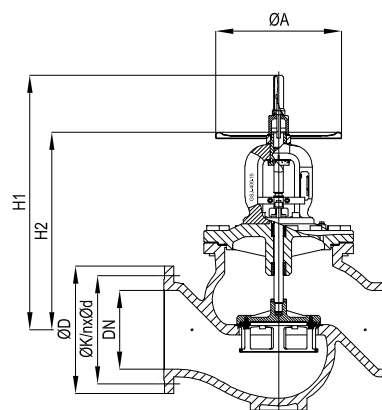


MSV-F2 DN 50

MSV-F2 DN 65



MSV-F2 DN 80 - 150



MSV-F2 DN 200 - 300

DN	L	H1	H2	ØA	PN 16			PN 25		
					ØD	ØK	n × Ød	ØD	ØK	n × Ød
mm										
50	230	125	-	70	165	125	4 × 19	165	125	4 × 19
65	290	187	-	140	185	145	4 × 19	185	145	8 × 19
80	310	205	-	140	200	160	8 × 19	200	160	8 × 19
100	350	222	-	140	220	180	8 × 19	235	190	8 × 23
125	400	251	-	140	250	210	8 × 19	270	220	8 × 28
150	480	247	-	140	285	240	8 × 23	300	250	8 × 28
200	600	721	533	360	340	295	12 × 23	360	310	12 × 28
250	730	808	617	400	405	355	12 × 28	425	370	12 × 31
300	850	855	664	400	460	410	12 × 28	485	430	12 × 31

Remark: "n" is number of holes in the flange.

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