

Data sheet

Manual Presetting Valves LENO™ MSV-O

Description

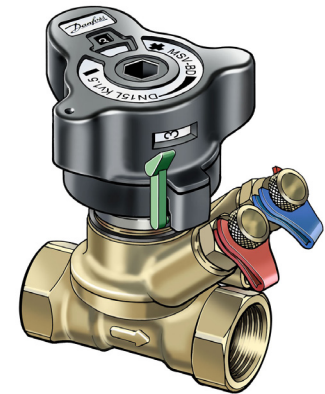
LENO™ MSV-O is a new generation of manual valves for balancing flow in heating, cooling and domestic hot water systems.

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

- Fixed venturi orifice.
- Removable hand wheel for easy mounting.
- Numeric presetting scale, visible from more angles.
- Easy locking of presetting.
- Built-in test plugs for Ø 3 mm needles.
- Open-close with Allen key in emergency.
- Open-closed colour indicator.

It is recommended to use LENO™ MSV-O in constant flow systems in front of boilers, flat stations or heat pumps in one-family houses for balancing, shut-off function for service and repair, flow verification, one pipe systems. The valve may be mounted in flow or return.

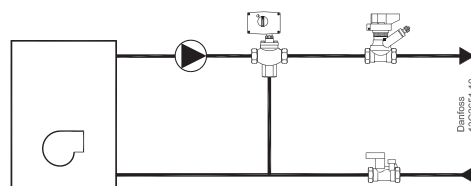
All dimensions are available with internal thread.



Danfoss PFM 1000/PFM 100 measuring instruments contain valve data for LENO™ MSV-O in memory.

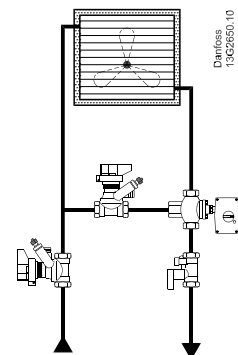
Application

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



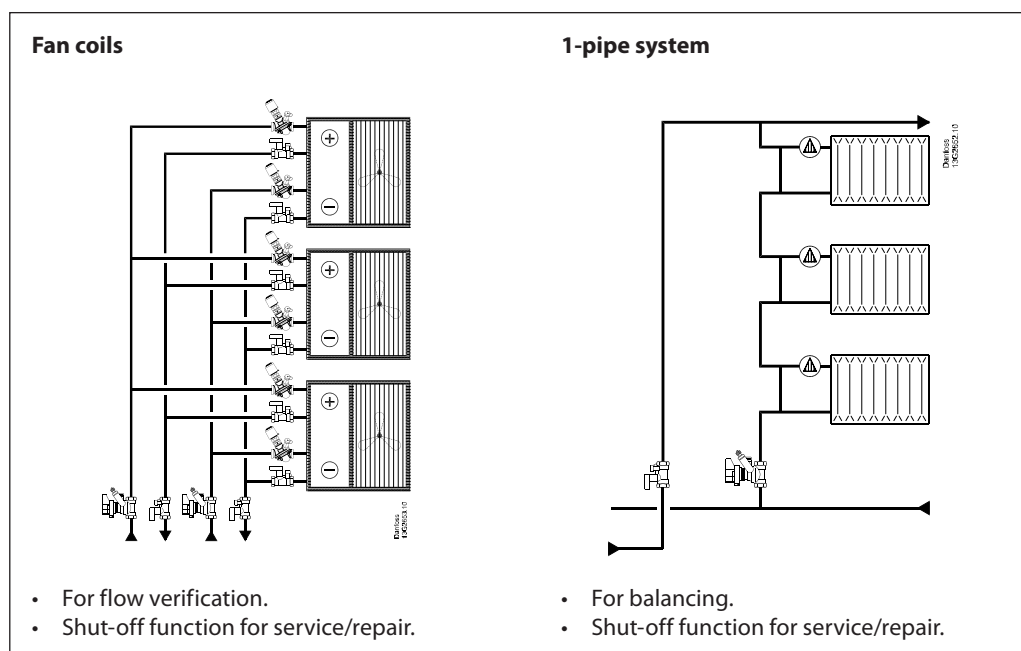
- For balancing.
- Shut-off function for service/repair.

Air handling unit



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

Application



DOMESTIC HOT WATER SYSTEMS: Depending on local legislation it can be used in Domestic hot water applications.

Ordering

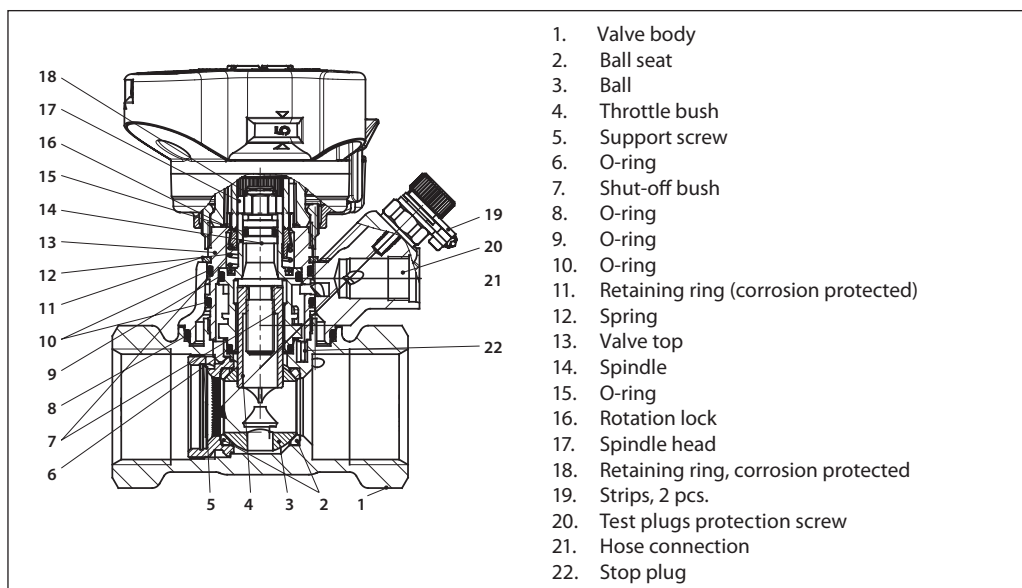
LENO™ MSV-O valve with internal thread

Type	Material	Size (mm)	k_{vs} (m³/h)	Connection	Code No.
	DZR brass ¹⁾	DN 15 LF	0.63	Rp ½"	003Z4020
		DN 15	2.8	Rp ½"	003Z4021
		DN 20	5.7	Rp ¾"	003Z4022
		DN 25	9.7	Rp 1"	003Z4023
		DN 32	16.6	Rp 1¼"	003Z4024
		DN 40	25.4	Rp 1½"	003Z4025
		DN 50	37.9	Rp 2"	003Z4026

Accessories

Type	Code No.
Standard test plugs, 2 pcs.	003Z4662
Extended measuring nipples, 60 mm, 2 pcs.	003Z4657
Operating handle	003Z4652
Flow measuring instrument PFM 1000 (10 bar)	003Z8260
Flow measuring instrument PFM 1000 (20 bar)	003Z8261
Identification tag & strips, 10 pcs.	003Z4660

Design



Materials and parts in contact with water

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

Technical data

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.

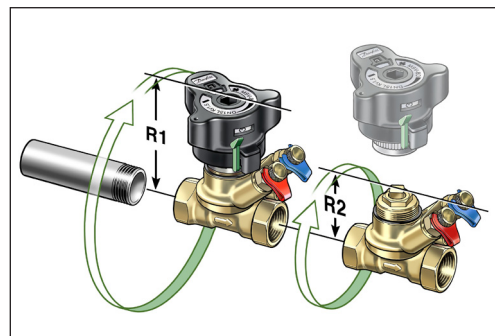
Calibration of the handle

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



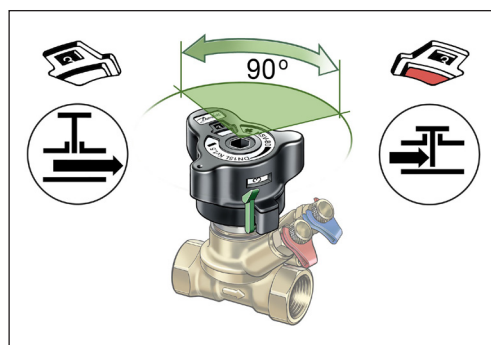
Shut-off

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:

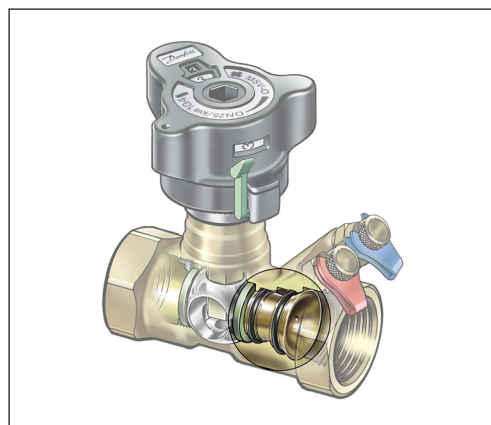
- red = closed
- white = open



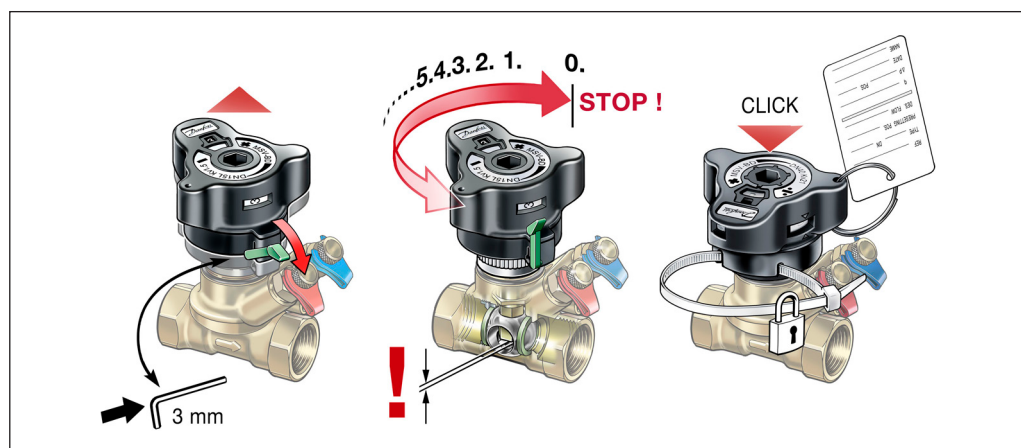
Fixed Orifice

LENO™ MSV-O has a fixed venturi orifice in the valve body with constant kvs-value. This feature makes it possible to read flow on the measuring device, without typing in presetting.

This feature saves time for commissioning for each valve installed.



Setting and sealing



The valve has a presetting feature for setting/adjusting flow ratings.

Setting the required flow is made in 5 steps:

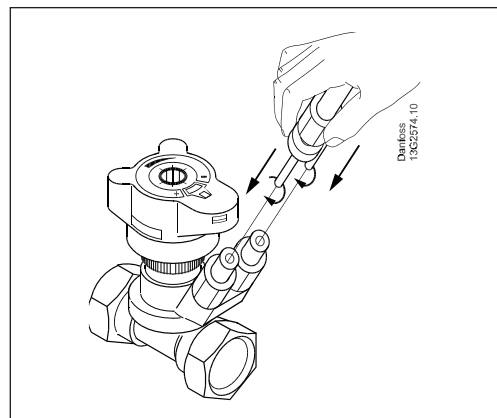
1. In open position, release the lock using the green lever or a 3 mm Allen key.
2. The handle pops up automatically.
3. The calculated value can now be set.
4. The setting is locked when the handle is pressed to click.
5. The setting can be sealed by using a strip as shown.

Measuring

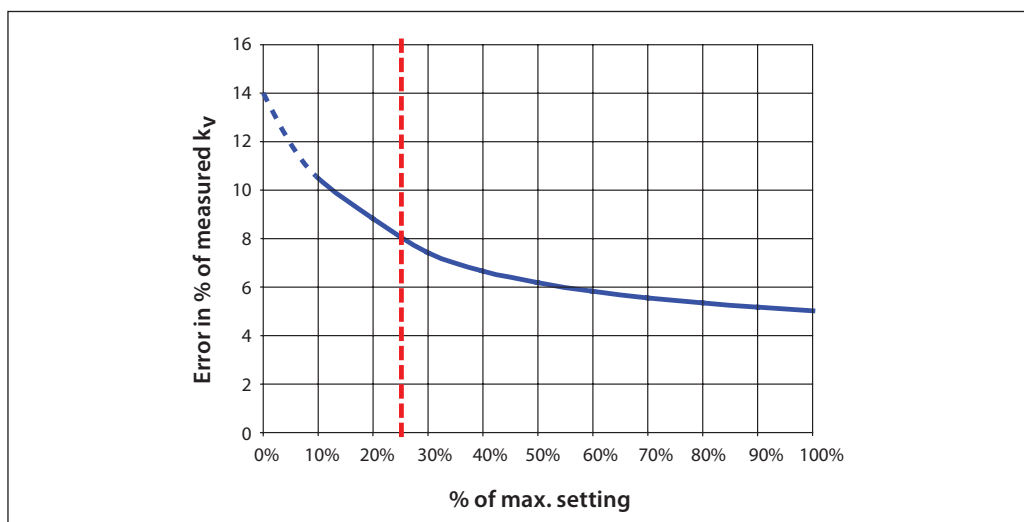
The flow through the LENO™ MSV-O valve can be measured using Danfoss PFM 1000/100 or other brands of measuring instruments. The LENO™ MSV-O valve is supplied with two measuring nipples for 3 mm needles.

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

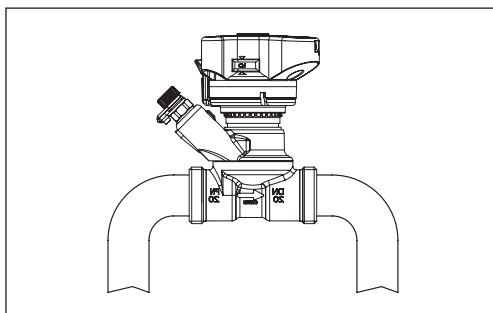


LENO™ MSV-O is very accurate, due to the separate functions for presetting and shut-off. Valve can be mounted everywhere in the system (closed to T-pieces, elbows, pumps, etc.), since it is unaffected by turbulence in any setting or installation.

The red line indicates 25% of max. flow.

According to BS7350:1990 flow rates must be within following values:

- ± 18% at 25% open position
- ± 10% at fully open position



Kv-signal

kv-signal values are used for non-Danfoss measuring instruments. Danfoss PFM 1000/100 have all data in memory, and the instruments are using this formula:

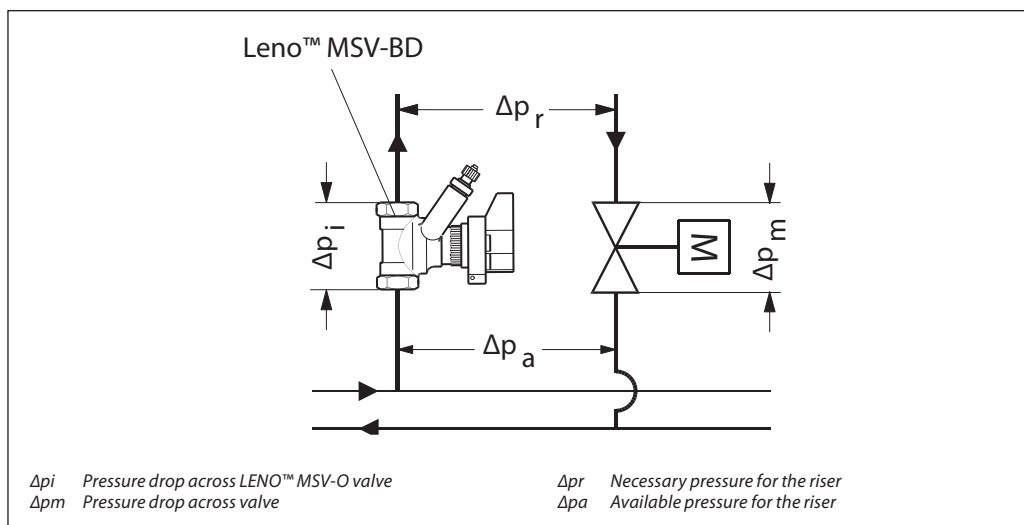
$$\Delta P_{val} = \Delta P_{sig} \left(\frac{k_{v-sig}}{k_{v-val}} \right)^2$$

Δp across the measuring nipples (k_{v-sig}) and Δp across the valve (k_{v-val}) is not the same due to turbulence influence for pressure measuring.

Kv-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						30.74
6.4							31.17
6.5							31.47
6.6							31.61

Valve size and presetting



Example

Given:

Max. pipe flow Q 2.0 m³/h

Δp_r 15 kPa

Δp_a 45 kPa

Δp_m 10 kPa

Δp_i $\Delta p_a - \Delta p_r - \Delta p_m$

$$\Delta p_i = 45 \text{ kPa} - 15 \text{ kPa} - 10 \text{ kPa} = 20 \text{ kPa}$$

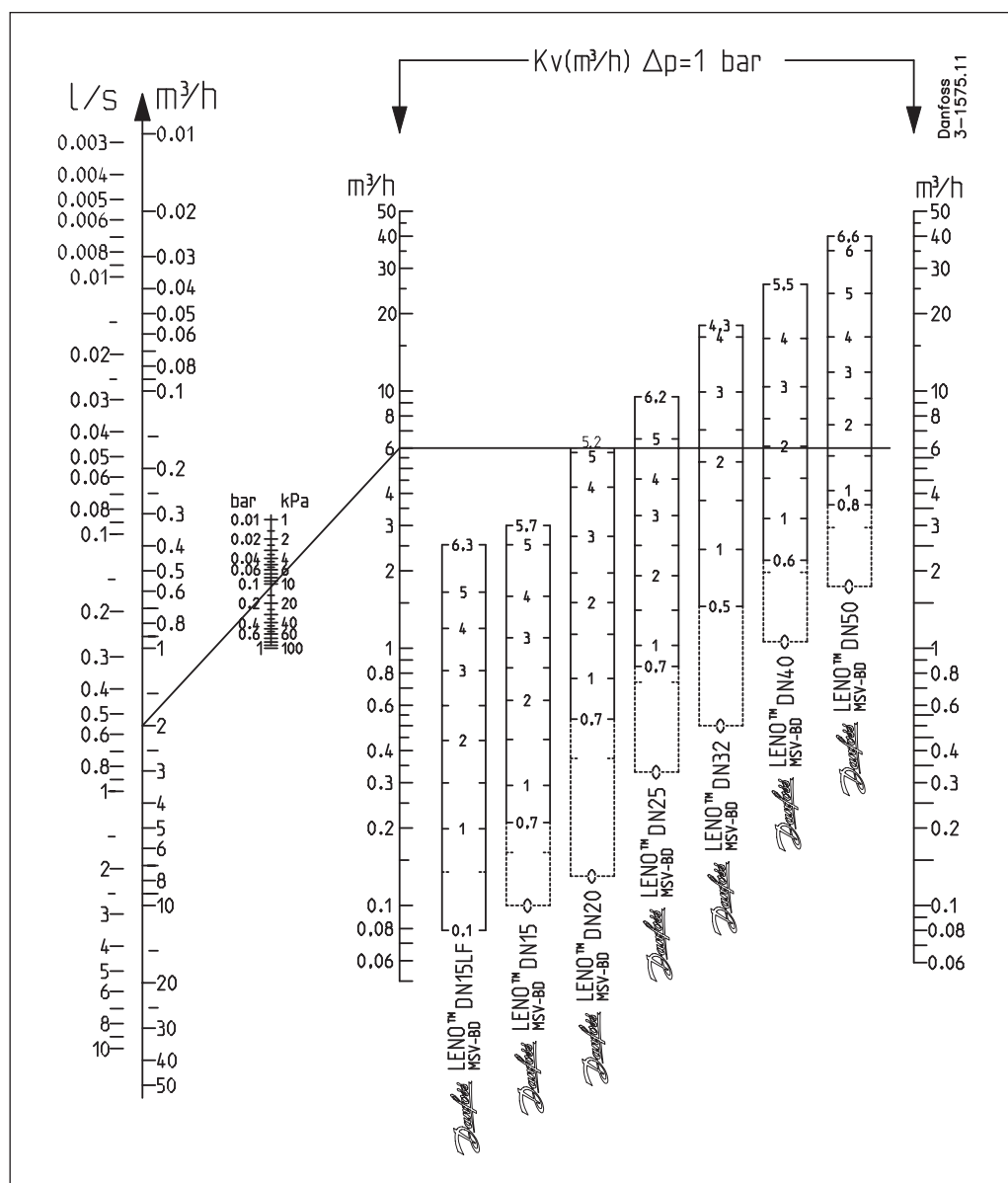
Correct valve size and presetting is found in the sizing and flow diagrammes, p 9.

$$Q = 2.0 \text{ m}^3/\text{h} \text{ and } \Delta p_i = 20 \text{ kPa}$$

Setting can be also calculated from the formula:

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

Sizing



Correction factors

Medium: Ethylene glycol / propylene glycol percentage (max. 30 %).

Temp. °C	Flow, m³/h						
	25	30	40	50	60	65	100
-40.0	1)	1)	1)	1)	0.89	0.88	1)
-17.8	1)	1)	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	2)	2)	2)	2)	2)	2)	0.94

¹⁾ Below freezing point

²⁾ Above boiling point

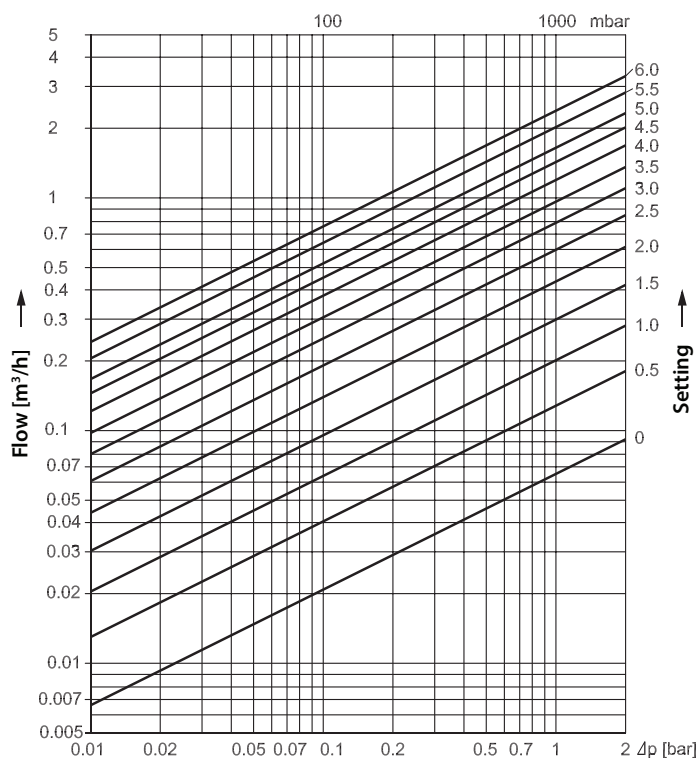
Example

Flow needed 30 m³/h

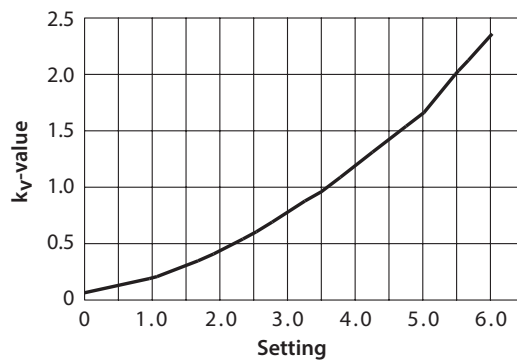
Flow after correction 30 x 0.95 = 28 m³/h

Flow diagrammes,
DN 15 LF

LENO™ MSV-O DN 15 LF



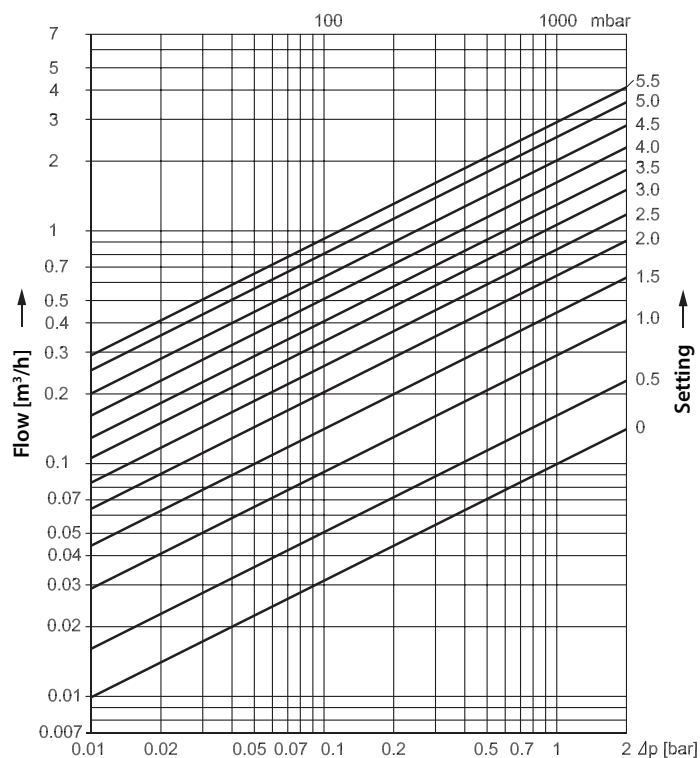
Flow characteristics



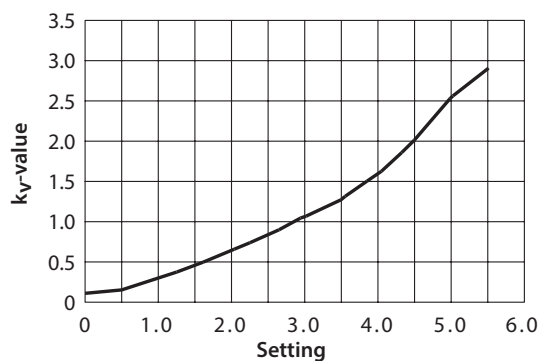
Setting	k _v -value
0.0	0.07
0.1	0.08
0.2	0.09
0.3	0.11
0.4	0.12
0.5	0.13
0.6	0.15
0.7	0.16
0.8	0.17
0.9	0.19
1.0	0.20
1.1	0.22
1.2	0.23
1.3	0.25
1.4	0.28
1.5	0.30
1.6	0.32
1.7	0.35
1.8	0.38
1.9	0.41
2.0	0.44
2.1	0.47
2.2	0.50
2.3	0.53
2.4	0.56
2.5	0.60
2.6	0.63
2.7	0.67
2.8	0.71
2.9	0.74
3.0	0.78
3.1	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

LENO™ MSV-O DN 15



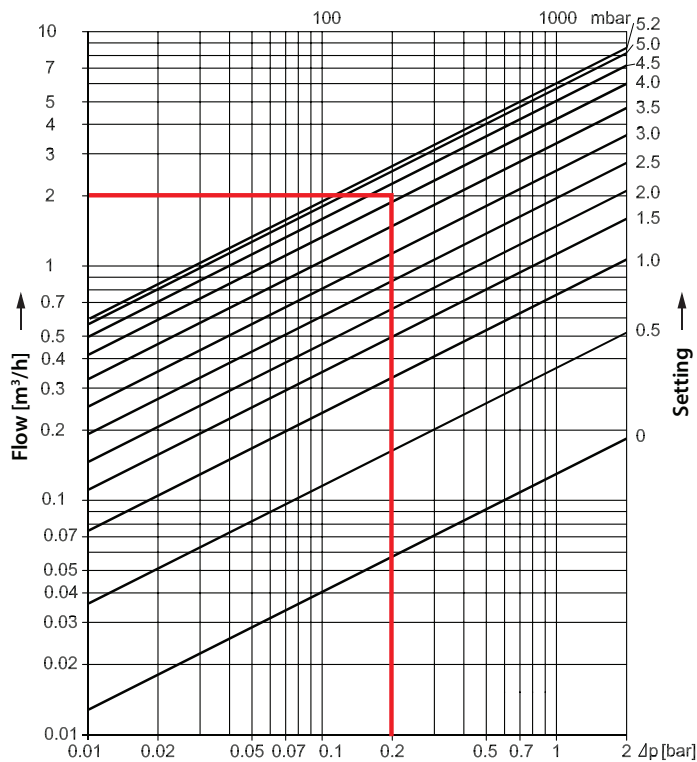
Flow characteristics



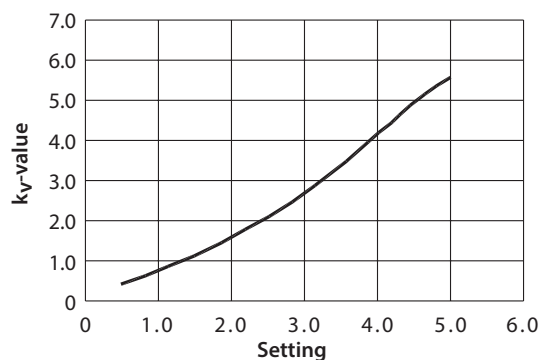
Setting	k _v -value
0.0	0.10
0.1	0.11
0.2	0.12
0.3	0.13
0.4	0.14
0.5	0.16
0.6	0.19
0.7	0.21
0.8	0.24
0.9	0.27
1.0	0.29
1.1	0.32
1.2	0.35
1.3	0.38
1.4	0.41
1.5	0.44
1.6	0.48
1.7	0.51
1.8	0.55
1.9	0.59
2.0	0.63
2.1	0.67
2.2	0.71
2.3	0.75
2.4	0.80
2.5	0.84
2.6	0.88
2.7	0.93
2.8	0.97
2.9	1.02
3.0	1.06
3.1	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

LENO™ MSV-O DN 20



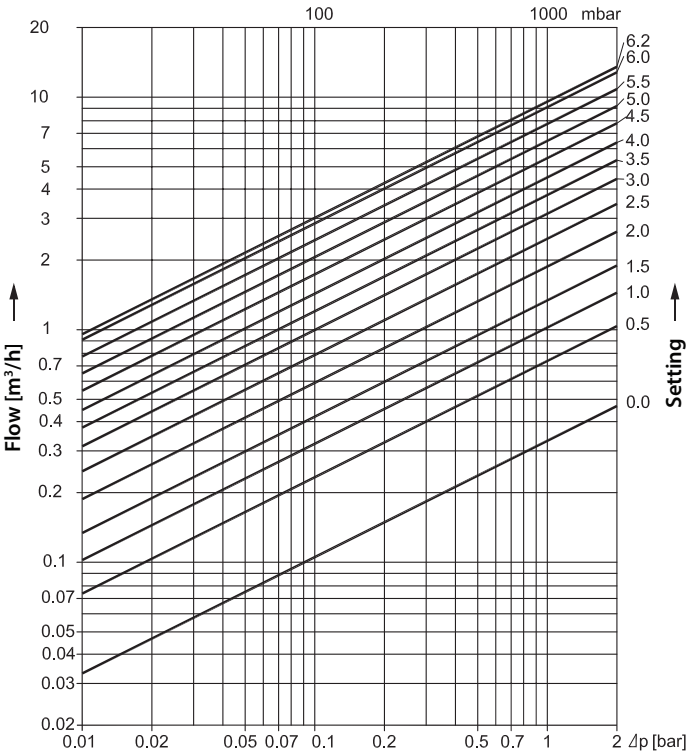
Flow characteristics



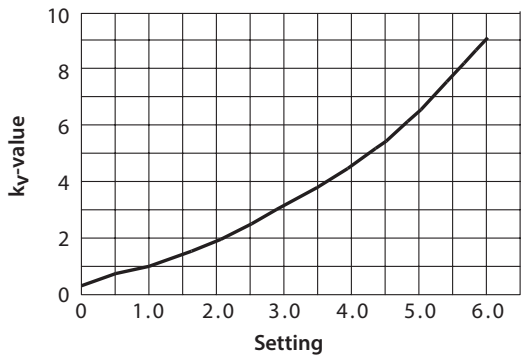
Setting	k _V -value
0.0	0.13
0.1	0.15
0.2	0.19
0.3	0.24
0.4	0.30
0.5	0.37
0.6	0.45
0.7	0.53
0.8	0.61
0.9	0.68
1.0	0.76
1.1	0.84
1.2	0.92
1.3	0.99
1.4	1.06
1.5	1.13
1.6	1.21
1.7	1.28
1.8	1.35
1.9	1.43
2.0	1.50
2.1	1.59
2.2	1.67
2.3	1.76
2.4	1.86
2.5	1.96
2.6	2.07
2.7	2.19
2.8	2.31
2.9	2.44
3.0	2.58
3.1	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

LENO™ MSV-O DN 25



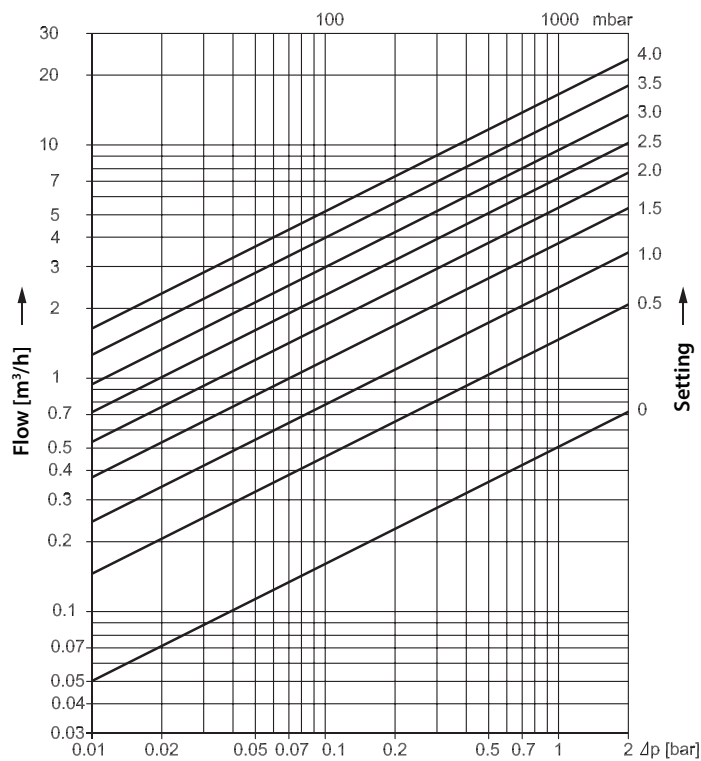
Flow characteristics



Setting	k _v -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

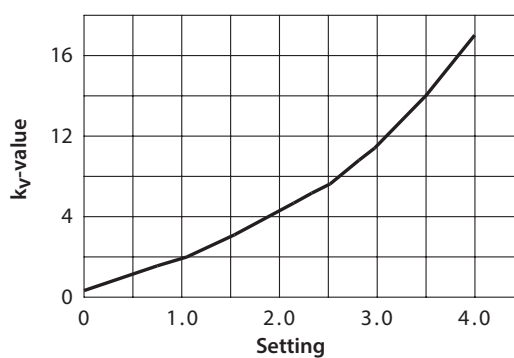
Flow diagrammes,
DN 32

LENO™ MSV-O DN 32



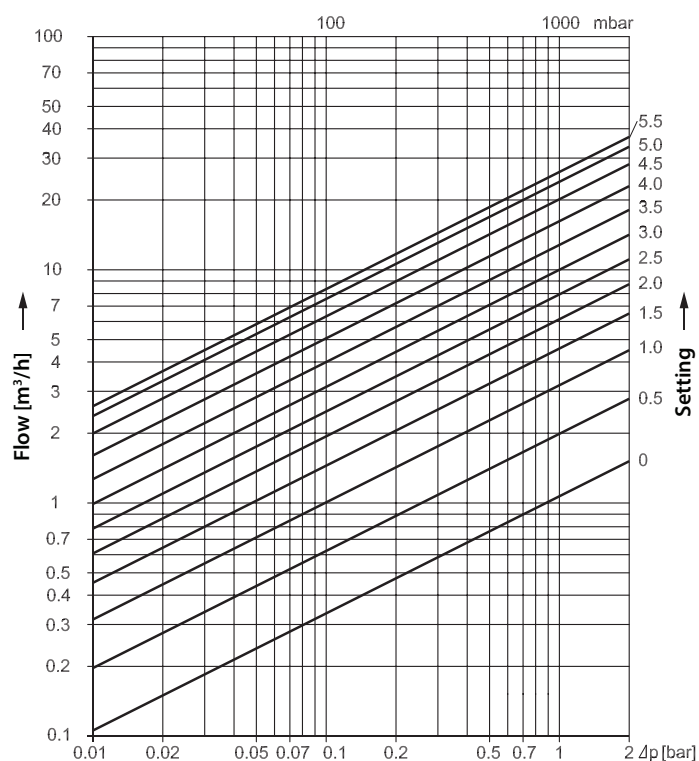
Setting	k_v -value
0.0	0.50
0.1	0.75
0.2	0.95
0.3	1.13
0.4	1.29
0.5	1.45
0.6	1.62
0.7	1.80
0.8	1.99
0.9	2.20
1.0	2.42
1.1	2.66
1.2	2.92
1.3	3.19
1.4	3.47
1.5	3.75
1.6	4.05
1.7	4.36
1.8	4.67
1.9	4.98
2.0	5.30
2.1	5.63
2.2	5.97
2.3	6.32
2.4	6.68
2.5	7.06
2.6	7.46
2.7	7.89
2.8	8.34
2.9	8.83
3.0	9.35
3.1	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 characteristics

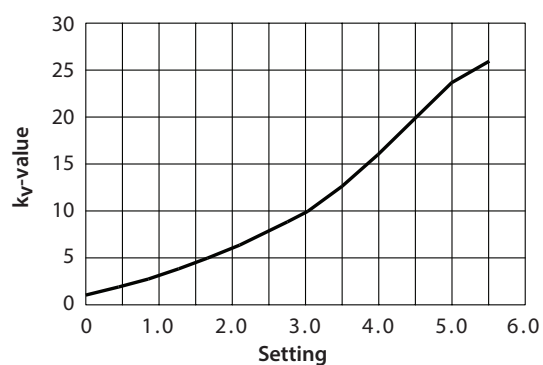


Flow diagrammes,
DN 40

LENO™ MSV-O DN 40



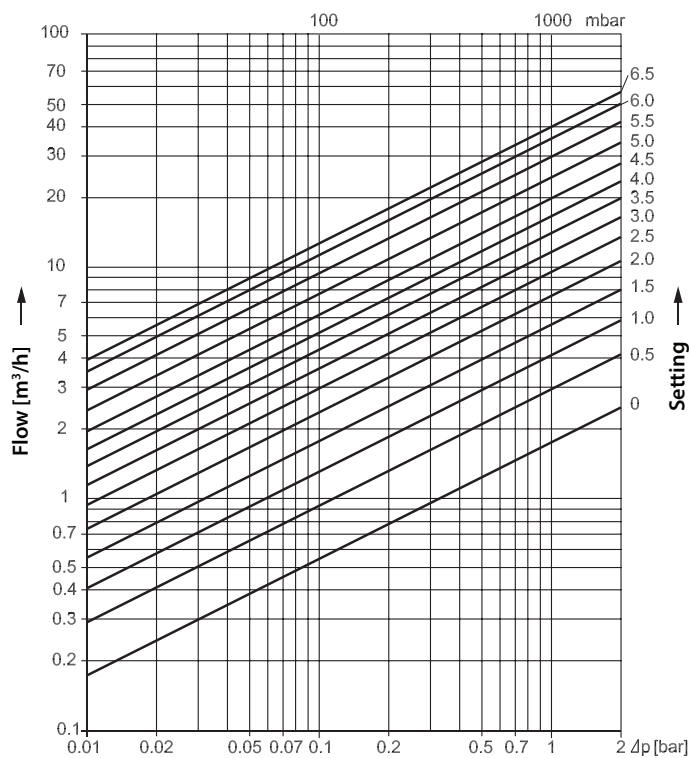
Flow characteristics



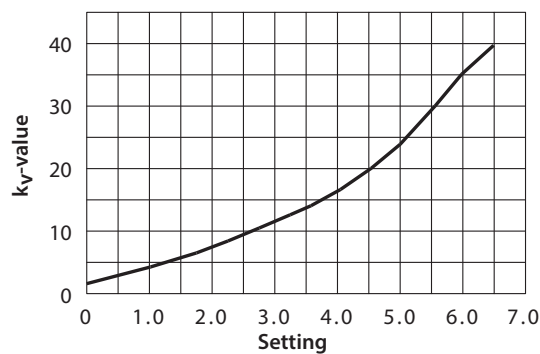
Setting	k _v -value
0.0	1.06
0.1	1.21
0.2	1.38
0.3	1.56
0.4	1.76
0.5	1.97
0.6	2.20
0.7	2.43
0.8	2.68
0.9	2.93
1.0	3.19
1.1	3.46
1.2	3.73
1.3	4.01
1.4	4.29
1.5	4.58
1.6	4.87
1.7	5.17
1.8	5.47
1.9	5.78
2.0	6.09
2.1	6.41
2.2	6.74
2.3	7.09
2.4	7.44
2.5	7.80
2.6	8.18
2.7	8.58
2.8	9.00
2.9	9.44
3.0	9.90
3.1	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

LENO™ MSV-O DN 50

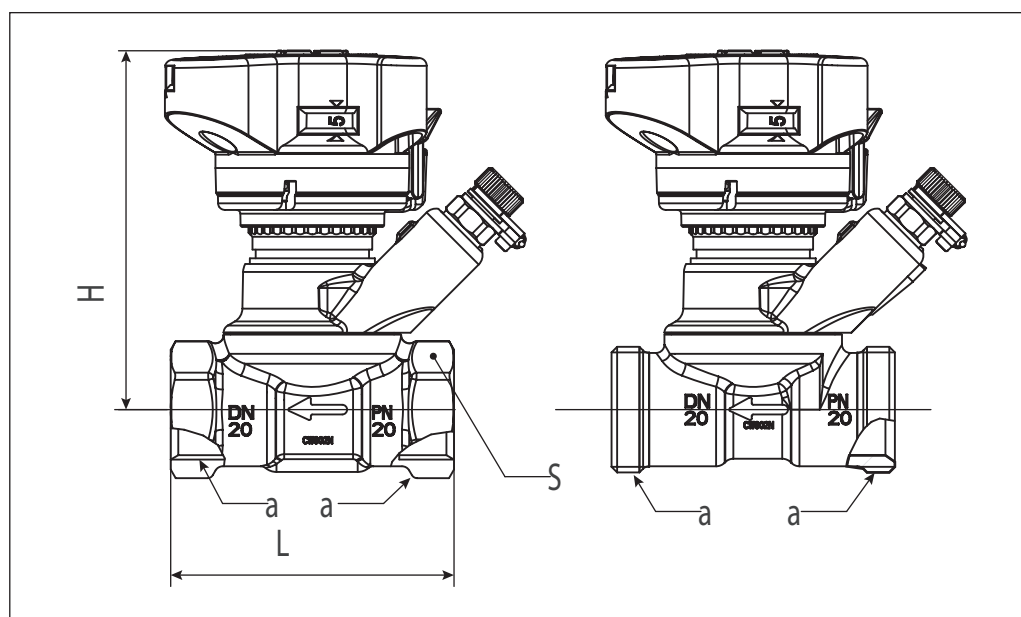


Flow characteristics



Setting	k _v -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



MSV-O	Size	a Thread ISO 228-1	L (mm)	H (mm)	S (mm)
003Z4000	DN 15 LF	G ½	65	92	27
003Z4001	DN 15	G ½	65	92	27
003Z4002	DN 20	G ¾	75	95	32
003Z4003	DN 25	G 1	85	98	41
003Z4004	DN 32	G 1¼	98	121	50
003Z4005	DN 40	G 1½	100	125	55
003Z4006	DN 50	G 2	130	129	67
003Z4100	DN 15 LF	G ¾ A	70	92	-
003Z4101	DN 15	G ¾	70	92	-
003Z4102	DN 20	G 1 A	75	95	-

Tender specifications

LENO™ MSV –BD can be used in heating and cooling systems.

Features	LENO™ MSV-O
Balancing / Commissioning	•
Presetting	•
Fixed orifice	
Self sealing test plugs	•
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 test plugs	•
360° rotating measuring station (drain tap and test plugs)	•

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-O has a leakage rate A according to ISO 5208, the ball valve is 100% tight.

The LENO™ MSV-O measuring accuracy is 8% at 25% of max. setting.

Accuracy is according to BS 7350 : 1990.

Measuring instruments must be equipped with Ø3 mm measuring needles. Danfoss measuring instruments PFM 1000 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 from EPDM rubber.



Danfoss A/S

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