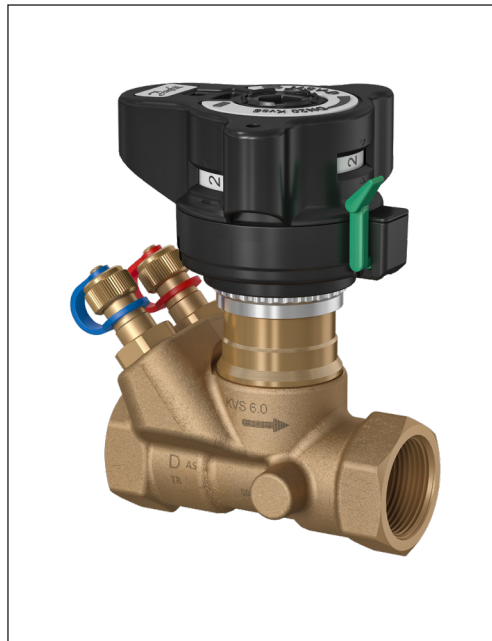


## Data sheet

# Manual Presetting Valves LENO™ MSV-D

## Description



LENO MSV-D is a new generation of manual valves for balancing flow in heating and cooling systems.

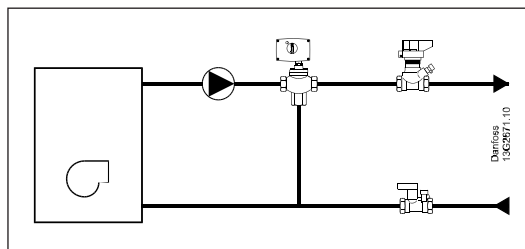
LENO™ MSV-D is a combined presetting and shut off valve with a range of unique features:

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

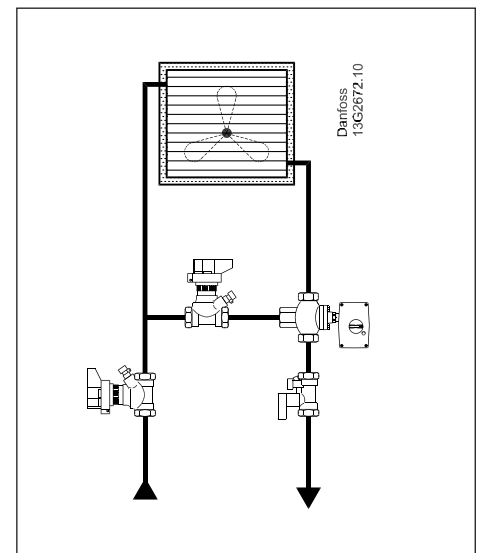
Dynamic balancing valves are the preferred option for hydronic balancing in constant and variable flow systems. If manual balancing valves are used for hydronic balancing they are better suited for constant flow systems. Manual balancing valves can be used in both constant and variable flow systems for flow verification, shut off function for service and repair. The valve may be mounted in flow or return.

Danfoss PFM 100/1000 are Danfoss recommended measuring devices.

## Application

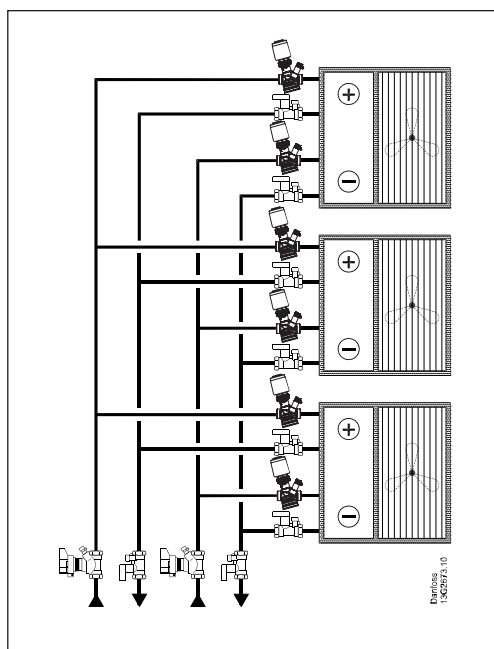

**Boiler, flat station or heat pump.**

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


**Air handling unit**

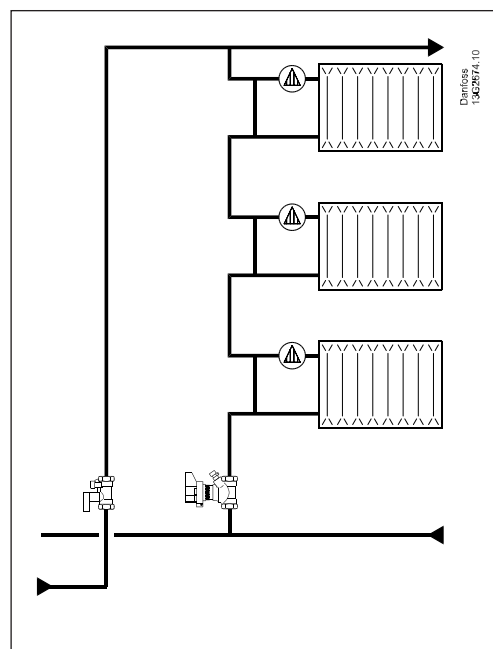
- For constant flow.
- For balancing.
- Shut-off function for service/ repair.

Application (continuous)



Fan coils

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



1-pipe system

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

Ordering

LENO™ MSV-D valve with internal thread

| Type                                                                                | Material | Size     | $k_{vs}$<br>(m <sup>3</sup> /h) | Connections<br>(ISO 228/2) | Code No. |
|-------------------------------------------------------------------------------------|----------|----------|---------------------------------|----------------------------|----------|
|  | CW617N   | DN 15 LF | 2.5                             | G ½                        | 003Z7000 |
|                                                                                     |          | DN 15    | 3.0                             | G ½                        | 003Z7001 |
|                                                                                     |          | DN 20    | 6.0                             | G ¾                        | 003Z7002 |
|                                                                                     |          | DN 25    | 9.5                             | G 1                        | 003Z7003 |
|                                                                                     |          | DN 32    | 18                              | G 1¼                       | 003Z7004 |
|                                                                                     |          | DN 40    | 26                              | G 1½                       | 003Z7005 |
|                                                                                     |          | DN 50    | 40                              | G 2                        | 003Z7006 |

Accessories

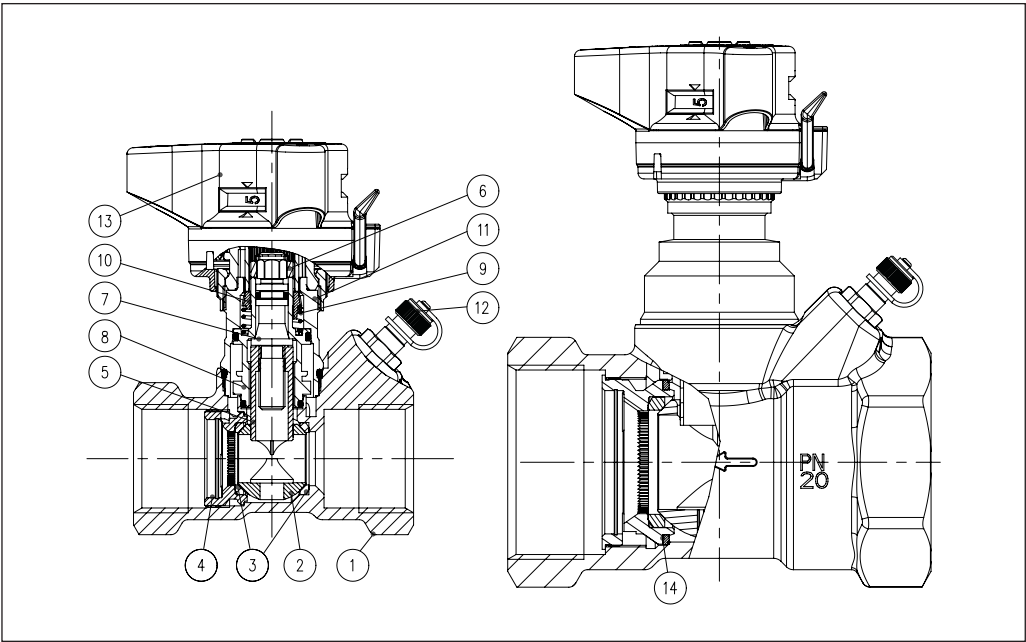
| Type                                        | Code No. |
|---------------------------------------------|----------|
| Operating handle                            | 003Z4652 |
| Flow measuring instrument PFM 100 (10 bar)  | 003L8260 |
| Flow measuring instrument PFM 1000 (10 bar) | 003Z8260 |
| Flow measuring instrument PFM 1000 (20 bar) | 003Z8261 |
| Identification tag & strips, 10 pcs.        | 003Z4660 |

Accessories - Fittings

| Type                                                                                | Comments                    | to pipe | to valve     | Code No. |
|-------------------------------------------------------------------------------------|-----------------------------|---------|--------------|----------|
|  | Tailpiece threaded (1 pcs.) | R ½     | DN 15        | 003Z0232 |
|                                                                                     |                             | R ¾     | DN 20        | 003Z0233 |
|                                                                                     |                             | R 1     | DN 25        | 003Z0234 |
|                                                                                     |                             | R 1¼    | DN 32        | 003Z0235 |
|                                                                                     |                             | R 1½    | DN 40        | 003Z0273 |
|                                                                                     |                             | R 2     | DN 50 (2 ¼") | 003Z0274 |

# Design

1. Valve body
2. Ball
3. Ball seat
4. Support screw
5. Throttle bush
6. Spindle head
7. Spindle
8. Shut off bush
9. Spring
10. Rotation lock
11. Top
12. Measuring nipple
13. Handle
14. Gasket for support screw



# Technical Data

## Materials and parts in contact with water

|              |                       |
|--------------|-----------------------|
| Valve body   | Brass - CW617N        |
| 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.

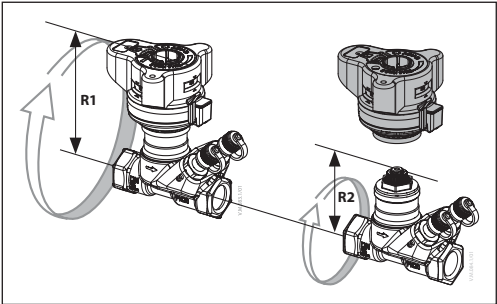
## Calibration of the handle

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

## Bi-directional functionality

If necessary (due to space constraints or any other reason), the MSV-D valve can be installed in the reversed orientation. The design of the valve means that kv of the valve remains the same in both orientation. For additional explanation of bi-directional functionality please use the link below or scan the QR code on the box label.

| DN | R1/R2 (mm) |
|----|------------|
| 15 | 92/57      |
| 20 | 95/60      |
| 25 | 98/63      |
| 32 | 121/86     |
| 40 | 125/90     |
| 50 | 129/94     |



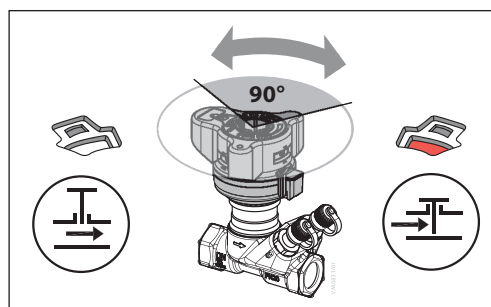
## Shut-Off

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

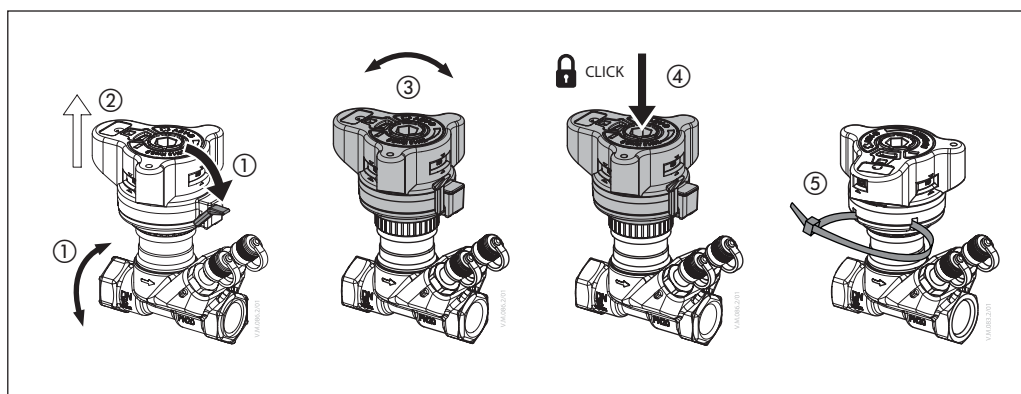
The shut-off function features a ball valve, which only requires a 90 degree turn to shut the valve completely.

An indicator window shows the actual setting:

- red = closed
- white = open



## 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. 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.

## Bi-directional functionality

Due to the valve's design it can be installed in the system so that the medium flows through the valve in same direction as is marked on the valve body (Flow arrow), or it can be installed in the system in the opposite direction, to that medium flows through the valve in the opposite direction to the marking on the valve body. The valve  $k_v$  values will remain unchanged, regardless of valve orientation.



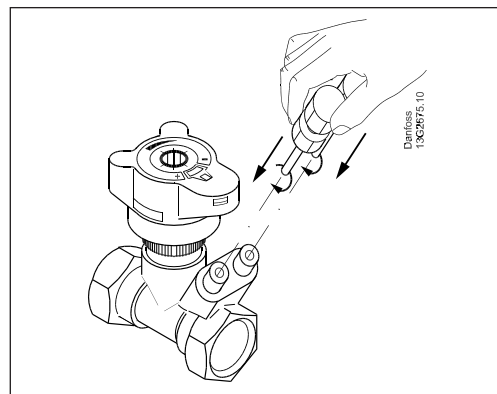
Please, scan QR code or click on link to see animation:  
<https://youtu.be/4zLTNO-jc4Y>

## Measuring

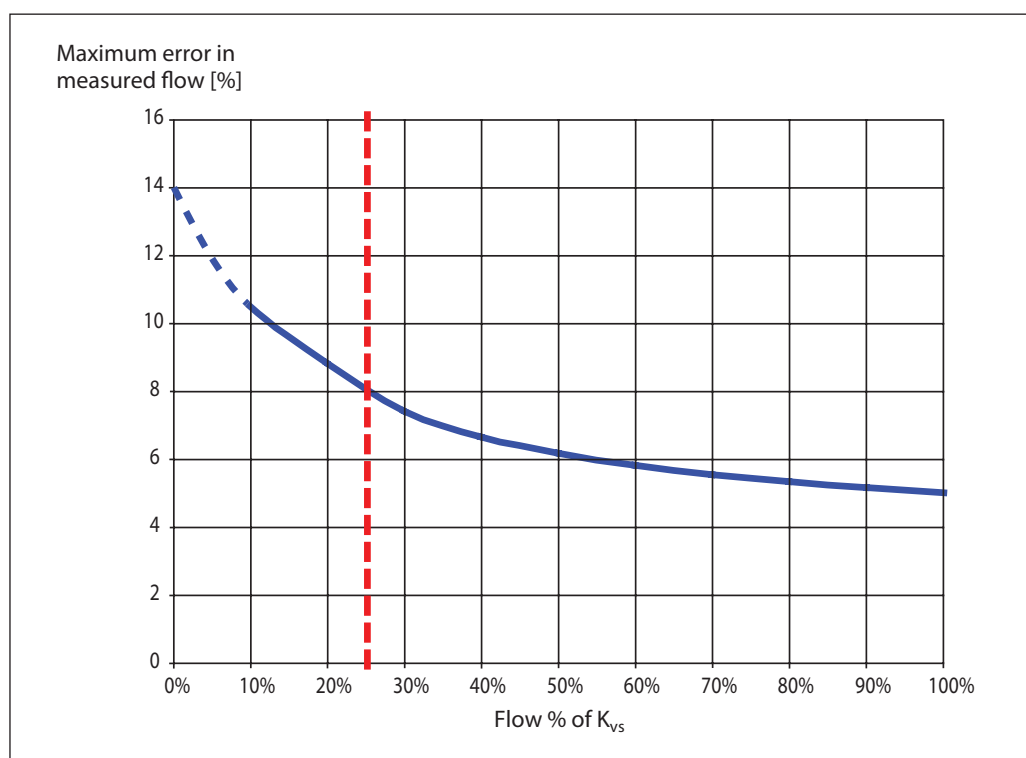
The flow through the LENO™ MSV-D valve can be measured using Danfoss PFM 100/1000 or other brands of measuring instruments. The LENO™ MSV-D valve is supplied with two measuring test ports for 3 mm needles.

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



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

LENO™ MSV-D 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 PFM1000 have all data in memory, and the instruments are using this formula:

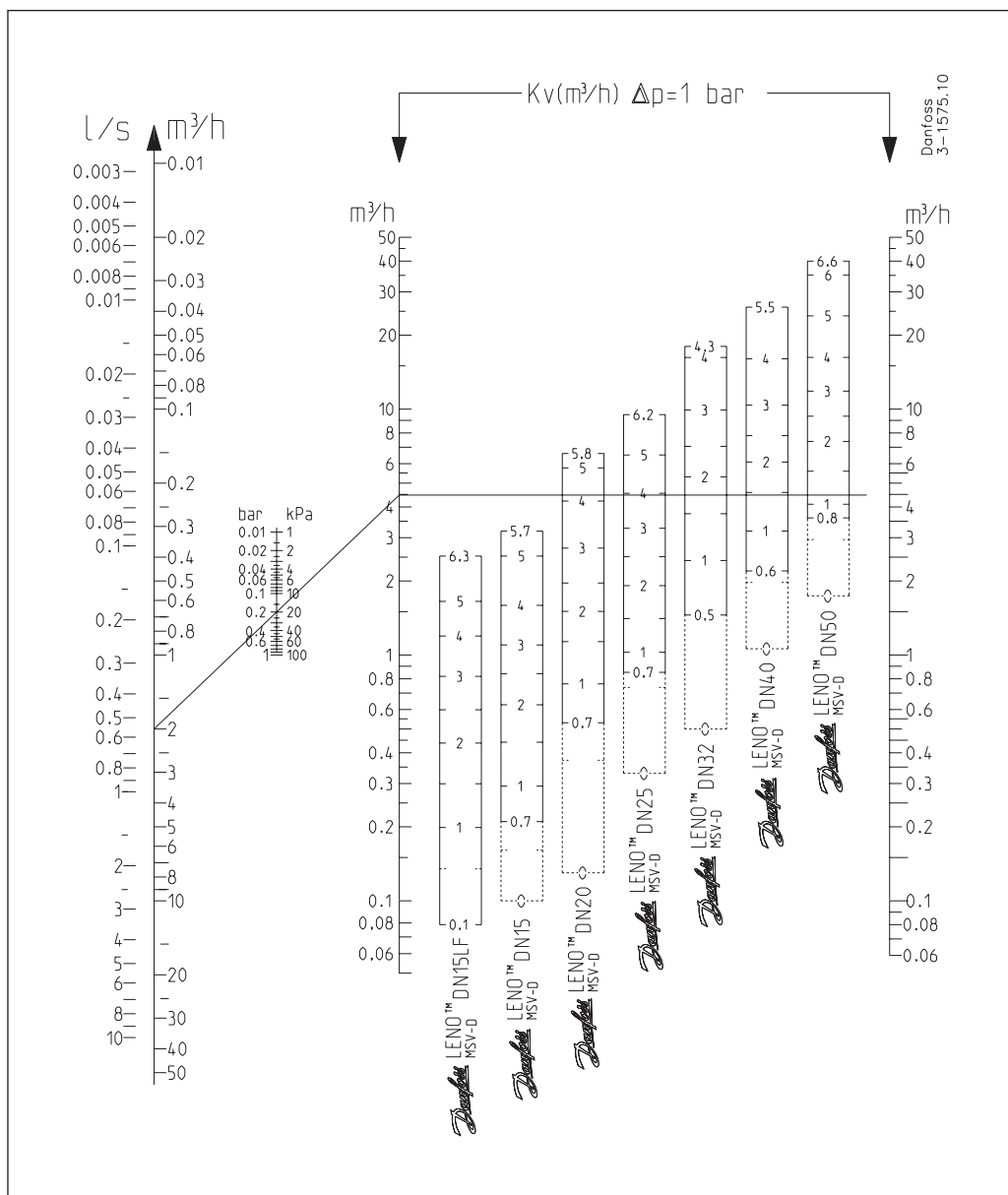
$$P_{val} = P_{sig} \left( 1 + 4 \cdot \frac{k_{v-sig}}{k_{v-val}} \right)^2$$

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

## 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  | 4.18  | 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  | 5.09  | 6.38  | -     | 20.24 | 23.30 |
| 5.4     | 1.79    | 2.46  | 5.14  | 6.57  | -     | 20.41 | 24.12 |
| 5.5     | 1.87    | 2.50  | 5.18  | 6.77  | -     | 20.48 | 24.94 |
| 5.6     | 1.93    | 2.54  | 5.21  | 6.96  | -     | -     | 25.76 |
| 5.7     | 1.99    | 2.57  | 5.24  | 7.15  | -     | -     | 26.58 |
| 5.8     | 2.04    | -     | 5.27  | 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 |

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



## Correction Factors

| Temp.<br>°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  $Q = 2 \text{ m}^3/\text{h}$

$\Delta p_r = 15 \text{ kPa}$

$\Delta p_a = 45 \text{ kPa}$

$\Delta p_m = 10 \text{ kPa}$

$\Delta p_i = \Delta p_a - \Delta p_r - \Delta p_m$

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

Correct valve size and presetting is found in flow diagramme, page 7.

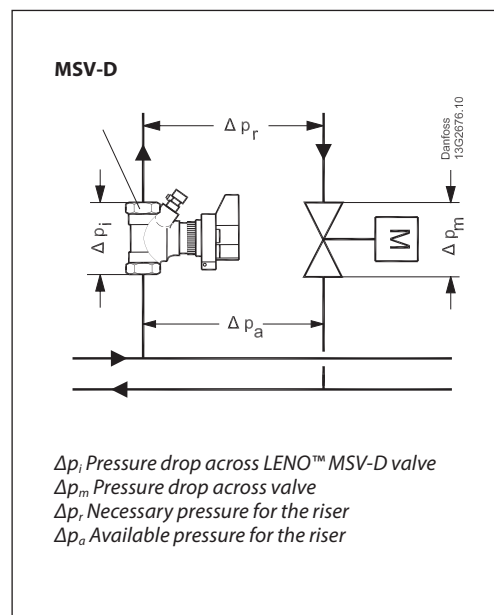
$Q = 2.0 \text{ m}^3/\text{h}$  and  $\Delta p_i = 20 \text{ kPa}$

On page 10 intersect guides and presetting is found to be 4.2 (DN 20 valve)

Setting can be also calculated from the formula:

$$k_v = \frac{Q[\text{m}^3/\text{h}]}{\sqrt{p_i[\text{bar}]}} = \frac{2.0}{\sqrt{0.2}} = 4.5 \text{ m}^3/\text{h}$$

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

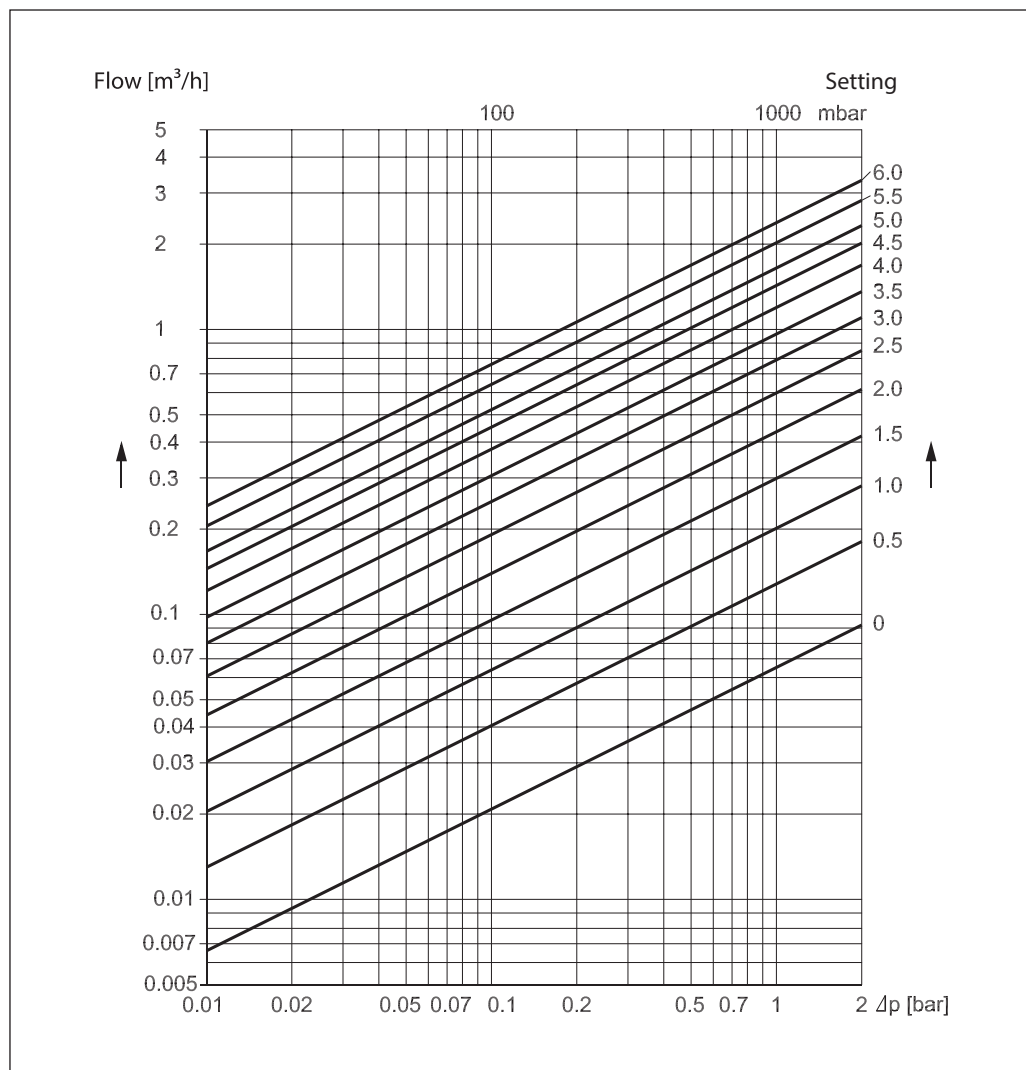




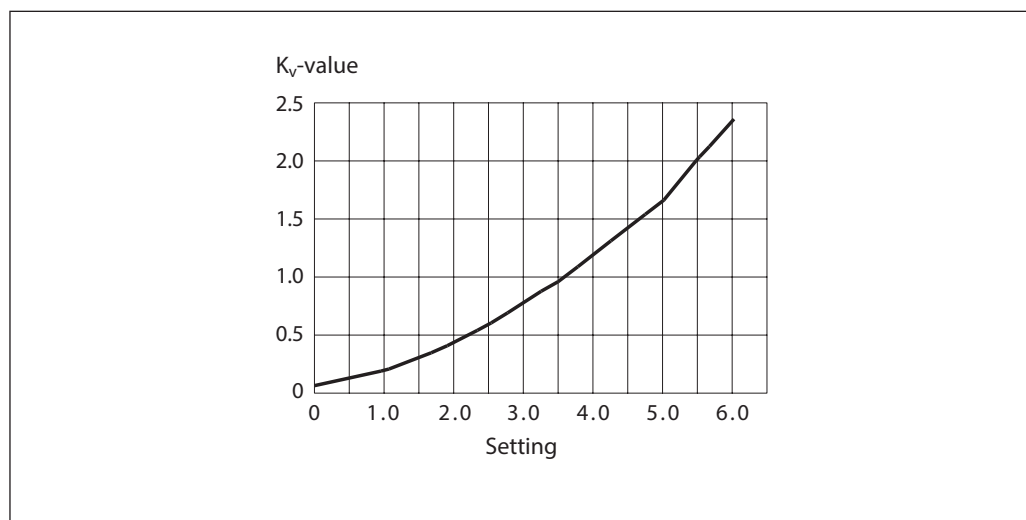
Flow Diagrammes, DN 15 LF

| 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                  |
| 0.10    | 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                  |

LENO™ MSV-D DN 15 LF



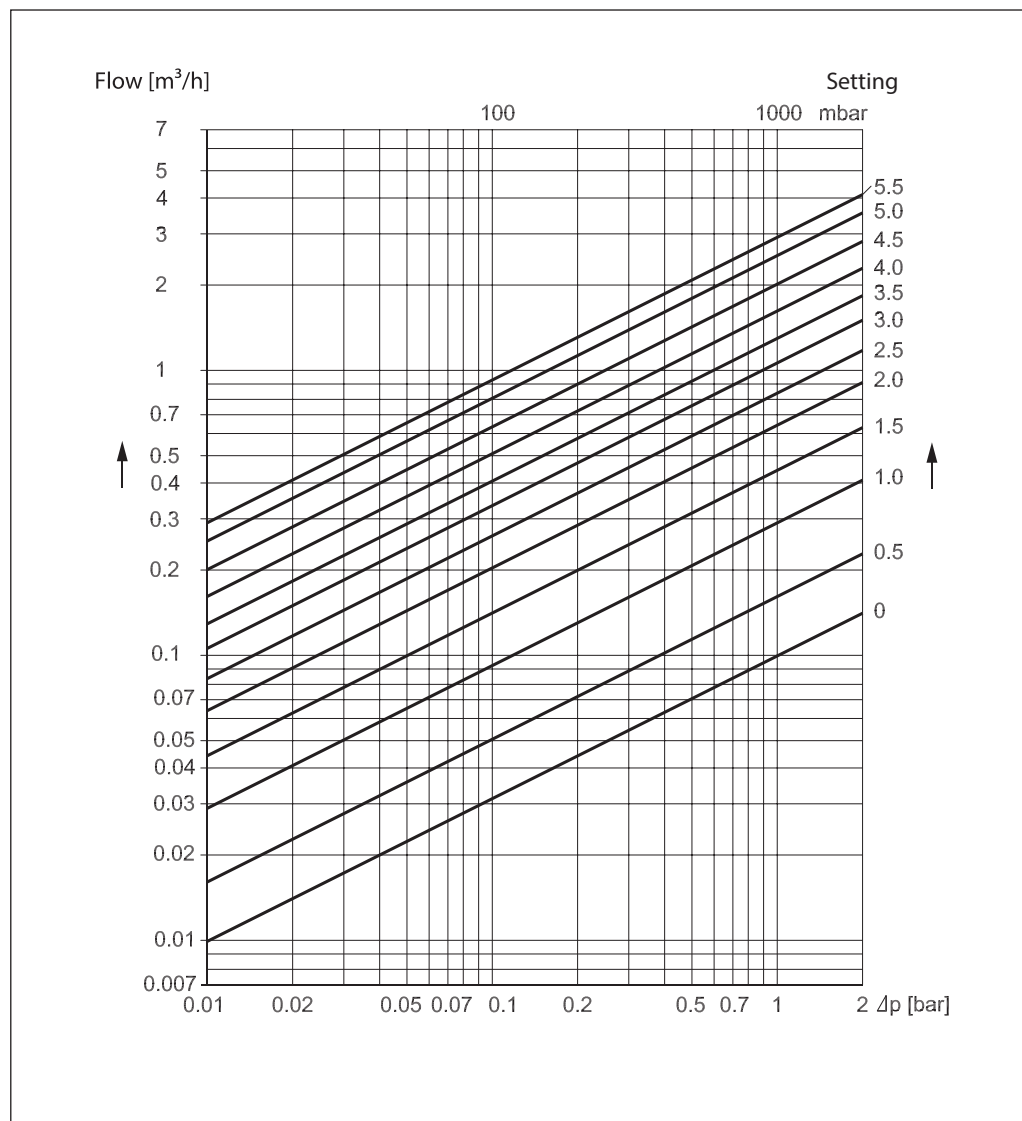
Flow characteristics



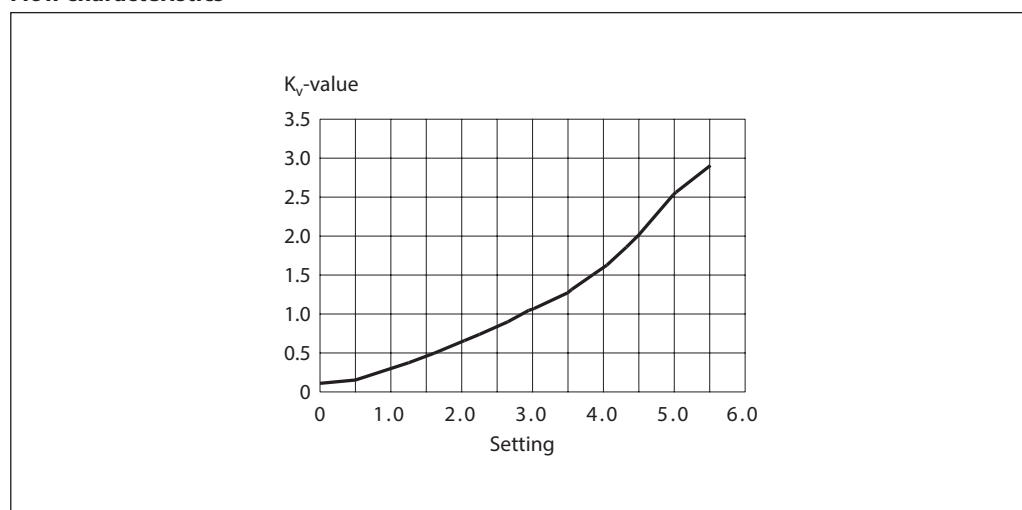
Flow Diagrammes, DN 15

| Setting | k <sub>v</sub> -value |
|---------|-----------------------|
| 0.0     | 0.11                  |
| 0.1     | 0.12                  |
| 0.2     | 0.13                  |
| 0.3     | 0.14                  |
| 0.4     | 0.16                  |
| 0.5     | 0.19                  |
| 0.6     | 0.20                  |
| 0.7     | 0.21                  |
| 0.8     | 0.24                  |
| 0.9     | 0.27                  |
| 0.10    | 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                  |

LENO™ MSV-D DN 15



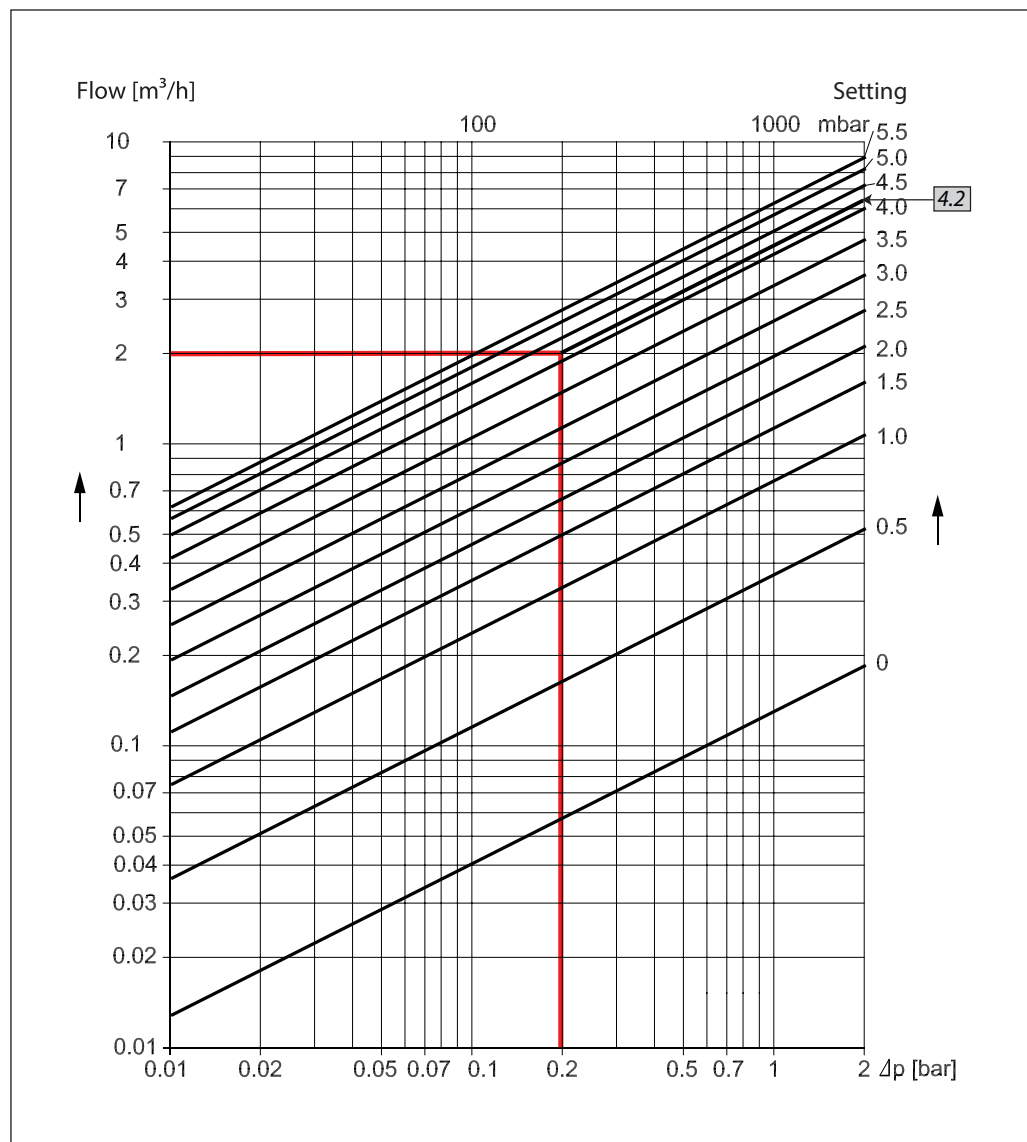
Flow characteristics



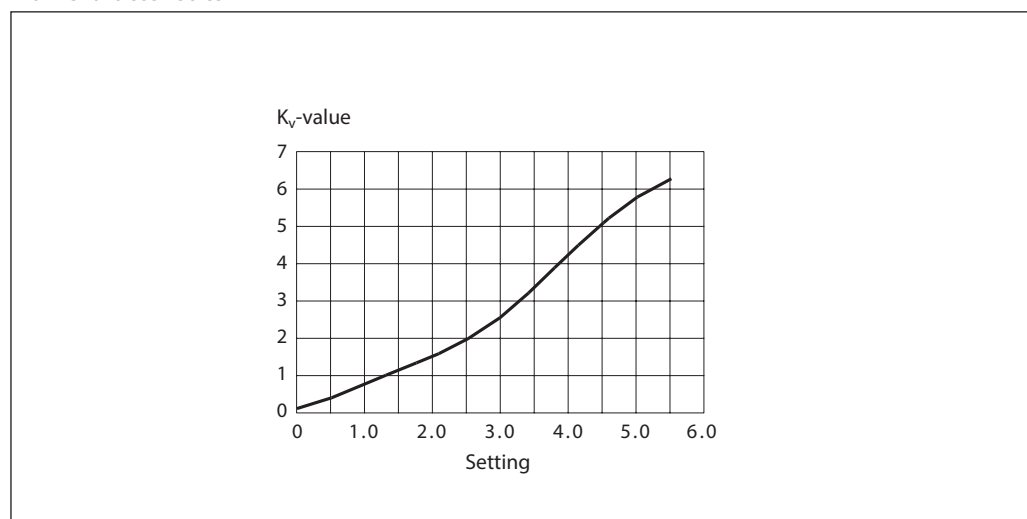
Flow Diagrammes, DN 20

| Setting | k <sub>v</sub> -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                  |
| 0.10    | 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     | 5.99                  |
| 5.3     | 6.09                  |
| 5.4     | 6.19                  |
| 5.5     | 6.29                  |
| 5.6     | 6.39                  |
| 5.7     | 6.49                  |
| 5.8     | 6.60                  |

LENO™ MSV-D DN 20



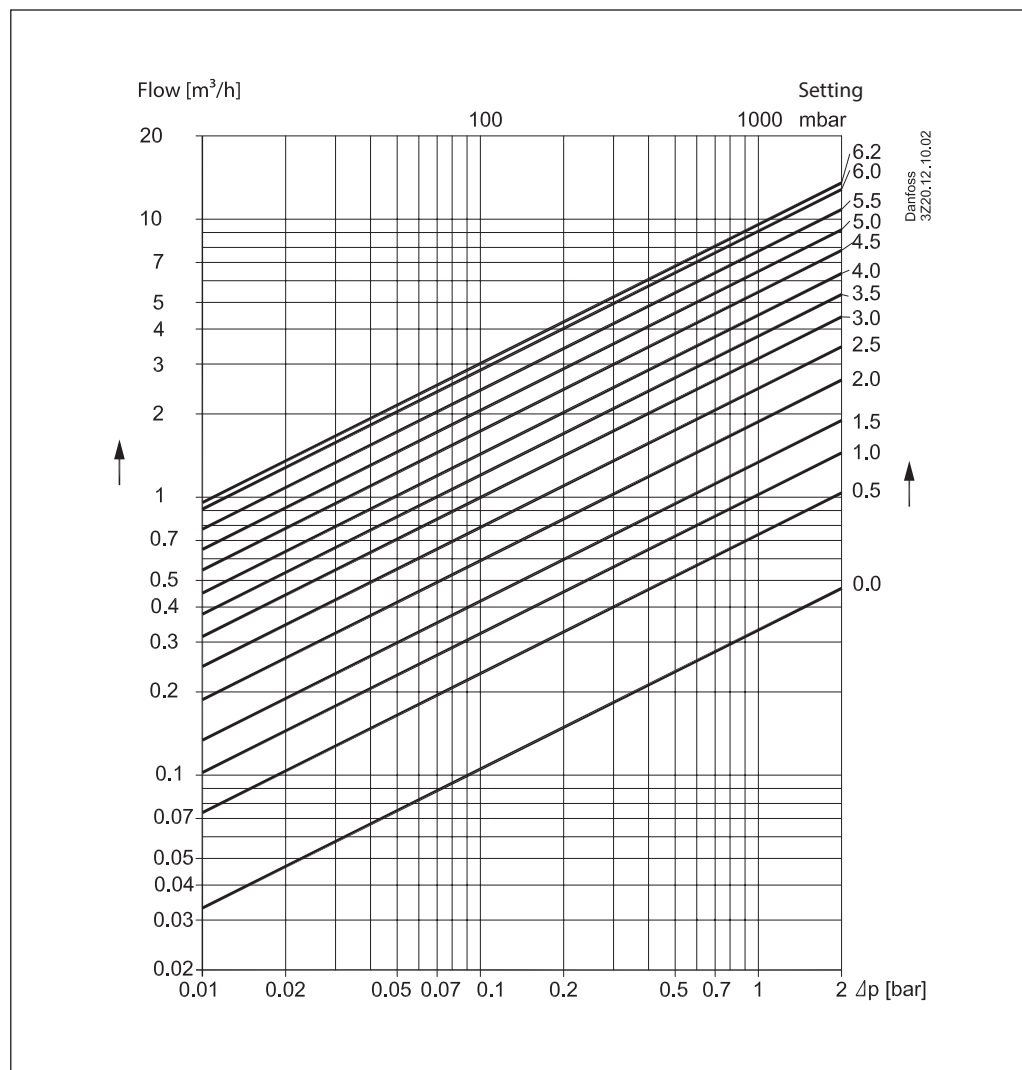
Flow characteristics



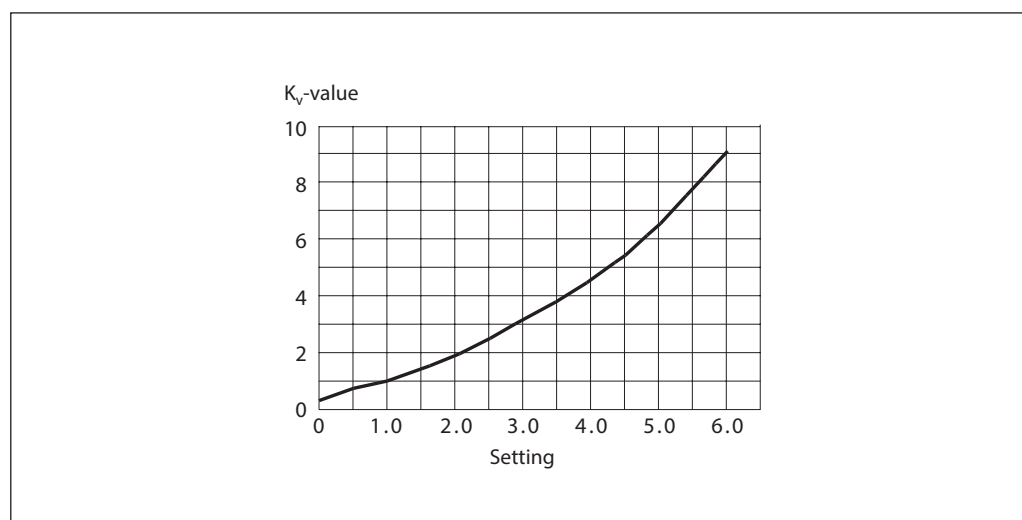
Flow Diagrammes, DN 25

| 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                  |
| 0.10    | 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                  |

LENO™ MSV-D DN 25



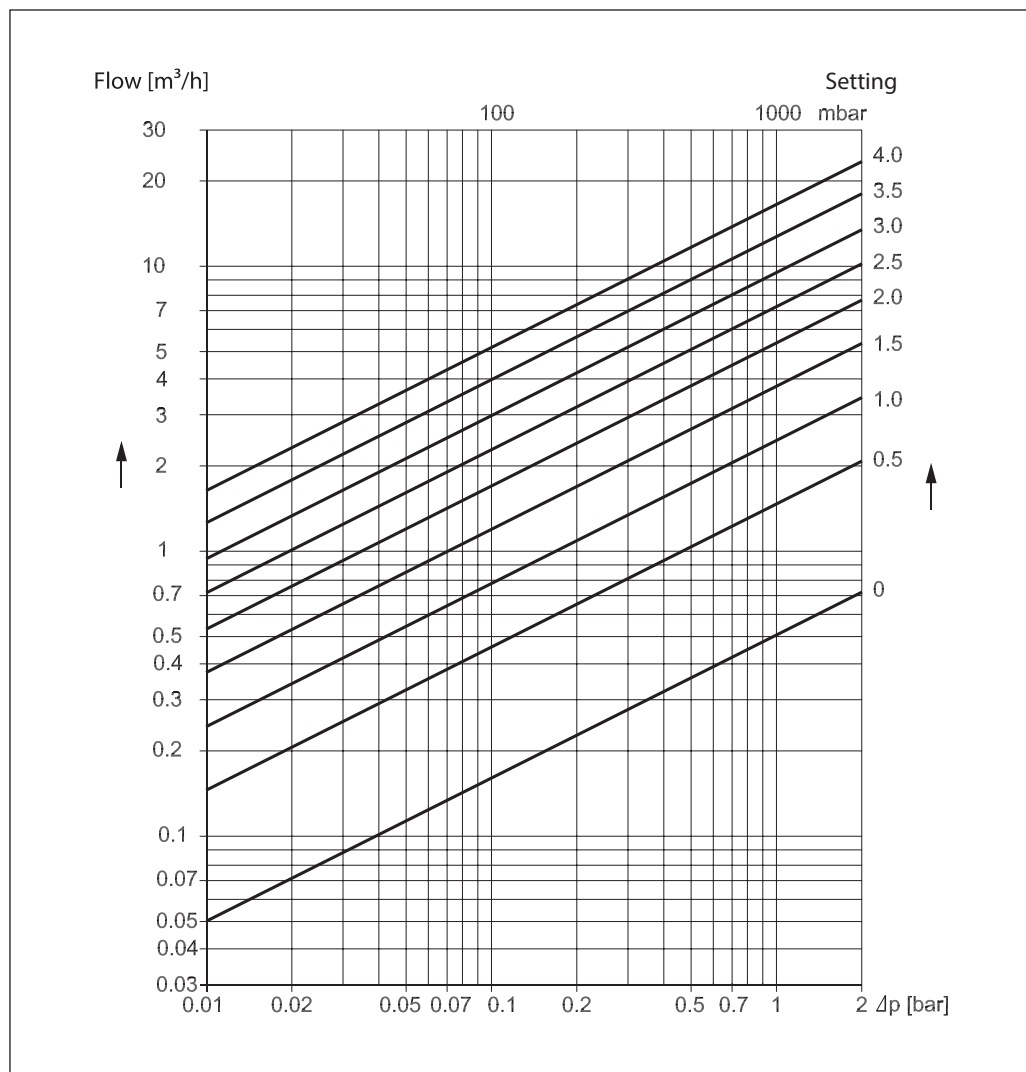
Flow characteristics



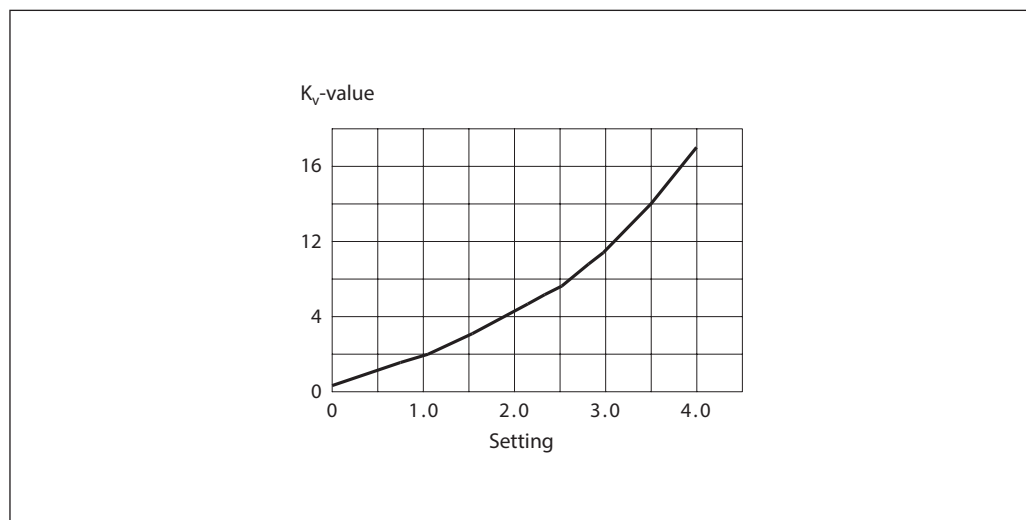
Flow Diagrammes, DN 32

| Setting | k <sub>v</sub> -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                  |
| 0.10    | 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                 |

LENO™ MSV-D DN 32



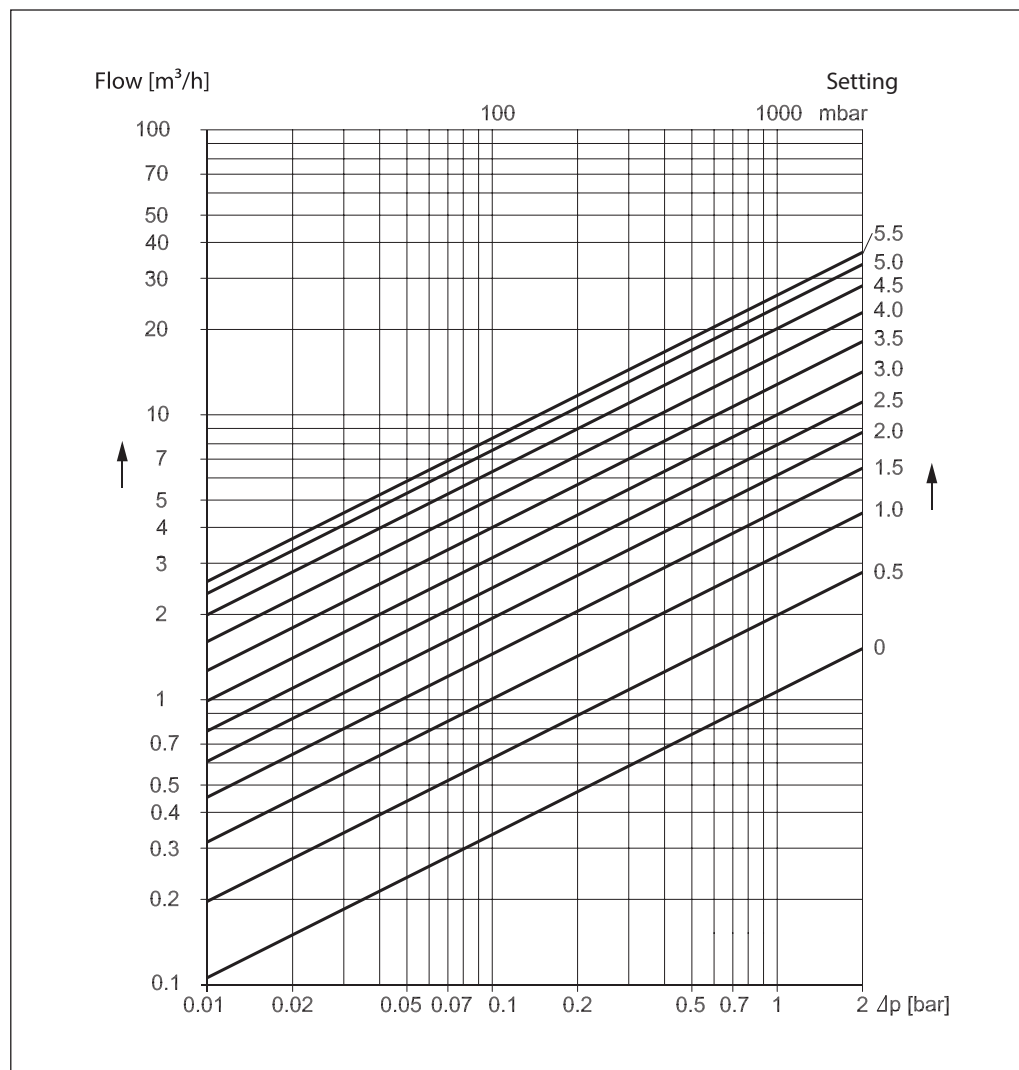
Flow characteristics



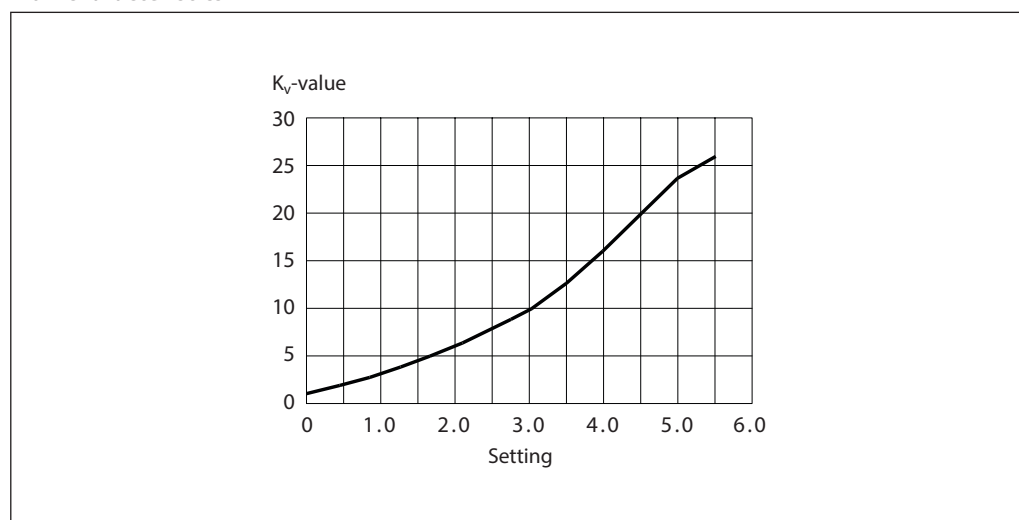
Flow Diagrammes, DN 40

| 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                 |

LENO™ MSV-D DN 40



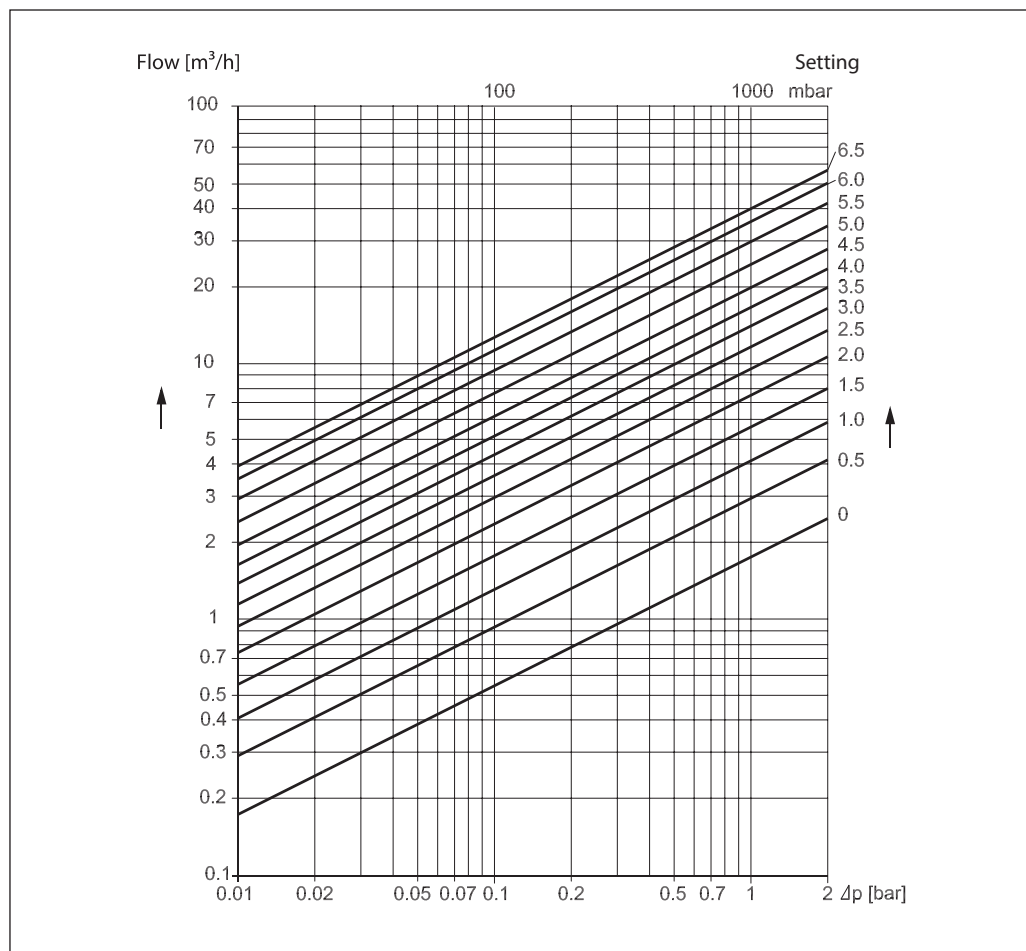
Flow characteristics



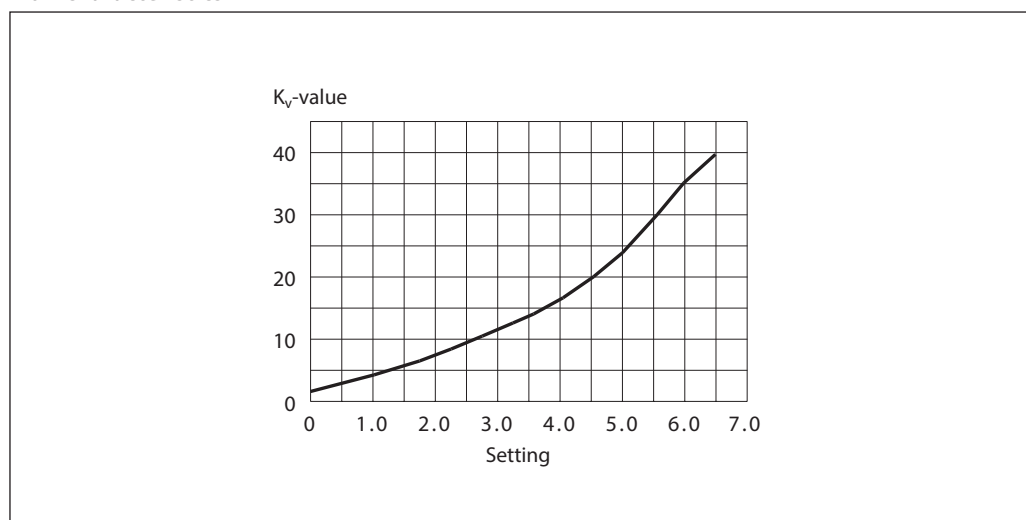
Flow Diagrammes, DN 50

| 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                 |

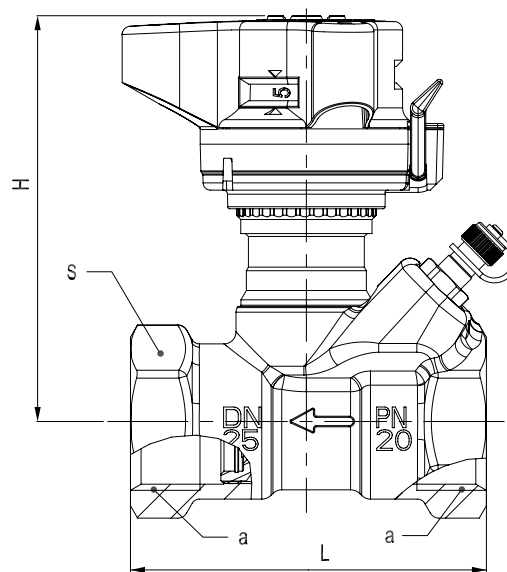
LENO™ MSV-D DN 50



Flow characteristics



Dimensions



| Size<br>(DN) | Connections<br>a (ISO 228/2) | L<br>(mm) | H<br>(mm) | S<br>(mm) |
|--------------|------------------------------|-----------|-----------|-----------|
| 15           | G ½                          | 76        | 92        | 27        |
| 20           | G ¾                          | 80        | 95        | 32        |
| 25           | G 1                          | 86        | 98        | 41        |
| 32           | G 1¼                         | 102       | 121       | 50        |
| 40           | G 1½                         | 102       | 125       | 55        |
| 50           | G 2                          | 130       | 129       | 67        |



## Tender specifications

| Features                                                           | LENO™ MSV-D |
|--------------------------------------------------------------------|-------------|
| 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 valve is bi-directional.

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

There are no requirements for inlet and outlet conditions.

The LENO™ MSV-D measuring accuracy is 10% up to 25% of max. setting.  
Accuracy is according to BS 7350 : 1990.

Measuring instruments must be equipped with 3mm measuring needles. Danfoss recommends using Danfoss PFM100 or Danfoss PFM1000.

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 kvs-value

The valve body is made of CW617N brass.  
The ball is made of chromium plated brass.  
O-rings are made of EPDM rubber.



**Danfoss A/S**

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