

## HydroControl VFC, VFN, VFR

### Double regulating and commissioning valves PN 16/PN 25/PN 6, DN 20...400



The HydroControl VFx (short designation, representative of VFC, VFN und VFR) is a flanged double regulating and commissioning valve for the static hydronic balancing of pipelines in closed heating and cooling systems. It offers a measuring function via the valve seat.

The HydroControl VFx consists of a flow optimised Y-pattern body with flanged connection, a valve insert with double O-ring sealing, ergonomically designed handwheel, low pitch and sophisticated cone shaped plug as well as two Classic measuring valves. All functions are accessible from the top and include the following:

- Accurate flow regulation
- Reproducible, blockable and lead sealable infinitely adjustable presetting
- Pipeline shutoff
- Flow measurement connection
- Optional filling, bleeding and draining
- Optional connection of the impulse tube of a differential pressure regulator

#### Features

- + Complete portfolio up to nominal size DN 400
- + Flanges with hole circles according to EN1092-2 PN 16, PN 25, PN 6 or according to ANSI class 150
- + Made of cast iron, nodular cast iron or bronze

#### Variants

The HydroControl VFC is the standard valve with cast iron body. It is available in PN 16 up to DN 400 and in PN 6 or ANSI.

The HydroControl VFN is the PN 25 variant with nodular cast iron body.

The HydroControl VFR is a PN 16 variant with bronze body and bonnet. It is suitable for difficult media.

# Product Details

## Technical Data

|                       | HydroControl VFC                                                                                                             | HydroControl VFN             | HydroControl VFR                                                                                                                                                          |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal sizes         | DN 20...400<br>¾...16"                                                                                                       | DN 65...300                  | DN 50...200                                                                                                                                                               |
| Flange versions       | According to EN 1092-2 PN 16 <sup>1</sup><br>According to EN 1092-2 PN 6<br>According to ANSI class 150                      | According to EN 1092-2 PN 25 | According to EN 1092-2 PN 16                                                                                                                                              |
| Length                | According to EN 558, basic series 1 <sup>2</sup>                                                                             |                              |                                                                                                                                                                           |
| Operating temperature | -10...150 °C                                                                                                                 | -20...150 °C                 | -20...150 °C                                                                                                                                                              |
| Operating pressure    | Max. 16 bar<br>Max. 20 bar for cold water<br>With flanges PN 6: max. 6 bar                                                   | Max. 25 bar                  | Max. 16 bar<br>Max. 20 bar for cold water                                                                                                                                 |
| Medium                | Heating and cooling water according to VDI 2035 or ÖNORM 5195<br>Water and glycol mixtures with a max. glycol content of 50% |                              | Heating and cooling water according to VDI 2035 or ÖNORM 5195<br>Water-glycol mixtures with a max. glycol content of 50 %<br>Cold salt water up to 38 °C<br>Service water |
| Kvs values            | 4.8...3,750                                                                                                                  | 98...1,600                   | 36...815                                                                                                                                                                  |
| Storage temperature   | -20...60 °C                                                                                                                  |                              |                                                                                                                                                                           |

## Functions

### Flow Regulation

Flow regulation is done by limiting the valve lift and hence the opening between plug and seat. The low pitch allows very precise setting. The plug position is displayed on a scale on the handwheel. This value is the presetting value.

The HydroControl has an almost linear characteristic line and a wide flow range evenly graded over all nominal sizes. As is typical for regulating valves, the control quality decreases the smaller the opening is between plug and seat. Very small presettings are therefore not recommended for the HydroControl and are generally not specified.

### Presetting

- Infinitely: all intermediate values are adjustable
- Reproducible: when the valve is closed, it can only be opened up to the set presetting value
- Blockable: Valves up to and including DN 50 can be blocked at the presetting position, i.e. locked against opening or closing. The blocking set item no. 1060180 is required for this (see chapter Accessories, further on)
- Lead sealable: the valve can be additionally lead sealed, e.g. with the wire seal kit item no. 1089091 (see chapter Accessories)

### Shutoff

Turning the handwheel clockwise until it stops shuts off the pipeline tightly.

<sup>1</sup> EN 1092-2 PN6 / PN16 / PN25 corresponds to ISO 7005-2 PN 6 / PN 16 / PN 25

<sup>2</sup> EN 558, basic series 1 corresponds to ISO 5752, series 1

## Flow Determination

Each HydroControl VFX is equipped with two Classic measuring valves in order to be able to measure the differential pressure and thus determine the flow rate. The Oventrop OV-DMC 3 measuring device contains the required measuring needles and the characteristic lines of all HydroControl VFX are stored as standard.

Due to the patented measuring arrangement (measuring chamber is routed around the valve insert to the measuring connection), the pressure difference measured at the measuring valves almost matches the actual pressure difference of the valve.

### FILLING, DRAINING AND BLEEDING

For filling, draining and bleeding, one or both Classic measuring valves can be replaced with fill and drain ball valves. For replacement, the valve must be depressurised. To ensure tightness, use the fill and drain ball valve item no. 1060191 (see chapter Accessories).

A flow determination can still be carried out, as the necessary adapters for connection to fill and drain ball valves are included with the OV-DMC 3 measuring device.

### IMPULSE TUBE CONNECTION

To connect an impulse tube, one of the measuring valves must also be replaced with a fill and drain ball valve. The impulse tube of the differential pressure regulator is connected to the hose connection of the fill and drain ball valve. Flow determination by the HydroControl VFX is then only possible with a separate measuring adapter item no. 1060299 (see chapter Accessories).

### CONNECTION OF AN OV-DMC 3

The measuring hoses of an OV-DMC 3 measuring device can be connected to the Classic measuring valves with needle adapters. The needle adapters are supplied with the OV-DMC 3.

## Materials

| Component          | Nominal size      | HydroControl VFC                      | HydroControl VFN                      | HydroControl VFR      |
|--------------------|-------------------|---------------------------------------|---------------------------------------|-----------------------|
| Handwheel assembly | All               | Polyamide plastic PA6                 | Polyamide plastic PA6                 | Polyamide plastic PA6 |
| Body               | up to DN 300      | Cast iron <sup>3</sup>                | Nodular cast iron GGG-50 <sup>4</sup> | Bronze <sup>5</sup>   |
|                    | DN 350 and DN 400 | Nodular cast iron GGG-50              | —                                     | —                     |
| Bonnet             | DN 20...50        | Bronze                                | —                                     | Bronze                |
|                    | DN 65...80        | Cast iron                             | Bronze                                | Bronze                |
|                    | DN 100...150      | Bronze                                | Bronze                                | Bronze                |
|                    | DN 200...300      | Nodular cast iron GGG-40 <sup>6</sup> | Nodular cast iron GGG-40              | Bronze                |
|                    | DN 350 and DN 400 | Nodular cast iron GGG-50              | —                                     | —                     |
| Bonnet sealing     | All               | 2 x EPDM O-ring                       | 2 x EPDM O-ring                       | 2 x EPDM O-ring       |
| Spindle            | All               | DZR brass <sup>7</sup>                | DZR brass                             | Stainless steel       |
| Spindle sealing    | All               | 2 x EPDM O-ring                       | 2 x EPDM O-ring                       | 2 x EPDM O-ring       |
| Plug               | DN 20...50        | DZR brass                             | —                                     | Bronze                |
|                    | DN 65...80        | DZR brass                             | Bronze                                | Bronze                |
|                    | DN 100...400      | Bronze                                | Bronze                                | Bronze                |
| Seat sealing       | All               | PTFE                                  | PTFE                                  | PTFE                  |
| Measuring valves   | All               | DZR brass                             | DZR brass                             | DZR brass             |

<sup>3</sup> Cast iron EN-GJL-250 according to EN 1561 (GG-25)

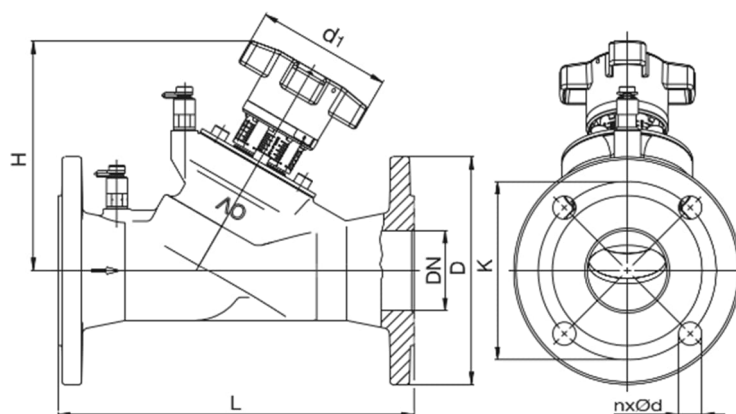
<sup>4</sup> Nodular cast iron EN-GJS-500-7 according to EN 1563 (GGG-50)

<sup>5</sup> Bronze CC491K (Rg5)

<sup>6</sup> Nodular cast iron EN-GJS-400-15 according to EN 1563 (GGG-40)

<sup>7</sup> Dezincification resistant brass CW602

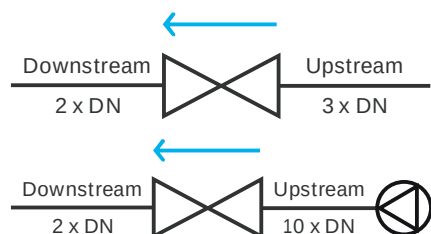
## Dimensions



| DN / Inch       | All VFX |     |     | VFC, VFR PN 16 |     |         | VFC PN 6 |     |        | VFN PN 25 |     |         | VFC ANSI |     |         |
|-----------------|---------|-----|-----|----------------|-----|---------|----------|-----|--------|-----------|-----|---------|----------|-----|---------|
|                 | L       | H   | d1  | D              | K   | n x Ød  | D        | K   | n x Ød | D         | K   | n x Ød  | D        | K   | n x Ød  |
| <b>20 / ¾</b>   | 150     | 118 | 70  | 105            | 75  | 4 x 14  | 90       | 65  | 4 x 11 |           |     |         | 99       | 70  | 4 x 16  |
| <b>25 / 1</b>   | 160     | 118 | 70  | 115            | 85  | 4 x 14  | 100      | 75  | 4 x 11 |           |     |         | 108      | 79  | 4 x 16  |
| <b>32 / 1¼</b>  | 180     | 136 | 70  | 140            | 100 | 4 x 19  | 120      | 90  | 4 x 14 |           |     |         | 118      | 89  | 4 x 16  |
| <b>40 / 1½</b>  | 200     | 136 | 70  | 150            | 110 | 4 x 19  | 130      | 100 | 4 x 14 |           |     |         | 127      | 98  | 4 x 16  |
| <b>50 / 2</b>   | 230     | 145 | 70  | 165            | 125 | 4 x 19  | 140      | 110 | 4 x 14 |           |     |         | 153      | 121 | 4 x 19  |
| <b>65 / 2½</b>  | 290     | 188 | 110 | 185            | 145 | 4 x 19  | 160      | 130 | 4 x 14 | 185       | 145 | 8 x 19  | 185      | 140 | 4 x 19  |
| <b>80 / 3</b>   | 310     | 203 | 110 | 200            | 160 | 8 x 19  | 190      | 150 | 4 x 19 | 200       | 160 | 8 x 19  | 200      | 152 | 4 x 19  |
| <b>100 / 4</b>  | 350     | 240 | 160 | 220            | 180 | 8 x 19  | 210      | 170 | 4 x 19 | 235       | 190 | 8 x 23  | 220      | 191 | 8 x 19  |
| <b>125 / 5</b>  | 400     | 283 | 160 | 250            | 210 | 8 x 19  | 240      | 200 | 8 x 19 | 270       | 220 | 8 x 28  | 250      | 216 | 8 x 22  |
| <b>150 / 6</b>  | 480     | 285 | 160 | 285            | 240 | 8 x 23  | 265      | 225 | 8 x 19 | 300       | 250 | 8 x 28  | 285      | 241 | 8 x 22  |
| <b>200 / 8</b>  | 600     | 467 | 300 | 340            | 295 | 12 x 23 | 320      | 280 | 8 x 19 | 360       | 310 | 12 x 28 | 340      | 298 | 8 x 22  |
| <b>250 / 10</b> | 730     | 480 | 300 | 405            | 355 | 12 x 28 |          |     |        | 425       | 370 | 12 x 31 | 405      | 362 | 12 x 25 |
| <b>300 / 12</b> | 850     | 515 | 300 | 460            | 410 | 12 x 28 |          |     |        | 485       | 430 | 16 x 31 | 485      | 432 | 12 x 25 |
| <b>350 / 14</b> | 980     | 560 | 300 | 520            | 470 | 16 x 28 |          |     |        |           |     |         | 535      | 476 | 12 x 28 |
| <b>400 / 16</b> | 1.100   | 655 | 300 | 580            | 525 | 16 x 31 |          |     |        |           |     |         |          |     |         |

All specifications in mm.

## Installation



- Calming sections of 3 x DN upstream and 2 x DN downstream of the valve should be provided.
- When installing directly downstream of a pump, a calming section of 10 x DN should be provided.
- The valve must be installed correctly in the flow direction which is indicated by an arrow on the body.

# Item Numbers

| DN / Inch       | HydroControl VFC<br>PN 16 | HydroControl VFC<br>PN 6 | HydroControl VFC<br>ANSI | HydroControl VFN | HydroControl VFR |
|-----------------|---------------------------|--------------------------|--------------------------|------------------|------------------|
| <b>20 / ¾</b>   | 1062646                   | 1062676                  | 1062946                  |                  |                  |
| <b>25 / 1</b>   | 1062647                   | 1062677                  | 1062947                  |                  |                  |
| <b>32 / 1¼</b>  | 1062648                   | 1062678                  | 1062948                  |                  |                  |
| <b>40 / 1½</b>  | 1062649                   | 1062679                  | 1062949                  |                  |                  |
| <b>50 / 2</b>   | 1062650                   | 1062680                  | 1062950                  |                  | 1062350          |
| <b>65 / 2½</b>  | 1062651                   | 1062681                  | 1062951                  | 1062451          | 1062351          |
| <b>80 / 3</b>   | 1062652                   | 1062682                  | 1062952                  | 1062452          | 1062352          |
| <b>100 / 4</b>  | 1062653                   | 1062683                  | 1062953                  | 1062453          | 1062353          |
| <b>125 / 5</b>  | 1062654                   | 1062684                  | 1062954                  | 1062454          | 1062354          |
| <b>150 / 6</b>  | 1062655                   | 1062685                  | 1062955                  | 1062455          | 1062355          |
| <b>200 / 8</b>  | 1062656                   | 1062686                  | 1062956                  | 1062456          | 1062356          |
| <b>250 / 10</b> | 1062657                   |                          | 1062957                  | 1062457          |                  |
| <b>300 / 12</b> | 1062658                   |                          | 1062958                  | 1062458          |                  |
| <b>350 / 14</b> | 1062659                   |                          | 1062959                  |                  |                  |
| <b>400 / 16</b> | 1062660                   |                          | 1062960                  |                  |                  |

## Accessories

### Thermal insulation shell

Made of polyurethane rigid foam with polystyrene shell. For heating and cooling systems. Operating temperature -10 to 130 °C. Building material class B2 according to DIN 4102. Meets the requirements of Appendix 8 to Sections 69 and 71(1) line ee) of the German Building Energy Act (GEG). Cold insulation: Min. medium temperature 6 °C, shells have to be bonded hermetically. Restricted diffusion tightness at low medium temperature and at high ambient temperature and/or air humidity.

|                                                                                     | Suitable for | Item no. |
|-------------------------------------------------------------------------------------|--------------|----------|
|  | DN 20        | 1062581  |
|                                                                                     | DN 25        | 1062582  |
|                                                                                     | DN 32        | 1062583  |
|                                                                                     | DN 40        | 1062584  |
|                                                                                     | DN 50        | 1062585  |
|                                                                                     | DN 65        | 1062586  |
|                                                                                     | DN 80        | 1062587  |
|                                                                                     | DN 100       | 1062588  |
|                                                                                     | DN 125       | 1062589  |
|                                                                                     | DN 150       | 1062590  |

### Spindle extension 35 mm

For valve insulation with commercially available insulation material. Not to be used in combination with the Oventrop thermal insulation shells.

|                                                                                      | Suitable for | Item no. |
|--------------------------------------------------------------------------------------|--------------|----------|
|  | DN 20...50   | 1688296  |
|                                                                                      | DN 65...150  | 1688297  |

### Measuring valve extension

|                                                                                      | Suitable for                    | Item no. |
|--------------------------------------------------------------------------------------|---------------------------------|----------|
|  | for all nominal sizes,<br>80 mm | 1060295  |
|                                                                                      | for all nominal sizes,<br>40 mm | 1688295  |

## Blocking set

Consisting of blocking head, seal and sealing wire.

|                                                                                   | Suitable for | Item no. |
|-----------------------------------------------------------------------------------|--------------|----------|
|  | DN 20...50   | 1060180  |

## Wire seal kit

10-fold, consisting of seal and sealing wire.

|                                                                                   | Suitable for      | Item no. |
|-----------------------------------------------------------------------------------|-------------------|----------|
|  | All nominal sizes | 1089091  |

## Identification ring

10-fold, for riser identification, can be clipped onto the handwheel.

|                                                                                    | Colour | Item no. |
|------------------------------------------------------------------------------------|--------|----------|
|  | Blue   | 1069650  |
|                                                                                    | Red    | 1069651  |

## Fill and drain ball valve

|                                                                                    | Suitable for      | Item no. |
|------------------------------------------------------------------------------------|-------------------|----------|
|  | All nominal sizes | 1060191  |

## Measuring adapter, 2-fold

|                                                                                    | Suitable for      | Item no. |
|------------------------------------------------------------------------------------|-------------------|----------|
|  | All nominal sizes | 1060299  |

## Replacement insert

|                                                                                    | Suitable for | Item no. |
|------------------------------------------------------------------------------------|--------------|----------|
|  | DN 20        | 1069006  |
|                                                                                    | DN 25        | 1069008  |
|                                                                                    | DN 32        | 1069010  |
|                                                                                    | DN 40        | 1069012  |
|                                                                                    | DN 50        | 1069016  |

# Sizing

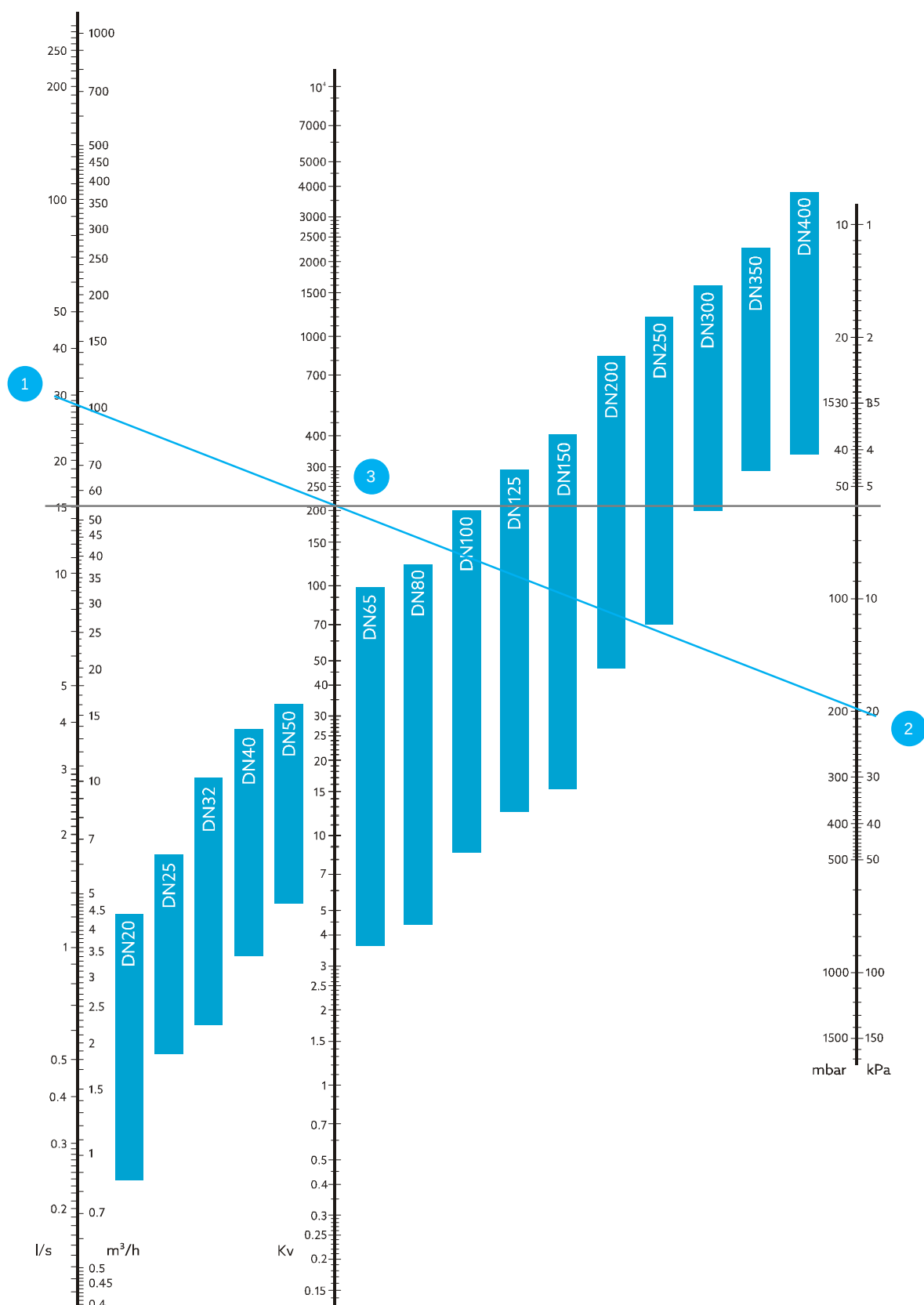
This data sheet offers you various options to size your HydroControl VFX:

- Use the alignment chart below for a quick sizing across all nominal sizes.
- Use the Kv value tables and flow charts in the "Flow data" section for an accurate determination of the presetting value.
- At the end of the data sheet you will find information on the exact Kv value calculation taking into account the medium temperature. Furthermore, you will find information on the approximate calculation of corrected flow values when using glycol mixtures.

## Alignment Chart

The alignment chart allows you to graphically determine the Kv value. Draw a line and place it so that it crosses the desired flow rate (1) on the left scale and the available differential pressure (2) on the right scale - in the example below it is the blue line that crosses the respective scales at 100 m³/h and 20 kPa. Now you can read off the Kv value (3) from the middle scale, in this case 223.

If you draw a line from the Kv-value scale to the right (in the example below, the grey line), you will immediately see which nominal sizes come into question for the required flow rate. For a Kv value of 223, DN 125 to DN 250 are possible. Since control and regulating valves are reluctant to operate at the lower end of their capacity, DN 300 should not be selected.



## Flow Data DN 20 to DN 50

### Kv Values DN 20

| Pre-decimal point | Decimal point presetting |      |      |      |      |      |      |      |      |      |
|-------------------|--------------------------|------|------|------|------|------|------|------|------|------|
|                   | .0                       | .1   | .2   | .3   | .4   | .5   | .6   | .7   | .8   | .9   |
| 1                 | 0.42                     | 0.48 | 0.52 | 0.55 | 0.59 | 0.63 | 0.67 | 0.70 | 0.75 | 0.79 |
| 2                 | 0.83                     | 0.87 | 0.91 | 0.95 | 0.99 | 1.04 | 1.08 | 1.12 | 1.16 | 1.20 |
| 3                 | 1.25                     | 1.30 | 1.35 | 1.41 | 1.47 | 1.54 | 1.61 | 1.70 | 1.79 | 1.89 |
| 4                 | 2.00                     | 2.11 | 2.22 | 2.33 | 2.43 | 2.54 | 2.65 | 2.76 | 2.87 | 2.98 |
| 5                 | 3.09                     | 3.19 | 3.30 | 3.41 | 3.52 | 3.63 | 3.74 | 3.84 | 3.95 | 4.06 |
| 6                 | 4.17                     | 4.27 | 4.35 | 4.43 | 4.5  | 4.56 | 4.61 | 4.66 | 4.70 | 4.74 |
| 7                 | 4.77                     |      |      |      |      |      |      |      |      |      |

### Kv Values DN 25

| Pre-decimal point | Decimal point presetting |      |      |      |      |      |      |      |      |      |
|-------------------|--------------------------|------|------|------|------|------|------|------|------|------|
|                   | .0                       | .1   | .2   | .3   | .4   | .5   | .6   | .7   | .8   | .9   |
| 1                 | 1.33                     | 1.43 | 1.53 | 1.63 | 1.73 | 1.83 | 1.94 | 2.04 | 2.14 | 2.24 |
| 2                 | 2.34                     | 2.44 | 2.53 | 2.63 | 2.73 | 2.83 | 2.93 | 3.03 | 3.12 | 3.22 |
| 3                 | 3.32                     | 3.45 | 3.58 | 3.70 | 3.84 | 3.98 | 4.13 | 4.27 | 4.42 | 4.58 |
| 4                 | 4.74                     | 4.90 | 5.07 | 5.24 | 5.42 | 5.60 | 5.80 | 6.00 | 6.20 | 6.42 |
| 5                 | 6.64                     | 6.85 | 7.03 | 7.18 | 7.32 | 7.44 | 7.55 | 7.65 | 7.74 | 7.82 |
| 6                 | 7.90                     | 7.97 | 8.03 | 8.09 | 8.15 | 8.20 | 8.24 | 8.28 | 8.32 | 8.35 |
| 7                 | 8.38                     |      |      |      |      |      |      |      |      |      |

### Kv Values DN 32

| Pre-decimal point | Decimal point presetting |       |       |       |       |       |       |       |       |       |
|-------------------|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                   | .0                       | .1    | .2    | .3    | .4    | .5    | .6    | .7    | .8    | .9    |
| 1                 | 1.73                     | 1.92  | 2.11  | 2.30  | 2.49  | 2.68  | 2.87  | 3.06  | 3.25  | 3.44  |
| 2                 | 3.63                     | 3.82  | 4.01  | 4.20  | 4.39  | 4.58  | 4.77  | 4.96  | 5.15  | 5.34  |
| 3                 | 5.53                     | 5.73  | 5.92  | 6.12  | 6.31  | 6.51  | 6.71  | 6.90  | 7.10  | 7.30  |
| 4                 | 7.46                     | 7.69  | 7.88  | 8.08  | 8.27  | 8.47  | 8.67  | 8.86  | 9.06  | 9.25  |
| 5                 | 9.45                     | 9.68  | 9.92  | 10.15 | 10.35 | 10.60 | 10.83 | 11.05 | 11.27 | 11.48 |
| 6                 | 11.70                    | 11.96 | 12.20 | 12.41 | 12.62 | 12.81 | 13.00 | 13.17 | 13.33 | 13.49 |
| 7                 | 13.65                    | 13.78 | 13.92 | 14.06 | 14.18 | 14.30 | 14.42 | 14.54 | 14.65 | 14.76 |
| 8                 | 14.86                    | 14.97 | 15.10 | 15.20 | 15.31 | 15.42 | 15.53 | 15.64 | 15.75 | 15.86 |
| 9                 | 15.97                    | 16.08 | 16.20 | 16.30 | 16.41 | 16.53 | 16.64 | 16.75 | 16.86 | 16.97 |
| 10                | 17.08                    |       |       |       |       |       |       |       |       |       |

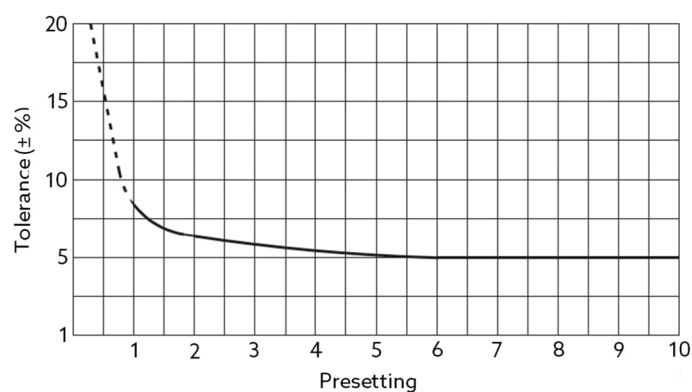
## Kv Values DN 40

| Pre-decimal point | Decimal point presetting |       |       |       |       |       |       |       |       |       |
|-------------------|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                   | .0                       | .1    | .2    | .3    | .4    | .5    | .6    | .7    | .8    | .9    |
| 1                 | 3.27                     | 3.58  | 3.85  | 4.18  | 4.48  | 4.77  | 5.06  | 5.35  | 5.64  | 5.92  |
| 2                 | 6.20                     | 6.43  | 6.67  | 6.90  | 7.15  | 7.39  | 7.64  | 7.89  | 8.14  | 8.39  |
| 3                 | 8.69                     | 8.91  | 9.17  | 9.43  | 9.69  | 9.97  | 10.25 | 10.52 | 10.80 | 11.09 |
| 4                 | 11.38                    | 11.67 | 11.97 | 12.27 | 12.58 | 12.89 | 13.20 | 13.52 | 13.84 | 14.17 |
| 5                 | 14.51                    | 14.91 | 15.32 | 15.75 | 16.14 | 16.62 | 17.10 | 17.58 | 18.07 | 18.59 |
| 6                 | 19.13                    | 19.53 | 19.90 | 20.25 | 20.59 | 20.90 | 21.21 | 21.50 | 21.74 | 22.04 |
| 7                 | 22.30                    | 22.55 | 22.79 | 23.03 | 23.26 | 23.47 | 23.70 | 23.91 | 24.11 | 24.31 |
| 8                 | 24.51                    | 24.64 | 24.78 | 24.90 | 25.03 | 25.16 | 25.29 | 25.41 | 25.53 | 25.65 |
| 9                 | 25.77                    | 25.89 | 26.00 | 26.12 | 26.23 | 26.34 | 26.45 | 26.56 | 26.67 | 26.77 |
| 10                | 26.88                    |       |       |       |       |       |       |       |       |       |

## Kv Values DN 50

| Pre-decimal point | Decimal point presetting |       |       |       |       |       |       |       |       |       |
|-------------------|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                   | .0                       | .1    | .2    | .3    | .4    | .5    | .6    | .7    | .8    | .9    |
| 1                 | 5.76                     | 6.10  | 6.41  | 6.70  | 6.96  | 7.24  | 7.66  | 8.20  | 8.66  | 9.10  |
| 2                 | 9.55                     | 9.96  | 10.36 | 10.78 | 11.18 | 11.57 | 11.95 | 12.33 | 12.69 | 13.06 |
| 3                 | 13.41                    | 13.87 | 14.32 | 14.78 | 15.25 | 15.56 | 16.20 | 16.67 | 17.14 | 17.60 |
| 4                 | 18.34                    | 18.52 | 19.01 | 19.48 | 19.95 | 20.55 | 20.89 | 21.36 | 21.83 | 22.30 |
| 5                 | 22.70                    | 23.12 | 23.54 | 23.95 | 24.37 | 24.80 | 25.21 | 25.63 | 26.04 | 26.46 |
| 6                 | 26.88                    | 27.18 | 27.48 | 27.75 | 28.06 | 28.31 | 28.61 | 28.88 | 29.15 | 29.41 |
| 7                 | 29.68                    | 29.91 | 30.15 | 30.40 | 30.64 | 30.88 | 31.11 | 31.33 | 31.57 | 31.79 |
| 8                 | 32.00                    | 32.22 | 32.44 | 32.65 | 32.86 | 33.06 | 33.27 | 33.47 | 33.67 | 33.87 |
| 9                 | 34.06                    | 34.25 | 34.44 | 34.69 | 34.82 | 35.00 | 35.20 | 35.40 | 35.60 | 35.80 |
| 10                | 36.00                    |       |       |       |       |       |       |       |       |       |

## Tolerance Curve



## Flow Data DN 65 to DN 150

### Kv Values DN 65

| Pre-decimal point | Decimal point presetting |       |       |       |       |       |       |       |       |       |
|-------------------|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                   | .0                       | .1    | .2    | .3    | .4    | .5    | .6    | .7    | .8    | .9    |
| 1                 | 3.60                     | 4.12  | 4.49  | 4.86  | 5.23  | 5.60  | 6.43  | 7.29  | 8.17  | 9.07  |
| 2                 | 10.00                    | 10.95 | 11.91 | 12.92 | 13.94 | 15.00 | 16.66 | 18.38 | 20.14 | 21.95 |
| 3                 | 24.00                    | 25.73 | 27.70 | 29.74 | 31.84 | 34.00 | 35.93 | 37.84 | 39.74 | 41.63 |
| 4                 | 43.50                    | 45.36 | 47.20 | 49.03 | 50.85 | 52.00 | 54.45 | 56.23 | 58.00 | 59.74 |
| 5                 | 61.00                    | 63.21 | 64.93 | 66.63 | 68.32 | 70.00 | 71.69 | 73.33 | 74.93 | 76.48 |
| 6                 | 78.00                    | 79.48 | 80.91 | 82.31 | 83.67 | 85.00 | 86.12 | 87.20 | 88.23 | 89.23 |
| 7                 | 90.00                    | 91.13 | 92.02 | 92.89 | 93.71 | 94.50 | 95.27 | 96.00 | 96.70 | 97.36 |
| 8                 | 98.00                    |       |       |       |       |       |       |       |       |       |

### Kv Values DN 80

| Pre-decimal point | Decimal point presetting |        |        |        |        |        |        |        |        |        |
|-------------------|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                   | .0                       | .1     | .2     | .3     | .4     | .5     | .6     | .7     | .8     | .9     |
| 1                 | 4.40                     | 4.74   | 5.17   | 5.67   | 6.28   | 7.00   | 7.89   | 8.82   | 9.78   | 10.79  |
| 2                 | 11.85                    | 12.95  | 14.11  | 15.33  | 16.61  | 18.65  | 19.39  | 20.90  | 22.51  | 24.24  |
| 3                 | 26.10                    | 27.85  | 29.61  | 31.39  | 33.19  | 35.00  | 36.83  | 38.68  | 40.55  | 42.43  |
| 4                 | 44.75                    | 46.27  | 48.21  | 50.19  | 52.18  | 55.20  | 56.22  | 58.28  | 60.36  | 62.47  |
| 5                 | 64.60                    | 66.98  | 69.32  | 71.63  | 73.90  | 75.45  | 78.37  | 80.56  | 82.72  | 84.85  |
| 6                 | 87.00                    | 89.04  | 91.00  | 93.13  | 95.14  | 97.55  | 99.10  | 101.04 | 102.96 | 104.87 |
| 7                 | 106.75                   | 108.39 | 110.00 | 111.60 | 113.00 | 114.50 | 116.13 | 117.78 | 119.27 | 120.74 |
| 8                 | 122.20                   |        |        |        |        |        |        |        |        |        |

### Kv Values DN 100

| Pre-decimal point | Decimal point presetting |        |        |        |        |        |        |        |        |        |
|-------------------|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                   | .0                       | .1     | .2     | .3     | .4     | .5     | .6     | .7     | .8     | .9     |
| 1                 | 8.55                     | 9.58   | 10.61  | 11.64  | 12.67  | 14.00  | 14.73  | 15.76  | 16.79  | 17.82  |
| 2                 | 18.50                    | 19.88  | 20.91  | 21.94  | 22.97  | 24.00  | 26.00  | 28.13  | 30.40  | 32.81  |
| 3                 | 35.40                    | 38.18  | 41.17  | 44.44  | 48.02  | 52.00  | 55.93  | 59.89  | 63.89  | 67.92  |
| 4                 | 72.00                    | 76.11  | 80.27  | 84.47  | 88.71  | 93.00  | 97.37  | 101.62 | 105.74 | 109.75 |
| 5                 | 112.00                   | 117.46 | 121.17 | 124.79 | 127.52 | 132.00 | 135.16 | 138.47 | 141.71 | 144.89 |
| 6                 | 148.00                   | 151.94 | 155.63 | 159.10 | 162.38 | 164.03 | 168.44 | 171.26 | 173.95 | 176.53 |
| 7                 | 179.01                   | 181.37 | 183.65 | 185.85 | 187.96 | 190.04 | 192.37 | 194.66 | 196.85 | 198.96 |
| 8                 | 201.00                   |        |        |        |        |        |        |        |        |        |

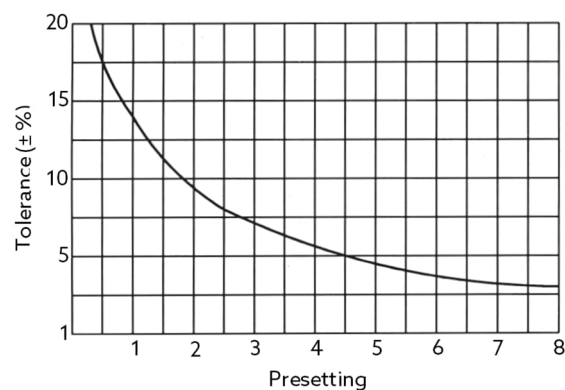
## Kv Values DN 125

| Pre-decimal point | Decimal point presetting |        |        |        |        |        |        |        |        |        |
|-------------------|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                   | .0                       | .1     | .2     | .3     | .4     | .5     | .6     | .7     | .8     | .9     |
| 1                 | 12.45                    | 13.84  | 15.23  | 16.62  | 18.01  | 19.40  | 20.94  | 22.47  | 24.01  | 25.54  |
| 2                 | 26.60                    | 28.61  | 30.15  | 31.36  | 33.22  | 34.75  | 37.18  | 39.69  | 42.29  | 44.97  |
| 3                 | 47.75                    | 50.63  | 53.62  | 56.73  | 60.00  | 63.35  | 66.62  | 70.00  | 73.53  | 77.21  |
| 4                 | 81.05                    | 85.05  | 89.30  | 93.77  | 98.50  | 103.55 | 108.16 | 112.92 | 117.84 | 122.95 |
| 5                 | 128.25                   | 133.77 | 139.54 | 145.60 | 151.96 | 158.70 | 164.10 | 169.60 | 175.21 | 180.94 |
| 6                 | 185.30                   | 192.75 | 198.85 | 205.10 | 211.50 | 218.05 | 223.37 | 228.64 | 233.89 | 239.03 |
| 7                 | 244.15                   | 249.23 | 254.26 | 259.25 | 264.19 | 268.15 | 273.95 | 278.77 | 283.55 | 287.96 |
| 8                 | 293.00                   |        |        |        |        |        |        |        |        |        |

## Kv Values DN 150

| Pre-decimal point | Decimal point presetting |        |        |        |        |        |        |        |        |        |
|-------------------|--------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|                   | .0                       | .1     | .2     | .3     | .4     | .5     | .6     | .7     | .8     | .9     |
| 1                 | 15.22                    | 17.22  | 19.23  | 21.23  | 23.24  | 25.26  | 27.24  | 29.50  | 31.25  | 33.26  |
| 2                 | 35.26                    | 37.13  | 39.41  | 42.30  | 46.25  | 53.92  | 61.00  | 68.55  | 76.64  | 85.40  |
| 3                 | 95.02                    | 105.51 | 114.45 | 122.36 | 129.52 | 135.45 | 142.21 | 147.41 | 153.33 | 160.00 |
| 4                 | 167.12                   | 174.48 | 181.76 | 189.05 | 196.34 | 203.65 | 210.78 | 217.79 | 224.14 | 231.46 |
| 5                 | 238.91                   | 244.72 | 251.20 | 257.60 | 263.90 | 272.40 | 276.24 | 282.30 | 288.27 | 294.17 |
| 6                 | 300.40                   | 305.76 | 311.45 | 317.08 | 322.07 | 326.70 | 333.58 | 338.34 | 344.29 | 349.56 |
| 7                 | 355.60                   | 360.00 | 365.06 | 370.13 | 375.15 | 382.00 | 385.04 | 389.34 | 394.20 | 399.54 |
| 8                 | 404.30                   |        |        |        |        |        |        |        |        |        |

## Tolerance Curve DN 65 to DN 150



# Flow Data DN 200 to DN 300

## Kv Values DN 200

| Pre-decimal point | Decimal point presetting |       |       |       |       |       |       |       |       |       |
|-------------------|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                   | .0                       | .1    | .2    | .3    | .4    | .5    | .6    | .7    | .8    | .9    |
| 2                 | 45.9                     | 51.6  | 54.2  | 55.8  | 59.4  | 62.0  | 66.4  | 70.8  | 75.2  | 79.8  |
| 3                 | 84.0                     | 90.0  | 96.0  | 102.0 | 108.0 | 114.0 | 121.0 | 128.6 | 136.2 | 143.6 |
| 4                 | 151.0                    | 162.0 | 173.0 | 184.0 | 195.0 | 206.0 | 216.8 | 227.6 | 238.4 | 249.2 |
| 5                 | 260.3                    | 271.9 | 283.8 | 295.6 | 307.5 | 320.0 | 332.0 | 344.8 | 357.6 | 370.3 |
| 6                 | 383.0                    | 396.0 | 409.0 | 422.0 | 435.0 | 447.8 | 460.0 | 472.6 | 484.8 | 497.2 |
| 7                 | 509.5                    | 519.4 | 529.3 | 539.2 | 549.1 | 559.0 | 571.0 | 582.5 | 594.2 | 606.0 |
| 8                 | 618.0                    | 626.8 | 634.8 | 643.2 | 651.6 | 660.0 | 672.8 | 665.2 | 693.7 | 711.6 |
| 9                 | 724.5                    | 731.4 | 738.2 | 744.9 | 751.7 | 758.5 | 760.6 | 762.7 | 764.8 | 766.9 |
| 10                | 769.0                    | 771.2 | 773.4 | 775.6 | 778.0 | 780.0 | 782.0 | 784.0 | 786.0 | 788.0 |
| 11                | 790.0                    | 792.2 | 794.6 | 796.8 | 799.1 | 801.4 | 804.0 | 806.6 | 809.2 | 812.0 |
| 12                | 814.5                    |       |       |       |       |       |       |       |       |       |

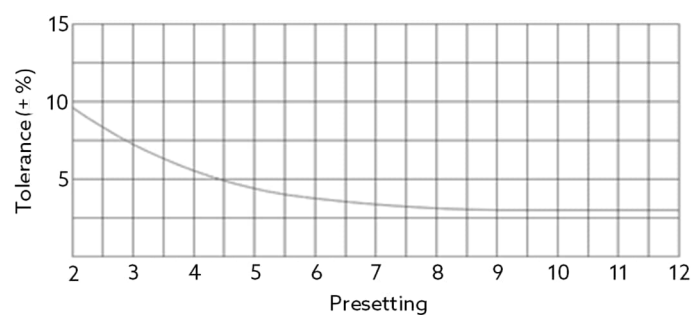
## Kv Values DN 250

| Pre-decimal point | Decimal point presetting |      |       |       |      |       |      |      |      |       |
|-------------------|--------------------------|------|-------|-------|------|-------|------|------|------|-------|
|                   | .0                       | .1   | .2    | .3    | .4   | .5    | .6   | .7   | .8   | .9    |
| 2                 | 70                       | 72.5 | 75.5  | 79    | 82   | 85    | 89.5 | 94   | 99   | 104.5 |
| 3                 | 110                      | 117  | 123.5 | 130.5 | 139  | 150   | 155  | 164  | 174  | 184   |
| 4                 | 195                      | 208  | 221   | 236   | 252  | 270   | 287  | 304  | 321  | 338   |
| 5                 | 356                      | 373  | 390   | 407   | 423  | 440   | 457  | 473  | 490  | 506   |
| 6                 | 522                      | 539  | 555   | 571   | 587  | 607   | 619  | 635  | 651  | 666   |
| 7                 | 682                      | 698  | 714   | 729   | 745  | 760   | 778  | 795  | 811  | 826   |
| 8                 | 840                      | 850  | 860   | 870   | 880  | 890   | 899  | 907  | 916  | 925   |
| 9                 | 933                      | 942  | 952   | 961   | 970  | 980   | 989  | 998  | 1008 | 1018  |
| 10                | 1028                     | 1038 | 1048  | 1059  | 1071 | 1080  | 1088 | 1096 | 1104 | 1112  |
| 11                | 1120                     | 1128 | 1136  | 1144  | 1152 | 11160 | 1168 | 1176 | 1184 | 1192  |
| 12                | 1200                     |      |       |       |      |       |      |      |      |       |

## Kv Values DN 300

| Pre-decimal point | Decimal point presetting |      |      |      |      |      |      |      |      |      |
|-------------------|--------------------------|------|------|------|------|------|------|------|------|------|
|                   | .0                       | .1   | .2   | .3   | .4   | .5   | .6   | .7   | .8   | .9   |
| <b>2</b>          | 200                      | 210  | 220  | 230  | 240  | 250  | 261  | 273  | 285  | 297  |
| <b>3</b>          | 310                      | 323  | 336  | 350  | 365  | 380  | 401  | 421  | 441  | 461  |
| <b>4</b>          | 480                      | 499  | 517  | 535  | 553  | 570  | 588  | 606  | 624  | 642  |
| <b>5</b>          | 660                      | 678  | 696  | 714  | 732  | 750  | 771  | 791  | 810  | 828  |
| <b>6</b>          | 845                      | 861  | 877  | 892  | 906  | 920  | 933  | 947  | 961  | 975  |
| <b>7</b>          | 990                      | 1005 | 1020 | 1036 | 1053 | 1070 | 1084 | 1098 | 1112 | 1126 |
| <b>8</b>          | 1140                     | 1154 | 1168 | 1182 | 1196 | 1210 | 1228 | 1245 | 1261 | 1276 |
| <b>9</b>          | 1290                     | 1303 | 1316 | 1328 | 1339 | 1350 | 1365 | 1379 | 1393 | 1407 |
| <b>10</b>         | 1420                     | 1433 | 1446 | 1457 | 1468 | 1480 | 1490 | 1500 | 1510 | 1520 |
| <b>11</b>         | 1530                     | 1539 | 1547 | 1555 | 1563 | 1570 | 1577 | 1583 | 1589 | 1595 |
| <b>12</b>         | 1600                     |      |      |      |      |      |      |      |      |      |

## Tolerance Curve DN 200 to DN 300



# Flow Data DN 350 and DN 400

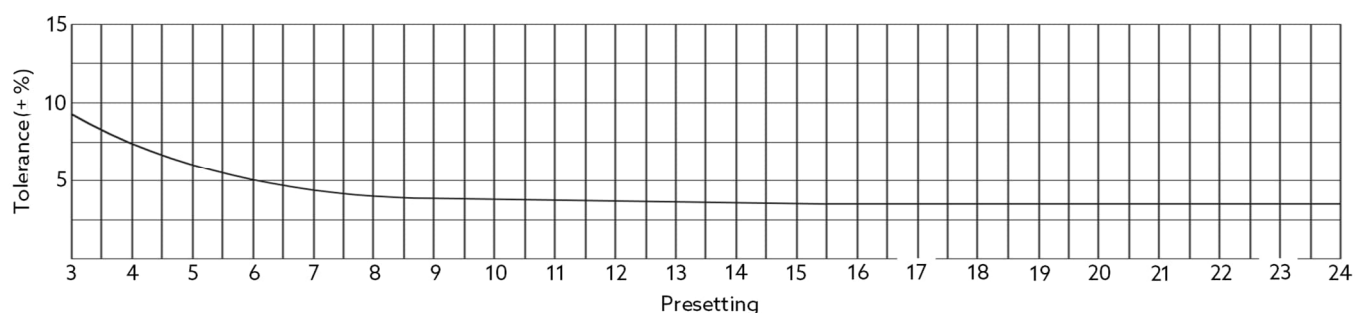
## Kv Values DN 350

| Pre-decimal point | Decimal point presetting |      |      |      |      |      |      |      |      |      |
|-------------------|--------------------------|------|------|------|------|------|------|------|------|------|
|                   | .0                       | .1   | .2   | .3   | .4   | .5   | .6   | .7   | .8   | .9   |
| <b>3</b>          | 290                      | 299  | 308  | 318  | 328  | 340  | 350  | 361  | 374  | 387  |
| <b>4</b>          | 400                      | 414  | 429  | 445  | 462  | 480  | 499  | 518  | 537  | 556  |
| <b>5</b>          | 575                      | 588  | 615  | 635  | 655  | 675  | 696  | 716  | 737  | 758  |
| <b>6</b>          | 800                      | 818  | 836  | 854  | 872  | 890  | 912  | 934  | 956  | 978  |
| <b>7</b>          | 1000                     | 1018 | 1036 | 1054 | 1072 | 1090 | 1108 | 1126 | 1144 | 1162 |
| <b>8</b>          | 1180                     | 1192 | 1204 | 1216 | 1228 | 1240 | 1252 | 1264 | 1276 | 1288 |
| <b>9</b>          | 1300                     | 1312 | 1324 | 1336 | 1348 | 1360 | 1372 | 1384 | 1396 | 1408 |
| <b>10</b>         | 1420                     | 1434 | 1448 | 1462 | 1476 | 1490 | 1504 | 1518 | 1532 | 1546 |
| <b>11</b>         | 1560                     | 1571 | 1582 | 1593 | 1604 | 1615 | 1626 | 1637 | 1648 | 1659 |
| <b>12</b>         | 1670                     | 1682 | 1694 | 1706 | 1718 | 1730 | 1742 | 1754 | 1766 | 1778 |
| <b>13</b>         | 1790                     | 1802 | 1814 | 1826 | 1838 | 1850 | 1862 | 1874 | 1886 | 1898 |
| <b>14</b>         | 1910                     | 1920 | 1930 | 1940 | 1950 | 1960 | 1970 | 1980 | 1990 | 2000 |
| <b>15</b>         | 2010                     | 2019 | 2028 | 2037 | 2046 | 2055 | 2064 | 2073 | 2082 | 2091 |
| <b>16</b>         | 2100                     | 2108 | 2116 | 2124 | 2132 | 2140 | 2148 | 2156 | 2164 | 2172 |
| <b>17</b>         | 2180                     | 2187 | 2194 | 2201 | 2208 | 2215 | 2222 | 2229 | 2236 | 2243 |
| <b>18</b>         | 2250                     |      |      |      |      |      |      |      |      |      |

## Kv Values DN 400

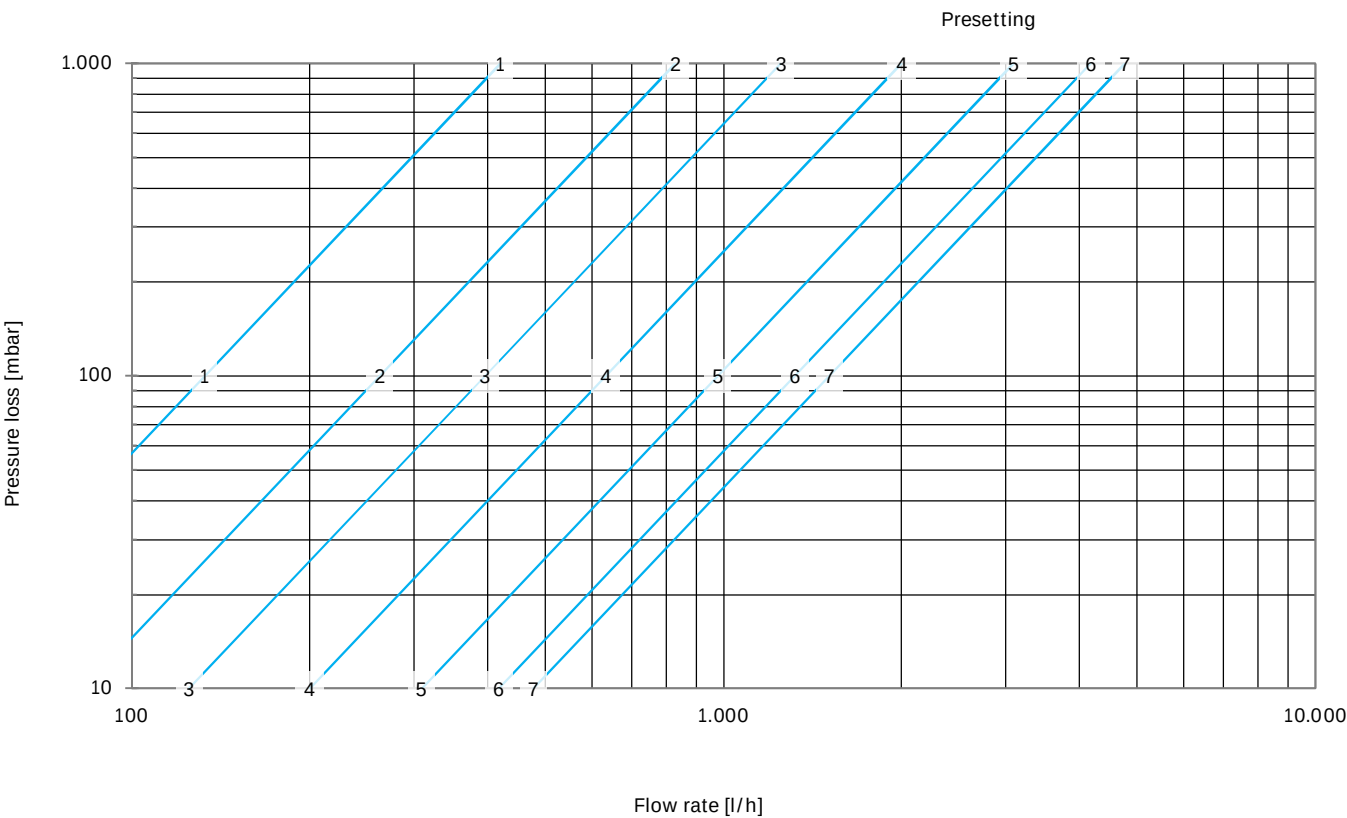
| Pre-decimal point | Decimal point presetting |      |      |      |      |      |      |      |      |      |
|-------------------|--------------------------|------|------|------|------|------|------|------|------|------|
|                   | .0                       | .1   | .2   | .3   | .4   | .5   | .6   | .7   | .8   | .9   |
| 3                 | 338                      | 352  | 365  | 379  | 392  | 406  | 420  | 433  | 447  | 460  |
| 4                 | 474                      | 497  | 520  | 544  | 567  | 590  | 611  | 632  | 653  | 674  |
| 5                 | 695                      | 720  | 745  | 770  | 795  | 820  | 845  | 870  | 895  | 920  |
| 6                 | 945                      | 972  | 998  | 1025 | 1051 | 1078 | 1104 | 1131 | 1157 | 1184 |
| 7                 | 1210                     | 1235 | 1261 | 1286 | 1312 | 1337 | 1362 | 1387 | 1413 | 1438 |
| 8                 | 1463                     | 1489 | 1515 | 1540 | 1566 | 1592 | 1617 | 1645 | 1672 | 1698 |
| 9                 | 1725                     | 1746 | 1767 | 1788 | 1809 | 1830 | 1852 | 1873 | 1894 | 1915 |
| 10                | 1936                     | 1954 | 1972 | 1990 | 2008 | 2026 | 2044 | 2062 | 2080 | 2098 |
| 11                | 2116                     | 2137 | 2158 | 2180 | 2201 | 2222 | 2243 | 2264 | 2286 | 2307 |
| 12                | 2328                     | 2348 | 2368 | 2388 | 2408 | 2428 | 2449 | 2469 | 2489 | 2509 |
| 13                | 2529                     | 2547 | 2566 | 2584 | 2602 | 2621 | 2639 | 2657 | 2675 | 2694 |
| 14                | 2712                     | 2729 | 2746 | 2762 | 2779 | 2796 | 2813 | 2830 | 2846 | 2863 |
| 15                | 2880                     | 2891 | 2901 | 2912 | 2922 | 2933 | 2944 | 2954 | 2965 | 2975 |
| 16                | 2986                     | 2999 | 3012 | 3025 | 3038 | 3051 | 3064 | 3076 | 3089 | 3102 |
| 17                | 3115                     | 3126 | 3137 | 3148 | 3159 | 3170 | 3182 | 3193 | 3204 | 3215 |
| 18                | 3226                     | 3235 | 3245 | 3254 | 3264 | 3273 | 3282 | 3292 | 3301 | 3311 |
| 19                | 3320                     | 3329 | 3338 | 3347 | 3356 | 3365 | 3374 | 3383 | 3392 | 3401 |
| 20                | 3410                     | 3418 | 3426 | 3434 | 3442 | 3450 | 3458 | 3466 | 3474 | 3482 |
| 21                | 3490                     | 3500 | 3510 | 3520 | 3530 | 3540 | 3550 | 3560 | 3570 | 3580 |
| 22                | 3590                     | 3599 | 3608 | 3517 | 3626 | 3635 | 3644 | 3653 | 3662 | 3671 |
| 23                | 3680                     | 3687 | 3694 | 3701 | 3708 | 3715 | 3722 | 3729 | 3736 | 3743 |
| 24                | 3750                     |      |      |      |      |      |      |      |      |      |

## Tolerance Curve DN 350 and DN 400

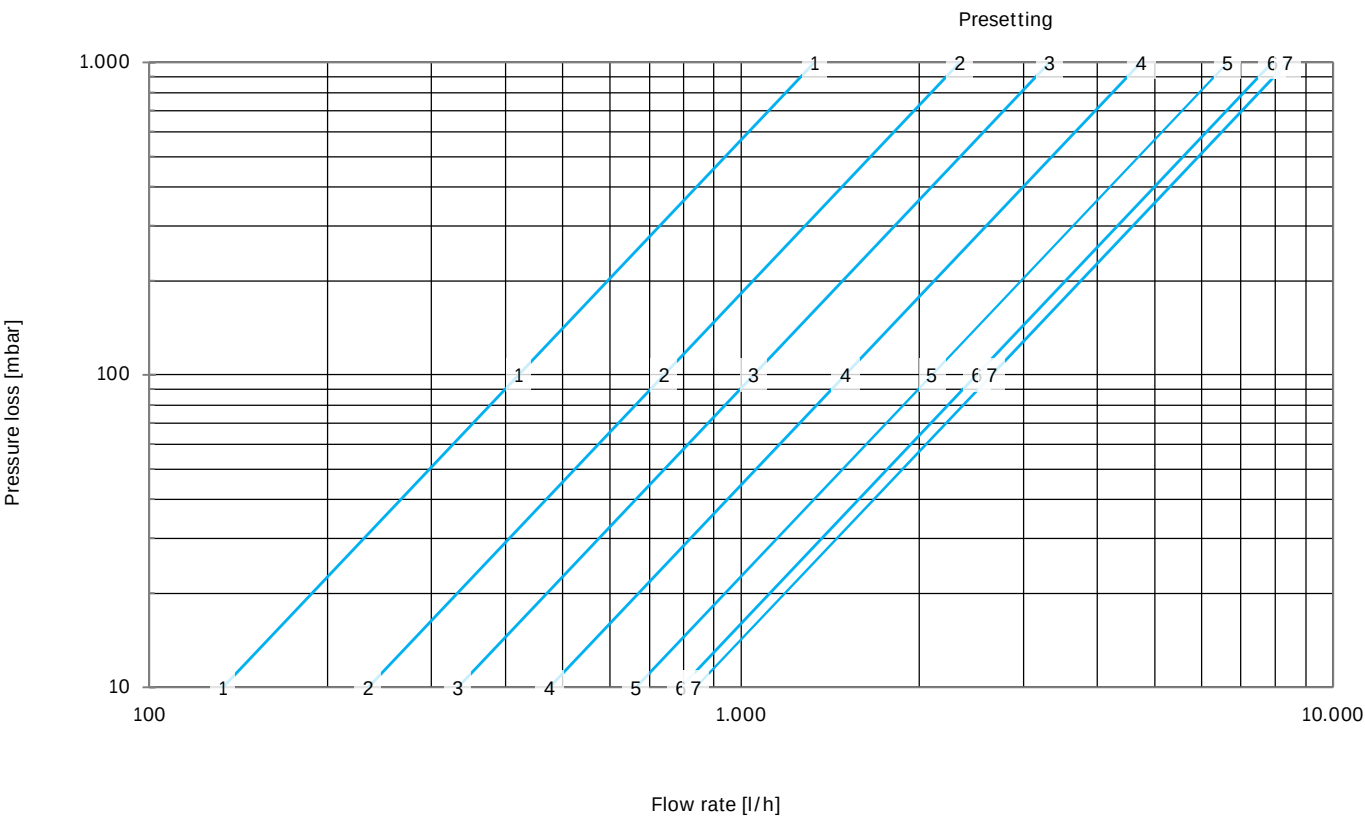


# Flow Charts

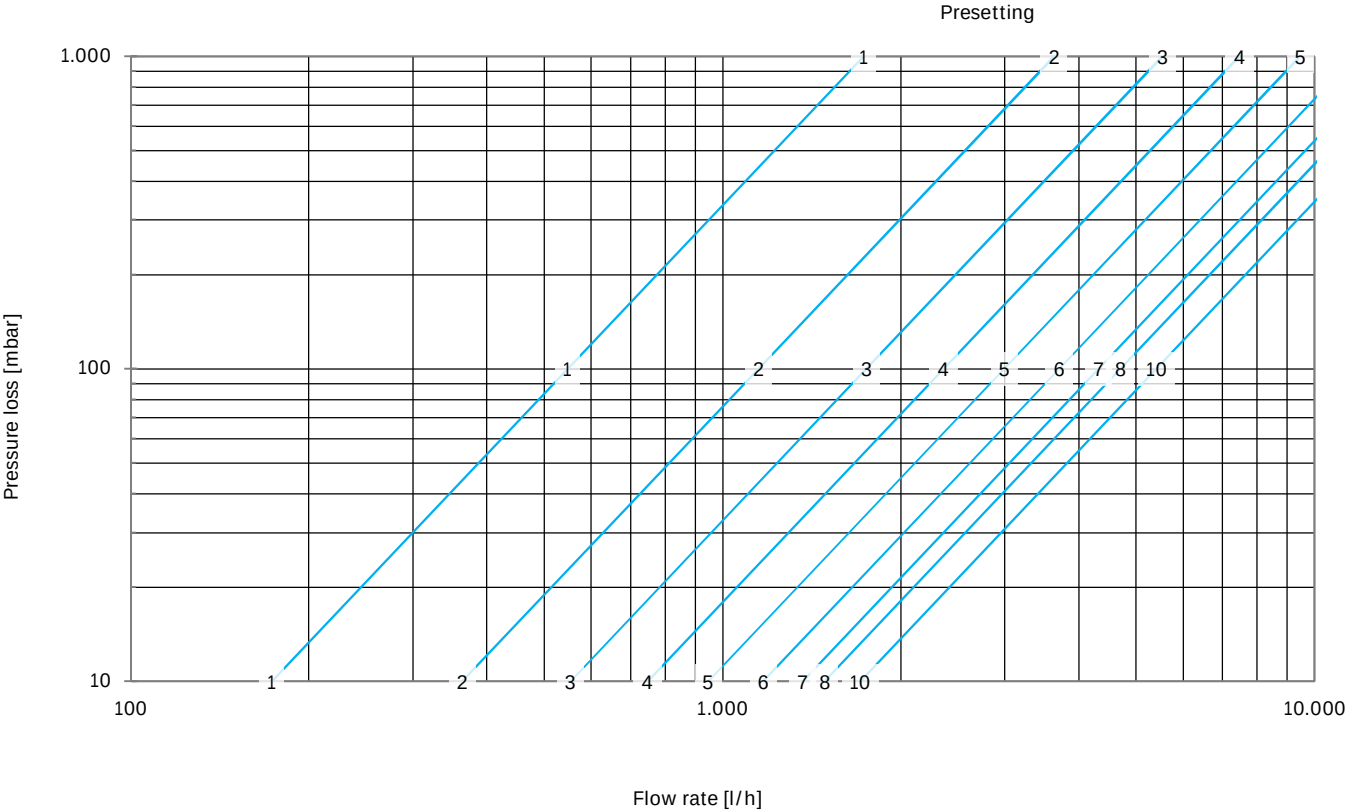
DN 20



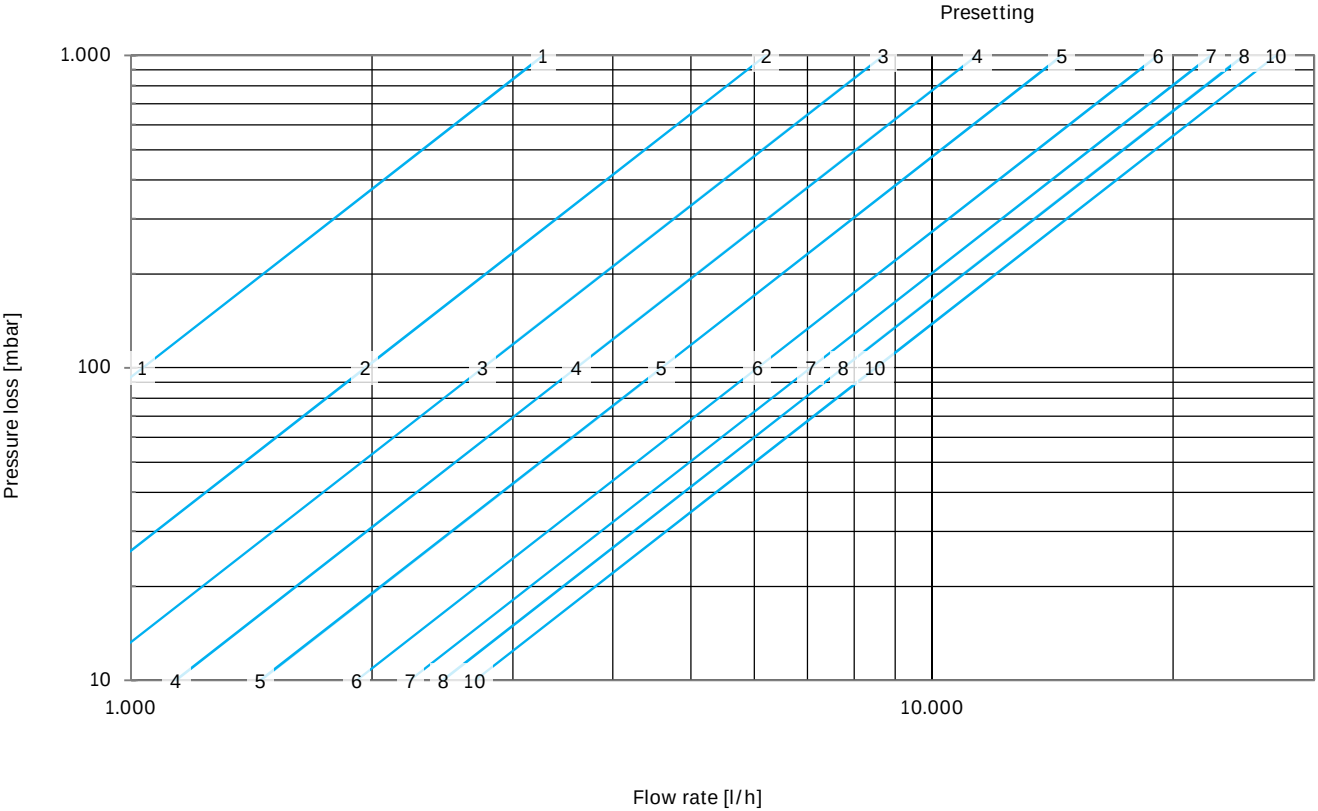
DN 25



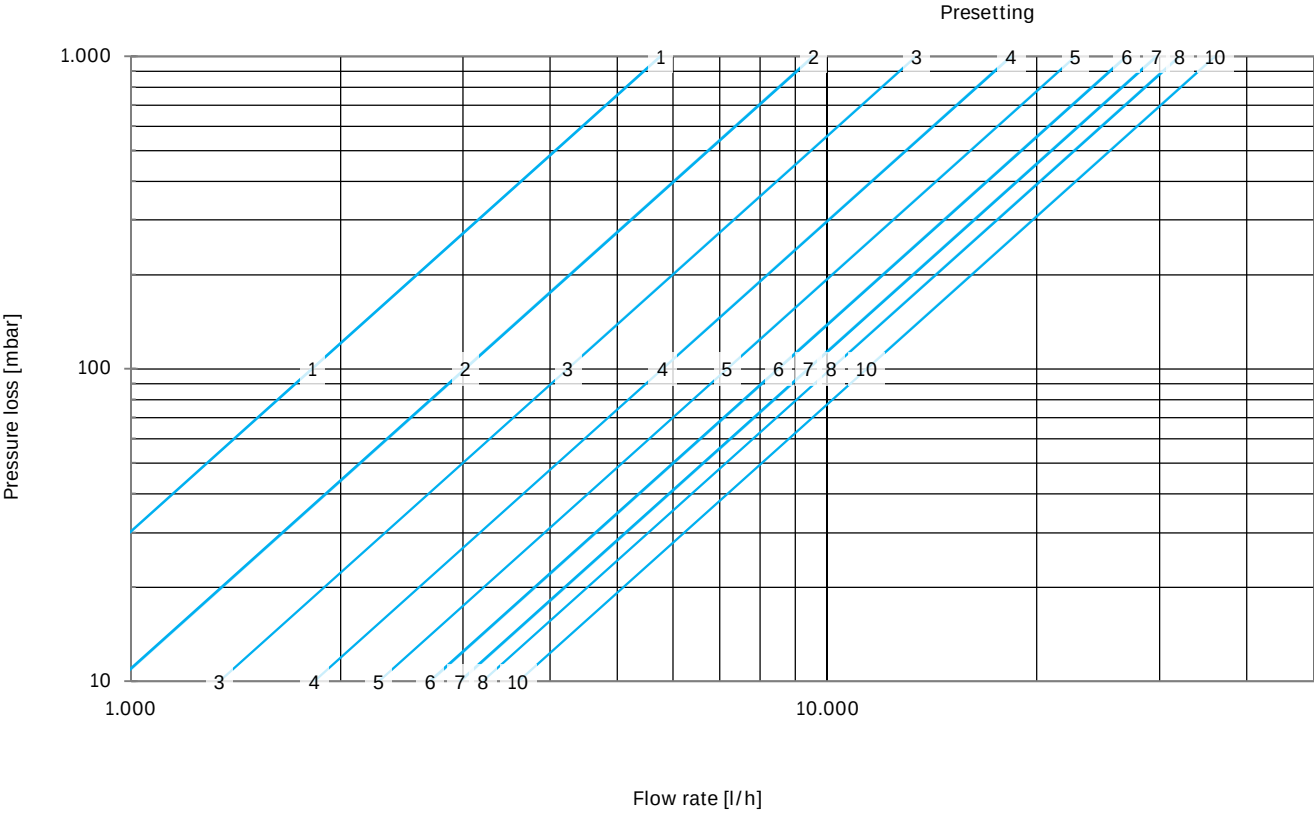
DN 32



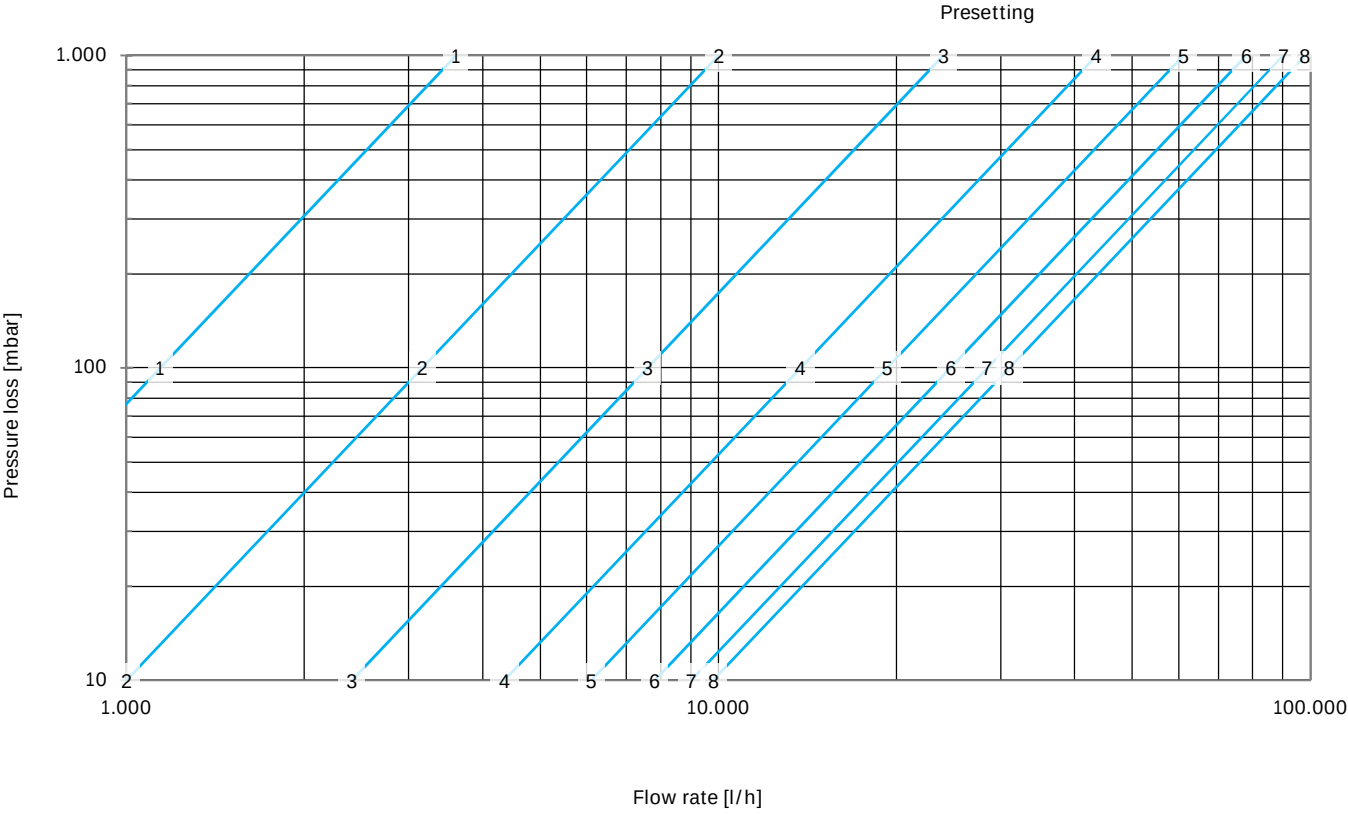
DN 40



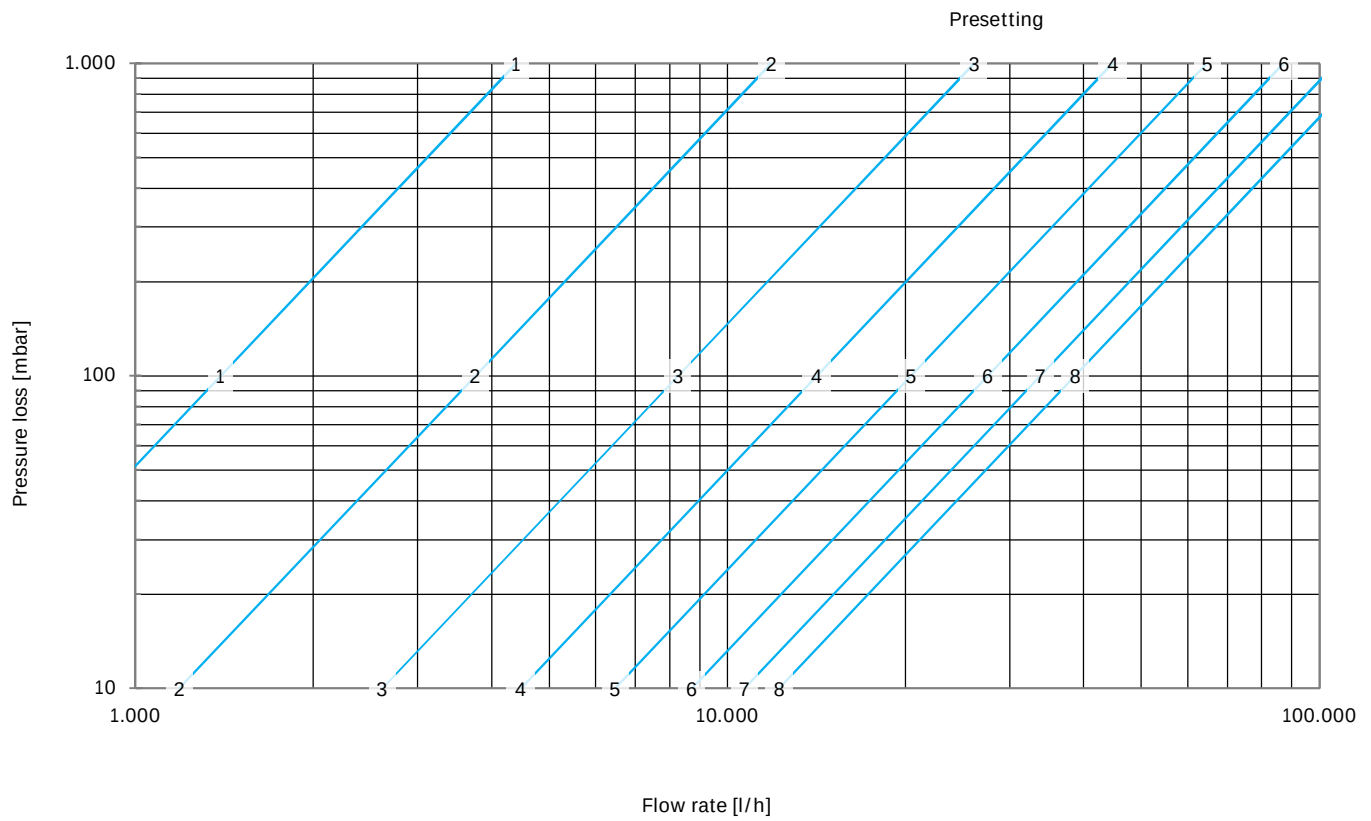
DN 50



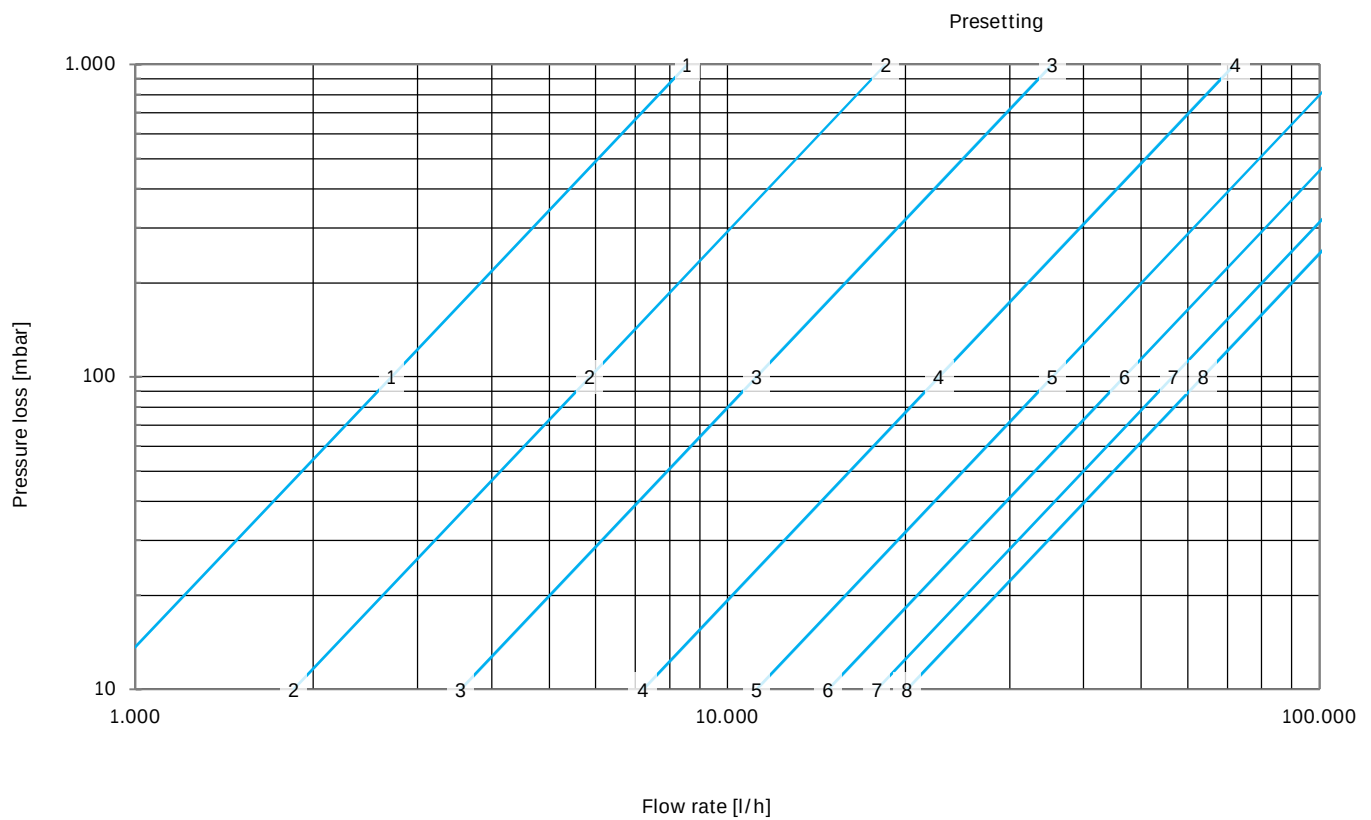
DN 65



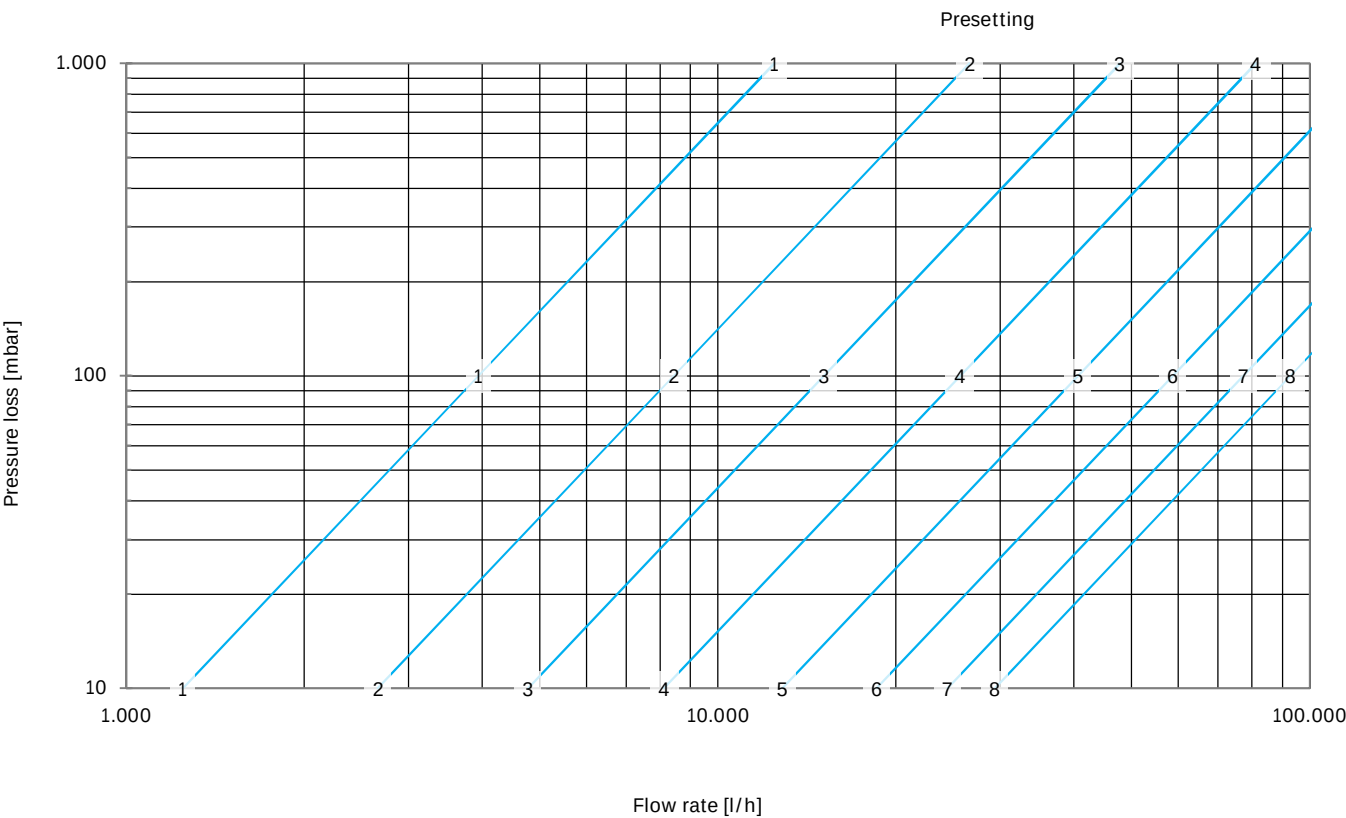
## DN 80



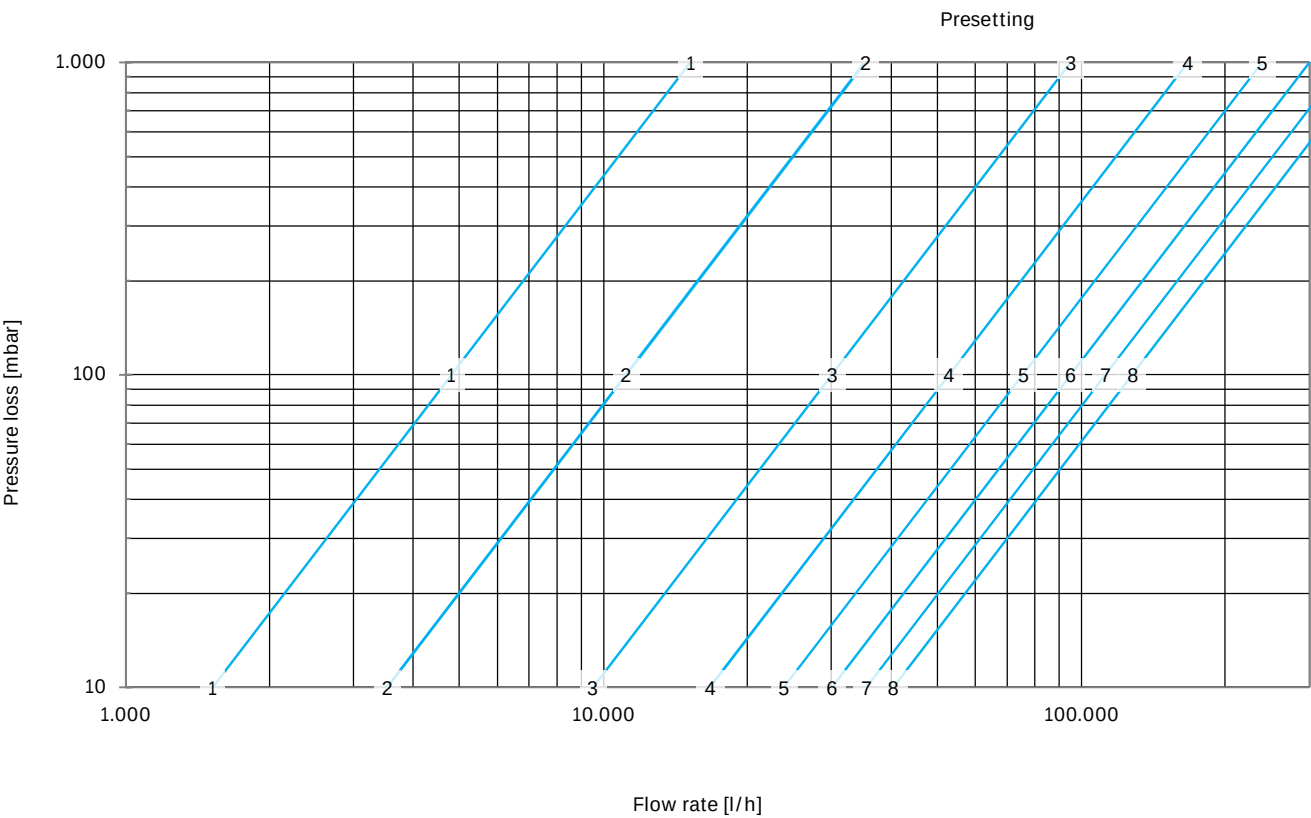
## DN 100



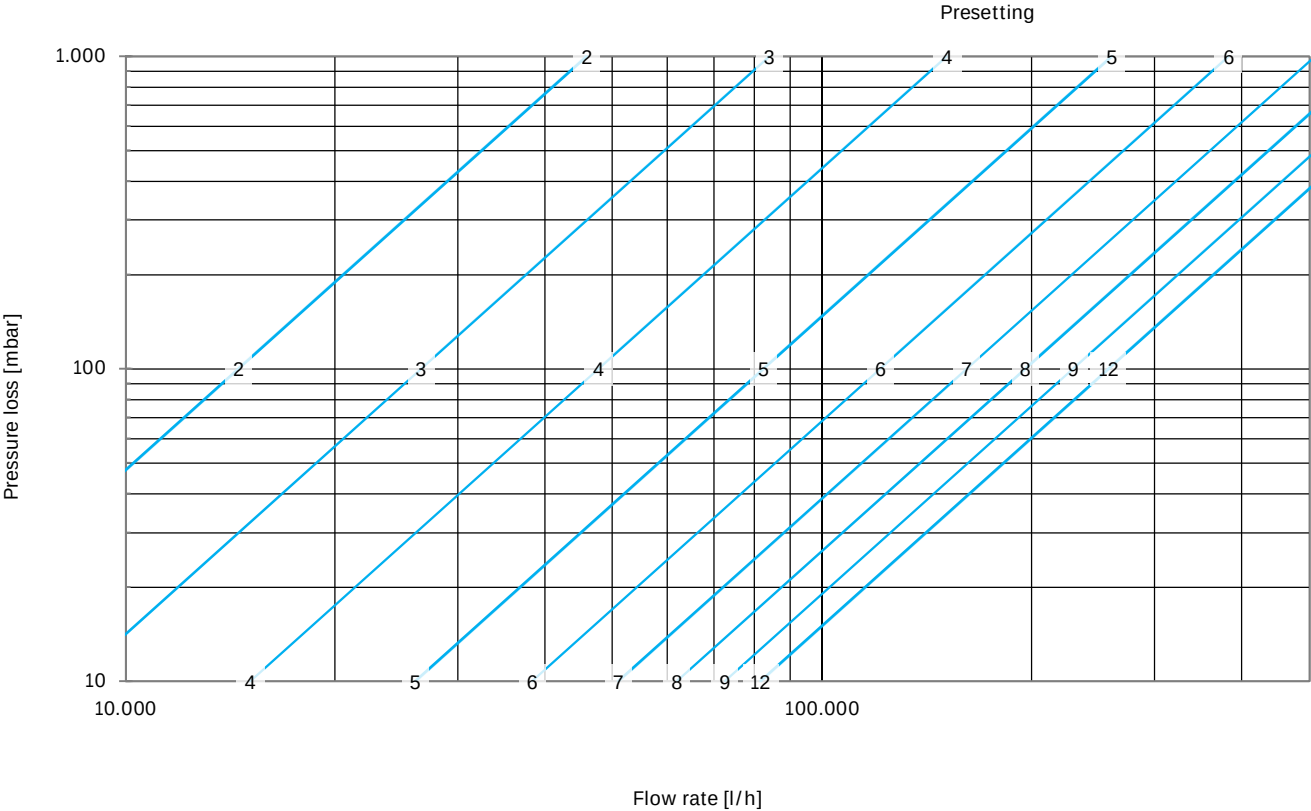
DN 125



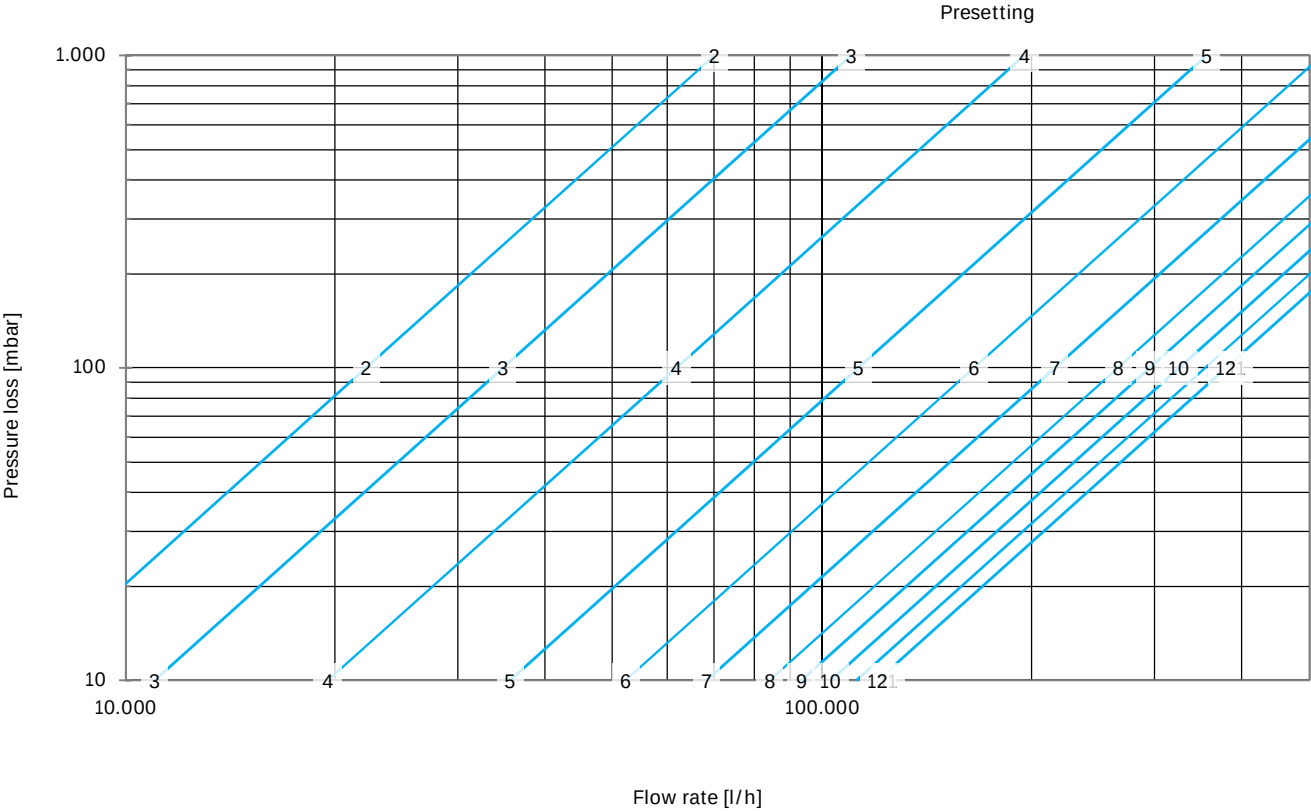
DN 150



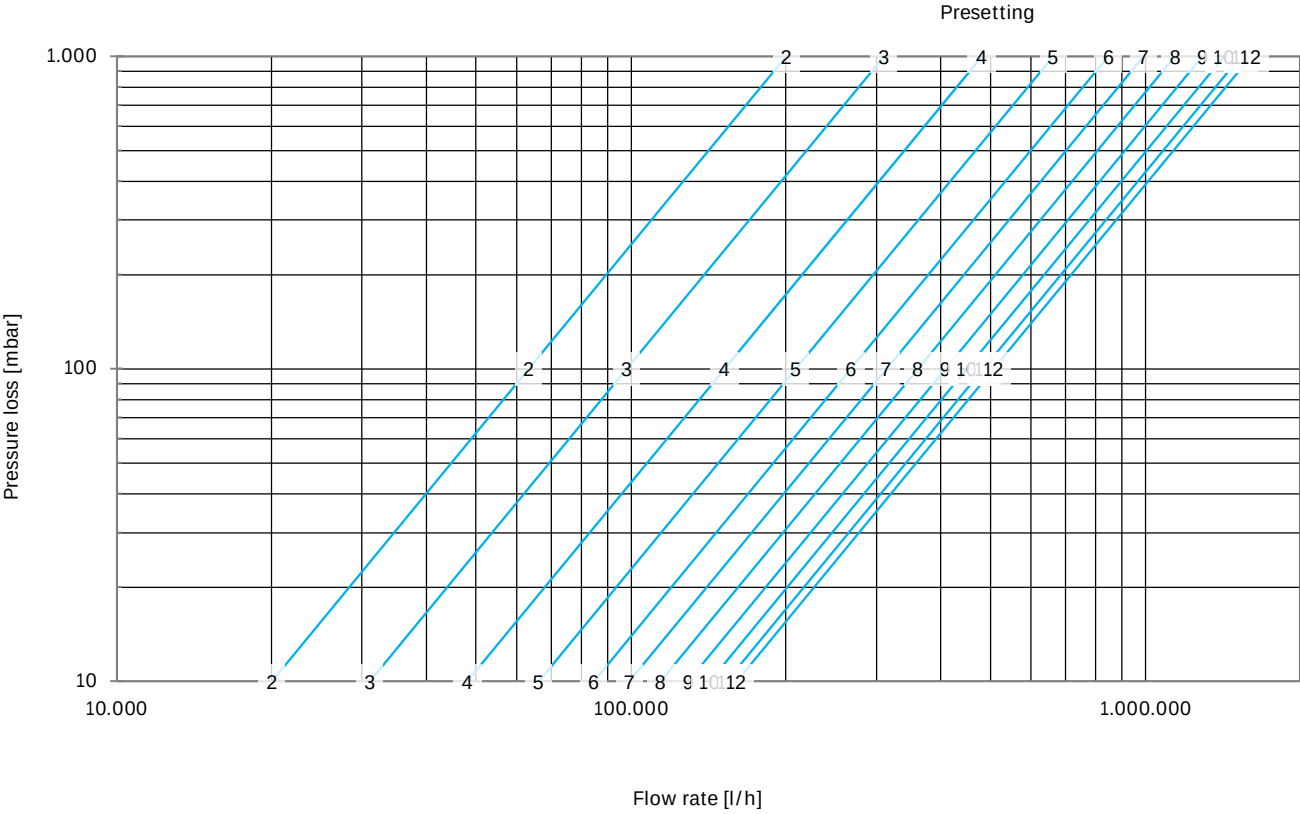
DN 200



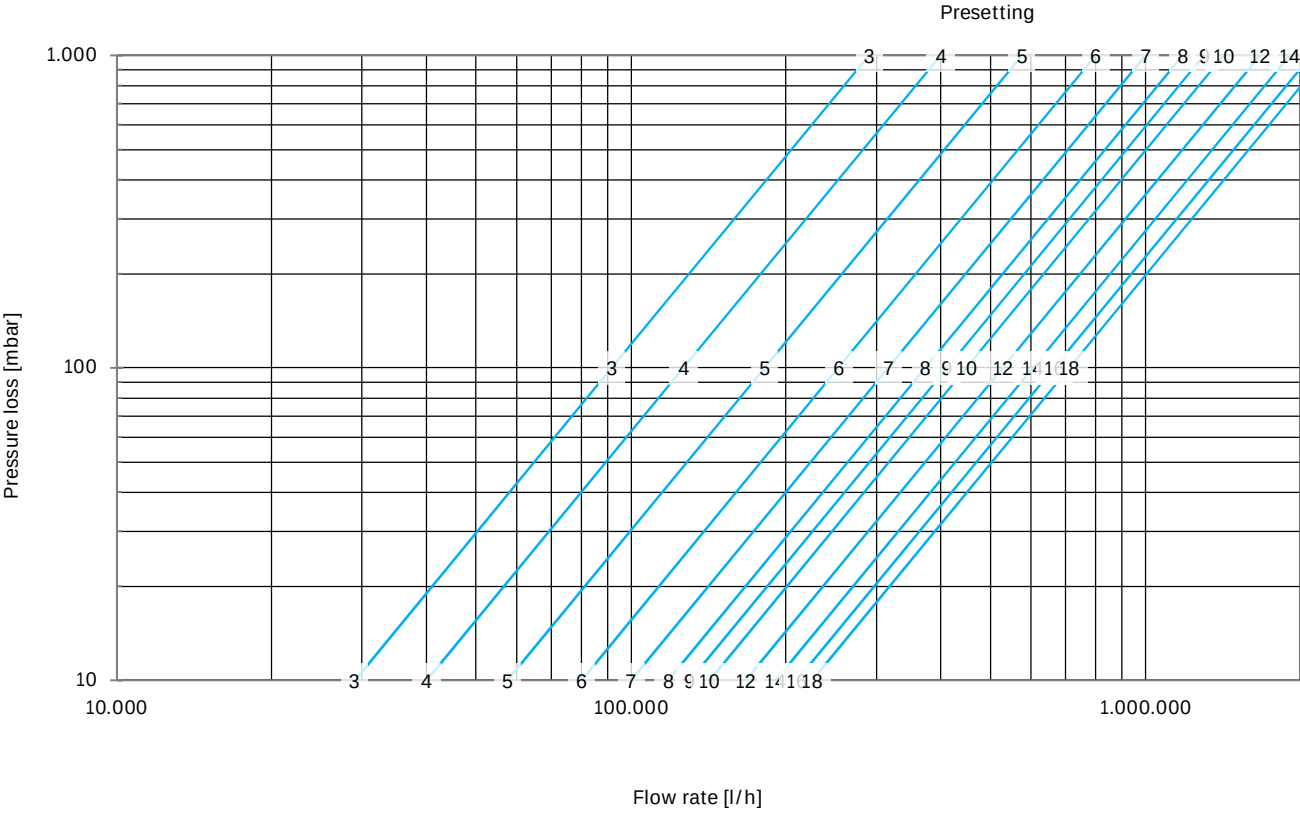
DN 250



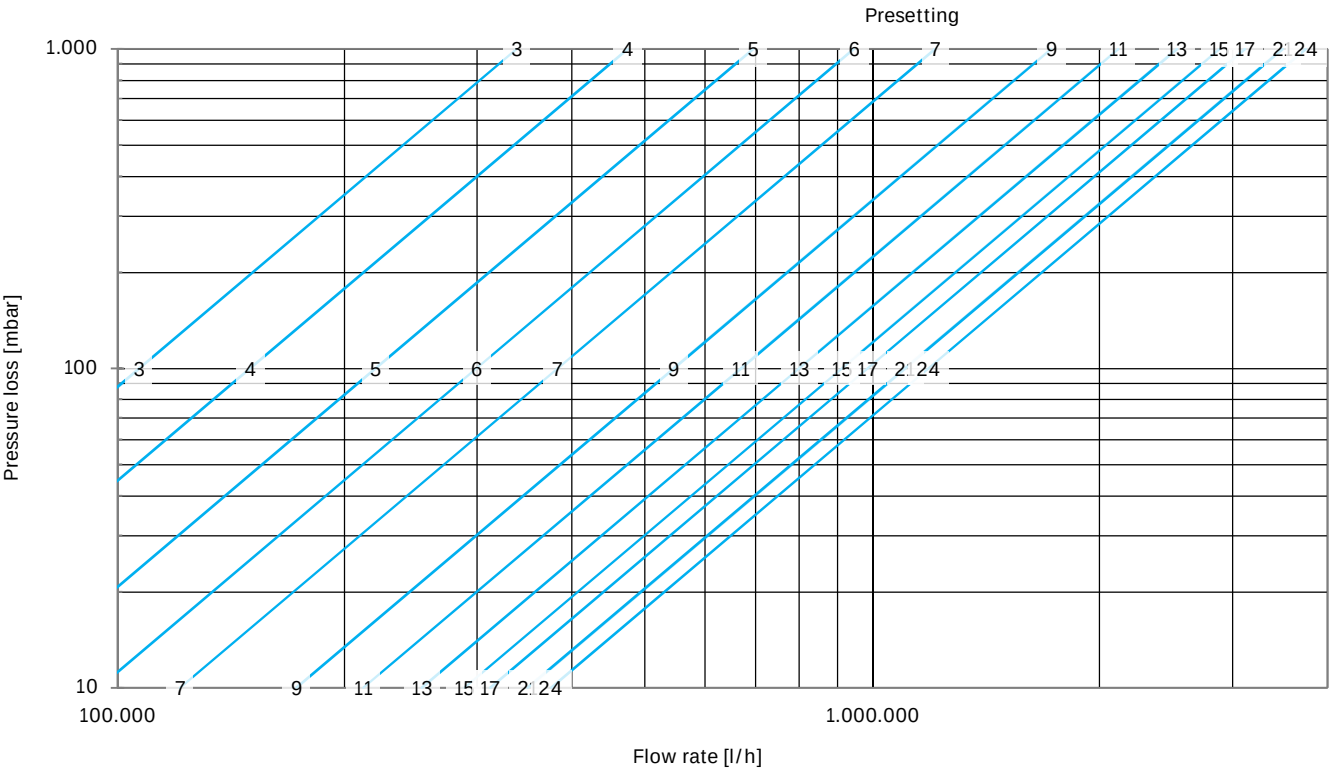
DN 300



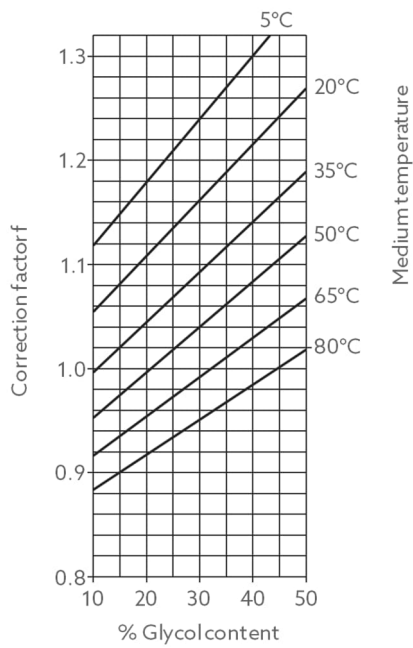
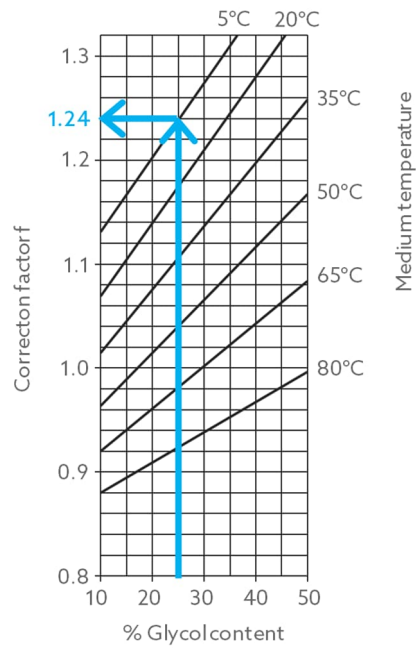
DN 350



DN 400





Correction factor  $f$  for ethylene glycolCorrection factor  $f$  for propylene glycol**Example:**

A glycol content of 25 % and a medium temperature of 5 °C result in a factor of 1.24 with the following impacts:

- If the original Kv value was 10, it is now reduced to just short of 9
- If the original flow rate was 10 m<sup>3</sup>/h, it is now reduced to just short of 9 m<sup>3</sup>/h (at the same differential pressure)
- If the original differential pressure was 10 kPa, it must now be increased to 12.4 kPa to ensure the same flow rate

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