



**VF, VFT  
VFH**



**Butterfly valves  
Rp3/4 ... Rp2  
DN40 ... DN200**

# VF, VFT VFH

## Butterfly valves

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### Description

VF, VFT and VFH butterfly valves are designed for regulation and control of gas flow and air flow in combustion processes.

Valves can be operated manually using a lever (to setup the high-fire rate of the burner) or automatically using a servomotor (modulating or staged control) or a solenoid actuator (two-stage control).

### Features

Valves are made of aluminum (VF/VFT types) or cast-iron (VFH type), with wide range of threaded connections and for from installation between EN 1092 flanges.

Possibility to have one-size or two-size reductions of the nominal diameter for VF/VFT types.

Suitable for use with air and non-aggressive gases according to EN 437 (VF/VFT types); heated air and flue gas (VFH type).

Low leakage when valve is in closed position (VFH type provided with butterfly disc stop).

The VFH type is provided with a double-eccentricity disc and a spring to reduce the backlash. This results in an high precision adjustment and avoids valve floating.

Operated by manual lever, servomotor or by solenoid actuator.

All components are designed to withstand any mechanical, chemical, thermal condition occurring during typical service. Effective impregnation and surface treatments have been used to improve mechanical sturdiness, sealing and resistance to corrosion of the components.



### WARNING

This control must be installed in compliance with the rules in force.

## Functioning and application

VF/VFT/VFH butterfly valves are devices for regulation/modulation using auxiliary power supply or manually operated.

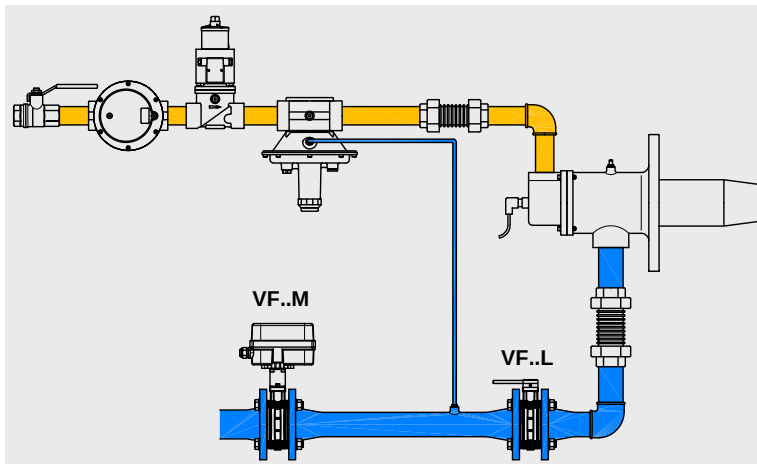


Fig. 1

- in case of combustion process being regulated by combustion air modulation, VF(VFT) valves with servomotor can be used, coupled to another butterfly valve manually operated (available graduated scale and locking screw) to setup high-fire rate of the burner.

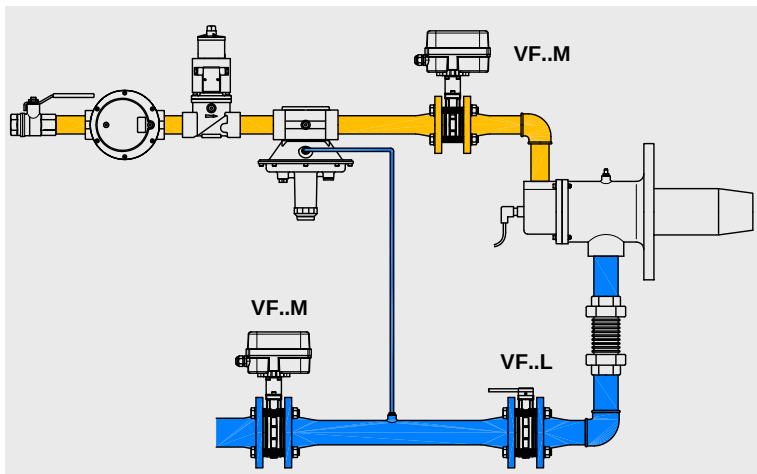


Fig. 2

- In case of combustion process with excess of air or gas, VF(VFT) butterfly valve can be used, coupled to a Lambda sensor for ratio correction.

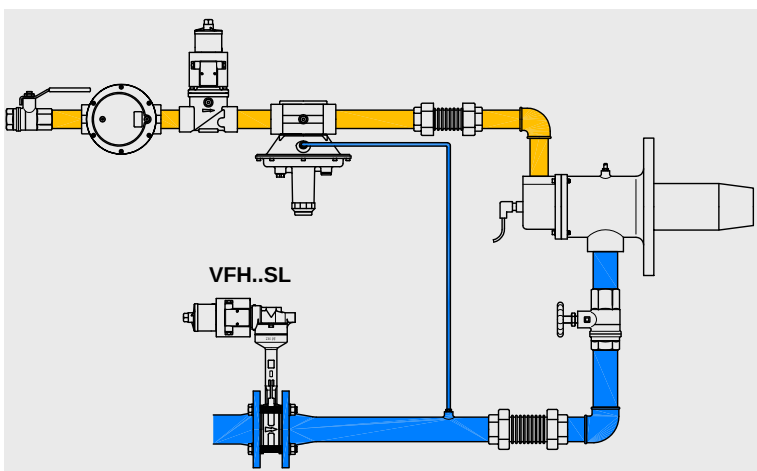


Fig. 3

- In case of combustion process with pre-heated air, VFH butterfly valve can be used. Solenoid actuator is preferentially suitable for min/max regulation with heavy duty cycles.



## WARNING

Location and mode of installation must be in compliance with local rules in force.

# Technical specifications

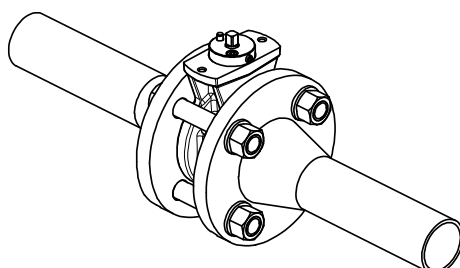
Tab. 1

|                                             | VF, VFT                                                                                                                                | VFH                                                                             |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| <b>Connections</b>                          | Threaded from Rp3/4 to Rp2 according to ISO 7-1<br>From DN40 up to DN150 for fitting between two flanges according to EN 1092 PN16     | From DN40 up to DN200 for fitting between two flanges according to EN 1092 PN16 |
| <b>Rotation angle</b>                       | 0 / 90° adjustable                                                                                                                     | 0 / 90° adjustable                                                              |
| <b>Ambient temperature</b>                  | -15°C / +60°C                                                                                                                          | -15°C / +60°C                                                                   |
| <b>Media type</b>                           | Air and non-aggressive gases according EN 437                                                                                          | Heated air and flue gas                                                         |
| <b>Max. media temperature</b>               | +60°C<br>+200°C for use with air only (special version on request)                                                                     | +250°C<br>+450°C with dissipators (optional kit)                                |
| <b>Max. Operating pressure</b>              | 500 mbar (50 kPa)                                                                                                                      | 150 mbar (15 kPa)                                                               |
| <b>Max. Pressure loss @ V<sub>max</sub></b> | 150 mbar (15 kPa)                                                                                                                      | 45 mbar (4,5 kPa)                                                               |
| <b>Flow rate</b>                            | See tables                                                                                                                             | See tables                                                                      |
| <b>Materials in contact with fluid</b>      | Aluminium alloy<br>Copper alloy<br>Stainless steel<br>Nitrile rubber (NBR)<br>Fluoro elastomer (FPM)<br>Polytetrafluoroethylene (PTFE) | Cast iron<br>Stainless steel<br>Polytetrafluoroethylene (PTFE)                  |
| <b>Driving systems and actuators</b>        | - square shaft □8<br>- round shaft Ø10<br>- manual lever<br>- solenoid SR/SL/ST<br>- servomotor MZ                                     | - manual lever<br>- solenoid SR/SL/ST<br>- servomotor MZ                        |

| VF<br>VFT | Rp3/4 | Rp1 | Rp1¼ | DN40<br>Rp1½ | DN50<br>Rp2 | DN65 | DN80 | DN100 | DN125 | DN150 |  |
|-----------|-------|-----|------|--------------|-------------|------|------|-------|-------|-------|--|
| MZ        | ●     | ●   | ●    | ●            | ●           | ●    | ●    | ●     | ●     | ●     |  |
| S..4      | ●     | ●   | ●    | ●            | ●           | ●    |      |       |       |       |  |
| S..8      |       |     |      |              |             |      | ●    | ●     | ●     | ●     |  |

| VFH  |  |  |  | DN40 | DN50 | DN65 | DN80 | DN100 | DN125 | DN150 | DN200 |
|------|--|--|--|------|------|------|------|-------|-------|-------|-------|
| MZ   |  |  |  | ●    | ●    | ●    | ●    | ●     | ●     | ●     | ●     |
| S..4 |  |  |  | ●    | ●    |      |      |       |       |       |       |
| S..8 |  |  |  |      |      | ●    | ●    | ●     | ●     | ●     | ●     |

Fitting between two flanges according to EN 1092 PN16



Fitting onto threaded pipelines

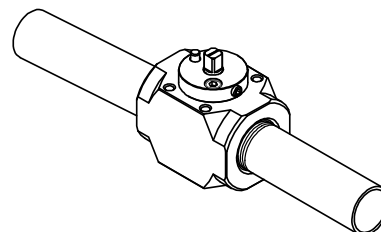


Fig.4

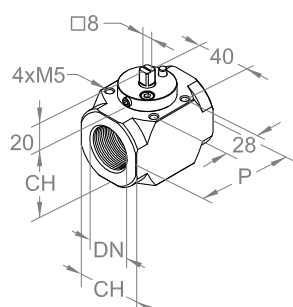
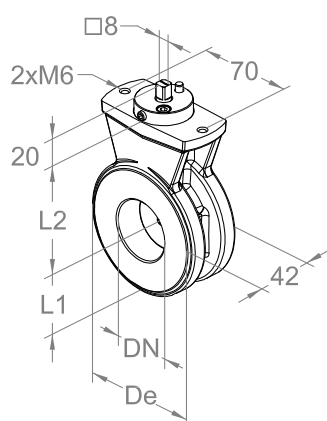
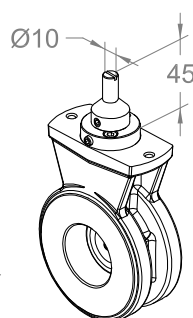
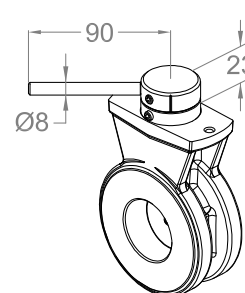
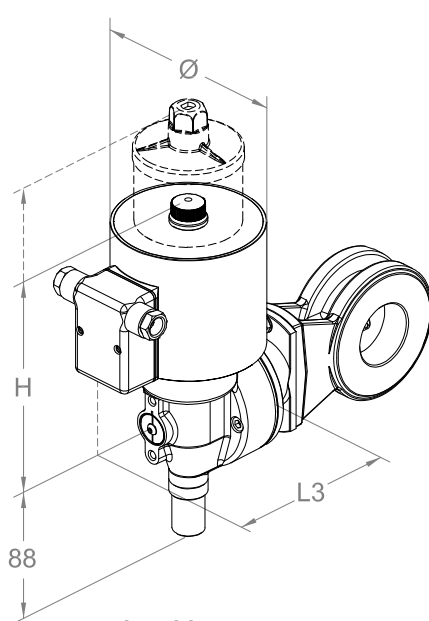
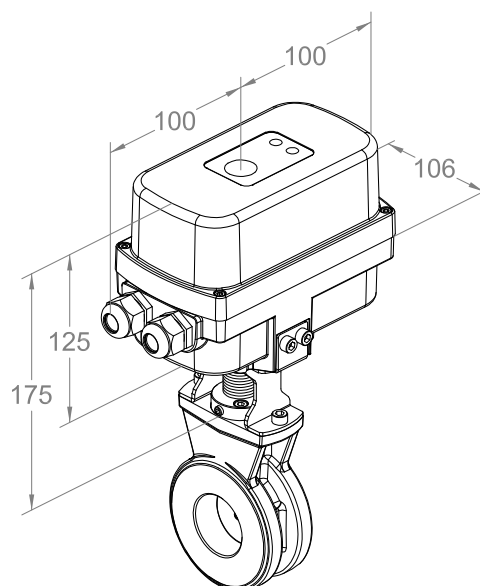
**VFT****VF****Square shaft****Round shaft  
(+Set O)****Manual lever  
(+Set L)****Solenoid actuator  
(+Set S/ST)****Servomotor  
(+Set M/MT)**

Fig.5

Tab. 2

| Connections | Overall dimensions [mm] |    |     |       |       | Weight <sup>1</sup> [Kg] | Actuator | Overall dimensions [mm] |     |     | Weight [Kg] |
|-------------|-------------------------|----|-----|-------|-------|--------------------------|----------|-------------------------|-----|-----|-------------|
|             | CH                      | P  | De  | L1    | L2    |                          |          | L3                      | H   | Ø   |             |
| Rp 3/4      | 50                      | 70 |     |       |       | 0,45                     |          |                         |     |     |             |
| Rp 1        | 50                      | 70 |     |       |       | 0,40                     |          |                         |     |     |             |
| Rp 1¼       | 65                      | 85 |     |       |       | 0,75                     |          |                         |     |     |             |
| Rp 1½       | 65                      | 85 |     |       |       | 0,65                     |          |                         |     |     |             |
| Rp 2        | 75                      | 90 |     |       |       | 0,80                     |          |                         |     |     |             |
| DN 40       |                         |    | 92  | 46    | 80    | 0,8                      | SR4      | 126                     | 160 | 100 | 5,0         |
| DN 50       |                         |    | 107 | 53,5  | 87,5  | 0,9                      | SL4      | 126                     | 230 | 100 | 5,5         |
| DN 65       |                         |    | 127 | 63,5  | 97,5  | 1,2                      | ST4      | 126                     | 240 | 100 | 5,6         |
| DN 80       |                         |    | 142 | 71    | 105   | 1,3                      | SR8      | 134                     | 182 | 114 | 7,2         |
| DN 100      |                         |    | 162 | 81    | 115   | 1,5                      | SL8      | 134                     | 252 | 114 | 7,7         |
| DN 125      |                         |    | 192 | 96    | 130   | 1,8                      | ST8      | 134                     | 262 | 114 | 7,8         |
| DN 150      |                         |    | 217 | 108,5 | 147,5 | 2,2                      | MZ       |                         |     |     | 2,0         |

<sup>(1)</sup> Actuator weight excluded (adapter for VF..S 0,55Kg)

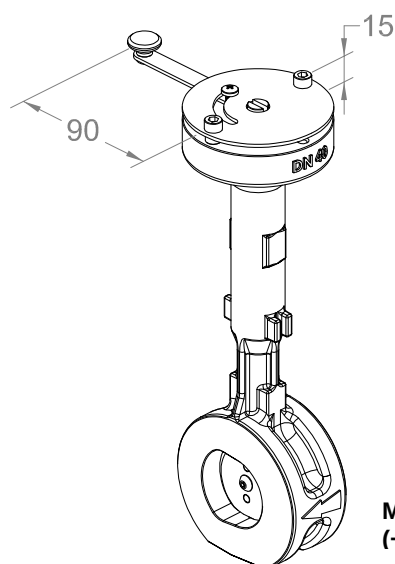
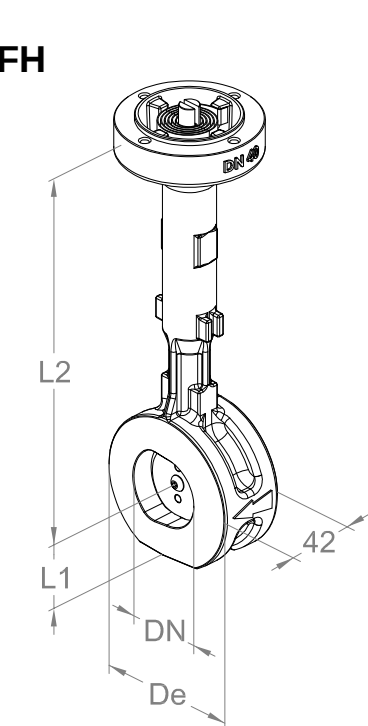
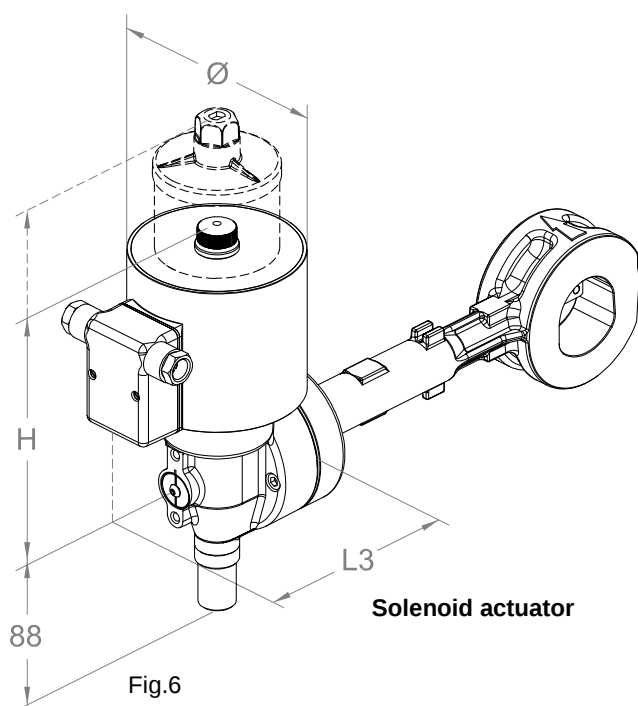
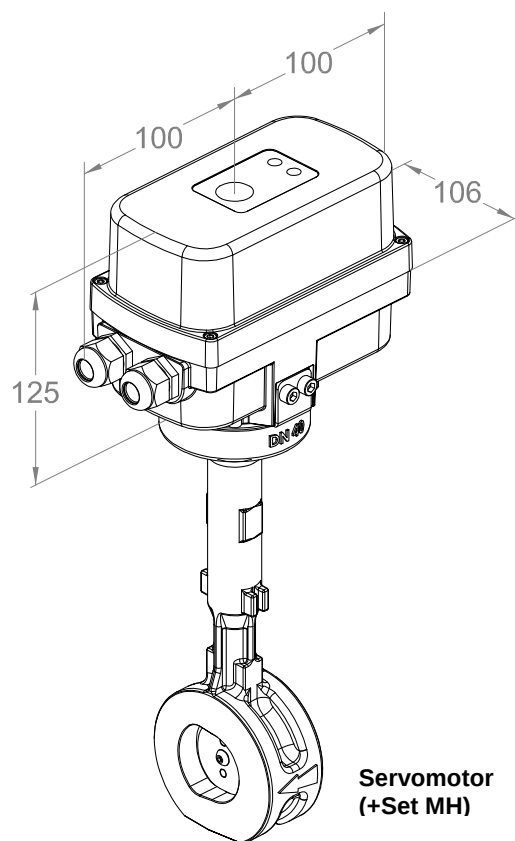
**VFH****Manual lever  
(+Set LH)****Solenoid actuator****Servomotor  
(+Set MH)**

Fig.6

Tab. 3

| Connections | Overall dimensions [mm] |      |       | Weight <sup>(1)</sup> [Kg] | Actuator | Overall dimensions [mm] |     |     | Weight [Kg] |
|-------------|-------------------------|------|-------|----------------------------|----------|-------------------------|-----|-----|-------------|
|             | De                      | L1   | L2    |                            |          | L3                      | H   | Ø   |             |
| DN 40       | 92                      | 42   | 230   | 2,9                        | SR4      | 126                     | 160 | 100 | 5,0         |
| DN 50       | 107                     | 49,5 | 237,5 | 3,3                        | SL4      | 126                     | 230 | 100 | 5,5         |
| DN 65       | 127                     | 59,5 | 247,5 | 3,9                        | ST4      | 126                     | 240 | 100 | 5,6         |
| DN 80       | 142                     | 67   | 255   | 4,3                        | SR8      | 134                     | 182 | 114 | 7,2         |
| DN 100      | 162                     | 81   | 265   | 4,8                        | SL8      | 134                     | 252 | 114 | 7,7         |
| DN 125      | 192                     | 99   | 275   | 7,2                        | ST8      | 134                     | 262 | 114 | 7,8         |
| DN 150      | 217                     | 111  | 287   | 8,2                        | MZ       |                         |     |     | 2,0         |
| DN 200      | 275                     | 140  | 315   | 11                         |          |                         |     |     |             |

<sup>(1)</sup> Actuator weight excluded

## Flow chart - VF, VFT

- blue lines: leakage @ 0° opening angle
- orange lines: max flowrate @ 90° opening angle

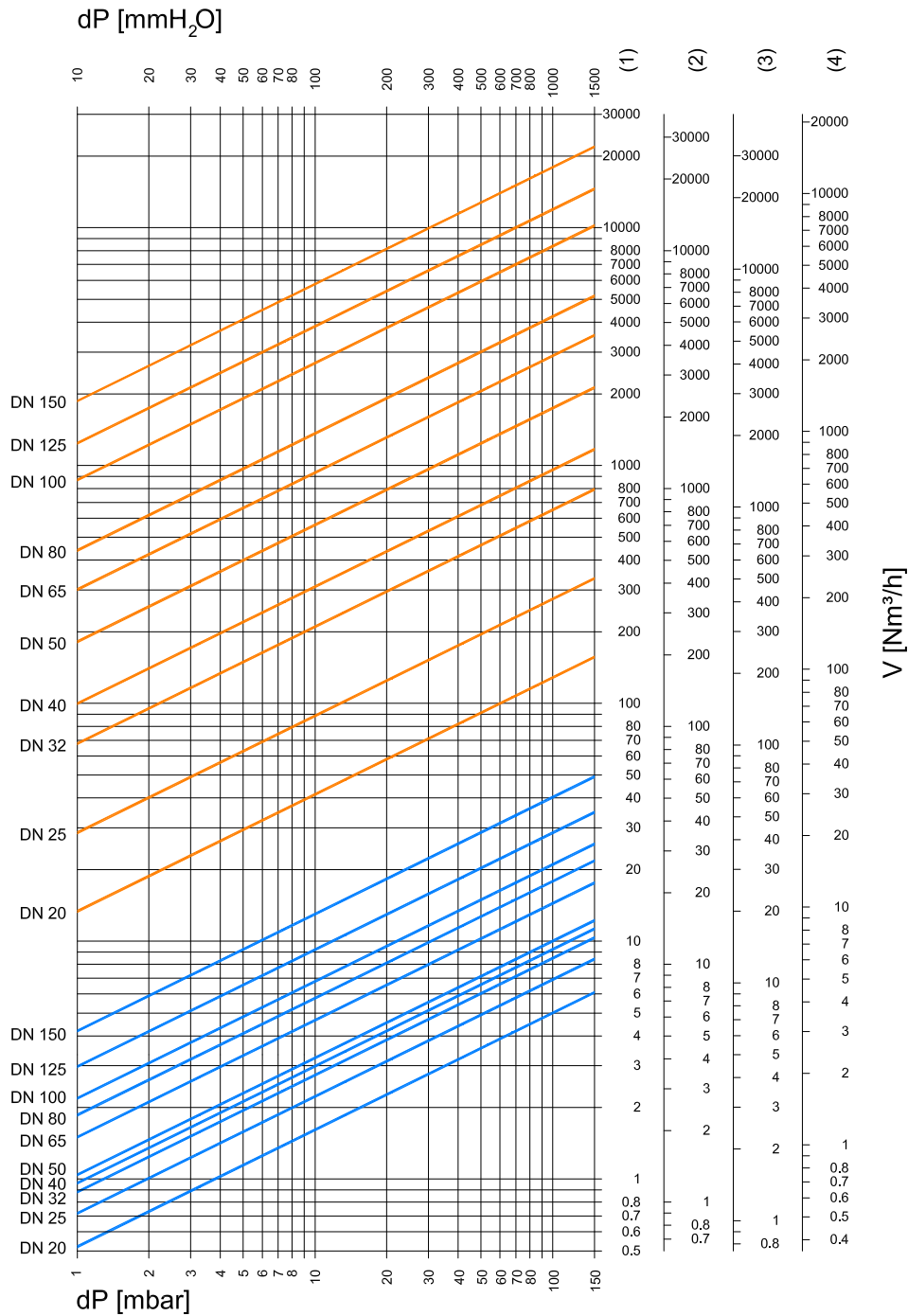


Fig.7

## Formula of conversion from air to other gases

$$V_{GAS} = k \cdot V_{AIR}$$

Tab. 4

| Gas type       | Specific gravity<br>$\rho$<br>[Kg/m <sup>3</sup> ] | $k = \sqrt{\frac{125}{\rho_{GAS}}}$ |
|----------------|----------------------------------------------------|-------------------------------------|
| 1) Air         | 1,25                                               | 1,00                                |
| 2) Natural gas | 0,80                                               | 1,25                                |
| 3) Town gas    | 0,57                                               | 1,48                                |
| 4) LPG         | 2,08                                               | 0,77                                |

15°C, 1013 mbar, dry

## Flow chart - VFH

- blue lines: leakage @ 0° opening angle
- orange lines: max flowrate @ 90° opening angle

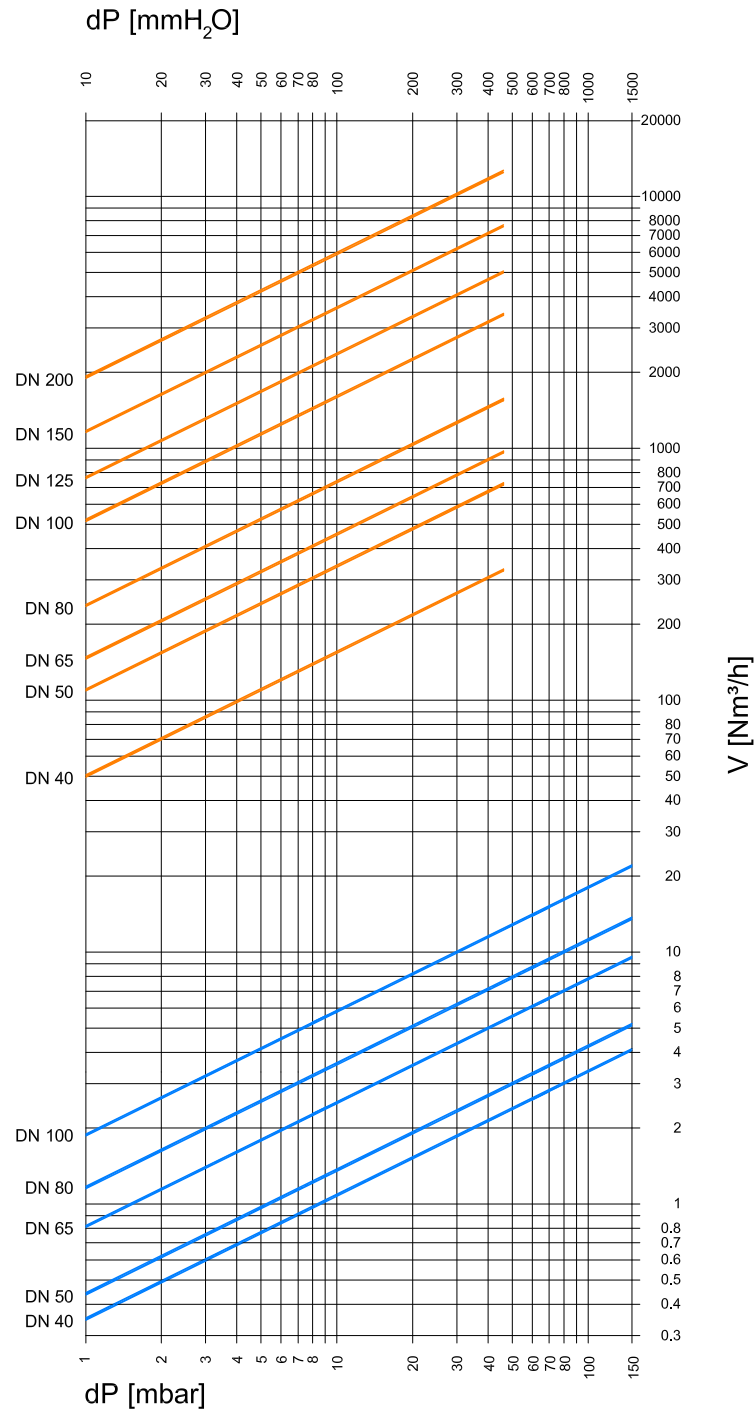


Fig.8



Pressure drop ( $\Delta p$ ) being 30% of inlet pressure  $p_1$  assures a good flow control.

## Flow velocities chart

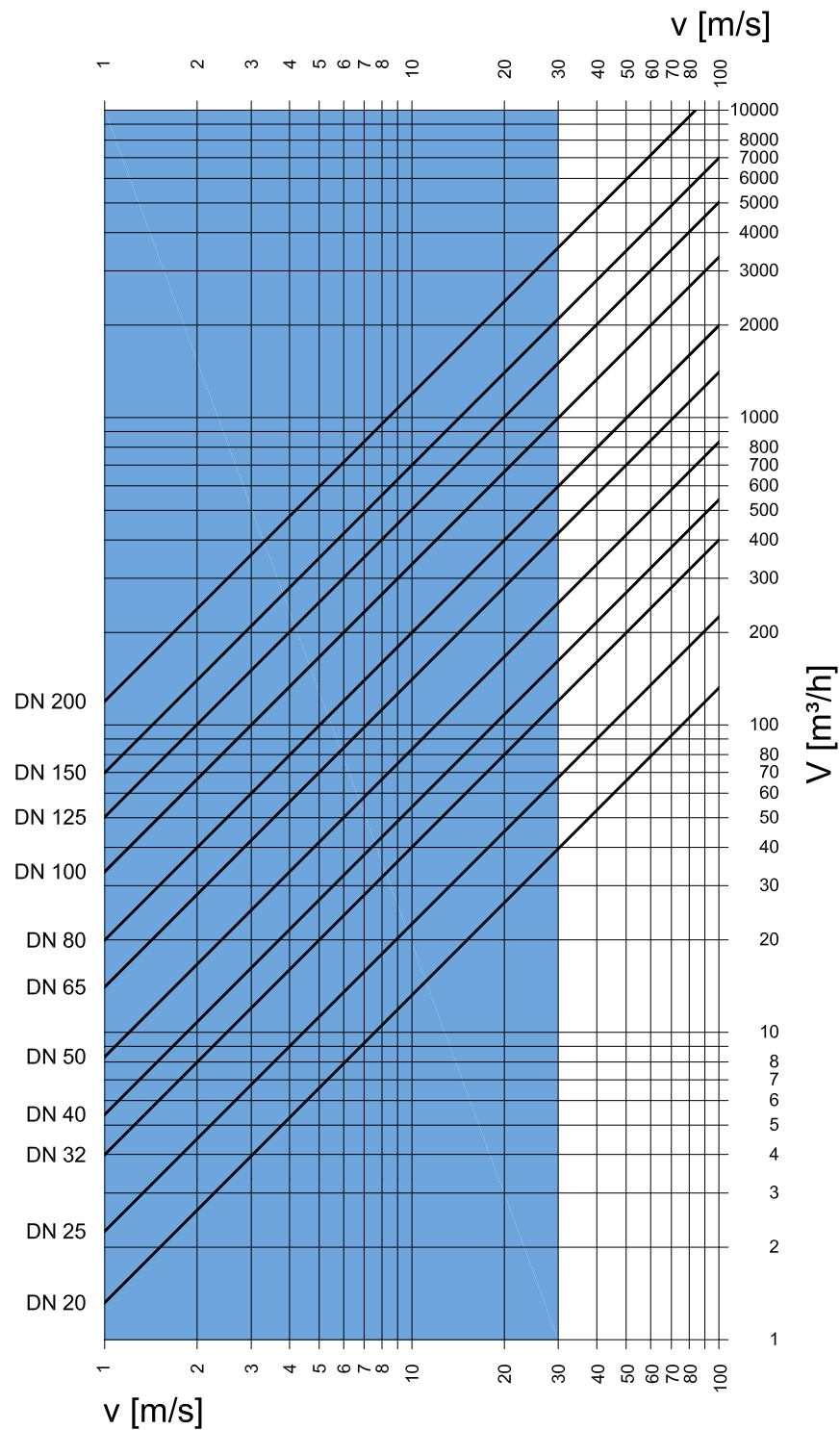


Fig.9



Flow velocity lower than 30 m/s is recommended to avoid noise and turbulence that can affect pressure drop.

**Flow factor Kvs**

(15°C, 1013 mbar, dry)

**VF, VFT types**

Tab. 5

| Connections                  | Reduction     | Opening angle |            |            |            |            |             |             |             |             |             |
|------------------------------|---------------|---------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|
|                              |               | 0°            | 10°        | 20°        | 30°        | 40°        | 50°         | 60°         | 70°         | 80°         | 90°         |
| <b>Rp 3/4</b>                | <b>DN 20</b>  | <b>0.6</b>    | <b>0.8</b> | <b>1.0</b> | <b>2.1</b> | <b>3.5</b> | <b>6.4</b>  | <b>8.2</b>  | <b>10.3</b> | <b>11.2</b> | <b>12.5</b> |
| <b>Rp 1</b>                  | DN 20         | 0.6           | 0.8        | 1.0        | 2.1        | 3.5        | 6.4         | 8.2         | 10.3        | 11.2        | 12.5        |
|                              | <b>DN 25</b>  | <b>0.8</b>    | <b>1.0</b> | <b>1.5</b> | <b>4.0</b> | <b>6.5</b> | <b>10.7</b> | <b>16.5</b> | <b>23</b>   | <b>27</b>   | <b>29</b>   |
| <b>Rp 1¼</b>                 | DN 20         | 0.6           | 0.8        | 1.0        | 2.1        | 3.5        | 6.4         | 8.2         | 10.3        | 11.2        | 12.5        |
|                              | DN 25         | 0.8           | 1.0        | 1.5        | 4.0        | 6.5        | 10.7        | 16.5        | 21          | 25          | 28          |
|                              | <b>DN 32</b>  | <b>1.0</b>    | <b>1.4</b> | <b>2.8</b> | <b>5.4</b> | <b>9.5</b> | <b>16</b>   | <b>27</b>   | <b>41</b>   | <b>57</b>   | <b>63</b>   |
| <b>Rp 1½</b><br><b>DN 40</b> | DN 25         | 0.8           | 1.0        | 1.5        | 4.0        | 6.5        | 10.7        | 16.5        | 20          | 24          | 27          |
|                              | DN 32         | 1.0           | 1.4        | 2.8        | 5.4        | 9.5        | 16          | 27          | 41          | 57          | 63          |
|                              | <b>DN 40</b>  | <b>1.1</b>    | <b>1.5</b> | <b>3.6</b> | <b>7.3</b> | <b>13</b>  | <b>23</b>   | <b>37</b>   | <b>56</b>   | <b>77</b>   | <b>90</b>   |
| <b>Rp 2</b><br><b>DN 50</b>  | DN 32         | 1.0           | 1.4        | 2.8        | 5.4        | 9.6        | 16          | 26          | 38          | 50          | 56          |
|                              | DN 40         | 1.1           | 1.5        | 3.2        | 7.1        | 13         | 21          | 34          | 52          | 73          | 90          |
|                              | <b>DN 50</b>  | <b>1.2</b>    | <b>1.6</b> | <b>4.0</b> | <b>9.3</b> | <b>17</b>  | <b>31</b>   | <b>51</b>   | <b>82</b>   | <b>123</b>  | <b>167</b>  |
| <b>DN 65</b>                 | DN 40         | 1.1           | 1.5        | 3.3        | 7.1        | 13         | 20          | 32          | 46          | 61          | 71          |
|                              | DN 50         | 1.3           | 1.6        | 4.3        | 9.5        | 17         | 29          | 46          | 68          | 97          | 120         |
|                              | <b>DN 65</b>  | <b>1.7</b>    | <b>2.7</b> | <b>7.3</b> | <b>16</b>  | <b>32</b>  | <b>57</b>   | <b>94</b>   | <b>144</b>  | <b>210</b>  | <b>281</b>  |
| <b>DN 80</b>                 | DN 50         | 1.3           | 1.6        | 4.0        | 9.0        | 16         | 28          | 44          | 64          | 85          | 101         |
|                              | DN 65         | 2.0           | 2.4        | 7.0        | 16         | 31         | 55          | 89          | 132         | 185         | 243         |
|                              | <b>DN 80</b>  | <b>2.1</b>    | <b>3.2</b> | <b>9.8</b> | <b>24</b>  | <b>47</b>  | <b>83</b>   | <b>132</b>  | <b>202</b>  | <b>296</b>  | <b>405</b>  |
| <b>DN 100</b>                | DN 65         | 2.0           | 2.9        | 7.7        | 17         | 32         | 55          | 86          | 122         | 162         | 185         |
|                              | DN 80         | 2.4           | 3.3        | 9.8        | 23         | 49         | 88          | 140         | 203         | 275         | 335         |
|                              | <b>DN 100</b> | <b>2.5</b>    | <b>3.4</b> | <b>12</b>  | <b>34</b>  | <b>78</b>  | <b>133</b>  | <b>214</b>  | <b>331</b>  | <b>517</b>  | <b>792</b>  |
| <b>DN 125</b>                | DN 80         | 2.4           | 3.4        | 8.7        | 22         | 47         | 85          | 133         | 185         | 237         | 273         |
|                              | DN 100        | 2.9           | 5.2        | 17         | 48         | 103        | 173         | 262         | 364         | 478         | 561         |
|                              | <b>DN 125</b> | <b>3.4</b>    | <b>7.4</b> | <b>25</b>  | <b>78</b>  | <b>145</b> | <b>244</b>  | <b>385</b>  | <b>583</b>  | <b>910</b>  | <b>1132</b> |
| <b>DN 150</b>                | DN 100        | 2.9           | 4.2        | 15         | 42         | 95         | 160         | 237         | 319         | 397         | 458         |
|                              | DN 125        | 3.8           | 6.6        | 25         | 89         | 180        | 288         | 422         | 586         | 771         | 940         |
|                              | <b>DN 150</b> | <b>4.7</b>    | <b>13</b>  | <b>58</b>  | <b>132</b> | <b>229</b> | <b>369</b>  | <b>583</b>  | <b>882</b>  | <b>1557</b> | <b>1696</b> |

**VFH type**

Tab. 6

| Connection    | Opening angle |     |     |     |     |     |     |     |     |     |
|---------------|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|               | 0°            | 10° | 20° | 30° | 40° | 50° | 60° | 70° | 80° | 90° |
| <b>DN 40</b>  | 0.4           | 6,5 | 10  | 13  | 17  | 23  | 31  | 42  | 55  | 60  |
| <b>DN 50</b>  | 0.5           | 10  | 14  | 18  | 25  | 36  | 51  | 75  | 108 | 120 |
| <b>DN 65</b>  | 0.9           | 15  | 23  | 31  | 44  | 64  | 85  | 114 | 150 | 160 |
| <b>DN 80</b>  | 1.3           | 24  | 35  | 46  | 63  | 96  | 137 | 190 | 243 | 260 |
| <b>DN 100</b> | 2.1           | 34  | 52  | 74  | 105 | 165 | 250 | 370 | 540 | 570 |
| <b>DN 125</b> | See diagram   |     |     |     |     |     |     |     |     |     |
| <b>DN 150</b> |               |     |     |     |     |     |     |     |     |     |
| <b>DN 200</b> |               |     |     |     |     |     |     |     |     |     |

Valve dimension can be calculated using flow diagrams or using characteristic flow factor (K<sub>VS</sub>) mentioned in tables 5 and 6 for several opening angles of the butterfly disc.

**Example (calculation using diagram):**

Target is to select a valve for air with  $p_2 = 50$  mbar and flow rate  $V = 800$  Nm<sup>3</sup>/h. DN100 pipes are advisable to avoid to overtake recommended flow velocity.  
Pressure drop will be:

$$\Delta p = \left( \frac{0.3}{1-0.3} \right) p_2 = 21.4 \text{ mbar}$$

VF diagram curves suggest that DN65 valve can assure the requested flow rate. Considering DN100 pipe diameter, version DN100/65 (double reduction) can be adopted.

**Example (calculation using flow factor Kvs):**

Target is to select a valve for air at 250°C temperature with  $p_2 = 30$  mbar and flow rate  $V_{MAX} = 200$  Nm<sup>3</sup>/h. DN50 pipes are advisable to avoid to overtake recommended gas speed.  
Pressure drop will be:

$$\Delta p = \left( \frac{0.3}{1-0.3} \right) p_2 \cong 13 \text{ mbar}$$

Valve identification requires the calculation of Kv factor under operating conditions.  
Considering subcritical pressure drops only:

$$\Delta p < \frac{p_1}{2}$$

Kv can be calculated with the formula:

$$Kv = \frac{V}{514} \sqrt{\frac{\rho(t+273)}{\Delta p \cdot p_{2A}}}$$

where:

V = flow rate [Nm<sup>3</sup>/h]  
Kv = flow factor [m<sup>3</sup>/h]  
 $\rho$  = density [Kg/m<sup>3</sup>]  
 $p_{1A}$  = absolute inlet pressure [bar]  
 $p_{2A}$  = absolute outlet pressure [bar]  
 $\Delta p$  = differential pressure  $p_1 - p_2$  [bar]  
t = media temperature [°C]

$$Kv = \frac{200}{514} \sqrt{\frac{1.25(250+273)}{0.013 \cdot 1.043}} \cong 85$$

VFH valve (type for heated air) having Kvs just higher than Kv is DN 50 (table 6).  
Considering a linear Kv behavior with opening angle, the required Kv value comes with an angle of about 72°.

Using the following formula it is now possible to determine the leakage rate with completely closed disc or the flow rate  $V_{MIN}$  with disc in minimum flow rate setting:

$$V = 514 \cdot Kv \cdot \sqrt{\frac{\Delta p \cdot p_{2A}}{\rho(t+273)}}$$

## Ordering information

Tab.7

|    |     |     | VF                                                                     | 4 | 1 | R |
|----|-----|-----|------------------------------------------------------------------------|---|---|---|
| VF | VFT | VFH | Model                                                                  |   |   |   |
|    |     |     | <b>Connection</b>                                                      |   |   |   |
| ⊗  | ●   | ⊗   | 2= Rp 3/4                                                              |   |   |   |
| ⊗  | ●   | ⊗   | 3= Rp 1                                                                |   |   |   |
| ⊗  | ●   | ⊗   | 35= Rp 1¼                                                              |   |   |   |
| ⊗  | ●   | ⊗   | 4= Rp 1½                                                               |   |   |   |
| ⊗  | ●   | ⊗   | 6= Rp 2                                                                |   |   |   |
| ●  | ⊗   | ●   | 4= DN 40                                                               |   |   |   |
| ●  | ⊗   | ●   | 6= DN 50                                                               |   |   |   |
| ●  | ⊗   | ●   | 7= DN 65                                                               |   |   |   |
| ●  | ⊗   | ●   | 8= DN 80                                                               |   |   |   |
| ●  | ⊗   | ●   | 9= DN 100                                                              |   |   |   |
| ●  | ⊗   | ●   | 93= DN 125                                                             |   |   |   |
| ●  | ⊗   | ●   | 95= DN 150                                                             |   |   |   |
| ⊗  | ⊗   | ●   | 98= DN 200                                                             |   |   |   |
|    |     |     | <b>Reduction DN</b>                                                    |   |   |   |
| ●  | ●   | ●   | = none                                                                 |   |   |   |
| ○  | ○   | ⊗   | 1= 1xDN                                                                |   |   |   |
| ○  | ○   | ⊗   | 2= 2xDN                                                                |   |   |   |
|    |     |     | <b>Max. Media temperature</b>                                          |   |   |   |
| ●  | ●   | ⊗   | = +60°C                                                                |   |   |   |
| ○  | ○   | ⊗   | R= +200°C (air only)                                                   |   |   |   |
| ⊗  | ⊗   | ●   | = +250°C (+450°C with dissipators)                                     |   |   |   |
|    |     |     | <b>Driving systems and actuators<sup>1</sup></b>                       |   |   |   |
| ●  | ●   | ⊗   | - square shaft □8                                                      |   |   |   |
| ○  | ○   | ⊗   | - round shaft Ø10                                                      |   |   |   |
| ○  | ○   | ○   | - manual lever                                                         |   |   |   |
| ○  | ○   | ●   | - solenoid SR/SL/ST                                                    |   |   |   |
| ○  | ○   | ○   | - servomotor MZ                                                        |   |   |   |
|    |     |     | <b>For more information about actuators see their technical sheets</b> |   |   |   |

● Standard

⊗ Not available

○ Optional (<sup>1</sup> adaptation set is required, see fig.5-6)

Manufacturer reserves the right to update or make technical changes without prior notice.

## Standards and approvals

The VF valve type meets current European approval requirements regarding safety use on gaseous fuels. These products conform with the Gas Appliances Directive 2009/142/EC and the tests have been carried out according to EN13611 standard.



CE Reg.-Nr. 0063CL1111

The product complies with the Technical Regulation TP TC 004/2011-016/2011-020/2011-032/2013 of Russia, Belarus and Kazakhstan.



Certificate No.: TC № RU Д-IT.PA01.B.21942

Quality Management System certified according to UNI EN ISO 9001.

