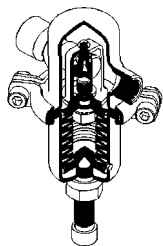




# Pressure Control Valves

## Pressure Reducing Valves for Liquids and Gases

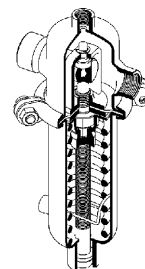


### DM 506 Small pressure reducing valve

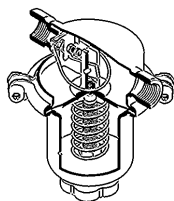
controls even smallest volumes  
all stainless steel SST 316 construction  
PN..... 315 G..... 1/4  
p<sub>2</sub>..... 0.3 - 20 bar T..... 130 °C  
K<sub>VS</sub>..... 0.15 m<sup>3</sup>/h

### Small capacity, available in various capacities DM 505

all CrNiMo-steel construction  
PN..... 250 DN..... 15 - 25  
p<sub>2</sub>..... 0.005 - 20 bar G..... 1/2  
K<sub>VS</sub>..... 0.12, 0.4 oder 0.9 m<sup>3</sup>/h T..... 130 °C



Top Seller

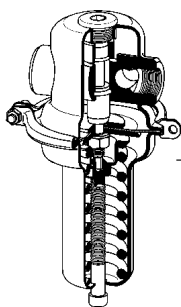
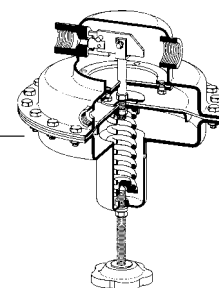


### DM 765 Tank blanketing, small capacity

small economical millibar control valve  
all stainless steel SST 316 construction  
PN..... 16 G..... 1/2  
p<sub>2</sub>..... 0.03 - 0.8 bar T..... 130 °C  
K<sub>VS</sub>..... 0.2 m<sup>3</sup>/h

### Tank blanketing, high precision DM 762

millibar control valve  
all stainless steel SST 316 construction  
PN..... 16 DN..... 15 - 50  
p<sub>2</sub>..... 0.002 - 0.52 bar G..... 1/2 - 2  
K<sub>VS</sub>..... 0.2 - 3.6 m<sup>3</sup>/h T..... 130 °C

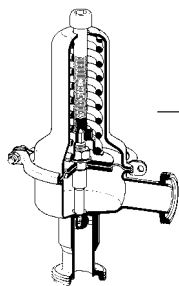
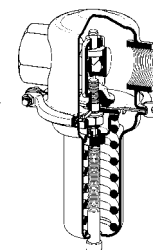


### DM 662 Universal valve, medium capacity

all stainless steel SST 316 construction  
PN..... 100 DN..... 15 - 25  
p<sub>2</sub>..... 0.02 - 12 bar G..... 1/2 - 1  
K<sub>VS</sub>..... 3.2 - 3.6 m<sup>3</sup>/h T..... 130 °C

### Standard valve, stainless steel and brass DM 502

especially recommended for CO<sub>2</sub>  
body stainless steel SST 316, internal components brass  
PN..... 100 G..... 1/2 - 2  
p<sub>2</sub>..... 0.02 - 16 bar T..... 130 °C  
K<sub>VS</sub>..... 0.6 - 4.2 m<sup>3</sup>/h

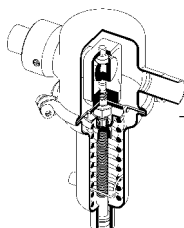
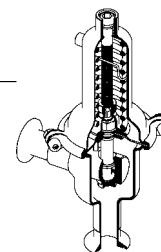


### DM 152 Hygienic applications, large capacity

angled design, virtually pocket-free, can be electropolished  
all stainless steel SST 316 construction  
PN..... 16 DN..... 15 - 150  
p<sub>2</sub>..... 0.3 - 5 bar T..... 180 °C  
K<sub>VS</sub>..... 2 - 5.2 m<sup>3</sup>/h

### Hygienic application, large capacity DM 462

angled design, virtually pocket-free, can be electropolished  
all stainless steel SST 316 construction  
PN..... 16 - 40 DN..... 25 - 50  
p<sub>2</sub>..... 0.8 - 12 bar T..... 200 °C  
K<sub>VS</sub>..... 3.7 - 16 m<sup>3</sup>/h



### DM 505P Special valve for high purity media

virtually pocket-free, can be electropolished  
all stainless steel SST 316 construction  
PN..... 250 DN..... 15 - 50  
p<sub>2</sub>..... 0.005 - 12 bar T..... 130 °C  
K<sub>VS</sub>..... 0.1 - 3.6 m<sup>3</sup>/h

Special versions on request. All the pressure has always been indicated as overpressure. We reserve the right to alter technical specifications without notice.

WIR REGELN DAS SCHON  
FIRMLY IN CONTROL

**MANKENBERG**

# Pressure Control Valves

## Pressure Reducing Valves for Liquids and Gases

### Universal valve, for all media

DM 652

for all applications

all stainless steel SST 316 construction

PN..... 16 - 40

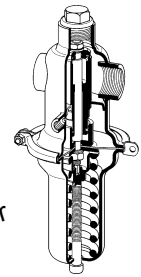
DN..... 15 - 50

p<sub>2</sub>..... 0.02 - 12 bar

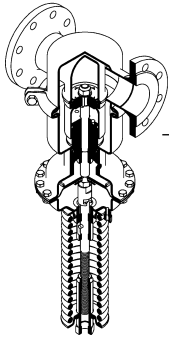
G..... 1/2 - 2

K<sub>VS</sub>..... 4 - 18 m<sup>3</sup>/h

T..... 130 °C



Top Seller



DM 664

### High capacity

all stainless steel SST 316 construction

PN..... 16

DN..... 50 - 100

p<sub>2</sub>..... 0.02 - 8 bar

T..... 130 °C

K<sub>VS</sub>..... 32 - 100 m<sup>3</sup>/h

### High pressure, up to 315 bar inlet pressure

DM 510

body carbon steel, stainless steel

PN..... 16 - 315

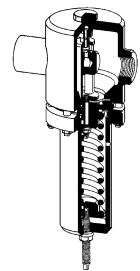
DN..... 15 - 50

p<sub>2</sub>..... 0.005 - 160 bar

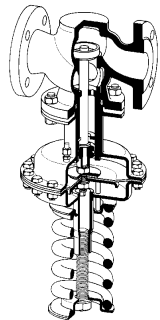
G..... 3/8 - 2

K<sub>VS</sub>..... 0.2 - 5.5 m<sup>3</sup>/h

T..... 130/400 °C



bis 518



DM 613

### Standard valve, cast body

for all applications

body grey cast iron, spheroidal cast iron, cast steel

PN..... 16 - 40

DN..... 15 - 150

p<sub>2</sub>..... 0.02 - 10 bar

T..... 130 °C

K<sub>VS</sub>..... 4 - 160 m<sup>3</sup>/h

### High capacity, only for small pressure drops

DM 307

sliding gate, sandwich design

DM 307 features open spring, DM 308 has a open spring cap

body carbon steel, stainless steel

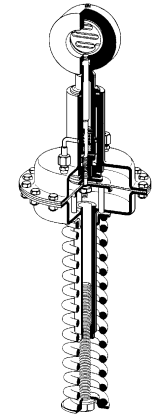
PN..... 10 - 40

DN..... 15 - 150

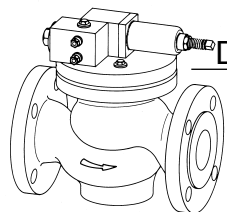
p<sub>2</sub>..... 0.1 - 10 bar

T..... 300 °C

K<sub>VS</sub>..... 2 - 338 m<sup>3</sup>/h



308



DM 810

### High capacity, for high pressures

pilot-controlled valve, cast body

body spheroidal cast iron, cast steel

PN..... 16 - 160

DN..... 40 - 400

p<sub>2</sub>..... 1 - 40 bar

T..... 130 °C

K<sub>VS</sub>..... 20 - 900 m<sup>3</sup>/h

### High capacity, inline valve

DM 814

pilot-controlled

body steel welded, stainless steel SST

PN..... 16 - 25

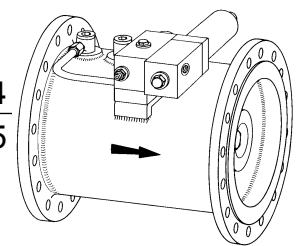
DN..... 100 - 800

p<sub>2</sub>..... 1 - 20 bar

T..... 130 °C

K<sub>VS</sub>..... 60 - 2100 m<sup>3</sup>/h

815





# Know How • Pressure reducing valves

Pressure reducing valves reduce a high and frequently fluctuating pressure to an adjustable constant pressure downstream of the valve. A spring keeps the valve open and this closes as the outlet pressure rises.

## Selecting valve type and nominal diameter

Using your maximum operating data and the smallest differential pressure  $D_p$ , you should calculate the characteristic performance figure  $K_v$  (see leaflet Calculation of Pressure Regulators). Select a valve whose  $K_{vs}$  value is 30% greater than the calculated  $K_v$  figure. Additional allowances must be made for high-viscosity liquids or liquids which vaporise when depressurised.

You should also note the reduction ratio i.e. inlet pressure  $p_1$  divided by outlet pressure  $p_2$ . The inlet pressure acting on the cone causes the valve to open whereas the outlet pressure acting on the diaphragm/spring system causes it to close. If the reduction ratio calculated from the operating data is greater than the quoted ratio, the valve will not close.

Pressure reducing valves should not be overdimensioned. Their optimum working range is within 10% to 70% of their  $K_{vs}$  value.

## Selecting rated pressure and valve material

The rated pressure must exceed the maximum system pressure, irrespective of safety allowances. Please note also the effect of the temperature (see DIN 2401).

## Selecting the setting range

For good control accuracy you should select a setting range which places the required outlet pressure near its upper limit. If, for example, the controlled outlet pressure is to be 2.3 bar, you should select the 0.8 to 2.5 bar setting range, not 2 to 5 bar. If the available setting range is not wide enough you may go below the bottom limit of the setting range provided that the valve loading is kept low and a high control accuracy not required.

## Selecting elastomer materials

You should select elastomers according to the operating temperature and the requirements of the medium. High-pressure gases, for example, can diffuse into the elastomer and cause damage when being depressurised.

## Flow velocity

Depending on pressure drop and permitted maximum noise level, we recommend the following flow velocities:

Liquids	1 - 5	m/s
Saturated steam	10 - 40	m/s
Superheated steam	15 - 60	m/s
Gases up to 2 bar	2 - 10	m/s
Gases above 2 bar	5 - 40	m/s

## Sense line (control line)

You should install a sense line if the selected pressure reducer is designed for sense line operation. The sense line should be connected at a distance of not less than 10 times nominal diameter downstream of the pressure reducing valve.

No isolating valves should be installed in the sense line to avoid an excessive pressure differential between valve body and diaphragm.

To attenuate any oscillations occurring in the pipeline system, the sense line may be fitted with a restrictor which must never be fully closed during operation.

In the case of steam and liquids the sense line must be installed so as to fall towards the valve. Under special operating conditions, for example intermittent operation with dry steam, a compensation vessel must be installed. The sense line must be rigid as elastic hoses can induce oscillations.

## Protecting your system

To protect your system you should install a safety valve downstream of the pressure reducer to prevent the maximum permitted operating pressure (normally 1.5 x maximum set pressure) being exceeded. The safety valve operating pressure should be set approximately 40% above the maximum set pressure of the pressure reducer to avoid blow-off during slight pressure fluctuations. For example: if the pressure reducer setting range is 2 - 5 bar the safety valve operating pressure must be 1.4 x 5 bar = 7 bar.

## Protecting the pressure reducing valve

To protect the pressure reducer against damage from solid particles carried in the pipeline, a strainer or filter should be fitted and serviced at regular intervals.

With steam as medium, the pressure reducer should be preceded by a water trap, which is also called steam dryer, to protect it from cavitation (see below chapter "Steam Operation").

## Valve seat leakage

Pressure reducers are control valves which are not required to provide a leak-proof seal (VDI/VDE Guideline 2174). Normally pressure reducers leave the factory with perfectly leakproof valve seats. During operation, however, solid particles often cause damage and seat leakage. Any low leakage requirement must be expressly specified when ordering. Valve leakage can be considerably reduced by special measures such as lapping the valve seat, using special cone seals and increasing the control (diaphragm) surfaces.

## Cut-off

For the purpose of installation, servicing and isolation of the valve, shut-off valves should be installed upstream and downstream of the pressure reducer. When closing the shut-off valves the upstream valve must always be closed first. A bypass line may be necessary to maintain emergency operation.

## Stellited seat and cone

In the case of abrasive media or liquids with pressure drops (inlet pressure minus outlet pressure) of more than 25 bar the valve cone must be stellited; for pressure drops above 150 bar the seat must be stellited as well.

# Know How • Pressure reducing valves

Pressure reducing valves reduce a high and frequently fluctuating pressure to an adjustable constant pressure downstream of the valve. A spring keeps the valve open and this closes as the outlet pressure rises

## Leakage line

If toxic or hazardous media are used the valve must feature a sealed spring cap (including setting spindle seal) fitted with a leakage line connection. When the pressure reducer is installed on site a leakage line must be fitted capable of safely and pressureless draining the escaping medium in case the control valve should become defective.

## Mounting position

For gases a pressure reducing valve can normally be fitted in horizontal pipelines with the spring cap at the bottom or at the top. Installation in vertical pipe runs is possible but can result in increased wear and loss of control accuracy owing to increased friction. In the case of liquids a pressure reducer should be installed with the spring cover at the bottom. Thus gas traps upstream of the valve are avoided which would cause the valve to oscillate. For steam a pressure reducer should likewise be installed with its spring cover at the bottom to protect the diaphragm against overheating by means of a layer of condensate.

## Start-up

Pressure reducers should be started up and operated without pressure surges, if possible. A sudden operation of upstream or downstream valves should be avoided.

## Steam operation

If a pressure reducer is installed in a steam plant the diaphragm water reservoir must be filled before the plant is started up. There must be no danger of overheating at the installation site caused by excessive ambient temperatures or insufficient heat dissipation. Pressure regulators must not be insulated. In some cases an insulating of the body is permitted, but only with cast bodies. Never insulate diaphragm housing, mid section and spring cap (or open springs). Overheating caused by insulating destroys the elastomere of the control unit.

Many steam generators send a lot of water through the piping together with the steam. Even an initial overheating can get lost through piping heat losses, so that the steam gets "wet". A piping speed of up to 25 m/s is normal for "dry steam", whilst wet steam already has the effect of a sandblasting machine at this speed, and the condensate and/or the water droplets eat holes into pipings and valve seats. In addition, water obstructs heat transition especially in heat exchangers. To avoid it, the water should be removed by a water trap, also called steam dryer, as quickly as possible and without steam losses.

## Setting the pressure

Pressure reducing valves are normally supplied by us with a relaxed spring. This means that a valve is set at the factory to the minimum outlet pressure. The required pressure should be set under operating conditions.

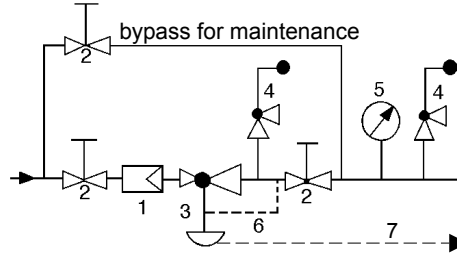
## Maintenance

Pressure reducers must be cleaned and serviced regularly.

## Valves free of oil and grease or silicone

Please pay attention to order an fit only spares free of oil and grease resp. free of silicone.

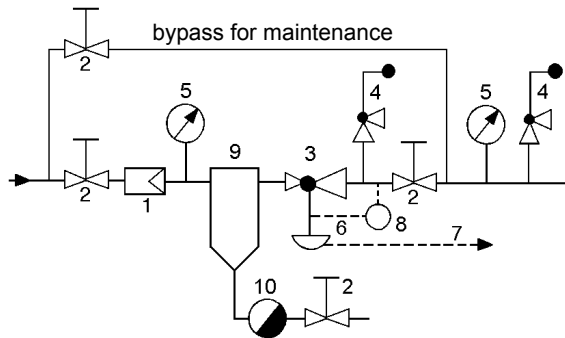
## Recommended installation for liquids and gasses



- |                      |                    |                |
|----------------------|--------------------|----------------|
| 1 Strainer or Filter | 3 Pressure Reducer | 6 Sense Line   |
| 2 Shutoff Valves     | 4 Safety Valves    | 7 Leakage Line |
|                      | 5 Pressure Gauge   |                |

Sense line connection 10 - 20 x DN behind the valve

## Recommended installation for steam



- |                    |                  |                            |
|--------------------|------------------|----------------------------|
| 1 Strainer         | 5 Pressure Gauge | 9 Water Trap (Steam Dryer) |
| 2 Shutoff Valves   | 6 Sense Line     | 10 Steam Trap              |
| 3 Pressure Reducer | 7 Leakage Line   |                            |
| 4 Safety Valves    | 8 Expansion Tank |                            |

Sense line connection 10 - 20 x DN behind the valve

**Please consult our engineer if extreme operating conditions apply or whenever you are in doubt.**

**Notes on Safety, Operating Instruction etc." MUST be followed.**

# Calculation of Pressure Regulators

Designing and selecting pressure regulating valves is not a secret science mastered only by a handful of experts. The procedure described below allows the user to select a suitable valve for a particular application with relatively little effort. The calculations based on the so-called  $K_v$  value method have been considerably simplified compared with the very accurate calculations given in IEC 534; they produce, however, results which for our purposes are sufficiently accurate.

The  $K_v$  value is the flow coefficient which corresponds to a water flow rate -given in  $m^3/h$ - at a differential pressure of 1 bar and a water temperature between 5 and 30 °C.

The American system uses the flow coefficient  $C_v$  which corresponds to a water flow rate -given in USgal/min- at a pressure difference of 1 psi and a water temperature of 60 °F. The relationship between  $K_v$  and  $C_v$  is:  $K_v = 0.86 \times C_v$ .

The  $K_{vs}$  value quoted in technical documentation is the  $K_v$  value at nominal valve lift for a specific series of valves. The  $K_{vs}$  value allows the maximum throughput to be calculated for a valve.

The methods of calculating the  $K_v$  value described here have been, as mentioned above, considerably simplified. Many factors have been excluded from the calculation. By treating steam as an ideal gas and excluding the specific volume, a maximum error of 5% may result which, however, in view of the allowances used, is acceptable.

The calculations are simple; a knowledge of basic arithmetic and finding roots is sufficient. Tables or diagrams are not absolutely necessary but can be helpful if available.

The operating pressures and setting ranges specified in our design examples are given as pressures above atmospheric [barg = bar], as is customary. The calculations, on the other hand, are based on absolute pressures [bara]. For instance, if an outlet pressure of 7 bar is specified an absolute pressure of  $7 + 1 = 8$  bara must be used in the calculation.

Flow rate and density should be specified for liquids in their operating state and for gases in their standard state (0°C, 1013 mbar).

# Calculation of Pressure Regulators

## Calculation of the $K_V$ -value

To design or select a valve you should first calculate the  $K_V$  value from the operating data at which the valve is to operate

$$K_V = Q \sqrt{\frac{\rho}{1000 \cdot \Delta p}}$$

$K_V$	Flow Coefficient	$m^3/h$
$Q$	Volume Flow	$m^3/h$
$\rho$	Density	$kg/m^3$
$p_1$	Inlet Pressure (abs.)	bar
$p_2$	Outlet Pressure (abs.)	bar
$\Delta p$	Differential Pressure ( $p_1 - p_2$ )	bar

Example:

We are looking for a pressure reducing valve for 2-7  $m^3/h$  of methanol having a density of 790  $kg/m^3$ ; the inlet pressure varies between 9 and 12 bar and the outlet pressure is to be maintained at 4 bar.

In our calculation we use the maximum flow rate and the minimum pressure drop

$$K_V = 7 \sqrt{\frac{790}{1000 \cdot 5}} = 2.78 \text{ m}^3/h$$

To the  $K_V$  - value calculated from the operating data we add an allowance of 30 % and thus obtain the minimum  $K_{Vs}$  - value which the valve should have

$$K_{Vs} \text{ value} \geq 1.3 \times K_V \text{ value} = 1.3 \times 2.78 = 3.61 \text{ m}^3/h$$

Additional allowances are required if evaporation occurs as the pressure drops, which is the case especially where the pressure drops are large and the temperatures high. The value of  $\Delta p$  to be used in the formula can be calculated. Frequently the data required for this calculation are, however, difficult to obtain. For the sake of simplicity we therefore recommend that a pressure difference should be used in the formula which does not exceed 0.6 times the absolute inlet pressure, i.e.

$$\Delta p \leq 0.6 \times p_1 \text{ [bara]}$$

If this is not feasible we suggest that you contact us for advice; the same applies to other extreme operating conditions such as high-viscosity liquids, abrasive media as well as high pressures and temperatures.

## Calculating the nominal diameter

To keep pressure drop and noise within acceptable limits, certain flow velocities in the pipelines should not be exceeded e.g.

- suction side of centrifugal pumps 2 m/s
- suction side of reciprocating pumps 1 m/s
- delivery side of pumps 5 m/s
- local drinking water supplies 1 m/s
- water or fuel trunk pipelines 3 m/s
- high-viscosity liquids 1 m/s

Pipeline diameter can be calculated as follows

$$d = 18.8 \sqrt{\frac{Q}{w}}$$

$d$	Pipeline Diameter	mm
$Q$	Volume Flow	$m^3/h$
$w$	Flow Velocity	m/s

If in our Example we permit a maximum flow velocity of 2 m/s, the required pipeline diameter will be

$$d = 18.8 \sqrt{\frac{7}{2}} = 35.2 \text{ mm}$$

In this case we would select a pipe of 40 mm nominal diameter (DN 40).

For a given pipeline diameter the flow velocity can be calculated as follows

$$w = 354 \frac{Q}{d^2}$$

In our example the flow velocity for a DN 40 pipeline and a flow rate of 7  $m^3/h$  would be

$$w = 354 \frac{7}{40^2} = 1.55 \text{ m/s}$$

For certain operating conditions a control valve may be selected whose nominal diameter is one or two sizes smaller than the nominal pipeline diameter; this applies especially to valves with sense line.

## Pressure Regulators for Liquids

### Selecting a suitable valve

Our selection tables and data sheets contain all the technical data needed to select MANKENBERG valves.

The  $K_{VS}$  value of the selected valve should be equal to the calculated  $K_V$  value plus the required allowance. Most valves operate most efficiently within 10 to 70 % of their  $K_{VS}$  values; small non-balanced valves such as our pressure reducers DM 502, 505, 506, 510, 762 and 765, will operate satisfactorily even at minimum flow rates.

You should select a setting range which places the required control pressure at the top end. If, for instance, the pressure to be controlled is 2.3 bar, you should select the 0.8-2.5 bar range rather than the 2-5 bar range, as with the latter the control errors would be considerably greater. If in special cases the standard setting range is not wide enough, a lower setting range may be selected provided the valve operates at low capacity and the control accuracy is of minor importance. Under such conditions, for instance, a pressure reducer featuring a setting range of 0.8-2.5 bar may still operate satisfactorily at 0.5 bar.

You should select the materials in accordance with the operating requirements by using the material resistance table.

Let us return to our example:

Based on the operating data we had calculated a minimum  $K_{VS}$  value of 3.61 m<sup>3</sup>/h. According to our selection table several valve types meet this requirement. In view of the properties of the fluid to be handled we select pressure reducer DM 652, DN 25,  $K_{VS}$  value 6 m<sup>3</sup>/h, setting range 2-5 bar, spring cap with leakage line connection. In its standard version this valve is manufactured from materials which are compatible with methanol. Additional features are high control accuracy, low weight, good surface quality and a price which is remarkably low for a stainless steel valve.

Here is another example:

We are looking for a overflow valve (back pressure regulator) capable of discharging 250 m<sup>3</sup>/h of drinking water into an open reservoir at a pressure of 10 bar.

First we calculate the  $K_V$  value corresponding to the operating data. Although the pressure drop (  $p_1 - p_2$  ) is 10 bar, we shall use for our calculation a pressure drop of only

$$0.6 \times p_1 [\text{bara}] = 6.6 \text{ bar}$$

because of the evaporation which occurs across the valve  
Thus:

$$K_V = 250 \sqrt{\frac{1000}{1000 \times 6.6}} = 97.3 \text{ m}^3/\text{h}$$

Hence the  $K_{VS}$  value of the valve should be at least

$$K_{VS} \text{ value} = 1.3 \times K_V \text{ value} = 1.3 \times 97.3 = 126.5 \text{ m}^3/\text{h}$$

We select the pilot operated overflow valve UV 824, DN 200,  $K_{VS}$  value 180 m<sup>3</sup>/h, setting range 4–12 bar, a relatively economical, lightweight and very accurate control valve made from steel or better stainless steel.

Let us give another example:

We are looking for a CIP pressure reducing valve capable of reducing the pressure of demineralized water from 2-4 bar to 0.7 bar at a rate of 1-3 l/min. The pipeline has a nominal diameter of 25 mm and Tri Clamp connection.

Based on the operating data we again calculate the  $K_V$  value as follows:

$$K_V = 0.003 \times 60 \sqrt{\frac{1000}{1000 \cdot 1.3}} = 0.16 \text{ m}^3/\text{h}$$

Hence the  $K_{VS}$  value of the valve should be at least

$$K_{VS} \text{ value} = 1.3 \times K_V \text{ value} = 1.3 \times 0.16 = 0.21 \text{ m}^3/\text{h}$$

We select the pressure reducer DM 152, DN 25,  $K_{VS}$  value 3.5 m<sup>3</sup>/h, setting range 0.8-2.5 bar, an angled stainless steel valve which can be polished. We have selected this valve, although its  $K_{VS}$  value is relatively high and the required outlet pressure is outside the specified setting range, because extensive bench testing has shown that this valve is ideal for the above-mentioned operating conditions.

We have used this example to demonstrate that in special cases valves can be used outside the parameter ranges specified in the catalogue provided that the user has a good knowledge of the operating characteristics of the valve.

# Calculation of Pressure Regulators

## Calculation of the $K_V$ value

The selection of a valve first of all that the  $K_V$  value is determined from the operating data under which the valve is to operate.

For subcritical pressure drops, i.e. if

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

use formula

$$K_V = \frac{Q_N}{514} \sqrt{\frac{\rho_N(t_1 + 273)}{\Delta p \times p_2}}$$

or for supercritical pressure drops, i.e. if

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

use formula

$$K_V = \frac{Q_N}{257 \times p_1} \sqrt{\rho_N(t_1 + 273)}$$

$K_V$	Flow Coefficient	$m^3/h$
$Q_N$	Volume Flow	$m^3/h$
$Q_1$	Volume Flow Upstream of the Valve	$m^3/h$
$Q_2$	Volume Flow Downstream of the Valve	$m^3/h$
$\rho_N$	Density	$kg/m^3$
$\Delta p$	Differential Pressure ( $p_1 - p_2$ )	bar
$p_1$	Inlet Pressure	bar
$p_2$	Outlet Pressure (abs.)	bar
$t_1$	Temperature at Inlet	$^{\circ}C$
$t_2$	Temperature at Outlet	$^{\circ}C$
$w_1$	Velocity inside Pipeline before the Valve	m/s
$w_2$	Velocity inside Pipeline behind the Valve	m/s
$d_1$	Nominal Diameter before the Valve	mm
$d_2$	Nominal Diameter behind the Valve	mm

### Example:

We are looking for a stainless steel pressure reducing valve for  $Q_N$  max. 1200  $m^3/h$   $CO_2$ , operating temperature 20  $^{\circ}C$ , density 2  $kg/m^3$ , inlet pressure 10-12 bar above atmospheric, controlled outlet pressure 7 bar above atmospheric.

The pressure drop is subcritical, as

$$\Delta p < \frac{p_1}{2} \text{ namely } 3 < \frac{11}{2}$$

Hence

$$K_V = \frac{1200}{514} \sqrt{\frac{2(20+273)}{3 \times 8}} = 11.54 \text{ m}^3/h$$

To the  $K_V$  value calculated from the operating data we add an allowance of 30 % and thus obtain the minimum  $K_V$  value

which the valve to be selected should have.

$$K_{Vs} \text{ value} \geq 1.3 \text{ } K_V \text{ value} = 1.3 \times 11.54 = 15 \text{ m}^3/h$$

## Calculating the Nominal Diameter

To keep pressure drop and noise within acceptable limits, certain flow velocities in the pipelines should not be exceeded.

- up to 10 mbar 2 m/s
- up to 100 mbar 4 m/s
- up to 1 bar 10 m/s
- up to 10 bar 20 m/s
- above 10 bar 40 m/s

If no values have been specified we recommend the following: These rough guidelines apply to pipe diameters from DN 80 up. For smaller diameters lower flow velocities should be used. To calculate the flow velocity we need the flow rate figure under operating conditions. This may be calculated as follows:

$$Q = \frac{Q_N(273+t)}{p \times 273}$$

Accordingly in our example the flow rates upstream and downstream of the valve are as follows:

$$Q_1 = \frac{1200(273+20)}{11 \times 273} = 117,1 \text{ m}^3/h$$

$$Q_2 = \frac{1200(273+20)}{8 \times 273} = 161 \text{ m}^3/h$$

The pipeline diameter can be calculated as follows:

$$d = 18,8 \sqrt{\frac{Q}{w}}$$

If in our example maximum flow velocities of 20 m/s upstream and 15 m/s downstream of the valve have been specified, the following pipeline diameters will be required

$$d_1 = 18,8 \sqrt{\frac{117,1}{20}} = 45.5 \text{ mm}$$

$$d_2 = 18,8 \sqrt{\frac{161}{15}} = 59.6 \text{ mm}$$

Consequently we would recommend a DN 50 pipeline upstream and a DN 65 pipeline downstream of the valve.

For a given nominal diameter the flow velocity can be calculated as follows

$$w = 354 \frac{Q}{d^2}$$

In our example we would thus obtain the following flow velocities

$$w_1 = 354 \frac{117.1}{50^2} = 16.6 \text{ m/s}$$

$$w_2 = 354 \frac{161}{65^2} = 13.5 \text{ m/s}$$

For certain operating conditions a control valve may be selected whose nominal diameter is one or two sizes smaller than the nominal pipeline diameter. Downstream of the valve the pipeline diameter may be increased by one or two sizes depending on the flow velocity; this applies especially to valves with sense line.

### Selecting a suitable valve

Our selection tables and data sheets contain all the technical data needed to select MANKENBERG valves.

The  $K_{VS}$  value of the selected valve should be equal to the calculated  $K_V$  value plus the required allowance. Most valves operate most efficiently within 10 to 70 % of their  $K_{VS}$  values; small non-balanced valves such as our pressure reducers DM 502, 505, 506, 510, 762 and 765, will operate satisfactorily even at minimum flow rates.

You should select a setting range which places the required control pressure at the top end. If, for instance, the pressure to be controlled is 2.3 bar, you should select the 0.8-2.5 bar range rather than the 2-5 bar range, as with the latter the control errors would be considerably greater. If in special cases the standard setting range is not wide enough, a lower setting range may be selected provided the valve operates at low capacity and the control accuracy is of minor importance. Under such conditions, for instance, a pressure reducer featuring a setting range of 0.8-2.5 bar may still operate satisfactorily at 0.5 bar.

You should select the materials in accordance with the operating requirements by using the material resistance table.

If toxic or flammable fluids are to be handled a sealed spring cover – possibly with sealed setting screw - should be used and a leakage line connection (threaded connection at spring cover) provided so that any fluid leaking as a result of a defective control mechanism can be drained safely.

Let us return to our example:

Based on the operating data we had calculated a minimum  $K_{VS}$  value of 15 m<sup>3</sup>/h. According to our selection table several valve types meet this requirement. We select pressure reducer DM 652, DN 50,  $K_{VS}$  value 18 m<sup>3</sup>/h, setting range 4-8 bar. In its standard version this valve is manufactured from materials which are suitable for the application. Additional features are high control accuracy, low weight, good surface quality and a price which is remarkably low for a stainless steel valve.

Let us take another example:

We are looking for an overflow valve capable of discharging 2000 m<sup>3</sup>/h of 60°C warm air to atmosphere at 4 bar.

The pressure drop is supercritical because

$$\Delta p > \frac{p_1}{2} \text{ namely } 4 > \frac{5}{2}$$

Hence

$$K_V = \frac{2000}{257 \times 5} \sqrt{1.293 \times (60 + 273)} = 32.3 \text{ m}^3/\text{h}$$

To the  $K_V$  value calculated from the operating data we add an allowance of 30 % and thus obtain the minimum  $K_{VS}$  value which the valve should have.

$$K_{VS} \text{ value} \geq 1.3 \times K_V \text{ value} = 1.3 \times 32.3 = 42 \text{ m}^3/\text{h}$$

The flow rate under operating conditions is

$$Q_1 = \frac{2000(273 + 60)}{5 \times 273} = 488 \text{ m}^3/\text{h}$$

and accordingly, given a maximum permitted flow velocity of 20 m/s, the minimum pipeline diameter is

$$d_1 = 18.8 \sqrt{\frac{488}{20}} = 93 \text{ mm}$$

On the basis of the calculated data and taking into account the properties of the medium, we select the MANKENBERG overflow valve UV 4.1, DN 100,  $K_{VS}$  value 100 m<sup>3</sup>/h, setting range 2-5 bar; a relatively economical and accurate valve very suitable for the application.

## Calculation of the $K_V$ value

The selection of a valve requires first of all that the  $K_V$  value is determined from the operating data under which the valve is to operate.

As in most cases a table or diagram giving the specific volume of steam is not available, the formulae given below, which treat steam as an ideal gas, can be used to arrive at a sufficiently accurate result.

For subcritical pressure drops i.e. if

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

use formula

$$K_V = \frac{G}{461} \sqrt{\frac{t_1 + 273}{\Delta p \times p_2}}$$

or for supercritical pressure drops, i.e. if

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

use formula

$$K_V = \frac{G}{230 \times p_1} \sqrt{t_1 + 273}$$

The temperature of steam in its saturated state ( saturated steam ) may be roughly calculated using the formula

$$t_s \approx \sqrt[4]{p_1} \times 100$$

$K_V$ Flow Coefficient	m <sup>3</sup> /h
G Mass Flow	kg/h
$Q_1$ Volume Flow Upstream of the Valve	m <sup>3</sup> /h
$Q_2$ Volume Flow Downstream of the Valve	m <sup>3</sup> /h
$\Delta p$ Differential Pressure ( $p_1 - p_2$ )	bar
$p_1$ Inlet Pressure (abs.)	bar
$p_2$ Outlet Pressure (abs.)	bar
$t_1$ Temperature at Inlet	°C
$t_s$ Temperature of Saturated Steam	°C
$w_1$ Velocity Inside of the Pipeline before the valve	m/s
$w_2$ Velocity Inside of the Pipeline behind the valve	m/s
$d_1$ Nominal Diameter before the Valve	mm
$d_2$ Nominal Diameter behind the Valve	mm

Example:

We are looking for a stainless steel pressure reducing valve capable of reducing the pressure of 1100 kg/h of saturated steam from 7 to 4 bar.

The pressure drop is subcritical because

$$\Delta p < \frac{p_1}{2} \text{ namely } 3 < \frac{8}{2}$$

As we do not know either the specific volume nor the temperature, we use the formula

$$K_V = \frac{G}{461} \sqrt{\frac{t_1 + 273}{\Delta p \times p_2}}$$

Having calculated the temperature

$$t_s \approx \sqrt[4]{p_1} \times 100 = \sqrt[4]{8} \times 100 = 168 \text{ °C}$$

we calculate

$$K_V = \frac{1100}{461} \sqrt{\frac{168 + 273}{3 \times 5}} = 12.9 \text{ m}^3/\text{h}$$

To the  $K_{VS}$  value calculated from the operating data we add an allowance of 30 % and thus obtain the minimum  $K_{VS}$  value which the valve to be selected should have

$$K_{VS} \text{ value} \geq 1.3 \times K_V \text{ value} = 1.3 \times 12.9 = 16.8 \text{ m}^3/\text{h}$$

## Calculating the nominal diameter

To keep pressure drop and noise within acceptable limits, certain flow velocities in the pipelines should not be exceeded.

If no values have been specified we recommend the following:

- Exhaust steam 25 m/s
- Saturated steam 40 m/s
- Super heated steam 60 m/s

These rough guidelines apply to pipe diameters from DN 80 up. For smaller diameters lower flow velocities should be used.

As in most cases the specific volume is not known, we use the following sufficiently accurate formula to calculate the volume:

$$Q = \frac{G \times (t + 273)}{p \times 219}$$

Accordingly in our example the flow rates upstream and downstream of the valve are as follows (not taking into account the temperature drop caused by the pressure drop):

$$Q_1 = \frac{1100(168 + 273)}{8 \times 219} = 277 \text{ m}^3/\text{h}$$

$$Q_2 = \frac{1100(168 + 273)}{5 \times 219} = 443 \text{ m}^3/\text{h}$$

Pipeline diameter can be calculated using following formula

$$d = 18.8 \sqrt{\frac{Q}{w}}$$

If in our example a maximum flow velocity of 25 m/s has been specified, the required pipeline diameters will be as follows:

$$d_1 = 18.8 \sqrt{\frac{277}{25}} = 63 \text{ mm}$$

$$d_2 = 18.8 \sqrt{\frac{443}{25}} = 79 \text{ mm}$$

We would therefore recommend pipes DN 65 upstream and pipes DN 80 downstream of the valve.

For a given nominal diameter the flow velocity can be calculated as follows:

$$w = 354 \frac{Q}{d^2}$$

In our example the flow velocities in the pipeline would be

$$w_1 = 354 \frac{277}{65^2} = 23 \text{ m/s}$$

$$w_2 = 354 \frac{443}{80^2} = 24 \text{ m/s}$$

For certain operating conditions a control valve may be selected whose nominal diameter is one or two sizes smaller than the nominal pipeline diameter. Downstream of the valve the pipeline diameter may be increased by one or two sizes depending on the flow velocity; this applies especially to valves designed for sense line operation.

### Selecting a suitable valve

Our selection tables and data sheets contain all the technical data needed to select MANKENBERG valves.

The  $K_{VS}$  value of the selected valve should be equal to the calculated  $K_V$  value plus the required allowance. Most valves operate most efficiently within 10 to 70 % of their  $K_{VS}$  values; small non-balanced valves such as our pressure reducers DM 152, 505 and 701, will operate satisfactorily even at minimum flow rates.

You should select a setting range which places the required control pressure at the top end. If, for instance, the pressure to be controlled is 2.3 bar, you should select the 0.8-2.5 bar range rather than the 2-5 bar range, as with the latter the control errors would be considerably greater. If in special cases the standard setting range is not wide enough, a lower setting range may be selected provided the valve operates at low capacity and the control accuracy is of minor importance. Under such conditions, for instance, a pressure reducer featuring a setting range of 0.8-2.5 bar may still operate satisfactorily at 0.5 bar.

You should select the materials in accordance with the operating requirements by using the material resistance table.

Let us return to our example:

Based on the operating data we had calculated a minimum  $K_{VS}$  value of 16.8  $\text{m}^3/\text{h}$ . According to our selection table several valve types meet this requirement. We select pressure reducer type 652, DN 50,  $K_{VS}$  value 18  $\text{m}^3/\text{h}$ , setting range 2-5 bar. In its standard version this valve is manufactured from materials which are suitable for the application. Additional features are high control accuracy, low weight, good surface quality and a price which is remarkably low for a stainless steel valve.

Here is another example:

We are looking for a pressure reducing valve capable of reducing the pressure of 8 t/h of 460°C superheated steam from 100 bar to 20 bar for the purpose of soot blowing.

The pressure drop is supercritical because

$$\Delta p > \frac{p_1}{2} \text{ namely } 80 > \frac{101}{2}$$

As we do not know the specific volume at the moment, we calculate

$$K_V = \frac{8000}{230 \times 101} \sqrt{460 + 273} = 9.33 \text{ m}^3/\text{h}$$

To the  $K_V$  value calculated from the operating data we add an allowance of 30 % and thus obtain the minimum  $K_{VS}$ -value which the valve to be selected should have.

$$K_{VS} \text{ value} \geq 1.3 \quad K_V \text{ value} = 1.3 \times 9.33 = 12.1 \text{ m}^3/\text{h}$$

Under operating conditions the volume flow rates are

$$Q_1 = \frac{8000(460 + 273)}{101 \times 219} = 265 \text{ m}^3/\text{h}$$

$$Q_2 = \frac{8000(460 + 273)}{21 \times 219} = 1275 \text{ m}^3/\text{h}$$

Pipeline diameter can be calculated using following formula:

$$d = 18.8 \sqrt{\frac{Q}{w}}$$

If in our example a maximum permitted flow velocity of 50 m/s has been specified, the required pipeline diameter will be as follows:

$$d_1 = 18.8 \sqrt{\frac{265}{50}} = 43.3 \text{ mm}$$

$$d_2 = 18.8 \sqrt{\frac{1275}{50}} = 94.5 \text{ mm}$$

Consequently we would recommend a DN 50 pipeline upstream and a DN 100 pipeline downstream of the valve.

Using the calculated data and taking into account the special operating conditions, we select the twin seat pressure reducer type 401 ZK, DN 50/80,  $K_{VS}$  value 16  $\text{m}^3/\text{h}$ , setting range 15-25 bar, complete with adjustable damper unit and stellite cones - a design which has proved reliable in many soot blowing systems.



# Selection • Pressure Reducing Valves

## for Steam

PN	Outlet pressure bar		T °C	K <sub>vs</sub> -Value m <sup>3</sup> /h		Connection			SS	Notes	Type
						screwed	flanged DN	*			
16	0.3	- 5	180	2	- 5.2		15 - 50	*	•	CIP, SIP, elbow design, electropolished available	152
16	0.8	- 5	180	4.4	- 50		25 - 100	*	•	CIP, SIP, globe or elbow design, electropolished available	462
40	0.005	- 12	200	0.15	- 0.9	1/2	15 - 25	*	•	small flow rates, sterile applications	505Z
40	0.02	- 10	350	4	- 160		15 - 150			standard steam valve	603
40	0.02	- 10	250	4	- 160		15 - 150			the most economical steam valve	604
40	0.02	- 12	190	4	- 18	1/2 - 2	15 - 50	*	•	our most popular valve, can be used anywhere, also for clean steam	652
40	0.1	- 10	300	1.7	- 338		15 - 150	*		sandwich design, large flow rates at low pressure drops	307/308
100	0.5	- 10	280	32	- 1200		50 - 400			large flow rates, weight loaded, high accuracy	3 / 4
250	0.1	- 40	530	6	- 360		25 - 250			large flow rates, high temperatures, high pressures	401/402
315	0.5	- 40	530	0.2	- 5.5		15 - 50			small flow rates, high temperatures, high pressures	701

• other connections available • stainless steel deep drawn

## for Liquids

PN	Outlet pressure bar		T °C	K <sub>vs</sub> -Value m <sup>3</sup> /h		Connection			SS	Notes	Type
						screwed	flanged DN	*			
16	2	- 0.52	130	0.2	- 3.6	1/2 - 2	15 - 50	*	•	low pressure regulator	762
16	0.03	- 0.8	130	0.2		1/2		*	•	low pressure regulator, laboratory application	765
16	0.3	- 5	180	2	- 5.2		15 - 50	*	•	CIP, SIP, elbow design, electropolished available	152
16	0.8	- 5	180	4.4	- 50		25 - 100	*	•	CIP, SIP, globe or elbow design, electropolished available	462
25	0.1	- 21	100	47	- 3205		50 - 600			for drinkingwater epoxy coated, pilot controlled	E2115
25	1	- 20	130	60	- 2100		100 - 800			large flow rate, inline-valve, pilot controlled	814/815
40	0.02	- 8	130	32	- 100		50 - 100	*	•	economical stainless steel valve	664
40	0.02	- 10	130	4	- 160		15 - 150			economical valve with cast body	613
40	0.02	- 12	130	4	- 18	1/2 - 2	15 - 50	*	•	our most popular valve, can be used anywhere	652
40	0.1	- 10	300	1.7	- 338		15 - 150			sandwich design, high flow rates at low pressure drops	307/308
40	4	- 10	130	20	- 50		50 - 100	*		for high purity applications	212P
100	0.02	- 12	130	3.2	- 3.6	1/2 - 1	15 - 25	*	•	if PRV 505 is too small and 652 too big	662
100	0.02	- 16	130	0.6	- 4.2	1/2 - 2		*	•	economic stainless steel valve, inner parts made of brass	502
100	0.02	- 12	130	0.15	- 3.6	1/2 - 2	15 - 50	*	•	for high purity applications	505P
100	0.5	- 10	280	32	- 1200		50 - 400			large flow rates, weight loaded, high accuracy	3 / 4
160	1	- 40	130	20	- 900		40 - 400	*	•	large flow rate, pilot controlled	810
250	0.005	- 20	130	0.15	- 0.9	1/2	15 - 25			for small flow rates, also for sterile applications	505
315	0.005	- 100	400	0.2	- 5.5	3/8 - 2	15 - 50	*		high pressure valves	510 - 518
315	0.3	- 20	130	0.15		1/4	15	*	•	for very small flow rates	506

• other connections available • stainless steel deep drawn

## for Gases

PN	Outlet pressure bar		T °C	K <sub>vs</sub> -Value m <sup>3</sup> /h		Connection			SS	Notes	Type
						screwed	flanged DN	*			
16	0.002	- 3.00	130	0.2	- 3.6	1/2 - 2	15 - 50	*	•	low pressure regulator, tank blanketing	762
16	0.03	- 0.8	130	0.2		1/2		*	•	low pressure regulator, laboratory application	765
16	0.3	- 5	180	2	- 5.2		15 - 50	*	•	CIP, SIP, elbow design, electropolished available	152
16	0.8	- 5	180	4.4	- 50		25 - 100	*	•	CIP, SIP, globe or elbow design, electropolished available	462
25	1	- 20	130	60	- 2100		100 - 800			large flow rate, inline-valve, pilot controlled	814/815
40	0.02	- 8	130	32	- 100		50 - 100	*	•	economical stainless steel valve	664
40	0.02	- 10	130	4	- 160		15 - 150			economical valve with cast body	613
40	0.02	- 12	130	4	- 18	1/2 - 2	15 - 50	*	•	our most popular valve, can be used anywhere	652
40	0.1	- 10	300	1.7	- 338		15 - 150			sandwich design, high flow rates at low pressure drops	307/308
40	4	- 10	130	20	- 50		50 - 100	*		for high purity applications	212P
100	0.02	- 12	130	3.2	- 3.6	1/2 - 1	15 - 25	*	•	if PRV 505 is too small and 652 too big	662
100	0.02	- 16	130	0.6	- 4.2	1/2 - 2		*	•	economic stainless steel valve, inner parts made of brass	502
100	0.02	- 12	130	0.15	- 3.6	1/2 - 2	15 - 50	*	•	for high purity applications	505P
100	0.5	- 10	280	32	- 1200		50 - 400			large flow rates, weight load, high accuracy	3 / 4
160	1	- 40	130	20	- 900		40 - 400			large flow rates, pilot controlled	810
250	0.005	- 20	130	0.15	- 0.9	1/2	15 - 25	*	•	for small flow rates, also for sterile applications	505
315	0.005	- 100	400	0.2	- 5.5	3/8 - 2	15 - 50	*		high pressure valves	510 - 518
315	0.3	- 20	130	0.15		1/4	10 - 15	*	•	for very small flow rates	506

• other connections available • stainless steel deep drawn

Special designs on request. The pressure has always been indicated as overpressure.

Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.

WIR REGELN DAS SCHON  
FIRMLY IN CONTROL

**MANKENBERG**





Pressure reducer for liquids and gases up to 130°C, steam up to 180 °C  
CIP/SIP design for sanitary use

## Technical Data

Connection	DN 15 - 50 clamps other connections on request
Nominal Pressure	PN 2.5 - 10 (see table below)
Inlet Pressure	up to 8 bar
Outlet Pressure	0.3 - 5 bar in 3 setting ranges
K <sub>vs</sub> -Value	2 - 5.2 m <sup>3</sup> /h
Tightness	in acc. to VDI/VDE-guideline 2174 (leakage rate ≤ 0.05 % of K <sub>vs</sub> -value)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The DM 152 pressure reducing valve is a diaphragm-controlled spring-loaded proportional control valve which is primarily used for hygienic applications in the food processing and pharmaceutical industries. A PTFE protective foil renders the diaphragm physiologically safe and steamproof up to 180 °C. The valve does not require an external pilot line.

This pressure reducer is manufactured from deep-drawn stainless steel featuring excellent corrosion resistance. It contains virtually no dead pockets and is suitable for use in CIP and SIP systems. The angled design allows complete draining.

The spring module comprising bonnet, spring, adjusting screw, diaphragm and internal components, is connected to the valve body only by means of a clamp ring and two bolts. Changing the diaphragm or the complete spring assembly for a different control pressure range is extremely simple and does not call for special tools. The same applies to servicing and maintenance. Changing the control pressure setting does not affect the height of the valve (non increasing adjusting screw).

The outlet pressure to be controlled is balanced across the diaphragm by the force of the valve spring (set pressure). As the outlet pressure rises above the pressure set using the adjusting screw, the valve cone moves towards the seat and the volume of medium is reduced. As the outlet pressure drops the valve control orifice increases; when the pipeline is depressurised the valve is open. Rotating the adjusting screw clockwise increases the outlet pressure.

## STANDARD EQUIPMENT

- All stainless steel construction
- Non increasing adjusting screw
- Quick-release body clamp ring
- Diaphragm protected by PTFE foil

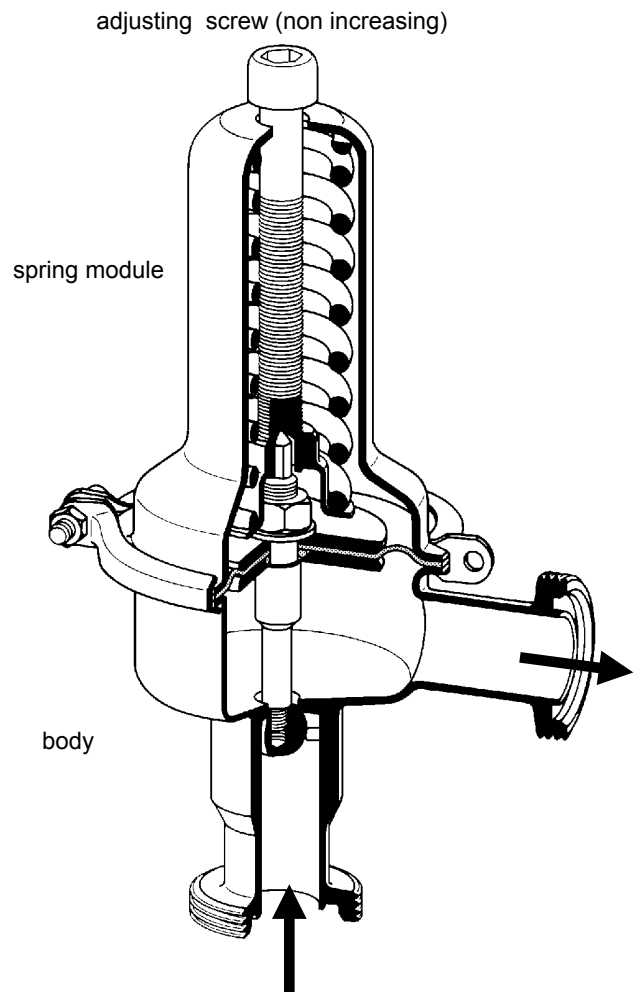
## OPTIONS

- Polished version for food, pharmaceutical and superclean applications, surface roughness Ra ≤ 0.25 or 0.4 or 0.8 µm
- Metal diaphragm
- soft seal
- For toxic or hazardous media: sealed bonnet complete with leakage line connection (incl. sealed adjusting screw). Must be installed with a leakage line capable of draining leaking medium safely and without pressure
- Various diaphragm and seal materials suitable for your medium
- Special connections: Aseptic, ANSI or DIN flanges, welding spigots; other connections on request
- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

All the pressure has always been indicated as overpressure.

We reserve the right to alter technical specifications without notice.



K <sub>vs</sub> -Values [m <sup>3</sup> /h]							
nom. diam. DN	15	20	25	32	40	50	
K <sub>vs</sub> -value m <sup>3</sup> /h	2	3	3.5	4	4.5	5.2	

Setting Ranges [bar] and Nominal Pressure PN			
outlet press. bar	1 - 5	0.8 - 2.5	0.3 - 1.1
nom. diam.	15 - 50	15 - 50	15 - 50
PN	10/10	10/6	10/2.5

Pressure reducer for liquids and gases up to 130°C, steam up to 180 °C  
CIP/SIP design for sanitary use



Materials	
Body, Bonnet, Internals	CrNiMo-steel
Spring	CrNi-steel
Valve Seal	CrNiMo-steel optional soft seal
Diaphragm	FPM
Protection Foil (for diaphragm)	PTFE

Dimensions [mm]							
pressure range [bar]	size	nominal diameter DN					
		15	20	25	32	40	50
0.8-2.5 2-5	AE <sub>1</sub>	90	90	90	120	120	120
	AE <sub>2</sub>	90 / 100 / 110 *		90	120	120	120
	C	200	200	200	200	200	200
	D	138	138	138	138	138	138

\* size can vary according to type of connection, please inquire

Dimensions [mm]							
pressure range [bar]	size	nominal diameter DN					
		15	20	25	32	40	50
0.3-1.1	AE <sub>1</sub>	120	120	120	120	120	120
	AE <sub>2</sub>	120 / 140 *		120	120	120	120
	C	200	200	200	200	200	200
	D	200	200	200	200	200	200

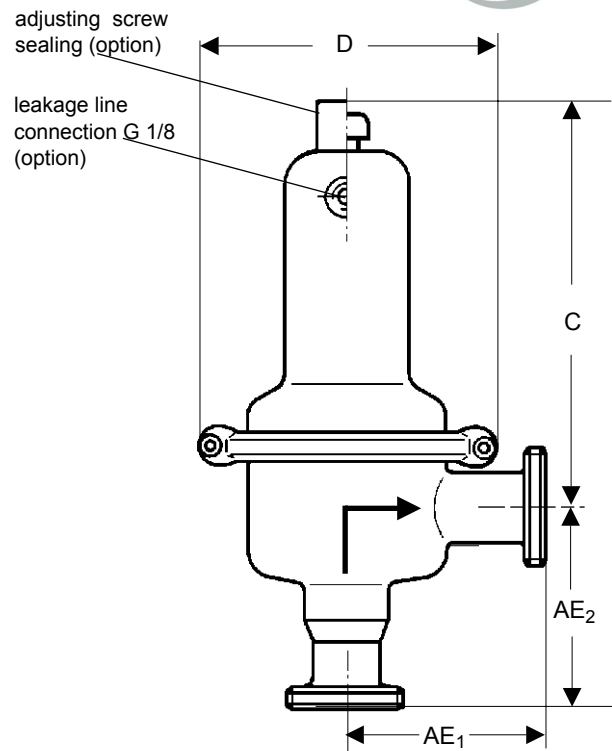
\* size can vary according to type of connection please inquire

Weights [kg]						
pressure range [bar]	nominal diameter DN					
	15	20	25	32	40	50
0.8 - 2.5	2	2	2	2.5	2.5	3
1 - 5	2	2	2	2.5	2.5	3
0.3 - 1.1	3	3	3	3.5	3.5	4

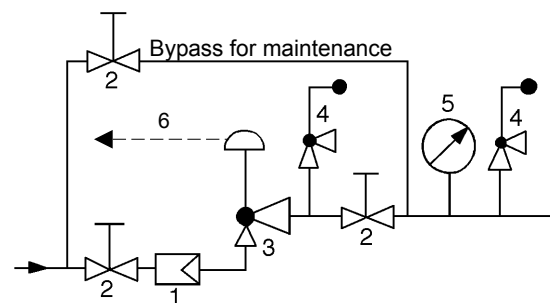
Special designs on request.

The pressure has always been indicated as overpressure.

Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.



### Recommended installation



- 1 Strainer
- 2 Shutoff valves
- 3 Pressure reducer
- 4 Safety valve
- 5 Pressure gauge
- 6 Leakage line G 1/8 (option)

use MANKENBERG-products



Pressure reducer sandwich design,  
for liquids, gases and steam up to 300 °C

## Technical Data

Connection	DN 15 - 150
Nominal Pressure	inlet PN 40 outlet PN 1 - 16
Inlet Pressure	up to 40 bar
Outlet Pressure	0.1 - 10 bar in 6 setting ranges
K <sub>vs</sub> -Value	1.7 - 338 m <sup>3</sup> /h
Tightness	acc. to VDI/VDE-guideline 2174 (leakage rate ≤ 0.05 % of K <sub>vs</sub> -value)
Design	DM 307 with open spring, DM 308 with closed spring cap

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The DM 307 and DM 308 pressure reducing valves are spring-loaded proportional control valves for large volumes providing the following special features:

- space-saving installation between flanges
- low weight (especially for the large valve sizes)
- valve body geometry common to all pressure ranges PN 10-40
- high Kvs ratings
- low leakage
- low-noise operation

Two slotted discs which slide and seal against each other are operated by a medium-controlled spring-loaded diaphragm drive mechanism. When the system is depressurised the valve spring keeps the slots in "open" position. As the pressure rises the fluid flows from the inlet side through the slots and acts on the diaphragm/spring mechanism from the outlet side (outlet pressure) via the pilot line. The outlet pressure to be controlled is balanced across the diaphragm by the force of the valve spring (set pressure). As the outlet pressure rises above the pressure set using the adjusting screw, the slots narrow and the volume of medium is reduced. As the outlet pressure drops the valve control orifice increases; when the pipeline is depressurised the valve is open. Rotating the adjusting screw clockwise increases the outlet pressure.

The pressure reducers DM 307 and DM 308 require a pilot line (to be installed on-site).

We recommend that the pilot line be fitted with an expansion tank.

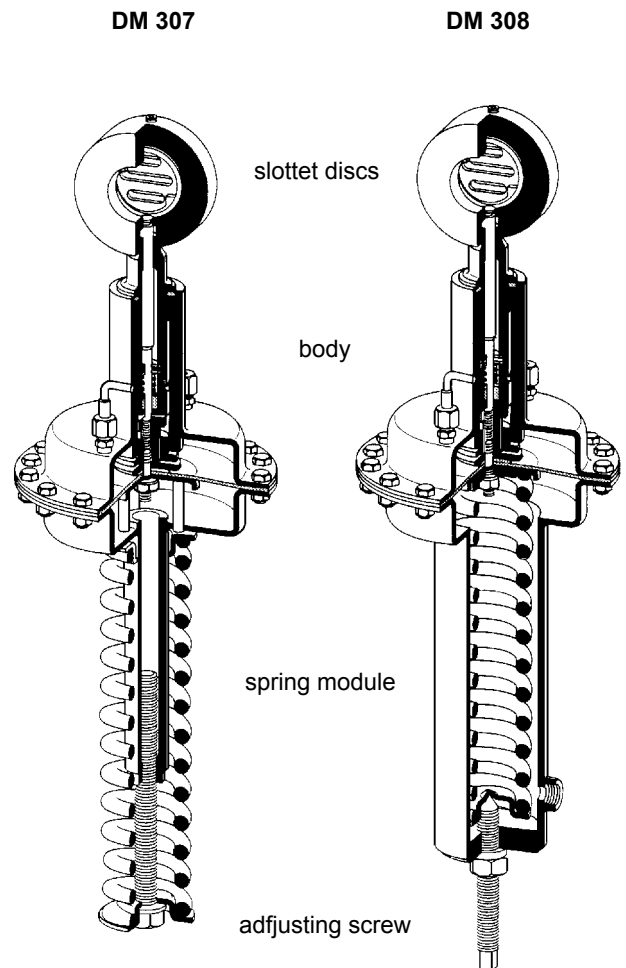
## OPTIONS

- For toxic or hazardous media: sealed bonnet complete with leakage line connection (incl. sealed adjusting screw). Must be installed with a leakage line capable of draining leaking medium safely and without pressure
- Various diaphragm and seal materials suitable for your medium
- Special connections: Aseptic, ANSI or DIN flanges, welding spigots; other connections on request
- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure.

We reserve the right to alter technical specifications without notice.



K <sub>vs</sub> -values [m <sup>3</sup> /h] and max.ΔP [bar]							
nom. diam.	DN	15	20	25	32	40	50
K <sub>vs</sub> -value	m <sup>3</sup> /h	4 (1.7)	6,4	11 (4)	16	26 (11)	45 (20)
max.ΔP	bar	40	40	32	40	35	20

lower K<sub>vs</sub>-values price supplement

K <sub>vs</sub> -values [m <sup>3</sup> /h] and max.ΔP [bar]						
nom. diam.	DN	65	80	100	125	150
K <sub>vs</sub> -value	m <sup>3</sup> /h	52	92 (40)	154 (62)	237 (95)	338
max. ΔP	bar	15	9	6	4	3

lower K<sub>vs</sub>-values price supplement

Setting Ranges [bar], Nominal Pressure PN					
0.1 - 0.3	0.2 - 0.6	0.5 - 1.2	1 - 2.5	2 - 5	4 - 10
PN 40/1	PN 40/1	PN 40/2.5	PN 40/6	PN 40/10	PN 40/16

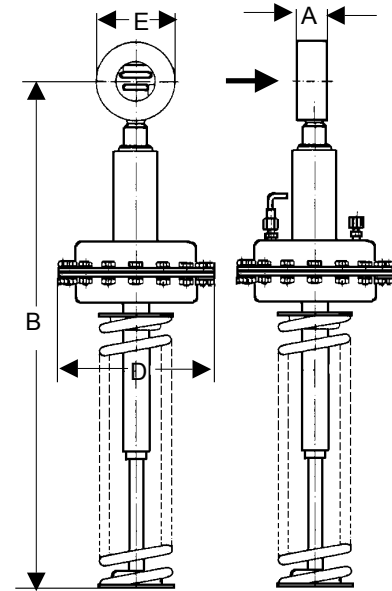
Pressure reducer sandwich design,  
for liquids, gases and steam up to 300 °C



Materials			
Design	standard	medium wetted CrNiMo-steel	completely CrNiMo-steel
Body	C-steel	CrNiMo-steel	CrNiMo-steel
Diaphragm Housing	C-steel	CrNiMo-steel	CrNiMo-steel
Bonnet	C-steel	C-steel	CrNiMo-steel
Spring	spring steel C	spring steel C	CrNiMo-steel
Plates (valve seal)	CrNiMo-steel, special carbon material, metallic impregnation		
Diaphragm	CR optional FPM, EPDM or PTFE		

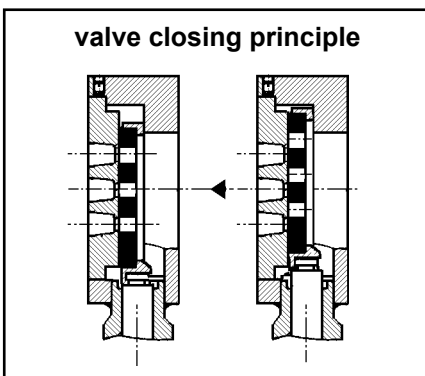
Dimensions [mm]												
pressure range [bar]	size	nominal diameter DN										
		15	20	25	32	40	50	65	80	100	125	150
all ranges	øE	53	62	72	82	92	108	127	142	164	194	219
	A	33	33	33	33	33	43	46	46	52	56	56
0.1 - 0.3	B*	550	555	560	680	685	695	705	715	725	740	755
	D	360	360	360	500	500	500	500	500	500	500	500
0.2 - 0.6	B*	550	555	560	680	685	695	705	715	725	740	755
	D	270	270	270	360	360	360	360	360	360	360	360
0.5 - 1.2	B*	550	555	560	680	685	695	705	715	725	740	755
	D	220	220	220	270	270	270	270	270	270	270	270
1.0 - 2.5	B*	530	535	540	680	685	695	705	715	725	740	755
	D	175	175	175	220	220	220	220	220	220	220	220

\*max. size with stressless spring  
DM 308 (closed spring cap) size C + 200 mm

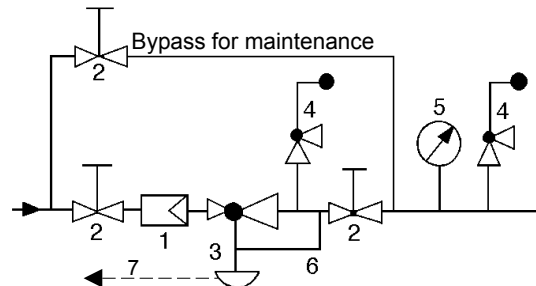


D = diaphragm ø  
control line connection ø 8/6 Ermeto

Weights [kg]												
pressure range [bar]	nominal diameter DN											
	15	20	25	32	40	50	65	80	100	125	150	
0.1 - 0.3	19.7	19.8	19.9	23	23.1	24.2	24.7	25.4	25.6	28.4	30.4	
0.2 - 0.6	16.7	16.8	16.9	22	22.1	23.2	23.7	24.4	24.6	27.4	29.4	
0.5 - 1.2	23.7	23.8	13.9	19	19.1	20.2	20.7	21.4	22.6	24.4	26.4	
1.0 - 10	12.7	12.8	12.9	16	16.1	17.2	17.7	18.4	19.6	21.4	23.4	



### Recommended Installation



- 1 Strainer
- 2 Shutoff valves
- 3 Pressure reducer
- 4 Safety valve
- 5 Pressure gauge
- 6 Sense Line ø 8/6 Ermeto
- 7 Leakage line (option)

use MANKENBERG-products

Special designs on request.  
The pressure has always been indicated as overpressure.  
Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.

Pressure reducing valve for steam  
up to 530 °C

## Technical Data

Connection	DN 25 - 250
Nominal Pressure	up to PN 250/100
Inlet Pressure	up to 160 bar
Outlet Pressure	1,5 - 32 bar in several ranges
$K_{VS}$ -value	6 - 360 m <sup>3</sup> /h
Tightness	acc. to VDI/VDE-guideline 2174 (leakage rate $\leq 0.5\%$ of $K_{VS}$ -value)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The DM 401 pressure reducing valve is a diaphragm or piston-controlled spring-loaded proportional control valve with pressure relief for large flow rates at low pressure drops. The valve cone is fitted with a metallic seal.

The outlet pressure to be controlled is balanced across the control unit by the force of the valve spring (set pressure). As the outlet pressure rises above the pressure set using the adjusting screw, the valve cone moves towards the seat and the volume of medium is reduced. As the outlet pressure drops the valve control orifice increases; when the pipeline is depressurised the valve is open. Rotating the adjusting screw clockwise increases the outlet pressure.

The DM 401 pressure reducer requires a pilot line (to be installed on-site).

## STANDARD

- Open spring
- Pilot line connection

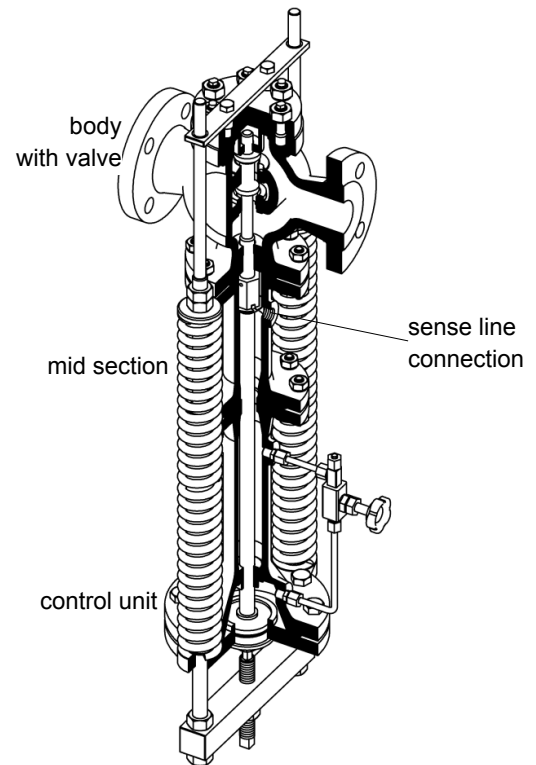
## OPTIONEN

- Mid section for higher temperatures (400 - 530 °C)
- Hydraulic damping
- Enlarged outlet
- Cone stellite for pressure drops > 25 bar
- Various diaphragm and seal materials suitable for your medium
- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure.

We reserve the right to alter technical specifications without notice.



$K_{VS}$ -values [m <sup>3</sup> /h]						
DN	25	32	40	50	65	80
m <sup>3</sup> /h	6	11	16	25	42	65

$K_{VS}$ -values [m <sup>3</sup> /h]					
DN	100	125	150	200	250
m <sup>3</sup> /h	80	120	170	230	360

Pressure reducing valve for steam  
up to 530 °C

Materials DM 401 PN 16	
Temperature	300°C
Body	cast iron
Bottom Part	cast iron
Spring	spring steel C
Internals	on request
Diaphragm	CR

Materials DM 401 PN 25 - 40			
Temperature	300°C	350°C	400°C
Body	cast iron	cast iron	GS 17 CrMo 55
Bottom Part	cast iron	cast iron	cast iron
Mid Section	-	-	GS 17 CrMo 55
Spring	spring steel C	spring steel C	spring steel C
Internals	on request		
Diaphragm	CR	Cr	Cr
O-ring	NBR	NBR	NBR

Materials DM 401 PN 63 - 100			
Temperature	350°C	400°C	530°C
Body	cast iron	GS 17 CrMo 55	cast iron
Bottom Part	cast iron	cast iron	cast iron
Mid Section	-	GS 17 CrMo 55	GS 17 CrMo 55 oder 10 CrMo 9-10
Spring	spring steel C	spring steel C	spring steel C
Internals	on request		
Diaphragm	CR	Cr	Cr
O-ring	NBR	NBR	NBR

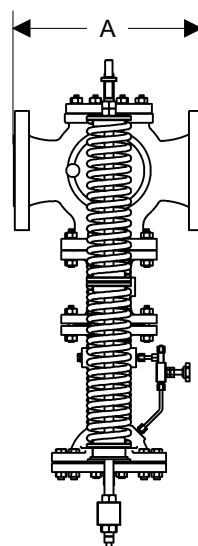
Dimensions [mm]											
size	nominal diameter DN										
	25	32	40	50	65	80	100	125	150	200	250
A PN 16 - 40	-	180	200	230	290	310	350	400	480	600	730
A PN 63 - 100	230	-	260	300	330	380	430	500	-	-	-

As the DM 401 pressure reducing valve is designed specifically for your operating data and may vary considerably in terms of construction, we are unable at this stage to give any dimensions or weights. Please contact us if you have specific queries.

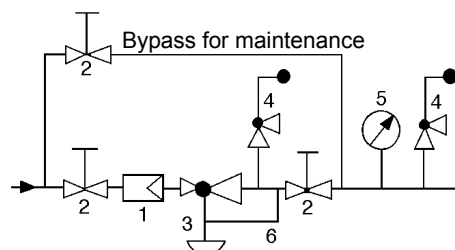
Special designs on request.

The pressure has always been indicated as overpressure.

Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.



### Recommended Installation



- 1 Strainer
- 2 Shutoff Valves
- 3 Pressure Reducer
- 4 Safety Valve
- 5 Pressure Gauge
- 6 Sense Line

sense line connection 10 - 20 x DN behind the valve



Pressure reducer for liquids and gases up to 130°C, steam up to 180 °C  
CIP/SIP design for sanitary use

## Technical Data

Connection	DN 25 - 100 clamps other connections on request
Nominal Pressure	PN 2.5 - 10 (see table below)
Inlet Pressure	up to 8 bar
Outlet Pressure	0.3 - 5 bar in 3 setting ranges
K <sub>VS</sub> -Value	4.4 - 50 m <sup>3</sup> /h
Tightness	acc. to VDI/VDE-guideline 2174 (leakage rate ≤ 0.5% of K <sub>VS</sub> -value)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The DM 462 pressure reducing valve is a twin seat diaphragm-controlled spring-loaded proportional control valve which is primarily used for hygienic applications in the food processing and pharmaceutical industries. A PTFE protective foil renders the diaphragm physiologically safe and steamproof up to 180 °C. The valve does not require an external pilot line.

This pressure reducer is manufactured from deep-drawn stainless steel featuring excellent corrosion resistance. It contains virtually no dead pockets and is suitable for use in CIP and SIP systems. The angled design allows complete draining.

The spring module comprising bonnet, spring, adjusting screw, diaphragm and internal components, is connected to the valve body only by means of a clamp ring and two bolts. Changing the diaphragm or the complete spring assembly for a different control pressure range is extremely simple and does not call for special tools. The same applies to servicing and maintenance. Changing the control pressure setting does not affect the height of the valve (non increasing adjusting screw).

The outlet pressure to be controlled is balanced across the diaphragm by the force of the valve spring (set pressure). As the outlet pressure rises above the pressure set using the adjusting screw, the valve cone moves towards the seat and the volume of medium is reduced. As the outlet pressure drops the valve control orifice increases; when the pipeline is depressurised the valve is open. Rotating the adjusting screw clockwise increases the outlet pressure.

## STANDARD EQUIPMENT

- All stainless steel construction
- Non increasing adjusting screw
- Quick-release body clamp ring
- Diaphragm protected by PTFE foil

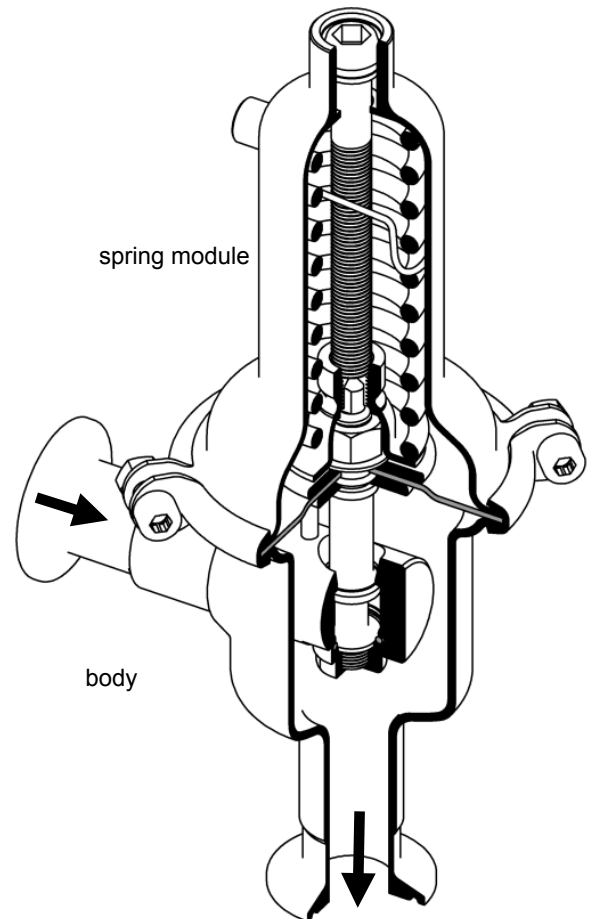
## OPTIONS

- Polished version for food, pharmaceutical and superclean applications, surface roughness Ra ≤ 0.25 / 0.4 / 0.8 / 1.6 µm
- For toxic or hazardous media: sealed bonnet complete with leakage line connection (incl. sealed adjusting screw). Must be installed with a leakage line capable of draining leaking medium safely and without pressure
- Various diaphragm and seal materials suitable for your medium
- Special connections: Aseptic, ANSI or DIN flanges, welding spigots; other connections on request
- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure. We reserve the right to alter technical specifications without notice.

adjusting screw (non increasing)



K <sub>VS</sub> -Values [m <sup>3</sup> /h]					
nominal diameter DN					
25	40	50	65	80	100
4.4	14	16	40	45	50

Setting Ranges [bar] and Nominal Pressure PN		
Nennweite DN		
40 - 100	25 - 100	25 - 100
0.3 - 1.1	0.8 - 2.5	2 - 5
PN 10/2.5	PN 10/6	PN 10/10

Setting Ranges [bar] and Nominal Pressure PN		
nominal diameter DN		
	65 - 100	
0.3 - 1.1	0.8 - 2.5	2 - 5
PN 10/2,5	PN 10/6	PN 10/10

Pressure reducer for liquids and gases up to 130 °C, steam up to 180 °C  
CIP/SIP design for sanitary use



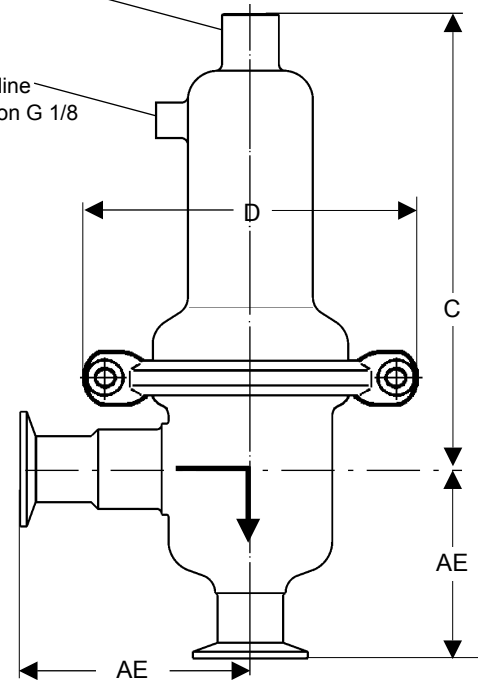
Materials		
Temperature	130 °C	180 °C
Body, Bonnet, Internals	CrNiMo-steel	CrNiMo-steel
Valve Seal	EPDM	FEPM
Spring	CrNi-steel	CrNi-steel
Diaphragm	EPDM	FPM
Protection Foil for Diaphragm	(option)	PTFE

Dimensions [mm]						
	nominal diameter DN (clamping flanges)					
size	25	40	50	65	80	100
AE	100	115	125	175	175	175
C	205	230	230	510	510	510
D	138	200	200	265	265	265

Weights [kg]						
	nominal diameter DN (clamping flanges)					
size	25	40	50	65	80	100
Weight	2.5	6.5	6.5	26	26	26

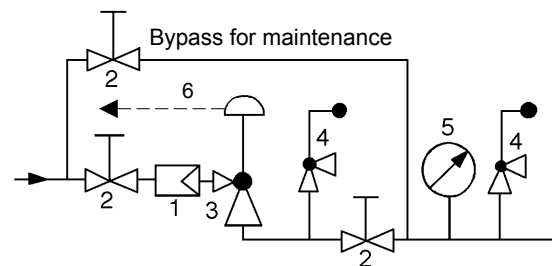
adjusting screw  
sealing (option)

leakage line  
connection G 1/8  
(option)



Special designs on request.  
The pressure has always been indicated as overpressure.  
Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.

### Recommended installation



- 1 Strainer
- 2 Shutoff valves
- 3 Pressure reducer
- 4 Safety valve
- 5 Pressure gauge
- 6 Leakage line G 1/8 (option)

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Pressure reducer for liquids and gases up to 130 °C, especially for CO<sub>2</sub>,  
body stainless steel, internals made of brass

## Technical Data

Connection	G 1/2 - 2
Nominal Pressure	inlet PN 100 outlet PN 1 - 16
Inlet Pressure	up to 100 bar
Outlet Pressure	0.02 - 16 bar in several setting ranges
K <sub>vs</sub> -Value	0.6 - 4.2 m <sup>3</sup> /h
Valve Seal	soft seal
Tightness	acc. to VDI/VDE-guideline 2174 (leakage rate ≤ 0.05% of K <sub>vs</sub> -value)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The DM 502 pressure reducing valve is a diaphragm-controlled spring-loaded proportional control valve specially designed for CO<sub>2</sub>.

This pressure reducer is manufactured from deep-drawn stainless steel featuring excellent corrosion resistance. The valve cone is fitted with a soft seal.

The spring module comprising bonnet, spring, adjusting screw, diaphragm and internal components, is connected to the valve body only by means of a clamp ring and two bolts. Changing the diaphragm or the complete spring assembly for a different control pressure range is extremely simple and does not call for special tools. The same applies to servicing and maintenance. Changing the control pressure setting does not affect the height of the valve (non-increasing adjusting screw).

The outlet pressure to be controlled is balanced across the diaphragm by the force of the valve spring (set pressure). As the outlet pressure rises above the pressure set using the adjusting screw, the valve cone moves towards the seat and the volume of medium is reduced. As the outlet pressure drops the valve control orifice increases; when the pipeline is depressurised the valve is open. Rotating the adjusting screw clockwise increases the outlet pressure.

A pilot line is required for outlet pressures ≤ 1.1 bar (to be installed on-site).

## STANDARD EQUIPMENT

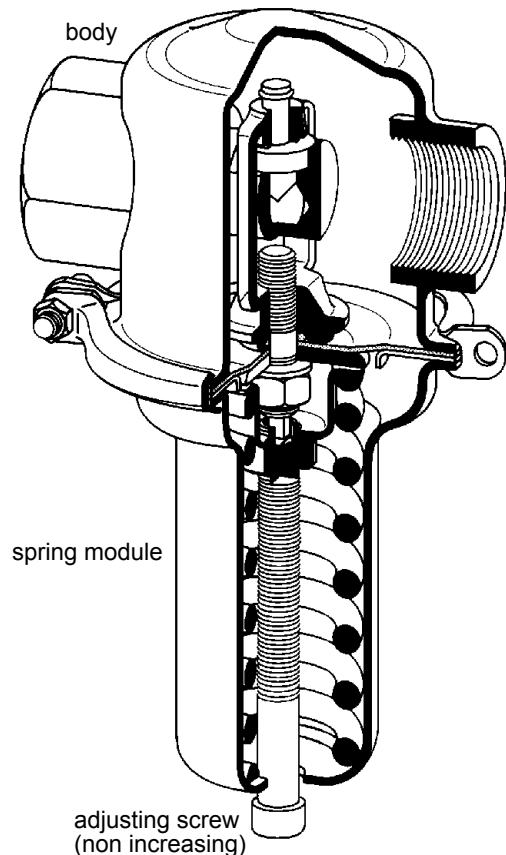
- Body and bonnet made of stainless steel
- Non increasing adjusting screw
- Quick-release body clamp ring
- Pilot line connection (only for outlet pressures ≤ 1.1 bar)

## OPTIONS

- Pressure gauge connection
- Drain hole provided at bottom of spring cover for draining condensate
- For toxic or hazardous media: sealed bonnet complete with leakage line connection (incl. sealed adjusting screw). Must be installed with a leakage line capable of draining leaking medium safely and without pressure
- Various diaphragm and seal materials suitable for your medium
- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure. We reserve the right to alter technical specifications without notice.



K <sub>vs</sub> -values [m <sup>3</sup> /h]						
nom. diameter	1/2	3/4	1	1 1/4	1 1/2	2
m <sup>3</sup> /h	0.6	0.9	1.5	2.8	3.6	4.2

Setting Ranges [bar]							
0.02 - 0.12	0.1 - 0.5	0.3 - 1.1	1 - 2.5	2 - 5	4 - 8	6 - 12	10 - 16

Permissible Reduction Ratio (max. p <sub>1</sub> /p <sub>2</sub> )						
nom. pressure	1/2	3/4	1	1 1/4	1 1/2	2
setting range 0.02 - 0.12 bar						
ratio p <sub>1</sub> /p <sub>2</sub>	810	750	530	280	230	185
setting range 0.1 - 0.5 bar						
ratio p <sub>1</sub> /p <sub>2</sub>	220	200	140	75	60	50
setting range 0.3 - 1.1 bar						
ratio p <sub>1</sub> /p <sub>2</sub>	100	90	65	35	25	20
setting range 1 - 2.5 bar						
ratio p <sub>1</sub> /p <sub>2</sub>	55	50	35	20	15	10
setting range 2 - 5, 4 - 8 and 6 - 12 bar						
ratio p <sub>1</sub> /p <sub>2</sub>	25	25	15	10	8	6
setting range 10 - 16 bar						
ratio p <sub>1</sub> /p <sub>2</sub>	20	15	13	7	5	4

The reduction ratio is used to calculate the minimum outlet pressure for a given pressure.

# Pressure Control Valves

# DM 502

Pressure reducer for liquids and gases up to 130 °C, especially for CO<sub>2</sub>,  
body stainless steel, internals made of brass

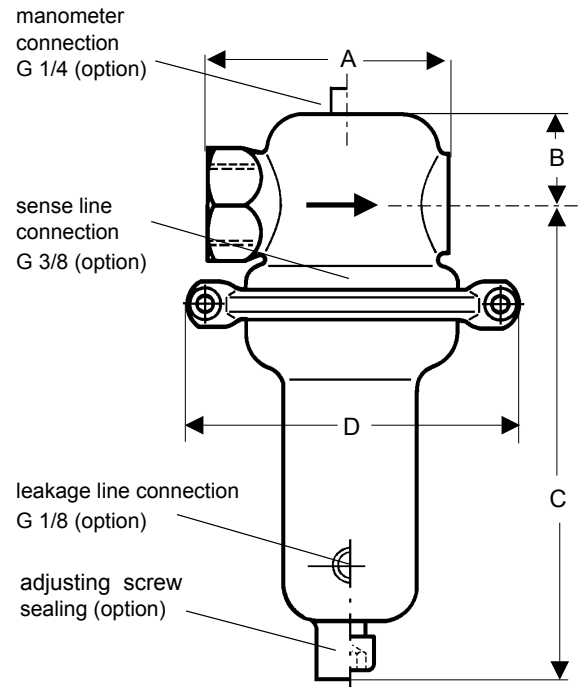


Materials		
Temperature	80 °C	130 °C
Body, Bonnet	CrNiMo-steel	CrNiMo-steel
Internals	brass, CR-steel	brass, CR-steel
Spring	CrNi-steel	CrNi-steel
Valve Seal	EU	FPM optional EPDM oder PTFE
Diaphragm	CR	FPM or EPDM
Protection Foil for Diaphragm	PTFE (option)	PTFE (option)

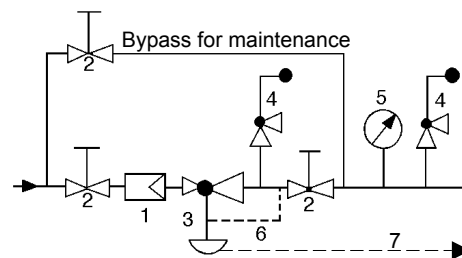
Dimensions [mm]							
pressure range [bar]	size	nominal diameter (G)					
		1/2	3/4	1	1 1/4	1 1/2	2
all ranges	A	85	95	105	120	130	150
	B	37	48	45	43	50	56
0,02 - 0,12	C	260	265	270	270	270	285
	D	360	360	360	360	360	360
0,1 - 0,5	C	260	265	270	270	270	285
	D	264	264	264	264	264	264
0,3 - 1,1	C	260	265	270	270	270	285
	D	200	200	200	200	200	200
1 - 16	C	195	200	200	205	205	220
	D	138	138	138	138	138	138

Weights						
pressure range [bar]	nominal diameter (G)					
	1/2	3/4	1	1 1/4	1 1/2	2
0.3 - 1.7	22	22	23	29	30	31
1.5 - 7.0	12	12	13	18	19	20
4.0 - 16	10	10	11	15.5	16.5	18

Special designs on request.  
The pressure has always been indicated as overpressure.  
Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.



### Recommended Installation



- 1 Strainer
- 2 Shutoff Valves
- 3 Pressure Reducer
- 4 Safety Valve
- 5 Pressure Gauge
- 6 Sense Line G 3/8 (option)
- 7 Leakage Line G 1/8 (option)

Sense line connection 10 - 20 x DN behind the valve

WIR REGELN DAS SCHON  
FIRMLY IN CONTROL



DM 505 for liquids and gases up to 130 °C, DM 505Z for steam up to 200 °C for low flow rates



## Technical Data

Connection	G 1/2
	DN 15 - 25
Nominal Pressure	Inlet PN 250
	Outlet PN 1 - 25
Inlet Pressure	up to 250 bar
Outlet Pressure	DM 505: 0.005 - 20 bar in 8 ranges
	DM 505Z: 0.005 - 12 bar in 7 ranges
$K_{vs}$ -Value	0.15 - 0.9 m <sup>3</sup> /h
Sense Line	DM 505: setting range 0.005 - 1.1 bar
	DM 505Z: all setting ranges
Tightness	acc. to VDI/VDE-guideline 2174
	(leakage rate $\leq 0.05\%$ of $K_{vs}$ -value)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The DM 505 pressure reducing valve is a diaphragm-controlled spring-loaded proportional control valve for small volumes.

This pressure reducer is manufactured from deep-drawn stainless steel featuring excellent corrosion resistance. The tubular inlet spigot of the valve body accommodates the seat aperture. The soft-sealing valve cone is guided in the seat assembly and connected with the control diaphragm by means of a stirrup which surrounds the seat assembly.

The valve type 505 Z, recommended for temperatures up to 200 °C, is identical in its design apart from the metallic cone seal and water-cooled thermal protection between body and diaphragm.

The spring module comprising bonnet, spring, adjusting screw, diaphragm and internal components, is connected to the valve body only by means of a clamp ring and two bolts. Changing the diaphragm or the complete spring assembly for a different control pressure range is extremely simple and does not call for special tools. The same applies to servicing and maintenance. Changing the control pressure setting does not affect the height of the valve (non increasing adjusting screw).

The outlet pressure to be controlled is balanced across the diaphragm by the force of the valve spring (set pressure). As the outlet pressure rises above the pressure set using the adjusting screw, the valve cone moves towards the seat and the volume of medium is reduced. As the outlet pressure drops the valve control orifice increases; when the pipeline is depressurised the valve is open. Rotating the adjusting screw clockwise increases the outlet pressure.

DM 505 Z requires a pilot line (to be installed on-site); for outlet pressures  $\leq 1.1$  bar DM 505 also requires a pilot line.

## STANDARD EQUIPMENT

- All stainless steel construction
- Non increasing adjusting screw
- Quick-release body clamp ring
- Pilot line connection (in the case of DM 505 only for outlet pressures  $\leq 1.1$  bar)

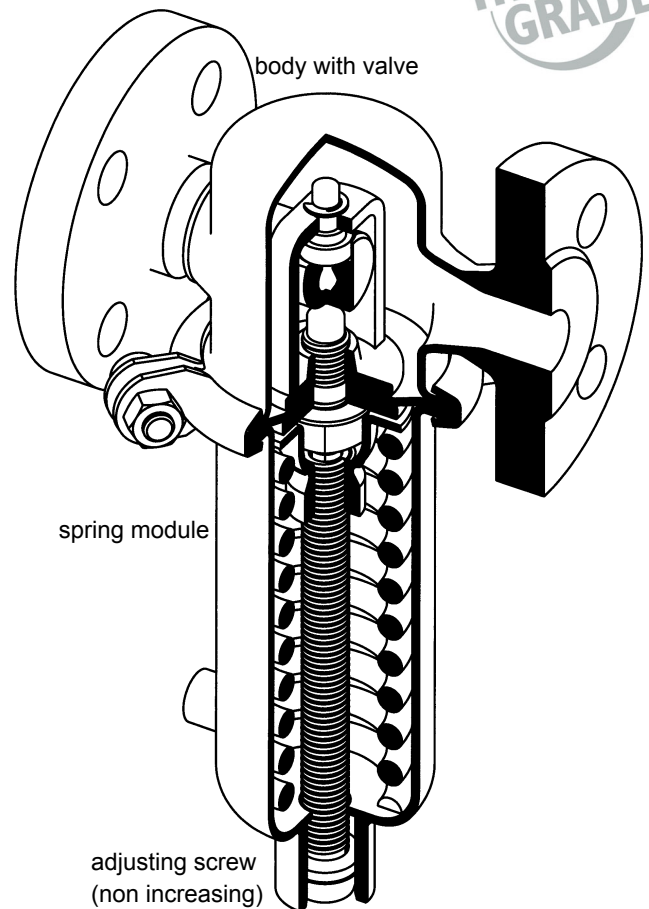
## OPTIONS

- Pressure gauge connection
- For toxic or hazardous media: sealed bonnet complete with leakage line connection (incl. sealed adjusting screw). Must be installed with a leakage line capable of draining leaking medium safely and without pressure
- Various diaphragm and seal materials suitable for your medium
- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure.

We reserve the right to alter technical specifications without notice.



Kvs-values [m <sup>3</sup> /h]			
for all body sizes, please select	0.15	0.4	0.9

DM 505 setting ranges [bar]							
0.005-0.025	0.02-0.12	0.1-0.5	0.2-1.1	0.8-2.5	1-5	4-12	10-20

DM 505Z setting ranges [bar]						
0.005-0.025	0.02-0.12	0.1-0.5	0.2-1.1	0.8-2.5	1-5	4-12

Permissible Reduction Ratio (max. p <sub>1</sub> /p <sub>2</sub> )			
max. p <sub>1</sub> = 250 bar			
setting ranges 0.005 - 0.025 and 0.02- 0.12 bar			
K <sub>vs</sub> -value	0.15	0.4	0.9
ratio p <sub>1</sub> /p <sub>2</sub>	1485	1000	750
setting range 0.1 - 0.5 bar			
K <sub>vs</sub> -value	0.15	0.4	0.9
ratio p <sub>1</sub> /p <sub>2</sub>	405	280	210
setting range 0.2 - 1.1 bar			
K <sub>vs</sub> -value	0.15	0.4	0.9
ratio p <sub>1</sub> /p <sub>2</sub>	185	125	100
setting range 0.8 - 2.5 bar			
K <sub>vs</sub> -value	0.15	0.4	0.9
ratio p <sub>1</sub> /p <sub>2</sub>	105	70	50
setting range 1 - 5 bar, 4 - 12 bar, 10 - 20 bar			
K <sub>vs</sub> -value	0.15	0.4	0.9
ratio p <sub>1</sub> /p <sub>2</sub>	39	27	20

# Pressure Control Valves

# DM 505, 505Z

DM 505 for liquids and gases up to 130 °C, DM 505Z for steam up to 200 °C  
for low flow rates



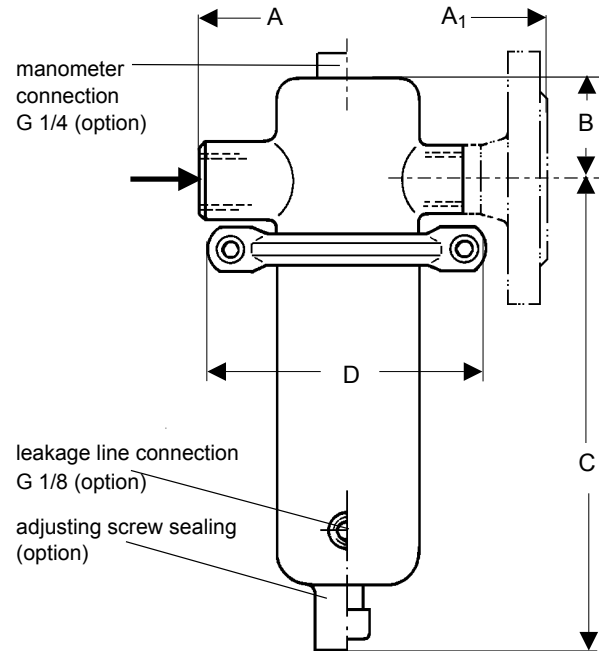
Materials			
Type	DM 505		DM 505Z
Temperature	80 °C	130 °C	200 °C
Body	CrNiMo-steel	CrNiMo-steel	CrNiMo-steel
Spring Cap			
Internals			
Set Screw			
Spring	CrNi-steel	CrNi-steel	CrNi-steel
Valve Seal	EU	FPM optional EPDM or PTFE	CrNiMo-steel
Diaphragm	CR	FPM oder EPDM	EPDM
Protection Foil	PTFE (option)	PTFE (option)	PTFE (option)

Dimensions [mm]						
pressure range [bar]	size	DM	G 1/2	flanges acc. to DIN 2635		
				DN 15	DN 20	DN 25
all ranges	A/A <sub>1</sub>	505 + 505Z	100	130	150	160
	B	505 + 505Z	53	53	53	53
0.005 - 0.025	C	505	257	257	257	267
	C	505Z	387	387	387	297
0.02 - 0.12	D	505 + 505Z	360	360	360	360
	C	505	257	257	257	267
0.1 - 0.5	C	505Z	387	387	387	297
	D	505 + 505Z	264	264	264	264
0.2 - 1.1	C	505	257	257	257	257
	C	505Z	387	387	387	387
0.8 - 2.5	D	505 + 505Z	200	200	200	200
	C	505	196	196	196	196
1 - 5	C	505Z	326	326	326	326
	D	505 + 505Z	138	138	138	138
4 - 12	C	505	190	190	190	190
	C	505Z	320	320	320	320
10 - 20	D	505 + 505Z	114	114	114	114

Weights [kg]					
pressure range [bar]	DM	G 1/2	flanges acc. to DIN 2635		
			DN 15	DN 20	DN 25
0.005 - 0.025	505	6	7.5	7.5	8
	505Z	6.5	8	8	8.5
0.02 - 0.12	505	5.5	7	7	7.5
	505Z	6	7.5	7.5	8
0.1 - 0.5	505	4.5	6	6	6.5
	505Z	5	6.5	6.5	7
0.2 - 1.1	505	2	3.5	3.5	4
	505Z	2.5	4	4	4.5
0.8 - 2.5	505	1.5	3	3	3.5
	505Z	2	3.5	3.5	4
1 - 5	505	1.5	3	3	3.5
4 - 12	505	2	3.5	3.5	4
10 - 20	505Z	2	3.5	3.5	4

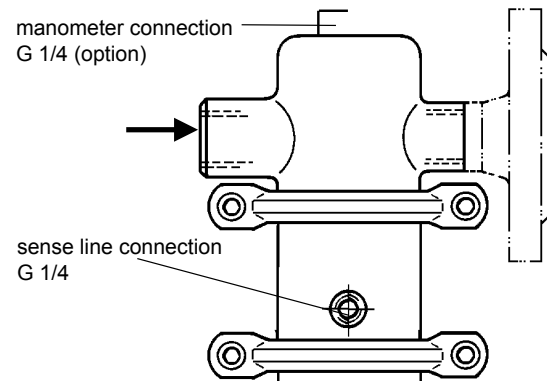
Special designs on request.  
The pressure has always been indicated as overpressure.  
Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.

## DM 505

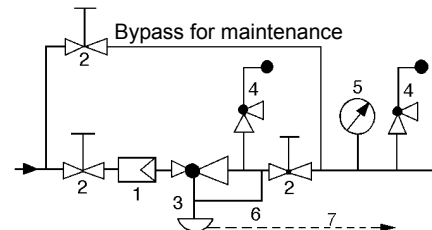


## DM 505Z

dimensions see DM 505



## Recommended Installation



- 1 Strainer
- 2 Shutoff Valves
- 3 Pressure Reducer
- 4 Safety Valve
- 5 Pressure Gauge
- 6 Sense Line G 1/4 (DM 505Z)
- 7 Leakage Line G 1/8 (option)

Sense line connection 10 - 20 x DN behind the valve

für liquids und gases bis 80 / 130 °C



## Technical Data

Connection	G 1/4 DN 15 (DIN 2635)
Nominal Pressure	Inlet PN 315 Outlet PN 2.5 - 25
Inlet Pressure	up to 250 bar
Outlet Pressure	0.3 - 20 bar in 3 setting ranges
$K_{VS}$ -value	0.15 m <sup>3</sup> /h
Tightness	acc. to VDI/VDE-guideline 2174 (leakage rate $\leq 0.05\%$ of $K_{VS}$ -value)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The DM 506 pressure reducing valve is a diaphragm-controlled spring-loaded proportional control valve for small volumes and high inlet pressures.

This pressure reducer is manufactured from deep-drawn stainless steel featuring excellent corrosion resistance. The valve cone is fitted with a soft seal.

The spring module comprising bonnet, spring, adjusting screw, diaphragm and internal components, is connected to the valve body only by means of a clamp ring and two bolts. Changing the diaphragm or the complete spring assembly for a different control pressure range is extremely simple and does not call for special tools. The same applies to servicing and maintenance.

The outlet pressure to be controlled is balanced across the diaphragm by the force of the valve spring (set pressure). As the outlet pressure rises above the pressure set using the adjusting screw, the valve cone moves towards the seat and the volume of medium is reduced. As the outlet pressure drops the valve control orifice increases; when the pipeline is depressurised the valve is open. Rotating the adjusting screw clockwise increases the outlet pressure.

## STANDARD EQUIPMENT

- All stainless steel construction
- Non increasing adjusting screw
- Quick-release body clamp ring

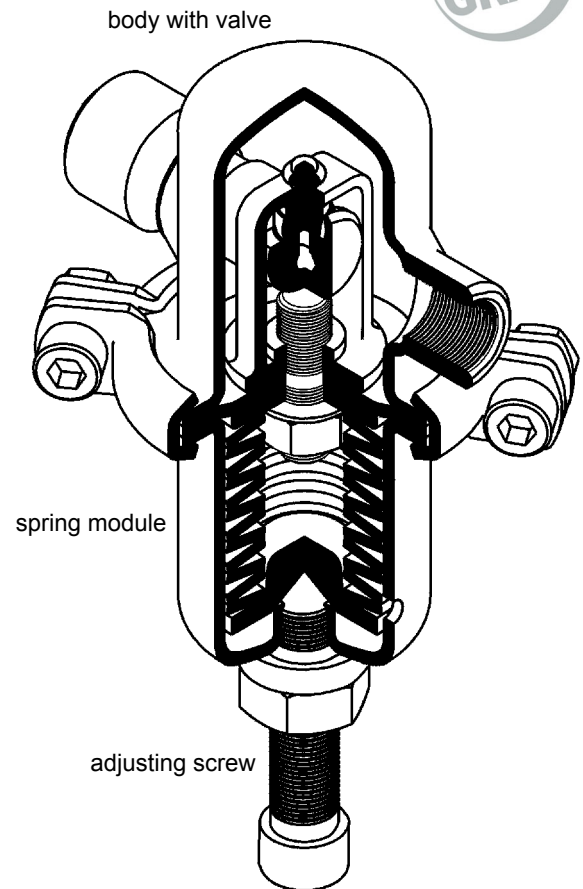
## OPTIONS

- Pressure gauge connection
- For toxic or hazardous media: sealed bonnet complete with leakage line connection (incl. sealed adjusting screw). Must be installed with a leakage line capable of draining leaking medium safely and without pressure
- Various diaphragm and seal materials suitable for your medium
- Special connections: Aseptic, ANSI or DIN flanges, welding spigots; other connections on request
- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure.

We reserve the right to alter technical specifications without notice.



Setting Ranges, $K_{VS}$ -Values, Permissible Reduction Ratio (max. $p_1/p_2$ )				
$K_{VS}$ -value	m <sup>3</sup> /h	0.15		
outlet pressure	bar	0.3 - 1.5	1 - 6	5 - 20
nom. pressure	PN	315 / 2.5	315 / 10	315 / 25
ratio $P_1/P_2$		20		

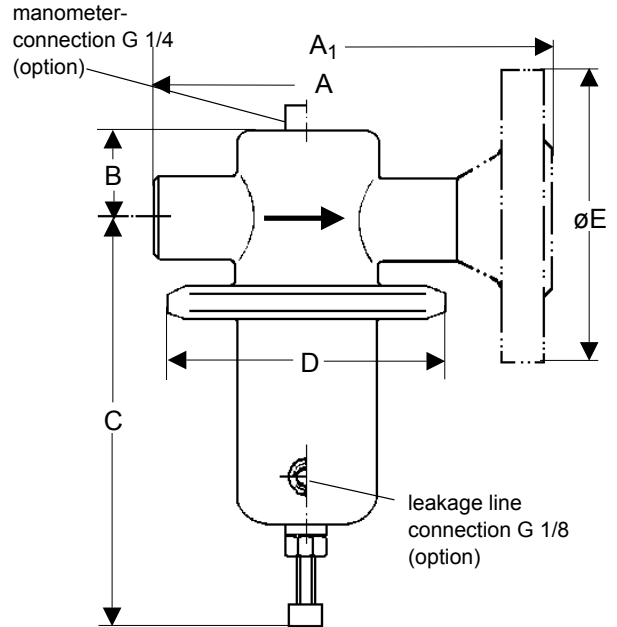
für liquids und gases bis 80 / 130 °C



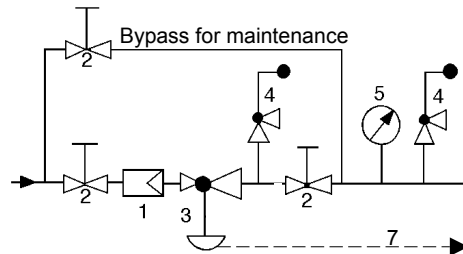
Materials		
Temperature	80 °C	130 °C
Body		
Bonnet	CrNiMo-steel	CrNiMo-steel
Internals		
Adjusting Screw		
Spring	CrNi-steel	CrNi-steel
Valve Seal	EU	FPM optional FFKM, EPDM, PTFE
Diaphragm	NBR	FPM optional EPDM
Protection Foil	PTFE (option)	PTFE (option)

Dimensions [mm]		
size	nominal diameter	
	G 1/4	DN 15
A/A <sub>1</sub>	75	130
B	28	28
C	~105	~105
D	80	80
øE	-	95

Weights [kg]		
nominal diameter		
	G 1/4	DN 15
	0.75	2.5



### Recommended Installation



- 1 Strainer
- 2 Shutoff Valves
- 3 Pressure Reducer
- 4 Safety Valve
- 5 Pressure Gauge
- 7 Leakage Line G 1/8 (option)

Special designs on request.

The pressure has always been indicated as overpressure. Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.

Only for pressure reducer DM 510, 511, 514, 515, 516 and 518  
DM 512, 513 and 517 see separate data sheet

## Technical Data

Connection	DM 510	G 3/8 - 2
	DM 511	DN 15 - 50
	DM 514	G 1/2 - 1
	DM 515	DN 15 - 25
	DM 516	DN 15 - 50 welding ends
	DM 518	DN 15 - 25 welding ends
Inlet Press.	up to 315 bar	
Outlet Press.	DM 510	2 - 100 bar in 10 ranges
	DM 511	2 - 100 bar in 10 ranges
	DM 514	40 - 160 bar in 2 ranges
	DM 515	40 - 160 bar in 2 ranges
	DM 516	2 - 100 bar in 10 ranges
	DM 518	40 - 160 bar in 2 ranges
$K_{vs}$ -value	0.2 - 5,5 m <sup>3</sup> /h	
Limits	diaphragm	130 °C P2 20bar
	piston	130 °C P2 160 bar
	bellow	400 °C P2 160 bar
Tightness	acc. to VDI/VDE-guideline 2174 (leakage rate $\leq$ 0.05% of $K_{vs}$ -value)	

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The DM 510, DM 511, DM 514, DM 515, DM 516 and DM 518 pressure reducing valves are diaphragm, piston or bellows-controlled spring-loaded proportional control valves for high inlet and outlet pressures. They can be supplied with three types of connections: sockets, flanges and welding spigots. Each size of valve may be fitted with three different seats (see data sheet DM 510/2.0.061.2). The valve cone may be fitted with a soft or metallic seal.

The outlet pressure to be controlled is balanced across the diaphragm by the force of the valve spring (set pressure). As the outlet pressure rises above the pressure set using the adjusting screw, the valve cone moves towards the seat and the volume of medium is reduced. As the outlet pressure drops the valve control orifice increases; when the pipeline is depressurised the valve is open. Rotating the adjusting screw clockwise increases the outlet pressure.

## OPTIONS

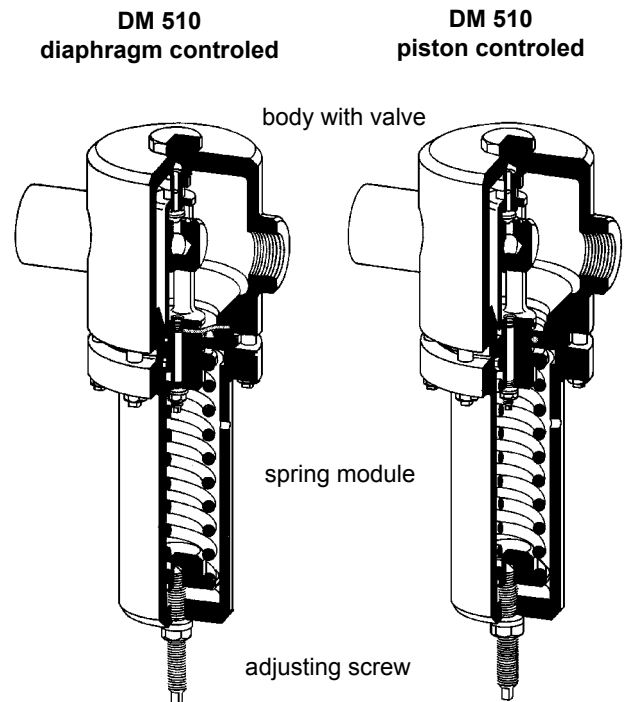
- Pressure gauge connection
- Valve cone and seat armoured
- For toxic or hazardous media: sealed bonnet complete with leakage line connection (incl. sealed adjusting screw). Must be installed with a leakage line capable of draining leaking medium safely and without pressure
- Various diaphragm and seal materials suitable for your medium
- Special connections: Aseptic, ANSI or DIN flanges, welding spigots; other connections on request
- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

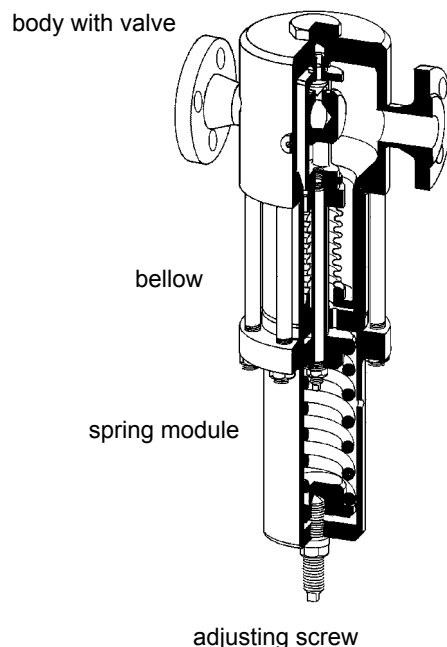
The pressure has always been indicated as overpressure.

We reserve the right to alter technical specifications without notice.

## examples of design



## DM 510 bellows controlled



Nominal Pressure,  $K_{vs}$ -Values, Setting Ranges and Permissible Reduction Ratio see sheet no. DM 510/2.1.061.2

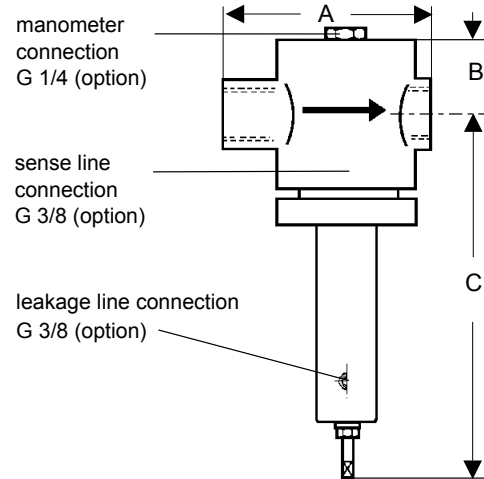
# Pressure Control Valves

# DM 510 - 518

Only for pressure reducer DM 510, 511, 514, 515, 516 and 518  
DM 512, 513 and 517 see separate data sheet

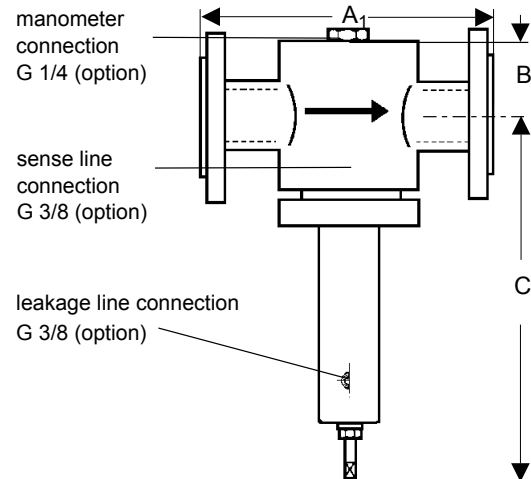
Materials			
Temperature	80 °C	130 °C	400 °C
Body	G 3/8 - 1, DN 15 - 25 = C 22.8 G 1 1/4 - 2, DN 32 - 50 = steel welded optional CrNiMo-steel for all body sizes		
Bonnet	steel welded optional CrNiMo-steel		
Internals	Ms optional CrMo-St or CrNiMo-St	CrNiMo-steel	
Spring	CrNi-steel	CrNi-steel	CrNi-steel
Valve Seal	EU	FPM optional EPDM or PTFE	-
Metallic Sealing	CrNiMo-steel	CrNiMo-steel	CrNiMo-steel
Diaphragm	CR	FPM optional EPDM	-
Protection Foil	PTFE (option)	PTFE (option)	PTFE (option)
O-Ring for Piston	NBR	FPM optional EPDM or PTFE	-
Bellow	-	-	CrNiMo-steel

**DM 510**  
**DM 514**  
**DM 516**  
**DM 518**



Dimensions [mm] DM 510, DM 511 and DM 516					
type	size	nominal diameter			
		G 3/8 - 1/2 DN 15	G 3/4 - 1 DN 20 - 25	G 1 1/4 - 1 1/2 DN 32 - 40	G 2 DN 50
510	A	140	170	250	250
511	A <sub>1</sub>	220	220	280*	300*
516	A / A <sub>1</sub>	220	220	acc. to DIN 3202 - S14	
all	B	80	80	110	110
all	C	< 520	< 520	< 800	< 800

**DM 511**  
**DM 515**

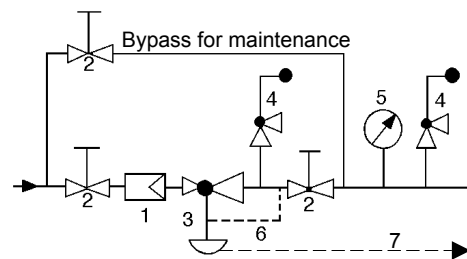


Dimensions [mm] DM 514, DM 515 and DM 518	
size	all diameters
A / A <sub>1</sub>	220
B	90
C	< 530

Weights [kg] for DM 510, all other on request						
nominal diameter						
3/8	1/2	3/4	1	1 1/4	1 1/2	2
13	13	14	15	21	21	21

Special designs on request.  
The pressure has always been indicated as overpressure.  
Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.

## Recommended Installation



- 1 Strainer
- 2 Shutoff Valves
- 3 Pressure Reducer
- 4 Safety Valve
- 5 Pressure Gauge
- 6 Sense Line G 3/8 (option)
- 7 Leakage Line G 3/8 (option)

Sense line connection 10 - 20 x DN behind the valve

# Pressure Control Valves

# DM 510 - 518

for pressure reducing valves DM 510, 511, 512, 513, 514, 515, 516, 517 und 518

K <sub>vs</sub> -values [m <sup>3</sup> /h], (3 diff. K <sub>vs</sub> -values for each body size)								
G	nominal diameter							
	3/8	1/2	3/4	1	1 1/4	1 1/2	2	
DN		15	20	25	32	40	50	
seat	I	0,2	0,2	0,25	0,25	0,4	0,4	1
	II	0,9	0,9	0,9	0,9	2,5	2,5	3,5
	III	1,7	1,8	2	2,2	3,9	3,9	5,5

Setting Ranges [bar], Nominal Pressure DM 510, 511, 516				
2 - 4	4 - 7	7 - 10	5 - 16	10 - 20
PN 315/6	PN 315/16	PN 315/16	PN 315/25	PN 315/25
10 - 25	20 - 35	35 - 50	45 - 63	60 - 100
PN 315/40	PN 315/40	PN 315/63	PN 315/100	PN 315/100

Setting Range [bar], Nominal Pressure DM 512, 513, 517			
0.005 - 0.07	0.02 - 0.1	0.05 - 0.4	0.1 - 0.4
PN 100/1	PN 100/1	PN 100/1	PN 100/1
0.4 - 0.8	0.3 - 1	1 - 2	
PN 100/1,6	PN 100/1,6	PN 100/6	

Setting Range [bar], Nominal Pressure DM 514, 515, 518	
40 - 100	80 - 160
PN 315/100	PN 315/160

Permissible Reduction Ratio (max. p <sub>1</sub> /p <sub>2</sub> ) DM 510, 511, 516				
setting range bar	seat	nominal diameter		
		G 3/8 - 1 DN 15 - 25	G 1 1/4 - 1 1/2 DN 32 - 40	G 2 DN 50
2 - 4	I	100	80	60
	II	30	29	18
	III	15	15	12
4 - 7	I	80	52	39
	II	30	19	12
	III	15	10	8
7 - 10	I	80	38	28
	II	30	14	8
	III	15	7	6
5 - 16	I	32	45	33
	II	21	16	10
	III	9	8	7
10 - 20	I	32	38	28
	II	21	14	8
	III	9	7	6
10 - 25	I	20	25	18
	II	17	9	6
	III	7	4.5	4
20 - 35	I	16	20	15
	II	13	7	4.5
	III	4	3.5	3
35 - 50	I	9	15	11
	II	9	5.5	3
	III	4	3	2.5
45 - 63	I	7	11	8
	II	7	4	2.5
	III	3	2	1.5
60 - 100	I	6	8	5.5
	II	6	2.5	1.5
	III	2.5	1.5	1.2

Permissible Reduction Ratio (max. p <sub>1</sub> /p <sub>2</sub> ) DM 512, 513, 517				
setting range bar	seat	nominal diameter		
		G 3/8 - 1 DN 15 - 25	G 1 1/4 - 1 1/2 DN 32 - 40	G 2 DN 50
5 - 0.07	I	4000	6570	4865
	II	1500	2390	1490
	III	600	1200	1010
0.02 - 0.1	I	200	1950	1445
	II	800	710	440
	III	300	355	300
0.05 - 0.4	I	1000	1020	755
	II	400	370	230
	III	150	185	155
0.1 - 0.4	I	700	510	375
	II	200	185	115
	III	90	90	75
0.4 - 0.8	I	700	510	375
	II	200	185	115
	III	90	90	75
0.3 - 1	I	300	280	205
	II	100	100	60
	III	40	50	40
1 - 2	I	300	280	205
	II	100	100	60
	III	40	50	40

Permissible Reduction Ratio (max. p <sub>1</sub> /p <sub>2</sub> ) DM 514, 515, 518		
setting range bar	seat	nominal diameter
		G 3/8 - 2   DN 15 - 50
all ranges	I	4
	II	
	III	

Special designs on request.  
The pressure has always been indicated as overpressure.  
Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.

Sheet no. DM 510/2.1.061.2 - Issue 12.06.2006



Pressure reducer for liquids and gases up to 130 °C, for high inlet pressure  
For outlet pressure higher than 2 bar see data sheet DM 510

## Technical Data

Connection	DM 512 G 3/8 DM 513 DN 15 DM 517 DN 15
Nominal Pressure	Inlet PN 100 Outlet PN 1 - 6
Inlet Pressure	up to 100 bar
Outlet Pressure	0.005 - 2 bar in 7 setting ranges
$K_{vs}$ -Value	0.2 - 5.5 m <sup>3</sup> /h
Tightness	acc. VDI/VDE-guideline 2174 (leakage rate $\leq$ 0.05 % of $K_{vs}$ -value)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The DM 512, DM 513 and DM 517 pressure reducing valves are diaphragm-controlled spring-loaded proportional control valves for high inlet and low outlet pressures. They can be supplied with three types of connections: sockets, flanges and welding spigots. Each size of valve may be fitted with three different seats (see data sheet DM 510/2.0.061.2). The valve cone may be fitted with a soft or metallic seal.

When the pipeline is depressurised the valve spring keeps the cone in "open" position. As the pressure rises the fluid flows from the inlet side through the valve seat into the body and acts on the diaphragm/spring mechanism from the outlet side (outlet pressure).

The outlet pressure to be controlled is balanced across the diaphragm by the force of the valve spring (set pressure). As the outlet pressure rises above the pressure set using the adjusting screw, the valve cone moves towards the seat and the volume of medium is reduced. As the outlet pressure drops the valve control orifice increases; when the pipeline is depressurised the valve is open. Rotating the adjusting screw clockwise increases the outlet pressure. These valves require a 3/8 inch pilot line (to be installed on-site).

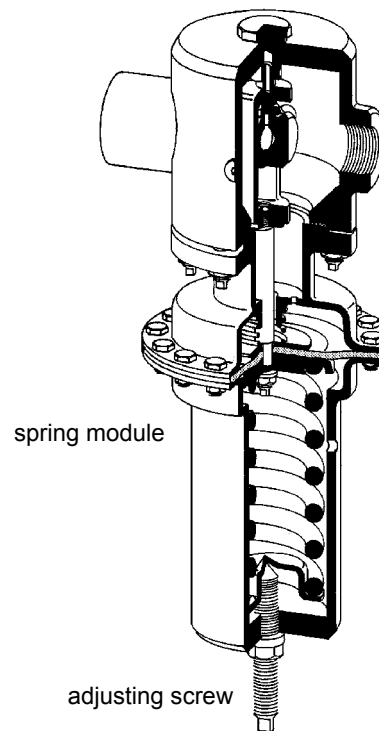
## OPTIONS

- Pressure gauge connection
- Valve cone and seat armoured
- For toxic or hazardous media: sealed bonnet complete with leakage line connection (incl. sealed adjusting screw).  
Must be installed with a leakage line capable of draining leaking medium safely and without pressure
- Various diaphragm and seal materials suitable for your medium
- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure.  
We reserve the right to alter technical specifications without notice.

body with valve



Nominal Pressure,  $K_{vs}$ -Values, Setting Ranges and Permissible Reduction Ratio see sheet no. DM 510/2.1.061.2

# Pressure Control Valves

# DM 512, 513, 517

Pressure reducer for liquids and gases up to 130 °C, for high inlet pressure  
For outlet pressure higher than 2 bar see data sheet DM 510

Materials		
Temperature	80 °C	130 °C
Body	G 3/8 - 1, DN 15 - 25 = C22.8 G 1 1/4 - 2, DN 32 - 50 = steel welded optional CrNiMo-steel for all body sizes	
Bonnet	steel welded optional CrNiMo-steel	
Internals	brass optional CrMo-steel or CrNiMo-steel	
Spring	CrNi-steel	CrNi-steel
Soft Seal	EU	FPM optional EPDM, PTFE
Metallic Seal	CrNiMo-steel	CrNiMo-steel
Diaphragm	CR	FPM optional EPDM
Protection Foil	PTFE (option)	PTFE (option)

Dimensions DM 512 [mm]				
pressure range [bar]	size	nominal diameter		
		G 3/8 - 1/2	G 3/4 - 1	1 1/4 - 2
all ranges	A	140	170	250
	B	80	80	110
	C	470	470	max. 720
0.005 - 0.07	D	500	500	850
0.02 - 0.1	D	360	360	500
0.05 - 0.4	D	270	270	360
0.1 - 0.8	D	220	220	270
0.3 - 2	D	175	175	220

Dimensions DM 513 [mm]				
pressure range [bar]	size	nominal diameter		
		DN 15 - 25	DN 32-40	DN 50
all ranges	A <sub>1</sub>	220	280*	300*
	B	80	110	110
	C	470	max. 720	max. 720
0.005 - 0.07	D	500	850	850
0.02 - 0.1	D	360	500	500
0.05 - 0.4	D	270	360	360
0.1 - 0.8	D	220	270	270
0.3 - 2	D	175	220	220

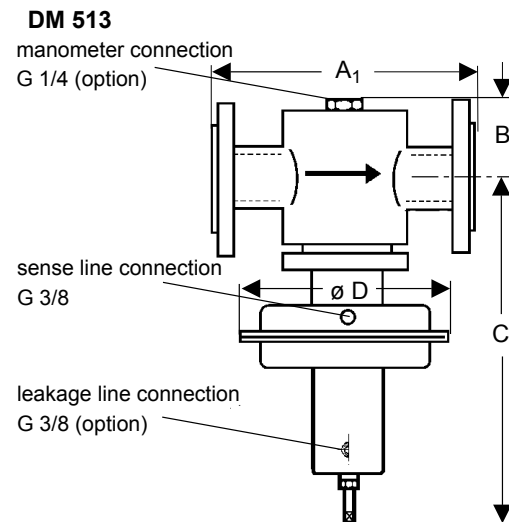
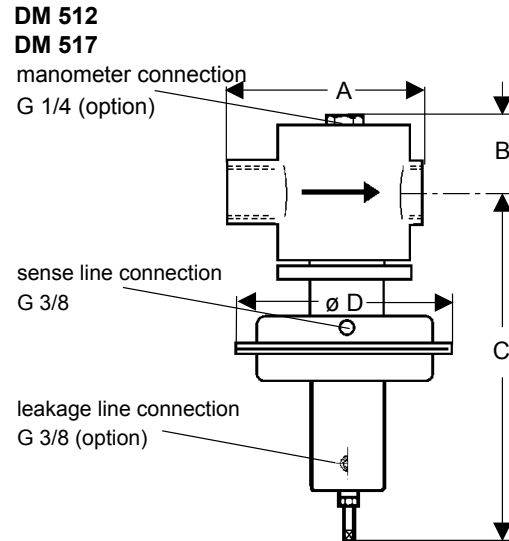
Dimensions DM 517 [mm]				
pressure range [bar]	size	nominal diameter		
		G 3/8 - 1	G 1 1/4 - 1 1/2	2
all ranges	A	220	270	300
	B	80	110	110
	C	470	max. 720	max. 720
0.005 - 0.07	D	500	850	850
0.02 - 0.1	D	360	500	500
0.05 - 0.4	D	270	360	360
0.1 - 0.8	D	220	270	270
0.3 - 2	D	175	220	220

Weights DM 512, 517 [kg]							
pressure range [bar]	nominal diameter						
	G 3/8	G 1/2	G 3/4	G 1	G 1 1/4	G 1 1/2	G 2
0.005 - 0.07	36	36	37	38	75	75	75
0.02 - 0.1	40	40	41	42	47	47	47
0.05 - 0.4	37	37	38	39	39	39	39
0.1 - 0.8	25	25	26	27	37	37	37
0.3 - 2	19	19	20	21	35	35	35

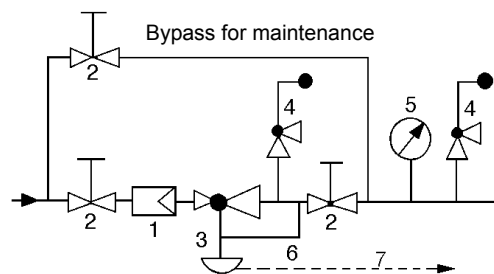
Weight of 1 flange for PRV 513 [kg]						
Weight of PRV 513 = PRV 512 + weight of 2 flanges						
nom. pressure PN	nominal diameter					
	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50
16 - 40	1.5	1.6	1.8	2.4	2.9	3.4
63	1.7		3.2		4.8	5.2
100	1.7		3.2		4.8	7.7
160	1.7		3.2		4.8	8
250	3		4		7.2	8.8
315	3.5		5.5		8.7	11.3

Special designs on request.  
The pressure has always been indicated as overpressure.  
Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.

WIR REGELN DAS SCHON  
FIRMILY IN CONTROL



### Recommended Installation



- 1 Strainer
- 2 Shutoff Valves
- 3 Pressure Reducer
- 4 Safety Valve
- 5 Pressure Gauge
- 6 Sense Line G 3/8
- 7 Leakage Line G 3/8 (option)

Sense line connection 10 - 20 x DN behind the valve

**MANKENBERG**

Pressure reducer for steam  
up to 350 °C

## Technical Data

Connection	DN 15 - 150
Nominal Pressure	Inlet PN 16 - 40 Outlet PN 16
Inlet Pressure	up to 40 bar
Outlet Pressure	0.02 - 10 bar in 6 setting ranges
K <sub>vs</sub> -Value	4 - 160 m <sup>3</sup> /h
Tightness	acc. VDI/VDE-guideline 2174 (leakage rate ≤ 0.05 % of K <sub>vs</sub> -value)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The DM 603 pressure reducing valve is a diaphragm-controlled spring-loaded proportional control valve for high temperatures and large volumes. The valve cone is fitted with a metallic seal (up to 350 °C).

The outlet pressure to be controlled is balanced across the diaphragm by the force of the valve spring (set pressure). As the outlet pressure rises above the pressure set using the adjusting screw, the valve cone moves towards the seat and the volume of medium is reduced. As the outlet pressure drops the valve control orifice increases; when the pipeline is depressurised the valve is open. Rotating the adjusting screw clockwise increases the outlet pressure.

The DM 603 pressure reducer requires a pilot line (to be installed on-site).

## STANDARD EQUIPMENT

- Open spring
- Pilot line connection

## OPTIONS

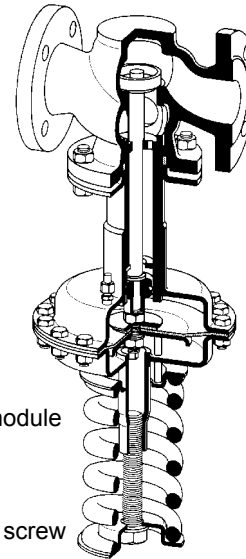
- Sealed bonnet
- For toxic or hazardous media: sealed bonnet complete with leakage line connection (incl. sealed adjusting screw).  
Must be installed with a leakage line capable of draining leaking medium safely and without pressure
- Various diaphragm and seal materials suitable for your medium
- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure.

We reserve the right to alter technical specifications without notice.

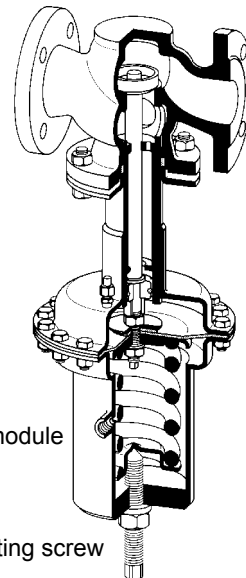
body with valve



spring module

adjusting screw

body with valve



spring module

adjusting screw

K <sub>vs</sub> -values [m <sup>3</sup> /h]										
DN	15	20	25	40	50	65	80	100	125	150
m <sup>3</sup> /h	4	5	6	20	32	50	80	100	140	160

Setting Ranges[ bar]						
DN 15-50	0.02 - 0.25	0.1 - 0.6	0.2 - 1.2	0.8 - 2.5	2 - 5	4.5 - 10
DN 65-100	0.02 - 0.25	0.1 - 0.6	0.2 - 1.2	0.8 - 2.5	2 - 5	4 - 8
DN 125+150	0.05 - 0.5	0.1 - 0.6	0.2 - 1.2	0.8 - 2.5	2 - 3.5	2 - 5
PN	40/1	40/1	40/2.5	40/6	40/10	40/16

Pressure reducer for steam  
up to 350 °C

Materials		
Temperature	300 °C	350 °C
Body	PN 16	up to DN 25 grey cast iron from DN 40 spheroidal cast iron
	PN 25 /40	cast steel
	PN 16 - 40	CrNiMo-steel
Diaphragm Housing	steel welded optional CrNiMo-steel	
Bonnet	steel welded optional CrNiMo-steel	
Spring	spring steel C optional CrNi-steel	
Diaphragm	CR	EPDM
O-ring (balance)	NBR	EPDM

Dimensions [mm]											
size	pressure range bar	nominal diameter DN									
		15	20	25	40	50	65	80	100	125	150
A	0.02 - 5/8/10	130	150	160	200	230	290	310	350	400	480
B		55	55	55	75	75	105	105	105	220	220
C	4.5 - 8/10	690	690	690	830	930	880	880	880	1040	1040
C <sub>1</sub>	2 - 3.5/5	820	820	820	990	990	1040	1040	1040	1200	1200
D	0.8 - 2.5	175	175	175	220	220	220	220	220	220	220
C	0.2 - 1.2	710	710	710	830	830	880	880	880	940	940
C <sub>1</sub>		840	840	840	990	990	1040	1040	1040	1100	1100
D		220	220	220	270	270	270	270	270	270	270
C	0.1 - 0.6	710	710	710	830	830	880	880	880	940	940
C <sub>1</sub>		840	840	840	990	990	1040	1040	1040	1100	1100
D		270	270	270	360	360	360	360	360	360	360
C	0.02 / 0.05 - 0.25	710	710	710	710	710	760	760	760	940	940
C <sub>1</sub>		840	840	840	870	870	920	920	920	1100	1100
D		360	360	360	360	360	360	360	360	500	500

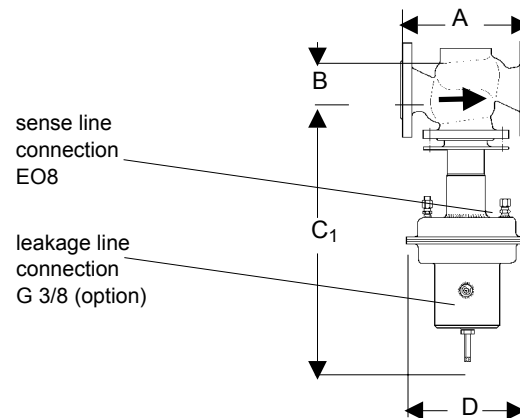
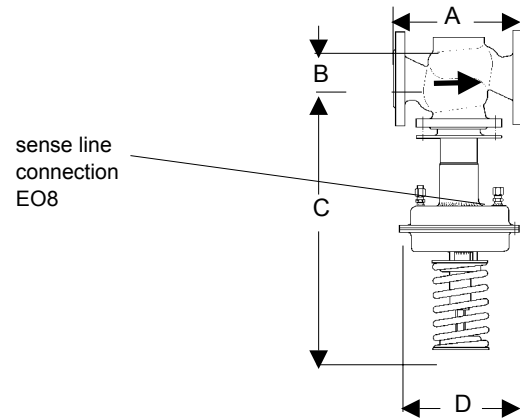
E = max. size with stressless spring

Weights [kg]											
nom. pressure	pressure range bar	nominal pressure DN									
		15	20	25	40	50	65	80	100	125	150
PN 16	0.8 - 5/8/10	18	18	19	33	36	61	64	68	110	130
	0.2 - 1.2	20	20	21	35	38	63	66	70	112	132
	0.1 - 0.6	24	24	25	39	42	67	70	74	116	136
	0.02/0.05 - 0.25	24	24	25	37	40	65	68	72	122	142
PN 25/40	0.8 - 5/8/10	19	19	20	36	38	64	68	71	118	143
	0.2 - 1.2	21	21	22	38	40	66	70	73	120	145
	0.1 - 0.6	25	25	26	42	44	70	74	77	124	149
	0.02/0.05 - 0.25	25	25	26	40	42	68	72	75	130	155

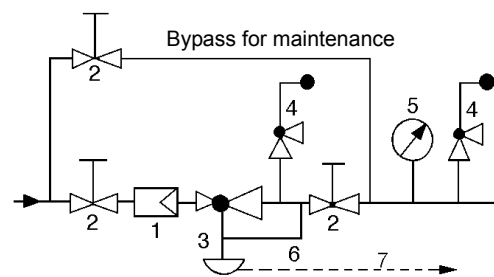
Special designs on request.

The pressure has always been indicated as overpressure.

Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.



### Recommended Installation



- 1 Strainer
- 2 Shutoff Valves
- 3 Pressure Reducer
- 4 Safety Valve
- 5 Pressure Gauge
- 6 Sense Line EO8
- 7 Leakage Line G 3/8 (option)

Sense line connection 10 - 20 x DN behind the valve

Pressure reducer for steam  
up to 250 °C

## Technical Data

Connection	DN 15 - 150
Nominal Pressure	Inlet PN 16 - 40 Outlet PN 1 - 16
Inlet Pressure	up to 40 bar
Outlet Pressure	0.02 - 10 bar in 6 setting ranges
K <sub>vs</sub> -value	4 - 160 m <sup>3</sup> /h
Tightness	acc. VDI/VDE-guideline 2174 (leakage rate ≤ 0.05 % of K <sub>vs</sub> -value)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The DM 604 pressure reducing valve is a diaphragm-controlled spring-loaded proportional control valve for high temperatures and large volumes. The valve cone is fitted with a metallic seal (up to 250 °C).

The outlet pressure to be controlled is balanced across the diaphragm by the force of the valve spring (set pressure). As the outlet pressure rises above the pressure set using the adjusting screw, the valve cone moves towards the seat and the volume of medium is reduced. As the outlet pressure drops the valve control orifice increases; when the pipeline is depressurised the valve is open. Rotating the adjusting screw clockwise increases the outlet pressure.

The DM 604 pressure reducer requires a pilot line (to be installed on-site).

## STANDARD EQUIPMENT

- Open spring
- Pilot line connection

## OPTIONS

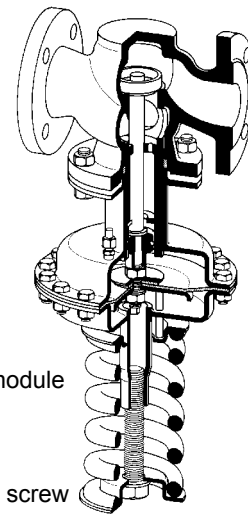
- Sealed bonnet
- For toxic or hazardous media: sealed bonnet complete with leakage line connection (incl. sealed adjusting screw).  
Must be installed with a leakage line capable of draining leaking medium safely and without pressure
- Various diaphragm and seal materials suitable for your medium
- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure.

We reserve the right to alter technical specifications without notice.

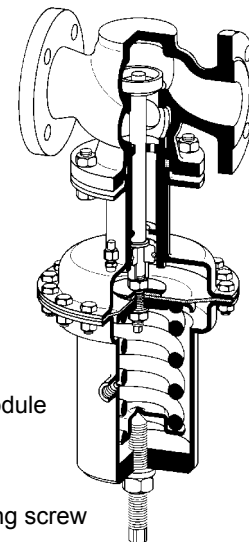
body with valve



spring module

adjusting screw

body with valve



spring module

adjusting screw

K <sub>vs</sub> -values [m <sup>3</sup> /h]										
DN	15	20	25	40	50	65	80	100	125	150
m <sup>3</sup> /h	4	5	6	20	32	50	80	100	140	160

Setting Ranges[ bar]						
DN 15-50	0.02 - 0.25	0.1 - 0.6	0.2 - 1.2	0.8 - 2.5	2 - 5	4.5 - 10
DN 65-100	0.02 - 0.25	0.1 - 0.6	0.2 - 1.2	0.8 - 2.5	2 - 5	4 - 8
DN 125+150	0.05 - 0.25	0.1 - 0.6	0.2 - 1.2	0.8 - 2.5	2 - 3.5	2 - 5
PN	40/1	40/1	40/2.5	40/6	40/10	40/16

Pressure reducer for steam  
up to 250 °C

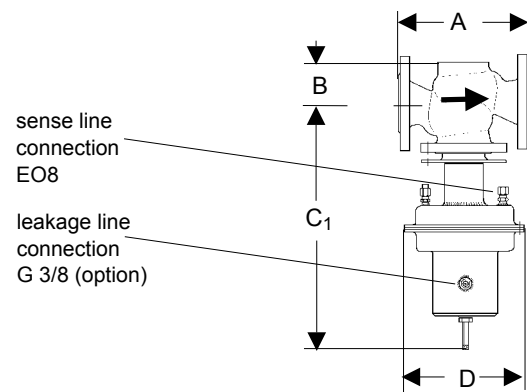
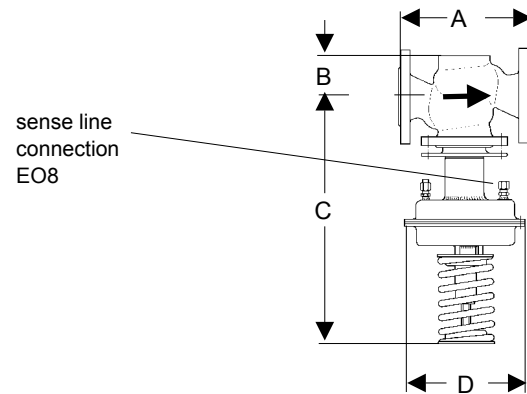
Materials		
Temperature		250 °C
Body	PN 16	up to DN 25 grey cast iron from DN 40 spheroidal cast iron
	PN 25 /40	cast steel
	PN 16 - 40	CrNiMo-steel
Diaphragm Housing		steel welded optional CrNiMo-steel
Bonnet		steel welded optional CrNiMo-steel
Spring		spring steel C optional CrNi-steel
Diaphragm		EPDM
O-ring (balance)		FXM

Dimensions [mm]											
size	pressure range bar	nominal diameter DN									
		15	20	25	40	50	65	80	100	125	150
A	0.02 - 5/8/10	130	150	160	200	230	290	310	350	400	480
B		55	55	55	75	75	105	105	105	220	220
C	4.5 - 8/10	530	530	530	560	560	640	640	640	940	940
C <sub>1</sub>	2 - 3.5/5	660	660	660	720	720	800	800	800	1100	1100
D	0.8 - 2.5	175	175	175	220	220	220	220	220	220	220
C	0.2 - 1.2	540	540	540	560	560	640	640	640	840	840
C <sub>1</sub>		670	670	670	720	720	800	800	800	1000	1000
D		220	220	220	270	270	270	270	270	270	270
C	0.1 - 0.6	540	540	540	560	560	640	640	640	840	840
C <sub>1</sub>		670	670	670	720	720	800	800	800	1000	1000
D		270	270	270	360	360	360	360	360	360	360
C	0.02 / 0.05 - 0.25	510	540	540	560	560	640	640	640	840	840
C <sub>1</sub>		670	670	670	720	720	800	800	800	1000	1000
D		360	360	360	360	360	360	360	360	500	500

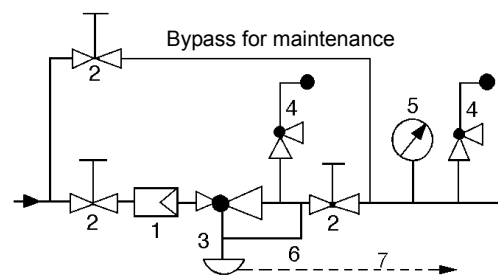
E = max. size with stressless spring

Weights [kg]											
nominal pressure	pressure range bar	nominal pressure DN									
		15	20	25	40	50	65	80	100	125	150
PN 16	0.8 - 5/8/10	17	17	18	30	33	55	58	62	100	120
	0.2 - 1.2	19	19	20	32	35	57	60	64	102	122
	0.1 - 0.6	23	23	24	36	39	61	64	68	106	126
	0.02/0.05 - 0.25	23	23	24	34	37	59	62	66	112	132
PN 25/40	0.8 - 5/8/10	18	18	19	33	35	58	62	65	108	133
	0.2 - 1.2	20	20	21	35	37	60	64	67	110	135
	0.1 - 0.6	24	24	25	39	41	64	68	71	114	139
	0.02/0.05 - 0.25	24	24	25	37	39	62	66	69	120	145

Special designs on request.  
The pressure has always been indicated as overpressure.  
Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.



### Recommended Installation



- 1 Strainer
- 2 Shutoff Valves
- 3 Pressure Reducer
- 4 Safety Valve
- 5 Pressure Gauge
- 6 Sense Line EO8
- 7 Leakage Line G 3/8 (option)

Sense line connection 10 - 20 x DN behind the valve

Pressure reducer for liquids and gases  
up to 130 °C

## Technical Data

Connection	DN 15 - 150
Nominal Pressure	Inlet PN 16 - 40 Outlet PN 1 - 16
Inlet Pressure	up to 40 bar
Outlet Pressure	0.02 - 10 bar in 6 setting ranges
K <sub>vs</sub> -value	4 - 160 m <sup>3</sup> /h
Tightness	acc. VDI/VDE-guideline 2174 (leakage rate ≤ 0.05 % of K <sub>vs</sub> -value)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The DM 613 pressure reducing valve is a diaphragm-controlled spring-loaded and balanced proportional control valve for large volumes. The valve body is made of cast iron, the control mechanism is a welded assembly. The valve cone is fitted with a soft seal (up to 80/130 °C).

The outlet pressure to be controlled is balanced across the diaphragm by the force of the valve spring (set pressure). As the outlet pressure rises above the pressure set using the adjusting screw, the valve cone moves towards the seat and the volume of medium is reduced. As the outlet pressure drops the valve control orifice increases; when the pipeline is depressurised the valve is open. Rotating the adjusting screw clockwise increases the outlet pressure.

The DM 613 pressure reducer requires a pilot line (to be installed on-site).

## STANDARD EQUIPMENT

- Open spring
- Pilot line connection

## OPTIONS

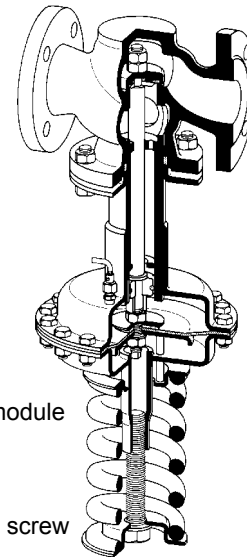
- Sealed bonnet
- For toxic or hazardous media: sealed bonnet complete with leakage line connection (incl. sealed adjusting screw). Must be installed with a leakage line capable of draining leaking medium safely and without pressure
- Various diaphragm and seal materials suitable for your medium
- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has been always indicated as overpressure.

We reserve the right to alter technical specifications without notice.

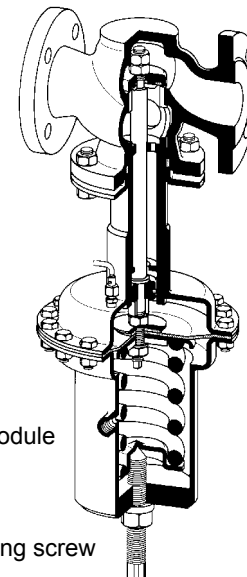
body with valve



spring module

adjusting screw

body with valve



spring module

adjusting screw

K <sub>vs</sub> -value [m <sup>3</sup> /h]										
DN	15	20	25	40	50	65	80	100	125	150
m <sup>3</sup> /h	4	5	6	20	32	50	80	100	140	160

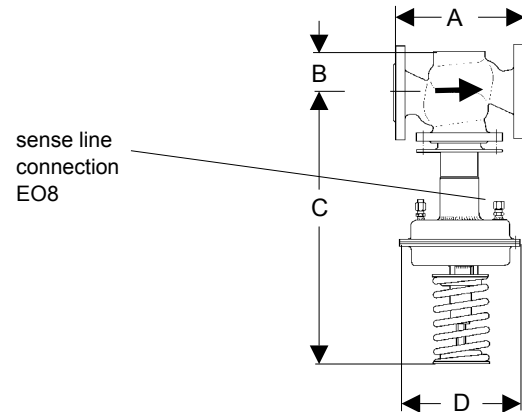
Setting Ranges [ bar]						
DN 15-50	0.02 - 0.25	0.1 - 0.6	0.2 - 1.2	0.8 - 2.5	2 - 5	4.5 - 10
DN 65-100	0.02 - 0.25	0.1 - 0.6	0.2 - 1.2	0.8 - 2.5	2 - 5	4 - 8
DN 125+150	0.05 - 0.25	0.1 - 0.6	0.2 - 1.2	0.8 - 2.5	2 - 3.5	2 - 5
PN	40/1	40/1	40/2.5	40/6	40/10	40/16

# Pressure Control Valves

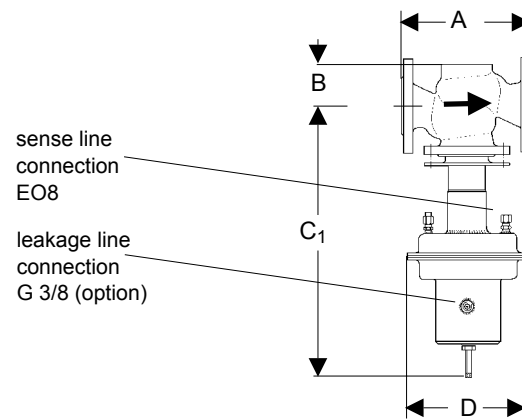
# DM 613

Pressure reducer for liquids and gases  
up to 130 °C

Materials			
Temperature		80 °C	130 °C
Body	PN 16	up to DN 25 grey cast iron ab DN 40 spheroidal cast iron	
	PN 25 /40	cast steel	cast steel
	PN 16 - 40	CrNiMo-steel	CrNiMo-steel
Diaphragm Housing		steel welded optional CrNiMo-steel	
Bonnet		steel welded optional CrNiMo-steel	
Spring		spring steel C optional CrNi-steel	
Valve Seal		NBR	EPDM optional FPM
Diaphragm		CR	EPDM optional FPM
O-ring (balance)		NBR	EPDM optional FPM



Dimensions [mm]											
size	pressure range	nominal diameter DN									
	bar	15	20	25	40	50	65	80	100	125	150
A	0.02 - 5/8/10	130	150	160	200	230	290	310	350	400	480
B		55	55	55	75	75	105	105	105	220	220
C	4.5 - 8/10	520	520	520	680	680	760	760	760	940	940
C <sub>1</sub>	2 - 3.5/5	650	650	650	840	840	920	920	920	1100	1100
D	0.8 - 2.5	175	175	175	220	220	220	220	220	220	220
C	0.2 - 1.2	540	540	540	680	680	760	760	760	840	840
C <sub>1</sub>		670	670	670	840	840	920	920	920	1000	1000
D		220	220	220	270	270	270	270	270	270	270
C	0.1 - 0.6	540	540	540	680	680	760	760	760	840	840
C <sub>1</sub>		670	670	670	840	840	920	920	920	1000	1000
D		270	270	270	360	360	360	360	360	360	360
C	0.02 / 0.05	540	540	540	560	560	640	640	640	840	840
C <sub>1</sub>	-	670	670	670	720	720	800	800	800	1000	1000
D	0.25	360	360	360	360	360	360	360	360	500	500



E = max. size with stressless spring

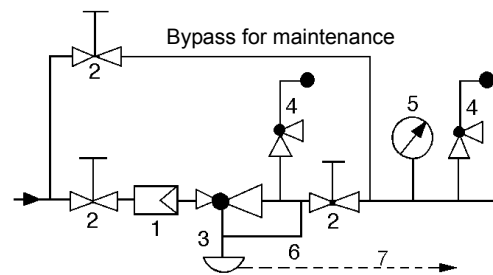
Weights [kg]											
nominal pressure	pressure range	nominal diameter DN									
	bar	15	20	25	40	50	65	80	100	125	150
PN 16	0.8 - 5/8/10	17	17	18	30	33	55	58	62	100	120
	0.2 - 1.2	19	19	20	32	35	57	60	64	102	122
	0.1 - 0.6	23	23	24	36	39	61	64	68	106	126
	0.02/0.05 - 0.25	23	23	24	34	37	59	62	66	112	132
PN 25/40	0.8 - 5/8/10	18	18	19	33	35	58	62	65	108	133
	0.2 - 1.2	20	20	21	35	37	60	64	67	110	135
	0.1 - 0.6	24	24	25	39	41	64	68	71	114	139
	0.02/0.05 - 0.25	24	24	25	37	39	62	66	69	120	145

Special designs on request.

The pressure has always been indicated as overpressure.

Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.

### Recommended Installation



- 1 Strainer
- 2 Shutoff Valves
- 3 Pressure Reducer
- 4 Safety Valve
- 5 Pressure Gauge
- 6 Sense Line EO8
- 7 Leakage Line G 3/8 (option)

Sense line connection 10 - 20 x DN behind the valve



Pressure reducer for steam up to 190 °C, liquids and gases up to 130 °C

## Technical Data

Connection	G 1/2 - 2 DN 15 - 50
Nominal Pressure	Inlet PN 16 - 40 Outlet PN 1 - 16
Inlet Pressure	up to 40 bar
Outlet Pressure	0.02 - 12 bar in 7 setting ranges
$K_{vs}$ -value	4 - 18 m <sup>3</sup> /h
Tightness	acc. VDI/VDE-guideline 2174 (leakage rate $\leq$ 0.05 % of $K_{vs}$ -value)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The DM 652 pressure reducing valve is a diaphragm-controlled spring-loaded and balanced proportional control valve for universal application.

This pressure reducer is manufactured from deep-drawn stainless steel featuring excellent corrosion resistance. The valve cone is fitted with a soft seal.

The spring module comprising bonnet, spring, adjusting screw, diaphragm and internal components, is connected to the valve body only by means of a clamp ring and two bolts. Changing the diaphragm or the complete spring assembly for a different control pressure range is extremely simple and does not call for special tools. The same applies to servicing and maintenance.

The outlet pressure to be controlled is balanced across the diaphragm by the force of the valve spring (set pressure). As the outlet pressure rises above the pressure set using the adjusting screw, the valve cone moves towards the seat and the volume of medium is reduced. As the outlet pressure drops the valve control orifice increases; when the pipeline is depressurised the valve is open. Rotating the adjusting screw clockwise increases the outlet pressure.

The DM 652 pressure reducer requires a pilot line (to be installed on-site).

## STANDARD EQUIPMENT

- All stainless steel construction
- Non increasing setting spindle
- Quick-release body clamp ring
- Pilot line connection
- Diaphragm protected by PTFE foil (only for pressure ranges 0.8 - 12 bar)

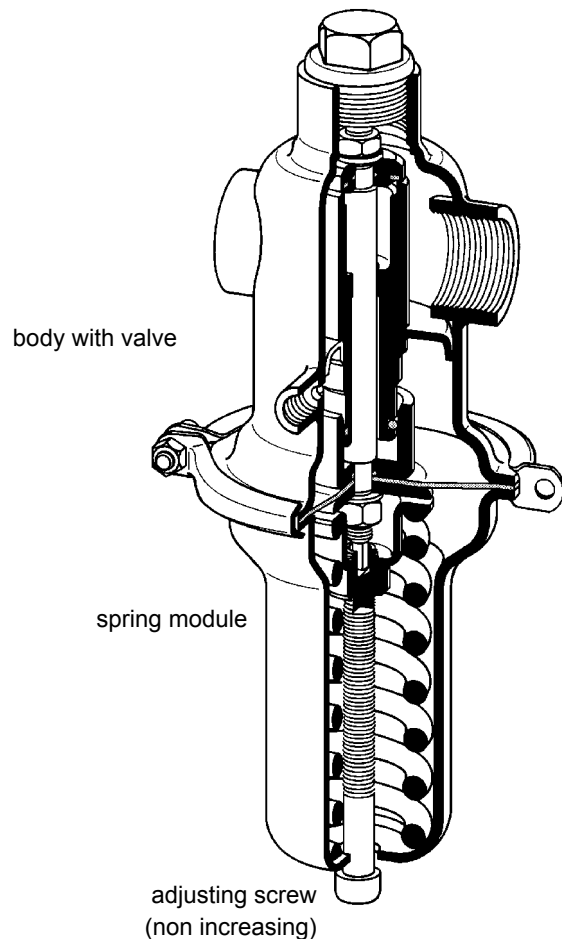
## OPTIONS

- Pressure gauge connection
- Internal pilot line
- Oil and grease-free version for oxygen
- Clean gas version with special connections
- Water-cooled thermal protection for steam up to 220 °C
- For toxic or hazardous media: sealed bonnet complete with leakage line connection (incl. sealed adjusting screw). Must be installed with a leakage line capable of draining leaking medium safely and without pressure
- Various diaphragm and seal materials suitable for your medium
- Special connections: Aseptic, ANSI or DIN flanges, welding spigots; other connections on request
- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure.

We reserve the right to alter technical specifications without notice.



$K_{vs}$ -values [m <sup>3</sup> /h]								
nominal diameter	G	1/2	3/4	1	1 1/4	1 1/2	2	
	DN	15	20	25	32	40	50	
$K_{vs}$ -value	m <sup>3</sup> /h	4	5	6	12	16	18	

Setting Ranges [bar], Nominal Pressure			
0.02-0.12	0.1-0.5	0.3-1.1	0.8-2.5
PN 16-40/1	PN 16-40/1	PN 16-40/2.5	PN 16-40/6

Setting Ranges [bar], Nominal Pressure		
2 - 5	4 - 8	6 - 12
PN 16-40/10	PN 16-40/16	PN 16-40/16

Permissible Reduction Ratio (max. $p_1/p_2$ )		
setting range bar	nominal diameter	
	G 1/2 - 1 DN 15 - 25	G 1 1/4 - 2 DN 32 - 50
0.02 - 0.12	80	50
0.1 - 0.5	40	25
0.3 - 1.1	30	18
0.8 - 12	20	12

Pressure reducer for steam up to 190 °C, liquids and gases up to 130 °C  
balanced valve with high flow rates and low leakage depending of soft seal

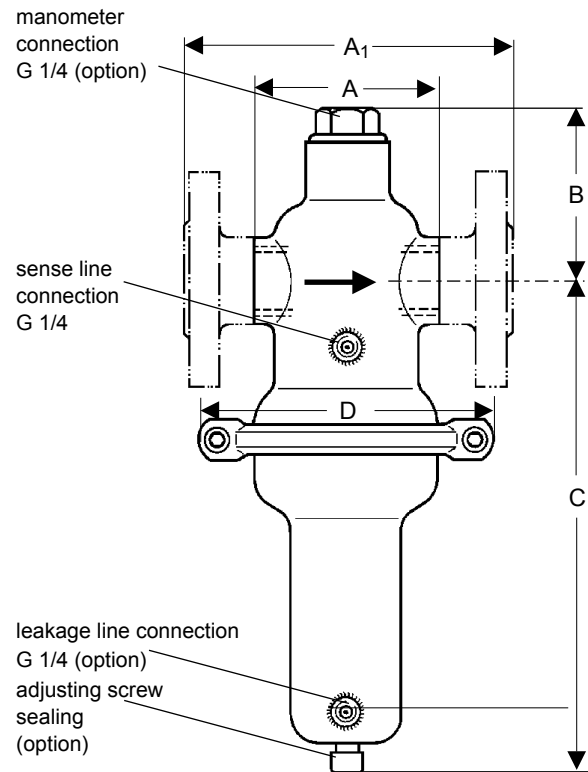


Materials		
Temperature	130 °C	for steam 190 °C
Body, Bonnet, Internals, Screws	CrNiMo-steel	CrNiMo-steel
Spring	CrNi-steel	CrNi-steel
Valve Seal	FEPM optional EPDM or FPM	FEPM optional PTFE
Diaphragm	EPDM optional FPM	EPDM
Protection Foil	PTFE pressure range 0.8 - 12 bar with FEPM-softseal: standard other pressure ranges and softseals: option	

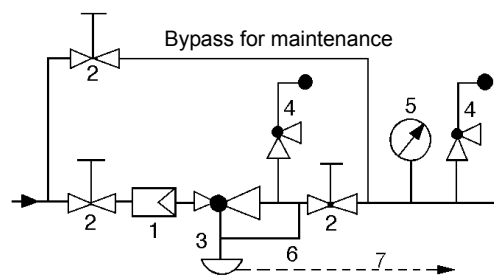
Dimensions [mm]							
pressure range [bar]	size	nominal diameter					
		G 1/2 DN 15	G 3/4 DN 20	G 1 DN 25	G 1 1/4 DN 32	G 1 1/2 DN 40	G 2 DN 50
all ranges	A	85	91	85	130	145	185
	A <sub>1</sub>	130	150	160	180	200	230
	B	76	76	76	90	90	90
0.02 - 0.12	C	300	300	300	300	300	300
	D	360	360	360	360	360	360
0.1 - 0.5	C	300	300	300	300	300	300
	D	264	264	264	264	264	264
0.3 - 1.1	C	300	300	300	300	300	300
	D	200	200	200	200	200	200
0.8 - 2.5	C	235	235	235	235	235	235
	D	138	138	138	138	138	138
2 - 5	C	235	235	235	235	235	235
	D	138	138	138	138	138	138
4 - 8	C	235	235	235	235	235	235
	D	138	138	138	138	138	138
6 - 12	C	235	235	235	235	235	235
	D	138	138	138	138	138	138

Weights [kg]						
pressure range [bar]	nominal diameter G					
	1/2	3/4	1	1 1/4	1 1/2	2
0.02 - 0.12	13,5	13,5	13,5	14,4	14,4	14,4
0.1 - 0.5	7,1	7,1	7,1	8	8	8
0.3 - 1.1	6,1	6,1	6,1	7	7	7
0.8 - 12	3,1	3,1	3,1	4	4	4

Weights [kg]						
pressure range [bar]	nominal diameter DN					
	15	20	25	32	40	50
0.02 - 0.12	15,3	15,3	15,3	18,4	18,4	18,4
0.1 - 0.5	8,9	8,9	8,9	12	12	12
0.3 - 1.1	7,9	7,9	7,9	11	11	11
0.8 - 12	4,9	4,9	4,9	8	8	8



### Recommended Installation



- 1 Strainer
- 2 Shutoff Valves
- 3 Pressure Reducer
- 4 Safety Valve
- 5 Pressure Gauge
- 6 Sense Line G 1/4
- 7 Leakage Line G 1/4 (option)

Sense line connection 10 - 20 x DN behind the valve

Special designs on request.  
The pressure has always been indicated as overpressure.  
Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.



Pressure reducer for liquids and gases up to 130 °C

## Technical Data

Connection	G 1/2 - 1
	DN 15 - 25
Nominal Pressure	Inlet PN 100
	Outlet PN 1 - 16
Inlet Pressure	up to 100 bar
Outlet Pressure	0.02 - 12 bar in 7 setting ranges
$K_{vs}$ -value	3.2 - 3.6 m <sup>3</sup> /h
Tightness	acc. VDI/VDE-guideline 2174 (leakage rate K 0.05 % of $K_{vs}$ -value)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

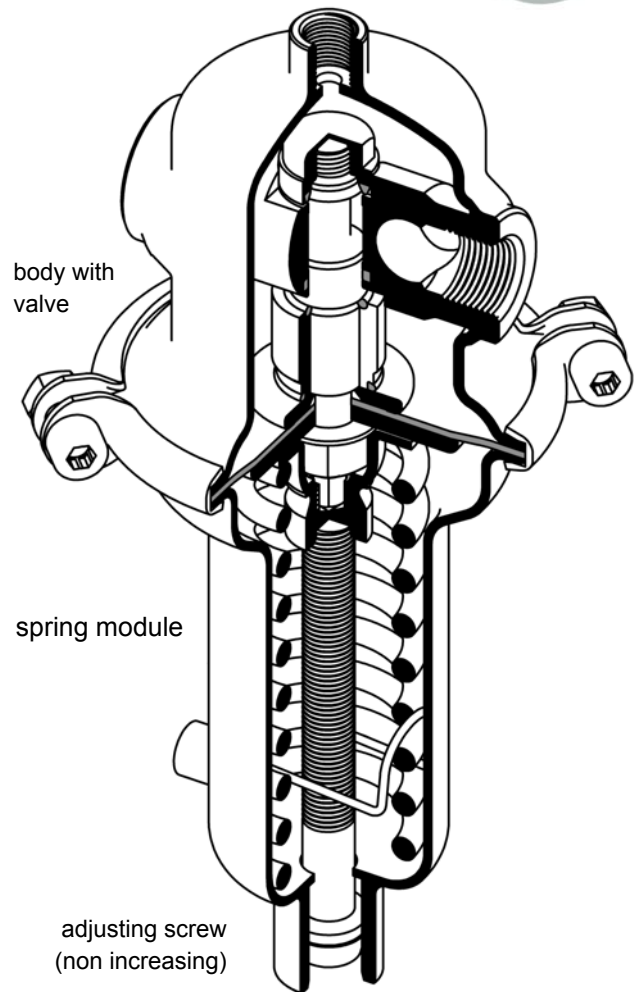
The DM 662 pressure reducing valve is a diaphragm-controlled spring-loaded and balanced proportional control valve for universal application and medium volumes.

This pressure reducer is manufactured from deep-drawn stainless steel featuring excellent corrosion resistance. The valve cone is fitted with a soft seal.

The spring module comprising bonnet, spring, adjusting screw, diaphragm and internal components, is connected to the valve body only by means of a clamp ring and two bolts. Changing the diaphragm or the complete spring assembly for a different control pressure range is extremely simple and does not call for special tools. The same applies to servicing and maintenance.

The outlet pressure to be controlled is balanced across the diaphragm by the force of the valve spring (set pressure). As the outlet pressure rises above the pressure set using the adjusting screw, the valve cone moves towards the seat and the volume of medium is reduced. As the outlet pressure drops the valve control orifice increases; when the pipeline is depressurised the valve is open. Rotating the adjusting screw clockwise increases the outlet pressure.

For outlet pressures  $\leq 1.1$  the DM 662 pressure reducer requires a pilot line (to be installed on-site).



## STANDARD EQUIPMENT

- All stainless steel construction
- Non increasing adjusting screw
- Quick-release body clamp ring
- Pilot line connection (only for outlet pressures  $\leq 1.1$  bar)

## OPTIONS

- Pressure gauge connection
- For toxic or hazardous media: sealed bonnet complete with leakage line connection (incl. sealed adjusting screw). Must be installed with a leakage line capable of draining leaking medium safely and without pressure
- Various diaphragm and seal materials suitable for your medium
- Special connections: Aseptic, ANSI or DIN flanges, welding spigots; other connections on request
- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure.

We reserve the right to alter technical specifications without notice.

<b><math>K_{vs}</math>-values [m<sup>3</sup>/h]</b>				
nominal diameter	DN	15	20	25
	G	1/2	3/4	1
$K_{vs}$ -value	m <sup>3</sup> /h	3.2	3.5	3.6

<b>Setting Ranges [bar], Nominal Pressure [PN]</b>				
setting range	6 - 12	4 - 8	2 - 5	0.8 - 2.5
nominal pressure	100/16	100/16	100/10	100/6

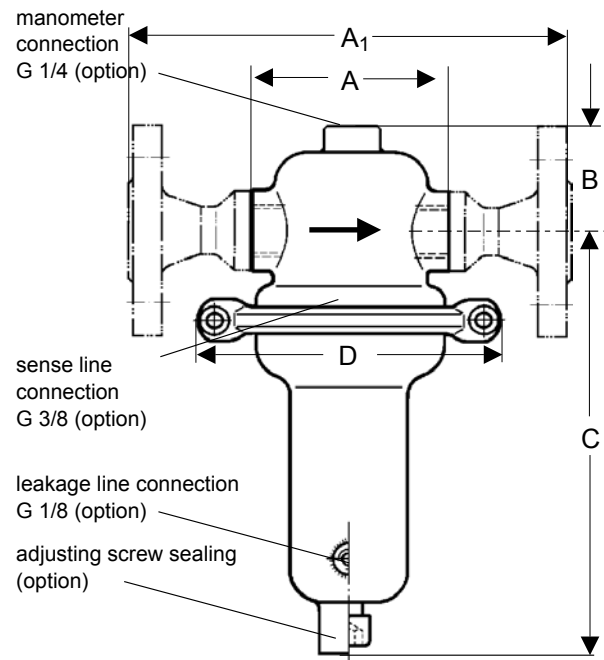
<b>Setting Ranges [bar], Nominal Pressure [PN]</b>			
setting range	0.3 - 1.1	0.1 - 0.5	0.02 - 0.12
nominal pressure	100/2.5	100/1	100/1

Pressure reducer for liquids and gases up to 130 °C



Materials	
Temperature	130 °C
Body, Bonnet, Spring, Diaphragm Housing	CrNiMo-steel
Internals, Screws	
Valve Seal	EPDM optional FPM
Diaphragm	EPDM optional FPM
O-ring	EPDM optional FPM

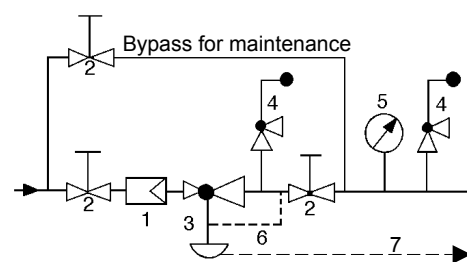
Dimensions [mm]				
pressure range [bar]	size	nominal diameter		
		G 1/2 DN 15	G 3/4 DN 20	G 1 DN 25
all ranges	A	90	90	136
	A <sub>1</sub>	200	200	200
	B	40	40	40
0.02 - 0.12	C	270	270	270
	D	360	360	360
0.1 - 0.5	C	270	270	270
	D	264	264	264
0.3 - 1.1	C	270	270	270
	D	200	200	200
0.8 - 2.5	C	205	205	205
	D	138	138	138
2 - 5	C	205	205	205
	D	138	138	138
4 - 8	C	205	205	205
	D	138	138	138
6 - 12	C	205	205	205
	D	138	138	138



Weights [kg]						
pressure ranges [bar]	nominal diameter G			nominal diameter DN		
	1/2	3/4	1	15	20	25
0.02 - 0.12	13	13	13	14	14	14
0.1 - 0.5	6.5	6.5	6.5	7.5	7.5	7.5
0.3 - 1.1	5.5	5.5	5.5	6.5	6.5	6.5
0.8 - 12	2.5	2.5	2.5	3.5	3.5	3.5

Special designs on request.  
The pressure has always been indicated as overpressure.  
Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.

### Recommended Installation



- 1 Strainer
- 2 Shutoff Valves
- 3 Pressure Reducer
- 4 Safety Valve
- 5 Pressure Gauge
- 6 Sense Line G 3/8 (option)
- 7 Leakage Line G 1/8 (option)

Sense line connection 10 - 20 x DN behind the valve

Pressure reducer for liquids and gases up to 130 °C



## Technical Data

Connection	DN 50 - 100
Nominal Pressure	Inlet PN 16
	Outlet PN 1 - 10
Inlet Pressure	up to 16 bar
Outlet Pressure	0.02 - 5 bar in 6 setting ranges
K <sub>VS</sub> -value	32 - 100 m <sup>3</sup> /h
Tightness	acc. VDI/VDE-guideline 2174 (leakage rate ≤ 0.05 % of K <sub>VS</sub> -value)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The DM 664 pressure reducing valve is a diaphragm-controlled spring-loaded and balanced proportional control valve for large volumes of non-hazardous media.

This pressure reducer is manufactured from deep-drawn stainless steel featuring excellent corrosion resistance. The valve cone is fitted with a soft seal (up to 130 °C).

The outlet pressure to be controlled is balanced across the diaphragm by the force of the valve spring (set pressure). As the outlet pressure rises above the pressure set using the adjusting screw, the valve cone moves towards the seat and the volume of medium is reduced. As the outlet pressure drops the valve control orifice increases; when the pipeline is depressurised the valve is open. Rotating the adjusting screw clockwise increases the outlet pressure.

The DM 664 pressure reducer requires a pilot line (to be installed on-site).

## STANDARD EQUIPMENT

- All stainless steel construction
- Quick-release body clamp ring
- Pilot line connection

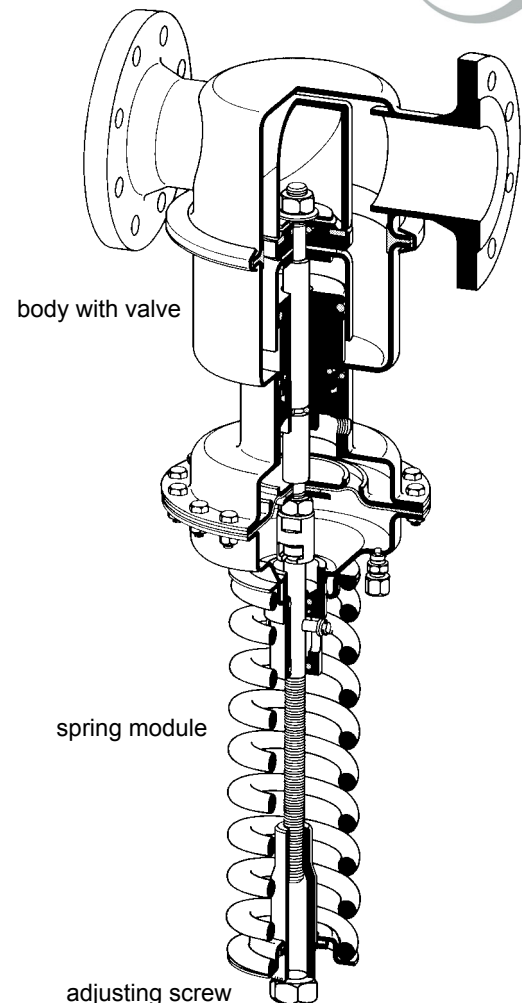
## OPTIONS

- Pressure gauge connection
- For toxic or hazardous media: additional leakage line connection. Must be installed with a leakage line capable of draining leaking medium safely and without pressure
- Various diaphragm and seal materials suitable for your medium
- Special connections: Aseptic, ANSI or DIN flanges, welding spigots; other connections on request
- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure.

We reserve the right to alter technical specifications without notice.



K <sub>VS</sub> -values [m <sup>3</sup> /h]			
nominal diameter DN			
50	65	80	100
32	50	80	100

Setting Ranges [bar], Nominal Pressure PN			
0,02 - 0,15	0,02 - 0,25	0,1 - 0,6	0,2 - 1,2
16/1	16/1	16/1	16/2,5

Setting Ranges [bar], Nominal Pressure PN		
0,8 - 2,5	2 - 5	4 - 8
16/6	16/10	16/16

Pressure reducer for liquids and gases up to 130 °C

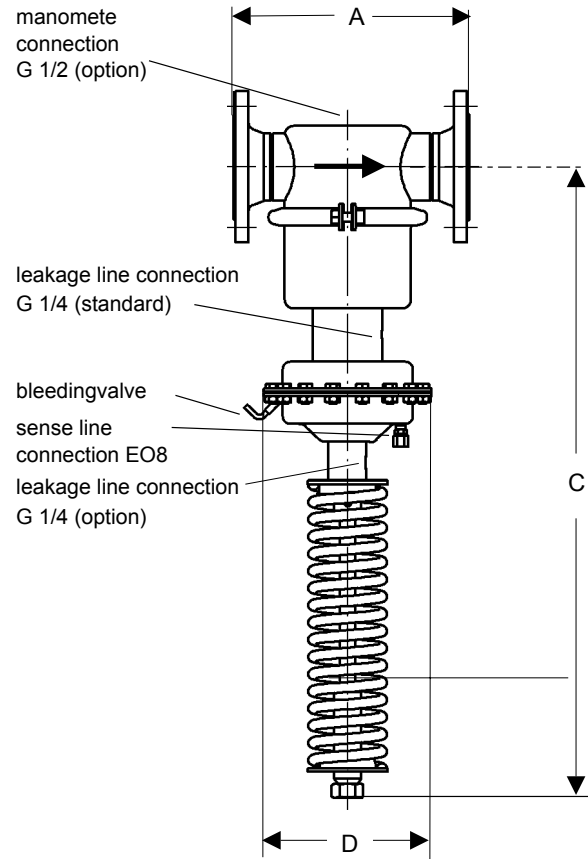


Materials	
Temperature	130 °C
Body, Diaphragm Housing, Internals	CrNiMo-steel
Spring	CrNi-steel
Valve Seal	EPDM optional FPM or PTFE
Diaphragm	EPDM optional FPM
O-ring	EPDM optional FPM

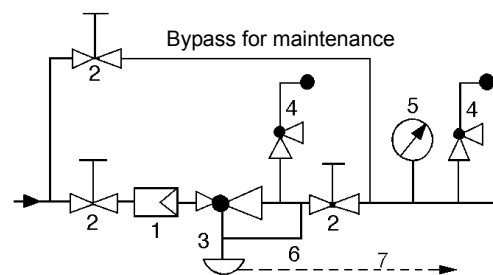
Dimensions [mm]					
pressure range [bar]	size	nominal diameter DN			
		50	65	80	100
all ranges	A	230	290	310	350
	C	650	700	700	700
0.02 - 0.15	D	500	500	500	500
	C	650	700	700	700
0.02 - 0.25	D	360	360	360	360
	C	740	790	790	790
0.1 - 0.6	D	360	360	360	360
	C	740	790	790	790
0.2 - 1.2	D	270	270	270	270
	C	740	790	790	790
0.8 - 2.5	D	220	220	220	220
	C	740	790	790	790
2 - 5	D	220	220	220	220
	C	740	790	790	790
4 - 8	D	220	220	220	220
	C	740	790	790	790

Weights [kg]				
pressure range [bar]	nominal diameter DN			
	50	65	80	100
0.02 - 0.15	40	41	43	45
0.02 - 0.25	40	41	43	45
0.1 - 0.6	37	38	40	42
0.2 - 5	34	35	37	39
4 - 8	34	35	37	39

Special designs on request.  
The pressure has always been indicated as overpressure.  
Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.



### Recommended Installation



- 1 Strainer
- 2 Shutoff Valves
- 3 Pressure Reducer
- 4 Safety Valve
- 5 Pressure Gauge
- 6 Sense Line EO8
- 7 Leakage Line G 1/4 (option)

Sense line connection 10 - 20 x DN behind the valve

Pressure reducing valve for steam  
up to 530 °C

## Technical Data

Connection	DN 15 - 50
Nominal Pressure	PN 315
Inlet Pressure	up to 160 bar
Outlet Pressure	up to 40 bar in several ranges
$K_{VS}$ -value	0,2 - 5,5 m <sup>3</sup> /h
Tightness	acc. to VDI/VDE-guideline 2174 (leakage rate $\leq 0.05\%$ of $K_{VS}$ -value)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The DM 701 pressure reducing valve is a piston controlled, spring loaded proportional control valve for small capacities with small pressure drops. The valve cone is fitted with a metallic seal.

The outlet pressure to be controlled is balanced across the piston by the force of the valve spring (set pressure). As the outlet pressure rises above the pressure set using the adjusting screw, the valve cone moves towards the seat and the volume of medium is reduced. As the outlet pressure drops the valve control orifice increases; when the pipeline is depressurised the valve is open. Rotating the adjusting screw clockwise increases the outlet pressure.

The DM 701 pressure reducer requires a pilot line (to be installed on-site).

## STANDARD

- Open spring
- Pilot line connection

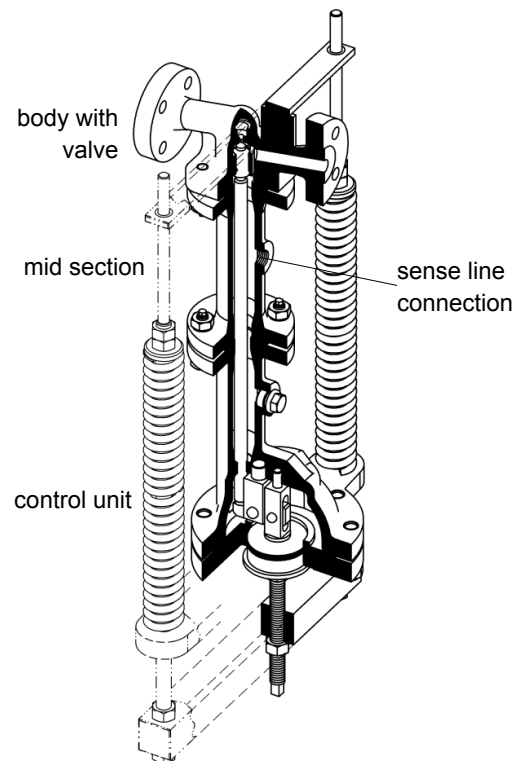
## OPTIONEN

- Mid section for higher temperatures (400 - 530 °C)
- Cone stellited for pressure drops > 25 bar
- Various diaphragm and seal materials suitable for your medium
- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure.

We reserve the right to alter technical specifications without notice.



K <sub>VS</sub> -Value [m <sup>3</sup> /h]						
seat	Nominal Pressure DN					
	15	20	25	32	40	50
I	0,2	0,25	0,25	0,4	0,4	1
II	0,9	0,9	0,9	2,5	2,5	3,5
III	1,8	2	2,2	3,9	3,9	5,5

Pressure reducing valve for steam  
up to 530 °C

Materials PN 16	
Temperature	300°C
Body	cast steel
Bottom Part	cast steel
Spring	spring steel C
Internals	on request
Piston	
O-ring	NBR or EPDM

Materials PN 25 - 40			
Temperature	300°C	350°C	400°C
Body	cast steel	cast steel	cast steel
Bottom Part	cast steel	cast steel	cast steel
Mid Section	-	-	GS 17 CrMo 55
Spring	spring steel C	spring steel C	spring steel C
Internals	on request		
Piston			
O-ring	NBR or EPDM	NBR or EPDM	NBR or EPDM

Materials PN 63 - 315			
Temperature	350°C	400°C	530°C
Body	C 22 N	C 22 N	10 CrMo 9-10
Bottom Part	cast steel	cast steel	cast steel
Mid Section	-	GS 17 CrMo 55	GS 17 CrMo 55 or 10 CrMo 9-10
Spring	spring steel C	spring steel C	spring steel C
Internals	on request		
Piston			
O-ring	NBR or EPDM	NBR or EPDM	NBR or EPDM

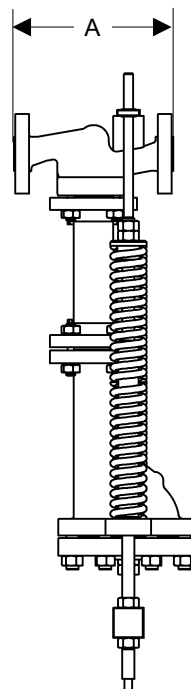
Dimensions [mm]						
size	nominal diameter DN					
	15	20	25	32	40	50
PN 16 - 40	130	150	160	180	200	230
A PN 63 - 100	210	230	230	260	260	300
PN 250 - 315	210	260	260	300	300	350

As the DM 701 pressure reducing valve is designed specifically for your operating data and may vary considerably in terms of construction, we are unable at this stage to give any dimensions or weights. Please contact us if you have specific queries.

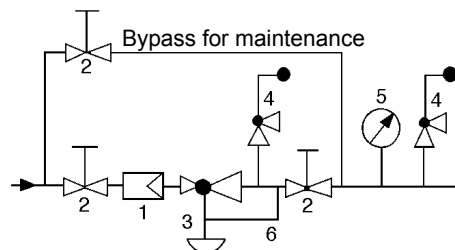
Special designs on request.

The pressure has always been indicated as overpressure.

Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.



### Recommended Installation



- 1 Strainer
- 2 Shutoff Valves
- 3 Pressure Reducer
- 4 Safety Valve
- 5 Pressure Gauge
- 6 Sense Line (option)

sense line connection 10 - 20 x DN behind the valve



Pressure reducer for liquids and gases up to 130 °C

## Technical Data

Connection	G 1/2 - 2 DN 15 - 50
Nominal Pressure	Inlet PN 16 Outlet PN 1
Inlet Pressure	up to 16 bar
Outlet Pressure	0.002 - 0.52 bar in 16 setting ranges
K <sub>vs</sub> -value	0.2 - 3.6 m <sup>3</sup> /h
Tightness	acc. VDI/VDE-guideline 2174 (leakage rate ≤ 0.05 % of K <sub>vs</sub> -values)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The DM 762 pressure reducing valve is a diaphragm-controlled spring-loaded proportional control valve for very small outlet pressures and large volumes.

This pressure reducer is manufactured from deep-drawn stainless steel featuring excellent corrosion resistance. The valve cone is fitted with a soft seal.

The outlet pressure to be controlled is balanced across the diaphragm by the force of the valve spring (set pressure). As the outlet pressure rises above the pressure set using the adjusting screw, the valve cone moves towards the seat and the volume of medium is reduced. As the outlet pressure drops the valve control orifice increases; when the pipeline is depressurised the valve is open. Rotating the adjusting screw clockwise increases the outlet pressure.

The DM 762 pressure reducer requires a pilot line (to be installed on-site).

We recommend that G 1 and G 1½ or DN 25 and DN 40 connections be used.

## STANDARD EQUIPMENT

- All stainless steel construction
- Pilot line connection

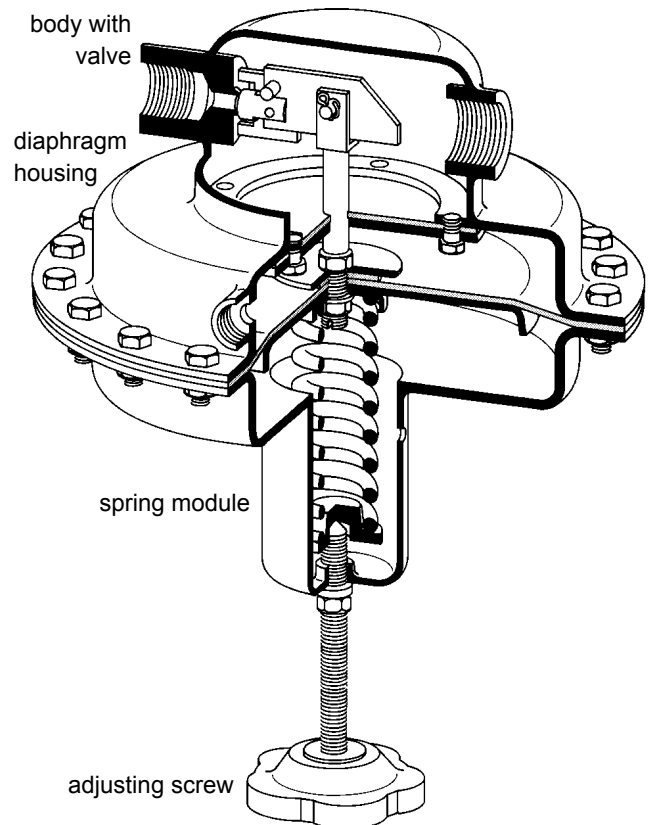
## OPTIONS

- Pressure gauge connection
- Oil and grease-free version for oxygen
- Clean gas version with special connections
- For toxic or hazardous media: sealed bonnet complete with leakage line connection (incl. sealed adjusting screw). Must be installed with a leakage line capable of draining leaking medium safely and without pressure
- Various diaphragm and seal materials suitable for your medium
- Special connections: Aseptic, ANSI or DIN flanges, welding spigots; other connections on request
- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure.

We reserve the right to alter technical specifications without notice.



K <sub>vs</sub> -values [m <sup>3</sup> /h] for all body sizes					
0.2	0.9	1.5	2.2	2.8	3.6

Setting Ranges [bar] diaphragm diameter 500 mm			
0.002 - 0.003	0.003 - 0.015	0.008 - 0.03	0.012 - 0.07

Setting Ranges [bar] diaphragm diameter 360 mm			
0.004 - 0.006	0.005 - 0.032	0.015 - 0.06	0.025 - 0.14

Setting Ranges [bar] diaphragm diameter 270 mm			
0.008 - 0.016	0.015 - 0.065	0.02 - 0.12	0.05 - 0.28

Setting Ranges [bar] diaphragm diameter 220 mm			
0.015 - 0.030	0.025 - 0.125	0.05 - 0.22	0.1 - 0.52

Permissible Reduction Ratio (max. p <sub>1</sub> /p <sub>2</sub> )						
diaphragm diameter	K <sub>vs</sub> -value [m <sup>3</sup> /h]					
	0.2	0.9	1.5	2.2	2.8	3.6
500	15000	7500	4500	2200	1500	1100
360	8000	4000	2500	1200	800	650
270	4000	2000	1250	600	400	320
220	2200	1100	660	320	210	170

# Pressure Control Valves

# DM 762

Pressure reducer for liquids and gases up to 130 °C



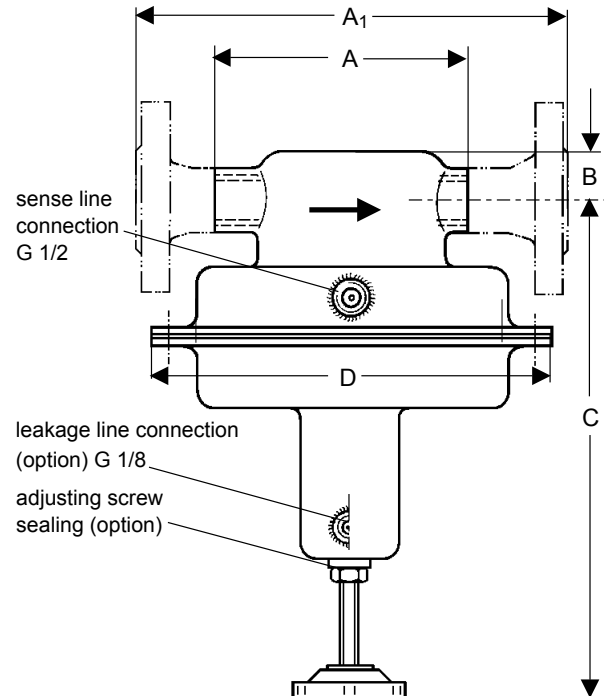
Materials		
Temperature	80 °C	130 °C
Body, Bonnet, Internals, Screws	CrNiMo-steel	CrNiMo-steel
Adjusting Screw	CrNiMo-steel M10 with handwheel made of Duroplast	
Spring	CrNi-steel	CrNi-steel
Valve Seal	FPM	FPM
Diaphragm	NBR	EPDM

Dimensions [mm]						
size	nominal diameter G					
	1/2	3/4	1	1 1/4	1 1/2	2
A	165	170	170	180	180	180
B	35	35	35	40	45	50
C	320	330	330	340	350	360
D	= diaphragm diameter, see table pressure ranges					

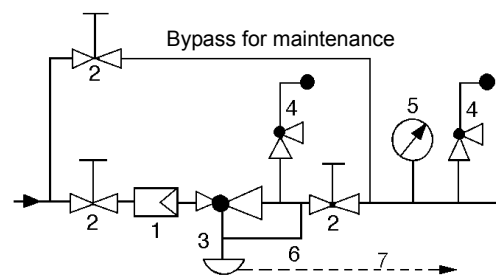
Dimensions [mm]						
size	nominal diameter DN					
	15	20	25	32	40	50
A <sub>1</sub>	240	240	250	250	260	260
B	35	35	35	40	45	50
C	320	330	330	340	350	360
D	= diaphragm diameter, see table pressure ranges					

Weights [kg]			
diaphragm-diameter	nominal diameter		
	G 1/2 - 2	DN 15 - 25	DN 32 - 50
500	13	15	17
360	12.5	14.5	16.5
270	8	10	12
220	6	8	10

Special designs on request.  
The pressure has always been indicated as overpressure.  
Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.



## Recommended Installation



- 1 Strainer
- 2 Shutoff Valves
- 3 Pressure Reducer
- 4 Safety Valve
- 5 Pressure Gauge
- 6 Sense Line 1/2
- 7 Leakage Line G 1/8 (option)

Sense line connection 10 - 20 x DN behind the valve



Pressure reducer for liquids and gases up to 130 °C

## Technical Data

Connection	G 1/2
Nominal Pressure	Inlet PN 16 Outlet PN 2.5
Inlet Pressure	up to 8 bar
Outlet Pressure	0.03 - 0.8 bar in 3 setting ranges
K <sub>vs</sub> -value	0.2 m <sup>3</sup> /h
Tightness	acc. VDI/VDE-guideline 2174 (leakage rate ≤ 0.05 % of K <sub>vs</sub> -value)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The DM 765 pressure reducing valve is a diaphragm-controlled spring-loaded proportional control valve for very small outlet pressures and small volumes.

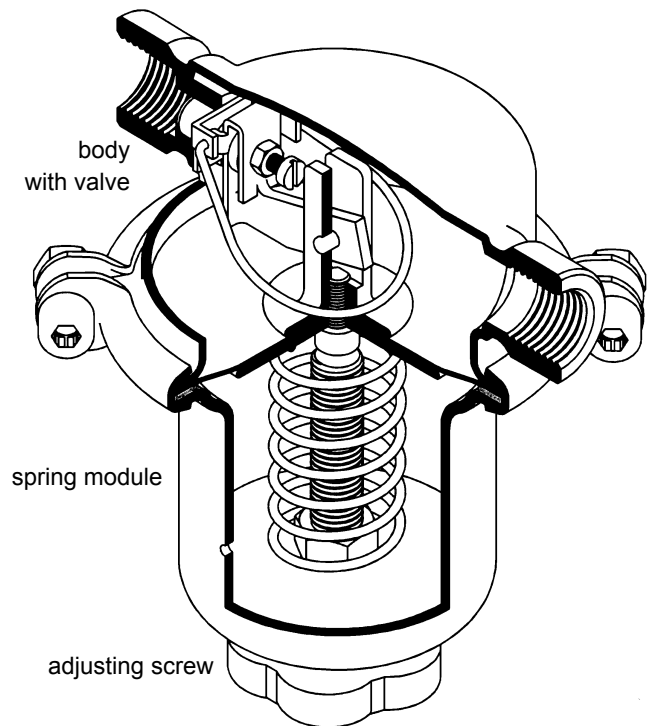
This pressure reducer is manufactured from deep-drawn stainless steel featuring excellent corrosion resistance. The valve cone is fitted with a soft seal.

The spring module comprising bonnet, spring, adjusting screw, diaphragm and internal components, is connected to the valve body only by means of a clamp ring and two bolts. Changing the diaphragm or the complete spring assembly for a different control pressure range is extremely simple and does not call for special tools. The same applies to servicing and maintenance.

The outlet pressure to be controlled is balanced across the diaphragm by the force of the valve spring (set pressure). As the outlet pressure rises above the pressure set using the adjusting screw, the valve cone moves towards the seat and the volume of medium is reduced. As the outlet pressure drops the valve control orifice increases; when the pipeline is depressurised the valve is open. Rotating the adjusting screw clockwise increases the outlet pressure.

For correct functioning the valve requires a minimum pressure drop of 1 bar (p<sub>1</sub> - p<sub>2</sub>).

If a larger valve is needed, please select DM 762 (K<sub>vs</sub> rating up to 3.6 m<sup>3</sup>/h).



K <sub>vs</sub> -values [m <sup>3</sup> /h] for all body sizes	
0.2	

Setting Ranges [bar]		
0.03 - 0.12	0.08 - 0.32	0.02 - 0.8

## STANDARD EQUIPMENT

- All stainless steel construction
- Quick-release body clamp ring

## OPTIONS

- Pressure gauge connection
- Oil and grease-free version for oxygen
- Clean gas version with special connections
- For toxic or hazardous media: sealed bonnet complete with leakage line connection (incl. sealed adjusting screw). Must be installed with a leakage line capable of draining leaking medium safely and without pressure
- Various diaphragm and seal materials suitable for your medium
- Special connections: Aseptic, ANSI or DIN flanges, welding spigots; other connections on request
- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure.

We reserve the right to alter technical specifications without notice.

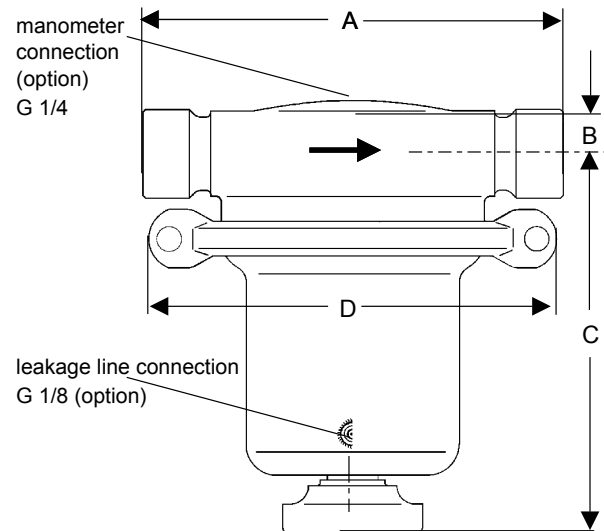
Pressure reducer for liquids and gases up to 130 °C



Materials		
Temperature	80 °C	130 °C
Body, Bonnet, Internals, Screws	CrNiMo-steel	CrNiMo-steel
Spring	CrNi-steel	CrNi-steel
Valve Seal	FPM	FPM
Diaphragm	NBR	EPDM optional FPM

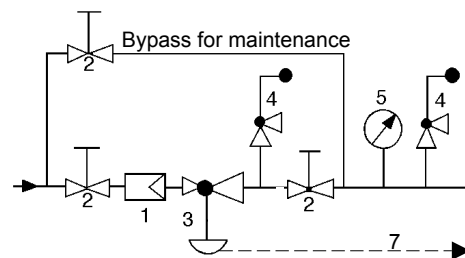
Dimensions [mm]		
size	nominal diameter	
	G 1/2	
A	140	
B	~20	
C	~130	
D	138	

Weights [kg]	
	1.5



Special designs on request.  
 The pressure has always been indicated as overpressure.  
 Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.

### Recommended Installation



- 1 Strainer
- 2 Shutoff Valves
- 3 Pressure Reducer
- 4 Safety Valve
- 5 Pressure Gauge
- 7 Leakage Line (option)

Pressure reducer pilot-controlled for liquids  
up to 130 °C

## Technical Data

Connection	DN 40 - 400
Nominal Pressure	Inlet PN 16 - 160 Outlet PN 10 - 63
Inlet Pressure	up to 160 bar, above $\Delta p$ 25 bar cone stellited
Outlet Pressure	1 - 40 bar in 4 setting ranges
$K_{vs}$ -value	20 - 900 m <sup>3</sup> /h
Tightness	acc. VDI/VDE-guideline 2174 (leakage rate $\leq 0.05$ % of $K_{vs}$ -value)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The RP 810 pressure reducing valve is a pilot-controlled control valve consisting of a main valve, a pilot valve complete with restrictor assembly and built-in strainer mounted on the cover of the main valve, non-return valve and restrictor valves.

The valve cone is fitted with a metallic seal.

When the pipeline is depressurised the main valve is kept closed by a preloaded spring.

When the outlet pressure is below the set pressure the pilot valve is kept open by its spring. The control medium can flow towards the valve outlet. Restrictor D1 produces a pressure drop causing the outlet pressure to be almost equal to the pilot pressure in the main valve piston. The inlet pressure overcomes the outlet pressure and closing force of the spring and opens the main valve.

As soon as the outlet pressure has reached the set pressure, the pilot valve restricts the flow. This causes the pilot pressure to rise and push the main valve piston into a controlling position. The restrictors D1 and D2 are used to optimise the control characteristics. The bypass fitted with a non-return valve ensures quick closing.

When the outlet pressure exceeds the set pressure the pilot valve closes. The pilot pressure is equal to the inlet pressure. The main valve closes as the piston diameter is greater than the valve seat. The spring also forces the valve to close.

The G ½ pulse lines must be installed on-site.

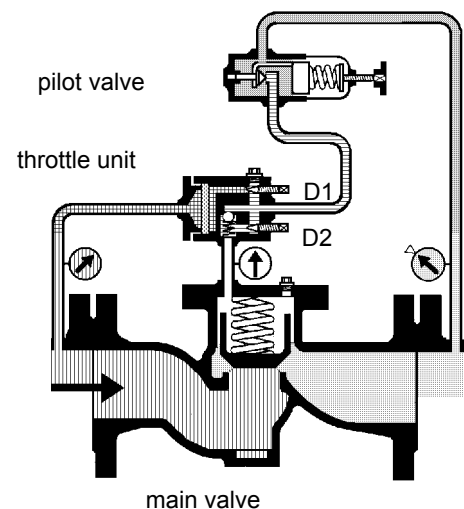
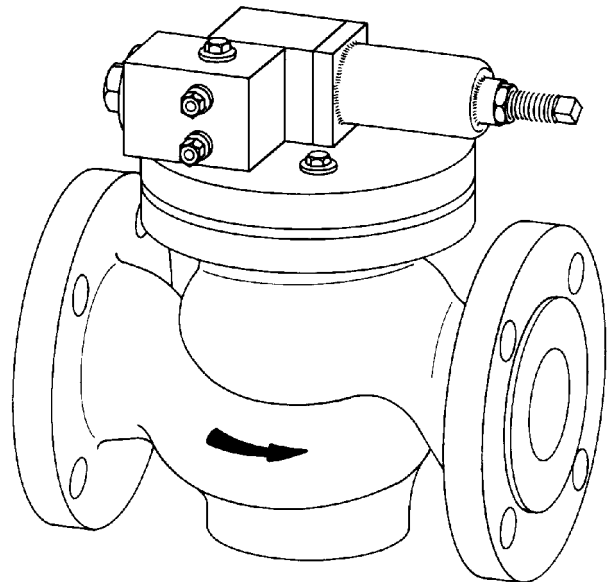
## OPTIONS

- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure.

We reserve the right to alter technical specifications without notice.



$K_{vs}$ -values [m <sup>3</sup> /h]							
nom. diam. DN	40	50	65	80	100	125	
$K_{vs}$ -value m <sup>3</sup> /h	20	32	50	60	70	150	

$K_{vs}$ -values [m <sup>3</sup> /h]							
nom. diam. DN	150	200	250	300	350	400	
$K_{vs}$ -value m <sup>3</sup> /h	250	350	500	600	700	900	

Setting Ranges [bar], Nominal Pressure			
1 - 5	4 - 12	10 - 20	15 - 40
PN 16-160/10	PN 16-160/16	PN 16-160/40	PN 16-160/63

The pressure has always been indicated as overpressure.

Pressure reducer pilot-controlled for liquids  
up to 130 °C

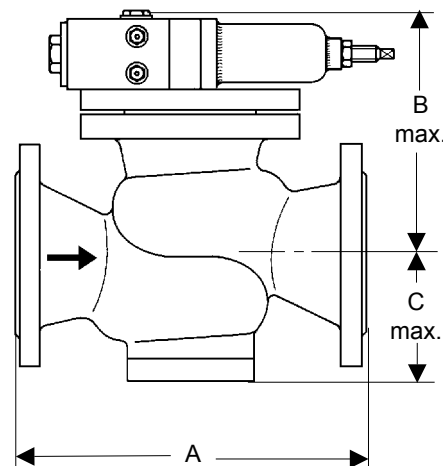
Materials			
Temperature	80 °C	130 °C	
Body	PN 16	spheroidal cast iron	spheroidal cast iron
	PN 160	cast steel	cast steel
	PN 16 - 160	CrNiMo-steel	CrNiMo-steel
Cover	steel optional CrNiMo-steel		
Internals	Cr-steel optional CrNi-steel or CrNiMo-steel		
Valve Seal	NBR	EPDM	
O-ring	NBR	EPDM	
Pilot Valve Throttle Unit	CrNiMo-steel	CrNiMo-steel	

Dimensions [mm]								
nom. press.	size	nominal diameter DN						
PN		40	50	65	80	100	125	
16	A	200	230	290	310	350	400	
40	A	200	230	290	310	350	400	
63 - 160	A	260	300	340	380	430		
all PN	B	200	220	250	260	280	290	
all PN	C	140	160	180	220	220	230	

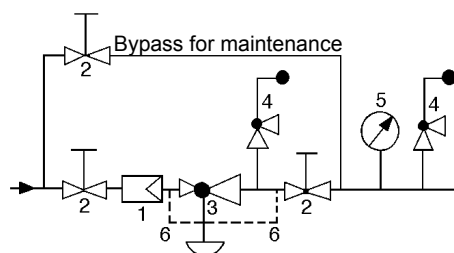
Dimensions [mm]								
nom. press.	size	nominal diameter DN						
PN		150	200	250	300	350	400	
16	A <sub>1</sub>	480	600	730	850	980	1100	
40	A <sub>1</sub>	480	600	730	850	980		
63 - 160	A <sub>1</sub>	550	650					
all PN	B	330	390	420	550	550	550	
all PN	C	240	270	290	350	350	410	

Weights [kg]												
nom. press.	nominal diameter DN											
PN	40	50	65	80	100	125	150	200	250	300	350	400
16	25	30	40	50	70	120	150	210	380	450	520	625
40	33	38	48	65	80	140	160	240	440	510	580	
63 - 160	40	45	55	80	110		165	290				

Special designs on request.  
The pressure has always been indicated as overpressure.  
Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.



### Recommended Installation



- 1 Strainer
- 2 Shutoff Valves
- 3 Pressure Reducer
- 4 Safety Valve
- 5 Pressure Gauge
- 6 Sense Line G 1/2

Pressure reducer, pilot-controlled, inline-valve for liquids up to 80 / 130 °C

## Technical Data

Connection	RP 814: DN 100 - 800 RP 815: DN 100 - 400
Nominal Pressure	PN 16 - 25
Inlet Pressure	up to 25 bar
Outlet Pressure	1 - 20 bar in 3 setting ranges
Differential Pressure	min. 2 bar
$K_{VS}$ -value	60 - 2100 m <sup>3</sup> /h
Tightness	acc. VDI/VDE-guideline 2174 (leakage rate $\leq 0.05\%$ of $K_{VS}$ -value)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The RP 814 and RP 815 pressure reducing valves are pilot-controlled control valves of tubular design consisting of a main valve, a pilot valve connected with the main valve via pipes and a restrictor assembly with built-in strainer.

The valve cone is fitted with a metallic seal.

When the pipeline is depressurised the main valve is kept closed by a preloaded spring. To open the valve a pressure difference ( $p_1 - p_2$ ) of at least 2 bar is required.

When the outlet pressure is below the set pressure the pilot valve is kept open by its spring. The control medium can flow towards the valve outlet. Restrictor D1 produces a pressure drop causing the outlet pressure to be almost equal to the pilot pressure in the main valve. The inlet pressure overcomes the outlet pressure and closing force of the spring and opens the main valve.

As soon as the outlet pressure has reached the set pressure, the pilot valve restricts the flow. This causes the pilot pressure to rise and push the main valve piston into a controlling position in which opening and closing forces are in balance. When the outlet pressure exceeds the set pressure the pilot valve closes. The pilot pressure is equal to the inlet pressure. The forces acting on the piston are in equilibrium and the main valve is kept closed by its spring.

The restrictors are used to optimise the control characteristics. The bypass line around D2 which is fitted with a non-return valve, ensures quick closing.

The valve is piped internally. The G ½ pulse lines must be installed on-site.

The valve can be fitted with electrical limit switches.

The RP 814 and RP 815 pressure reducers differ from each other by their size and  $K_{VS}$  ratings.

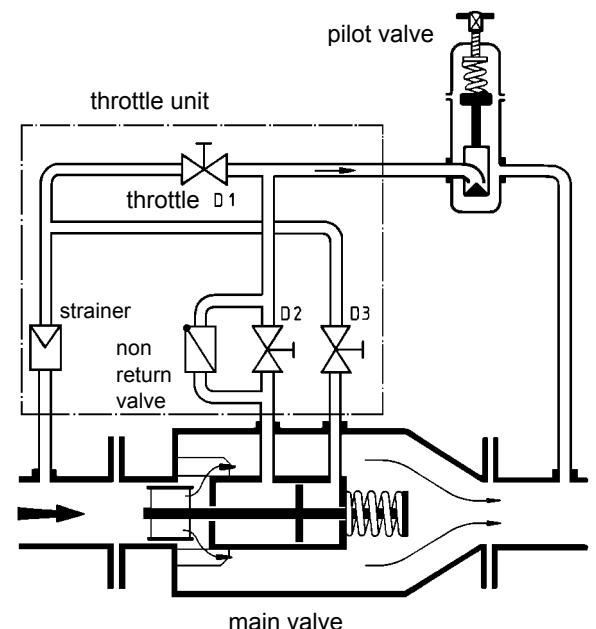
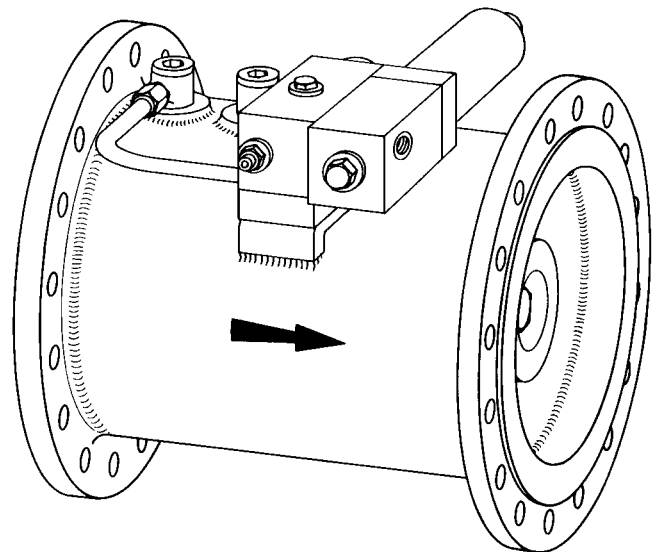
## OPTIONS

- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure.

We reserve the right to alter technical specifications without notice.



K <sub>VS</sub> -values [m <sup>3</sup> /h]						
	nominal diameter DN					
type	100	125	150	200	250	300
814	60	100	120	180	250	400
815	180	200	250	400	600	800

K <sub>VS</sub> -values [m <sup>3</sup> /h]							
	nominal diameter DN						
type	350	400	450	500	600	700	800
814	600	800	1100	1200	1800	2000	2100
815	1200	1800					

Setting Ranges [bar], Nominal Pressure		
1 - 5	4 - 12	10 - 20
PN 16 - 25/10	PN 16 - 25/25	PN 16 - 25/40

The pressure has always been indicated as overpressure.

# Pressure Control Valves

# RP 814, 815

Pressure reducer, pilot-controlled, inline-valve  
for liquids up to 80 / 130 °C

Materials		
Temperature	80 °C	130 °C
Body	steel optional CrNiMo-steel welded	
Internals	CrNiMo-steel	CrNiMo-steel
Valve Seal	CrNiMo-steel	CrNiMo-steel
O-ring	NBR	EPDM
Pilot Valve		
Sense Lines	CrNiMo-steel	CrNiMo-steel
Throttle Unit		

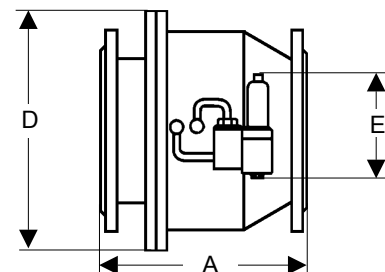
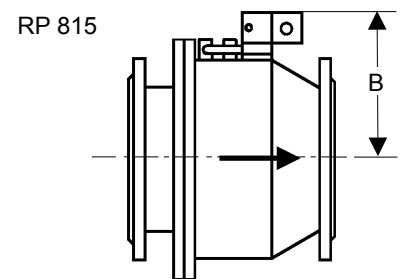
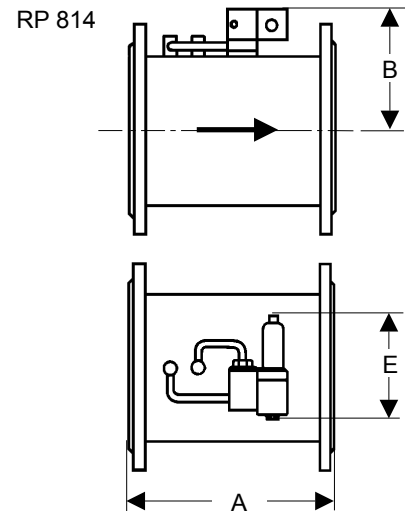
Dimensions [mm] RP 814													
size	nominal diameter DN												
	100	125	150	200	250	300	350	400	450	500	600	700	800
A	300	325	350	400	450	500	550	600	650	700	800	900	1000
B max.	200	200	220	240	270	300	320	350	380	400	450	500	550
E max.	270	270	270	270	270	270	270	270	270	270	270	270	270

Weights [kg] RP 814													
PN	nominal diameter DN												
	100	125	150	200	250	300	350	400	450	500	600	700	800
16	60	60	65	75	120	150	190	240	300	360	420	480	540
25	75	75	80	90	135	165	220	280	360	400	460	580	720

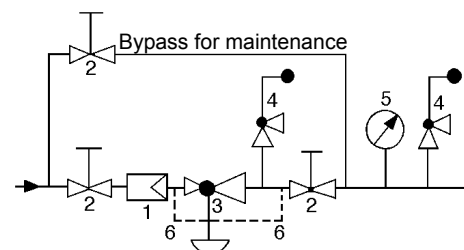
Dimensions [mm] RP 815									
size	nominal diameter DN								
	100	125	150	200	250	300	350	400	
A	350	400	480	600	730	850	980	1100	
B max.	220	240	270	300	320	350	400	450	
ø D max.	360	400	425	485	555	620	730	845	
E max.	270	270	270	270	270	270	270	270	

Weights [kg] RP 815									
PN	nominal diameter DN								
	100	125	150	200	250	300	350	400	
16	85	110	125	170	220	270	340	400	
25	90	115	135	180	240	300	370	430	

Special designs on request.  
The pressure has always been indicated as overpressure.  
Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.



### Recommended Installation



- 1 Strainer
- 2 Shutoff Valves
- 3 Pressure Reducer
- 4 Safety Valve
- 5 Pressure Gauge
- 6 Sense Line G 1/2

Pressure reducer, pilot-controlled, sandwich design,  
for liquids and gases up to 80 / 130 °C

## Technical Data

Connection	DN 65 - 150
Nominal Pressure	Inlet PN 10 - 40 Outlet PN 16
Inlet Pressure	up to 40 bar
Outlet Pressure	0.02 - 10 bar in 7 setting ranges
K <sub>vs</sub> -value	58 - 331 m <sup>3</sup> /h
Tightness	acc. VDI/VDE-guideline 2174 (leakage rate ≤ 0.05 % of K <sub>vs</sub> -value)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The RP 818 pressure reducing valve is a pilot-controlled control valve designed for mounting between flanges, consisting of a main valve, a pilot valve connected with the main valve via pipelines, a restrictor assembly and a strainer.

The valve closing mechanism consists of two slotted discs which slide and seal against each other.

When the pipeline is depressurised the main valve is kept closed by a preloaded spring.

When the outlet pressure is below the set pressure the pilot valve is open. Restrictor D1 produces a pressure drop causing the outlet pressure to be almost equal to the pilot pressure in the main valve spring chamber. The inlet pressure overcomes the pilot pressure and closing force of the spring and opens the main valve.

As soon as the outlet pressure has reached the set pressure, the pilot valve restricts the flow. This causes the pilot pressure to rise and push the main valve diaphragm into a controlling position in which opening and closing forces are in balance.

When the outlet pressure exceeds the set pressure the pilot valve closes. The pilot pressure is equal to the inlet pressure. The forces acting on the diaphragm are in equilibrium and the main valve is kept closed by its spring.

The valve is piped internally. The G ½ and E015 pulse lines must be installed on-site.

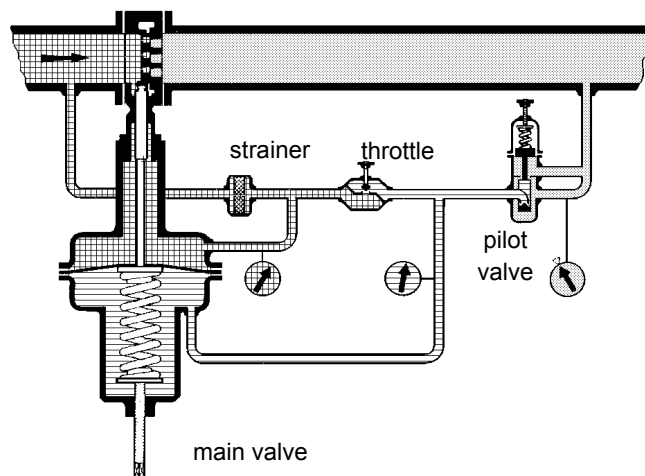
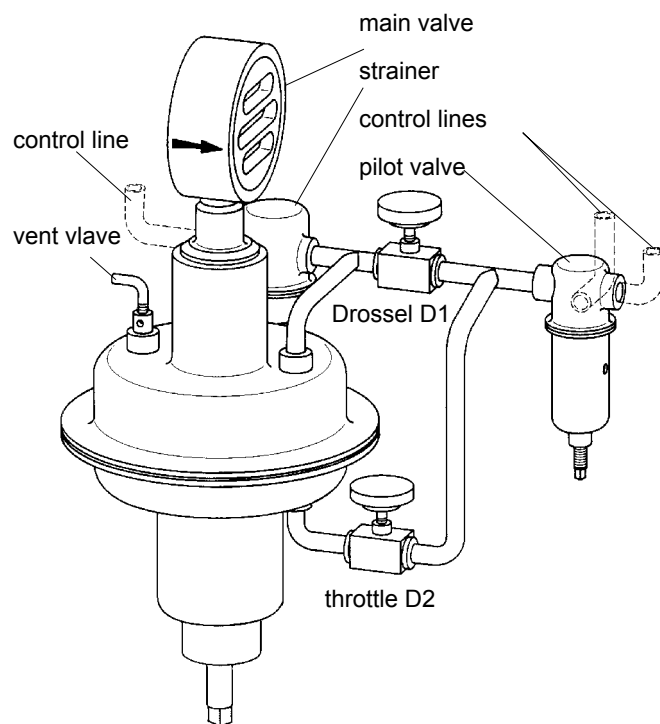
## OPTIONS

- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure.

We reserve the right to alter technical specifications without notice.



K <sub>vs</sub> -values / max. ΔP						
nom. dia.	DN	65	80	100	125	150
K <sub>vs</sub> -value	m <sup>3</sup> /h	58	89	146	241	331
max.Δp	bar	32	32	32	18	12

Setting Ranges [bar]						
0.02 - 0.1	0.1 - 0.3	0.2 - 0.6	0.5 - 1.2	1 - 2.5	2 - 5	4 - 10

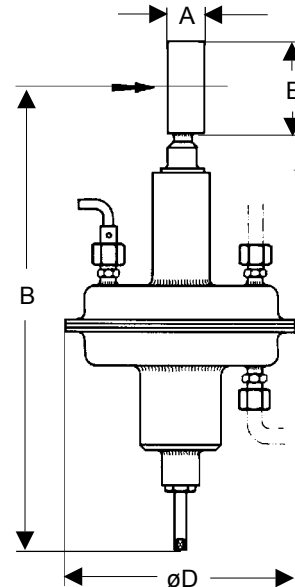
Pressure reducer, pilot-controlled, sandwich design, for liquids and gases up to 80 / 130 °C

Materials		
Temperature	80 °C	130 °C
Body	steel optional CrNiMo-steel welded	
Internals	CrNiMo-steel	CrNiMo-steel
Valve Seal	CrNiMo-steel	CrNiMo-steel
O-ring	NBR	EPDM
Pilot Valve		
Sense Lines	CrNiMo-steel	CrNiMo-steel
Throttle Unit		

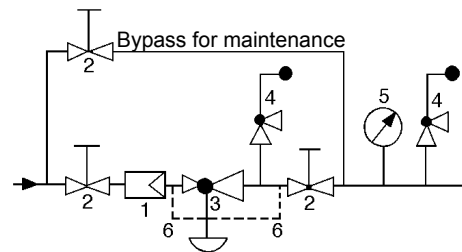
Dimensions [mm]					
size mm	nominal diameter DN				
	65	80	100	125	150
A	46	46	52	56	56
B	800	815	825	840	860
D max.	220	220	220	220	220
øE max.	127	142	164	194	219

Weights [kg]					
nominal diameter DN					
65	80	100	125	150	
27	28	29	31	33	

Special designs on request.  
The pressure has always been indicated as overpressure.  
Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.



### Recommended Installation



- 1 Strainer
- 2 Shutoff Valves
- 3 Pressure Reducer
- 4 Safety Valve
- 5 Pressure Gauge
- 6 Sense Line G 1/2

Pressure reducer pilot-controlled for water up to 70 °C

## Technical Data

Connection	DN 50 - 600
Nominal Pressure	PN 10 - 16
Inlet Pressure	up to 16 bar
Outlet Pressure	1.4 - 12 bar (standard) 0.1 - 2.0 bar (special)
$K_{vs}$ -Value	40 - 2550 m <sup>3</sup> /h
Tightness	acc. to VDI/VDE-guideline 2174 (leakage rate $\leq$ 0.05 % of the $K_{vs}$ -value)

## Description

Medium-controlled pressure reducers are simple control valves offering accurate control while being easy to install and maintain. They control the pressure downstream of the valve without requiring pneumatic or electrical control elements.

The DM EU115 pressure reducing valve is a pilot-controlled control valve consisting of main valve with position indicator, control unit, pilot valve, pressure gauge stop valves and connecting pipes. The main valve cone is fitted with a soft seal. This valve which has been specially developed for drinking water applications, features an electrostatically deposited coating on internal and external surfaces and meets the KTW recommendation of the German Ministry for Health. When the pipeline is depressurised or inlet and outlet pressures are equal, the main valve is kept closed by its spring.

When the outlet pressure falls below the set pressure the control medium can flow towards the valve outlet via the open pilot valve. A restrictor in the control unit produces a pressure drop upstream of the diaphragm causing the inlet pressure to overcome the control pressure and spring force and open the main valve.

As soon as the outlet pressure has reached the set pressure, the pilot valve restricts the flow. This causes the pilot pressure to rise and push the main valve cone into a controlling position.

When the outlet pressure exceeds the set pressure the pilot valve closes. The pilot pressure continues to rise and the main valve also closes.

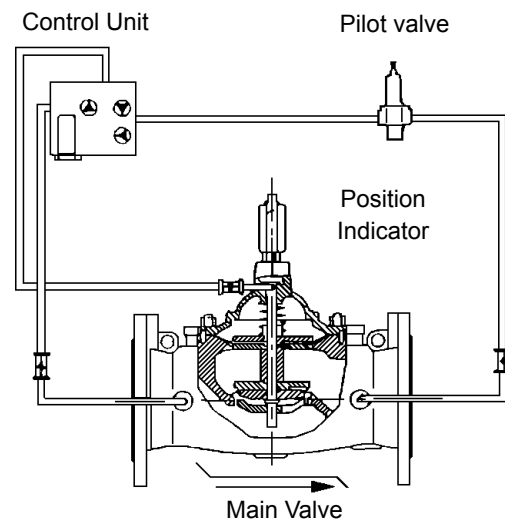
The control unit contains adjustable restrictors which allow the control characteristics of the pressure reducer to be matched to the system (closing, opening and response speeds).

The pressure reducer is completely piped. It does not require any additional pilot lines.

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure.

We reserve the right to alter technical specifications without notice.



$K_{vs}$ -Values [m <sup>3</sup> /h]		50	65	80	100	125	150	200
Nom. Diam.	DN	50	65	80	100	125	150	200
$K_{vs}$ -value	m <sup>3</sup> /h	40	43	47	115	170	175	360

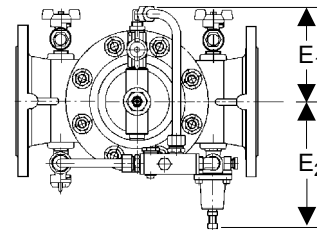
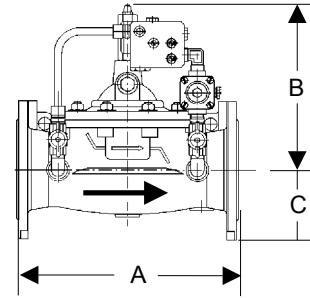
$K_{vs}$ -Values [m <sup>3</sup> /h]		250	300	350	400	500	600
Nom. Diam.	DN	250	300	350	400	500	600
$K_{vs}$ -value	m <sup>3</sup> /h	560	1240	1290	1780	2490	2550

Pressure reducer pilot-controlled for water  
up to 70 °C

Materials - Main Valve	
Temperature	70 °C
Body	spheroidal cast iron Epoxy-coated*
Cover	spheroidal cast iron Epoxy-coated*
Cap Bearing	bronze, self-lubricating
Internals	1.4401, 1.4305
Diaphragm-	
discs	DN 50 - 150 steel Epoxy-coated*
	ab DN 200 cast steel Epoxy-coated*
Spring	1.6900
Valve Seal	NBR Quad-ring
O-ring	Viton
Diaphragm	NBR-nylon-reinforced*

Materials - Pilot Circuit	
Control Unit	1.4305
Pilot Valve	bronze, 1.4305 / 1.4401, brass NBR diaphragm
Strainer	1.4404
Non-Return Valve	Hastoform, spring 1.4401
Pilot Line	1.4305
Pipe Unions	brass, nickel plated
Fittings	1.4301, 1.4401
Stop Valves	brass, nickel plated
Gauge Stop Valves	brass, nickel plated

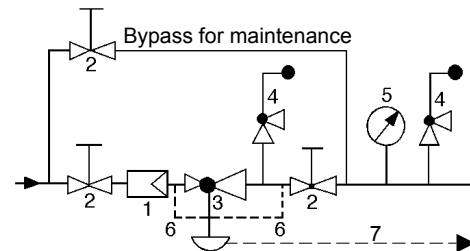
\* in accordance with KTW-recommendation



Dimensions [mm] and Weights [kg]								
nom. press.		nominal diameter DN						
PN	size	50	65	80	100	125	150	200
10/16	A	230	290	310	350	400	480	600
10/16	B	225	225	225	260	310	310	365
10/16	C	85	95	100	110	125	145	170
10/16	E <sub>1</sub>	160	170	175	190	200	210	235
10/16	E <sub>2</sub>	130	130	130	140	145	155	180
10/16	kg	20	23	25	36	50	61	110

Dimensions [mm] and Weights [kg]							
nom. press.		nominal diameter DN					
PN	size	250	300	350	400	500	600
10/16	A <sub>1</sub>	730	850	980	1100	1250	1450
10/16	B	475	570	570	680	720	820
10	C	200	230	255	285	335	390
16		200	230	260	290	360	420
10/16	E <sub>1</sub>	280	305	330	355	405	455
10/16	E <sub>2</sub>	220	245	270	295	360	420
10/16	kg	225	390	485	580	820	1180

### Recommended Installation



- 1 Strainer
- 2 Shutoff Valves
- 3 Pressure Reducer
- 4 Safety Valve
- 5 Pressure Gauge
- 6 Sense Line (option)
- 7 Leakage Line (option)

sense line connection 10 - 20 x DN behind the valve

Special designs on request.

The pressure has always been indicated as overpressure.

Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.

Pressure reducer weighted lever-type  
for liquids, gases and steam up to 280 °C

## Technical Data

Connection	DN 50 - 400
Nominal Pressure	PN 16 - 40
Inlet Pressure	up to 8 bar
Outlet Pressure	0.5 - 10bar
K <sub>VS</sub> -Value	32 - 1200 m <sup>3</sup> /h
Tightness	acc. VDI/VDE-guideline 2174

## Description

Pressure reducing valves control the pressure downstream of the valve.

The DM 3 and DM 4 pressure reducers are medium-controlled weighted-lever valves for medium to large volumes. These valves require no auxiliary energy. Thanks to their integral control characteristics they are very accurate. The time reponse is set by means of an oil-filled damper.

DM 3 is a single seat, DM 4 a twin seat valve; both are piston-controlled. The valves can be supplied with soft or hard seals. The valve seat leakage meets the VDI/VDE Guideline 2174.

When the pipeline is depressurised the valve cone is kept in open position by the weighted lever. As the outlet pressure rises a control piston is pressurised via a pilot line, lifting the lever and moving the valve cone towards the „closed“ position. During normal operation the opening force of the weight and the closing force of the piston balance each other and the pressure reducer operates continually. The outlet pressure is kept constant irrespective of inlet pressure and flow volume. The control pressure is set by changing the weight on the lever.

The maximum outlet pressure must not exceed 1.5 times the set pressure, unless specified otherwise.

In the case of toxic or hazardous media a leakage line must be installed to the control unit capable of draining leaking medium safely and without pressure if the control element should become defective.

The pressure reducers DM 3 and DM 4 require a pilot line (to be installed on-site).

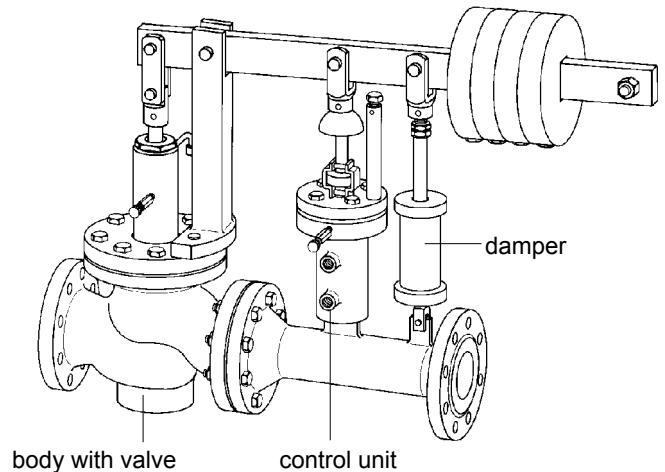
## OPTIONS

- Various seal materials suitable for your medium
- Special connections: Aseptic, ANSI or DIN flanges, welding spigots; other connections on request
- Special versions on request

Operating instructions, Know How and Safety instructions must be observed.

The pressure has always been indicated as overpressure.

We reserve the right to alter technical specifications without notice.



Kvs-values [m <sup>3</sup> /h]					
type	nominal diameter DN				
	50	65	80	100	125
3 (E)	32	50	75	100	140
4 (E)	40	65	100	150	180

Suffix E = enlarged outlet

Kvs-values [m <sup>3</sup> /h]						
type	nominal diameter DN					
	150	200	250	300	350	400
3 (E)	200	300	450	550	650	800
4 (E)	250	400	550	700	750	1200

Suffix E = enlarged outlet

Pressure reducer weighted lever-type  
for liquids, gases and steam up to 280 °C

Materials		
Temperature	80 °C	
Nominal Pressure	PN 16	PN 40
Operating Pressure	max. 16 bar	max. 40 bar
Body	GG-20	GS-C25
Tubular Section	steel welded	
Internals	Cr-Stahl / CrNiMo-Stahl	
Valve Seal	NBR / FPM / EPDM / PTFE Cr-steel / CrNiMo-steel	
O-ring	NBR / FPM / EPDM / PTFE	

Materials		
Temperature	280 °C	
Nominal Pressure	PN 16	PN 40
Operating Pressure	max. 13 bar	max. 28 bar
Body	GG-20	GS-C25
Tubular Section	steel welded	
Internals	Cr-steel / CrNiMo-steel	
Valve Seal	Cr-steel / CrNiMo-steel	
O-ring	FXM / FFKM	

Dimensions [mm]						
size	nominal diameter DN					
	50	65	80	100	125	150
A	580	630	670	750	850	980
B	120		200		260	
C*	650		850		900	
D*	750		1150		1500	

Dimensions [mm]					
size	nominal diameter DN				
	200	250	300	350	400
A	1200	1430	1650	1800	2100
B	260		350		420
C*	900			1100	
D*	1500			2000	

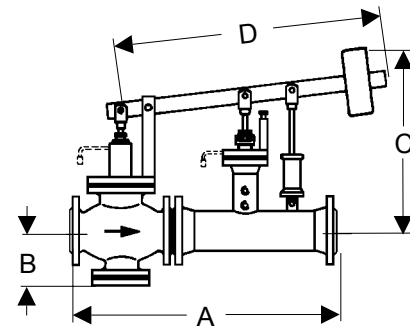
Dimensions [mm] (enlarged outlet)				
size	nominal diameter DN			
	50/100	65/125	80/150	100/200
A	650	770	850	1000
B	120		180	230
C*	650		850	950
D*	750		1150	1300

Dimensions [mm] (enlarged outlet)			
size	nominal diameter DN		
	125/250	150/300	200/400
A	1200	1500	1650
B	230	260	280
C*	950	1130	1200
D*	1300	1700	1800

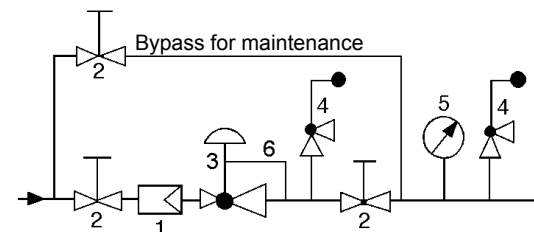
\*) Dimensions C and D are reference dimensions.  
The weighted lever (dim. D) may project beyond the valve outlet flange.

Special designs on request.  
The pressure has always been indicated as overpressure.  
Mankenberg reserves the right, to alter or improve the designs or specifications of the products described herein without notice.

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FIRMLY IN CONTROL**



### Recommended Installation



sense line connection: 10 - 20 x nominal diameter behind the pressure reducer.

- |                           |                    |
|---------------------------|--------------------|
| 1 Strainer *              | 4 Safety valves *  |
| 2 Shut-off valves         | 5 Pressure gauge * |
| 3 Pressure reducing valve | 6 Sense line G 1/2 |

\* use MANKENBERG-products