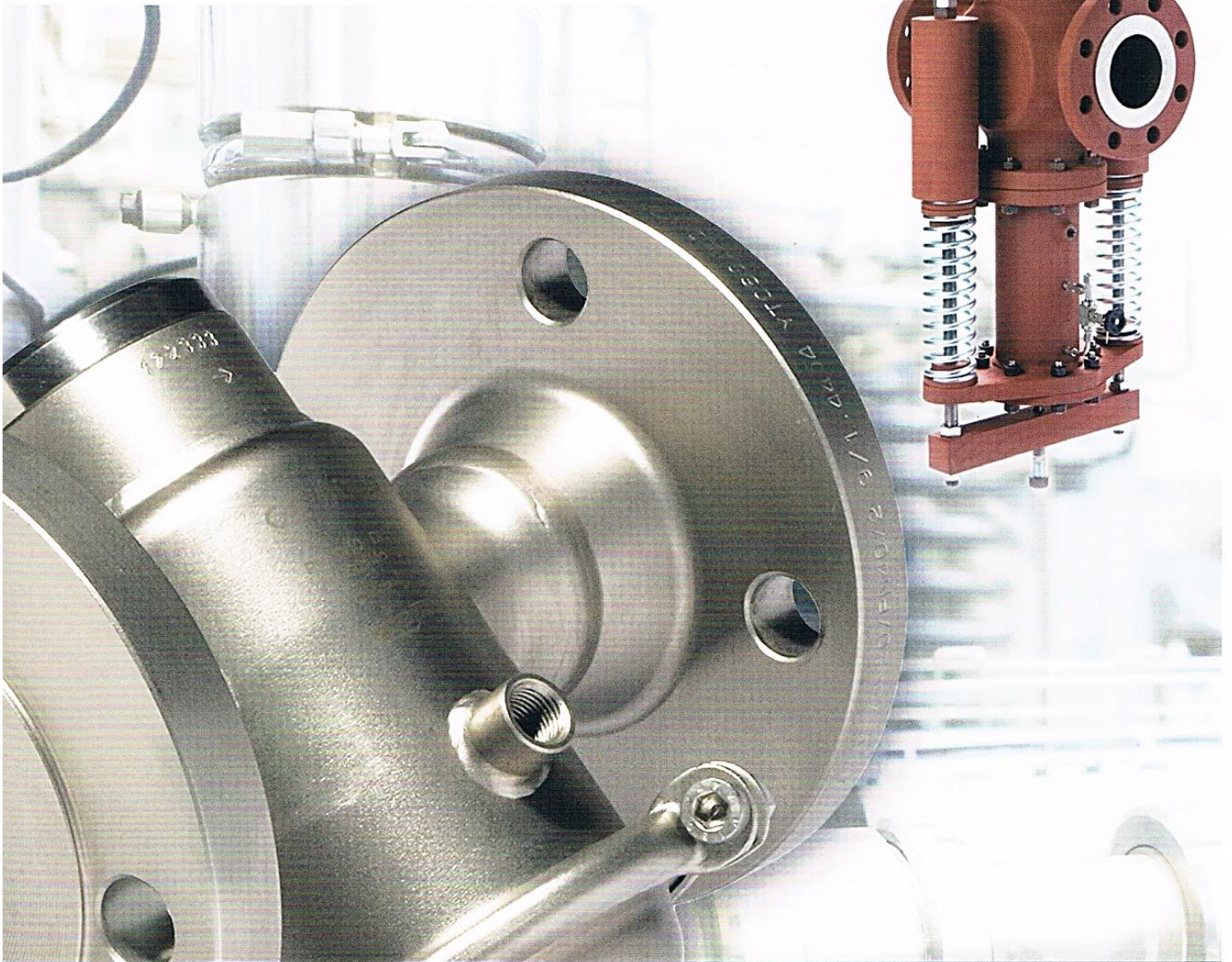


**MANKENBERG**

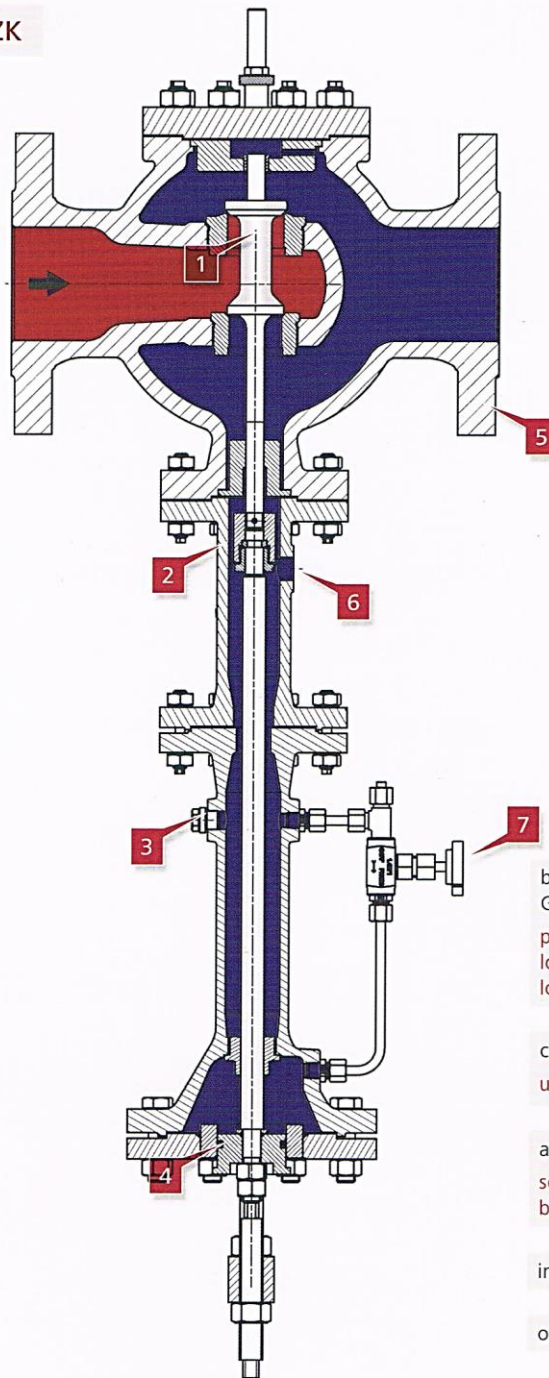
Industriearmaturen  
Industrial Valves



Your Partner and Specialist in the Field  
of Steam Applications

# Pressure Reducing Valve

DM 401ZK



double seat cone  
highest flow rates 1

spacer  
highest temperature resistance 2

water seal  
optimal elastomer protection  
in the event of high  
temperatures 3

piston control  
also suitable for high pressures 4

body of GS-C 25 or  
GS 17 CrMo 55  
particularly sturdy construction,  
long maintenance intervals,  
long operational lifespan 5

control line connection  
utmost regulating accuracy 6

attenuation (option)  
setting of the reaction  
behaviour 7

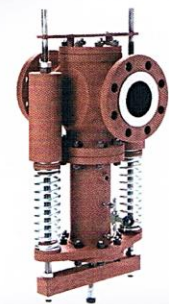
inlet pressure

outlet pressure

## Pressure Reducing Valve for High Flow Rates at High Pressures DM 401

double-seat straight-way valve for high pressure and high temperature, high flow rates | body made of GS-C 25, GS 17 CrMo 55 | usable as soot blower with damping | especially sturdy, offers long maintenance intervals, a long operational lifespan

DN	25 - 250	PN	16 - 100
$P_2$	1.5 - 32 bar	T	500 °C
		$K_{Vs}$	6 - 360 m <sup>3</sup> /h



## Extract from the Variety of our Valves for Steam Applications

### Pressure Reducing Valve for Hygiene Applications | Ultrapure Media DM 152

single-seat, angled design suitable for small and medium flow rates | completely made of deep-drawn CrNiMo-steel (316L) – surface finish possible up to  $Ra \leq 0.25 \mu\text{m}$  | virtually pocket-free, is corrosion-resistant, lightweight and compact | elastomers as per FDA and USP Class VI, hygienic class HE5 | reduced preheating time for CIP/SIP procedures, less energy needed | adjusting screw as a function of display, easy-to-maintain owing to the clamp system | Tri-Clamp® connections or DIN/ISO clamp connections | can be actuated pneumatically, spring cap available with leakage line connection and adjusting screw seal

DN	15 - 50	PN	2.5 - 10
		T	180 °C
$p_2$	0.3 - 5 bar	$K_{VS}$	2 - 7 m <sup>3</sup> /h



### Weight-loaded Pressure Reducing Valve DM 3, 4

balanced straight-way valve for medium and very high flow rates | body made of GGG-40 or GS-C 25 | high precision thanks to integral control behaviour | response time can be adjusted by damping

DN	50 - 400	PN	16 - 40
		T	280 °C
$p_2$	0.5 - 10 bar	$K_{VS}$	32 - 1,200 m <sup>3</sup> /h



### Pressure Reducing Valve for Hygiene Applications | Ultrapure Media DM 462

double-seat angled valve for large flow rate | completely made of deep-drawn CrNiMo-steel (316L), surface finish possible up to  $Ra \leq 0.25 \mu\text{m}$  | virtually pocket-free, corrosion-resistant, lightweight and compact | elastomers as per FDA and USP Class VI, hygienic class HE5 | reduced preheating time for CIP/SIP procedures, less energy needed | adjusting screw as a function of display, easy-to-maintain owing to the clamp system | Tri-Clamp® connections or DIN/ISO clamp connections, any other available on request | spring cap available with leakage line connection and adjusting screw seal

DN	25 - 80	PN	2.5 - 10
		T	180 °C
$p_2$	0.3 - 5 bar	$K_{VS}$	4 - 70 m <sup>3</sup> /h



### Pressure Reducing Valve for Hygiene Applications | Ultrapure Media DM 462V

double-seat straight-way or angled valve for medium flow rate | completely made of deep-drawn CrNiMo-steel (316L), surface finish possible up to  $Ra \leq 0.25 \mu\text{m}$  | virtually pocket-free, corrosion-resistant, lightweight and compact | elastomers as per FDA and USP Class VI, hygienic class HE5 | reduced preheating time for CIP/SIP procedures, less energy needed | adjusting screw as a function of display, easy-to-maintain owing to the clamp system | Tri-Clamp® connections or DIN/ISO clamp connections, PTFE protective foil for diaphragms | can be actuated pneumatically | spring cap available with leakage line connection and adjusting screw seal

DN	25	PN	2.5 - 16
		T	180 °C
$p_2$	0.8 - 5 bar	$K_{VS}$	4 m <sup>3</sup> /h



### Pressure Reducing Valve for small Flow Rates DM 505Z

single-seat straight-way valve | inlet pressure up to 250 bar, also controls millibar ranges | completely made of deep-drawn CrNiMo-steel (316L) – surface finish of the body  $Ra < 1.6 \mu\text{m}$  | adjusting screw as a function of display, easy-to-maintain owing to the clamp system | corrosion-resistant, very lightweight and compact | long operational lifespan, manageable installation, various designs and connection types | can be actuated pneumatically, spring cap available with leakage line connection and adjusting screw seal

DN	15 - 25	PN	250
G	1/2	T	200 °C
$p_2$	0.005 - 12 bar	$K_{VS}$	0.2 - 1.4 m <sup>3</sup> /h



### Pressure Reducing Valve for High Pressures

DM 510 – 518

single-seat straight-way valve for small to medium flow rates | highest pressures, up to 315 bar inlet pressure, high temperatures, also controls millibar ranges | body made of C-steel, CrNiMo-steel, special materials such as Duplex, Superduplex, Hastelloy® or titanium available | NACE-compatible | spring cap available with leakage line connection and adjusting screw seal | hardfaced valve cone and seat available for high pressure drops

DN	15 - 50	PN	16 - 315
G	3/8 - 2	T	400 °C
p <sub>2</sub>	2 - 160 bar	K <sub>VS</sub>	0.2 - 5.5 m <sup>3</sup> /h



### Standard Cast Pressure Reducing Valve

DM 603, 604

single-seat straight-way valve for high flow rates with balanced cone | highest temperatures up to 350 °C respectively 250 °C | body made of GS-C25 or CrNiMo-steel | steel / stainless steel, stainless-steel-diaphragm body, very precise thanks to a large number of different control ranges

DN	15 - 150	PN	16 - 40
		T	350 °C / 250 °C
p <sub>2</sub>	0.02 - 10 bar	K <sub>VS</sub>	4 - 160 m <sup>3</sup> /h



### Valve for High Pressures

DM 620 - 628

single-seat straight-way valve for medium and high flow rates with balanced cone | highest pressures, up to 315 bar inlet pressure | body made of C-steel, CrNiMo-steel, special materials such as Duplex, Superduplex, Hastelloy® or titanium are available | NACE-compatible | spring cap available with leakage line connection and adjusting screw seal | hard-faced valve cone and seat available for high pressure drops | allows for the solution of most difficult procedural requirements with only one device

DN	15 - 50	PN	16 - 315
G	1/2 - 2	T	200 °C
p <sub>2</sub>	2 - 160 bar	K <sub>VS</sub>	0.4 - 10 m <sup>3</sup> /h



### Universal Pressure Reducing Valve made of Stainless Steel DM 652

single-seat straight-way valve with balanced cone for high flow rates | completely made of deep-drawn CrNiMo-steel (316L) – surface finish of the body Ra ≤ 1.6 µm | adjusting screw as a function of display, easy-to-maintain owing to the clamp system | corrosion-resistant, very lightweight and compact | highest regulating accuracy thanks to a multitude of control ranges | various variants of convincing quality for your individual application | various connections and special versions available | can be actuated pneumatically, spring cap available with leakage line connection and adjusting screw seal

DN	15 - 50	PN	16 - 40
G	1/2 - 2	T	190 °C
p <sub>2</sub>	0.02 - 12 bar	K <sub>VS</sub>	5 - 22 m <sup>3</sup> /h



### Valve for Small Flow Rates at High Pressures

DM 701

double-seat straight-way valve for high pressures and temperatures, small flow rates | body made of GS-C 25, C 22 N, 10 CrMo 9-10 | especially sturdy with long service intervals, long operational lifespan | optionally: integrated extension on the outlet side

DN	15 - 50	PN	315
		T	500 °C
p <sub>2</sub>	0.5 - 40 bar	K <sub>VS</sub>	0.2 - 5.5 m <sup>3</sup> /h



## Weight-loaded Backpressure Regulator

UV 1.6, 2.6

balanced straight-way valve for medium up to very large flow rates | body made of GGG-40 or GS-C 25 | high precision thanks to integral control behaviour | response time can be adjusted by damping

DN	50 - 400	PN	16 - 40
$p_1$	0.5 - 10 bar	T	280 °C
		$K_{VS}$	32 - 1,200 m <sup>3</sup> /h



## Backpressure Regulator for Small and Medium Flow Rates

UV 3.2

single-seat straight-way valve for temperatures up to 300 °C | body made of GS-C 25 or CrNiMo-steel | diaphragm-, piston- or bellows-controlled

DN	15 - 50	PN	16 - 40
$p_1$	2 - 40 bar	T	300 °C
		$K_{VS}$	0.2 - 5.5 m <sup>3</sup> /h



fig. similar

## Compact Backpressure Regulator for Small Flow Rates

UV 3.5Z

single-seat straight-way valve, also controls millibar ranges | completely made of deep-drawn CrNiMo-steel (316L) – surface finish of the body  $Ra \leq 1.6 \mu m$  | adjusting screw as a function of display, easy-to-maintain owing to the clamp system | corrosion-resistant, very lightweight and compact | long operational lifespan, manageable installation, various designs and connection types | can be actuated pneumatically, spring cap available with leakage line connection and adjusting screw seal

DN	15 - 25	PN	1 - 25
G	1/2	T	200 °C
$p_1$	0.005 - 12 bar	$K_{VS}$	0.2 - 1.4 m <sup>3</sup> /h



## Standard Cast Backpressure Regulator

UV 4.1

single-seat straight-way valve with balanced cone for high flow rates | body made of GS-C 25 or CrNiMo-steel | can be actuated pneumatically, spring cap available with leakage line connection and adjusting screw seal

DN	15 - 150	PN	16 - 40
$p_1$	0.02 - 10 bar	T	200 °C
		$K_{VS}$	4 - 160 m <sup>3</sup> /h



## Backpressure Regulator for High Pressures

UV 8.2

single-seat straight-way or angle valve for small and medium flow rates | highest pressures, high temperatures | body made of C-steel, CrNiMo-steel, special material such as Duplex, Superduplex, Hastelloy® or titanium | NACE-compatible | spring cap available with leakage line connection and adjusting screw seal | hard-faced valve cone and seat available for high pressure drops

DN	15 - 50	PN	6 - 100
G	3/8 - 2	T	400 °C
$p_1$	2 - 100 bar	$K_{VS}$	0.2 - 5.5 m <sup>3</sup> /h



## Extract from the Variety of our Valves for Steam Applications

### Full-lift threaded Safety Valve

SV 29V

spring-loaded full lift safety valve | body made of 1.4104, 1.4404

		PN	40 - 250
G	$\frac{3}{4}$ A x 1 / 1 A x 1 1/2	T	200 °C
p <sub>1</sub>	0.3 - 200 bar		



### Full-lift Safety Valve

SV 60

spring-loaded, with open spring cap for steam / body made of GG-25, GS-C 25, CrNiMo steel

DN	25/40 - 150/250	PN	16 - 40
		T	200 °C
p <sub>1</sub>	0.1 - 40 bar		



### Steam Trap for Small Flow Rates

KA 2

float-controlled, soft seal valve closure, fully developed lever mechanism, with manual bleeding for steam | completely made of deep-drawn CrNiMo-steel (316L) – surface finish of the body Ra ≤ 1.6 µm | easy-to-maintain owing to the clamp system | very lightweight and compact, corrosion-resistant to aggressive media, especially gastight | easy installation, long operational lifespan | available in special materials, such as seawater-resistant stainless steel, titanium, Hastelloy® etc.

		PN	16
G	$\frac{3}{4}$ x $\frac{1}{2}$ A	T	190 °C
p	0 - 12 bar	Q	350 l/h



### Steam Trap for Larger Flow Rates

KA 2X

metallic seal, for steam with manual bleeding | completely made of deep-drawn CrNiMo-steel (316L) – surface finish of the body Ra ≤ 1.6 µm | easy-to-maintain owing to the clamp system | very lightweight, corrosion-resistant to aggressive media | easy installation, long operational lifespan | available in special materials, such as seawater-resistant stainless steel, titanium, Hastelloy® etc.

DN	25 - $\frac{3}{4}$ A	PN	16
G	1 x $\frac{3}{4}$ A	T	190 °C
p <sub>2</sub>	0 - 13 bar	Q	1,200 l/h



### Steam Trap with Thermal Bleeding

KA 3

with thermal bleeding, can be polished externally for clean and ultraclean rooms | completely made of deep-drawn CrNiMo steel – surface finish of the body Ra ≤ 1.6 µm | very lightweight and compact, corrosion resistant, optimal surface characteristics | easy installation, easy and cost-effective maintenance owing to the clamp system, long operational lifespan

DN	15 - 25	PN	16
G	$\frac{1}{2}$ - 1	T	190 °C
p	0 - 12 bar	Q	2,000 l/h



## High-performance and Sturdy Steam Trap

KA Niagara

with manual or thermal bleeding or fixed continuous bleeding | body made of GGG-40, GS-C 25, inner parts of CrNiMo steel | solid, well-proven, sturdy, for very high temperatures | extended service intervals, extremely long operational lifespan, reliable, well-known as a high-performance valve

DN	15 - 150	PN	16 - 40
		T	400 °C
p	0 - 40 bar	Q	193 m <sup>3</sup> /h



## Stainless Steel Filter

FI 6.06

especially suitable for sterile steam, filter insert of sintered steel or pleated stainless steel mesh, filter fineness 5, 20 or 25 µm | completely made of deep-drawn CrNiMo steel (316L) – surface finish of the body Ra ≤ 1.6 µm | easy-to-maintain owing to the clamp system | corrosion-resistant, very lightweight and compact | long operational lifespan, manageable installation – highest effectiveness with compact design

DN	15 - 50	PN	16
G	1/2 - 2	T	190 °C



## Strainer for Very High Pressures

SF 3.00

strainer made of forged steel in block design, low pressure drop, different sieve finenesses, clear mesh width 0.25–2.5 mm | body made of C-steel, CrNiMo-steel, special material such as Duplex, Superduplex, Hastelloy® or titanium available | optionally with manometer connection

DN	15 - 100	PN	160 - 500
		T	550 °C



## Liquid Separator

AS 2

spin separator of straight design | completely made of deep-drawn CrNiMo-steel (316L) – surface finish of the body Ra ≤ 1.6 µm | easy-to-maintain owing to the clamp system | corrosion-resistant, very lightweight and compact | long operational lifespan, manageable installation – highest effectiveness with compact design

DN	25 + 40	PN	16
G	1 + 1 1/2	T	190 °C
p	0 - 13 bar		



## Customised Solutions Your operating data determine the solution.

Customer-specific solutions are individually designed valves for our customers' special requirements. Mankenberg checks with every enquiry the customer-specific technical operating data and subsequently quotes the technical solution. If the operating data require solutions which cannot be realised with Mankenberg standard valves, our engineers will be happy to develop special solutions in accordance with our customer's enquiry. This may lead to either slightly modified valve type series or to a complex system. Discover our strength also in this case and send your enquiry.



example

## Mankenberg Valves for Steam Applications in Action

### Discharge of Condensate arising from the drying Air in a Wood-processing Company

Processed wood must have the suitable moisture for its intended use. Therefore fresh wood is mechanically dried prior to subsequent processing. In a forestry company in China the wood is treated by using the convection drying method. For this purpose heating appliances emit heat to the air which is led to the wood. The warm air absorbs the moisture escaping from the wood and discharges the steam formed during this process.

A rotary dryer extracts the moisture from the exhaust air that is saturated with steam. Consequently the warm air can be refed to the drying circuit. Mankenberg's steam trap of the NIAGARA type DN 65 purposefully drains the formed condensate of abt. 2 - 5 tons. The operating temperature of the steam amounts to approximately 215°C, the working pressure is 8 - 15 bar.



### Pressure Regulation of Superheated Steam for cleaning Boilers with Sootblowers in a coal-fired Power Plant

For process-related reasons the boilers in fossil-fuel power plants are always heavily soiled. Any kind of heat exchangers or reaction surfaces in residue incineration plants, in waste incineration, in steel industries or in many sectors of the petrochemical industry have to be regularly cleaned from soot, ashes or other accretions in order to keep the performance of the plant within the limit values. In coal-fired power plants sootblowing by means of high pressure superheated steam is a standard procedure. The boilers on the exhaust gas side are cleaned once a day. For this purpose sootblower lances are installed on two sides in seven layers which during the blowing procedure are pushed into the boiler in sets thus aiming the steam directly towards the stains. Two self-actuated pressure reducing valves of the Mankenberg DM 401 type per boiler supply heated steam of a temperature of 450 to 470 °C to the sootblowers. The pressure reducing valves DM 401 reduce the inlet pressure of 48 bar to an outlet pressure of 28 bar at a flow rate of 8,000 and/or 15,000 kg/h, respectively.





## Pressure Regulation of Cleaning Steam in a Filling Plant

In the foodstuffs and pharmaceuticals industries as well as in hospitals or laundries steam generating systems are required to supply different kinds of steam for plant cleaning. If, for example, cleaning of the entire plant is required after sterilisation liquids have been aseptically filled, clean steam in the secondary circuit is brought to the necessary pressure level by means of Mankenberg's pressure reducing valve DM 652. The valve made of deep-drawn stainless steel with DN 32 aseptic flanges and PTFE elastomers meets the severe requirements of the pharmaceutical industry or is also used in the foodstuffs industry.

The customary steam flow rates amount to 300 kg/h at a temperature of max. 190 °C. In this case the pressure reducing valve DM 652 reduces the inlet pressure of abt. 5 bar to a constant outlet pressure of 3 bar.

