

Technische Dokumentation Technical Documentation

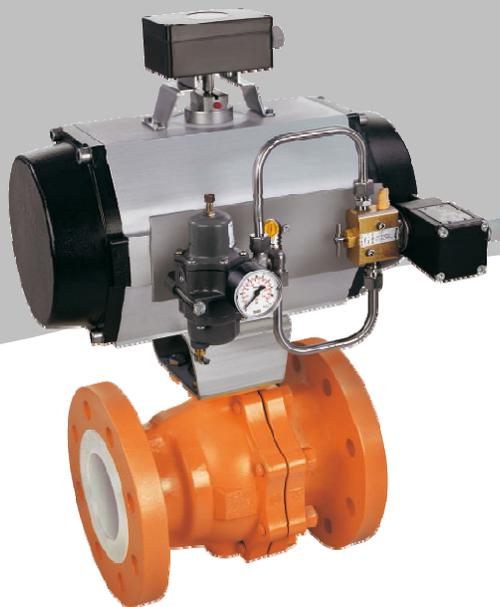


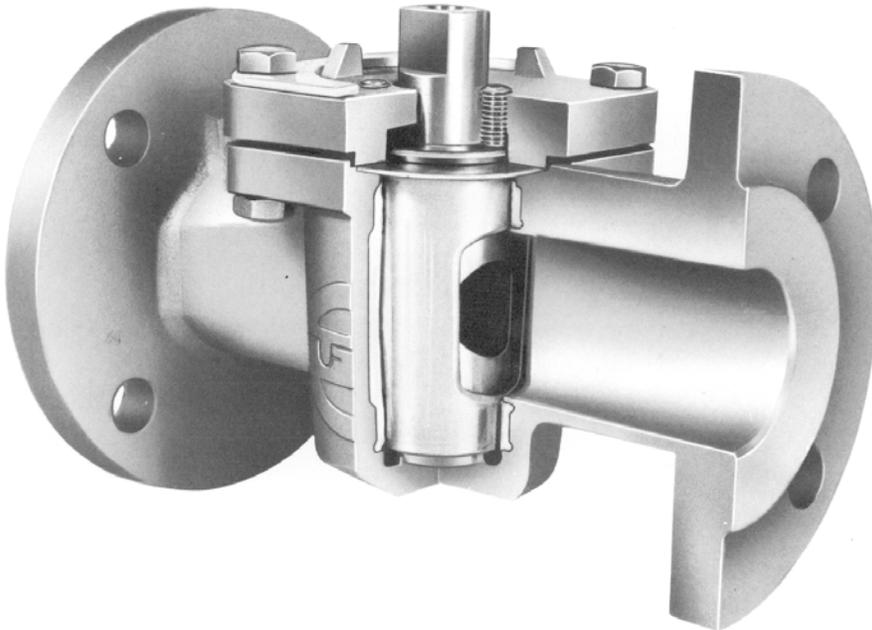


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for Control Valves opening when signal increases



XOMOX Control Valve Type 527 with Sleeve and Flow Cage



For the XOMOX Control Valve the proven sealing principle – tight shut – off by means of a Teflon® sleeve locked in the body – has been taken over from the standard through way valve.

It has been adapted a flow cage fixed on the body bottom to prevent rotation. The orifice of the flow cage is machined to provide the flow rate and the characterization desired.

By turning the plug, each required valve between 0 (0°) and the maximum Kv value (90°) can be reached. For changing the Kv value, the flow cage only has to be replaced.

Kv values available see below.



Components and Material Availability

Available materials for control valves:

Type 527:

Carbon steel EN10213-2 (1.0619, GS-C25),
 A216-WCB, A352-LCB
 Stainless steel z.B. 1.4408, 1.4552, 1.4306 according to EN10213-4,
 CF8M, CF8C, CF8, CF3M, CF3
 Argonit® 1 (1.4361) und Argonit® 2, CN7M (A 20)
 A494-M-35-1 ((Alloy 400, Monel), A494-CZ100 (Alloy 200,
 Nickel), A494-N7M (Alloy B2), A494-CW2M (Alloy C4),
 B367-C2 (Titanium), Stellite

Combinations of different materials for body, plug and
 flow cage are available.

Body and plug are of the same material unless otherwise
 requested.

Sleeves and seals are pure Teflon® (no regenerate).

Sleeves Teflon® glass fiber reinforced available on request.

Other plastic seals for special applications on request.

All Control Valves are available in FIRESAFE design, with
 Electrostatic eliminator or free of oil and grease.

After final assembly every valve is seat and shell tested
 according to the required standards.

Valves up to DN 100/NPS 4 are equipped as a standard with
 handles, DN 125/NPS 5 and larger with manual gear
 operators. Other operating systems on request.

Available Flange Standards:

Type 527 DIN	PN 10-40 (EN 1092-1)
	PN 63-100 (EN 1092-1)
Type 567, 5367, 5667 ASME	Class 150, 300, 600 (ASME B16.5)
Type 5867 JIS	JIS (JIS B2210)
British Standard	BS 1560
Screwed Ends:	Whitworth R (DIN 2999-1)
NPT (ASME B1.20.1)	
Weld Ends:	EN 12760 (SW)
EN 12627 (BW)	

Temperature Range:	173 K to 553 K (-100° C to +280° C)
Suitable for vacuum services	Range $1.33 \cdot 10^3$ to $1.33 \cdot 10^2$ bar

Strength calculations against internal pressure:

The stress-technical investigation of the pressure retaining bodyparts
 was accomplished according to DIN 3840 (#cEn12516).

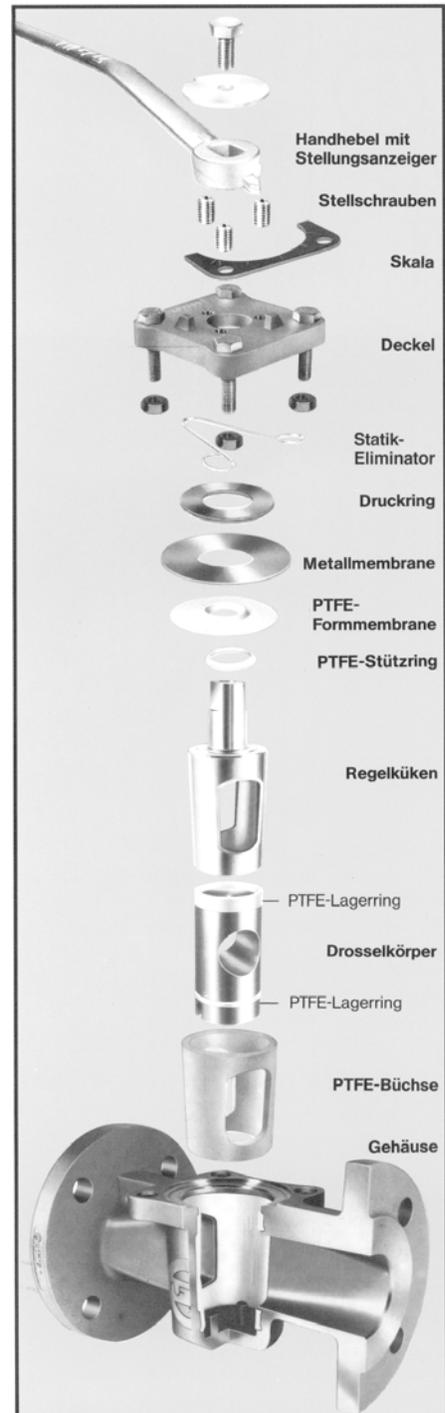
Available Dimensions

DN 25 - 300 resp. NPS 1 - 12

Other dimensions on request.

For dimensions and weights see technical data sheet: tdb_127_gb

Other materials and types on request.



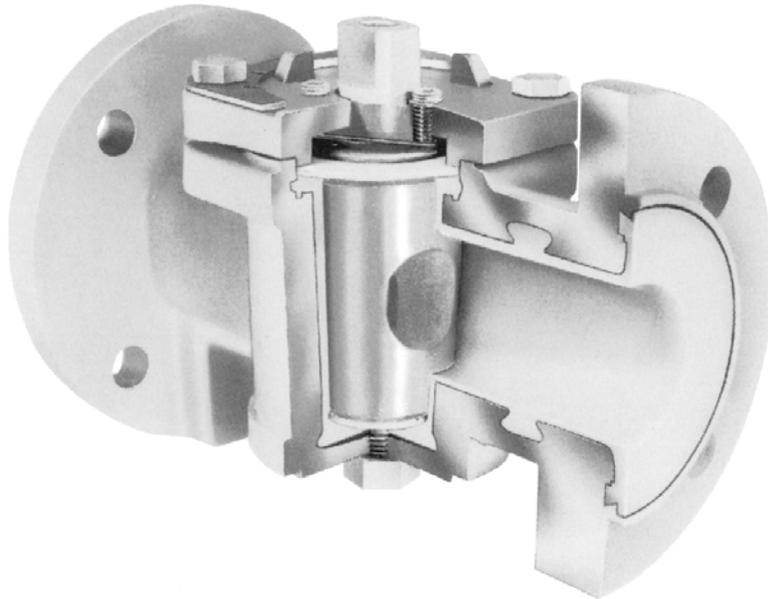
XOMOX®

Control Valve Type 5121 Fully Lined (PFA)

High chemical resistance. Low adhesion.

The XOMOX lined control valve is identical in its design to the lined standard valve;
Only the required maximum flow characteristics will be realized in the plug.

For possible K_{vs} - values see below.



PFA-fluorated Ethylene-Propylene is a fluorocarbon resin similar to the well-known Teflon® (tetrafluorethylene).

The PFA material offer excellent chemical resistance to adhesion of foreign materials. XOMOX uses PFA as a lining material because of its excellent chemical resistance and impermeability to liquid and gases. The liners produced by XOMOX are non-porous. Non-porosity is examined by means of a spark test. XOMOX plastic lined valves are ideal for application where other materials have insufficient chemical resistance or are not economical.

Components and Material Availability

Available materials for control valves:

type 5121 fully lined:

Body : Ductile Iron EN-JS1049
(0.7043, GGG 40.3)

Liner :PFA

Plug : Ductile Iron EN-JS1049
(0.7043, GGG 40.3) PFA lined

Other Body materials:

A352-LCB, 1.4408 nach EN10213-4

Valves up to DN 100 / NPS 4 are equipped as a standard with handles

DN 150/NPS 6 and larger with manual gear operators.

Other operating systems on request.

Available Flange Standards:

Type 5121 DIN PN 10-16 (EN1092-1)

Type 5021 CLASS 150 (ASME B16.5)

Type 5821 JIS 10 K (JIS B2210)

Temperature Range:

233 K to 453 K (-40°C to +180°C) for PFA

233 K to 413 K (-40°C to +140°C) for PVDF

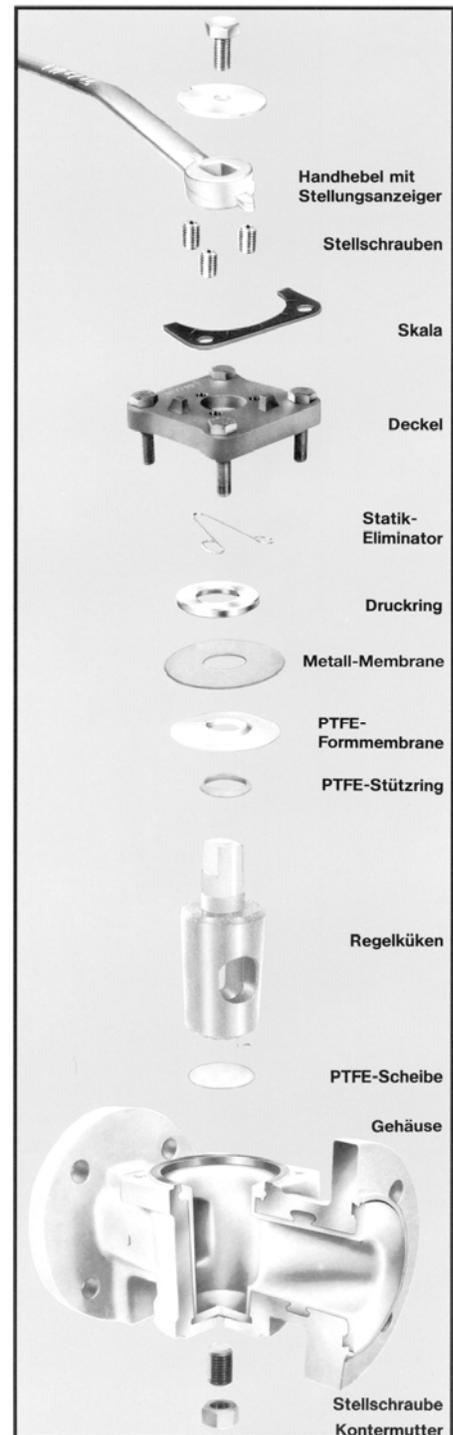
Suitable for vacuum service

Operating pressure max. 10bar

Available Diameters:

DN 15 – 250 / NPS ½ - 10

For dimensions and weights see technical data sheet tdb_r201_gb.



Kvs-Values, Resistance Coefficient of XOMOX-Control Valves

For XOMOX-Control Valves the advantages of large quantity runs – among others.- are realized. This is a consequence of the following features – that set the XOMOX Control Valve apart from common control valves.

- Small reduction of flow diameter
- No deflection of flow when valve is open

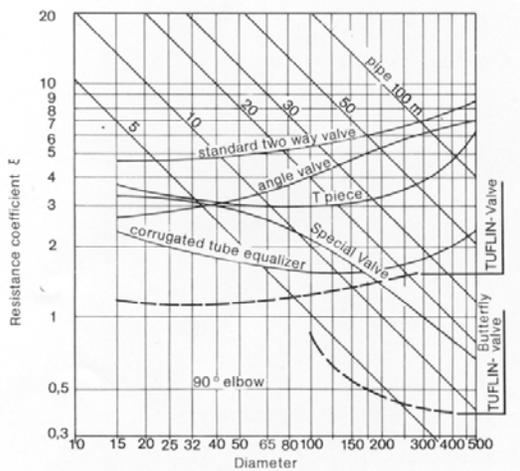
Kvs-values depend on the selected orifice of flow cage and can be easily changed in line by replacing the flow cage. For standard Kvs-values availability see table below.

Standard-k_{vs} values:

DN	0,2	0,25	0,315	0,4	0,5	0,63	0,8	1,0	1,25	1,6	2,0	2,5	3,15	4,0	5,0	6,3	8,0	10	16	20	25	30	48	63	100	125	160	R5
15		+						○+									+	○+										
20		+						○+									+	○+										
25								○+											○+	○+								
32								○+											○+	○+								
40																			○+	○+								
50																			○+	○+								
65																			○+	○+								
DN	1,0	1,25	1,6	2,0	2,5	3,15	4,0	5,0	6,3	8,0	10	16	25	40	63	100	160	220	375	400	630	800	1000	1200	1600	1800	2600	R10
80														○+		○+		○+										
100																				○+								
125																				+								
150																				○+								
200																					+							
250																						○+						
300																										+		

preferable types: + = type 527 ○ = type 5121 ◻ = not available ○+ = k_{vs} max.

For type 5121, k_{vs} values less than 1,0 are not available.



The resistance coefficients of XOMOX control butterfly valves referring to the pipe diameter with max. Kvs-values (in open position) are between 1,2 and 1,9. Compared with other plant equipment, the XOMOX valves have a small coefficient and low pressure drops.

Mechanical Characteristics

Stroke, Hysteresis, Overstroke, Rotation Speed, Tight Shutoff, Other

Stroke: max. 90° C turn

Hysteresis:

max. 1% of nominal stroke for double – acting pneumatic actuator.

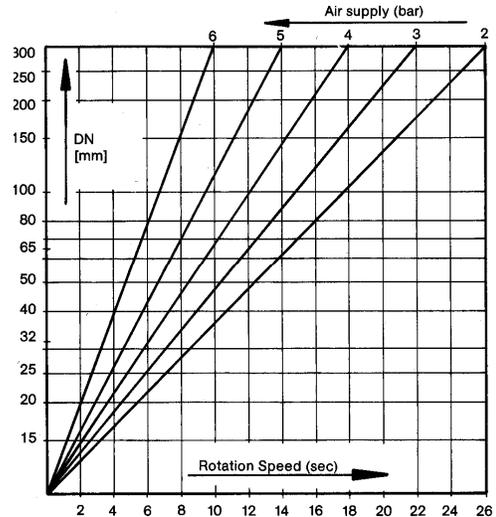
Max. 3% of nominal stroke for single - acting pneumatic actuator.

Rotation Speed:

When using vane – type actuators, low rotation speeds are obtained for XOMOX control valves due to few parts to be moved.

From the diagram on the margin you can see directive values of the operating speeds depending on the available air supply.

On request, these values can be decreased considerably by using special equipments (booster).



Reversal delay:
rotation

Approx. 4% of operating speed is necessary for the reversal of

Overstroke:

Max. 0.5 % of nominal stroke

Repeatability:

Max. deviation of stroke position 0.15 %

Spot hysteresis:

Approx. 0.6 % of signal range (0.2 – 1 bar) is necessary to cause rotation

Seat tightness:

Tight shutoff in zero – position suitable for vacuum service

Admissible differential pressure:

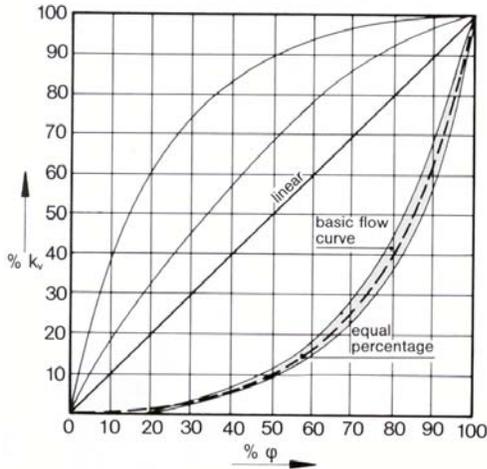
Max. pressure drop = nominal pressure

Flow direction:

Optimal, without any influence on operating power

Examination of the mentioned values will be performed according to VDI/VDE 2173/2174 standards. For selection of actuator size it is not necessary to consider fluid pressure of flow direction.

Flow Data Characteristics, Stroke Rate



Standard Flow Characteristics Linear and equal percentage

The flow characteristic of XOMOX Process Control Valves is between linear and equal percentage.

Due to the control valve construction principle, each possible characteristics can be obtained depending on the cam design. Therefore, a supplementary modification or replacement of the cam (also during operation) for change of the flow curve is possible.

Control Valves with linear or equal percentage characteristics are supplied as a standard, others on request. The appropriate data are determined in the XOMOX flow testing equipment following VDI/VDE 2173 Standard.

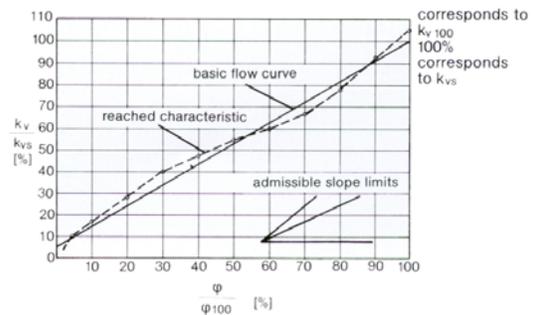
Standard-Rangeability: 25 and above

Normally the theoretic rangeabilities (K_{vs}/K_{v0}) 25 or 50 are the basis for the design of XOMOX control valves.

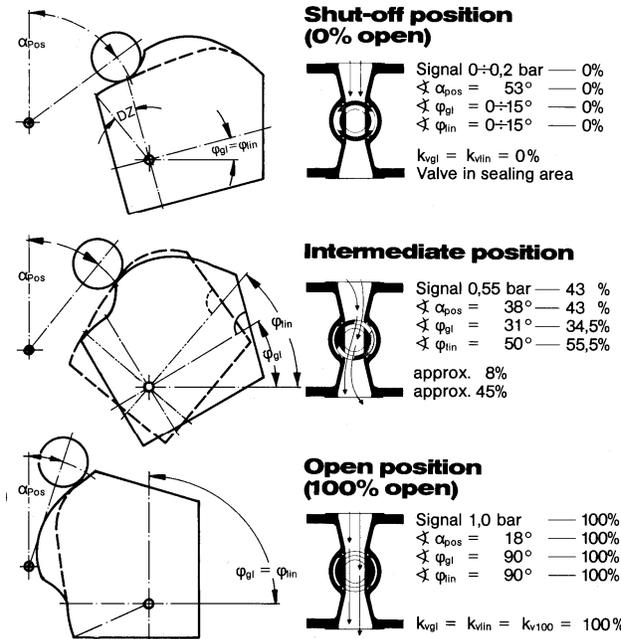
For standard control valves, rangeabilities (K_{vs}/K_{vr}) between 23 and 35 have been reached.

On special request rangeabilities up to 50 can be reached.

The requirements of VDI/VDE 2173 standard regarding characteristic slope and rangeability will be met in any case.



Motion Process at Flow Characteristics – linear and equal percentage - for Control Valves opening when signal increases



Cam design:

- equal perc. (gl.)
- linear (lin.)

α_{pos} Angular stroke of positioner axis :

- gl. : ϕ_{gl} Angular stroke of plug or actuator axis at flow curves:
- lin. : ϕ_{lin}

∩ Rotation point of positioner axis

Rotation point of plug or actuator axis

The difference between basic flow curve and required characteristic (linear or equal percentage) has been realized by means of the cam design. By means of the positioner, the actual stroke (valve angular stroke ϕ) corresponds to that commanded by the input signal. The sealing area (DZ) will be passed by all control valves automatically, since all cams have a constant radius in this range so that there will be no motion transmission to the positioner axis.

The condition for the equal percentage characteristic (equal stroke changes lead to equal percentage change of the corresponding Kv-value) is a very small change of the Kv value in the lower stroke range and a very big change of the Kv value in the upper stroke range. Because of this fact, the adequate rotation angle modifications have to be increased when stroke area is rising. The corresponding cam, therefore, shows a steep rise in the lower zone and continuously flattens to the top.

In case the equal percentage flow curve should be replaced by the linear characteristic (equal stroke changes lead to equal change of the appropriate Kv-value) the valve must have considerably higher Kv values over the whole stroke range, that means the opening angle ϕ_{lin} has to be considerably wider than ϕ_{lin} at the same signal (i.e. 43% = 0,55 bar).

Subject to technical modifications.



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