KLINGER Fluid Control

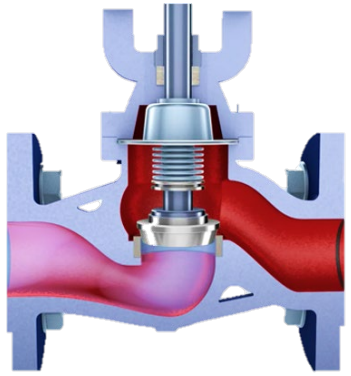
KLINGER FLUID CONTROL

KVN piston valve „Advanced“

KVN ADVANCED

Agenda

- Overview KVN
- Comparison to globe valves
- Comparison to Bonetti valves
- Comparison to Yakacik valves
- Operating torques
- KVN and AUMA actuators
- KVN and SART actuators
- Applications



PISTON VALVE KVN

Overview

DN	15-200
NPS	½“ to 8“
Material	EN-GJL-250 EN-JS1049 1.0619, 1.4581 WCB, CF8M
Types	Flange acc. EN1092-1, Body length acc. EN558-1, Size 1 Flange acc. ANSI B16.5, Body length acc. ANSI B16.10 Thread connection acc. ISO228-1, Body length acc. DIN3202-M9 Thread connection, NPT acc. ANSI B2.1 Butt weld ends acc. EN12627 Socket weld ends acc. EN12760 Regulation version




KVN COMPARISON

With globe valves

Based on experience, the piston valve has significant advantages compared to conventional globe valves. Those advantages are:

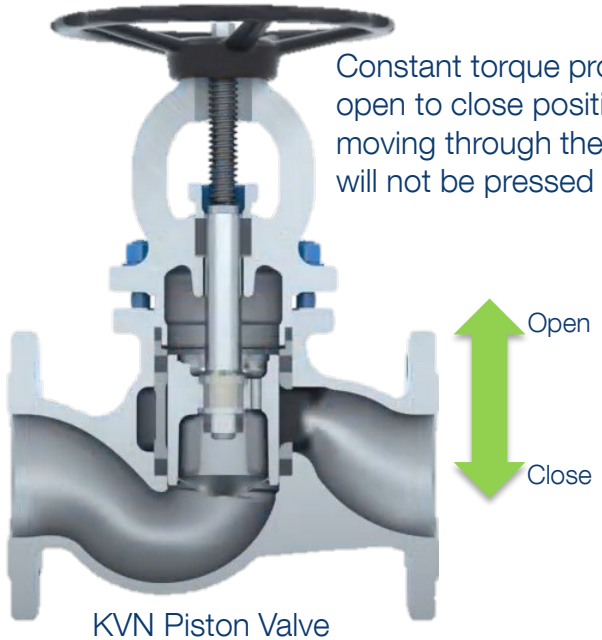
(a) Torque characteristic: Constant torque from open to close and vice versa

(b) Seat erosion: The seat rings are not directly exposed to the flow – no seat erosion

(c) Particles in the media: „Self cleaning“ effect

(d) Maintenance: Simple „inline“ service“

(a) Torque characteristic



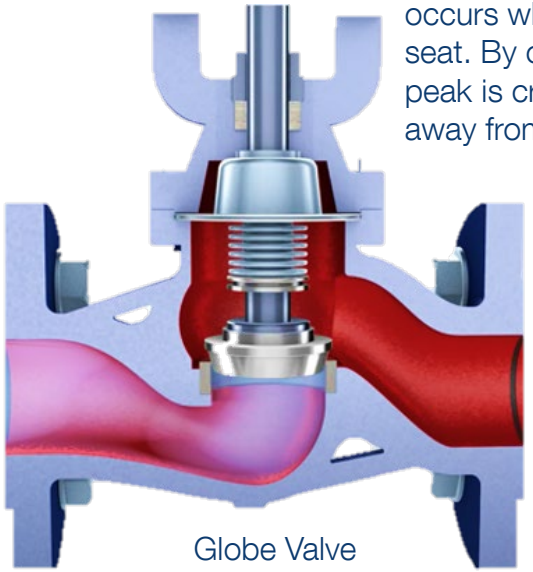
Constant torque progression from open to close position. The piston is moving through the valve rings and will not be pressed on a seat.

Open

Close

KVN Piston Valve

When closing, a torque increase occurs when the piston presses on the seat. By opening the valve, a torque peak is created when the piston is torn away from the seat.



Open

Close

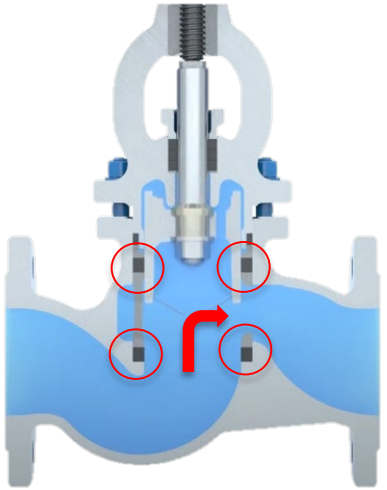
Globe Valve

KVN COMPARISON

With globe valves

(b) Seat erosion

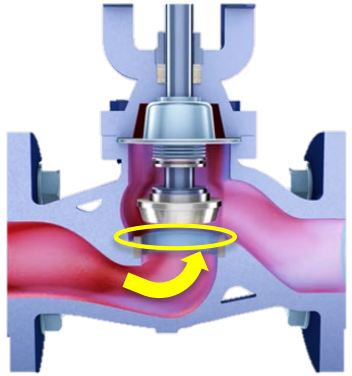
KVN Piston Valve



In open position, the valve rings are not directly in the media flow due to the construction of the valve.

Seat erosion is limited to a minimum.

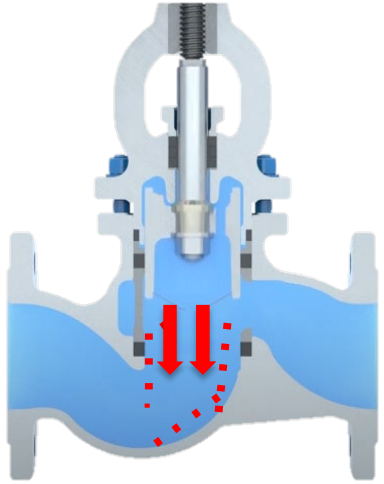
Globe Valve



The valve seat is exposed to the flow in open position. Erosion could occur which is harming the seat.

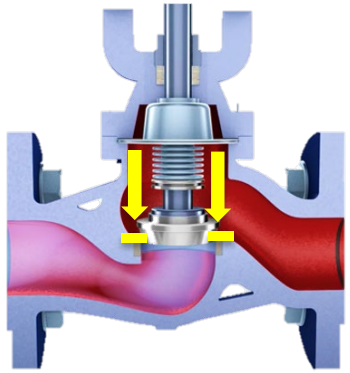
(c) Particles in the media

KVN Piston Valve



Particles in the flow could stick to the inner surface of the lower valve ring. Those particles will be pushed back by the piston when closing the valve (self cleaning effect).

Globe Valve

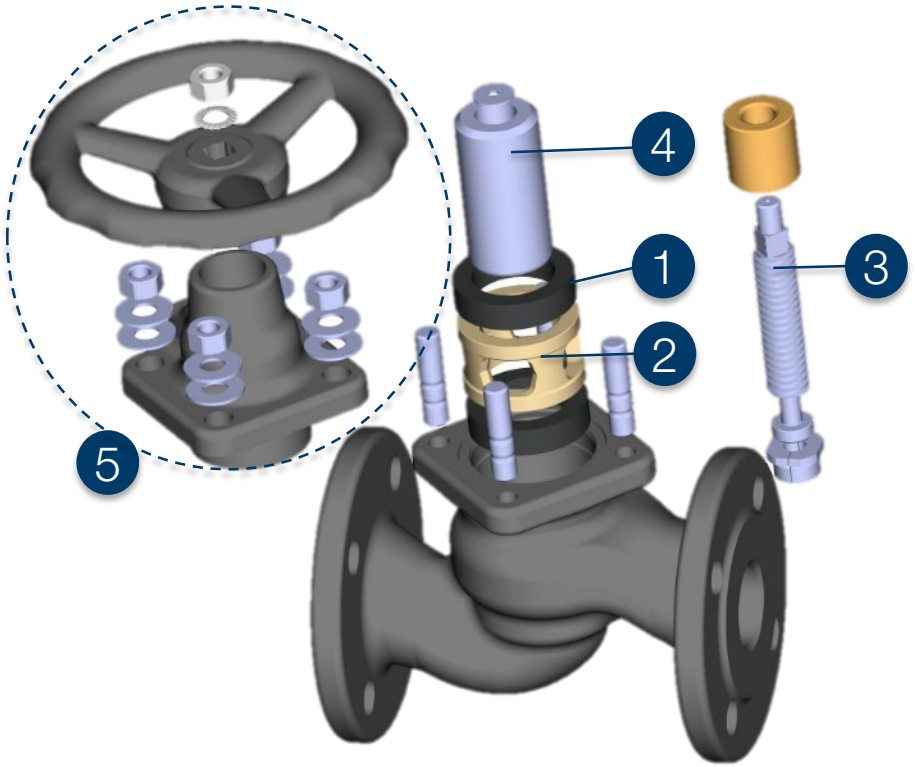


Particles from the flow stick on the surface of the seat. Those particles will be pressed into the seat by the piston when closing the valve which weaken the seat material.

KVN COMPARISON

With globe valves

(d) Maintenance



The KVN piston valve can be maintained „inline“. It is not necessary to remove the valve from the pipeline for maintenance.

An service should always be done in a depressurised state of the valve.

All important parts of the valve are available as spare parts. The maintenance can be carried out easily and in a time-saving manner.

Spare parts:

(1) Valve rings

(2) Lantern

(3) Spindle

(4) Piston

(5) Complete bonnet

KVN COMPARISON

With Bonetti valves

Bonetti valve

KVN Piston Valve

Spindle

The spindle of the KLINGER KVN valve consists of:

Body material III, VI, VIII made of 1.4021 Body material Xc made of 1.4404

Trapezoidal thread of the spindle is rolled according to the requirements of the KLINGER standard (KLN).

The surface of the KLINGER spindle is work-hardened by rolling and is also harder than the cut thread. In addition, the thread surface is shot-peened, creating small pits that can store lubricants.

Conclusion:

The spindle manufactured by KLINGER is subject to less friction and wear. This increases the service life. The improved lubrication effect leads to lower actuating torque.

The spindle of the Bonetti piston valve consists of:

Housing material III made of C30

Housing material VI, VIII made of 1.4006 Housing material Xc made of 1.4541

The ISO trapezoidal thread of the Bonetti valve is cut.

The surface of the thread has the same hardness as the base material, is smooth and cannot store lubricant. Furthermore, the ISO thread used by Bonetti is significantly narrower, which means that less lubricant remains between the flanks.

Conclusion:

Increased actuating torque due to poor lubrication. The higher friction in the Bonetti spindle leads to a shorter service life. Due to mech. functional failure also possible due to mechanical abrasion.

KVN COMPARISON

With Bonetti valves

Seal system

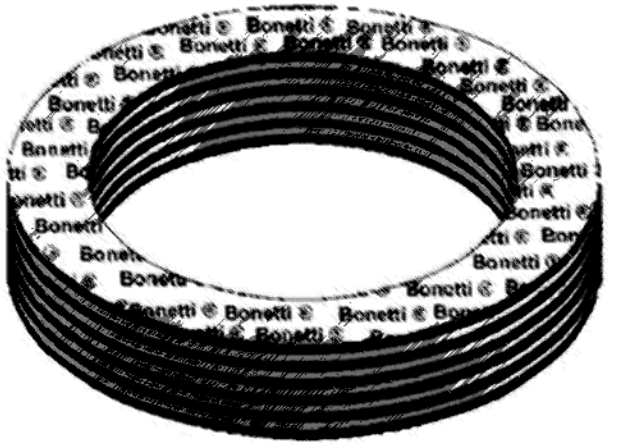
The sealing ring of the KLINGER KVN valve consists of graphite discs with spit plate inserts made of VA.

Spit plate is positively and non-positively connected to the graphite layers.

The graphite cannot slide off the sheet metal discs even under high pressure. The sealing rings of KLINGER piston valves are not deformed in any way!

Conclusion:

Longer service life of the KLINGER piston valve.



The sealing ring of the Bonetti valve consists of graphite discs with folded sheet metal spacers made of VA.

Folded sheet is smooth and therefore only friction-locked to graphite.

the graphite flows off the smooth sheet metal. The Bonetti valve must be closed when resealing (piston between sealing rings) otherwise the sealing rings may be deformed.

Conclusion:

Shorter service life of the Bonetti piston valve.

KVN COMPARISON

With Yakacik valves

Test comparison

The test was carried out using the KLINGER standard actuation test method for piston valves. It comprises 500 actuations with the respective nominal pressure with compressed air, and 500 actuations with saturated steam, which is also adapted to the respective nominal pressure. One actuation consists of "open" in the "closed" position and return to the "open" position. The actuating torque is measured every 100 operations, the tightness is checked and recorded. Important is that the spindle drive has only been lubricated with the respective lubricant during assembly.

KVN Piston Valve

Yakacik Valve

The actuation test showed an early failure of the Yakacik valve:

		Yakacik DN25		KLINGER DN25	
Pressure	Actuations	Torques open/close [Nm]		Torques open/close [Nm]	
0 bar	0	6,4	10,4	4,3	4,4
40 bar air	0	3,9	14	0,3	7
40 bar air	100	3,6	8,4	1,1	10,3
40 bar air	200	3,4	57,5	1,3	11,8
40 bar air	300	Damage at 250 actuations		1,2	10,7
40 bar air	400			1,7	12
40 bar air	500			1,4	10,3
32bar saturated steam	500			0,8	7,3
32bar saturated steam	600			4	9,5
32bar saturated steam	700			3,1	10,8
32bar saturated steam	800			2,4	11,8
32bar saturated steam	900			2,4	12,8
32bar saturated steam	1000			2,3	9,4

KVN COMPARISON

With Yakacik valves

Bonnet and spindle

Pic. 1:Yakacik valve bonnet:

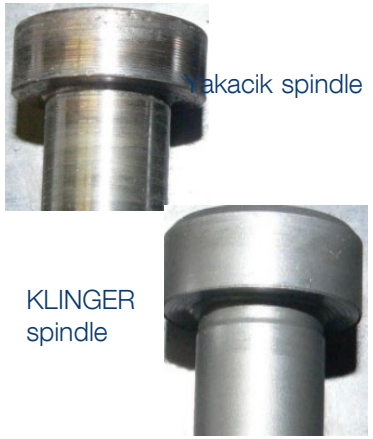
Due to the high wear on the spindle thread, the valve test had to be terminated prematurely.

Pic. 2: Spindle and split nut before the test

Pic. 3: Spindle and split nut after the test

The double split nut connection and the piston washer are made of brass. Pic. 3 shows a strong wear on the tread. Actually this should not be the case, because there is the piston washer.

The disassembly of this disk was not possible, because of substantial damage due to heavy wear and tear, see Pic. 4.



One reason for the high wear in the area of the double split nut connection is the construction of the spindle head and the surface. The spindle head is lubricant-coated at KLINGER. Due to the difference of the surface and the geometry of the spindle head, unwanted line contact and heavy wear occur at the Yakacik valve.

KVN COMPARISON

With Yakacik valves

Spindle

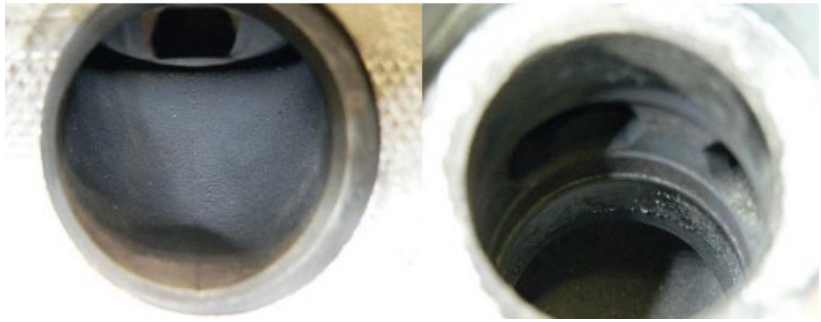
Wear of spindle at Yakacik valve after 250 actuations

The actuation test was stopped due to the high spindle wear and due to the increasing torque after 250 actuations. The wear is clearly visible in the picture. Wear marks are also visible in the bonnet.

Another reason for the strong and rapid wear is the misalignment of the spindle to the piston bore → Pic. 5.

Yakacik valve after pressure tests with water containing corrosion inhibitor

KLINGER valve after one year in service

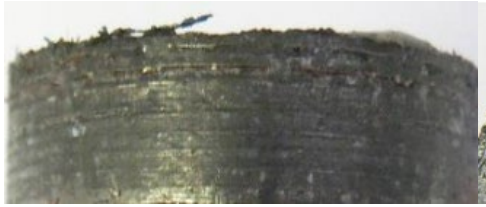


KVN COMPARISON

With Yakacik valves

Valve rings and lantern bush

Pic.6



Pic.7

Pic.8

The installed valve rings (Pic. 6 + 7) of Yakacik use tang metal sheet inserts, the size of the holes in the sheet being 1.5 mm at Yakacik and 1mm at KLINGER (Pic. 8).

Pic.9

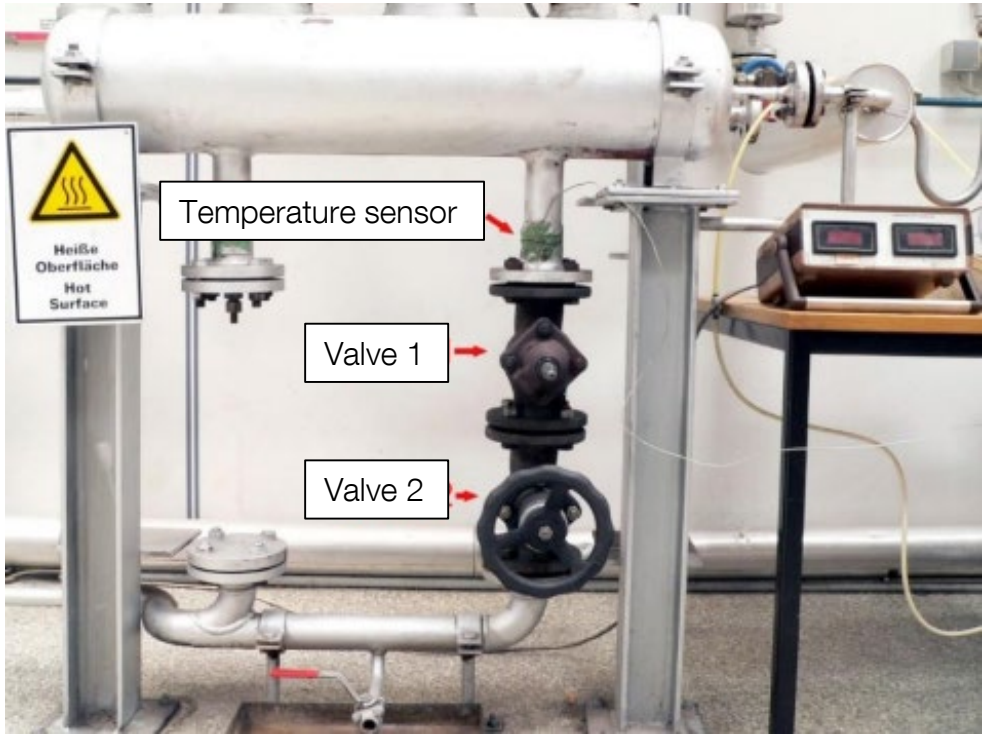
Pic.10

Another difference is the area of openings in the lantern bush through which the medium flows. These must be at least equal to the area of the piston. If this is not the case, the medium cannot flow through unobstructed and there is also a bigger pressure loss. In Pic. 9 you can see that the openings at Yakacik are round and the KLINGER openings are almost rectangular Pic. 10. As a result, the flow area at the KLINGER lantern bush is larger and there is no back pressure or pressure loss.

KVN COMPARISON

With Yakacik valves

Flash test DN50



In valve 1 the test valve rings are installed. This valve is during the whole test in open position. Valve 2 is actuated. With a sensor, the temperature of the fluid is measured. If valve 2 is open, steam heat up the valves and pipes. If valve 2 get closed, steam cannot flow and condensate. The big white horizontal pipe raise the amount of condensate. In the closed pipe the condensate fill up the pipe and reach the test valve rings installed in valve 1. If the temperature at the sensor is below 100°C the whole test valve 1 is filled with condensate. Due to a fast opening of valve 2, steam flow through the valve. The condensate in the valve rings heat up very quick and raise the volume immediately. Due to this “explosion” the valve rings can be damaged. The test consist of 50 of these cycles. After these test the valve should be tight in line.

KVN COMPARISON

With Yakacik valves

Flash test DN50

The bottom valve ring of the Yakacik valve is slightly damaged

Yakacik body after flash test, the valve housing is very corroded despite the prepared boiler water

KLINGER body after flash test

During the actuation test, the valve was far below KLINGER's standardized values. Although brass has been used in the wear and tear parts such as the double piece nut and piston washer. The actuation torque comparison between the Yakacik valves and a KLINGER valves show that the Yakacik valves have much higher torques and the number of actuatings is less than a quarter compared to KLINGER.

PISTON VALVE KVN

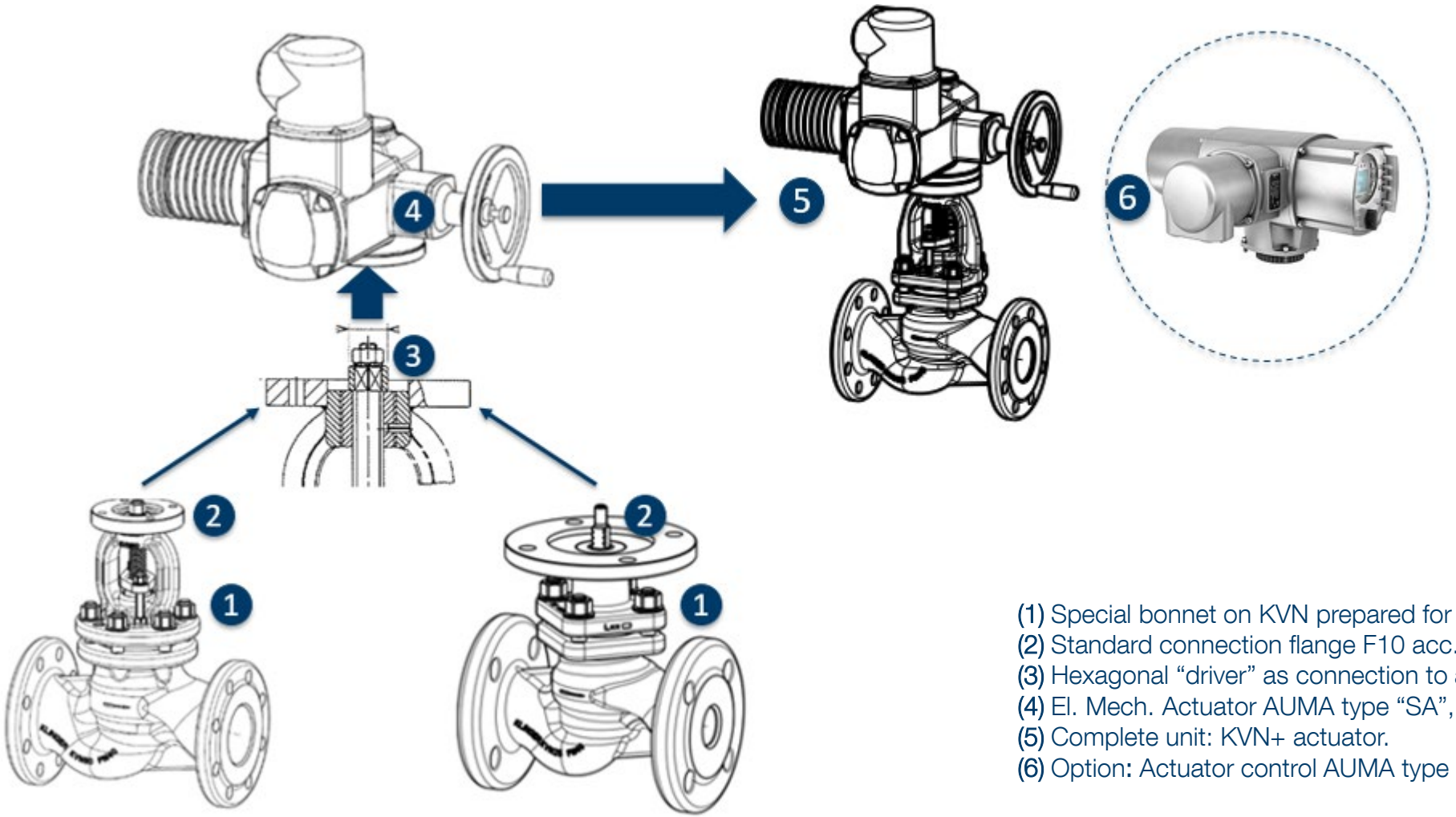
Operating torques

Torques

Nominal size DN	Pressure differential	Torque
mm	bar	Nm
15	40	4
20	40	5
25	40	8
32	40	13
40	40	21
50	40	34
65	40	21
80	40	24
100	40	36
125	40	43
150	40	50
200	40	64

PISTON VALVE KVN

AUMA SA actuator



(1) Special bonnet on KVN prepared for actuator assembly.
(2) Standard connection flange F10 acc. EN5210 for all sizes.
(3) Hexagonal “driver” as connection to actuator.
(4) El. Mech. Actuator AUMA type “SA”, “SAR” or “SAExC”.
(5) Complete unit: KVN+ actuator.
(6) Option: Actuator control AUMA type “AM” or “AC”.

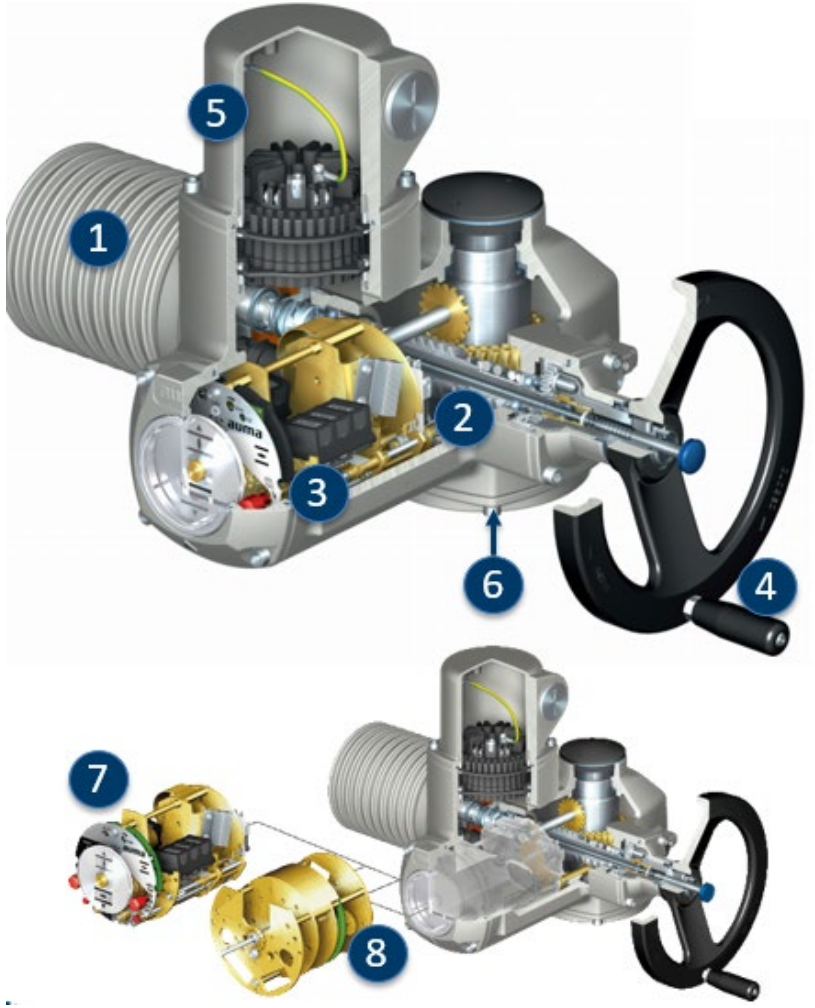
PISTON VALVE KVN

Sizing AUMA SA actuator

AUMA actuator type „SA“ for KVN			
Size	Stroke (mm)	Actuator type	Closing time (sec.)
DN25	30	SA07.2	20
DN32	34	SA07.2	22
DN40	44	SA07.6	28
DN50	51	SA07.6	26
DN65	47	SA07.6	25
DN80	57	SA07.6	29
DN100	63	SA07.6	29
DN125	83	SA07.6	37
DN150	93	SA10.2	44
DN200	118	SA10.2	63

AUMA SA ACTUATOR

Construction

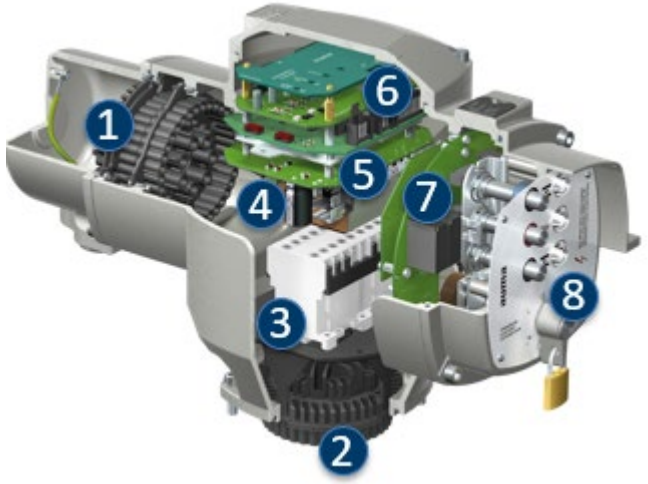


Standard configuration:
For OPEN/CLOSE applications – type SAR for regulating applications and type SAE for ATEX on demand.
Standard voltage 400V and 230V.
Heater in the switch compartment - Self-regulating PTC heater, 5 - 20 W, 110 - 250 V AC/DC.
Operation mode: Short-time duty S2 - 15 min, class A and B according to EN 15714-2.
Travel switches: Single switch (1 NC and 1 NO) per end position, not galvanically isolated.
Torque switches: Single switch (1 NC and 1 NO) per direction, not galvanically isolated.
Ambient temperature –30 °C bis +70 °C.
Protection class IP68 with AUMA three-phase motor.
Corrosion protection “KS” suitable for use in areas of high salt load, almost constant condensation and heavy contamination.
Color: AUMA silver-grey (similar to RAL 7037).
(1) Motor
(2) Worm gear
(3) Signalling and control unit
(4) Handwheel for emergency operation
(5) Electrical connection
(6) Valve connection
(7) Electro-mechanical signalling and control unit (RWG) for actuator control type “AM” and 4-20mA signal
(8) Electronic signalling and control unit (MWG) for actuator control type “AC” for demanding applications and bus-systems

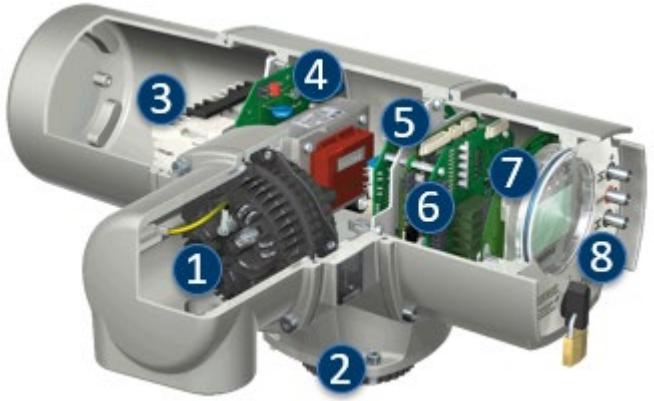
AUMA ACTUATOR CONTROLS

Construction

[1] Actuator control type „AM“ for OPEN/CLOSE applications. An electronic signalling and control unit “RWG“ (EWG) must be used.
[2] Actuator control type „AC“ for demanding applications and bus-systems. An electronic signalling and control unit “MWG“ must be used.



[1] Plug-in electrical connection
[2] Plug-in connector to the actuator
[3] Reversing contactors or thyristors
[4] Power supply unit for 24 V DC supply
[5] Logic board
[6] Interface
[7] Local controls board
[8] Local controls unit



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[4] Power supply unit for 24 V DC supply
[5] Logic board
[6] Interface
[7] Local controls board
[8] Local controls unit

PNEUM. ACTUATOR SART

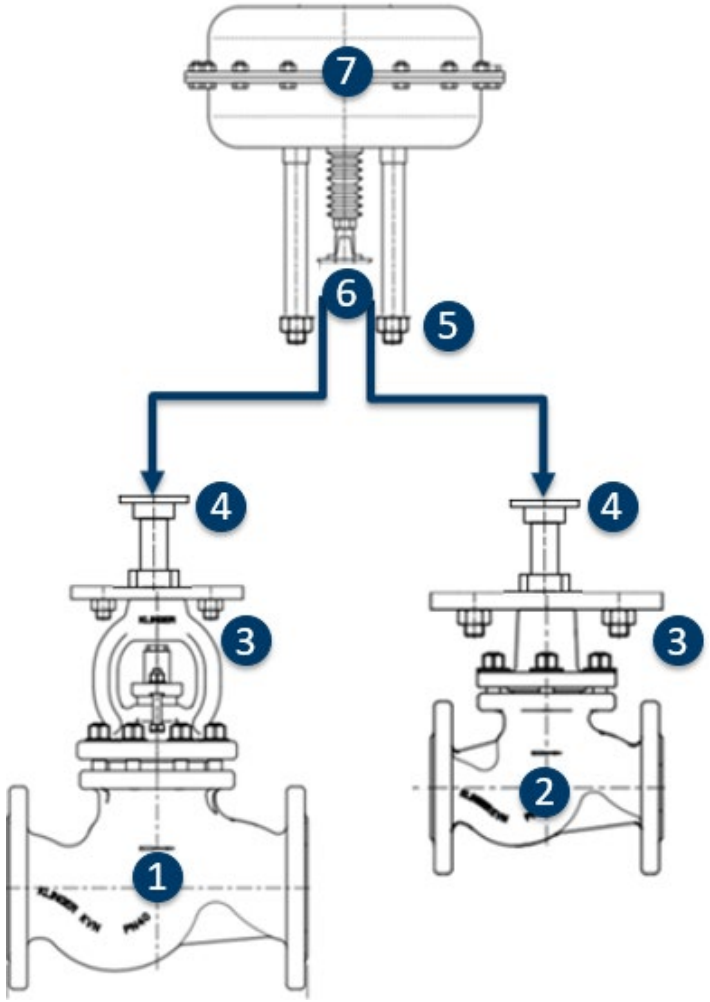
Overviev

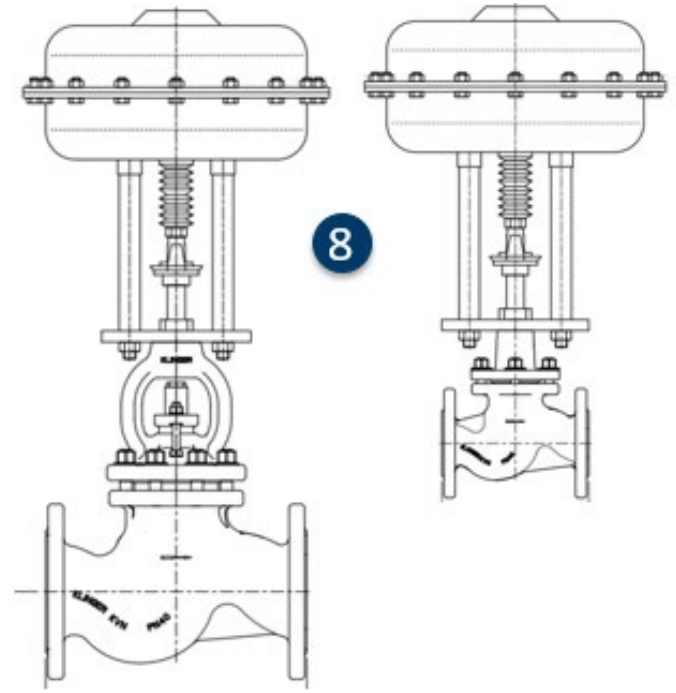
Required information:

- » Single acting, spring close **„Po“**
- » Single acting, spring open **„Ps“**
- » Double acting
- » Air supply in bar
- » Required closing time
- » Open/close or regulation applications
- » EX zone
- » Positioner
- » 4-20 mA output
- » Limit switches
- » Solenoid valve

PNEUM. ACTUATOR SART

Overviev





(1) Piston valve KVN, DN65 to 200.
(2) Piston valve KVN, DN15 to 50.
(3) Special bonnet with mounting plate for pneum. Actuator “SART”.
(4) Modified KVN spindle (piston) for connection to lifting rod.
(5) Actuator pillars for installation on special KVN bonnet.
(6) Lifting rod of actuator.
(7) Pneumatic actuator from “SART”, single or double acting.
(8) Complete unit: KVN with installed SART actuator.

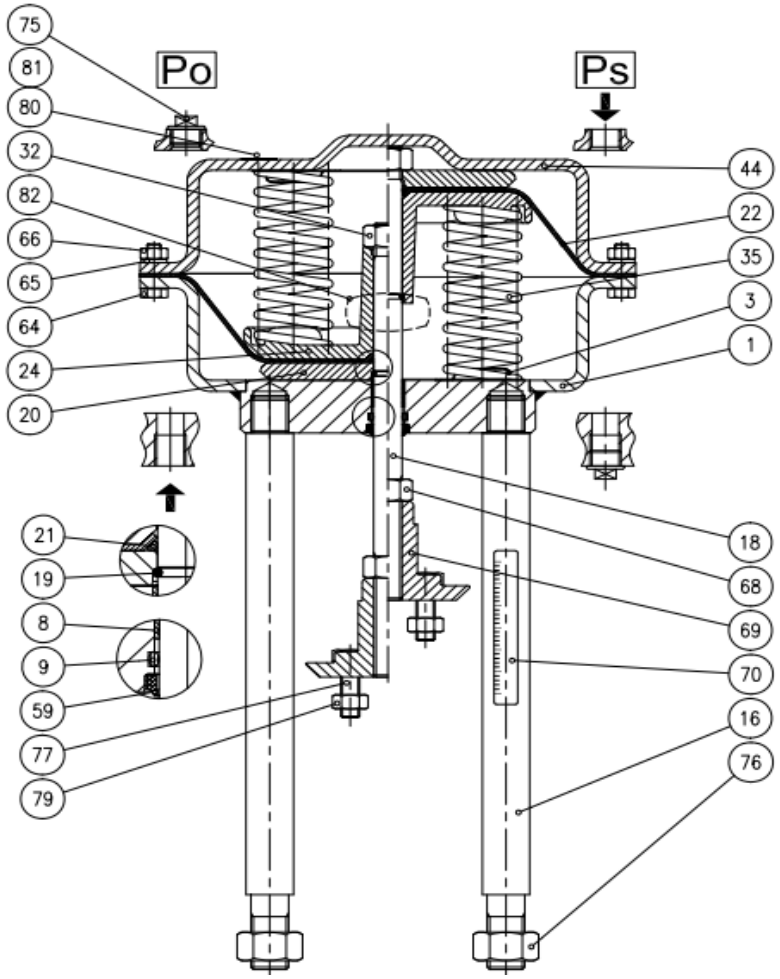
PNEUM. ACTUATOR SART

Sizing for KVN

KVN Line size	Actuator type, single acting, spring close	Air Supply, single acting spring close	Actuator type, single acting, spring open	Air Supply, single acting spring open	Actuator type, double acting	Air supply, double acting
DN15	PA35 B6 6G (Po)	2 bar	PA35 B6 3G (Ps)	2,5 bar	PA35 A6	1,4 bar
DN20	PA35 B6 4S (Po)	2,8 bar	PA35 B6 3G (Ps)	3,5 bar	PA35 A6	2 bar
DN25	PA35 B6 6S (Po)	4,7 bar	PA35 B6 3G (Ps)	4 bar	PA35 A6	3,2 bar
DN32	PA60 A6 5S (Po)	3,5 bar	PA35 B6 3G (Ps)	5 bar	PA35 A6	4 bar
DN40	MA41 B6 8S (Po)	2,5 bar	PA60 C6 3G (Ps)	4 bar	PA35 A6	5 bar
DN50	MA41 B6 12S (Po)	4,2 bar	PA60 C6 3G (Ps)	5,3 bar	PA35 A6	6 bar
DN65	MA41 B6 6S (Po)	2,1 bar	PA60 C6 3G (Ps)	3,5 bar	PA35 A6	4 bar
DN80	MA41 B6 7S (Po)	2,7 bar	PA60 C6 3G (Ps)	4 bar	PA35 A6	5 bar
DN100	MA41 B6 10S (Po)	4,1 bar	MA41 B6 2S (Ps)	3 bar	MA31 A6	3,5 bar
DN125	MA41 C6 4S (Po)	4,9 bar	MA41 C6 (Ps)	4,5 bar	MA31 A6	4 bar
DN150	MA41 D6 4B (Po)	4,5 bar	MA41 D6 (Ps)	5 bar	MA41 A6	2,5 bar
DN200	-	-	-	-	MA41 A6	3 bar

SART ACTUATOR DESIGN

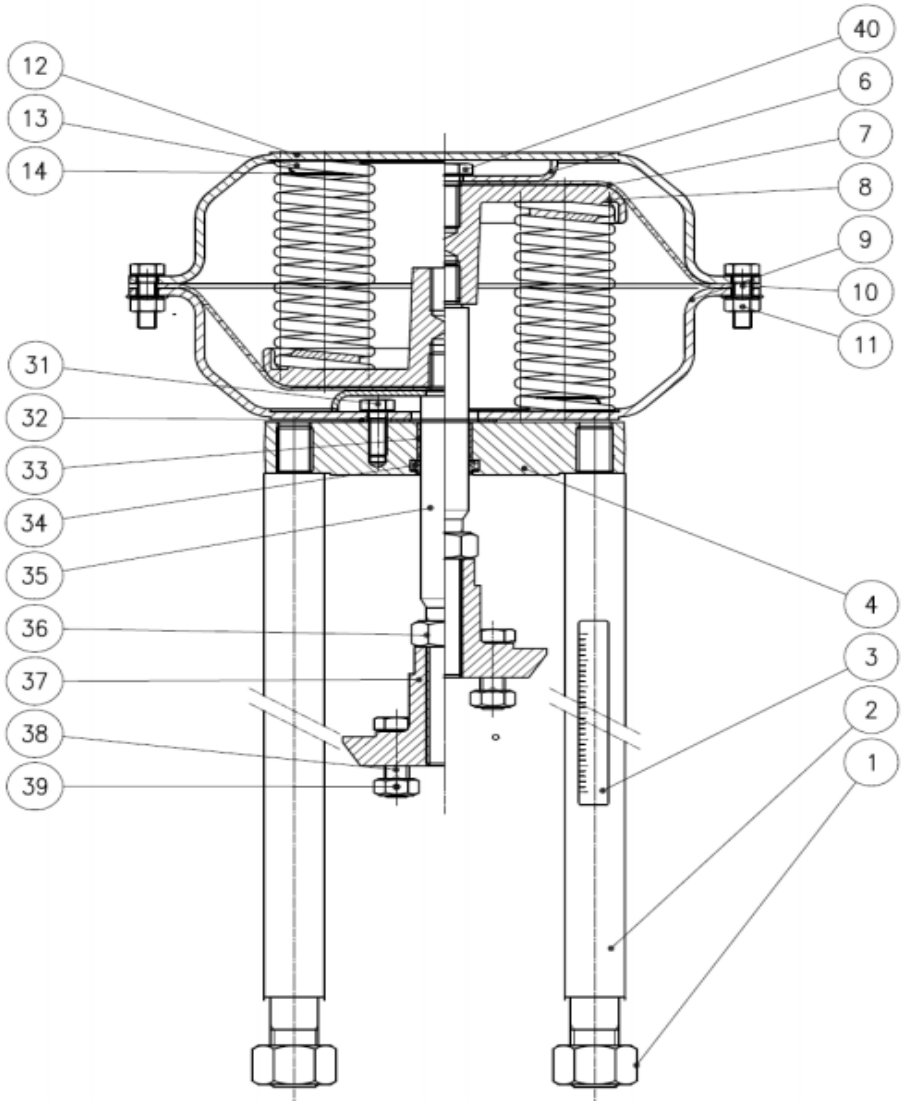
Type MA



Part	Description	Part	Description
1	Lower casing	59	Wiper seal
3	Spring plate	64	Screw
8	Guiding bush	65	Washer
9	O – Ring	66	Nut
16	Column	69	Half upper coupling
18	Stem	70	Stroke indicator
19	Stem ring	75	Vent screw
20	Pressure plate	76	Nut
21	O - Ring	77	Screw
22	Diaphragm	79	Nut
24	Diaphragm plate	80	Name plate
32	Hex nut	81	Rivet
35	Spring	82	Spring sticker
44	Upper casing		

SART ACTUATOR DESIGN

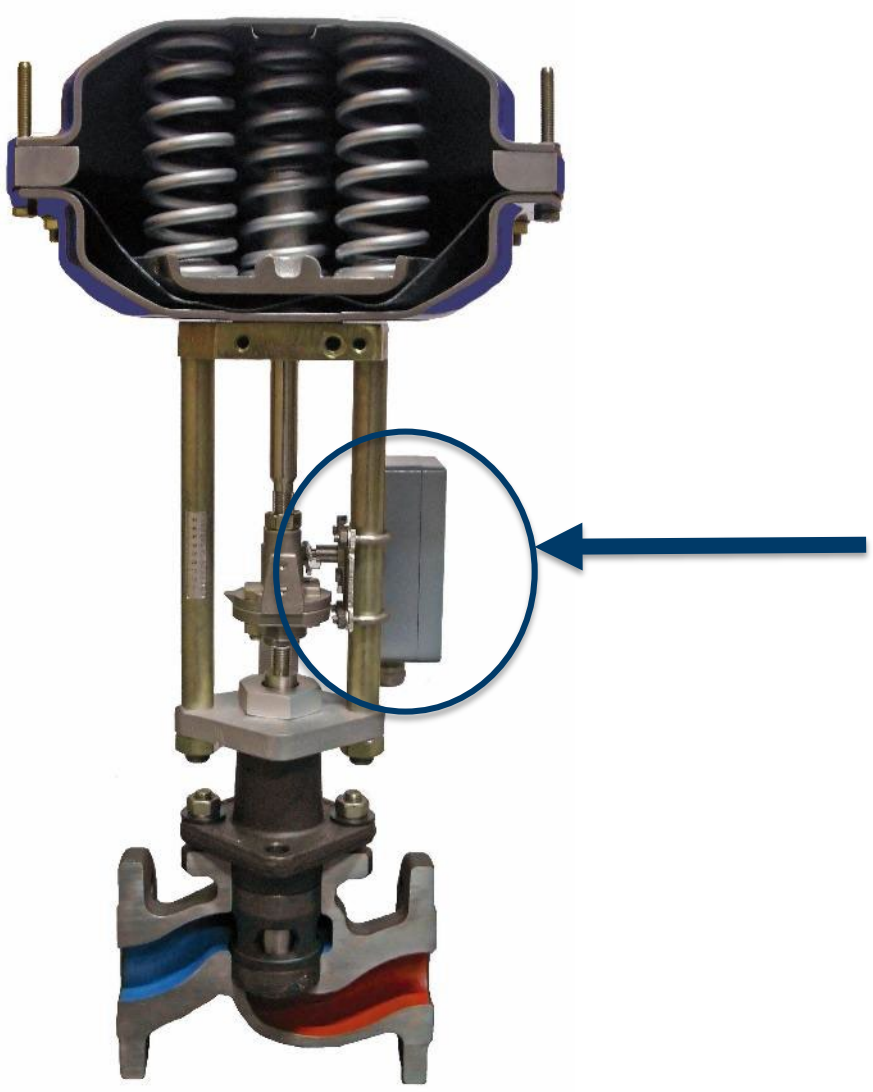
Type PA

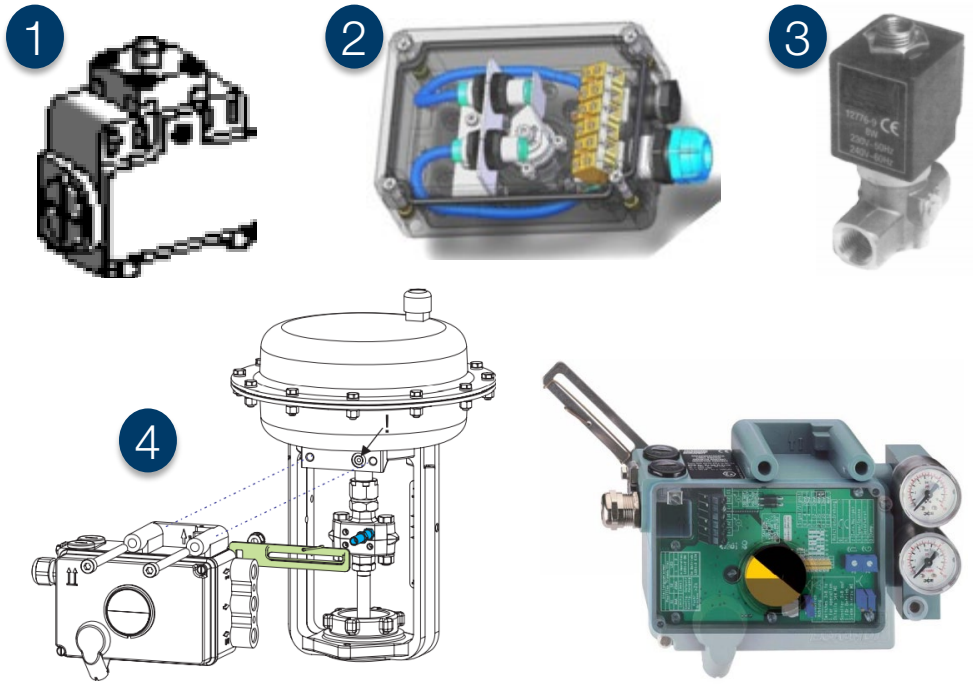


Part	Description	Part	Description
1	Nut	32	Gasket
2	Column	33	Guiding bush
3	Stroke indicator	34	Dirt stripper
4	Sub-plate	35	Stem
6	Back plate	36	Nut
7	Diaphragm	37	Coupling
8	Diaphragm plate	38	Screw
9	Lower casing	39	Nut
10	Screw	40	Diaphragm screw
11	Nut		
12	Upper casing		
13	Spring		
14	Spring plate		
31	Screw		

SART ACTUATORS

Accessories





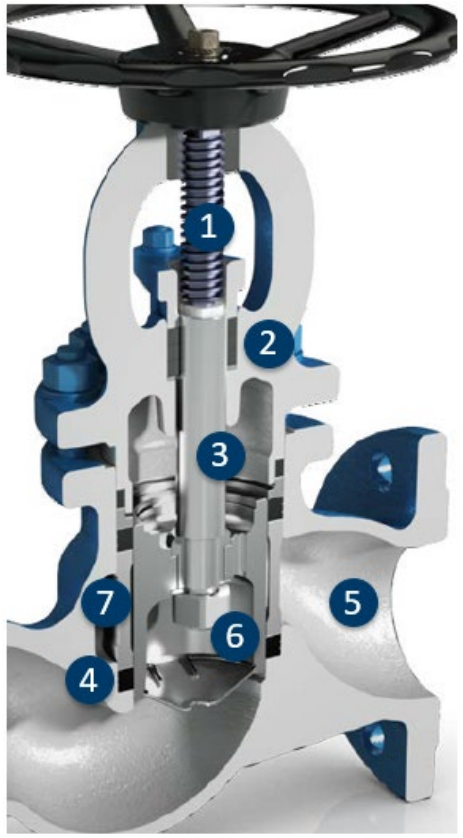
- (1) Mech. standard limit switches type XCK-T110, 1 N/C + 1 N/O „snap action“ mounted on actuator column
- (2) „ATEX“ inductive limit switches type 301080 P+F mounted on actuator column
- (3) 3/2 way solenoid valve 24V type 3210 NF mounted on actuator column
- (4) Analog positioner type „49.3“ in ATEX version with 4-20mA output mounted on actuator

APPLICATIONS

Construction & media

DN15 – 50 for media:
Superheated steam
Saturated steam
Oxygen
Water, Condensate, clear liquids
Heat transfer oils
Nitrogen – clear gases

(1) Bonnet:
Material carbon / stainless steel
(2) Spindle:
Material stainless steel
(3) Piston:
Material stainless steel
(4) Valve rings:
Type KX-GT graphite
Type KX1 graphite with PTFE disc for TA Luft
(5) Lantern:
Material Sint C10
(6) Body:
Material Cast / stainless steel
Flanged or welded ends
For oxygen use:
Valve is oil and grease free



DN65 – 200 for media:
Superheated steam
Saturated steam
Oxygen
Water, Condensate, clear liquids
Heat transfer oils
Nitrogen – clear gases

(1) Spindle:
Material stainless steel
(2) Stuffingbox:
Graphite
(3) Piston shaft:
Material stainless steel
(4) Valve rings:
Type KX-GT graphite
Type KX1 graphite with PTFE disc for TA Luft
(5) Body:
Material cast steel
Flanged or welded ends
(6) Piston:
Material stainless steel
(7) Lantern:
Material Sint C10
For oxygen use:
Valve is oil and grease free

THANKS FOR YOUR ATTENTION!

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