

valve technology

The sliding gate valve principle by Schubert & Salzer

This is how easy control can be. Over 25 years ago, Schubert & Salzer Control Systems took a new approach in control valves. We developed the sliding gate control valve: a practical, light and highly accurate valve. It operates based on a principle that had already excited Leonardo Da Vinci. Even today, it satisfies the most challenging requirements that are placed on a control valve.

The alternative when the demands are high

The GS valve product line controls liquids, steam and gases with accuracy; quickly and efficiently. A stationary sealing plate (2) fixed in the body (1) perpendicular to the direction of flow has a number of slots or orifices (3) a moving disc of equal height across its face with identical slot configuration and designed so it cannot rotate, slides vertically against it thereby changing the rate flow. The differential pressure presses the moving disc (3) against the fixed disc (2) and seals it.

Sliding gate valves are used to control gases, steam and liquids

- Chemical and pharmaceutical industry
- Steel and aluminum plants
- Food and beverage industry
- Breweries
- Textile manufacturing
- Tire production
- Plastics and rubber
- Research and development
- Gas and compressed air production and utilization
- & many more.



Details

Positioner

Pilot line

Diaphragm shell

Diaphragm disc

Coupling

Adjusting nut

Packing tube

Chevron packing, spring loaded

Bellows (where needed)

Column

Valve stem

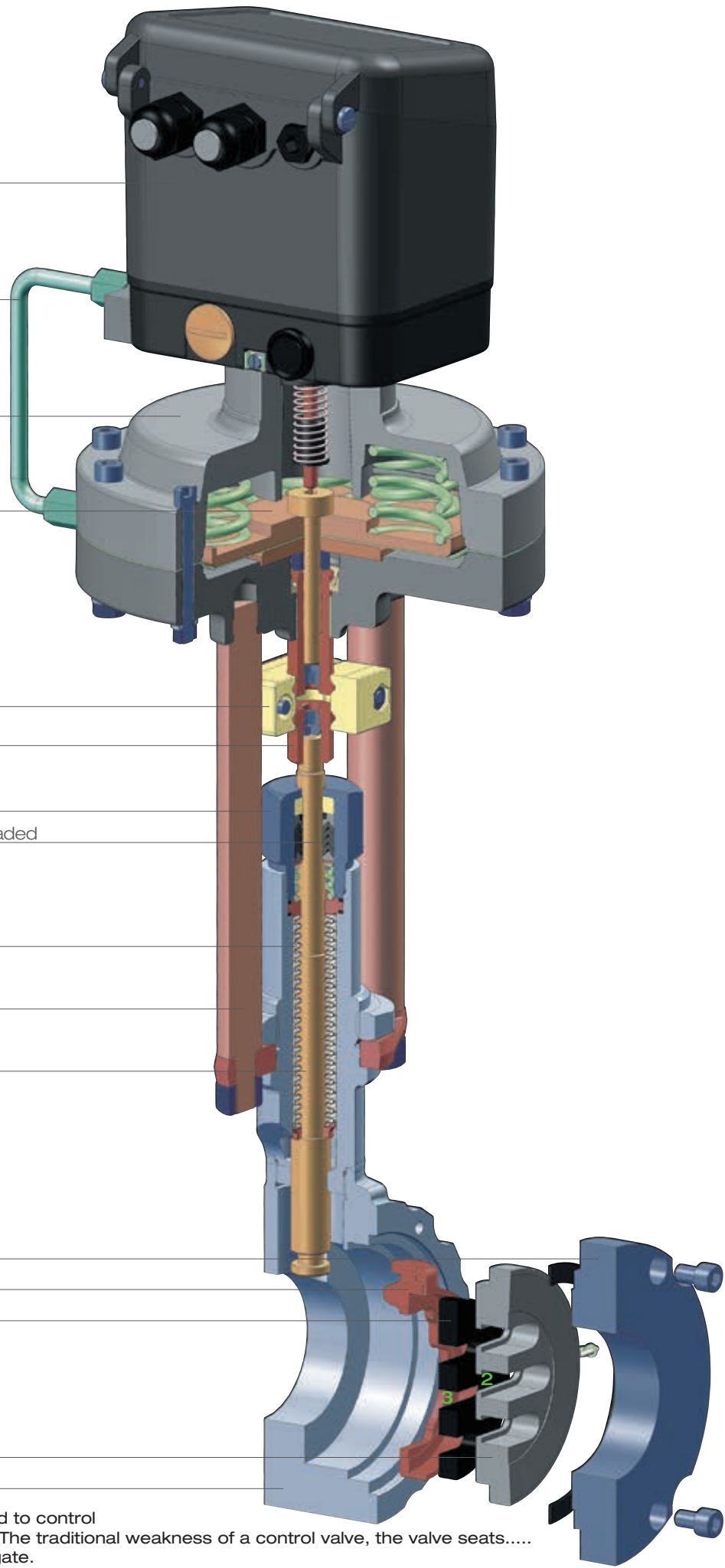
Body cover

Coupling ring

Moving disc (3)

Fixed disc (2)

Body (1)



Sliding gate valves are used to control gases, steam and liquids. The traditional weakness of a control valve, the valve seats..... does not exist in a sliding gate.

The advantages of sliding gate valves

Fits into tight spaces

Compact construction for minimum use of space and ease of installation

Variable C_v values

A simple exchange of the fixed disc (plate) is all that's needed to change the C_v value at any time - possible range of $C_v = 0.05$ to 1056

Extremely low leakage rate

< 0.0001% of the C_v value due to the self-lapping action of the moving disc and the pressure of the medium against the moving disc, using a surface seal instead of an annular seal.

Outstanding rangeability

Up to 160:1

Standard packing environmentally safe

Schubert & Salzer's standard packing is certified by the TUV to comply with the German TA-Luft-standard which limits valve packing emissions. The applied testing procedure verifies if the tested sealing design is equivalent to a bellows solution. The measured leakage rate (after 150,000 full valve cycles) was $8E-8$ mbar l/s and is far below the allowable leakage standard of $4.7E-6$ mbar l/s.

Optimal flow control

Avoids cavitation problems in the valve and operates quietly by reducing turbulence

Easy to install and maintain

Thanks to the compact construction, the low weight and the innovative seal disc design makes easy work of installation and maintenance.

Minimal wear

Low turbulence means less erosion. The short stroke (1/4" to 1/2") insures greater packing life and also requires reduced actuation energy.

High differential pressures

Using its unique compact design and low energy consumption, the GS valve gives accurate control of high differential pressures up to 1450 psi

Size comparison between a normal globe valve and a [Schubert & Salzer sliding gate valve](#). In the example, the line size of both valves are identical.

Size Comparison 10 inch GS vs Globe

76.4 inches high
1,850 lbs.

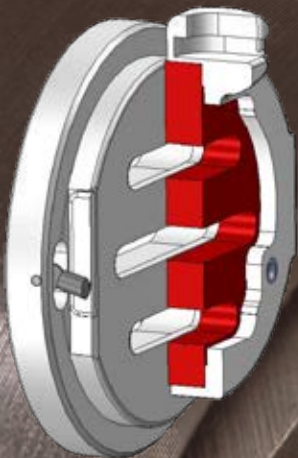
23.8 inches high
116 lbs.



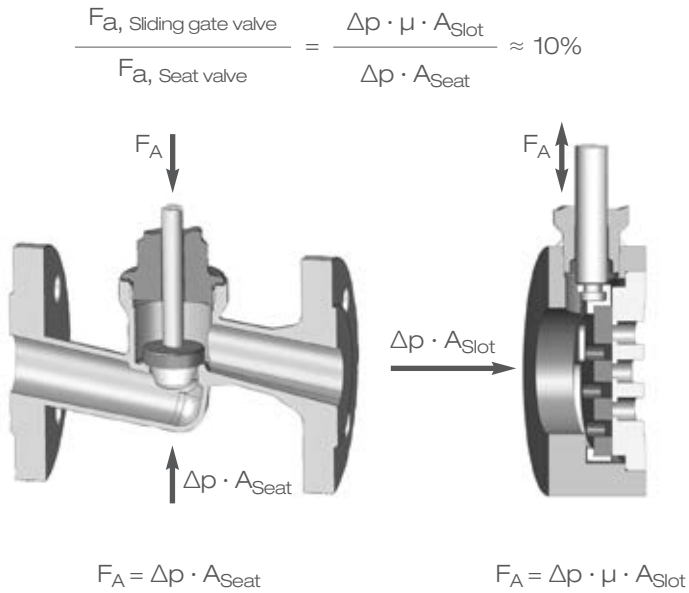
Variable Cv Values

Ordering code	-	A	1	B	6	2	7	C	3	4	8	5	9	
Size	Charact.	100 %	63 %	40 %	25 %	20%	16 %	12 %	10 %	6,3 %	2,5 %	2 %	1 %	0,4%
1/2"	(mod.) linear	4.6	3	2	1.6	-	0.82	0.57	0.51	0.3	0.16	0.09	0.05	-
	eq. perc.	2	-	1.3	-	0.4	-	-	-	0.12	-	-	-	-
3/4"	(mod.) lin.	7.4	-	-	-	-	1.16	-	-	-	-	0.15	-	-
	eq. perc.	3.5	-	1.7	-	-	-	-	-	-	-	-	-	-
1"	(mod.) linear	13	7.4	4.6	-	-	1.9	-	1.08	0.72	0.3	-	0.16	0.05
	eq. perc.	5.8	-	2.8	-	1.3	-	-	-	-	-	-	-	-
1 1/4"	(mod.) linear	19	12	-	-	-	-	-	-	-	-	-	-	-
	eq. perc.	9.3	-	-	-	-	-	-	-	-	-	-	-	-
1 1/2"	(mod.) lin.	30	19	13	8.1	-	-	-	-	-	-	-	-	-
	eq. perc.	13	9.9	-	3.2	-	-	-	-	-	-	-	-	-
2"	(mod.) linear	52	32	23	14	12	-	-	-	-	-	-	-	-
	eq. perc.	22	14	-	-	-	-	-	-	-	-	-	-	-
2 1/2"	(mod.) linear	60	41	-	17	-	-	-	-	-	-	-	-	-
	eq. perc.	35	-	-	9.3	-	-	-	-	-	-	-	-	-
3"	(mod.) linear	107	67	46	-	-	-	-	-	-	-	-	-	-
	eq.perc.	56	41	-	-	-	-	-	-	-	-	-	-	-
4"	(mod.) linear	179	110	72	-	-	-	-	-	-	-	-	-	-
	eq.perc.	89	56	-	-	-	-	-	-	-	-	-	-	-
5"	(mod.) linear	275	-	110	-	-	-	-	-	-	-	-	-	-
	eq.perc.	135	-	-	-	-	-	-	-	-	-	-	-	-
6"	(mod.) linear	392	246	-	-	-	-	-	-	-	-	-	-	-
	eq.perc.	171	104	-	-	-	-	-	-	-	-	-	-	-
8"	(mod.) linear	650	408	-	-	-	-	-	-	-	-	-	-	-
	eq.perc.	-	-	-	-	-	-	-	-	-	-	-	-	-
10"	(mod.) linear	1056	-	-	-	-	-	-	-	-	-	-	-	-
	eq.perc.	-	-	-	-	-	-	-	-	-	-	-	-	-

Seating Elements



		Function unit			
		Carbon - SST	SFC	STN2	STN3
Characteristics	Friction coefficient	++	++	-	-
	Actuator force	++	++	-	-
	Leakage rate	++	+	-	-
	Chem. Resistance	++	++	+	+
	Ability for high differential pressure	-	+	+	++
	Edge stability	--	+	+	++
	Application during cavitation	--	+	+	++
	Application at low valve opening (liquids and steam)	--	+	+	++
Applications	Range of use	Gases, fluids, steam without possibility for condensate hammer (continuous applications)	Reinforced alternative to carbon tribological pairing without influence to actuating forces, stability and rigidity of the STN2 pairing	Loaded fluids, like steam even at the danger of water hammers	Applications with very high differential pressures
	Fluid temperature	-328°F to 892°F	-76°F to 572°F	-76°F to 988°F	
Setup	Fixed disc	Stainless steel, coated with Stellite		Stellite	
	Moving disc	Carbon	Stainless steel combined coating technique - SFC	Stainless steel coated with Tribaloy	Tribaloy
Availability		1/2"- 10"		1/2"-6"	1/2"-1"



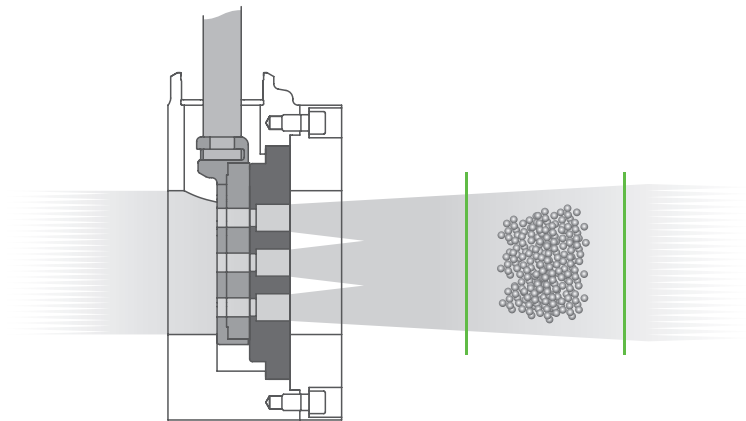
Efficiency

The outstanding feature of the sliding gate valve is the actuating force which is approximately 10% of that needed to actuate a globe valve of the same size and differential pressure. This permits the use of much smaller actuators even though both designs of the same size have similar flow rates!

This beneficial feature stems from the fact that, in the sliding gate valve, closure is perpendicular to the direction of flow and not against it, as with the globe valve.

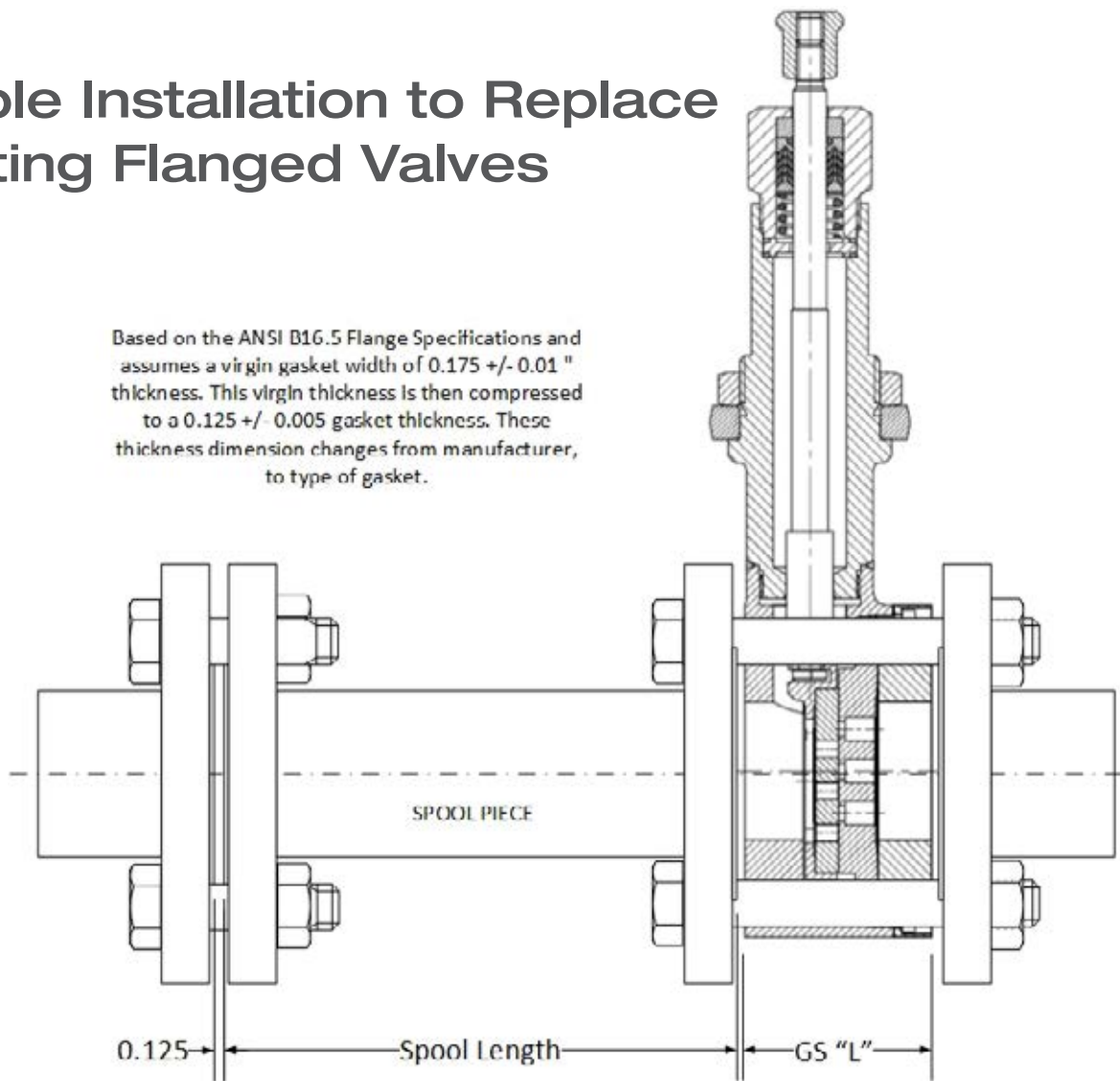
Cavitation

A high rate of flow through the narrowest cross section of a valve will lower the local pressure below the vapor pressure of the liquid. Vapor bubbles form which then collapse in the regions of higher pressure. When they come into contact with solid boundaries (valve body), the imploding bubbles can cause damage. In the case of a sliding gate valve, these dangerous cavitation zones are external, or more accurately, they are located about **3 - 6 ft** beyond the valve. The cavitation bubbles then collapse around the center of the pipe-line without damaging consequences.



Simple Installation to Replace Existing Flanged Valves

Based on the ANSI B16.5 Flange Specifications and assumes a virgin gasket width of 0.175 +/- 0.01 " thickness. This virgin thickness is then compressed to a 0.125 +/- 0.005 gasket thickness. These thickness dimension changes from manufacturer, to type of gasket.

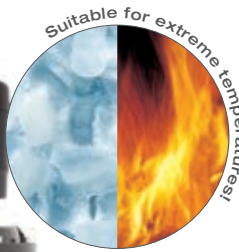


Spool Piece Adapters for Retrofitting Schubert & Salzer GS Wafer Flanges

Nominal Size	150#	300#	600#	150#	300#	600#	S&S GS Valve L Dimension (in.)
	ANSI B16.5 Standard Face to Face Dimension (in.)			Spool Piece Length (in.)			
1/2"	7.25	7.50	8.00	4.93	5.18	5.68	2.20
3/4"	7.25	7.63	8.13	4.93	5.30	5.80	2.20
1"	7.25	7.75	8.25	4.93	5.43	5.93	2.20
1-1/4"	NA	8.38	NA	NA	6.06	NA	2.20
1-1/2"	8.75	9.25	9.88	6.43	6.93	7.55	2.20
2"	10.00	10.50	11.25	7.36	7.86	8.61	2.52
2-1/2"	10.88	11.50	12.25	8.07	8.70	9.45	2.68
3"	11.75	12.50	13.25	8.88	9.63	10.38	2.75
4"	13.88	14.50	15.50	10.80	11.43	12.43	2.95
5"	Consult Factory						3.15
6"	17.75	18.63	Consult Factory	14.48	15.35	Consult Factory	3.15
8"	21.38	Consult Factory		17.60	Consult Factory		3.65
10"	26.50			22.59			3.78

Virgin Gasket Width in. 0.175 may vary
 Nominal Gasket Compression Width in. 0.125 may vary

Based on the ANSI B16.5 Flange Specifications and assumes a virgin gasket width of 0.175 +/- 0.01 " thickness. This virgin thickness is then compressed to a 0.125 +/- 0.005 gasket thickness. These thickness dimension changes from manufacturer, to type of gasket used.



Sliding gate control valve 8021

Nominal size: 1/2" - 10"
 Nominal pressure: ANSI Class 150 - 600
 Media temperature: -76°F to +662°F, optional
 -328°F to +986°F
 Material: carbon steel, stainless steel,
 hastelloy, duplex, inconel & others upon request
 Positioner: pneumatic, analog
 electropneumatic, digital electro-pneumatic,
 Ex-i version, AS-i bus connection



Sliding gate control valve 8020

Nominal size: 1/2" - 10"
 Nominal pressure: ANSI Class 150 - 600
 Media temperature: -76°F to +662°F,
 optional -328°F to +986°F
 Material: carbon steel, stainless steel,
 hastelloy, duplex, inconel & others upon
 request
 Side mount positioner: pneumatic,
 analog electro-pneumatic,
 digital electro-pneumatic,
 Ex-Version, Various communication
 protocols available, ex. Hart, Fieldbus
 Foundation, Profibus, etc.



Manual Sliding gate valve 8050

Nominal size: 1/2" - 10"
 Nominal pressure: ANSI Class 150 - 600
 Media temperature: -76°F to +662°F,
 optional -328°F to +986°F.
 Gear operator available
 Material: carbon steel, stainless steel,
 hastelloy, duplex, inconel & others upon
 request

Modular Design, 360° of Installation





Sliding gate motor valve 8230

Nominal size: 1/2"-2" (others on request)
 Nominal pressure: ANSI class 150 - 300
 Media temperature: -76°F to +662°F,
 Material: carbon steel, stainless steel,
 hastelloy, duplex, inconel & others upon
 request
 Actuation: On/off and control actuation,
 optional positioning control and
 position feedback plus limit switches



Sliding gate control valve 8043/44

Nominal size: 1/2" - 10"
 Nominal pressure: ANSI Class 150 - 300
 Media temperature: -76°F to +662°F
 Material: carbon steel, stainless steel,
 hastelloy, duplex, inconel & others upon
 request
 Positioner: pneumatic,
 analog electro-pneumatic,
 digital electro-pneumatic,
 Ex-i version, AS-i bus connection



Sliding gate motor valve 8037

Nominal size: 1/2" - 10"
 Nominal pressure: ANSI Class 150 - 600
 Media temperature: -76°F to +662°F
 optional -328°F to 986°F
 Material: carbon steel, stainless steel,
 hastelloy, duplex, inconel & others upon
 request
 Power supply: 24 ... 230 V AC/DC
 (Multi-zone power pack)
 Explosion-proof (gas version):
 II 2G Ex de [ia] IIC T6/T5
 Protection class: IP 66
 Optional actuation with 3-point
 control + position electronics obtainable



Sliding gate motor valve 8038

Nominal size: 1/2" - 10"
 Nominal pressure: ANSI Class 150 - 600
 Media temperature: -76°F to +662°F
 optional -328°F to 986°F
 Material: carbon steel, stainless steel,
 hastelloy, duplex, inconel & others upon
 request
 Dead band: +/- 2%
 Repeatability: +/- 0,1%
 Stroking speed: adjustable between
 4,7 and 35 seconds
 Actuator: high resolution motor actuator
 for control and switching with stroke
 monitoring, limit switches and optional
 fail safe unit



Sliding gate pressure regulator 8011

Nominal size: 1/2" - 6"
 Nominal pressure: ANSI Class 150 - 300
 Media temperature: -76°F to +572°F
 Pressure ranges: 7 psi to 145 psi
 Material: Stainless steel
 Self-operated pressure controller
 Enclosed spring housing



Sliding gate stop valve 8040/41

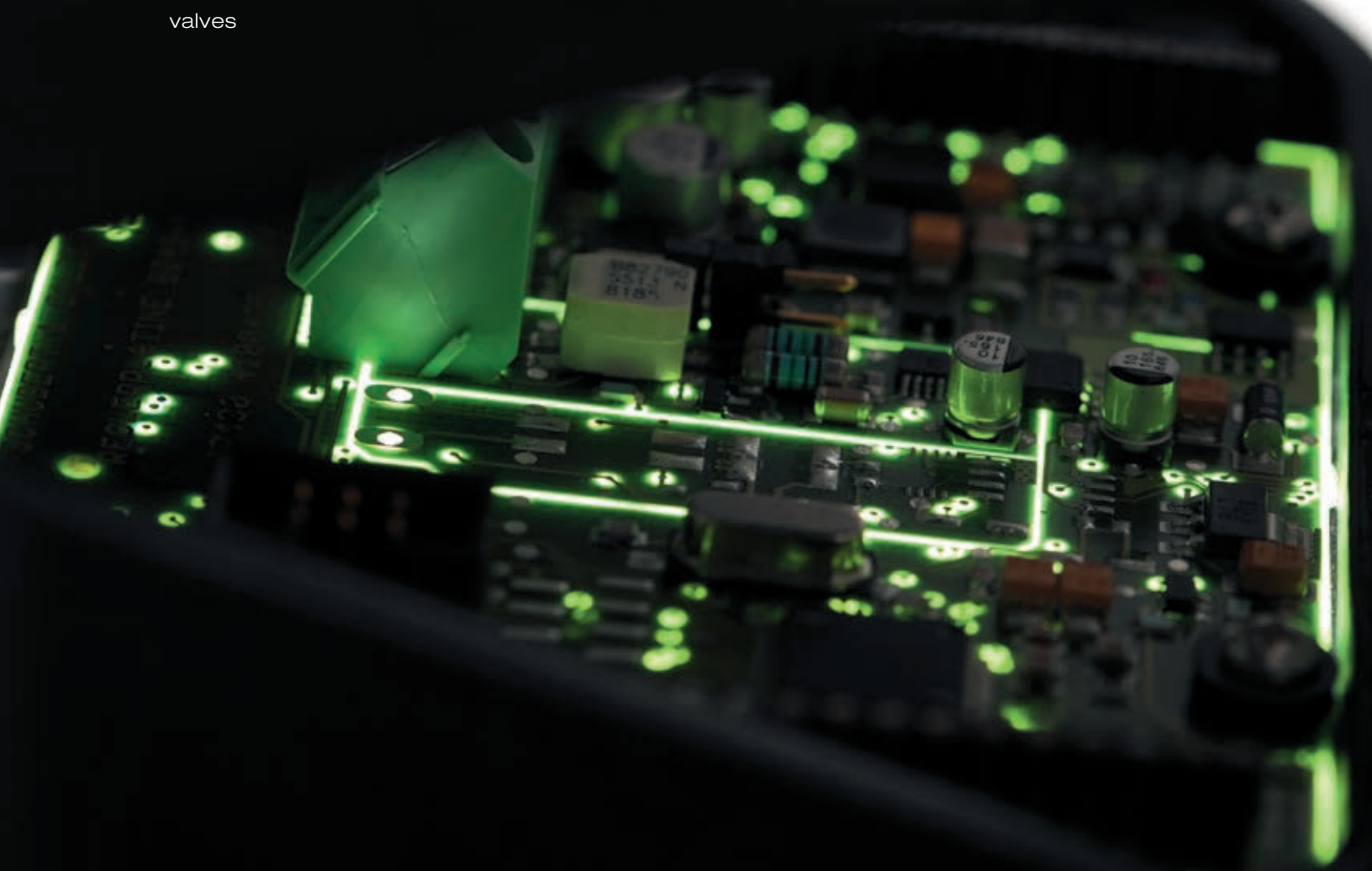
Nominal size: 1/2" - 8"
 Nominal pressure: ANSI Class 150 - 300
 Media temperature: -76°F to +662°F
 Material: carbon steel, stainless steel
 Accessories: metal bellows, pilot valve,
 limit switches, stroke limiter



Positioners by Schubert & Salzer

Compact positioners in analogue and digital versions for adaptation to pneumatic control valves

- Mounting the positioner on top of the valve actuation, no external moving parts. This increases operating efficiency, provides better control and less hysteresis
- Extremely compact, space saving design when integrating into systems
- Suitable for linear & rotary actuation
- Visual and electronic display of valve position



Digital Positioner 8049

Connections: G 1/8", NPT 1/8"

Input signal: 0/4 - 20 mA,

optional 0/2 - 10 V

Adaptation to actuator: self-learning

Adaptability: 3 - 28 mm (sliding stem),
max. 270° (rotary stem)

Versions: 2 and 4-wire

Configuration: via PC software

Ambient temperature: -20°C to +75°C /
-4°F to +167°F

Also in ATEX version

Optional feedback module available

Version for rotational actuation
available

Accessories: Set point signal

AS-i profile, Bluetooth, remote mount

Electrical connections: M12 or 1/2"

conduit

Communication Software with interface

Dongle or Bluetooth: logs Maintenance

Data and allows easy change of valve

characteristics



Digital Positioner 8049

(stainless steel)

Entirely in stainless steel

Connections: G 1/8", NPT 1/8"

Accessories: Set point signal

AS-i profile

Input signal: 0/4 - 20 mA, optional

0/2 - 10 V

Adaptation to actuator: self-learning

Stroke range: 3 - 28 mm

Versions: 2 and 4-wire

Configuration: via PC software

Ambient temperature:

-20°C to +75°C / -4°F to +167°F

Also in ATEX version



Digital Positioner 8049 IPC

Positioner with process controller with
integrated process controller

Input signal: 0/4 - 20 mA, PT-100

Sampling rate: ca. 50 ms

Set point setting: external/internal

Configuration: via PC software

Ambient temperature:

-20°C to +75°C / -4°F to +167°F



Digital position indicator 2040

Optical and electronic position

indicator for mounting on pneumatic

valves with linear or quarter turn actuator

Valve position output via switching contacts

Display of error messages

Display of maintenance intervals

Supply voltage: 24 V DC

Temperature range: -20°C to +75°C /

-4°F to +167°F

Configuration: via PC software



Positioner 8047 p/p

Input signal range:

pneumatic 3 - 15 psi

Stroke range: 5 - 22 mm / 0.2" - .87"

(depending on stroke return spring)

Pilot energy: 43 - 87 psi

Hysteresis: < +/- 1%

Air consumption: 400 - 600 NI/h

(depending on air supply)



Positioner 8047 i/p

Input signal range:

electro-pneumatic 0/4 - 20 mA

Stroke range: 5 - 22 mm / 0.2" - .87"

(depending on stroke return spring)

Pilot energy: 43 - 87 psi

Hysteresis: < +/- 1%

Air consumption: 400 - 600 NI/h

(depending on air supply)

Also in ATEX version

M12 connection



Segmented disc valves by Schubert & Salzer

Perfect and variable control with high precision over a wide flow range, this is made possible by the segmented disc valves by Schubert & Salzer.

Due to the robust design and the reciprocal flow direction, segmented disc valves are suitable for fluids, gases and steam, even those carrying a high degree of particulate. The wide range of applications includes areas such as building materials, chemical and power plants, pipelines, water and waste water treatment, and shipbuilding. A simple yet effective valve design!



Details

Analogue actuation
(such as 4-20 mA
or 3-point actuation)

Electric actuator
(customised speci-
fications possible)

Actuators available
in various voltages
and accessories

Gear rack rotating
the moving disc

Optical position
indication

Adjustable gland
nut packing

Body with space-
saving wafer design
according to DIN
(special designs
according to ANSI)

Body in stainless
steel or carbon steel
(other materials on
request)

Spring pre-tension-
ing of the sealing
disc, this means
control opposite to
the flow direction is
possible as well

Fixed disc,
protected against
rotation

The special contour
of the sealing disc
provides durability in
case of contami-
nated media

Hardened or coated
disc pairings



Functional principle of segmented disc valves

Segmented disc valves work on a very simple but effective principle.

The central throttling element - the segmented discs that rotate and seal against each other - are positioned in the valve body perpendicular to the flow direction. The fixed disc is a non-rotating element whose geometry determines the Cv and flow characteristic. The moving disc having the same number of segments is driven by a linear stem which opens and closes the segments in precise segments to regulate superior control.

The movable segmented disc is constantly pressed onto the fixed disc by a spring assembly regardless of the prevailing differential pressure. As a result, the flow can be bi-directional and the valve can be installed in any position.



This special design makes segmented disc valves one of the few valves that combine control precision even in extreme operating conditions with a high seal tightness and very low exposure to wear.

Technical information

Design	Wafer design for flanges according to DIN EN 1092-1 type B	
Nominal sizes	DN 25 to DN 300/ 1"-12" (on request up to DN 800, 32")	
Nominal pressure *	DN 25 - DN 150	PN 25 according to DIN 2401 (also suitable for flanges PN 10 - PN 25)
*Consult Factory	DN 200	PN 25 according to DIN 2401
for ANSI ratings	DN 250 - DN 300	PN 16 according to DIN 2401
Media temperature	-60°C to +220°C, -76°F to 428°F (higher temperatures on request)	
Ambient temperature*	-30°C to +100°C , -22°F to 212°F	
Rangeability	60 : 1	
Characteristic	Modified linear	
Leak rate % of C _{vs}	< 0.001, 10 X > ANSI Class IV	

* Note Limits of the positioner!

Details

Positioner

Pilot line

Diaphragm housing

Diaphragm plate

Coupling

Adjusting nut

Column

End positions

Protection tube

Serrated Linear Stem

Packing

Segment disc fixed

Segment disc moving

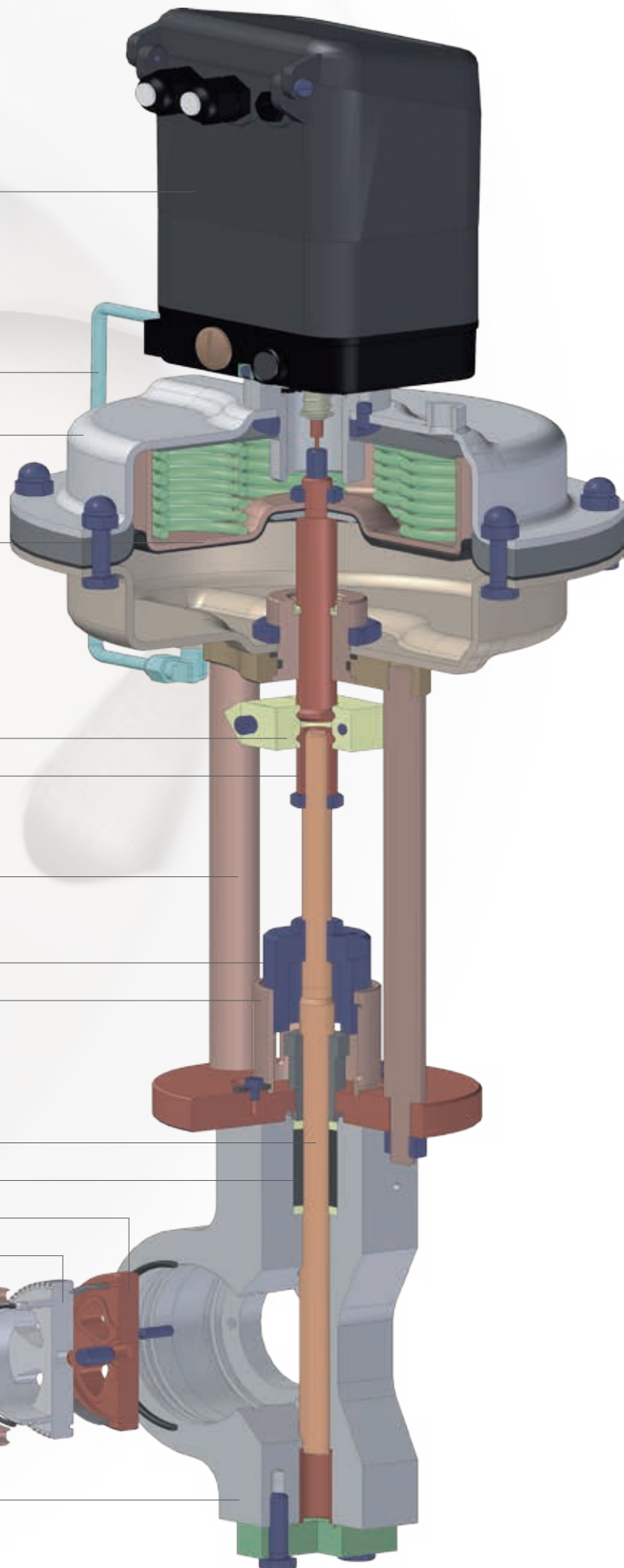
Sliding ring

Spring retainer

Circlip

Retaining ring

Body





**Segment disc valve
with pneumatic actuator 5020**

Nominal size: DN 25 - 300 (on request up to DN 800) 1" to 12", up to 32"

Nominal pressure: PN 25 (PN 16 for DN 250 and larger)

Material: Stainless steel (also available in carbon steel for 6 inch and larger)

Available with and without positioner

Positioner: pneumatic, analog electro-pneumatic, digital electro-pneumatic, Ex-i version



**Segment disc valve
with motor actuator 5030**

Nominal size: DN 25 - 300 (on request up to DN 800) 1" to 12", up to 32"

Nominal pressure: PN 25 (PN 16 for DN 250 and larger) ANSI

Material: Stainless steel (also available in carbon steel for 6 inches and larger)

Actuator: Various electrical actuators available, stop and control actuators, optional position control and position feedback plus limit switch



**Segment disc valve
with manual actuator 5050**

Nominal size: DN 25 - 200 (on request up to DN 800) 1" to 12", up to 32"

Nominal pressure: PN 25, ANSI

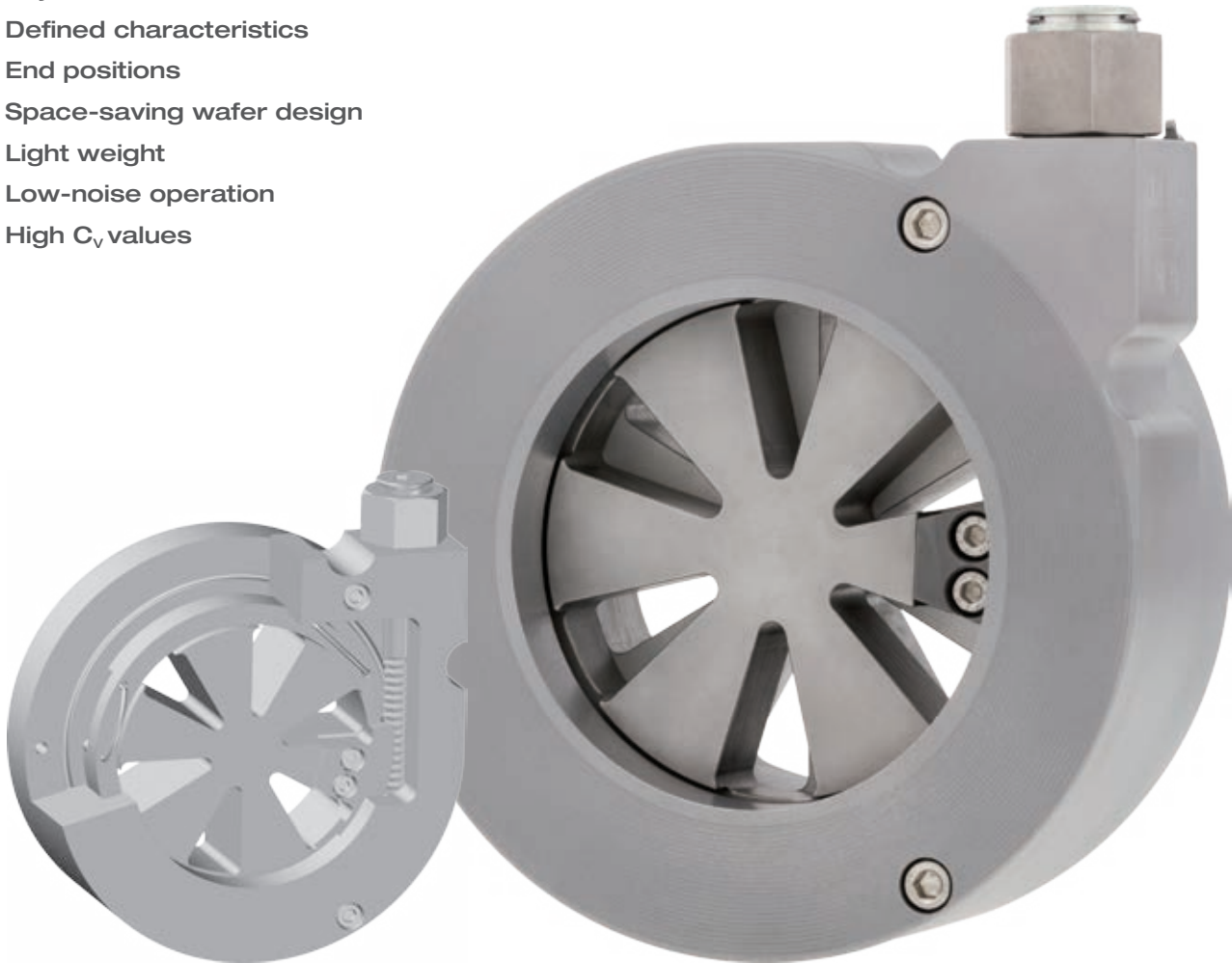
Material: Stainless steel (also available in carbon steel for 6 inch and larger)

Actuator: Smooth-running ball-bearing manual actuation

Segmented disc orifices

Adjustable orifice for the precise adjustment of a defined flow.

- Adjustable while installed
- Defined characteristics
- End positions
- Space-saving wafer design
- Light weight
- Low-noise operation
- High C_v values



Technical Information

Design		Wafer design for flanges according to DIN EN 1092-1 type B (ANSI connections upon request)
Nominal sizes		DN 15 up to DN 300, 1" to 12"
Nominal pressure		PN 16 according to DIN 2401 (also suitable for flanges PN 10), ANSI
Media temperature	Carbon steel body	-10°C to +220°C, +14°F to 428°F
	Red bronze body	-30°C to +170°C, -22°F to 338°F
Seals	NBR	-30°C to +100°C, -22°F to 212°F
	EPDM	-30°C to +140°C, -22°F to 284°F
	VITON	-15°C to +180°C, -5°F to 212°F
	PTFE	-30°C to +220°C, -22°F to 428°F

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