FLOWSERVE

TECHNICAL BULLETIN

Valtek CS - ASME

Cold Box Valve, NPS 1/2 - 8, Class 300

FCD SAENTBC740-00-A4 06/15

Experience in Motion

Valtek CS - “Cold Box Valve”

The Valtek CS product line is a globe-style, single-seat, top-entry control valve with a fabricated extension for cold box cryogenic applications to -328°F / -200°C. The bodies are designed for a minimum heat transfer and for high flow capacity with a minimum of mass to reduce boil-off on valve cool-down.

The extension design permits easy access and removal of the valve trim without breaking down the cold box. During operation, a small amount of liquefied gas passes into the extension bonnet area where it vaporizes and insulates the packing from the liquefied gas temperature. The pressure resulting from the vaporization of the liquid prevents additional liquid from passing into the bonnet area.

Housing
rib design - results in lighter weight

Packing
standard live loaded
TA-Luft / ISO 15848-1

Bonnet seal
for easy maintenance and low thermal loss

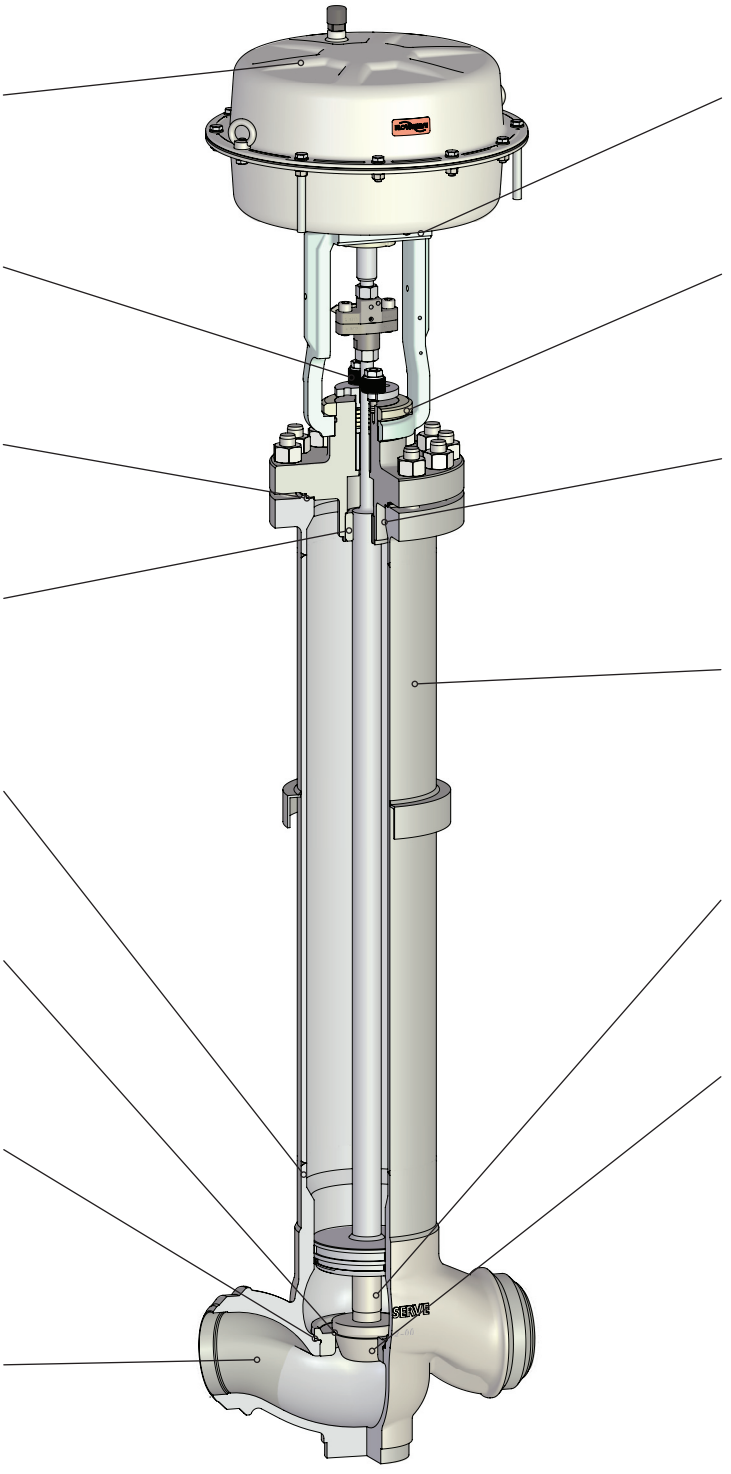
Guiding
double guided

Body
Streamlined, light-weight body for reduced heat transfer

Seat leakage
Standard
Class IV shut-off

Tight Seal
Profile ring designed for zero-leakage between seat and body

Flow passages
for smooth, nearly constant-area, high capacity and minimum turbulence



Mounting location
direct mounted positioner - no tubing

Actuator mounting
easy and versatile

Top-entry
for easy service without breaking down cold box

Cold box extension
for packing protection and to prevent icing of the stem

Single-seat
for precise throttling and tight shutoff

Contour
Precisely machined

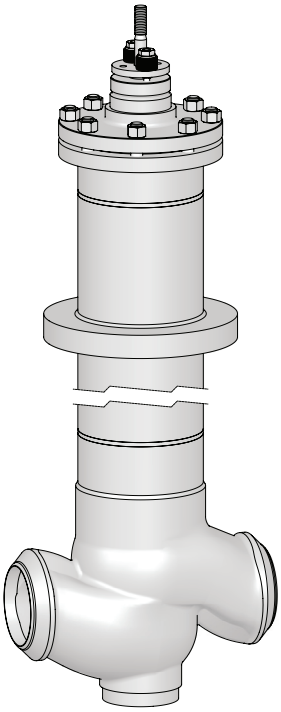
Characteristic
Excellent flow rate

Parts
interchangeable with the FlowTop - series

Valtek CS - Advantages

Cold Box - Design	Designed for air separation units (ASU), mainly for O_2 capability; easy to clean; butt weld design; in accordance with EC/DIN standards, adapted for ASME application; additional imperial units for information only.
Easy of Maintenance	The top entry design allows the valve body to remain in line whilst the trim is changed or replaced.
Modular Trim - Design	Mounting position with installation angle ≥ **25°** with vented design Mounting position with installation angle < **25°** with plug seal design
Stem guided	One solid guide on top and a PTFE guiding ring on bottom stabilise the stem and plug during valve travel and minimizes vibration and wear.
Dynamic Stability	Solid, sturdy plug head guiding minimizes vibration and wear.
Proven Design	The function principle is based on the proven design of Valtek Mark 6 and the Sereg Top 200.
Low Noise and Anti - Cavitation Trim	Multi - Hole Plug, RLS (Multi-Step Radial perforated Plug Design), reducing noise levels generated by vapors and gases and eliminating cavitation.
Versatile Packing Configuration	Available in braided PTFE - Quality Supplier / O_2. Live loading kits are retrofittable without any modification to the valve.
Fugitive Emission Packing	Environmental packing design is available in accordance with “TA-Luft” or ISO 15848-1 up to + 482 °F (+ 250 °C) operating temperature.
Wide Variety of Trim Sizes	Up to 17 cv values per valve size.
Multifunction Yoke	The standard multifunction yoke is designed to accept all of the standard mountings available on the market including NAMUR (IEC 534.6) and the direct VDI / VDE 3847 / 3845 mounting.
High-Thrust Diaphragm	The actuator is compact, light weight and suitable for up to 87 psi (6 bar) air supply; multiple spring combinations reduces installation size and initial expenditure.
Field Reversible Actuator	Failure mode is easily reversed, using standard equipment.
Certifications and Approvals *(sample)*	Quality assurance system certificated according to EN ISO 9001:2000 inc. product development. EC-Type-Examination according to PED 97/23/EC Module B + D ATEX - Valve and pneumatic actuator are a "equipment without its own potential source of ignition (BOPZ)" and do not therefore fall under the definition in the scope of Directive 94/9/EC TA-Luft - Certificate and Fugitive Emission according ISO 15848-1 SIL - Certificate according IEC 61508 TR CU - Certificate according to Directive TR CU 010/2011 (GOST-R) Machinery Directive CSA on request

Body Design - “Three Flange”

Body Design	Type (Body) / Size		Body Material	Bonnet Design	Packing Design	Trim Design
3-Flange	**DW . . .** Welded Class 300 NPS Size 0.5 1 1.5 2 3 4 6 8		A351CF8M	**Vented Design** VN Standard Bonnet **Plug Seal Design** CN Standard Bonnet *see page 5*	**adjustable** A PTFE Y Oxygen **spring loaded** N PTFE Q PTFE TA-Luft W Oxygen *see page 6*	**Parabolic Plug** PON Standard POD Partial Stellited POK Contour Stellited POW Soft Seated POC Soft Seated **Disk Plug** TON Standard TOW Soft Seated TOC Soft Seated **Multi-Hole Plug** LON Standard LOW Soft Seated LOC Soft Seated **Special Trim Equipment** *see page 10 or* Special Brochure

Body Connecting Design - “Detail”

Body Design	Type (Body)		Norm
3-Flange	. **W** . . . Welded		according to **ASME B16.25 - 2012 2a** - Schedule 40

Body Pressure - Temperature Ratings

ANSI Class	Body Material	Service Temperature in	°F	-328	-238	-148	-76	14	122	212	302	392	482
			°C	-200	-150	-100	-60	-10	50	100	150	200	250
300	A351 CF8M	MAWP [1] in following ASME B16.34-2013	psi	720	720	720	720	720	698	620	560	515	480
			bar	49,6	49,6	49,6	49,6	49,6	48,1	42,2	38,5	35,7	33,4

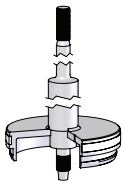
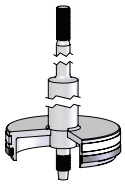
NOTICE → according to the relevant version of standards !

[1] MAWP = Maximum Allowable Working Pressure

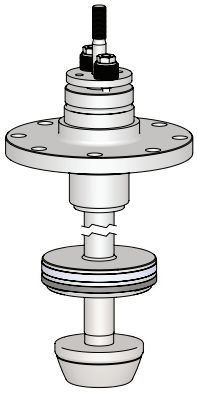
Working Temperature Range Depending on Body / Bonnet / Packing in °F & °C

Body Material	Bonnet Design		Adjustable Packing		Spring Loaded Packing		
			A	Y	N	Q	W
			PTFE	Oxygen	PTFE	PTFE TA-Luft	Oxygen
A351 CF8M	**VN** Standard Bonnet - Vented Design	°F	- 328 to 482	- 328 to 392	- 328 to 482	- 328 to 482	- 328 to 392
		°C	- 200 to 250	- 200 to 200	- 200 to 250	- 200 to 250	- 200 to 200
	CN Standard Bonnet - Plug Seal Design	°F	- 328 to 482	- 328 to 392	- 328 to 482	- 328 to 482	- 328 to 392
		°C	- 200 to 250	- 200 to 200	- 200 to 250	- 200 to 250	- 200 to 200

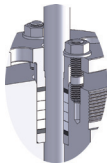
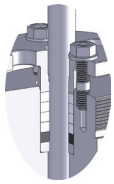
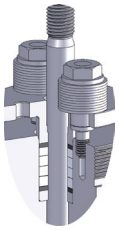
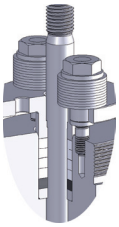
Trim Design - Vented or Plug Seal for NPS Size 1/2 - 8

Design	Type (Trim)		Material	Temperature Range	Application	Packing Design
Vented	. . **V** . . Vented Design		depending on body material A351 CF8M → **316SS**	- 328 to 482 °F - 200 to 250 °C *see also Working Temperature Range on Page 4 - 5*	for air separation plants with installation angle between the valve main axis and the horizontal of ≥ **25°**.	**adjustable** A PTFE Y Oxygen **spring loaded** N PTFE Q PTFE TA-Luft W Oxygen *see page 6*
Plug Seal	. . **C** . . Plug Seal Design		depending on body material A351 CF8M → **316SS**	- 328 to 482 °F - 200 to 250 °C *see also Working Temperature Range on Page 4 - 5*	for air separation plants with installation angle between the valve main axis and the horizontal of < **25°**.	**adjustable** A PTFE Y Oxygen **spring loaded** N PTFE Q PTFE TA-Luft W Oxygen *see page 6*

Bonnet Design - for NPS Size 1/2 - 8

Bonnet Design	Type (Bonnet)		Material	Temperature Range	Application	Packing Design
Standard	. . . **N** . Standard Bonnet		depending on body material A351 CF8M → **316SS**	- 328 to 482 °F - 200 to 250 °C *see also Working Temperature Range on Page 4 - 5*	Universal use	**adjustable** A PTFE Y Oxygen **spring loaded** N PTFE Q PTFE TA-Luft W Oxygen *see page 6*

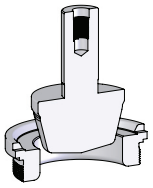
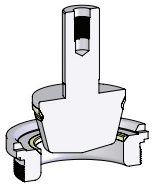
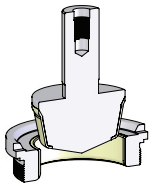
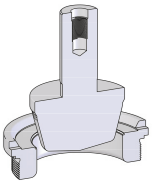
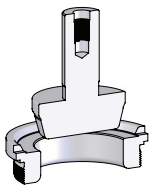
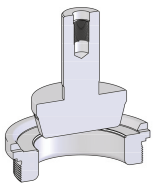
Packing Design - "Detail"

Packing Design	Type (Packing)		Material	Temperature Range	Application	Approvals
adjustable	. . . . **A** PTFE		**Packing Rings** Braided PTFE-Yarn impregnated with PTFE-Dispersion **Chamber Washers** PTFE-Carbon	- 328 to 482 °F - 200 to 250 °C *see also Working Temperature Range on Page 4 - 5*	Universal chemical resistance.	FMPA for food application
	. . . . **Y** Oxygen		**Packing Rings** Braided Graphite resp. 100% PTFE silk yarns, impregnated with PTFE-Dispersion	- 328 to 392 °F - 200 to 200 °C *see also Working Temperature Range on Page 4 - 5*	Oxygen service only!	BAM for gaseous oxygen hence the packing is on top of the valve. It can be assumed that the state of matter is always gaseous at the packing. Therefore the packing is also suitable for lox → liquid oxygen
spring loaded	. . . . **N** PTFE		**Packing Rings** Braided PTFE-Yarn impregnated with PTFE-Dispersion **Chamber Washers** PTFE-Carbon	- 328 to 482 °F - 200 to 250 °C *see also Working Temperature Range on Page 4 - 5*	Universal chemical resistance.	FMPA for food application
	. . . . **Q** PTFE "TA-Luft"		**Packing Rings** Braided Carbon-Yarn, covered with a sleeve of impregnated and lubricated PTFE-Yarn **Chamber Washers** PTFE-Carbon	- 328 to 482 °F - 200 to 250 °C *see also Working Temperature Range on Page 4 - 5*	Universal chemical resistance.	TA-Luft ISO 15848-1
	. . . . **W** Oxygen		**Packing Rings** Braided Graphite resp. 100% PTFE silk yarns, impregnated with PTFE-Dispersion	- 328 to 392 °F - 200 to 200 °C *see also Working Temperature Range on Page 4 - 5*	Oxygen service only!	BAM for gaseous oxygen hence the packing is on top of the valve. It can be assumed that the state of matter is always gaseous at the packing. Therefore the packing is also suitable for lox → liquid oxygen

Rangeability

Rangeability		Seat Diameter																				
	mm	4	6	8	10	12	16	20	25	34	40	42	50	53	67	80	84	100	105	125	130	150
	in	0.16	0.24	0.31	0.39	0.47	0.63	0.79	0.98	1.34	1.57	1.65	1.97	2.09	2.64	3.15	3.31	3.94	4.13	4.92	5.12	5.91
Standard	1 : 50	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Special	1 : 70	•	•	•	•	•	•	•														
	1 : 100								•	•	•	•	•	•	•	•	•	•	•	•	•	•

Trim Design - "Standard"

Type (Trim) / Material			Medium		Flow	max. allowable Differential Pressure	Noise Reduction
Parabolic Plug Characteristic: . . . . . **G** . ↓ mod. equal per. . . . . **L** . ↓ linear	**PON** . . . . standard 316SS or 1.4571		• clean • marginally contaminated with particles • low clogging potential for dirty service	gases, vapors and liquids	. . . . . **G** Flow direction **under** the plug	$\Delta p_l < x_{FZ} \cdot (p_1 - p_V)$ $\Delta p_c < x_T \cdot p_1$	none - noise reduction with Special Trim Equipment or Noise Insulating provided by customer
	POD . . . . partial stellited (seat surface) 316SS or 1.4571					$\Delta p_l < (x_{FZ}+0{,}10) \cdot (p_1 - p_V)$ $\Delta p_c < x_T \cdot p_1$	
	POK . . . . full stellited (contour) 316SS or 1.4571					$\Delta p_l < (x_{FZ}+0{,}15) \cdot (p_1 - p_V)$ $\Delta p_c < x_T \cdot p_1$	
	POW . . . . soft seated - 76 °F to + 482 °F - 60 °C to + 250 °C 316SS or 1.4571 + PTFE					$\Delta p_l < x_{FZ} \cdot (p_1 - p_V)$ $\Delta p_c < x_T \cdot p_1$	
	POC . . . . soft seated - 328 °F to + 302 °F - 200 °C to + 150 °C 316SS or 1.4571 + PCTFE						
Disk Plug with Throttle Lip Characteristic: . . . . . **A** . ↓ On / Off	**TON** . . . . standard 316SS or 1.4571				. . . . . **G** Flow direction **under** or . . . . . **I** **over** the plug	$\Delta p < MAWP$	
	TOW . . . . soft seated - 76 °F to + 482 °F - 60 °C to + 250 °C 316SS or 1.4571 + PTFE						
	TOC . . . . soft seated - 328 °F to + 302 °F - 200 °C to + 150 °C 316SS or 1.4571 + PCTFE						

Characteristic values of incompressible fluids $\Delta p_l \rightarrow x_{FZ} \rightarrow 0{,}79 - 0{,}24$ respectively compressible fluids $\Delta p_c \rightarrow x_T \rightarrow 0{,}82 - 0{,}61$ according to Flowserve Villach Operation (see also VDI/VDE 2173)

Noise Reduction Trim Sets see Page 10 and Special Brochure

Contoured Plug

Characteristic: linear

[1] W = PTFE (- 60 °C to + 250 °C)
C = PCTFE (- 200 °C to + 150 °C)

Capacity		Seat Ø		Material / Design					Possible seat diameter depends on nominal port size NPS							
				316SS or 1.4571					0.5	1	1.5	2	3	4	6	8
cv	kvs	in	mm	N	D	K	W [1]	C [1]								
gpm	m³/h			standard	partial stellited	full stellited	soft seated		Stroke = 20 mm / 0.79 in				40 / 1.57		60 / 2.36	80 / 3.15
0.18	0,16	0.16	4			●			●	●						
0.29	0,25	0.16	4			●			●	●						
0.46	0,40	0.16	4	●		●			●	●						
0.73	0,63	0.24	6	●		●	●		●	●						
1.16	1,0	0.31	8	●		●	●		●	●						
1.8	1,6	0.31	8	●		●	●		●	●						
2.9	2,5	0.39	10	●		●	●		●	●						
4.6	4,0	0.47	12	●	●	●	●		●	●						
6.5	5,6	0.63	16	●	●	●	●		●							
7.3	6,3	0.63	16	●	●	●	●			●	●					
11.6	10	0.79	20	●	●	●	●			●	●	●				
16.2	14	0.98	25	●	●	●	●			●						
18.5	16	0.98	25	●	●	●	●				●	●				
29	25	1.34	34	●	●	●	●				●	●				
36	31,5	1.57	40	●	●	●	●				●					
46	40	1.65	42	●	●	●	●					●	●			
55	47,5	1.97	50	●	●	●	●					●				
73	63	2.09	53	●	●	●	●						●	●		
116	100	2.64	67	●	●	●	●						●	●	●	
145	125	3.15	80	●	●	●	●						●			
185	160	3.31	84	●	●	●	●							●	●	
208	180	3.94	100	●	●	●	●							●		
231	200	3.94	100	●	●	●	●									●
289	250	4.13	105	●	●	●	●								●	
410	355	4.92	125	●	●	●	●									●
410	355	5.12	130	●	●	●	●								●	
520	450	5.91	150	●	●	●	●									●

Multi hole Plug

Characteristic: linear

Capacity		Seat Ø		Material / Design	Possible seat diameter depends on nominal port size NPS							
				1.4571	0.5	1	1.5	2	3	4	6	8
cv	kvs	in	mm	N								
gpm	m³/h			tenifer treated	Stroke = 20 mm / 0.79 in				40 / 1.57		60 / 2.36	80 / 3.15
2.9	2,5	0.79	20	●	●	●						
4.6	4,0	0.79	20	●	●	●						
7.3	6,3	0.79	20	●		●	●					
11.6	10	0.98	25	●		●	●	●				
18.5	16	1.34	34	●			●	●				
29	25	1.57	40	●			●					
29	25	1.65	42	●				●				
41	35,5	1.97	50	●				●				
73	63	2.09	53	●					●			
104	90	2.64	67	●					●	●		
116	100	3.15	80	●					●			
145	125	3.31	84	●						●		
185	160	3.31	84	●							●	
162	140	3.94	100	●						●		
231	200	4.13	105	●							●	
231	200	3.94	100	●								●
364	315	4.92	125	●								●
324	280	5.12	130	●							●	

Contoured Plug

Characteristic: modified - equal percentage

[1] W = PTFE (- 60 °C to + 250 °C)
C = PCTFE (- 200 °C to + 150 °C)

Capacity		Seat Ø		Material / Design					Possible seat diameter depends on nominal port size NPS							
				316SS or 1.4571					0.5	1	1.5	2	3	4	6	8
cv	kvs	in	mm	N	D	K	W [1]	C [1]								
gpm	m³/h			standard	partial stellited	full stellited	soft seated		Stroke = 20 mm / 0.79 in				40 / 1.57		60 / 2.36	80 / 3.15
0.18	0,16	0.16	4			●			●	●						
0.29	0,25	0.16	4			●			●	●						
0.46	0,40	0.16	4	●		●			●	●						
0.73	0,63	0.24	6	●		●	●		●	●						
1.16	1,0	0.31	8	●		●	●		●	●						
1.8	1,6	0.31	8	●		●	●		●	●						
2.9	2,5	0.39	10	●		●	●		●	●						
4.6	4,0	0.47	12	●	●	●	●		●	●						
6.5	5,6	0.63	16	●	●	●	●		●							
7.3	6,3	0.63	16	●	●	●	●			●	●					
11.6	10	0.79	20	●	●	●	●			●	●	●				
16.2	14	0.98	25	●	●	●	●			●						
18.5	16	0.98	25	●	●	●	●				●	●				
29	25	1.34	34	●	●	●	●				●	●				
36	31,5	1.57	40	●	●	●	●				●					
46	40	1.65	42	●	●	●	●					●	●			
55	47,5	1.97	50	●	●	●	●					●				
73	63	2.09	53	●	●	●	●						●	●		
116	100	2.64	67	●	●	●	●						●	●	●	
145	125	3.15	80	●	●	●	●						●			
185	160	3.31	84	●	●	●	●							●	●	
208	180	3.94	100	●	●	●	●							●		
231	200	3.94	100	●	●	●	●									●
289	250	4.13	105	●	●	●	●								●	
410	355	4.92	125	●	●	●	●									●
410	355	5.12	130	●	●	●	●								●	
520	450	5.91	150	●	●	●	●									●

Multi hole Plug

Characteristic: modified - equal percentage

Capacity		Seat Ø		Material / Design	Possible seat diameter depends on nominal port size NPS							
				1.4571	0.5	1	1.5	2	3	4	6	8
cv	kvs	in	mm	N								
gpm	m³/h			tenifer treated	Stroke = 20 mm / 0.79 in				40 / 1.57		60 / 2.36	80 / 3.15
2.9	2,5	0.79	20	●	●	●						
4.6	4,0	0.79	20	●	●	●						
7.3	6,3	0.79	20	●		●	●					
11.6	10	0.98	25	●		●	●	●				
18.5	16	1.34	34	●			●	●				
23	20	1.57	40	●			●					
29	25	1.65	42	●				●				
32	28	1.97	50	●				●				
65	56	2.09	53	●					●			
82	71	2.64	67	●					●	●		
92	80	3.15	80	●					●			
116	100	3.31	84	●						●		
145	125	3.31	84	●							●	
129	112	3.94	100	●						●		
185	160	4.13	105	●							●	
231	200	3.94	100	●								●
324	280	4.92	125	●								●
231	200	5.12	130	●							●	

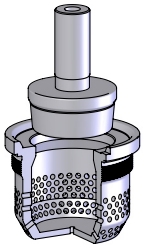
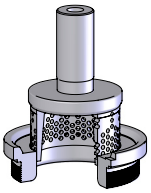
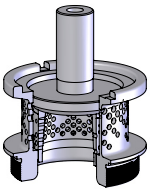
Disk Plug with Throttle Lip

Characteristic: on / off

[1] W = PTFE (- 60 °C to + 250 °C)
C = PCTFE (- 200 °C to + 150 °C)

Capacity		Seat Ø		Guide of Plug	Material / Design			Possible seat diameter depends on nominal port size NPS							
					316SS or 1.4571			0.5	1	1.5	2	3	4	6	8
cv	kvs	in	mm		N	W [1]	C [1]								
gpm	m³/h				standard	soft seated		Stroke = 20 mm / 0.79 in				40 / 1.57		60 / 2.36	80 / 3.15
7.3	6,3	0.63	16	1	•	•	•	•							
18.5	16	0.98	25	1	•	•	•		•						
41	35,5	1.57	40	1	•	•	•			•					
61	53	1.97	50	1	•	•	•				•				
162	140	3.15	80	1	•	•	•					•			
231	200	3.94	100	1	•	•	•						•		
462	400	5.12	130	1	•	•	•							•	
728	630	5.90	150	1	•	•	•								•

Special Trim Equipment - Details see Special Brochure SAENBRNOIS-00

Type (Trim) Characteristic . . . . . **G** . → mod. equal per. or . . . . . **L** . → linear			Medium		Flow	Differential Pressure	Noise Reduction
MultiStream	**PI**		• clean • marginally contaminated with particles • low clogging potential for dirty service	Liquids	. . . . . **G** Flow direction **under** the plug	Type P . N P . W P . C $\Delta p_l < x_{FZ} \cdot (p_1 - p_V)$ Type P . D $\Delta p_l < (x_{FZ} + 0{,}10) \cdot (p_1 - p_V)$ Type P . K $\Delta p_l < (x_{FZ} + 0{,}15) \cdot (p_1 - p_V)$	max. - 8 dB(A)
Multi Hole Plug	**LO**		• clean • high clogging potential for dirty service	Gases, Vapors and Liquids	. . . . . **G** Flow direction **under** or . . . . . **I** **over** the plug for Gases and Vapors . . . . . **G** Flow direction **over** the plug for Liquids only	$\Delta p_l < (x_{FZ} + 0{,}20) \cdot (p_1 - p_V)$ $\Delta p_c < x_T \cdot p_1$	max. - 15 dB(A)
RLS Radial Multi-Step System	**AO**						max. - 30 dB(A)

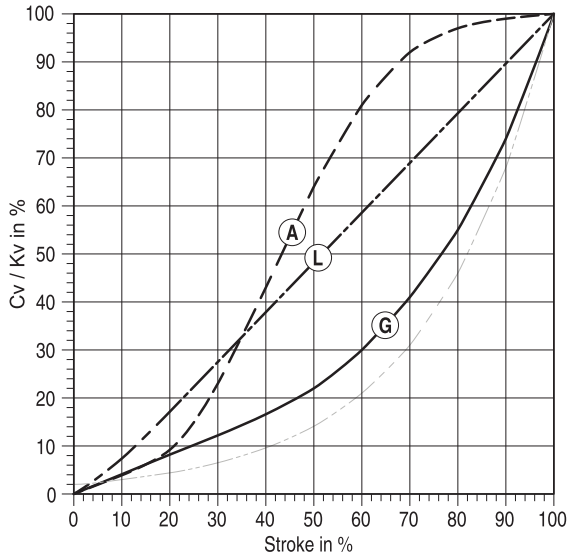
NOTICE → expert knowledge is required for the selection of Trim! The specified datas are used for a rough orientation only and may not taken for dimensioning !

Seat Leakage

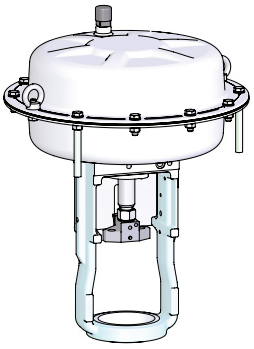
Ø d = Seat Ø
LF = Leakage Factor see Standard IEC 60534-4 Table 3, Remark 2 or ANSI / FCI 70-2-2006 Table 2

Standard	Balancing	Plug Code		Leakage Class	Test Medium	Test Pressure	max. Seat Leakage	Leakage Code
IEC 60534-4:2007-06 resp. ANSI / FCI 70-2-2006	Without	metal to metal seated	. . . **D** . . .	IV	Gas	Operating Pressure, max. 3,5 bar	0,000 1 · kvs	IV G 1
						Operating Pressure, max. 50.7 psi	0.000 1 · cv	
		metal to metal seated increased seal force	. . . **F** . . .	V	Gas	Operating Pressure, max. 3,5 bar	0,000 010 8 · Ø d	V G 1
						Operating Pressure, max. 50.7 psi		
		soft seated	. . . **T** . . .	VI	Gas	Operating Pressure, max. 3,5 bar	0,3 · Δp · LF	VI G 1
						Operating Pressure, max. 50.7 psi		
EN 12266-1:2012-04		soft seated	. . . **B** . . .	P12	Gas	Operating Pressure, max. 6 bar	no visually leakage	A

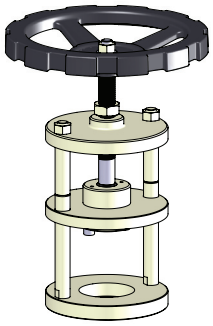
Valve Characteristic

Type (Trim)	**Application**
	**G Modified equal percentage Flow Characteristic** • The equal percentage characteristic is used for highly changeable differential pressure. • A "soft" inlet characteristic alleviates pressure impulses for short closing times. • The equal percentage characteristic relates equal increments of travel to equal percentage increments of the corresponding Cv / Kv-value. • The equal percentage characteristic is recommended for a pressure ratio of $\Delta p_0 / \Delta p_{100} > 2$ • **L Linear Flow Characteristic** • The linear characteristic is used for constant differential pressure under different loads. • The linear characteristic relates equal increments of travel to equal increments of the Cv / Kv-value. • The linear characteristic is recommended for a pressure ratio of $\Delta p_0 / \Delta p_{100} > 1 < 2$ **A On / Off Flow Characteristic with Throttle Lip** • On / Off characteristic is mainly used for closing operations. • The stroke of the On / Off characteristic shows an approximate linear run up to a 1/4 of the seat diameter and furthermore enables the full flow area when open.

Actuator - "Linear Style"

Actuator Design	**Type** (Actuator) / **Size**		**max. Force**	**Air / Power Supply**	**Failure Position**	**Hand Wheel**
pneumatic operated	**IT** 253 503 701 **PB** 253 503 701 1502 3002 Manufacturer: **Flowserve Villach Operation**		250 N ÷ 39 000 N depending on Actuator Size	1,2 bar ÷ 6,0 bar depending on Actuator Size	Stem • retracted • extended	• without • top mounted (option) • side mounted (option) depending on Actuator Size

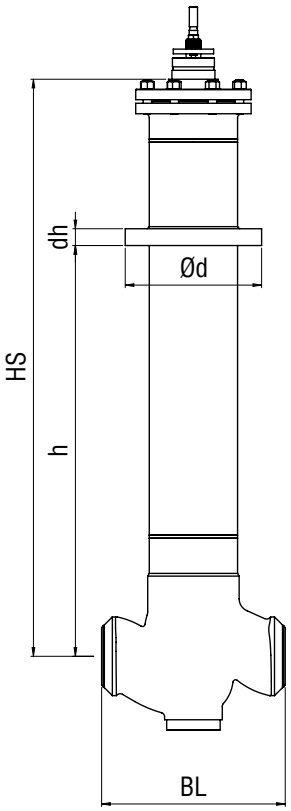
Actuator - "Linear Style"

Actuator Design	**Type / Size**		**max. Force**	**Power Supply**	**Failure Position**	**Hand Wheel**
hand operated	**HB** 12 16 20 Manufacturer: **Flowserve Villach Operation**		13 00 N ÷ 30 000 N depending on Actuator Size	bi-manual Hand operating Force 200 N	Stem • locked	• top mounted

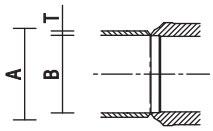
Dimensions and Weights

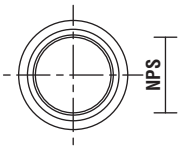
(Values in Millimeter → mm respectively Kilogram → kg)

Description			Nominal Port Size NPS							
			0.5	1	1.5	2	3	4	6	8
			Stroke = 20 mm / 0.79 in				40 / 1.57		60/2.36	80/3.15
BL	FTF Dimension acc. to ANSI/ISA-75.08.05-2002 L		203	210	251	286	337	394	508	610
Ød	Cover-plate Diameter (mm)		130	130	165	165	200	260	280	260
dh	Cover-plate Height (mm)		38	38	38	38	32	32	20	32
≈ Height	H_S	for Standard Bonnet (mm)	800	800	800	900	900	1100	1100	1100
	h	for Cover-plate (mm)	635	635	660	660	625	815	800	840
≈ Weight		for Standard Bonnet (kg)	14	14	24	27	64	94	182	283
Welded ends comply with			ASME B16.25-2012 2a in Millimeters							
BL	FTF Dimension acc. to ANSI/ISA-75.08.05-2002 L		8.00	8.25	9.88	11.25	13.25	15.50	20.00	24.00
Ød	Cover-plate Diameter (inch)		5.12	5.12	6.50	6.50	7.87	10.24	11.02	10.24
dh	Cover-plate Height (inch)		1.50	1.50	1.50	1.50	1.26	1.26	0.79	1.26
≈ Height	H_S	for Standard Bonnet (inch)	31.50	31.50	31.50	35.43	35.43	43.30	43.30	43.30
	h	for Cover-plate (inch)	25.00	25.00	25.98	25.98	24.61	32.09	31.50	33.07
≈ Weight		for Standard Bonnet (lbs)	30.9	30.9	52.9	59.5	141.1	207.2	401.2	623.9



Preferred Dimensions of Body Welding Ends

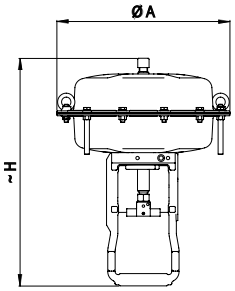




Nominal Port Size NPS			0.5	1	1.5	2	3	4	6	8
Class 300	A	Valve Outside Diameter (mm)	22	35	50	62	91	117	172	223
	B	Valve Inside Diameter (mm)	B = øD - 2xT							
	D	Pipe Outside Diameter (mm)	21,3	33,4	48,3	60,3	88,9	114,3	168,3	219,1
	T	Pipe Thickness (mm)	2,77	3,38	3,68	3,91	5,49	6,02	7,11	8,18
Connecting Dimensions according to ASME B16.25-2012 2a - Schedule 40 in Millimeters										
Class 300	D	Pipe Outside Diameter (inch)	0.840	1.315	1.900	2.375	3.500	4.500	6.625	8.625
	T	Pipe Thickness (inch)	0.109	0.133	0.145	0.154	0.216	0.237	0.280	0.322

Pneumatic Linear Actuator
with multi-function Yoke

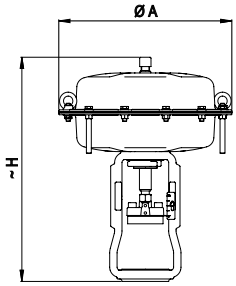
Description	Area (cm²)	250		500				700			
	Stroke mm	20				40		20		40	
Ø A	(mm / inch)	265	10.4	352	10.4	352	10.4	405	15.9	405	15.9
≈ H	(mm / inch)	335	13.2	455	17.9	560	22.0	545	21.5	550	21.7
≈ Weight	(kg / lbs)	16	35.3	31	68.3	40	88.2	46	101	46	101



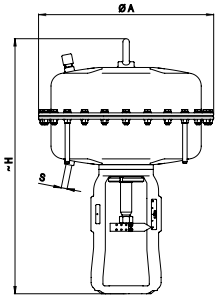
Pneumatic Linear Actuator
with NAMUR-Yoke

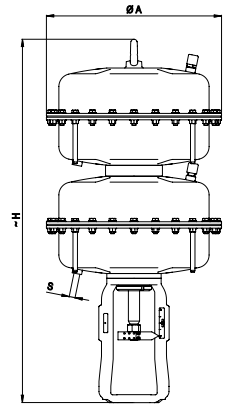
Description	Area (cm²)	250		500				700					
	Stroke mm	20		20		40		20		40		60	
Ø A	(mm / inch)	265	10.4	352	10.4	352	10.4	405	15.9	405	15.9	405	15.9
≈ H	(mm / inch)	330	13.0	420	16.5	450	17.7	545	21.5	545	21.5	600	23.6
≈ Weight	(kg / lbs)	16	35.3	31	68.3	40	88.2	46	101	46	101	46	101

All further information see Technical Bulletin - FlowAct !



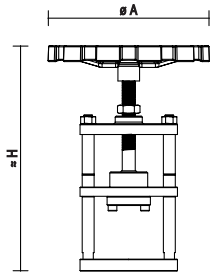
Description	Area (cm²)	1500		3000	
	Stroke mm	20 / 40 / 60 / 80		40 / 60 / 80	
Ø A	(mm / inch)	548	21.6	548	21.6
≈ H	(mm / inch)	800	31.5	1140	44.9
≈ Weight	(kg / lbs)	124	273	240	529





Manual Operation

Description	Manual Operation	HB 12		HB 16		HB 20	
	Stroke mm	20		40		60 / 80	
Ø A	(mm / inch)	300	11.8	300	11.8	400	15.7
≈ H	(mm / inch)	400	15.7	450	17.7	480	18.9
≈ Weight	(kg / lbs)	17	37.5	17	37.5	18	39.7



Cold Box Control Valve - Valtek CS order code

Valtek CS			Type						Size	PN	Body material / Certificate					Plug							Seat	cv	Trim
			C726	D	W	V	N	A	2"	300	A351CF8M	O	O	A	O	P	O	N	D	1	G	G	42	46	316SS
Body design	globe style			**D**																					
Butt welding end	acc. to ASME B16.25-2012 2a				**W**																				
Mounting position	installation angle ≥ **25°**					**V**																			
	installation angle < **25°**						**C**																		
Bonnet	Standard bonnet							**N**																	
Stuffing box packing	adjustable PTFE-rings							**A**																	
	adjustable Graphite + PTFE-rings, Oxygen only							**Y**																	
	spring loaded PTFE-rings							**N**																	
	spring loaded PTFE-rings, TA-Luft							**Q**																	
	spring loaded Graphite + PTFE-rings, Oxygen only							**W**																	
Nominal Size	1/2" - 1" - 1 1/2" - 2" - 3" - 4" - 6" - 8"							**1/2" - 8"**																	
Nominal pressure		Class								**300**															
Body material		ANSI								**A351 CF8M**															
Regulation for material	PED											**O**													
	PED & AD 2000											**A**													
Material certificate	without												**O**												
	EN 10204	2.2											**Z**												
		3.1 with list of certificates of body & bonnet (without CMTR)											**B**												
		3.1 with copy of certificates (CMTR of body & bonnet)											**D**												
		3.1 with copy of certificates (CMTR of body & bonnet & bolting)											**E**												
		3.1 with copy of certificates (CMTR of body & bonnet & bolting & trim)											**H**												
		3.2											**A**												
Regulation for final test	EN 1349	IEC 534 / FCI 70-2												**A**											
	according to customer specification													**M**											
Final test certificate	without														**O**										
	EN 10204	2.2													**Z**										
		3.1													**B**										
		3.2													**A**										
Plug type	Contoured plug	control service														**P**									
	Multi-hole plug	control service, noise reduction max. - 15 dB(A)														**L**									
	Multi-step system	control service, noise reduction max. - 30 dB(A)														**A**									
	Disk plug	on / off service														**T**									
Trim equipment	without	additional trim equipment															**O**								
	One-stage	for liquid service	MultiStream, noise reduction max. - 6 dB(A)														**I**								
Plug and seat design	standard (Multi-hole plug - tenifer treaded)																	**N**							
	Seat surface - Alloy 6																	**D**							
	Full contour - Alloy 6																	**K**							
	Soft seat - PTFE, for - 60 °C to + 250 °C																	**W**							
	Soft seat - PCTFE, for - 200 °C to + 150 °C																	**C**							
Seat leakage	Class IV	IEC / FCI	Test medium	Gas															**D**						
	Class V	IEC / FCI		Gas															**F**						
	Class VI	IEC / FCI		Gas															**T**						
	Class P12	EN		Gas															**B**						
Plug guiding	Double stem guided / Cage guided with pressure balanced design																			**1**					
Characteristic	Modified equal percentage																				**G**				
	Modified equal percentage - special rangeability																				**H**				
	Linear																				**L**				
	Quick opening (on-off)																				**A**				
Flow direction	Flow under the plug																					**G**			
	Flow over the plug																					**I**			
Seat diameter																							**4 - 150**		
cv - value	(gpm)																							**0.18 - 520**	
Trim material	316SS																								**316SS**

Option	O	A
Oil- and greaseless according to T007	**P**	
Oil- and greaseless for Oxygen according to T007	**O**	
SIL		**A**

Pneumatic multi spring actuator - FlowAct order code

FlowAct										Order code							
										I	T	503	B	FY	O	Z	B
Actuator design	Internal air supply									**I**							
	External air supply									**P**							
Yoke design	Multi-function yoke for Valve-Series C726										**T**						
	NAMUR yoke for Valve-Series C726										**B**						
Actuator size (cm ²/*inch* ²)	250	*38.75*	Stroke (mm/*inch*)	20	*0.79*							**253**					
	500	*77.50*		20, 40	*0.79, 1.57*							**503**					
	700	*108.50*		20, 40, 60	*0.79, 1.57, 2.36*							**701**					
	1500	*232.50*		20, 40, 60, 80	*0.79, 1.57, 2.36, 3.15*							**1502**					
	3000	*465.00*		40, 60, 80	*1.57, 2.36, 3.15*							**3002** [2]					
Color	white, powder coated												**B**				
	blue, powder coated												**A**				
	yellow, powder coated												**C**				
			Stroke (mm) [1]	Actuator	253	503	701	1502	3002								
Spring range (bar/*psi*)	0,2 - 1,0	*3 - 15*	20, 40, 60, 80	Actuator force (N)	500	1 000	1 400	3 000	6 000					**AD**			
	0,4 - 2,0	*6 - 29*	40, 60, 80					6 000	12 000					**GF**			
	0,5 - 1,9	*7 - 28*	20, 40, 60		1 250	2 500	3 500							**BL**			
	0,75 - 1,4	*11 - 20*	40, 60, 80					11 250	22 500					**KI**			
	0,8 - 1,6	*12 - 23*	20		2 000			12 000						**MU**			
	1,0 - 2,4	*15 - 35*	20, 40, 60, 80		2 500	5 000	7 000		30 000					**DY**			
	1,3 - 2,1	*19 - 30*	40, 60, 80						39 000					**EP**			
	1,5 - 2,1	*22 - 30*	20					22 500						**VP**			
	1,5 - 2,7	*22 - 39*	20, 40, 60, 80		3 750	7 500	10 500	22 500						**VC**			
	1,5 - 3,8	*22 - 55*	20, 40, 60		3 750	7 500	10 500							**VI**			
	1,8 - 2,7	*26 - 39*	20				12 600							**JC**			
	2,0 - 3,5	*29 - 51*	40, 60, 80					30 000						**FS**			
	2,0 - 4,8	*29 - 70*	20, 40, 60		5 000	10 000	14 000							**FY**			
	2,3 - 3,4	*33 - 49*	20				16 100							**TD**			
	2,6 - 4,2	*38 - 61*	40, 60, 80					39 000						**AJ**			
	3,0 - 4,2	*44 - 61*	20				21 000							**RJ**			
Handwheel	without														**O**		
	top mounted "light design"														**L**		
	top mounted "heavy design"														**H**		
	side mounted "light design"														**S** [2]		
	central mounted "heavy design"														**Z** [2]		
Safety position at air failure	spring to close															**Z**	
	spring to open															**A**	
	fail in place by spring to close															**S**	
	fail in place by spring to open															**T**	
Stroke	20	0.79															**A**
	40	1.57															**B**
	60	2.36															**C**
	80	3.15															**D**

[1] Not every spring range / stroke combination are possible for each actuator size !
[2] Contact factory !

Manual operation - order code

Manual operation						Order code			
						H	B	16	B
Design	Internal air supply					**H**			
Yoke design	NAMUR yoke for Valve-Series C726						**B**		
Size	12		Stroke (mm/*inch*)	20	*0.79*			**12**	
	16			40	*1.57*			**16**	
	20			60, 80	*2.36, 3.15*			**20**	
Stroke (mm/*inch*)	20	0.79							**A**
	40	1.57							**B**
	60	2.36							**C**
	80	3.15							**D**

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