Control Valves

In line & Angle Valves

SchuFl

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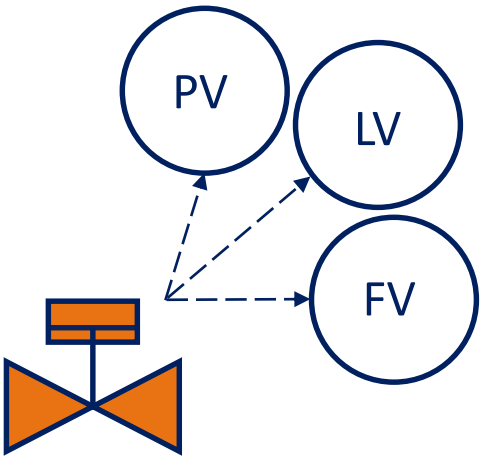
SchuF Control Valves Introduction

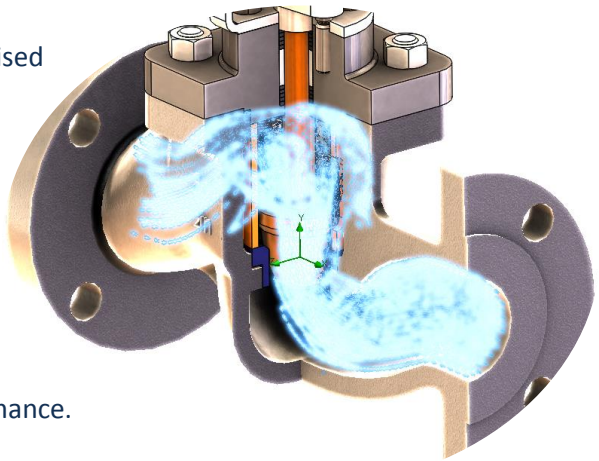
Control valves work to keep a process variable such as flow or pressure within a predefined operating range. They are often the last piece of equipment in a process loop that can compensate a load disturbance and are therefore considered critical valves.



Why choose SchuF?

The SchuF Group is an industry-renowned valve supplier with over 100 years´experience designing and manufacturing application-specific valve solutions.

SchuF has developed over 20,000 control valve variations in its hundred-year history. Each has its own specific characteristics tailored to the process control elements that are most important for it – pressure, level, flow or temperature.



SchuF has the capability to ship our unique and highly-praised valve solutions worldwide from production facilities located in Germany, India, Ireland, Italy, the United Kingdom and the United States.

SchuF has an extensive product selection with a vast and diverse range of applications, from oil production to concrete manufacture. SchuF´s skilled team of engineers and product specialists design each valve, from the ground up to meet specific application requirements and provide optimal service life and performance.

Where does SchuF use its expertise?

- **Discharge and feed** flow-control valve in **PET, PVC, PP & PE reactors**
- **Level, pressure & steam injection** control valves in **PTA processes**
- **Level control** of flashing fluid in **coal liquefaction** or **heavy oil upgrading**
- **Feed and level control** for **gasification** according to the **Siemens, Lurgi, GE** and **Shell** process licenses
- **Flow control of powder** in **fine chemical & pharmaceutical processes**
- **Resurge and flare control for gas**
- **Steam, feedwater and condensate control in power generation and Cogen/CHP facilities**
- **High-precision multi-port flow** control of **highly viscous, non linear, non-Newtonian polymer fluids**
- **Discharge flow** control valves for **urea reactors** where **urea-grade** stainless steel is mandatory
- Fully-jacketed **short-body wafer** control valves, for **Nylon and PC** production
- **Mineral processing** applications such as high-pressure acid leaching **(HPAL)**
- **Sour water** and **Amine letdown** in several **refinery** processes
- **Bio - Fuels** (Renmatix)
- **Hydrocarbon fluid separation and injection in Oil and Gas industries**

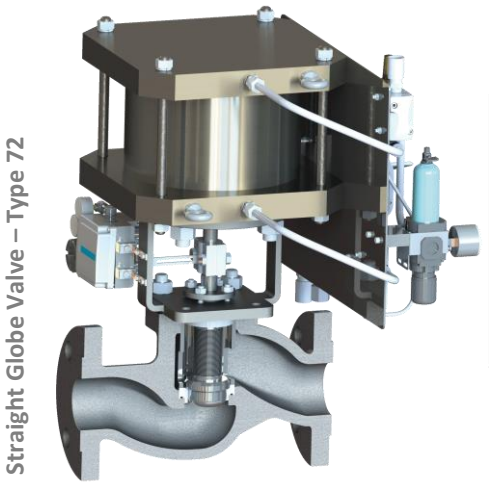
Control Valve Types

In line Control Valves

Straight Globe Valve – Type 72

Straight Globe control valves combine the protection of a bellows seal with the controllability and leak-tightness of a SchuF control valve. They are used in arduous and lethal services with critical media such as chlorine, phosgene, hydrofluoric acid, NH_3, CO_2 , urea etc. They are Eurochlor compliant.

- Designed for at least **20.000 operations**
- **Emergency stuffing boxes** as standard
- **Linear, equal % or on/off** control
- Optional **bellows** fitted in bonnet **to protect against erosion**
- Wide **variety of control trims** available (see page 8-10)
- Loose self-aligning disc for **absolute shut-off**, (ASME **Class VI**)
- **Metallic sealing surfaces** with different hardness (Stellite®…)

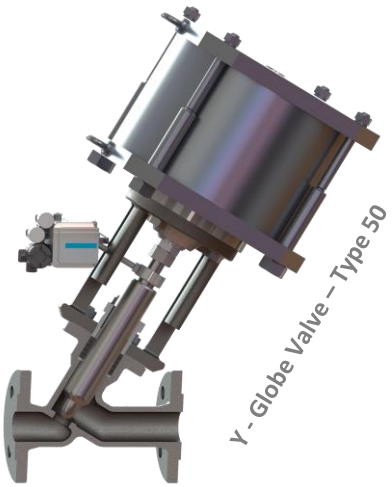


Straight Globe Valve – Type 72

Y - Globe Valve - Type 50

The Y-globe control valve can be installed in process lines from 1 inch to 24 inches and is **ideal to control flow or to reduce pressure**. It has a **sturdy design, superior flow and control characteristics** (compared to globe or ball control valves) and **zero-leakage sealing** performance.

- **High throughput** (e.g. 4" (DN 100) – Cv min 140 to max 300)
- Flow optimized – **low pressure drop**
- **Equal %, linear or custom control characteristics**
- **Class VI** process **shut-off** and **zero leakage to atmosphere** performance
- **Dead-and slow-space-free** options



Y - Globe Valve – Type 50

Wafer Valve – Type 76

Ideal for limited-space control applications

- **Space-saving** design
- **Cost-optimised**
- **Linear or equal %**
- **½ inch to 3 inch**
- Up to **ASME Class 2500**

Wafer Valve – Type 76

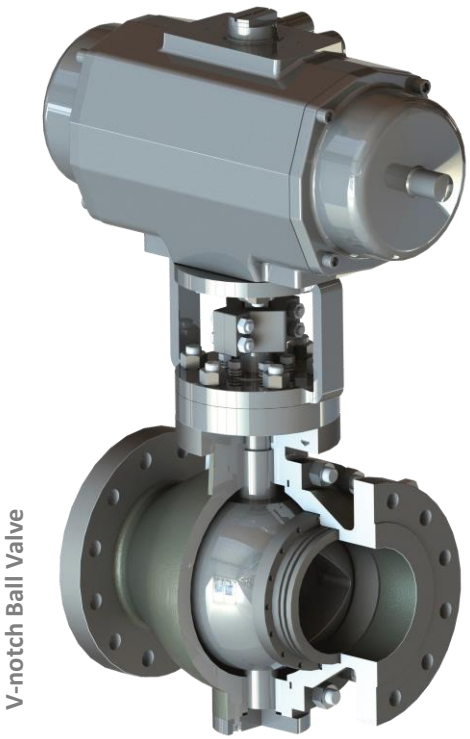
Control Valve Types

In line Control Valves

V-notch Ball Valve

By choosing the SchuF line of characterized **V-Control ball valves**, a full range of control applications is available with **superior flow control**. These quarter-turn-control ball **valves are more compact, lighter weight and much less expensive** than comparably sized globe valves and segmented control valves currently available in the market.

- **Superior rangeabilty and repeatability**
- **High flow capacity**
- Ability to function with fluids containing **solids and fibers**
- **Ease of maintenance**
- **Exceptional interface** with PLCs and computer command signals
- SchuF´s **high-quality pneumatic and electric control actuators**
- **Accurate positioning**

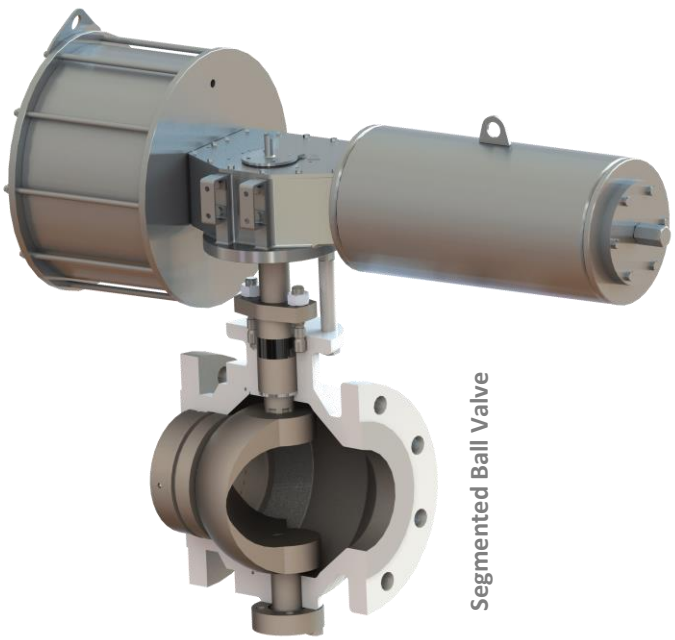


V-notch Ball Valve

Segmented Ball Valve

The SchuF **Segmented Ball Valve** offers an **accurate control** with a **clogging free design**. **High capacity** and **superior sealing properties** make this valve type a perfect In-Line valve for control purposes, even with **high solid content mediums**.

- **Superior rangeabilty and repeatability**
- **High flow capacity**
- Ability to function with fluids **containing solids and fibers**
- Flow optimized – **low pressure drop**
- **Erosive medium control**
- **Ease of maintenance and seal replacement**
- **Accurate positioning**



Segmented Ball Valve

Control Valve Types

Angle Control Valves – Model 74

The SchuF Model 74 Angle Control Valves are designed for critical or severe applications involving level control and pressure let-down in High Pressure Acid Leach (HPAL), Hydrocracking, Coal Liquefaction, PTA and other demanding processes.

The SchuF Angle Control Valve is often custom-made to suit process requirements in order to optimise field performance. Valve bodies are designed to help extend service life, by preventing impingement of particles on internal surfaces. Stagnant areas are minimized to prevent build-up of slurry or scale.

X-Flash – Type 74BS

These **valves open into the downstream** vessel to **eliminate choking** and **cavitation**.
The “accelerating body” design prevents in-body flashing.

- **High CV values (1 to 3000)**
- **Low wear and tear**
- Disc opening **eliminates plugging** by sediments
- **Best suited for vessel installation**

X-Flash – Type 74BS

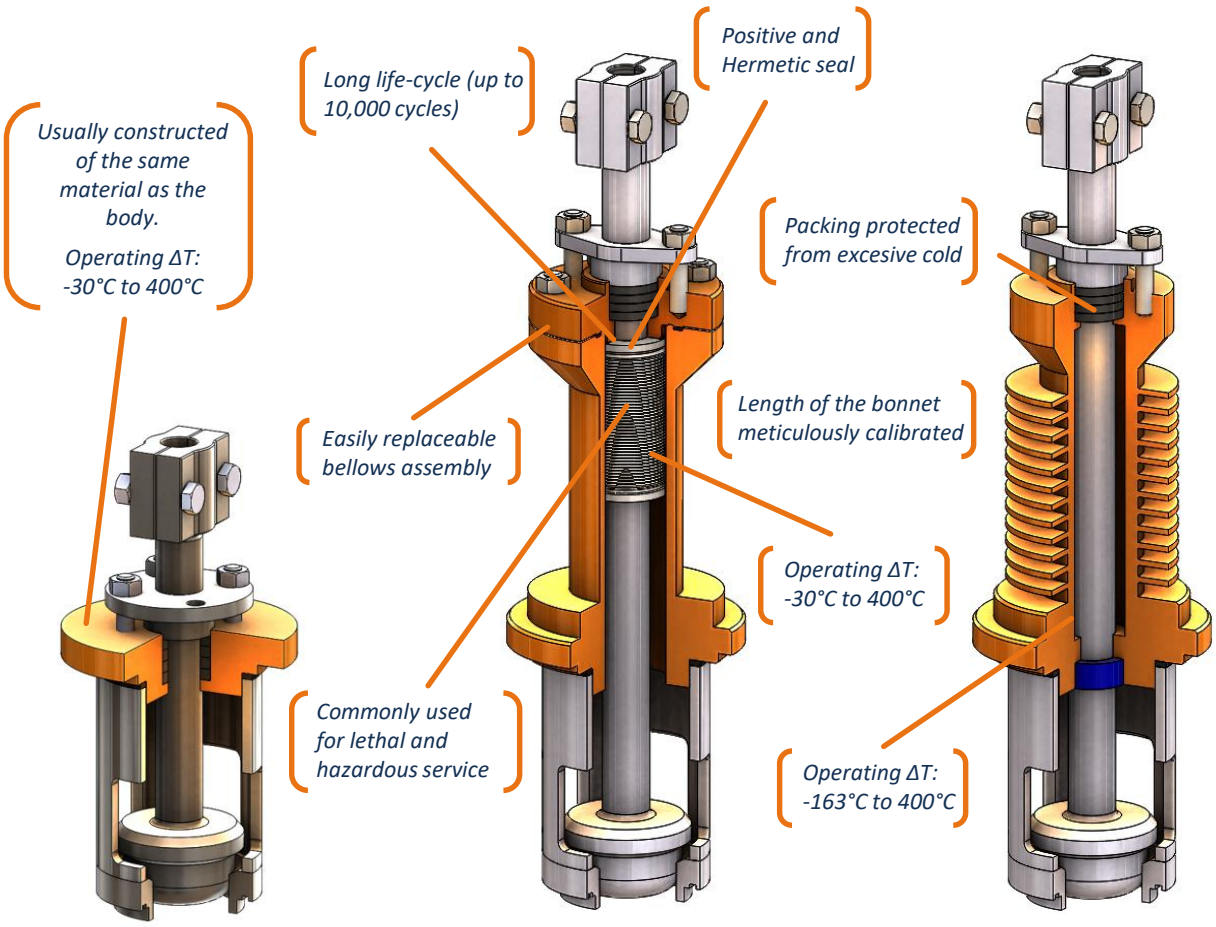
Tough Flash – Type 74CS

If piping considerations prohibit a disc-opening valve, the 74CS accomodates flashing in the valve while **opening the disc into the body**. The effects of cavitation are minimised by the use of suitable trims.

- **Hard material trim**
- **Flashing occurs in the protected seat/ choke tube area**
- **Up to 180 bar let-down** is possible in a **single stage**
- **Customised and replaceable choke tube**
- **Suitable for pipeline or vessel installation**

Tough Flash – Type 74CS

Control Globe Valve Bonnet Selection



Standard Bonnet **Bellows Bonnet** **Cryogenic Bonnet**

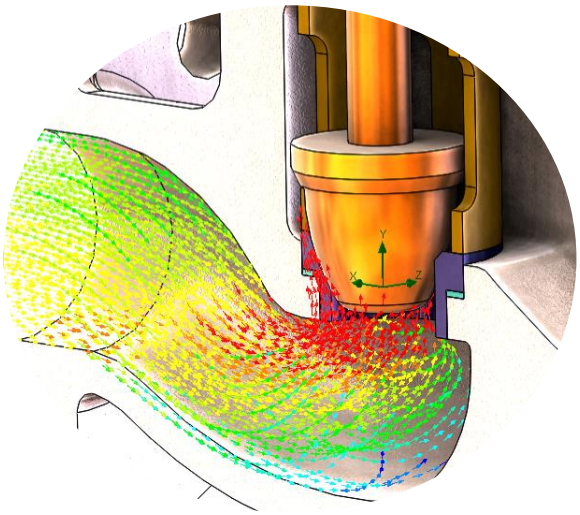
Control Valve Actuators

Pneumatic *Hydraulic* *Electric* *Manual*

SchuF Control Curve Characterisation

• *Linear*

Linear flow characteristics are those where, for example, a 1% change of the total valve stroke will result in a flow rate change of 1% of the total flow. This ensures that, for a constant pressure drop, the valve gain is more or less constant at all flows. Linear characteristics are suitable for most straightforward applications.



• *Equal Percentage*

Equal Percentage flow characteristics are commonly used where pressure differential across the valve goes down as the flow rate Increases, and are ideal for more complex process control. Equal percentage valves open progressively more area as the valve is stroked open, so, for example, every 10% increase in stroke would result in a fixed percentage increase in the flow rate prior to adjustment- all across the stroke range.

Curve Types

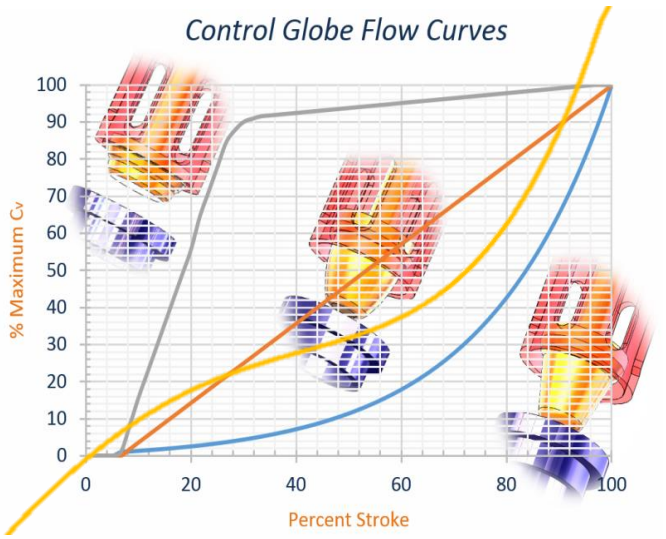
- *Linear*
- *Equal Percentage*
- *Quick Opening*
- *SchuF x³*

• *Quick Opening*

Quick-Opening flow characteristics, as implied by the title, allow maximum changes in flow rate following small initial changes in valve stroke. As the valve travel approaches the fully open posit-ion, valve flow-rate changes approach zero. This characteristic is commonly used for on-off service.

• *SchuF x³ Bell Curve*

SchuF's patented x³ bell curve is available as an alternative to the above characteristics. The hybrid qualities of the x³ bell curve offer considerably improved controllability of the process.



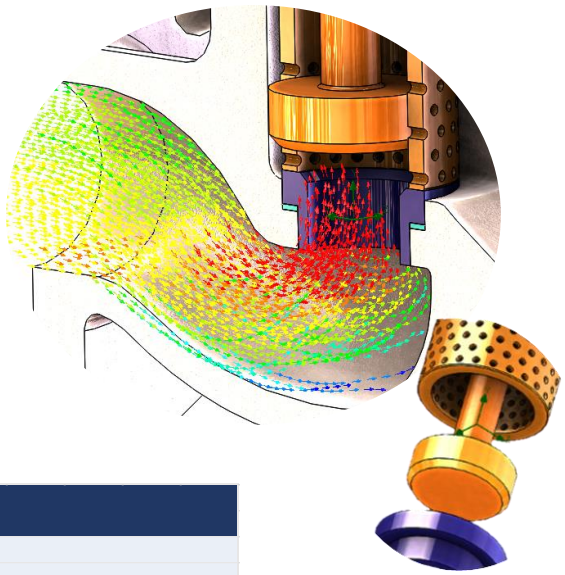
Valve Size		Available trim Cv for Standard Trims
in	mm	
1	25	15
1,5	40	45
2	50	80
3	80	160
4	100	300
6	150	600
8	200	1000
10	250	1400
12	300	2000
14	350	2500
16	400	3500
18	450	4500
20	500	7000

Special Trim Types

Cage

Ideal for **energy dispersion** and **noise** control

- Multi-hole cage design – to achieve **accurate flow characteristics and noise attenuation**
- **Class VI** (API 598**) shut-off** is achieved, eliminating unacceptable leakage
- **Linear or Equal %** control characteristics
- Available with fast-opening actuators, and smart positioners

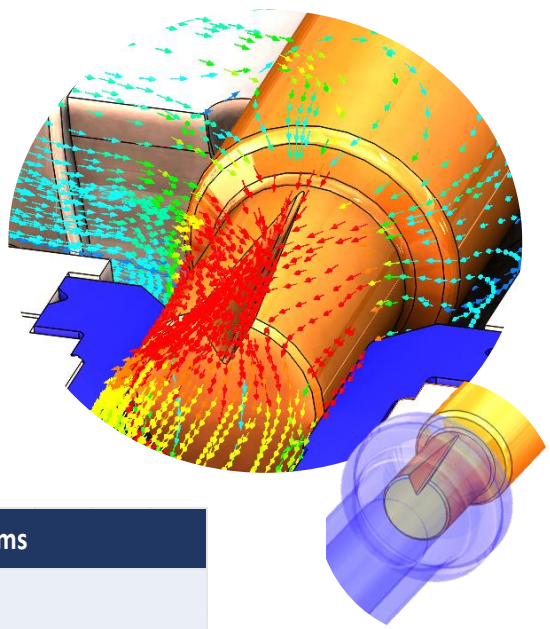


Valve Size		Available trim Cv for Cage Trims
in	mm	
1	25	10
1,5	40	20
2	50	45
3	80	90
4	100	150
6	150	300
8	200	400
10	250	600
12	300	900
14	350	1200
16	400	1500
18	450	2000
20	500	3000

Needle Spline

Ideal for **micro flow** applications from **CV values up to 5**.

- The needle spline provides **optimum rangeability and accurate flow control**.
- Excellent performance with **high solid content** media for **severe applications**
- Provides **optimum guidance** of the control head **to prevent fracture** when **using hard metals**
- **Bigger CV values** are **also available on request**

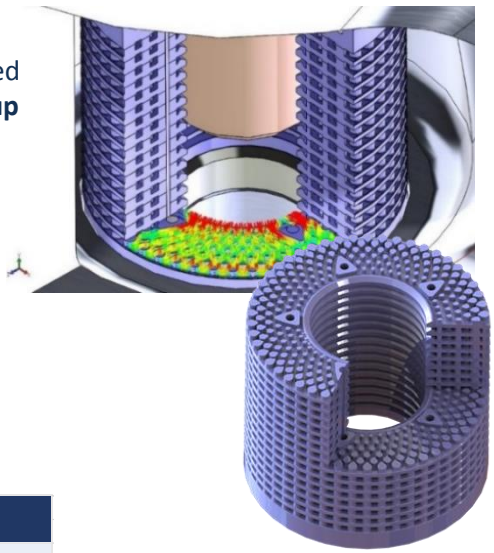


Valve Size		Available trim Cv for Needle Spline Trims
in	mm	
1	25	Microflow from 0,01 up to 5
1,5	40	
2	50	
3	80	

Special Trim Types

Stacker – Kinetic Energy Control Solution

By **controlling** the process through a series of torturous **paths of expansions, contractions, fluid impingement and splitting channels**, the **exit velocity is reduced** to a less aggressive level. Specially designed packing scraper and flow passage geometry **prevents solids building up** and **reduces** the need for **servicing and production downtime**:

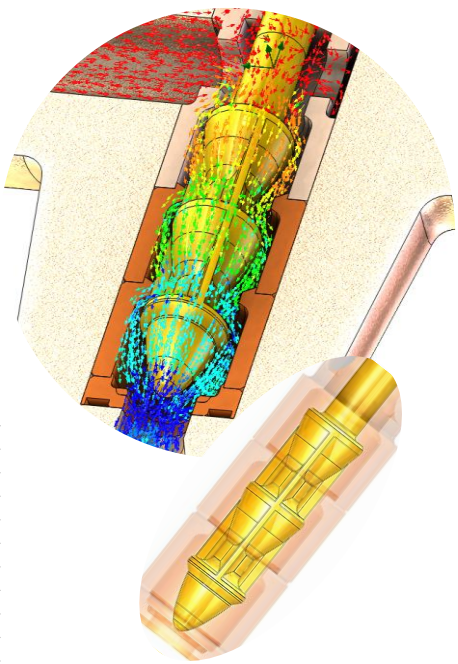


- **More than 30 stages** available
  - Greatly reducing erosion, flashing damage, clogging and noise
  - Eliminating cavitation, vibration and hydrate/condensate formation
- Up to ASME Class 4500 (PN640)
- All body shapes available
- Class V and MSSP-61 shut-off
- For valve dimensions please consult factory

Valve Size		Available trim Cv for Stacker Trims
in	mm	
1	25	
1,5	40	
2	50	10
3	80	20
4	100	50
6	150	100
8	200	150
10	250	200
12	300	250
14	350	350
16	400	500
18	450	700
20	500	1000

Multi Stage Axial Flow

Ideal to let down high pressure over several stages and avoid cavitation:



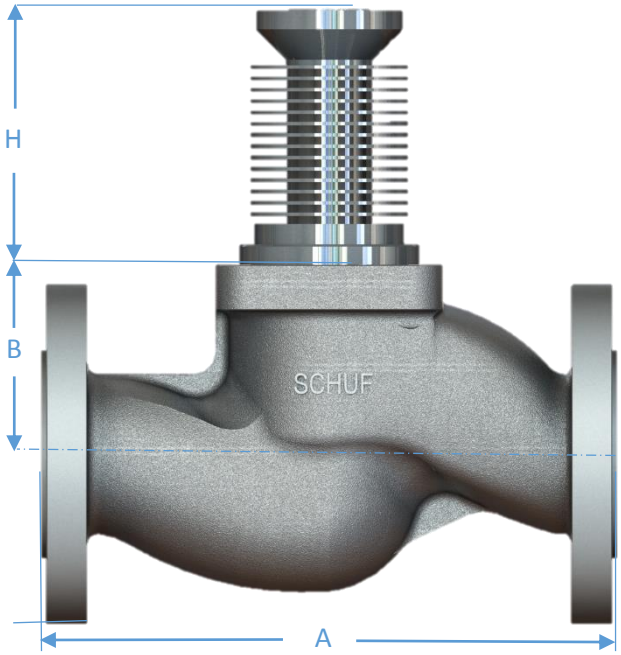
- **2, 3 or up to 6 staged** pressure - reduction disc design
- **Up to ASME Class 2500 as standard**
- True **Equal %** characteristics
- **High CV values** (1 to 3000)
- **Large outlet chamber** to reduce velocities
- **Disc opening** direction eliminates plugging by catalyst fines or other sediments

Valve Size		Available trim Cv for Multi Stage Trims
in	mm	
1	25	
1,5	40	
2	50	35
3	80	70
4	100	200
6	150	300
8	200	400
10	250	600
12	300	900
14	350	1200
16	400	1500
18	450	2000
20	500	3000

Standard Materials

Globe and Angle Control Body & Bonnet Materials					
PRESSURE RATING	**Standard ASME Class 150 to ASME 2500** **Other pressure applications are possible**				
TEMPERATURE RATING	**Standard -29°C to 260° C** **Other temperature applications are possible**				
SHUT-OFF CLASS	**ANSI/FCI 70-2 Class V** / Class VI Available **API 598 / EN 1022-1**				
TRIM MATERIAL	**STANDARD**	**STAINLESS**	**TITANIUM**	**ALLOYS**	**SPECIALS**
RECOMMENDED SERVICE	-	***Corrosive***	***Highly Corrosive***	***Highly Corrosive***	***Abrasive***
BODY	**Carbon Steel** • DIN 1.0619 • A216 (WCB)	**Duplex** • DIN 1.4462 / A 479 (S31803) **Stainless Steel** • DIN 1.4401 / A 182 (316) • DIN 1.4404 / A 182 (316L) • DIN 1.4552 / A 351 (CF8C)	**Titanium Grade 2**	• **Hastelloy(R)** • **Incolloy®** • **Inconel®** • **Monel®**	**Cladded with Alloy Steel**
TRIM	**Carbon Steel** • DIN 1.0619 • A216 (WCB) **Stainless Steel** • DIN 1.4401 / A 182 (316) • DIN 1.4404 / A 182 (316L) • DIN 1.4541 / A 182 (321) • DIN 1.4550 / A 182 (347)	**Duplex** • DIN 1.4462 / A 479 (S31803) **Stainless Steel** • DIN 1.4401 / A 182(316) • DIN 1.4404 / A 182 (316L) • DIN 1.4541 / A 182 (321) • DIN 1.4550 / A 182 (347) • Nitronic	**Titanium Grade 2 or 5**	**Titanium Grade 2 or 5** **Hastelloy®** **Incolloy®** **Monel®**	**Cladded with Alloy Steel** **Ceramic** **Tungsten Carbide** **Proprietary coatings**

Globe Control Valve Standard Dimensions



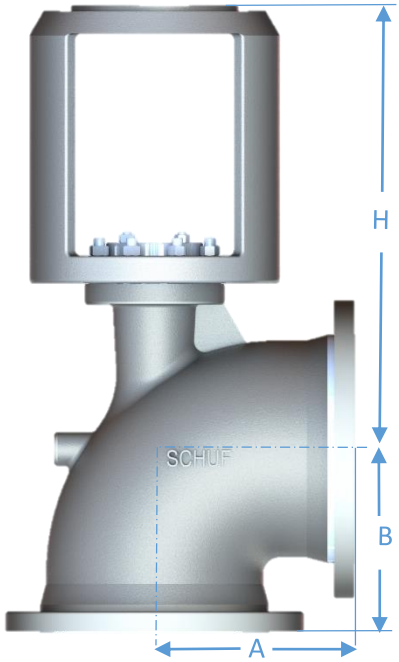
[1] Additional sizes, connections, and configurations are available upon request; dimensions are subject to change.
[2] Threaded, BWE, RF, RTJ, API, BX, and PE connections are available for all sizes and configurations.
[3] ASME RF flanged dimensions are shown. Threaded, BWE, RTJ and ISO flanged dimensions are available upon request.

ASME/ANSI RF Flanged Globe Control Valve Dimensions[1 2]

Body Size Inch (Din)	A (mm)[3]						B (mm)	H (mm)	
	Integral Flange								
	Class 150 PN10/16	Class 300 PN25/40	Class 600 PN100	Class 900 PN160	Class 1500 PN250	Class 2500 PN400		Std. Bonnet	Ext. Bonnet
½“ (15)	108	152	165	216	-	264	38	97	212
¾“ (20)	117	178	190	229	229	273	38	97	212
1“ (25)	127	203	216	254	254	308	44	97	212
1½“ (40)	165	229	241	305	305	384	59	132	246
2“ (50)	203	267	292	368	368	451	59	138	252
3“ (80)	241	318	356	381	470	578	86	172	312
4“ (100)	292	356	432	457	546	673	133	214	354
6“ (150)	406	444	559	610	705	914	146	311	451
8“ (200)	495	559	660	737	832	1022	190	365	505
10“ (250)	622	622	787	838	991	1270	227	359	524
12“ (300)	698	711	838	965	1130	1422	318	413	578
14“ (350)	787	838	889	1029	1257	-	330	622	908
16“ (400)	914	864	991	1130	1384	-	400	721	1013
18“ (450)	978	991	1092	1219	1537	-	407	714	1020
20“ (500)	991	1143	1194	1321	1664	-	489	902	1082
24“ (600)	1143	1295	1397	1549	1943	-	508	864	1180

Angle Control Valve Standard Dimensions

[1] Additional sizes, connections, and configurations are available upon request; dimensions are subject to change.
[2] Threaded, BWE, RF, RTJ, API, BX, and PE connections are available for all sizes and configurations.
[3] ASME RF flanged dimensions are shown. Threaded, BWE, RTJ and ISO flanged dimensions are available upon request.



ASME/ANSI RF Flanged Angle Control Valve Dimensions[1] [2]

Body Size (Din)	A/B (mm) [3]						H (mm)
	Integral Flange						
	Class 150 PN10/16	Class 300 PN25/40	Class 600 PN100	Class 900 PN160	Class 1500 PN250	Class 2500 PN400	
½“ (15)	51	76	83	-	108	132	229
¾“ (20)	57	89	95	114	114	137	234
1“ (25)	70	102	108	127	127	154	251
1½“ (40)	83	114	121	152	152	192	324
2“ (50)	102	133	146	184	184	226	364
3“ (80)	121	159	178	190	235	289	461
4“ (100)	146	178	216	178	273	337	551
6“ (150)	203	222	279	305	353	457	768
8“ (200)	248	279	330	368	416	511	876
10“ (250)	311	311	394	419	495	635	994
12“ (300)	349	356	419	483	565	711	1124
14“ (350)	394	-	-	514	629	-	-
16“ (400)	457	-	-	660	-	-	-
18“ (450)	-	-	-	737	-	-	-
20“ (500)	-	-	-	826	-	-	-
24“ (600)	-	-	-	991	-	-	-

Control Globe Standards

Design Standards

ASME B16.10

ASME B16.34

ASME Boiler Pressure Vessel Code Sec. VIII

Pressure Equipment Directive (PED)

Flange Standards

ASME B16.5

ASME B16.47

EN 1092-1

ISO 10423-API 6A

API 17D

ASME B16.5

Quality Standards

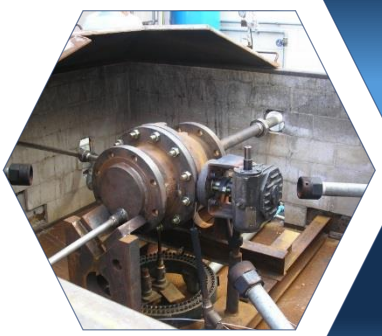
Pressure Equipment Directive (PED)

API Q1

API PSL 1,2,3 & 3G

ISO 10423-API 6A

EN ISO 9001



Testing Standards

API 6A PR2

API 17D

EN 10204

ASME B16.34

ISO 15848-1

ASME FCI 70-2

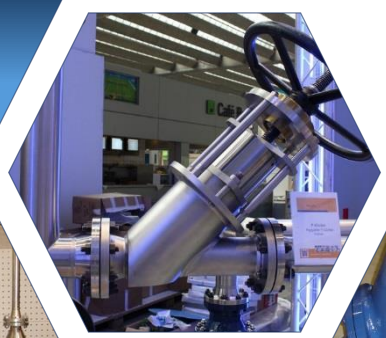
Additional Testing Standards

ANSI/ ISA S75.02

ANSI/ ISA S75.07

ANSI B16.104

Class IV & V



Sour Service Standards

Nace MR-01-75

Nace MR0103

ISO 15156

Add. Standards

ISO 4406

EN ISO 9001

ATEX 96/9/EC

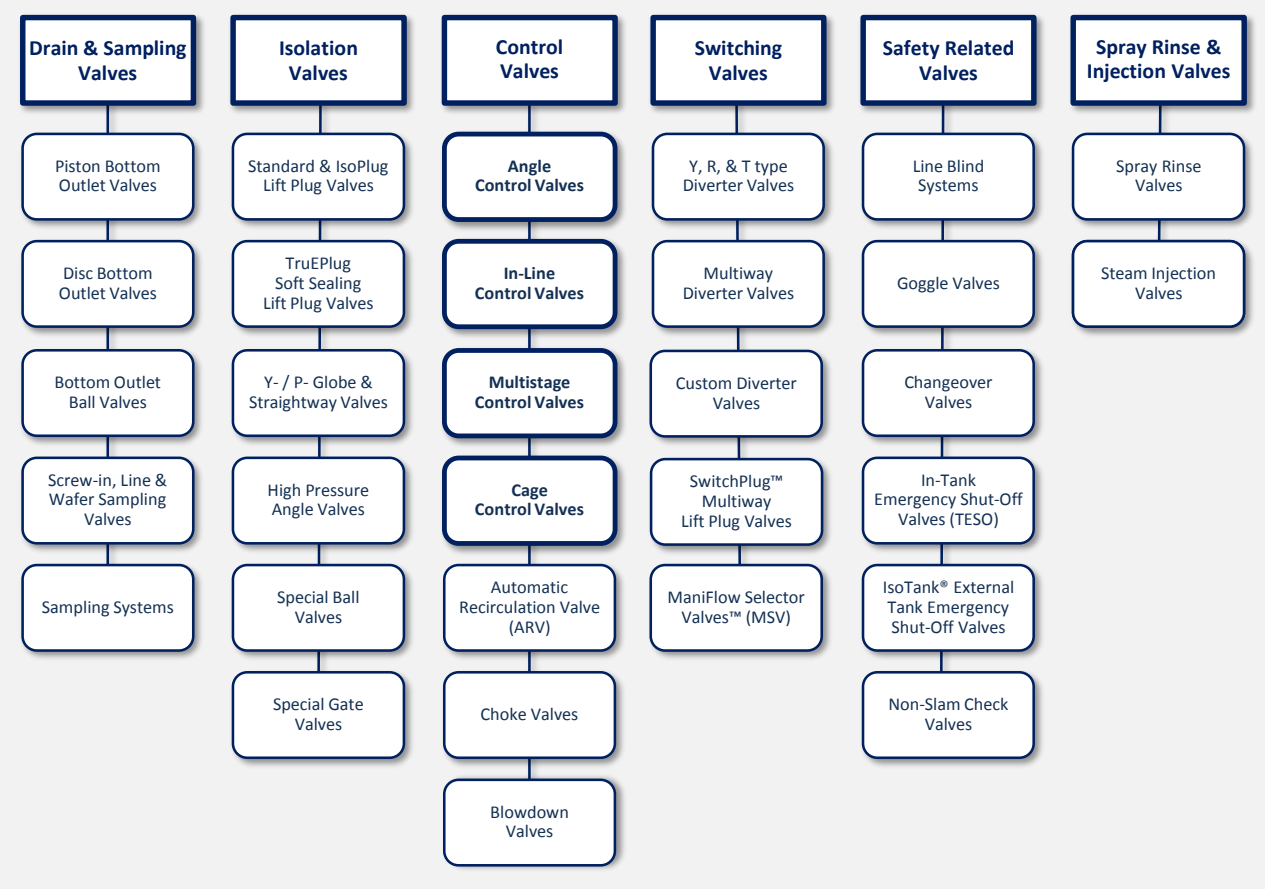
TR-CU

NORSOK

Product Portfolio Overview

The SchuF Group has delivered over one million valves during its 100 year history, to a wide variety of industries in over 50 countries worldwide.
Headquartered near Frankfurt, Germany, the company has additional design and manufacturing centres in India, Ireland, Italy, UK, and the USA.

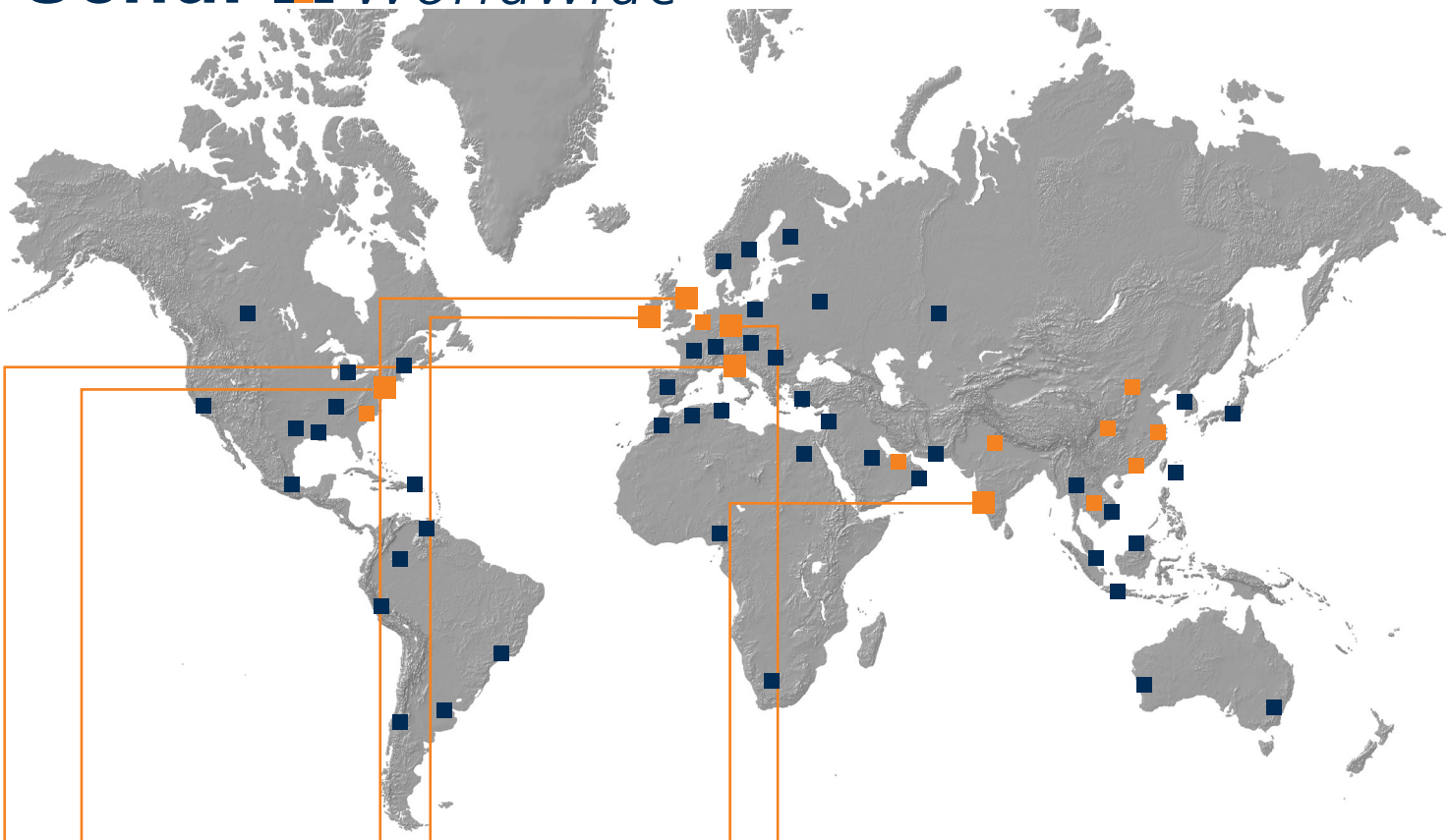
The SchuF Group has sales and agent offices servicing virtually every country in the world.
We manufacture valve products that control, isolate, divert, and sample liquids, gases, powders, and slurries. Our extensive product range of engineered, customized valves includes:



Control Valve Client List:

- Aluminium Pechiney
- Auriga Polymers
- BASF
- CEPSA
- Chang Chun Petrochemical
- China Textile
- CTCI
- Formosa Chemicals & Fibre
- Far Eastern New Century
- Hengli Petrochemical
- Hebi Huashi United Energy
- Ignite Energy Resources
- Jiangsu Hailun Petrochemical
- KBR Technology
- Lenzing
- Lurgi
- Nanjing Chemical
- OPTC
- Reliance Industries
- Renmatix
- SABIC Innovative Plastics
- Samsung Petrochemical
- Technip
- Uhde Inventa Fischer

SchuF Worldwide



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