

Series 240 and 250

Pneumatic Control Valves with AC-1 or AC-2 Trim



Application

Optimized trims for low-noise pressure letdown of liquids with differential pressures up to 40 bar

Nominal size DN 50 to 300 · NPS 2 to 12
Nominal pressure PN 16 to 160 · Class 150 to 900
Temperature range -10 to +220 °C · 14 to 428 °F



The optimized **AC-1** trim has the following special features:

- Raised seat
- Parabolic plug with integrated guide in the seat

One to four attenuation plates are integrated into the seat of the **AC-2** trim upstream of the parabolic plug and the plug guide. The differential pressure must not exceed 40 bar (580 psi).

Versions

Standard version for SAMSON valves according to Table 2 and Table 3

- **AC-1** · Optimized trim for valves in DN 50 to 300 or NPS 2 to 12
- **AC-2** · Optimized trim with one to four attenuation plates for valve sizes DN 80 to 250 or NPS 3 to 10

Further versions

- **Balanced valve plug** with PTFE seal · Possible for DN 200/NPS 8 and larger and with a seat bore of minimum 125 mm (Type 3251) or minimum 150 mm (Type 3241)
- **Balanced valve plug** with graphite seal · On request

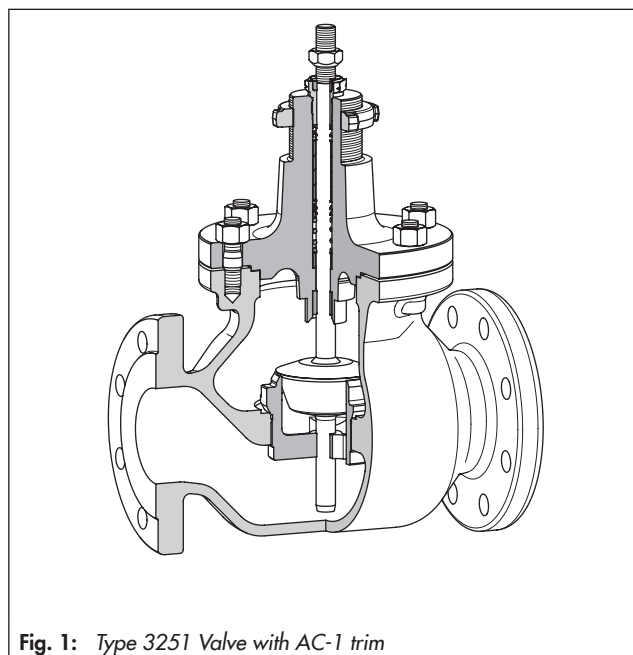


Fig. 1: Type 3251 Valve with AC-1 trim

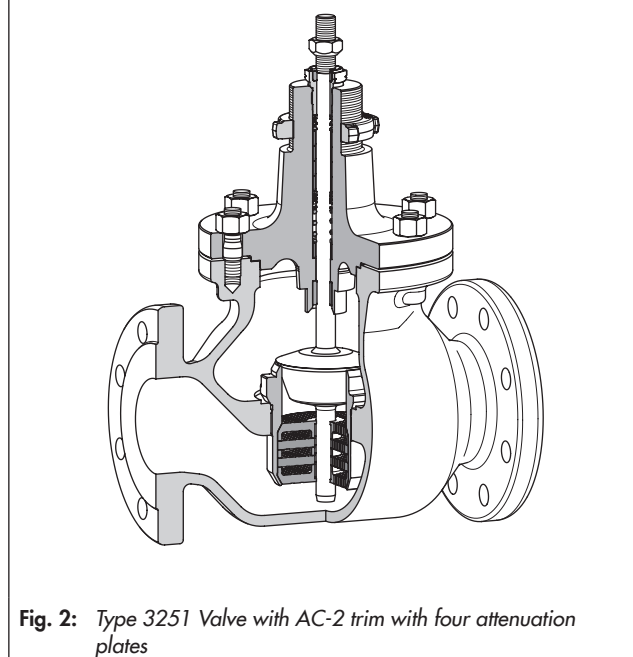


Fig. 2: Type 3251 Valve with AC-2 trim with four attenuation plates

Principle of operation

The medium flows in the flow-to-open direction through the valve. The valve plug determines the cross-sectional area of flow. The K_V coefficient is adapted over the plug and, if necessary, using a combination of attenuation plates upstream of the seat.

To avoid vibrations, the plug is double guided by a guide bushing at the top and a second guide in the seat.

AC-1

Compared to standard valve trims, these trims considerably reduce the sound pressure level for differential pressure ratios between $X_F = 0.25$ and $X_F = 0.75$ by shifting the point of incipient cavitation.

Depending on the valve load, the sound pressure level is reduced to varying degrees.

AC-2

Optionally one to four attenuation plates can be integrated into the seat on the upstream side. In this way, the point of incipient cavitation is shifted at large valve loads to higher differential pressure ratios X_F .

For small valve loads, the onset of cavitation is shifted by higher X_{FZ} values of the parabolic plug to higher differential pressure ratios.

Compared to standard valve trims, these trims considerably reduce the sound pressure level for differential pressure ratios between $X_F = 0.25$ and $X_F = 0.9$ by shifting the point of incipient cavitation.

The differential pressure ratio X_F is defined as follows:

$$X_F = \frac{\Delta p}{p_1 - p_v}$$

with Δp being the differential pressure across the valve, p_1 being the upstream pressure, and p_v representing the vapor pressure of the medium.

The reduction of the sound pressure level ΔL_{pa} compared to a standard valve trim is exemplified in Fig. 5 and Fig. 6. The diagrams illustrate four different valve loads.

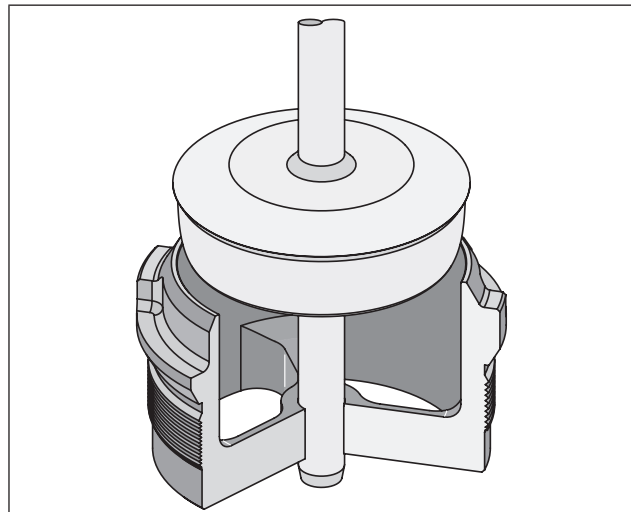


Fig. 3: Sectional drawing of AC-1 trim

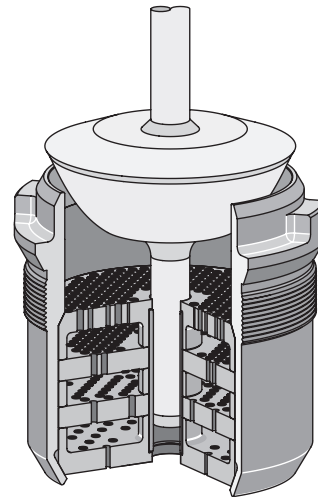


Fig. 4: Sectional drawing of AC-2 trim with four attenuation plates

Table 1: Technical data for AC-1 and AC-2 trims

	AC-1	AC-2
Nominal size	DN 50 to 300 · NPS 2 to 12	DN 80 to 250 · NPS 3 to 10
Nominal pressure	PN 16 to 160 · Class 150 to 900	
Temperature range	-10 to +220 °C · 14 to 428 °F	
Δp_{max} Max. permissible differential pressure	Operation without cavitation: < 40 bar · < 580 psi	
	Operation with cavitation: < 25 bar · < 360 psi	
Medium	Liquid applications only	
Flow direction	Flow-to-open (FTO) only	
Closure member	Double-guided parabolic plug	Double-guided parabolic plug with attenuation plates integrated into the seat
Seat/plug seal Leakage class (IEC 60534)	Metal seal, class IV IV-S1 with SB ≥ 100 · IV-S2 with SB < 100	
K_V/C_V coefficient	See Table 2	See Table 3
Characteristic	Equal percentage	Mod. equal percentage
Rangeability	50:1	See Table 3
Seat bore	See Table 2	See Table 3
Travel	See Table 2	See Table 3
Seat/plug material	1.4404 Stellite hard facing/1.4006 Stellite hard facing/1.4301	

Reduction of the sound pressure level

The diagrams illustrate the reduction of the sound pressure level ΔL_{pa} when using the AC Trims as opposed to a standard trim. ΔL_{pa} values of other AC Trims available on request.

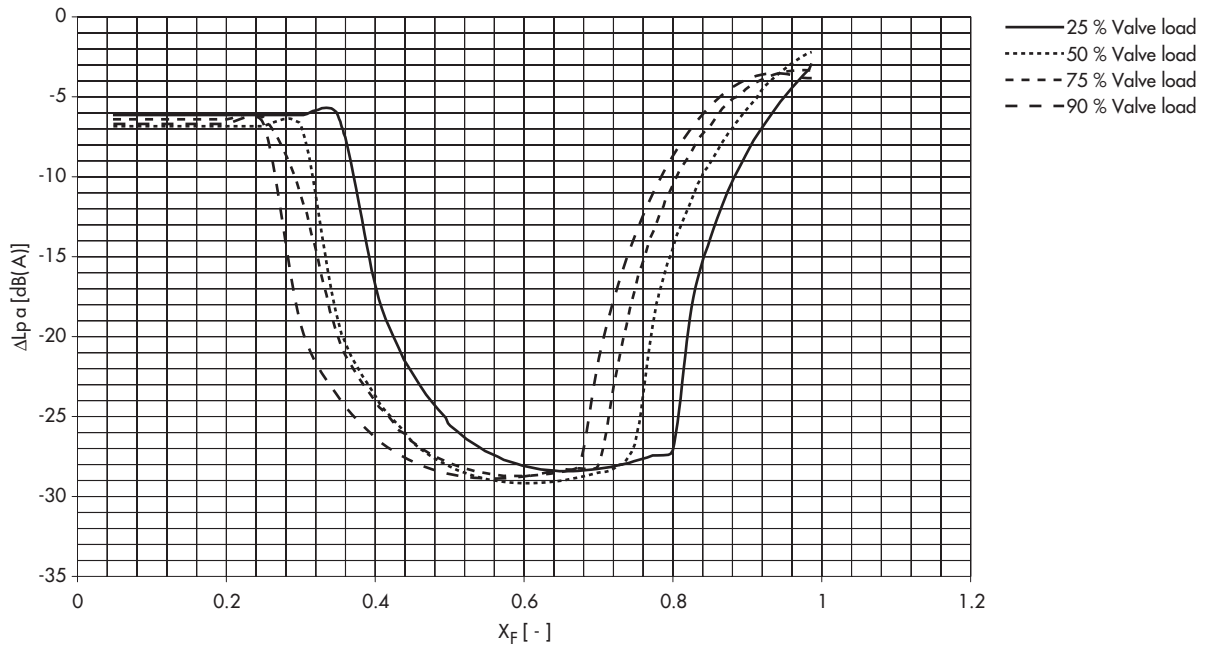


Fig. 5: Nominal size DN 80 (NPS 3)

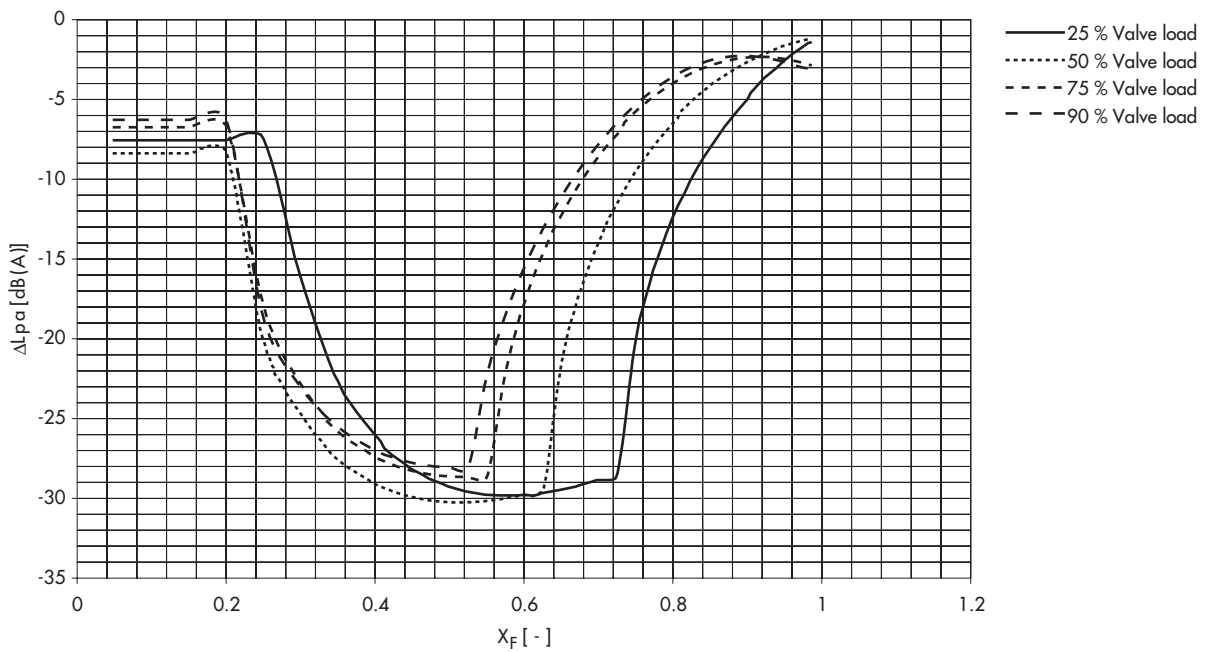


Fig. 6: Nominal size DN 150 (NPS 6)

Table 2: AC-1 trim · Nominal sizes with associated K_V and C_V coefficients

The specified travels must be achieved including an overtravel of 10 %. The use of a mechanical travel stop is required for fail-close actuators.

Nominal size	SB [mm]	Travel [mm]	K_V	C_V	Type ... Valve	X_{Fz} value (valve load in %)
DN 50 NPS 2	38	15	22	26	3241	0.43 (90 %) 0.46 (75 %) 0.52 (50 %) 0.61 (25 %)
	48	15	35	40	3241	0.34 (90 %) 0.38 (75 %)
	50	30			3251/3256	0.45 (50 %) 0.54 (25 %)
DN 80 NPS 3	38	15	22	26	3241	0.43 (90 %) 0.46 (75 %) 0.52 (50 %) 0.61 (25 %)
	48	15	35	40	3241	0.34 (90 %) 0.38 (75 %)
	50	30			3251/3256	0.45 (50 %) 0.54 (25 %)
	63	15	50	60	3241	0.31 (90 %) 0.35 (75 %)
		30			3251/3256	0.44 (50 %) 0.56 (25 %)
	80	30	60	70	3251 3256	0.38 (90 %) 0.42 (75 %) 0.49 (50 %) 0.60 (25 %)
70			80	0.35 (90 %) 0.38 (75 %) 0.47 (50 %) 0.58 (25 %)		
DN 100 NPS 4	48	15	38	45	3241	0.33 (90 %) 0.36 (75 %)
	50	30			3251/3256	0.43 (50 %) 0.53 (25 %)
	63	30	55	65	3241	0.29 (90 %) 0.33 (75 %)
					3251/3256	0.42 (50 %) 0.54 (25 %)
	80	30	75	90	3241	0.33 (90 %) 0.37 (75 %)
					3251/3256	0.45 (50 %) 0.57 (25 %)
	100	30	75	90	3251/3256	0.42 (90 %) 0.46 (75 %) 0.53 (50 %) 0.63 (25 %)
100			120	3241	0.37 (90 %)	
3251/3256					0.40 (75 %) 0.48 (50 %) 0.59 (25 %)	
DN 150 NPS 6	80	30	95	110	3241	0.27 (90 %) 0.32 (75 %)
					3251/3256	0.41 (50 %) 0.53 (25 %)
	100	30	145	170	3241/3251/3256	0.28 (90 %) 0.32 (75 %) 0.41 (50 %) 0.54 (25 %)
					3241	0.25 (90 %) 0.29 (75 %)
	125	30	205	240	3251/3256	0.38 (50 %) 0.50 (25 %)
60						

Nominal size	SB [mm]	Travel [mm]	K _v	C _v	Type ... Valve	X _{Fz} value (valve load in %)
DN 150 NPS 6	150	60	205	240	3251 3256	0.34 (90 %) 0.37 (75 %) 0.45 (50 %) 0.57 (25 %)
			250	290		0.28 (90 %) 0.33 (75 %) 0.41 (50 %) 0.54 (25 %)
DN 200 NPS 8	100	30	155	180	3241 3251 3256	0.27 (90 %) 0.31 (75 %) 0.40 (50 %) 0.53 (25 %)
	125	60	230	270		0.22 (90 %) 0.26 (75 %) 0.36 (50 %) 0.49 (25 %)
	150	60	305	360		0.24 (90 %) 0.28 (75 %) 0.37 (50 %) 0.51 (25 %)
	200	60	360	420		0.33 (90 %) 0.37 (75 %) 0.45 (50 %) 0.57 (25 %)
480			560	0.26 (90 %) 0.31 (75 %) 0.40 (50 %) 0.52 (25 %)		
DN 250 NPS 10	100	30	155	180	3241 3251 (3254)	0.27 (90 %) 0.31 (75 %) 0.40 (50 %) 0.53 (25 %)
	125	60	230	270		0.22 (90 %) 0.26 (75 %) 0.36 (50 %) 0.49 (25 %)
	150	60	305	360		0.24 (90 %) 0.28 (75 %) 0.37 (50 %) 0.51 (25 %)
	200	60	360	420		0.33 (90 %) 0.37 (75 %) 0.45 (50 %) 0.57 (25 %)
480			560	0.26 (90 %) 0.31 (75 %) 0.40 (50 %) 0.52 (25 %)		
DN 300 NPS 12	125	60	230	270	3241 3251 (3254)	0.22 (90 %) 0.26 (75 %) 0.36 (50 %) 0.49 (25 %)
	150	60	305	360		0.24 (90 %) 0.28 (75 %) 0.37 (50 %) 0.51 (25 %)
	200	60	480	560		0.26 (90 %) 0.31 (75 %) 0.40 (50 %) 0.52 (25 %)
	250	120	1000	1150		0.20 (90 %) 0.24 (75 %) 0.33 (50 %) 0.48 (25 %)

Table 3: AC-2 trim · Nominal sizes with associated K_V and C_V coefficients

The specified travels must be achieved including an overtravel of 10 %. The use of a mechanical travel stop is required for fail-close actuators.

Nominal size	SB [mm]	Travel [mm]	K_V	C_V	Type ... Valve	Attenuation plates		Rangeability	
						Qty.	Borehole Ø		
DN 80 NPS 3	80	30	16	20	3251	4	3	> 10:1	
			22	25					
			25	30					
			30	35					
			35	40		3		> 15:1	
			38	45		2			
			43	50		1			> 20:1
			50	60					> 25:1
DN 100 NPS 4	100	30	35	40	3251	4	3	> 20:1	
			38	45				> 15:1	
			43	50				> 10:1	
			45	55				> 15:1	
			50	60		3			
			55	65		2			
			60	70		1			> 20:1
			63	75				> 30:1	
72	85	> 20:1							
DN 150 NPS 6	150	60	85	100	3251	4	5	> 15:1	
			95	110				> 20:1	
			100	120				> 15:1	
			110	130					
			120	140					
			130	150		3			
			135	160		2		> 20:1	
			145	170					
			155	180		1		> 25:1	
			160	190				> 20:1	
180	210								
DN 200 NPS 8	200	60	135	160	3241 3251	4	5	> 15:1	
			145	170				> 10:1	
			155	180				> 15:1	
			160	190					
			170	200					
			180	210		3			
			190	220				2	
			205	240		1			20:1
			220	255				> 20:1	
			250	290		> 20:1			
			260	305		> 25:1			
			280	325					
			320	375					
DN 250 NPS 10	200	60	135	160	3241	4	5	> 15:1	
			145	170				> 10:1	
			155	180				> 15:1	
			160	190					
			170	200					
			180	210		3			
			190	220				5	
			205	240		2			20:1
			220	255				1	> 20:1
			250	290		> 20:1			
			260	305		> 25:1			
			280	325					
			320	375					

Order specifications:

AC-1 trim with K_V/C_V according to Table 2

or

AC-2 trim with K_V/C_V according to Table 3

Material

For tag number ...

In order/quotation ...

Operating pressure in bar (a), bar (g) or psi (a), psi (g)
(with minimum, normal and maximum flow rate)

Flow rate kg/h or m³/h
in operating state with minimum, normal,
and maximum flow rate

Process medium Density in kg/m³
Temperature in °C/°F
Vapor pressure in bar

Nominal size DN ... or NPS ...

Nominal pressure PN ... or Class ...

Material According to Table 1

Specifications subject to change without notice



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