

Valve Series V2001

Globe Valve for Heat Transfer Oil Type 3531 with Pneumatic or Electric Actuator



ANSI version

Application

Control valves designed for heat transfer systems using organic heat transfer media in accordance with DIN 4754

Valve size NPS ½ to 3
Pressure rating ANSI Class 125 and 150
Temperature range 14 to 660 °F (-10 to 350 °C)



Type 3531 Globe Valves for Heat Transfer Oil can be equipped with either pneumatic or electric actuators:

- Electropneumatic actuator with integrated i/p positioner for Type 3531-IP
- Pneumatic actuators for Type 3531-PP
- Electric actuators for Type 3531-E1 or Type 3531-E3

Valve body materials

- Spheroidal graphite iron, carbon steel or stainless steel for Class 125 and Class 150
- Valve sizes NPS ½ to 3
- Stem sealing with metal bellows and packing
- Valve plug with metal sealing.

The control valves can be optionally equipped with positioners, limit switches and potentiometers.

Versions

with Type 3531 Globe Valve for Heat Transfer Oil

Type 3531-IP Electropneumatic Globe Valve for Heat Transfer Oil (Fig. 1)

with Type 3372 Electropneumatic Actuator, plug connector, tight-closing function for completely venting or filling the actuator with air, reference variable 4 to 20 mA, max. 90 psi (6 bar) supply air, fail-safe position valve CLOSED or OPEN, optionally with Type 4744-2 Limit Switch

Type 3531-PP Pneumatic Globe Valve for Heat Transfer Oil with Type 3371 Pneumatic Actuator, bench range 30 to 48 psi (2.1 to 3.3 bar) for version with fail-safe position valve CLOSED or 6 to 20 psi (0.4 to 1.4 bar) for version with fail-safe position valve OPEN, optionally with Type 4744-2 Limit Switch (Fig. 2)

Type 3531-E1 Electric Globe Valve for Heat Transfer Oil Valve sizes NPS ½ to 2, with Type 5824-30 Electric Actuator, power supply 230 V/50 Hz or 60 Hz, 110 V/60 Hz and 24 V/50 Hz, optionally with limit switches, potentiometer, positioner (Fig. 3)

Type 3531-E3 Electric Globe Valve for Heat Transfer Oil with Type 3374 Electric Actuator (Fig. 4) for power supply 230 V/50 Hz or 60 Hz, 120 V/60 Hz and 24 V/50 Hz or 60 Hz, optionally with fail-safe action (typetested), limit switches, potentiometer, positioner

Type 3531 · Temperature range down to -94 °F (-70 °C) on request

Explosion-protected version with electric actuators on request
Type 3531 according to DIN standards · See T 8131 EN



Fig. 1 · Type 3531-IP



Fig. 2 · Type 3531-PP



Fig. 3 · Type 3531-E1



Fig. 4 · Electric Actuator for Type 3531-E3

Principle of operation

The process medium flows through the valve in the direction indicated by the arrow (Figs. 5 and 6) in the flow-to-open direction. The valve plug position determines the cross-sectional area between the seat and plug. The plug stem is connected to the actuator stem by the stem connector and sealed by a metal bellows.

Fail-safe position with pneumatic actuators

Depending on how the springs are arranged in the electropneumatic or pneumatic actuator, the control valve has two different fail-safe positions that become effective when the supply air fails:

Actuator stem extends (FA)

The valve closes when the supply air fails.

Actuator stem retracts (FE)

The valve opens when the supply air fails.

Associated documentation

Refer to the Mounting and Operating Instructions delivered with the product:

- EB 8111/2 EN Globe Valve Type 3531
- EB 8313 EN Actuator for Type 3531-IP
- EB 5824 EN Electric Actuator for Type 3531-E1
- EB 8331-1 EN Electric Actuator for Type 3531-E3

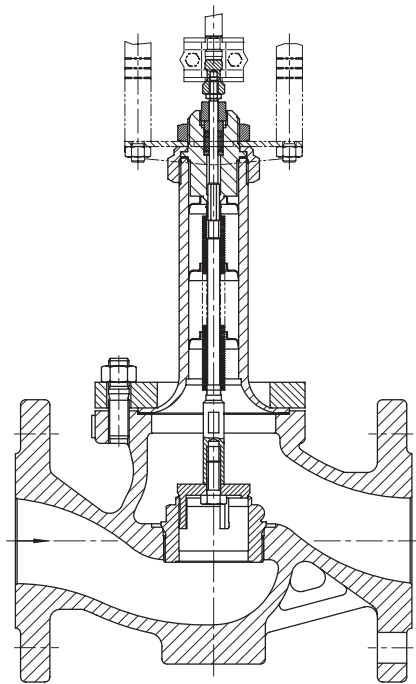


Fig. 5 · Type 3531-IP Globe Valve for Heat Transfer Oil in NPS 1/2 to 2

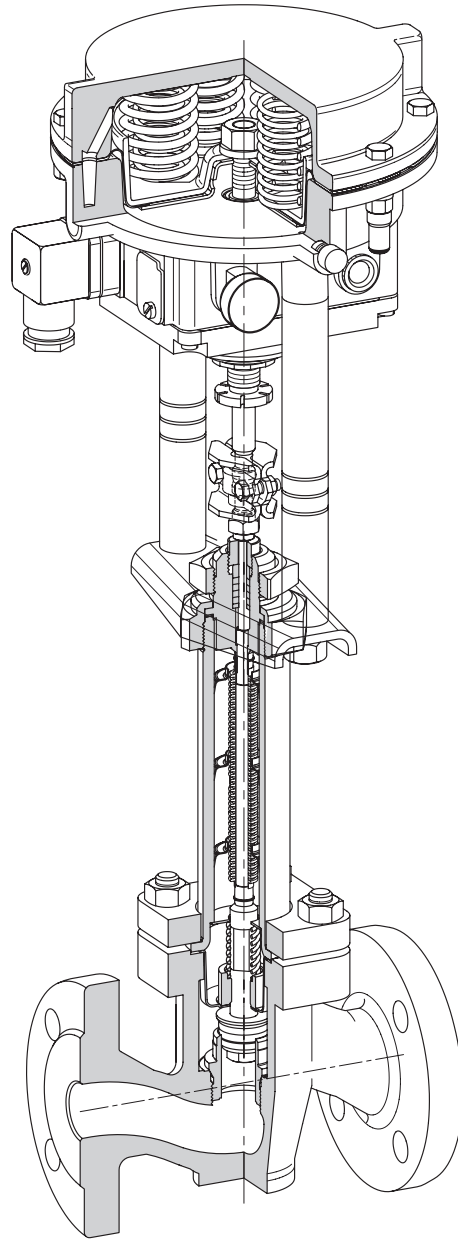


Fig. 6 · Type 3531-IP Globe Valve for Heat Transfer Oil, actuator with integrated i/p positioner

1. Type 3531 Globe Valve for Heat Transfer Oil

Table 1.1 · Technical data

Valve size	NPS	½ · ¾ · 1 · 1½ · 2 · 2½ · 3		
Material		Spheroidal graphite iron · A 395	Carbon steel · A 216 WCC	Stainless steel · A 351 CF8M
Connection	Flanges	EN 1092-1 Form B1, Ra 3.2 to 12.5 µm · EN 1092-1, groove Form D		
Pressure rating		Class 125 · Class 150		
Seat/plug sealing		Metal sealing		
Characteristic		Equal percentage		
Rangeability		50 : 1		
Temperature range		14 to 660 °F (-10 to 350 °C) · Extended temperature range down to -94 °F (-70 °C) on request		
Leakage class according to DIN EN 1349		Metal sealing: Class IV		

Table 1.2 · Materials · Material number according to DIN EN

Valve size	NPS	½ · ¾ · 1 · 1½ · 2 · 2½ · 3		
Valve body		Spheroidal graphite iron · A 395	Carbon steel · A 216 WCC	Stainless steel · A 351 CF8M
Valve bonnet		Carbon steel S235JR (St 37)		1.4408
Seat and plug	Seat	Up to NPS 1: 1.4305 · NPS 1½ to 2: 1.4104 · NPS 2½ and 3: 1.4006		
	Plug	1.4305		
Bellows seal		1.4541 · 1.4301		
Packing		PTFE		
Body gasket		Metal graphite		

Table 1.3 · Valve sizes, flow coefficients, seat diameters and travels

Valve sizes	NPS	½		¾		1		1½	2	2½	3
		DN		20		25		40	50	65	80
Flow rate	C _v	2	5	3	7.5	5	12	30	40	60	94
	K _{vS}	1.6	4	2.5	6.3	4	10	25	35	50	80
Seat Ø	in	0.37	0.75	0.55	0.86	0.75	0.94	1.25	1.57	2.56	
	mm	9.5	19	14	22	19	24	32	40	65	
Rated travel	in (mm)	0.59" · 15 mm									

Table 1.4 · Flow coefficients and associated valve sizes

C _v		2	3	5	7.5	12	30	40	60	94
K _{vS}		1.6	2.5	4	6.3	10	25	35	50	80
NPS	DN									
½	15	•		•						
¾	20		•		•					
1"	25			•		•				
1½	40						•			
2	50							•		
2½	65								•	
3	80									•

2. Pneumatic actuators

Table 2.1 · Technical data

Actuator	Electropneumatic actuator for Type 3531-IP	Pneumatic actuator for Type 3531-PP
Actuator area	120 cm ²	120 cm ²
Fail-safe position	Valve CLOSED or valve OPEN	
Reference variable/ bench range for fail-safe position	CLOSED	4 to 20 mA · Minimum current 3.6 mA Load impedance < 6 V (300 Ω/20 mA) Direction of action >>, fixed
	OPEN	30 to 48 psi (2.1 to 3.3 bar)
Characteristic	Linear, deviation from terminal-based conformity ≤ 2 %	-
Hysteresis	≤ 1 %	
Variable position	≤ 7 %	
Transit time for rated travel	p _{perm} =60 psi (4 bar)	Approx. 3 s
Air consumption in steady-state condition	≤ 160 l _n /h at p _{perm} = 60 psi (4 bar) ≤ 200 l _n /h at p _{perm} = 90 psi (6 bar)	-
Degree of protection	IP 54 ²⁾	-
Permissible ambient temperature	-22 to 160 °F (-30 to +70 °C)	-31 to 194 °F (-35 to +90 °C)
Accessories	1 or 2 limit switches with changeover contact (IP 65, Ex d, 3 m lead) nominal voltage/current: 250 V~/5 A~ or 250 V~/0.4 A-	

Table 2.2 · Materials · Material number according to DIN EN

Actuator case	GD-Al Si 12		
Diaphragm	NBR		
Actuator stem	1.4305		
Positioner housing	POM-GF	-	Polyamide
Yoke	Rods	9SMn28K galvanized, matt black finish	
	Crossbeam	1.4301	

Table 2.3 · Permissible differential pressures

Fail-safe position		Valve CLOSED		Valve OPEN	
Bench range	psi (bar)	20 to 34 (1.4 to 2.3)	30 to 48 (2.1 to 3.3)	20 to 34 (1.4 to 2.3)	6 to 20 (0.4 to 1.4)
Min./max. supply pressure	psi (bar)	40 to 60 (2.8 to 4.0)	55 to 90 (3.7 to 6.0)	55 to 60 (3.7 to 4.0)	50 to 90 (3.5 to 6.0)
C _v	K _{vS}	Δp when p ₂ = 0 psi (bar)			
2 to 12	1.6 to 10	230 (16)	-	230 (16)	-
30 · 40	25 · 35	145 (10)	-	145 (10)	-
60 · 94	50 · 80	50 (3.5)	72 (5.0)	50 (3.5)	72 (5.0)

3. Electric actuators

Table 3.1 · Technical data

Actuator		for	Type 3531-E1	Type 3531-E3	
Thrust			0.7 kN	2.5 kN Type 3374-11	2.0 kN Type 3374-21/31 ¹⁾
Transit time for rated travel			90 s	120 s · Other transit times on request	
Power supply	230 V/50 Hz		•	•	
	230 V/60 Hz		Special version	•	
	120 V/60 Hz		•	•	
	24 V/50 Hz		•	•	
	24 V/60 Hz		–	•	
Power consumption	Motor		3 VA	7.5 VA	10.5 VA
	With positioner		–	9.5 VA	12.5 VA
Manual override			•	•	
Degree of protection			IP 54 when installed upright	IP 54 · IP 65 with cable gland	
Mounting position			Suspended mounting position not permitted (see EB 5824 EN and EB 8331-1 EN)		
Permissible ambient temperature			32 to 122 °F (0 to 50 °C)	41 to 140 °F (5 to 60 °C)	
Additional electrical equipment					
Limit switch			2	2	
Potentiometer (not for version with positioner)			1 0 to 1000 Ω	2 0 to 1000 Ω	
Positioner			Digital ²⁾	Digital	
Input signal			0(4) to 20 mA · 0(2) to 10 V		
Output signal			0(2) to 10 V		

¹⁾ Actuators with fail-safe position: Type 3374-21 actuator stem extends; Type 3374-31 actuator stem retracts

²⁾ Power supply for version with positioner: 24 V DC, 24 V/50 Hz and 60 Hz as well as 85 to 264 V/50 Hz and 60 Hz

Table 3.2 · Permissible differential pressures

Table 3.2.1 · Plug with metal sealing, all pressures in psi and (bar)

Actuator		for	Type 3531-E1	Type 3531-E3
Thrust			0.7 kN	2.5 kN
C_v	K_{vs}		Δp when $p_2 = 0$ psi (bar)	
2 to 12	1.6 to 10		145 (10)	230 (16)
30 · 40	25 · 35		50 (3.5)	175 (12)
60 · 94	50 · 80		–	58 (4)

4. Dimensions and weights · Type 3531 Globe Valve

Valve size	NPS	½	¾	1	1½	2	2½	3
	DN	15	20	25	40	50	65	80
Installation length L for Class 150	in	7.25	7.25	7.25	8.75	10.0	10.87	11.75
	mm	184	184	184	222	254	276	298

Table 4.1 · Type 3531-IP Electropneumatic Valve · Dimensions for fail-safe position valve OPEN or valve CLOSED

H1 (Valve CLOSED)	in	18.54			18.94		23.07	
	mm	471			481		586	
H1 (Valve OPEN)	in	21.89			22.28		26.41	
	mm	556			566		671	
H2	in	1.57			2.83		3.86	
	mm	40			72		98	
H3 (Valve CLOSED)	in	4.33			4.33		4.33	
	mm	110			110		110	
H3 (Valve OPEN)	in	8.27			8.27		8.27	
	mm	210			210		210	
Weight approx.	lb	17	19.2	22	33.7	40.1	56.7	76.1
	kg	7.7	8.7	10	15.3	18.2	25.7	34.5

Table 4.2 · Type 3531-PP Pneumatic Valve · Dimensions valid for both fail-safe positions

H1 (Valve CLOSED or OPEN)	in	18.54			18.94		23.07	
	mm	471			481		586	
H2	in	1.57			2.83		3.86	
	mm	40			72		98	
H3 (minimum distance)	in	4.33			4.33		4.33	
	mm	110			110		110	
Weight approx.	lb	16.1	18.3	21.2	32.8	39.2	55.8	68.6
	kg	7.3	8.3	9.6	14.9	17.8	25.3	31.1

Table 4.3 · Type 3531-E1 Electric Valve

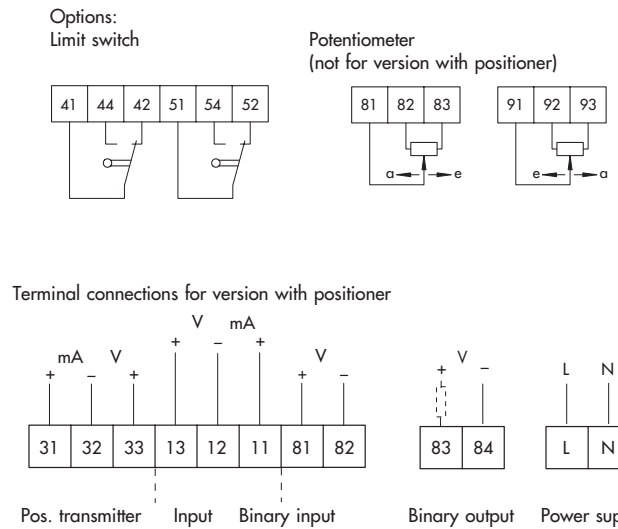
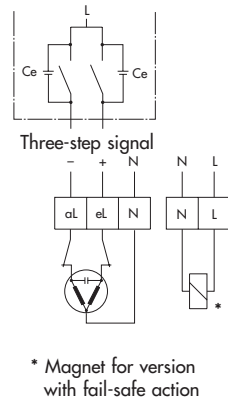
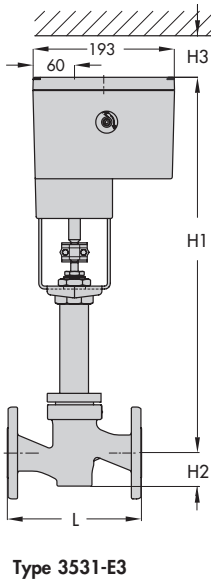
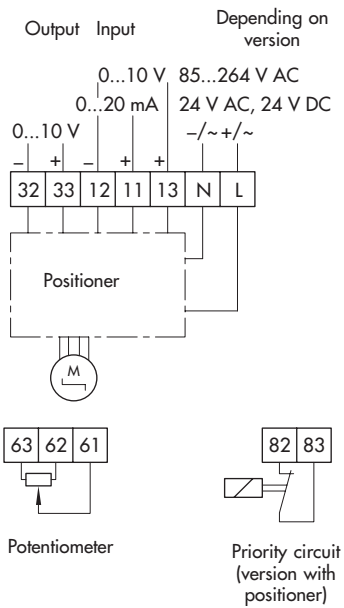
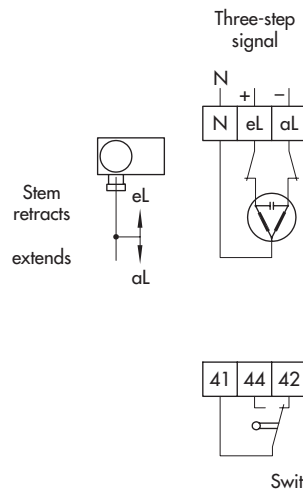
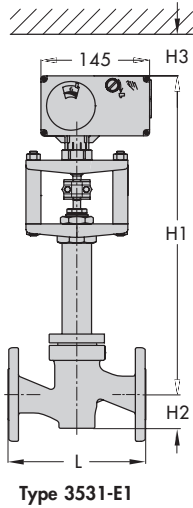
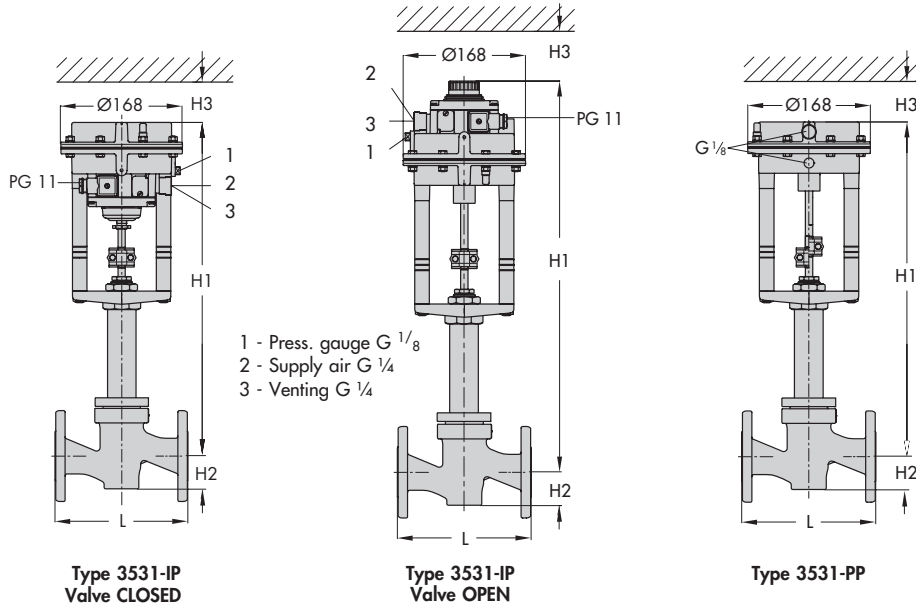
H1	in	16.89			17.28			
	mm	429			439			
H2	in	1.57			2.83			
	mm	40			72			
H3	in	4.33			4.33			
	mm	110			110			
Weight approx.	lb	12.8	15.0	17.9	29.5	35.9		
	kg	5.8	6.8	8.1	13.4	16.3		

Table 4.4 · Type 3531-E3 Electric Valve

H1	in	20.83			21.22		25.35	
	mm	529			539		644	
H2	in	1.57			2.83		3.86	
	mm	40			72		98	
H3 ¹⁾ (minimum distance)	in	4.33			4.33		4.33	
	mm	110			110		110	
Weight approx.	lb	20.9	23.1	26.0	37.7	44.1	60.6	80.0
	kg	9.5	10.5	11.8	17.1	20.0	27.5	36.3

¹⁾ Note: Cover screws are inserted from the top

Dimensional diagrams and terminal connections



5. Ordering text

When ordering, please indicate the following details:

Type 3531 Globe Valve

Valve size and flow rate	NPS ... Cv ...
Pressure rating	Class ...
Body material	Spheroidal graphite iron, carbon steel or stainless steel
Seat/plug sealing	Metal sealing

Actuators

for **Type 3531-IP**: Electropneumatic actuator

with integrated positioner 4 to 20 mA

optionally

Intrinsically safe  II 2 G EEx ia IIC T6 acc. to ATEX

Accessories

Limit switch 1 or 2

for **Type 3531-PP**: Pneumatic actuator

Fail-safe position Valve CLOSED or
valve OPEN

Bench range	Valve CLOSED	30 to 48 psi (2.1 to 3.3 bar)
	Valve OPEN	6 to 20 psi (0.4 to 1.4 bar)

Accessories

Limit switch 1 or 2

for **Type 3531-E1**: Electric actuator

Power supply

Three-step signal 230 V/50 Hz,
230 V/60 Hz,
120 V/60 Hz,
24 V/50 Hz

Version with positioner 24 V DC,
24 V/50 Hz, 60 Hz
85 to 264 V/50 Hz and 60 Hz

Accessories

Limit switches	2
Potentiometer	0 to 1000 Ω
Positioner input	0(4) to 20 mA or 0(2) to 10 V

for **Type 3531-E3**: Electric actuator

Fail-safe position Valve CLOSED or
valve OPEN

Nom. thrust	with fail-safe action	2 kN
	w/o fail-safe action	2.5 kN

Power supply 230 V/50 Hz,
230 V/60 Hz,
120 V/60 Hz
24 V/50 Hz
24 V/60 Hz

Accessories

Limit switches	2
Potentiometer	0 to 1000 Ω
Digital positioner	
Input and output	0(4) to 20 mA or 0(2) to 10 V

Specifications subject to change without notice.

