

## Series V2001 Valves

# Type 3531 Globe Valve for Heat Transfer Oil with pneumatic or electric actuator

ANSI version

SAMSON

### Application

Control valves for heat transfer applications using organic media according to DIN 4754

<b>Valve size</b>	<b>NPS ½ to 3</b>
<b>Pressure rating</b>	<b>Class 150</b>
<b>Temperature range</b>	<b>14 to 660 °F (-10 to +350 °C)</b>



The Type 3531 Globe Valve 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, cast steel or stainless steel for Class 150
- Valve sizes NPS ½ to 3
- Stem sealing with metal bellows and additional packing
- Metal-seated valve plug

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

### Versions

#### with Type 3531 Globe Valve for Heat Transfer Oil

- **Type 3531-IP Electropneumatic Globe Valve for Heat Transfer Oil** with Type 3372 Electropneumatic Actuator (Fig. 1) · 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 fail-close or fail-open, optionally with Type 4744-2 Limit Switch
- **Type 3531-PP Pneumatic Globe Valve for Heat Transfer Oil** with Type 3371 Pneumatic Actuator (Fig. 2), bench range 30 to 48 psi (2.1 to 3.3 bar) for fail-close version or 6 to 20 psi (0.4 to 1.4 bar) for fail-open version, optionally with Type 4744-2 Limit Switch
- **Type 3531-E1 Electric Globe Valve for Heat Transfer Oil** (Fig. 3) in NPS ½ to 2 with Type 5824-30 Electric Actuator, power supply 230 V/50 Hz or 230 V/60 Hz, 110 V/60 Hz and 24 V/50 Hz, optionally with limit contacts, resistance transmitters, positioner



Fig. 1: Type 3531-IP



Fig. 2: Type 3531-PP



Fig. 3: Type 3531-E1



Fig. 4: Electric actuator for Type 3531-E3

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

### Further versions

- **Type 3531** · Temperature range down to  $-94\text{ F}$  ( $-70\text{ }^{\circ}\text{C}$ )  
On request
- **Explosion-protected** version with electric actuators · On request
- **Type 3531 according to DIN standards** · See Data Sheet  
▶ T 8131

### Principle of operation

The process medium flows through the valve in the direction indicated by the arrow in the flow-to-open direction (Fig. 5, Fig. 6). 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

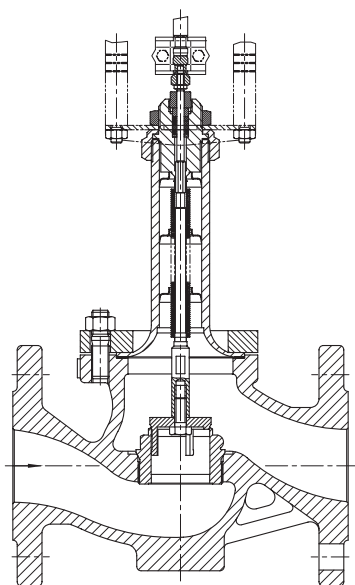
Depending on how the springs are arranged in the electro-pneumatic, pneumatic or electric actuator, the control valve has two different fail-safe positions that become effective when the supply air or control signal fails:

- **Actuator stem extends (fail-close):** The valve closes when the supply air fails.
- **Actuator stem retracts (fail-open):** The valve opens when the supply air fails.

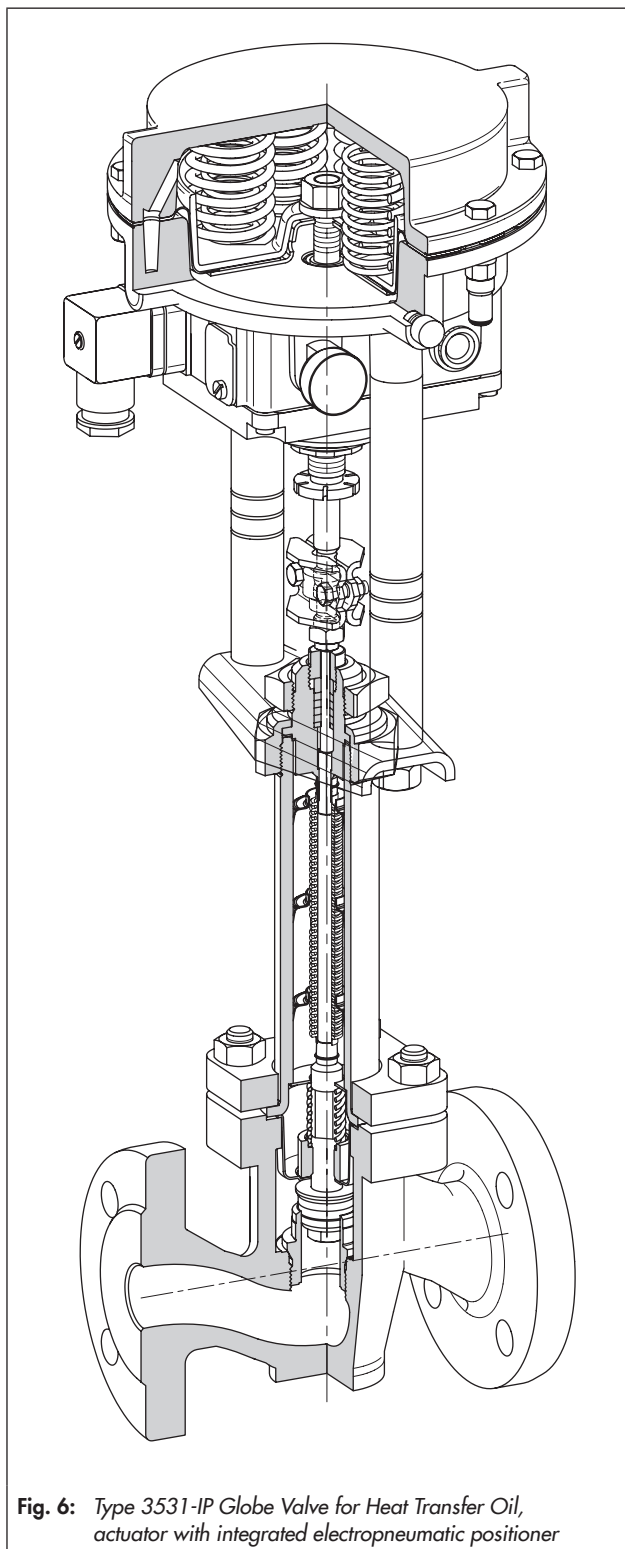
### Associated documentation

Instructions on how to mount the valve on the actuator can be found in the mounting and operating instructions delivered with the product:

- ▶ EB 8111           Type 3531 Globe Valve
- ▶ EB 8313-1        Actuator for Type 3531-IP
- ▶ EB 8313-3
- ▶ EB 5824-1        Electric actuator for Type 3531-E1
- ▶ EB 8331-3        Electric actuator for Type 3531-E3



**Fig. 5:** Type 3531-IP Globe Valve for Heat Transfer Oil in NPS  $\frac{1}{2}$  to 2



**Fig. 6:** Type 3531-IP Globe Valve for Heat Transfer Oil, actuator with integrated electropneumatic positioner

**Table 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	Cast steel A216 WCC	Stainless steel A351 CF8M
Connection	Flanges	Raised face		
Pressure rating		Class 150		
Seat-plug seal		Metal seal		
Characteristic		Equal percentage		
Rangeability		50:1		
Temperature range		14 to 660 °F (-10 to 350 °C) · Extended temperature range lower than -94 °F (-70 °C) on request		
Leakage class according to IEC 60534-4		Metal seal: IV		
Compliance		CE · EAC		

**Table 1.2:** Materials (previous material designation written in parentheses)

Valve size	NPS	½ · ¾ · 1 · 1½ · 2 · 2½ · 3		
Valve body		Spheroidal graphite iron A 395	Cast steel A216 WCC	Stainless steel A351 CF8M
Valve bonnet		A105		A351 CF8M
Seat and plug	Seat	Up to NPS 2: A479 316/A479 316L NPS 2½ and larger: A276 410 T		A479 316/A479 316L
	Plug	Up to NPS 2: 1.4305 NPS 2½ and larger: A582 430F		
Bellows seal		A479 316 Ti		
Packing		PTFE		
Body gasket		Graphite on metal core		

**Table 1.3:** Overview: Nominal sizes, valve coefficients, seat diameters, and travel

Valve size	NPS	½		¾		1		1½	2	2½	3
	DN	15		20		25		40	50	65	80
C <sub>v</sub> coefficient		2	5	3	7.5	5	12	30	40	60	94
K <sub>vS</sub> coefficient		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	0.59									
	mm	15									

**Table 1.4:** C<sub>v</sub> and K<sub>vS</sub> coefficients and associated valve sizes

C <sub>v</sub>		2	3	5	7.5	12	30	40	60	94
K <sub>vS</sub>		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									•

**Table 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 <sup>2</sup>	120 cm <sup>2</sup>
Fail-safe action	Fail-close or fail-open	
Reference variable/bench range with fail-safe action	CLOSED	4 to 20 mA · Minimum current 3.6 mA Compliance voltage <6 V (300 Ω/20 mA) Operating direction increasing/increasing >>, fixed
	OPEN	30 to 48 psi (2.1 to 3.3 bar) 6 to 20 psi (0.4 to 1.4 bar)
Characteristic	Linear · Deviation from terminal-based conformity ≤2 %	-
Hysteresis	≤1 %	
Variable position	≤7 %	
Transit time for rated travel	p <sub>perm</sub> = 60 psi (4 bar)	Approx. 3 s
Air consumption in steady state	≤160 l <sub>n</sub> /h at p <sub>perm</sub> = 60 psi (4 bar) ≤200 l <sub>n</sub> /h at p <sub>perm</sub> = 90 psi (6 bar)	-
Degree of protection	IP 54 <sup>2)</sup>	-
Permissible ambient temperature	-22 to +160 °F (-30 to +70 °C)	-31 to +194 °F (-35 to +90 °C)
Additional electrical equipment	1 or 2 changeover contacts (IP 65, Ex d, 3 m cable) Nominal voltage/current: 250 V~/5 A~ or 250 V~/0.4 A~	

**Table 2.2: Materials**

Actuator housing	GD-Al Si 12		
Diaphragm	NBR		
Actuator stem	1.4305		
Positioner housing	POM-GF	-	Polyamide
Yoke	Rod	9SMn28K zinc-coated, matt black finish	
	Bracket	1.4301	

**Table 2.3: Permissible differential pressures**

Fail-safe action		Fail-close		Fail-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 <sub>V</sub> coefficients	K <sub>VS</sub> coefficients	Δp when p <sub>2</sub> = 0 psi (bar)			
2 to 12	1.6 to 10	230 (16)	-	230 (16)	-
30 and 40	25 and 35	145 (10)	-	145 (10)	-
60 and 94	50 and 80	50 (3.5)	72 (5)	50 (3.5)	72 (5)

**Table 3:** Electric actuators**Table 3.1:** Technical data

Actuator		For	Type 3531-E1	Type 3531-E3	
Positioning force			0.7 kN	2.5 kN (Type 3374-11)	2.0 kN (Type 3374-21/31) <sup>1)</sup>
Transit time for rated travel			90 s	120 s · Shorter 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 not permitted (see ► EB 5824-1 and ► EB 8331-3)		
Permissible ambient temperature			0 to 50 °C	5 to 60 °C	
Additional electrical equipment					
Limit contact			2	2	
Resistance transmitters (not for version with positioner)			1 0 to 1000 Ω	2 0 to 1000 Ω	
Positioner			Digital <sup>2)</sup>	Digital	
Input signal			0/4 to 20 mA · 0/2 to 10 V		
Output signal			0/2 to 10 V		

<sup>1)</sup> Actuators with fail-safe action: Type 3374-21 with stem extends, Type 3374-31 with stem retracts

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

**Table 3.2:** Permissible differential pressures for metal-seated plug · All pressures in psi (bar)

Actuator		For	Type 3531-E1	Type 3531-E3
Positioning force			0.7 kN	2.5 kN
$C_v$ coefficients	$K_{vs}$ coefficients		$\Delta p$ when $p_2 = 0$ psi (bar)	
2 to 12	1.6 to 10		145 (10)	230 (16)
30 and 40	25 and 35		50 (3.5)	175 (12)
60 and 94	50 and 80		–	58 (4)

**Table 4:** Dimensions and weights · Type 3531 Globe Valve

**Table 4.1:** Type 3531-IP Electropneumatic Control Valve · Dimensions for fail-open or fail-close version

Valve size	NPS	½	¾	1	1½	2	2½	3
	DN	15	20	25	40	50	65	80
L (face-to-face dimension) Class 150	in	7.25	7.25	7.25	8.75	10	10.87	11.75
	mm	184	184	184	222	254	276	298
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	lbs	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 Control Valve · Dimensions apply to both fail-safe positions

Valve size	NPS	½	¾	1	1½	2	2½	3
	DN	15	20	25	40	50	65	80
L (face-to-face dimension) Class 150	in	7.25	7.25	7.25	8.75	10	10.87	11.75
	mm	184	184	184	222	254	276	298
H1 (fail-close or fail-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	lbs	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 Control Valve

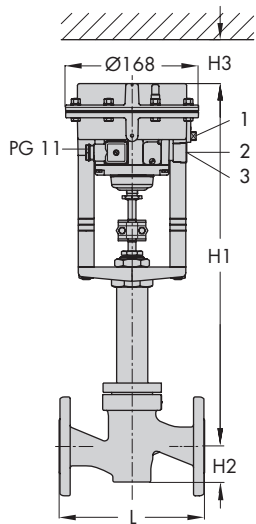
Valve size	NPS	½	¾	1	1½	2	2½	3
	DN	15	20	25	40	50	65	80
L (face-to-face dimension) Class 150	in	7.25	7.25	7.25	8.75	10	10.87	11.75
	mm	184	184	184	222	254	276	298
H1	in	16.89			17.28		-	
	mm	429			439			
H2	in	1.57			2.83			
	mm	40			72			
H3	in	4.33			4.33			
	mm	110			110			
Weight	lbs	12.8	15	17.9	29.5	35.9		
	kg	5.8	6.8	8.1	13.4	16.3		

**Table 4.4:** Type 3531-E3 Electric Control Valve

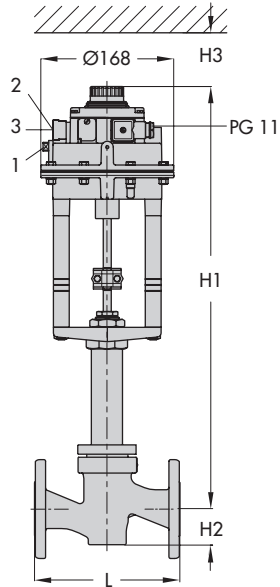
Valve size	NPS	½	¾	1	1½	2	2½	3
	DN	15	20	25	40	50	65	80
L (face-to-face dimension) Class 150	in	7.25	7.25	7.25	8.75	10	10.87	11.75
	mm	184	184	184	222	254	276	298
H1	in	20.83			21.22		25.35	
	mm	529			539		644	
H2	in	1.57			2.83		3.86	
	mm	40			72		98	
H3 <sup>1)</sup> (minimum distance)	in	4.33			4.33		4.33	
	mm	110			110		110	
Weight	lbs	20.9	23.1	26	37.7	44.1	60.6	80
	kg	9.5	10.5	11.8	17.1	20	27.5	36.3

<sup>1)</sup> Cover screws are mounted from the top

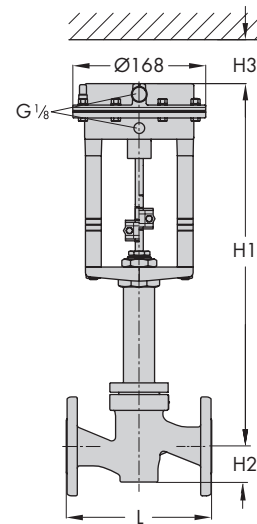
Dimensional drawings



Type 3531-IP, fail-close

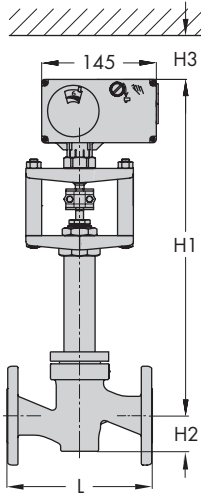


Type 3531-IP, fail-open

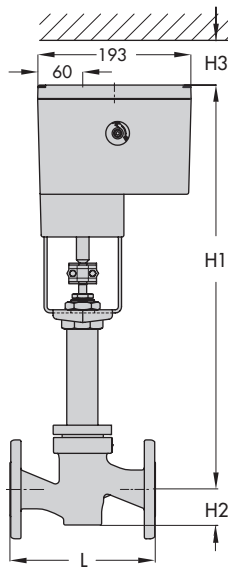


Type 3531-PP

- 1 Pressure gauge G 1/8
- 2 Supply air G 1/4
- 3 Vent plug G 1/4



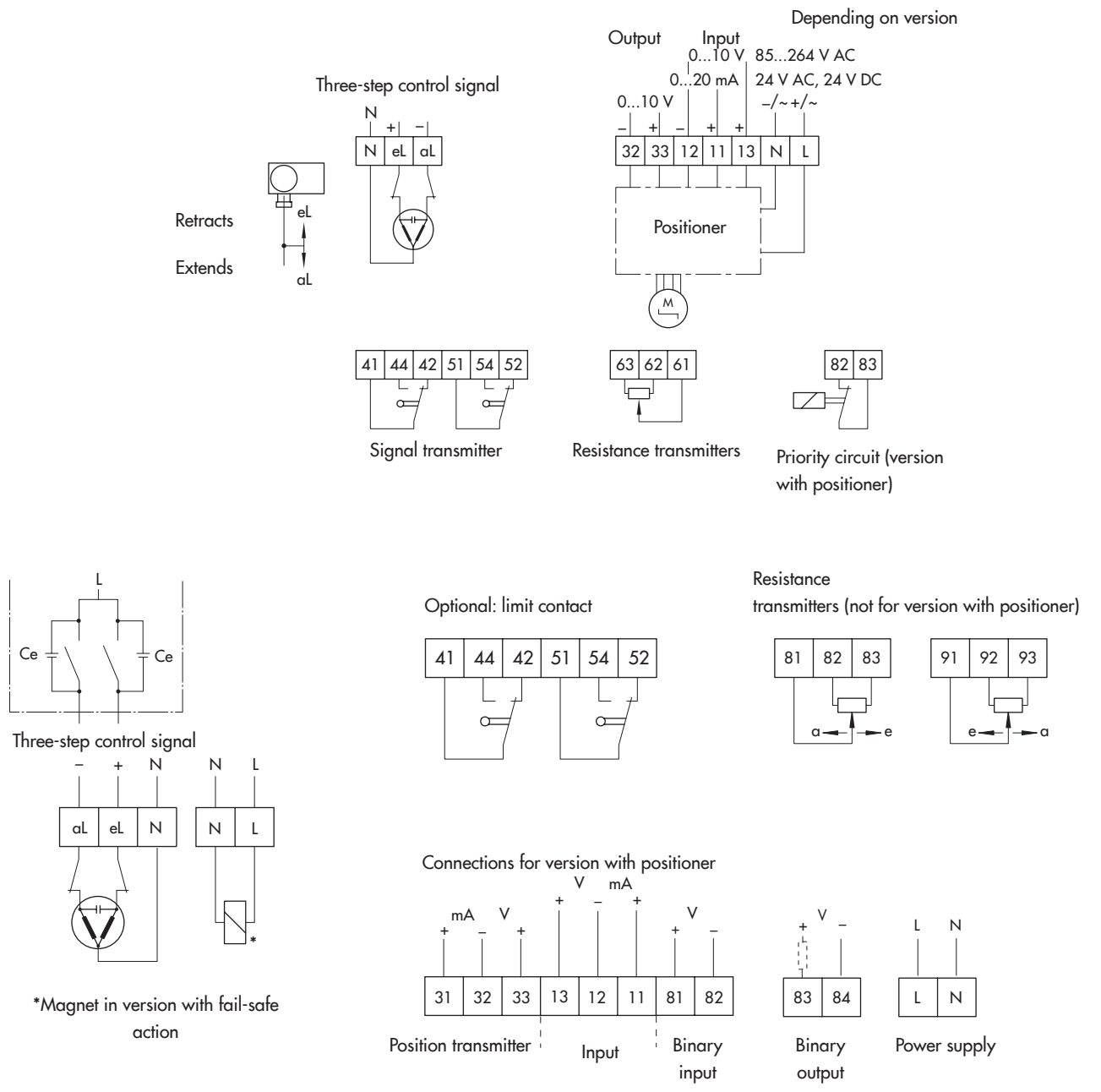
Type 3531-E1



Type 3531-E3



# Wiring plans



## Ordering text

The following specifications are required on ordering:

### Globe valve for Type 3531

Valve size	NPS ...
Flow coefficient	$C_v$ ...
Pressure rating	Class ...
Body material	Spheroidal graphite iron, cast steel or stainless steel
Seat-plug seal	Metal seal

### Actuators

For **Type 3531-IP**: Electropneumatic actuator with integrated positioner, 4 to 20 mA

Optional                    Intrinsicly safe  $\text{Ex}$  II 2G Ex ia IIC T6  
according to ATEX

Additional equipment    Limit switch 1 or 2

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

Fail-safe action        Fail-close or fail-open

Bench range            Fail-close: 30 to 48 psi  
(2.1 to 3.3 bar)  
Fail-open: 6 to 20 psi  
(0.4 to 1.4 bar)

Additional equipment    Limit switch 1 or 2

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

Voltage supply

Three-step version    – 230 V/50 Hz  
                                  – 230 V/60 Hz  
                                  – 120 V/60 Hz  
                                  – 24 V/50 Hz

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

Additional equipment    – Limit contact 2  
                                  – Resistance transmitter 0 to  
                                  1000  $\Omega$   
                                  – Positioner  
                                  input  
                                  0/4 to 20 mA or 0/2 to 10 V

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

Fail-safe action        Fail-close or fail-open

Positioning force        With fail-safe action: 2 kN  
                                  Without 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

Additional equipment    – Limit contact 2  
                                  – Resistance transmitter 0 to  
                                  1000  $\Omega$   
                                  – Digital positioner with input and  
                                  output 0/4 to 20 mA or 0/2 to  
                                  10 V



Specifications subject to change without notice



SAMSON AG · MESS- UND REGELTECHNIK  
Weismüllerstraße 3 · 60314 Frankfurt am Main, Germany  
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507  
samson@samson.de · www.samson.de

**T 8132 EN**

2018-05-03 · English