

T 8131 EN

Series V2001 Valves · Type 3531 Globe Valve for Heat Transfer Oil with electropneumatic, pneumatic or electric actuator

DIN version



Application

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

| | |
|--------------------------|-----------------------|
| Valve size | DN 15 to 80 |
| Pressure rating | PN 25 |
| Temperature range | -10 to +350 °C |

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 PN 25
- Valve sizes DN 15 to 80
- Stem sealed by metal bellows and additional packing
- Metal-seated valve plug

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

Versions

- **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, 4 to 20 mA reference variable, max. 6 bar supply air, 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 2.1 to 3.3 bar for fail-close version or 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 DN 15 to 50 with Type 5824-30 or Type 5827-N3 Electric Actuator, supply voltage 230 V/50 Hz or 24 V/50 Hz, optionally with limit contacts, resistance transmitter, positioner



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

Further versions

- **Type 3531** · Temperature range down to $-70\text{ }^{\circ}\text{C}$ · On request
- **Explosion-protected version** with electric actuators · On request
- **Type 3531 according to ANSI standards** · See Data Sheet
▶ T 8132

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 5827-1
- ▶ EB 8331-3 Electric actuator for Type 3531-E3

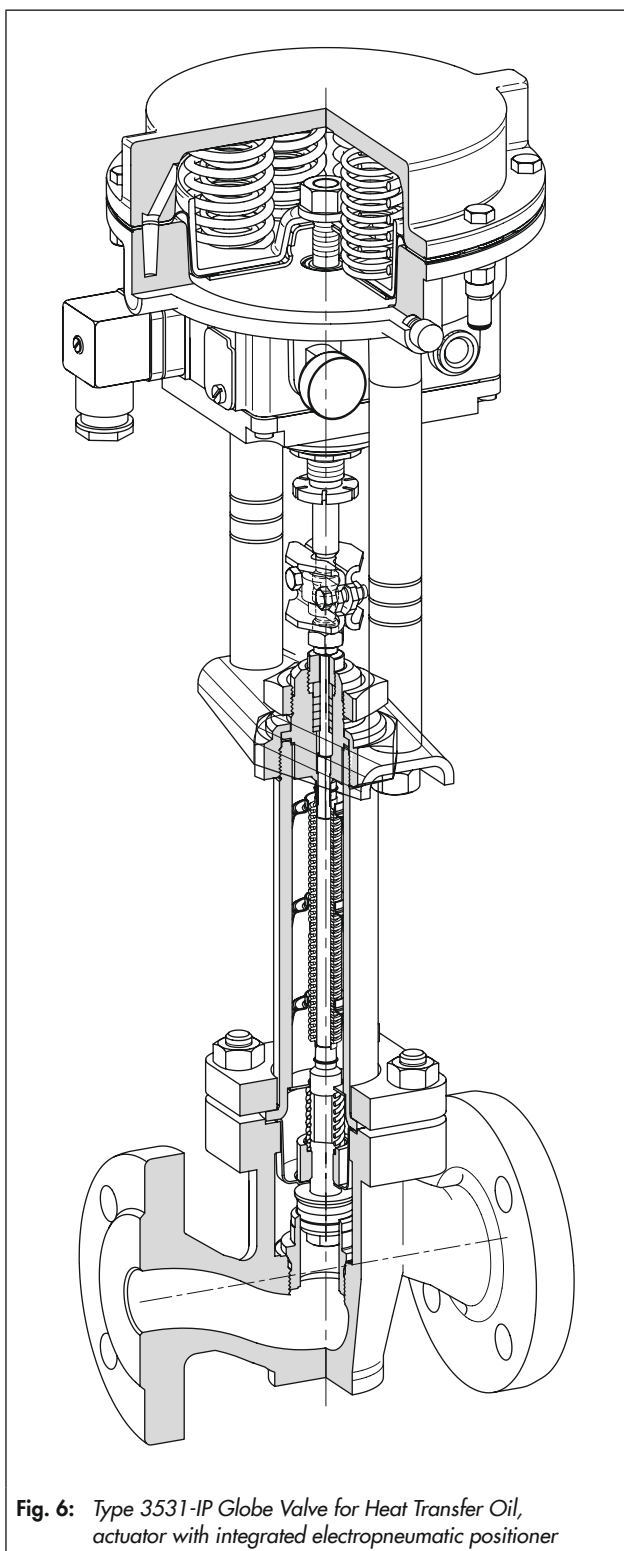
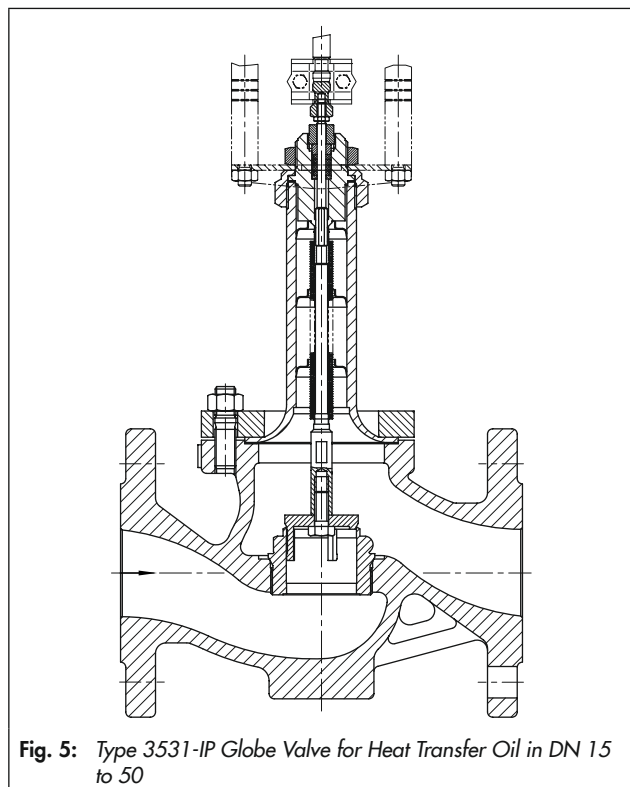


Fig. 6: Type 3531-IP Globe Valve for Heat Transfer Oil, actuator with integrated electropneumatic positioner

Table 1: Type 3531 Globe Valve for Heat Transfer Oil**Table 1.1:** Technical data

| | | | | |
|--|---------|--|---------------------|--------------------------|
| Valve size | DN | 15 · 20 · 25 · 32 · 40 · 50 · 65 · 80 | | |
| Material | | Spheroidal graphite iron · EN-GJS-400-18-LT | Cast steel · 1.0619 | Stainless steel · 1.4408 |
| Connection | Flanges | EN 1092-1 form B1, Ra 3.2 to 12.5 µm · EN 1092-1, groove form D | | |
| Pressure rating | PN | 25 | | |
| Seat-plug seal | | Metal seal | | |
| Characteristic | | Equal percentage | | |
| Rangeability | | 50 : 1 | | |
| Temperature range | | -10 to +350 °C · Extended temperature range lower than -70 °C on request | | |
| Leakage class according to IEC 60534-4 | | Metal seal: Class IV Type 3531-E1: Class I (0.05 % of K_{VS} coefficient) | | |
| Conformity | | CE · EAC | | |

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

| | | | | |
|---------------|------|--|---------------------|--------------------------|
| Valve size | DN | 15 · 20 · 25 · 32 · 40 · 50 · 65 · 80 | | |
| Valve body | | Spheroidal graphite iron · EN-GJS-400-18-LT | Cast steel · 1.0619 | Stainless steel · 1.4408 |
| Valve bonnet | | 1.0460 | | 1.4408 |
| Seat and plug | Seat | Up to DN 50: 1.4401/1.4404 DN 65 and larger: 1.4006 | | 1.4401/1.4404 |
| | Plug | Up to DN 50: 1.4305 DN 65 and larger: 1.4104 | | |
| Bellows seal | | 1.4571 | | |
| Packing | | PTFE | | |
| Body gasket | | Graphite on metal core | | |

Table 1.3: Valve sizes, K_{VS} coefficients, seat diameters and travel

| Valve size | DN | 15 | | 20 | | 25 | | 32 | 40 | 50 | 65 | 80 |
|----------------------|----|-----|----|-----|-----|----|----|----|----|----|----|----|
| K_{VS} coefficient | | 1.6 | 4 | 2.5 | 6.3 | 4 | 10 | 16 | 25 | 35 | 50 | 80 |
| Seat Ø | mm | 9.5 | 19 | 14 | 22 | 19 | 24 | 32 | 40 | 40 | 65 | |
| Rated travel | mm | 15 | | | | | | | | | | |

Table 1.4: K_{VS} coefficients and associated valve sizes

| K_{VS} | 1.6 | 2.5 | 4 | 6.3 | 10 | 16 | 25 | 35 | 50 | 80 |
|----------|-----|-----|---|-----|----|----|----|----|----|----|
| DN | | | | | | | | | | |
| 15 | • | | • | | | | | | | |
| 20 | | • | | • | | | | | | |
| 25 | | | • | | • | | | | | |
| 32 | | | | | | • | | | | |
| 40 | | | | | | | • | | | |
| 50 | | | | | | | | • | | |
| 65 | | | | | | | | | • | |
| 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 ² | 120 cm ² |
| 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 Load impedance <6 V (300 Ω/20 mA) Operating direction increasing/increasing >>, fixed |
| | OPEN | |
| Characteristic | Linear · Deviation from terminal-based conformity ≤2 % | 2.1 to 3.3 bar |
| Hysteresis | ≤1 % | 0.4 to 1.4 bar |
| Variable position | ≤7 % | |
| Transit time for rated travel | p _{perm} = 4 bar | Approx. 3 s |
| Air consumption in steady state | ≤160 l _n /h at p _{perm} = 4 bar ≤200 l _n /h at p _{perm} = 6 bar | – |
| Degree of protection | IP 54 | – |
| Permissible ambient temperature | –30 to +70 °C | –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 | Stem | 9SMn28K zinc-plated, matt black finish | |
| | Bracket | 1.4301 | |

Table 2.3: Permissible differential pressures

| Fail-safe action | | Fail-close | | Fail-open | |
|------------------------------|-----------|--------------------------------|------------|------------|------------|
| Bench range | bar | 1.4...2.3 | 2.1 to 3.3 | 1.4 to 2.3 | 0.4 to 1.4 |
| Min./max. supply pressure | bar | 2.8 to 4.0 | 3.7 to 6.0 | 3.7 to 4.0 | 3.5 to 6.0 |
| K _{V5} coefficients | | Δp when p ₂ = 0 bar | | | |
| | 1.6 to 10 | 16 | – | 16 | – |
| | 16 to 35 | 10 | – | 10 | – |
| | 50 and 80 | 3.5 | 5.0 | 3.5 | 5.0 |

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) ¹⁾ |
| Transit time for rated travel | | 90 s | 120 s · Other transit times on request | |
| Supply voltage | 230 V/50 Hz | • | • | |
| | 230 V/60 Hz | Special version | • | |
| | 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 |
| Handwheel | | • | • | |
| Degree of protection | | IP 54 when installed upright | IP 54 · IP 65 with cable gland | |
| | Mounting orientation | Suspended mounting not permitted (see ► EB 5824-1, ► EB 5827-1 and ► EB 8331-3) | | |
| Permissible ambient temperature | | 0 to 50 °C | 5 to 60 °C | |
| Additional electrical equipment | | | | |
| Limit switch | Limit contacts | 2 | 2 | |
| Resistance transmitters (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 action: Type 3374-21 with stem extends, Type 3374-31 with stem retracts

²⁾ 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 bar*

| Actuator | for | Type 3531-E1 | Type 3531-E3 |
|-----------------------|-----|-------------------------------|--------------|
| Positioning force | | 0.7 kN | 2.5 kN |
| K_{VS} coefficients | | Δp when $p_2 = 0$ bar | |
| 1.6 to 10 | | 10 | 16 |
| 16 to 35 | | 3.5 | 12 |
| 50 and 80 | | – | 4 |

Table 4: Dimensions in mm and weights in kg · Type 3531 Globe Valve**Table 4.1:** Type 3531-IP Electropneumatic Control Valve · Dimensions for fail-open or fail-close version

| Valve size | DN | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | |
|----------------------------|----|-----|-----|-----|------|------|------|------|------|--|
| L (face-to-face dimension) | mm | 130 | 150 | 160 | 180 | 200 | 230 | 290 | 310 | |
| Height | | | | | | | | | | |
| H1 (valve CLOSED) | mm | 471 | | | 481 | | | 586 | | |
| H1 (valve OPEN) | mm | 556 | | | 566 | | | 671 | | |
| H2 | mm | 40 | | | 72 | | | 98 | | |
| H3 (valve CLOSED) | mm | 110 | | | 110 | | | 110 | | |
| H3 (valve OPEN) | mm | 210 | | | 210 | | | 210 | | |
| Weight | kg | 7.7 | 8.7 | 10 | 14.7 | 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 | DN | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | |
|------------------------------|----|-----|-----|-----|------|------|------|------|------|--|
| L (face-to-face dimension) | mm | 130 | 150 | 160 | 180 | 200 | 230 | 290 | 310 | |
| Height | | | | | | | | | | |
| H1 (fail-close or fail-open) | mm | 471 | | | 481 | | | 586 | | |
| H2 | mm | 40 | | | 72 | | | 98 | | |
| H3 (minimum distance) | mm | 110 | | | 110 | | | 110 | | |
| Weight | kg | 7.3 | 8.3 | 9.6 | 14.3 | 14.9 | 17.8 | 25.3 | 31.1 | |

Table 4.3: Type 3531-E1 Electric Control Valve

| Valve size | DN | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | |
|----------------------------|------------------------|-----|-----|-----|------|------|------|----|----|--|
| L (face-to-face dimension) | mm | 130 | 150 | 160 | 180 | 200 | 230 | – | | |
| Height | | | | | | | | | | |
| H1 | for Type 5824 Actuator | mm | 429 | | | 439 | | | – | |
| | for Type 5827 Actuator | mm | 432 | | | 442 | | | | |
| H2 | mm | 40 | | | 72 | | | | | |
| H3 (minimum distance) | mm | 110 | | | 110 | | | | | |
| Weight | kg | 5.8 | 6.8 | 8.1 | 12.8 | 13.4 | 16.3 | | | |

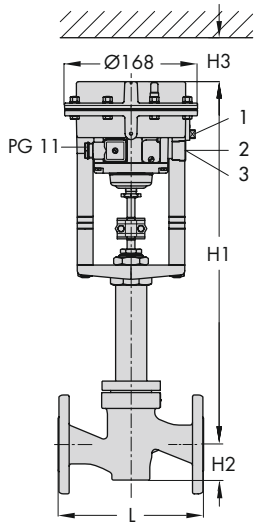
Table 4.4: Type 3531-E3 Electric Control Valve

| Valve size | DN | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 | |
|-------------------------------------|----|-----|------|------|------|------|-----|------|------|--|
| L (face-to-face dimension) | mm | 130 | 150 | 160 | 180 | 200 | 230 | 290 | 310 | |
| Height | | | | | | | | | | |
| H1 | mm | 529 | | | 539 | | | 644 | | |
| H2 | mm | 40 | | | 72 | | | 98 | | |
| H3 ¹⁾ (minimum distance) | mm | 110 | | | 110 | | | 110 | | |
| Weight | kg | 9.5 | 10.5 | 11.8 | 16.5 | 17.1 | 20 | 27.5 | 36.3 | |

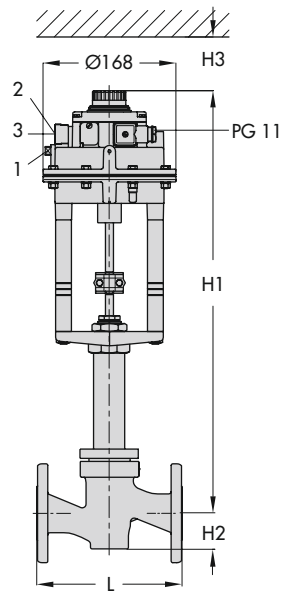
¹⁾ Cover screws are mounted from the top.

Dimension diagrams for electropneumatic control valves

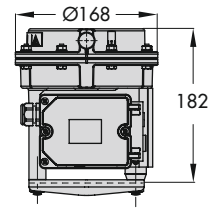
- 1 Pressure gauge G 1/8
- 2 Supply air G 1/4
- 3 Vent plug G 1/4



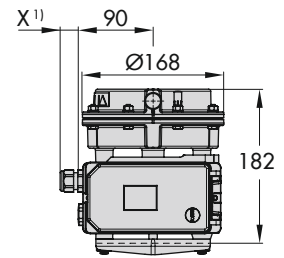
Type 3531-IP, fail-close



Type 3531-IP, fail-open



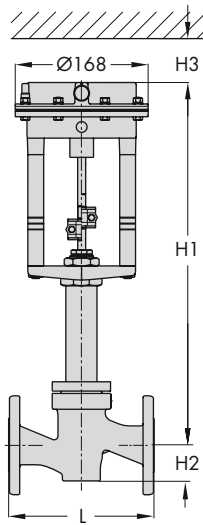
Type 3372 with Type 3725 Positioner



Type 3372 with Series 3730 Positioner

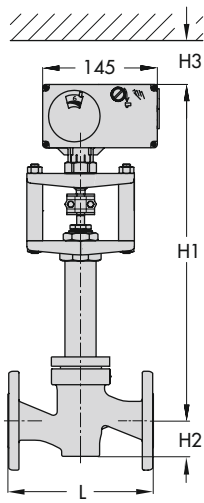
1) The dimension X depends on the cable gland used.

Dimension diagrams for pneumatic control valves



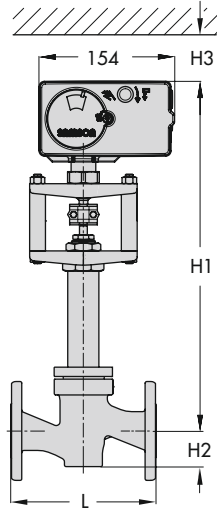
Type 3531-PP

Dimension diagrams for electric control valves



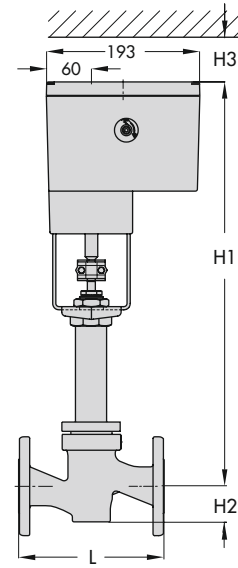
Type 3531-E1

Valve with Type 5824 Electric Actuator



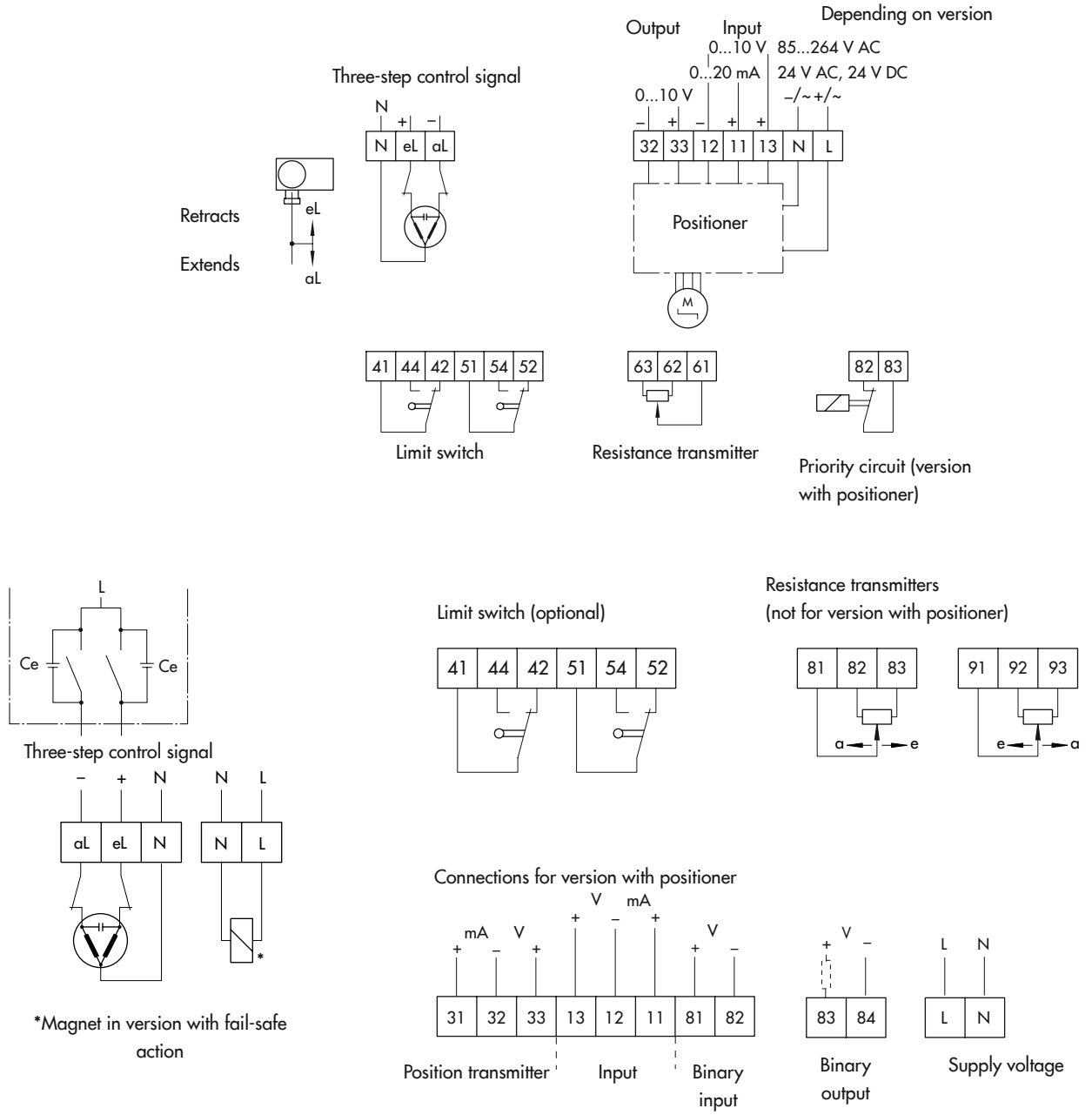
Type 3531-E1

Valve with Type 5827 Electric Actuator



Type 3531-E3

Wiring plans



Ordering text

The following specifications are required on ordering:

Type 3531 Globe Valve

| | |
|------------------|--|
| Valve size | DN ... |
| Flow coefficient | K_{VS} ... |
| Pressure rating | PN ... |
| 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 or with Type 3725/Series 3730 Positioner

Optional Intrinsically 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: 2.1 to 3.3 bar
Fail-open: 0.4 to 1.4 bar

Additional equipment Limit switch 1 or 2

For **Type 3531-E1**: Type 5824 or Type 5827 Electric Actuator

Supply voltage

Three-step version – 230 V/50 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 switch 2
 – Resistance transmitter 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 action Fail-close or fail-open

Positioning force With fail-safe action: 2 kN
Without fail-safe action: 2.5 kN

Supply voltage – 230 V/50 Hz
 – 230 V/60 Hz
 – 24 V/50 Hz
 – 24 V/60 Hz

Additional equipment – Limit switch 2
 – Resistance transmitter 0 to
 1000 Ω
 – Digital positioner with input and
 output 0/4 to 20 mA or 0/2 to
 10 V