# Series 250

# Pneumatic Control Valve Type 3253-1 and Type 3253-7
# Three-way Valve Type 3253

**Application**

Diverting or mixing valves for heavy-duty service in process engineering

| | |
|---|---|
| **Nominal sizes** | **DN 15 to 500** |
| **Nominal pressure** | **PN 10 to 160** |
| **Temperatures** | **–200 to +500 °C** |

Type 3253 Three-way Valve optionally operated with:
- Type 3271 Pneumatic Actuator (Type 3253-1 Control Valve) or
- Type 3277 Pneumatic Actuator (Type 3253-7 Control Valve) for integral positioner attachment

Valve body optionally made of
- Cast iron (DN 250 or larger for PN 10, DN 150/200 for PN 16)
- Cast steel (DN 15 to 100 for PN 63 or greater, DN 150 to DN 500 for PN 16 or greater), DN 400 and DN 500 for up to PN 40
- Cast stainless steel

Stuffing box containing either two spring-loaded PTFE V-ring packings or two adjustable high-temperature (HT) packings. Optional test connection between the two packings

Conversion between mixing and diverting services by **reversing** the seat-guided valve plug

The control valves, designed according to the modular assembly principle, can be equipped with various accessories:

Positioners, limit switches, solenoid valves and other equipment according to IEC 60534-6 and NAMUR recommendation (see Information Sheet T 8350 EN for details).

**Versions**

**Standard version** with PTFE packing for temperatures from –10 to +220 °C or with adjustable high-temperature packings for –10 to +350 °C

**Type 3253-1** (Fig. 1) · Type 3253 Valve and Type 3271 Actuator with 350 to 2800 cm² (see T 8310-1 EN and T 8310-2 EN)

**Type 3253-7** · Type 3253 Valve and Type 3277 Actuator with 350 or 700 cm² (see Data Sheet T 8310-1 EN)

**Additional versions with**
- **Nominal pressures >PN 160 to 400** · On request
- **Extension bonnet or bellows seal** · See Technical Data
- **Additional handwheel** · See T 8310-1/-2 EN
- **ANSI version** · NPS ½ to 20, ANSI Class 300 to 2500 on request
- **Type 3244** · DN 15 to 150, PN 10 to 40; NPS ½ to 6, ANSI Class 150 to 300 (see Data Sheet T 8026 EN).
- **Type 3253-2 Electric Control Valve** · On request


Fig. 1 · Type 3253-1 Pneumatic Control Valve with Type 3271 Actuator

- **Type 3253-3 Hand-operated Valve** · With Type 3273 Hand-operated Actuator (see T 8312 EN for details)

**Associated Information Sheets** **T 8000-1/-2/-3 EN**
**Associated Data Sheets for Pneumatic Actuators** **T 8310-1/-2 EN**

**Edition February 2008**

**Data Sheet** **T 8055 EN**

**Principle of operation**

Depending on plug arrangement, the three-way valve can be used for mixing or diverting service.

When used as a mixing valve, the process media to be mixed enter through valve ports A and B. The combined stream leaves at port AB (Fig. 2 and 3). The flow rate from valve ports A and B to port AB depends on the cross-sectional area of flow between the seats and the valve plugs.

When used as a diverting valve, the process medium enters at port AB and the partial streams leave at valve ports A and B (Fig. 4).

**Fail-safe action**

Depending on how the compression springs are arranged in the pneumatic actuator (see T 8310-1 EN and T 8310-2 EN for further details), the control valve has two different fail-safe actions which become effective upon a supply air failure:

**Actuator stem extends**:
Whenever the air supply fails, either valve port B (mixing valve) or valve port A (diverting valve) is closed.

**Actuator stem retracts**:
Whenever the air supply fails, either valve port A (mixing valve) or valve port B (diverting valve) is closed.

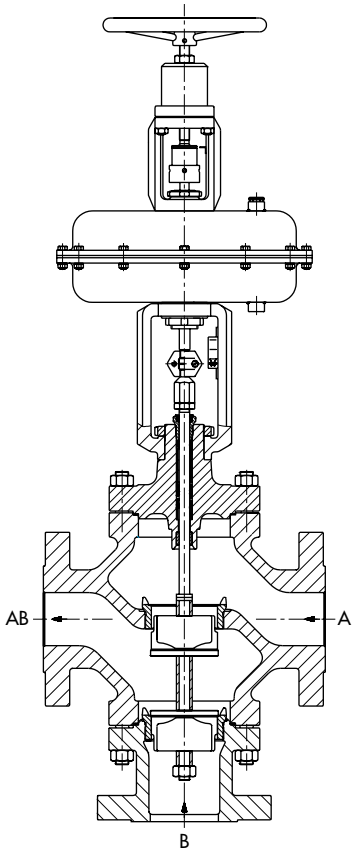



Fig. 2 · Type 3253-1 Control Valve with Type 3271 Pneumatic Actuator and additional handwheel, Body version for DN 50 to DN 500, Plug arrangement for mixing service

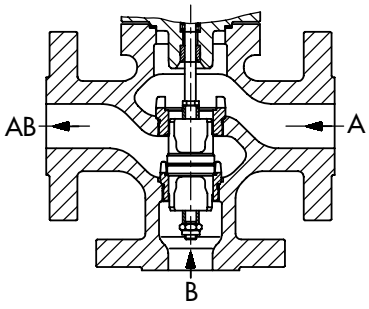



Fig. 3 · Type 3253 Three-way Valve Body version for DN 15 to DN 40, Plug arrangement for mixing service, Plug arrangement for diverting service DN 15 to 25

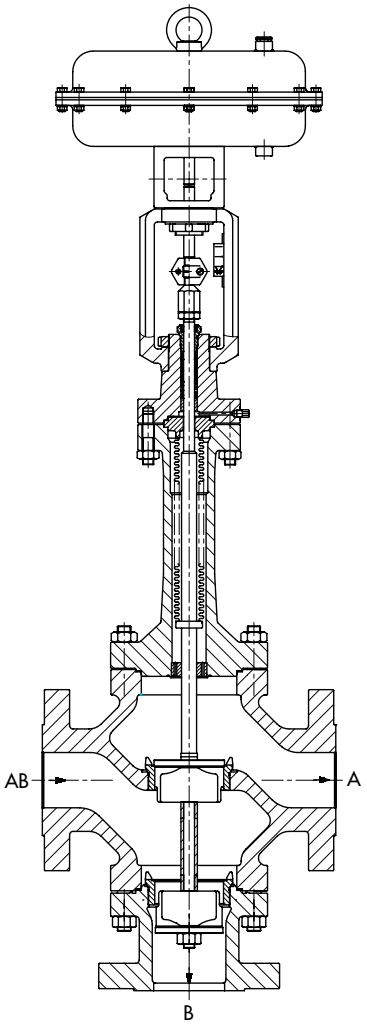



Fig. 4 · Type 3253-7 Control Valve with Type 3277 Pneumatic Actuator (only up to DN 100), Body version for DN 40 to DN 500, Plug arrangement for diverting service

**Table 1 · Technical Data for Type 3253 Three-way Valve**

| Material | | Cast iron EN-JL1040 | | Cast steel 1.0619 | | Cast stainless steel 1.4581 | |
|---|---|---|---|---|---|---|---|
| Nominal sizes | DN | 15 ... 200 | 200 ... 500 | 15 ... 100 | 150 ... 500 | 15 ... 100 | 150 ... 500 |
| Nominal pressure [1] | PN | 16 | 10 | 63 ... 160 | 16 ... 160 | 63 ... 160 | 16 ... 100 |
| End connection | Flanges | All DIN EN versions · Other connections on request | | | | | |
| Seat/plug sealing | | Metal sealing | | | | | |
| Characteristic | | Linear | | | | | |
| Rangeability | | 50 : 1 | | | | | |
| **Temperature ranges in °C** · Permissible operating pressures according to pressure-temperature diagram (see Information Sheet T 8000-2 EN) | | | | | | | |
| Body without extension bonnet | | –10 ... 220 °C · up to 350 °C with HT packing | | | | | |
| Body with | Ext. bonnet | –10 ... 300 | | –10 ... 400 [2] | | –10 ... 450 | |
| | Bellows | –10 ... 300 | | –10 ... 400 [2] | | –10 ... 450 | |
| Valve plug | Metal sealing | –200 ... 450 | | | | | |
| **Leakage rate** Acc. to DIN EN 1349: 2000 | | I | | | | | |

[1] Up to PN 400 on request, DN 400 to DN 500 only for up to PN 40

[2] In connection with suitable body material; for temperatures exceeding 500 °C: 1.7380

**Table 2 · Materials** (material numbers according to EN)

| Standard version Valve body and bonnet | Cast iron EN-JL1040 | Cast steel 1.0619 | Cast stainless steel 1.4581 |
|---|---|---|---|
| Seat and plug [1] | 1.4006 | | 1.4571 |
| Guide bushings | 1.4112 | | 2.4610 |
| Stuffing box packing | V-ring packing PTFE with carbon, spring 1.4310 or HT packing | | |
| Body gaskets | Metal | | |
| **Extension bonnet** | 1.0460 | 1.7335 | 1.4571 |
| **Metal bellows seal** | | | |
| Intermediate piece | 1.0460/1.0619 | 1.7335/1.0619 | 1.4571 |
| Metal bellows | 1.4571 | | |

[1] All seats and plugs also available with Stellite facing

**Table 3 · Available $K_{VS}$ coefficients**

| Kvs | 4 | 10 | 25 | 40 | 100 | 160 | 360 | 630 | 800 | 1500 | 2500 | 4000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Seat ∅ | 24 | | 38 | 50 | 80 | 100 | 150 | 200 | 250 | 300 | 400 | 500 |
| Travel | 15 | | | 30 | | | 60 | | | 120 | | |
| DN | | | | | | | | | | | | |
| 15 | • | | | | | | | | | | | |
| 25 | | • | | | | | | | | | | |
| 40 | | | • | | | | | | | | | |
| 50 | | | | • | | | | | | | | |
| 80 | | | | | • | | | | | | | |
| 100 | | | | | | • | | | | | | |
| 150 | | | | | | | • | | | | | |
| 200 | | | | | | | | • | | | | |
| 250 | | | | | | | | | • | | | |
| 300 | | | | | | | | | | • | | |
| 400 | | | | | | | | | | | • | |
| 500 | | | | | | | | | | | | • |

**Table 4a · Permissible differential pressures Δp for valves with and without metal bellows seal**
**Fail-safe action "Actuator stem extends" · Pressures in bar**

Values specified in the columns highlighted in gray correspond to the standard bench range, i.e. applied at rated travel · Values specified in the other columns apply to maximum pretensioned springs.

| Bench range (bar) for actuator area ($cm^2$) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 350 | 0.2 ... 1.0 (0.8 ... 1.2) | 0.4 ... 2.0 (1.6 ... 2.4) | 1.4 ... 2.3 (1.85 ... 2.3) | 2.1 ... 3.3 (2.7 ... 3.3) | – | – | – |
| | | 700 | | | | | | | |
| | | 1400 | | | 0.5 ... 2.5 (2 ... 3) | 1.1 ... 2.4 (2.05 ... 2.7) | 1.3 ... 2.8 (2.45 ... 3.2) | | |
| | | 2800 | – | | | 0.9 ... 1.6 (1.4 ... 1.7) | 1.0 ... 2.1 (1.8 ... 2.3) | 1.1 ... 2.6 (2.2 ... 3.0) | – |
| | | 2 x 2800 | | | | | | | 1.6 ... 3.2 |
| Required supply pressure | | | Lower spring range value + upper spring range value | | | | | | |
| DN | $K_{vs}$ | Actuator $cm^2$ | Δp in bar | | | | | | |
| 15 | 4 | 350 | 8.5 | 22.5 | 92 | 141 | – | – | – |
| | | 700 | (106) | (217) | (252) | (370) | – | – | – |
| 25 | 10 | 350 | 8.5 | 22.5 | 92 | 140 | – | – | – |
| | | 700 | (106) | (217) | (252) | (370) | – | – | – |
| 40 | 25 | 350 | – | 8.2 | 36 | 55 | – | – | – |
| | | 700 | (41.5) | (86) | (100) | (147) | – | – | – |
| 50 | 40 | 700 | 4.2 | 10.6 | 42.7 | 65 | – | – | – |
| | | 1400 | (49) | (100) | (126) | (129) | (155) | – | – |
| 80 | 100 | 700 | – | – | 16.4 | 25 | – | – | – |
| | | 1400 | (18.8) | (38.9) | (49) | (50.2) | (60.2) | – | – |
| 100 | 160 | 700 | – | – | 10.3 | 15.9 | – | – | – |
| | | 1400 | (11.2) | (24.7) | (31.2) | (32) | (38.4) | – | – |
| 150 | 360 | 1400 | – | 10.8 | 13.6 | 14 | 16.8 | – | – |
| | | 2800 | – | (22.2) | (27.9) | (19.3) | (25) | (30.7) | – |
| 200 | 630 | 1400 | – | – | – | 4 | 4.7 | – | – |
| | | 2800 | – | (12.4) | (15.5) | (10.7) | (13.9) | (17.2) | – |
| | | 2x2800 | (16.6) | (25) | (31) | (21.4) | (27.8) | (34.4) | – |
| 250 | 800 | 2800 | – | – | – | (6.8) | (8.8) | (10.9) | – |
| | | 2x2800 | – | – | – | (13.6) | (17.6) | (21.8) | – |
| 300 | 1500 | 2800 | – | – | – | – | – | 3.6 | – |
| | | 2x2800 | – | – | – | – | – | 7.2 | – |
| 400 | 2500 | 2800 | – | – | – | – | – | – | – |
| | | 2x2800 | – | – | – | – | – | 4 | – |
| 500 | 4000 | 2x2800 | – | – | – | – | – | – | 3.5 |

**Table 4b · Permissible differential pressure Δp for valves with or without metal bellows seal**
**Fail-safe action "actuator stem retracts" · Pressures in bar**

Values specified in the columns highlighted in gray correspond to the standard bench range, i.e. applied at rated travel · Values specified in the other columns apply to maximum pretensioned springs.

| Bench range (bar) for actuator area ($cm^2$) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 350 | 0.2 ... 1.0 (0.2 ... 0.6) | 0.4 ... 2.0 (0.4 ... 1.2) | 1.4 ... 2.3 (1.4 ... 1.85) | 2.1 ... 3.3 (2.1 ... 2.7) | – | – | – |
| | | 700 | | | | | | | |
| | | 1400 | | | 0.5 ... 2.5 (0.5 ... 1.5) | 1.1 ... 2.4 (1.1 ... 1.75) | 1.3 ... 2.8 (1.3 ... 2.05) | | |
| | | 2800 | – | | | 0.9 ... 1.6 (0.9 ... 1.25) | 1.0 ... 2.1 (1.0 ... 1.55) | 1.1 ... 2.6 (1.1 ... 1.85) | – |
| | | 2 x 2800 | | | | | | | 1.6 ... 3.2 |
| Required supply pressure | | | Lower spring range value + upper spring range value | | | | | | |
| DN | $K_{vs}$ | Actuator $cm^2$ | Δp in bar | | | | | | |
| 15 | 4 | 350 | 8.5 | 22.5 | 92 | 141 | – | – | – |
| | | 700 | (22.5) | (50) | (189) | (287) | – | – | – |
| 25 | 10 | 350 | 8.5 | 22.5 | 92 | 141 | – | – | – |
| | | 700 | (22.5) | (50) | (189) | (287) | – | – | – |
| 40 | 25 | 350 | – | 8.2 | 36 | 55.4 | – | – | – |
| | | 700 | (8.2) | (19.4) | (75) | (114) | – | – | – |
| 50 | 40 | 700 | 4.2 | 10.6 | 42.7 | 65 | – | – | – |
| | | 1400 | (10.5) | (23.5) | (30) | (68.4) | (17) | – | – |
| 80 | 100 | 700 | – | – | 16.3 | 25 | – | – | – |
| | | 1400 | (4) | (8.8) | (11.3) | (26.4) | (31.4) | – | – |
| 100 | 160 | 700 | – | – | 10.3 | 7.9 | – | – | – |
| | | 1400 | – | (5.5) | (7.1) | (16.7) | (19.9) | – | – |
| 150 | 360 | 1400 | – | – | – | 7.2 | 8.6 | – | – |
| | | 2800 | – | (5.1) | (6.5) | (12.2) | (13.6) | (15) | – |
| 200 | 630 | 1400 | – | – | – | 4 | 4.7 | – | – |
| | | 2800 | – | – | – | (6.7) | (7.5) | (8.3) | – |
| | | 2x2800 | – | (5.4) | (7) | (13.4) | (15) | (16.6) | – |
| 250 | 800 | 2800 | – | – | – | (4.2) | (4.8) | (5.3) | – |
| | | 2x2800 | – | – | (4.4) | (8.4) | (9.6) | (10.6) | – |
| 300 | 1500 | 2800 | – | – | – | – | – | – | – |
| | | 2x2800 | – | – | – | 5.8 | 6.6 | 7.2 | – |
| 400 | 2500 | 2800 | – | – | – | – | – | – | – |
| | | 2x2800 | – | – | – | – | – | 4 | – |
| 500 | 4000 | 2x2800 | – | – | – | – | – | – | 3.5 |

**Table 5 · Dimensions in mm for Type 3253-1 and Type 3253-7 Pneumatic Control Valve in standard version**

| Valve | DN | 15 | 25 | 40 | 50 | 80 | 100 | 150 | 200 | 250 | 300 | 400 | 500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Length L | PN 10 ... 40 | – | | | | | | 480 | 600 | 730 | 850 | 1100 | 1250 |
| | PN 63 ...160 | 210 | 230 | 260 | 300 | 380 | 430 | 550 | 650 | 775 | 900 | 1150 | – |
| H1 for actuator | 350 $cm^2$ | 392 | 392 | 404 | 457 | 462 | 482 | – | | | | | |
| | 700 $cm^2$ | 392 | 392 | 404 | 457 | 462 | 482 | 732 | 805 | 860 | 1035 | 1035 | – |
| | 1400 $cm^2$ | – | | | 512 | 517 | 537 | 732 | 805 | 860 | 1035 | 1035 | 1258 |
| | 2800 $cm^2$ | – | | | 697 | 702 | 722 | 817 | 890 | 1094 | 1290 | 1290 | 1410 |
| H2 approx. | PN 10 ... 40 | – | | | | | | 480 | 520 | 595 | 740 | 830 | 985 |
| | PN 63 ...160 | 115 | 115 | 130 | 275 | 275 | 370 | 535 | 590 | 730 | – | – | – |

| Actuator $cm^2$ | 350 | 700 | 1400 | 2800 | 2 x 2800 |
|---|---|---|---|---|---|
| Diaphragm ∅ D | 280 | 390 | 530 | 770 | |
| H [1] | 82 | 200 | 287 | 620 | 1134 |
| H3 [2] | 110 | 190 | 610 | 650 | |
| Thread | M 30 x 1.5 | | M 60 x 1.5 | M 100 x 2 | |
| a (with Type 3271 Actuator) | G ⅜ (⅜ NPT) | | G ¾ (¾ NPT) | G 1 (1 NPT) | |
| a2 (with Type 3277 Actuator) | G ⅜ (⅜ NPT) | | – | | |

[1] Actuator 350 $cm^2$ without lifting ring

[2] Minimum clearance required to disassemble the actuator

**Table 6 · Weights for Type 3253-1 and Type 3253-7 Pneumatic Control Valve in standard version**

| Valve | DN | 15 | 25 | 40 | 50 | 80 | 100 | 150 | 200 | 250 | 300 | 400 | 500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Valve without actuator (approx. kg) | PN 10 ... 40 | [1] | | | | | | | 395 | 645 | 1550 | 2000 | 3700 |
| | PN 63 ...160 | 32 | 37 | 50 | 93 | 129 | 165 | 365 | [1] | | | – | – |

| Actuator $cm^2$ | | 350 | 700 | 1400 | 2800 | 2 x 2800 |
|---|---|---|---|---|---|---|
| Type 3271 (approx.) [2] | Without | 8 | 22 | 70 | 450 | 950 |
| | With handwheel | 13 | 27 | Only with side-mounted handwheel, see T 8310-2 EN | | |
| Type 3277 (approx.) [2] | Without | 12 | 26 | – | | |
| | With handwheel | 17 | 31 | | | |

[1] Weights on request

[2] Top row without handwheel, bottom row with handwheel

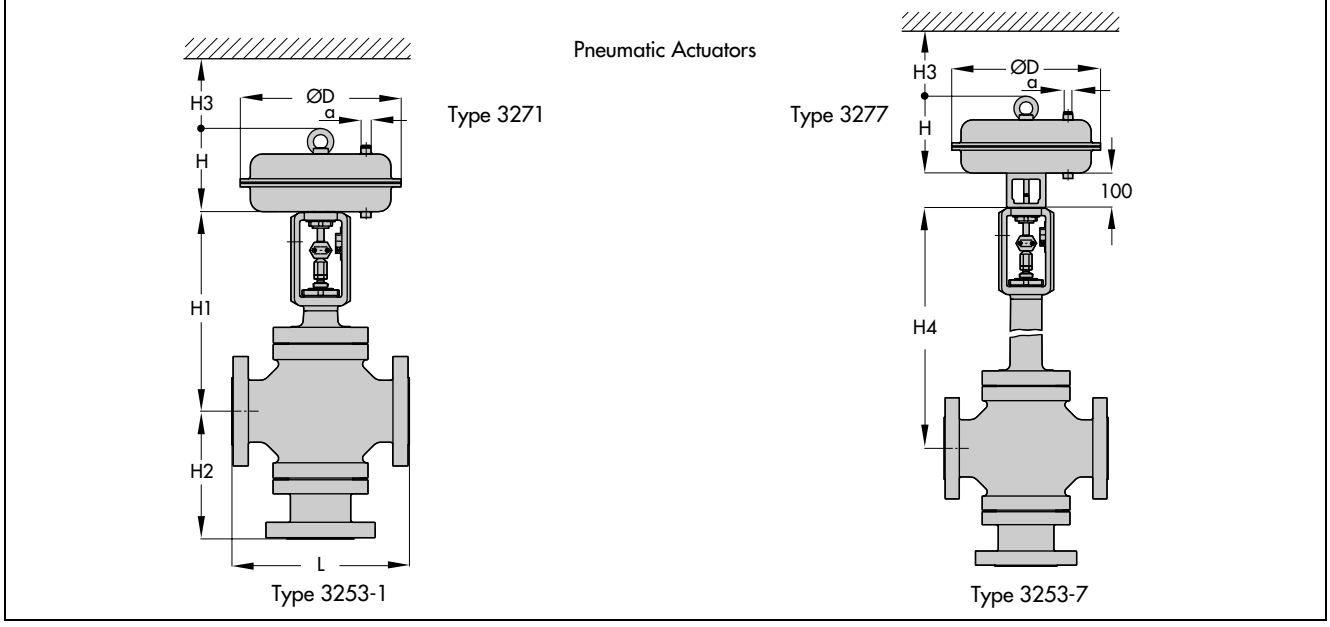


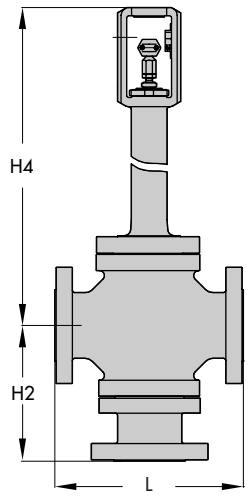
**Table 7 · Dimensions in mm and weights for Type 3253 Valve in standard version with extension bonnet** · Without actuator

| Nominal sizes | DN | 15 | 25 | 40 | 50 | 80 | 100 | 150 | 200 | 250 | 300 | 400 | 500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Height H4 for actuator | 350 | 593 | 593 | 605 | 727 | 732 | 752 | – | | | | | |
| | 700 | 593 | 593 | 605 | 727 | 732 | 752 | 1083 | 1365 | 1485 | 1555 | 1615 | – |
| | 1400 | – | | | 782 | 787 | 807 | 1083 | 1365 | 1485 | 1555 | 1615 | 1) |
| | 2800 | – | | | 967 | 972 | 992 | 1168 | 1450 | 1719 | 1810 | 1870 | 1) |
| Weight without actuator (approx. kg) | PN 16 ... 40 | 1) | | | | | | | 1) | | | | |
| | PN 63 ...160 | 37 | 42 | 55 | 103 | 139 | 175 | 380 | 1) | | | – | – |

**Table 8 · Dimensions in mm and weights for Type 3253 Valve in standard version with bellows seal** · Without actuator

| Nominal sizes | DN | 15 | 25 | 40 | 50 | 80 | 100 | 150 | 200 | 250 | 300 | 400 | 500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| H4 for PN 16 ... 40 for actuator | 350 | 590 | 590 | 602 | 836 | 841 | 841 | – | | | | | |
| | 700 | 590 | 590 | 602 | 836 | 841 | 841 | 1139 | 1455 | 1905 | 1895 | 1925 | – |
| | 1400 | – | | | 891 | 896 | 896 | 1139 | 1455 | 1905 | 1895 | 1925 | 1) |
| | 2800 | – | | | 1076 | 1081 | 1081 | 1224 | 1540 | 2139 | 2150 | 2180 | 1) |
| H4 for PN 63 ... 160 for actuator | 350 | 590 | 590 | 602 | 836 | 841 | 841 | – | | | | – | – |
| | 700 | 590 | 590 | 602 | 836 | 841 | 841 | 1271 | 1855 | 1) | | – | – |
| | 1400 | – | | | 891 | 896 | 896 | 1271 | 1855 | | | – | – |
| | 2800 | – | | | 1076 | 1081 | 1081 | 1356 | 1940 | | | – | – |
| Weight without actuator (apprx. kg) | PN 16 ... 40 | 1) | | | | | | | 370 | 1) | | – | – |
| | PN 63 ...160 | 37 | 42 | 55 | 103 | 139 | 175 | 1) | | | | – | – |

1) Data on request




Type 3253 with bellows seal or extension bonnet

**Selection and sizing of the control valve**

1. Calculate the appropriate $K_v$ coefficient acc. to IEC 60534
2. Select the nominal size DN and $K_{vs}$ coefficient according to Tables 3 and 4
3. Determine the permissible differential pressure $\Delta p$ according to Table 4
4. Select the body material according to Tables 1 and 2 and the pressure-temperature diagram in Information Sheet T 8000-2 EN
5. Select accessories according to Tables 1 and 2

**The following details are required on ordering**

| | |
|---|---|
| Nominal size | DN |
| Nominal pressure | PN |
| Body material | According to Table 2 |
| End connection | Flanges |
| Actuator | Type 3271 or Type 3277 (see T 8310-1 EN or T 8310-2 EN) |
| Fail-safe action | Actuator stem extends/retracts |
| Process medium | Densitiy in kg/m³ and temperature in °C |
| Flow rate | kg/h or m³/h in standard or operating state |
| Pressure | $p_1$ und $p_2$ in bar (absolute pressure $p_{abs}$) both with minimum, normal and maximum flow rate |
| Accessories | Positioner and/or limit switches |

Specifications subject to change without notice.

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