

Low leakage Pressure Balanced Cage type Control Valves

Model AC2

Overview

The model AC2 low leakage pressure balanced cage type control valves are designed for heavy duty service.

The valve plug employs pressure balance structure to control high differential pressure fluid with small actuator force.

The AC2 realizes seat leakage performance IEC class V per IEC60534-4 by flexible-seat structure.

The actuator is adopted a compact and powerful diaphragm motor.

The AC2 is applicable for high differential pressure process line where low seat leakage performance is required.

Specification

Body

Type

Straight-through, cast globe valve

Nominal size

6, 8, 10, 12, 14, 16, 18, 20, 24 inches

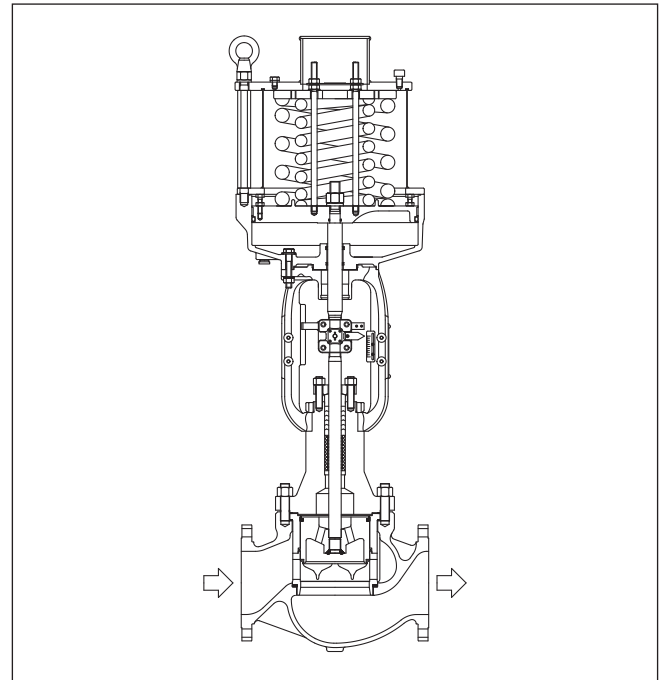
Pressure rating

- JIS10K, 20K, 30K
- ANSI Class 150, 300, 600
- JPI Class 150, 300, 600

End connection

- Flanged end

| Connection type | Pressure rating | Applicable standard | |
|-----------------|--------------------------|--------------------------|---------------------------|
| | | Nominal size 8" and less | Nominal size 10" and more |
| RF | JIS10K | JIS B2210-1984 | JIS B2212-1972 |
| | JIS20K | | JIS B2214-1967 |
| | JIS30K | | JIS B2215-1967 |
| | ANSI Class 150, 300, 600 | ANSI B16.5-1981 | ANSI B16.5-1968 |
| | JPI Class 150, 300, 600 | JPI-7S-15-1993 | JPI-7S-15-1993 |
| RJ | ANSI Class 150, 300, 600 | ANSI B16.5-1981 | ANSI B16.5-1968 |
| | JPI Class 150, 300, 600 | JPI-7S-15-1993 | JPI-7S-15-1993 |



- Welded end; BW

Material

For body/trim material combinations and operating temperature ranges, refer to Table 1.

Bonnet

Plain bonnet (-17 to +230°C)

Extension bonnet Type 1 (230 to 400°C)

Note) Take care not to exceed the operating temperature ranges specified for respective materials

Combination of nominal size and temperature range

| Nominal size | Temperature range |
|----------------|-------------------|
| 6 to 24 inches | -17 to +230°C |
| 6 to 12 inches | -17 to +400°C |

Gland type

- Grease not provided
When V shaped PTFE packing or PTFE yarn packing is used.

- Grease provided

When graphite packing is used.

Note) PTFE: Polytetrafluoroethylene

Gasket

| | General/High temperature | Oil free treatment |
|-------------------------|-----------------------------|--|
| Between body and bonnet | Serrated gasket V543 | Serrated gasket (PTFE coating) V543 (PTFE) |
| For upper cage | Serrated gasket V543 | Serrated gasket (PTFE coating) V543 (PTFE) |
| For lower cage | Spiral wound gasket (V8590) | Spiral wound gasket (V7590) |

Trim**Valve plug**

Pressure balanced type

Cage

Metal seat: Equal percentage (%V)
Linear (LV)

(For flow characteristics, refer to Figure 2)

Material

For body/trim material combinations and operating temperature ranges, refer to Table 1

Note) For fluid conditions that require Stellite, refer to Figure 5.

Actuator**Type**

Spring type piston actuator (Type PSA6/7)

Springless piston actuator (Type DAP)

Action

Direct or reverse action

Spring range

200 to 340kPa {2.0 to 3.5kgf/cm²} (Type PSA6/7)

200 to 390kPa {2.0 to 4.0kgf/cm²} (Type PSA6)

Supply pressure

Spring type piston actuator

Type PSA6: 400 to 500kPa

Type PSA7: 500kPa

Springless type piston actuator

Type DAP: 500kPa

Air connection

Rc1/4 or 1/4NPT internal thread

Ambient temperature

-30 to +70°C

Valve action

Air-to-close (Direct action actuator is combined.)

Air-to-open (Reverse action actuator is combined.)

Optional accessories

Positioner*, pressure regulator with filter, hand wheel*, limit switch, solenoid valve, motion transmitter, booster relay, lock-up valve, and others.

Note) 1. For the optional items, refer to the specification sheets and installation drawings of respective accessories.

2. Accessories with the asterisk mark (*) are selected from among the following types depending on the actuators to be combined.

Combination for accessories

| Actuator | Positioner | | Hand wheel | |
|----------|------------|---------|------------|------|
| | P/P | I/P | Top | Side |
| PSA6 | VPP | AVP/HEP | – | SHM |
| PSA7 | VPP | AVP/HEP | – | SHM |
| DAP560 | VPP | AVP/HEP | – | SHM |
| DAP1000 | | | | |
| DAP1500 | | | | |
| DAP1000X | | | | |

Additional specifications (by special order)

- Special inspection
Flow characteristics inspection, material inspection (Material certificate), non-destructive inspection, low-temperature inspection
- With drain plug
- Oil/water free treatment
- Special air piping and joint
- Yoke material carbon steel
- Saline damage preventive measure
- Sand-/dust preventive measure
- Cold-area use specification
- Double gland
- Copper free treatment
- Vacuum service

Performance**Rated Cv value**

Refer to Table 2

Flow characteristics

Refer to Figure 1

Inherent range ability

50:1

Allowable differential pressure

Refer to Table 3

Leakage specification

IEC60534-4:2006 or JIS B2005-4:2012

Class V: $18 \times 10^{-4} \times \text{Valve differential pressure (MPa)}$
 $\times \text{Port size (mm) l/h}$

Note) Valve plug and seat ring are parts having lives by its seat structure.

Hysteresis error

Without positioner: Within 9% F.S.

With positioner: Within 2% F.S.

Linearity

Without positioner: Within $\pm 9\%$ F.S.

With positioner: Within $\pm 2\%$ F.S.

Note) When positioner is not provided, operating performance may vary depending on type of packing used.

Dimensions

Refer to Figure 4, Table 4 and Table 5

Weight

Refer to Table 6

Actuator orientation

Refer to Figure 5

Finish

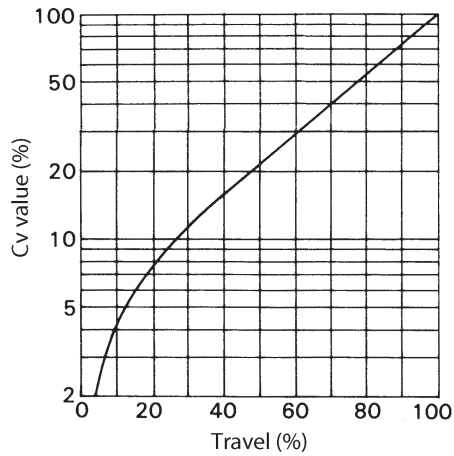
Blue (Munsell 10B5/10) or silver, or other specified colors.

Table 1. Body/trim material combination and operating temperature ranges (°C)

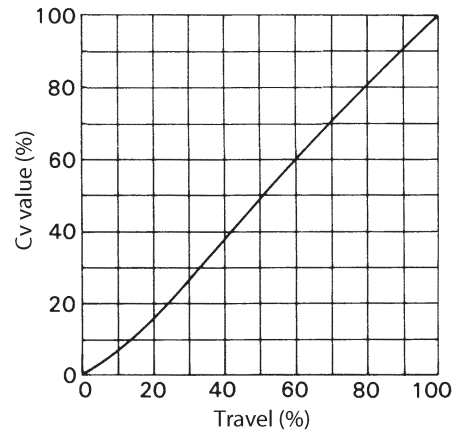
| Body material / Trim material | | JIS | SCPH2 | SCPH21 | SCPH61 | SCPL1 | SCS13A | SCS14A |
|-------------------------------|--|------|------------|------------|------------|-------------|------------|------------|
| | | ASTM | A216WCB | A217WC6 | A217C5 | A352LCB | A351CF8 | A351CF8M |
| ASTM | A351CF8M (Nominal size 6 and 8 inches) | | -5 to +400 | -5 to +400 | -5 to +400 | -5 to +400 | -5 to +400 | -5 to +400 |
| | A351CF8M Stellite | | -5 to +400 | -5 to +400 | -5 to +400 | -5 to +400 | -5 to +400 | -5 to +400 |
| JIS | SCS14A (Nominal size 10 inches and more) | | -5 to +400 | -5 to +400 | -5 to +400 | -5 to +400 | -5 to +400 | -5 to +400 |
| | SCS14A Stellite (Nominal size 10 inches and more) | | -5 to +400 | -5 to +400 | -5 to +400 | -5 to +400 | -5 to +400 | -5 to +400 |
| | SCS24 | | -5 to +400 | -5 to +400 | -5 to +400 | -17 to +350 | - | - |

Table 2. Cv value and travel

| Nominal size (inches) | 6 | | | 8 | | | 10 | | | 12 | | | 14 | | | 16 | | | 18 | | | 20 | | | 24 | | | |
|-----------------------|----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Port size (inches) | 4 | 5 | 6 | 5 | 6 | 8 | 6 | 8 | 10 | 8 | 10 | 12 | 10 | 12 | 14 | 12 | 14 | 16 | 14 | 16 | 18 | 16 | 18 | 20 | 20 | 22 | 24 | |
| Rated Cv value | %V | 179 | 261 | 322 | 275 | 360 | 610 | 395 | 640 | 1000 | 640 | 1000 | 1440 | 1000 | 1440 | 1930 | 1440 | 1930 | 2560 | 1930 | 2560 | 3180 | 2560 | 3180 | 3970 | 3180 | 3970 | 5820 |
| | LV | - | - | 371 | - | - | 795 | - | - | 1000 | - | - | 1440 | - | - | 1930 | - | - | 2560 | - | - | 3180 | - | - | 3970 | - | - | 5820 |
| Rated travel (mm) | 50 | | | 75 | | | 100 | | | 100 | | | 100 | | | 150 | | | 200 | | | 200 | | | 250 | | | |



a. Equal percentage characteristics (%V metal seat)



b. Linear characteristics (LV metal seat)

Figure 1. Flow characteristics

Note) The above graphs indicate typical flow characteristics.

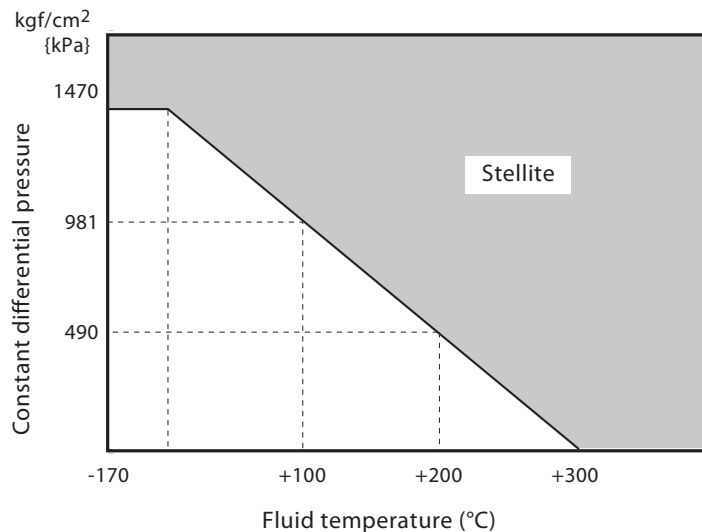


Figure 2. Temperature/normal differential pressure ranges requiring Stellite

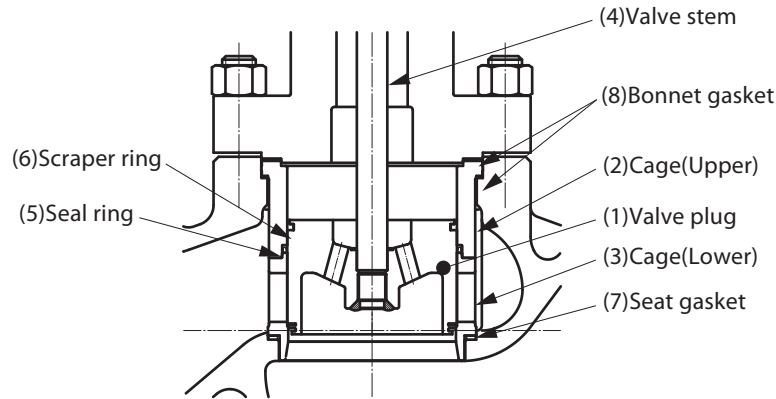


Figure 3. Structural drawing of trim (Plain bonnet)

1. The valve body material is carbon steel (SCPH2/A216WCB), and bonnet type is plain

| | | | |
|-------------------|---|-------|--|
| (1) Valve plug | A351CF8M | SCS24 | A351CF8M Stellite |
| (2) Cage(Upper) | A351CF8M | SCS24 | A351CF8M |
| (3) Cage(Lower) | A351CF8M/SUS316 | SCS24 | A351CF8M/SUS316 Stellite |
| (4) Valve stem | SUS316 | | |
| (5) Seal ring | MoS2-inserted PTFE, Hastelloy C276 with spring | | |
| (6) Scraper ring | Carbon-inserted PTFE | | |
| (7) Seat gasket | General | | Oil free |
| | Spiral gasket (hoop:SUS316, filler:inorganic paper) | | Spiral gasket (hoop:SUS316, filler:PTFE) |
| (8) Bonnet gasket | SUS316 | | SUS316(PTFE coating) |

2. The valve body material is stainless steel (SCS13A/A351CF8 of SCS14A/A351CF8M), and bonnet type is plain.

| | | | |
|-------------------|---|--------------------------|--|
| (1) Valve plug | A351CF8M/SCS14A | A351CF8M/SCS14A Stellite | |
| (2) Cage(Upper) | A351CF8M/SCS14A | A351CF8M/SCS14A | |
| (3) Cage(Lower) | A351CF8M/SCS14A | A351CF8M/SCS14A Stellite | |
| (4) Valve stem | SUS316 | | |
| (5) Seal ring | MoS2-inserted PTFE, Hastelloy C276 with spring | | |
| (6) Scraper ring | Carbon-inserted PTFE | | |
| (7) Seat gasket | General | | Oil free |
| | Spiral gasket (hoop:SUS316, filler:inorganic paper) | | Spiral gasket (hoop:SUS316, filler:PTFE) |
| (8) Bonnet gasket | SUS316 | | SUS316(PTFE coating) |

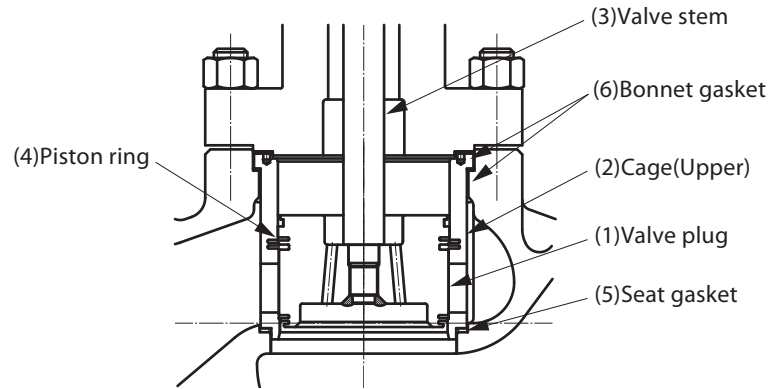


Figure 4. Structural drawing of trim (Extension bonnet type 1)

3. The valve body material is carbon steel (SCPH2/A216WCB), and bonnet type is extension type 1 for high temperature.

| | | | |
|-------------------|---|-----------------|-------|
| (1) Valve plug | SCS14A | SCS14A Stellite | SCS24 |
| (2) Cage | SCS14A | SCS14A Stellite | SCS24 |
| (3) Valve stem | SUS316 | | |
| (4) Piston ring | Carbon impregnated with antimony | | |
| (5) Seat gasket | Spiral gasket (hoop:SUS316, filler:inorganic paper) | | |
| (6) Bonnet gasket | SUS316 | | |

4. The valve body material is carbon steel (SCS13A/A351CF8 of SCS14A/A351CF8M), and bonnet type is extension type 1 for high temperature.

| | | |
|-------------------|---|-------|
| (1) Valve plug | A351CF8M Stellite | SCS24 |
| (2) Cage(Upper) | A351CF8M | SCS24 |
| (3) Valve stem | SUS316 | |
| (4) Piston ring | Carbon impregnated with antimony | |
| (5) Seat gasket | Spiral gasket (hoop:SUS316, filler:inorganic paper) | |
| (6) Bonnet gasket | SUS316 | |

Allowable differential pressure

Operating temperature range: -17 to +230°C

Table 3. Spring type piston actuator

| Actuator | Supply pressure kPa {kgf/cm ² } | Spring range kPa {kgf/cm ² } | Differential pressure (by nominal size (inches)) MPa {kgf/cm ² } | | | | | | | | |
|----------|---|--|---|-------------|-------------|-------------|----|----|----|----|----|
| | | | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 |
| PSA6R | 500 {5.0} | 200 to 390 {2.0 to 4.0} | 3.7 {37} | - | - | - | - | - | - | - | - |
| | | | 10 {100} | | | | | | | | |
| PSA7R | 400 {4.0} | 200 to 340 {2.0 to 3.5} | - | 3.7 {37} | 3.7 {37} | 3.7 {37} | - | - | - | - | - |
| | | | | 10 {100} | 10 {100} | 10 {100} | | | | | |

Table 4. Springless type piston actuator

| Actuator | Supply pressure kPa {kgf/cm ² } | Spring range kPa {kgf/cm ² } | Differential pressure (by nominal size (inches)) MPa {kgf/cm ² } | | | | | | | | | |
|----------|---|--|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|----|-------------|
| | | | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 | |
| DAP560 | 400 {4.0} | - | 10 {100} | - | - | - | - | - | - | - | - | - |
| DAP1000 | 400 {4.0} | - | - | 10 {100} | 10 {100} | 10 {100} | - | - | - | - | - | - |
| DAP1000 | 500 {5.0} | - | - | - | - | - | 10 {100} | - | - | - | - | - |
| DAP1500 | 500 {5.0} | - | - | - | - | - | - | 10 {100} | 10 {100} | 10 {100} | - | - |
| DAP1000X | 500 {5.0} | - | - | - | - | - | - | - | - | - | - | 10 {100} |

Operating temperature range: 230 to 400°C

Table 5. Springless type piston actuator

| Actuator | Supply pressure kPa {kgf/cm ² } | Spring range kPa {kgf/cm ² } | Differential pressure (by nominal size (inches)) MPa {kgf/cm ² } | | | |
|----------|---|--|---|-------------|-------------|-------------|
| | | | 6 | 8 | 10 | 12 |
| DAP1000 | 500 {5.0} | - | 10 {100} | - | - | - |
| DAP1000X | 500 {5.0} | - | - | 10 {100} | 10 {100} | 10 {100} |

Dimensions

Table 6. Face-to-face dimensions

[Unit: mm]

| Nominal size (inches) | A | | | | |
|--------------------------|--------------------------------------|-----------------------------------|-----------------------|---------------------------------|-------------------------|
| | JIS10KFF,RF ANSI150RF JPI150RF | JIS20KRF ANSI300RF JPI300RF | ANSI600RF JPI600RF | ANSI150,300 JPI150,300 BW | ANSI600 JPI600 BW |
| 6 | 451 | 473 | 508 | 473 | 508 |
| 8 | 543 | 568 | 610 | 568 | 610 |
| 10 | 673 | 708 | 752 | 708 | 752 |
| 12 | 737 | 775 | 819 | 775 | 819 |
| 14 | 889 | 927 | 972 | 927 | 972 |
| 16 | 1016 | 1057 | 1108 | 1057 | 1108 |
| 18 | 1360 | 1400 | 1550 | – | – |
| 20 | 1700 | 1745 | 1900 | – | – |
| 24 | 2000 | 2100 | 2300 | – | – |

Table 7. External dimension

[Unit: mm]

| Nominal size (inches) | Actuator | H | | B | E |
|--------------------------|----------|-----------------|---------------------|-----|---|
| | | Plain bonnet | Extension bonnet | | |
| 6 | PSA6R | 1315 | – | 476 | 170 |
| | DAP560 | 1245 | – | 380 | |
| | DAP1000 | – | 1545 | 470 | |
| 8 | PSA7R | 2165 | – | 580 | 220 |
| | DAP1000 | 1440 | – | 470 | |
| | DAP1000X | – | * | 470 | |
| 10 | PSA7R | * | – | 580 | 300 |
| | DAP1000 | * | – | 470 | |
| | DAP1000X | – | * | 470 | |
| 12 | PSA7R | * | – | 580 | 325(Class300 and less) 345(Class600) |
| | DAP1000 | * | – | 470 | |
| | DAP1000X | – | * | 470 | |
| 14 | DAP1000 | * | – | 470 | 380(Class150) 420(Class300) |
| 16 | DAP1500 | * | – | 570 | 410(Class150) 440(Class300) |
| 18 | DAP1500 | * | – | 570 | 500(Class150) 520(Class300) |
| 20 | DAP1500 | * | – | 570 | 650 |
| 24 | DAP1000X | * | – | 470 | * |

* Contact our sales.

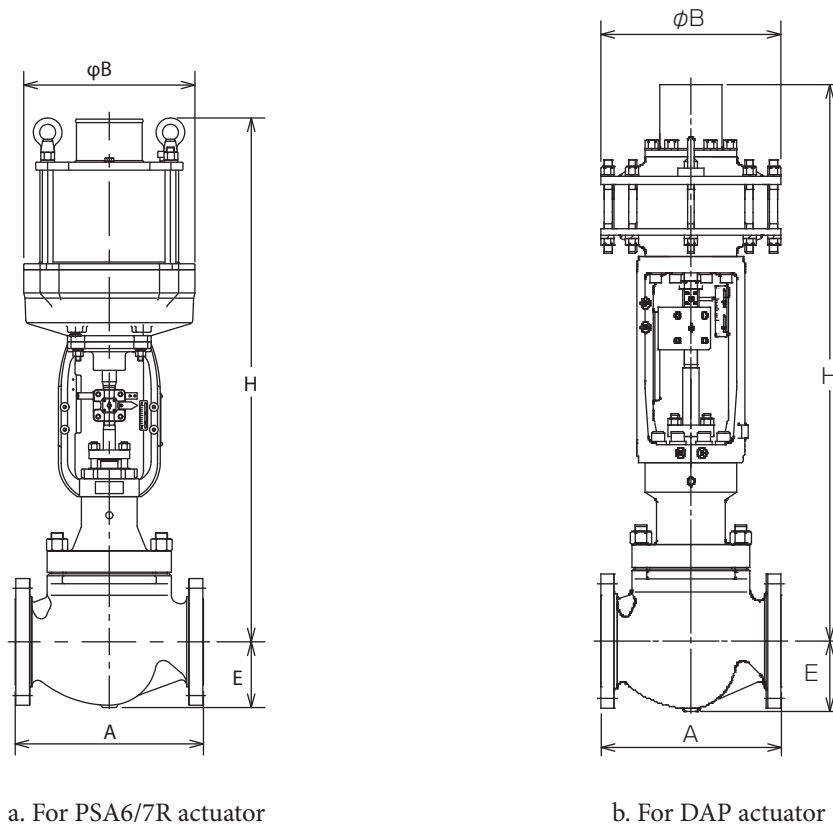


Figure 5. Face-to-face and external dimensions

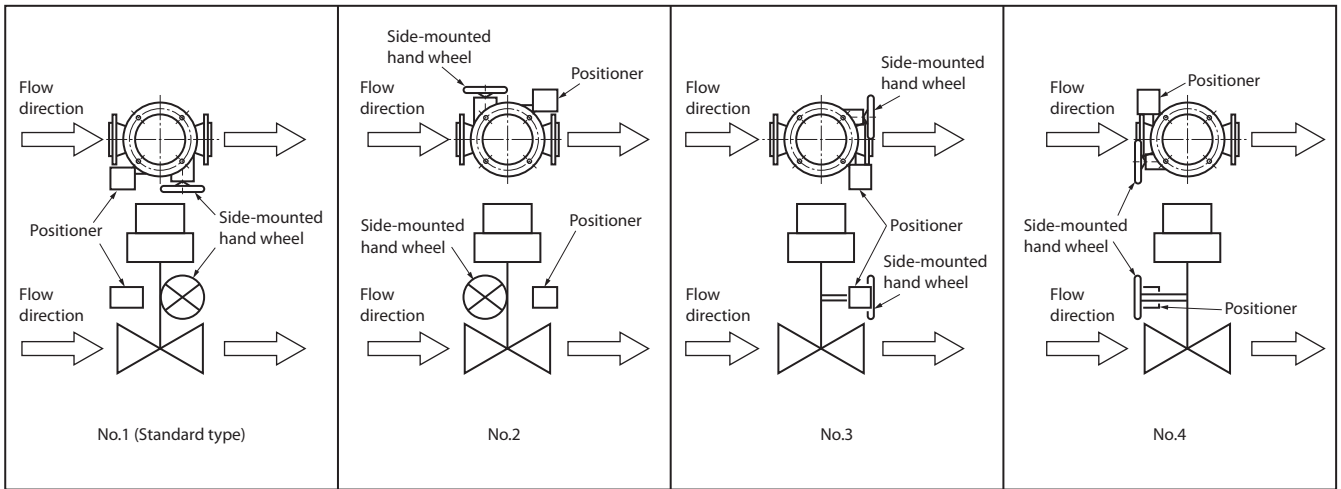
Table 8. Weight

[Unit: kg]

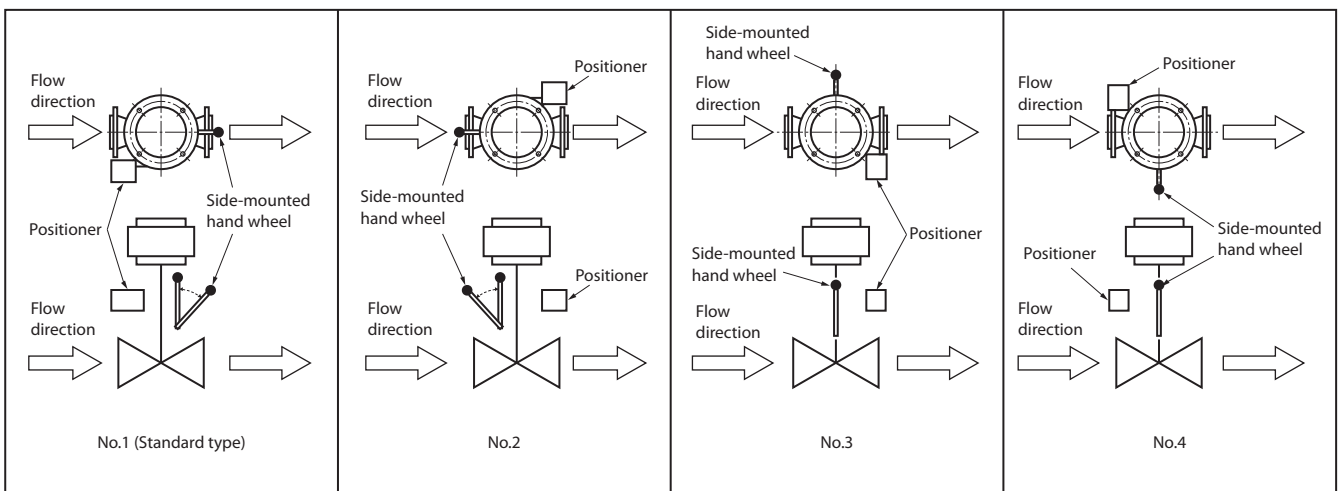
| Nominal size (inches) | Actuator | Weight | | | | | | | |
|--------------------------|----------|---|---------------------|---|---------------------|-----------------------------------|---------------------|--|---------------------|
| | | Flanged connection JIS10K, ANSI/JPI150 | | Flanged connection JIS20K, ANSI/JPI300 | | Flanged connection ANSI/JPI600 | | Welded connection ANSI/JPI150, 300, 600 | |
| | | Plain bonnet | Extension bonnet | Plain bonnet | Extension bonnet | Plain bonnet | Extension bonnet | Plain bonnet | Extension bonnet |
| 6 | PSA6R | 385 | — | 415 | — | 465 | — | 315 | — |
| | DAP560 | 290 | — | 320 | — | 370 | — | 310 | — |
| | DAP1000 | — | 345 | — | 375 | — | 425 | — | 365 |
| 8 | PSA7R | 770 | — | 820 | — | 940 | — | 745 | — |
| | DAP1000 | 375 | — | 425 | — | 545 | — | 450 | — |
| | DAP1000X | — | 475 | — | 525 | — | 645 | — | 600 |
| 10 | PSA7R | 920 | — | 1215 | — | 1395 | — | * | — |
| | DAP1000 | 585 | — | 880 | — | 1060 | — | * | — |
| | DAP1500 | — | * | — | * | — | * | — | * |
| 12 | PSA7R | 1100 | — | 1240 | — | 1420 | — | * | — |
| | DAP1000 | 765 | — | 905 | — | 1085 | — | * | — |
| | DAP1000X | — | 805 | — | 945 | — | 1125 | — | * |
| 14 | DAP1000 | * | — | * | — | * | — | * | — |
| 16 | DAP1500 | * | — | * | — | * | — | * | — |
| 18 | DAP1500 | * | — | * | — | * | — | * | — |
| 20 | DAP1500 | * | — | * | — | * | — | * | — |
| 24 | DAP1000X | * | — | * | — | * | — | * | — |

* Contact our sales.

(PSA6 Actuator)



(PSA7, DAP Actuator)



Note) Indicate by position number when installation other than the standard type is required.

Figure 6. Actuator orientation

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Specifications are subject to change without notice.

The logo for Azbil Corporation, featuring the word "azbil" in a bold, lowercase, sans-serif font.

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