

NELES

Neles™ V-port segment valve RA-series

Neles V-port valve in the R-series is primarily intended as a control valve, but it can also be used for shut-off service. The R-series V-port segment valve is a good general control valve for most pulp and paper process applications. The valve can be fitted with an aerodynamic noise- and liquid cavitation-reducing (for example, steam and gas applications) Q-Trim™ segment. A low capacity segment is available for the DN25 valve.



FEATURES

Single-piece valve body

- R-series valves have single-piece bodies, which prevents leaks caused by separate flanges or locking rings.

Durable metal seat

- The seat of the R-series V-port segment valve is firm and uniquely durable. The seat is designed in such a way that its sealing surface is not located directly in the flow stream. This gives the seat an extended service life. The working principle is a pressure-aided seat which enables good sealing properties at a low pressure difference. The seat is located inside the valve, which prevents forces from the pipe system influencing the sealing effect.

PTFE seat

- The R-series V-port segment valve is also available with a soft seat. This is primarily intended for applications where a hard chromium plated segment is unsuitable, e.g. for acids and acidic liquids. This structure contains an X-treme™ seat, fitted in a body made of stainless steel.

Bearings

- The bearings are located in the valve body, away from the flow stream, with a large bearing surface, offering a low bearing pressure and a long service life.

Smooth action

- Because of the double bearing, the pre-tightened spring-loaded gland packing, and the low seat friction, the torque requirement of the R-series V-port segment valve is low. For this reason the size of actuator required is small. As a consequence, the control valve package combines low overall costs with good control performance.

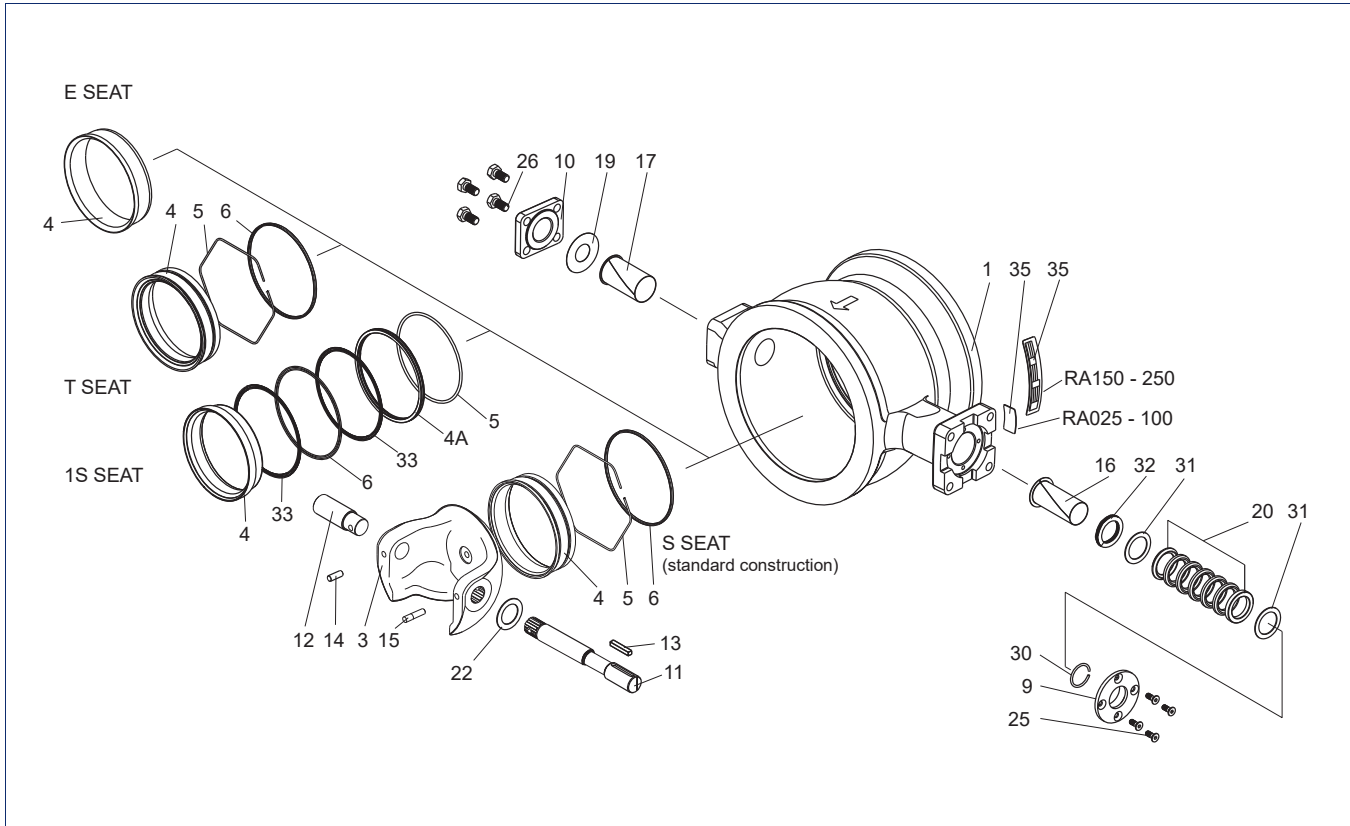
Q-Trim™

- Most pulp and paper mills have maximum noise levels for control valves. These limits are easily exceeded, especially for gas and steam applications, when using standard valves. High pressure drops, which occur during control of water and liquid flows, generate cavitation which may cause damage to the pipe system. The solution to these applications is the Q-Trim design. Impurities will not block the valve because of the self-cleaning design. The design can be used for media such as impure steam, black liquor, and even 3.5 % pulp.

Low capacity

- Four different low capacity C_v trims are available for the DN25 valve. These enable high accuracy control of small flows. Typical applications are, for example, dyes and other additives on a paper machine.

EXPLODED VIEW



PARTS LIST (standard construction)*

| Part | Name | BODY MATERIAL |
|------|-------------------------------------|---|
| 1 | Body | ASTM A351 gr. CF8M |
| 3 | V-port segment | SIS 2324 + chromium / SIS 2324 / AISI 329 |
| 4 | Seat | Cobalt based alloy / PTFE 1) |
| 4A | Back ring | AISI 316 |
| 5 | Lock spring | INCONEL 625 |
| 6 | Back seal | Stainless steel + PTFE |
| 9 | Gland follower | ASTM A351 gr. CF8M |
| 10 | Blind flange | ASTM A351 gr. CF8M |
| 11 | Drive shaft | SIS 2324/AISI 329 duplex SS |
| 12 | Shaft | SIS 2324/AISI 329 duplex SS |
| 13 | Key | SIS 2324/AISI 329 |
| 14 | Cylindrical pin | SIS 2324/AISI 329 |
| 15 | Cylindrical pin | SIS 2324/AISI 329 |
| 16 | Bearing | PTFE + SS net |
| 17 | Bearing | PTFE + SS net |
| 19 | Sealing plate | Graphite |
| 20 | Packing | PTFE |
| 22 | Filling ring (only low Cv 1"/DN 25) | Stainless Steel AISI 316 |
| 25 | Countersunk screw | ISO 3506 A2-70 |
| 26 | Hexagon bolt | ISO 3506 A2-70 |
| 30 | Retainer ring | AISI 316 |
| 31 | Sheet ring | AISI 316 |
| 32 | Wave spring | AISI 316 |
| 35 | Identification plate | AISI 304 |

* The parts are not in number order since certain part has dedicated part number.

TECHNICAL SPECIFICATIONS

Type

Reduced-bore quarter-turn valve
– RA mounted between flanges

Pressure ratings

Body
RA: ASME 300 / PN 40
Trim: See table below

| Valve size DN / inch | Max shut-off dp (bar) |
|-------------------------|-----------------------------|
| 025 / 1" | 50 |
| 040 / 1 1/2" | 50 |
| 050 / 2" | 50 |
| 065 / 2 1/2" | 50 |
| 080 / 3" | 50 |
| 100 / 4" | 40 |
| 150 / 6" | 40 |
| 200 / 8" | 35 |
| 250 / 10" | 35 |

Size

RA: DN25, 40, 50, 65, 80, 100, 150, 200, 250

Face-to-face dimensions

RA According to Neles internal standard

Temperature range

-40... +260 °C.

Inherent flow characteristic

Equal percentage.

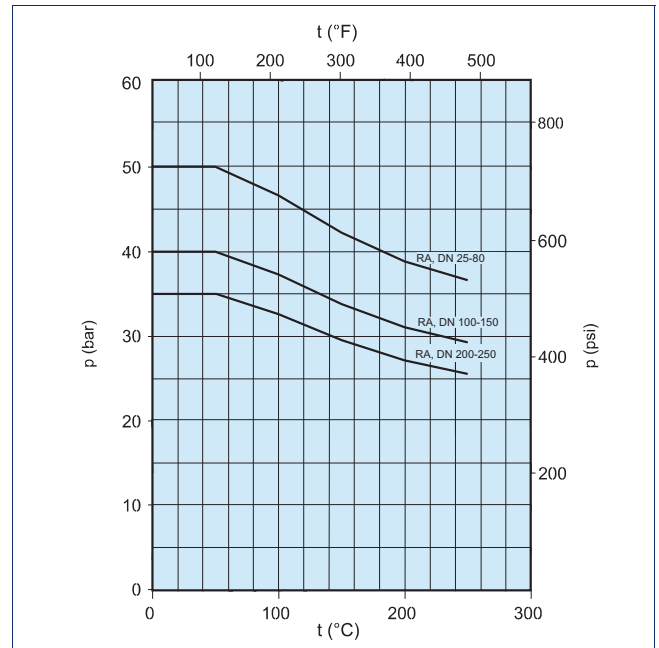
Tightness

Tightness testing is done in the flow direction. The standard tightness of the metal-seated V-port segment valve is ANSI/FCI 70.2 Class IV.

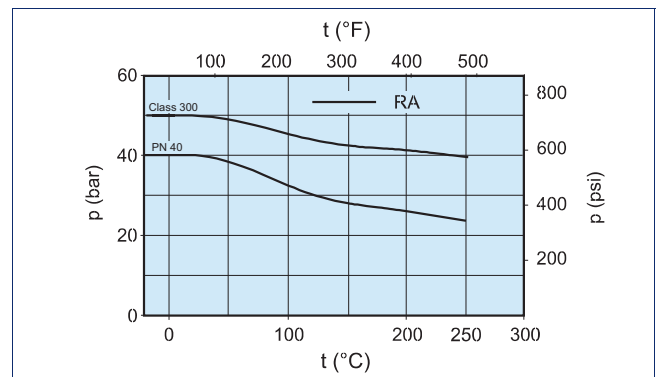
Pressure and tightness testing of the valve

Every valve manufactured by Neles is subjected to a body pressure test and a trim tightness test. The test pressure of a R-series body is 1.5 x the maximum operating pressure. The pressure of the tightness test is 3,5 barG according to IEC 60534 / ANSI/FCI 702 Class IV. The testing medium is water.

Maximum operating pressure differential in shut-off service



Maximum body pressure for standard A 351 gr. CF8M material



Note that max. throttling pressures are mechanical maximum differential pressures at ambient temperature.

In practice you must always check temperature, actuator, load factor, noise, cavitation intensity, velocity, etc. from Nelprof™ sizing and selection software.

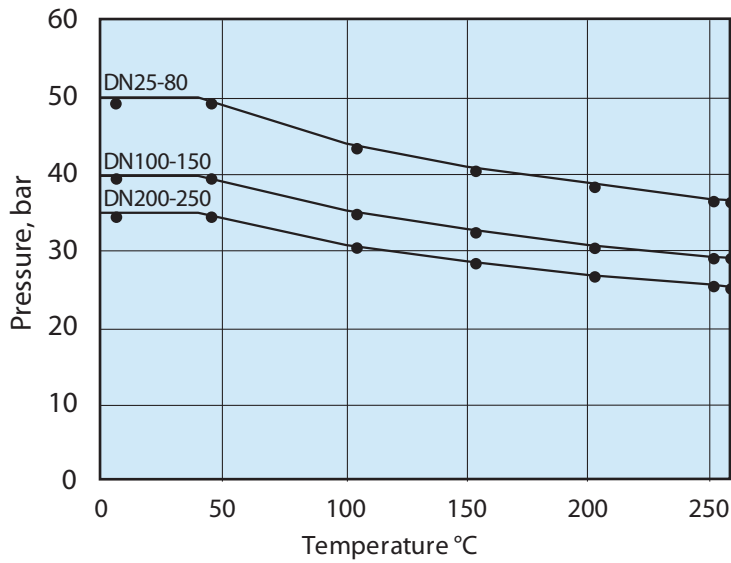
Maximum C_v-values for RA series valves

| Size | | Metal seat, S | Q-Trim | Metal seat, 1S | Q-Trim with 1S | Soft seat, T2 |
|------|-------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| DN | Inch | C _v 100 % ¹⁾ | C _v 100 % ²⁾ | C _v 100 % ¹⁾ | C _v 100 % ²⁾ | C _v 100 % ¹⁾ |
| 25 | 1 | 45 | – | 24 | – | 21 |
| 40 | 1 1/2 | 110 | – | 58 | – | 61 |
| 50 | 2 | 180 | 47 | 115 | 30 | 110 |
| 65 | 2 1/2 | 280 | 96 | 210 | 72 | 215 |
| 80 | 3 | 420 | 160 | 342 | 130 | 340 |
| 100 | 4 | 620 | 250 | 510 | 210 | 520 |
| 150 | 6 | 1260 | 540 | 1160 | 500 | 1070 |
| 200 | 8 | 2030 | 880 | 1910 | 830 | 1760 |
| 250 | 10 | 3210 | 1510 | 3050 | 1440 | 2830 |

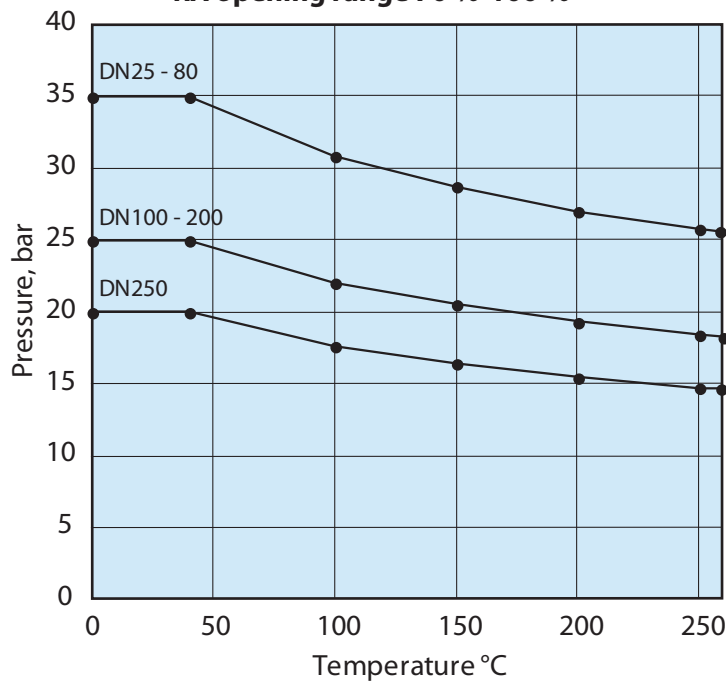
1) 100 % corresponds to 95° turning angle

2) For Q-R-valves, 100 % corresponds to 90° turning angle

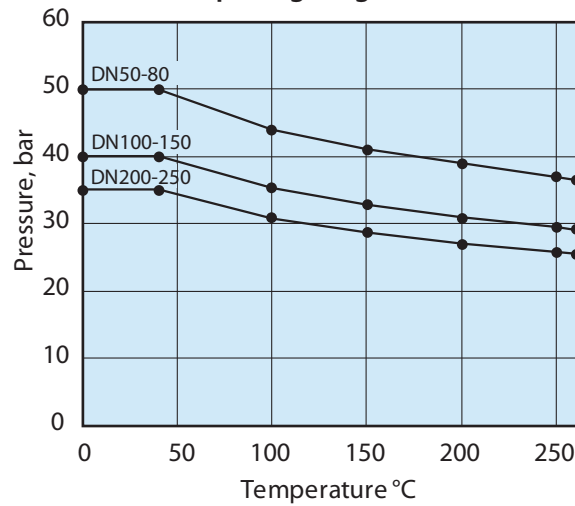
**Max operating pressure differential in control service,
RA opening range 0 %-70 %**



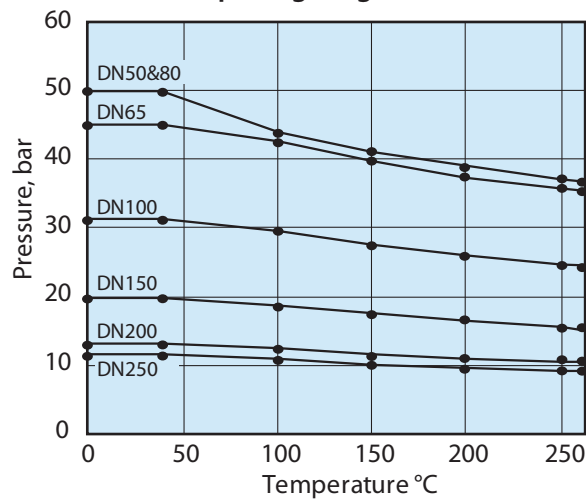
**Max operating pressure differential in control service,
RA opening range 70 %-100 %**



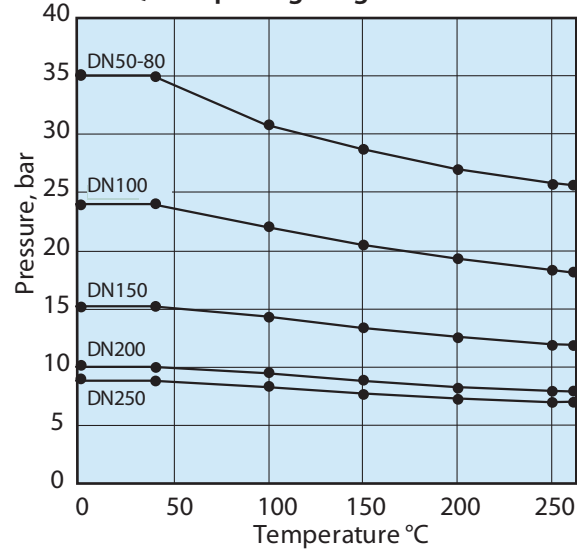
**Max operating pressure differential in control service,
Q-RA opening range 0 %- 30 %**



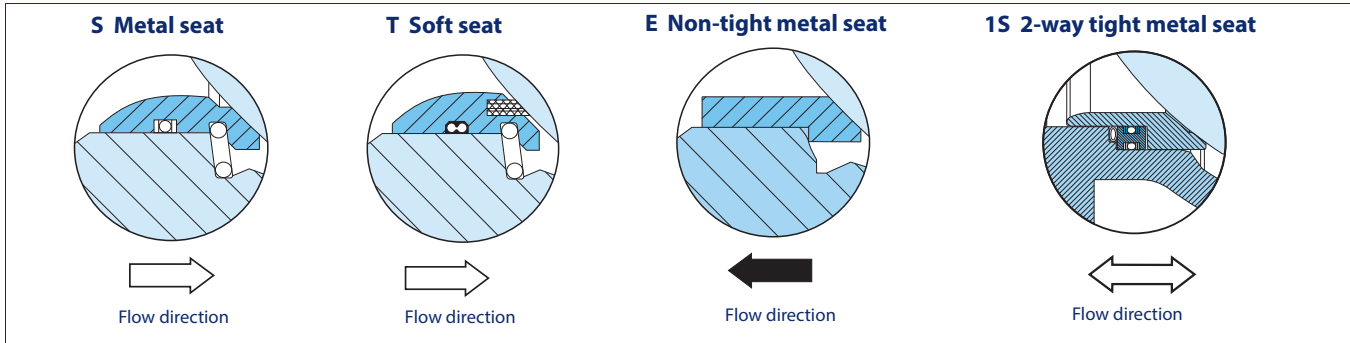
**Max operating pressure differential in control service,
Q-RA opening range 30 % - 60 %**



**Max operating pressure differential in control service,
Q-RA opening range 60 %-100 %**



SEATS DESIGN



ACTUATOR SELECTION, R-SERIES VALVE

Valve/actuator sizes have been pre-selected. You will find them on pages 7 - 11. The valve/actuator size must be checked with the Nelprof program for each control valve.

Maximum allowed stem torque

| Valve size | | Torque | |
|------------|--------|--------|-------|
| DN | Inches | Nm | ft-lb |
| 25 | 1 | 30 | 22 |
| 40 | 1.5 | 30 | 22 |
| 50 | 2 | 65 | 48 |
| 65 | 2.5 | 65 | 48 |
| 80 | 3 | 160 | 118 |
| 100 | 4 | 160 | 118 |
| 150 | 6 | 490 | 362 |
| 200 | 8 | 675 | 498 |
| 250 | 10 | 1350 | 996 |

S seat

| | |
|-------------------|--|
| Seat | Stainless steel + cobalt based hard facing |
| Spring | Inconel 625 |
| Seat seal | Filled PTFE lip seal/Elgiloy spring |
| Temperature range | -40 °C... +260 °C / - 40 °F ...+500 °F |
| Service | General service |

T Soft seat (PTFE + C25 %)

| Code | Seat body | Spring | Seat seal | Back seal |
|---|-----------|-------------|---|-----------|
| T2 | 316 SS | Inconel 625 | DN 25 - 150 X-treme DN 200 - 250 filled PTFE | PTFE |
| Temperature range T2, -40 °C... +260 °C / -40 °F ...+500 °F | | | | |

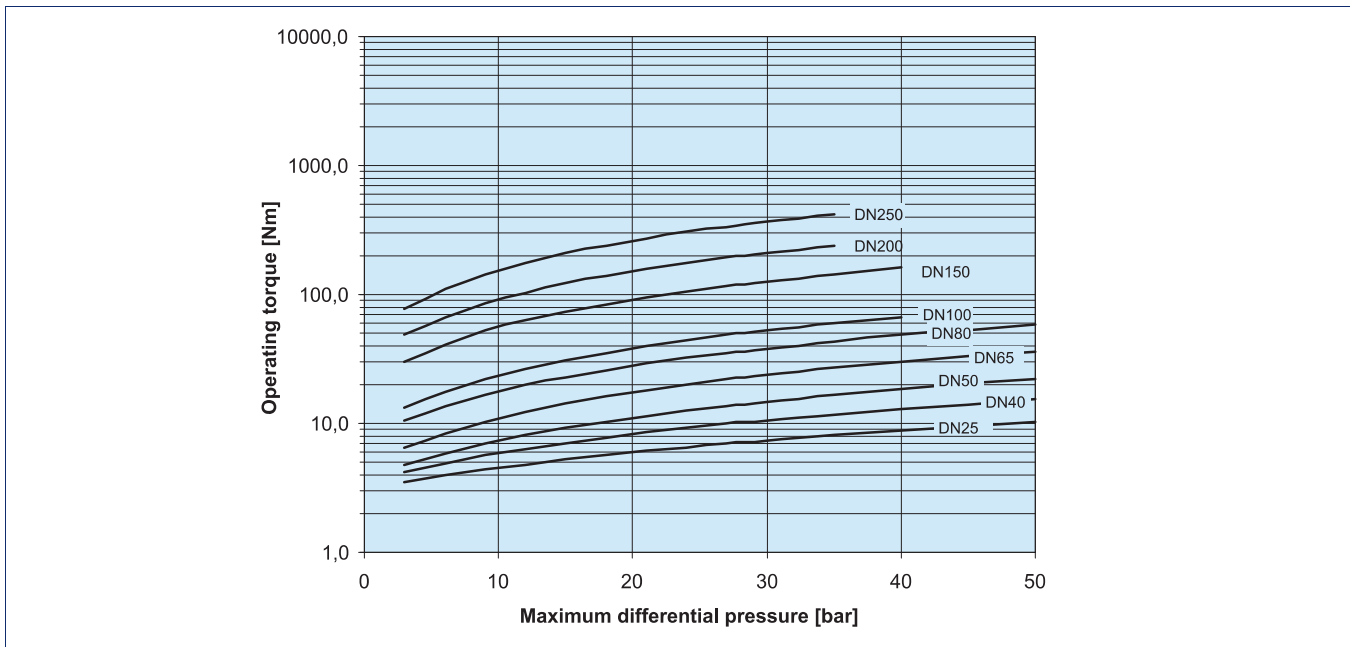
E Non-tight metal seat

| | |
|-------------------|---|
| Seat | Cobalt based alloy |
| Temperature range | -40 °C... +260 °C / - 40 °F ...+500 °F |
| Service | Erosive applications, non-tight design. |
| Note! | Flow direction arrow is reversed. |

1S 2-way tight metal seat

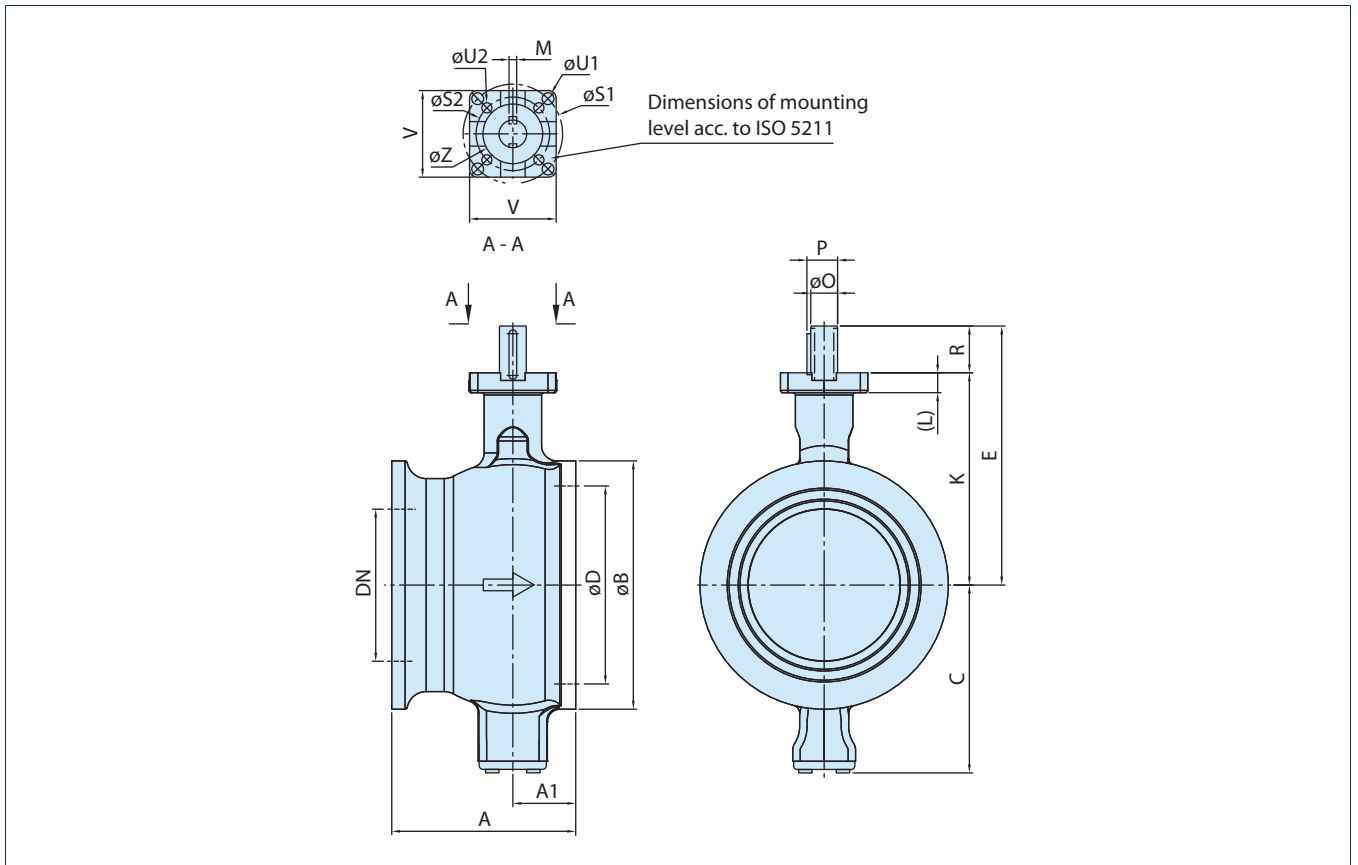
| | |
|--------------|---------------------------------------|
| Seat: | 316 SS + Cobalt based hard facing |
| Spring: | Inconel 625 |
| Seat seal: | Viton GF |
| Temp. range: | -30 °C... +200 °C / -22 °F ...+186 °F |
| Service: | General |

TORQUE CHART



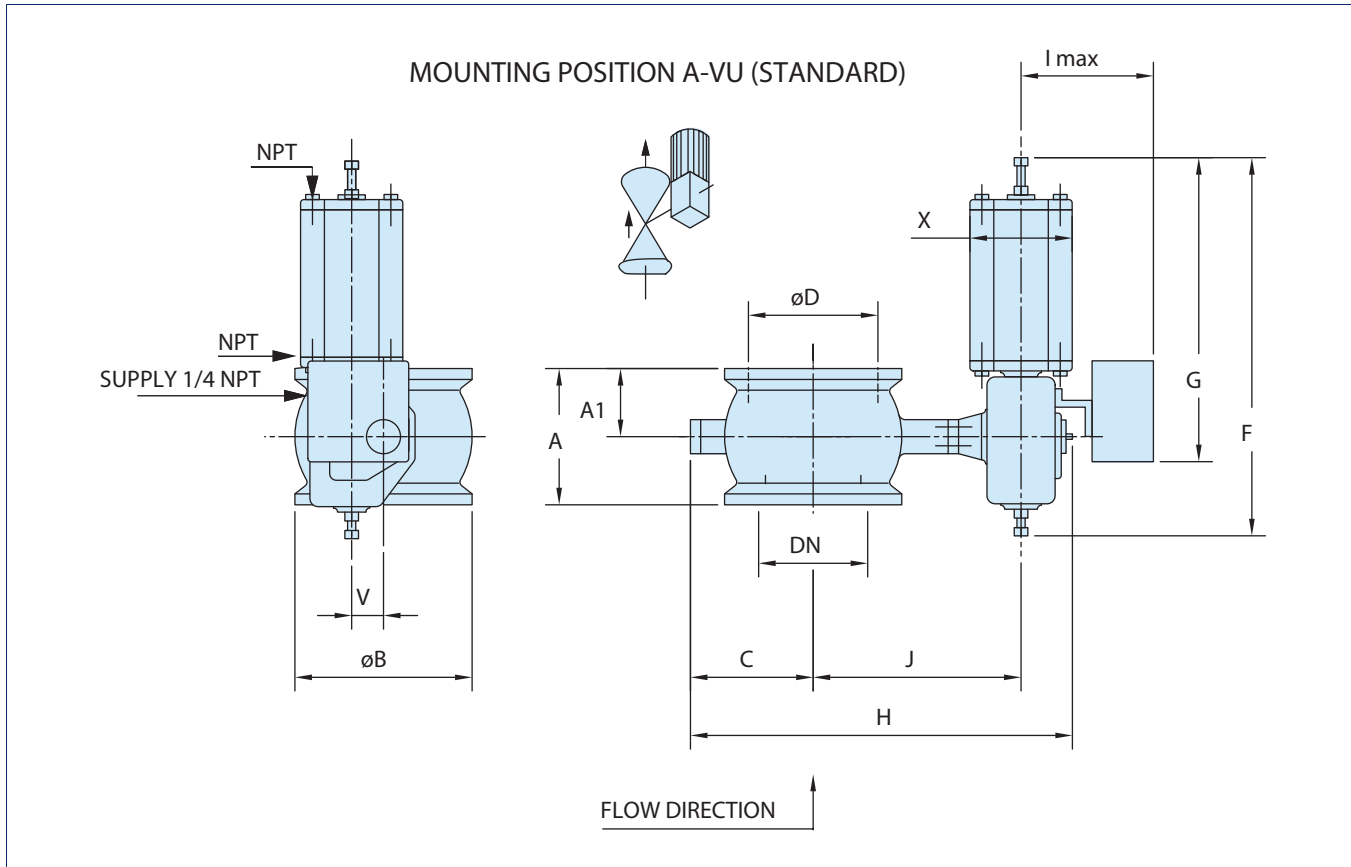
DIMENSIONS

RA



| Type | DN | ISO 5211 | Dimensions, mm | | | | | | | | | | | | | | | | | Kg | |
|------|-----|----------|----------------|-----|----------|-----|----------|-------|----|-------|----------|------|------|-----------|-----------|-----------|-----------|----------|------|-----|-----|
| | | | A1 | A | ϕB | C | ϕD | E | R | K | ϕO | M | P | $\phi S1$ | $\phi S2$ | $\phi U1$ | $\phi U2$ | ϕZ | L | | V |
| RA | 25 | F05 | 21 | 50 | 64 | 56 | 33 | 127 | 27 | 102 | 15 | 4.76 | 17 | - | 50 | - | 6.6 | 35 | 15.5 | 52 | 1.3 |
| | 40 | F05 | 21 | 60 | 82 | 65 | 49 | 133.5 | 25 | 108.5 | 15 | 4.76 | 17 | - | 50 | - | 6.6 | 35 | 15.5 | 52 | 2.4 |
| | 50 | F05, F07 | 27 | 75 | 100 | 91 | 60 | 144.5 | 25 | 119.5 | 15 | 4.76 | 17 | 70 | 50 | 9 | 6.6 | 55 | 15.5 | 67 | 3.7 |
| | 65 | F05, F07 | 40 | 100 | 118 | 97 | 75 | 151 | 25 | 126 | 15 | 4.76 | 17 | 70 | 50 | 9 | 6.6 | 55 | 15.5 | 67 | 5.3 |
| | 80 | F07, F10 | 38 | 100 | 130 | 108 | 89 | 177 | 35 | 142 | 20 | 4.76 | 22.2 | 102 | 70 | 11 | 9 | 70 | 16 | 94 | 6.2 |
| | 100 | F07, F10 | 41 | 115 | 158 | 120 | 115 | 186 | 35 | 151 | 20 | 4.76 | 22.2 | 102 | 70 | 11 | 9 | 70 | 16 | 94 | 9.6 |
| | 150 | F10, F12 | 55 | 160 | 216 | 174 | 164 | 244 | 44 | 200 | 25 | 6.35 | 27.8 | 125 | 102 | 14 | 11 | 85 | 22 | 114 | 24 |
| | 200 | F10, F12 | 70 | 200 | 268 | 201 | 205 | 285 | 50 | 235 | 30 | 6.35 | 32.9 | 125 | 102 | 14 | 11 | 85 | 22 | 114 | 42 |
| | 250 | F12, F14 | 82 | 240 | 324 | 251 | 259 | 338 | 61 | 277 | 35 | 9.53 | 39.1 | 140 | 125 | 18 | 14 | 100 | 26 | 136 | 68 |

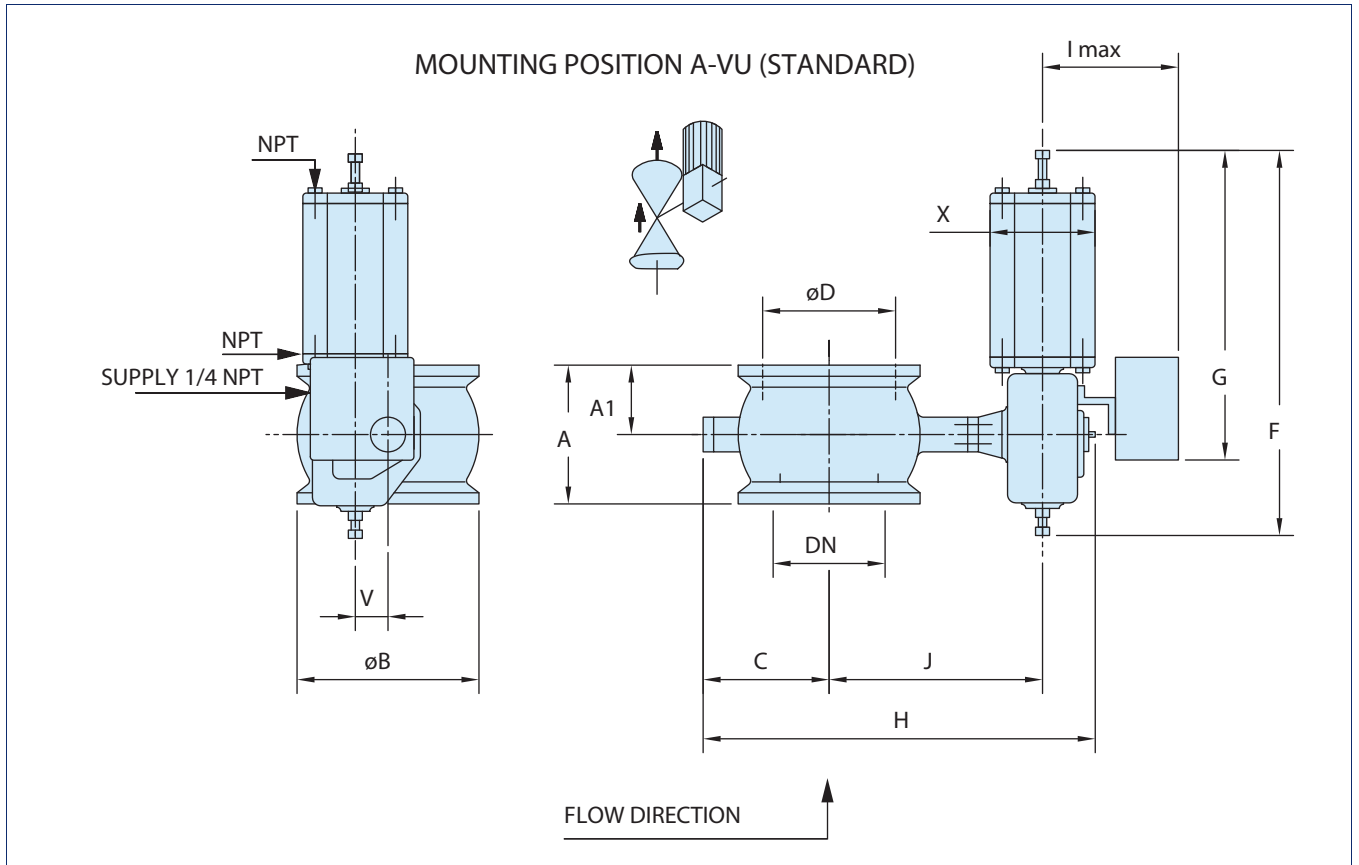
RA-B1C



| Type | Max. Δp 1) | Dimensions [mm] | | | | | | | | | | | | NPT | Kg | |
|--------------|------------|-----------------|-----|----|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|-------|
| | | DN | A | A1 | B | C | D | F | G | X | V | J | H | | | I max |
| RA_025-B1C6 | 50 | 25 | 50 | 21 | 64 | 56 | 33 | 400 | 260 | 90 | 36 | 168 | 305 | 310 | 1/4 | 5,5 |
| RA_040-B1C6 | 50 | 40 | 60 | 21 | 82 | 65 | 49 | 400 | 260 | 90 | 36 | 175 | 320 | 310 | 1/4 | 6,6 |
| RA_050-B1C6 | 50 | 50 | 75 | 27 | 100 | 91 | 60 | 400 | 260 | 90 | 36 | 185 | 355 | 310 | 1/4 | 8 |
| RA_050-B1C9 | 50 | 50 | 75 | 27 | 100 | 91 | 60 | 455 | 315 | 110 | 43 | 185 | 365 | 305 | 1/4 | 13,5 |
| RA_065-B1C6 | 50 | 65 | 100 | 40 | 118 | 97 | 75 | 400 | 260 | 90 | 36 | 192 | 367 | 310 | 1/4 | 9,5 |
| RA_065-B1C9 | 50 | 65 | 100 | 40 | 118 | 97 | 75 | 455 | 315 | 110 | 43 | 192 | 380 | 305 | 1/4 | 15 |
| RA_080-B1C6 | 50 | 80 | 100 | 38 | 130 | 108 | 89 | 400 | 260 | 90 | 36 | 200 | 390 | 310 | 1/4 | 11 |
| RA_080-B1C9 | 50 | 80 | 100 | 38 | 130 | 108 | 89 | 455 | 315 | 110 | 43 | 200 | 400 | 305 | 1/4 | 16 |
| RA_100-B1C6 | 40 | 100 | 115 | 41 | 158 | 120 | 115 | 400 | 260 | 90 | 36 | 210 | 410 | 310 | 1/4 | 15 |
| RA_100-B1C9 | 40 | 100 | 115 | 41 | 158 | 120 | 115 | 455 | 315 | 110 | 43 | 210 | 420 | 305 | 1/4 | 19 |
| RA_150-B1C9 | 25 | 150 | 160 | 55 | 216 | 174 | 164 | 455 | 315 | 110 | 43 | 260 | 515 | 305 | 1/4 | 34 |
| RA_150-B1C11 | 40 | 150 | 160 | 55 | 216 | 174 | 164 | 540 | 375 | 135 | 51 | 265 | 530 | 310 | 3/8 | 40 |
| RA_150-B1C13 | 40 | 150 | 160 | 55 | 216 | 174 | 164 | 635 | 445 | 175 | 65 | 280 | 550 | 325 | 3/8 | 55 |
| RA_200-B1C9 | 15 | 200 | 200 | 70 | 268 | 201 | 205 | 455 | 315 | 110 | 43 | 294 | 575 | 305 | 1/4 | 52 |
| RA_200-B1C11 | 32 | 200 | 200 | 70 | 268 | 201 | 205 | 540 | 375 | 135 | 51 | 310 | 590 | 310 | 3/8 | 59 |
| RA_200-B1C13 | 35 | 200 | 200 | 70 | 268 | 201 | 205 | 635 | 445 | 175 | 65 | 325 | 610 | 325 | 3/8 | 73 |
| RA_250-B1C13 | 30 | 250 | 240 | 82 | 324 | 251 | 259 | 635 | 445 | 175 | 65 | 366 | 730 | 325 | 3/8 | 100 |
| RA_250-B1C17 | 35 | 250 | 240 | 82 | 324 | 251 | 259 | 770 | 545 | 215 | 78 | 373 | 750 | 340 | 3/8 | 125 |

1) Max Δp in on-off service with actuator load factor 0.6 and supply pressure 5 bar

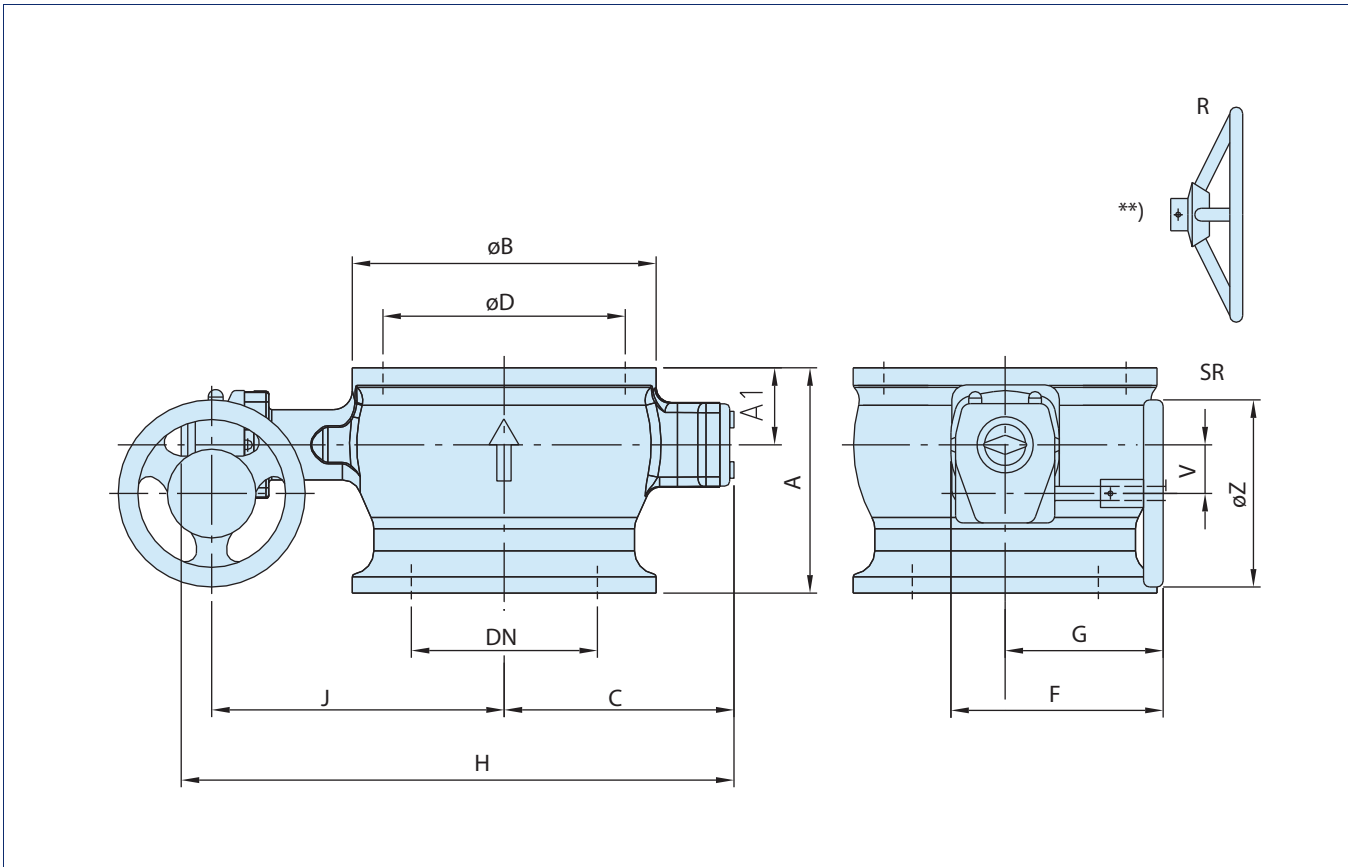
RA - B1J, B1JA



| Type | Max. Δp 1) | Dimensions, mm | | | | | | | | | | | | | | |
|---------------------|------------|----------------|-----|----|-----|-----|-----|-----|-----|-----|----|-----|-----|-------|-----|-----|
| | | DN | A | A1 | øB | C | øD | F | G | X | V | J | H | I max | NPT | kg |
| RA_025-B1J6/B1JA6 | 50/50 | 25 | 50 | 21 | 64 | 56 | 33 | 485 | 368 | 110 | 36 | 167 | 291 | 305 | 3/8 | 17 |
| RA_040-B1J6/B1JA6 | 50/50 | 40 | 60 | 21 | 82 | 65 | 49 | 485 | 368 | 110 | 36 | 174 | 306 | 305 | 3/8 | 16 |
| RA_050-B1J6/B1JA6 | 50/50 | 50 | 75 | 27 | 100 | 91 | 60 | 485 | 368 | 110 | 36 | 184 | 343 | 305 | 3/8 | 17 |
| RA_065-B1J6/B1JA6 | 50/50 | 65 | 100 | 40 | 118 | 97 | 75 | 485 | 368 | 110 | 36 | 194 | 358 | 305 | 3/8 | 19 |
| RA_080-B1J6/B1JA6 | 25/50 | 80 | 100 | 38 | 130 | 108 | 89 | 485 | 368 | 110 | 36 | 199 | 374 | 305 | 3/8 | 20 |
| RA_100-B1J6/B1JA6 | 12/50 | 100 | 115 | 41 | 158 | 120 | 113 | 485 | 368 | 110 | 36 | 209 | 398 | 305 | 3/8 | 23 |
| RA_150-B1J6/B1JA6 | -/25 | 150 | 160 | 55 | 216 | 174 | 164 | 485 | 368 | 110 | 36 | 257 | 498 | 305 | 3/8 | 37 |
| RA_025-B1J8/B1JA8 | 50/50 | 25 | 50 | 21 | 64 | 56 | 33 | 560 | 420 | 135 | 43 | 168 | 293 | 305 | 3/8 | 19 |
| RA_040-B1J8/B1JA8 | 50/50 | 40 | 60 | 21 | 82 | 65 | 49 | 560 | 420 | 135 | 43 | 175 | 308 | 305 | 3/8 | 20 |
| RA_050-B1J8/B1JA8 | 50/50 | 50 | 75 | 27 | 100 | 91 | 60 | 560 | 420 | 135 | 43 | 185 | 345 | 305 | 3/8 | 21 |
| RA_065-B1J8/B1JA8 | 50/50 | 65 | 100 | 40 | 118 | 97 | 75 | 560 | 420 | 135 | 43 | 195 | 360 | 305 | 3/8 | 23 |
| RA_080-B1J8/B1JA8 | 50/50 | 80 | 100 | 38 | 130 | 108 | 89 | 560 | 420 | 135 | 43 | 200 | 376 | 305 | 3/8 | 24 |
| RA_100-B1J8/B1JA8 | 50/50 | 100 | 115 | 41 | 158 | 120 | 113 | 560 | 420 | 135 | 43 | 210 | 400 | 305 | 3/8 | 27 |
| RA_150-B1J8/B1JA8 | 10/25 | 150 | 160 | 55 | 216 | 174 | 164 | 560 | 420 | 135 | 43 | 258 | 500 | 305 | 3/8 | 41 |
| RA_150-B1J10/B1JA10 | 40/40 | | | | | | | 650 | 490 | 175 | 51 | 275 | 530 | 225 | 3/8 | 55 |
| RA_200-B1J10/B1JA10 | 15/25 | 200 | 200 | 70 | 268 | 201 | 205 | 650 | 490 | 175 | 51 | 310 | 590 | 310 | 3/8 | 75 |
| RA_200-B1J12/B1JA12 | 32/35 | | | | | | | 800 | 620 | 215 | 65 | 324 | 635 | 235 | 1/2 | 100 |
| RA_250-B1J16/B1JA16 | 35/35 | 250 | 240 | 85 | 324 | 251 | 259 | 990 | 760 | 265 | 78 | 373 | 760 | 340 | 1/2 | 170 |

1) Supply pressure BJ 4 bar / BJA 5 bar

RA - M



| TYPE | ACTUATOR/ MOUNTING ISO 5211 | Dimensions, mm | | | | | | | | | | | kg | |
|-----------|--------------------------------|----------------|-----------------|-----|-----|-----------------|-----|-----|-----|-----|-----|-----|-----|-----------------|
| | | DN | $\varnothing D$ | A | A1 | $\varnothing B$ | C | F | G | H | J | V | | $\varnothing Z$ |
| RA | M07/15F05 | 25 | 33/38x | 50 | 21 | 64 | 56 | 235 | 184 | 223 | 131 | 52 | 160 | 5.1 |
| | M07/15F05 | 40 | 49 | 60 | 21 | 82 | 65 | 235 | 184 | 238 | 137 | 52 | 160 | 6.2 |
| | M07/15F05 | 50 | 60 | 75 | 27 | 100 | 91 | 235 | 184 | 275 | 148 | 52 | 160 | 7.5 |
| | M07/15F05 | 65 | 75 | 100 | 40 | 118 | 97 | 235 | 184 | 288 | 155 | 52 | 160 | 9.5 |
| | M07/20F07 | 80 | 89 | 100 | 38 | 130 | 108 | 235 | 184 | 315 | 171 | 52 | 160 | 10 |
| | M07/20F07 | 100 | 115 | 115 | 41 | 158 | 120 | 235 | 184 | 336 | 180 | 52 | 160 | 14 |
| | M10/25F10 | 150 | 164 | 160 | 55 | 216 | 174 | 238 | 187 | 439 | 235 | 52 | 200 | 29 |
| | M12/30F12 | 200 | 205 | 200 | 70 | 268 | 201 | 307 | 238 | 524 | 276 | 71 | 315 | 52 |
| | M12/35F12 | 250 | 259 | 240 | 82 | 324 | 251 | 307 | 238 | 616 | 318 | 71 | 315 | 78 |
| M14/35F12 | 250 | 259 | 240 | 82 | 324 | 251 | 385 | 285 | 621 | 320 | 86 | 400 | 87 | |

**) ACTUATORS M07...M12 ARE EQUIPPED WITH HANDWHEEL TYPE SR,
ACTUATORS M14...M25 ARE EQUIPPED WITH HANDWHEEL TYPE R.

HOW TO ORDER

Example: The following example is for a RA valve, with a standard capacity trim (-), flangeless body design ASME Class 300 (RA), standard keyway (A), size (080), body CF8M, segment type 329+Hard chromium, screws A2-70, shafts, pins, & bearings AISI 329/PTFE (A) and seat cobalt based alloy, back seal PTFE lip seal (S).

| | RA | A | 080 | A | S |
|----|----|----|-----|----|----|
| 1. | 2. | 3. | 4. | 5. | 6. |

| 1. | Q-TRIM OR LOW-CAPACITY C_v |
|------|--|
| - | Standard capacity C_v or without a Q-trim. |
| Q | Q-trim to reduce noise and cavitation. |
| C005 | Max. C_v = 0.5, DN25 valve. |
| C015 | Max. C_v = 1.5, DN25 valve. |
| C05 | Max. C_v = 5, DN25 valve. |
| C15 | Max. C_v = 15, DN25 valve. |

| 2. | PRODUCT SERIES / DESIGN |
|----|---|
| RA | Flangeless, reduced bore, Neles face to face length, Body Class 300/PN 40 |

| 3. | CONSTRUCTION |
|----|----------------------------------|
| A | Standard drive shaft with keyway |

| 4. | SIZE |
|----|--|
| | Size in millimeters: 025, 040, 050, 065, 080, 100, 150, 200, 250. |

| 5. | BODY | SEGMENT | SCREWS | SHAFTS, PINS BEARINGS |
|------------------|------------------------|--|--------|---|
| A | CF8M | Type 329+ Hard chromium | A2-70 | AISI 329/ PTFE |
| S | CF8M | Type 329 | A2-70 | AISI 329/PTFE |
| H (with T6 seat) | CW-6M (Hastelloy C) | CW-6M | A2-70 | Hastelloy C/PVDF |
| U (with U seat) | CK3MCuN (SMO) | ASTM A351 gr. CK3MCuN + ceramic coating (TiO) | A2-70 | UNS31254/Filled PTFE on SMO 254 net |

| 6. | SEAT |
|----|--|
| S | Cobalt based alloy, back seal PTFE lip seal. |
| T | X-treme sizes DN 25 - 150, metal body, back seal PTFE lip seal. PTFE+C25 % sizes DN 200 - 250, metal body, back seal PTFE lip seal. |
| E | Cobalt based alloy, erosion-resistant version non-tight. |
| U | Titanium, back seal virgin PTFE lip seal/titanium spring |
| 1S | 316 SS + Cobalt based hard facing, 2-way tight metal seat |

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