

CR-TEC Engineering

Automated Valve Solutions

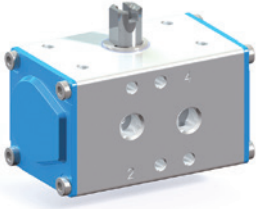
actubar[®]

The intelligent actuator

Technical data sheet



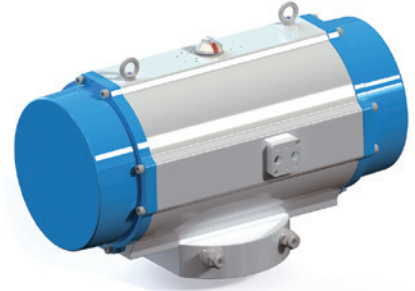
Type AD-001 + AD/AS-002



Type AD/AS-004 to -230



Type AD/AS-360 to -1200



Objective

The actubar is the intelligently equipped generation of our pneumatic part-turn actuators. Externally unmistakable and technically unique, the actubar offers completely new advantages that can be used for flexible adaptations to specific plant which results in higher production efficiency.

The actubar is the main component of the vacotrol® valve control system, a modular, intelligent system for monitoring and controlling automatic valves.

Actuator and control units form a system family for control tasks, which makes efficient use of the installation space with a clear design and no piping. The result is optimized compressed air consumption, sustainable processes, and higher cost efficiency for smooth plant operation.

Additional benefit by vacotrol®

In combination with our directly mountable system components positrol, posturn2 or posiswitch, actubar can also be used to control shut-off valves cost-effectively.

The openings of the pneumatic air duct as a direct connection between the actuator and the control unit are equipped with a are closed with a blow-out-proof and reusable screw. When retrofitting control units from the bar-vacotrol® series, simply unscrew the screw plug from the actuator housing to open the direct connection.

vacotrol® as an integrated air duct realizes an increased level in the reduction of interfaces between the actuator and the control unit. The suitably developed generation of control components eliminates the need for external piping and is easily accessible and logical to operate. The integrated air duct is predestined for an optimal realization of the interface according to VDI/VDE 3847-2.

Emissions due to leakages are reduced by eliminating susceptible pneumatic screw fittings and the small number of robust sealing points. A dead volume in lines is eliminated. The process operation is less susceptible to faults and more insensitive to vibrations.

External influences lead to damage and failures much less frequently. For the plants, this results in longer running times and higher availability.

When changing components, the modular system eliminates the need to adapt pipelines. The changeover process of components can be integrated into the processes without any problems, and assembly times are reduced considerably.



bar-vacotrol® interface closed



Benefits for plant safety

- the unique construction of the actubar enables the addition of components acc. to VDI/VDE 3847 without hose connections or conduit
- positioner and limit switch boxes with solenoid valves can be mounted directly, without conduit installation and constitute a compact unit in combination with actubar-actuators
- end position can be adjusted at 0° and 90° from +5° to -10°
- from size actubar AD/AS-360, the pneumatic air supply can be changed very easily from 1/4" to 1/2" air connection in the standard version using an adapter plate
- simple insertion and removal of safety springs
- optional coatings and materials enable usage even in aggressive environments
- blowout-secure pinion minimizes the danger of accidents
- elevated failsafe performance by our SIL 3 certified actuators
- The DV certification awarded by TÜV Rheinland confirms the robustness and suitability of the actuator for applications in the maritime, off-shore and other demanding operating conditions.

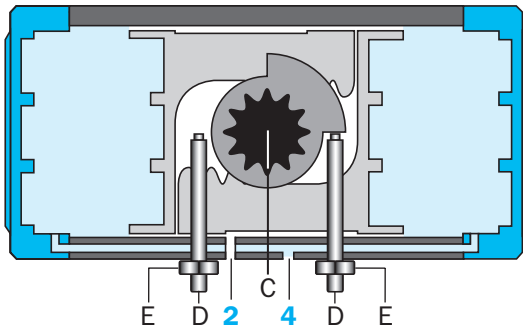
Benefits for better cost efficiency

- From actubar AD/AS-360 onwards, the pneumatic air supply can be easily changed from a 1/4" to a 1/2" air connection via an adapter plate.
- the standard interface (VDI / VDE 3845) allows mounting of all commercially available signal units
- reduced warehousing by using equal end-caps for single as well as double-acting actuators
- flexible automation of valves through various ISO flange interfaces per actuator size for many versions of the series
- long service life via plain-bearing system which reaches all moving parts
- octagonal pinion-connection enables actubar to fit universally onto valves with parallel or diagonally operating shafts

Technical data

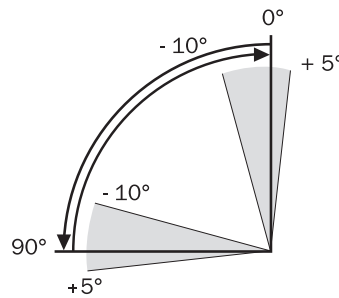
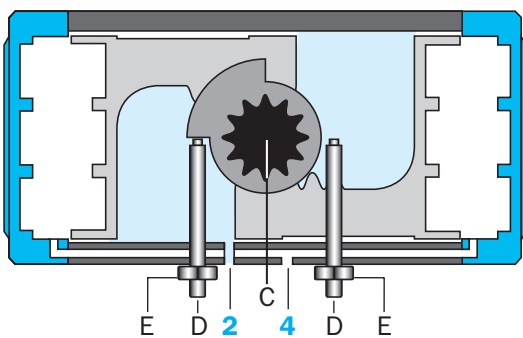
| | Standard model | Options available |
|--------------------------|--|--|
| Description | pneumatic double piston actuator type AD = double-acting type AS = single-acting (with spring return) | |
| Constructional features | rack and pinion principle with self-centering piston guides in the casing; single-acting: with bar safety springs | |
| Mounting position | any orientation | |
| Standards | interface actuator signal unit: acc. to VDI/VDE 3845 (NAMUR) and VDI/VDE 3847 interface actuator/control valve: acc. to NAMUR i.e. VDI/VDE 3845 interface actuator/valve: 4, i.e. 8 internal threaded in actuator casing acc. to EN ISO 5211 | differing mounting and connecting dimensions possible pinion optional with internal double-D or acc. to DIN ISO 5211 |
| Materials | casing: aluminium alloy, anodized caps: aluminium alloy pistons/racks: aluminium alloy pinion: corrosion-protected steel seals: NBR bearings: self-lubricating plastic screws: stainless steel A2 | Casing: anodized, powder-coated, PTFE Caps: PTFE Pinion: stainless steel AISI 303; AISI 316 Seals: FKM |
| Ambient temperature | up to AD/AS-230: -40°C to +80°C AD/AS-360 to -1200: -20°C to +80°C | AD/AS-360 to -1200 Low temperature version: -40°C to +80°C AD/AS-001 to -1200 High temperature version: -20°C to +160°C |
| Rated pivoting angle | double and single-acting: 90° rated pivoting angle as standard from +5° to -10° adjustable in both end positions | |
| Torque | 2.5 Nm to 8,490 Nm | |
| Control pressure | 2 to 8 bar | |
| Control medium / Quality | filtered air in respect of remaining oil content, dust and water minimum according to DIN ISO 8573-1:2010 [7: - :4] | also upon request: other non-aggressive gaseous or liquid mediums |
| Certificates | SIL 3 by TÜV Rheinland, test basis IEC61508 Parts 1-2 and 4-7:2010 | |

Function – double-acting



When pressure is applied to both of the external chambers through input connection „4“, then the pistons move together into the basic position (0°). The force from both pistons is transferred onto the pinion „C“ via the toothed rack. If input connection „2“ is given pressure and „4“ as exhaust, then the pistons move apart into the 90° position.

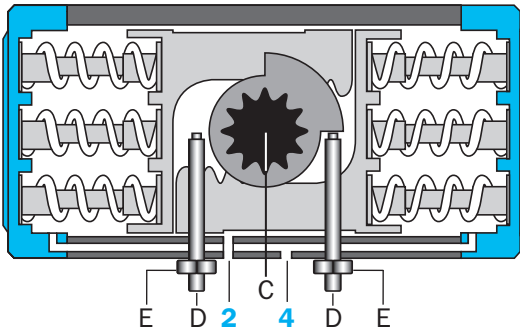
In both positions, the pivoting angle can be set via the adjusting screws „D“ to a position of + 5° and - 10° in a depressurised condition. When the correct angle is reached, then fix with locking nut „E“.



Torque for double-acting actuators, type AD [Nm]

| Type | Control pressure P_{st} [bar] | | | | | | | | | | |
|-----------|---------------------------------|------|------|------|------|------|------|------|------|------|------|
| | 2 | 2,5 | 3 | 3,5 | 4 | 4,5 | 5 | 5,5 | 6 | 7 | 8 |
| AD - 001 | 2,5 | 3,2 | 3,8 | 4,4 | 5,1 | 5,7 | 6,4 | 7,0 | 7,6 | 8,9 | 10,2 |
| AD - 002 | 4 | 5,2 | 6,4 | 7,5 | 8,6 | 9,7 | 10,8 | 11,9 | 13 | 15,5 | 18 |
| AD - 004 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 28 | 32 |
| AD - 006 | 13 | 16 | 19 | 22 | 25 | 28 | 32 | 35 | 38 | 44 | 51 |
| AD - 008 | 16 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 | 56 | 64 |
| AD - 011 | 23 | 29 | 35 | 40 | 46 | 52 | 58 | 63 | 69 | 81 | 92 |
| AD - 018 | 36 | 45 | 54 | 63 | 72 | 81 | 90 | 99 | 108 | 126 | 144 |
| AD - 026 | 52 | 65 | 78 | 91 | 104 | 117 | 130 | 143 | 156 | 182 | 208 |
| AD - 037 | 74 | 93 | 111 | 129 | 148 | 166 | 185 | 204 | 222 | 259 | 296 |
| AD - 050 | 100 | 125 | 150 | 175 | 200 | 225 | 250 | 275 | 300 | 350 | 400 |
| AD - 076 | 152 | 190 | 228 | 266 | 304 | 342 | 380 | 418 | 456 | 532 | 608 |
| AD - 110 | 220 | 275 | 330 | 385 | 440 | 495 | 550 | 605 | 660 | 770 | 880 |
| AD - 160 | 323 | 403 | 484 | 565 | 645 | 726 | 807 | 887 | 968 | 1129 | 1290 |
| AD - 230 | 463 | 579 | 695 | 811 | 927 | 1043 | 1159 | 1274 | 1390 | 1622 | 1854 |
| AD - 360 | 746 | 933 | 1119 | 1306 | 1492 | 1679 | 1865 | 2052 | 2238 | 2611 | 2984 |
| AD - 520 | 1040 | 1300 | 1560 | 1820 | 2080 | 2340 | 2600 | 2860 | 3120 | 3640 | 4160 |
| AD - 800 | 1560 | 1950 | 2340 | 2730 | 3120 | 3510 | 3900 | 4290 | 4680 | 5460 | 6240 |
| AD - 1200 | 2426 | 3032 | 3639 | 4245 | 4851 | 5458 | 6064 | 6671 | 7277 | 8490 | |

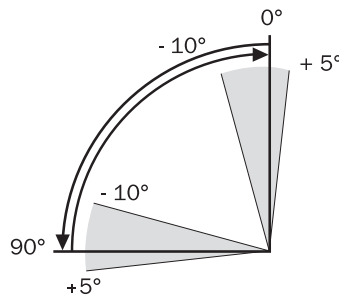
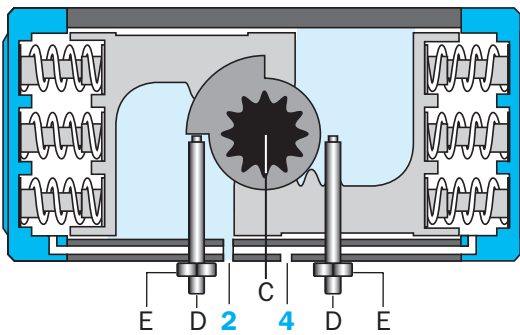
Function – single-acting



In the single-acting model the springs push the pistons back into the basic position and air is exhausted from connection „2“.

The number of springs can be selected to correspond to the applied pressure.

Adjustment of the end positions is described in „Function double-acting“.



Torques – single-acting actuators, type AS [Nm]

| | | Spring force | | Pneumatic applied torque Md N [Nm] at min. control pressure PSt [bar] | | | | | | | | | | | | | | | | | | | | | |
|--------|-------------|--------------|--------|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|
| | | Md F [Nm] | | 2,0 | | 2,5 | | 3,0 | | 3,5 | | 4,0 | | 4,5 | | 5,0 | | 5,5 | | 6,0 | | 7,0 | | 8,0 | |
| Type | No. springs | Md min | Md max | min | max | min | max | min | max | min | max | min | max | min | max | min | max | min | max | min | max | min | max | min | max |
| AS-002 | 2 | 1,0 | 1,6 | 2,4 | 3,1 | 3,6 | 4,3 | 4,8 | 5,5 | 6,0 | 6,7 | 7,1 | 7,8 | 8,2 | 8,9 | 9,4 | 10,0 | 10,5 | 11,1 | 11,6 | 12,2 | 13,9 | 14,5 | 16,2 | 16,8 |
| | 4 | 2,1 | 3,3 | 0,8 | 2,1 | 2,0 | 3,3 | 3,1 | 4,5 | 4,3 | 5,7 | 5,4 | 6,8 | 6,5 | 7,9 | 7,5 | 9,0 | 8,7 | 10,1 | 9,8 | 11,2 | 12,2 | 13,6 | 14,7 | 16,0 |
| | 6 | 3,2 | 5,1 | | | | | 1,0 | 3,2 | 2,3 | 4,5 | 3,5 | 5,7 | 4,7 | 6,9 | 5,8 | 8,0 | 7,0 | 9,2 | 8,2 | 10,4 | 10,6 | 12,8 | 12,9 | 15,1 |
| | 8 | 4,4 | 6,9 | | | | | | | | | 1,7 | 4,6 | 3,0 | 5,8 | 4,2 | 7,0 | 5,4 | 8,1 | 6,5 | 9,2 | 8,9 | 11,5 | 11,4 | 13,9 |
| | 10 | 5,4 | 8,6 | | | | | | | | | | | 1,2 | 4,8 | 2,4 | 6,0 | 3,6 | 7,1 | 4,7 | 8,2 | 7,0 | 10,5 | 9,4 | 12,7 |
| AS-004 | 2 | 1 | 3 | 5 | 7 | 7 | 9 | 9 | 11 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 25 | 26 | 29 | 30 |
| | 4 | 3 | 5 | 3 | 5 | 5 | 7 | 7 | 9 | 9 | 11 | 10 | 13 | 12 | 15 | 14 | 17 | 16 | 19 | 18 | 21 | 22 | 25 | 26 | 29 |
| | 6 | 4 | 8 | | | 2 | 6 | 4 | 8 | 6 | 10 | 8 | 12 | 10 | 14 | 12 | 16 | 14 | 18 | 16 | 20 | 20 | 24 | 24 | 28 |
| | 8 | 5 | 11 | | | | | 1 | 7 | 3 | 9 | 5 | 10 | 7 | 12 | 9 | 14 | 11 | 16 | 13 | 18 | 17 | 22 | 21 | 26 |
| | 10 | 7 | 13 | | | | | | | 1 | 7 | 3 | 9 | 4 | 11 | 6 | 13 | 8 | 15 | 10 | 17 | 14 | 21 | 18 | 25 |
| AS-006 | 2 | 2 | 4 | 8 | 11 | 12 | 14 | 15 | 17 | 18 | 20 | 21 | 23 | 24 | 26 | 27 | 30 | 31 | 33 | 34 | 36 | 40 | 42 | 46 | 48 |
| | 4 | 4 | 8 | 4 | 8 | 7 | 12 | 11 | 15 | 14 | 18 | 17 | 21 | 20 | 24 | 23 | 27 | 26 | 31 | 30 | 34 | 36 | 40 | 42 | 46 |
| | 6 | 6 | 13 | | | 3 | 10 | 6 | 13 | 10 | 16 | 13 | 19 | 16 | 22 | 19 | 25 | 22 | 28 | 25 | 32 | 32 | 38 | 38 | 44 |
| | 8 | 8 | 17 | | | | | 2 | 11 | 5 | 14 | 8 | 17 | 12 | 20 | 15 | 23 | 18 | 26 | 21 | 30 | 27 | 36 | 34 | 42 |
| | 10 | 11 | 21 | | | | | | | 1 | 12 | 4 | 15 | 7 | 18 | 11 | 21 | 14 | 24 | 17 | 27 | 23 | 34 | 30 | 40 |
| | 12 | 13 | 25 | | | | | | | | | | | 3 | 16 | 6 | 19 | 10 | 22 | 13 | 25 | 19 | 32 | 25 | 38 |

Torques – single-acting actuators, type AS [Nm]

| Spring force | | | Pneumatic applied torque Md N [Nm] at min. control pressure PSt [bar] | | | | | | | | | | | | | | | | | | | | | | | |
|--------------|-------------|-----------|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Type | No. springs | Md F [Nm] | | 2,0 | | 2,5 | | 3,0 | | 3,5 | | 4,0 | | 4,5 | | 5,0 | | 5,5 | | 6,0 | | 7,0 | | 8,0 | | |
| | | min | max | min | max | min | max | min | max | min | max | min | max | min | max | min | max | min | max | min | max | min | max | min | max | |
| AS-008 | 3 | 5 | 8 | 8 | 12 | 12 | 16 | 16 | 20 | 20 | 24 | 24 | 28 | 28 | 32 | 32 | 36 | 36 | 40 | 40 | 44 | 48 | 52 | 56 | 60 | |
| | 4 | 6 | 11 | 5 | 10 | 9 | 14 | 13 | 18 | 17 | 22 | 21 | 26 | 25 | 30 | 29 | 34 | 33 | 38 | 37 | 42 | 45 | 50 | 53 | 58 | |
| | 5 | 8 | 14 | 2 | 9 | 6 | 13 | 10 | 17 | 14 | 21 | 18 | 25 | 22 | 29 | 26 | 33 | 30 | 37 | 34 | 41 | 42 | 49 | 50 | 57 | |
| | 6 | 9 | 17 | | | 3 | 11 | 7 | 15 | 11 | 19 | 15 | 23 | 19 | 27 | 23 | 31 | 27 | 35 | 31 | 39 | 39 | 47 | 47 | 55 | |
| | 7 | 11 | 20 | | | | | 4 | 14 | 8 | 18 | 12 | 22 | 16 | 26 | 20 | 30 | 24 | 34 | 28 | 38 | 36 | 46 | 44 | 54 | |
| | 8 | 12 | 22 | | | | | 2 | 12 | 6 | 16 | 10 | 20 | 14 | 24 | 18 | 28 | 22 | 32 | 26 | 36 | 34 | 44 | 42 | 52 | |
| | 9 | 14 | 25 | | | | | | 3 | 15 | 7 | 19 | 11 | 23 | 15 | 27 | 19 | 31 | 23 | 35 | 31 | 43 | 39 | 51 | | |
| | 10 | 15 | 28 | | | | | | | | 4 | 17 | 8 | 21 | 12 | 25 | 16 | 29 | 20 | 33 | 28 | 41 | 36 | 49 | | |
| | 11 | 17 | 31 | | | | | | | | 1 | 16 | 5 | 20 | 9 | 24 | 13 | 28 | 17 | 32 | 25 | 40 | 33 | 48 | | |
| | 12 | 18 | 34 | | | | | | | | | | 2 | 18 | 6 | 22 | 10 | 26 | 14 | 30 | 22 | 38 | 30 | 46 | | |
| | 13 | 20 | 36 | | | | | | | | | | | | 4 | 21 | 8 | 25 | 12 | 29 | 20 | 37 | 28 | 45 | | |
| | 14 | 21 | 39 | | | | | | | | | | | | | 1 | 19 | 5 | 23 | 9 | 27 | 17 | 35 | 25 | 43 | |
| | AS-011 | 3 | 6 | 12 | 11 | 17 | 17 | 23 | 23 | 29 | 28 | 34 | 34 | 40 | 40 | 46 | 46 | 52 | 51 | 57 | 57 | 63 | 69 | 75 | 80 | 86 |
| | | 4 | 8 | 16 | 7 | 15 | 13 | 21 | 19 | 27 | 24 | 32 | 30 | 38 | 36 | 44 | 42 | 50 | 47 | 55 | 53 | 61 | 65 | 73 | 76 | 84 |
| 5 | | 10 | 20 | 3 | 13 | 9 | 19 | 15 | 25 | 20 | 30 | 26 | 36 | 32 | 42 | 38 | 48 | 43 | 53 | 49 | 59 | 61 | 71 | 72 | 82 | |
| 6 | | 12 | 24 | | | 5 | 17 | 11 | 23 | 16 | 28 | 22 | 34 | 28 | 40 | 34 | 46 | 39 | 51 | 45 | 57 | 57 | 69 | 68 | 80 | |
| 7 | | 14 | 28 | | | 1 | 15 | 7 | 21 | 12 | 26 | 18 | 32 | 24 | 38 | 30 | 44 | 35 | 49 | 41 | 55 | 53 | 67 | 64 | 78 | |
| 8 | | 16 | 31 | | | | | 4 | 19 | 9 | 24 | 15 | 30 | 21 | 36 | 27 | 42 | 32 | 47 | 38 | 53 | 50 | 65 | 61 | 76 | |
| 9 | | 18 | 35 | | | | | | | 5 | 22 | 11 | 28 | 17 | 34 | 23 | 40 | 28 | 45 | 34 | 51 | 46 | 63 | 57 | 74 | |
| 10 | | 20 | 39 | | | | | | | 1 | 20 | 7 | 26 | 13 | 32 | 19 | 38 | 24 | 43 | 30 | 49 | 42 | 61 | 53 | 72 | |
| 11 | | 22 | 43 | | | | | | | | 3 | 24 | 9 | 30 | 15 | 36 | 20 | 41 | 26 | 47 | 38 | 59 | 49 | 70 | | |
| 12 | | 24 | 47 | | | | | | | | | | 5 | 28 | 11 | 34 | 16 | 39 | 22 | 45 | 34 | 57 | 45 | 68 | | |
| 13 | | 26 | 51 | | | | | | | | | | | 1 | 26 | 7 | 32 | 12 | 37 | 18 | 43 | 30 | 55 | 41 | 66 | |
| 14 | | 28 | 55 | | | | | | | | | | | | 3 | 30 | 8 | 35 | 14 | 41 | 26 | 53 | 37 | 64 | | |
| AS-018 | | 3 | 9 | 18 | 18 | 27 | 27 | 36 | 36 | 45 | 45 | 54 | 54 | 63 | 63 | 72 | 72 | 81 | 81 | 90 | 90 | 99 | 108 | 117 | 126 | 135 |
| | | 4 | 12 | 24 | 12 | 24 | 21 | 33 | 30 | 42 | 39 | 51 | 48 | 60 | 57 | 69 | 66 | 78 | 75 | 87 | 84 | 96 | 102 | 114 | 120 | 132 |
| | 5 | 15 | 30 | 6 | 21 | 15 | 30 | 24 | 39 | 33 | 48 | 42 | 57 | 51 | 66 | 60 | 75 | 69 | 84 | 78 | 93 | 96 | 111 | 114 | 129 | |
| | 6 | 18 | 36 | | | 9 | 27 | 18 | 36 | 27 | 45 | 36 | 54 | 45 | 63 | 54 | 72 | 63 | 81 | 72 | 90 | 90 | 108 | 108 | 126 | |
| | 7 | 21 | 42 | | | 3 | 24 | 12 | 33 | 21 | 42 | 30 | 51 | 39 | 60 | 48 | 69 | 57 | 78 | 66 | 87 | 84 | 105 | 102 | 123 | |
| | 8 | 24 | 48 | | | | | 6 | 30 | 15 | 39 | 24 | 48 | 33 | 57 | 42 | 66 | 51 | 75 | 60 | 84 | 78 | 102 | 96 | 120 | |
| | 9 | 27 | 54 | | | | | | | 9 | 36 | 18 | 45 | 27 | 54 | 36 | 63 | 45 | 72 | 54 | 81 | 72 | 99 | 90 | 117 | |
| | 10 | 30 | 60 | | | | | | | 3 | 33 | 12 | 42 | 21 | 51 | 30 | 60 | 39 | 69 | 48 | 78 | 66 | 96 | 84 | 114 | |
| | 11 | 33 | 66 | | | | | | | | | 6 | 39 | 15 | 48 | 24 | 57 | 33 | 66 | 42 | 75 | 60 | 93 | 78 | 111 | |
| | 12 | 36 | 72 | | | | | | | | | | | 9 | 45 | 18 | 54 | 27 | 63 | 36 | 72 | 54 | 90 | 72 | 108 | |
| | 13 | 39 | 78 | | | | | | | | | | | | 3 | 42 | 12 | 51 | 21 | 60 | 30 | 69 | 48 | 87 | 66 | 105 |
| | 14 | 42 | 84 | | | | | | | | | | | | | 6 | 48 | 15 | 57 | 24 | 66 | 42 | 84 | 60 | 102 | |
| | AS-026 | 3 | 13 | 27 | 25 | 39 | 38 | 52 | 51 | 65 | 64 | 78 | 77 | 91 | 90 | 104 | 103 | 117 | 116 | 130 | 129 | 143 | 155 | 169 | 181 | 195 |
| | | 4 | 17 | 35 | 17 | 35 | 30 | 48 | 43 | 61 | 56 | 74 | 69 | 87 | 82 | 100 | 95 | 113 | 108 | 126 | 121 | 139 | 147 | 165 | 173 | 191 |
| 5 | | 21 | 44 | 8 | 31 | 21 | 44 | 34 | 57 | 47 | 70 | 60 | 83 | 73 | 96 | 86 | 109 | 99 | 122 | 112 | 135 | 138 | 161 | 164 | 187 | |
| 6 | | 26 | 53 | | | 12 | 40 | 25 | 53 | 38 | 66 | 51 | 79 | 64 | 92 | 77 | 105 | 90 | 118 | 103 | 131 | 129 | 157 | 155 | 183 | |
| 7 | | 30 | 62 | | | 3 | 35 | 16 | 48 | 29 | 61 | 42 | 74 | 55 | 87 | 68 | 100 | 81 | 113 | 94 | 126 | 120 | 152 | 146 | 178 | |
| 8 | | 34 | 71 | | | | | 7 | 44 | 20 | 57 | 33 | 70 | 46 | 83 | 59 | 96 | 72 | 109 | 85 | 122 | 111 | 148 | 137 | 174 | |
| 9 | | 38 | 80 | | | | | | | 11 | 53 | 24 | 66 | 37 | 79 | 50 | 92 | 63 | 105 | 76 | 118 | 102 | 144 | 128 | 170 | |
| 10 | | 43 | 89 | | | | | | | 2 | 49 | 15 | 62 | 28 | 75 | 41 | 88 | 54 | 101 | 67 | 114 | 93 | 140 | 119 | 166 | |
| 11 | | 47 | 98 | | | | | | | | 6 | 57 | 19 | 70 | 32 | 83 | 45 | 96 | 58 | 109 | 84 | 135 | 110 | 161 | | |
| 12 | | 51 | 106 | | | | | | | | | | | 11 | 66 | 24 | 79 | 37 | 92 | 50 | 105 | 76 | 131 | 102 | 157 | |
| 13 | | 55 | 115 | | | | | | | | | | | | 2 | 62 | 15 | 75 | 28 | 88 | 41 | 101 | 67 | 127 | 93 | 153 |
| 14 | | 60 | 124 | | | | | | | | | | | | | 6 | 71 | 19 | 84 | 32 | 97 | 58 | 123 | 84 | 149 | |
| AS-037 | | 3 | 21 | 40 | 34 | 53 | 53 | 72 | 71 | 90 | 89 | 108 | 108 | 127 | 126 | 145 | 145 | 164 | 163 | 182 | 182 | 201 | 219 | 238 | 256 | 275 |
| | | 4 | 27 | 53 | 21 | 47 | 40 | 66 | 58 | 84 | 76 | 102 | 95 | 121 | 113 | 139 | 132 | 158 | 150 | 176 | 169 | 195 | 206 | 232 | 243 | 269 |
| | 5 | 34 | 66 | 8 | 40 | 27 | 59 | 45 | 77 | 63 | 95 | 82 | 114 | 100 | 132 | 119 | 151 | 137 | 169 | 156 | 188 | 193 | 225 | 230 | 262 | |
| | 6 | 41 | 80 | | | 13 | 52 | 31 | 70 | 49 | 88 | 68 | 107 | 86 | 125 | 105 | 144 | 123 | 162 | 142 | 181 | 179 | 218 | 216 | 255 | |
| | 7 | 48 | 93 | | | | | 18 | 63 | 36 | 81 | 55 | 100 | 73 | 118 | 92 | 137 | 110 | 155 | 129 | 174 | 166 | 211 | 203 | 248 | |
| | 8 | 55 | 106 | | | | | 5 | 56 | 23 | 74 | 42 | 93 | 60 | 111 | 79 | 130 | 97 | 148 | 116 | 167 | 153 | 204 | 190 | 241 | |
| | 9 | 62 | 119 | | | | | | | 10 | 67 | 29 | 86 | 47 | 104 | 66 | 123 | 84 | 141 | 103 | 160 | 140 | 197 | 177 | 234 | |
| | 10 | 69 | 133 | | | | | | | | 15 | 79 | 33 | 97 | 52 | 116 | 70 | 134 | 89 | 153 | 126 | 190 | 163 | 227 | | |
| | 11 | 75 | 146 | | | | | | | | 2 | 73 | 20 | 91 | 39 | 110 | 57 | 128 | 76 | 147 | 113 | 184 | 150 | 221 | | |
| | 12 | 82 | 159 | | | | | | | | | | | 7 | 84 | 26 | 103 | 44 | 121 | 63 | 140 | 100 | 177 | 137 | 214 | |
| | 13 | 89 | 173 | | | | | | | | | | | | | 12 | 96 | 30 | 114 | 49 | 133 | 86 | 170 | 123 | 207 | |
| | 14 | 96 | 186 | | | | | | | | | | | | | | 17 | 107 | 36 | 126 | 73 | 163 | 110 | 200 | | |

Torques – single-acting actuators, type AS [Nm]

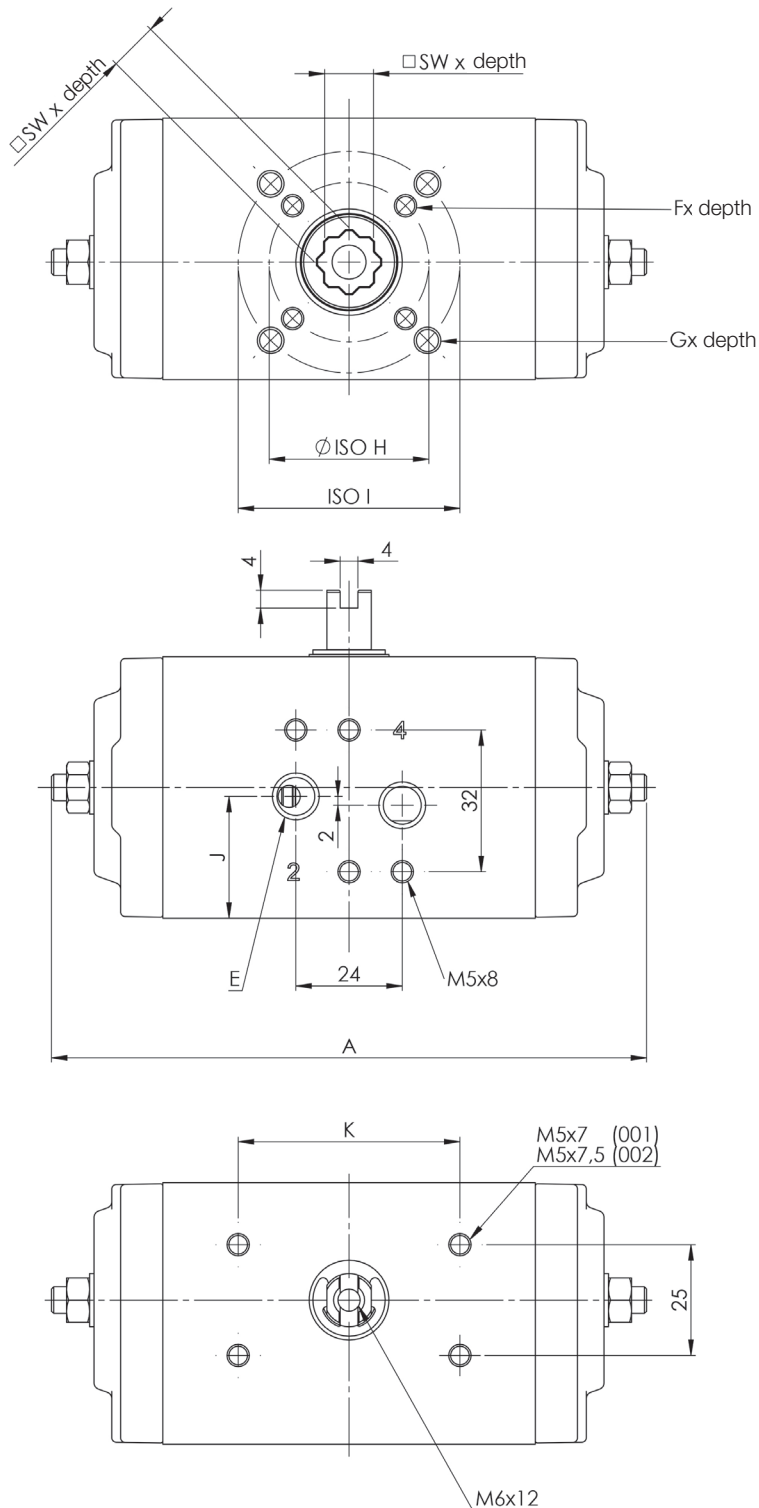
| | | Spring force | | Pneumatic applied torque Md N [Nm] at min. control pressure PSt [bar] | | | | | | | | | | | | | | | | | | | | | | | |
|--------|-------------|--------------|--------|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|-----|
| | | Md F [Nm] | | 2,0 | | 2,5 | | 3,0 | | 3,5 | | 4,0 | | 4,5 | | 5,0 | | 5,5 | | 6,0 | | 7,0 | | 8,0 | | | |
| Type | No. springs | Md min | Md max | min | max | min | max | min | max | min | max | min | max | min | max | min | max | min | max | min | max | min | max | min | max | | |
| AS-050 | 3 | 28 | 53 | 47 | 72 | 72 | 97 | 97 | 122 | 122 | 147 | 147 | 172 | 172 | 197 | 197 | 222 | 222 | 247 | 247 | 272 | 272 | 297 | 322 | 347 | 372 | |
| | 4 | 37 | 71 | 29 | 63 | 54 | 88 | 79 | 113 | 104 | 138 | 129 | 163 | 154 | 188 | 179 | 213 | 204 | 238 | 229 | 263 | 279 | 313 | 329 | 363 | | |
| | 5 | 46 | 88 | 12 | 54 | 37 | 79 | 62 | 104 | 87 | 129 | 112 | 154 | 137 | 179 | 162 | 204 | 187 | 229 | 212 | 254 | 262 | 304 | 312 | 354 | | |
| | 6 | 56 | 106 | | | 19 | 69 | 44 | 94 | 69 | 119 | 94 | 144 | 119 | 169 | 144 | 194 | 169 | 219 | 194 | 244 | 244 | 294 | 294 | 344 | | |
| | 7 | 65 | 124 | | | | | 26 | 85 | 51 | 110 | 76 | 135 | 101 | 160 | 126 | 185 | 151 | 210 | 176 | 235 | 226 | 285 | 276 | 335 | | |
| | 8 | 74 | 142 | | | | | 8 | 76 | 33 | 101 | 58 | 126 | 83 | 151 | 108 | 176 | 133 | 201 | 158 | 226 | 208 | 276 | 258 | 326 | | |
| | 9 | 83 | 159 | | | | | | | 16 | 92 | | | 41 | 117 | 66 | 142 | 91 | 167 | 116 | 192 | 141 | 217 | 191 | 267 | 317 | |
| | 10 | 93 | 177 | | | | | | | | | | | 23 | 107 | 48 | 132 | 73 | 157 | 98 | 182 | 123 | 207 | 173 | 257 | 307 | |
| | 11 | 102 | 195 | | | | | | | | | | | 5 | 98 | 30 | 123 | 55 | 148 | 80 | 173 | 105 | 198 | 155 | 248 | 298 | |
| | 12 | 111 | 212 | | | | | | | | | | | | | 13 | 114 | 38 | 139 | 63 | 164 | 88 | 189 | 138 | 239 | 188 | 289 |
| | 13 | 121 | 230 | | | | | | | | | | | | | | | 20 | 129 | 45 | 154 | 70 | 179 | 120 | 229 | 170 | 279 |
| | 14 | 130 | 248 | | | | | | | | | | | | | | | | | 27 | 145 | 52 | 170 | 102 | 220 | 152 | 270 |
| | AS-076 | 3 | 42 | 80 | 72 | 110 | 110 | 148 | 148 | 186 | 186 | 224 | 224 | 262 | 262 | 300 | 300 | 338 | 338 | 376 | 376 | 414 | 414 | 452 | 490 | 528 | 566 |
| | | 4 | 56 | 107 | 45 | 96 | 83 | 134 | 121 | 172 | 159 | 210 | 197 | 248 | 235 | 286 | 273 | 324 | 311 | 362 | 349 | 400 | 425 | 476 | 501 | 552 | |
| 5 | | 70 | 134 | 18 | 82 | 56 | 120 | 94 | 158 | 132 | 196 | 170 | 234 | 208 | 272 | 246 | 310 | 284 | 348 | 322 | 386 | 398 | 462 | 474 | 538 | | |
| 6 | | 84 | 161 | | | 29 | 106 | 67 | 144 | 105 | 182 | 143 | 220 | 181 | 258 | 219 | 296 | 257 | 334 | 295 | 372 | 371 | 448 | 447 | 524 | | |
| 7 | | 98 | 188 | | | 2 | 92 | 40 | 130 | 78 | 168 | 116 | 206 | 154 | 244 | 192 | 282 | 230 | 320 | 268 | 358 | 344 | 434 | 420 | 510 | | |
| 8 | | 112 | 214 | | | | | 14 | 116 | 52 | 154 | 90 | 192 | 128 | 230 | 166 | 268 | 204 | 306 | 242 | 344 | 318 | 420 | 394 | 496 | | |
| 9 | | 126 | 241 | | | | | | | 25 | 140 | 63 | 178 | 101 | 216 | 139 | 254 | 177 | 292 | 215 | 330 | 291 | 406 | 367 | 482 | | |
| 10 | | 140 | 268 | | | | | | | | | 36 | 164 | 74 | 202 | 112 | 240 | 150 | 278 | 188 | 316 | 264 | 392 | 340 | 468 | | |
| 11 | | 154 | 295 | | | | | | | | | 9 | 150 | 47 | 188 | 85 | 226 | 123 | 264 | 161 | 302 | 237 | 378 | 313 | 454 | | |
| 12 | | 168 | 321 | | | | | | | | | | | 21 | 174 | 59 | 212 | 97 | 250 | 135 | 288 | 211 | 364 | 287 | 440 | | |
| 13 | | 183 | 348 | | | | | | | | | | | | | | | 32 | 197 | 70 | 235 | 108 | 273 | 184 | 349 | 260 | 425 |
| 14 | | 197 | 375 | | | | | | | | | | | | | | | 5 | 183 | 43 | 221 | 81 | 259 | 157 | 335 | 233 | 411 |
| AS-110 | | 3 | 66 | 116 | 104 | 154 | 159 | 209 | 214 | 264 | 269 | 319 | 324 | 374 | 379 | 429 | 434 | 484 | 489 | 539 | 544 | 594 | 654 | 704 | 764 | 814 | |
| | | 4 | 88 | 155 | 65 | 132 | 120 | 187 | 175 | 242 | 230 | 297 | 285 | 352 | 340 | 407 | 395 | 462 | 450 | 517 | 505 | 572 | 615 | 682 | 725 | 792 | |
| | 5 | 110 | 193 | 27 | 110 | 82 | 165 | 137 | 220 | 192 | 275 | 247 | 330 | 302 | 385 | 357 | 440 | 412 | 495 | 467 | 550 | 577 | 660 | 687 | 770 | | |
| | 6 | 132 | 232 | | | 43 | 143 | 98 | 198 | 153 | 253 | 208 | 308 | 263 | 363 | 318 | 418 | 373 | 473 | 428 | 528 | 538 | 638 | 648 | 748 | | |
| | 7 | 154 | 271 | | | 4 | 121 | 59 | 176 | 114 | 231 | 169 | 286 | 224 | 341 | 279 | 396 | 334 | 451 | 389 | 506 | 499 | 616 | 609 | 726 | | |
| | 8 | 176 | 309 | | | | | 21 | 154 | 76 | 209 | 131 | 264 | 186 | 319 | 241 | 374 | 296 | 429 | 351 | 484 | 461 | 594 | 571 | 704 | | |
| | 9 | 197 | 348 | | | | | | | 37 | 188 | 92 | 243 | 147 | 298 | 202 | 353 | 257 | 408 | 312 | 463 | 422 | 573 | 532 | 683 | | |
| | 10 | 219 | 387 | | | | | | | | | 53 | 221 | 108 | 276 | 163 | 331 | 218 | 386 | 273 | 441 | 383 | 551 | 493 | 661 | | |
| | 11 | 241 | 425 | | | | | | | | | 15 | 199 | 70 | 254 | 125 | 309 | 180 | 364 | 235 | 419 | 345 | 529 | 455 | 639 | | |
| | 12 | 263 | 464 | | | | | | | | | | | 31 | 232 | 86 | 287 | 141 | 342 | 196 | 397 | 306 | 507 | 416 | 617 | | |
| | 13 | 285 | 503 | | | | | | | | | | | | | 47 | 265 | 102 | 320 | 157 | 375 | 267 | 485 | 377 | 595 | | |
| | 14 | 307 | 541 | | | | | | | | | | | | | 9 | 243 | 64 | 298 | 119 | 353 | 229 | 463 | 339 | 573 | | |
| | AS-160 | 3 | 84 | 160 | 162 | 239 | 243 | 319 | 323 | 400 | 404 | 481 | 485 | 561 | 565 | 642 | 646 | 723 | 727 | 803 | 807 | 884 | 969 | 1045 | 1130 | 1207 | |
| | | 4 | 112 | 214 | 109 | 211 | 189 | 292 | 270 | 372 | 351 | 453 | 431 | 534 | 512 | 614 | 593 | 695 | 673 | 775 | 754 | 856 | 915 | 1017 | 1076 | 1179 | |
| 5 | | 140 | 267 | 55 | 183 | 136 | 264 | 216 | 344 | 297 | 425 | 378 | 506 | 458 | 586 | 539 | 667 | 620 | 748 | 700 | 828 | 862 | 989 | 1023 | 1151 | | |
| 6 | | 168 | 321 | | | 82 | 236 | 163 | 316 | 244 | 397 | 324 | 478 | 405 | 558 | 486 | 639 | 566 | 720 | 647 | 800 | 808 | 962 | 969 | 1123 | | |
| 7 | | 195 | 374 | | | | | 109 | 288 | 190 | 369 | 271 | 450 | 351 | 530 | 432 | 611 | 513 | 692 | 593 | 772 | 755 | 934 | 916 | 1095 | | |
| 8 | | 223 | 428 | | | | | 56 | 261 | 137 | 341 | 217 | 422 | 298 | 502 | 379 | 583 | 459 | 664 | 540 | 744 | 701 | 906 | 862 | 1067 | | |
| 9 | | 251 | 481 | | | | | | | 83 | 313 | 164 | 394 | 244 | 475 | 325 | 555 | 406 | 636 | 486 | 717 | 648 | 878 | 809 | 1039 | | |
| 10 | | 279 | 535 | | | | | | | | | 110 | 366 | 191 | 447 | 272 | 527 | 352 | 608 | 433 | 689 | 594 | 850 | 756 | 1011 | | |
| 11 | | 307 | 588 | | | | | | | | | | | 137 | 419 | 218 | 499 | 299 | 580 | 379 | 661 | 541 | 822 | 702 | 983 | | |
| 12 | | 335 | 642 | | | | | | | | | | | | | 165 | 471 | 245 | 552 | 326 | 633 | 487 | 794 | 649 | 955 | | |
| 13 | | 363 | 695 | | | | | | | | | | | | | | | 192 | 524 | 272 | 605 | 434 | 766 | 595 | 927 | | |
| 14 | | 391 | 749 | | | | | | | | | | | | | | | | | 219 | 577 | 380 | 738 | 542 | 900 | | |
| AS-230 | | 3 | 128 | 221 | 242 | 335 | 358 | 451 | 474 | 567 | 590 | 683 | 706 | 799 | 822 | 915 | 938 | 1030 | 1053 | 1146 | 1169 | 1262 | 1401 | 1494 | 1633 | 1725 | |
| | | 4 | 171 | 295 | 169 | 293 | 285 | 408 | 400 | 524 | 516 | 640 | 632 | 756 | 748 | 872 | 864 | 988 | 980 | 1103 | 1096 | 1219 | 1327 | 1451 | 1559 | 1683 | |
| | 5 | 214 | 368 | 95 | 250 | 211 | 366 | 327 | 482 | 443 | 597 | 559 | 713 | 674 | 829 | 790 | 945 | 906 | 1061 | 1022 | 1177 | 1254 | 1408 | 1485 | 1640 | | |
| | 6 | 256 | 442 | 21 | 207 | 137 | 323 | 253 | 439 | 369 | 555 | 485 | 671 | 601 | 786 | 717 | 902 | 832 | 1018 | 948 | 1134 | 1180 | 1366 | 1412 | 1597 | | |
| | 7 | 299 | 516 | | | 64 | 280 | 180 | 396 | 295 | 512 | 411 | 628 | 527 | 744 | 643 | 860 | 759 | 975 | 875 | 1091 | 1106 | 1323 | 1338 | 1555 | | |
| | 8 | 342 | 589 | | | | | 106 | 353 | 222 | 469 | 338 | 585 | 453 | 701 | 569 | 817 | 685 | 933 | 801 | 1048 | 1033 | 1280 | 1264 | 1512 | | |
| | 9 | 384 | 663 | | | | | 32 | 311 | 148 | 427 | 264 | 542 | 380 | 658 | 496 | 774 | 611 | 890 | 727 | 1006 | 959 | 1237 | 1191 | 1469 | | |
| | 10 | 427 | 737 | | | | | | | 74 | 384 | 190 | 500 | 306 | 616 | 422 | 731 | 538 | 847 | 654 | 963 | 885 | 1195 | 1117 | 1426 | | |
| | 11 | 470 | 810 | | | | | | | | | 117 | 457 | 232 | 573 | 348 | 689 | 464 | 804 | 580 | 920 | 812 | 1152 | 1043 | 1384 | | |
| | 12 | 513 | 884 | | | | | | | | | | | 159 | 530 | 275 | 646 | 390 | 762 | 506 | 878 | 738 | 1109 | 970 | 1341 | | |
| | 13 | 555 | 958 | | | | | | | | | | | | | 201 | 603 | 317 | 719 | 433 | 835 | 664 | 1067 | 896 | 1298 | | |
| | 14 | 598 | 1031 | | | | | | | | | | | | | | | 243 | 676 | 359 | 792 | 591 | 1024 | 822 | 1256 | | |

Torques – single-acting actuators, type AS [Nm]

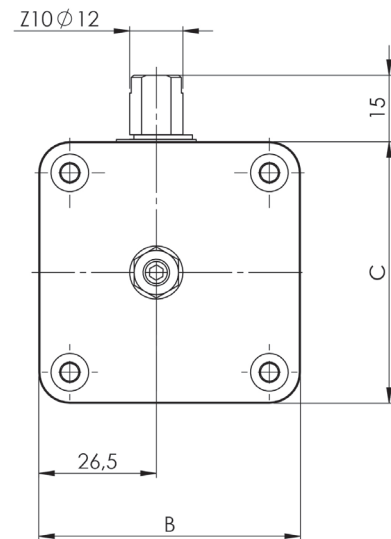
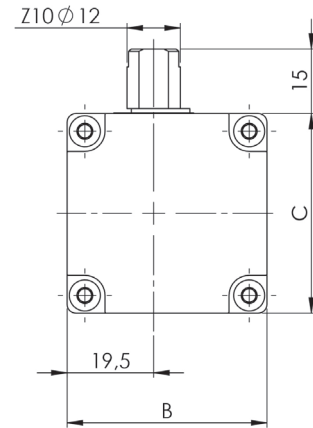
| Spring force | | | | Pneumatic applied torque Md N [Nm] at min. control pressure Pst [bar] | | | | | | | | | | | | | | | | | | | | | | | |
|--------------|-------------|-----------|--------|---|------|-------|-------|--------|------|--------|--------|--------|------|--------|--------|--------|------|--------|--------|--------|------|--------|------|--------|------|------|--|
| Type | No. springs | Md F [Nm] | | 2,0 | | 2,5 | | 3,0 | | 3,5 | | 4,0 | | 4,5 | | 5,0 | | 5,5 | | 6,0 | | 7,0 | | 8,0 | | | |
| | | min | max | min | max | min | max | min | max | min | max | min | max | min | max | min | max | min | max | min | max | min | max | min | max | | |
| AS-360 | 1 | 74 | 112,5 | 633,5 | 672 | 820 | 858,5 | 1006,5 | 1045 | 1193 | 1231,5 | 1379,5 | 1418 | 1566 | 1604,5 | 1752,5 | 1791 | 1939 | 1977,5 | 2125,5 | 2164 | 2498,5 | 2537 | 2871,5 | 2910 | | |
| | 2 | 148 | 225 | 521 | 598 | 707,5 | 784,5 | 894 | 971 | 1080,5 | 1157,5 | 1267 | 1344 | 1453,5 | 1530,5 | 1640 | 1717 | 1826,5 | 1903,5 | 2013 | 2090 | 2386 | 2463 | 2759 | 2836 | | |
| | 3 | 222 | 337,5 | 408,5 | 524 | 595 | 710,5 | 781,5 | 897 | 968 | 1083,5 | 1154,5 | 1270 | 1341 | 1456,5 | 1527,5 | 1643 | 1714 | 1829,5 | 1900,5 | 2016 | 2273,5 | 2389 | 2646,5 | 2762 | | |
| | 4 | 296 | 450 | 296 | 450 | 482,5 | 636,5 | 669 | 823 | 855,5 | 1009,5 | 1042 | 1196 | 1228,5 | 1382,5 | 1415 | 1569 | 1601,5 | 1755,5 | 1788 | 1942 | 2161 | 2315 | 2534 | 2688 | | |
| | 5 | 370 | 562,5 | 183,5 | 376 | 370 | 562,5 | 556,5 | 749 | 743 | 935,5 | 929,5 | 1122 | 1116 | 1308,5 | 1302,5 | 1495 | 1489 | 1681,5 | 1675,5 | 1868 | 2048,5 | 2241 | 2421,5 | 2614 | | |
| | 6 | 444 | 675 | 71 | 302 | 257,5 | 488,5 | 444 | 675 | 630,5 | 861,5 | 817 | 1048 | 1003,5 | 1234,5 | 1190 | 1421 | 1376,5 | 1607,5 | 1563 | 1794 | 1936 | 2167 | 2309 | 2540 | | |
| | 7 | 518 | 787,5 | | | 145 | 414,5 | 331,5 | 601 | 518 | 787,5 | 704,5 | 974 | 891 | 1160,5 | 1077,5 | 1347 | 1264 | 1533,5 | 1450,5 | 1720 | 1823,5 | 2093 | 2196,5 | 2466 | | |
| | 8 | 592 | 900 | | | 32,5 | 340,5 | 219 | 527 | 405,5 | 713,5 | 592 | 900 | 778,5 | 1086,5 | 965 | 1273 | 1151,5 | 1459,5 | 1338 | 1646 | 1711 | 2019 | 2084 | 2392 | | |
| | 9 | 666 | 1012,5 | | | | | 106,5 | 453 | 293 | 639,5 | 479,5 | 826 | 666 | 1012,5 | 852,5 | 1199 | 1039 | 1385,5 | 1225,5 | 1572 | 1598,5 | 1945 | 1971,5 | 2318 | | |
| | 10 | 740 | 1125 | | | | | | | 180,5 | 565,5 | 367 | 752 | 553,5 | 938,5 | 740 | 1125 | 926,5 | 1311,5 | 1113 | 1498 | 1486 | 1871 | 1859 | 2244 | | |
| | 11 | 814 | 1237,5 | | | | | | | 68 | 491,5 | 254,5 | 678 | 441 | 864,5 | 627,5 | 1051 | 814 | 1237,5 | 1000,5 | 1424 | 1373,5 | 1797 | 1746,5 | 2170 | | |
| | 12 | 888 | 1350 | | | | | | | | | | 142 | 604 | 328,5 | 790,5 | 515 | 977 | 701,5 | 1163,5 | 888 | 1350 | 1261 | 1723 | 1634 | 2096 | |
| AS-520 | 1 | 98 | 162 | 878 | 942 | 1138 | 1202 | 1398 | 1462 | 1658 | 1722 | 1918 | 1982 | 2178 | 2242 | 2438 | 2502 | 2698 | 2762 | 2958 | 3022 | 3478 | 3542 | 3998 | 4062 | | |
| | 2 | 196 | 324 | 716 | 844 | 976 | 1104 | 1236 | 1364 | 1496 | 1624 | 1756 | 1884 | 2016 | 2144 | 2276 | 2404 | 2536 | 2664 | 2796 | 2924 | 3316 | 3444 | 3836 | 3964 | | |
| | 3 | 294 | 486 | 554 | 746 | 814 | 1006 | 1074 | 1266 | 1334 | 1526 | 1594 | 1786 | 1854 | 2046 | 2114 | 2306 | 2374 | 2566 | 2634 | 2826 | 3154 | 3346 | 3674 | 3866 | | |
| | 4 | 392 | 648 | 392 | 648 | 652 | 908 | 912 | 1168 | 1172 | 1428 | 1432 | 1688 | 1692 | 1948 | 1952 | 2208 | 2212 | 2468 | 2472 | 2728 | 2992 | 3248 | 3512 | 3768 | | |
| | 5 | 490 | 810 | 230 | 550 | 490 | 810 | 750 | 1070 | 1010 | 1330 | 1270 | 1590 | 1530 | 1850 | 1790 | 2110 | 2050 | 2370 | 2310 | 2630 | 2830 | 3150 | 3350 | 3670 | | |
| | 6 | 588 | 972 | 68 | 452 | 328 | 712 | 588 | 972 | 848 | 1232 | 1108 | 1492 | 1368 | 1752 | 1628 | 2012 | 1888 | 2272 | 2148 | 2532 | 2668 | 3052 | 3188 | 3572 | | |
| | 7 | 686 | 1134 | | | 166 | 614 | 426 | 874 | 686 | 1134 | 946 | 1394 | 1206 | 1654 | 1466 | 1914 | 1726 | 2174 | 1986 | 2434 | 2506 | 2954 | 3026 | 3474 | | |
| | 8 | 784 | 1296 | | | 4 | 516 | 264 | 776 | 524 | 1036 | 784 | 1296 | 1044 | 1556 | 1304 | 1816 | 1564 | 2076 | 1824 | 2336 | 2344 | 2856 | 2864 | 3376 | | |
| | 9 | 882 | 1458 | | | | | 102 | 678 | 362 | 938 | 622 | 1198 | 882 | 1458 | 1142 | 1718 | 1402 | 1978 | 1662 | 2238 | 2182 | 2758 | 2702 | 3278 | | |
| | 10 | 980 | 1620 | | | | | | | 200 | 840 | 460 | 1100 | 720 | 1360 | 980 | 1620 | 1240 | 1880 | 1500 | 2140 | 2020 | 2660 | 2540 | 3180 | | |
| | 11 | 1078 | 1782 | | | | | | | 38 | 742 | 298 | 1002 | 558 | 1262 | 818 | 1522 | 1078 | 1782 | 1338 | 2042 | 1858 | 2562 | 2378 | 3082 | | |
| | 12 | 1176 | 1944 | | | | | | | | | 136 | 904 | 396 | 1164 | 656 | 1424 | 916 | 1684 | 1176 | 1944 | 1696 | 2464 | 2216 | 2984 | | |
| AS-800 | 1 | 108 | 185 | 1375 | 1452 | 1765 | 1842 | 2155 | 2232 | 2545 | 2622 | 2935 | 3012 | 3325 | 3402 | 3715 | 3792 | 4105 | 4182 | 4495 | 4572 | 5275 | 5352 | 6055 | 6132 | | |
| | 2 | 216 | 370 | 1190 | 1344 | 1580 | 1734 | 1970 | 2124 | 2360 | 2514 | 2750 | 2904 | 3140 | 3294 | 3530 | 3684 | 3920 | 4074 | 4310 | 4464 | 5090 | 5244 | 5870 | 6024 | | |
| | 3 | 324 | 555 | 1005 | 1236 | 1395 | 1626 | 1785 | 2016 | 2175 | 2406 | 2565 | 2796 | 2955 | 3186 | 3345 | 3576 | 3735 | 3966 | 4125 | 4356 | 4905 | 5136 | 5685 | 5916 | | |
| | 4 | 432 | 740 | 820 | 1128 | 1210 | 1518 | 1600 | 1908 | 1990 | 2298 | 2380 | 2688 | 2770 | 3078 | 3160 | 3468 | 3550 | 3858 | 3940 | 4248 | 4720 | 5028 | 5500 | 5808 | | |
| | 5 | 540 | 925 | 635 | 1020 | 1025 | 1410 | 1415 | 1800 | 1805 | 2190 | 2195 | 2580 | 2585 | 2970 | 2975 | 3360 | 3365 | 3750 | 3755 | 4140 | 4535 | 4920 | 5315 | 5700 | | |
| | 6 | 648 | 1110 | 450 | 912 | 840 | 1302 | 1230 | 1692 | 1620 | 2082 | 2010 | 2472 | 2400 | 2862 | 2790 | 3252 | 3180 | 3642 | 3570 | 4032 | 4350 | 4812 | 5130 | 5592 | | |
| | 7 | 756 | 1295 | 265 | 804 | 655 | 1194 | 1045 | 1584 | 1435 | 1974 | 1825 | 2364 | 2215 | 2754 | 2605 | 3144 | 2995 | 3534 | 3385 | 3924 | 4165 | 4704 | 4945 | 5484 | | |
| | 8 | 864 | 1480 | 80 | 696 | 470 | 1086 | 860 | 1476 | 1250 | 1866 | 1640 | 2256 | 2030 | 2646 | 2420 | 3036 | 2810 | 3426 | 3200 | 3816 | 3980 | 4596 | 4760 | 5376 | | |
| | 9 | 972 | 1665 | | | 285 | 978 | 675 | 1368 | 1065 | 1758 | 1455 | 2148 | 1845 | 2538 | 2235 | 2928 | 2625 | 3318 | 3015 | 3708 | 3795 | 4488 | 4575 | 5268 | | |
| | 10 | 1080 | 1850 | | | 100 | 870 | 490 | 1260 | 880 | 1650 | 1270 | 2040 | 1660 | 2430 | 2050 | 2820 | 2440 | 3210 | 2830 | 3600 | 3610 | 4380 | 4390 | 5160 | | |
| | 11 | 1188 | 2035 | | | | | 305 | 1152 | 695 | 1542 | 1085 | 1932 | 1475 | 2322 | 1865 | 2712 | 2255 | 3102 | 2645 | 3492 | 3425 | 4272 | 4205 | 5052 | | |
| | 12 | 1296 | 2220 | | | | | 120 | 1044 | 510 | 1434 | 900 | 1824 | 1290 | 2214 | 1680 | 2604 | 2070 | 2994 | 2460 | 3384 | 3240 | 4164 | 4020 | 4944 | | |
| | 13 | 1404 | 2405 | | | | | | | 325 | 1326 | 715 | 1716 | 1105 | 2106 | 1495 | 2496 | 1885 | 2886 | 2275 | 3276 | 3055 | 4056 | 3835 | 4836 | | |
| | 14 | 1512 | 2590 | | | | | | | 140 | 1218 | 530 | 1608 | 920 | 1998 | 1310 | 2388 | 1700 | 2778 | 2090 | 3168 | 2870 | 3948 | 3650 | 4728 | | |
| | 15 | 1620 | 2775 | | | | | | | | | 345 | 1500 | 735 | 1890 | 1125 | 2280 | 1515 | 2670 | 1905 | 3060 | 2685 | 3840 | 3465 | 4620 | | |
| | 16 | 1728 | 2960 | | | | | | | | | 160 | 1392 | 550 | 1782 | 940 | 2172 | 1330 | 2562 | 1720 | 2952 | 2500 | 3732 | 3280 | 4512 | | |
| AS-1200 | 1 | 244 | 363 | 2063 | 2183 | 2670 | 2790 | 3276 | 3396 | 3883 | 4002 | 4489 | 4609 | 5096 | 5215 | 5702 | 5822 | 6308 | 6428 | 6915 | 7034 | 8128 | 8247 | | | | |
| | 2 | 487 | 726 | 1701 | 1940 | 2307 | 2546 | 2914 | 3153 | 3520 | 3759 | 4126 | 4366 | 4733 | 4972 | 5339 | 5578 | 5946 | 6185 | 6552 | 6791 | 7765 | 8004 | | | | |
| | 3 | 730 | 1088 | 1338 | 1697 | 1945 | 2303 | 2551 | 2910 | 3157 | 3516 | 3764 | 4123 | 4370 | 4729 | 4977 | 5335 | 5583 | 5942 | 6189 | 6548 | 7402 | 7761 | | | | |
| | 4 | 973 | 1406 | 975 | 1454 | 1582 | 2060 | 2188 | 2667 | 2795 | 3273 | 3401 | 3880 | 4008 | 4486 | 4614 | 5092 | 5220 | 5699 | 5827 | 6305 | 7040 | 7518 | | | | |
| | 5 | 1216 | 1814 | 613 | 1211 | 1219 | 1817 | 1826 | 2424 | 2432 | 3030 | 3038 | 3637 | 3645 | 4243 | 4251 | 4849 | 4858 | 5456 | 5464 | 6062 | 6677 | 7275 | | | | |
| | 6 | 1459 | 2176 | 250 | 968 | 857 | 1574 | 1463 | 2180 | 2069 | 2787 | 2676 | 3393 | 3282 | 4000 | 3889 | 4606 | 4495 | 5213 | 5101 | 5819 | 6314 | 7032 | | | | |
| | 7 | 1702 | 2539 | | | 494 | 1331 | 1100 | 1937 | 1706 | 2544 | 2313 | 3150 | 2920 | 3757 | 3526 | 4363 | 4132 | 4969 | 4739 | 5576 | 5952 | 6789 | | | | |
| | 8 | 1945 | 2902 | | | 131 | 1088 | 738 | 1694 | 1344 | 2301 | 1950 | 2907 | 2557 | 3514 | 3163 | 4120 | 3770 | 4726 | 4376 | 5333 | 5589 | 6546 | | | | |
| | 9 | 2188 | 3264 | | | | | 375 | 1451 | 981 | 2058 | 1588 | 2664 | 2194 | 3270 | 2801 | 3877 | 3407 | 4483 | 4013 | 5090 | 5226 | 6303 | | | | |
| | 10 | 2431 | 3627 | | | | | | | 619 | 1815 | 1225 | 2421 | 1832 | 3027 | 2438 | 3634 | 3044 | 4240 | 3651 | 4847 | 4864 | 6059 | | | | |
| | 11 | 2674 | 3990 | | | | | | | 256 | 1571 | 862 | 2178 | 1469 | 2784 | 2075 | 3391 | 2682 | 3997 | 3288 | 4604 | 4501 | 5816 | | | | |
| | 12 | 2918 | 4352 | | | | | | | | | 500 | 1935 | 1106 | 2541 | 1713 | 3148 | 2319 | 3754 | 2925 | 4360 | 4138 | 5573 | | | | |

Drawings for actubar type AD-001 and type AD/AS-002

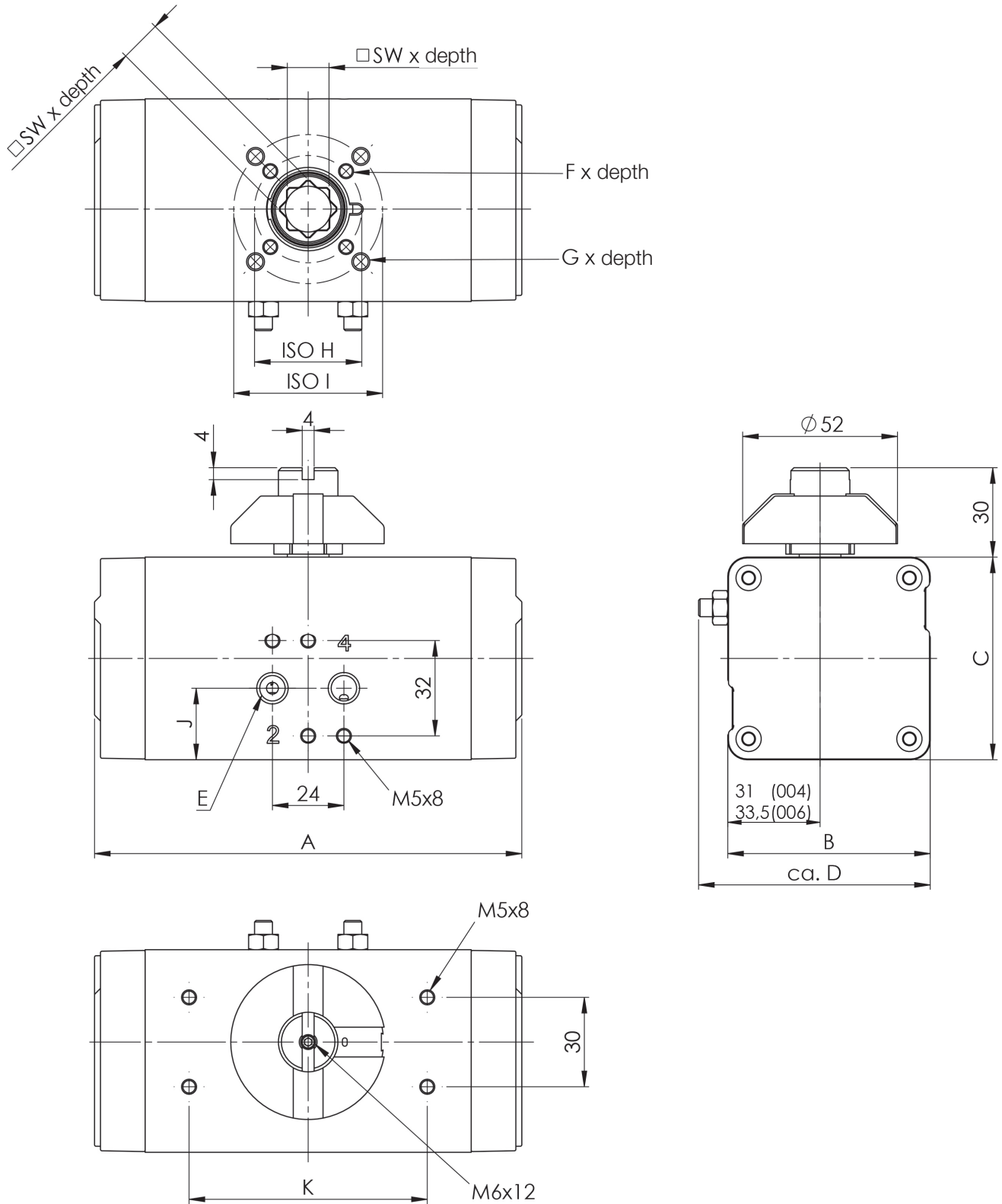
Type AD/AS-002



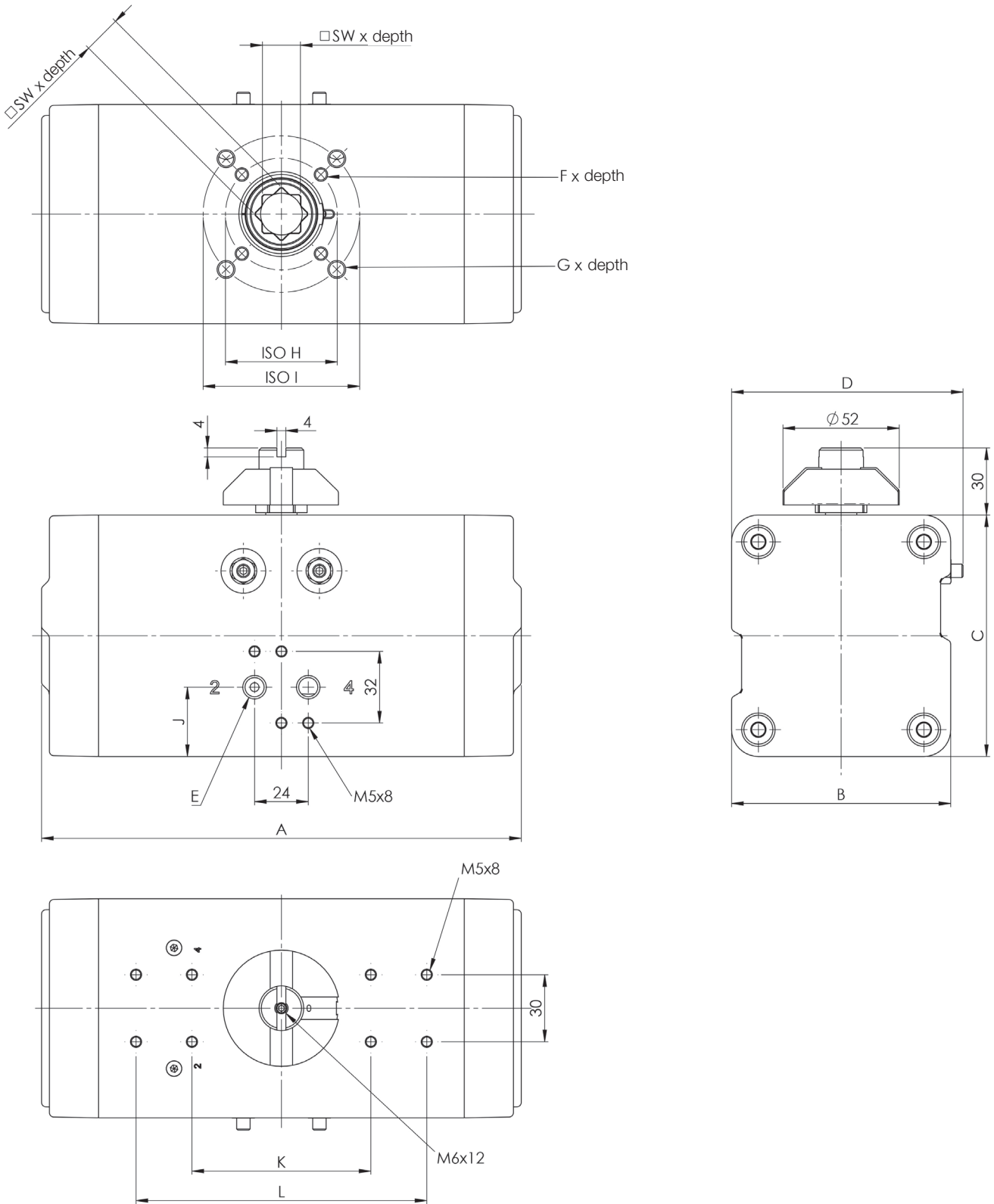
Type AD-001



Drawings for actubar type AD/AS-004 to -006



Drawings for actubar types AD/AS-008 to -230



Drawings for actubar types AD/AS-360 to -1200

Type AD/AS-360 to AD/AS-520

Type AD/AS-800 to AD/AS-1200

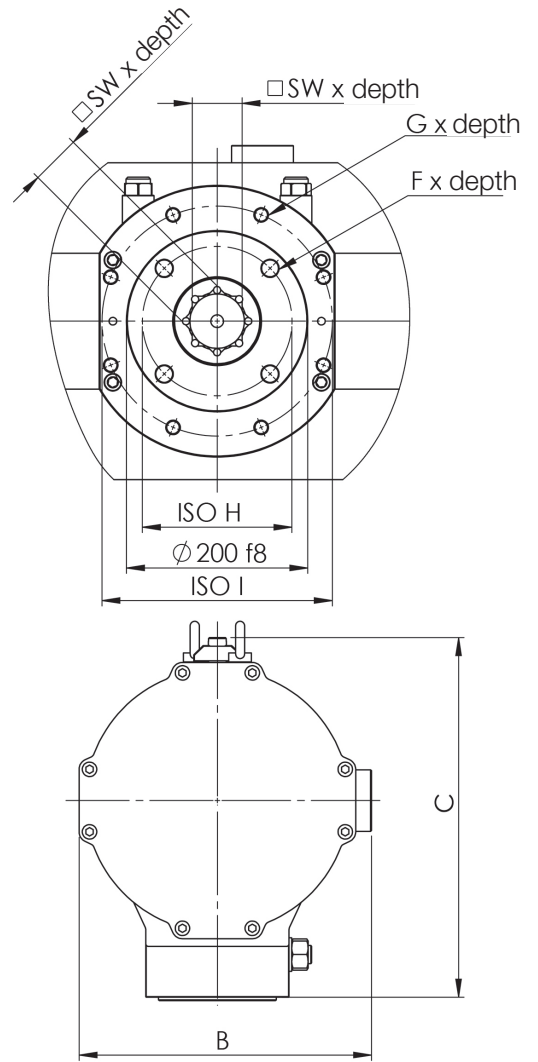
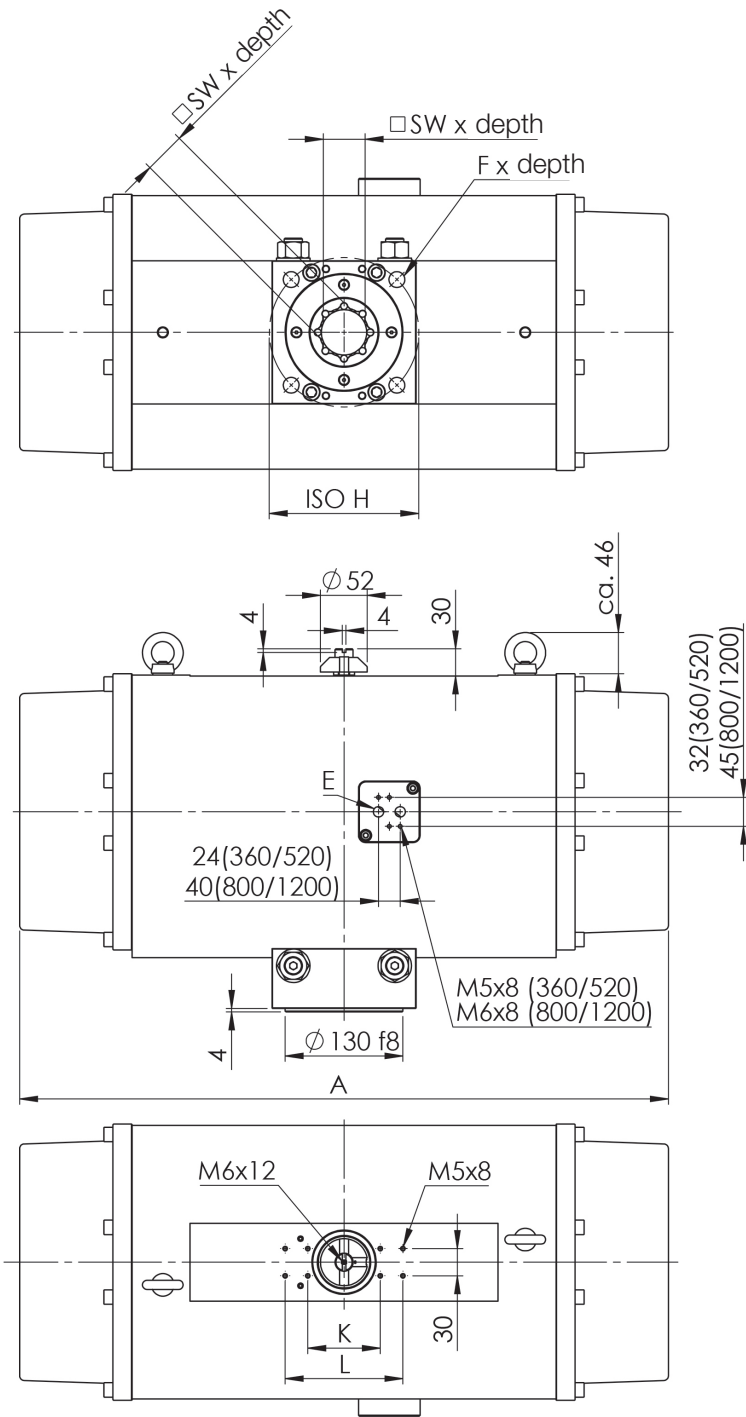


Table of dimensions

| Type AD/AS | A | B | C | D | E | F x depth | G x depth | ISO H | ISO I | J | K | L | SW x depth |
|-------------|-----|-----|-----|-----|--------|-----------|-----------|----------|----------|------|----|-----|------------|
| 001 | 80 | 45 | 45 | | G 1/8" | M5x8 | | ø36/F03 | | 22,5 | 50 | | 9x12 |
| 002 | 134 | 59 | 59 | | G 1/8" | M5x8 | M6x9 | ø36/F03 | ø50/F05 | 27,5 | 50 | | 11x13 |
| 004 | 144 | 68 | 68 | 82 | G 1/8" | M5x8 | M6x9 | ø36/F03 | ø50/F05 | 24 | 80 | | 14x17 |
| 006 | 159 | 76 | 84 | 90 | G 1/8" | M6x9 | M8x12 | ø36/F03 | ø70/F07 | 32 | 80 | | 14x17 |
| 008 | 173 | 98 | 108 | 109 | G 1/8" | M6x9 | M8x12 | ø50/F05 | ø70/F07 | 31 | 80 | | 14x17 |
| 011 | 215 | 98 | 108 | 109 | G 1/8" | M6x9 | M8x12 | ø50/F05 | ø70/F07 | 31 | 80 | 130 | 17x20 |
| 018 | 213 | 114 | 132 | 127 | G 1/4" | M6x9 | M8x12 | ø50/F05 | ø70/F07 | 36,5 | 80 | 130 | 17x20 |
| 026 | 281 | 114 | 132 | 127 | G 1/4" | M8x12 | M10x15 | ø70/F07 | ø102/F10 | 36,5 | 80 | 130 | 22x25 |
| 037 | 301 | 138 | 161 | 155 | G 1/4" | M8x12 | M10x15 | ø70/F07 | ø102/F10 | 40,5 | 80 | 130 | 22x25 |
| 050 | 347 | 138 | 161 | 155 | G 1/4" | M8x12 | M10x15 | ø70/F07 | ø102/F10 | 40,5 | 80 | 130 | 22x25 |
| 076 | 329 | 176 | 200 | 196 | G 1/4" | M10x15 | M12x18 | ø102/F10 | ø125/F12 | 50 | 80 | 130 | 27x30 |
| 110 | 475 | 176 | 200 | 196 | G 1/4" | M10x15 | M12x18 | ø102/F10 | ø125/F12 | 50 | 80 | 130 | 27x30 |
| 160 | 516 | 199 | 220 | 225 | G 1/4" | M10x15 | M12x18 | ø102/F10 | ø125/F12 | 48 | 80 | 130 | 27x30 |
| 230 | 560 | 223 | 244 | 249 | G 1/4" | M16x24 | | ø140/F14 | | 58 | 80 | 130 | 36x40 |
| 360 | 696 | 278 | 320 | | G 1/4" | M20x30 | | ø165/F16 | | | 80 | 130 | 46x50 |
| 520 | 716 | 323 | 368 | | G 1/4" | M20x30 | | ø165/F16 | | | 80 | 130 | 46x60 |
| 800 | 725 | 371 | 424 | | G 1/2" | M20x28 | M16x30 | ø165/F16 | ø254/F25 | | | 130 | 55x58 |
| 1200 | 953 | 431 | 486 | | G 1/2" | M16x30 | | ø254/F25 | | | | 130 | 55x58 |

Double-acting actuators

| Type AD | Weight [kg] | Volume/Double-stroke [L] |
|-------------|-------------|--------------------------|
| 001 | 0,34 | 0,05 |
| 002 | 0,73 | 0,15 |
| 004 | 1,21 | 0,25 |
| 006 | 1,81 | 0,41 |
| 008 | 2,97 | 0,60 |
| 011 | 3,59 | 0,85 |
| 018 | 4,80 | 1,35 |
| 026 | 6,27 | 1,78 |
| 037 | 8,23 | 2,75 |
| 050 | 11,25 | 3,73 |
| 076 | 15,90 | 5,50 |
| 110 | 22,94 | 8,50 |
| 160 | 27,46 | 11,90 |
| 230 | 38,10 | 16,90 |
| 360 | 55,00 | 25,00 |
| 520 | 71,00 | 37,00 |
| 800 | 101,00 | 53,00 |
| 1200 | 162,20 | 93,70 |

Single-acting actuators

| Typ AS | Weight* [kg] | Volume/Double-stroke [L] |
|-------------|--------------|--------------------------|
| 002 | 0,84 | 0,06 |
| 004 | 1,38 | 0,09 |
| 006 | 2,04 | 0,19 |
| 008 | 3,13 | 0,20 |
| 011 | 3,89 | 0,33 |
| 018 | 5,28 | 0,50 |
| 026 | 6,93 | 0,73 |
| 037 | 9,43 | 1,15 |
| 050 | 12,81 | 1,63 |
| 076 | 18,66 | 2,30 |
| 110 | 27,02 | 3,50 |
| 160 | 33,30 | 4,80 |
| 230 | 45,20 | 7,00 |
| 360 | 67,00 | 10,00 |
| 520 | 90,20 | 15,00 |
| 800 | 120,20 | 23,00 |
| 1200 | 212,60 | 38,10 |

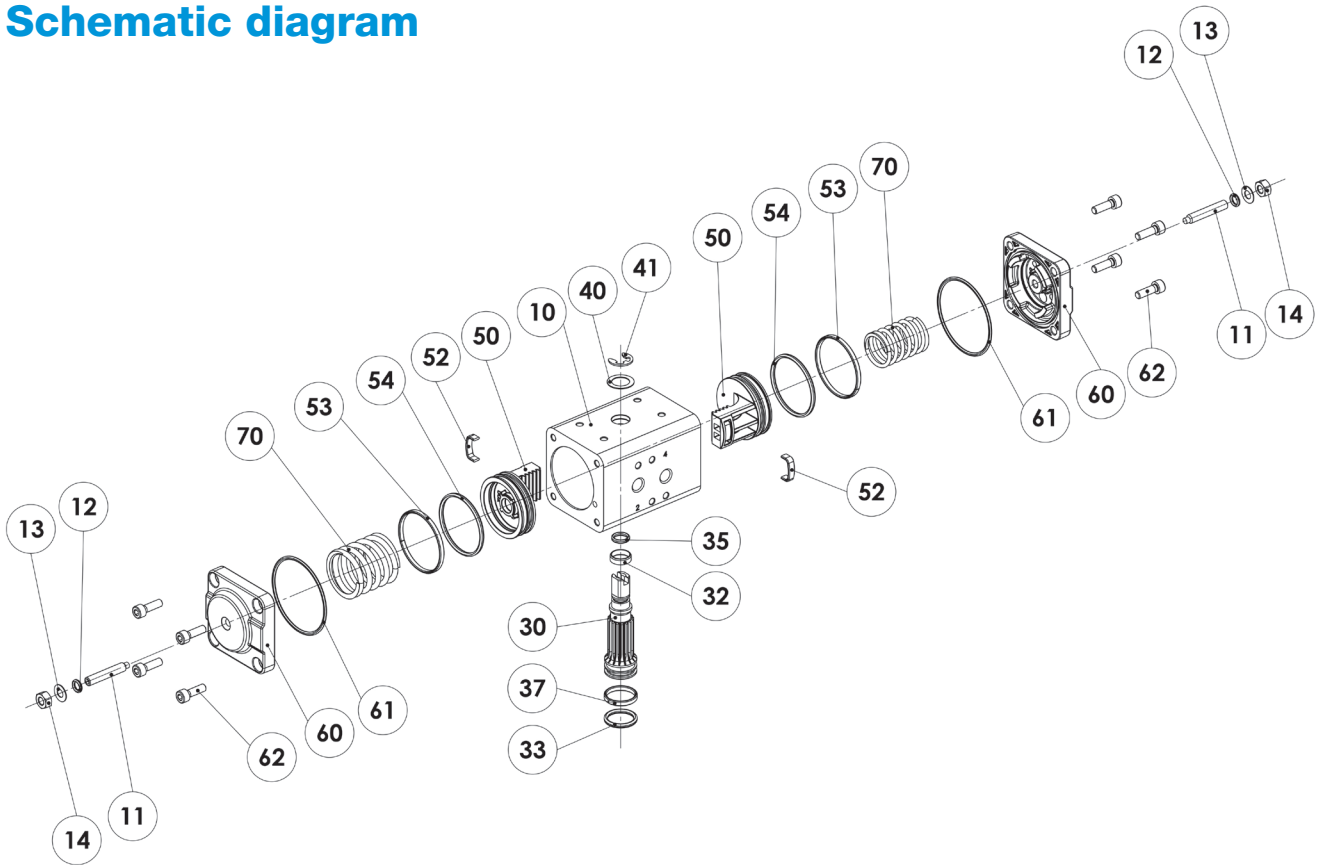
* Weight with 12 springs

Components AD-001 to AD/AS-002

| | | | | | | | |
|-----------------------|--------------------|-----------------------|----------------------|-----------|-------------|-----------------------|-------------------|
| 10 | Housing | 30 | Pinion | 50 | Piston | 61 | Cap sealing |
| 11¹ | Stop screw | 32 | Top pinion bearing | 52 | Guide shoe | 62 | Cap screws |
| 12¹ | Sealing stop screw | 33¹ | Lower pinion bearing | 53 | Guide ring | 70¹ | Springs (type AS) |
| 13¹ | Disk | 35 | Upper pinion sealing | 54 | Piston seal | | |
| 14¹ | Lock nut | 37 | Ower pinion sealing | 60 | Cap | | |

¹ Not applicable for size 001

Schematic diagram

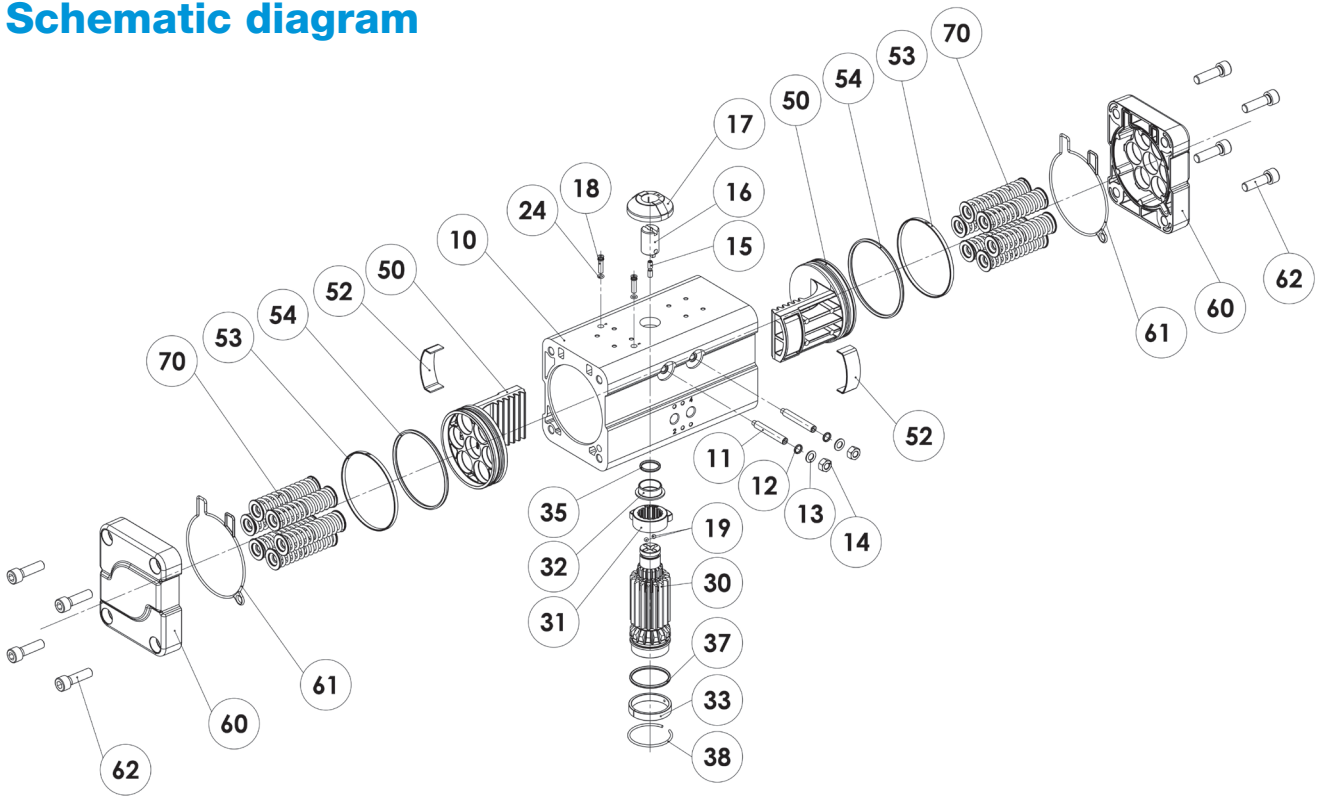


Components AD/AS-004 to AD/AS-230

| | | | | | | | |
|----|--------------------|-----------------|---------------------------|----|----------------------|----|-------------------|
| 10 | Housing | 17 | Position indicator | 32 | Top pinion bearing | 53 | Guide ring |
| 11 | Stop screw | 18 | Vacotrol sealing screw | 33 | Lower pinion bearing | 54 | Piston seal |
| 12 | Sealing stop screw | 19 | Position indication balls | 35 | Upper pinion sealing | 60 | Cap |
| 13 | Disk | 24 | Vacotrol sealing | 37 | Lower pinion sealing | 61 | Cap sealing |
| 14 | Lock nut | 25 ¹ | Ring nut | 38 | Circular wire ring | 62 | Cap screws |
| 15 | Threaded pin | 30 | Pinion | 50 | Piston | 70 | Springs (type AS) |
| 16 | Namur shaft | 31 | Stop cams | 52 | Guide shoe | | |

¹ Size 160-230 (slings from AD/AS-160)

Schematic diagram

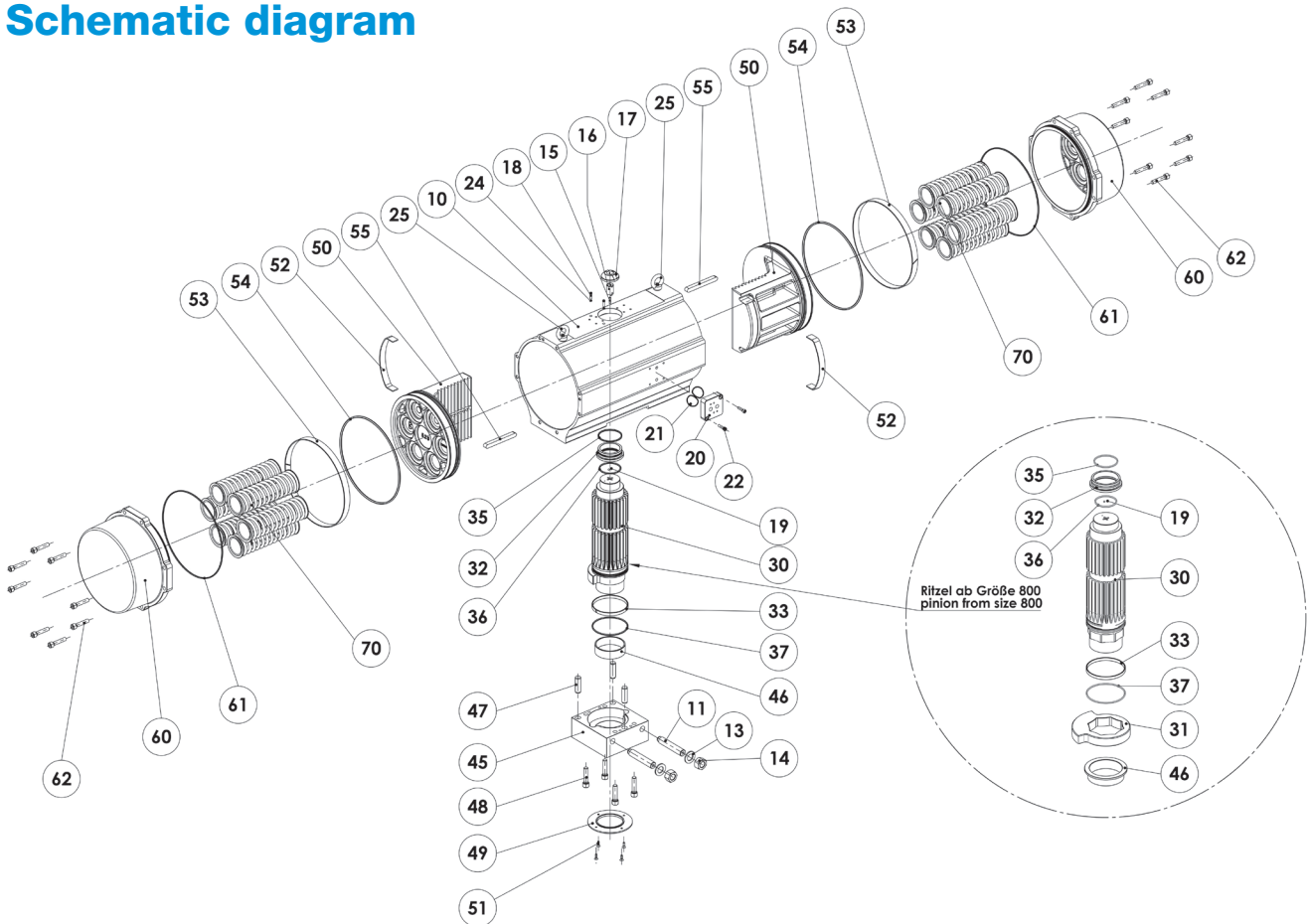


Components AD/AS-360 to AD/AS-1200




| | | | | | | | |
|-----------------|---------------------------|-----------------|----------------------|-----------------|----------------------|-----------------|--------------------|
| 10 | Housing | 20 | Namur adapter plate | 35 | Upper pinion sealing | 51 ² | Countersunk screws |
| 11 | Stop screw | 21 | Sealing | 36 | Sealing upper layer | 52 | Guide shoe |
| 13 ¹ | Disk | 22 | Screws | 37 | Lower pinion sealing | 53 | Guide ring |
| 14 | Lock nut | 24 | Vacotrol sealing | 45 | Flange plate | 54 | Piston seal |
| 15 | Threaded pin | 25 | Ring nut | 46 | Bearing flange plate | 55 | Feather key |
| 16 | Namur shaft | 30 | Pinion | 47 | Straight pins | 60 | Cap |
| 17 | Position indicator | 31 ² | Stop cams | 48 | Flange screws | 61 | Cap sealing |
| 18 | Vacotrol sealing screw | 32 | Top pinion bearing | 49 ² | Centering ring | 62 | Cap screws |
| 19 | Position indication balls | 33 | Lower pinion bearing | 50 | Piston | 70 | Springs (type AS) |

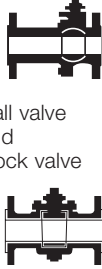


¹ Not applicable for size 360-520 | ² Not applicable for size 800-1200

Schematic diagram



Mounting variations

| 2/2-way-valve | Drive pinion | Function | |
|--|---|--------------------------------------|--|
| Butterfly valve  | Double D = Z (upon request)  | single-acting spring force closed | |
| | | single-acting spring force open | |
| | Octagonal = V  | single-acting spring force closed | |
| | | single-acting spring force open | |

| 2/2-way-valve | Drive pinion | Function | |
|--|---|--------------------------------------|--|
| Ball valve and Cock valve  | Double D = Z (upon request)  | single-acting spring force closed | |
| | | single-acting spring force open | |
| | Octagonal = V  | single-acting spring force closed | |
| | | single-acting spring force open | |

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Electro-pneumatic positioner



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Electro-pneumatic positioner
and 3-position control device



valve&switch
Feedback system with integrated
control valves



posiswitch
Opto-electrical feedback system



posifixx-A
Air guide plates for positioner
Type TZID (ABB)



posifixx-S
Air guide plates for positioner
Type SIPART PS2



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