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4th GENERATION PNEUMATIC ACTUATOR



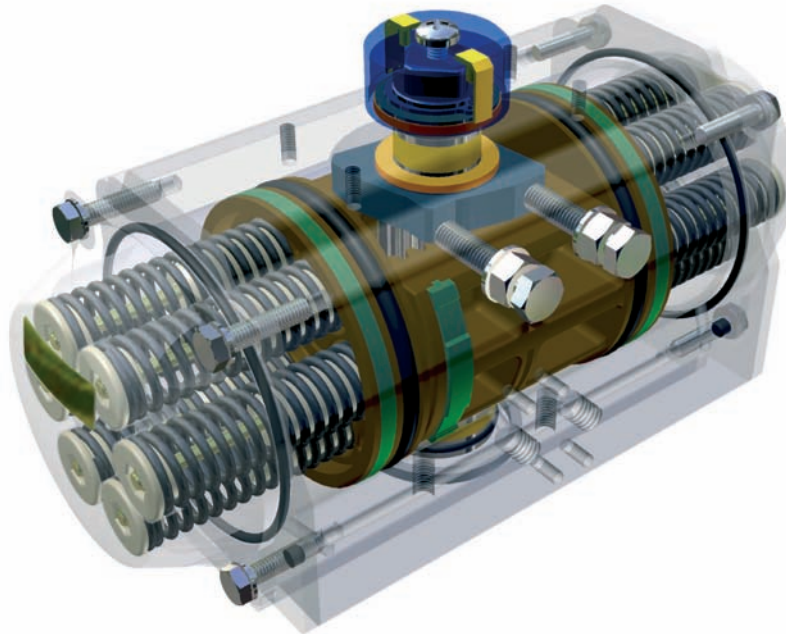
DESIGN

The new 4th Generation rack and pinion pneumatic actuator has been designed, developed and tested incorporating the latest technology and materials available, with some innovative design features. As a result of this product research we have obtained a high grade product with the following characteristics:

- ◆ Reliability
- ◆ High performance
- ◆ Wider product range permitting a more economical sizing selection
- ◆ Innovative and patented universal drive shaft and multifunction position indicator
- ◆ Full compliance with latest worldwide specifications
- ◆ A wide selection of highest levels of corrosion protection technology
- ◆ Aesthetically compact and modern style with no external cavities to avoid deposit build up

CONSTRUCTION

1. **Extruded aluminium body**, with both internal and external corrosion protection having honed cylinder surface for longer life and lower coefficient of friction.
2. **Dual piston rack and pinion design** for compact construction, symmetric mounting position, high cycle life and fast operation, reverse rotation can be accomplished in the field by simply inverting the pistons.
3. **Two independent external travel stop adjustments.** Permits an easy and precise adjustment of +/- 4° in both directions, in the open and close positions for an accurate valve alignment.
4. **Universal and anti-blowout patented drive shaft** for an easy conversion from parallel to diagonal square and vice versa. This feature permits a lower and more flexible stock.
5. **One compact design** with identical body and end caps for double acting and spring return models reducing inventory and allowing field conversion, by adding or removing modular spring cartridge.
6. **Multifunction position indicator** with Namur slot to allow: visual position indication, to fit and drive all accessories, to fit easily and economically the most popular sensors. Available in a special black material for ATEX version.
7. **Multiple bearings and guides** on racks and pistons for precise operation, low friction, high cycle life and prevent shaft blowout.
8. **Modular preloaded spring cartridge design.** With coated spring for simple versatile range, greater safety and corrosion resistance.
9. **Fully machined teeth** on piston rack and pinion for accurate low backlash rack and pinion engagement and maximum efficiency.
10. **Electroless nickel-plated** blowout resistant, bearing guided one-piece pinion for improved safety and maximum cycle life.
11. **Selected high quality bearings** and seal for low friction, high cycle life and a wide operating temperature range.
12. **Internal and external stainless steel fasteners** for long term corrosion resistance.
13. **Full conformance** to the latest specifications: ISO 5211, DIN 3337 and VDI/VDE 3845 NAMUR for product interchangeability and easy mounting of solenoids, limit switches and other accessories.



RANGE OF OPTIONS, QUALITY MANUFACTURING, AND ACCESSORIES

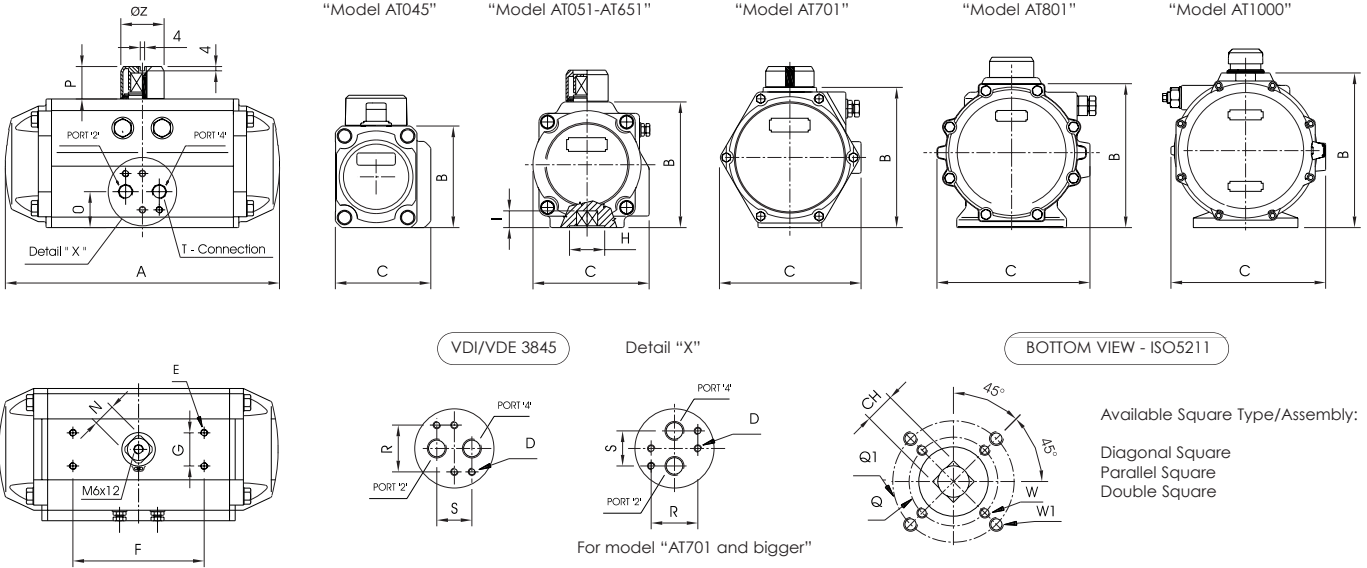
RANGE OF OPTIONS

- A. With the 4th generation actuator we are able to offer 6 different levels of protections A, B, C, D, E, P. Please see table of protection levels available N° P01/99.
- B. Stainless steel 303 or 316 drive shaft is available on request on all sizes and all different protection levels.
- C. For high and low temperature applications FPM or Silicon O rings combined with a suitable lubricant are available for all models.
- D. 100% Adjustable travel stop.
- E. Economical Lock out capability in the fully-open or the fully-closed position.
- F. Multifunction Position indicator with S.S. metal inserts for proximity sensing.
- G. S.S. drive shaft Cover with namur slot for high temperature application and manual override.
- H. Other than the standard Parallel or Diagonal bottom drive shaft connection, we can supply Keyed drive connection, Flat head connection or special customized connections.
- I. 120° and 180° Actuator rotation and intermediate rotations like 135°.
- J. 3 position Actuators.

ACCESSORIES AVAILABLE

- ◆ Square drive reduction pieces for all drive shafts
- ◆ Centering/location ring for all sizes
- ◆ Brackets
- ◆ Couplings
- ◆ Solenoid valves
- ◆ Switch boxes
- ◆ Proximity sensors
- ◆ Gear boxes
- ◆ Positioners

METRIC DIMENSIONS AND TECHNICAL DATA



Available Square Type/Assembly:
 Diagonal Square
 Parallel Square
 Double Square

FOR DETAILED DIMENSIONS PLEASE SEE THE SPECIFIC ACTUATOR TECHNICAL DATA SHEET.

| ACTUATOR MODEL | AT045 | AT051 | AT101 | AT201 | AT251 | AT301 | AT351 | AT401 | AT451 | AT501 | AT551 | AT601 | AT651 | AT701 | AT801 | AT1000 |
|-------------------|-------|-------|-------|---------|---------|---------|---------|---------|---------|---------|--------|--------|-------|-------|-------|--------|
| | D/S | D/S | D/S | D/S | D/S | D/S | D/S | D/S | D/S | D/S | D/S | D/S | D/S | D/S | D/S | D/S |
| A | 118 | 140,5 | 158,5 | 210,5 | 247,5 | 268,5 | 315 | 345 | 408,5 | 437,5 | 487 | 543 | 621 | 728 | 876 | 950 |
| B | 66 | 69 | 85 | 102 | 115 | 127 | 145 | 157 | 177 | 196 | 220,5 | 245 | 298,5 | 330 | 410 | 520 |
| C | 62 | 70,5 | 83 | 94,5 | 106,3 | 123 | 141 | 151,5 | 171,5 | 187 | 204 | 222 | 262 | 329,5 | 418 | 525 |
| D | M5x8 | M5x8 | M5x8 | M5x8 | M5x8 | M5x8 | M5x8 | M5x8 | M5x8 | M5x8 | M5x8 | M5x8 | M6x10 | M6x10 | M6x10 | M6x10 |
| E | M5x8 | M5x4 | M5x8 | M5x8 | M5x8 | M5x8 | M5x8 | M5x8 | M5x8 | M5x8 | M5x8 | M5x8 | M5x8 | M5x8 | M5x8 | M6x10 |
| F | 50 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 130 | 130 | 130 | 130 | 130 | 200 |
| G | 25 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 50 |
| N | 11 | 11 | 11 | 17 | 17 | 17 | 17 | 27 | 27 | 27 | 36 | 36 | 36 | 36 | 36 | 36 |
| O | 25 | 26,5 | 30 | 30,5 | 32,5 | 37,5 | 42,5 | 45 | 47 | 52 | 58 | 62 | 78,5 | 165 | 205 | 237 |
| P | 20 | 20 | 20 | 20 | 20 | 20 | 30 | 30 | 30 | 30 | 50 | 50 | 50 | 50 | 50 | 80 |
| R | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 45 | 45 | 45 | 45 |
| S | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 40 | 40 | 40 | 40 |
| T-ISO 228 | 1/8" | 1/8" | 1/8" | 1/8" | 1/8" | 1/4" | 1/4" | 1/4" | 1/4" | 1/4" | 1/4" | 1/4" | 3/8" | 1/2" | 1/2" | 1/2" |
| ØZ1 | 40 | 40 | 40 | 40 | 40 | 40 | 56/65 | 56/65 | 65 | 65 | 80/115 | 80/115 | 115 | 115 | 115 | 115 |
| ISO Flange | F04 | F04 | F05 | F05 | F07 | F07 | F10 | F10 | F12 | F12 | F14 | F14 | F16 | F16 | F25 | F30 |
| Ch | 11 | 11 | 14 | 14 | 17 | 17 | 22 | 22 | 27 | 27 | 36 | 36 | 46 | 46 | 55 | 75 |
| I min. | 12 | 12 | 16 | 16 | 19 | 19 | 24 | 24 | 29 | 29 | 38 | 38 | 48 | 48 | 57 | 77 |
| H | 30 | 30 | 35 | 35 | 55 | 55 | 70 | 70 | 85 | 85 | 100 | 100 | 130 | 130 | 200 | 230 |
| Q | 42 | 42 | 50 | 50 | 70 | 70 | 102 | 102 | 125 | 125 | 140 | 140 | 165 | 165 | 254 | 298 |
| Q1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| W | M5 | M5 | M6 | M6 | M8 | M8 | M10 | M10 | M12 | M12 | M16 | M16 | M20 | M20 | M16 | M20 |
| W1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| ISO Flange | F03 | F03 | F04 | F05-F07 | F05-F07 | F05-F07 | F07-F10 | F07-F10 | F10-F12 | F10-F12 | F12 | F12 | F14 | F14 | F16 | F25 |
| H | 25 | 25 | 30 | 35 | 40 | 40 | 55 | 55 | 70 | 70 | 85 | 85 | 100 | 112 | 130 | 200 |
| Q | 36 | 36 | 42 | 50 | 50 | 50 | 70 | 70 | 102 | 102 | 125 | 125 | 140 | 140 | 165 | 254 |
| Q1 | - | - | - | 70 | 70 | 70 | 102 | 102 | 125 | 125 | - | - | - | - | - | - |
| W | M5 | M5 | M5 | M6 | M6 | M6 | M8 | M8 | M10 | M10 | M12 | M12 | M16 | M16 | M20 | M16 |
| W1 | - | - | - | M8 | M8 | M8 | M10 | M10 | M12 | M12 | - | - | - | - | - | - |
| CH | 9 | 9 | 11 | 17 | 17 | 17 | 22 | 22 | 27 | 27 | 27 | 27 | 36 | 36 | 46 | 55 |
| I min. | 10 | 10 | 12 | 19 | 19 | 19 | 24 | 24 | 29 | 29 | 29 | 29 | 38 | 38 | 48 | 57 |

| METRIC | MODEL TYPE | AT045 | AT051 | AT101 | AT201 | AT251 | AT301 | AT351 | AT401 | AT451 | AT501 | AT551 | AT601 | AT651 | AT701 | AT801 | AT1000 |
|-------------------------|-----------------|-----------|-----------|-----------|----------|----------|----------|----------|-----------|----------|-----------|----------|----------|----------|----------|----------|----------|
| | | D S | D S | D S | D S | D S | D S | D S | D S | D S | D S | D S | D S | D S | D S | D S | D S |
| Chamber | φ (mm) | 45 | 50 | 63 | 75 | 88 | 100 | 115 | 125 | 145 | 160 | 180 | 200 | 240 | 265 | 330 | 420 |
| Screw stroke adjustment | For 1° adj.need | NA | 1/6 turn | 1/6 turn | 1/6 turn | 1/5 turn | 1/5 turn | 1/5 turn | 1/4 turn | 1/5 turn | 1/4 turn | 1/4 turn | 1/4 turn | 1/4 turn | 1/4 turn | 1/4 turn | 1/4 turn |
| Air Volume Opening | (L) | 0,06 | 0,09 | 0,16 | 0,31 | 0,51 | 0,71 | 1,19 | 1,54 | 2,41 | 3,14 | 4,26 | 5,94 | 10 | 14,5 | 25 | 49 |
| Air volume Closing | (L) | 0,10 | 0,15 | 0,26 | 0,49 | 0,78 | 1,11 | 1,8 | 2,34 | 3,78 | 4,92 | 6,89 | 9,46 | 15,2 | 21,38 | 40 | 84 |
| Opening Time (A) | (Sec.) | 0,15 0,2 | 0,2 0,25 | 0,25 0,3 | 0,3 0,4 | 0,4 0,5 | 0,5 0,7 | 0,7 0,9 | 0,9 1,2 | 1,2 1,5 | 1,5 1,8 | 2 2,4 | 2,7 3,5 | 3,5 4,1 | 4 4,5 | 6 7,5 | 8 10 |
| Closing Time (A) | (Sec.) | 0,2 0,25 | 0,25 0,3 | 0,3 0,35 | 0,35 0,5 | 0,5 0,6 | 0,6 0,9 | 0,8 1,1 | 1,1 1,4 | 1,4 1,8 | 1,7 2,1 | 2,2 2,8 | 3,2 4 | 4 4,6 | 4,5 5 | 7 8,5 | 9 11 |
| Approximate weight | (Kg) | 0,75 0,90 | 1,03 1,14 | 1,57 1,77 | 2,8 3,2 | 3,9 4,5 | 5,6 6,4 | 8,3 9,7 | 10,2 12,1 | 14,8 18 | 18,7 22,9 | 25 33 | 35 43 | 54 69 | 76 96 | 127 169 | (B) (B) |

- Notes:**
 (A) The above indicated moving time of the actuator is obtained in the following test conditions:
 For model AT045 + AT501 >>> (1) Room Temperature, (2) Actuator Stroke 90°, (3) Solenoid Valve with Orifice Of 4 mm and a flow capacity Qn 400 L/min., (4) Inside pipe diameter 8 mm, (5) Medium clean air, (6) Air supply pressure 5,5 bar (79,75 Psi), (7) Actuator without external resistance load.
 For model AT551 + AT1000 >>> (1) Room Temperature, (2) Actuator Stroke 90°, (3) Solenoid Valve with Orifice Of 11 mm and a flow capacity Qn 6000 L/min., (4) Inside pipe diameter 11 mm, (5) Medium clean air, (6) Air supply pressure 5,5 bar (79,75 Psi), (7) Actuator without external resistance load.
 Cautions: obviously on the field applications when one or more of the above parameters are different, the moving time will be different.
 (B) For AT1000 with Aluminum drive shaft: Double Acting = 170 Kg / Spring Return = 238 Kg
 For AT1000 with Steel drive shaft: Double Acting = 201 Kg / Spring Return = 269 Kg



| SPRING RETURN TORQUE RATINGS IN Nm | | | | | | | | | | | | | | | | | | | | | | | Spring stroke | | |
|------------------------------------|------------|-------------|-------------|--------------|-------------|--------------|-------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------|----------|---------|----------|---------------|------|------|
| Supply Pressure | | 2,5 bar | | 3 bar | | 3,5 bar | | 4 bar | | 4,2 bar | | 4,5 bar | | 5 bar | | 5,5 bar | | 6 bar | | 7 bar | | 8 bar | | 90° | 0° |
| Actuator Model | Spring Set | 0° Start | 90° End | 0° Start | 90° End | 0° Start | 90° End | 0° Start | 90° End | 0° Start | 90° End | 0° Start | 90° End | 0° Start | 90° End | 0° Start | 90° End | 0° Start | 90° End | 0° Start | 90° End | 0° Start | 90° End | | |
| AT 045 | S 2-2" | | | | | 4,9 | 2,0 | 6,1 | 3,2 | 6,6 | 3,7 | 7,3 | 4,4 | | | | | | | | | | | 6,4 | 3,5 |
| | S 2-3" | | | | | | | | | | | 6,6 | 2,8 | 7,8 | 4,0 | 9,0 | 5,2 | 10,2 | 6,4 | | | | | 8,0 | 4,2 |
| | S 3-3" | | | | | | | | | | | | | | 8,2 | 3,6 | 9,4 | 4,8 | 11,8 | 7,2 | 14,1 | 9,5 | | | 9,6 |
| AT 051 | S 05 | 4,9 | 3,4 | 6,6 | 5,1 | 8,3 | 6,8 | 9,9 | 8,4 | 10,6 | 9,1 | 11,6 | 10,1 | 13,2 | 11,7 | | | | | | | | | 4,9 | 3,4 |
| | S 06 | 4,3 | 2,5 | 5,9 | 4,1 | 7,6 | 5,8 | 9,3 | 7,4 | 9,9 | 8,1 | 10,9 | 9,1 | 12,6 | 10,8 | 14,2 | 12,4 | | | | | | | 5,8 | 4 |
| | S 07 | | | 5,3 | 3,1 | 6,9 | 4,8 | 8,6 | 6,5 | 9,2 | 7,1 | 10,2 | 8,1 | 11,9 | 9,8 | 13,6 | 11,5 | 15,2 | 13,1 | | | | | 6,8 | 4,7 |
| | S 08 | | | | | 6,2 | 3,8 | 7,9 | 5,5 | 8,6 | 6,2 | 9,6 | 7,2 | 11,2 | 8,8 | 12,9 | 10,5 | 14,6 | 12,1 | 15,5 | | | | 7,8 | 5,4 |
| | S 09 | | | | | | | 7,2 | 4,5 | 7,9 | 5,2 | 8,9 | 6,2 | 10,6 | 7,8 | 12,2 | 9,5 | 13,9 | 11,2 | 14,5 | 20,5 | 17,8 | | 8,8 | 6,1 |
| | S 10 | | | | | | | | | | | 8,2 | 5,2 | 9,9 | 6,9 | 11,5 | 8,5 | 13,2 | 10,2 | 13,5 | 19,8 | 16,8 | | 9,7 | 6,7 |
| | S 11 | | | | | | | | | | | | | 9,2 | 5,9 | 10,9 | 7,6 | 12,5 | 9,2 | 12,5 | 19,2 | 15,9 | | 10,7 | 7,4 |
| S 12 | | | | | | | | | | | | | | | 10,2 | 6,6 | 11,9 | 8,2 | 11,6 | 18,5 | 14,9 | | 11,7 | 8,1 | |
| AT 101 | S 05 | 9,1 | 6,2 | 12 | 9,2 | 15,0 | 12,1 | 17,9 | 15,0 | 19,1 | 16,2 | 20,8 | 17,9 | 23,8 | 20,9 | | | | | | | | | 8,4 | 5,5 |
| | S 06 | 8 | 4,5 | 10,9 | 7,5 | 13,9 | 10,4 | 16,8 | 13,3 | 18 | 14,5 | 19,7 | 16,3 | 22,7 | 19,2 | 25,6 | 22,1 | | | | | | | 10,1 | 6,7 |
| | S 07 | | | 9,8 | 5,8 | 12,8 | 8,7 | 15,7 | 11,6 | 16,9 | 12,8 | 18,6 | 14,6 | 21,5 | 17,5 | 24,5 | 20,4 | 27,4 | 23,4 | | | | | 11,8 | 7,8 |
| | S 08 | | | | | 11,6 | 7 | 14,6 | 10 | 15,7 | 11,1 | 17,5 | 12,9 | 20,4 | 15,8 | 23,4 | 18,7 | 26,3 | 21,7 | 32,2 | 27,5 | | | 13,5 | 8,9 |
| | S 09 | | | | | | | 13,5 | 8,3 | 14,6 | 9,4 | 16,4 | 11,2 | 19,3 | 14,1 | 22,3 | 17,1 | 25,2 | 20 | 31,1 | 25,9 | 36,9 | 31,7 | 15,2 | 10 |
| | S 10 | | | | | | | | | | | 15,3 | 9,5 | 18,2 | 12,4 | 21,1 | 15,4 | 24,1 | 18,3 | 29,9 | 24,2 | 35,8 | 30 | 16,9 | 11,1 |
| S 11 | | | | | | | | | | | | | 17,1 | 10,8 | 20 | 13,7 | 23 | 16,6 | 28,8 | 22,5 | 34,7 | 28,3 | 18,6 | 12,2 | |
| S 12 | | | | | | | | | | | | | | | 18,9 | | 21,9 | 14,9 | 27,7 | 20,8 | 33,6 | 26,7 | 20,2 | 13,3 | |
| AT 201 | S 05 | 18,0 | 11,8 | 23,8 | 17,6 | 29,7 | 23,4 | 35,5 | 29,2 | 37,8 | 31,6 | 41,3 | 35 | 47,1 | 40,9 | | | | | | | | | 17,3 | 11,1 |
| | S 06 | 15,8 | 8,3 | 21,6 | 14,1 | 27,5 | 19,9 | 33,3 | 25,8 | 35,6 | 28,1 | 39,1 | 31,6 | 44,9 | 37,4 | 50,7 | 43,2 | | | | | | | 20,8 | 13,3 |
| | S 07 | | | 19,4 | 10,7 | 25,2 | 16,5 | 31,1 | 22,3 | 33,4 | 24,6 | 36,9 | 28,1 | 42,7 | 33,9 | 48,5 | 39,8 | 54,3 | 45,6 | | | | | 24,2 | 15,5 |
| | S 08 | | | | | 23 | 13 | 28,8 | 18,8 | 31,2 | 21,2 | 34,7 | 24,7 | 40,5 | 30,5 | 46,3 | 36,3 | 52,1 | 42,1 | 63,7 | 53,7 | | | 27,7 | 17,7 |
| | S 09 | | | | | | | 26,6 | 15,4 | 29 | 17,7 | 32,5 | 21,2 | 38,3 | 27,0 | 44,1 | 32,8 | 49,9 | 38,6 | 61,5 | 50,3 | 73,2 | 61,9 | 31,2 | 19,9 |
| | S 10 | | | | | | | | | | | 30,2 | 17,7 | 36,1 | 23,6 | 41,9 | 29,4 | 47,7 | 35,2 | 59,3 | 46,8 | 71 | 58,5 | 34,6 | 22,1 |
| S 11 | | | | | | | | | | | | | 33,8 | 20,1 | 39,7 | 25,9 | 45,5 | 31,7 | 57,1 | 43,4 | 68,7 | 55 | 38,1 | 24,3 | |
| S 12 | | | | | | | | | | | | | | | 37,5 | 22,4 | 43,3 | 28,3 | 54,9 | 39,9 | 66,5 | 51,5 | 41,5 | 26,5 | |
| AT 251 | S 05 | 27,4 | 16,9 | 36,6 | 26 | 45,7 | 35,2 | 54,9 | 44,3 | 58,5 | 48 | 64 | 53,5 | 73,2 | 62,6 | | | | | | | | | 28,9 | 18,3 |
| | S 06 | 23,8 | 11,1 | 32,9 | 20,3 | 42,1 | 29,4 | 51,2 | 38,6 | 54,9 | 42,2 | 60,4 | 47,7 | 69,5 | 56,9 | 78,7 | 66 | | | | | | | 34,7 | 22 |
| | S 07 | | | 29,2 | 14,5 | 38,4 | 23,6 | 47,5 | 32,8 | 51,2 | 36,4 | 56,7 | 41,9 | 65,8 | 51,1 | 75 | 60,2 | 84,2 | 69,4 | | | | | 40,4 | 25,7 |
| | S 08 | | | | | 34,7 | 17,9 | 43,9 | 27 | 47,5 | 30,7 | 53 | 36,2 | 62,2 | 45,3 | 71,3 | 54,5 | 80,5 | 63,6 | 98,8 | 81,9 | | | 46,2 | 29,3 |
| | S 09 | | | | | | | 40,2 | 21,2 | 43,9 | 24,9 | 49,4 | 30,4 | 58,5 | 39,5 | 67,7 | 48,7 | 76,8 | 57,8 | 95,1 | 76,1 | 113 | 94,5 | 52 | 33 |
| | S 10 | | | | | | | | | | | 45,7 | 24,6 | 54,8 | 33,8 | 64 | 42,9 | 73,1 | 52,1 | 91,5 | 70,4 | 110 | 88,7 | 57,8 | 36,7 |
| S 11 | | | | | | | | | | | | | 51,2 | 28 | 60,3 | 37,1 | 69,5 | 46,3 | 87,8 | 64,6 | 106 | 82,9 | 63,5 | 40,3 | |
| S 12 | | | | | | | | | | | | | | | 56,7 | 31,4 | 65,8 | 40,5 | 84,1 | 58,8 | 102 | 77,1 | 69,3 | 44 | |
| AT 301 | S 05 | 41,1 | 27,1 | 54,4 | 40,4 | 67,7 | 53,7 | 81 | 67 | 86,3 | 72,3 | 94,3 | 80,3 | 108 | 93,6 | | | | | | | | | 39,4 | 25,3 |
| | S 06 | 36,1 | 19,2 | 49,4 | 32,5 | 62,7 | 45,8 | 76 | 59,1 | 81,3 | 64,4 | 89,3 | 72,4 | 103 | 85,7 | 116 | 99 | | | | | | | 47,3 | 30,4 |
| | S 07 | | | 44,3 | 24,6 | 57,6 | 37,9 | 70,9 | 51,2 | 76,2 | 56,5 | 84,2 | 64,5 | 97,5 | 77,8 | 111 | 91,1 | 124 | 104 | | | | | 55,1 | 35,5 |
| | S 08 | | | | | 52,5 | 30 | 65,8 | 43,3 | 71,1 | 48,7 | 79,1 | 56,6 | 92,4 | 69,9 | 106 | 83,2 | 119 | 96,5 | 146 | 123 | | | 63 | 40,5 |
| | S 09 | | | | | | | 60,8 | 35,5 | 66,1 | 40,8 | 74 | 48,8 | 87,3 | 62,1 | 101 | 75,3 | 114 | 88,6 | 141 | 115 | 167 | 142 | 70,9 | 45,6 |
| | S 10 | | | | | | | | | | | 69 | 40,9 | 82,3 | 54,2 | 95,6 | 67,5 | 109 | 80,8 | 135 | 107 | 162 | 134 | 78,8 | 50,7 |
| S 11 | | | | | | | | | | | | | 77,2 | 46,3 | 90,5 | 59,6 | 104 | 72,9 | 130 | 99 | 157 | 126 | 86,7 | 55,7 | |
| S 12 | | | | | | | | | | | | | | | 85,4 | 51,7 | 98,7 | 65 | 125 | 92 | 152 | 118 | 94,5 | 60,8 | |
| AT 351 | S 05 | 66,5 | 41,9 | 87,9 | 63,4 | 109 | 84,9 | 131 | 106 | 140 | 115 | 152 | 128 | 174 | 149 | | | | | | | | | 65,5 | 41 |
| | S 06 | 58,3 | 28,8 | 79,7 | 50,3 | 101 | 71,8 | 123 | 93,3 | 131 | 102 | 144 | 115 | 166 | 136 | 187 | 158 | | | | | | | 78,6 | 49,2 |
| | S 07 | | | 71,5 | 37,2 | 93 | 58,7 | 115 | 80,2 | 123 | 88,8 | 136 | 102 | 158 | 123 | 179 | 145 | 200 | 166 | | | | | 91,7 | 57,4 |
| | S 08 | | | | | 84,8 | 45,6 | 106 | 67,1 | 115 | 75,7 | 128 | 88,6 | 149 | 110 | 171 | 132 | 192 | 153 | 235 | 196 | | | 105 | 65,6 |
| | S 09 | | | | | | | 98,1 | 54 | 107 | 62,6 | 120 | 75,5 | 141 | 97 | 163 | 118 | 184 | 140 | 227 | 183 | 270 | 226 | 118 | 73,8 |
| | S 10 | | | | | | | | | | | 111 | 62,4 | 133 | 83,9 | 154 | 105 | 176 | 127 | 219 | 170 | 262 | 213 | 131 | 82 |
| S 11 | | | | | | | | | | | | | 125 | 70,8 | 146 | 92,3 | 168 | 114 | 211 | 157 | 254 | 200 | 144 | 90,2 | |
| S 12 | | | | | | | | | | | | | | | 138 | 79,2 | 159 | 101 | 202 | 144 | 245 | 187 | 157 | 98,4 | |
| AT 401 | S 05 | 86 | 56,1 | 113,7 | 83,8 | 141 | 111 | 169 | 139 | 180 | 150 | 197 | 167 | 224 | 195 | | | | | | | | | 82 | 52,5 |
| | S 06 | 75,5 | 39,6 | 103,2 | 67,3 | 131 | 95 | 159 | 123 | 170 | 134 | 186 | 150 | 214 | 178 | 242 | 206 | | | | | | | 99 | 63 |
| | S 07 | | | 92,7 | 50,8 | 120,4 | 78,5 | 148 | 106 | 159 | 117 | 176 | 134 | 203 | 162 | 231 | 189 | 259 | 217 | | | | | 115 | 73,5 |
| | S 08 | | | | | 110 | 62 | 137,6 | 89,7 | 149 | 101 | 165 | 117 | 193 | 145 | 221 | 173 | 248 | 201 | 304 | 256 | | | 132 | 84 |
| | S 09 | | | | | | | 127 | 73,3 | 138 | 84,3 | 155 | 101 | 182 | 129 | 210 | 156 | 238 | 184 | 293 | 239 | 349 | 295 | 148 | 94,5 |
| | S 10 | | | | | | | | | | | 144 | 84,5 | 172 | 112 | 200 | 140 | 227 | 168 | 283 | 223 | 338 | 278 | 165 | 105 |
| S 11 | | | | | | | | | | | | | 161 | 95,7 | 189 | 123 | 217 | 151 | 272 | 206 | 328 | 262 | 181 | 116 | |
| S 12 | | | | | | | | | | | | | | | 179 | 107 | 206 | 135 | 262 | 190 | 317 | 245 | 198 | 126 | |
| AT 451 | S 05 | 135 | 88,6 | 179 | 132 | 222 | 176 | 265 | 219 | 283 | 236 | 309 | 262 | 352 | 306 | | | | | | | | | 129 | 82 |
| | S 06 | 119 | 62,8 | 162 | 106 | 206 | 150 | 249 | 193 | 266 | 211 | 293 | 237 | 336 | 280 | 379 | 324 | | | | | | | 155 | 99 |
| | S 07 | | | | | | | | | | | | | | | | | | | | | | | | |

METRIC TORQUE RATINGS



| SPRING RETURN TORQUE RATINGS IN Nm | | | | | | | | | | | | | | | | | | | | | | Spring Stroke | | | |
|------------------------------------|--------|---------|------|-------|------|---------|------|-------|------|---------|------|---------|------|-------|------|---------|------|-------|------|-------|------|---------------|------|-------|------|
| Supply pressure | | 2,5 bar | | 3 bar | | 3,5 bar | | 4 bar | | 4,2 bar | | 4,5 bar | | 5 bar | | 5,5 bar | | 6 bar | | 7 bar | | 8 bar | | 90° | 0° |
| Actuator | Spring | 0° | 90° | 0° | 90° | 0° | 90° | 0° | 90° | 0° | 90° | 0° | 90° | 0° | 90° | 0° | 90° | 0° | 90° | 0° | 90° | 0° | 90° | Start | End |
| Model | Set | Start | End | Start | End | Start | End | Start | End | Start | End | Start | End | Start | End | Start | End | Start | End | Start | End | Start | End | Start | End |
| AT 601 | S 05 | 319 | 217 | | | | | | | | | | | | | | | | | | | | | 315 | 213 |
| | S 06 | 277 | 154 | 383 | 260 | 489 | 367 | 596 | 473 | 638 | 515 | 702 | 579 | 808 | 686 | 915 | 792 | | | | | | | 378 | 255 |
| | S 07 | | | 341 | 197 | 447 | 304 | 553 | 410 | 596 | 453 | 660 | 516 | 766 | 623 | 872 | 729 | 979 | 835 | | | | | 441 | 298 |
| | S 08 | | | | | 404 | 241 | 511 | 347 | 553 | 390 | 617 | 453 | 723 | 560 | 830 | 666 | 936 | 772 | 1149 | 985 | | | 504 | 340 |
| | S 09 | | | | | | | 468 | 284 | 511 | 327 | 575 | 390 | 681 | 497 | 787 | 603 | 894 | 709 | 1106 | 922 | 1319 | 1135 | 567 | 383 |
| | S 10 | | | | | | | | | | | 532 | 327 | 638 | 434 | 745 | 540 | 851 | 646 | 1064 | 859 | 1277 | 1072 | 630 | 425 |
| | S 11 | | | | | | | | | | | | | 596 | 371 | 702 | 477 | 809 | 583 | 1021 | 796 | 1234 | 1009 | 693 | 468 |
| | S 12 | | | | | | | | | | | | | | | 660 | 414 | 766 | 520 | 979 | 733 | 1192 | 946 | 756 | 510 |
| AT 651 | S 05 | 533 | 372 | 712 | 551 | 890 | 730 | 1069 | 908 | 1141 | 980 | 1248 | 1087 | 1426 | 1266 | | | | | | | | | 521 | 360 |
| | S 06 | 461 | 268 | 640 | 447 | 818 | 625 | 997 | 804 | 1068 | 876 | 1176 | 983 | 1354 | 1162 | 1533 | 1340 | | | | | | | 625 | 433 |
| | S 07 | | | 568 | 343 | 746 | 521 | 925 | 700 | 996 | 771 | 1104 | 879 | 1282 | 1057 | 1461 | 1236 | 1640 | 1415 | | | | | 730 | 505 |
| | S 08 | | | | | 674 | 417 | 853 | 596 | 924 | 667 | 1032 | 774 | 1210 | 953 | 1389 | 1132 | 1568 | 1310 | 1925 | 1668 | | | 834 | 577 |
| | S 09 | | | | | | | 781 | 491 | 852 | 563 | 959 | 670 | 1138 | 849 | 1317 | 1028 | 1495 | 1206 | 1853 | 1564 | 2210 | 1921 | 938 | 649 |
| | S 10 | | | | | | | | | | | 887 | 566 | 1066 | 745 | 1245 | 923 | 1423 | 1102 | 1781 | 1459 | 2138 | 1817 | 1042 | 721 |
| | S 11 | | | | | | | | | | | | | 994 | 640 | 1173 | 819 | 1351 | 998 | 1709 | 1355 | 2066 | 1713 | 1146 | 793 |
| | S 12 | | | | | | | | | | | | | | | 1101 | 715 | 1279 | 894 | 1637 | 1251 | 1994 | 1608 | 1251 | 865 |
| AT 701 | S 05 | 751 | 496 | 1011 | 755 | 1270 | 1015 | 1529 | 1274 | 1633 | 1378 | 1789 | 1533 | 2048 | 1793 | | | | | | | | | 801 | 546 |
| | S 06 | 642 | 336 | 902 | 595 | 1161 | 854 | 1420 | 1114 | 1524 | 1217 | 1680 | 1373 | 1939 | 1632 | 2198 | 1892 | | | | | | | 961 | 655 |
| | S 07 | | | 792 | 435 | 1052 | 694 | 1311 | 954 | 1415 | 1057 | 1570 | 1213 | 1830 | 1472 | 2089 | 1732 | 2349 | 1991 | | | | | 1121 | 764 |
| | S 08 | | | | | 943 | 534 | 1202 | 793 | 1306 | 897 | 1461 | 1053 | 1721 | 1312 | 1980 | 1571 | 2239 | 1831 | 2758 | 2350 | | | 1281 | 873 |
| | S 09 | | | | | | | 1093 | 633 | 1197 | 737 | 1352 | 893 | 1612 | 1152 | 1871 | 1411 | 2130 | 1671 | 2649 | 2189 | 3168 | 2708 | 1442 | 982 |
| | S 10 | | | | | | | | | | | 1243 | 732 | 1503 | 992 | 1762 | 1251 | 2021 | 1510 | 2540 | 2029 | 3059 | 2548 | 1602 | 1091 |
| | S 11 | | | | | | | | | | | | | 1393 | 832 | 1653 | 1091 | 1912 | 1350 | 2431 | 1869 | 2950 | 2388 | 1762 | 1200 |
| | S 12 | | | | | | | | | | | | | | | 1544 | 931 | 1803 | 1190 | 2322 | 1709 | 2840 | 2228 | 1922 | 1309 |
| AT 801 | S 05 | 1332 | 1014 | 1783 | 1465 | 2233 | 1915 | 2684 | 2365 | 2864 | 2546 | 3134 | 2816 | 3585 | 3266 | | | | | | | | | 1238 | 920 |
| | S 06 | 1149 | 767 | 1599 | 1217 | 2049 | 1667 | 2500 | 2118 | 2680 | 2298 | 2950 | 2568 | 3401 | 3019 | 3851 | 3469 | | | | | | | 1486 | 1104 |
| | S 07 | | | 1415 | 969 | 1865 | 1420 | 2316 | 1870 | 2496 | 2050 | 2766 | 2321 | 3217 | 2771 | 3667 | 3222 | 4118 | 3672 | | | | | 1733 | 1288 |
| | S 08 | | | | | 1682 | 1172 | 2132 | 1623 | 2312 | 1803 | 2582 | 2073 | 3033 | 2524 | 3483 | 2974 | 3934 | 3424 | 4835 | 4325 | | | 1981 | 1472 |
| | S 09 | | | | | | | 1948 | 1375 | 2128 | 1555 | 2398 | 1825 | 2849 | 2276 | 3299 | 2726 | 3750 | 3177 | 4651 | 4078 | 5552 | 4979 | 2229 | 1656 |
| | S 10 | | | | | | | | | | | 2215 | 1578 | 2665 | 2028 | 3115 | 2479 | 3566 | 2929 | 4467 | 3830 | 5368 | 4731 | 2476 | 1839 |
| | S 11 | | | | | | | | | | | | | 2481 | 1781 | 2931 | 2231 | 3382 | 2682 | 4283 | 3582 | 5184 | 4483 | 2724 | 2023 |
| | S 12 | | | | | | | | | | | | | | | 2748 | 1983 | 3198 | 2434 | 4099 | 3335 | 5000 | 4236 | 2971 | 2207 |
| AT 1000 | S 05 | 2474 | 1695 | 3308 | 2529 | 4142 | 3362 | 4976 | 4196 | 5310 | 4530 | 5810 | 5030 | 6644 | 5864 | | | | | | | | | 2475 | 1695 |
| | S 06 | 2135 | 1200 | 2969 | 2034 | 3803 | 2867 | 4637 | 3701 | 4971 | 4035 | 5471 | 4535 | 6305 | 5369 | 7139 | 6203 | | | | | | | 2970 | 2034 |
| | S 07 | | | 2630 | 1539 | 3464 | 2373 | 4298 | 3206 | 4632 | 3540 | 5132 | 4040 | 5966 | 4874 | 6800 | 5708 | 7633 | 6542 | | | | | 3465 | 2373 |
| | S 08 | | | | | 3125 | 1878 | 3959 | 2711 | 4292 | 3045 | 4793 | 3545 | 5627 | 4379 | 6461 | 5213 | 7294 | 6047 | 8962 | 7715 | | | 3960 | 2712 |
| | S 09 | | | | | | | 3620 | 2217 | 3953 | 2550 | 4454 | 3050 | 5288 | 3884 | 6122 | 4718 | 6955 | 5552 | 8623 | 7220 | 10291 | 8887 | 4455 | 3051 |
| | S 10 | | | | | | | | | | | 4115 | 2555 | 4949 | 3389 | 5783 | 4223 | 6616 | 5057 | 8284 | 6725 | 9952 | 8393 | 4949 | 3390 |
| | S 11 | | | | | | | | | | | | | 4610 | 2894 | 5444 | 3728 | 6277 | 4562 | 7945 | 6230 | 9613 | 7898 | 5444 | 3729 |
| | S 12 | | | | | | | | | | | | | | | 5105 | 3233 | 5938 | 4067 | 7606 | 5735 | 9274 | 7403 | 5939 | 4068 |

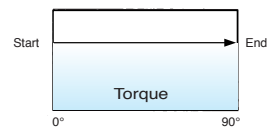
N°of Springs The above value are the out-put torque that remain available to operate the valve when the part "2" is pressurized

Springs

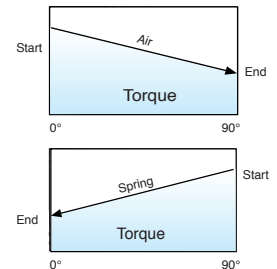
Out-put torque available when air supply falls

| DOUBLE ACTING TORQUE RATINGS IN Nm | | | | | | | | | | | |
|------------------------------------|---------|-------|---------|-------|---------|---------|-------|---------|-------|-------|-------|
| Supply Pressure | 2,5 bar | 3 bar | 3,5 bar | 4 bar | 4,2 bar | 4,5 bar | 5 bar | 5,5 bar | 6 bar | 7 bar | 8 bar |
| Model | | | | | | | | | | | |
| AT 045D | 6,0 | 7,2 | 8,4 | 9,6 | 10,1 | 10,8 | 12,0 | 13,2 | 14,4 | 16,8 | 19,1 |
| AT 051D | 8,3 | 10,0 | 11,6 | 13,3 | 14,0 | 15,0 | 16,6 | 18,3 | 19,9 | 23,3 | 26,6 |
| AT 101D | 14,7 | 17,6 | 20,5 | 23,5 | 24,6 | 26,4 | 29,3 | 32,2 | 35,2 | 41,0 | 46,9 |
| AT 201D | 29,1 | 34,9 | 40,7 | 46,5 | 48,9 | 52,4 | 58,2 | 64,0 | 69,8 | 81,4 | 93,1 |
| AT 251D | 45,8 | 54,9 | 64,1 | 73,2 | 76,9 | 82,4 | 91,5 | 101 | 110 | 128 | 146 |
| AT 301D | 66,5 | 79,8 | 93,1 | 106 | 112 | 120 | 133 | 146 | 160 | 186 | 213 |
| AT 351D | 107 | 129 | 150 | 172 | 181 | 193 | 215 | 236 | 258 | 301 | 344 |
| AT 401D | 138 | 166 | 194 | 222 | 233 | 249 | 277 | 305 | 332 | 388 | 443 |
| AT 451D | 217 | 261 | 304 | 348 | 365 | 391 | 435 | 478 | 522 | 609 | 696 |
| AT 501D | 284 | 340 | 397 | 454 | 477 | 511 | 567 | 624 | 681 | 794 | 908 |
| AT 551D | 383 | 459 | 536 | 613 | 643 | 689 | 766 | 842 | 919 | 1072 | 1225 |
| AT 601D | 532 | 638 | 745 | 851 | 893 | 957 | 1064 | 1170 | 1276 | 1489 | 1702 |
| AT 651D | 893 | 1072 | 1251 | 1430 | 1501 | 1608 | 1787 | 1966 | 2144 | 2502 | 2859 |
| AT 701D | 1297 | 1556 | 1815 | 2075 | 2179 | 2334 | 2594 | 2853 | 3112 | 3631 | 4150 |
| AT 801D | 2252 | 2703 | 3153 | 3604 | 3784 | 4054 | 4504 | 4955 | 5405 | 6306 | 7207 |
| AT 1000D | 4169 | 5003 | 5837 | 6671 | 7005 | 7505 | 8339 | 9173 | 10007 | 11674 | 13342 |

Torque diagram double acting actuators



Torque diagram single acting actuators



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