

4th GENERATION PNEUMATIC ACTUATOR



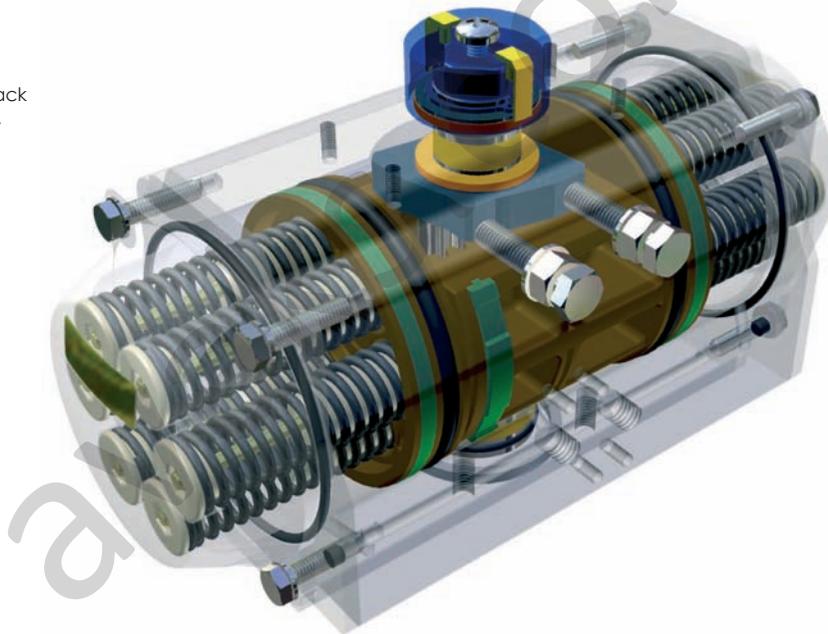
DESIGN

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

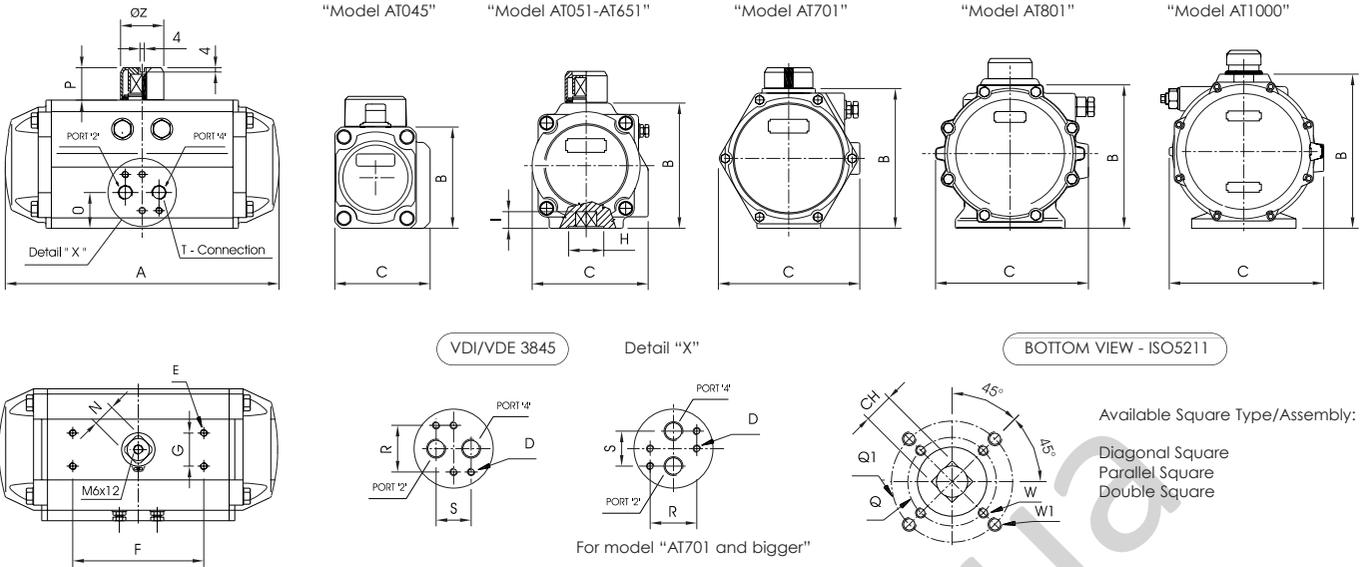
RANGE OF OPTIONS

- 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



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	27	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	M8	M10	M10	M12	M12	M16	M16	M16
W1	-	-	-	M8	M8	M8	M10	M10	M10	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



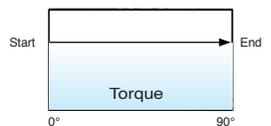
Supply pressure		SPRING RETURN TORQUE RATINGS IN Nm																				Spring Stroke					
Actuator Model	Spring Set	2,5 bar		3 bar		3,5 bar		4 bar		4,2 bar		4,5 bar		5 bar		5,5 bar		6 bar		7 bar		8 bar		90°	0°		
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°				
AT 601	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	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

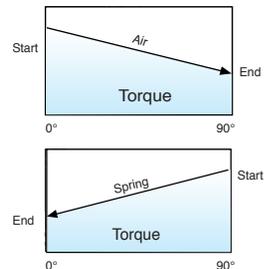
Out-put torque available when air supply falls

Supply Pressure		DOUBLE ACTING TORQUE RATINGS IN Nm									
Model	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
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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