

T R U T O R Q

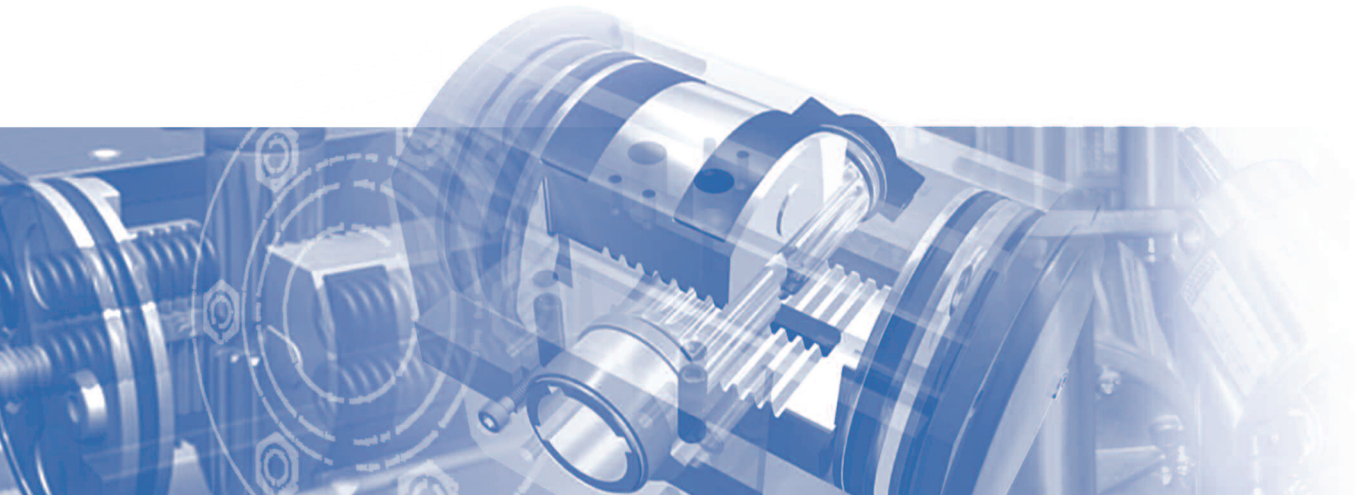
Company Description

With headquarters in England Trutorq is an international company with many experience in actuators technology. We have established a reputation for design innovation, excellence in manufacturing and a dedication to costumer satisfaction.

Our facility in northern Italy provides us with fast and efficient access to some of the best technology and engineering know-how in the world, giving us the ability to provide our customers with a world-class range of products and services.

Trutorq actuators are designed to combine the perfect balance of power, durability and safety, in a compact and lightweight form. The result is a complete range of actuators for accurate control of valves, in a wide range of applications.

It is our dedication as individuals and as a company to you, the customer, which makes Trutorq the right choice for all your automation needs.



QUALITY ASSURANCE

Factory operates a quality assurance plan to ISO 9000:2000 which is certified by Tuv Sud, Italy (certificate available on request)

Constant monitoring of all components through computer controlled, three dimensional and co-ordinated measuring systems using Mitutoyo devices.

Experienced and dedicated engineering team that strives to continually improve the product, looking for new technologies, techniques and manufacturing processes.

RESEARCH AND DEVELOPMENT

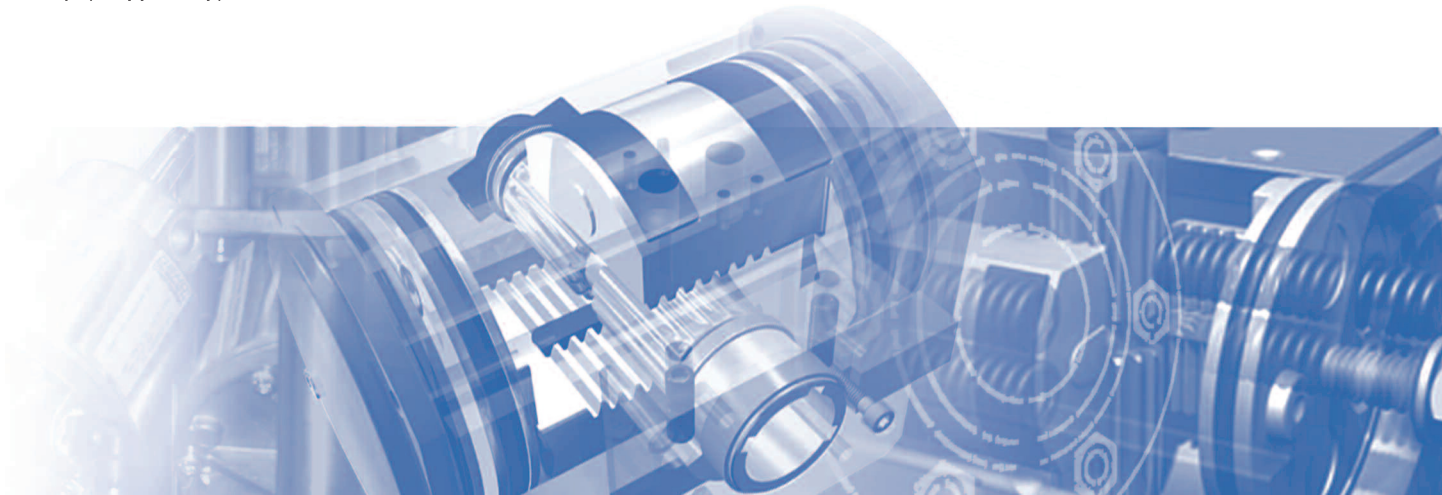
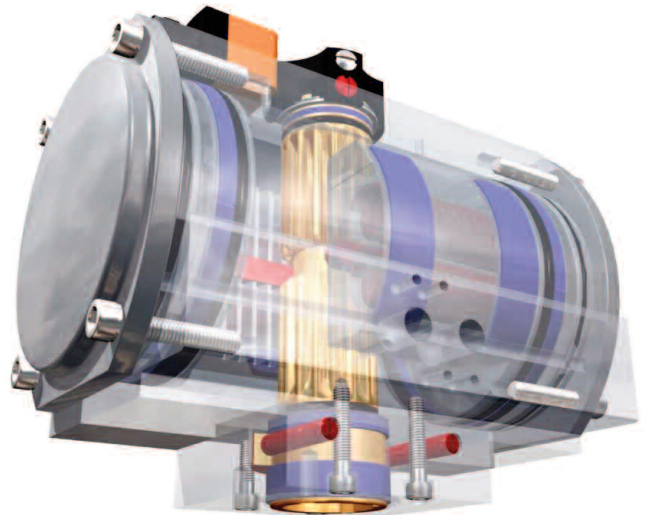
Computer controlled torque test rig which allows for actuators to be tested (DA) & (SR) under full load

Computer controlled life cycle test stations, testing is performed at 80% load as standard, custom testing is also available to customers specifications.

Product Description

Trutorq actuators are pneumatic quarter turn actuators. The basic design is of double rack and pinion. Unique features of the actuator are:

- The spring encapsulation, no special tools required to change DA to SR, same overall dimensions remain the same for both types (E & C-Type only)
- The dual encapsulated wear pads “POM” on the piston prevent metal to metal contact between piston and cylinder wall
- The piston racks each have an encapsulated support “GUIDE BAR” which rolls against the drive shaft and thus relieves any side loading which reduces pinion & rack wear.
- Triple shaft bearing system to prevent any adverse loading on the driveshaft (dual bearings on C & S-Type)
- Piston back-up bearings, which are situated behind the pistons ‘o’ ring to ensure linear movement and prevent wear on the cylinder surface
- Integral body adaptor kit, which is interchangeable with a wide range of valves for direct mounting by using an interchangeable insert sleeve, which is retained by a Circlip (E-Type only)

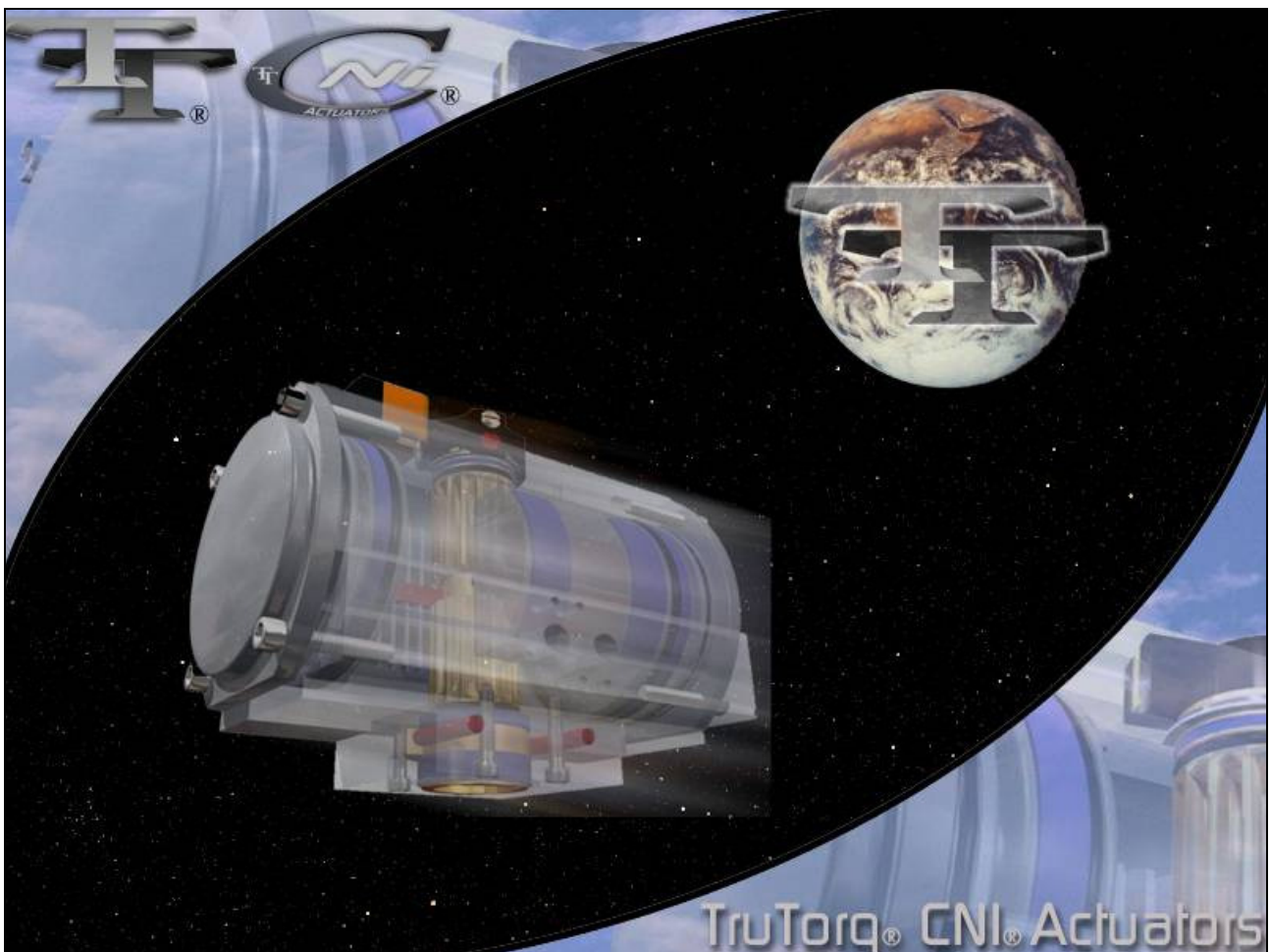


- Dual end stop adjustments, located outside of the pressurised cylinder, which are integral to the body adaptor and operate in conjunction with the machined cam on the single piece driveshaft (E-Type only)
- TruVision pucks for use with IFM, Turck and other magnetic contact sensors. (standard on CNI® actuators, optional on standard units)

Standards

TruTorq Pneumatic Actuators are designed to and in compliance with the following standards:

- DIN3337: Orientation of insert sleeve is 45 degrees offset, not in line.
- ISO5211: Orientation of actuator to valve mounting flange (i.e. F05, F07...)
- VDI/VDE3845: Namur mounting for accessories such as switchboxes, solenoid valves and positioners.
- ATEX: Compliance to the ATEX directive (94/9/CE), certificate available upon request.
- PED: Compliance to the Pressure Equipment Directive (97/23/CE), certificate available upon request.



Technical Data

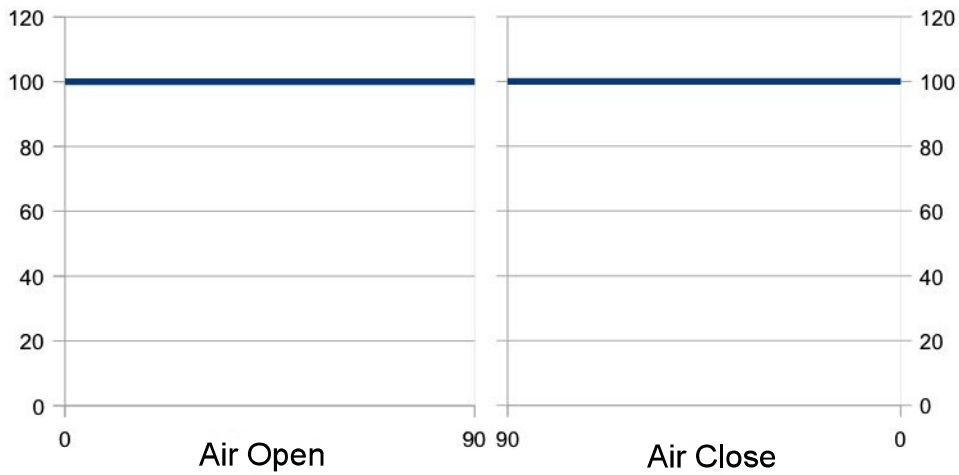
Actuator Size	OPERATING TIME			
	DA open	DA close	SR open	SR close
TT1	<1	<1	N/A	N/A
TT3	<1	<1	<1	<1
TT5	<1	<1	<1	<1
TT10	<1	<1	<1	<1
TT2	<1	<1	<1	<1
TT4	<1	<1	<1	<1
TT8	<1	<1	<1	<1
TT12	1,5	1,5	1,5	1
TT20	2,0	2,0	2,0	1,5
TT35	2,5	2,5	2,5	2,0
TT55	3,5	3,5	3,5	3,0
TT70	4,0	4,0	4,0	3,0
TT100	4,5	4,5	5,5	3,0
TT150	5,0	5,0	7,0	4,0
TT250	7,0	7,0	8,0	5,0
TT400	12,0	12,0	13,0	10,0

Actuator Size	AIR CONSUMPTION			
	Open (l)	Close (l)	Open (ci)	Close (ci)
TT1	0,04	0,06	2,44	3,65
TT3	0,09	0,12	5,49	7,32
TT5	0,18	0,24	10,98	14,65
TT10	0,38	0,50	23,18	30,52
TT2	0,09	0,12	5,49	7,32
TT4	0,18	0,24	10,98	14,65
TT8	0,34	0,41	20,75	25,02
TT12	0,49	0,64	29,90	39,05
TT20	0,90	1,00	54,92	61,02
TT35	1,69	1,90	103,12	115,94
TT55	2,80	3,40	170,86	207,47
TT70	3,05	3,70	186,12	225,79
TT100	5,52	5,90	336,85	360,04
TT150	7,60	9,60	463,78	585,83
TT250	8,50	9,80	518,03	598,03
TT400	13,60	17,50	892,92	1067,92

Actuator Size	OVERALL ACTUATOR WEIGHT (KG)	
	Double Acting	Spring Return
TT1	0,6	N/A
TT3	1,0	1,1
TT5	1,8	1,9
TT10	2,8	2,9
TT2	1,0	1,1
TT4	1,8	1,9
TT8	3,1	3,4
TT12	4,1	4,7
TT20	6,3	7,0
TT35	10,5	12,0
TT55	18,2	20,6
TT70	20,4	24,1
TT100	31,2	35,8
TT150	44,4	52,8
TT250	59,0	84,0
TT400	107,0	135,0

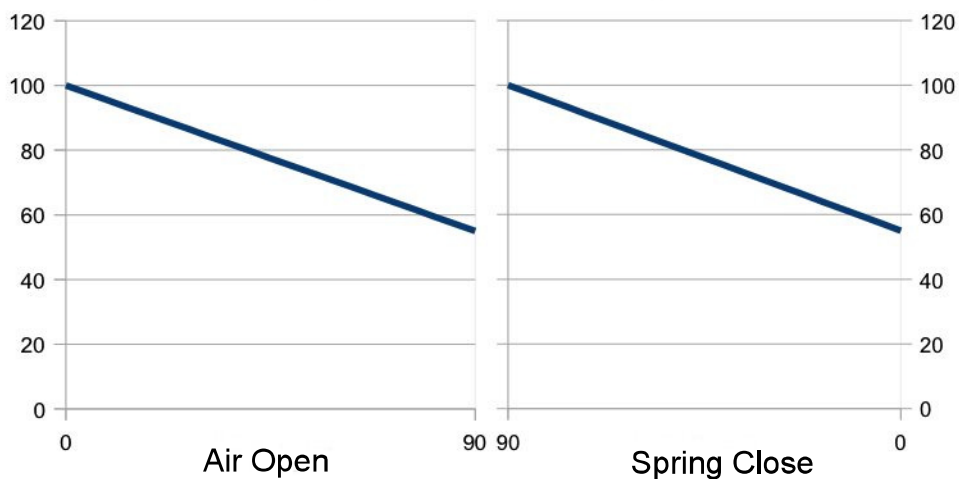
Double Acting and Spring Return Actuators Torque

Double Acting Torque Diagram



With reference to the above diagram it can be noted that the torque of a Double Acting actuator remains constant through-out the complete action.

Spring Return Torque Diagram



With reference to the above diagram the torque of a Spring Return actuator is not constant but decreasing. This is due to the action of springs that when compressed during air actuation counteract the piston movement and accumulate energy which will be available in a decreasing way during the rotation inversion.

Actuator Operation

Actuator Operation

Double Acting



Opening Stroke

- Looking at the front of the Actuator, PORT "A" is on the left and PORT "B" is on the right.
- To open the Actuator, connect the air supply to PORT "A" to fill the central chamber of the Actuator.
- The two opposing Pistons will open and rotate the driveshaft in a counter-clockwise direction.
- When the pistons reach the end of their travel, the actuator driveshaft will be in the open position.



Closing Stroke

- Looking at the front of the Actuator, PORT "A" is on the left and PORT "B" is on the right.
- To close the actuator, connect the air supply to PORT "B" to fill the outer chambers of the Actuator.
- The two opposing Pistons will close and rotate the actuator driveshaft in a clockwise direction.
- When the pistons reach the end of their travel, the actuator driveshaft will be in the closed position.

Double Acting Actuators Torque Values

Class	Actuator Size	AIR SUPPLY (Bar)						
		2	3	4	5	5,5	6	7
S-TYPE	TT1 DA	2,9	4,4	5,8	7,3	8,0	8,8	10,2
	TT3 DA	7,9	11,9	15,8	19,8	21,7	23,7	27,7
	TT5 DA	16,9	25,4	33,8	42,3	46,5	50,7	59,2
	TT10 DA	33,8	50,7	67,6	84,5	93,0	101,4	118,3
C-TYPE	TT2 DA	6,8	10,3	13,7	17,1	18,8	20,5	23,9
	TT4 DA	13,9	20,8	27,7	34,6	38,1	41,6	48,5
E-TYPE C-TYPE	TT8 DA	30,0	45,0	60,0	75,0	82,5	90,0	105,0
	TT12 DA	40,8	61,3	81,7	102,1	112,3	122,5	142,9
	TT20 DA	67,3	101,0	134,6	168,3	185,1	201,9	235,6
	TT35 DA	125,0	187,0	249,0	312,0	343,0	374,0	437,0
	TT55 DA	199,0	298,0	398,0	497,0	547,0	597,0	696,0
	TT70 DA	275,0	412,0	550,0	587,0	756,0	825,0	962,0
	TT100 DA	374,0	561,0	748,0	935,0	1029,0	1122,0	1309,0
	TT150 DA	552	827	1103	1379	1517	1655	1931
C-TYPE	TT250 DA	883	1324	1765	2206	2427	2648	3089
	TT400 DA	1601	2402	3202	4003	4403	4803	5604

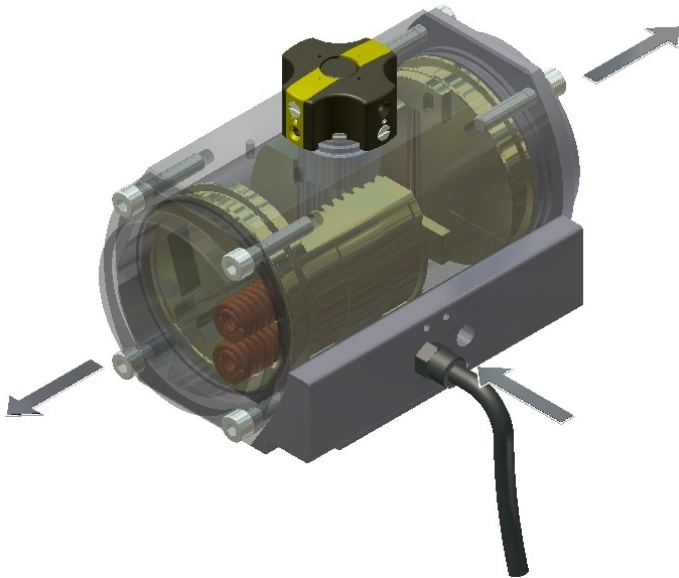


The image above shows an actuator subjected to the patented treatment CNI® (Chemically Nickel Impregnated), which allows to replace stainless steel actuators on pharmaceutical and food plants. For more information contact our sales department.

Actuator Operation

Actuator Operation

Spring Return



Opening Stroke

- Looking at the front of the Actuator, PORT "A" is on the left and PORT "B" is on the right.
- To open the Actuator, connect the air supply to PORT "A" to fill the central chamber of the Actuator.
- The two opposing Pistons will open, compressing the springs in the outer chambers and rotate the drive shaft in a counter-clockwise direction.
- When the pistons reach the end of their travel, the springs will be fully compressed and the actuator driveshaft will be in the open position.



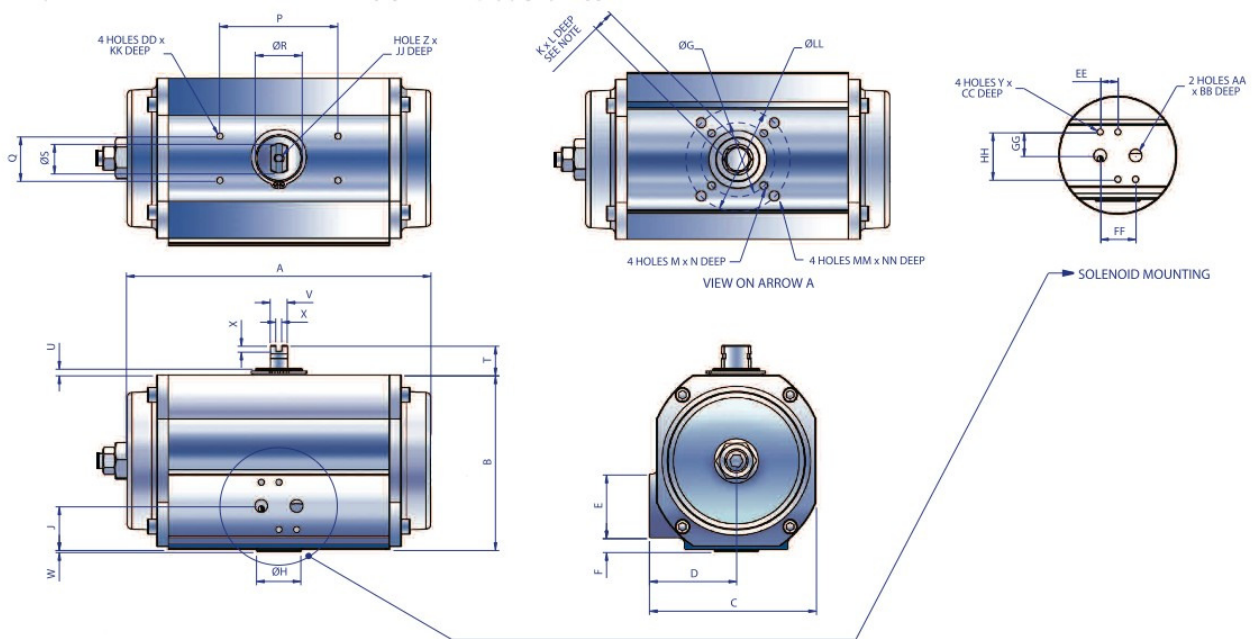
Closing Stroke

- Looking at the front of the Actuator, PORT "A" is on the left and PORT "B" is on the right.
- To close the Actuator, disconnect the air supply from PORT "A". This will allow the compressed springs to push the pistons back to their starting position.
- As the springs decompress the two opposing Pistons will close and rotate the actuator driveshaft in a clockwise direction.
- When the pistons reach the end of their travel, the actuator driveshaft will be in the closed position.

Torque Values Spring Return Actuators

Size	N° Springs		Torque Spring		AIR SUPPLY (Barg)							
	Outer	Inner	0°	90°	4		5		5.5		6	
					0°	90°	0°	90°	0°	90°	0°	90°
TT3	8		5,36	10,48	10,40	5,30	11,80	7,90	16,40	11,20	18,30	13,20
	10		6,70	13,10			13,10	6,70	15,00	8,60	17,00	10,60
	11		7,37	14,41					14,40	7,30	16,30	9,30
	12		8,04	15,72					13,70	6,00	15,70	8,00
TT5	8		12,00	21,76	21,80	12,00	30,30	20,50	34,50	34,70	38,70	28,90
	10		15,00	27,20			27,30	15,10	31,50	19,30	35,70	23,50
	11		16,50	29,92					30,00	16,60	34,20	20,80
	12		18,00	32,64					28,50	13,80	32,70	18,10
TT10	8		26,72	40,96	40,90	26,60	57,80	43,50	66,20	52,00	74,70	60,40
	10		33,40	51,20			51,10	33,30	59,60	41,80	68,00	50,20
	11		36,74	56,32					56,20	36,60	64,70	45,10
	12		40,08	61,44					52,90	31,50	61,30	40,00
TT2	4	0	4,80	8,80	8,80	4,90	12,30	8,30	14,00	10,00	15,70	11,70
	4	2	6,10	11,00	7,60	2,70	11,00	6,10	12,80	7,80	14,50	9,50
	4	3	6,70	12,10			10,40	5,00	12,10	6,70	13,90	8,40
	4	4	7,30	13,20			9,80	3,90	11,50	5,60	13,20	7,30
TT4	4	0	9,80	17,80	17,90	9,90	24,90	16,80	28,30	20,30	31,80	23,80
	4	2	12,20	22,20	15,50	5,50	22,40	12,40	25,90	15,90	29,40	19,30
	4	3	13,40	24,50			21,20	10,20	24,70	13,60	28,10	17,10
	4	4	14,60	26,70			20,00	8,00	23,50	11,40	26,90	14,90
TT8	4	0	21,10	38,40	38,90	21,60	53,90	36,60	61,40	44,10	68,90	51,60
	4	2	23,80	43,20	33,60	12,00	48,60	27,00	56,10	34,50	63,60	42,00
	4	3	29,00	52,80			46,00	22,20	53,50	29,70	61,00	37,20
	4	4	31,70	57,60			43,30	17,40	50,80	24,90	58,30	32,40
TT12	4	0	28,80	52,40	52,90	29,30	73,30	49,70	83,50	59,90	93,70	70,10
	4	2	36,00	65,50	54,70	16,20	66,10	36,60	76,30	46,80	86,50	57,00
	4	3	39,60	72,10			62,50	30,00	72,70	40,30	82,90	50,50
	4	4	43,20	78,60			58,90	23,50	69,10	33,70	79,30	43,90
TT20	4	0	47,70	86,80	86,90	47,80	120,60	81,50	137,40	98,30	154,20	115,10
	4	2	53,70	108,50	75,00	26,10	108,60	59,80	125,40	76,60	142,30	93,40
	4	3	65,50	119,40			102,60	48,90	119,50	65,80	136,30	82,60
	4	4	71,60	130,20			96,70	38,10	113,50	54,90	130,30	71,70
TT35	4	0	88,40	160,80	161,00	88,70	223,40	151,00	254,60	182,20	285,70	213,40
	4	2	110,50	201,00	138,90	48,50	201,30	110,80	232,50	142,00	263,60	173,20
	4	3	121,60	221,10			190,20	90,70	221,40	121,90	252,60	153,10
	4	4	132,60	241,20			179,20	70,60	210,40	101,80	241,50	133,00
TT55	4	0	141,00	256,40	256,80	141,40	356,30	240,90	406,00	290,60	455,70	340,30
	4	2	176,30	320,50	221,60	77,30	321,00	176,80	370,70	226,50	420,50	279,20
	4	3	193,90	352,60			303,40	144,70	353,10	194,50	402,80	244,20
	4	4	211,50	384,60			285,80	112,70	335,50	162,40	385,20	212,10
TT70	4	0	195,0	354,0	355,0	196,0	493,0	333,0	561,0	402,0	630,0	471,0
	4	2	243,0	443,0	306,0	107,0	444,0	245,0	513,0	314,0	581,0	382,0
	4	3	268,0	487,0			420,0	201,0	488,0	269,0	557,0	338,0
	4	4	292,0	531,0			395,0	156,0	464,0	225,0	533,0	294,0
TT100	4	0	265,0	482,0	483,0	266,0	670,0	453,0	764,0	547,0	857,0	640,0
	4	2	331,0	603,0	417,0	146,0	604,0	333,0	697,0	426,0	791,0	520,0
	4	3	365,0	663,0			571,0	272,0	664,0	366,0	758,0	459,0
	4	4	398,0	723,0			538,0	212,0	631,0	306,0	725,0	399,0
TT150	4	0	391,0	711,0	712,0	392,0	988,0	668,0	1126,0	806,0	1264,0	944,0
	4	2	489,0	889,0	615,0	215,0	890,0	491,0	1028,0	629,0	1166,0	766,0
	4	3	538,0	977,0			842,0	402,0	979,0	540,0	1117,0	678,0
	4	4	586,0	1066,0			793,0	313,0	931,0	451,0	1069,0	589,0
TT250	6		606,0	936,0	1159,0	829,0	1600,0	1270,0	1821,0	1491,0	2042,0	1712,0
	8		808,0	1248,0	957,0	517,0	1398,0	958,0	1619,0	1179,0	1840,0	1400,0
	9		909,0	1404,0			1297,0	802,0	1518,0	1023,0	1739,0	1244,0
	10		1010,0	1560,0			1196,0	646,0	1417,0	867,0	1638,0	1088,0
TT400	10		1180,0	1820,0	2022,0	1382,0	2823,0	2183,0	3223,0	2583,0	3623,0	2983,0
	12		1416,0	2184,0	1786,0	1018,0	2587,0	1819,0	2987,0	2219,0	3387,0	2619,0
	15		1770,0	2730,0			2233,0	1273,0	2633,0	1673,0	3033,0	2073,0
	16		1888,0	2912,0					2515,0	1491,0	2915,0	1891,0

S-Type Actuator Overall Dimensions



	ISO	A	B	C	D	E	F	ØG	ØH	ØJ	K	L	M	N	P	Q	ØR	ØS	T
TT1	F03	103,0	45,0	51,0	28,5	N/A	N/A	36,0	25,0	22,5	9,0	11,0	M5	8,0	80,0	30,0	22,4	16,0	20,0
TT3	F04 *	149,5	70,0	69,5	38,0	40,0	15	42,0	30,0	23,0	11,0	12,0	M5	8,0	80,0	30,0	32,0	20,0	20,0
TT5	F05-F07	186,5	87,0	90,5	49,0	40,0	26,5	50,0	35,0	34,5	14,0	15,0	M6	10,0	80,0	30,0	32,0	20,0	20,0
TT10	F05-F07	206,0	118,0	113,0	59,0	43,0	9,4	50,0	30,0	29,5	14,0	15,0	M8	13,0	80,0	30,0	32,0	20,0	20,0

	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	JJ	KK	ØLL	MM	NN
TT1	4,5	11,5	2,0	4,0	M5	M6	G1/8"	7,0	8,0	M5	12,0	24,0	16,0	32,0	12,0	5,0	N/A	N/A	N/A
TT3	4,5	11,5	1,5	4,0	M5	M6	G1/8"	10,0	8,0	M5	12,0	24,0	16,0	32,0	12,0	8,0	N/A	N/A	N/A
TT5	4,5	11,5	3,0	4,0	M5	M6	G1/8"	10,0	8,0	M5	12,0	25,0	16,0	32,0	12,0	8,0	70,0	N/A	N/A
TT10	4,5	11,5	1,4	4,0	M5	M6	G1/8"	10,0	8,0	M5	12,0	25,0	16,0	32,0	12,0	8,0	70,0	M8	13,0

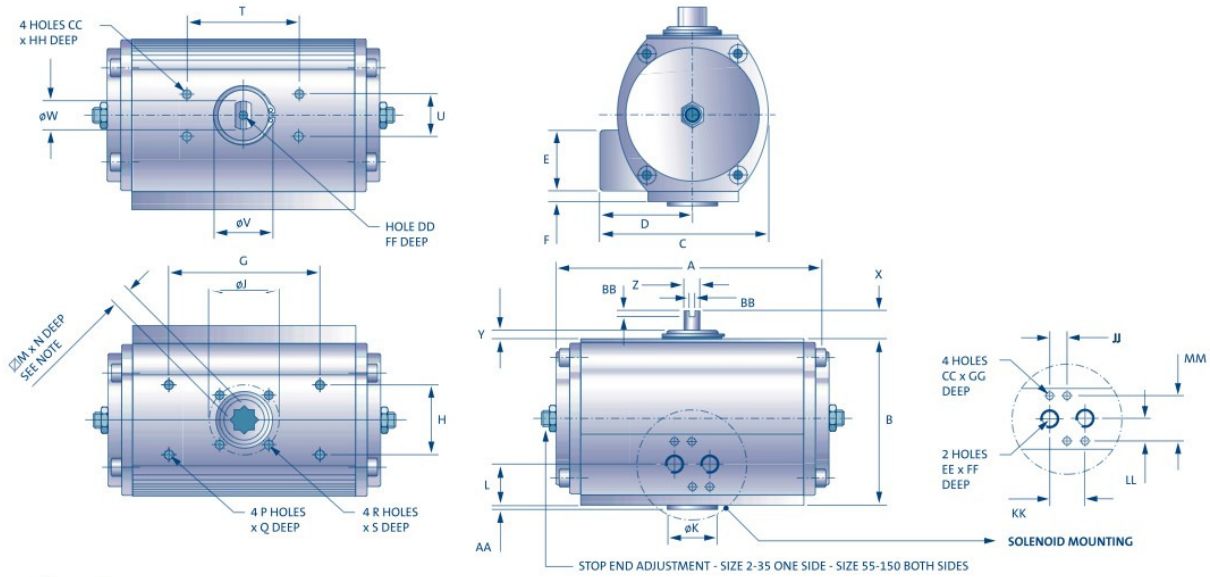
NOTES:

TT1 without regulation

TT3, TT5 and TT10 Single Regulation

*TT3 available with ISO F03/F05 and square "K" 9 upon request

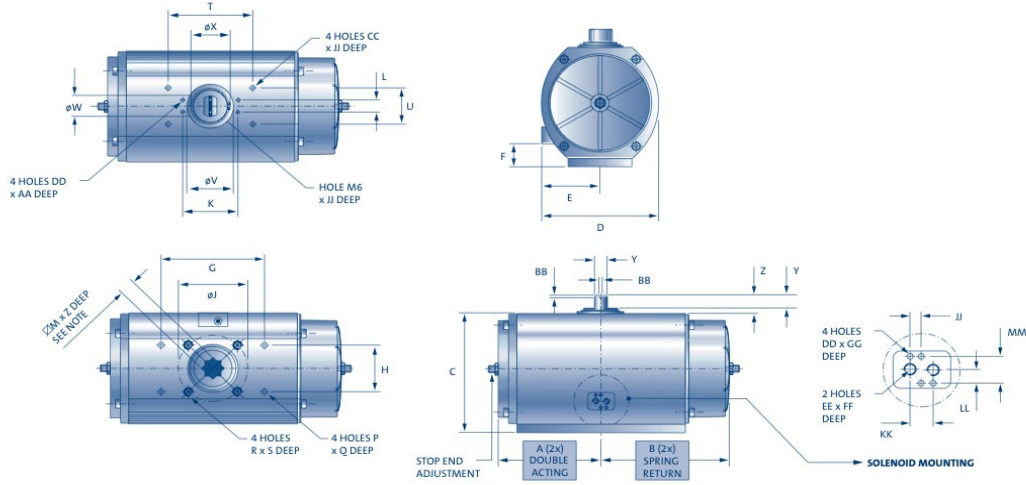
C-Type Actuator Overall Dimensions (Single Regulation)



	ISO	A	B	C	D	E	F	G	H	ØJ	ØK	L	M	N	P	Q	R	S	T
TT2	F03	114,5	73,0	75,5	43,5	41,0		73,0	32,0	36,0	25,0	20,5	9,0	10,0	M5	8,0	M5	8,0	80,0
TT4	F04	133,0	90,5	87,5	47,5	41,0		73,0	32,0	42,0	30,0	20,5	11,0	12,0	M5	8,0	M5	8,0	80,0
TT8	F05-F07	162,0	109,0	105,0	57,0	41,0	7,5	73,0	32,0	50,0	35,0	28,5	14,0	16,0	M6	10,0	M6	10,0	80,0
TT12	F05-F07	194,0	118,5	121,0	67,0	43,0	8,0	107,0	49,0	70,0	55,0	29,5	17,0	19,0	M6	10,0	M8	10,0	80,0
TT20	F07	218,0	140,5	136,5	72,0	43,0	8,0	108,0	49,0	70,0	55,0	29,5	17,0	19,0	M6	10,0	M8	10,0	80,0
TT35	F07-F10	266,0	166,5	156,0	78,0	43,0	8,0	161,0	73,0	102,0	70,0	30,0	22,0	24,0	M6	12,0	M10	12,0	80,0
TT55	F12	312,0	207,5	191,0	95,5	43,0	20,5	161,0	73,0	125,0	85,0	42,0	29,0	29,0	M8	15,0	M12	15,0	130,0
TT70	F12	340,0	207,5	191,0	95,5	43,0	20,5	213,0	102,0	125,0	85,0	42,0	27,0	29,0	M8	12,0	M12	20,0	130,0
TT100	F14	361,0	250,0	227,0	113,5	43,0	39,5	213,0	102,0	140,0	100,0	61,0	36,0	38,0	M10	15,0	M16	25,0	130,0
TT150	F14	390,0	300,0	280,0	140,0	43,0	56,5	244,0	117,0	140,0	100,0	78,0	36,0	38,0	M12	22,0	M16	25,0	130,0

	ISO	U	ØV	ØW	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	JJ	KK	LL	MM
TT2	F03	30,0	25,0	16,0	20,0	4,5	11,5	2,0	4,0	M5	M6	G1/8"	12,0	8,0	5,0	12,0	24,0	16,0	32,0
TT4	F04	30,0	31,0	20,0	20,0	5,0	11,5	3,0	4,0	M5	M6	G1/8"	12,0	8,0	5,0	12,0	24,0	16,0	32,0
TT8	F05-F07	30,0	35,0	20,0	20,0	5,0	11,5	3,0	4,0	M5	M6	G1/8"	12,0	8,0	5,0	12,0	24,0	16,0	32,0
TT12	F05-F07	30,0	46,0	20,0	20,0	5,5	11,5	3,0	4,0	M5	M6	G1/4"	12,0	8,0	5,0	12,0	24,0	16,0	32,0
TT20	F07	30,0	50,0	32,0	20,0	6,5	19,0	3,0	4,0	M5	M6	G1/4"	12,0	8,0	5,0	12,0	24,0	16,0	32,0
TT35	F07-F10	30,0	61,0	32,0	20,0	7,0	19,0	3,0	4,0	M5	M6	G1/4"	12,0	8,0	5,0	12,0	24,0	16,0	32,0
TT55	F12	30,0	61,0	40,0	30,0	7,5	25,4	3,0	4,0	M5	M6	G1/4"	12,0	8,0	5,0	12,0	24,0	16,0	32,0
TT70	F12	30,0	72,0	40,0	30,0	7,0	25,4	3,0	4,0	M5	M6	G1/4"	12,0	8,0	5,0	12,0	24,0	16,0	32,0
TT100	F14	30,0	78,0	40,0	30,0	7,0	25,4	4,0	4,0	M5	M6	G1/4"	12,0	8,0	5,0	12,0	24,0	16,0	32,0
TT150	F14	30,0	78,0	40,0	30,0	7,0	25,4	4,0	4,0	M5	M6	G1/4"	12,0	8,0	5,0	12,0	24,0	16,0	32,0

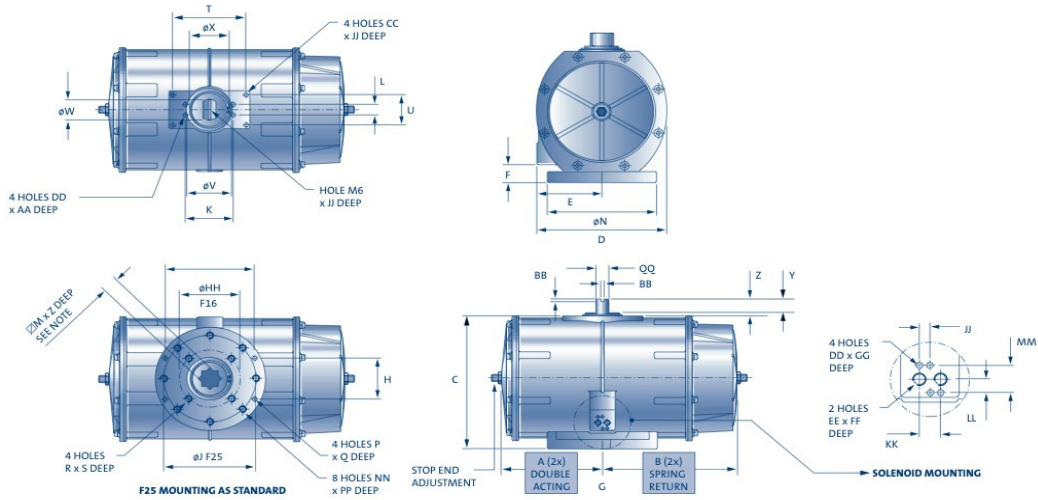
TT250 C-Type Actuator Overall Dimensions (Single Regulation)



	ISO	A	B	C	D	E	F	G	H	ØJ	ØK	L	□M	P	Q	R	S	T
TT250	F16	248	338	300	280	140	56	244	117	Ø166	130	30	46	M12	22	M20	32	200

	ISO	U	ØV	ØW	ØX	Y	Z	AA	BB	CC	DD	EE	FF	GG	JJ	KK	LL	MM
TT250	F16	90	120	60	111	36	50	6	4	M8	M5	G1/4"	12	8	12	24	16	32

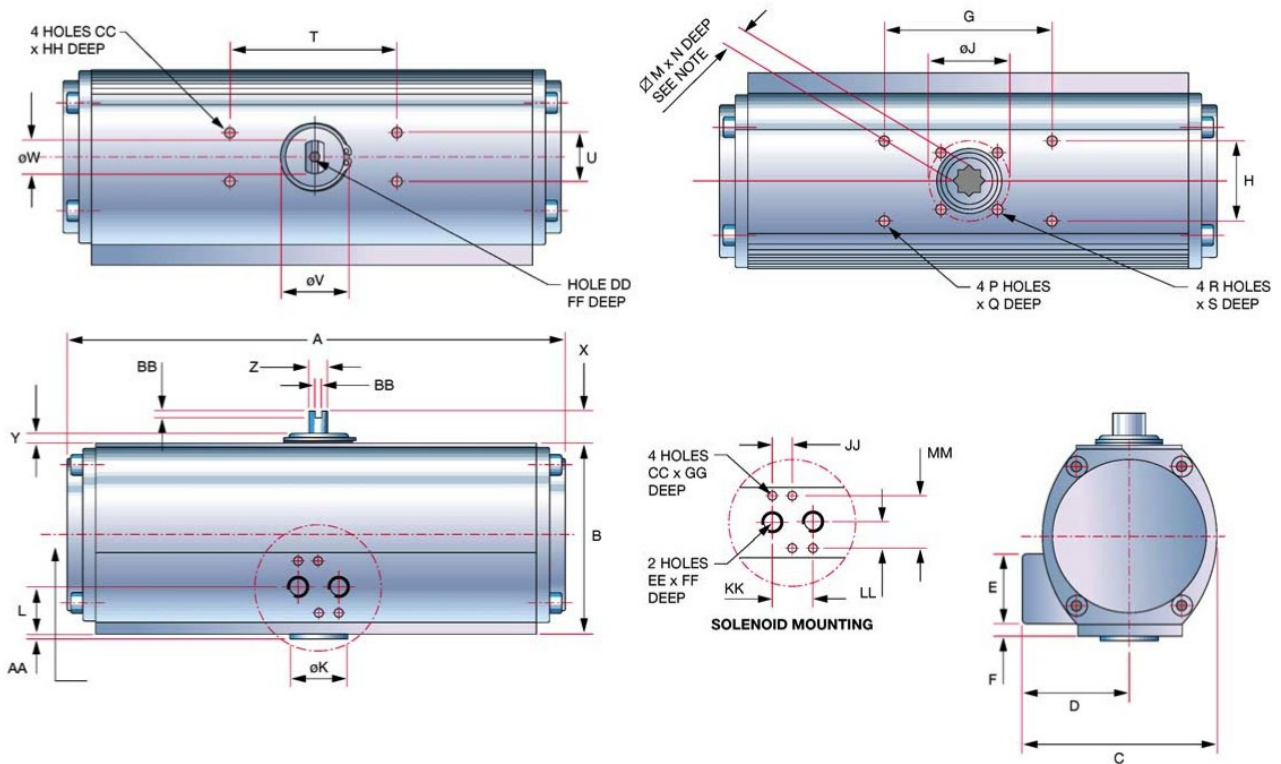
TT400 C-Type Actuator Overall Dimensions (Single Regulation)



	ISO	A	B	C	D	E	F	G	H	ØJ	K	L	□M	ØN	P	Q	R	S	T	U
TT400	F25	300	371,0	385	360,0	180,0	53,0	244,0	117,0	254,0	130,0	30,0	55,0	300	M12	22,0	M20	35,0	200,0	90

	ØV	ØW	ØX	Y	Z	AA	BB	CC	DD	EE	FF	GG	ØHH	JJ	KK	LL	MM	NN	PP	QQ
TT400	120	60	111,0	40	60,0	9,0	4,0	M8	M5	G1/4"	12,0	8,0	Ø166	12	24,0	16,0	32,0	M16	25,0	36

C-Type Actuator 180 degrees Overall Dimensions

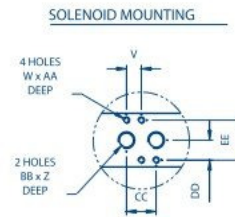
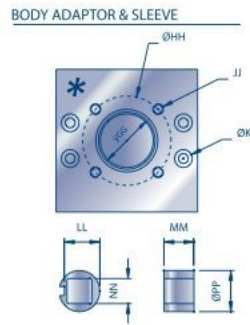
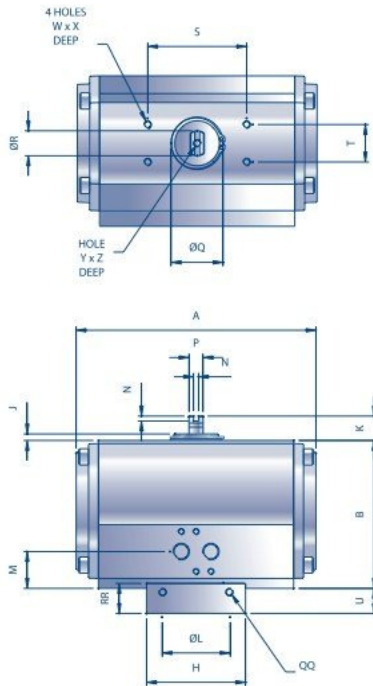


	ISO	A	B	C	D	E	F	G	H	ØJ	K	L	M	Nmin	P	Q	R	S	T
TT2	F03	169,0	73,0	75,5	43,5	41,0	/	73,0	32,0	36,0	25,0	20,5	9,0	10,0	M5	8,0	M5	8,0	80,0
TT4	F04	215,0	90,0	87,5	47,5	41,0	/	73,0	32,0	42,0	30,0	20,5	11,0	12,0	M5	8,0	M5	8,0	80,0
TT8	F05	245,0	109,0	105,0	57,0	42,0	7,5	73,0	32,0	50,0	35,0	28,5	14,0	16,0	M6	10,0	M6	10,0	80,0
TT12	F05	295,0	118,5	121,0	67,0	43,0	8,0	107,0	49,0	50,0	35,0	29,5	14,0	16,0	M6	10,0	M6	10,0	80,0
TT20	F07	337,0	140,5	136,5	72,0	43,0	8,0	107,0	49,0	70,0	55,0	29,5	17,0	19,0	M6	13,0	M8	13,0	80,0
TT35	F10	402,0	166,5	156,0	78,0	43,0	8,5	161,0	73,0	102,0	70,0	30,0	22,0	24,0	M6	16,0	M10	16,0	80,0

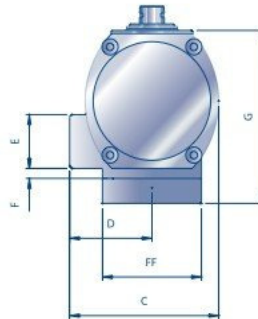
	ISO	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	JJ	KK	LL	MM
TT2	F03	30,0	25,0	16,0	20,0	4,5	11,5	2,0	4,0	M5	M6	G1/8"	12,0	8,0	5,0	12,0	24,0	16,0	32,0
TT4	F04	30,0	31,0	20,0	20,0	4,5	11,5	2,0	4,0	M5	M6	G1/8"	12,0	8,0	5,0	12,0	24,0	16,0	32,0
TT8	F05	30,0	35,0	20,0	20,0	5,0	11,5	3,0	4,0	M5	M6	G1/8"	12,0	8,0	5,0	12,0	24,0	16,0	32,0
TT12	F05	30,0	45,0	20,0	20,0	5,5	11,5	3,0	4,0	M5	M6	G1/4"	12,0	8,0	5,0	12,0	24,0	16,0	32,0
TT20	F07	30,0	50,0	32,0	20,0	6,5	19,0	3,0	4,0	M5	M6	G1/4"	12,0	8,0	5,0	12,0	24,0	16,0	32,0
TT35	F10	30,0	61,0	32,0	20,0	7,0	19,0	3,0	4,0	M5	M6	G1/4"	12,0	8,0	5,0	12,0	24,0	16,0	32,0

Available only Double Acting

E-Type Actuators Overall Dimensions (Double Regulation)



* Bak's may be dual drilled



	ISO	A	B	C	D	E	F	G	H	J	K	ØL	M	N	P	ØQ	ØR	S	T	U	V
TT8	F05	162,0	109,0	105,0	57	42,0	7,5	127,0	80,0	5,0	20,0	35,0	27,0	4,0	11,5	35,0	20,0	80,0	30,0	20,0	12,0
TT8	F07	162,0	109,0	105,0	57	42,0	7,5	127,0	80,0	5,0	20,0	35,0	27,0	4,0	11,5	35,0	20,0	80,0	30,0	20,0	12,0
TT12	F05	194,0	118,5	121,0	67	43,0	8,0	139	80,0	5,5	20,0	35,0	29,5	4,0	11,5	46,0	20,0	80,0	30,0	20,0	12,0
TT12	F07	194,0	118,5	121,0	67	43,0	8,0	139	80,0	5,5	20,0	35,0	29,5	4,0	11,5	46,0	20,0	80,0	30,0	20,0	12,0
TT20	F07	218,0	140,5	136,5	72	43,0	8,0	165	90,0	6,5	20,0	55,0	29,5	4,0	19,0	50,0	32,0	80,0	30,0	24,0	12,0
TT35	F07	266,0	166,5	156,0	78	43,0	8,5	199	120,0	7,0	30,0	55,0	30,0	4,0	19,0	61,0	32,0	80,0	30,0	30,0	12,0
TT35	F10	266,0	166,5	156,0	78	43,0	8,5	199	120,0	7,0	30,0	55,0	30,0	4,0	19,0	61,0	32,0	80,0	30,0	30,0	12,0
TT55	F10	312,0	207,5	191,0	95,5	43,0	20,5	243	140,0	7,5	30,0	85,0	42,0	4,0	25,4	61,0	40,0	130,0	30,0	35,0	12,0
TT55	F12	312,0	207,5	191,0	95,5	43,0	20,5	243	140,0	7,5	30,0	85,0	42,0	4,0	25,4	61,0	40,0	130,0	30,0	35,0	12,0
TT70	F10	340,0	207,5	191,0	95,5	43,0	20,5	244	140,0	7,0	30,0	85,0	42,0	4,0	25,4	72,0	40,0	130,0	30,0	36,1	12,0
TT70	F12	340,0	207,5	191,0	95,5	43,0	20,5	244	140,0	7,0	30,0	85,0	42,0	4,0	25,4	72,0	40,0	130,0	30,0	36,1	12,0
TT100	F14	361,0	250,0	227,0	114	43,0	39,5	301	160,0	7,0	30,0	100	61,0	4,0	25,4	78,0	40,0	130,0	30,0	50,8	12,0
TT150	F14	390,0	300,0	280,0	140	43,0	56,5	349,0	160,0	7,0	30,0	100	78,0	4,0	25,4	78,0	40,0	130,0	30,0	49,0	12,0

	ISO	W	X	Y	Z	AA	BB	CC	DD	EE	FF	ØGG	ØHH	JJ	ØKK	LL	MM	NN	ØPP	QQ	RR
TT8	F05	M5	5,0	M6	12,0	8,0	G1/8"	24,0	16,0	32,0	79,9	30,0	50,0	M6	5,5	20,0	17,0	14,0	23,0	M5	22,0
TT8	F07	M5	5,0	M6	12,0	8,0	G1/8"	24,0	16,0	32,0	79,9	47,0	70,0	M8	5,5	29,5	17,0	17,0	33,0	M6	24,0
TT12	F05	M5	5,0	M6	12,0	8,0	G1/4"	24,0	16,0	32,0	79,9	30,0	50,0	M6	5,5	20,0	17,0	14,0	23,0	M5	22,0
TT12	F07	M5	5,0	M6	12,0	8,0	G1/4"	24,0	16,0	32,0	79,9	47,0	70,0	M8	5,5	29,5	17,0	17,0	33,0	M6	24,0
TT20	F07	M5	5,0	M6	12,0	8,0	G1/4"	24,0	16,0	32,0	89,9	46,0	70,0	M8	6,6	29,5	20,0	17,0	33,0	M8	28,0
TT35	F07	M5	5,0	M6	12,0	8,0	G1/4"	24,0	16,0	32,0	119,9	46,0	70,0	M8	9,0	29,5	20,0	17,0	33,0	M10	34,0
TT35	F10	M5	5,0	M6	12,0	8,0	G1/4"	24,0	16,0	32,0	119,9	61,0	70,0	M10	9,0	39,0	25,0	22,0	44,0	M10	34,0
TT55	F10	M5	5,0	M6	12,0	8,0	G1/4"	24,0	16,0	32,0	139,9	61,0	102,0	M10	11,0	39,0	25,0	22,0	44,0	M10	40,0
TT55	F12	M5	5,0	M6	12,0	8,0	G1/4"	24,0	16,0	32,0	139,9	75,0	125,0	M12	11,0	50,0	25,0	27,0	55,0	M10	40,0
TT70	F10	M5	5,0	M6	12,0	8,0	G1/4"	24,0	16,0	32,0	139,9	61,0	102,0	M10	11,0	39,0	25,0	22,0	44,0	M10	40,0
TT70	F12	M5	5,0	M6	12,0	8,0	G1/4"	24,0	16,0	32,0	139,9	75,0	125,0	M12	11,0	50,0	25,0	27,0	55,0	M10	40,0
TT100	F14	M5	5,0	M6	12,0	8,0	G1/4"	24,0	16,0	32,0	159,9	88,0	140,0	M16	14,0	62,5	35,0	36,0	68,0	M14	57,0
TT150	F14	M5	5,0	M6	12,0	8,0	G1/4"	24,0	16,0	32,0	159,9	88,0	140,0	M16	14,0	62,5	35,0	36,0	68,0	M14	57,0

E-Type Actuator Features and Benefits

TRUVISION INDICATOR

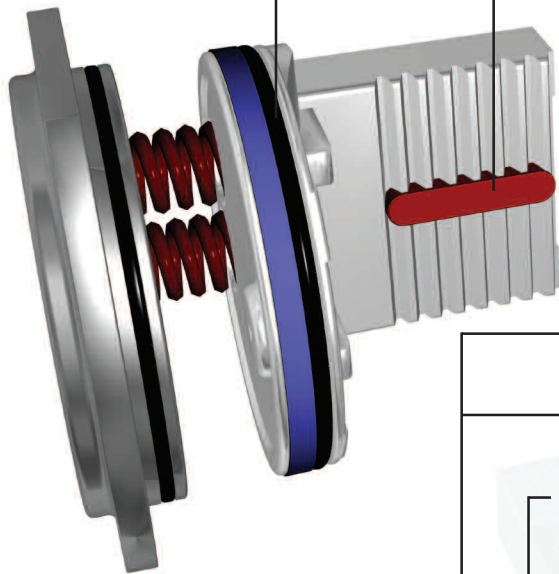
Local visual indicator compatible with fitted Namur switchbox and positioners or as a puck for proximity sensors. (Optional extra)

TWIN GUIDE BARS

Unique twin guide bar absorbs adverse side loading from rack at the start of each stroke and maintains even engagement between rack and pinion for smooth operation.

BACK UP BEARING

Increases life span of the piston 'O' seal and improves "reduces" friction travel. PAT.#6,173,965



DRIVESHAFT AND CAM

The shaft and adjustment cam are machined from solid bar material. The cam mechanism allows for 2.5 deg. overtravel in both directions. The inner depth of the driveshaft allows for total engagement of any valve shaft height for direct mount. PAT.#6,598,511

BODY ADAPTOR KIT AND STOP ADJUSTMENTS

Recessed into the actuator's main body, the "B.A.K." is drilled in accordance to DIN/ISO standards or Valve Topworks PCD, for direct mounting options. PAT.#6,612,219

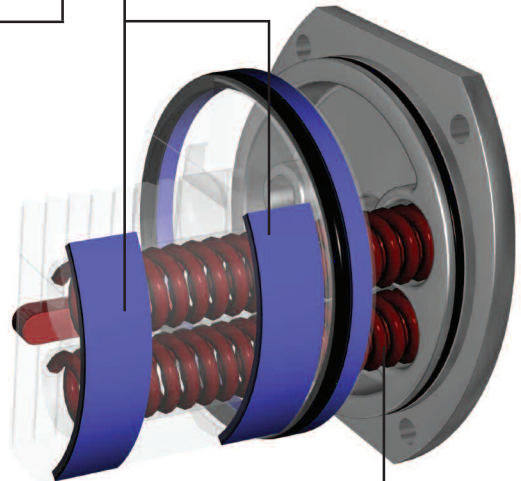
The "B.A.K." is also fitted with our unique open and closed stop end adjustment and locking screws. This being external to actuator pressure complies to future P.E.D. directives.

TRIPLE SHAFT BEARINGS

Eliminates metal to metal contact and absorbs the impact load on the stop cam drive mechanism.

PISTON WEAR PADS

The dual encapsulated "POM" wear pads absorb the adverse side loading at start of each stroke. The 4 off encapsulated "POM" wear pads also ensure no metal to metal contact thus providing low friction travel.



SPRINGS

Unique patented spring design, located inside piston rack. "SR" units utilise the same end covers as "DA". Springs are manufactured from SiCr in compliance to EN10204 and available with 3.1b certificate.

Long bolting is a standard feature in order to fully relax springs. PAT.#4,354,424

INSERT SLEEVE

Manufactured from stainless steel bar, it can be rotated for cross and parallel mounting and suit most valve shafts. The insert is held inside the driveshaft by means of a circlip.

Actuator Mounting

Mounting Variation

Below are the two common variations to mounting a 90 degree or 180 degree actuator to a valve.

13.1 mounted in-line or parallel to the pipe, the actuator and valve are in the standard closed position

13.2 mounted in-line or parallel to the pipe, the actuator and valve are in the standard open position

13.3 mounted crossmount or offset to the pipe, the actuator and valve are in the standard closed position

13.4 mounted crossmount or offset to the pipe, the actuator and valve are in the standard open position

Mounting actuators in these varying positions is due to space constraints in the global assembly or simply due to consistency with prior assemblies already in existence. Please note how the indicator puck always correctly shows the position of the valve disc and hence showing the flowpath of the medium running through the pipe.

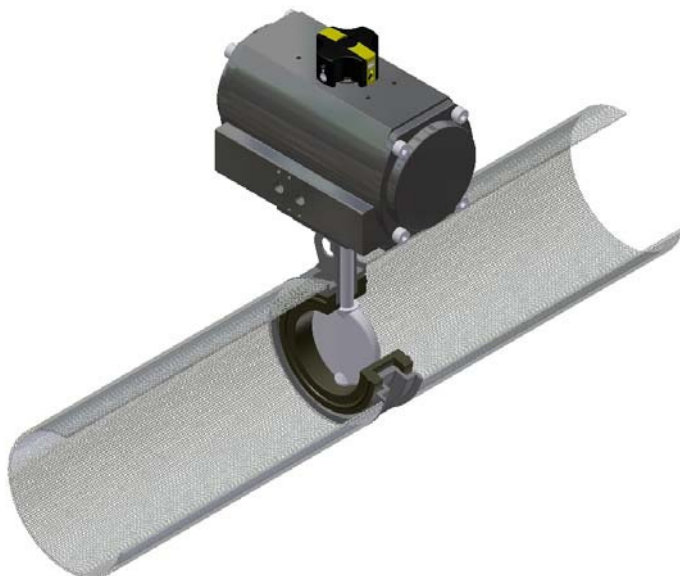
13.1 in-line, closed position



13.2 in-line, open position



13.3 crossmount, closed position



13.4 crossmount, open position





MOR Series manual override worm gear operators are designed for superior performance with any valves or mechanism requiring 90 degree rotation to be equipped with pneumatic actuators and require manual override feature.

For rugged and dependable application, the units are built with enough strength and operating integrity to give you unexcelled performance virtually in any operating environment.

Features

All MOR Series operators are manufactured from high quality material and precise machining to ensure maximum service and reliability. They are excellent in design, functionality and dependability.

Employing a declutch mechanism for use with Double-Acting actuators and non-clutch type for Spring-Return actuators makes the MOR Series fit today's valve automation requirement.

- All worm gears are self-locking and engaged with minimum backlash design to prevent valve disc or ball vibration.
- All unit are sealed and fully weatherproof for outdoor services.
- All commercial units are permanently and sufficiently lubricated with NLGI EP-0 grease. High temperature or food grade lubricant can be provided on request.
- Stainless steel input shafts are supplies as standard.
- Independent stop adjustments +/- 5 % for open and close position.
- Epoxy primer and finished paint as standard.
- Removable stem nut design makes the gears more convenient to be mounted on to the valves.
- Mounting Flange complied to world recognized ISO 5211 standard.

TruGear - MOR

Performance Data

De-Clutchable Manual Override for Double Acting Actuators (DA)

MODEL	ISO 5211		RATIO	RATED TORQUE	SPUR GEAR	WT (Kg)	Max Bore / Depth (mm)	
	Bottom	TOP					Dia /Deep	Sq/Deep
MOR 150DA	F05,F07	F05,F07	32:1	150 Nm	Na	5.0	18/70	14/70
MOR 300DA	F07,F10	F07,F10	32:1	300 Nm	Na	9.0	24/80	17/80
MOR 750DA	F10,F12,F14	F10,F12,F14	48:1	750 Nm	Na	15.5	38/86	27/86
MOR 1350DA	F12,F14	F12,F14	48:1	1350 Nm	Na	24.7	52/100	36/100
MOR 2100DA	F14,F16	F14,F16	64:1	2100 Nm	Na	38.0	66/113	47/113
MOR 3000DA	F16,F25	F16,F25	80:1	3000 Nm	Na	62.5	78/129	55/129
MOR 5100DA	F15,F25	F15,F25	180:1	5100 Nm	3:1	7.5.5	78/129	55/129
MOR 7500DA	F25,F30	F25,F30	320:1	7500 Nm	4:1	144.5	115/150	80/150
MOR 12K DA	F25,F30,F36	F25,F30,F36	256:1	12000 Nm	4:1	148.5	115/150	80/150
MOR 18K DA	F30,F35,F40	F30,F35,F40	336:1	18000 Nm	4:1	283.5	140/180	100/180
MOR 24K DA	F30,F35,F40	F30,F35,F40	280:1	24000 Nm	4:1	287.5	140/180	100/180

* Auto Vent Valve is recommended for MOR-DA so as to auto vent off Pressurized Air in Actuator Chamber prior to Manual Operations.

Performance Data

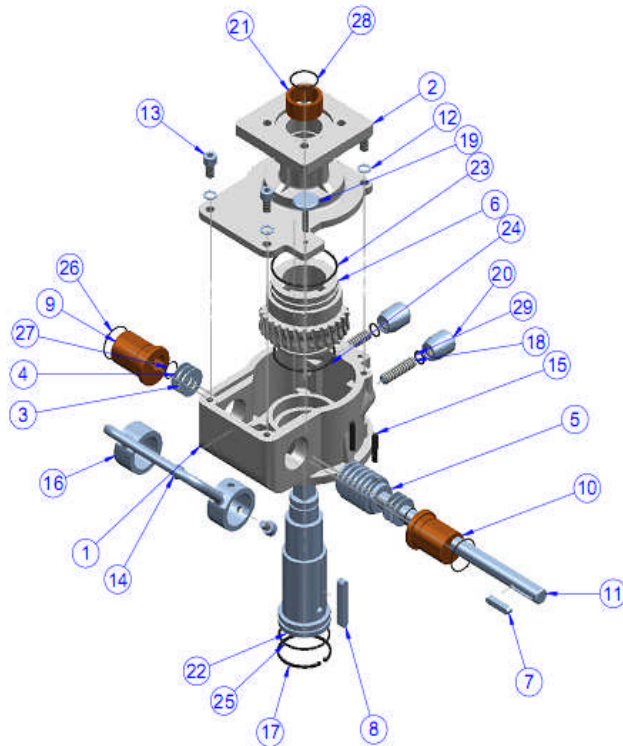
Manual Override for Spring Return Actuators only (SR)

MODEL	ISO 5211		RATIO	RATED TORQUE	SPUR GEAR	WT (Kg)	Max Bore / Depth (mm)	
	Bottom	TOP					Dia /Deep	Sq/Deep
MOR 200 SR	F05,F07	F05,F07	32:1	200 Nm	Na	4.7	18/70	14/70
MOR 400 SR	F07,F10	F07,F10	32:1	400 Nm	Na	8.2	24/80	17/80
MOR 1000 SR	F10,F12,F14	F10,F12,F14	48:1	1000 Nm	Na	14.0	38/86	27/86
MOR 1800 SR	F12,F14	F12,F14	48:1	1800 Nm	Na	23.0	52/100	36/100
MOR 2800 SR	F14,F16	F14,F16	64:1	2800Nm	Na	36.0	66/113	47/113
MOR 4000 SR	F16,F25	F16,F25	80:1	4000 Nm	Na	60.5	78/129	55/129
MOR 6800 SR	F15,F25	F15,F25	180:1	6800 Nm	4:1	74.0	78/129	55/129
MOR 10K SR	F25,F30	F25,F30	320:1	10000 Nm	4:1	135.2	115/150	80/150
MOR 16K SR	F25,F30,F36	F25,F30,F36	256:1	16000 Nm	4:1	138.8	115/150	80/150
MOR 24K SR	F30,F35,F40	F30,F35,F40	336:1	24000 Nm	4.5:1	282.5	140/180	100/180
MOR 32K SR	F30,F35,F40	F30,F35,F40	280:1	32000 Nm	4.5:1	285.5	140/180	100/180

Notes :

- **Weight of MOR are without H.Wheel and other options added**
- **We are constantly upgrading our products and we deserved the rights to Change information without prior notice**

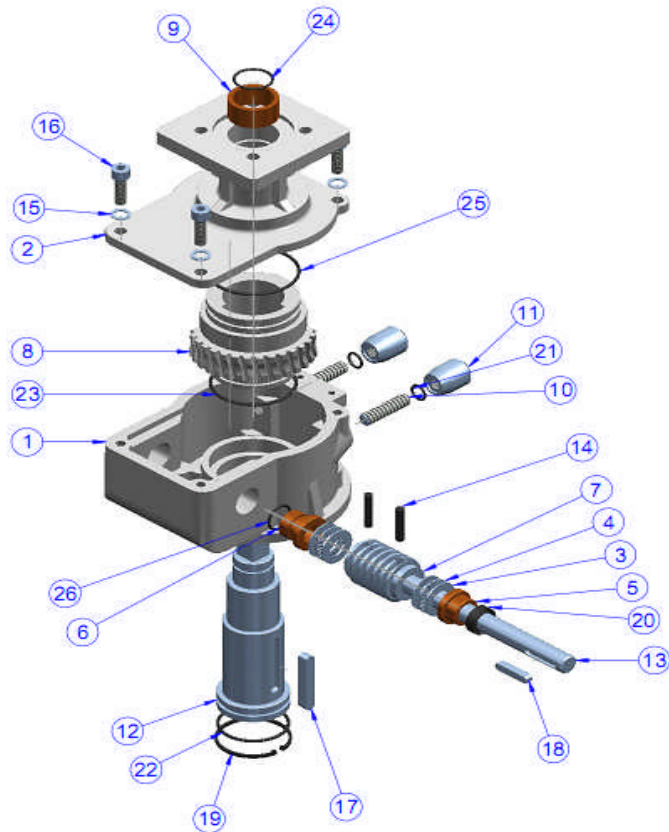
TruGear – MOR- DA



Construction of De-Clutchable Manual Gear Override

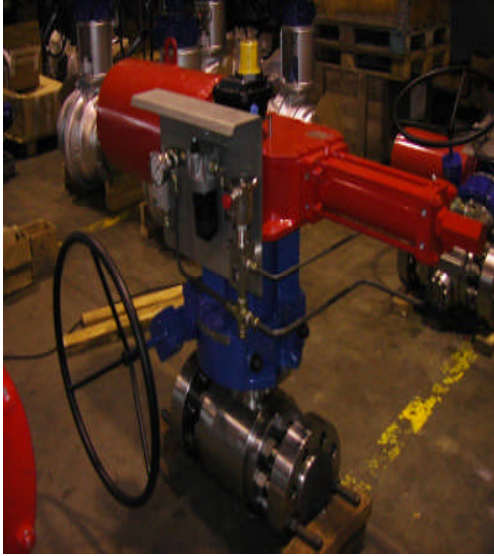
1	Gear Housing	1	Cast Iron (FC25)
2	Gear Cover	1	Cast Iron (FC25)
3	Thrust Bearing	2	SKF AXK
4	Thrust Washer	4	SKF AS
5	Worm Gear	1	Carbon Steel (S45C)
6	Worm Wheel	1	Ductile Iron (FCD40)
7	Key Worm Shaft	1	Carbon Steel
8	Key Drive Shaft	1	Carbon Steel
9	Bronze Sleeve L	1	Bronze, 90%
10	Bronze Sleeve R	1	Bronze, 90%
11	Worm Shaft	1	Stainless Steel, 304
12	Spring Washer	4	Carbon Steel
13	Cap Screw	4	High Tensile Steel
14	Cap Screw	2	High Tensile Steel
15	Pin	2	Carbon Steel
16	Lever	1	Carbon Steel
17	Circlip	1	High Tensile Steel
18	Stop Adjustment Screw	2	High Tensile Steel
19	Screw Lock Lever	1	Steel
20	Stop Adjustment Cap	2	Carbon Steel
21	Top Flange Bush	1	Bronze, 90%
22	Drive Shaft	1	Carbon Steel (S45C)
23	O' Ring	1	NBR
24	O' Ring	1	NBR
25	O' Ring	1	NBR
26	O' Ring	2	NBR
27	O' Ring	2	NBR
28	O' Ring	1	NBR
29	O' Ring	2	NBR
Item	Description	Qty	Material

TruGear – MOR- SR



Construction of Spring Return Gearbox

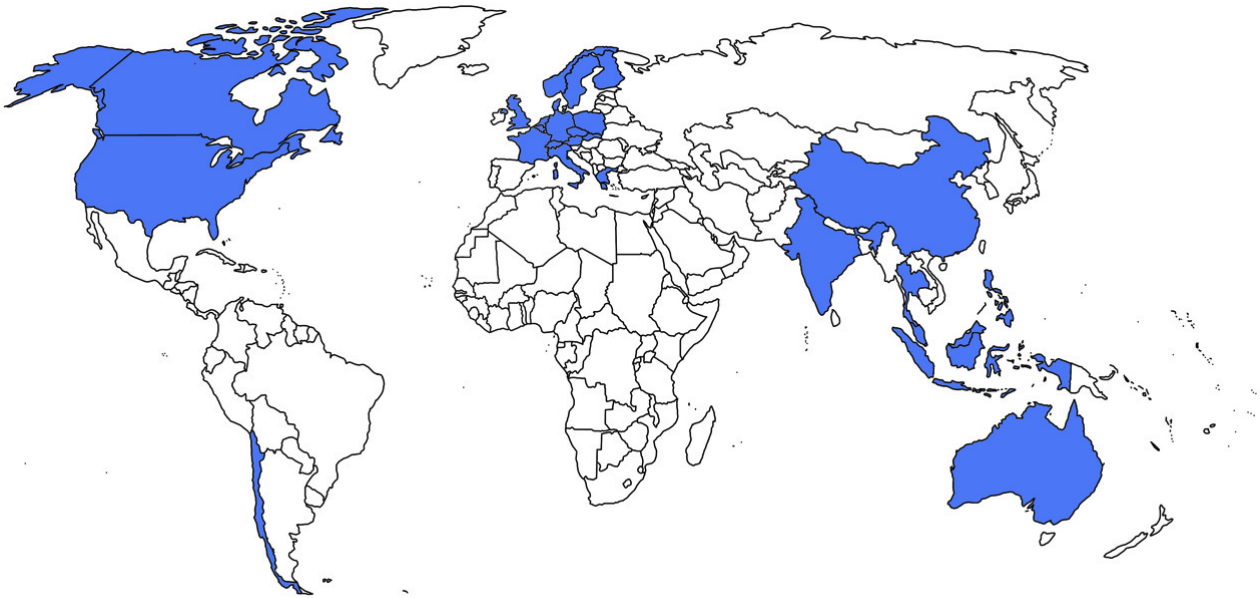
1	Gear Housing	1	Cast Iron (FC25)
2	Gear Cover	1	Cast Iron (FC25)
3	Thrust Washer	4	SKF AS
4	Thrust Bearing	2	SKF AXK
5	Bush Side R	1	Bronze, 90%
6	Bush Side L	1	Bronze, 90%
7	Worm Gear	1	Carbon Steel (S45C)
8	Worm Wheel	1	Ductile Iron (FCD40)
9	Top Flange Bush	1	Bronze, 90%
10	Stop Adjustment Screw	2	High Tensile Steel
11	Stop Adjustment Cap	2	Carbon Steel
12	Drive Shaft	1	Carbon Steel (S45C)
13	Worm Shaft	1	Stainless Steel, 304
14	Pin	2	Carbon Steel
15	Spring Washer	4	Carbon Steel
16	Cap Screw	4	High Tensile Steel
17	Key Drive Shaft	1	Carbon Steel
18	Key Worm Shaft	1	Carbon Steel
19	Circlip	1	High Tensile Steel
20	Oil Seal	1	NBR
21	O' Ring	2	NBR
22	O' Ring	1	NBR
23	O' Ring	1	NBR
24	O' Ring	1	NBR
25	O' Ring	1	NBR
26	O' Ring	1	NBR
Item	Description	Qty	Material



MOR - SR for Pneumatic
Rack & Pinion and Scotch Yoke Actuators

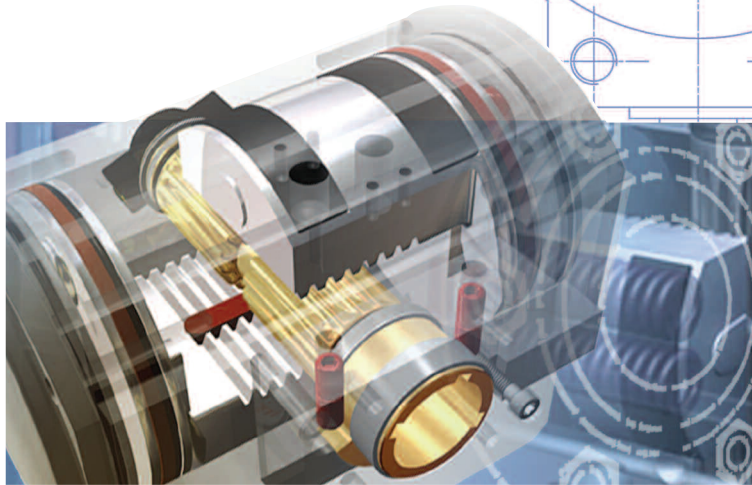
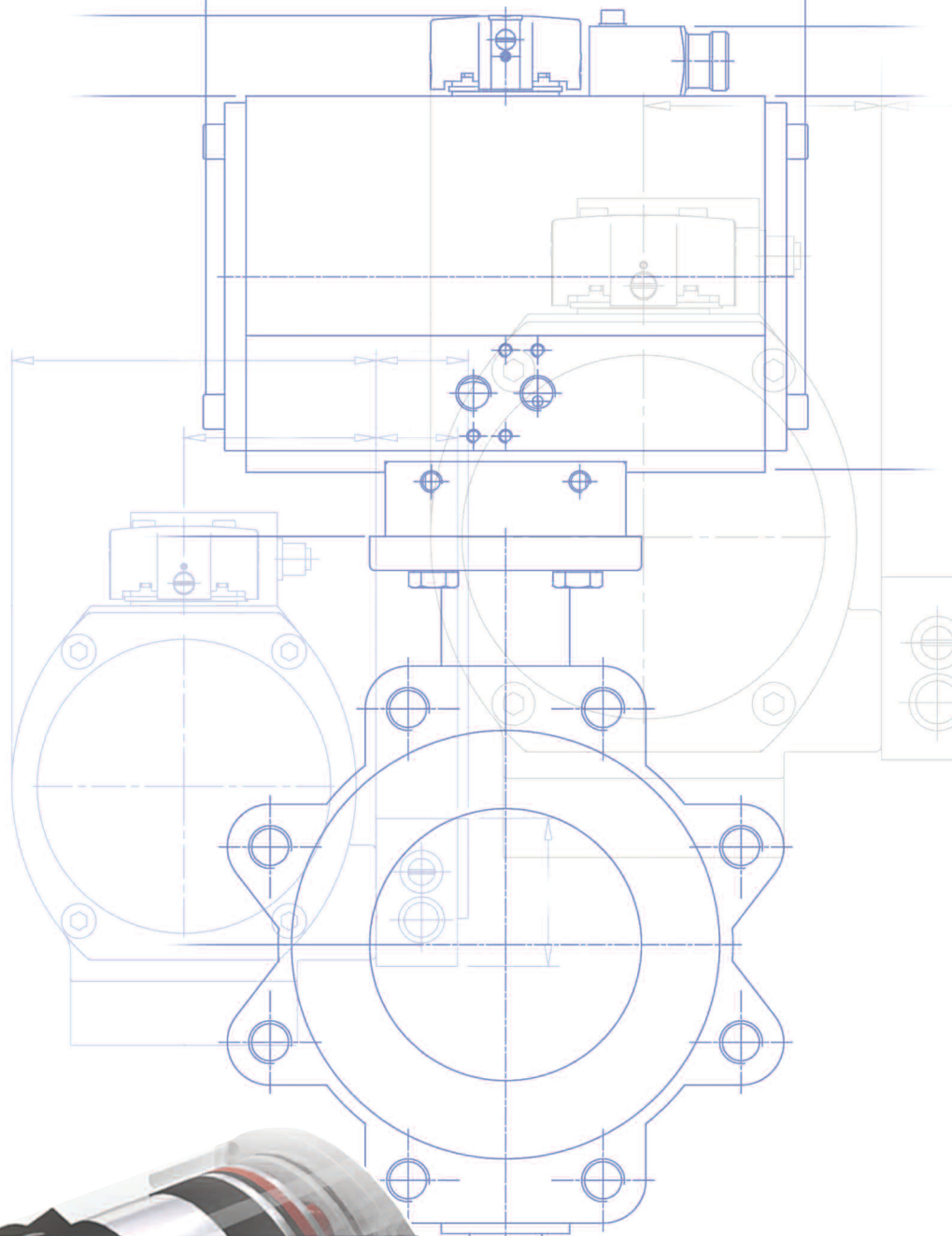
Trutorq in the World...

All Trutorq actuators are manufactured in Italy, where they are shipped in all the countries highlighted in the map below.



Trutorq group:

- **TRUTORQ ITALIA SRL** Rovato, Brescia, ITALY.
- **TRUTORQ LTD** Gosport Hampshire, United Kingdom.
- **MEKANOTJANST WIRE MATIC** Jarvso, Sweden.
- **TRUTORQ ASIA PTE LTD (TRISOME)** Singapore.



TRUTORQ ITALIA SRL

www.trutorqitalia.com