KÜHNER
Automation

ISO 9001 CERTIFIED

PNEUMATIC ACTUATOR

RAT SERIES PNEUMATIC ACTUATORS-STATEMENT OF AND SELECTION

- **DESIGN AND FEATURES**

Through research, development and design ,RAT series pneumatic actuators incorporate the latest mechanical technology, material, and innovative ideas. The product proudly boasts the following features:

•Full conformance to the latest specification:ISO5211, DIN3337, VD/VDE3845and NAMUR.

•The extruding high intensity aluminum body possess a honed internal surface coated with hone anode oxygenation for long life, low coefficient of friction and swift performance.

•Excellent, compact and modernized construction along with multi-specifications make the selection both economic and beneficial.

•All acting surfaces adopt high quality bearings, resulting in low friction, high cycle life and no noise.

•The two independent external travel stop adjustment bolts can easily and precisely adjust ±5°at both open and close directions.

•Same outline actuator have the functional modes of double acting and spring, and the spring return has the normal-open and normal-close styles.

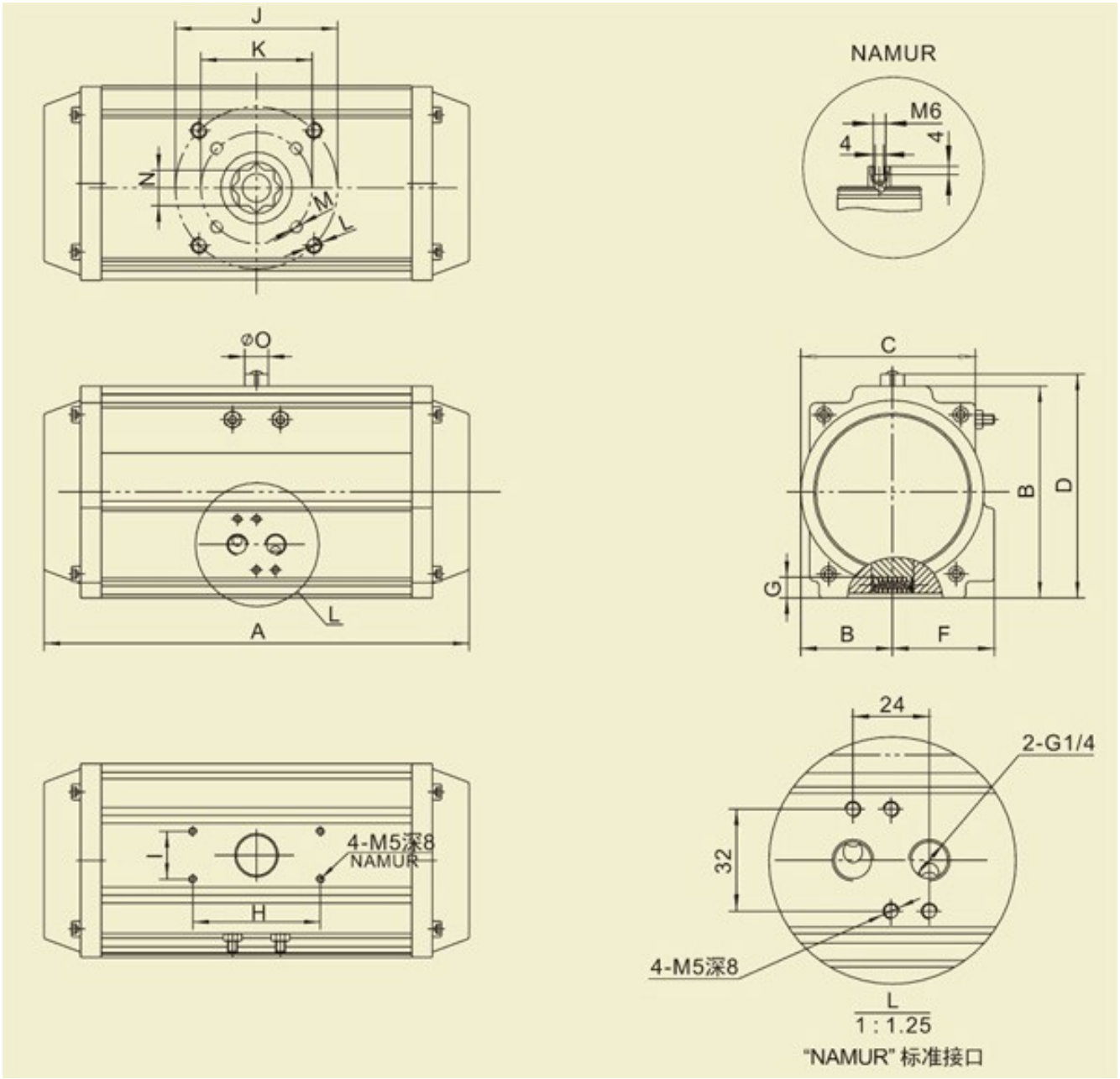
•Pre-compressed load spring is convenient for safe mounting and teardown procedures.

•Die-casting aluminum pistons and end caps have high intensity and light weight.

•position actuators.

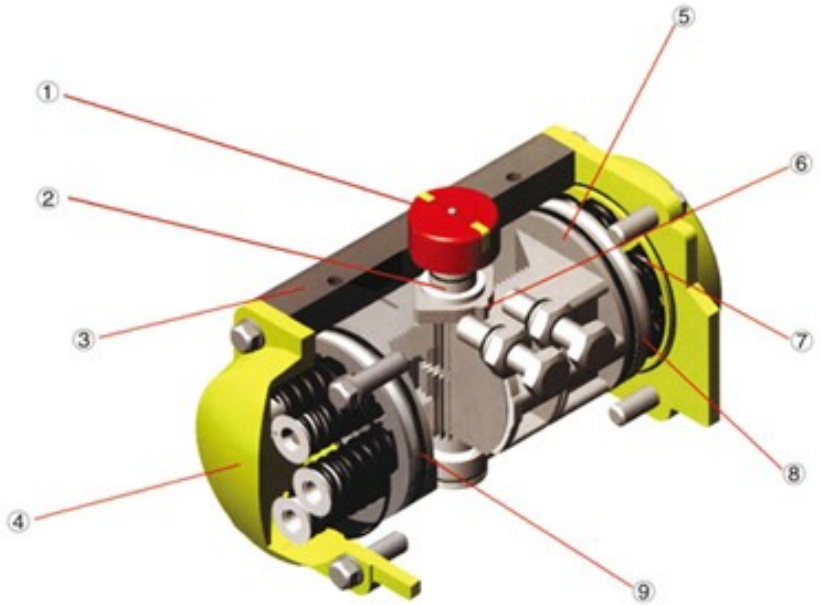
•Solenoid valves are easily mounted without any connecting plank.

MOUNTING CONNECTION AND DIMENSION



Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	A120	A180	Airconnection
RAT032	110	45	45	65	22.5	23	12	50	25		F03 ø36		M5×5	9				G1/8 "
RAT052	143	72	55	92	30	41	14	80	30	F05 ø50	F03 ø36	M6×8	M5×8	11	ø40	158	200	G1/4 "
RAT063	190	88	69	108	35	45	18	80	30	F07 ø70	F05 ø50	M8×13	M6×10	14	ø40	184	233	G1/4 "
RAT075	207	99.5	100.5	119.5	38.5	52.5	20.5	80	30	F07 ø70	F05 ø50	M8×10	M6×8	14	ø40	103	243	G1/4 "
RAT083	213	109	88	129	46	52.5	21	80	30	F07 ø70	F05 ø50	M8×13	M6×10	17	ø40	221	280	G1/4 "
RAT092	258	117	98.5	137	50	61	21	80	30	F07 ø70	F05 ø50	M8×12	M6×10	17	ø40	280	274	G1/4 "
RAT105	267	133	109	153	57	64	26	80	30	F10ø102	F07 ø70	M10×13	M8×10	22	ø40	304	388	G1/4 "
RAT125	340	155	120.5	175	67.5	70	27.5	80	30	F10ø102	F07 ø70	M10×16	M8×13	22	ø65	365	470	G1/4 "
RAT140	414	171.5	132	191.5	75	76	32	80	30	F12ø125	F10ø102	M12×20	M10×15	27	ø65	442	568	G1/4 "
RAT160	476	197	159.5	217	87.5	87.5	34	80	30	F12ø125	F10ø102	M12×20	M10×15	27	ø65	507	654	G1/4 "
RAT190	515	230	184	260	102	102	40	130	30	F14ø140		M16×22		36	ø78	575	742	G1/4 "
RAT210	580	255	205	285	113	113	40	130	30	F14ø140		M16×24		36	ø78	642	831	G1/4 "
RAT240	654	290	240	320	130	130	50	130	30	F16ø165		M20×26		46	ø78	739	965	G3/8(1/4") "
RAT270	725	320	269	350	147	147	50	130	30	F16ø165		M20×26		46	ø78	823	1075	G1/2(1/4") "

• PARTS INTRODUCTION



1. Indicator
Position indicator with NAMUR is convenient for mounting accessories such as Limit Switch box, Positioner etc.

2. Pinion
The pinon is high-precision and integrative, made from nickelled-alloy steel, full conform to the lastested standards of ISO5211、DIN3337、NAMUR. The dimensions and the stainless steel material can be customized .

3. Actuator Body
According to the different requirements, the extruded aluminum alloy ASTM6005 body can treated with hard anodized, powder polyester painted (different colour is available such as blue, orange, yellow etc.), PTFE or Nickel plated.

4. End Caps
Die-casting aluminum powder polyester painted in different colours ,PTFE or Nickel plated.

5. Pistons
The twin rack pistons are made from Die-casting aluminum treated with hard anodized or made from Cast steel with galvanization. Symmetric mounting position, long cycle life and fast operation, reversing rotation by simply inverting the pistons.

6. Travel Adjustment
The two independent external travel stop adjustment bolts can adjust ±5°at both open and close directions easily and precisely.

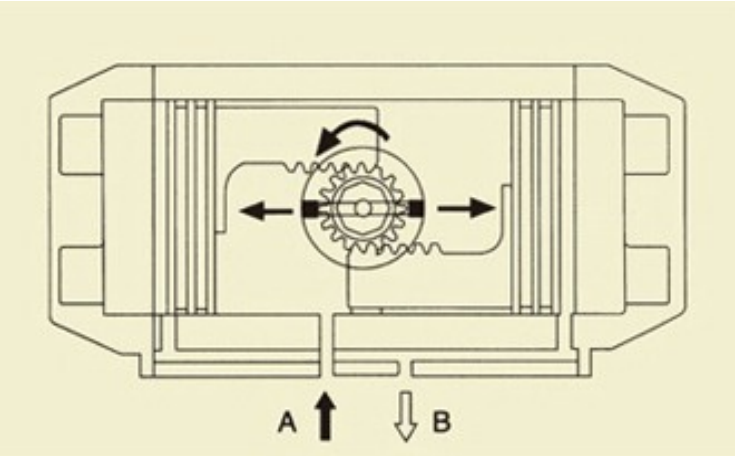
7. High performance springs
Preloaded coating springs are made from the high quality material for resistant to corrosion and longer service life, which can be demounted safely and conveniently to satisfy different requirements of torque by changing quantity of springs.

8. Bearings & Guides
Made from low friction, long-life compound material, to avoid the direct contact between metals. The maintenance and replacement are more easy and convenient.

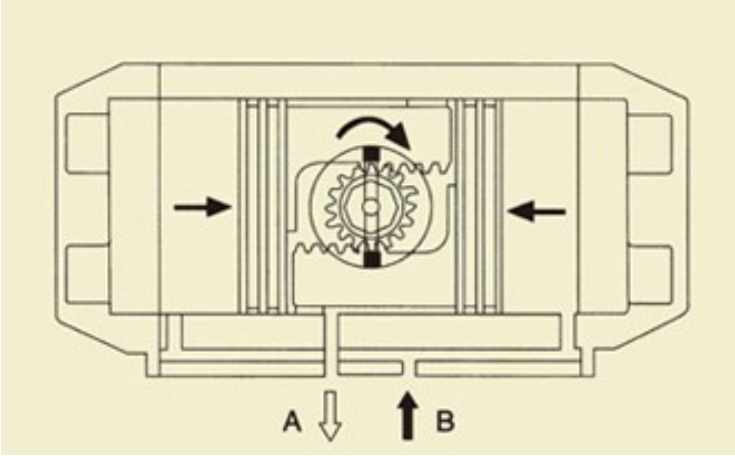
9. O-rings
Normal:NBR
High temp. & low temp. :Viton or Silicone

- **OPERATING PRINCIPLE (STANDARD ROTATION)**

1. Double action (planform)

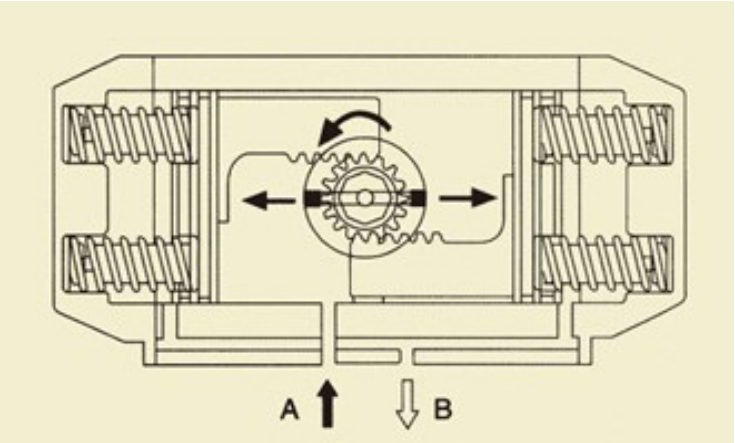


Air into Port A forces the pistons outwards, causing the pinion to turn counterclockwise while the air being exhausted from Port B.

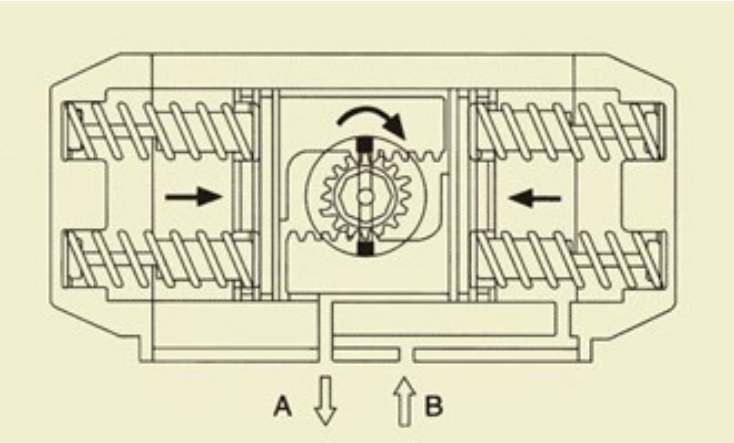


Air into Port B forces the pistons inwards, causing the pinion to turn clockwise while the air is being exhausted from Port A

2. Single action (planform)



Air into Port A forces the pistons outwards, causing the springs to compress, the pinion turns counterclockwise while air is being exhausted from Port B.



In the event of loss air pressure or power, the stored energy in the springs forces the pistons inwards, Rausing the pinion turns clockwise while air is being exhausted from Port A, and air to Port B can accelerate closing the valve.

- **The function and usage of the actuator and the parts**

•Double action actuator :open and close the valve.
•Single action actuator (Spring return):when air or power is lost, the actuator either close the valve automatically (normal-closed style) or opens the valve automatically (normal-open style).
•Double-control solenoid: power to solenoid opens the valve, power to the other solenoid closes the valve. This kind of
solenoid possesses the memorial function (available for anti-exploding).
•Single-control solenoid: power to the solenoid opens or closes the valve. Loss of power will close or open the valve
(available for anti-exploding).
•Limit switch box (signal feedback): remotely passes the signal of the valve's opened and closed status (available for antiexploding).
•Pneumatic positioner: according to the air pressure (0.2-1bar) to control the medium fl ux (available for anti-exploding).
•Electric positioner: according to the electric current (4-20mA) to control the medium fl ux (available for anti-exploding).
•Electric-pneumatic transfers the current signal to air pressure signal for compatibility with positioner .
•Tri-unit Air disposal: this includes decompression, fi lter, and oil unit, can clean and lubricate the connection parts.
•Manual equipment: able to use manual operation in the event of loss of air or power.

- **Sizing Information**

Make sure the torque of the opening or closing valve, under normal conditions is set to a safety factor of 15-20%. For water vapor and non-lubricated liquid medium, raise safety factor setting to 25%. For non-lubricated pasty medium, raise safety factor to 40%; For non-lubricated granule powder, raise safety factor to 80% .Then, according to the air pressure; search for the actuator's type in the output torque table of dual action or single action, In the output torque table of single action, the end line of the output torque of the spring is the torque of the closing the valve.
Sizing: dual action actuators
Example:
•The torque needed by ball valve=280N.m
•Operating medium :water
•Safety factor(20%)=280N.m+20%=336N.m
•Air supply pressure=4Bar
•According to the output torque table of the dual action actuator, we choose RAT140DA. when the air supply pressure

Output Torque of Double Acting Actuators

Output torque of RAT air force return actuator

Model	Air pressure (bar)						
	2	3	4	5	6	7	8
RAT 032DA	2.78	4.20	6.00	7.50	9.00	10.00	11.50
RAT 040DA	4.44	6.56	9.83	11.72	14.06	15.63	17.97
RAT 052DA	8.32	12.48	16.64	20.8	24.96	29.12	33.28
RAT 063DA	14.64	21.96	29.28	36.6	43.92	51.24	58.56
RAT 075DA	23.5	35.3	47	58.8	70.5	82.3	94
RAT 083DA	29.7	44.5	59.4	74.2	89.1	103.9	118.8
RAT 092DA	45.5	68.2	91.1	113.7	136.4	159.2	181.9
RAT 105DA	67.88	101.82	136.76	169.7	203.64	237.58	271.52
RAT 125DA	116.6	174.9	233.2	291.5	349.8	408.1	466.4
RAT 140DA	175.48	263.22	350.96	438.7	526.44	614.18	701.92
RAT 160DA	267.4	401.1	534.8	668.5	802.2	935.9	1069.6
RAT 190DA	430.96	646.44	861.9	1077.4	1292.9	1508.4	1723.8
RAT 210DA	592.2	888.4	1184.5	1480.6	1776.7	2072.8	2369
RAT 240DA	831.9	1220.8	1627.8	2030.7	2444.6	2848.6	3255.5
RAT 270DA	1305.4	1958.2	2610.9	3263.6	3916.3	4569	5221.8
RAT 300DA	1602	2403	3205	4006	4807	5608	6409
RAT 350DA	2399	3598	4798	5998	7197	8397	9596
RAT 400DA	3418	5127	6837	8546	10255	11964	13673

Output Torque of Spring Return Actuators

Output torque of RAT spring return actuator

Model	Spring qty	Output torque of Air supply										Spring stroke	
Air pressure (bar)		3		4		5		6		7			
		0° Start	90° End	0° Start	90° End	0° Start	90° End	0° Start	90° End	0° Start	90° End	0° Start	90° End
RAT032SA	2	3.28	2.74	4.37	3.65	5.47	4.56	6.5	5.47	7.65	6.39	8.74	7.29
RAT052SA	5	8.48	6.28	12.64	10.44							4	6.2
	6	7.68	4.98	11.84	9.14							4.8	7.5
	7	6.98	3.78	11.14	7.94							5.5	8.7
	8			10.34	6.74	14.5	10.9					6.3	9.9
	9			9.54	5.44	13.7	9.6					7.1	11.2
	10			8.74	4.24	12.9	8.4	17.06	12.56			7.9	12.4
	11					12.1	7.1	16.26	11.26	20.42	15.42	8.7	13.7
	12					11.3	5.9	15.46	10.06	19.62	14.22	9.5	14.9
RAT063SA	5	15	11.2	22.3	18.5	29.6	25.8					7	10.8
	6	13.5	9	20.8	16.3	28.1	23.7					8.5	12.95
	7	12	6.9	19.4	14.2	26.7	21.5					9.9	15.1
	8			18	12	25.3	19.3	32.6	26.6			11.3	17.3
	9			16.5	9.9	23.9	17.2	31.2	24.52			12.7	19.4
	10			15.3	7.7	22.6	15	29.9	22.3	37.2	29.6	14	21.6
	11			13.8	5.6	21.1	12.9	28.4	20.2	35.7	27.5	15.5	23.7
	12					19.7	10.7	27	18	34.3	25.3	16.9	25.9
RAT075SA	5	23.4	17.8	35.1	29.5							11.9	17.5
	6	-21.1	14.3	32.8	26							14.2	21
	7	-18.7	10.8	30.4	22.5							16.6	24.5
	8			28	19	39.8	30.8					19	28
	9			25.7	15.5	37.5	27.3					21.3	31.5
	10			23.3	12	35.1	23.8	46.8	35.5	58.6	47.3	23.7	35
	11					32.7	20.3	44.4	32	56.2	43.8	26.1	38.5
	12					30.4	16.8	42.1	28.5	53.9	40.3	28.4	42
RAT083SA	5	30.9	23.8	46.1	38.9							14.5	21.7
	6	28.1	19.5	43.3	34.6							17.39	26
	7	25.2	15.1	40.3	30.2							20.3	30.4
	8			37.4	25.9	52.6	41.1					23.2	34.7
	9			34.5	21.5	49.7	36.7					26.1	39.1
	10			31.6	17.2	46.8	32.4	62	47.6	77.1	62.7	29	43.4
	11					43.9	28.1	59.1	43.3	74.2	58.4	31.9	47.7
	12					41	23.7	56.2	38.8	71.3	54	34.78	52.08
RAT092SA	5	50.28	37.78	75.54	63.03							25.5	38
	6	45.18	30.18	70.44	55.44							30.6	45.6
	7	40.08	22.58	65.34	47.84							35.7	53.2
	8			60.24	40.24	85.5	65.5					40.8	60.8
	9			55.14	32.69	80.4	57.9					45.9	68.4
	10			50.04	25.04	75.3	50.3	100.56	75.56	125.82	100.82	51	76
	11					70.2	42.7	95.46	67.96	120.72	93.22	56.1	83.6
	12					65.1	35.1	90.36	60.36	115.6	85.6	61.2	91.2
RAT105SA	5	68.6	52	103.6	87							33.2	49.8
	6	61.9	42	96.9	77							39.9	59.8
	7	55.3	32.1	90.3	67.1							46.5	69.7
	8			83.7	57.1	116.6	90					53.1	79.7
	9			77	47.4	109.9	80.3					59.8	89.4
	10			70.4	37.2	103.3	70.1	137.3	104	171.2	138	66.4	99.6
	11					96.7	60.1	130.6	94	164.6	128	73	109.6
	12					90	50.2	123.9	64.1	157.9	118.1	79.7	119.5
RAT125SA	5	115.5	88	173.8	146.3							59.4	86.9
	6	103.6	70.6	161.9	128.9							71.3	104.3
	7	91.8	53.5	150.1	111.6							83.1	121.6
	8			138.2	94.2	196.5	152.5					95	139
	9			126.3	76.8	184.6	135.1					106.9	156.4
	10			114.4	59.4	172.7	117.7	231	176			118.8	173.8
	11					160.9	100.4	219.2	158.7	277.5	217	130.6	191.1
	12					149	83	207.3	141.3	265.6	199.6	142.5	208.5