KOMOTO

Technical Bulletin A-380

Series 3800
Pneumatically Operated Cylinder Actuators

AO-3800 Features

General
The AO-3800 Rotary cylinder actuators are designed to operate rotary valves, such as Ball valves. Butterfly valves and Plug valves for throttling or on-off service.

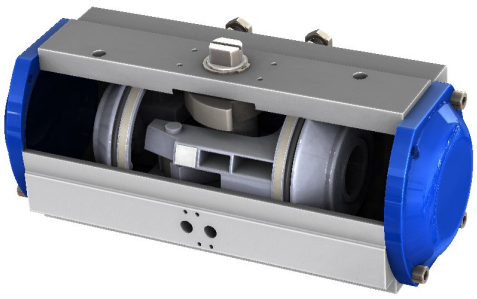
3800 Canted Scotch & Yoke
Aluminum Body
Light Medium Industries

3800 Canted Scotch & Yoke
Cast Iron (FCD) Body
Heavy Industries - Oil & Gas, Power Plant

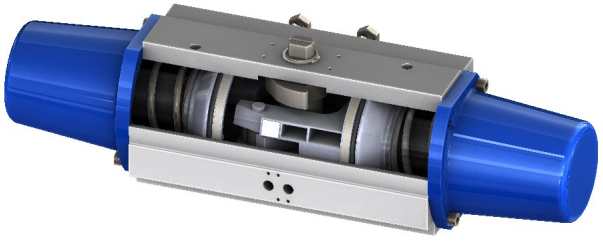
3800 Rack & Pinion
Aluminum Body
Light Medium Industries

Type of Actuators:
- **3800D**: Double acting
- **3800S**: Spring return acting (Air to clock-wise or counter clock-wise)

Scope of Design:
- Maximum output torque: 3.6 to 3539 Kgf-m
- Cylinder bore: 50 to 300 mm



Type A(3800D)



Type A(3800S)

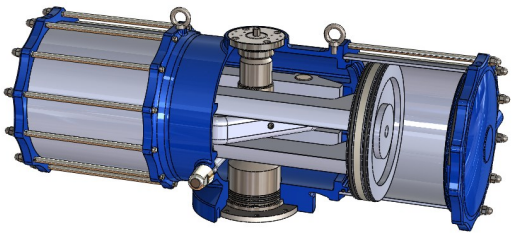
Canted Scotch Yoke Cylinder Mechanism

Fig.1 shows the comparison between the output torque curves of a canted, as a constant torque actuator. (i.e. Rack and pinion type)
These graphs demonstrate that, being the same the arm length and the cylinder diameter, the canted scotch-yoke actuator have the most suitable mechanism, from technical and economical reason, to operate quarter turn valves.

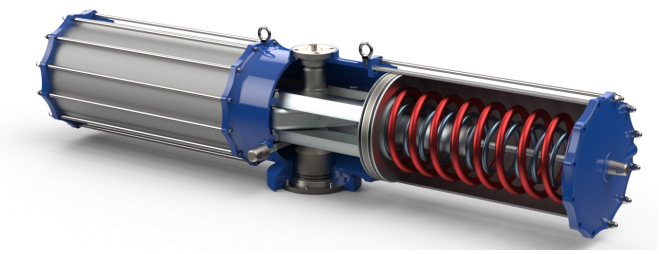
Rack & Pinion Cylinder Mechanism

The hardened alloy steel pinion is precision ground and Nickel plated (over 15um) in order to reduce friction, provide maximum wear resistance. Full conformance with the newest standards of ISO 5211 & DIN 3337. The dimensions can be customized and as options, stainless steel and aluminum alloy are also available.

Working conditions:
- Maximum working pressure: 8 Kgf/cm^{2}G
- Temperature:
  - Standard: -20°C ~ +80°C
  - Low: -40°C ~ +60°C
  - High: 0°C ~ +150°C



Type B(3800D)



Type B(3800S)

Over torque and travel stops

All manufactured valves have acceptable ± tolerance. When these tolerances of the components of an automated valve assembly are added, the actuator must provide compensation by being able to rotate more than 90° with over travel in both directions, and then stop precisely at the required position. AO-3800 actuator, with two way rotation travel stops, provide a minimum rotation of –5° to 95°, and positive, adjustable, rotation stopping (10° at each end)

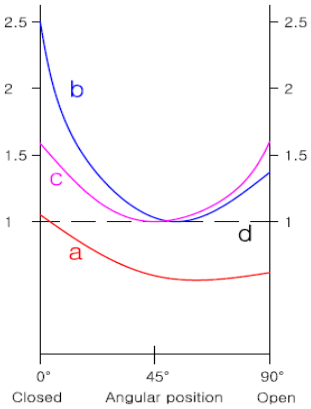
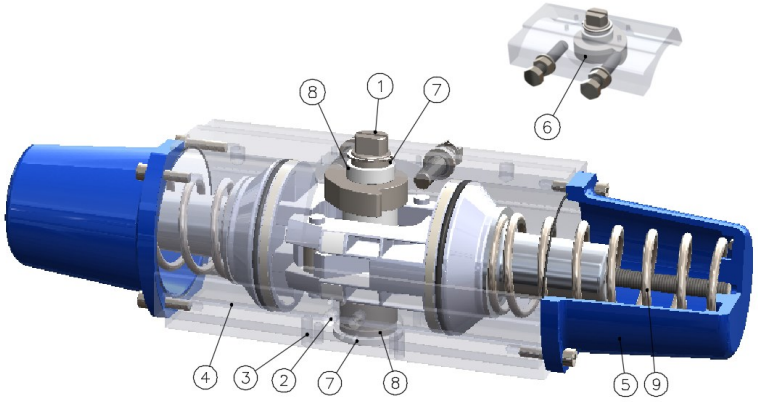


Figure 1. Torque curves

a. Valve torque
b. Actual output torque (canted scotch & yoke)
c. Actual output torque (symmetric scotch & yoke)
d. Output torque actuator (rack & pinion)

Canted Scotch & Yoke Type

Features & Benefits



1. NAMUR STANDARD SLOTTED SPINDLE (NAMUR Accessory mounting)

Provide a self centering, positive, no slop drive for positioners and switches and eliminates the actuator/ accessory coupling.

2. NAMUR SOLENOID MOUNTING PAD (An international Standard)

Permits choice of various manufactures' solenoid valves to be direct mounted to the actuator. A single solenoid valve can be used for all actuator sizes.

3. ISO 5211 STANDARD MOUNTING PAD (An international Standard)

Designed for optimum strength and interchangeability. Standardized mounting dimensions bolt diameters and bolt hole depths for ease and flexibility of mounting; with or without brackets.

4. LARGE AIR PASSAGE

This unique "supply-size" internal air passage permits obstruction free, fast operation an simple "air assist" when required.

5. VERSATILE MODULAR DESIGN

Attach or remove double acting or spring modules in minutes, select any combination of fail position, spindle rotation or actuator alignment in minutes - Safety!

6. TWO DIRECTIONAL TRAVEL STOPS (Option Parts)

Exclusive standard provides rotational adjustment for the actuator Spindle, in both directions of travel. Standard up to size AC12

7. SPINDLE THRUST AND RADIAL BEARINGS

Acetal thrust bearings project against vertical forces and also seal against atmospheric intrusion. Acetal Radial Bearings support all radial forces.

8. SPINDLE SEALS - TOP AND BOTTOM

Seals to the atmosphere are located to minimize any crevices and maximize the protection against external corrosive build up.

9. INDESTRUCTIBLE FAIL SAFE SPRINGS

Designed, built and protected to never break - rated to compensate for "spring set" for true fail safe confidence. Guaranteed and backed by a free complete actuator replacement. Highest "end of stroke" forces in the industry, for maximum reserve.

Torque Table (YA Type - Canted Scotch & Yoke)

Size : YA05SD, 06SD, 08SD, 10SD, 12SD, 14SD, 16SD, 20SD

DOUBLE ACTING (N.m)

Model	4 Bar			5 Bar		
	0°	45°	90°	0°	45°	90°
YA05D	42.8	20	31.4	54.2	25.7	39
YA06D	108.3	45.6	69.4	138.7	57	85.5
YA08D	209	90.3	137.8	266	109.3	166.3
YA10D	323	152	256.5	399	190	318.3
YA12D	750.5	332.5	527.3	997.5	413.3	646
YA14D	1026	451.3	693.5	1311	570	878.8
YA16D	1539	703	1125.8	1947.5	878.8	1401.3
YA20D	2945	1444	2318	3724	1805	2878.5

SPRING RETURN (N.m)

Model	Angle	SPRING	AIR 4BAR	SPRING	AIR 5BAR
YA05S	0°	10.5	21.9	16.2	26.6
	45°	8.2	11.9	12	13.6
	90°	16.2	17.1	24.2	16.2
YA06S	0°	29.5	53.2	43.7	58
	45°	15.6	28.5	24.9	28.5
	90°	29.2	47	47.2	41.2
YA08S	0°	47.5	104.5	76	114
	45°	33.3	52.3	42.8	57
	90°	61.8	95	85.5	85.5
YA10S	0°	95	161.5	114	199.5
	45°	61.8	90.3	76	95
	90°	109.3	133	152	133
YA12S	0°	109.3	465.5	285	451.3
	45°	57	261.3	166.3	247
	90°	118.8	489.3	318.3	408.5
YA14S	0°	133	674.5	384.8	655.5
	45°	85.5	342	228	313.5
	90°	152	532	446.5	475
YA16S	0°	313.5	921.5	503.5	1045
	45°	194.8	475	289.8	551
	90°	384.8	826.5	536.8	950
YA20S	0°	418	2156.5	1206.5	2109
	45°	247	1149.5	674.5	1097.3
	90°	475	1824	1239.8	1719.5

Torque Table (YC Type - Canted Scotch & Yoke)

Size : YC10SD, 12SD, 14SD, 16SD, 20SD, 25SD, 30SD, 35SD, 40SD, 50SD

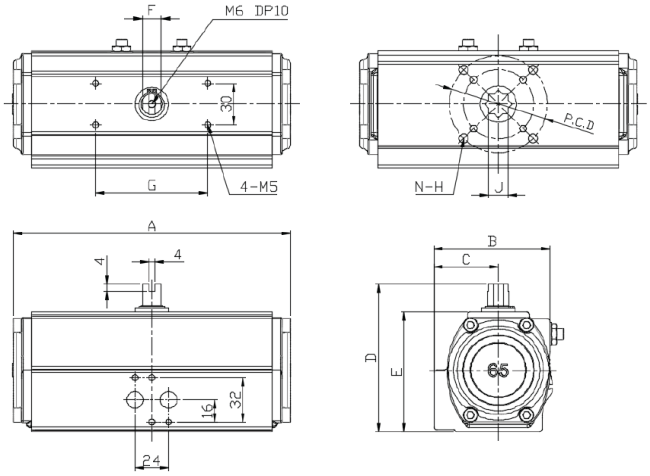
DOUBLE ACTING (N.m)

Model	4 Bar			5 Bar		
	0°	45°	90°	0°	45°	90°
YC10D	398	205	371	498	256	464
YC12D	522	247	472	652	309	590
YC14D	1051	485	918	1314	606	1148
YC17D	1540	754	1393	1924	942	1741
YC20D	3027	1437	2763	3784	1797	3453
YC25D	6009	2244	5184	7512	2805	6480
YC30D	9733	4740	9234	12166	5925	11543
YC40D	21026	9879	18894	26283	12348	23617
YC50D	49300	23228	44472	61626	29035	55589

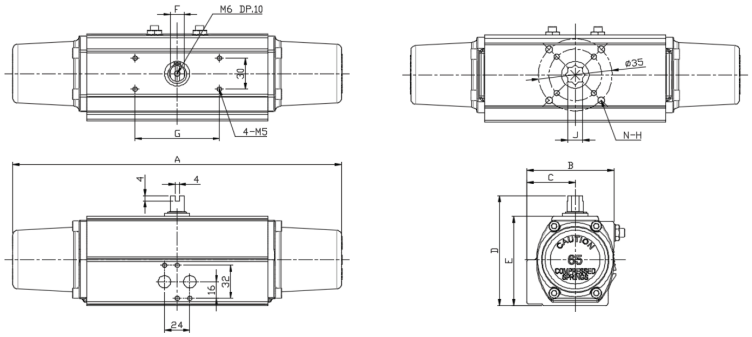
SPRING RETURN (N.m)

Model	Angle	SPRING	AIR 4BAR	SPRING	AIR 5BAR
YC10S	0°	149	249	202	295
	45°	102	102	102	154
	90°	232	139	278	186
YC12S	0°	196	326	266	386
	45°	123	123	157	152
	90°	295	177	365	226
YC14S	0°	394	657	502	812
	45°	242	242	297	309
	90°	574	344	686	462
YC17S	0°	577	962	740	1184
	45°	377	377	457	485
	90°	870	522	1050	691
YC20S	0°	1135	1892	1489	2295
	45°	719	719	924	873
	90°	1727	1036	2101	1353
YC25S	0°	2253	3756	2904	4608
	45°	1122	1122	1400	1405
	90°	3240	1944	3805	2675
YC30S	0°	3650	6083	4563	7604
	45°	2370	2370	2996	2929
	90°	5771	3463	7058	4485
YC40S	0°	7885	13141	10519	15764
	45°	4939	4939	6185	6164
	90°	11809	7085	13756	9861
YC50S	0°	18487	30813	24648	36978
	45°	11614	11614	14928	14107
	90°	27795	16677	33497	22093

Dimension Table

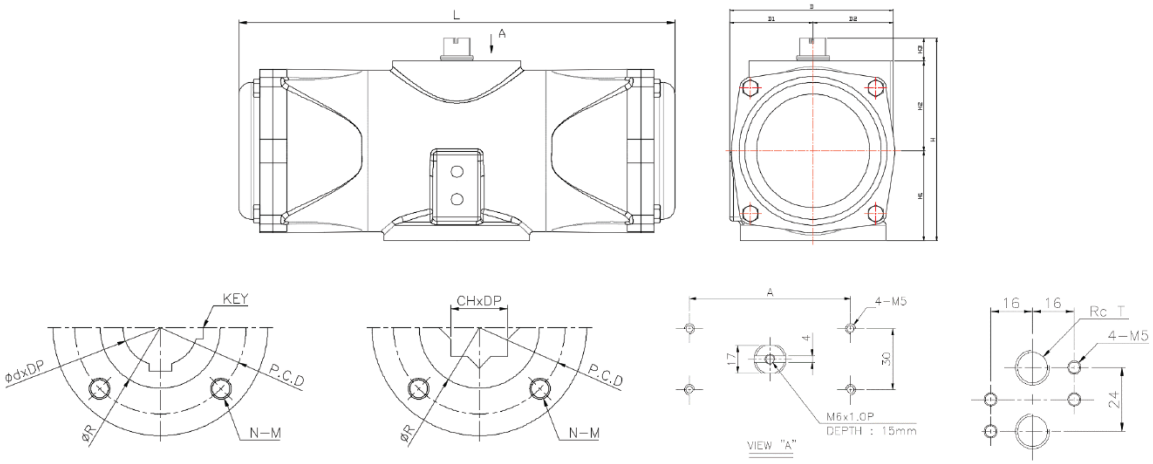


MODEL	A	B	C	D	E	F	G	ISO	P.C.D(Ø)	N-H	J	Stem Depth	Weight (Kg)
YA06D	202	89	46	107	87	13	80	F05/F07	50/70	4-M6/M8	14x14	17	2.3
YA08D	262	101	49.5	126	106	13	80	F07	70	4-M8	17x17	19	3.9
YA10D	311	129	61.5	148	128	19	80	F07/F10	70/102	4-M8/M10	22x22	26	6.7
YA12D	390	151	71.5	174	154	19	80	F07/F10	70/102	4-M8/M10	22x22	26	11.3
YA14D	431	164	77	192	172	24	80	F10/F12	102/125	4-M10/M12	27x27	30	16.4
YA17D	506	188	89	216	196	24	80	F14	140	4-M16	36x36	30	23.7
YA20D	605	231	115	284	254	36	130	F16	165	4-M20	46x46	60	45.5
YA25D	755	301	152	335	305	36	130	F16	165	4-M20	46x46	60	65.8
YA30D	900	360	170	408	378	36	130	F16/F25	165/254	4-M20/8-M16	55x55	60	165

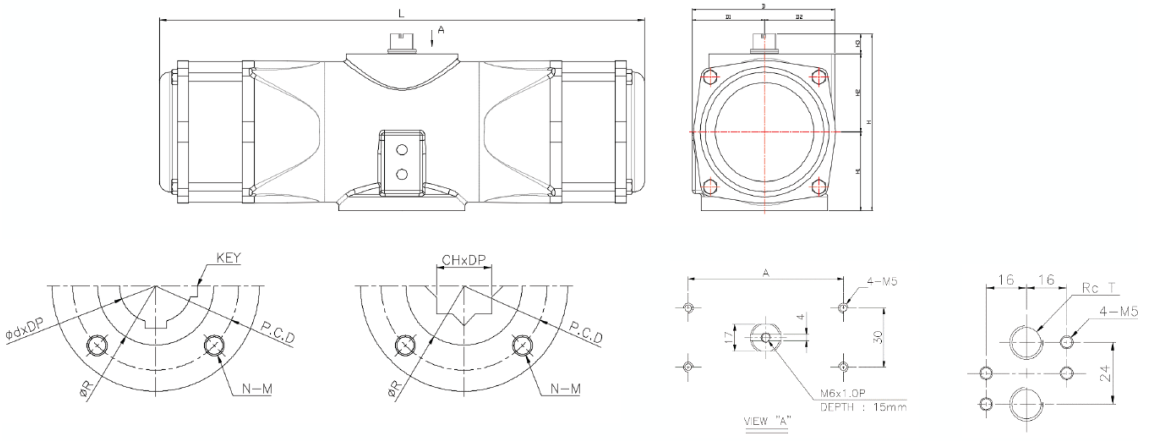


MODEL	A	B	C	D	E	F	G	ISO	P.C.D(Ø)	N-H	J	Stem Depth	Weight (Kg)
YA06S	314	89	46	107	87	13	80	F05/F07	50/70	4-M6/M8	14x14	17	3
YA08S	430	101	49.5	126	106	13	80	F07	70	4-M8	17x17	19	5.3
YA10S	500	129	61.5	148	128	19	80	F07/F10	70/102	4-M8/M10	22x22	26	9.5
YA12S	606	151	71.5	174	154	19	80	F07/F10	70/102	4-M8/M10	22x22	26	17.6
YA14S	682	164	77	192	172	24	80	F10/F12	102/125	4-M10/M12	27x27	30	23.9
YA17S	781	188	89	216	196	24	80	F14	140	4-M16	36x36	30	36.6
YA20S	982	231	115	284	254	36	130	F16	165	4-M20	46x46	60	77.2
YA25S	1108	301	152	335	305	36	130	F16	165	4-M20	46x46	60	119.6
YA30S	1344	360	170	408	378	36	130	F16/F25	165/254	4-M20/8-M16	55x55	60	275.5

Dimension Table



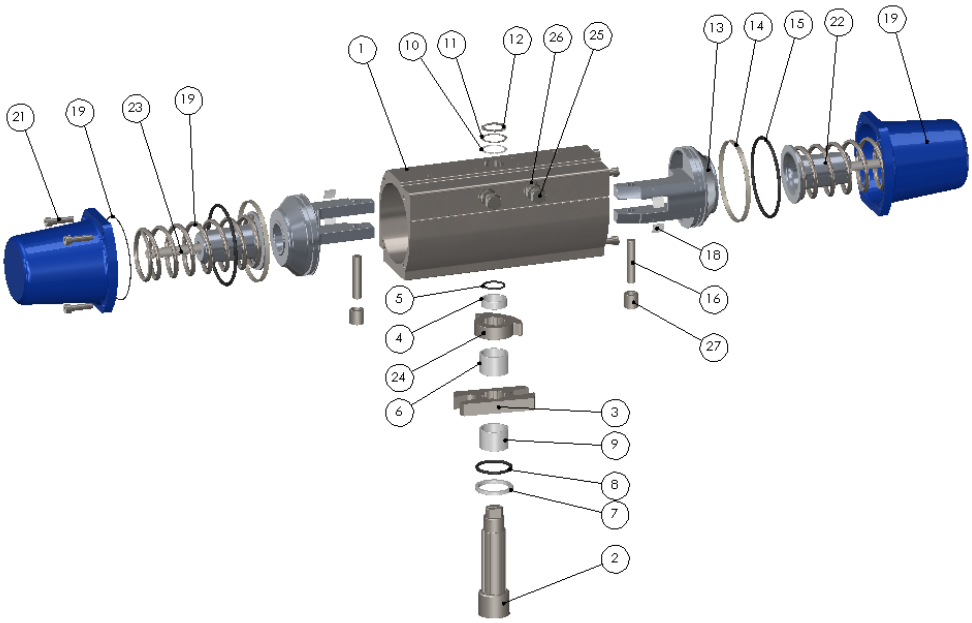
SIZE	ISO. BASE	L	D	D1	D2	H	H1	H2	H3	PCDØ	N-H	ØdxDp	Key	CHx-Dp	A	RCT	CHx-Dp	A	RCT
YC10D	F07/F10	313.5	129	62.5	55.5	128	64	64	20	Ø70 / Ø102	4-M8/M10	-	-	□22x26	80	43104	□22x26	80	1/4
YC12C	F07/F10	374	151	71.5	69	153.5	77	76.5	20	Ø70 / Ø102	4-M8/M10	-	-	□22x26	80	43104	□22x26	80	1/4
YC14D	F10/F12/*F14	443	164	87.5	77	172	86	86	20	Ø102 / Ø125	4-M10/M12	-	-	□27x30	80	43104	□27x45	80	1/4
YC17D	F14/*F16	511	188	97.5	89	196	98	98	20	Ø140	4-M16	-	-	□36x30	80	43104	□36x50	80	1/4
YC20D	F16/F25	618	231	115	104	255	128	127	30	Ø165/Ø254	8-M16/4-M20	-	-	□46x60	130	43104	□46x65	80	1/4
YC25D	F25	757	301	137	137	305	150	155	30	Ø254	4-M20	-	-	□46x60	130	43104	-	130	1/4
YC30D	F25	907	360	172	170	396.5	190	206.5	30	Ø254	4-M20	-	-	□46x60	130	43104	-	130	1/4
YC40D	F25	1048	520	300	210	512	257	235	20	Ø298	8-M20	Ø 90x80	25x14	-	130	43102	-	130	1/2
YC50D	F25	1910	625	310	315	777	420	329	20	Ø406	8-M36	Ø 180x200	45x22	-	130	43102	-	130	1/2



SIZE	ISO. BASE	L	D	D1	D2	H	H1	H2	H3	PCDØ	N-H	ØdxDp	Key	CHx-Dp	A	RCT	CHx-Dp	A	RCT
YC10S	F07/F10	497.1	129	62.5	55.5	128	64	64	20	Ø70 / Ø102	4-M8/M10	-	-	□22x26	80	43104	□22x26	80	1/4
YC12S	F07/F10	608	151	71.5	69	153.5	77	76.5	20	Ø70 / Ø102	4-M8/M10	-	-	□22x26	80	43104	□22x26	80	1/4
YC14S	F10/F12/*F14	682	164	87.5	77	172	86	86	20	Ø102/Ø125	4-M10/M12	-	-	□27x30	80	43104	□27x45	80	1/4
YC17S	F14/*F16	781	188	97.5	89	196	98	98	20	Ø140	4-M16	-	-	□36x30	80	43104	□36x50	80	1/4
YC20S	F16/F25	962	231	115	104	255	128	127	30	Ø165/Ø254	8-M16/4-M20	-	-	□46x60	130	43104	□46x65	80	1/4
YC25S	F25	1085	301	137	137	305	150	155	30	Ø254	4-M20	-	-	□46x60	130	43104	-	130	1/4
YC30S	F25	1344	360	172	170	396.5	190	206.5	30	Ø254	4-M20	-	-	□46x60	130	43104	-	130	1/4
YC40S	F25	2014	520	300	210	512	257	235	20	Ø298	8-M20	Ø 90x80	25x14	-	130	43102	-	130	1/2
YC50S	F25	2918	625	310	315	777	420	329	20	Ø406	8-M36	Ø 180x200	45x22	-	130	43102	-	130	1/2

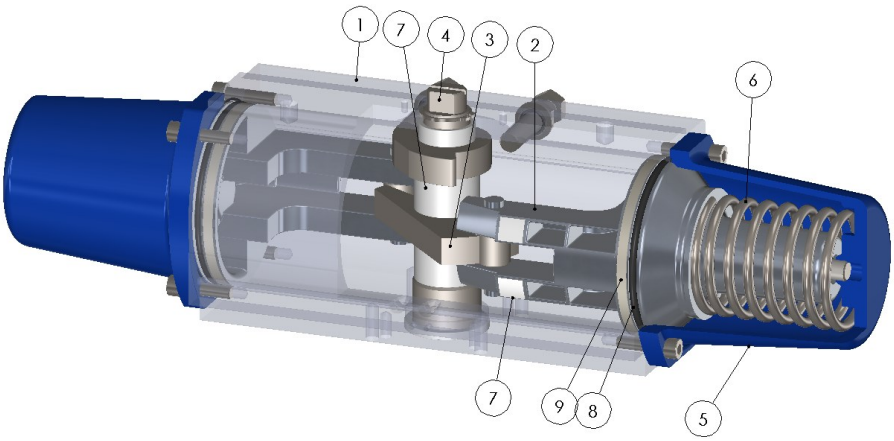
Part List

YA Type - Canted Scotch & Yoke



No.	Part Name	No.	Part Name
1	BODY	15	PISTON GUIDE-RING
2	SHAFT	16	PISTON PIN
3	CRANK	17	PISTON ROLLER
4	BUSHING (TOP)	18	PISTON PAD
5	BODY O-RING (TOP)	19	COVER
6	SHAFT ROLLER (TOP)	20	COVER O-RING
7	BUSHING (BOTTOM)	21	COVER BOLT
8	BODY O-RING (BOTTOM)	22	SPRING CAP
9	SGAFT ROLLER (BOTTOM)	23	SPRING
10	BODY WASHER (BOTTOM)	24	STOPPER
11	BODY WASHER (TOP)	25	STOPPER BOLT
12	BODY SNAP-RING	26	STOPPER O-RING
13	PISTON	27	STOPPER WASHER
14	PISTON O-RING	28	STOPPER NUT

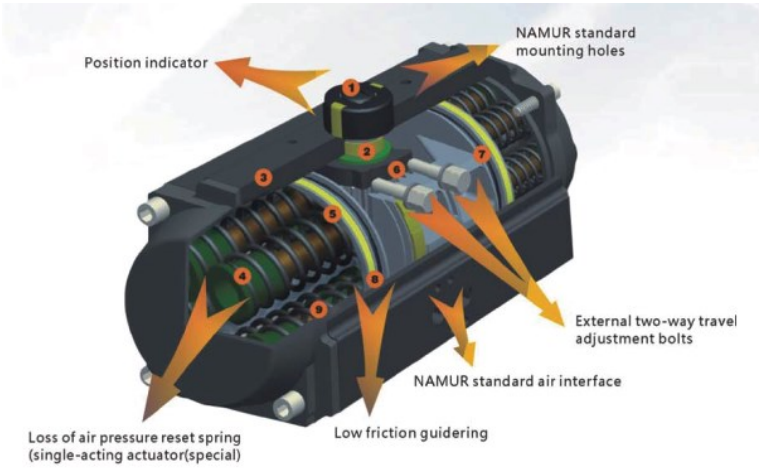
YC Type - Canted Scotch & Yoke



No.	Part Name
1	BODY
2	PISTON LINK
3	DISC
4	SPINDLE
5	SPRING CASE
6	SPRING
7	GUIDE
8	O-RING
9	WEAR RING

AO-3800 Rack & Pinion (RD Type)

Features & Benefits



IdicatorA

position indicator with Namur mounting is standard on all pneumatic actuators for mounting accessories.

Pinion

The hardened alloy steel pinion is precision ground and Nickel plated (over 15um) in order to reduce friction, provide maximum wear resistance. Full conformance with the newest standards of ISO 5211 & DIN 3337. The dimensions can be customized and as options, stainless steel and aluminum alloy are also available.

Pistons

The precisely-balanced and hard anodized treatment (over 30㎛) die cast aluminum pistons are fitted whit high quality rings and guides. The twin rack and piston design creates a constant torque output on all actuator.

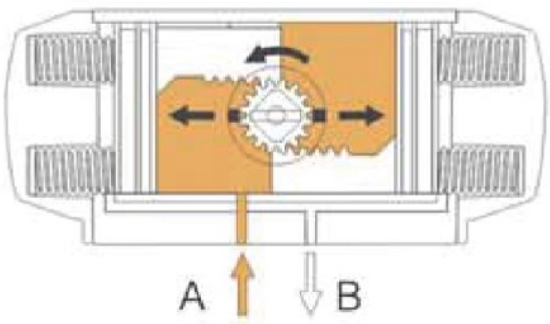
High Performance Spring

The high tensile steel springs are coated with epoxy coated for corrosion restistance and longer service. The preloaded springs can be safely & rapidly disassembled.

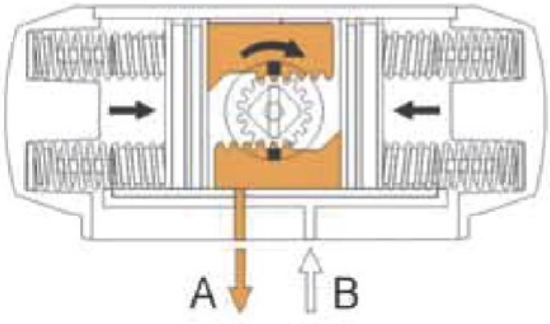
Travel Adjustment

The standard adjustment is ±5° in both the open closed positions through easily accessible external adjustment bolts.

3800 Operating Principle of double acting actuator



clockwiseAir to port A forces the pistons outwards, causing the piston to turn counter-clockwise while air is being exhausted from port B.



Air to port B forces the pistons inwards, causing the piston to turn clockwise while air is being exhausted from port A.

Torque Table (RD Type - Rack & Pinion)

Torque Table of Double Acting Actuator

Model	Air Supply Pressure (unit:bar)			
	3.0	4.0	5.0	6.0
	Air Torque Output(Nm)			
RP05D	12.0	16.0	20.0	24.0
RP06D	21.7	28.9	36.1	43.4
RP08D	42.8	57.0	71.3	85.5
RP10D	97.7	130.3	162.9	195.5
RP12D	173.3	231.0	288.8	346.5
RP14D	260.7	347.6	434.5	521.4
RP17D	397.2	529.6	662.0	794.4
RP18D	640.2	853.6	1067.0	1280.4
RP21D	789.8	1173.1	1466.4	1759.7
RP24D	1379.0	1838.6	2298.3	1757.9
RP30D	2289.1	3136.9	3984.7	4832.5
RP35D	3359.7	4479.6	5599.5	6194.4

Torque Table of Spring Return Actuator

Air Torque Output(Nm)												OutPut torque spring	
Air Supply Pressure (unit : bar)		2.5Bar		3Bar		4Bar		5Bar		6Bar			
Model	**Spring number**	**0°start**	**90°end**	**0°start**	**90°end**	**0°start**	**90°end**	**0°start**	**90°end**	**0°start**	**90°end**	**0°start**	**90°end**
RP05S	5	5.7	3.8	7.6	5.7							6.2	4.3
	6	4.9	2.5	6.9	4.5	10.9	8.5	14.0	10.4			7.4	5.0
	7	4.0	1.3	6.0	3.3	9.8	7.3	13.2	9.1	17.2	14.1	8.6	5.9
	8			5.2	2.0	9.2	6.0	12.3	7.9	16.3	12.8	9.9	6.7
	9			4.3	0.8	8.3	4.8	11.5	6.7	15.5	11.6	11.1	7.6
	10					7.4	3.6	10.6	5.4	14.6	10.4	12.4	8.5
	11					6.6	2.3	9.7	4.2	13.8	9.1	13.6	9.3
	12											14.8	10.2
RP06S	5	11.4	7.7	15.0	11.4	22.3	14.9					10.4	6.8
	6	10.1	5.7	13.6	9.3	20.9	16.6	28.3	23.9			12.5	8.2
	7	8.6	3.6	12.5	7.2	19.5	14.5	26.8	21.9			14.6	9.6
	8			10.9	5.1	18.2	12.4	25.5	19.8	32.8	27.0	16.7	10.9
	9					16.8	10.4	24.1	17.7	31.4	24.9	18.8	12.3
	10					1.4	8.2	22.8	15.6	30.0	22.8	20.9	13.7
	11							21.5	13.5	28.7	20.7	22.9	15.0
	12							20.0	11.4	27.3	18.6	25.0	16.4

Torque Table (RD Type - Rack & Pinion)

Torque Table of Spring Return Actuator

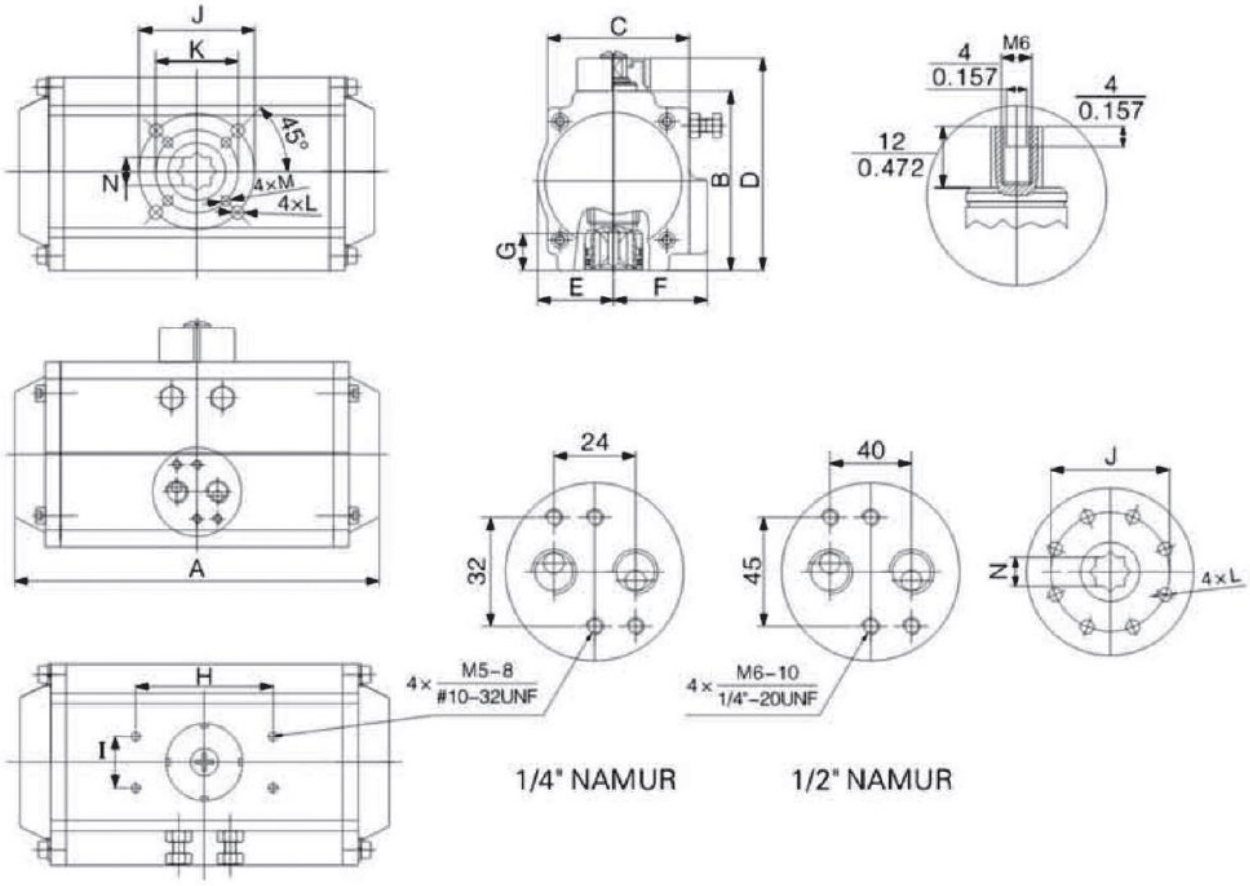
Air Torque Output(Nm)												OutPut torque spring	
Air Supply Pressure (unit : bar)		2.5Bar		3Bar		4Bar		5Bar		6Bar			
Model	Spring number	0˚start	90˚end	0˚start	90˚end	0˚start	90˚end	0˚start	90˚end	0˚start	90˚end	0˚start	90˚end
RP08S	5	23.3	16.1	31.1	24.0	16.8	39.7					23.0	15.8
	6	20.1	11.5	28.0	19.3	43.7	35.1	59.4	50.7			27.6	19.0
	7	17.0	6.9	24.8	14.8	40.5	30.5	56.2	46.2			32.3	22.1
	8			21.7	10.1	37.4	25.8	53.1	41.5	68.8	57.2	36.8	25.3
	9					34.2	21.3	49.9	37.0	65.6	52.6	41.4	28.5
	10					31.0	16.6	46.7	32.3	62.4	48.0	46.0	31.6
	11							43.6	27.7	59.3	43.4	50.6	34.8
	12							40.4	23.2	56.1	38.9	55.2	38.0
RP09S	5	33.1	22.0	44.2	33.2	66.8	55.9					34.4	23.3
	6	28.4	15.2	39.6	26.4	62.2	62.2	84.8	71.6			41.2	28.0
	7	23.8	8.2	34.9	19.4	57.5	57.5	80.2	64.7			48.1	32.7
	8			31.3	12.6	52.9	52.9	75.5	57.9	68.8	57.2	55.0	37.3
	9					48.2	48.2	70.9	51.0	65.6	52.6	61.9	42.0
	10					43.6	43.6	66.2	44.1	62.4	48.0	68.7	46.7
	11							61.5	37.2	59.3	43.4	75.6	51.4
	12							56.8	30.4	56.1	38.9	82.5	56.0
RP10S	5	51.0	33.4	67.5	49.9	100.6	83.0					49.2	31.6
	6	44.7	23.5	61.1	40.0	94.2	73.2	127.3	106.2			59.1	38.0
	7	38.4	13.7	54.9	30.3	87.9	63.4	121.0	96.4			68.9	44.3
	8			48.5	20.4	81.6	53.5	114.7	86.5	147.7	119.6	78.7	50.6
	9					75.3	43.7	108.4	76.8	141.5	109.8	88.6	56.9
	10					68.9	33.4	102.0	66.5	135.1	99.6	98.4	63.3
	11							95.7	57.0	128.7	90.1	108.3	69.6
	12							89.4	47.5	122.5	80.6	118.1	75.9
RP12S	5	73.0	47.0	98.0	72.0	148.0	122.0					79.0	52.0
	6	62.0	31.0	88.0	56.0	127.0	107.0	188.0	157.0			94.0	63.0
	7	52.0	15.0	77.0	40.0	117.0	90.0	178.0	141.0			110.0	73.0
	8			67.0	25.0	107.0	75.0	167.0	125.0	217.0	176.0	125.0	84.0
	9					96.0	59.0	157.0	109.0	207.0	159.0	141.0	94.0
	10						44.0	146.0	94.0	196.0	144.0	157.0	105.0
	11							136.0	78.0	186.0	128.0	173.0	115.0
	12							125.0	63.0	176.0	113.0	188.0	125.0
RP14S	5	128.0	85.0	171.0	127.0	256.0	213.0					129.0	86.0
	6	111.0	59.0	154.0	102.0	239.0	187.0	325.0	273.0			155.0	103.0
	7	94.0	33.0	137.0	76.0	222.0	162.0	308.0	247.0			181.0	120.0
	8			120.0	50.0	205.0	136.0	291.0	221.0	376.0	307.0	206.0	137.0
	9					187.0	110.0	273.0	196.0	358.0	281.0	232.0	155.0
	10					170.0	84.0	256.0	169.0	341.0	255.0	258.0	172.0
	11							238.0	143.0	324.0	229.0	284.0	189.0
	12							221.0	118.0	307.0	203.0	310.0	206.0

Torque Table (RD Type - Rack & Pinion)

Torque Table of Spring Return Actuator

Air Torque Output(Nm)												OutPut torque spring	
Air Supply Pressure (unit : bar)		2.5Bar		3Bar		4Bar		5Bar		6Bar			
Model	Spring number	0°start	90°end	0°start	90°end	0°start	90°end	0°start	90°end	0°start	90°end	0°start	90°end
RP17S	5	193.0	124.0	259.0	191.0	392.0	324.0					208.0	140.0
	6	165.0	83.0	232.0	149.0	365.0	282.0	498.0	415.0			250.0	168.0
	7	137.0	41.0	203.0	107.0	336.0	240.0	469.0	373.0			282.0	196.0
	8			176.0	66.0	309.0	199.0	442.0	237.0	575.0	465.0	33.0	223.0
	9					280.0	157.0	413.0	290.0	546.0	423.0	375.0	251.0
	10					253.0	115.0	386.0	248.0	519.0	381.0	417.0	279.0
	11							358.0	207.0	491.0	340.0	458.0	307.0
	12							330.0	165.0	463.0	298.0	500.0	335.0
RP21S	5	390.0	285.0	523.0	418.0	789.0	684.0					380.0	275.0
	6	335.0	209.0	468.0	342.0	734.0	608.0	1000.0	874.0			456.0	330.0
	7	280.0	133.0	413.0	266.0	679.0	532.0	945.0	798.0			532.0	385.0
	8			358.0	190.0	624.0	456.0	890.0	722.0	1156.0	988.0	608.0	440.0
	9					569.0	380.0	835.0	646.0	1101.0	912.0	684.0	495.0
	10					514.0	304.0	780.0	570.0	1046.0	836.0	760.0	550.0
	11							725.0	494.0	991.0	760.0	836.0	605.0
	12							670.0	418.0	936.0	684.0	912.0	660.0
RP24S	5	552.0	409.0	744.0	600.0	1129.0	985.0					554.0	410.0
	6	470.0	297.0	662.0	489.0	1047.0	874.0	1432.0	1259.0			665.0	492.0
	7	388.0	187.0	580.0	379.0	964.0	764.0	1349.0	1149.0			775.0	575.0
	8			498.0	268.0	883.0	653.0	1267.0	1037.0	1652.0	1422.0	886.0	656.0
	9					800.0	542.0	1185.0	926.0	1569.0	1311.0	998.0	739.0
	10					718.0	431.0	1103.0	816.0	1488.0	1201.0	1108.0	821.0
	11							1021.0	705.0	1406.0	1090.0	1219.0	903.0
	12							939.0	594.0	1323.0	979.0	1330.0	985.0
RP30S	5	1097.0	729.0									1061.0	730.0
	6	935.0	494.0	1316.0	875.0							1273.0	876.0
	7	772.0	258.0	1153.0	639.0	1916.0	1402.0					1485.0	1022.0
	8			991.0	403.0	1754.0	1166.0	2517.0	1929.0			1697.0	1168.0
	9					1592.0	930.0	2355.0	1693.0	3118.0	2456.0	1909.0	1314.0
	10					1430.0	695.0	2193.0	1458.0	2956.0	2221.0	2122.0	1460.0
	11							2030.0	1222.0	2793.0	1985.0	2334.0	1606.0
	12							1868.0	986.0	2631.0	1749.0	2546.0	1752.0
RP35S	5	1553.0	964.0									1702.0	1173.0
	6	1292.0	586.0	1863.0	1157.0							2043.0	1408.0
	7	1031.0	208.0	1602.0	779.0	2745.0	1922.0					2383.0	1642.0
	8			1341.0	401.0	2484.0	1544.0	3626.0	2686.0			2724.0	1877.0
	9					1963.0	1165.0	3336.0	2307.0	4508.0	3449.0	3064.0	2112.0
	10						787.0	3105.0	1929.0	4247.0	3071.0	6405.0	2346.0
	11							2844.0	1551.0	3986.0	2693.0	3745.0	2581.0
	12							2584.0	1172.0	3726.0	2314.0	4086.0	2816.0

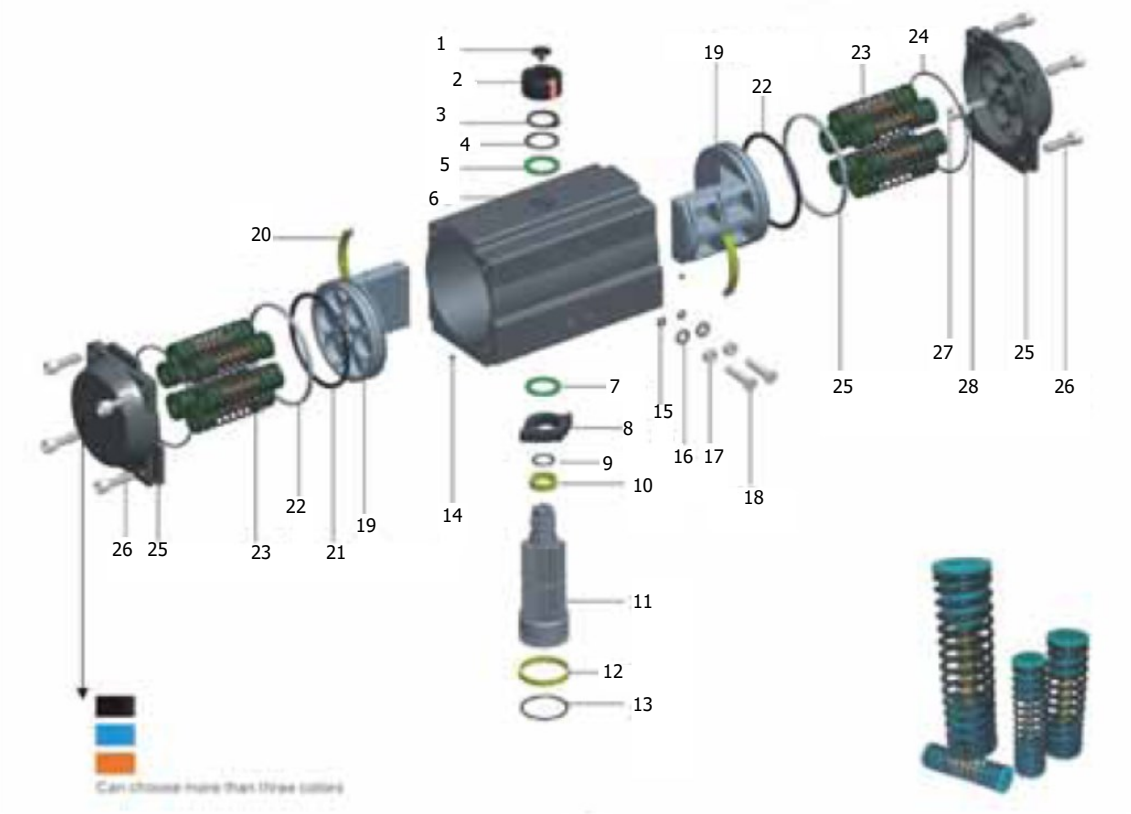
Dimension Table



Model	A	B	C	D	E	F	G	H	I	N	J	K	L	M	Air Connection
RP05 S/D	147	72.8	60.5	92	26	41.5	14	80	30	11	F05	F03	M6 x 10	M5 x 7.5	1/4″
RP06 S/D	170	90.5	70	110	33.5	47	17	80	30	14	F07	F05	M8 x 13	M6 x 7.5	1/4″
RP08 S/D	206	109	86	129	40	57	20	80	30	14	F07	F05	M8 x 13	M6 x 10	1/4″
RP10 S/D	268	135	104.8	155	52	64	26	80	30	17	F10	F07	M10 x 16	M8 x 13	1/4″
RP12 S/D	298	157	120	185	60	74.5	25	80	30	22	F10	F07	M10 x 16	M8 x 13	1/4″
RP14 S/D	398	174	125	204	65	77	30	130	30	27	F12	F10	M12 x 20	M10 x 16	1/4″
RP16 S/D	456	198.5	143	229	74	87	30	130	30	27	F12	F10	M12 x 20	M10 x 16	1/4″
RP20 S/D	536	265	194	295	97	113	43	130	30	36	F14	-	M16 x 20		1/4″
RP25 S/D	620	290	223	320	115	130	50	130	30	46	F16	-	M20 x 25		1/4″
RP30 S/D	784	354	335	384	162	173	50	130	30	46	F16	-	M20 x 25		1/2″
RP35 S/D	845	410	385	440	190	195	50	130	30	46	F16	-	M20 x 25		1/2″

Part List

RD Type - Rack & Pinion



No.	Name	No.	Name
1	Indicator screw	14	Plug
2	Indicator	15	Stroke Bolt O-Ring
3	Circlip	16	Stroke Bolt Washer
4	Gasket	17	Stroke Bolt Retaining Nut
5	Gasket	18	Stroke Bolt
6	Actuator body	19	Piston
7	Thrust Bearing (Pinion)	20	Piston Guide
8	Stroke Cam	21	Piston Bearing
9	Ring(Top Pinion)	22	Piston Seal
10	Bearing (Top Pinion)	23	Spring(Cartridge)
11	Pinion	24	End Cap Seals
12	Bearing(Lower Pinion)	25	End Cap
13	O-Ring(Lower Pinion)	26	End Cap Bolts

Warranty / Remedy

Korea Motoyama Inc. warrants goods of its manufacture as being free of defective materials and faulty workmanship for 12 months from the date of shipment, unless otherwise specified. In this period, all of our products claimed by original defects may be returned to our factory after notice and authorization by us. If warranted goods are returned to Korea Motoyama Inc. during the period of coverage, it will be repaired or replaced without charge for those items it finds defective. Such defects shall be exclusive of the effects of corrosion, erosion, normal wear or improper handling and storage. In case our engineers have field service, the user shall detach and install valves by his cost. Determination of the suitability of the Products for the use contemplated by the buyer or buyer's customer(s) is the sole responsibility of the buyer in connection therewith. The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose.

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