Sy-Pa Pneumatic Actuator

Installation / Operation

& Maintenance Manual

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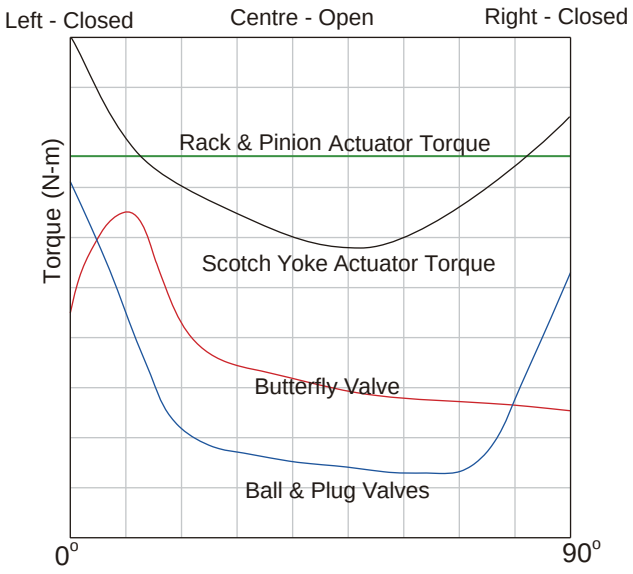
Features & Benefits :

- ► Both on/off and modulating applications.
- ► Light weight & Compact Design.
- ► Double Acting & Spring Return Configurations.
- ► Pre-tensioned Springs for Safety.
- ► High Torque at the end-of-stroke positions.
- ► Connections and mounting according to ISO5211.
- ► High efficiency, Low Air Comsumption.
- ► Housing in anodized aluminum.



< Valve / Actuator Torque Graph >

ISO Mounting Design :

- ► ISO 5211 for Valve Flange or Mounting Bracket.
- ► VED 3845 (NAMUR) for Solenoid Valve / Switch Box and Positioner.

Operating Media :

► Sy-Pa Pneumatic Actuators can be used with a 4-8 kg/cm2 range of air supply Pressure.
Standard air supply pressure is 5.5 kg/cm2

APD (Double Acting) : Pmax 8 bar (116 psi)
APS (Spring Return) : Pmax 7 bar (110 psi)

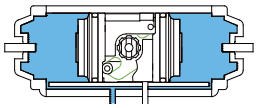
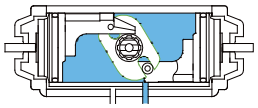
► Filtered insert Gas or Air must be used, and exhaust Air must be passed through silencer beforebeing vented into the atmosphere. The dew point shall be equal to - 20 °C or at least, 10 °C belowthe ambient temperature (ISO 8573 Part1, Class 3).

► The maximum particle size shall not exceed 40 µm (ISO 8573 Part1, Class 5).
Maximum pressureshall be 0.8 Mpa (8 bar) and the minimum design pressure for pressurized parts shall be 1.5 timesthe maximum operating pressure.

2. AIR CONSUMPTION

►The air consumption of actuator is calculated by below Figure.
The air consumption is based on 1 action of used valve and calculates consumption per an hour.

Double Acting Actuator ► V = (B + A) x N	V = Air Consumption (Liter) A = Volume "A" B = Volume "B" N = Number of Operating
Spring Return Actuator ► V = B x N	

Fail Close	
	
Close A port	Close B port

At 4 Bar (Unit : Liter)

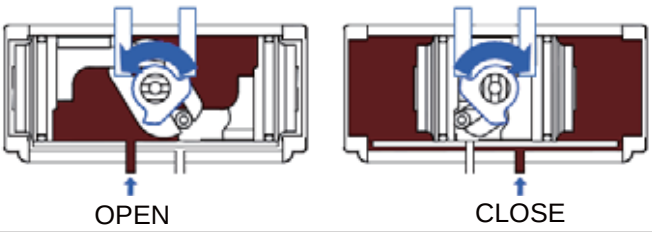
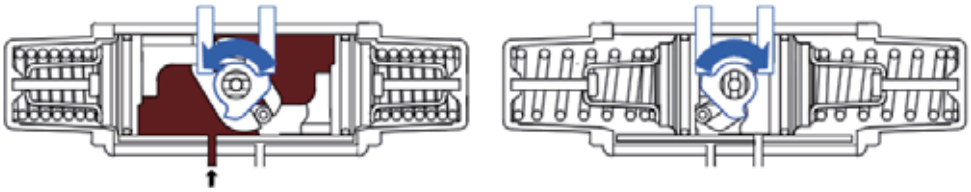
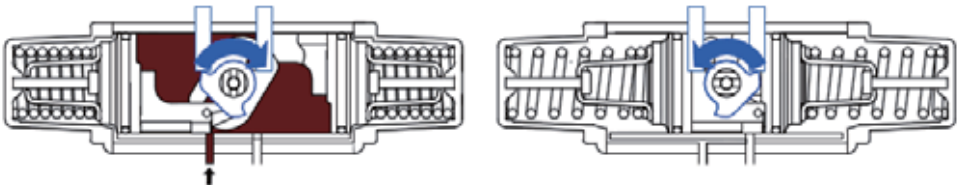
DOUBLE ACTING			SPRING RETURN		RACK PINION (D/A)		
MODEL	A	B	MODEL	B	MODEL	A	B
APD50	0.13	0.11	APS50	0.11	APx32R	0.05	0.03
APD65	0.25	0.24	APS65	0.24	APx40R	0.09	0.05
APD80	0.54	0.48	APS80	0.48	APx50R	0.15	0.10
APD100	0.97	0.86	APS100	0.86	APx65R	0.26	0.16
APD125	1.47	1.28	APS125	1.28	APx80R	0.52	0.33
APD140	1.67	1.45	APS140	1.45	APx90R	0.78	0.52
APD160	4.76	3.60	APS160	3.60			
APD210	5.62	4.83	APS210	4.83			

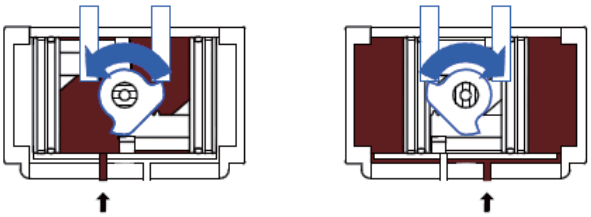
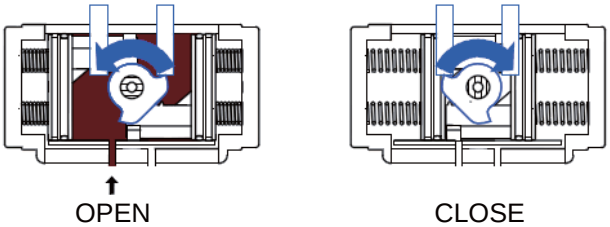
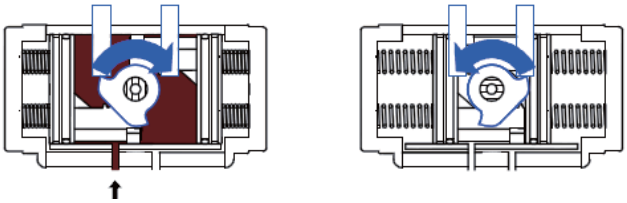
3. LUBRICATION REQUIREMENTS

► The Factory Lubricated for the life of the actuator so Sy-Pa Pneumatic Actuator generally do not require Lubrication, however, oil mist Lubrication is recommended for actuator which has performed more than 100,000 Operation cycles.

►Recommended Lubrication Grease :

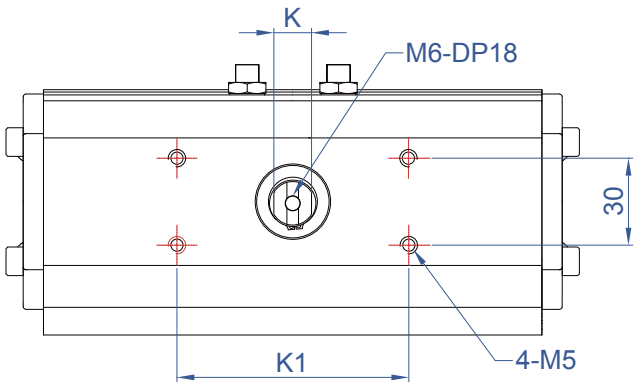
Parts	Actuator Version	Grease
Cylinder Bore, Shaft Sealings	Standard Temperature	Dark Brown Grease ALVANI A RL2/DC111
Cylinder Bore, Shaft Sealings	Low / High Temperature (-20 ~ +200 °C)	White Grease DC111 (DOWCORNING)

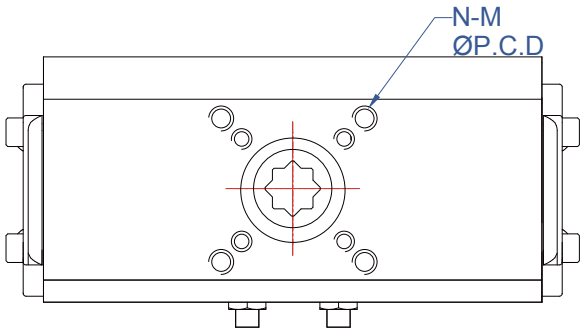
Scotch-Yoke Type		
Double acting	Action A	 OPEN CLOSE
Spring return	Action A (Fail open)	 OPEN CLOSE
	Action B (Fail close)	 CLOSE OPEN

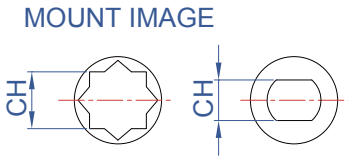
Rack Pinion Type		
Double acting	Action A	 OPEN CLOSE
Spring return	Action A (Fail open)	 OPEN CLOSE
	Action B (Fail close)	 CLOSE OPEN

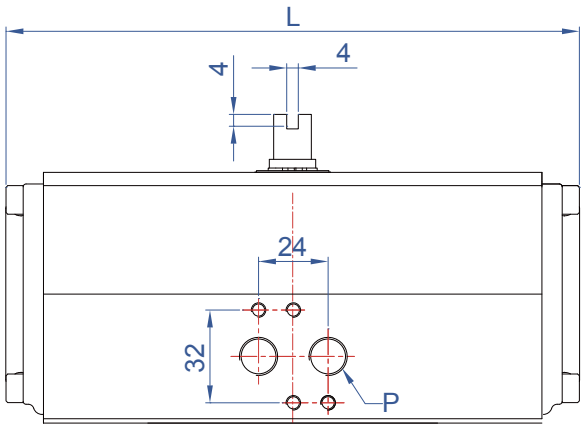
5. DIMENSIONS :

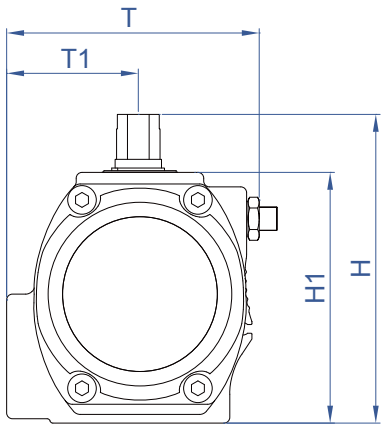
► APD Series





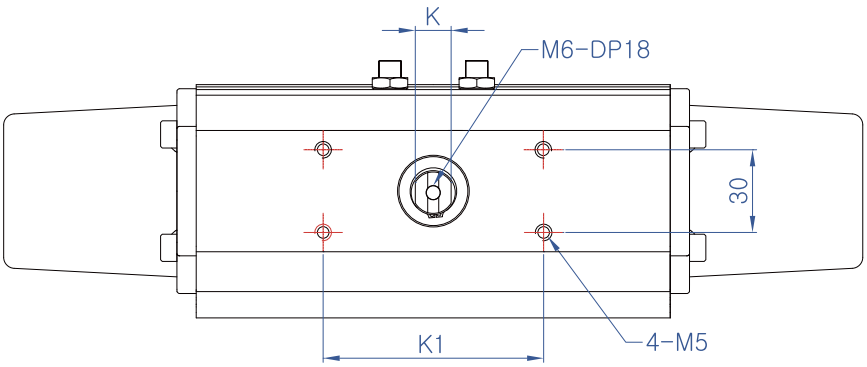


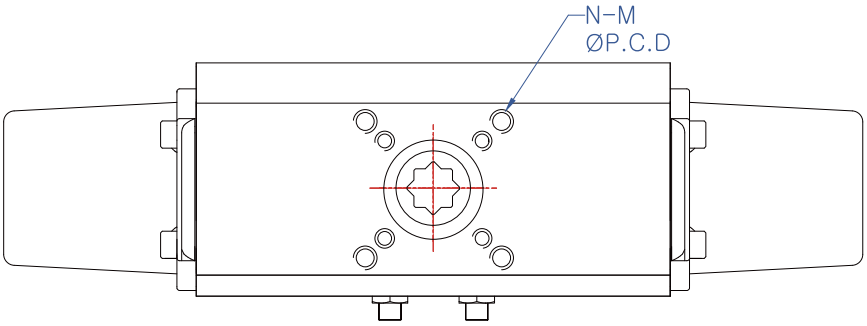


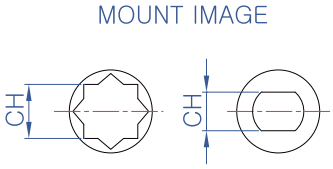


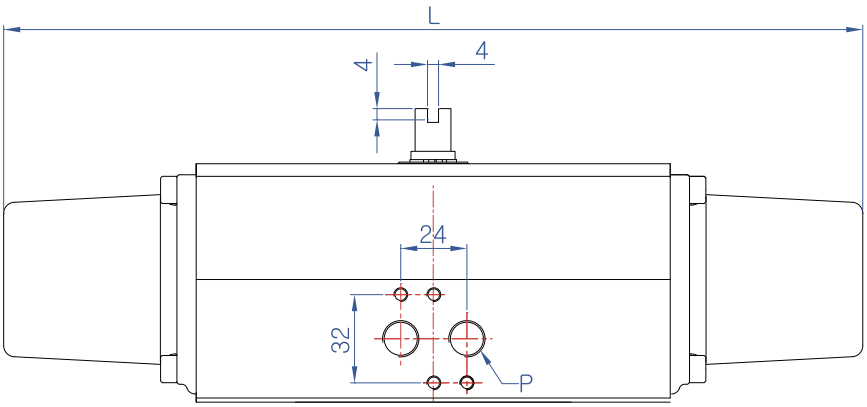
MODEL	K1	K2	ISO	P.C.D( )	N-G	K	L	T	T1	H	H1	CH	DTH	W(Kg)
APD50	80	30	F03/F05/F07	36/50/70	4-M5/M6/M8	10	162	75	40	90	70	11*11	13	1.6
												14*14	14	
												9.7* 15	14	
APD65	80	30	F05/F07	50/70	4-M6/M8	13	198	89	46	106	87	14*14	17	2.7
												11.7*17	17	
												9.7*15	14	
APD80	80	30	F07	70	4-M8	17	262	101	49.5	126	106	17*17	19	4.3
												14.7*19	20	
APD100	80	30	F07/F10	70/102	4-M8/M10	22	311	129	61.5	148	128	22*22	26	7.5
												17.7*22	27	
APD125	80	30	F07/F10	70/102	4-M8/M10	22	390	151	72	174	154	22*22	26	11.6
APD210	130	30	F16	168	4-M20	36	605	231	115	284	254	46*46	60	47.2

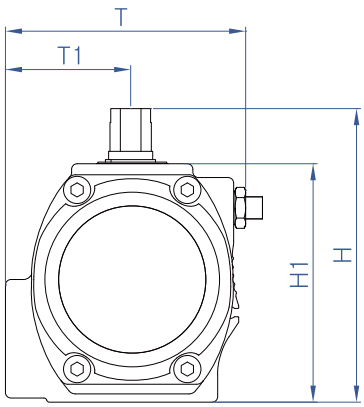
► APS Series





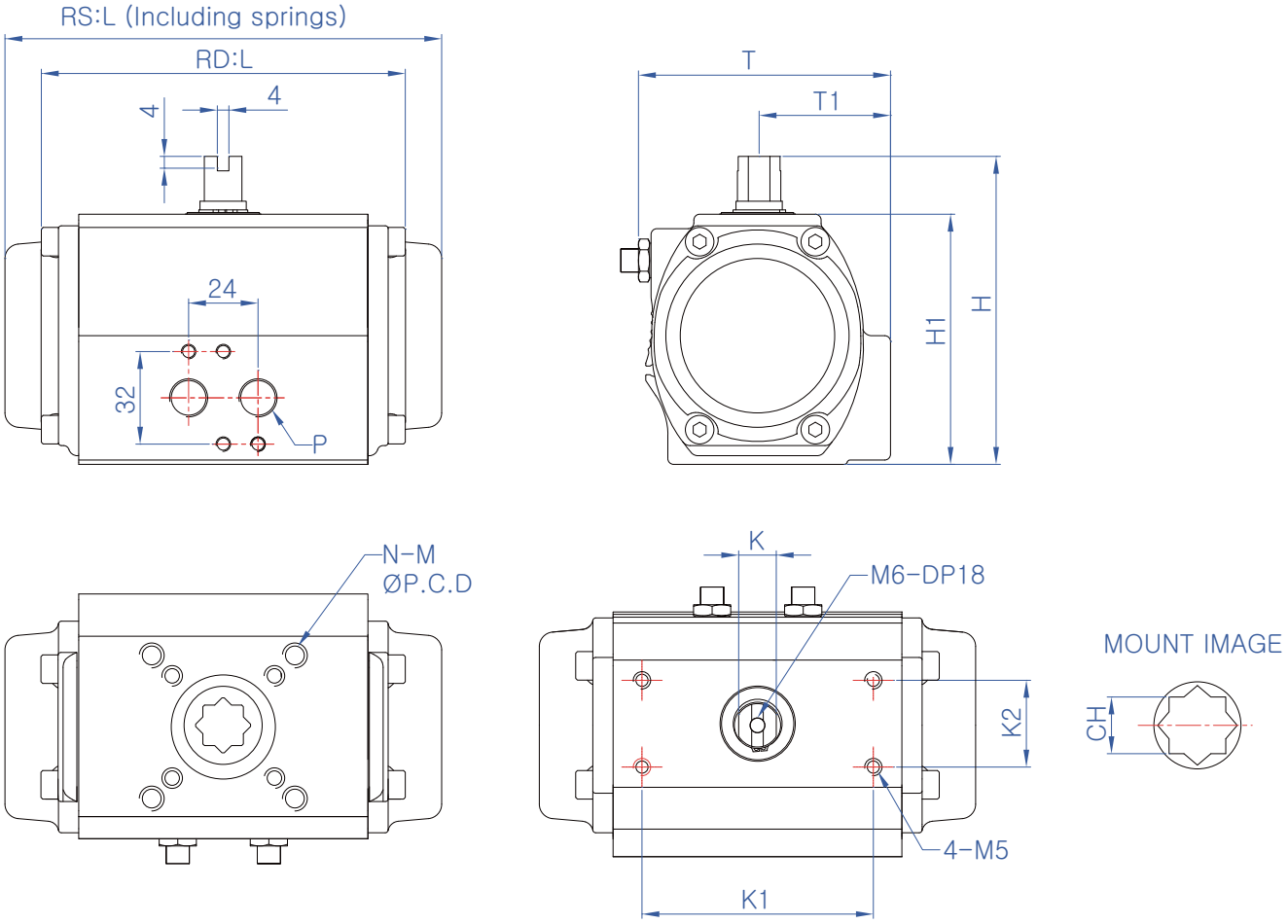






MODEL	K1	K2	ISO	P.C.D( )	N-G	K	L	T	T1	H	H1	CH	DTH	W(Kg)
APS50	80	30	F03/F05/F07	36/50/70	4-M5/M6/M8	10	257	75	40	90	70	11*11	13	1.7
												14*14	14	
												9.7* 15	14	
APS65	80	30	F05/F07	50/70	4-M6/M8	13	314	89	46	106	87	14*14	17	3.4
												11.7*17	17	
												9.7*15	14	
APS80	80	30	F07	70	4-M8	17	430	101	49.5	126	106	17*17	19	5.7
												14.7*19	20	
APS100	80	30	F07/F10	70/102	4-M8/M10	22	500	129	61.5	148	128	22*22	26	10.6
												17.7*22	27	
APS125	80	30	F07/F10	70/102	4-M8/M10	22	606	151	72	174	154	22*22	26	17.9
APS210	130	30	F16	168	4-M20	36	982	231	115	284	254	46*46	60	76.9

► APxR Series (Rack Pinion Type)



MODEL	K1	K2	ISO	P.C.D	N-G	K	L	T	T1	H	H1	CH	DTH	W(Kg)
APD32R	25.5	25.5	F03	36	4-M5	7	66	45	25	55	45	9*9	9	0.3
APD40R	50	25	F03/F05	36/50	4-M6/M8	9	109	60	33	74	54	9*9	9	0.6
APS40R														
APD50R	80	30	F03/F05/F07	36/50/70	4-M5/M6/M8	10	119	75	40	90	70	11*11	13	1.6
APS50R							133							1.3
APD65R	80	30	F05/F07	50/70	4-M6/M8	13	131	88.5	46	106.5	86.5	14*14	16	1.7
APS65R							154							2.1
APD90R	80	30	F07	70	4-M8	17	189	101	49.5	126	106	17*17	19	2.7
APS90R							101							3.4

6. TORQUE TABLE

APD Series Torque Table — Unit : N-m

MODEL	ANGLE	SUPPLY AIR									
		3 Bar		4 Bar		4.5 Bar		5 Bar		6 Bar	
		Air to Close	Air to Open	Air to Close	Air to Open	Air to Close	Air to Open	Air to Close	Air to Open	Air to Close	Air to Open
APD50	0	29	21	37	28	37	32	38	37	42	41
	45	15	16	20	21	22	23	25	26	30	31
	90	25	25	33	38	36	39	39	40	50	52
APD65	0	63	59	85	78	95	86	105	95	131	116
	45	33	38	45	49	51	56	57	63	68	73
	90	54	52	72	71	80	82	88	93	107	107
APD80	0	121	105	164	143	160	163	156	183	261	210
	45	65	69	84	92	98	106	112	121	130	144
	90	97	101	130	133	150	144	171	156	198	209
APD100	0	194	186	265	247	298	269	332	292	393	368
	45	110	127	147	165	166	180	185	196	237	250
	90	173	179	231	237	264	269	297	301	348	363
APD125	0	428	432	576	551	650	614	725	678	886	793
	45	255	273	339	360	382	401	425	443	513	531
	90	385	375	510	491	572	552	635	613	750	732
APD140	0	623	576	829	753	967	838	1,104	922	1,310	1,096
	45	333	331	450	455	514	518	579	582	691	668
	90	520	523	689	720	775	799	862	879	1,054	969
APD160	0	953	812	1,146	1,061	1,315	1,186	1,484	1,311	1,799	1,599
	45	540	569	730	757	824	853	919	948	1,109	1,132
	90	880	978	1,169	1,319	1,308	1,477	1,447	1,634	1,749	2,026
APD210	0	1,980	1,910	2,799	2,599	2,939	2,859	3,299	3,199	3,919	3,819
	45	1,100	1,149	1,459	1,499	1,709	1,749	1,919	1,949	2,299	2,399
	90	1,670	1,719	2,149	2,299	2,599	2,709	2,799	2,899	3,349	3,449

APS Series Torque Table — Unit : N-m

MODEL	ANGLE	SPRING TORQUE					
		WEAK (1~2 kgf/cm2G)		MIDDLE (2~3 kgf/cm2G)		STRONG (3~4 kgf/cm2G)	
		Spring to Close	Air to Open:3Bar	Spring to Close	Air to Open:4.5Bar	Spring to Close	Air to Open:6Bar
APS50	0	10	20	14	26	17	34
	45	9	9	12	12	15	15
	90	20	10	26	14	34	17
APS65	0	22	39	35	54	48	70
	45	18	18	23	28	37	32
	90	39	22	54	35	70	48
APS80	0	40	70	60	100	80	130
	45	30	30	50	50	70	70
	90	70	40	100	60	130	80
APS100	0	70	140	100	60	130	240
	45	50	50	80	80	110	110
	90	140	70	190	100	240	130
APS125	0	150	250	230	380	300	510
	45	130	130	190	190	260	260
	90	250	150	380	230	510	300
APS140	0	200	370	300	550	410	730
	45	170	170	290	290	340	340
	90	370	200	550	300	730	410
APS160	0	400	540	550	750	771	1,150
	45	290	290	420	420	560	560
	90	540	400	750	550	1,150	770
APS210	0	670	1,200	1,049	1,619	1,420	2,170
	45	560	560	939	939	1,260	1,260
	90	1,200	670	1,619	1,049	2,170	1,420

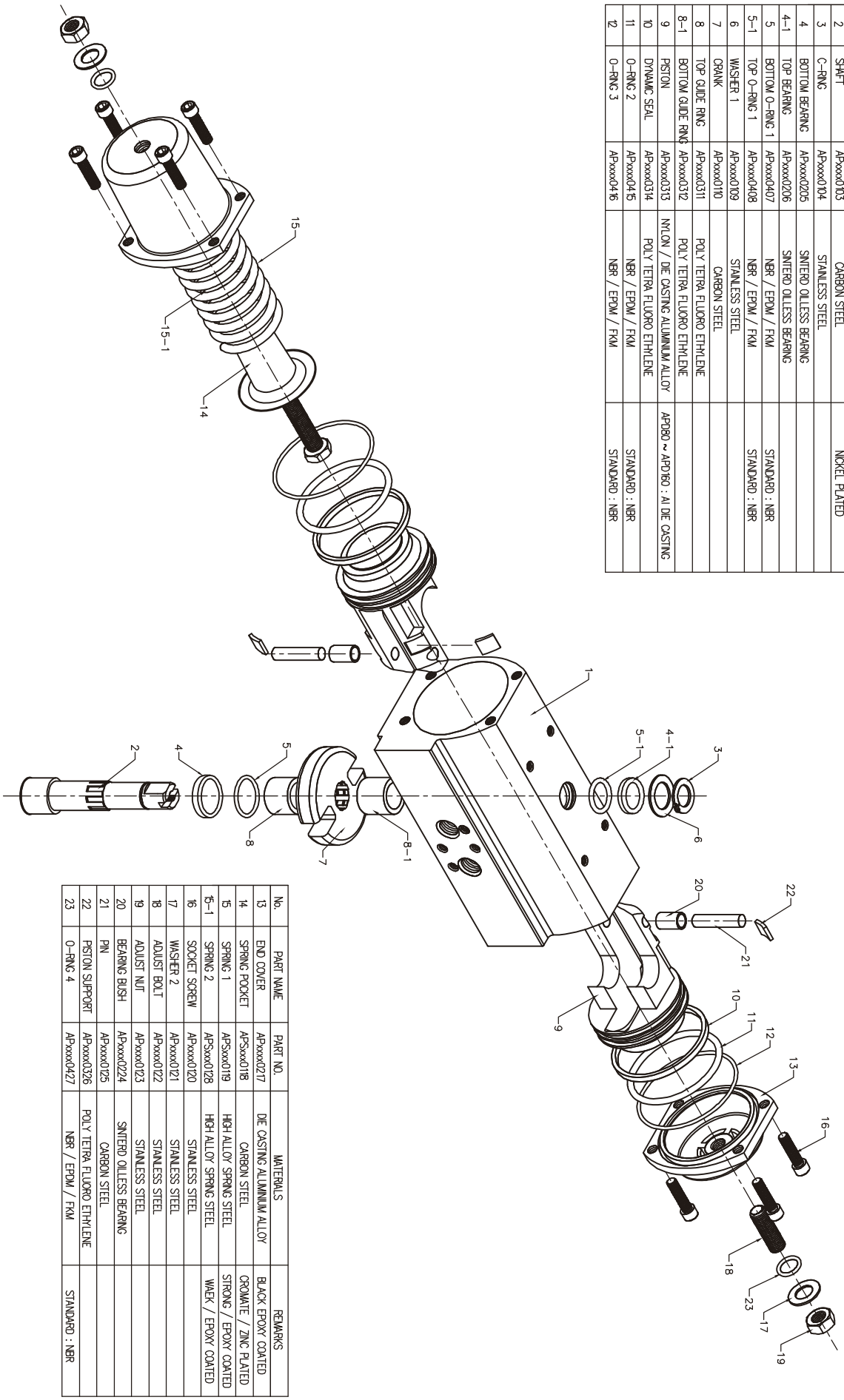
6. TORQUE TABLE

APD Series Torque Table (Rack-Pinion Type)					Unit : N-m
MODEL	SUPPLY AIR				
	3 Bar	4 Bar	5 Bar	5.5 Bar	6 Bar
APD32R	3.2	4.5	6.0	6.6	7.3
APD40R	5.0	7.0	9.0	10.0	11.0
APD50R	10.0	13.5	17.0	18.5	20.0
APD65R	17.0	24.0	30.0	33.0	36.0
APD90R	65.0	85.0	107.0	117.0	127

APS Series Torque Table (Rack-Pinion Type)														Unit : N-m
MODEL	SPRING	SUPPLY AIR													
		3 Bar		4 Bar		5 Bar		5.5 Bar		6 Bar		7 Bar		8 Bar	
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°
APS40R	1	2	-	4	2	6	4	7	6	8	7	10	8	12	9
	2	1	-	2	-	4	-	5	1	6	2	8	4	10	6
APS65R	5	12	9	17	14	22	20	25	23	28	26	34	32	41	38
	6	11	7	16	13	22	19	25	22	28	25	34	24	41	37
	7	10	5	15	11	21	17	24	20	27	23	33	29	40	35
	8	9	3	15	9	20	15	23	18	26	21	33	27	39	33
	9	7	1	13	7	19	13	22	16	25	19	31	25	39	31
	10	6	-	12	5	17	11	20	14	23	17	30	23	37	30
	11	5	-	11	4	17	10	19	13	23	16	29	22	35	29
	12	3	-	8	1	14	8	17	12	19	14	25	19	31	25
APS90R	5	51	40	71	60	92	82	103	95	115	105	137	126	158	150
	6	44	34	66	55	87	76	97	87	107	98	129	120	151	145
	7	42	30	64	51	86	73	97	84	107	96	129	117	150	142
	8	40	23	60	44	80	67	94	78	104	90	126	112	150	138
	9	36	17	57	38	83	62	91	72	102	82	124	108	147	129
	10	32	12	54	33	77	55	88	67	99	77	121	100	143	124
	11	31	6	53	28	75	51	86	61	97	72	119	96	142	119
	12	24	2	43	23	65	44	75	55	84	66	108	88	129	112

►APD / APS Series (Scotch-Yoke Type)

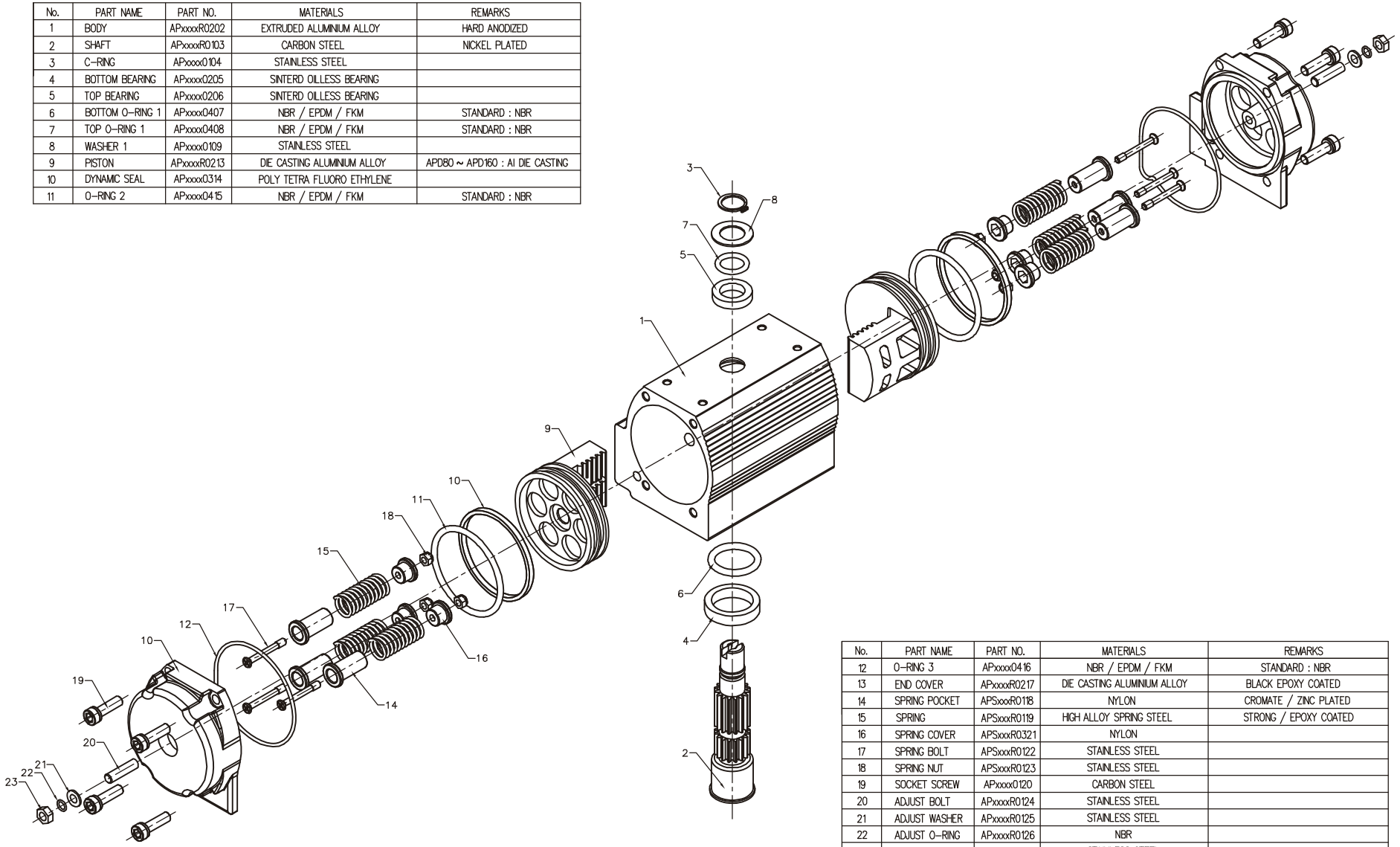
No.	PART NAME	PART NO.	MATERIALS	REMARKS
1	BODY	APxxxx0202	EXTRUDED ALUMINUM ALLOY	HARD ANODIZED
2	SHAFT	APxxxx0103	CARBON STEEL	NICKEL PLATED
3	C-RING	APxxxx0104	STAINLESS STEEL	
4	BOTTOM BEARING	APxxxx0205	SINTERD OILLESS BEARING	
4-1	TOP BEARING	APxxxx0206	SINTERD OILLESS BEARING	
5	BOTTOM C-RING 1	APxxxx0407	NBR / EPDM / FKM	STANDARD : NBR
5-1	TOP O-RING 1	APxxxx0408	NBR / EPDM / FKM	STANDARD : NBR
6	WASHER 1	APxxxx0109	STAINLESS STEEL	
7	CRANK	APxxxx0110	CARBON STEEL	
8	TOP GUIDE RING	APxxxx0311	POLY TETRA FLUORO ETHYLENE	
8-1	BOTTOM GUIDE RING	APxxxx0312	POLY TETRA FLUORO ETHYLENE	
9	PISTON	APxxxx0313	NYLON / DIE CASTING ALUMINUM ALLOY	APD80 ~ APD160 : Al DIE CASTING
10	DYNAMIC SEAL	APxxxx0314	POLY TETRA FLUORO ETHYLENE	
11	O-RING 2	APxxxx0415	NBR / EPDM / FKM	STANDARD : NBR
12	O-RING 3	APxxxx0416	NBR / EPDM / FKM	STANDARD : NBR



No.	PART NAME	PART NO.	MATERIALS	REMARKS
13	END COVER	APxxxx0217	DIE CASTING ALUMINUM ALLOY	BLACK EPOXY COATED
14	SPRING POCKET	APSxxx0118	CARBON STEEL	CROMATE / ZINC PLATED
15	SPRING 1	APSxxx0119	HIGH ALLOY SPRING STEEL	STRONG / EPOXY COATED
15-1	SPRING 2	APSxxx0128	HIGH ALLOY SPRING STEEL	WAEK / EPOXY COATED
16	SOCKET SCREW	APxxxx0120	STAINLESS STEEL	
17	WASHER 2	APxxxx0121	STAINLESS STEEL	
18	ADJUST BOLT	APxxxx0122	STAINLESS STEEL	
19	ADJUST NUT	APxxxx0123	STAINLESS STEEL	
20	BEARING BUSH	APxxxx0224	SINTERD OILLESS BEARING	
21	PIN	APxxxx0125	CARBON STEEL	
22	PISTON SUPPORT	APxxxx0326	POLY TETRA FLUORO ETHYLENE	
23	O-RING 4	APxxxx0427	NBR / EPDM / FKM	STANDARD : NBR

▲ APxR Series (Rack-Pinion Type)

No.	PART NAME	PART NO.	MATERIALS	REMARKS
1	BODY	APxxxxR0202	EXTRUDED ALUMINIUM ALLOY	HARD ANODIZED
2	SHAFT	APxxxxR0103	CARBON STEEL	NICKEL PLATED
3	C-RING	APxxxx0104	STAINLESS STEEL	
4	BOTTOM BEARING	APxxxx0205	SINTERD OILLESS BEARING	
5	TOP BEARING	APxxxx0206	SINTERD OILLESS BEARING	
6	BOTTOM O-RING 1	APxxxx0407	NBR / EPDM / FKM	STANDARD : NBR
7	TOP O-RING 1	APxxxx0408	NBR / EPDM / FKM	STANDARD : NBR
8	WASHER 1	APxxxx0109	STAINLESS STEEL	
9	PISTON	APxxxxR0213	DIE CASTING ALUMINIUM ALLOY	APD80 ~ APD160 : AI DIE CASTING
10	DYNAMIC SEAL	APxxxx0314	POLY TETRA FLUORO ETHYLENE	
11	O-RING 2	APxxxx0415	NBR / EPDM / FKM	STANDARD : NBR



No.	PART NAME	PART NO.	MATERIALS	REMARKS
12	O-RING 3	APxxxx0416	NBR / EPDM / FKM	STANDARD : NBR
13	END COVER	APxxxxR0217	DIE CASTING ALUMINIUM ALLOY	BLACK EPOXY COATED
14	SPRING POCKET	APSxxxR0118	NYLON	CROMATE / ZINC PLATED
15	SPRING	APSxxxR0119	HIGH ALLOY SPRING STEEL	STRONG / EPOXY COATED
16	SPRING COVER	APSxxxR0321	NYLON	
17	SPRING BOLT	APSxxxR0122	STAINLESS STEEL	
18	SPRING NUT	APSxxxR0123	STAINLESS STEEL	
19	SOCKET SCREW	APxxxx0120	CARBON STEEL	
20	ADJUST BOLT	APxxxxR0124	STAINLESS STEEL	
21	ADJUST WASHER	APxxxxR0125	STAINLESS STEEL	
22	ADJUST O-RING	APxxxxR0126	NBR	
23	ADJUST NUT	APxxxxR0127	STAINLESS STEEL	

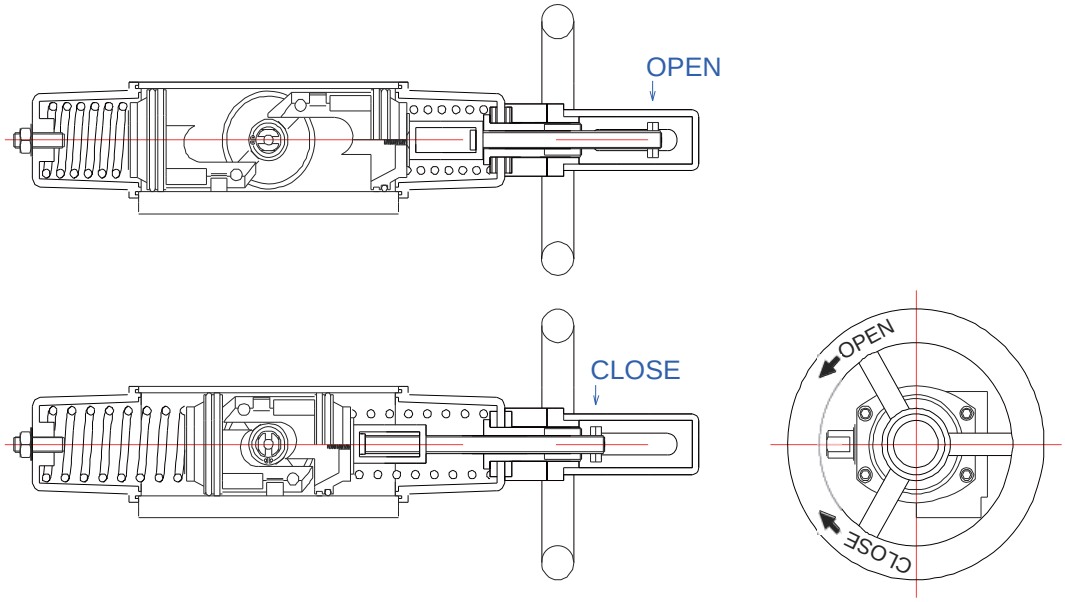
8. SIDE HAND-WHEEL (APD / APS Series)

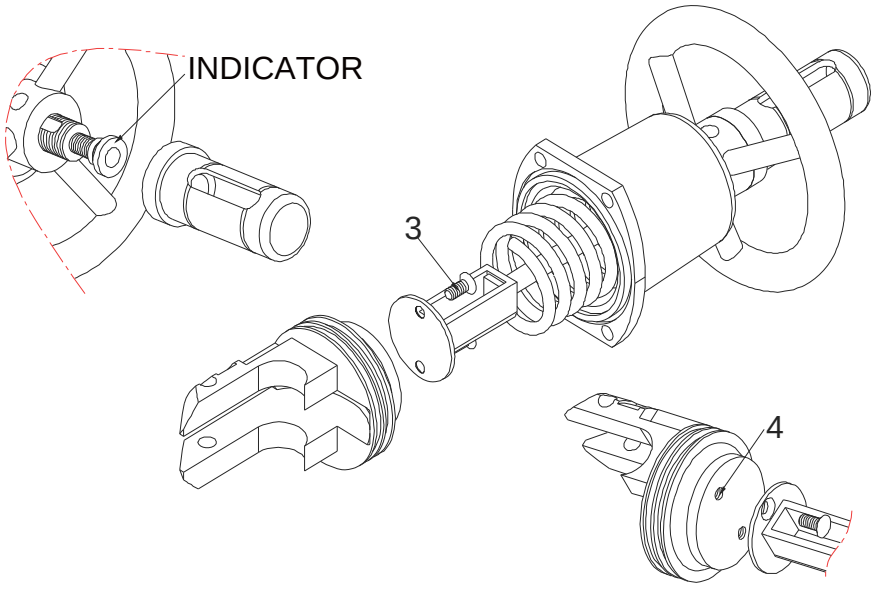
1. MANUAL OPEN

ROTATE HAND WHEEL BY CCW (COUNT-CLOCKWISE).
ROTATE WHEN INDICATE INDICATOR CAP's INDICATOR DOES OPEN POSITION.

2. MANUAL CLOSE

ROTATE HAND WHEEL BY CW (CLOCKWISE).
ROTATE WHEN INDICATE INDICATOR CAP's INDICATOR DOES CLOSE POSITION.





WARNING

Do not apply excessive force after OPEN & CLOSE.

9. TROUBLE SHOOTING

Status	Possible Reason	Recommended Action
Actuator doesn't work at all	Electric Power Line fails.	Check the incoming Voltage or Power Line
	Trouble in Solenoid Valve.	Check Voltage of Solenoid Coil
		When Coil is Ok, Check Operation of Spool Valve by using Manual Button.
	Blockage or Leak in Air Supply Line	Check Air Supply Line
Actuator is working but not smoothly.	Air Pressure is too low.	Increase supply air pressure.
	Blockage in air inlet/outlet lines by foreign material.	Take out foreign material in the line.
	Speed Controller is locked.	Open Speed Controller.
	Air Leakage through Piston Ring	Replace the Piston Ring.
	Actual Valve Torque is too high.	1) Increase air supply pressure 2) Replace with a larger Actuator
Valve doesn't open or close fully.	Stopper setting is wrong.	Set stopper again.
	Actual Valve Torque is too higher than Specification.	Replace with a larger Actuator.
Air Leakage.	Piston or Cover Bush o-ring is worn out.	Replace with a new o-ring