

6300RB 气动角行程式执行机构 Rotary Stem Motion Type Pneumatic Cylinder Actuators

概 要

该系列是一种外形小、高性能的执行机构，分为双动作和单动作两种，与角行程调节阀组合，可用于调节和开关的场合。

该系列也可用于其它回转装置的场合。

GENERAL

This Series provides double-acting and spring return pneumatic torque cylinder actuators characterized by small size and high-performance. Combined with rotary stem motion type control valves, the actuators of this Series are suited for modulating and on-off services. Uses with other rotary motion devices are also good.

标准规格 STANDARD SPECIFICATIONS

型 号 Series	6300RB
规 格 Size	双动作型 Double acting type : AT101 ~ AT701 单动作型 Spring return type : AT101 ~ AT701
输 出 方 式 Output type	角行程式 Rotary stem motion type
动 作 Function	双动作型 Double acting type、单动作型 Spring return type
输 出 力 矩 Output Torque	请参见表 1。 See Table 1.
气 源 压 力 Air supply	双动作型 Double acting type : 300 ~ 600 KPa G 单动作型 Spring return type : 300、400、500 or 600 KPa G
配 管 接 口 Air connection	请参见第 9 ~ 12 页。 See page 9 ~ 12.
回 转 角 度 Angle rotation	90 ° or 60 °
性 能 Performance	滞 后 : 带定位器时..... 1.5%FS 以内 直线性 : 带定位器时..... ± 2.0%FS 以内 Hysteresis : Less than 1.5% of full stroke with positioner Linearity : Less than ± 2.0% of full stroke with positioner
环 境 温 度 Ambient temperature	标准型 Standard type..... - 20 ~ + 80 高温型(选购) High temperature service (option)..... - 20 ~ + 100 低温型(选购) Low temperature service (option)..... - 40 ~ + 80
材 质 Materials	气 缸 Cylinder : 铝合金 Aluminum alloy 活 塞 Piston : 铝合金 Aluminum alloy 输 出 轴 Drive shaft : A105 镀镍 A105 Nickel plated 活 塞 环 Piston-ring : NBR or VITON 气 缸 盖 End-caps : 铝合金 Aluminum alloy 螺栓螺母 Bolts & nuts : 不锈钢 Stainless steel
表面涂层色 Painting	气 缸 CylinderAlodur (Special hard anodized) : Gray 气 缸 盖 End capChromatized + Polyester coated : Gray
附 件 Accessories	E / P 定位器、P / P 定位器、空气过滤减压阀、增压器、气控阀、限位开关、电磁阀、锁止阀、调速器、位置发送器等。 E / P Positioner, P / P Positioner, Air-set, Booster relay, Air-valve, Limit swith, Solenoid valve, Lock-valve, Speed controller, Position transmitter, etc.
选 购 设 备 Option	手动操作机构、特殊空气配管及特殊气接头、寒冷地区用、热带地区用、指定涂层色等。 Manual handwheel, Special air piping, Special air fitting, Low temperature service, High temperature service, Non-standard painting, etc.

图 1. 构造 (俯视图)

Fig. 1 CONSTRUCTION (TOP VIEW)

图 1-1 双动作型

Fig. 1-1 DOUBLE ACTING TYPE

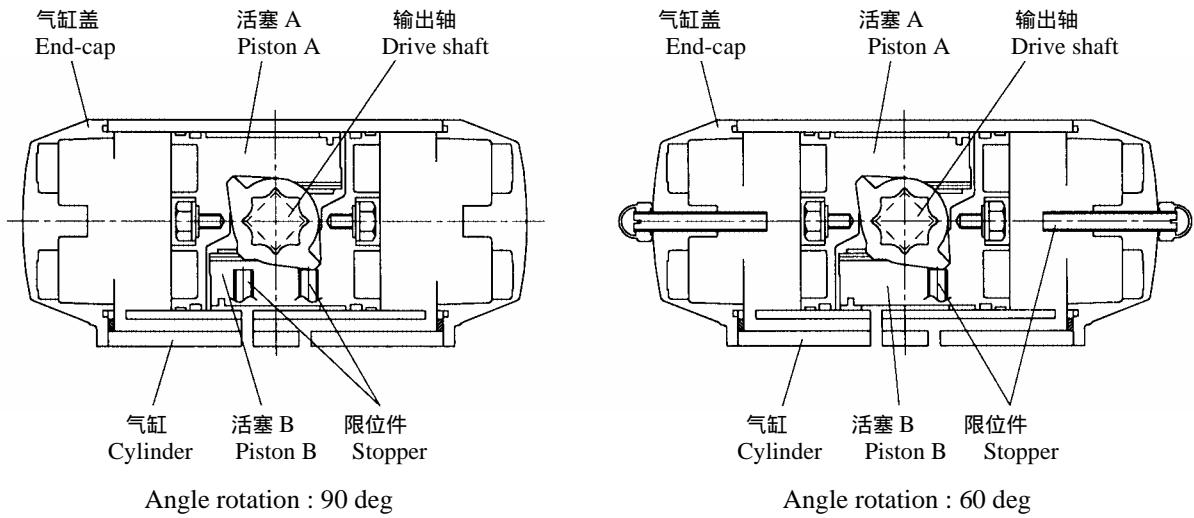


图 1-2 单动作型

Fig. 1-2 SPRING RETURN TYPE

图 1-2A 气压增加输出轴向右回转 (阀闭)

Fig. 1-2A AIR TO CLOCKWISE DRIVE SHAFT ROTATION (VALVE SHUT)

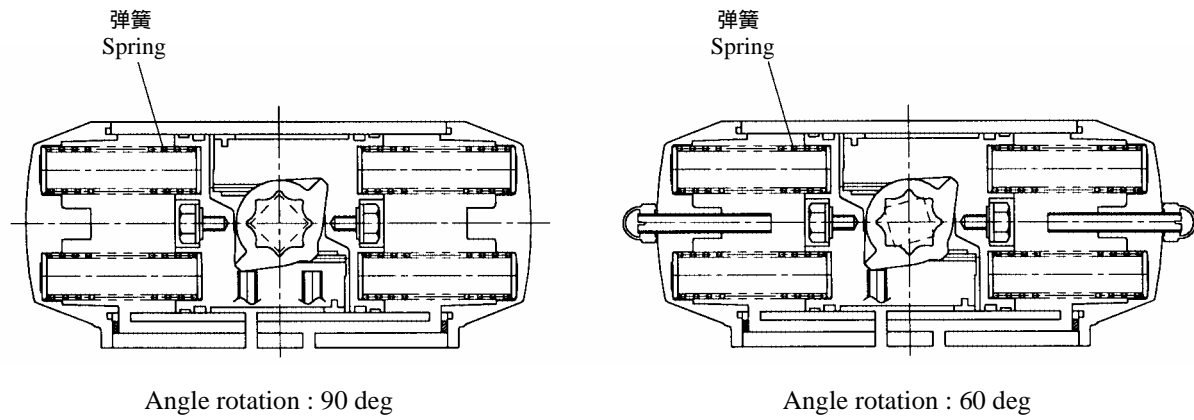


图 1-2B 气压增加输出轴向左回转 (阀开)

Fig. 1-2B AIR TO COUNTERCLOCKWISE DRIVE SHAFT ROTATION (VALVE OPEN)

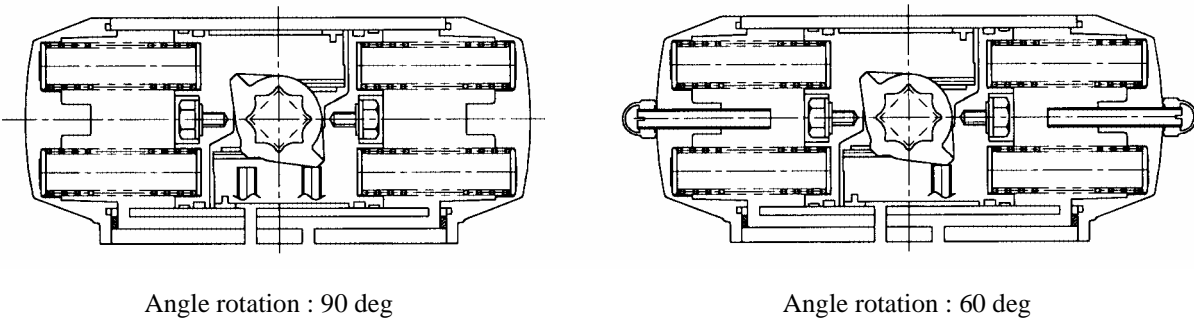


表 1. 输出力矩及重量

Table 1. OUTPUT TORQUE AND APPROXIMATE WEIGHT (WITHOUT ACCESSORIES)

执行机构 型号及尺寸 Actuator size and code	输出力矩 Output Torque (N · m)								重量 Approximate Weight (kg)			
	双动作型 Double acting type				单动作型 Spring return type				双动作型 Double acting type		单动作型 Spring return type	
	Air supply KPa G				Air supply KPa G				Without handwheel	With handwheel	Without handwheel	With handwheel
	300	400	500	600	300	400	500	600				
AT101 63B1RB	17.6	23.5	29.3	35.2	6.7	8.9	11.1	13.3	1.6	9.1	1.7	9.2
AT201 63B2RB	34.9	46.5	58.2	69.8	13.3	17.7	22.1	26.5	2.7	10.2	3.2	10.7
AT251 63BARB	54.9	73.2	91.5	110	20.3	27.0	33.8	40.5	3.8	11.3	4.4	11.9
AT301 63B3RB	79.8	106	133	160	30.4	40.5	50.7	60.8	5.4	12.4	6.6	13.6
AT351 63BBRB	129	172	215	258	49.2	65.6	82	98.4	8.5	15.5	9.9	16.9
AT401 63B4RB	166	222	277	332	63	84	105	126	10.2	17.2	12.6	19.6
AT451 63BCRB	261	348	435	522	99	132	165	198	14.5	26.5	18.1	31.1
AT501 63B5RB	340	454	567	681	135	180	224	269	19.8	31.8	24.0	37.0
AT551 63BDRB	459	613	766	919	175	234	292	351	25.0	47.0	31.6	62.6
AT601 63B6RB	638	851	1064	1276	255	340	425	510	35.5	57.5	45.1	76.1
AT651 63BERB	1072	1430	1787	2144	433	577	721	865	53.0	95.0	64.0	118
AT701 63B7RB	1556	2075	2594	3112	595	793	992	1190	83.0	125	102	156

图 2. 输出力矩特性 (气源压力 400 KPa G 时)

Fig. 2 TORQUE EXERTED WHEN AIR SUPPLY IS 400 KPa G

图 2-1 双动作型

Fig. 2-1 DOUBLE ACTING TYPE

图 2-2 单动作型

Fig. 2-2 SPRING RETURN TYPE

—— : 气压产生的力矩 Air to - - - - - : 弹簧产生的力矩 Spring return

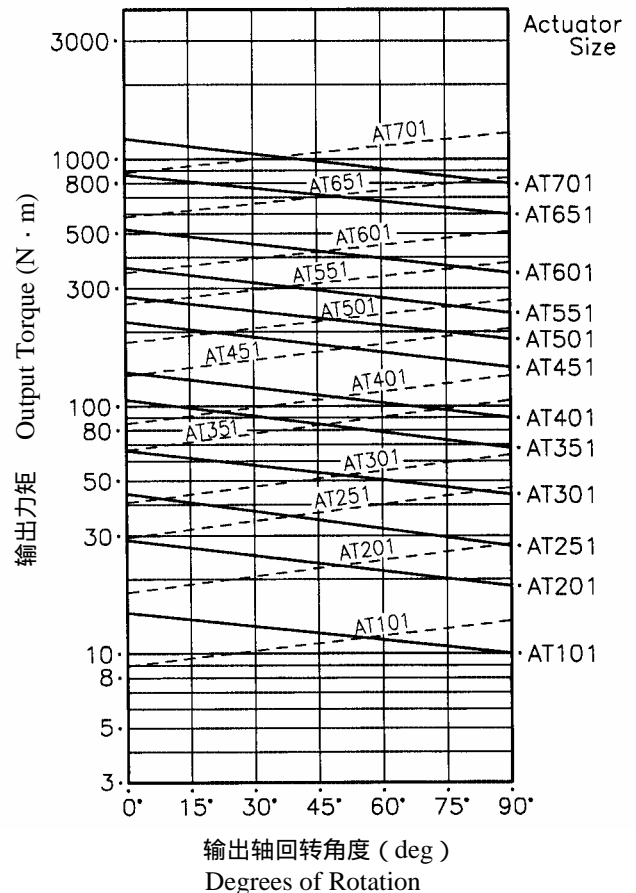
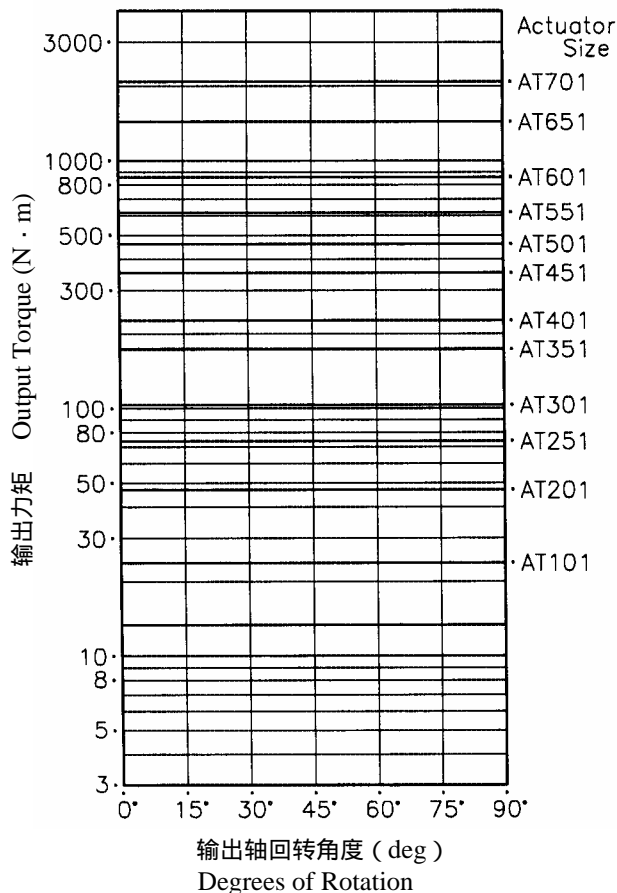


表 2. 气缸容量

Table 2. CYLINDER VOLUME

执行机构 型号及尺寸 Actuator size and code	双动作型 Double acting type			单动作型 Spring return type
	容量 Volume (l)			容量 Volume (l)
	A	B	A+B	A
AT101 63B1RB	0.16	0.26	0.42	0.16
AT201 63B2RB	0.31	0.49	0.80	0.31
AT251 63BARB	0.51	0.78	1.29	0.51
AT301 63B3RB	0.71	1.11	1.82	0.71
AT351 63BBRB	1.19	1.80	2.99	1.19
AT401 63B4RB	1.54	2.34	3.88	1.54
AT451 63BCRB	2.41	3.78	6.19	2.41
AT501 63B5RB	3.14	4.92	8.06	3.14
AT551 63BDRB	4.26	6.89	11.15	4.26
AT601 63B6RB	5.94	9.46	15.40	5.94
AT651 63BERB	10.0	15.2	25.2	10.0
AT701 63B7RB	14.5	21.4	35.9	14.5

*B = 气室 Cylinder B1 + 气室 Cylinder B2

A+B...活塞往复一次的容量 One Cycle for Piston

阀闭 Valve Shut 阀开 Valve Open 阀闭 Valve Shut 或 or
 阀开 Valve Open 阀闭 Valve Shut 阀开 Valve Open

气缸的耗气量 AIR CONSUMPTION

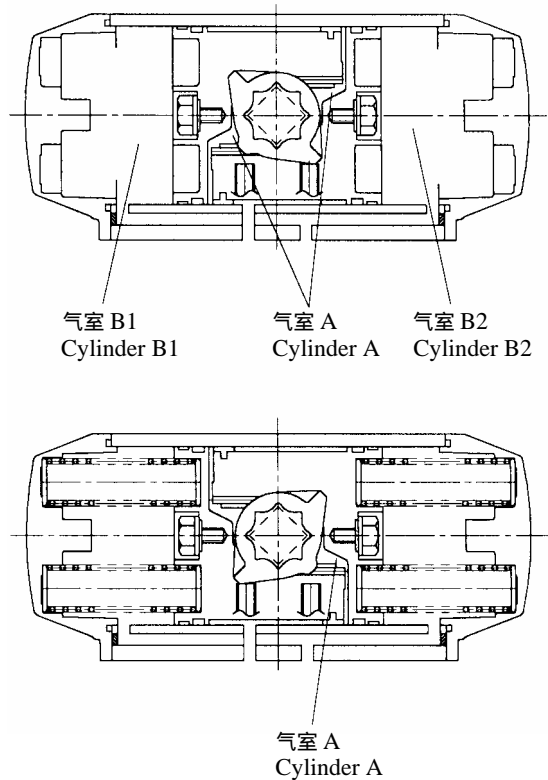
双动作型 Double acting type

$$V = (A+B)\{(P+101.3) \div 101.3\}M$$

单动作型 Spring return type

$$V = A\{(P+101.3) \div 101.3\}M$$

V : 耗气量 Air consumption NI / min
 P : 供给气源压力 Air supply KPa G
 M : 动作次数 / 分 Action cycle / min



CODE NO.

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系列 No.		6	3																		6300RB											
尺寸 Size	B 1																										AT101	B	C	AT451		
	B 2																											AT201	B	5	AT501	
	B A																											AT251	B	D	AT551	
	B 3																											AT301	B	6	AT601	
	B B																											AT351	B	E	AT651	
	B 4																											AT401	B	7	AT701	
输出轴形式 Output type		R																						角行程型 Rotary Stem Motion type								
型号代码 Style code		B																						型号变更代号 Model change code								
驱动方式 Action	1																											单动作型 (标准型) Spring return (Standard type) : - 20 ~ + 80				
	2																												双动作型 (标准型) Double acting (Standard type) : - 20 ~ + 80			
	3																												单动作型 (高温型) Spring return (High Temp. service) : - 20 ~ + 100			
	4																												双动作型 (高温型) Double acting (High Temp. service) : - 20 ~ + 100			
	5																													单动作型 (低温型) Spring return (Low Temp. service) : - 40 ~ + 80		
	6																													双动作型 (低温型) Double acting (Low Temp. service) : - 40 ~ + 80		
气源压力 Air supply	双动作型 Double acting	K																											设定气压 Set pressure : 600 KPa G			
		M																												设定气压 Set pressure : 500 KPa G		
		P																												设定气压 Set pressure : 400 KPa G		
		R																												设定气压 Set pressure : 300 KPa G		
	单动作型 Spring return	A																												设定气压 Set pressure : 600 KPa G		
		T																												设定气压 Set pressure : 500 KPa G		
		U																												设定气压 Set pressure : 400 KPa G		
		V																												设定气压 Set pressure : 300 KPa G		
手动操作机构 Manual handle		N																											无 None			
		K																												无 (带均压阀) None(With equalizing valve)		
		S																												旁式手轮 Side handle type		
选购设备 Option		N																											无 None			
		X																												特殊 Special		
调节信号 Control signal		1																											0.2 ~ 1.0 kgf/cm ² G			
		4																											4 ~ 20 mA DC			
		E																											20 ~ 100 KPa G			
		Z																											无 None			
输出轴动作 Drive shaft rotation	单动作型 Spring return	1																											气压增加输出轴右转 Air to Clockwise rotation			
		2																											电磁阀励磁输出轴右转 SOV energized : Clockwise rotation			
		3																											气压增加输出轴左转 Air to Counter-clockwise rotation			
		4																											电磁阀励磁输出轴左转 SOV energized : Counter-clockwise rotation			
	双动作型 Double acting	5																											无要求 No requirement			
		6																											调节信号增加输出轴右转 SIG increase : Clockwise rotation			
		7																											调节信号增加输出轴左转 SIG increase : Counter-clockwise rotation			
		8																											电磁阀励磁输出轴右转 SOV energized : Clockwise rotation			
		9																											电磁阀励磁输出轴左转 SOV energized : Counter-clockwise rotation			
紧急时动作 Emergency action		1																										7	SOV(for PO/CUT) de-energized : R			
		2																											8	SOV(for PO/CUT) de-energized : L		
		3																												9	SOV(for PS/CUT) de-energized : R	
		4																											A	SOV(for PS/CUT) de-energized : L		
		5																										B	Power failure : Lock			
		6																										X	Special			
用户气压单位 Units of customer air supply		1																									2	bar G				
		3																											Special			
输出轴回转角度 Degrees of drive shaft rotation		1																									X	Special				
		2																														

图 3. 标准配管回路 (俯视图) Fig. 3 SCHEMATIC DIAGRAM (ACTUATOR IS TOP VIEW)

图 3-1 定位器自动控制 : 气源压力降低 任意位置

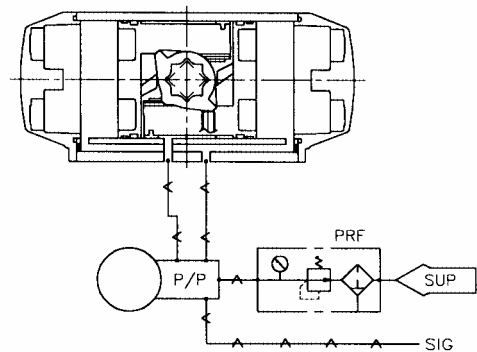
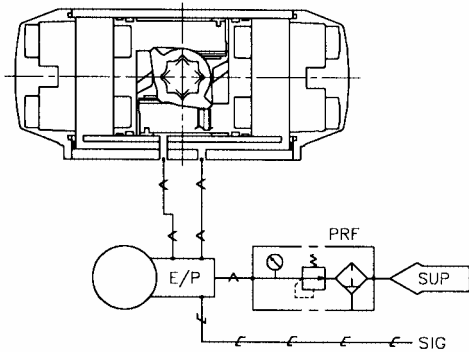
Fig. 3-1 MODULATION BY POSITIONER : AIR FAILURE FREE POSITION

图 3-1A 双动作型 : E/P

图 3-1B 双动作型 : P/P

Fig. 3-1A DOUBLE ACTING TYPE WITH E/P

Fig. 3-1B DOUBLE ACTING TYPE WITH P/P



*当输入定位器的调节信号增加时, 输出轴的回转方向可以用定位器出口空气配管的连接方式来进行改变。
Direction of drive shaft rotation against control signal increase can be changed by reversing positioner's output port connection.

图 3-2 定位器自动控制 : 气源压力降低 输出轴向右回转

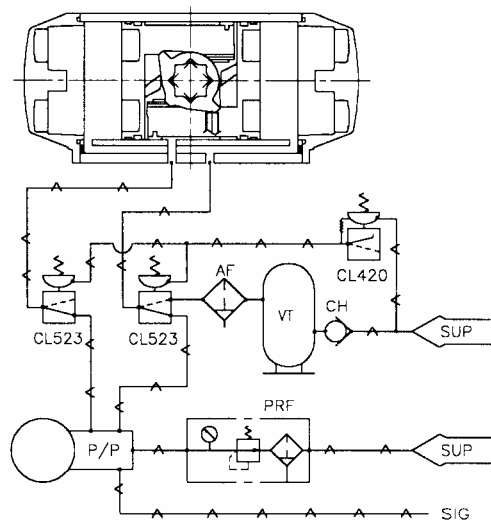
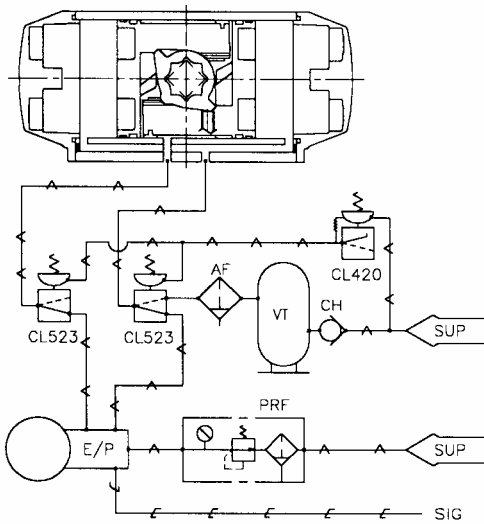
Fig. 3-2 MODULATION BY POSITIONER : AIR FAILURE CLOCKWISE DRIVE SHAFT ROTATION

图 3-2A 双动作型 : E/P

图 3-2B 双动作型 : P/P

Fig. 3-2A DOUBLE ACTING TYPE WITH E/P

Fig. 3-2B DOUBLE ACTING TYPE WITH P/P



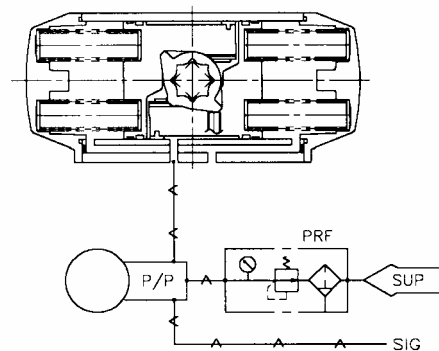
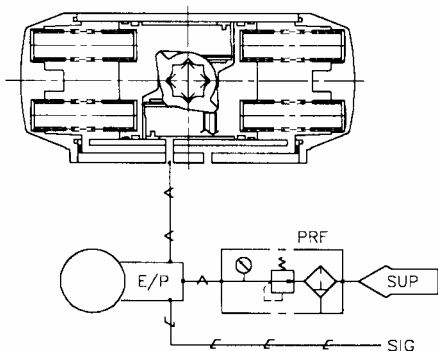
* 当输入定位器的调节信号增加时, 输出轴的回转方向可以用定位器出口空气配管的连接方式来进行改变。
Direction of drive shaft rotation against control signal increase can be changed by reversing positioner's output port connection.
* 气源压力降低使输出轴向左回转时, 请把 VT (贮气罐) 出口的空气配管接到左侧的 CL523 上。
For air failure to counterclockwise rotation, piping from VT is to be connected to CL523 on the left.

图 3-2C 单动作型 : E/P

图 3-2D 单动作型 : P/P

Fig. 3-2C SPRING RETURN TYPE WITH E/P

Fig. 3-2D SPRING RETURN TYPE WITH P/P



* 气源压力降低使输出轴向左回转时, 活塞的齿条部分应重新安装在齿轮轴的另一侧。
For air failure to counterclockwise rotation, please rearrange the direction of piston as opposite side.

图 3-3 定位器自动控制：气源压力降低.....保持原位

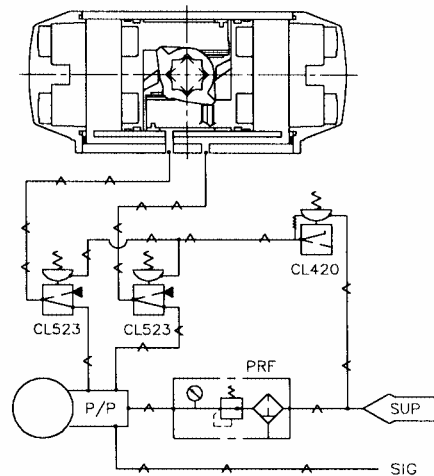
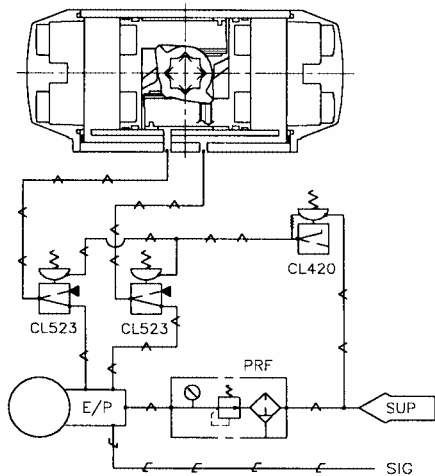
Fig. 3-3 MODULATION BY POSITIONER : AIR FAILURE . . . AIR FAILURE POSITION LOCK

图 3-3A 双动作型：E/P

图 3-3B 双动作型：P/P

Fig. 3-3A DOUBLE ACTING TYPE WITH E/P

Fig. 3-3B DOUBLE ACTING TYPE WITH P/P



*当输入定位器的调节信号增加时，输出轴的旋转方向可以用定位器出口空气配管的连接方式来进行改变。

Direction of drive shaft rotation against control signal increase can be changed by reversing positioner's output port connection.

图 3-4 电磁阀 ON-OFF 控制：气源压力降低.....任意位置

Fig. 3-4 ON-OFF CONTROL BY SOLENOID VALVE : AIR FAILURE . . . FREE POSITION

图 3-4A 双动作型：电磁阀励磁输出轴向右回转

图 3-4B 双动作型：电磁阀励磁输出轴向左回转

Fig. 3-4A DOUBLE ACTING TYPE

Fig. 3-4B DOUBLE ACTING TYPE

SOV ENERGIZED: CLOCKWISE DRIVE SHAFT ROTATION

SOV ENERGIZED: COUNTERCLOCKWISE DRIVE SHAFT ROTATION

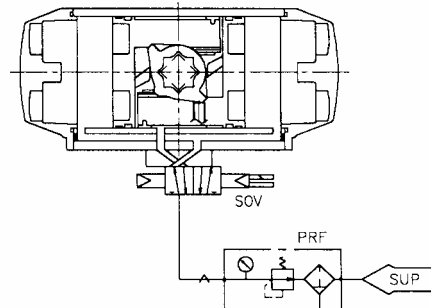
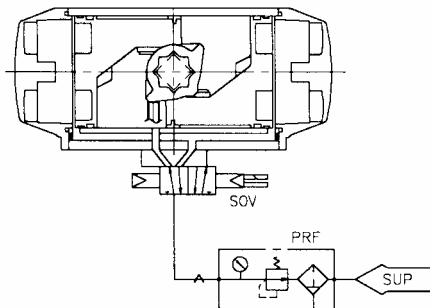


图 3-5 电磁阀 ON-OFF 控制：气源压力降低.....输出轴向右回转

Fig. 3-5 ON-OFF CONTROL BY SOLENOID VALVE : AIR FAILURE . . . CLOCKWISE DRIVE SHAFT ROTATION

图 3-5A 双动作型：电磁阀励磁输出轴向右回转

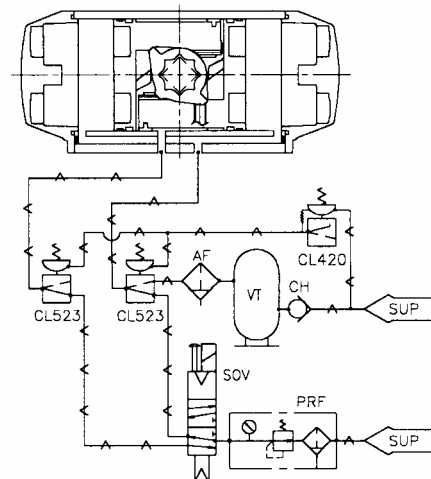
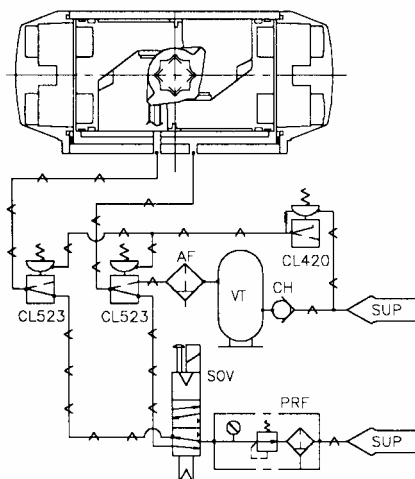
图 3-5B 双动作型：电磁阀励磁输出轴向左回转

Fig. 3-5A DOUBLE ACTING TYPE

Fig. 3-5B DOUBLE ACTING TYPE

SOV ENERGIZED: CLOCKWISE DRIVE SHAFT ROTATION

SOV ENERGIZED: COUNTERCLOCKWISE DRIVE SHAFT ROTATION



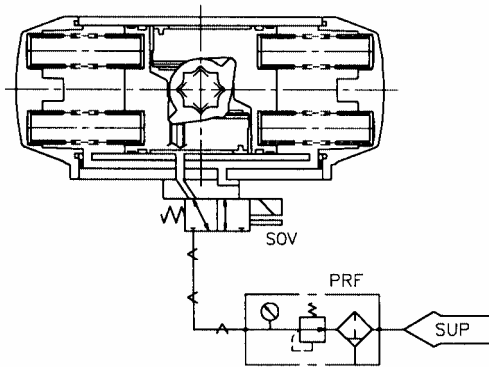
*气源压力降低使输出轴向左回转时，请把 VT（贮气罐）出口的空气配管接到左侧的 CL523 上。

For air failure to counterclockwise rotation, piping from VT is to be connected to CL523 on the left.

图 3-5C 单动作型：电磁阀励磁输出轴向右回转

Fig. 3-5C SPRING RETURN TYPE

SOV ENERGIZED: CLOCKWISE DRIVE SHAFT ROTATION



*电磁阀励磁使输出轴向左回转时，活塞的齿条部分应重新安装在齿轮轴的另一侧。

*For SOV energized to counterclockwise drive shaft rotation, please rearrange the direction of piston on opposite side.

图 3-6 电磁阀 ON-OFF 控制：气源压力降低.....保持原位

Fig. 3-6 ON-OFF CONTROL BY SOLENOID VALVE : AIR FAILURE . . . AIR FAILURE POSITION LOCK

图 3-6A 双动作型：电磁阀励磁输出轴向右回转

Fig. 3-6A DOUBLE ACTING TYPE

SOV ENERGIZED: CLOCKWISE DRIVE SHAFT ROTATION

图 3-6B 双动作型：电磁阀励磁输出轴向左回转

Fig. 3-6B DOUBLE ACTING TYPE

SOV ENERGIZED: COUNTERCLOCKWISE DRIVE SHAFT ROTATION

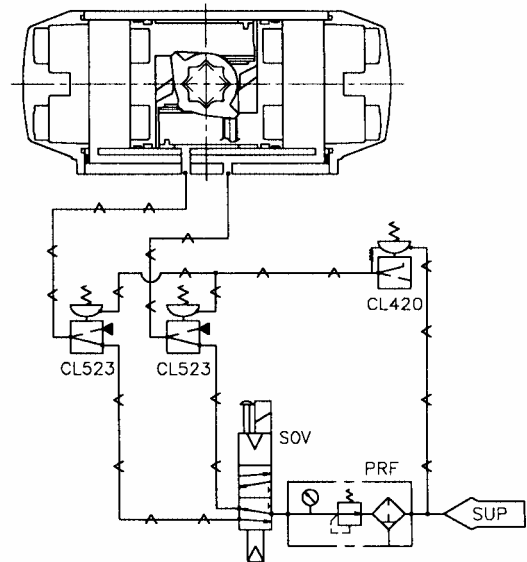
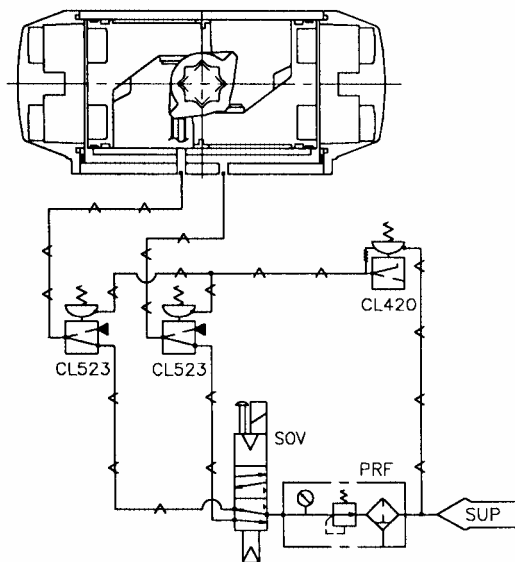
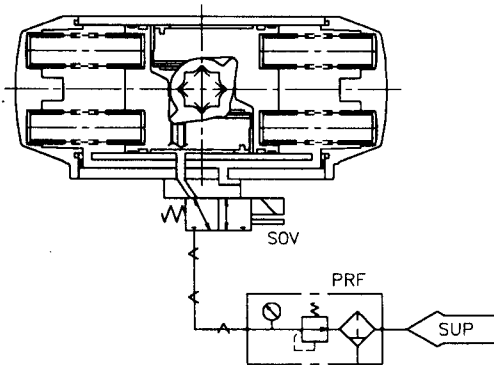


图 3-5C 单动作型：电磁阀励磁输出轴向右回转

Fig. 3-5C SPRING RETURN TYPE

SOV ENERGIZED: CLOCKWISE DRIVE SHAFT ROTATION



*电磁阀励磁使输出轴向左回转时，活塞的齿条部分应重新安装在齿轮轴的另一侧。

*For SOV energized to counterclockwise drive shaft rotation, please rearrange the direction of piston as opposite side.

图 3-6 电磁阀 ON-OFF 控制：气源压力降低 保持原位

Fig. 3-6 ON-OFF CONTROL BY SOLENOID VALVE: AIR FAILURE AIR FAILURE POSITION LOCK

图 3-6A 双动作型：电磁阀励磁输出轴向右回转

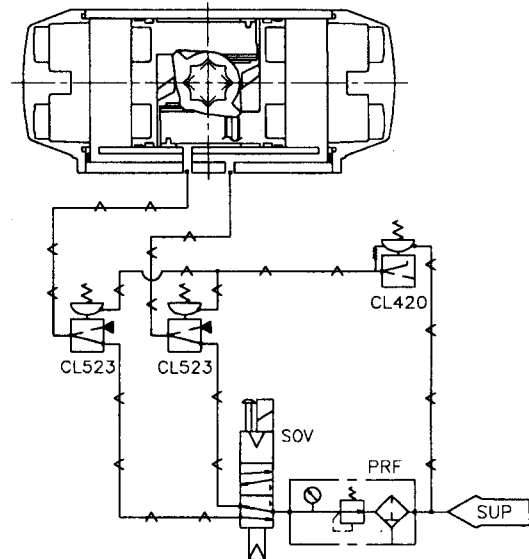
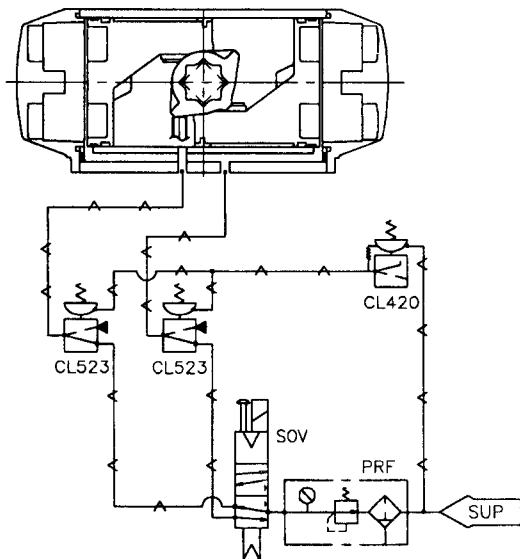
Fig. 3-6A DOUBLE ACTING TYPE

SOV ENERGIZED: CLOCKWISE DRIVE SHAFT ROTATION

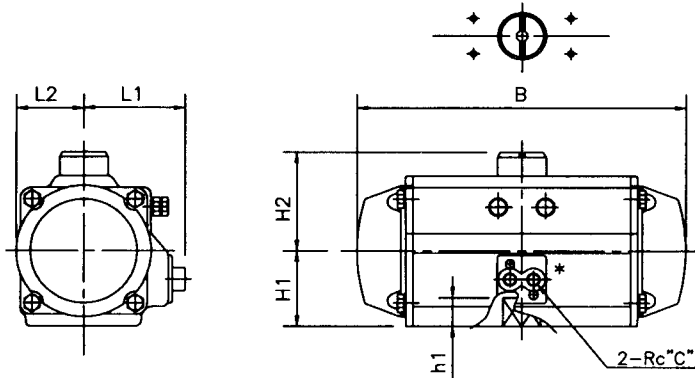
图 3-6B 双动作型：电磁阀励磁输出轴向左回转

Fig. 3-6B DOUBLE ACTING TYPE

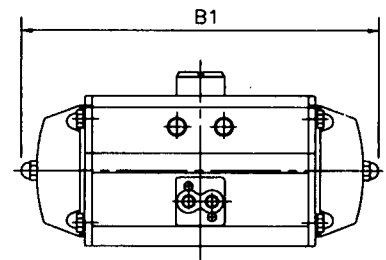
SOV ENERGIZED: COUNTERCLOCKWISE DRIVE SHAFT ROTATION



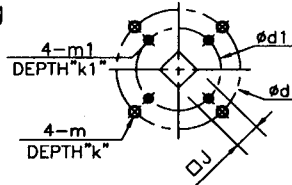
PNEUMATIC CYLINDER ACTUATOR *Double acting cylinder*



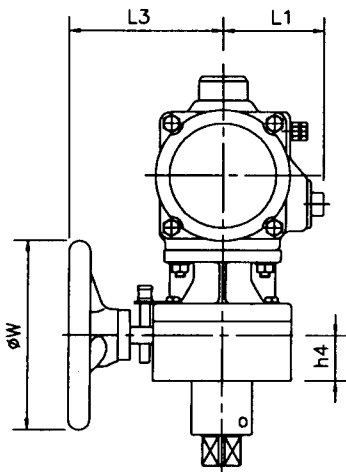
Angle rotation : 90 deg



Angle rotation : 60 deg

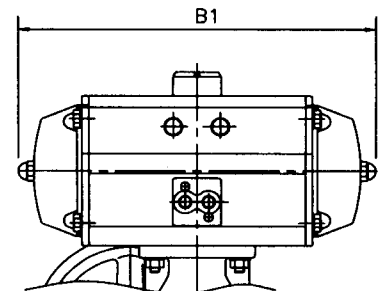
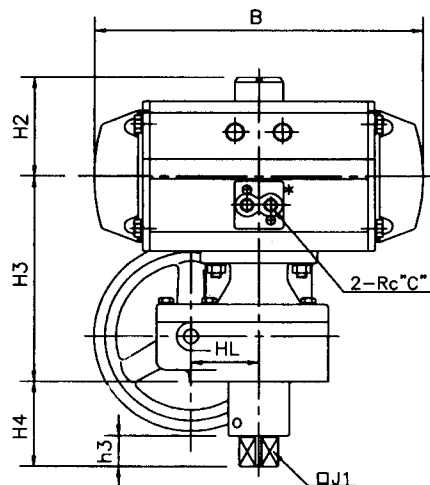


WITHOUT MANUAL HANDLE

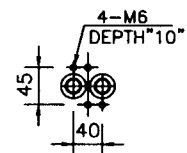


Angle rotation : 90 deg

WITH MANUAL HANDLE



Angle rotation : 60 deg



DETAIL OF *
 63BERB(AT651)

DIMENSIONS

UNIT : mm

SIZE CODE	B	B1	H1	H2	L1	L2	h1	d	m	k	d1	m1	k1	J	C	WITH MANUAL HANDLE										
																H3	H4	L3	h3	h4	d2	m2	k2	J1	HL	W
<input type="checkbox"/> 63B1RB (AT101)	160	180	43	63	65	36	16	—	—	—	50	M6	9	14	1/4	168	72	130	20	38	90	M12	12	12	56	160
<input type="checkbox"/> 63B2RB (AT201)	215	240	51	71	70	43	19	70	M8	12	50	M6	9	17	1/4	176	72	130	20	38	90	M12	12	16	56	160
<input type="checkbox"/> 63BARB (AT251)	250	275	58	78	75	50	19	70	M8	12	50	M6	9	17	1/4	183	72	130	20	38	90	M12	12	16	56	160
<input type="checkbox"/> 63B3RB (AT301)	270	305	64	84	85	56	24	102	M10	15	70	M8	12	22	1/4	174	72	130	25	38	90	M12	12	21	56	160
<input type="checkbox"/> 63B4RB (AT401)	345	385	79	109	100	70	29	102	M10	15	70	M8	12	27	1/4	189	72	130	25	38	90	M12	12	26	56	160
<input type="checkbox"/> 63BCRB (AT451)	410	455	89	119	110	80	29	125	M12	18	102	M10	15	27	1/4	217	87	150	32	43	110	M16	19	26	69	200
<input type="checkbox"/> 63B5RB (AT501)	440	485	98	128	120	88	29	125	M12	18	102	M10	15	27	1/4	226	87	150	32	43	110	M16	19	26	69	200
<input type="checkbox"/> 63BDRB (AT551)	490	540	112	159	125	99	38	140	M16	24	—	—	—	36	1/4	258	102	220	38	53	125	M16	22	36	90	300
<input type="checkbox"/> 63B6RB (AT601)	545	600	122	173	130	110	38	140	M16	24	—	—	—	36	1/4	268	102	220	38	53	125	M16	22	36	90	300
<input type="checkbox"/> 63BERB (AT651)	625	685	151	198	150	131	48	165	M20	30	—	—	—	46	3/8	317	127	355	50	62	180	M20	30	50	106	400

NOTE:

For AT101~AT251, a spacer is inserted between the actuator body and the manual override gearbox.

DRAWING No.

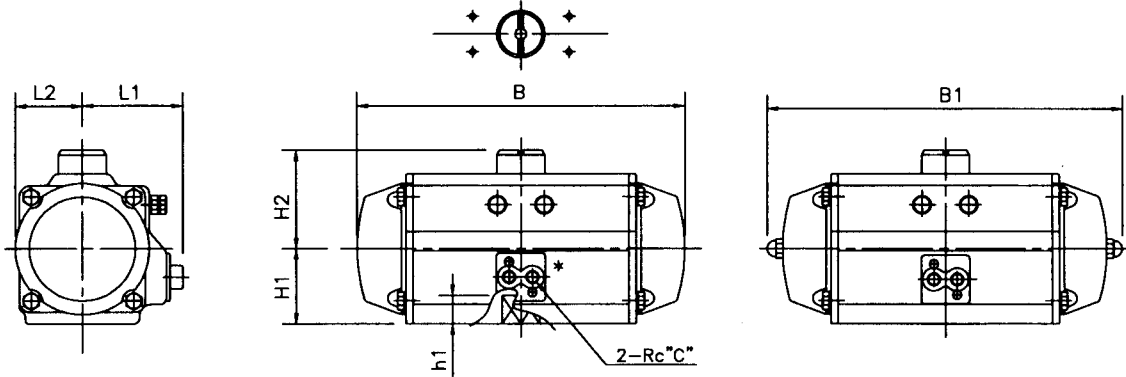
E-6300RB-W-N
S

REV.

B

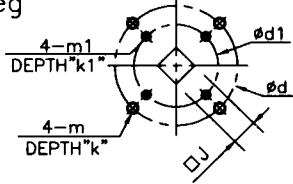
KOSO

PNEUMATIC CYLINDER ACTUATOR *Spring return cylinder*

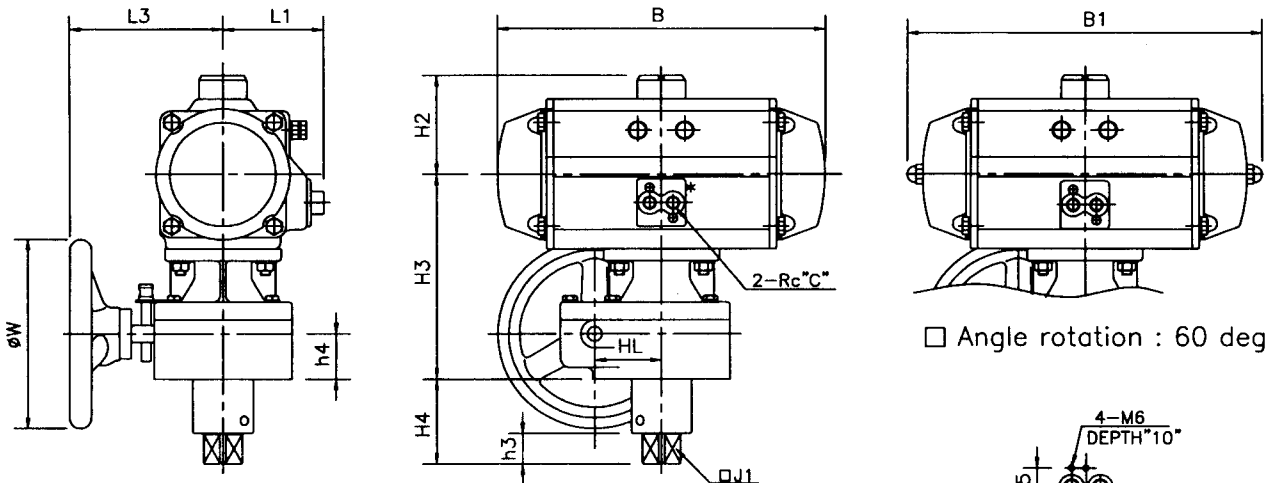


Angle rotation : 90 deg

Angle rotation : 60 deg

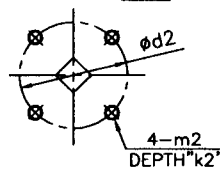


WITHOUT MANUAL HANDLE

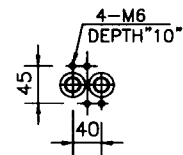


Angle rotation : 90 deg

Angle rotation : 60 deg



WITH MANUAL HANDLE



DETAIL OF *
 63BERB(AT651)

DIMENSIONS

UNIT : mm

SIZE CODE	B	B1	H1	H2	L1	L2	h1	d	m	k	d1	m1	k1	J	C	WITH MANUAL HANDLE										
																H3	H4	L3	h3	h4	d2	m2	k2	J1	HL	W
<input type="checkbox"/> 63B1RB (AT101)	160	180	43	63	65	36	16	—	—	—	50	M6	9	14	1/4	168	72	130	20	38	90	M12	12	12	56	160
<input type="checkbox"/> 63B2RB (AT201)	215	240	51	71	70	43	19	70	M8	12	50	M6	9	17	1/4	176	72	130	20	38	90	M12	12	16	56	160
<input type="checkbox"/> 63BARB (AT251)	250	275	58	78	75	50	19	70	M8	12	50	M6	9	17	1/4	183	72	130	20	38	90	M12	12	16	56	160
<input type="checkbox"/> 63B3RB (AT301)	270	305	64	84	85	56	24	102	M10	15	70	M8	12	22	1/4	174	72	130	25	38	90	M12	12	21	56	160
<input type="checkbox"/> 63BBRB (AT351)	315	355	73	103	95	64	24	102	M10	15	70	M8	12	22	1/4	183	72	130	25	38	90	M12	12	21	56	160
<input type="checkbox"/> 63B4RB (AT401)	345	385	79	109	100	70	29	102	M10	15	70	M8	12	27	1/4	189	72	130	25	38	90	M12	12	26	56	160
<input type="checkbox"/> 63BCRB (AT451)	410	455	89	119	110	80	29	125	M12	18	102	M10	15	27	1/4	217	87	150	32	43	110	M16	19	26	69	300
<input type="checkbox"/> 63B5RB (AT501)	440	485	98	128	120	88	29	125	M12	18	102	M10	15	27	1/4	226	87	150	32	43	110	M16	19	26	69	300
<input type="checkbox"/> 63BDRB (AT551)	490	540	112	159	125	99	38	140	M16	24	—	—	—	36	1/4	258	102	235	38	53	125	M16	22	36	90	400
<input type="checkbox"/> 63B6RB (AT601)	545	600	122	173	130	110	38	140	M16	24	—	—	—	36	1/4	268	102	235	38	53	125	M16	22	36	90	400
<input type="checkbox"/> 63BERB (AT651)	625	685	151	198	150	131	48	165	M20	30	—	—	—	46	3/8	317	127	355	50	62	180	M20	30	50	106	630

NOTE:

For AT101~AT251, a spacer is inserted between the actuator body and the manual override gearbox.

DRAWING No.

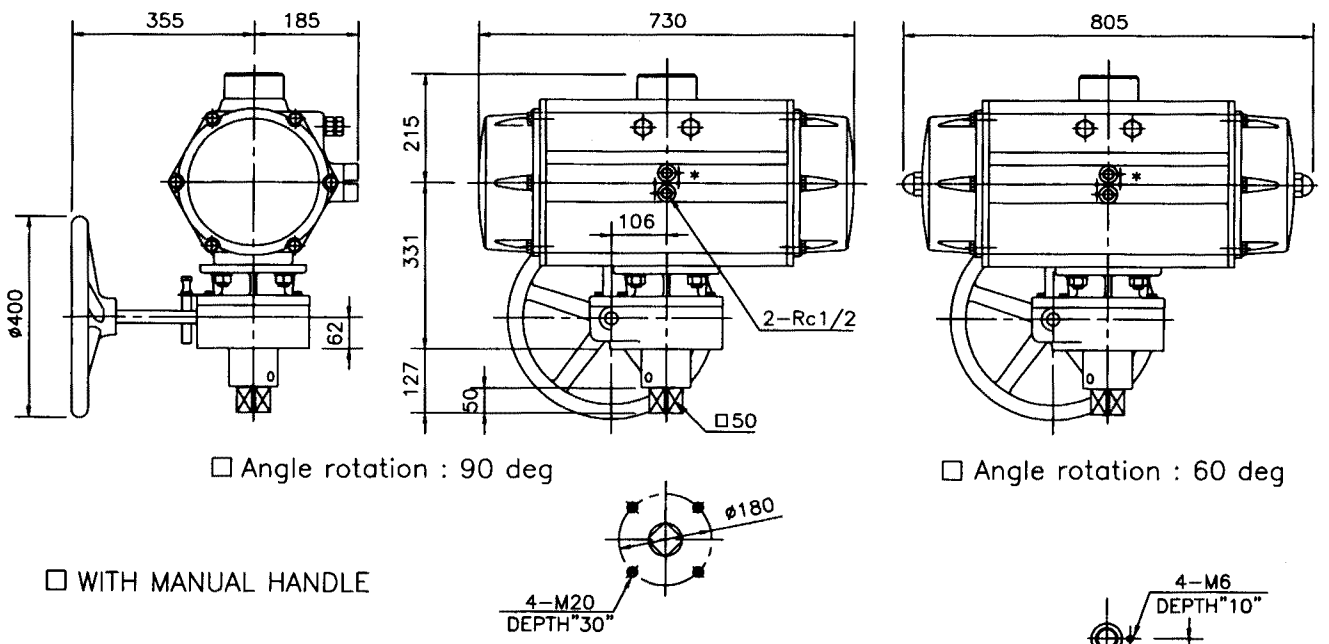
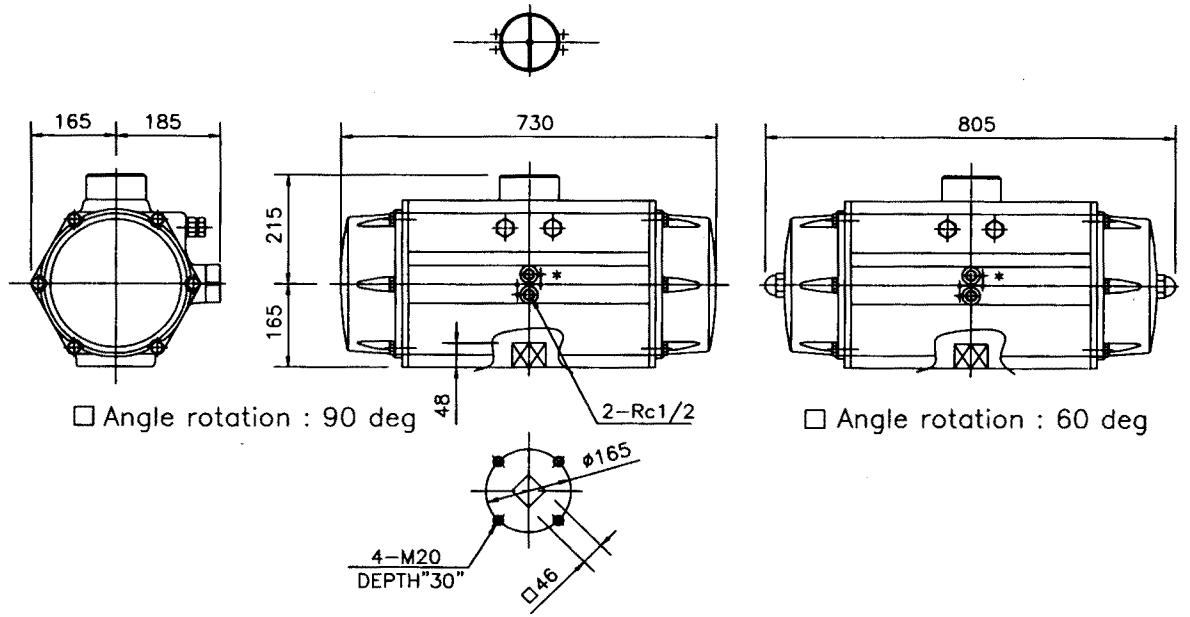
E-6300RB-S-
N
S

REV.

B

KOSO

PNEUMATIC CYLINDER ACTUATOR *Double acting cylinder*



NOTE:

DRAWING No.

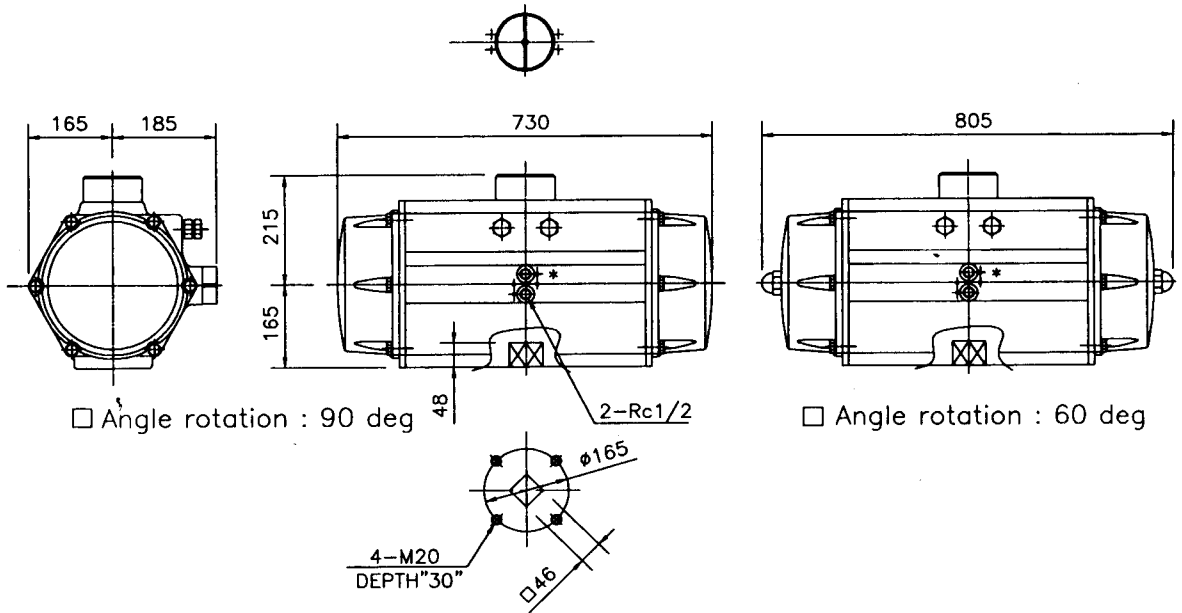
E-63B7RB-W-N
S

REV.

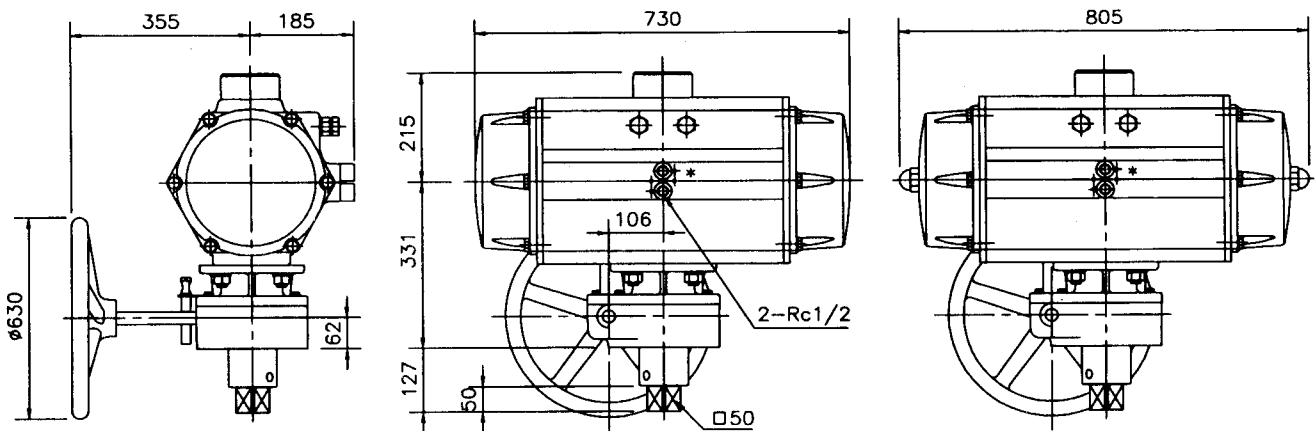
B

KOSO

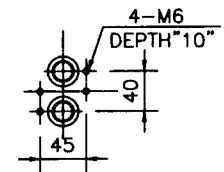
PNEUMATIC CYLINDER ACTUATOR *Spring return cylinder*



□ WITHOUT MANUAL HANDLE



□ WITH MANUAL HANDLE



DETAIL OF *

NOTE:

DRAWING No.

E-63B7RB-S-N
S

REV.

B

KOSO