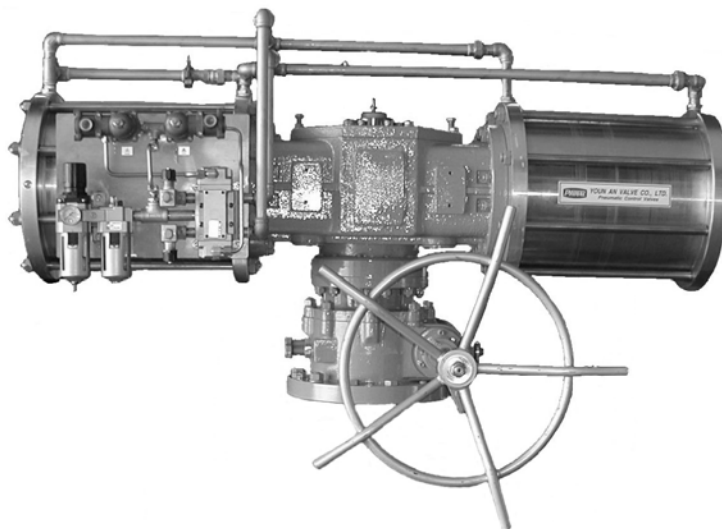




CONTROL VALVE STANDARD SPECIFICATION

CYLINDER ROTARY ACTUATOR HIGH TORQUE SCOTCH-YOKE TYPE



R6S~R14S Series



<http://www.proval.co.kr>



PROVAL Co., Ltd.

CYLINDER ROTARY ACTUATOR HIGH TORQUE

SCOTCH-YOKE TYPE

GENERAL

The **PROVAL** double acting and Spring return Cylinder actuators are powerful, high-performance pneumatic actuators that provide positive modulation or on-off operation for rotary stem motion type control valves and many other quarter-turn (90°) rotating

- The **PROVAL** pneumatic actuator series was engineered and produced to provide maximum torque output with minimum supply pressure.
- Simplicity, reliability and economy being at the top of the list of design parameters.
- The **PROVAL** actuator is suitable for any quarter turn application such as ball, plug, butterfly valves or dampers, in both On-Off and Modulating heavy duty service.

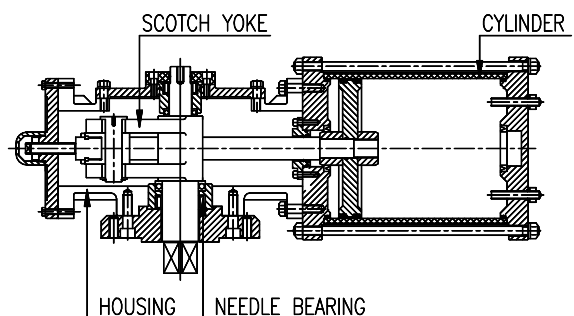
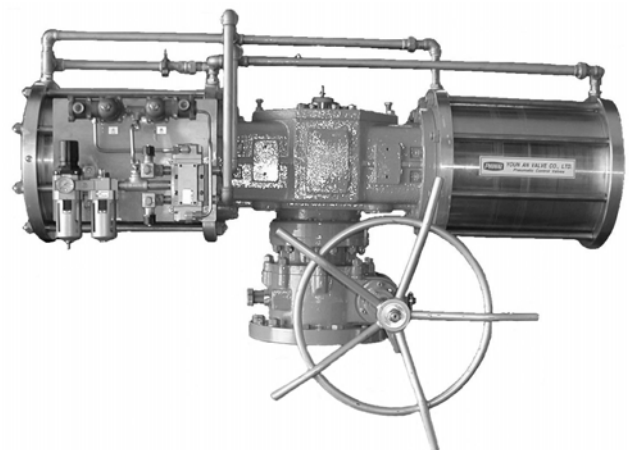
FEATURES

The well-accepted Pneumatic Cylinder Torque actuator is an actuator that gas made it possible to accommodate a variety of needs that continues to broaden, by accomplishing high power output, compactness and high dependability with accumulated improvements on the basis of rich experiences as well as performances.

Complete line-up is available from which optimum selection can be made for wider range of functions by combining with various accessories, for improved control capabilities or valve actuation in emergency.

With installation of manual override (optional) being possible, the dependability of any system can be further enhanced.

The Scotch-yoke mechanism produces a torque curve that most closely matches the requirements of valve actuation.



Part name	Design Construction
Cylinder	The cylinders are honed to a micro finish with hard chrome plating.
Scotch-Yoke	The slot in the scotch yoke mechanism is precision machined. The yoke pin is induction Hardened and chrome plated. The yoke pin roller is hardened steel.
Housing	This unique one piece housing assures Accurate alignment of both torque shaft and the piston rod
Needle Bearing	Mecair is the only actuator with precision drawn cup needle bearings at the torque shaft journals. The bearings significantly Increase torque output and cycle lift, while providing near frictionless rotary movement. The seals protect the needle from external dirt and corrosion, while the bearings rigid design prolongs seal lift.

STANDARD SPECIFICATION

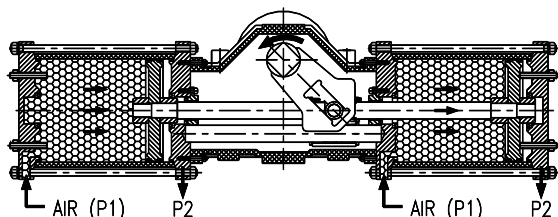
Type		High torque scotch-yoke											
Action		Direct Action (D.A) , Reverse Action (R.A)											
Function		Double Acting type , Single Acting type											
Actuator Model		Double Acting								Single Acting			
		R6S	R7S	R8S	R9S	R10 S	R11S	R12 S	R13 S	R14 S	R6SR	R7SR	R8SR
		R6SD	R7S D	R8S D	R9S D	R10 SD	R11S D	R12 SD	R13 SD	R14 SD			
Cylinder Diameter		Ø150 ~ Ø500											
Materials	Housing	FC20											
	Scotch Yoke	SCPH2 (or SS)											
	Cylinder	STKM (H.cr plated)											
	Scotch Piston	SS41 (Zn plated)											
	Shaft	SUS304 (H.cr plated)											
	O-Ring	N.B.R (※ Viton)											
Supply Air Pressure kPa (kgf/cm²G)		400 ~ 700 (4.0 ~ 7.0)								500 ~ 700 (5.0 ~ 7.0)			
Output Shaft Rotation		0° ~ 90°											
Output Torque		See “Torque Data” page 5											
Air Connection		R5S ~ R7S : Rc 3/8, R8S ~ R10S : Rc 1/2, R11S ~ R14S : Rc 3/4											
Ambient Temperature		-10°C ~ +70°C (※ 0°C ~ +100°C)											
Option		Manual H/W, Rotation Stopper, Special Piping & Fitting, Low or high Temp. Service, Non-Standard Painting ...etc.											
Accessories		E/P Positioner, P/P Positioner, Air-set, Limit S/W, Solenoid V/V, Position Transmitter, Speed Controller, Lock-Up V/V ...etc.											

[NOTE] ※ : Manufactured and attached as according to customer's order.

OPERATION

1. Double Acting

This series are driven in both directions by air pressure. They have bigger torque than same size of spring return cylinder actuator.



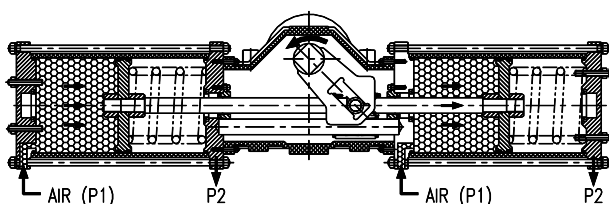
For counterclockwise output rotation, supply pressure to port 1, driving the pistons apart.

When required, the pistons can be inverted in the housing resulting in a clock wise rotation when pressure is applied to port 1.

2. Single Acting (Spring return)

Consideration should be given to the economics of selecting a “fail-safe” actuator over a spring return actuator, when high torque outputs are required. “Fail-safe” actuator utilizes an air accumulator as an “air-spring” in lieu of a mechanical spring to fail a valve to a closed or open position.

Depending on the conditions and the space available a single air accumulator can operate several valves.



• Actuator to Fail clockwise

For counterclockwise pressure rotation, apply pressure to port 1, driving the pistons apart and compressing the springs. During this pressure stroke, the volume on the spring side of the pistons is vented / exhausted at Port 2.

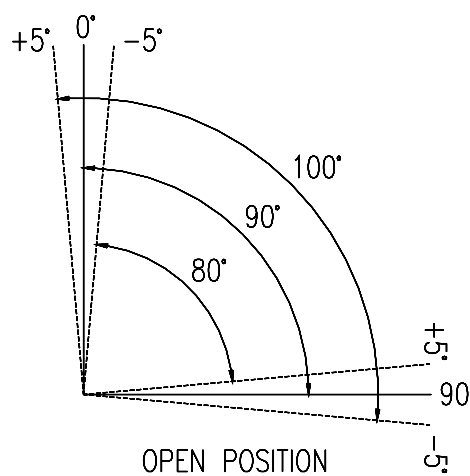
Spring force rotates the actuator clockwise when the pressure is vented / exhausted at Port 1.

3. Travel Stop Adjuster

This Series actuators feature directional pinion travel stops. Side located stops allow a full $\pm 5^\circ$ of valve travel adjustment, giving a guaranteed range of adjustment between 80° and 100° of actuator travel. These travel stops are designed to absorb the maximum rated torque of the actuator and the maximum impact loads associated with recommended stroke speed.

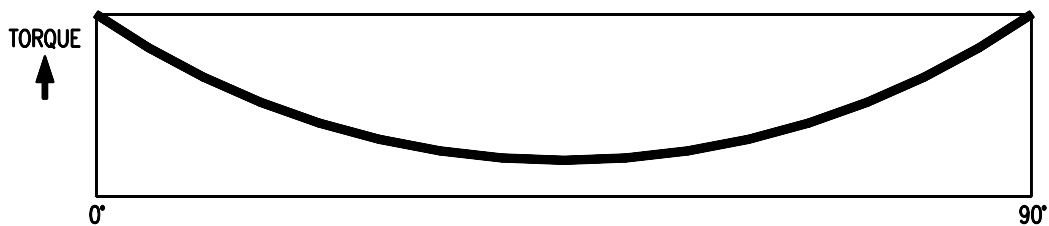
• Standard Assembly

Adjustment of the counterclockwise and clockwise rotation limits are accomplished by turning the respective left and right stop adjustment screws to reduce or increase out-put rotation.

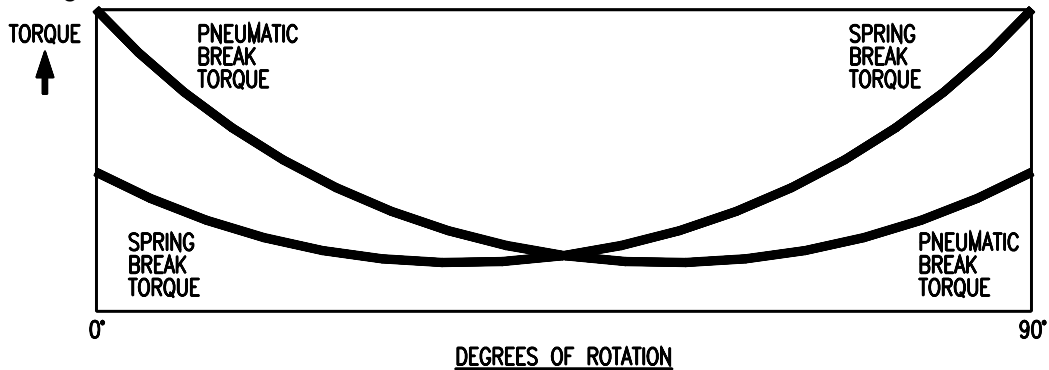


TORQUE DIAGRAM

1. Double Acting



2. Single Acting

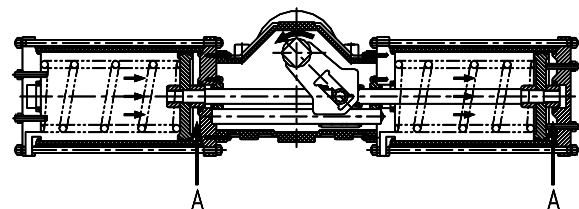
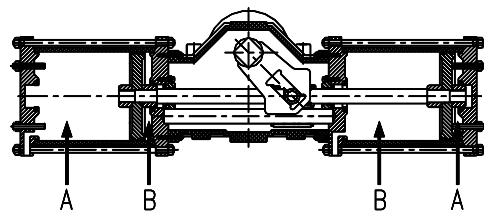


CYLINDER VOLUME

1. Cylinder Volume

Double Acting Type				Spring Return Type	
Actuator Model	Cylinder Volume(ℓ)			Actuator Model	Cylinder Volume(ℓ)
	A	B	A + B		A
R6SD	2.9	7.6	15.5	R6SR	6.3
R7SD	10.7	10.2	20.9		
R8SD	16.7	16.2	32.9		
R9SD	24	23.5	47.5	R7SR	8.8
R10SD	29.1	28.6	57.7		
R11SD	36.3	35.8	72.1	R8SR	12.7
R12SD	40.8	40.3	81.1		
R13SD	67.4	66.9	134.3	R9SR	16.3
R14SD	83.3	82.8	166.1		

[NOTE] "R()S" TYPE ⇒ R()SD / 2



2. Air Consumption

- Double acting: $V = (A+B) (P+1) M$
- Spring return: $V = (A) (P+1) M$

$\left\{ \begin{array}{l} V: \text{Air Consumption} \text{ ---- } N \text{ } \ell / \text{min} \\ P: \text{Air Supply} \text{ ---- } \text{kgf/cm}^2 \text{GM: Action Cycle} \end{array} \right.$

TORQUE DATA

1. Double acting torque rating.

[Unit: kg-m]

Actuator Model	Air supply (kgf/cm ²)					
	2	3	4	5	6	7
R6S	78	117	141	177	212	247
R7S	106	160	192	240	288	336
R8S	166	250	300	376	450	526
R9S	240	360	453	540	649	757
R10S	290	436	523	654	785	916
R11S	362	544	653	816	979	1142
R12S	533	799	959	1199	1439	1678
R13S	674	1012	1214	1571	1821	2124
R14S	832	1244	1499	1873	2248	2622
R5SD	88	132	160	198	238	478
R6SD	156	234	283	353	424	495
R7SD	212	320	382	481	577	673
R8SD	332	500	601	751	901	1051
R9SD	480	720	865	1081	1298	1514
R10SD	580	872	1047	1309	1570	1832
R11SD	724	1088	1306	1632	1958	2285
R12SD	1066	1598	1918	2398	2877	3357
R13SD	1348	2024	2428	3035	3641	4248

2. Single acting torque data. (at Fail close condition)

[Unit: kg-m]

Actuator Model	Air supply (kgf/cm ²)							
	4		5		6		7	
	0°	90°	0°	90°	0°	90°	0°	90°
R6SR	88.8	22.2	133.3	66.6	177.7	111	222	155
R7SR	125	31.3	187.4	93.8	249.9	156.2	312.3	218.7
R8SR	179.9	45	269.9	135	359.8	224.9	449.7	314.9
R9SR	224.4	56.2	336.5	168.4	448.7	280.5	560.8	392.7

WEIGHT

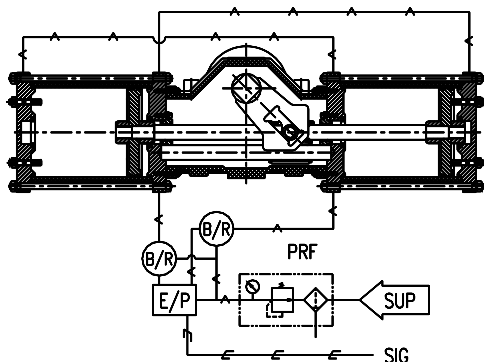
[Unit: kg]

Actuator Model	Weight	Actuator Model	Weight	Actuator Model	Weight
R6S	87	R6SD	110	R6SR	130
R7S	195	R7SD	235	R7SR	245
R8S	220	R8SD	270	R8SR	320
R9S	250	R9SD	300	-	-
R10S	285	R10SD	335	-	-
R11S	330	R11SD	390	-	-
R12S	390	R12SD	450	-	-
R13S	470	R13SD	530	-	-
R14S	580	R14SD	640	-	-

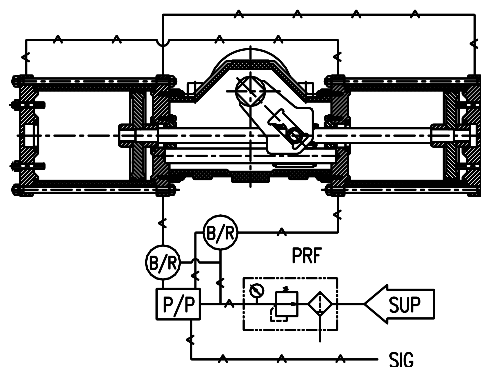
DIAGRAM

1. Modulation by positioner [Air failure: Free position]

- Double acting type with E/P



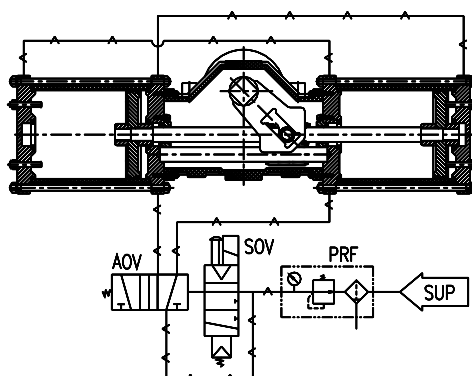
- Double acting type with P/P



2. On-off by solenoid valve [Air failure: Free position]

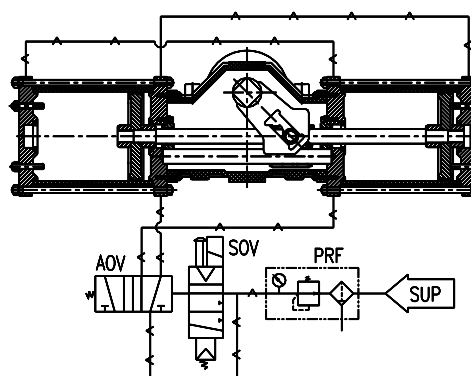
- Double acting type

SOV ENERGIZED : CLOCKWISE TORQUE SHAFT ROTATION



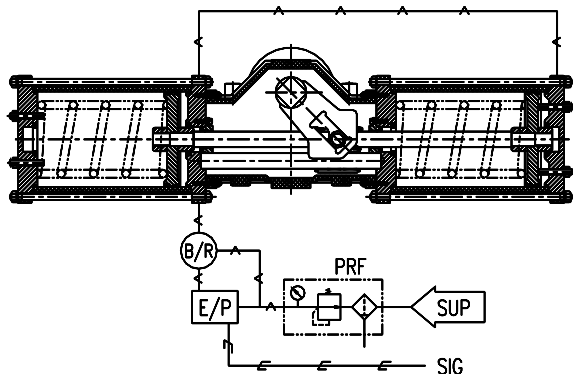
- Double acting type

SOV ENERGIZED : COUNTERCLOCKWISE TORQUE SHAFT ROTATION

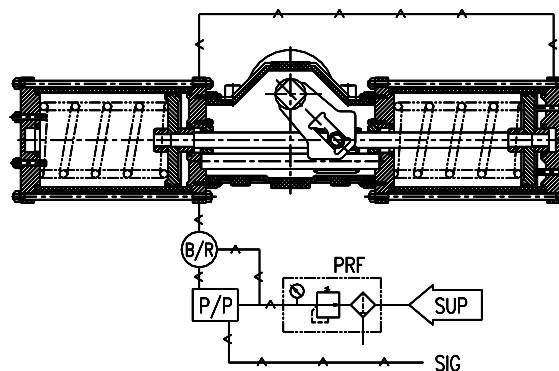


3. Modulation by positioner [Air failure: Clockwise torque shaft rotation (Valve shut)]

- Single acting type with E/P

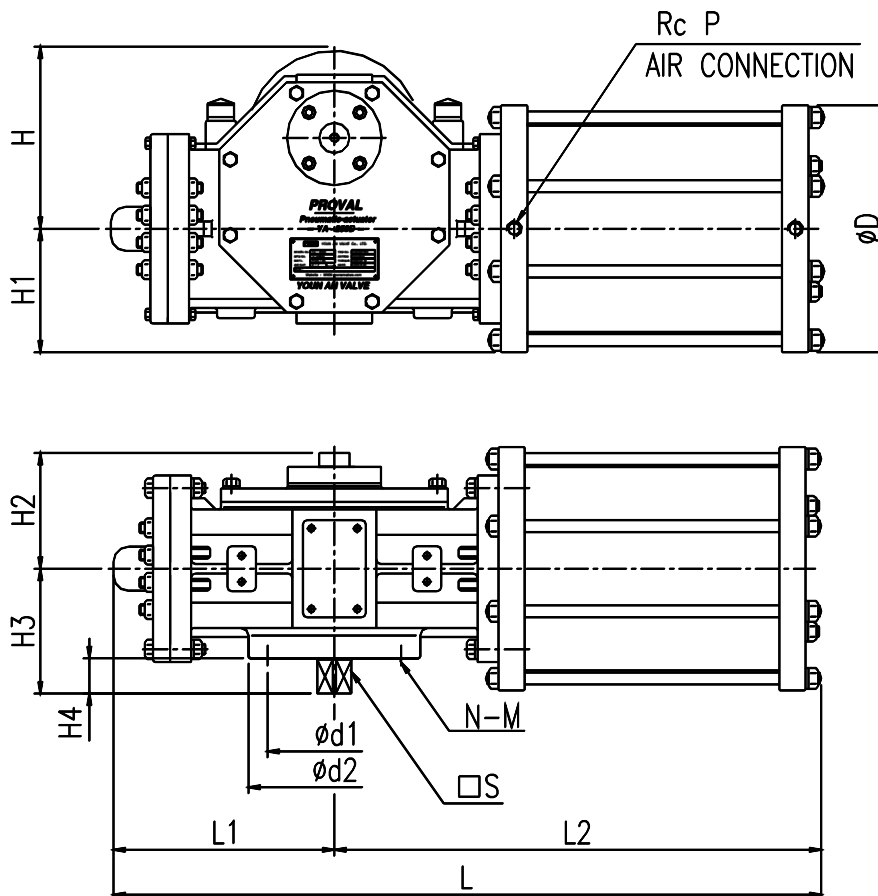


- Single acting type with P/P



DIMENSION DRAWING

MODEL : R6S ~ R14S



DIMENSIONS

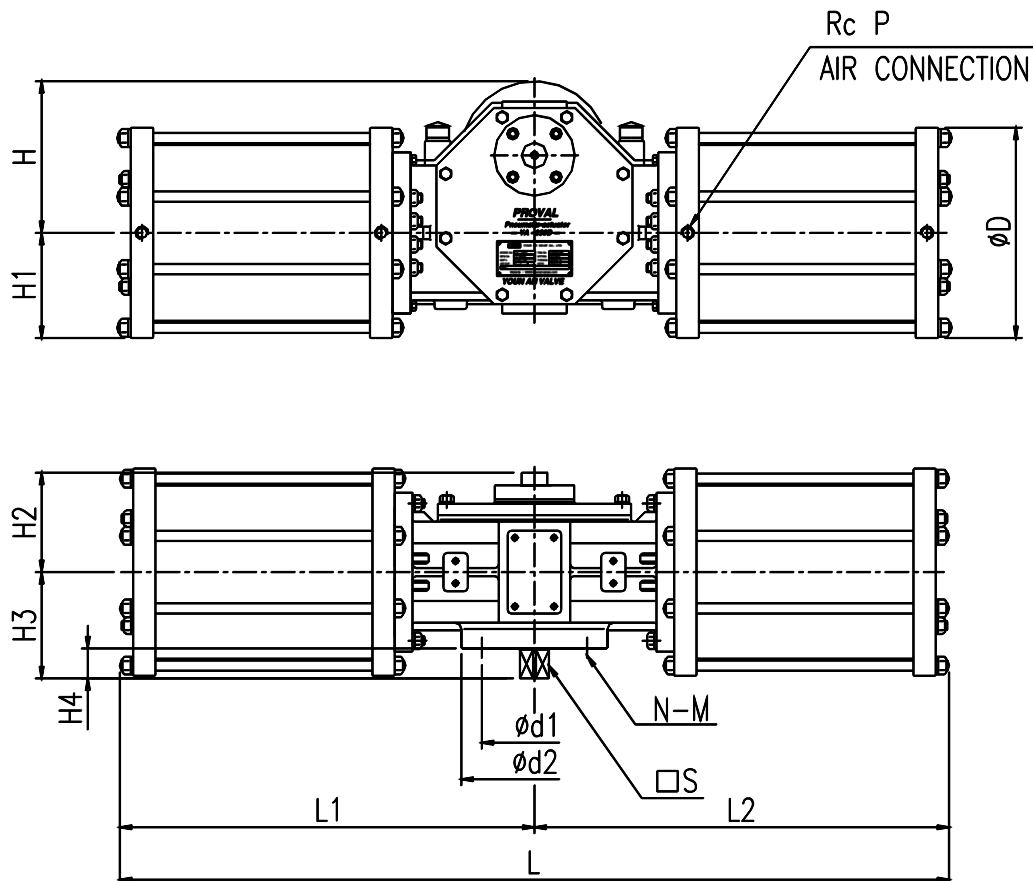
[Unit: mm]

Actuator Model	ØD	Ød1	Ød2	L	L1	L2	H	H1	H2	H3	H4	□S	N - M	P
R6S	270	130	160	625	220	405	135	115	103	171	82	40	4-M16	3/8
R7S	270	160	190	740	220	520	185	165	117	205	95	50	4-M16	3/8
R8S	325	250	214	940	291	649	235	163	150	182	50	50	8-M16	3/8
R9S	390	250	214	940	291	649	235	195	150	182	50	50	8-M16	1/2
R10S	420	250	214	940	291	649	235	210	150	182	50	50	8-M16	1/2
R11S	420	280	240	1165	379	786	235	210	186	215	60	60	8-M20	1/2
R12S	490	280	240	1165	379	786	265	240	186	215	60	60	8-M20	1/2
R13S	540	280	240	1165	379	786	265	267	186	215	60	60	8-M20	3/4
R14S	600	280	240	1165	379	786	265	267	186	215	60	60	8-M20	3/4

MODEL	R6S ~ R14S	SIZE	Ø270 ~ Ø600
PROVAL Co., Ltd.			

DIMENSION DRAWING

MODEL : R6SD ~ R14SD



DIMENSIONS

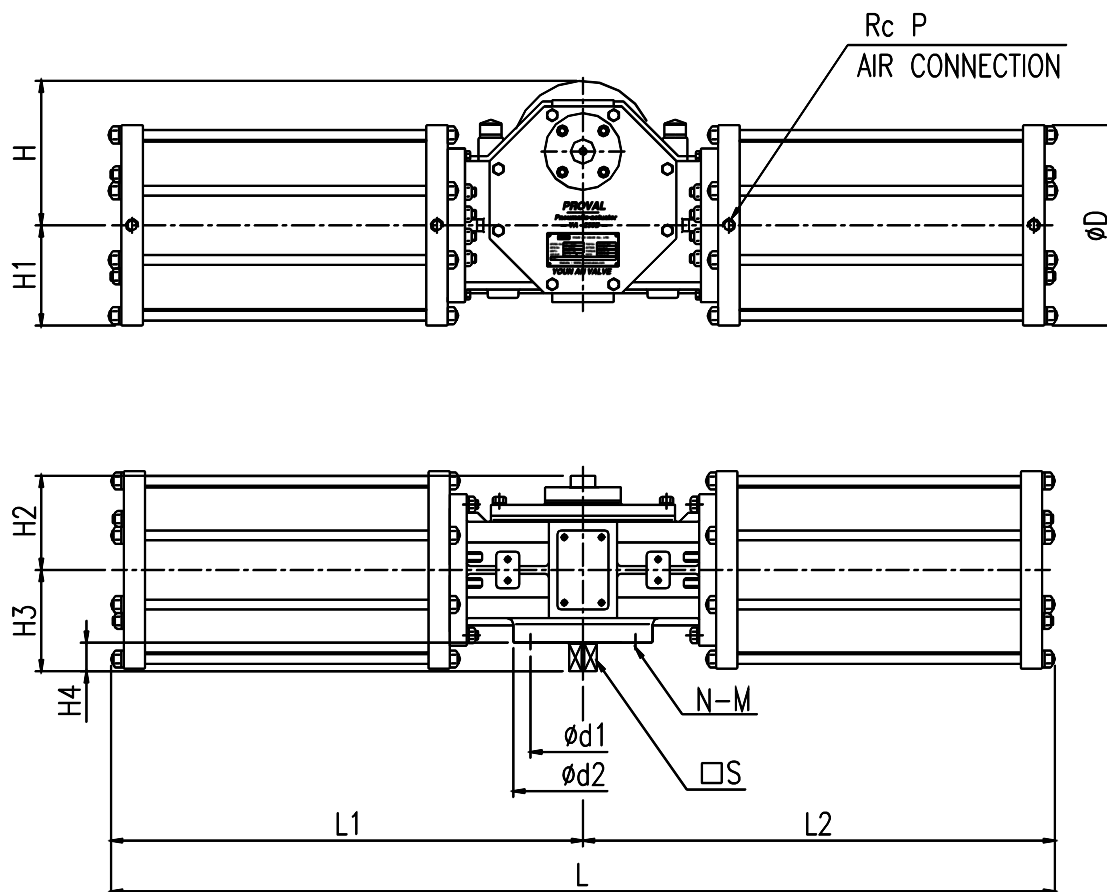
[Unit: mm]

Actuator Model	ØD	Ød1	Ød2	L	L1	L2	H	H1	H2	H3	H4	□S	N - M	P
R6SD	□270	180	150	1030	515	515	170	113	100	134	45	40	4-M20	3/8
R7SD	270	250	214	1298	649	649	235	138	150	182	50	50	8-M16	3/8
R8SD	325	250	214	1298	649	649	235	163	150	182	50	50	8-M16	3/8
R9SD	390	250	214	1298	649	649	235	195	150	182	50	50	8-M16	1/2
R10SD	420	250	214	1298	649	649	235	210	150	182	50	50	8-M16	1/2
R11SD	420	280	240	1572	786	786	265	210	186	215	60	60	8-M20	1/2
R12SD	490	280	240	1572	786	786	265	240	186	215	60	60	8-M20	1/2
R13SD	540	280	240	1572	786	786	265	267	186	215	60	60	8-M20	3/4
R14SD	600	280	240	1672	786	786	265	297	186	215	60	60	8-M20	3/4

MODEL	R6SD ~ R14SD	SIZE	Ø270 ~ Ø600
PROVAL Co., Ltd.			

DIMENSION DRAWING

MODEL : R6SR ~ R8SR



DIMENSIONS

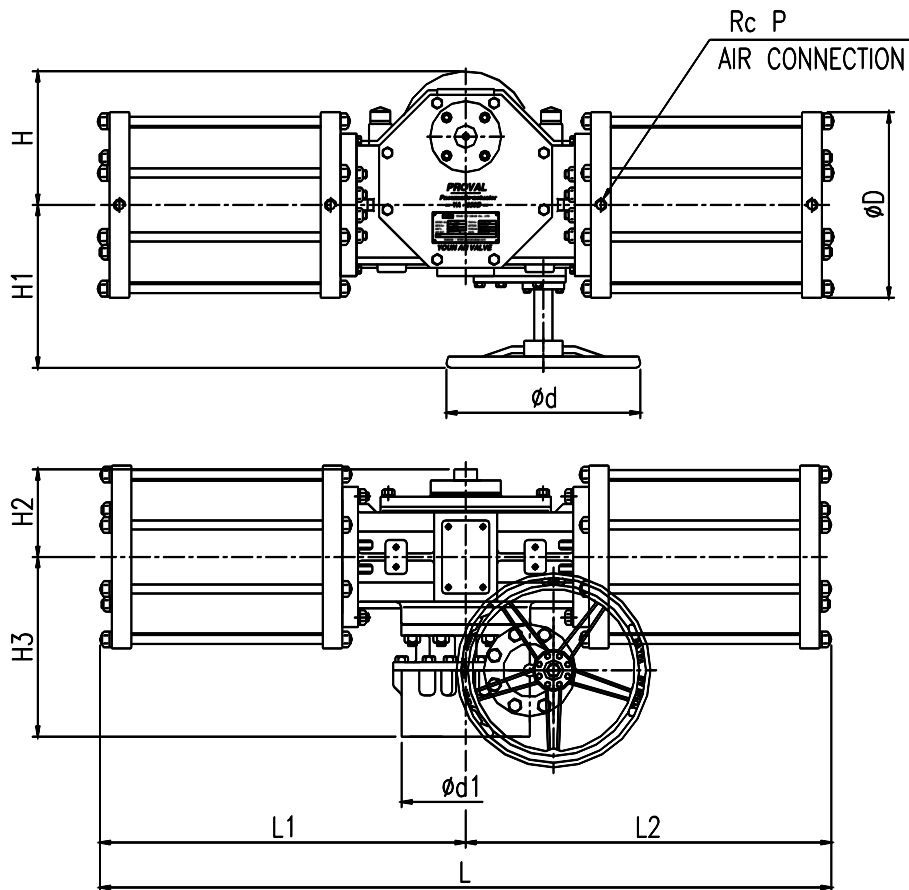
[Unit: mm]

Actuator Model	ØD	Ød1	Ød2	L	L1	L2	H	H1	H2	H3	H4	□S	N - M	P
R6SR	□270	180	150	1450	725	725	170	113	100	134	45	40	4-M20	3/8
R7SR	270	250	214	1950	820	820	235	138	150	182	50	50	8-M16	3/8
R8SR	325	250	214	1950	820	820	235	163	150	182	50	50	8-M16	3/8

MODEL	R6SR ~ R14SR	SIZE	Ø270 ~ Ø325
PROVAL Co., Ltd.			

DIMENSION DRAWING

MODEL : R6SH ~ R14SH



DIMENSIONS

[Unit: mm]

Actuator Model	ØD	Ød	Ød1	L	L1	L2	H	H1	H2	H3	H4	□S	N - M	P
R6SH	□270	430	290	1030	515	515	170	518	100	134	45	40	4-M20	3/8
R7SH	270	430	290	1298	649	649	235	518	150	182	50	50	8-M16	3/8
R8SH	325	430	290	1298	649	649	235	518	150	182	50	50	8-M16	3/8
R9SH	390	430	290	1298	649	649	235	518	150	182	50	50	8-M16	1/2
R10SH	420	430	290	1298	649	649	235	518	150	182	50	50	8-M16	1/2
R11SH	420	430	290	1572	786	786	265	518	186	215	60	60	8-M20	1/2
R12SH	490	430	290	1572	786	786	265	518	186	215	60	60	8-M20	1/2
R13SH	540	430	290	1572	786	786	265	518	186	215	60	60	8-M20	3/4
R14SH	600	430	290	1572	786	786	265	518	186	215	60	60	8-M20	3/4

MODEL	R6SH ~ R14SH	SIZE	Ø270 ~ Ø600
PROVAL Co., Ltd.			