Power Cylinder

RK CONTROL INSTRUMENTS

Mastering Flow Since 1969

An ISO 9001 Certified Company

Power Cylinder consists basically of a Double Acting Cylinder, Positioner and Air Filter Regulator.

This Power Cylinder has been designed to operate as an actuator in a pneumatic control system, to position the final control element in accordance with the controller signal.

These power cylinders are manufactured using the best grade raw materials and advanced technology. These units require little maintenance and they are mainly used outdoors where there is requirement for linear motion.

It finds application in Thermal Power Plants, Paint industries, Damper manufacturers, Steel plants, Industrial burner manufacturers. The most commonly used application is for actuating the dampers of the ID/ FD fans.

As well as being extremely sturdy, the Power Cylinder has either Trunnion or Plate mounting arrangements and can be fitted with stroke limit switches, position transmitters, bellows and other accessories.

Design Features:

- Proven design
- Reduced maintenance
- Assured product quality
- Utilises over 5 decades of engineering design & application expertise
- Wide range of sizes & strokes
- Trunnion mounting or end plate mounting option
- Easy reversal of action
- Linear or special characterised cams available
- Choices of rod ends, ball socket joint or fork end with knuckle rod joint
- Low air consumption
- Specialised material of construction available
- Low cost of ownership

SPECIFICATIONS

Maximum working pressure	:	10 kg/cm (150 psi) clean dry air
Maximum working temperature	:	80°C (176°F)
Accuracy	:	Within 2.5% of full stroke
Control signal pressure range	:	0.2 to 1 kg/cm
Air Consumption	:	1 scfm at supply pressure of 4 kg/cm at steady state
Characteristics	:	Linear with standard cam
Piston movement	:	Direction of piston movement in relation to signal can be reversed by reversal of the cam and re-routing the piping
Material	:	Cylinder Anodized Aluminium upto 6“ bore MS Seamless steel tube hard chrome plated for 8“ bore and above
Piston Rod	:	Hard chrome plated steel
Seals	:	NBR as Standard / Viton for high temperature application up to 180°C (356°F)
Bore Sizes	:	3", 4", 6", 8", 10", 12"
Strokes	:	6”, 8”, 12", 16” Engineered specials available on request
Accessories	:	Pneumatic / Electropneumatic / Digital Positioner (HART/FF), Limit switches, Volume booster, Air Lock Relay can be provided on request and based on applications.

POWER CYLINDER DE-CODIFICATION SHEET

1, 2		3, 4		5, 6		7		8		9		10		11		12		13		14	
Series		Bore Diameter		Stroke Length		Cylinder Material		Seals		Service		Base Plate with Pin (Hinge Bracket)		Leather Bellows		Handwheel		TYPE		Mounting	
Power Cylinder	PC	3"	03	4"	04	Aluminium	A	NBR	N	On - Off	O	No	0	No	0	No	0	Regular	R	Rare Plate	P
		4"	04	6"	06	Chrome Plated Steel Tube	C	Viton	V	Regulating	R	Yes	1	Yes	1	Yes	1	Special	S	Rare Trunnion	T
		5"	05	8"	08															Special Mount	S
		6"	06	10"	10																
		8"	08	12"	12																
		10"	10	14"	14																
		12"	12	16"	16																
				18"	18																
				20"	20																

OPERATION

The Power Cylinder and positioner together form a complete position controller in which the control signal is converted into an equivalent regulating-unit position.

The positioner is generally supplied with linear characteristics, either direct or reverse acting i.e. a rise in signal pressure will cause the piston rod to either extend or retract.

Additional accessories can be provided such as

- Air Locks - To obtain fail safe stay-put position
- Volume Boosters - To increase stroking rate
- Limit Switches
- Position Transmitter

An equalizing valve permits the power cylinder to be operated manually in the event of air failure. The unit with R K Positioner, operates on the force balance principle in that the control signal, via diaphragm assembly balances the force of a feedback spring in accordance with the piston position. A pilot valve directs high pressure air to one side or other of the piston to move it in the desired direction until the forces applied to the control spring are balanced. At the balance position the pilot valve is closed and the piston is in steady state condition. Thus any particular control signal will result in a definite piston position with in the cylinder.

Fig 1 shows the layout of a power cylinder and VP5 positioner, in which an increase in control pressure causes the piston rod to extend. An increase in the control signal pressure results in downward movement of the spool of the pilot valve with respect to the ports, opening 'A' to the high pressure air supply and exhausting pressure from port 'B' to atmosphere.

High pressure air now enters one end of the cylinder and the opposite end is vented to atmosphere thus causing the piston to move and extend the position rod until balanced by the downward force exerted through the feedback calibration spring will be at the central, neutral position, both valve ports will be closed and the power cylinder in the revised position.

A decrease in control signal pressure value will have the opposite effect to that given above the positioner can be arranged so that the power cylinder piston rod either retracts or extends for any given change in control signal pressure, by reversing the pilot valve connections to the cylinder and reversing the cam.

Cam is generally profiled for linear characteristics. However special profile can be developed on the cam for any desired specific characteristics. The shape of the pilot valve ports affect the speed of response of the power cylinder for a given change in control pressure.

MOUNTING

The power cylinder is supplied for trunnion mounting or rear plate mounting arrangement Refer Fig.2.

TRUNNION MOUNTING

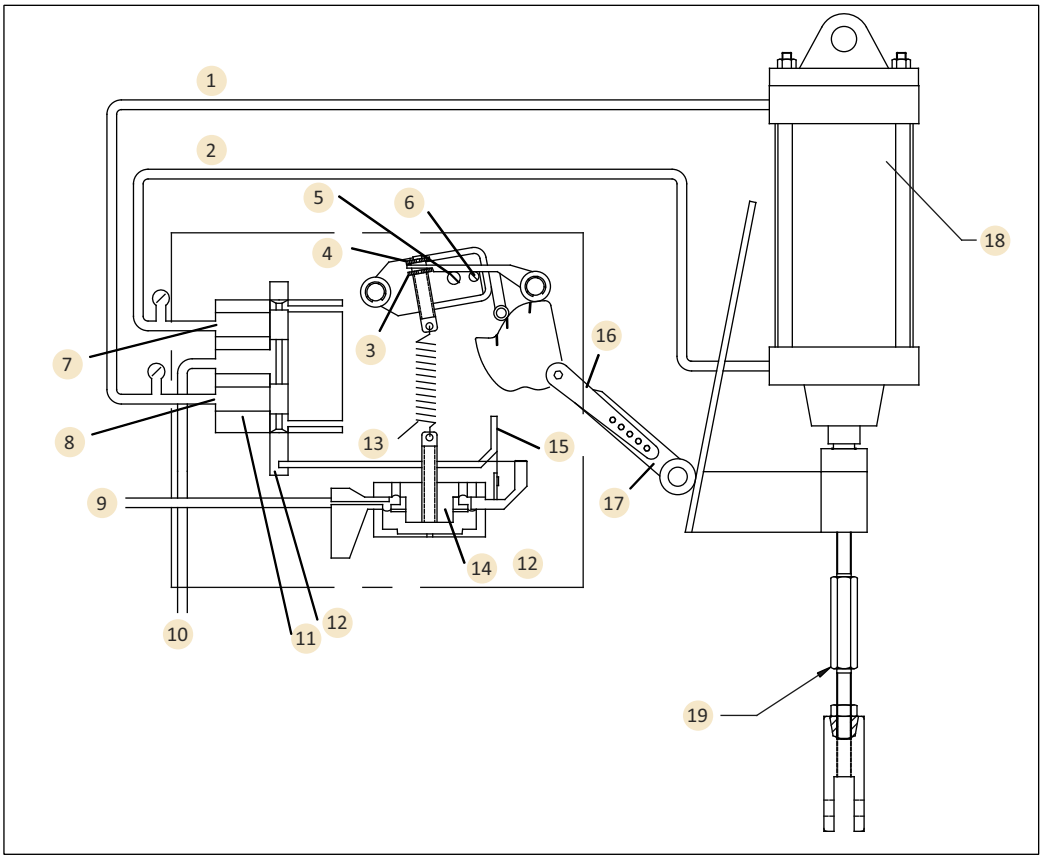
With this method, the power cylinder is supported on trunnion bearings which permit self-alignment (in one plane) with the linkage of final control element.

PLATE MOUNTING

With this method of mounting, the cylinder is supported on an end mounting plate which is bolted to a solid foundation.

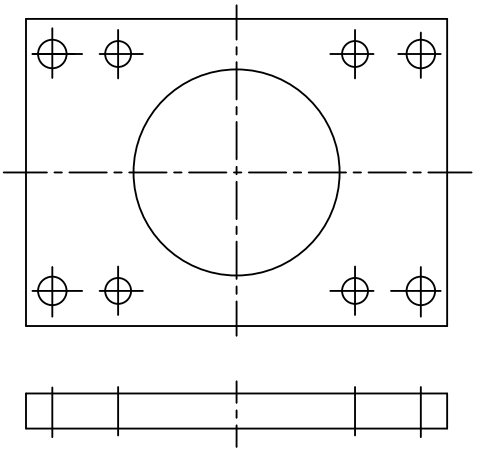
The cylinder can be supplied with an adjustable turn buckle if required, to line up the power cylinder with the regulating unit.

Fig. 1 : LAYOUT OF POWER CYLINDER AND POSITIONER

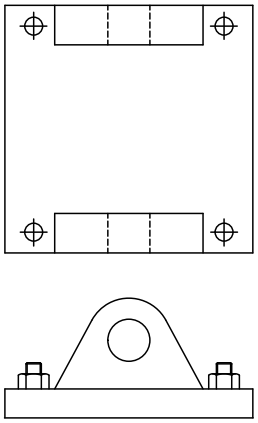


1 Output 'A'	6 Range Adjustment Screw	11 Pilot Valve Body	16 Follower Arm
2 Output 'B'	7 Output Port 'B'	12 Pilot Valve Spool	17 Take-of Arm
3 Zero Adjustment Lock Knob	8 Output Port 'A'	13 Feedback spring	18 Pneumatic Power Cylinder
4 Zero Adjustment	9 Signal 3-15 psi	14 Double Assembly Sensor Assembly	19 Turn Buckle With Fork
5 Range Adjustment Lock Screw	10 Supply	15 Balance Beam	

Fig. 2 : MOUNTING OPTIONS



REAR PLATE MOUNTING



REAR TRUNNION MOUNTING

INSTALLATION

Check that the power cylinder is securely mounted in the correct position, that all pneumatic connections have been correctly and securely made and that mechanical linkage or connections the piston rod joint are correct.

Note: The equalizing valve when provided must always be fully closed when the cylinder is in operation.

MAINTENANCE

Regular lubrication is essential for the efficient operation of the power cylinder.

Lightly oil piston with good quality light oil before reassembly.

No lubrication is required on the positioner.

Drain the moisture from the filter pressure regulator at regular intervals.

Bore		Stroke		70% of Max Thrust At	
mm	Inch	mm	Inch	4 kg / cmg - kgf	5.6 kg / cmg - kgf
76	3	152	6	125	178
76	3	305	12	125	178
101	4	152	6	224	315
101	4	305	12	224	315
152	6	152	6	504	710
152	6	305	12	504	710
203	8	152	6	895	1264
203	8	305	12	895	1264

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Date of issue: January 2026

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