Product Manual

HV

Spring Return / Double acting Type

piston actuator

Chongqing Chuanyi Control valve Co., Ltd.

1、Structure and action principle

1-1 The structure and operating principle of HV spring return type piston actuator

Structure： Spring Return type piston actuator is primarily composed of upper cylinder cover, bottom cylinder cover, cylinder body, piston, actuator stem, , spring and seat, yoke, slit nut etc. The structure sees Fig 1-1-1 and Fig.1-1-2.

How it works: Spring return type actuator, the gas pressure from the air supply system to the gas cell of the cylinder, a thrust is generated on the piston. To overcome the reaction force of the compression spring and make the actuator stem moved a certain distance which called the travel of the actuator.

Pneumatic spring return piston actuator is divided into direct actuator and reverse actuator. We take downward motion of the actuator stem when air pressure to the cylinder as direct type, and the upward motion of the actuator stem as reverse type.

Manual operation：

（1）Side-mounted handwheel

① For the direct actuator, firstly cut off the air supply, turn the handwheel CW to move the screw bolt down to drive the block and the actuator stem downward for manual operation. When converting to automatic operation, turn the handwheel CCW until the screw bolt is at the top end (The handwheel can't be moved any more), then connect the air source for automatic operation, as shown in figure 1-1-1.

②For the reverse actuator, firstly cut off the air supply, turn the handwheel CW to move the screw bolt down, Insert the link pin into the through hole which the actuator stem and the screw bolt are aligned with, then turn the handwheel CCW to make the screw bolt and the actuator stem moved upward for manual operation. When converting to automatic operation, you have to pull out the pin first and turn the handwheel CCW until the screw bolt is at the top end (the handwheel can't be turned any more), then connect the air source for automatic operation, as shown in figure 1-1-2.

（2）Top mounted handwheel

①For the direct actuator, firstly cut off the air supply and loosen the lock nut, then turn the handwheel CW to move the screw bolt downward for manual operation. When switching to automatic operation, turn the handwheel CCW until the screw bolt is at the top end (the handwheel can't be turned any more), tighten the lock nut and connect the air source for automatic operation, as shown in Fig.1-1-3.

②For the reverse actuator, firstly cut off the air supply and loosen the lock nut, then turn the handwheel CCW to move the screw bolt up for manual operation. When switching to automatic operation, turn the handwheel CW to make the screw bolt moved downward till the handwheel and lock nut are both flat with handwheel body, then tighten the lock nut and connect the air source for automatic operation, as shown in Fig.1-1-3.

（3）Hydraulic handwheel

Firstly cut off the air supply to the cylinder, and a specified labeled antiwear hydraulic oil satisfying ISO cleanliness below grade 10 is poured into the oil feeding hole, then shut down the pressure switch clockwise and press up and down with the pressure rod, so as to carry out manual operation and realize the valve switch. When switching to automatic operation, open the pressure switch CCW, when the pressure gauge is 0, the gas source is switched on, and the automatic operation is carried out. As shown in figure 1-1-4

Matters needing attention：

a. When manual operation of pressure rod, please pay attention to the change of the pressure gauge and the oil leakage at the joint of the high pressure pipe to prevent the natural aging of the rubber seal.

b. When manual-automatic operation, the complete pressure relieve must be guaranteed. Automatic operation can be done when the pressure gauge is 0. (The factory default is automatic).

c. If the hand wheel is not used for a long time, please release the hydraulic oil in time so as to avoid the deterioration of hydraulic oil and the performance of the handwheel.

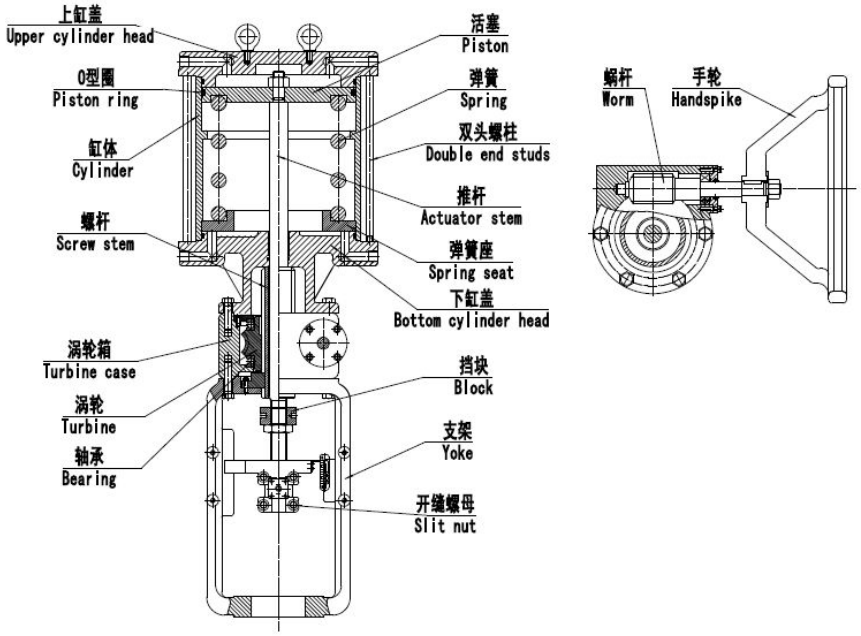


Fig.1-1-1.HV direct actuator with side-mounted handwheel

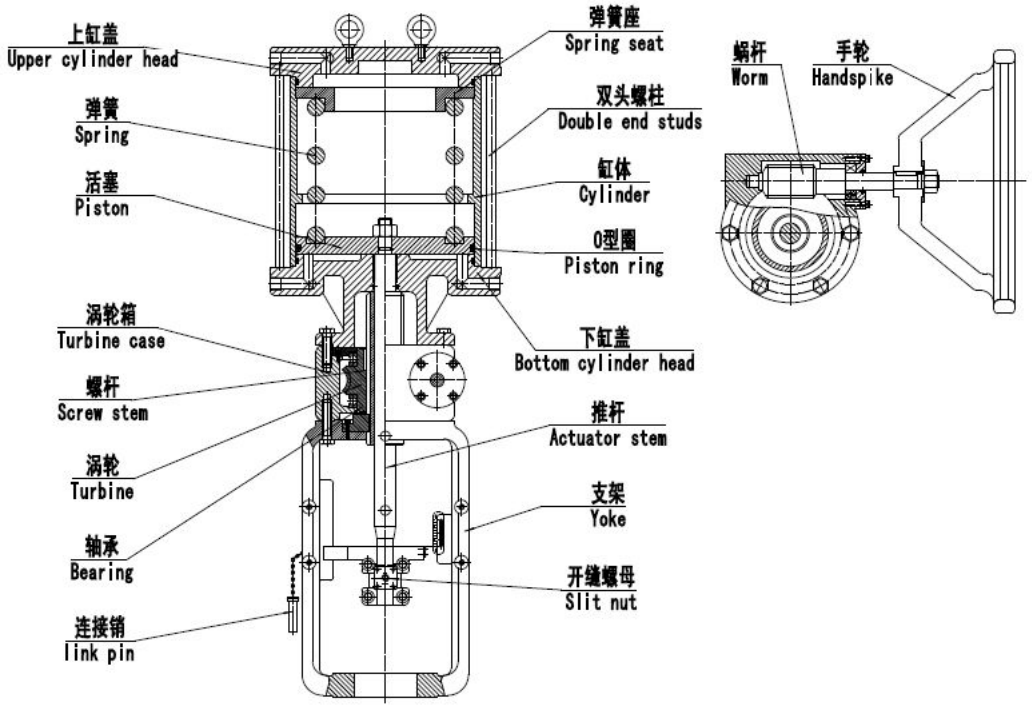
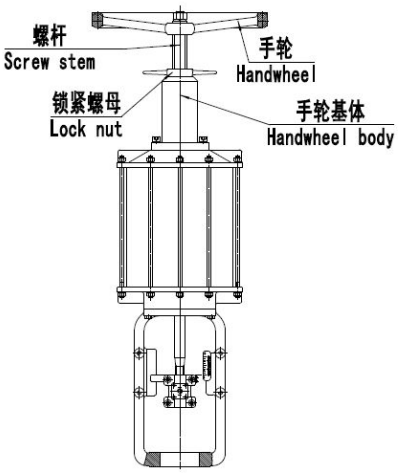


Fig.1-1-2.HV reverse actuator with side-mounted handwheel



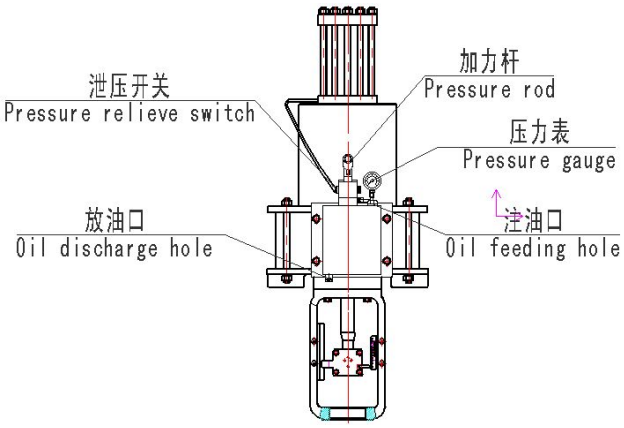


Fig.1-1-3.HV single acting type with top-mounted handwheel Fig.1-1-4.HV single acting type with hydraulic handwheel

1-2　Structure and working principle of HV double acting pneumatic piston actuator

Structure：The structure of the double-acting piston actuator is composed of cylinders (top and bottom), cylinder body, piston, actuator stem, tapped studs, slit nut etc, see Fig1-2-1.

How it works: When the air signal from the air supply system is input into the gas cell of the cylinder, a thrust will be generated on the piston to make the actuator stem moved and the moved distance is the travel of the actuator.

Manual operation:

（1）Side-mounted handwheel

Firstly cut off the air supply to the air cylinder, open the cut-off valve, turn the handwheel CW to move the screw bolt down , and insert the link pin into the through hole which the actuator stem and the screw bolt are aligned with. Turn the handwheel CW for manual operation of FO type actuator while CCW for that of FC type. When switching to automatic operation, pull out the link pin, turn the handwheel CCW until the screw bolt is at the top end (The handwheel can't be moved any more), shut off the cut-off valve, connect the gas source and carry out the automatic operation, as shown in figure 1-2-1.

（2）Top-mounted handwheel

Firstly cut off the air supply to the air cylinder, open the cut-off valve and loosen the lock nut. Turn the handwheel CW for manual operation of FO type actuator while CCW for that of FC type. When switching to automatic operation, the length of the screw between the handwheel and the handwheel body is measured by position ruler to ensure that the two are approximately equal. Then tighten the lock nut, shut off the cut-off valve, connect the gas source and carry out the automatic operation, as shown in figure 1-2-2.

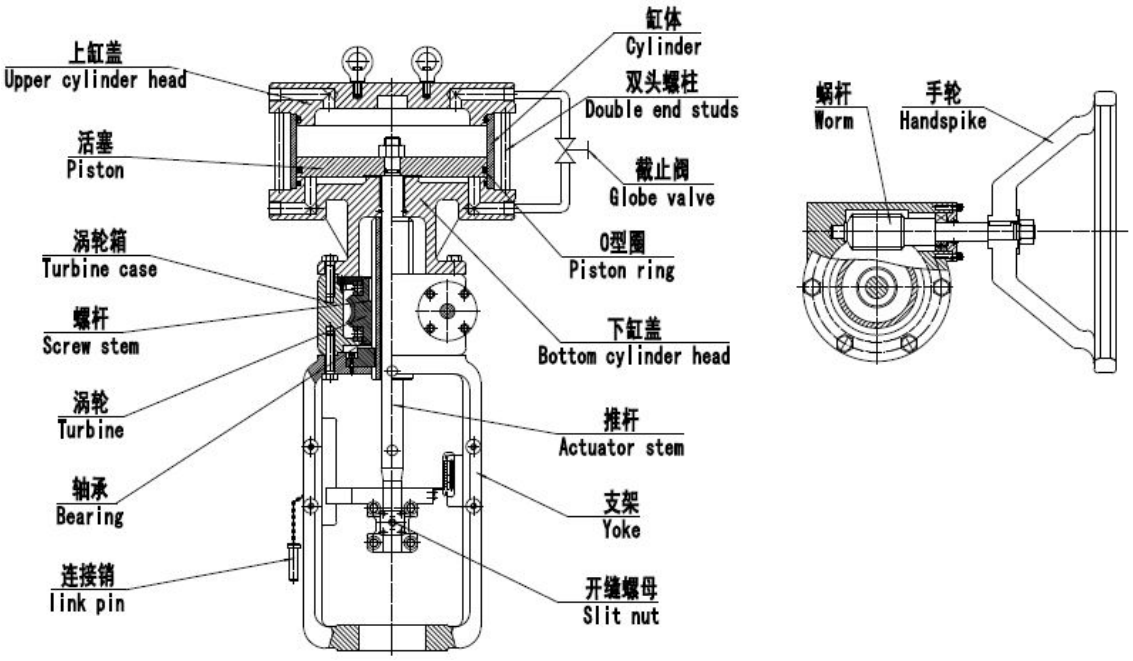


Fig.1-2-1.HV double acting actuator with side mounted handwheel

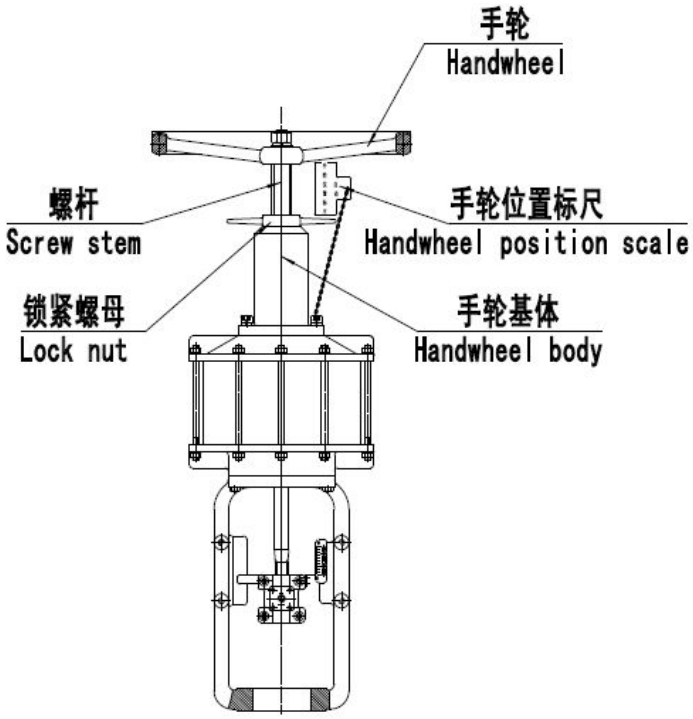


Fig.1-2-2.HV double acting actuator with top-mounted handwheel

2、Chief Technical Parameter

Model

HV21SR、HV31SR、HV41SR、HV51SR、HV61SR、HV71SR、HV81SR（reverse actuator）

HV21SD、HV31SD、HV41SD、HV51SD、HV61SD、HV71SD、HV81SD（direct actuator）

HV21D、HV31D、HV41D、HV51D、HV61D、HV71D、HV81D（double acting actuator）

Comments material

Cylinder body: 20＃Hot rolled seamless steel pipe

Piston: Q235

Actuator stem: SUS420

Yoke: SCPH2

Guide bush：Fe+Cu+F4

Sealing ring: butadiene rubber, fluoro rubber, three ethylene propylene rubber

Spring range 190～350kPa（HV）

Air supply 500kPa (HV);400~700kPa (HV)

Air connection Rc1/4"(HV21、HV31)；Rc 3/8"（HV41~61、HV41~61)；Rc 1/2"（HV71~81）

Ambient temp. Standard type: -20～+70℃

High Temp.service:-20～+100℃

Low Temp.service :-40～+70℃

Accessories Positioner, air-set, position switch, Handwheel, etc

Capacity

Hysteresis Error Less than 1% of the total travel with the positioner（HV, HV）

Intrinsic error Less than ±1% of the total travel with the positioner

Auxiliary air supply control system（HV） When the air supply pressure is decreased, both upper and lower three-way valve start action, in this case, the gas is input into the upper cylinder from the air tank, while the lower cylinder pressure drains.（Typical schematic diagram for accessory configuration when the air failure and valve closed）

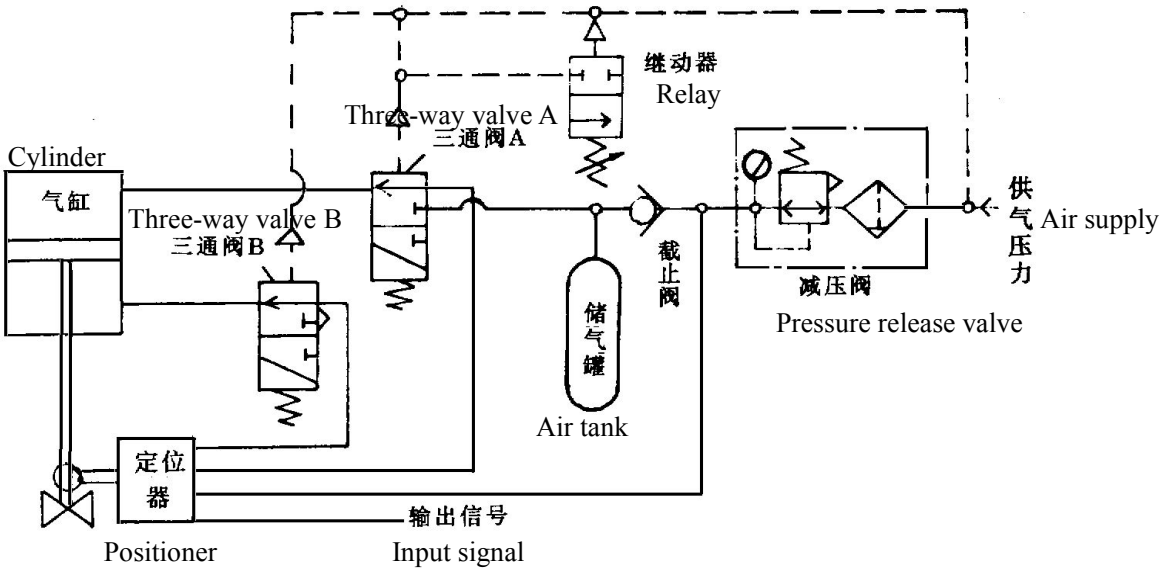


Fig.2-1 Auxiliary air supply control system

Table 1 Output force, travel and cylinder size

HV

Air supply 100kPa	输出力（N）Output force							
	Actuator	HV21S	HV31S	HV41S	HV51S	HV61S	HV71S	HV81S
	Stroke	14.3，25	14.3，25，38	25，38，50 75	25，38，50，75	38，50，75	75，100 120	120，150
5 Reverse action		2800	5000	7900	11400	19200	30000	45000
5 Direct action		2200	4000	6200	9000	15200	24000	41000

HV

Actuator	Stroke mm	Output force（KN）						
		Cylinder size mm	Air supply (100kPa)					
			2	3	4	5	6	7
HV21D	25、38	150	2.8	4.2	5.6	7.0	8.5	9.9
HV31D	25、38、50	200	5.0	7.5	10.0	12.5	15.0	17.6
HV41D	38、50、75、100	258	7.8	11.8	15.7	19.6	23.5	27.5
HV51D	38、50、75、100	304	11	17	22	28	34	39
HV61D	75、100、120	390	19	29	38	48	57	67
HV71D	100、120、150	490	30	45	60	75	90	105
HV81D	120、150	590	44	65	87	109	131	153

Table 2 Handwheel mechanism configuration

HV

Actuator	HV21S	HV31S	HV41S	HV51S	HV61S	HV71S	HV81S
Side-mounted handwheel	SVM-2	SVM-3	SVM-4	SVM-5	SVM-6	—	—
Top-mounted handwheel	TVM-2	TVM-3	—	—	—	—	—
Hydraulic handwheel	—	—	—	—	—	YHM-7	YHM-8

HV

Actuator	HV21D	HV31D	HV41D	HV51D	HV61D	HV71D	HV81D
Side-mounted handwheel	SVM-2	SVM-3	SVM-4	SVM-5	SVM-6	SVM-7	SVM-8
Top-mounted handwheel	TVM-2	TVM-3	—	—	—	—	—

Table 3 Outline dimension and weight

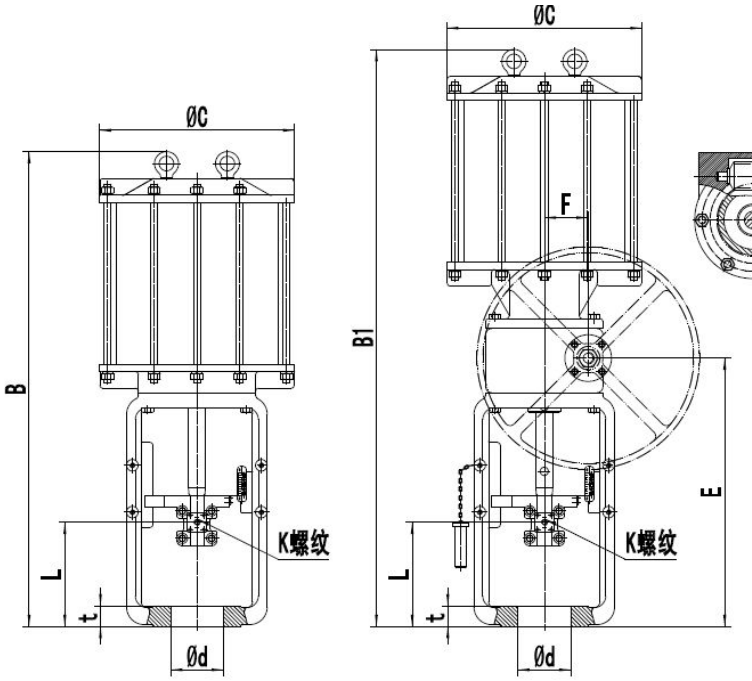


Fig.2-2 The outline dimension of HV21~HV41S without handwheel or with side-mounted handwheel

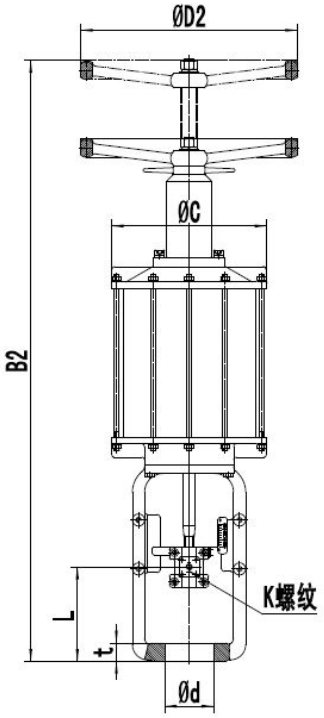


Fig.2-3 The outline dimension of HV21~HV31S with top-mounted handwhee

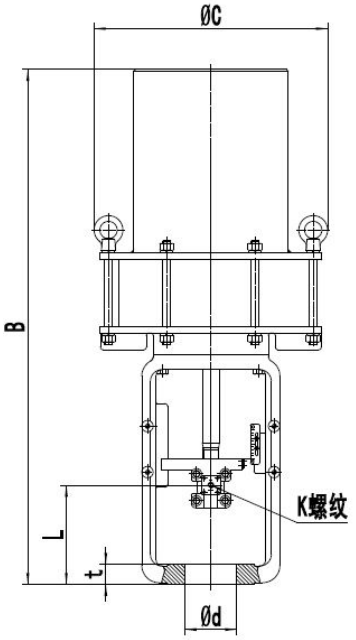


Fig.2-4 The outline dimension of HV41SR~HV81SR without handwheel

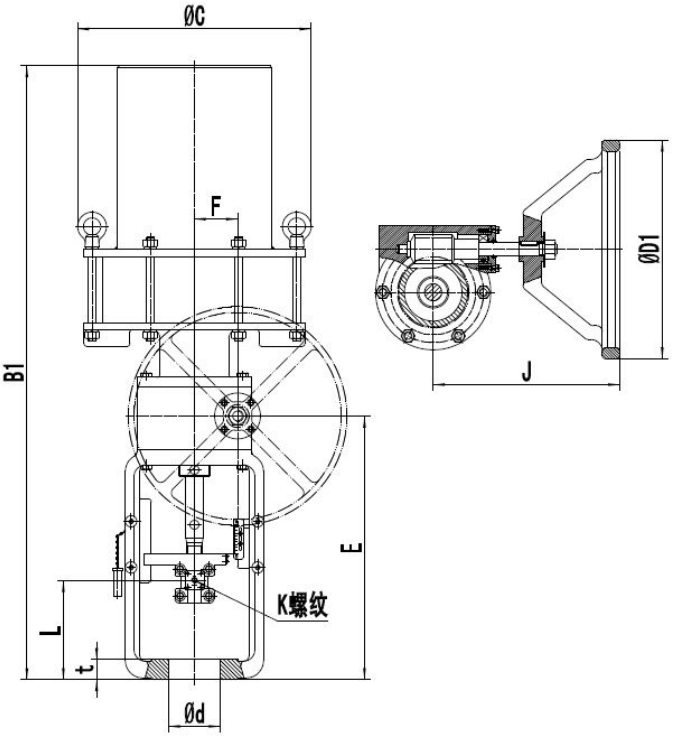


Fig.2-5 The outline dimension of HV51SR~HV61SR with side-mounted handwheel

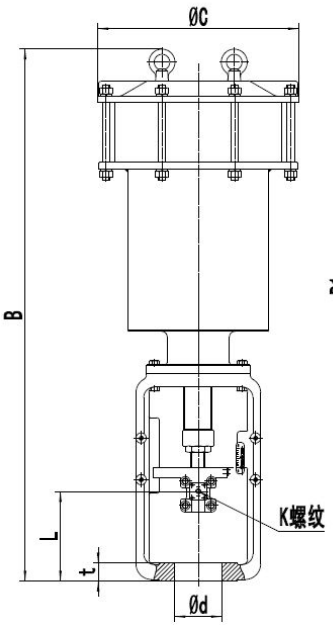


Fig.2-6 The outline dimension of HV51SD~HV81SD without handwhee

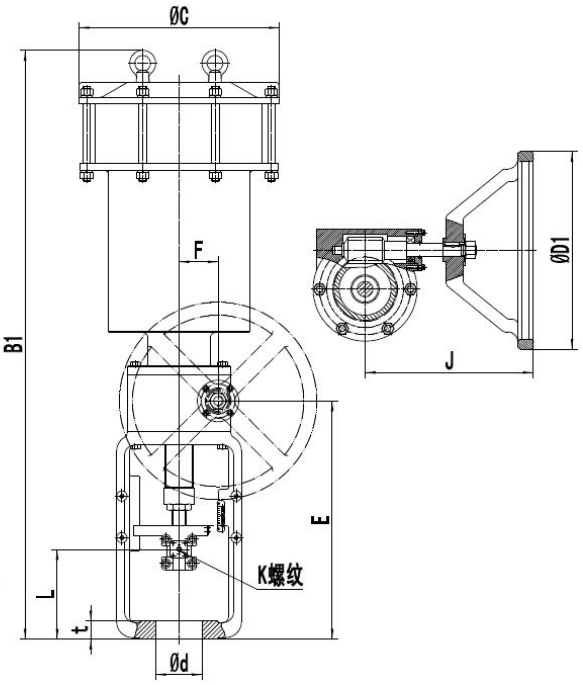


Fig.2-7 The outline dimension of HV5DS~HV6DS with side-mounted handwheel

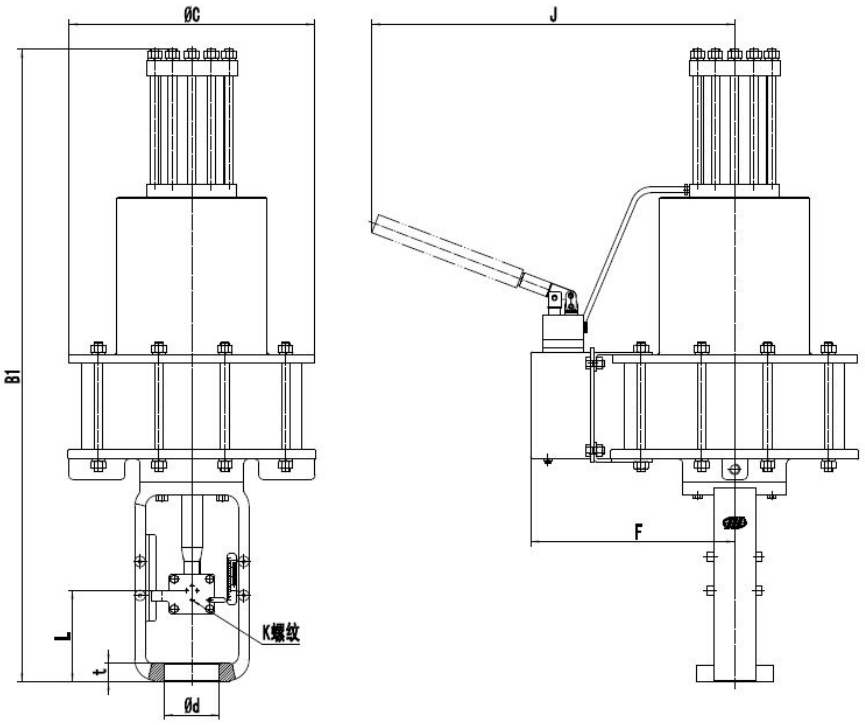


Fig.2-8 The outline dimension of HV71SR~81SR with hydraulic handwheel

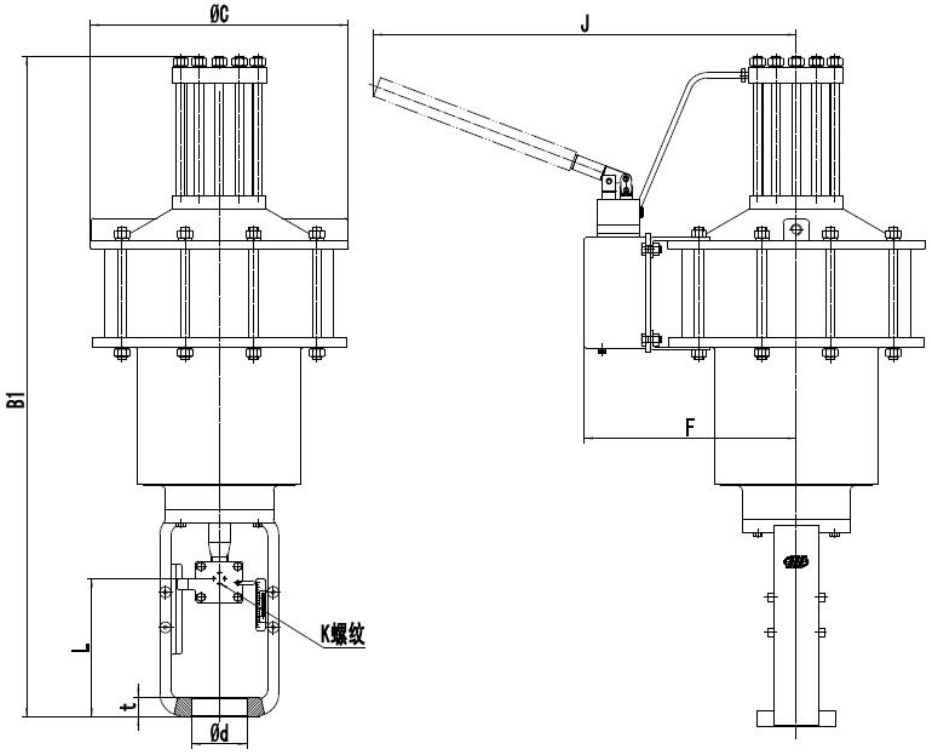


Fig.2-9 The outline dimension of HV71SD~81SD with hydraulic handwheel

Outline dimension

Actuator	Stroke	L	K Screw thread	t	Φd	ΦC	ΦD1 (ΦD2)	E	F	J	B (B1) (B2)	Cylinder diameter	Weight (Kg)
HV21S	L=14.3	123	M12X1.25	26	Φ65	200	200 (200)	320	50	180	650 (800) (1000)	150	
	L=25	113											
HV31S	L=14.3	123	M12X1.25	26	Φ65	254	200 (355)	320	50	180	750 (900) (1100)	200	
	L=25	113											
	L=38	102											
	L=14.3	175	M15X1.5	30	Φ80			365					
	L=25	170											
	L=38	154											
HV41S	L=25	177	M18X1.5	35	Φ90	334	380	460	75	324	1000 (1200)	258	
	L=38	172											
	L=50	172											
	L=75	172											
HV51S	L=25	177	M18X1.5	35	Φ90	382	380	460	75	324	1150 (1350)	304	160
	L=38	172											
	L=50	172											
	L=75	172											
	L=75	190	M27X1.5	38	Φ100								
HV61S	L=38	190	M27X1.5	38	Φ100	480	380	540	100	384	1200 (1450)	390	200 (250)
	L=50	190											
	L=75	190											
	L=100	190											
	L=75	205	M39X2	45	Φ125			580					
	L=100	205											
HV71S	L=75	205	M39X2	45	Φ125	580	-	-	500	1300	1250 (1600)	490	
	L=100	205											
	L=120	205											
HV81S	L=120	260	M45X3	50	Φ160	715	-	-	600	1400	1550 (1950)	590	
	L=150	260											

Note: Dimension L is the size of the piston at its lowest position. D, E, F, J is the size of the actuator with handwheel. The data in brackets is the size and weight of the actuator with handwheel.

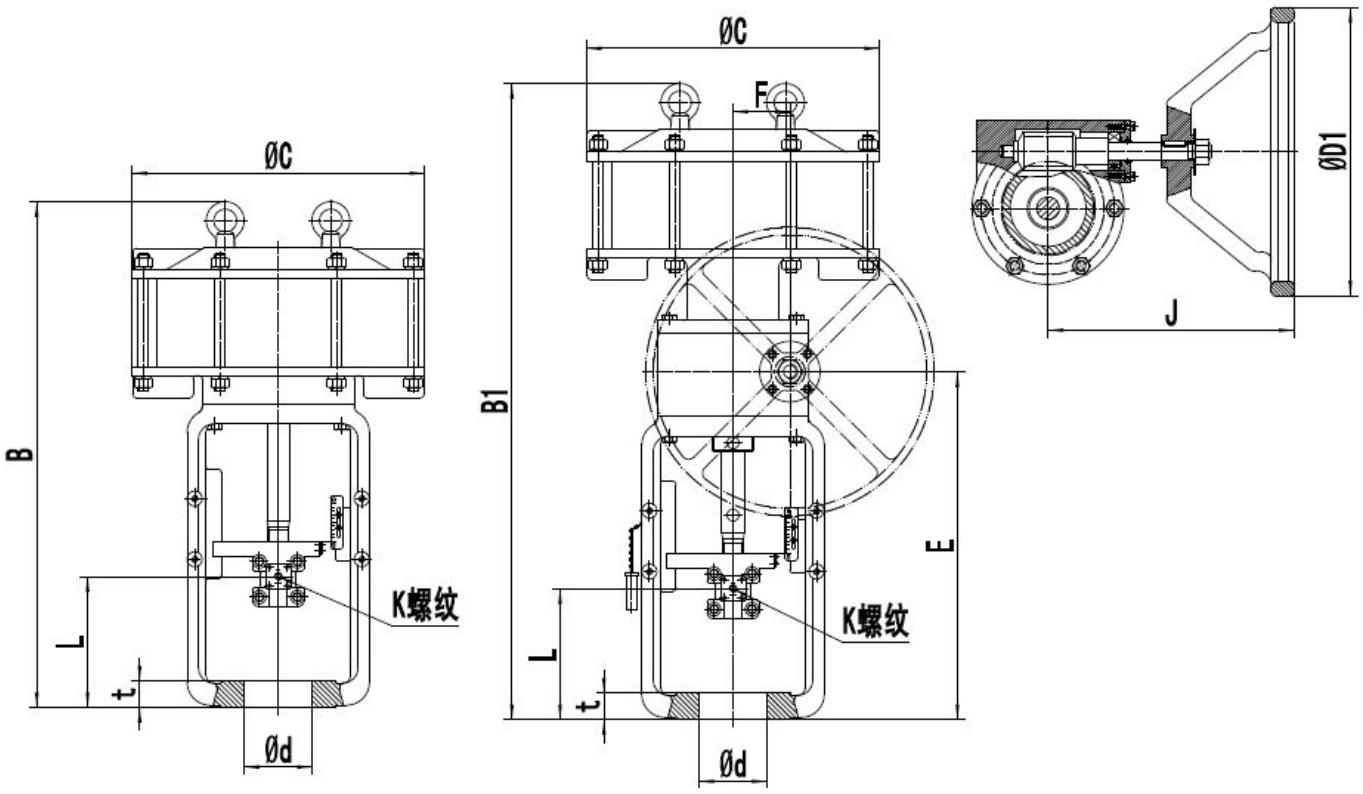


Fig.2-10 The outline dimension of HV21D~HV81D without handwheel or with side-mounted handwheel

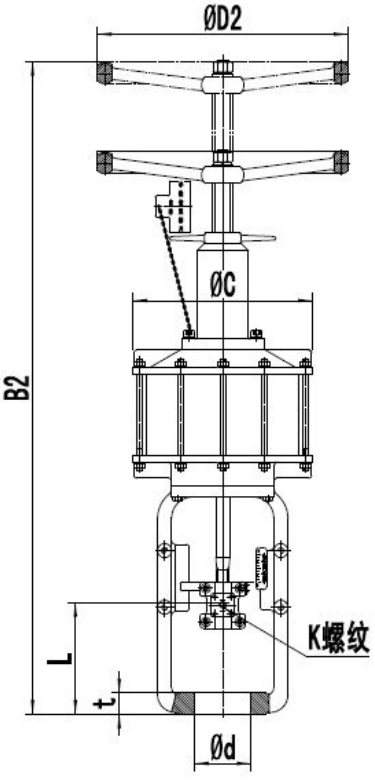


Fig.2-11 The outline dimension of HV21D~HV31D with top-mounted handwheel

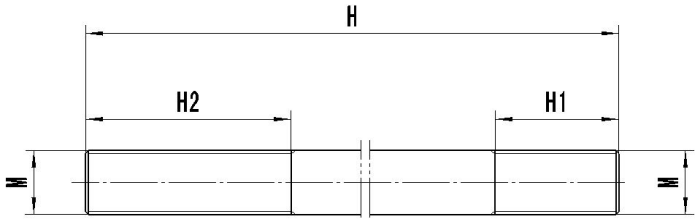
Outline dimension

Actuator	Stroke	L	K Screw thread	t	Φd	ΦC	ΦD1 (ΦD2)	E	J	Cylinder diameter	B (B1) (B2)	Weight （Kg）
HV21D	L=25	113	M12X1.25	26	Φ65	200	200 (200)	320	180	150	500 (640) (820)	
	L=38	102										
HV31D	L=25	113	M12X1.25	26	Φ65	254	200 (355)	320	180	200	560 (700) (850)	
	L=38	102										
	L=25	170	M15X1.5	30	Φ80			365				
	L=38	154										
	L=50	139										
HV41D、HV51D	L=38	172	M18X1.5	35	Φ90	334	380	460	324	250	700 (900)	
	L=50	172										
	L=75	172										
	L=75	190	M27X1.5	38	Φ100	382	380	460	324	300		
	L=100	190										
HV61D	L=75	190	M27X1.5	38	Φ100	480	380	540	384	390	900 (1150)	200 (230)
	L=100	190										
	L=120	190										
	L=100	205	M39X2	45	Φ125			580				
	L=120	205										
HV71D	L=100	205	M39X2	45	Φ125	580	380	580	384	490	1000 (1250)	
	L=120	205										
	L=150	205										
	L=120	226	M45X3	45	Φ140			580				
	L=150	226										
HV81D	L=120	260	M45X3	50	Φ160	715	380	670	440	590	1150 (1450)	
	L=150	260										

Note: Dimension L is the size of the piston at its lowest position. D, E, F, J is the size of the actuator with handwheel. The data in brackets is the size and weight of the actuator with handwheel.

3 、The disassembly and assembly of HV actuator

There are springs in the cylinder of HV actuator, see Fig.1-1-1 and 1-1-2. Disassembly only by the professionals for potential dangerous. When disassembly, a rod used for disassembly to let the spring stretched to free height shall be prepared, as the following figure and table:



Model	H	H1	H2	M
HV2	450	50	200	M8
HV3	450	50	200	M8
HV4	500	50	350	M12
HV5	500	50	350	M14
HV6	550	50	350	M18
HV7	620	50	400	M20
HV8	700	70	400	M20

Disassemble step：

(1) Screw out one of the hex nut of the actuator, and then remove the stud.

(2) Fit the rod and screws on the hex nut (Screws to the same position with the remaining 6 hex nuts).

(3) Remove 4 double headed studs (HV7) or 6 double headed studs (HV8) symmetrically according to one and two steps, fit the rod and screws on the hex nut

(4) Then remove the remaining stud

Rotate the hex nut slowly and symmetrically until the compression spring tension is eliminated, and then remove the rod.

The assembly procedure shall be carried out in compliance with the reverse procedure.

4、Ordering information

Give a clear indication in ordering:：

1、Actuator model　　2、Spring range

3、Accessories (piston, handwheel and reducing valve)

4、Rated travle　　5、spare parts and components

Address： **Caihe road 879, Caijiagang town, Beibei district, Chongqing**

Chongqing Chuanyi Control valve Co., Ltd.

Contact：The sales department

TEL：023-67032525/27/26

FAX：023-67032523

Post Code：400707

Version: CY11-2021B-01