

## DIRECTION CONTROL VALVES



Direction Control Valves are used for operating air/power cylinders. It is a prerequisite to identify the type of valve suitable to the relevant application. A detailed of the types of valves and their application is illustrated below.

1. Spool Type : Series 11
2. Direct Acting Type : Series 12
3. Poppet Type : Series 16

### SPOOL TYPE VALVES (SERIES 11)

The movement by the piston in the cylinder is achieved by the alternate flow of compressed air guided by the position of the spool in the valve. The position of the spool is governed by external means of actuation which could be manual or electrical.

Selection of spool valve is based on the following criteria:

1. Forward operating mechanism of spool
2. Return operating mechanism of spool
3. Number of ports
4. Number of Positions
5. Port Size

#### 1. Forward Operating Mechanism of spool:

ACTUATION	TYPES
MANUAL	HAND LEVER / FOOT PEDAL / PALM
SOLENOID COIL	6 TO 220 V.D.C. / 6 TO 440 V A.C.
PILOT AIR	EXTERNAL
MECHANICAL	ROLLER / ROLLER LEVER

#### 3. Number of Ports :

NO.OFTYPES PORTS	TYPES	PP : Pressure port (pressure line in)
2 PORTS	1PP / 1OP	OP : Outlet port
3 PORTS	1PP / 1CP / 1EP	EP : Exhaust port
5 PORTS	1PP / 2 CP / 2EP	CP : Compressor port

#### 2. Return operation of spool :

ACTUATION	TYPES
MANUAL	HAND LEVER / FOOT PEDAL/PALM
SOLENOID COIL	6 TO 220 V.D.C. / 6 TO 440 V A.C.
PILOT AIR	EXTERNAL
MECHANICAL	ROLLER / ROLLER LEVER

#### 4. Number of Positions :

- a. Two position
- b. Three position

#### 5. Port Size :

Indicates the size of the ports of the valve to which pipe fittings are made. Where it is required to have higher flow rate, it is taken as a rough assumption that the larger the port size, higher is the flow rate leading to increase in linear speed of cylinder. 'LUTHRA' make offers port valve sizes ranging from 1/8" B.S.P to 3/4" B.S.P.

A numbering system is used to designate directional control valve and is in accordance with ISO 5599 (Draft). The lettering system is presented as follows :

### Directional Control Valves : Symbol Development

PORT OF CONNECTION	ISO 5599
PRESSURE PORT	1
EXHAUST PORT	3 & 5
SIGNAL PORT ( CYLINDER PORT)	2 & 4

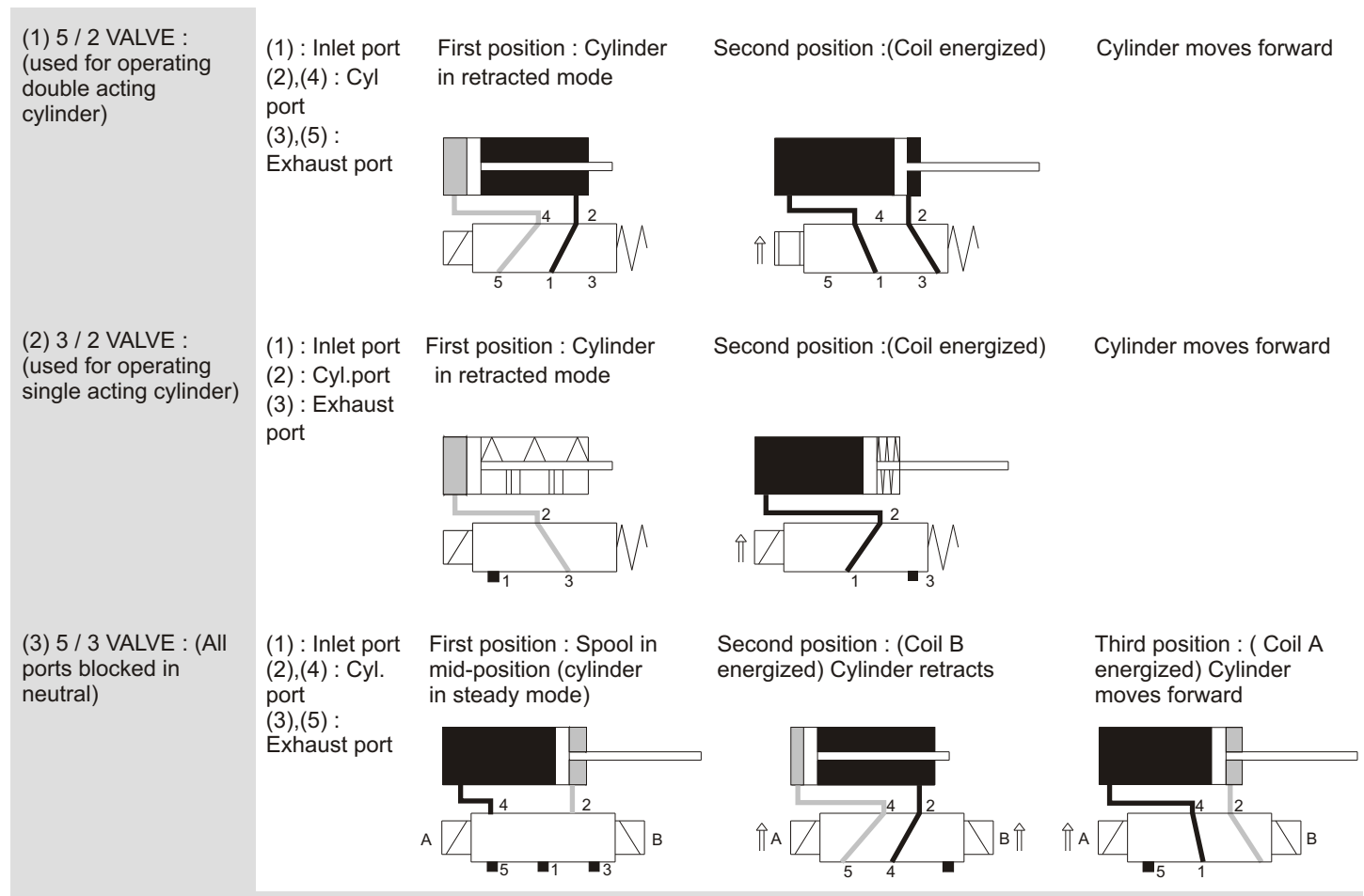
Lines indicate flow path, arrow showing direction of flow	
Shut off positions	
Line connection (inlet and outlet ports)	

## ILLUSTRATION : SPOOL VALVES

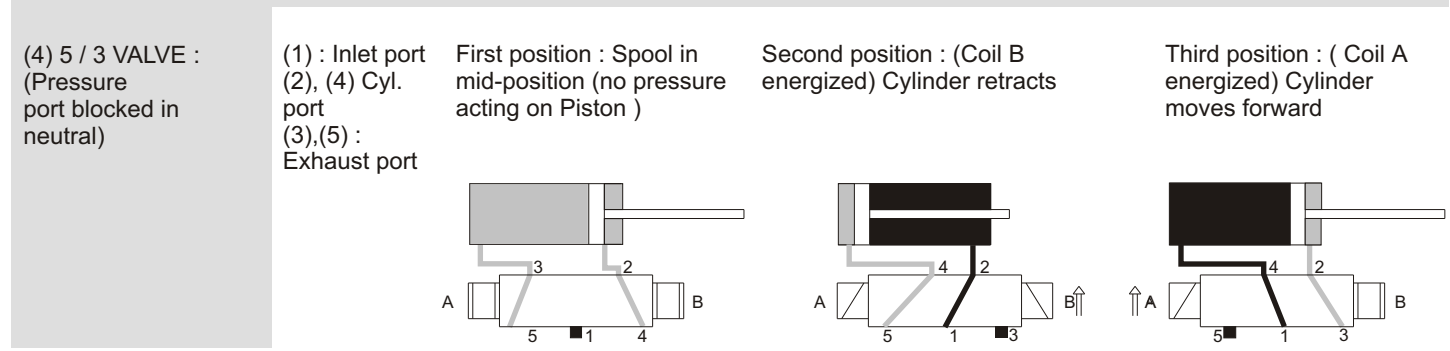


Direction Control Valves are used in changing the passage of compressed air from one cylinder port to another. The air passage is altered by linear motion of the spool present in the valve. This spool can be shifted either manually or by electric signal using solenoid coil. These valves are identified on the basis of a) Type of mechanism b) No. of ports c) Port Size d) Size of orifice. The larger the orifice / port size, the higher is the flow rate available which leads to increased operational speed of the cylinder.

Illustration for cylinder operation using spool type directional control valves.



Note : When lever is in mid position ( neutral position) , passage of air to all ports is blocked. In this way, the cylinder can be stopped at any desired position and can be maintained as long as lever is in neutral position.



Note : When level is in mid position (neutral position), pressure is related from the cylinder and is exhausted through the exhaust ports of the valve hence cylinder retracts in case of load acting on its during operation.

**SERIES 11 : SPOOL OPERATED VALVES**



BODY	ALUMINIUM HARD ANODIZED
SPOOL	En8 HARD CHROME PLATED
SEALS	NITRILE / VITON
TEMPERATURE	-10 to 80 / -10 to 250 DEG. CEN.
PORT SIZE	1/4", 3/8", 1/2" B.S.P.
MEDIA	AIR FLUID*
PRESSURE RANGE	AS PER TYPE OF VALVE

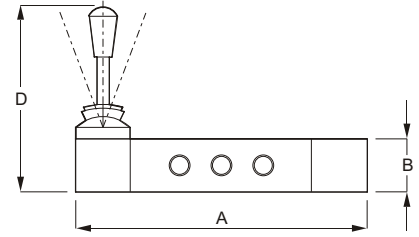
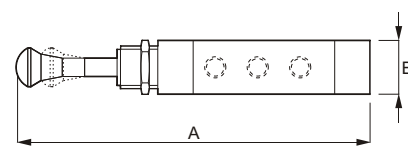
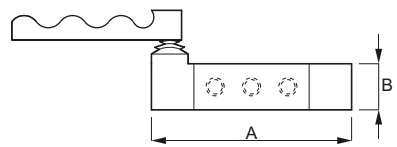
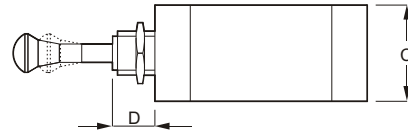
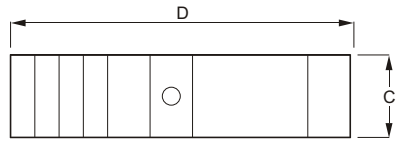
\* : fluid media application valid for all spool valves except for 3 port & 5 port solenoid operated valves.

**HANDLEVER OPERATED**



**FOOT OPERATED VALVES**

**PALM BUTTON OPERATED**



TYPE	SIZE	A	B	C	D
1) 5/2	1/4"	134	25	50	214
Spring	3/8"	216	38	68	320
Return	1/2"	216	38	68	320
4) 3/2	1/4"	110	25	50	190
Spring	3/8"	176	38	68	280
Return	1/2"	176	38	68	280
Pressure range		0 to 10 bar			

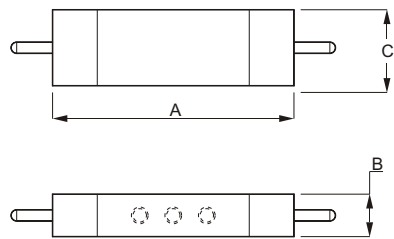
TYPE	SIZE	A	B	C	D
1) 5/2	1/4"	175	25	50	15
Spring	3/8"	255	38	68	15
Return	1/2"	255	38	68	15
2) 5/2	1/4"	170	25	50	15
Detent	3/8"	250	38	68	15
Tye	1/2"	250	38	68	15
4) 3/2	1/4"	150	25	50	15
Spring	3/8"	215	38	68	15
Return	1/2"	215	38	68	15
5) 3/2	1/4"	155	25	50	15
Detent	3/8"	220	38	68	15
	1/2"	220	38	68	15

TYPE	SIZE	A	B	C	D
1) 5/2	1/4"	134	25	50	120
Spring	3/8"	216	38	68	150
Return	1/2"	216	38	68	150
2) 5/2	1/4"	138	25	50	120
Detent	3/8"	209	38	68	150
Tye	1/2"	209	38	68	150
3) 5/3	1/4"	138	25	50	120
Detent	3/8"	209	38	68	150
	1/2"	209	38	68	150
4) 3/2	1/4"	109	25	50	120
Spring	3/8"	175	38	68	150
Return	1/2"	175	38	68	150
5) 3/2	1/4"	1131	25	49	120
Detent	3/8"	179	38	68	150
	1/2"	179	38	68	150
6) 3/3	1/4"	113	25	49	120
Detent	3/8"	179	38	68	150
	1/2"	179	38	68	150
Pressure range		2 to 10 bar			

## HYDRAULIC CYLINDER

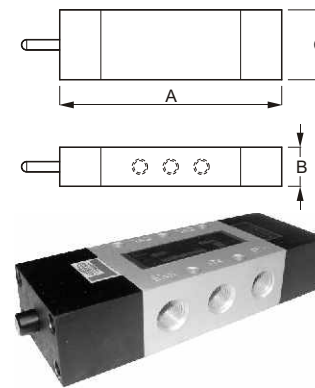


### DOUBLE PILOT



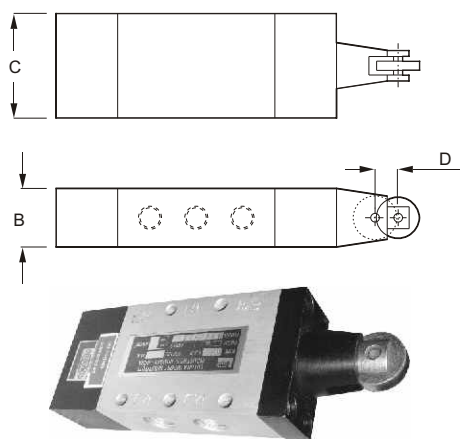
TYPE	SIZE	A	B	C
1) 5/2	1/4"	138	30	50
Detent	3/8"	216	38	68
Type	1/2"	216	38	68
2) 3/2	1/4"	115	30	50
Detent	3/8"	176	38	68
Type	1/2"	176	38	68
Pressure range		2 to 10 bar		

### SINGLE PILOT



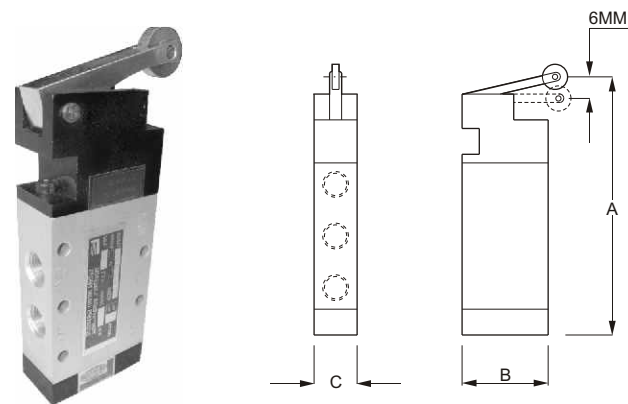
TYPE	SIZE	A	B	C
1) 5/2	1/4"	138	25	50
Spring	3/8"	216	38	68
return	1/2"	216	38	68
2) 3/2	1/4"	112	25	50
Spring	3/8"	176	38	68
return	1/2"	176	38	68
Pressure range		2 to 10 bar		

### ROLLER OPERATED



TYPE	SIZE	A	B	C	D
1) 5/2	1/4"	140	25	50	5
Spring	3/8"	222	38	68	5
return	1/2"	222	38	68	5
2) 3/2	1/4"	125	25	50	5
Spring	3/8"	180	38	68	5
return	1/2"	180	38	68	5
Pressure range		0 to 10 bar			

### ROLLER LEVER OPERATED



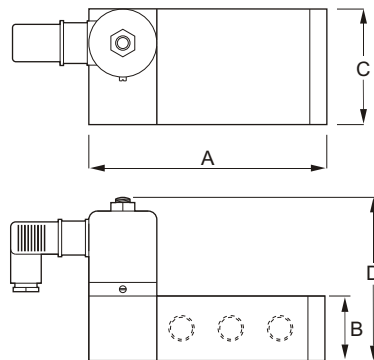
TYPE	SIZE	A	B	C
1) 5/2	1/4"	150	50	25
Spring				
return				
2) 3/2	1/4"	125	50	25
Spring				
return				
Pressure range		0 to 10 bar		

**SERIES 11 : SPOOL OPERATED VALVES**



COIL CHARACTERISTICS	
COIL	EPOXY MOULDED (WEATHER PROOF)
COIL HOUSING1	HARD CHROME PLATED
VOLTAGE	6 TO 440 V a.c. /6 TO 220 V d.c.
POWER CONSUMPTION	11 WATTS
INSULATION	CLASS 'H'
COIL APPROVED BY GOVT. OF INDIA AS PER 1S8935 - 1985	

**SINGLE SOLENOID OPERATED**

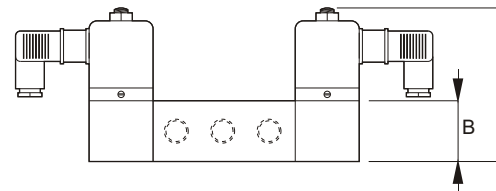
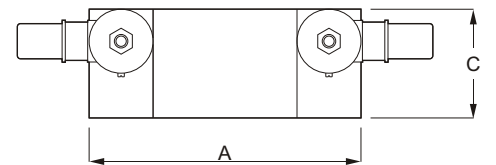


TYPE	SIZE	A	B	C	D
1) 5/2 Spring return	1/4"	145	30	50	105
	3/8"	216	38	68	105
	1/2"	216	38	68	105
	3/4"	250	42	85	117
2) 3/2 Spring return	1/4"	125	30	50	105
	3/8"	216	38	68	105
	1/2"	216	38	68	105
Pressure range		2 to 10 bar			
1/4", 3/8", 1/2"		2 to 10 bar			
3/4" B.S.P.		4 to 10 bar			

**Note:**

1. It is mandatory to keep the coil continuously energized to continue forward motion of cylinder.
2. The single solenoid spring return valve finds wide Applications in areas where the cylinder needs to be in retracted position in case of power failure.

**DOUBLE SOLENOID OPERATED**



TYPE	SIZE	A	B	C	D
1) 5/2 Retaining Type	1/4"	164	30	50	105
	3/8"	216	38	68	113
	1/2"	216	38	68	113
2) 5/3 Spring centered	1/4"	194	30	50	105
	3/8"	260	38	68	113
	1/2"	260	38	68	113
4) 3/2 Retaining type	1/4"	140	30	50	105
	3/8"	175	38	68	113
	1/2"	175	38	68	113
5) 3/3 Spring centered	1/4"	170	30	50	105
	3/8"	220	38	68	113
	1/2"	220	38	68	113
<b>PRESSURE RANGE</b>					
1/4", 3/8", 1/2"		1.5 to 10 bar			
3/4" B.S.P.		2.5 to 10 bar			

**1. Two position type :**

It is only required to give a momentary electrical impulse alternately to the coil A&B to shift the spool and consequently operate the cylinder. Hence coils need not be continuously energized.

**2. Three position type:**

Alternate coil needs to be continuously energized to operate the cylinder.