

MONOBLOCK  
DIRECTIONAL CONTROL VALVE

**SD** 18



 **walvoil**  
HYDRAULIC CONTROL SYSTEMS

## Features

Simple, compact and heavy duty designed monoblock from 1 to 6 sections for open and closed center hydraulic systems.

H Fitted with a direct or pilot operated main pressure relief valve.

H Parallel circuit.

H Optional power beyond port.

H Diameter 25 mm - 0.98 in interchangeable spools.

H A wide variety of service port valves.

H Available manual, pneumatic, electro-pneumatic, hydraulic and electro-hydraulic spool control kits.

### Additional information

This catalog shows the product in the most standard configurations.

Please contact Customer Service Dpt. for more detailed information or special request.

### WARNING!

All specifications of this catalog refer to the standard product at this date.

Walvoil, oriented to a continuous improvement, reserves the right to discontinue, modify or revise the specifications, without notice.

WALVOIL IS NOT RESPONSIBLE FOR ANY DAMAGE CAUSED BY AN  
INCORRECT USE OF THE PRODUCT.

4<sup>th</sup> edition October 2001:

**This edition supercedes all prior documents.**

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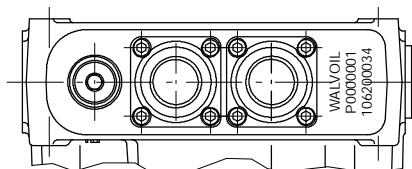
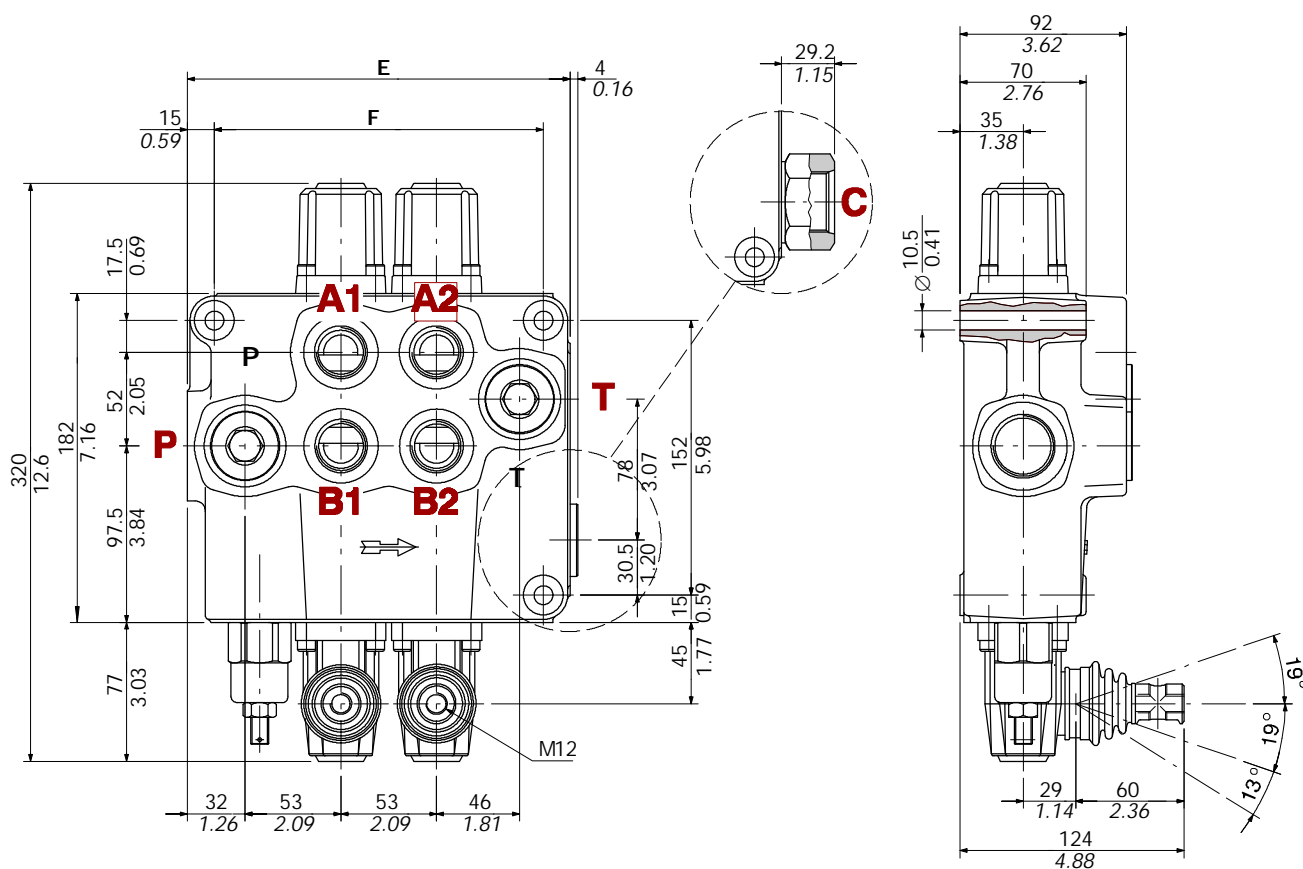
# SD18

## Working conditions

This catalogue shows technical specifications and diagrams measured with mineral oil of 46 mm<sup>2</sup>/s - 46 cSt viscosity at 40°C - 104°F temperature.

Nominal flow rating		160 l/min	42 US gpm
Operating pressure (maximum)		250 bar	3620 psi
Max. back pressure	<i>on outlet port T</i>	25 bar	360 psi
Internal leakage A(B)→T	<i>Δp=100 bar - 1450 psi fluid and valve at 40°C - 104°F</i>	4 cm <sup>3</sup> /min	0.24 in <sup>3</sup> /min
Hydraulic fluid		Mineral oil	
Fluid temperature range	<i>with NBR seals</i>	from -20° to 80°C	<i>from -4° to 176°F</i>
	<i>with FPM (VITON) seals</i>	from -20° to 100°C	<i>from -4° to 212°F</i>
Viscosity	<i>operating range</i>	from 15 to 75 mm <sup>2</sup> /s	<i>from 15 to 75 cSt</i>
	<i>min.</i>	12 mm <sup>2</sup> /s	12 cSt
	<i>max.</i>	400 mm <sup>2</sup> /s	400 cSt
Max level of contamination		19/16 - ISO 4406	NAS 1638 - class10
Ambient temperature range		from -40° to 60°C	<i>from -40° to 140°F</i>

NOTE - For different conditions please contact Customer Service.



**WALVOIL**  
**P0000001**  
**106200034**

Production batch :  
 P00 = production year (2000)  
 00001 = progressive number  
 Valve code

TYPE	E		F		Weight	
	mm	in	mm	in	kg	lb
<b>SD18/1-P</b>	159	6.26	129	5.08	13.2	29.1
<b>SD18/2-P</b>	212	8.35	182	7.17	18.6	41
<b>SD18/3-P</b>	265	10.4	235	9.25	23.5	51.8

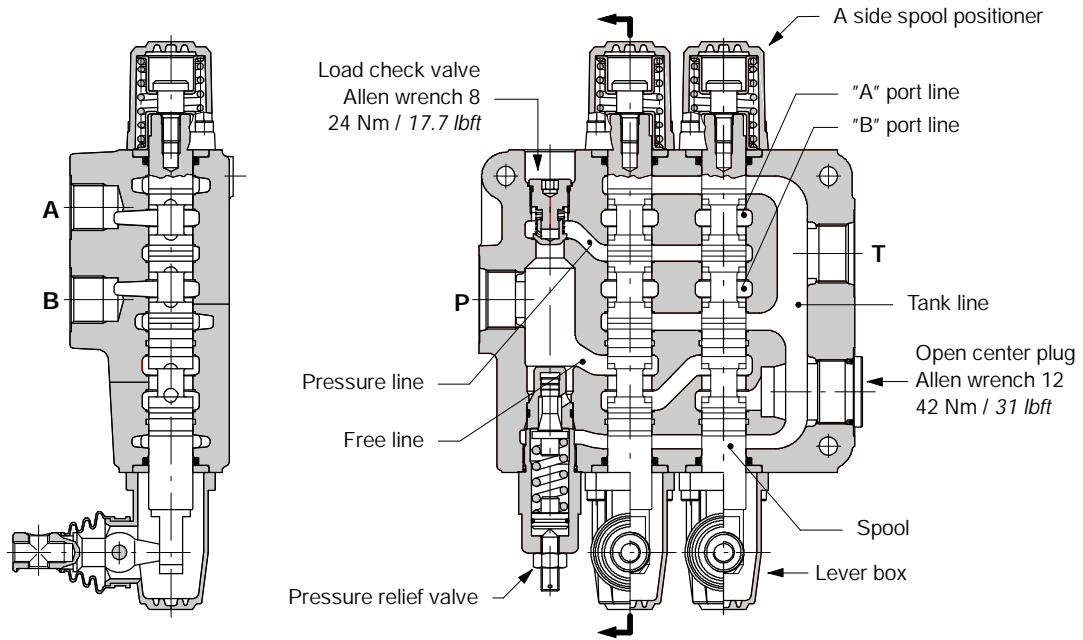
TYPE	E		F		Weight	
	mm	in	mm	in	kg	lb
<b>SD18/4-P</b>	318	12.5	288	11.3	28.8	63.5
<b>SD18/5-P</b>	371	14.6	341	13.4	34.1	75.2
<b>SD18/6-P</b>	424	16.7	394	15.5	39.4	86.9

### Standard threads

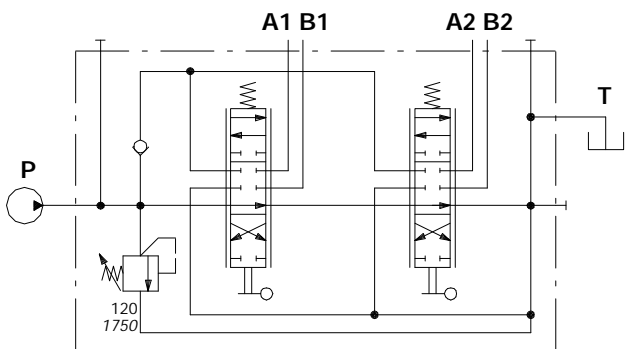
PORT	BSP (ISO 228/1)	UN-UNF (ISO 11926-1)
Inlet <b>P</b> and power beyond <b>C</b>	G 3/4	1 5/16-12 UN-2B (SAE 16)
<b>A</b> and <b>B</b> ports	G 3/4	1 1/16-12 UN-2B (SAE 12)
Outlet <b>T</b>	G 1	1 5/16-12 UN-2B (SAE 16)
PILOT PORTS		
Hydraulic	G 1/4	9/16-18 UNF-2B (SAE 6)
Pneumatic	NPTF 1/8-27	NPTF 1/8-27

# SD18

## Hydraulic circuit

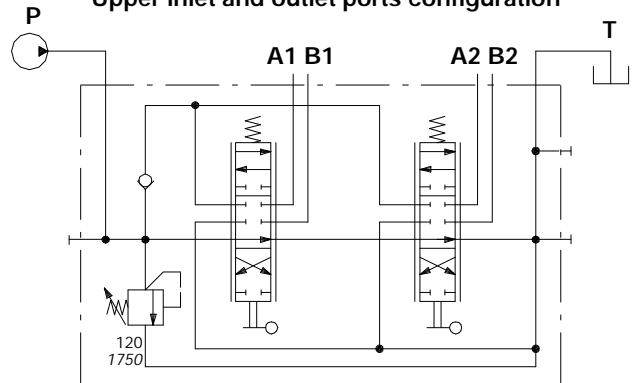


Standard configuration



Ex.: SD18/2-P(KG3-120)/18L/18L/AET

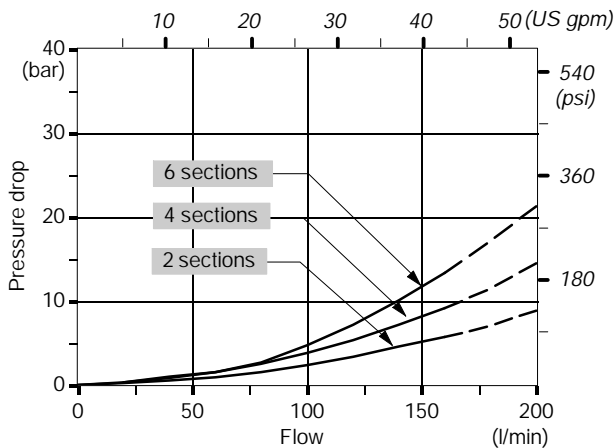
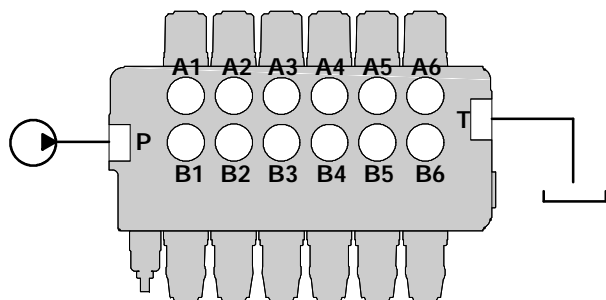
Upper inlet and outlet ports configuration



Ex.: SD18/2-P(KG3-120)/18L/18L/AET-PSA

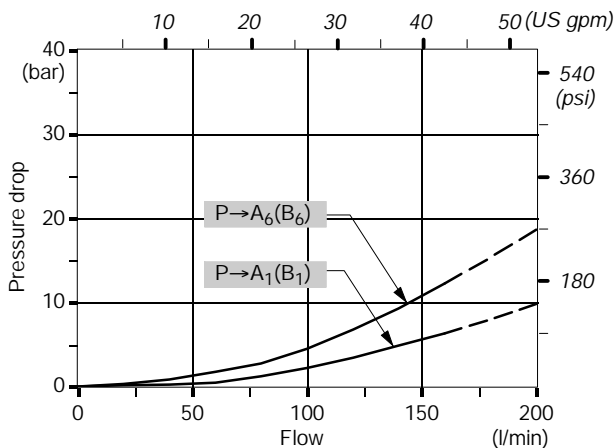
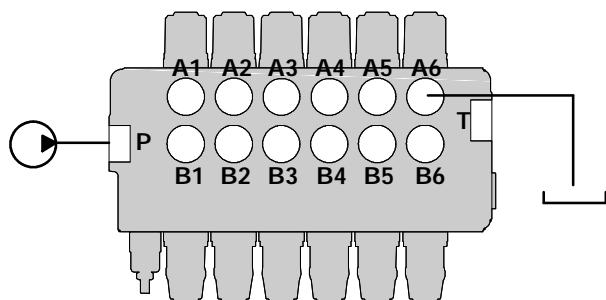
Performance data (pressure drop vs. flow)

From side inlet to side outlet.



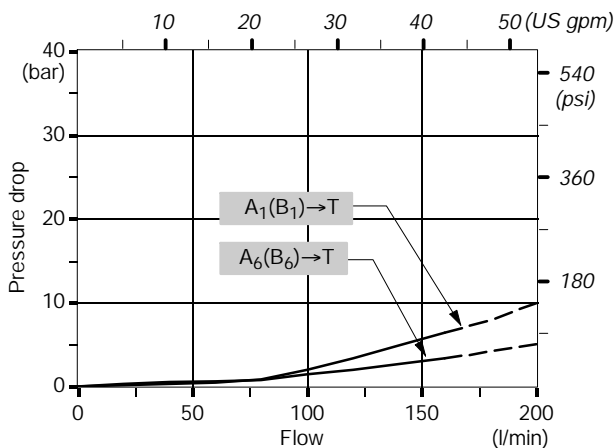
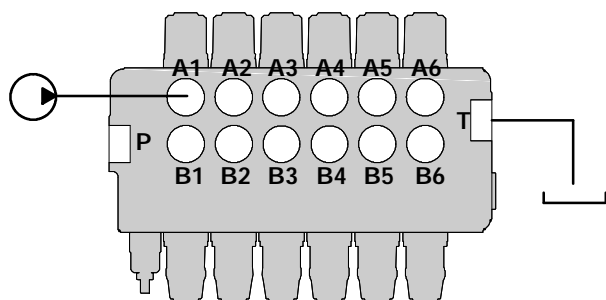
Inlet to work port

From side inlet to A port (spool in position 1) or B port (spool in position 2).



Work port to outlet

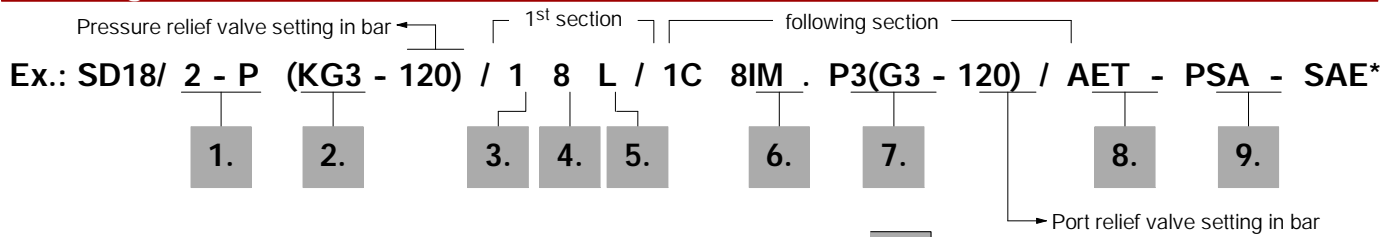
From A port (spool in position 2) or B port (spool in position 1) to side outlet.



NOTE - Measured with spool type 1.

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## Ordering codes



### 1. Body kits \*

TYPE CODE DESCRIPTION

Without service port valves prearrangement

1-P	5KC1717000	1 section
2-P	5KC1727000	2 sections
3-P	5KC1747000	3 sections
4-P	5KC1767000	4 sections
5-P	5KC1787000	5 sections
6-P	5KC1807000	6 sections

Include body, seals, rings and load check valve.

### 2. Inlet relief options

page 10

TYPE CODE DESCRIPTION

VMD20/1 direct pressure relief valve type K (standard)

**(KG2-80)** 5KIT120112 Range 25 to 80 bar / 360 to 1150 psi  
standard setting 80 bar / 1150 psi

**(KG3-120)** 5KIT120113 Range 63 to 200 bar / 900 to 2900 psi  
standard setting 120 bar / 1750 psi

**(KG4-220)** 5KIT120114 Range 160 to 250 bar / 2300 to 3600 psi  
standard setting 220 bar / 3200 psi

VMP20/1 pilot operated pressure relief valve type X

**(XG-120)** X007211120 Range 63 to 250 bar / 900 to 3600 psi  
standard setting 120 bar / 1750 psi

Standard setting is referred to 10 l/min - 2.6 US gpm flow.

SV 3XTAP535410 Relief valve blanking plug

### 3. Spools

page 12

TYPE CODE CIRCUIT DESCRIPTION

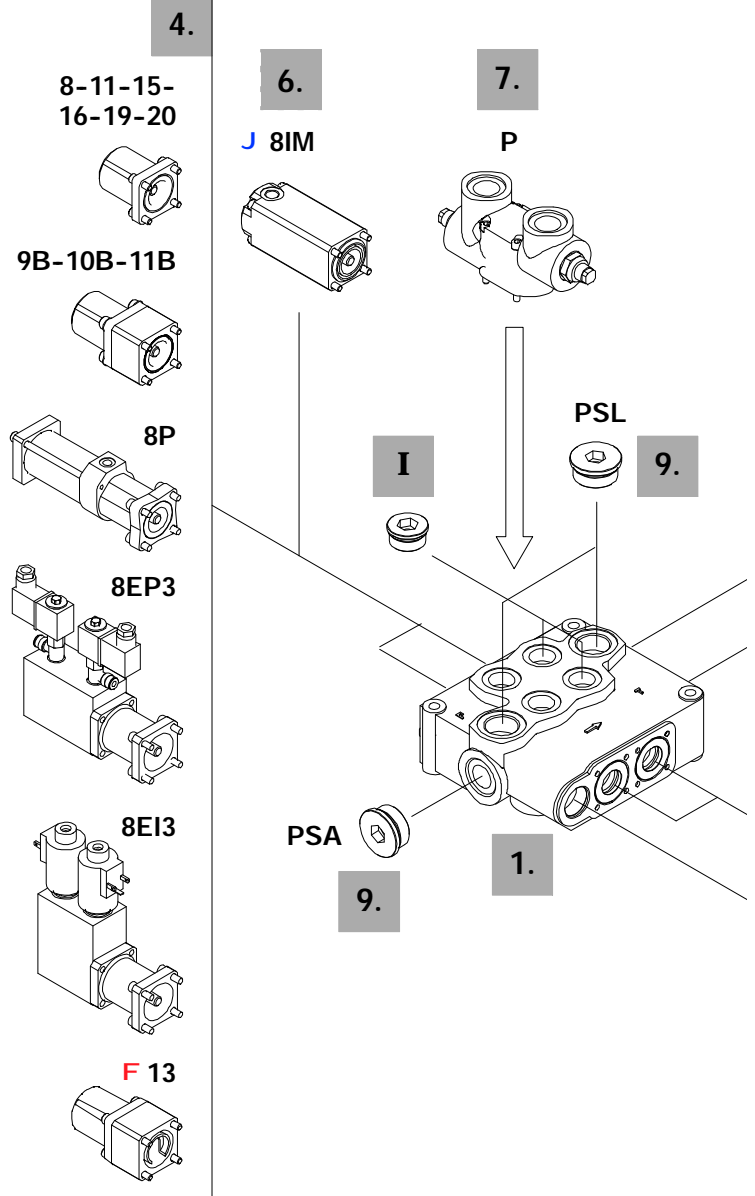
1	3CU1610130	Double acting, 3 positions, with A and B closed in neutral position
2	3CU1625130	Double acting, 3 positions, with A and B open to tank in neutral position
3	3CU1631130	Single acting on A, 3 positions, B plugged requires SAE 12 plug (see part I)
4	3CU1635130	Single acting on B, 3 positions, A plugged requires SAE 12 plug (see part I)

**J** Spools for 8IM hydraulic control

1C	3CU1610400	As type 1
2C	3CU1625400	As type 2
3C	3CU1631400	As type 3

Special spools: **need special body kit**

<b>F</b> 5	3CU1641130	Double acting, 4 positions, with A and B to tank in 4 <sup>th</sup> position (float); for type 13 spool positioner
<b>8F</b>	3CU1661100	Double acting, 3 positions, with regenerative in position 2



### 4. "A" side spool positioners

page 16

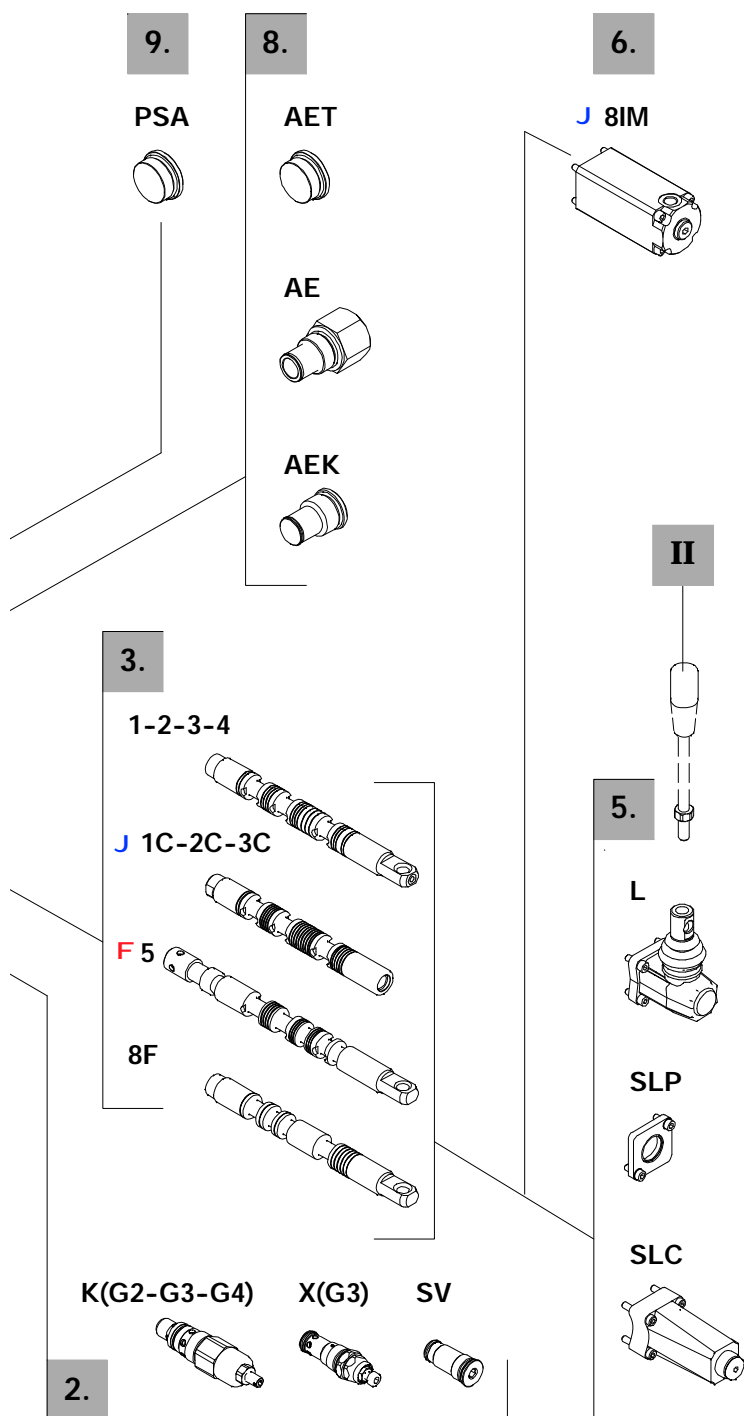
TYPE CODE DESCRIPTION

<b>8</b>	5V08120000	With spring return in neutral position
<b>9B</b>	5V09120000	With detent in position 1 and spring return neutral position
<b>10B</b>	5V09120000	With detent in position 2 and spring return neutral position
<b>11B</b>	5V11220000	With detent in positions 1 and 2, spring return neutral position

..... to be continued on next page

NOTE (\*) - Items are referred to **UN-UNF** thread.





NOTE **J F** - Spools and positioners with the same symbol must be assembled together.

### 4. "A" side spool positioners page 16

TYPE	CODE	DESCRIPTION
11	5V11120000	With detent in positions 1, 0 and 2
15	5V15120000	With detent in positions 1 and 0
16	5V16120000	With detent in positions 2 and 0
19	5V19120000	With spring return in position 0 from 1
20	5V19120000	With spring return in position 0 from 2
8P	5V08120701	ON/OFF pneumatic kit
8EP3	5V08120735	12 VDC ON/OFF electro-pneumatic kit
	5V08120736	24 VDC ON/OFF electro-pneumatic kit
8E13	5V08120350	12 VDC ON/OFF electro-hydraulic kit
	5V08120351	24 VDC ON/OFF electro-hydraulic kit

#### Special positioner

<b>F 13</b>	5V13020000	With detent in position 3 and spring return neutral position, for spool type 5
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### 5. "B" side spool control kits page 23

TYPE	CODE	DESCRIPTION
L	5LEV120000	Standard lever
SLP	5COP120000	Without lever, with dust-proof plate
SLC	5COP220000	Without lever, with cap

### 6. Hydraulic spool control kit \* page 24

TYPE	CODE	DESCRIPTION
<b>J 8IM</b>	5IDR220700	Proportional hydraulic operated with spring return in position 0, requires spools type C

### 7. Port relief options \* page 26

TYPE	CODE	DESCRIPTION
Kit with anti-shock: <b>need special body kit</b>		
Range from 80 to 200 bar / 1150 to 2900 psi		
P1(G3-100)	606001000	Mounted on port A
P2(G3-100)	606001000	Mounted on port B
P3(G3-100)	606001100	Mounted on ports A and B
Standard setting is 100 bar - 1450 psi to 10 l/min - 2.6 US gpm flow.		

### 8. Outlet port conversion \* page 28

TYPE	CODE	DESCRIPTION
AET	3XTAP640250	Open center plug
AE	3XGIU546810	SAE16 power beyond sleeve
AEK	3XTAP540560	Closed center plug

### 9. Inlet and outlet selection \* page 6

TYPE	CODE	DESCRIPTION
PSL	3XTAP838200	SAE16 plug for side inlet and outlet (n.2 plugs required)
PSA	3XTAP838200	SAE16 plug for upper inlet and outlet (n.2 plugs required)

### I Ports plug \*

TYPE	CODE	DESCRIPTION
SAE12	3XTAP832200	For single acting (spools type 3 and 4)

### II Optional handlever

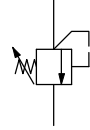
TYPE	CODE	DESCRIPTION
AL01/M12x250	170013025	For L lever box L= 250 mm / 9.84 in

## Inlet relief options

### Direct pressure relief valve

#### VMD20 ( K G 3 - 120 )

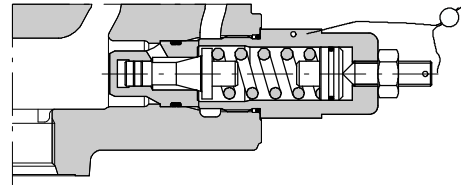
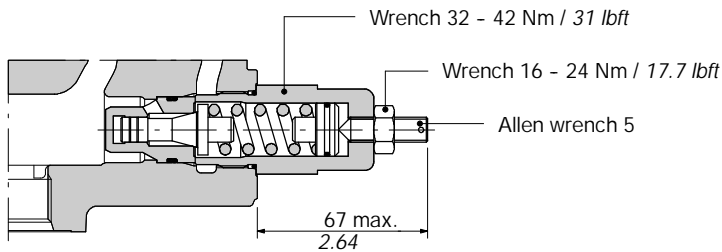
- Pressure setting in bar (standard 120 / 1750 psi)
- Spring type (2, 3, 4).
- Adjustment type (G, H)



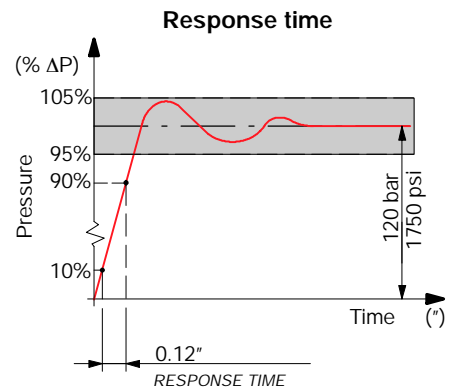
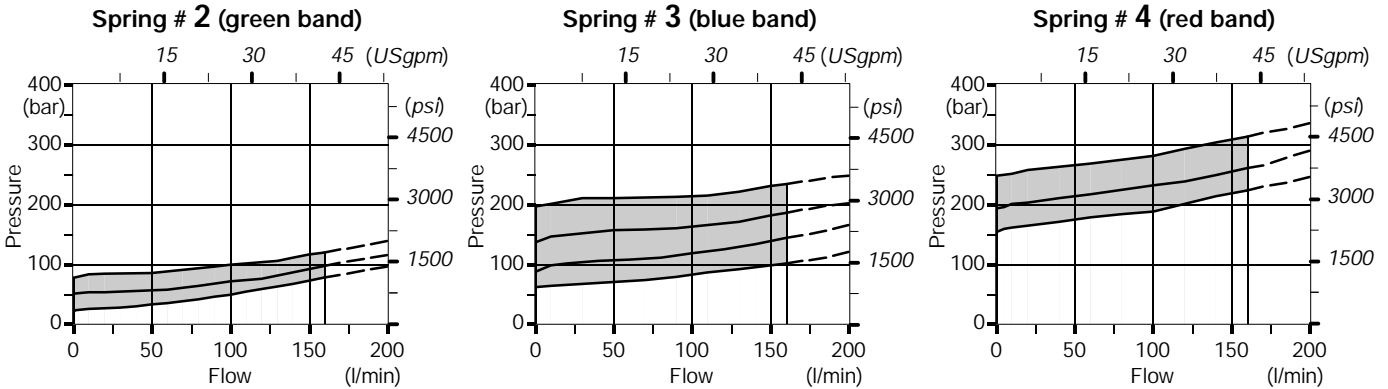
### Adjustment type

**G:** with screw

**H:** valve set and locked



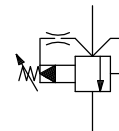
### Performance data



Pilot operated pressure relief valve

VMP20 ( X G - 120 )

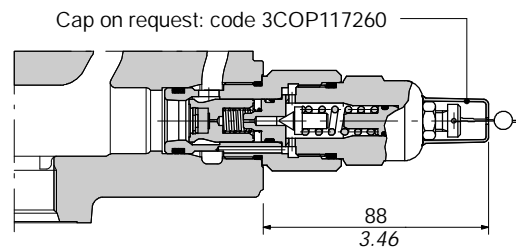
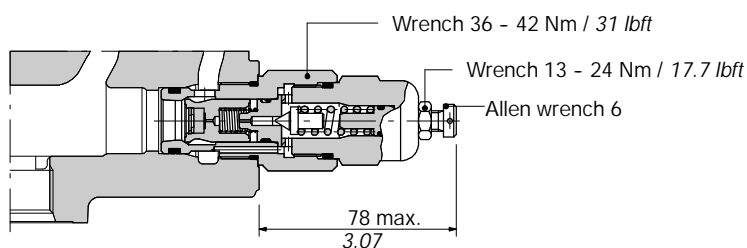
Pressure setting in bar (standard 120 / 1750 psi)  
Adjustment type (G, H)



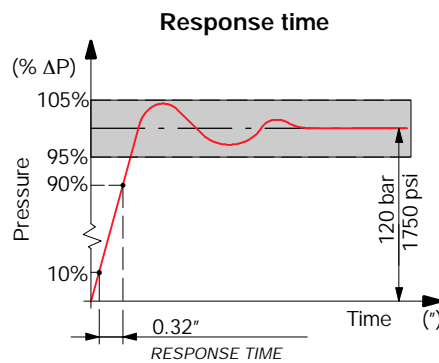
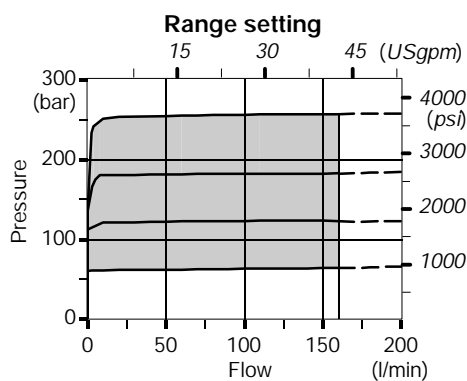
Adjustment type

G: with screw

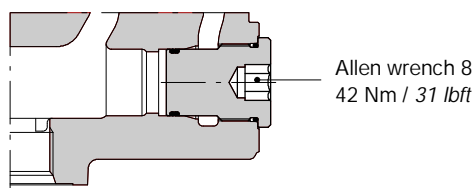
H: valve set and locked



Performance data



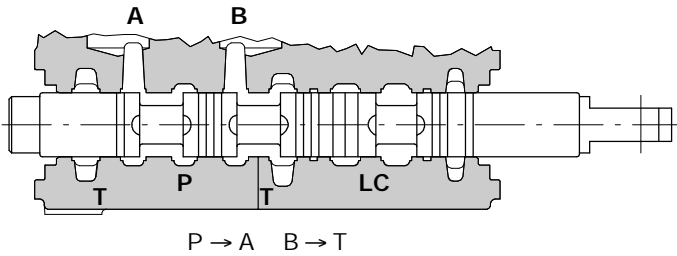
SV: relief valve blanking plug



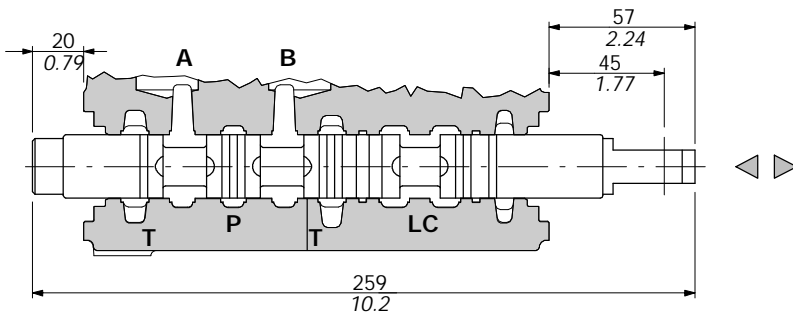
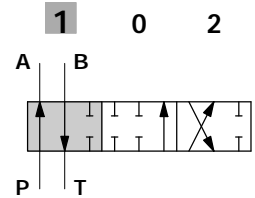
# SD18

## Spool options

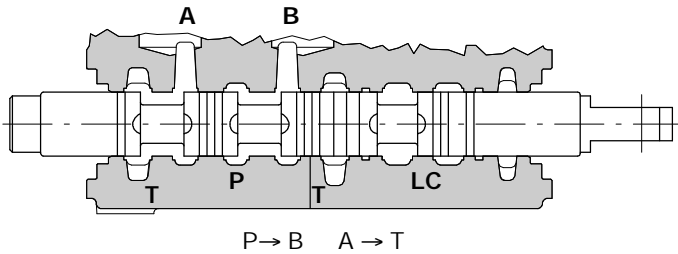
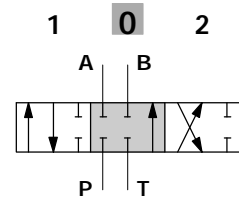
### Type 1



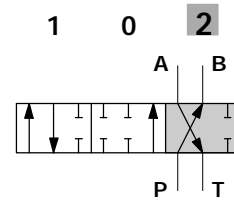
stroke = + 10 mm  
+ 0.39 in



P-A-B-T closed, with flow through line (LC) open

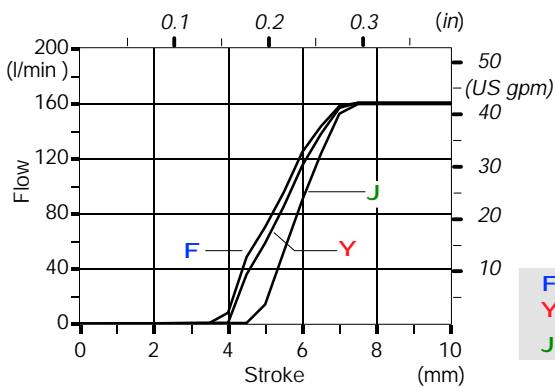


A stroke = - 10 mm  
- 0.39 in

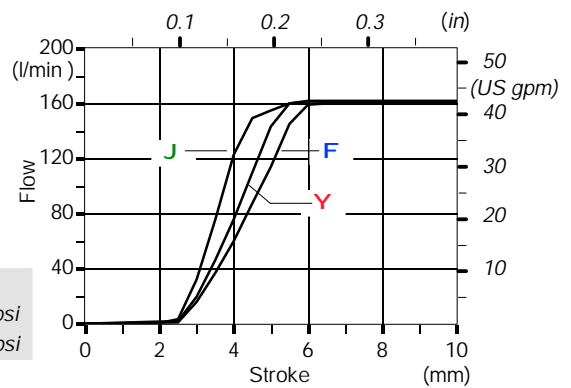


## Performance data

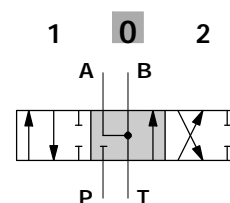
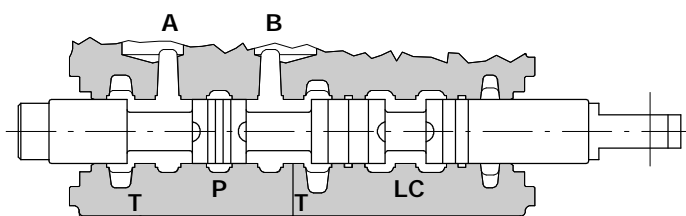
Spool metering P → A(B)



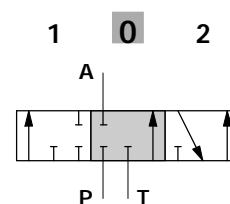
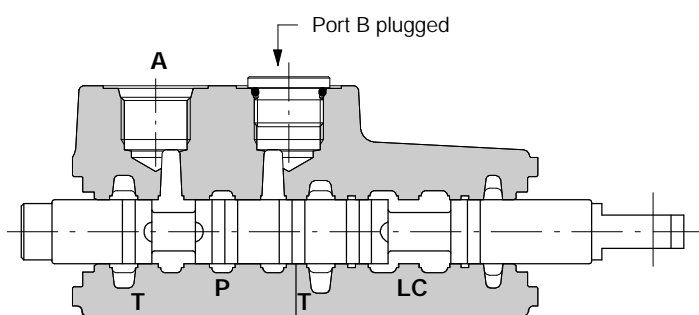
Spool metering A(B) → T



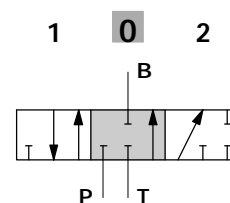
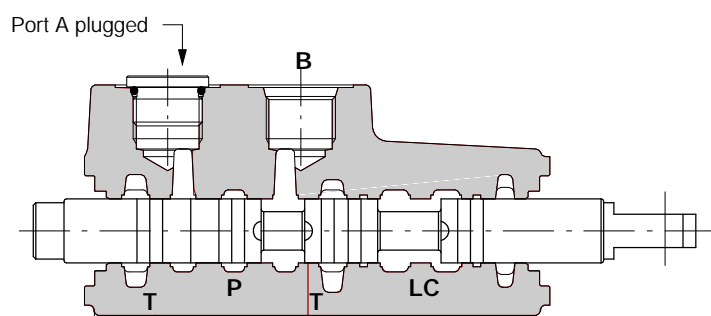
Type 2



Type 3



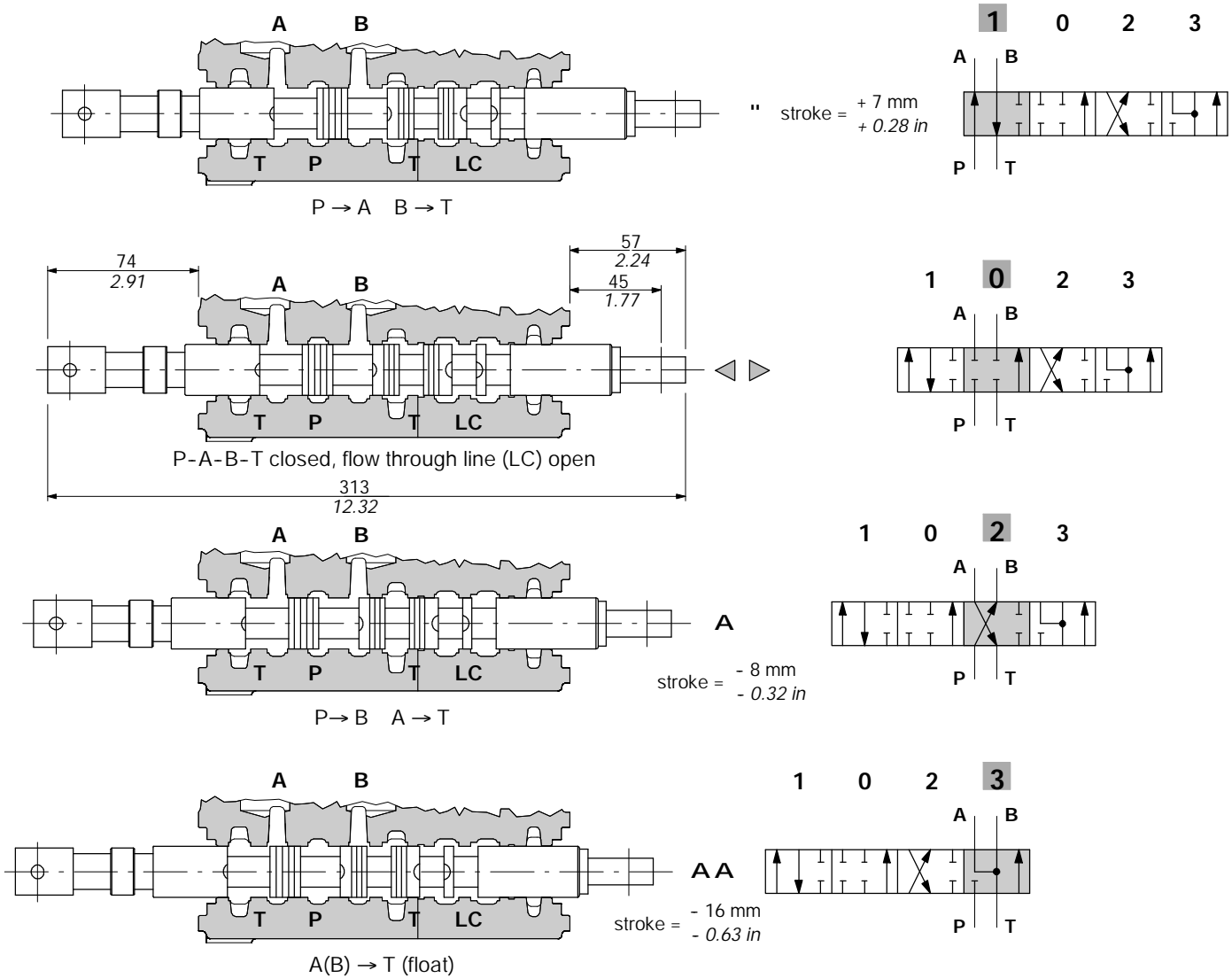
Type 4



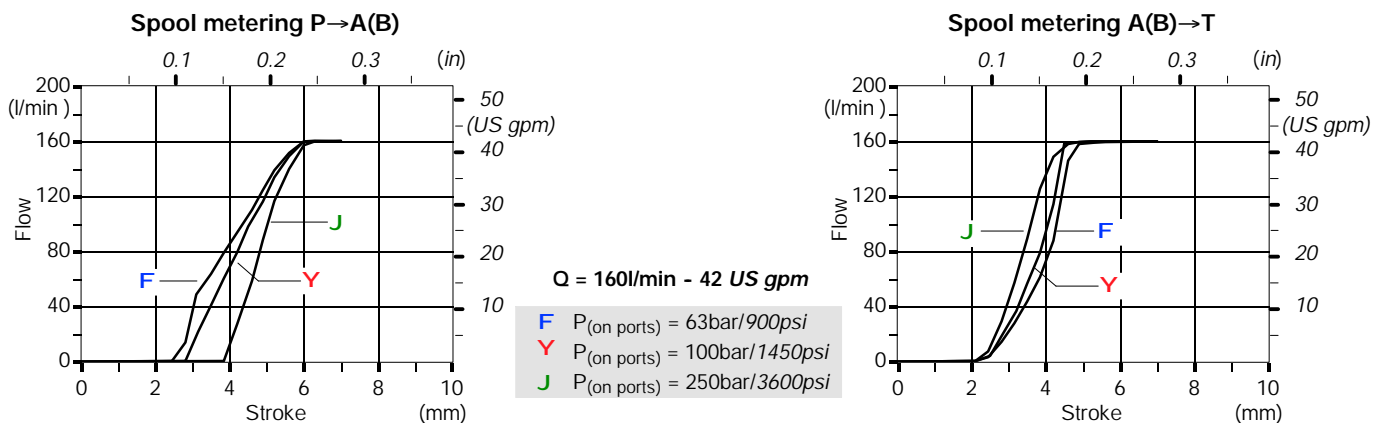
## Spool options

### Type 5

This spool needs special body with extra machining and must be used only with spool positioner type 13 (see page 19).

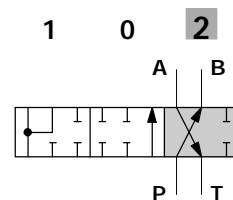
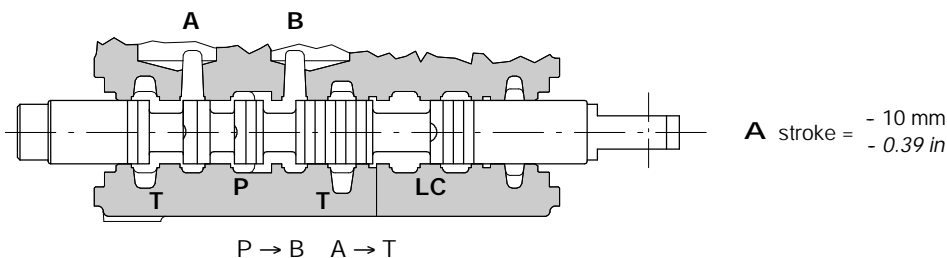
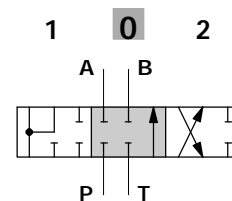
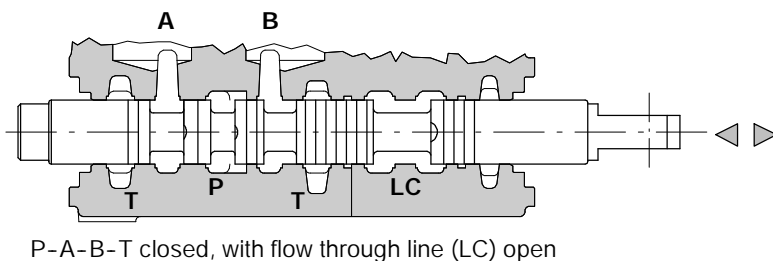
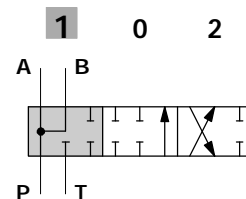
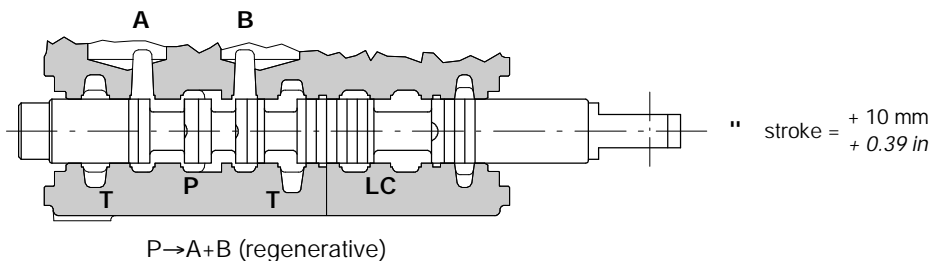


### Performance data

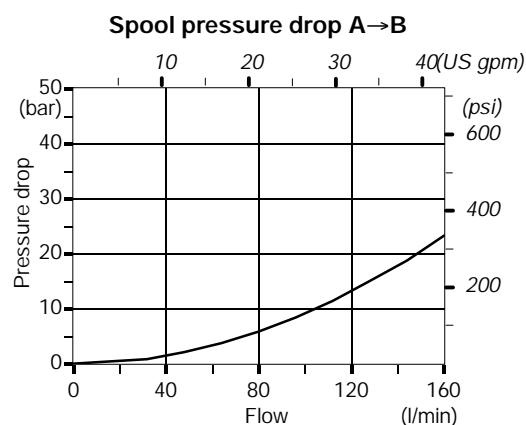
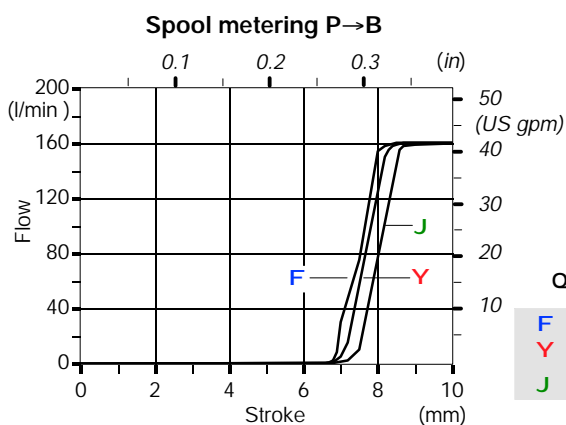


Type 8F

This spool needs special body with extra machining.



Performance data



# SD18

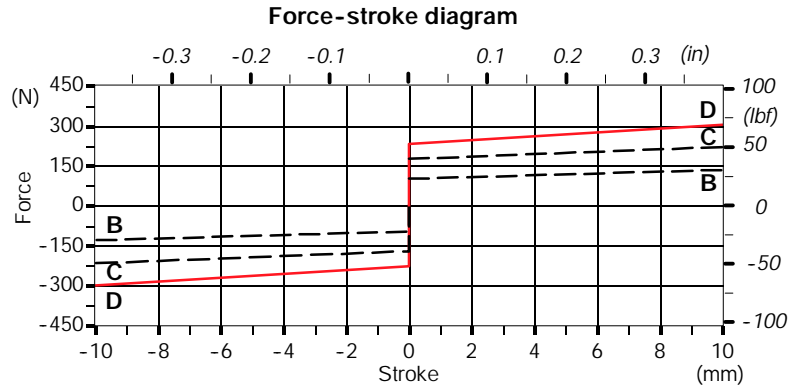
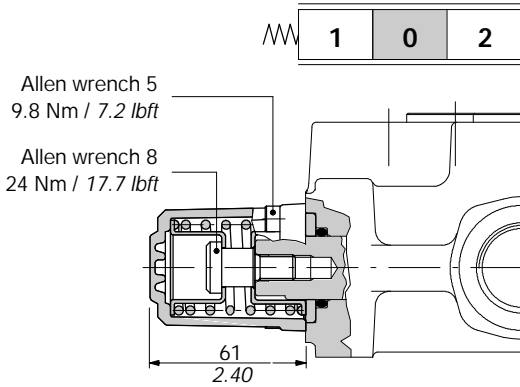
## "A" side spool positioners

### With spring return

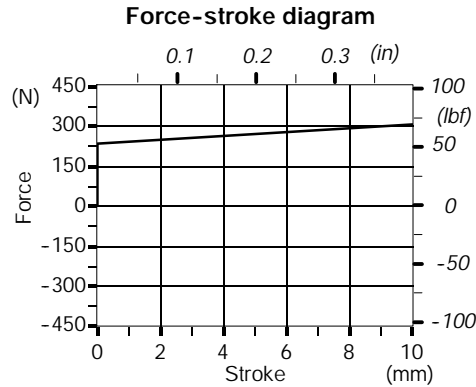
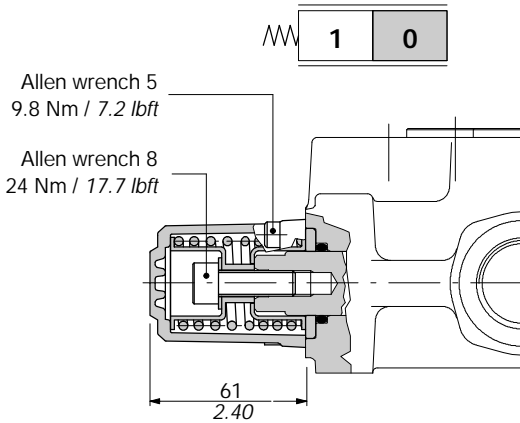
#### 8 kit

Supplied with standard spring type D (see force-stroke diagram); available with lighter spring type B (**8MB** code: 5V08220000) or type C (**8MC** code: 5V08120010).

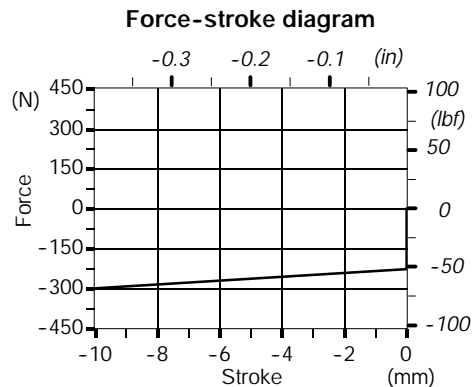
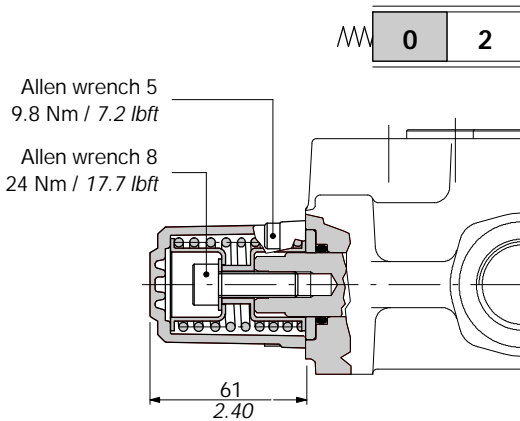
In order to correctly apply these kits please contact Customer Service, there could be some usage limitation.



#### 19 kit



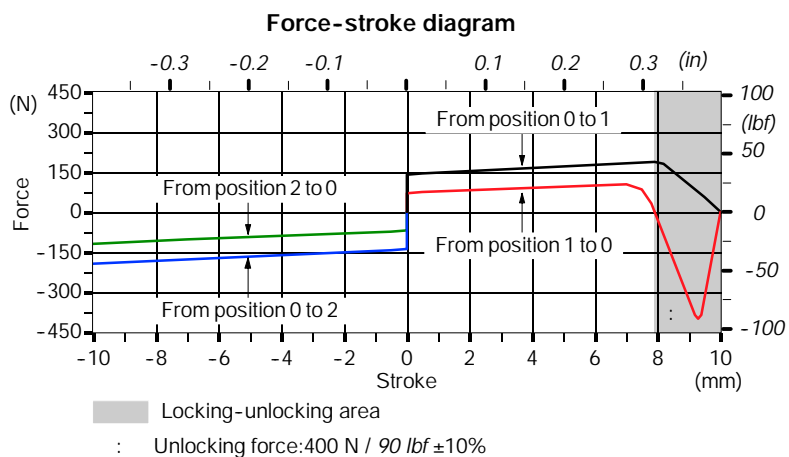
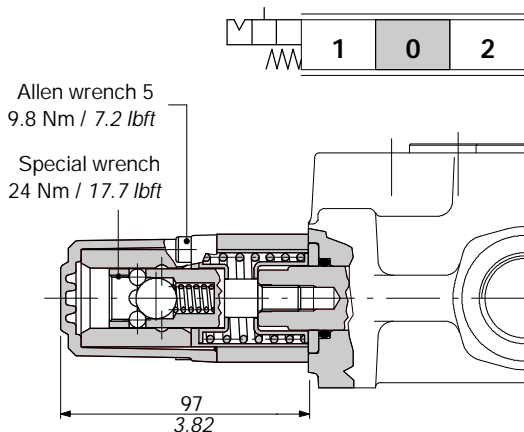
#### 20 kit



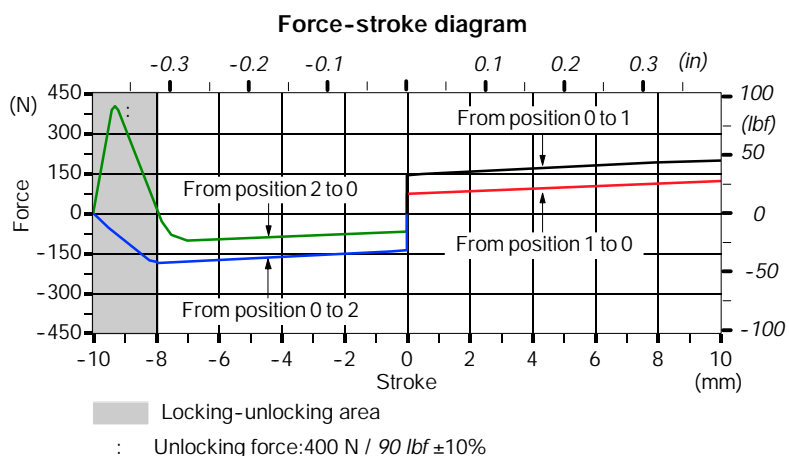
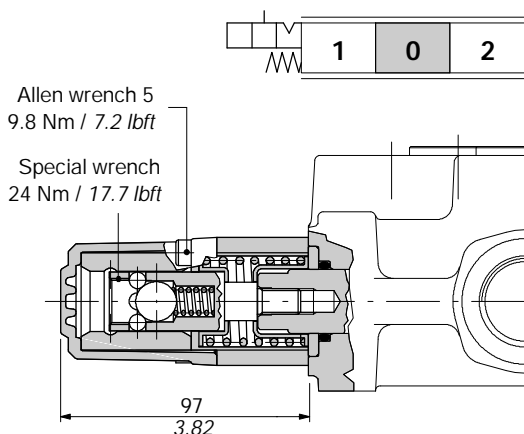


With detent

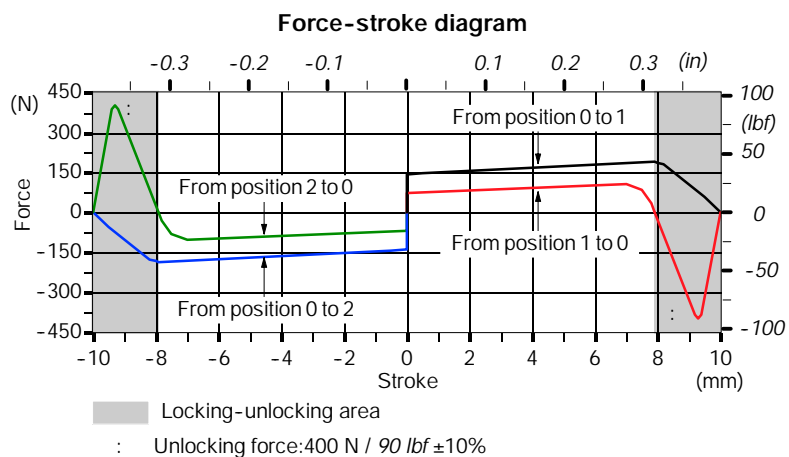
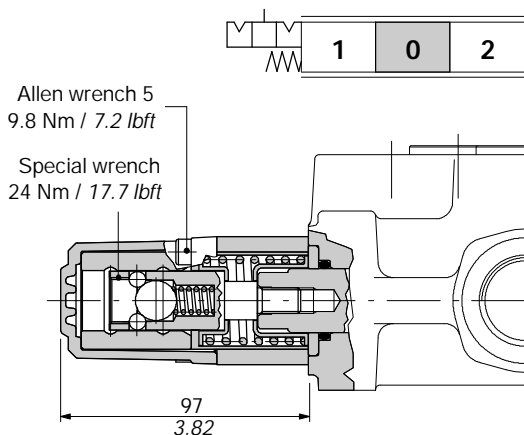
9B kit



10B kit



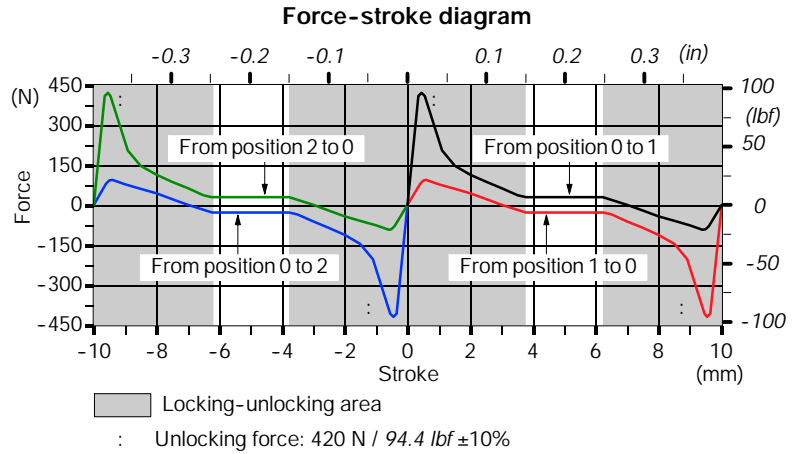
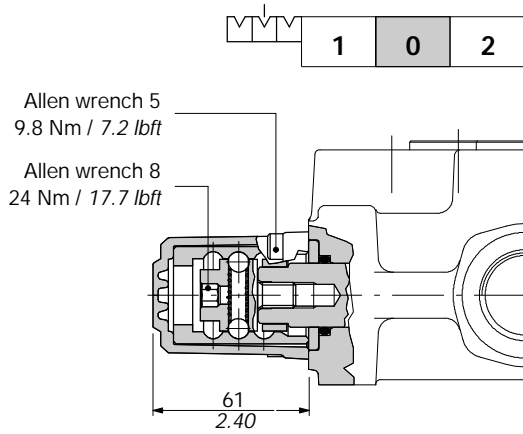
11B kit



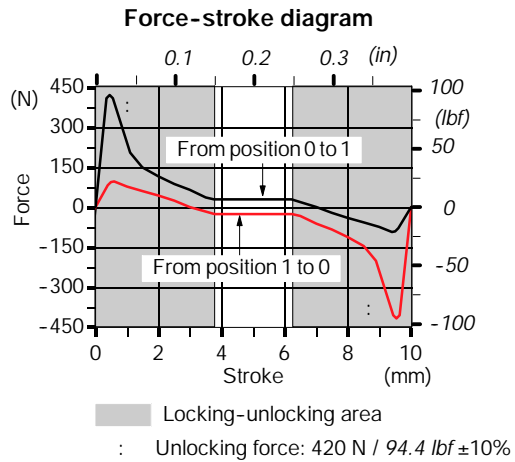
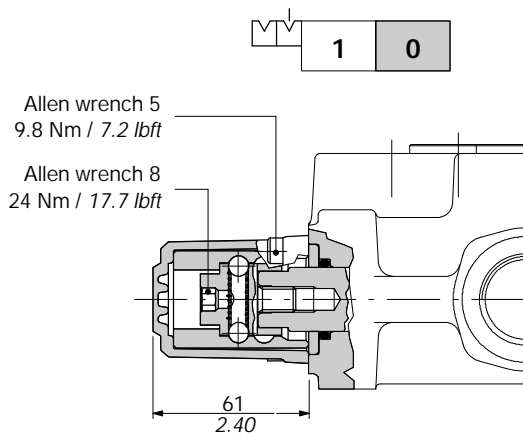
# SD18

## "A" side spool positioners

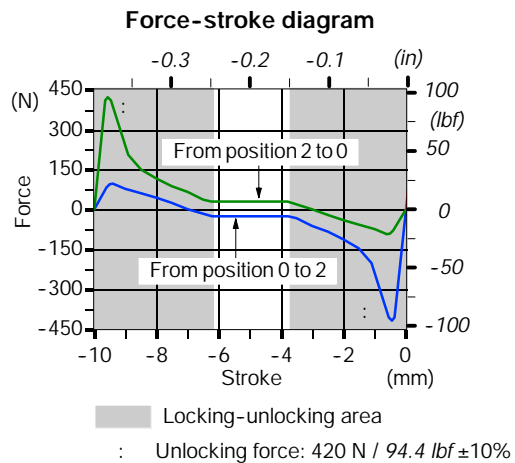
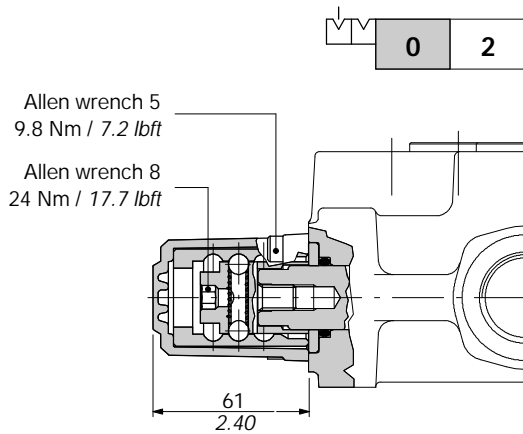
### 11 kit



### 15 kit

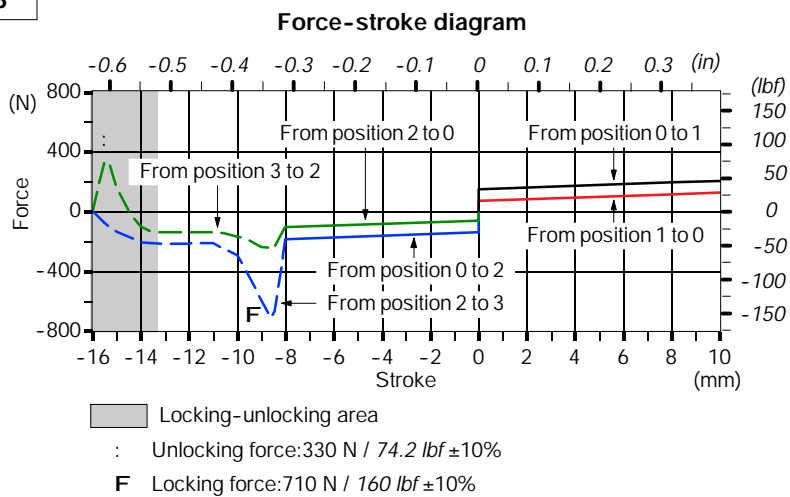
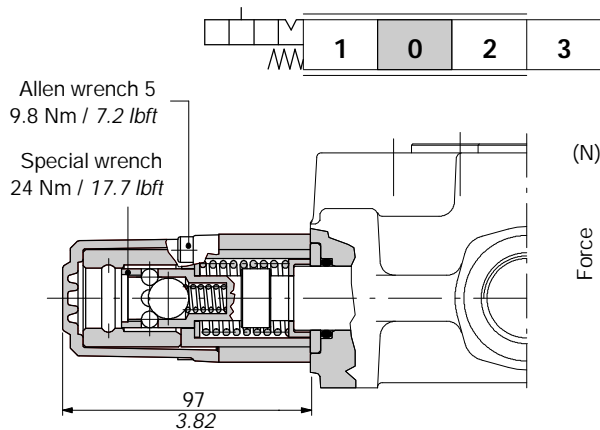


### 16 kit



For spool type 5

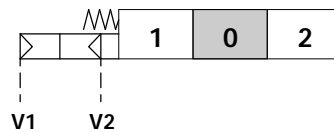
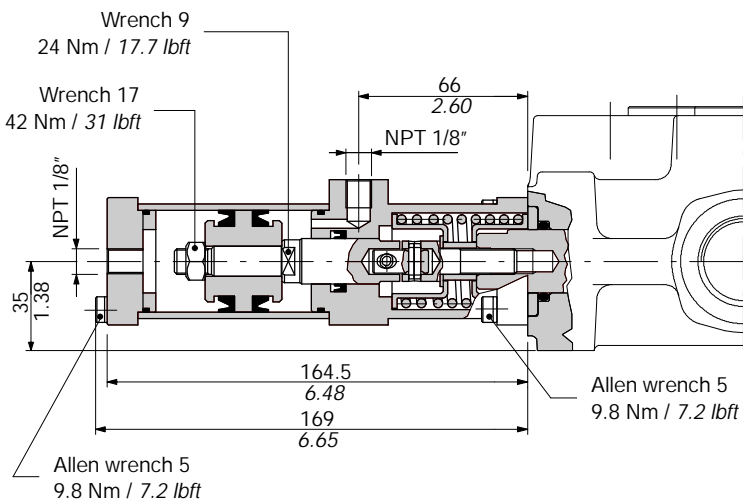
13 kit



# SD18

## "A" side spool positioners

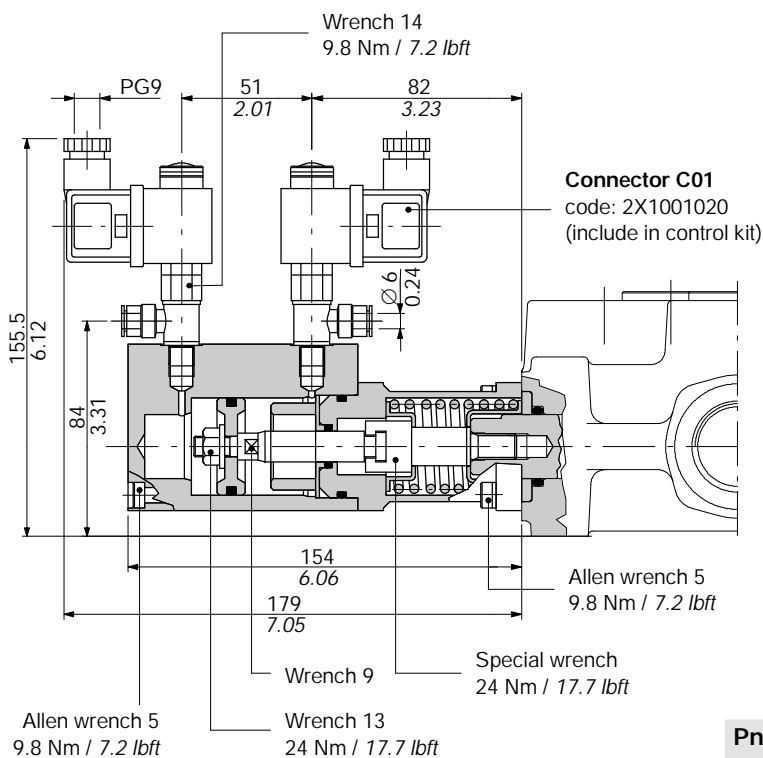
### 8P kit



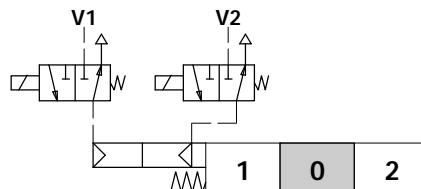
#### Operating features

Pilot pressure ..... : 6 bar (max.10)  
 : 87 psi (max.145)

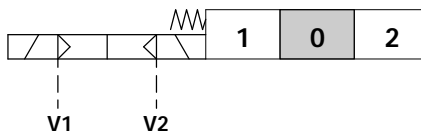
### 8EP3 kit



#### Scheme



#### Scheme ISO 1219



#### Operating features

Pilot pressure ..... : 6 bar (max.10)  
 : 87 psi (max.145)

#### Solenoid operating features

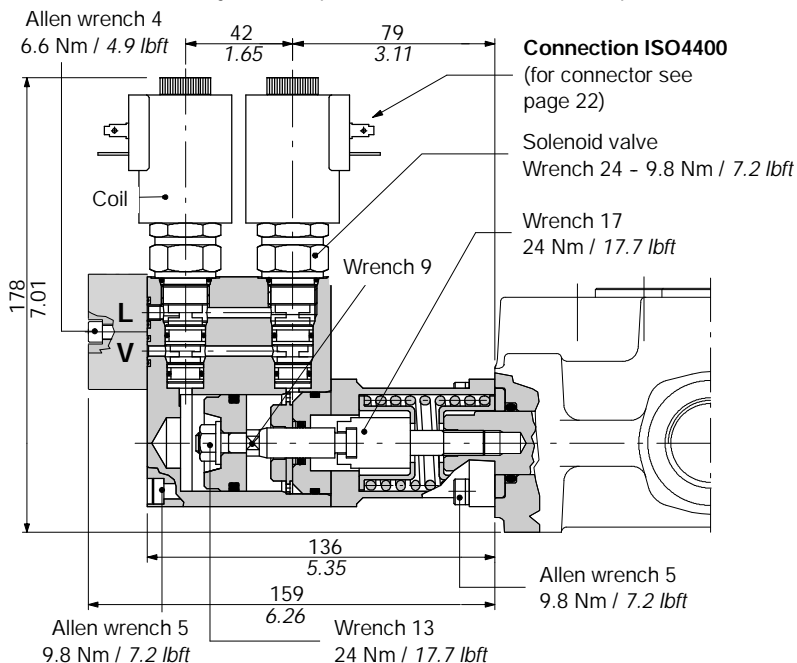
Nominal voltage ..... : 12 VDC / 24 VDC  
 Power rating ..... : 8 W  
 Duty cycle ..... : 100%

#### Pneumatic solenoid valve ordering code (with connector)

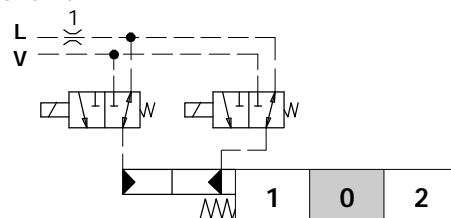
CODE	DESCRIPTION
2X4001012	12VDC solenoid valve
2X4001024	24VDC solenoid valve

**8E13 kit**

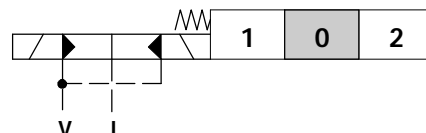
ON-OFF electro-hydraulic spool control kit with external pilot and drain.



**Scheme**



**Scheme ISO 1219**



**Operating features**

Pilot pressure ..... : min.10 bar - 145 psi  
 ..... : max.50 bar - 725 psi  
 Max.back pressure on outlet L ..... : 4 bar - 58 psi

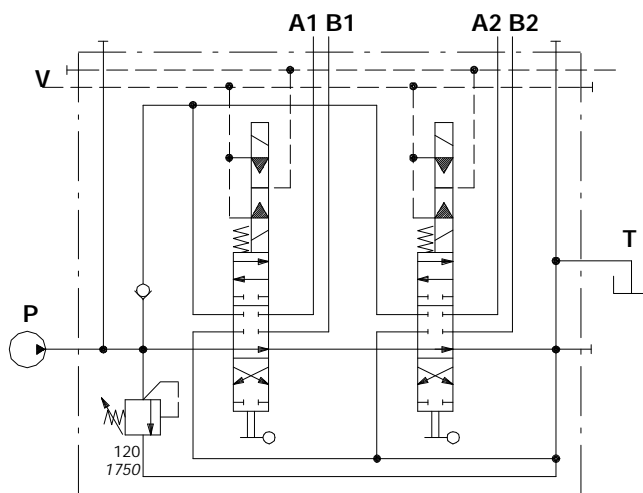
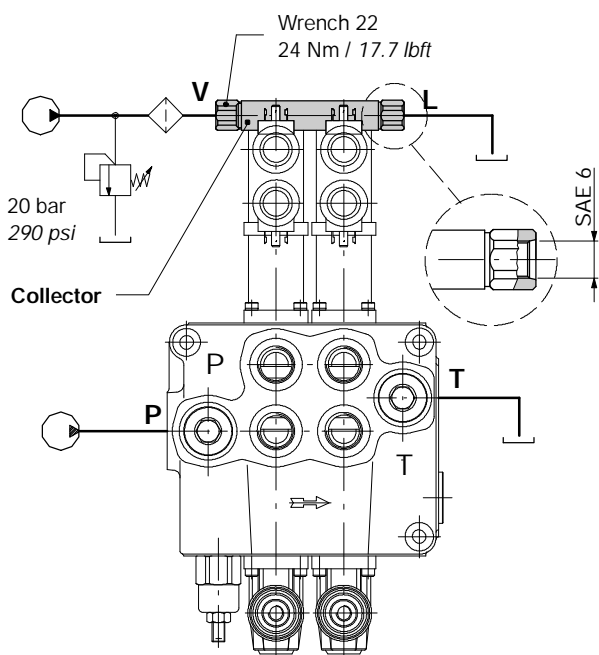
**Solenoid operating features**

Nominal voltage ..... : 12 VDC / 24 VDC  
 Power required ..... : 21 W  
 Duty cycle ..... : 100%

**Valve and solenoids ordering codes**

CODE	DESCRIPTION
2S0EJ08002013	3 ways solenoid valve
2X4350012	12VDC coil
2X4350024	24VDC coil

**Collector kit for external pilot and drain**



**Ordering codes (UN-UNF thread)**

TYPE	CODE	DESCRIPTION
KE1S0	5KE1S00070	kit for 1 section
KE2S0	5KE2S00670	kit for 2 sections
KE3S0	5KE3S00670	kit for 3 sections
KE4S0	5KE4S00670	kit for 4 sections
KE5S0	5KE5S00670	kit for 5 sections
KE6S0	5KE6S00670	kit for 6 sections

Ex: SD18/2-P(KG3-120)/18E13L/18E13L/AET-SAE-KE2S0-24VDC

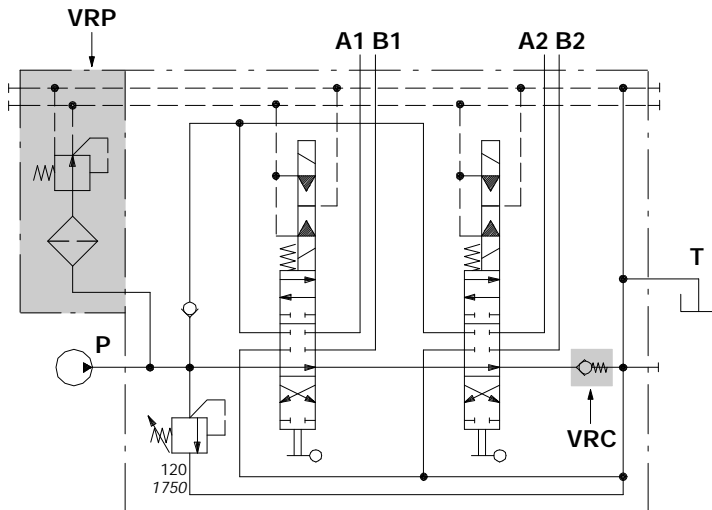
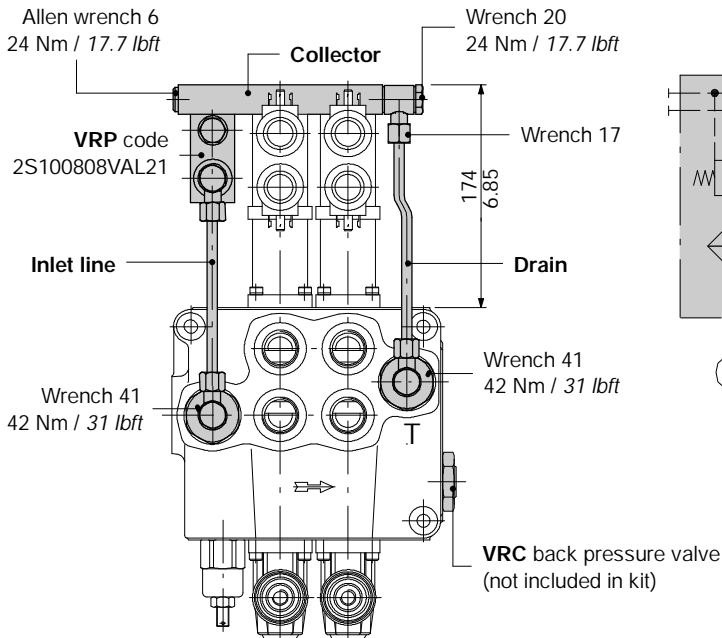
# SD18

## "A" side spool positioners

### 8EI3 kit

#### Collector kit with pilot and drain lines

The kit consists of a collector with **VRP** pressure reducing valve and relative pipes.



#### VRP valve operating features

Outlet pressure ..... : 20 bar / 290 psi  
 Max. flow ..... : 8 l/min / 2.11 US gpm  
 Filtering ..... : 80 μ

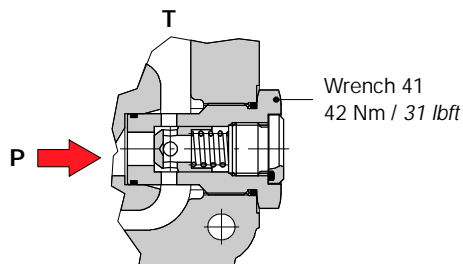
Ex: SD18/2-P(KG3-125)/18EI3L/18EI3L/VRC  
 -SAE-KE2R3-24VDC

#### Ordering codes (UN-UNF thread)

TYPE	CODE	DESCRIPTION
KE1R3	5KE1R30670	kit for 1 section
KE2R3	5KE2R30670	kit for 2 sections
KE3R3	5KE3R30670	kit for 3 sections
KE4R3	5KE4R30670	kit for 4 sections
KE5R3	5KE5R30670	kit for 5 sections
KE6R3	5KE6R30670	kit for 6 sections

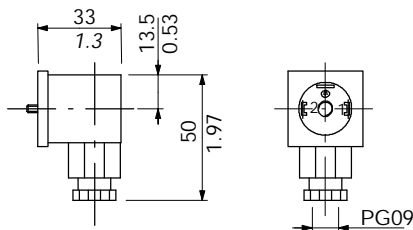
#### VRC valve : code XGIU541602

Valve assembled on flow through passage provides pilot pressure to the actuator.



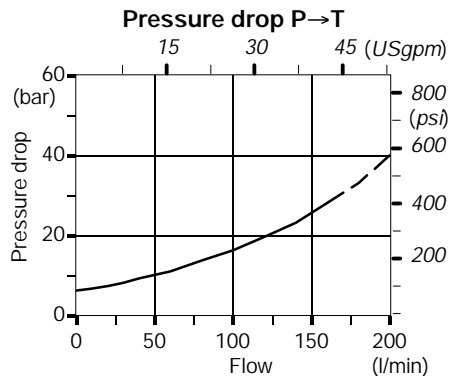
#### C02 connector code: 2X1001010

Connector according to ISO4400



#### Operating features

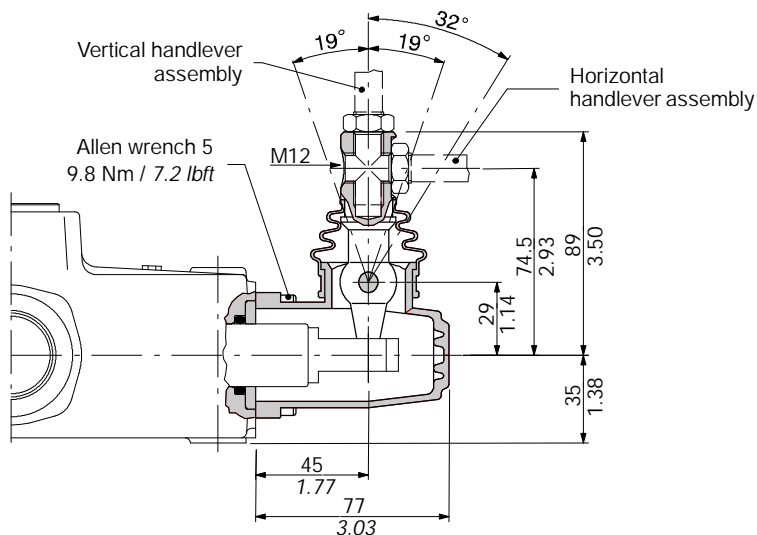
Nominal voltage ..... : 250 VAC / 300 VDC  
 Weather protection ..... : IP65



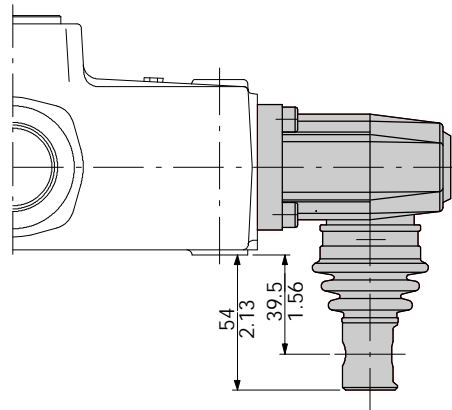
**L lever box**

Alluminium with protection boot lever pivot box; it can be rotated 180° (L180 configuration)

1	0	2
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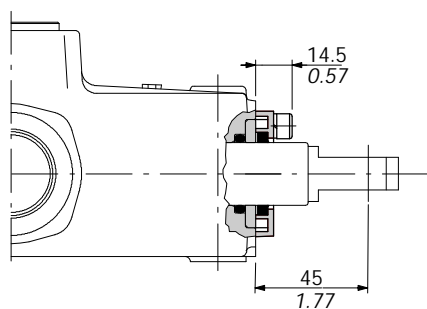
L180 configuration



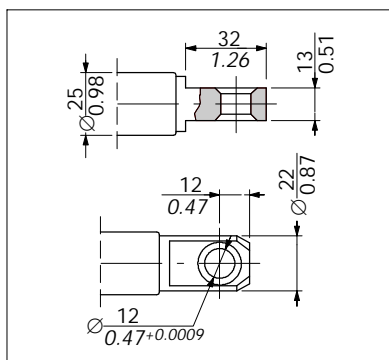
**SLP dust proof plate**

Mechanical control with dust proof plate.

1	0	2
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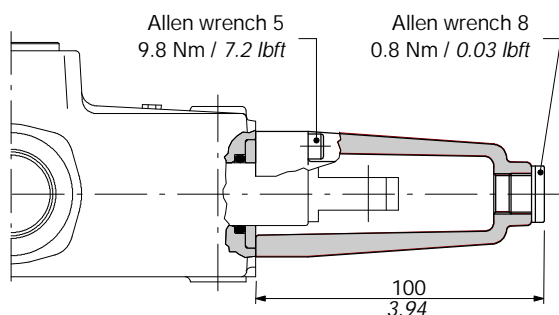
Spool dimension



**SLC cap**

Protection cap usable with pneumatic spool and electro-hydraulic control kit.

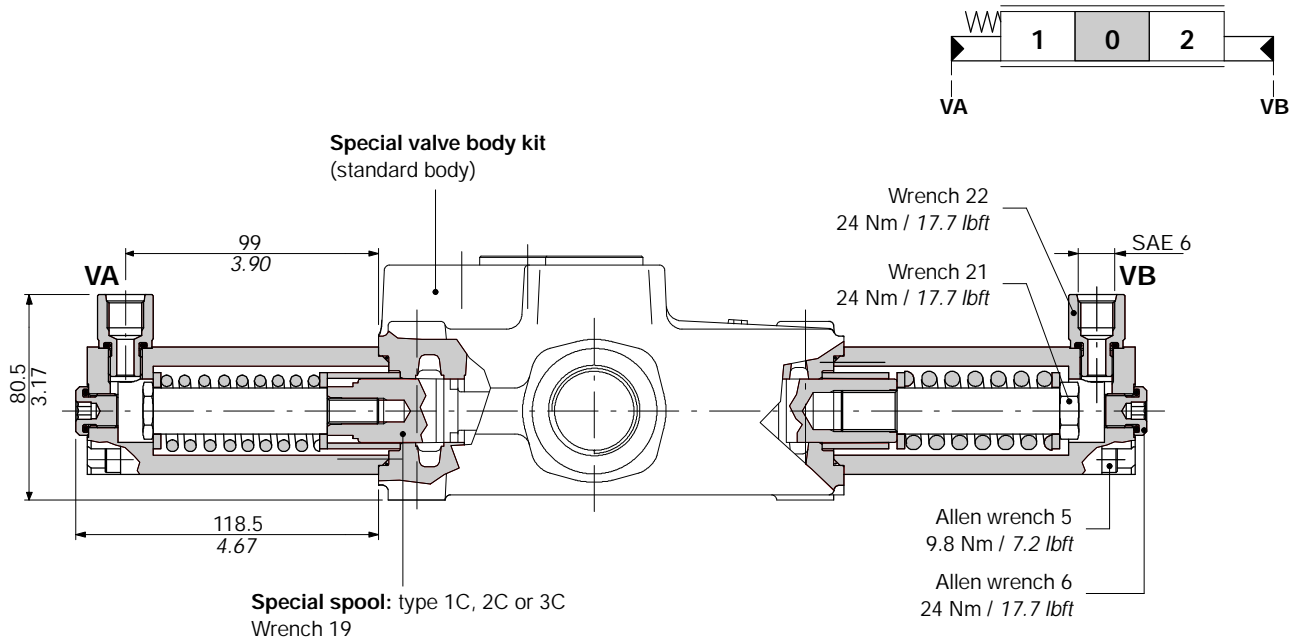
1	0	2
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# SD18

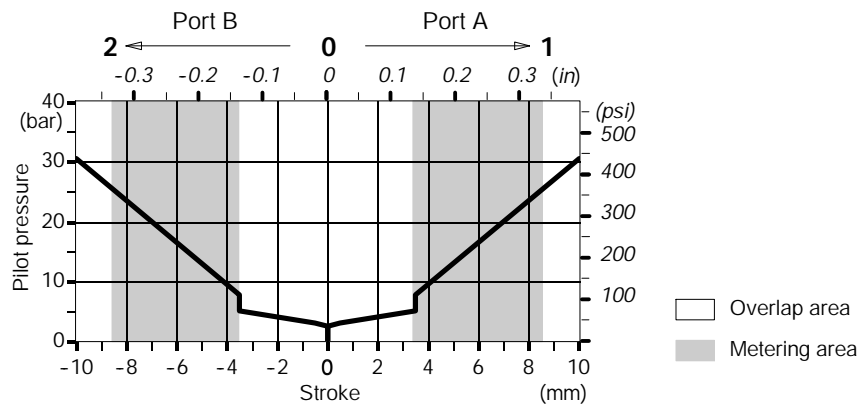
## Hydraulic spool control

**8IM kit** (for single acting and double acting spools)



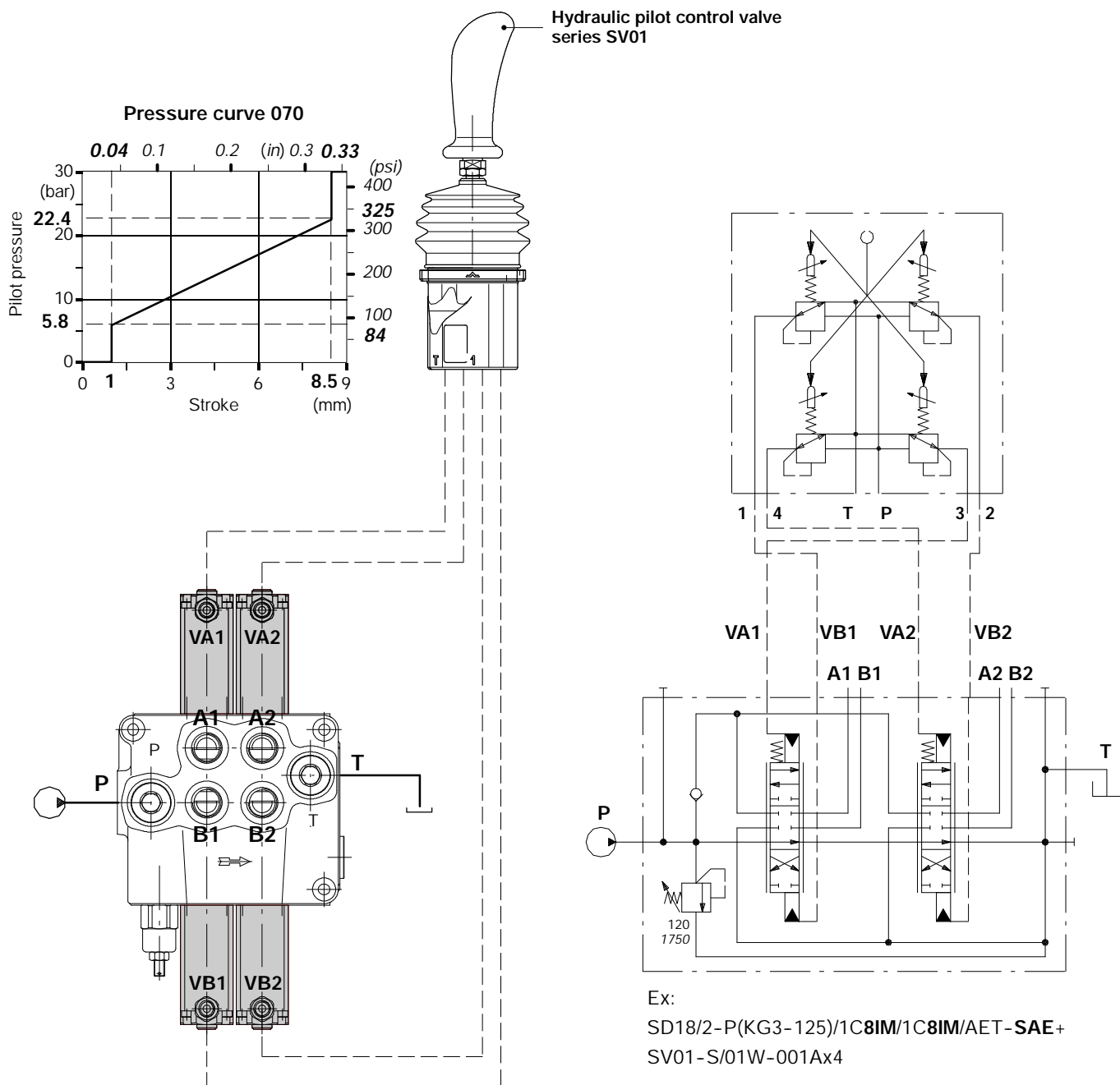
**Pressure-stroke diagram**

Max. pilot pressure 50 bar / 725 psi





Connection example

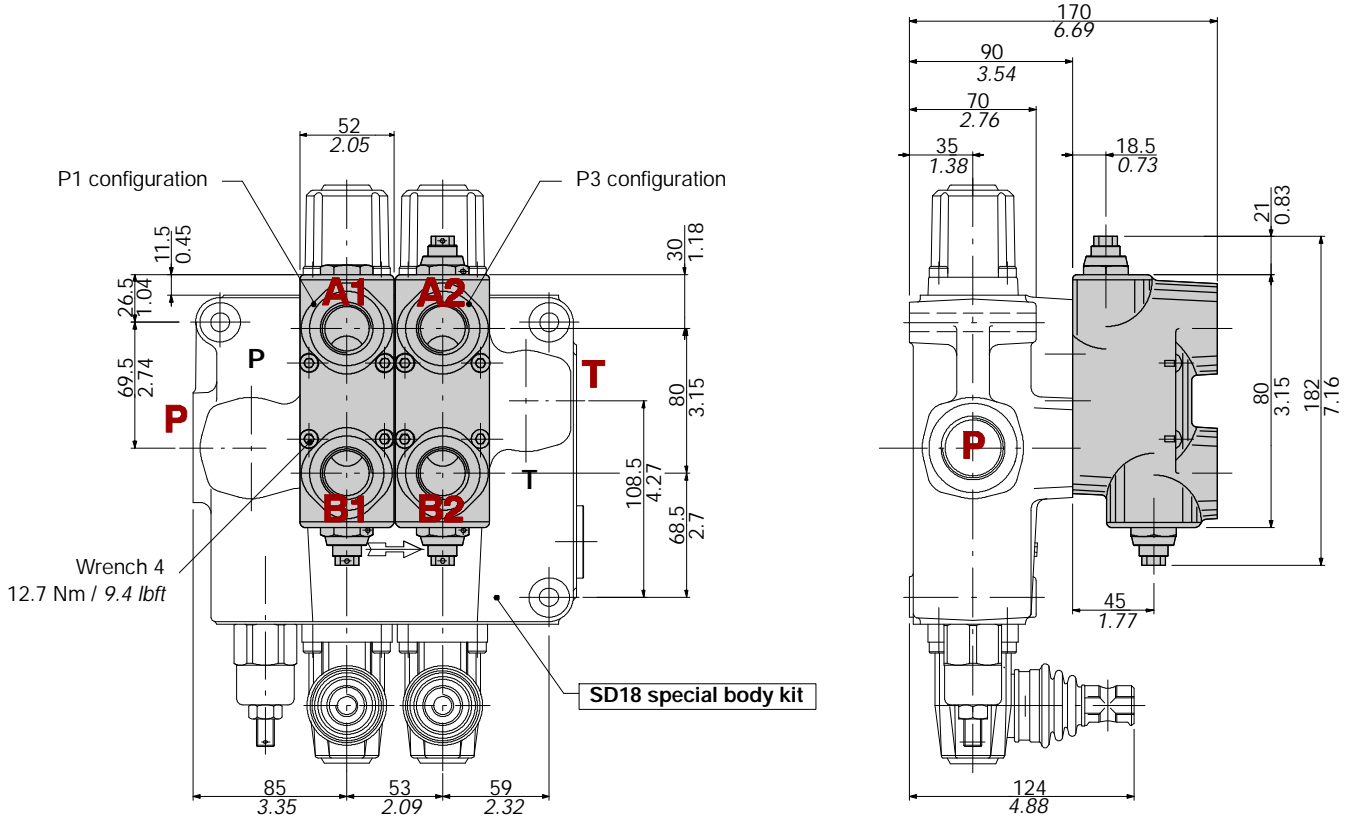


# SD18

## Port relief options

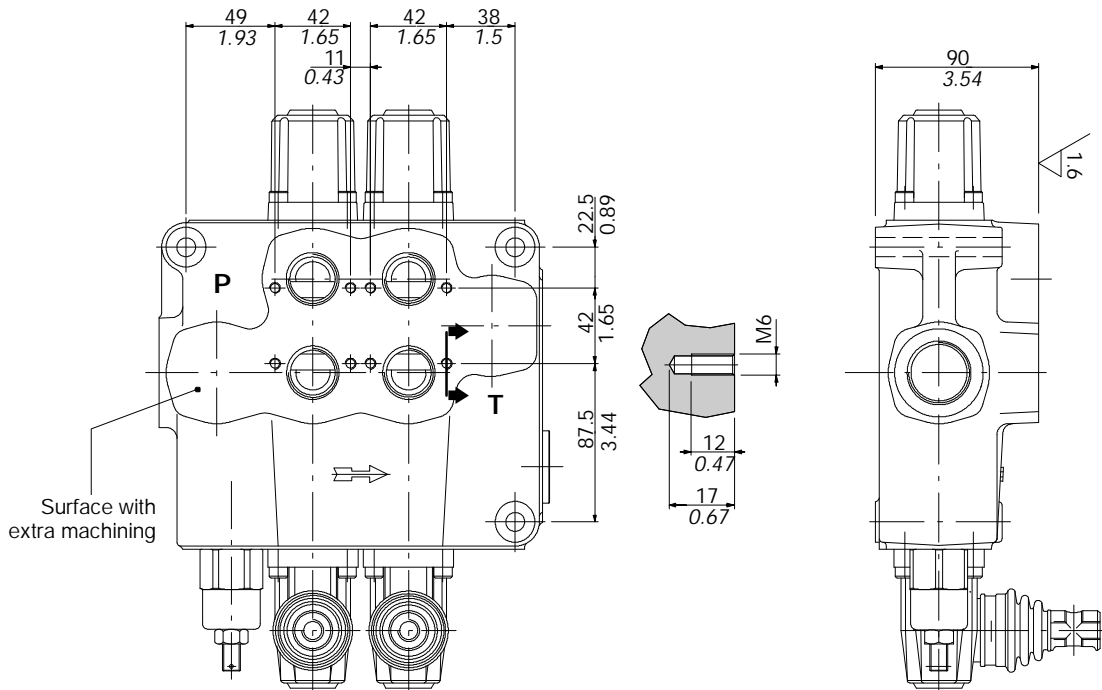
Complete kit with cast iron block and anti-shock valves

## Example of mounting on directional valve



## Example of SD18 valve with extra machining

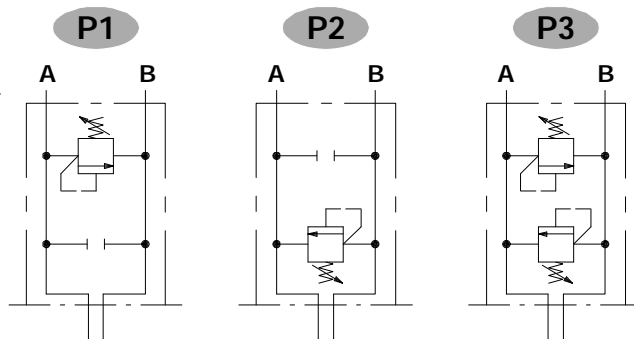
When port valves are flanged on the first or the last section of the body, top inlet and outlet are not available.



Circuit

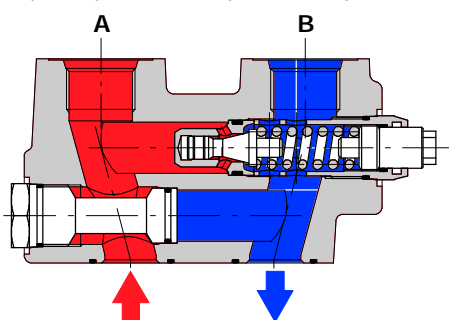
P 1 (G 3 - 120)

- Setting value in bar standard 100 - 1450 (psi).
- Spring type (3).
- Adjustment type (G, H).
- 1 mounted on A port.
- 2 mounted on B port.
- 3 mounted on A and B ports.



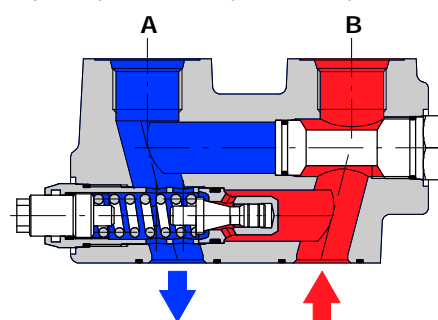
P1 configuration

Example of pressure on port A and port B to tank



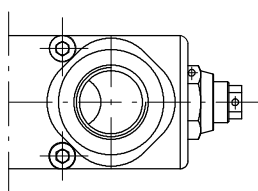
P2 configuration

Example of pressure on port B and port A to tank

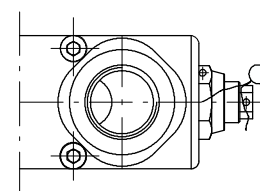


Adjustment type

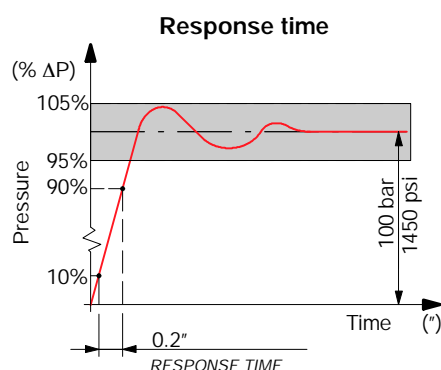
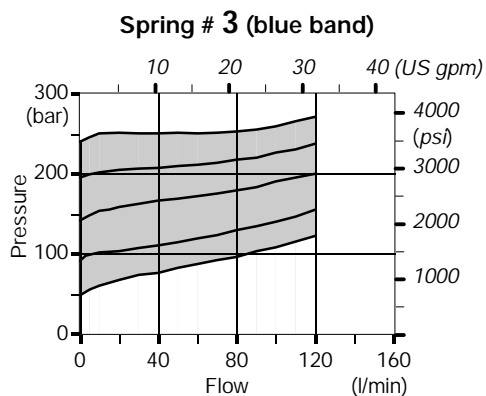
G: with screw



H: valve set and locked



Performance data



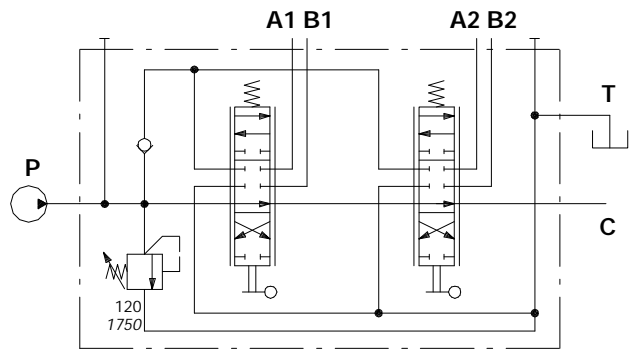
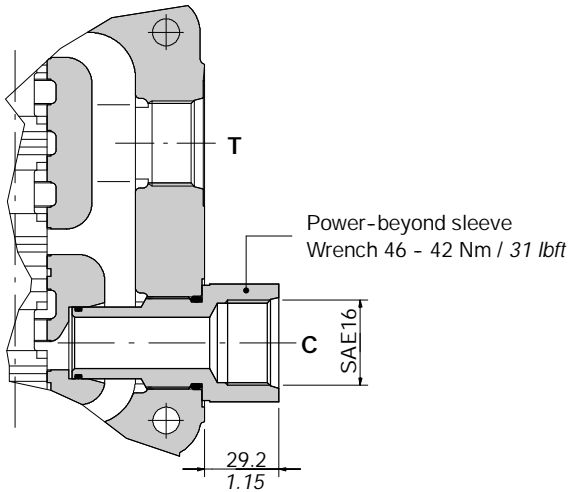
# SD18

## Outlet port conversion

### AET: (standard)

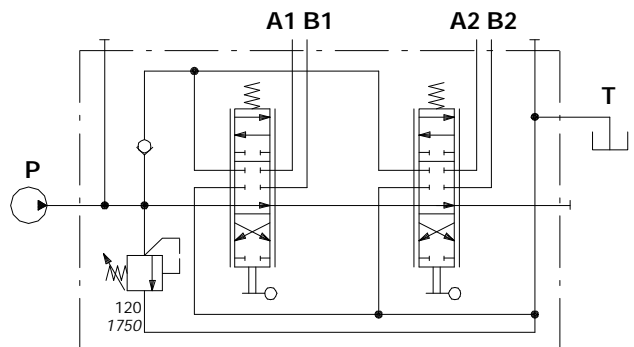
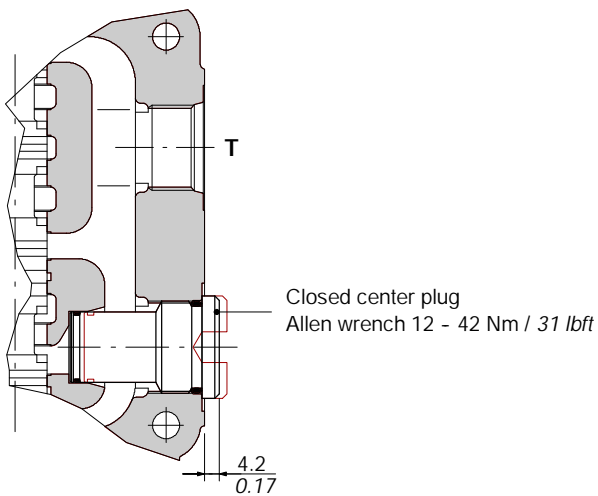
See page 6

### AE: with power beyond



Ex: SD18/2-P(KG3-120)/18L/18L/AE

### AEK: closed center

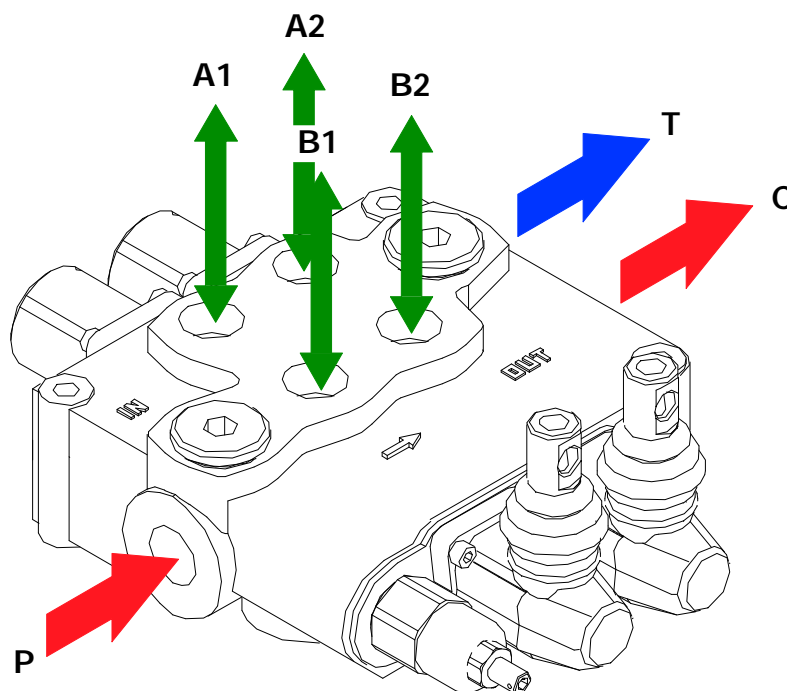


Ex: SD18/2-P(KG3-120)/18L/18L/AEK

The SD18 valve is assembled and tested as per the technical specification of this catalog.

Before the final installation on your equipment, follow the below recommendations:

- the valve can be assembled in any position, in order to prevent body deformation and spool sticking mount the product on a flat surface;
- in order to prevent the possibility of water entering the lever box and spool control kit, do not use high pressure wash down directly on the valve;
- prior to painting, ensure plastic port plugs are tightly in place.



Power beyond configuration

### Fitting tightening torque - Nm / lbft

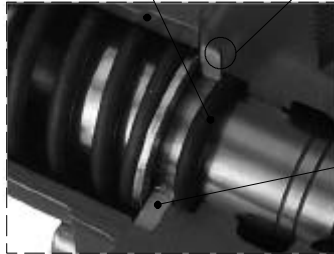
THREADS TYPE	P and C ports	A and B ports	T port
BSP (ISO 228/1)	G 3/4	G 3/4	G 1
With O-Ring seal	90 / 66.4	90 / 66.4	100 / 73.7
With copper washer	90 / 66.4	90 / 66.4	90 / 66.4
With steel and rubber washer	70 / 51.6	70 / 51.6	100 / 73.7
UN-UNF (ISO 11926-1)	1 5/16-12 UN-2B (SAE 16)	1 1/16-12 UN-2B (SAE 12)	1 5/16-12 UN-2B (SAE 16)
With O-Ring seal	150 / 110.6	95 / 70.1	150 / 110.6

NOTE - These torque are recommended. Assembly tightening torque depends on many factors, including lubrication, coating and surface finish. The manufacturer shall be consulted.

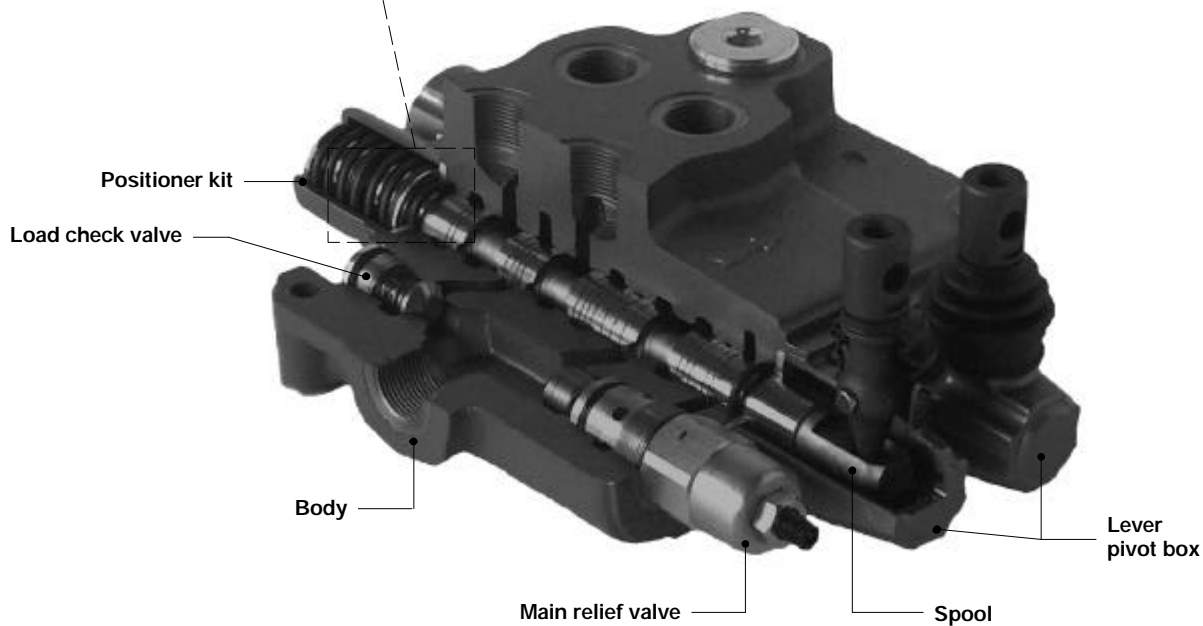
## Installation and maintenance

O-Ring seal 24.99x3.53  
code: 4GUA125035

Chamfer



Holding O-Ring bushing



Normally spools are interchangeable. Verify the smoothness during the assembly

NOTE - All articulated parts inside cap, lever box and mechanical joystick are lubricated with synthetic base grease grade NLGI2

Malfunction	Cause	Remedy
External leakage pivot box lever or control kit side.	Worn spool seal due to mechanical actuation or high back pressure.	Locate the leakage and replace the seal. Check back pressure level.
Excessive internal leakage on A and B ports.	Increase clearance between spools and body due to high wear	Replace the directional control valve and check the oil contamination level.
Dropping load during transition while raising	High leakage on the load check valve.	Remove the load check valve and clean the seat.
Inability to build pressure on A and B ports.	Pressure relief valve blocked open. Low pump pressure and flow.	Remove and clean or replace the valve. Check the pump and circuit.





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