

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 centre hydraulic systems.

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

H Parallel circuit.

H Optional carry-over 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 catalogue 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 catalogue 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.

5th edition October 2001:

This edition supercedes all prior documents.

Contents

| | |
|--|----|
| Working conditions | 4 |
| Dimensional data | 5 |
| Hydraulic circuit | 6 |
| Performance data | 7 |
| Ordering codes | 8 |
| Inlet relief options | 10 |
| Spool options | 12 |
| “A” side spool positioners | 16 |
| “B” side options | 23 |
| Proportional hydraulic spool control | 24 |
| Port relief options | 26 |
| Outlet port conversion | 28 |
| Installation and maintenance | 29 |

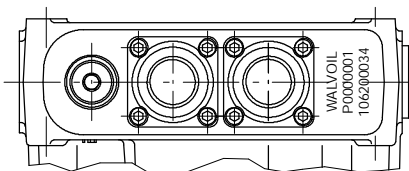
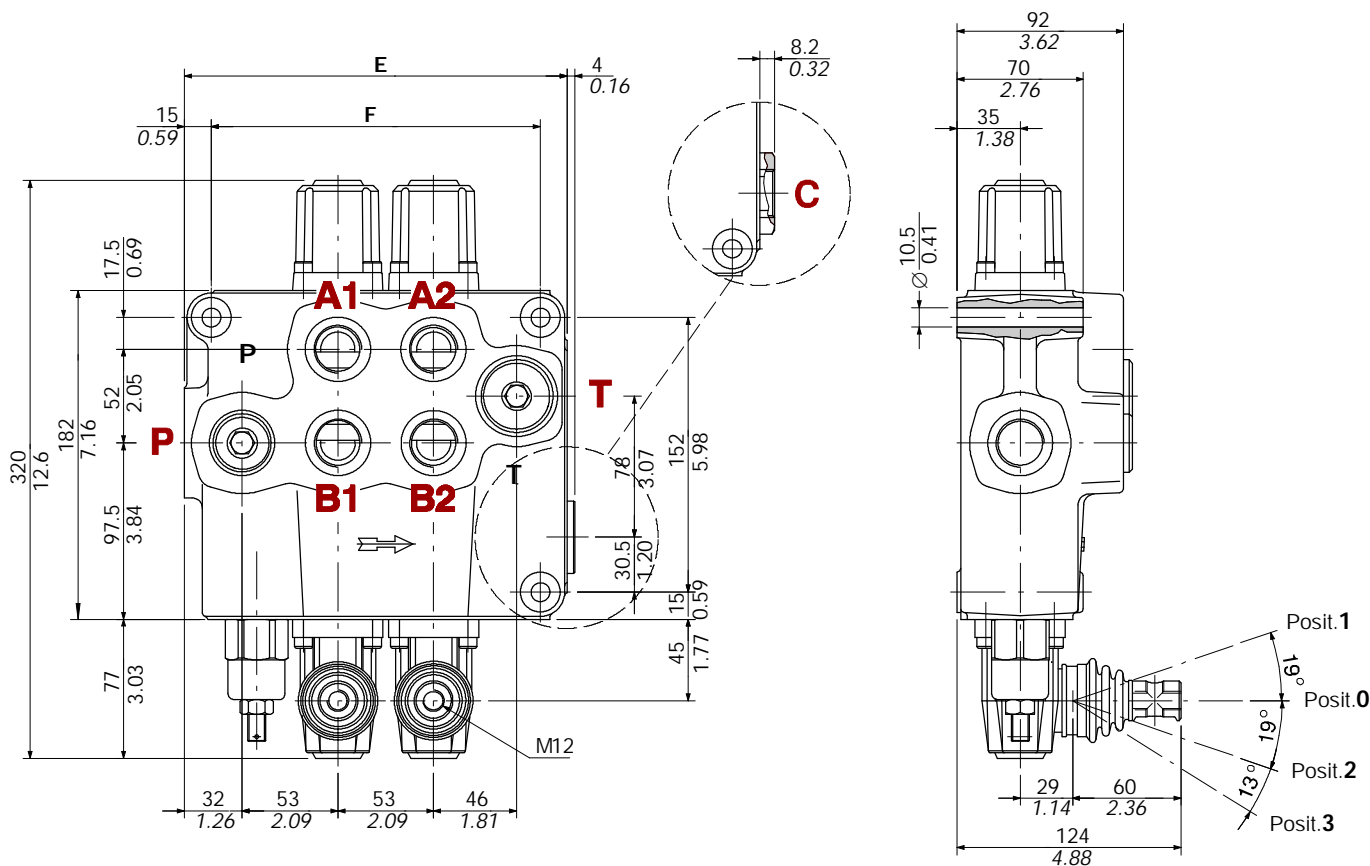
SD18

Working conditions

This catalogue shows technical specifications and diagrams measured with mineral oil of 46 mm²/s - 46 cSt viscosity at 40°C temperature.

| | | | |
|------------------------------|--|----------------------------------|---------------------------|
| Nominal flow rating | | 160 l/min | |
| 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</i> | 4 cm ³ /min | 0.24 in ³ /min |
| Hydraulic fluid | | Mineral oil | |
| Fluid temperature | <i>with NBR seals</i> | from -20° to 80°C | |
| | <i>with FPM (VITON) seals</i> | from -20° to 100°C | |
| Viscosity | <i>operating range</i> | from 15 to 75 mm ² /s | <i>from 15 to 75 cSt</i> |
| | <i>min.</i> | 12 mm ² /s | 12 cSt |
| | <i>max.</i> | 400 mm ² /s | 400 cSt |
| Max level of contamination | | 19/16 - ISO 4406 | |
| Ambient temperature | | from -40° to 60°C | |

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 |
| SD18/1-P | 159 | 6.26 | 129 | 5.08 | 13.2 | 29.1 |
| SD18/2-P | 212 | 8.35 | 182 | 7.17 | 18.6 | 41 |
| SD18/3-P | 265 | 10.4 | 235 | 9.25 | 23.5 | 51.8 |

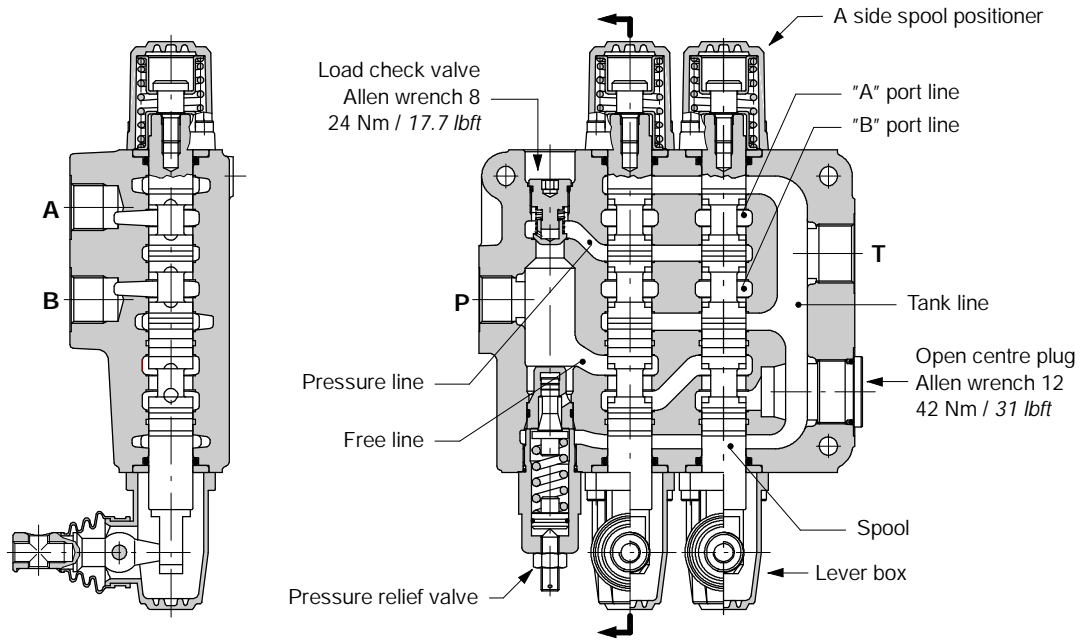
| TYPE | E | | F | | Weight | |
|-----------------|-----|------|-----|------|--------|------|
| | mm | in | mm | in | kg | lb |
| SD18/4-P | 318 | 12.5 | 288 | 11.3 | 28.8 | 63.5 |
| SD18/5-P | 371 | 14.6 | 341 | 13.4 | 34.1 | 75.2 |
| SD18/6-P | 424 | 16.7 | 394 | 15.5 | 39.4 | 86.9 |

Standard threads

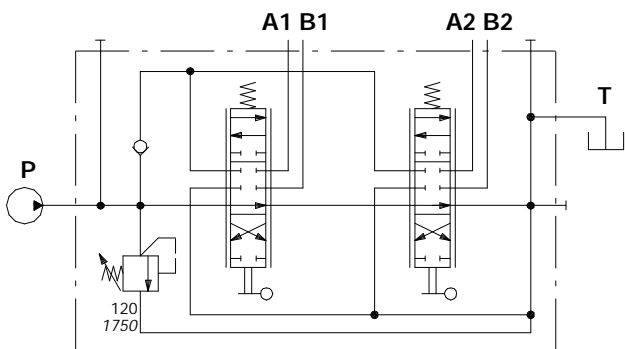
| PORT | BSP (ISO 228/1) | UN-UNF (ISO 11926-1) |
|--|--------------------|--------------------------|
| Inlet P and carry-over C | G 3/4 | 1 5/16-12 UN-2B (SAE 16) |
| A and B ports | G 3/4 | 1 1/16-12 UN-2B (SAE 12) |
| Outlet T | G 1 | 1 5/16-12 UN-2B (SAE 16) |
| PILOT PORTS | | |
| Hydraulic | G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

SD18

Hydraulic circuit

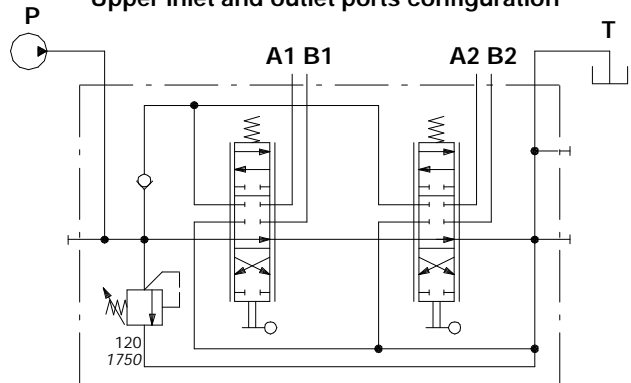


Standard configuration



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

Upper inlet and outlet ports configuration

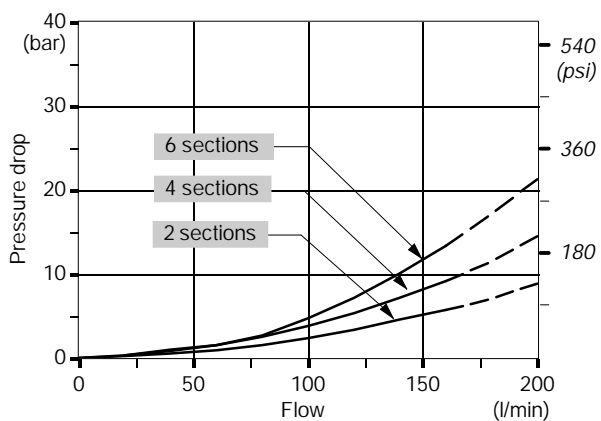
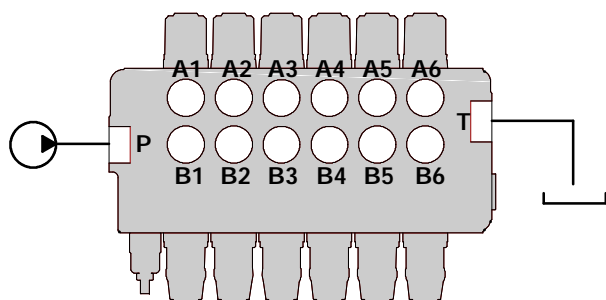


Ex.: SD18/2-P(KG3-120)/18L/18L/AET-PSA

Performance data (pressure drop vs. flow)

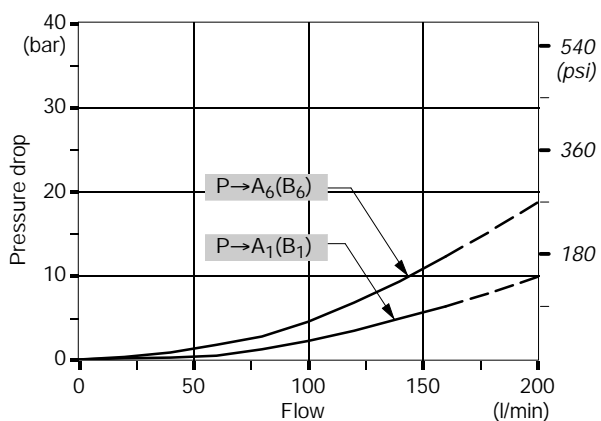
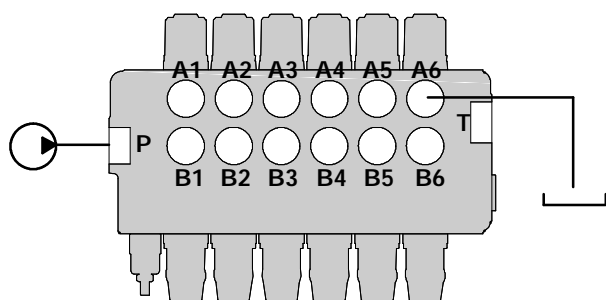
Open centre

From side inlet to side outlet.



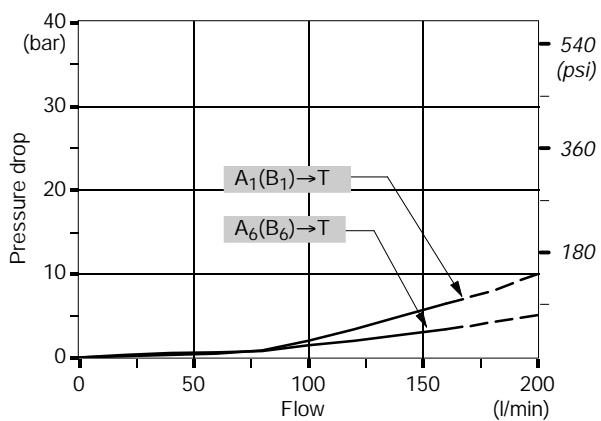
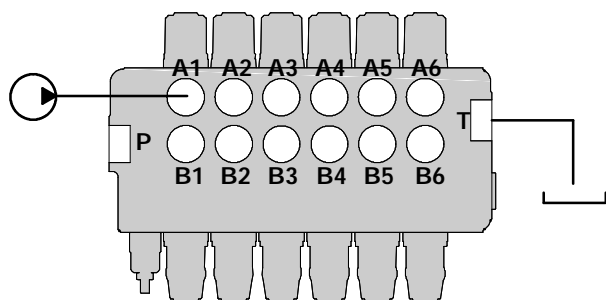
Inlet to work port

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



Work port to outlet

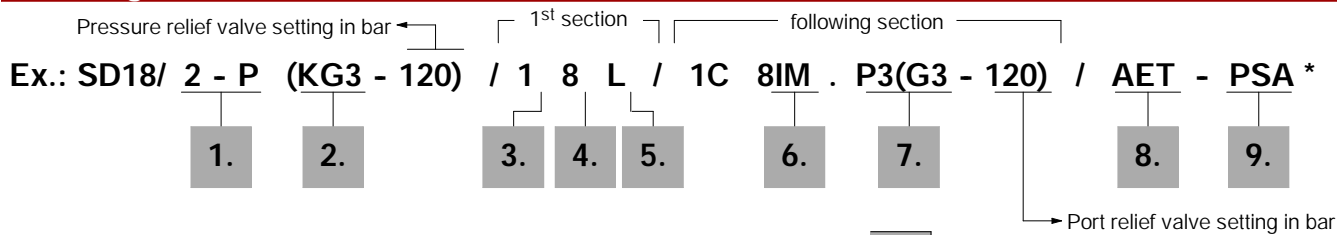
From A port (spool in position 2) or B port (spool in position 1) to side outlet.



NOTE - Measured with spool type 1.

SD18

Ordering codes



1. Body kits *

TYPE CODE DESCRIPTION

Without service port valves prearrangement

| | | |
|-----|------------|------------|
| 1-P | 5KC1713000 | 1 section |
| 2-P | 5KC1723000 | 2 sections |
| 3-P | 5KC1743000 | 3 sections |
| 4-P | 5KC1763000 | 4 sections |
| 5-P | 5KC1783000 | 5 sections |
| 6-P | 5KC1803000 | 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 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 G3/4 plug (see part I) |
| 4 | 3CU1635130 | Single acting on B, 3 positions, A plugged requires G3/4 plug (see part I) |

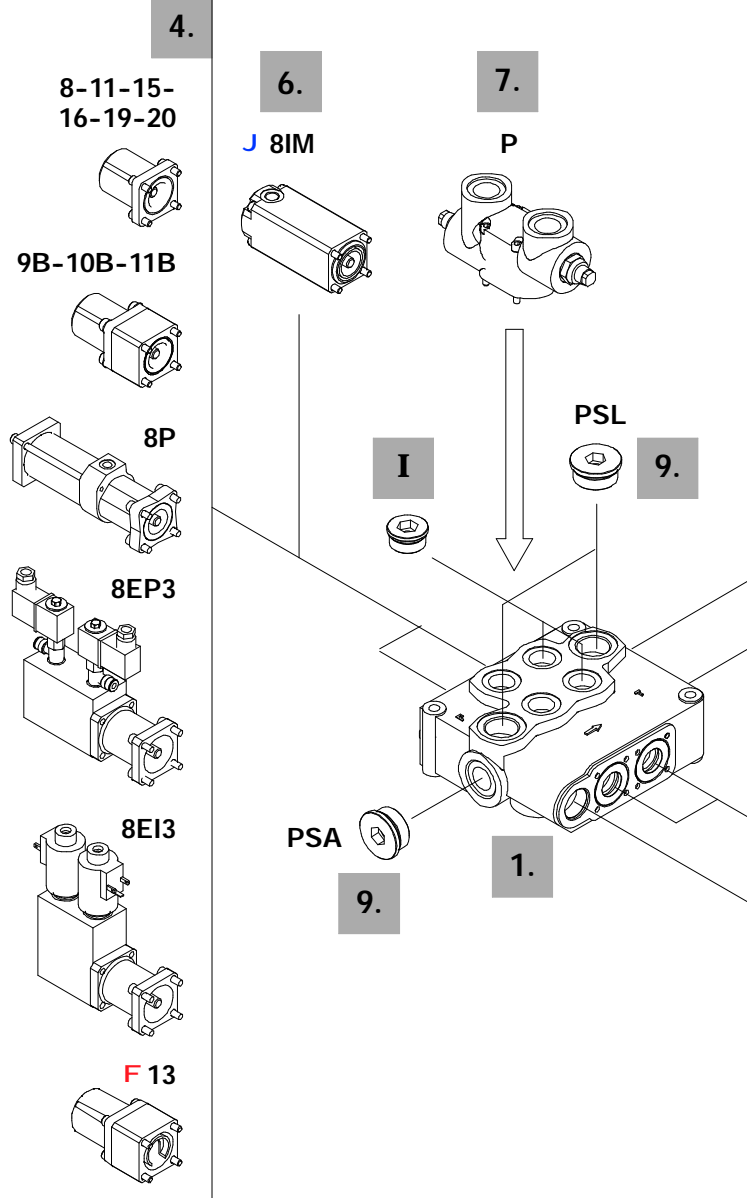
J Spools for 8IM hydraulic control

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

Special spools: need special body kit

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

NOTE (*) - Items are referred to **BSP** thread.



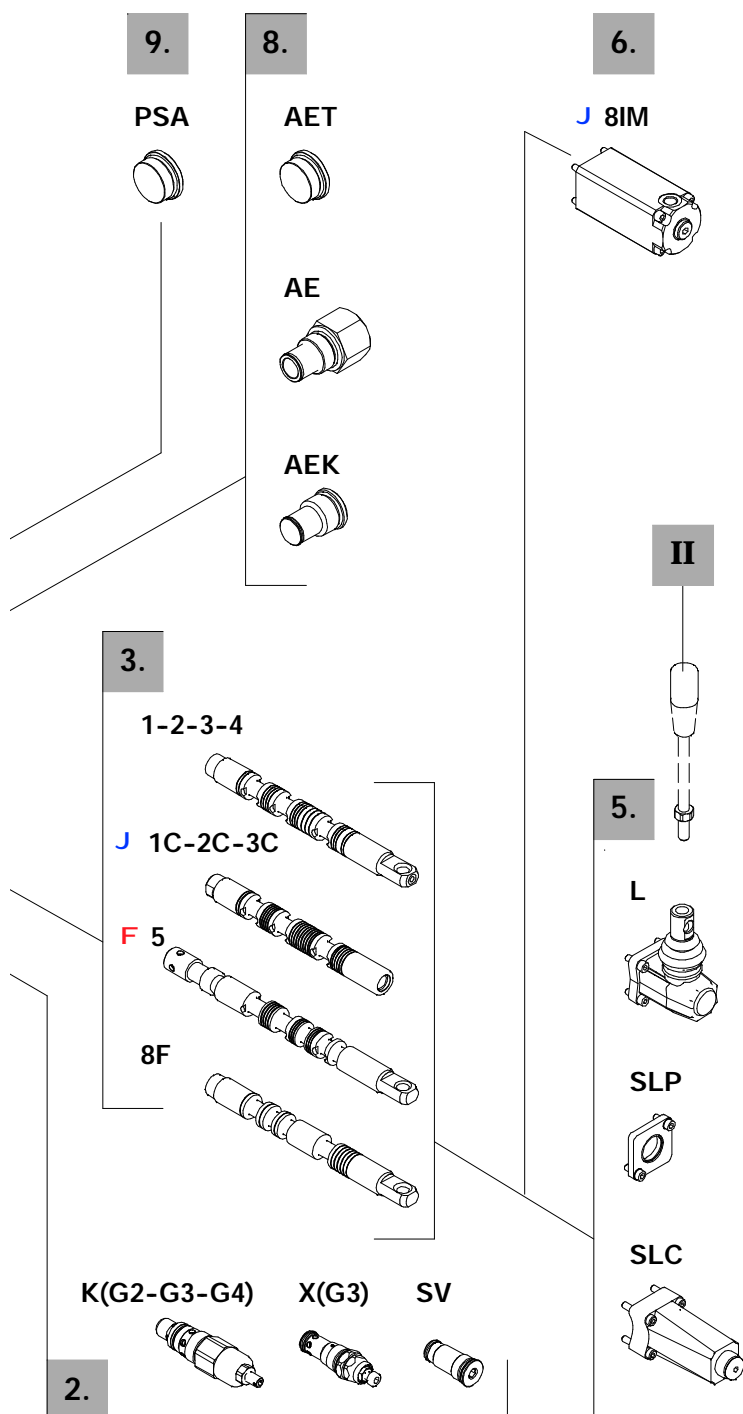
4. "A" side spool positioners

page 16

TYPE CODE DESCRIPTION

| | | |
|-----|------------|--|
| 8 | 5V08120000 | With spring return in neutral position |
| 9B | 5V09120000 | With detent in position 1 and spring return neutral position |
| 10B | 5V09120000 | With detent in position 2 and spring return neutral position |
| 11B | 5V11220000 | With detent in positions 1 and 2, spring return neutral position |

..... to be continued on next page



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 |
| <u>Special positioner</u> | | |
| F 13 | 5V13020000 | With detent in position 3 and spring return neutral position, for spool type 5 |

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 |
|------------------------------|------------|--|
| Need special body kit | | |
| J 8IM | 5IDR220000 | Proportional hydraulic operated with spring return in position 0, requires spools type C |

7. Port relief options * page 26

| TYPE | CODE | DESCRIPTION |
|--|-----------|--------------------------|
| <u>Kit with anti-shock: need special body kit</u> | | |
| 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 flow. | | |

8. Outlet port conversion * page 28

| TYPE | CODE | DESCRIPTION |
|------------|-------------|------------------------|
| AET | 3XTAP640250 | Open centre plug |
| AE | 3XGIU541600 | G3/4 carry-over sleeve |
| AEK | 3XTAP540560 | Closed centre plug |

9. Inlet and outlet selection * page 6

| TYPE | CODE | DESCRIPTION |
|------------|-------------|--------------------------------|
| PSL | 3XTAP732200 | Nr.1 G3/4 plug for side inlet |
| | 3XTAP740210 | Nr.1 G1 plug for side outlet |
| PSA | 3XTAP732200 | Nr.1 G3/4 plug for upper inlet |
| | 3XTAP740210 | Nr.1 G1 plug for upper outlet |

I Ports plug *

| TYPE | CODE | DESCRIPTION |
|-------------|-------------|---|
| G3/4 | 3XTAP732200 | For single acting (spools type 3 and 4) |

II Optional handlever

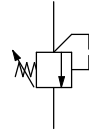
| TYPE | CODE | DESCRIPTION |
|---------------------|-----------|-------------------------------------|
| AL01/M12x250 | 170013025 | For L lever box L= 250 mm / 9.84 in |

Inlet relief options

Direct pressure relief valve

VMD20 (K G 3 - 120)

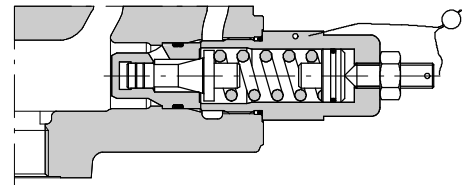
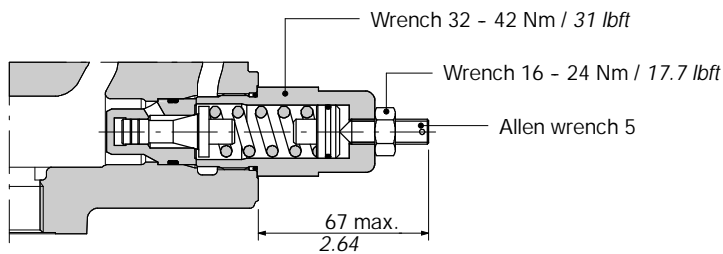
- Pressure setting in bar (standard 120 / 1750 psi)
- Spring type (2, 3, 4).
- Adjustment type (G, H)



Adjustment type

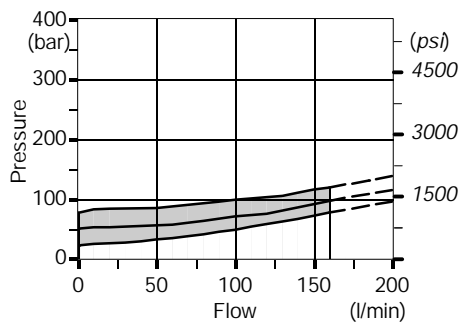
G: with screw

H: valve set and locked

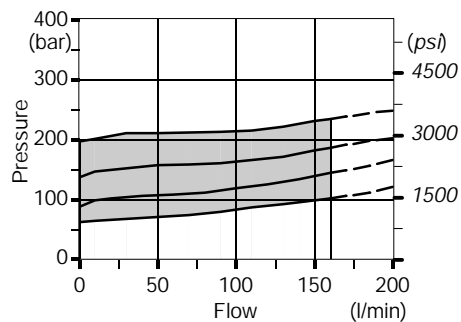


Performance data

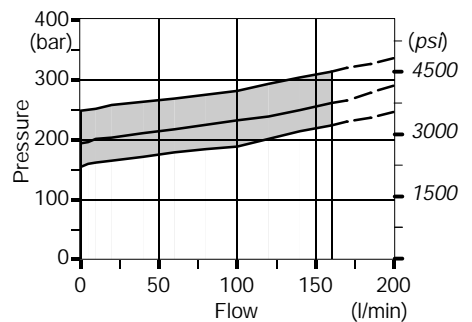
Spring nr. 2 (green band)



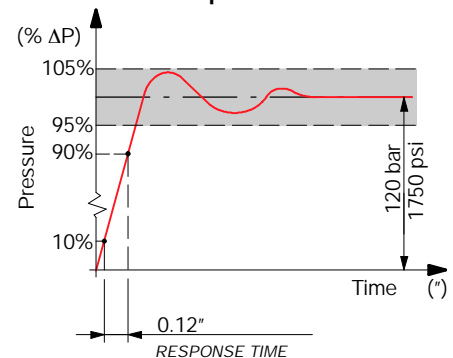
Spring nr. 3 (blue band)



Spring nr. 4 (red band)



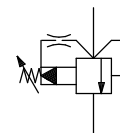
Response time



Pilot operated pressure relief valve

VMP20 (X G - 120)

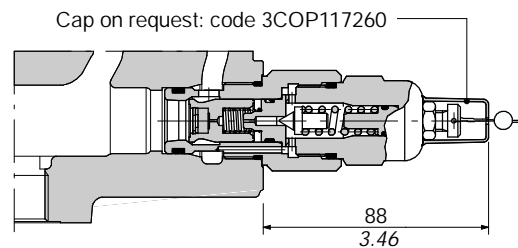
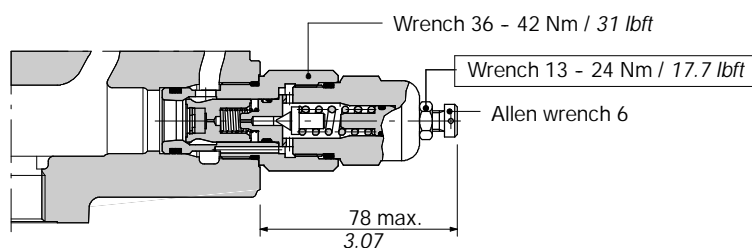
Pressure setting in bar (standard 120 / 1750 psi)
Adjustment type (G, H)



Adjustment type

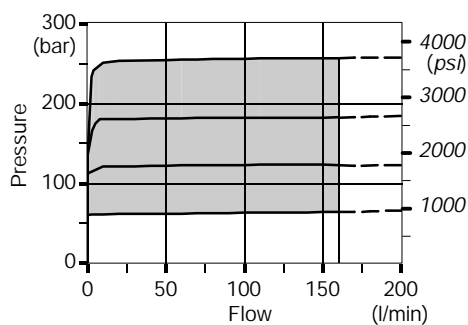
G: with screw

H: valve set and locked

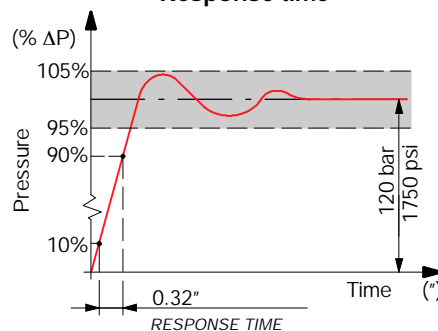


Performance data

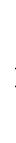
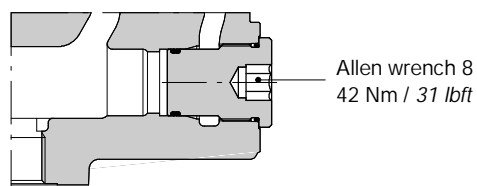
Range setting



Response time



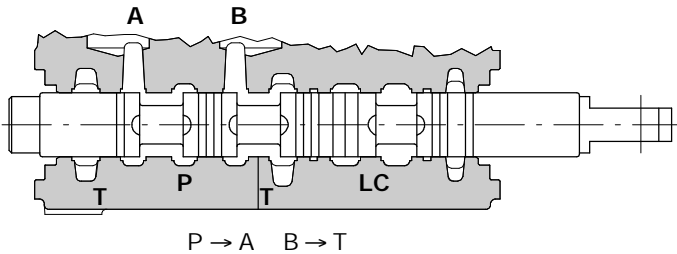
SV: relief valve blanking plug



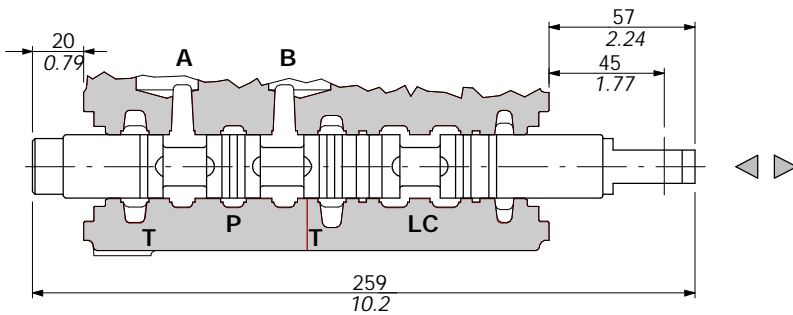
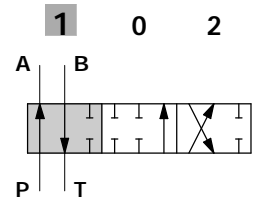
SD18

Spool options

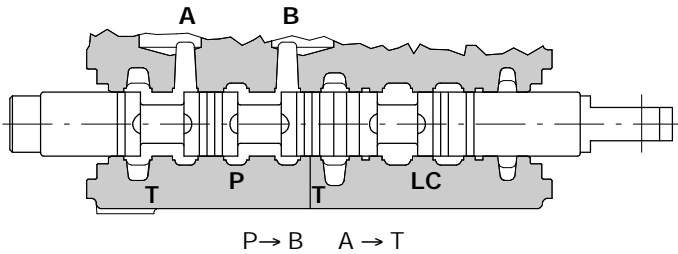
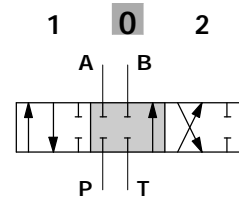
Type 1



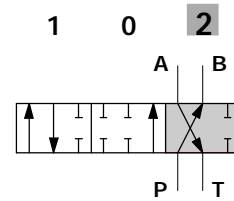
stroke = + 10 mm
+ 0.39 in



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

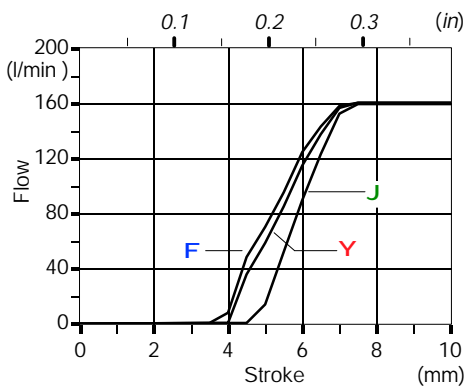


A stroke = - 10 mm
- 0.39 in



Performance data

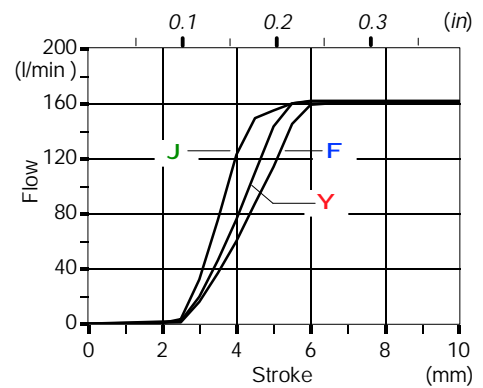
Spool metering P → A(B)



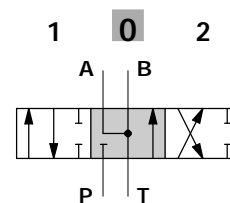
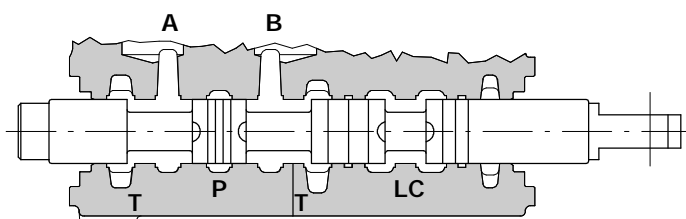
Q = 160 l/min

- F P (on ports) = 63bar/900psi
- Y P (on ports) = 100bar/1450psi
- J P (on ports) = 250bar/3600psi

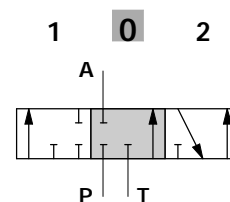
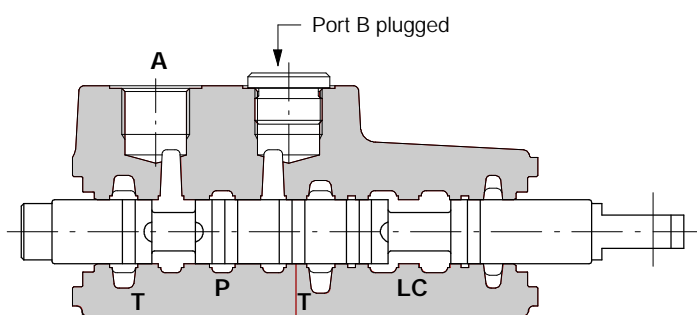
Spool metering A(B) → T



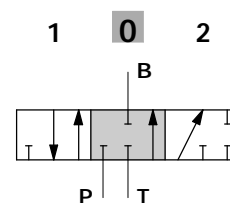
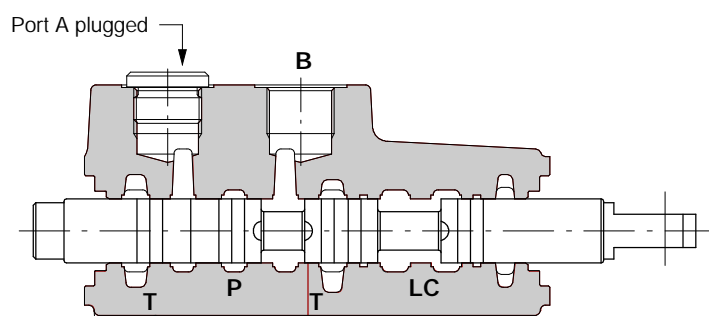
Type 2



Type 3



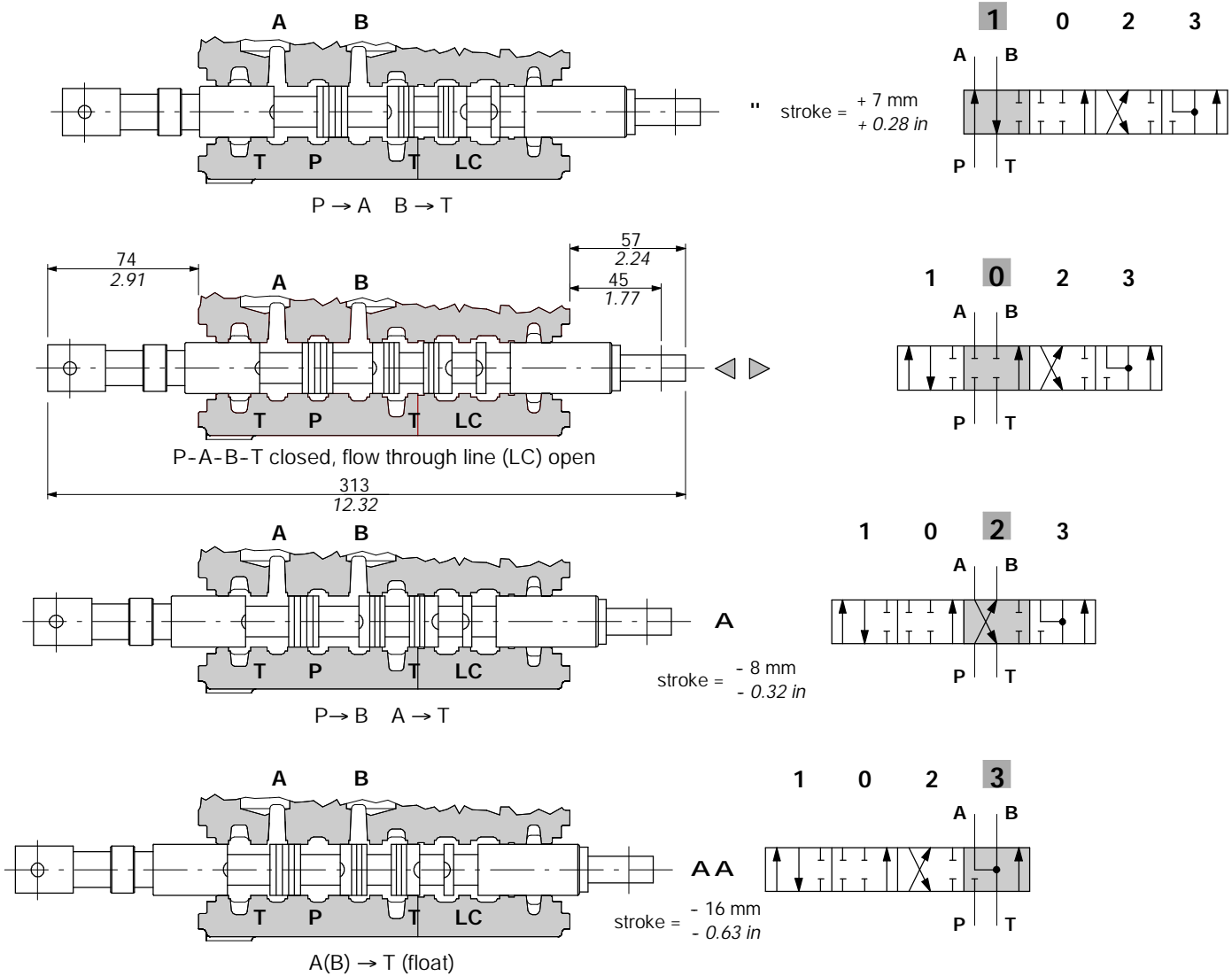
Type 4



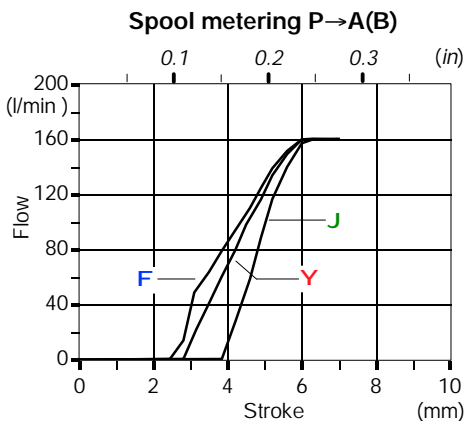
Spool options

Type 5

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

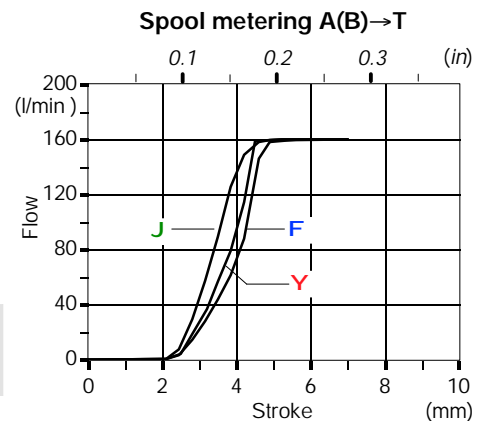


Performance data



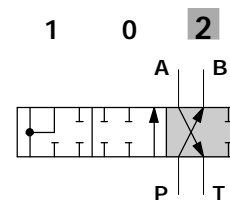
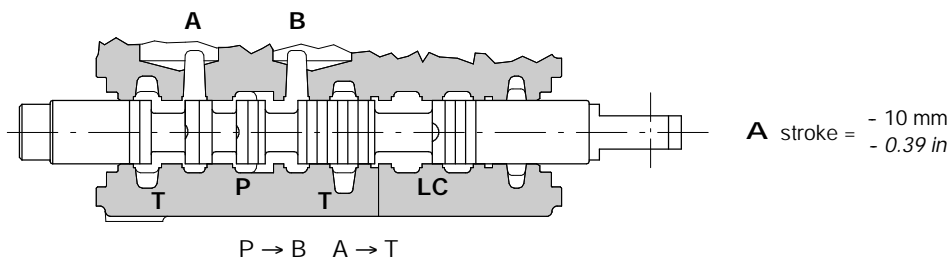
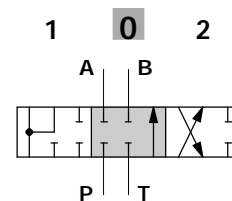
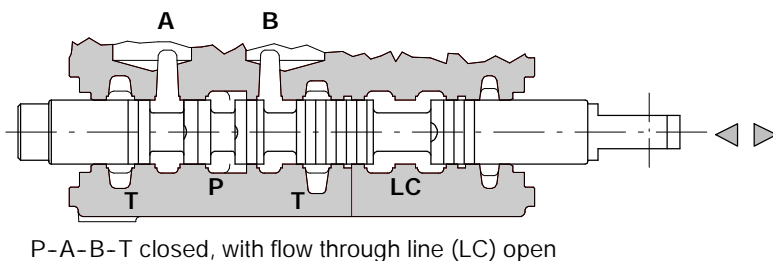
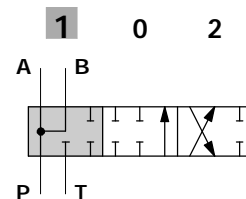
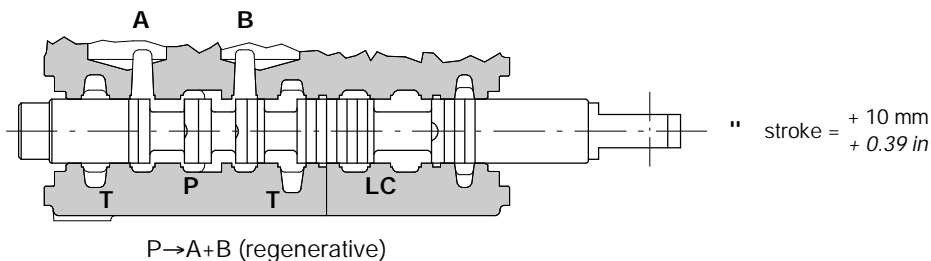
Q = 160l/min

- F** P(on ports) = 63bar/900psi
- Y** P(on ports) = 100bar/1450psi
- J** P(on ports) = 250bar/3600psi

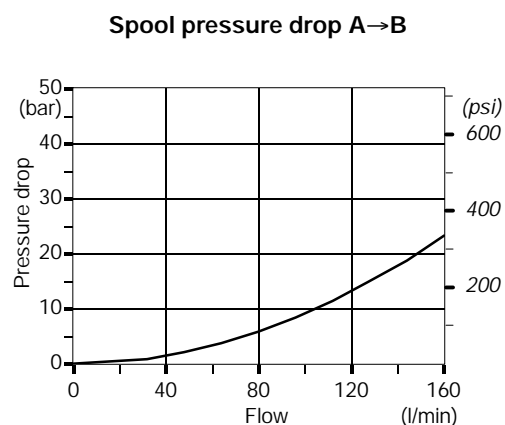
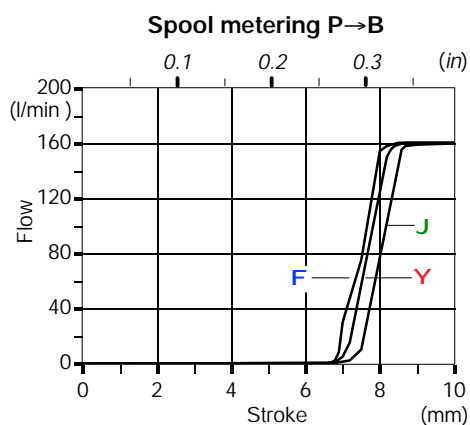


Type 8F

This spool needs special body with extra machining.



Performance data



SD18

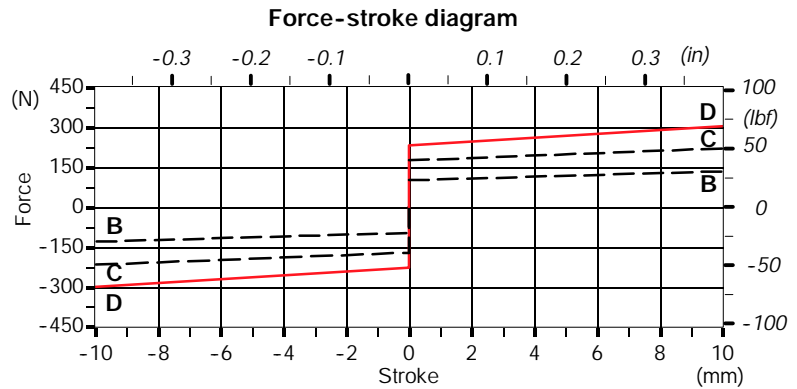
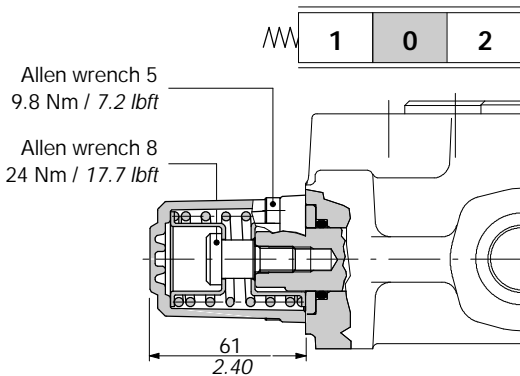
"A" side spool positioners

With spring return

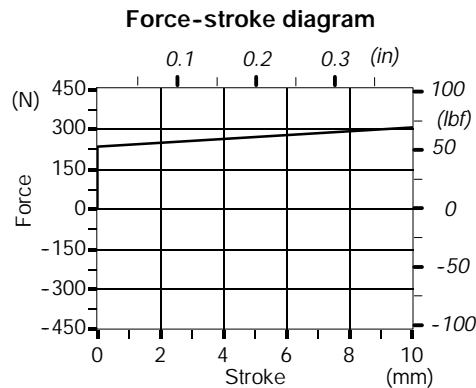
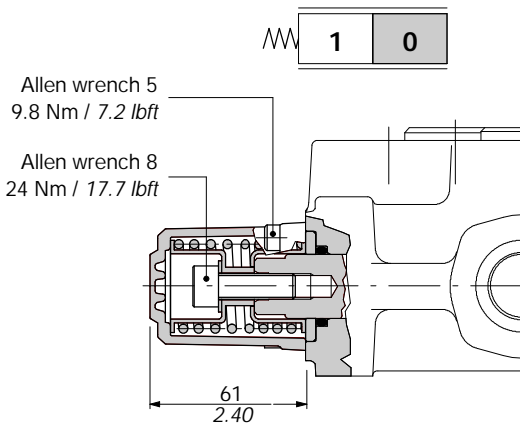
8 kit

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).

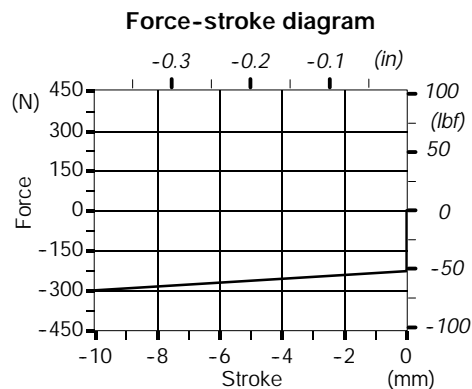
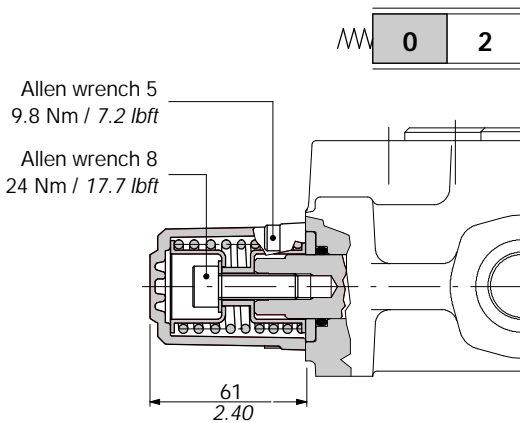
In order to correctly apply these kits please contact Customer Service, there could be some usage limitation.



19 kit

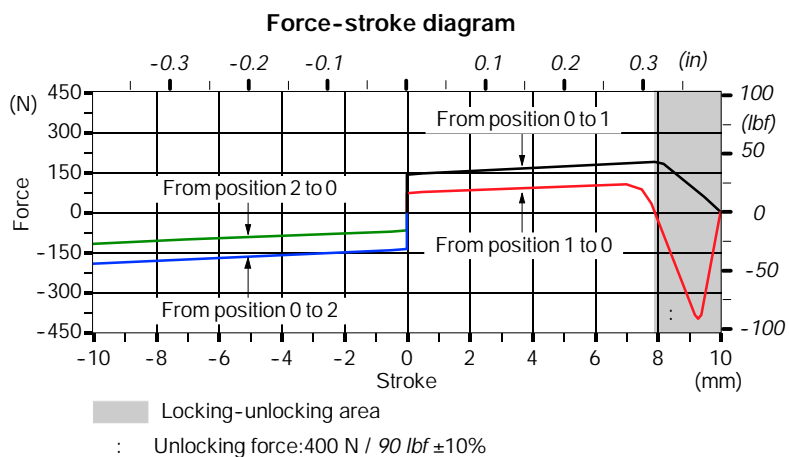
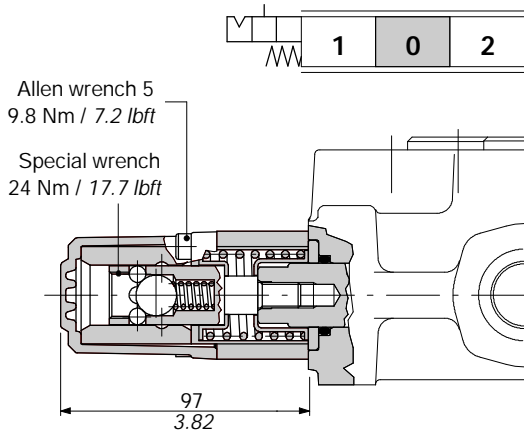


20 kit

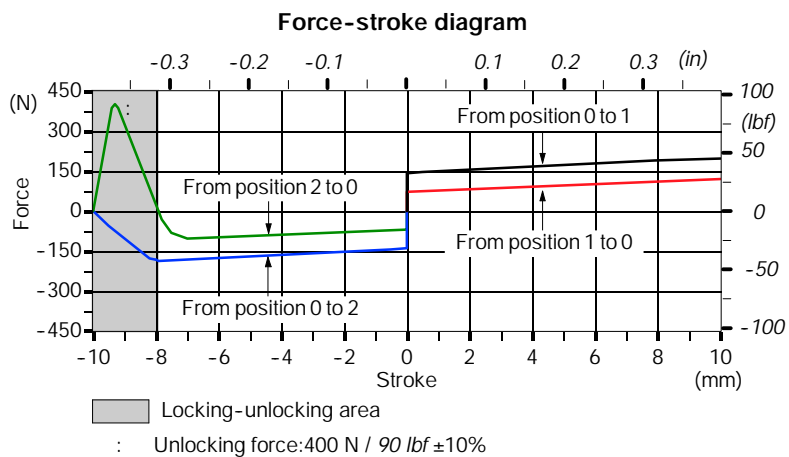
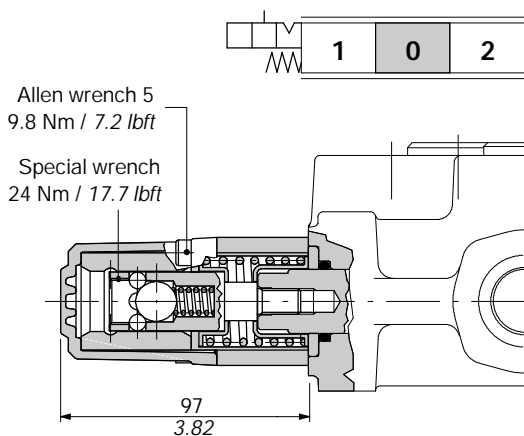


With detent

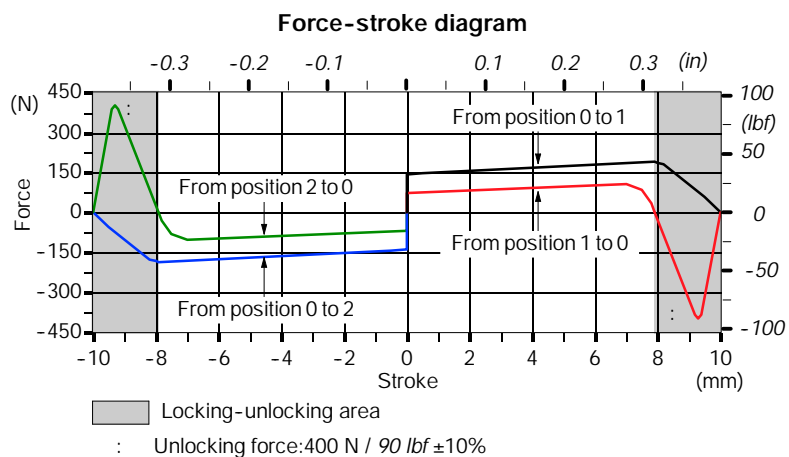
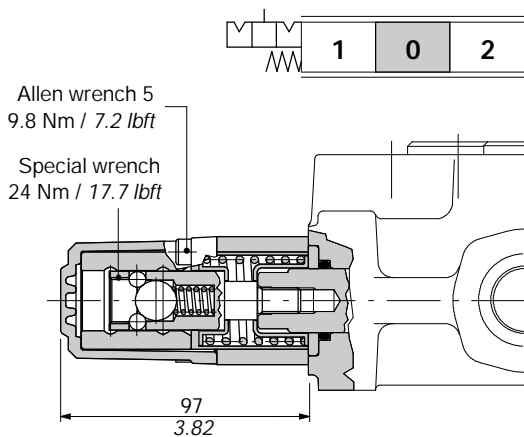
9B kit



10B kit



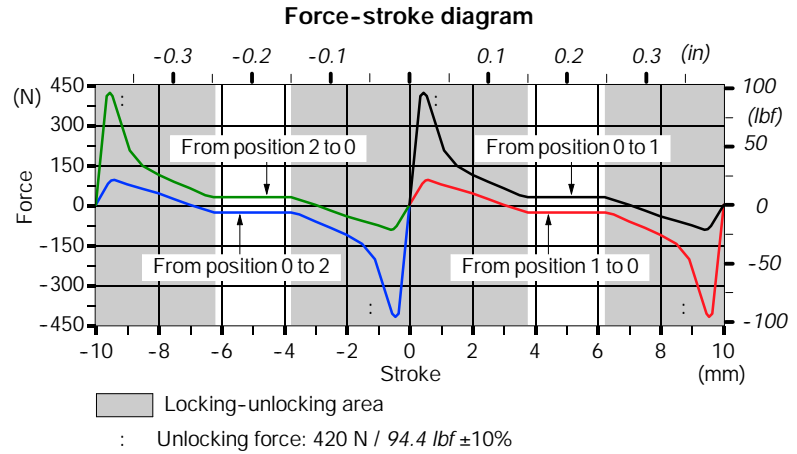
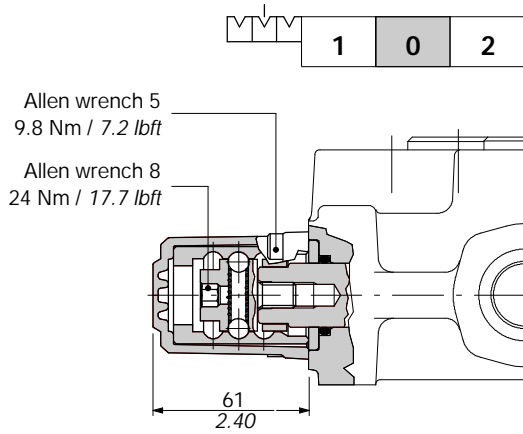
11B kit



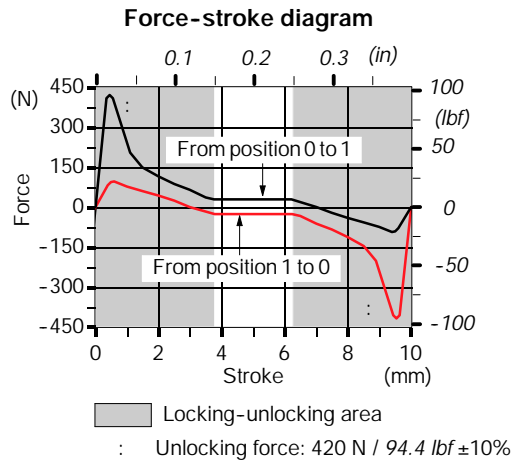
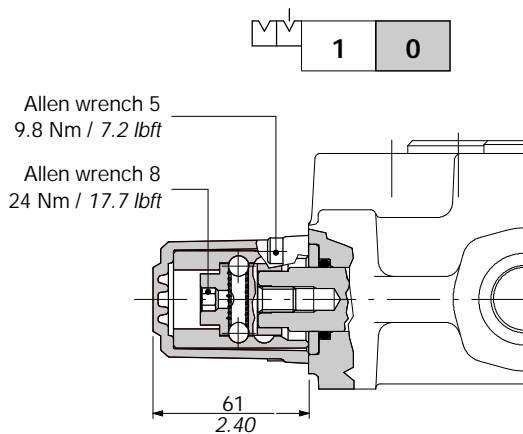
SD18

"A" side spool positioners

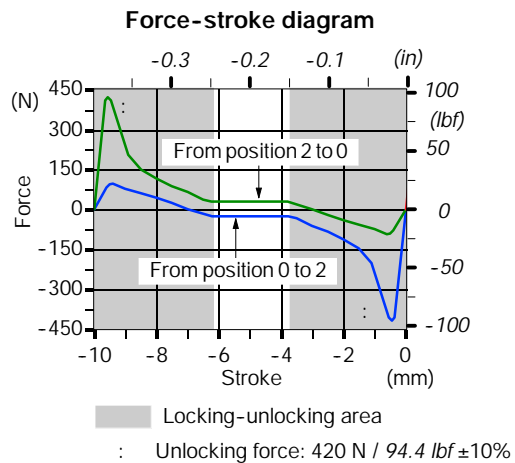
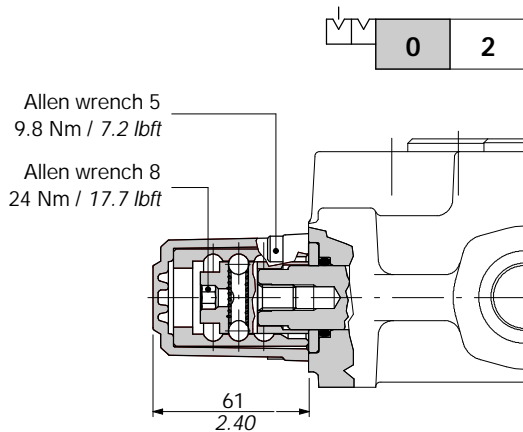
11 kit



15 kit

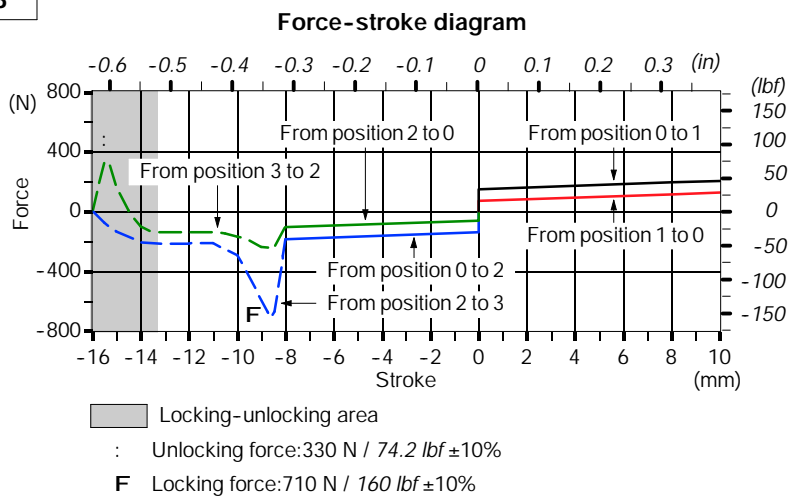
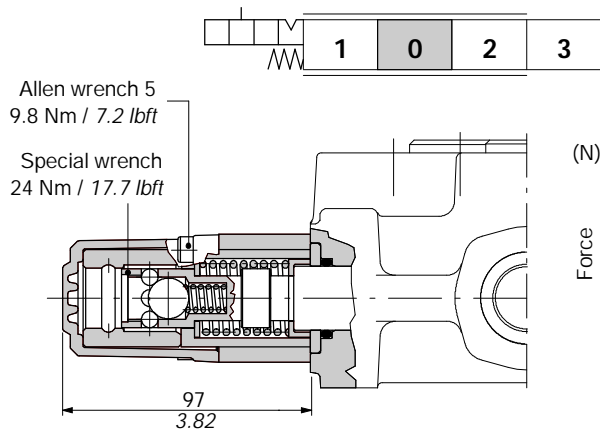


16 kit



For spool type 5

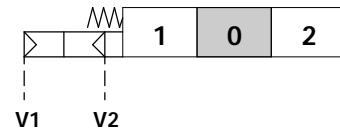
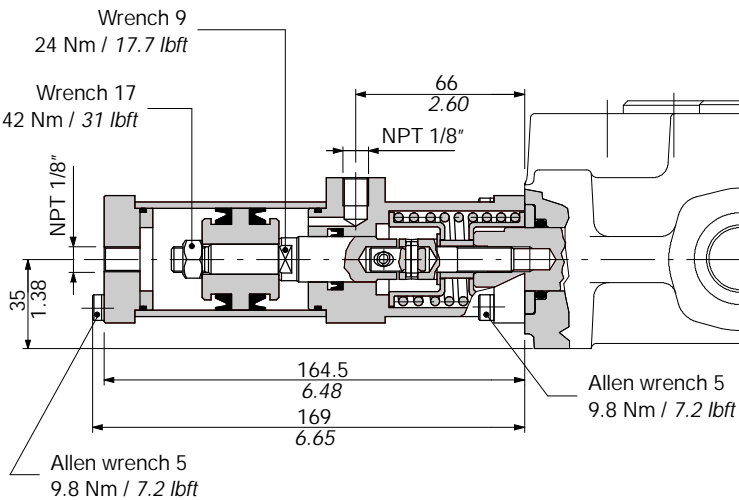
13 kit



SD18

"A" side spool positioners

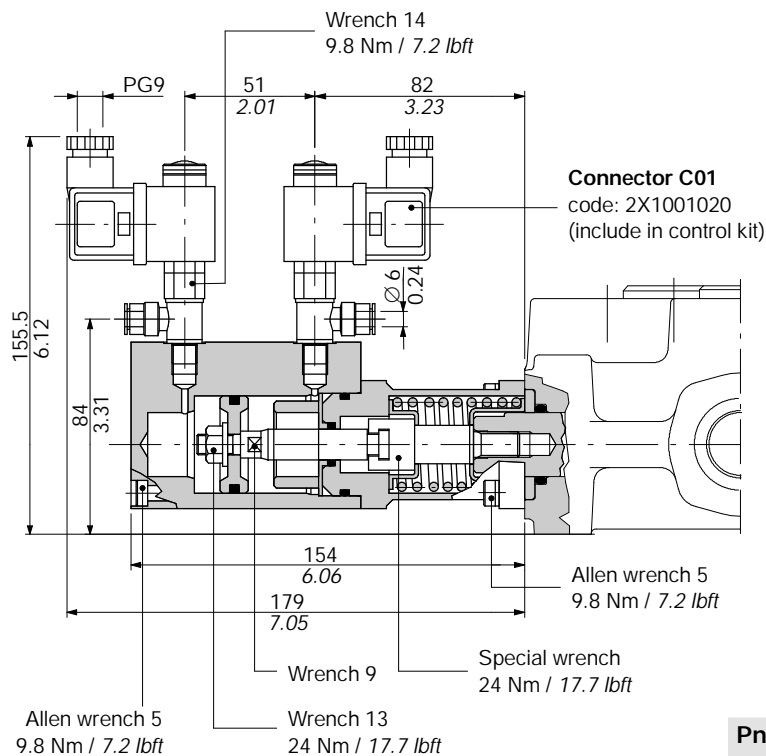
8P kit



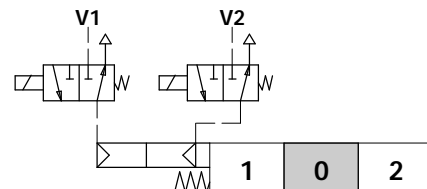
Operating features

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

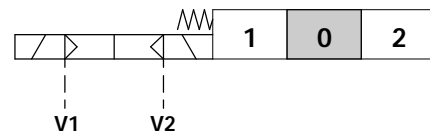
8EP3 kit



Scheme



Scheme ISO 1219



Operating features

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

Solenoid operating features

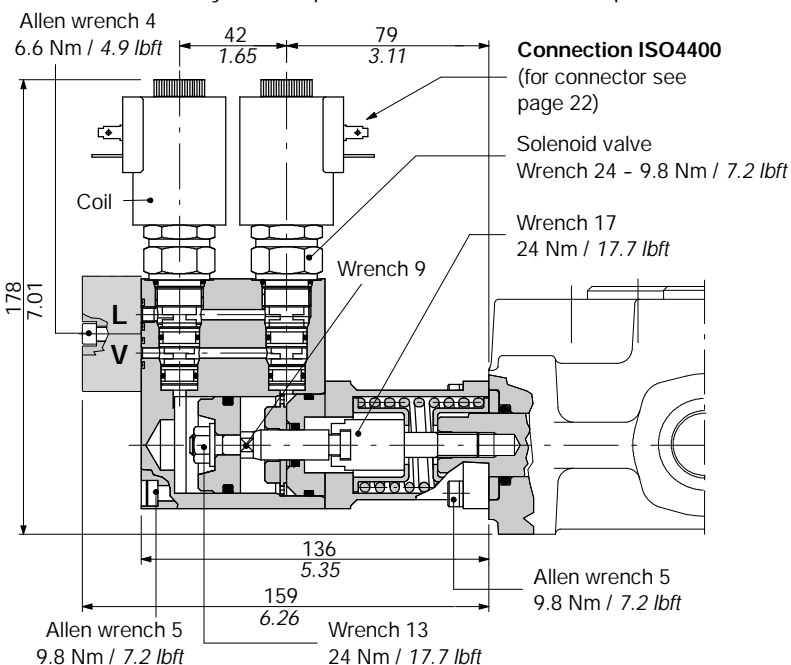
Nominal voltage : 12 VDC / 24 VDC
 Power rating : 8 W
 Duty cycle : 100%

Pneumatic solenoid valve ordering code (with connector)

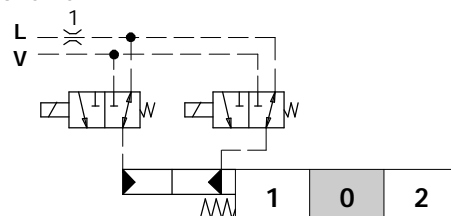
| CODE | DESCRIPTION |
|-----------|----------------------|
| 2X4001012 | 12VDC solenoid valve |
| 2X4001024 | 24VDC solenoid valve |

8E13 kit

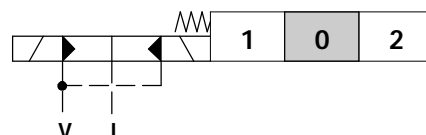
ON-OFF electro-hydraulic spool control kit with external pilot and drain.



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

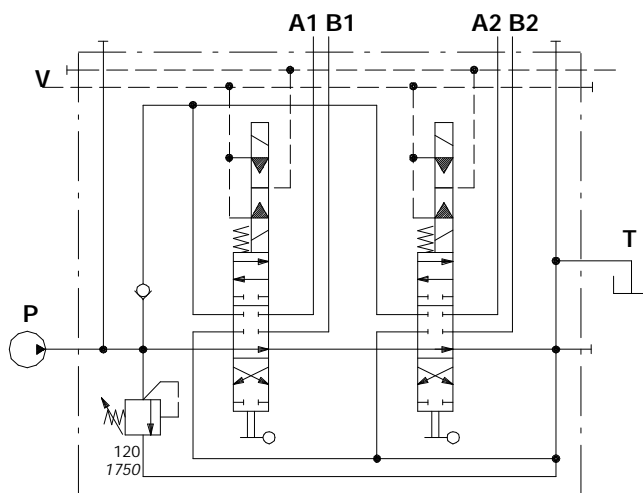
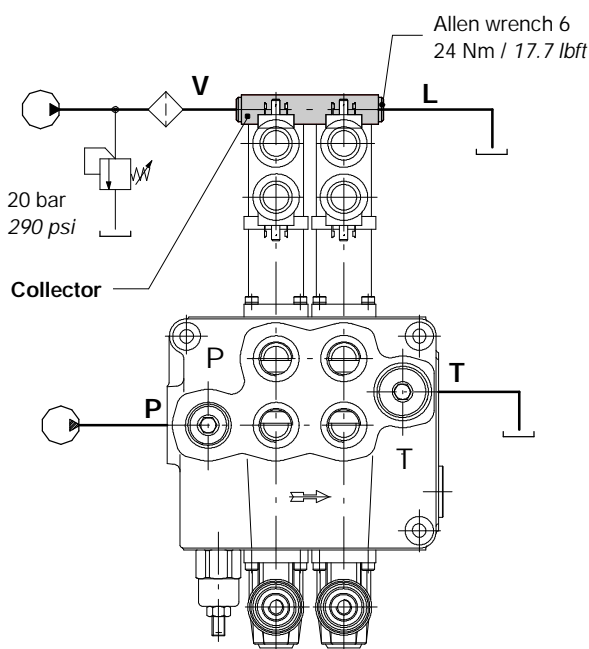
Solenoid operating features

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 (BSP thread)

| TYPE | CODE | DESCRIPTION |
|-------|------------|--------------------|
| KE1S0 | 5KE1S00030 | kit for 1 section |
| KE2S0 | 5KE2S00630 | kit for 2 sections |
| KE3S0 | 5KE3S00630 | kit for 3 sections |
| KE4S0 | 5KE4S00630 | kit for 4 sections |
| KE5S0 | 5KE5S00630 | kit for 5 sections |
| KE6S0 | 5KE6S00630 | kit for 6 sections |

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

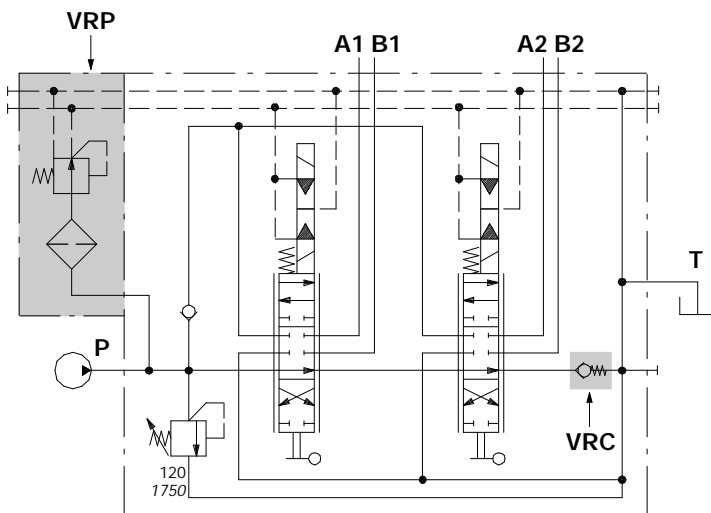
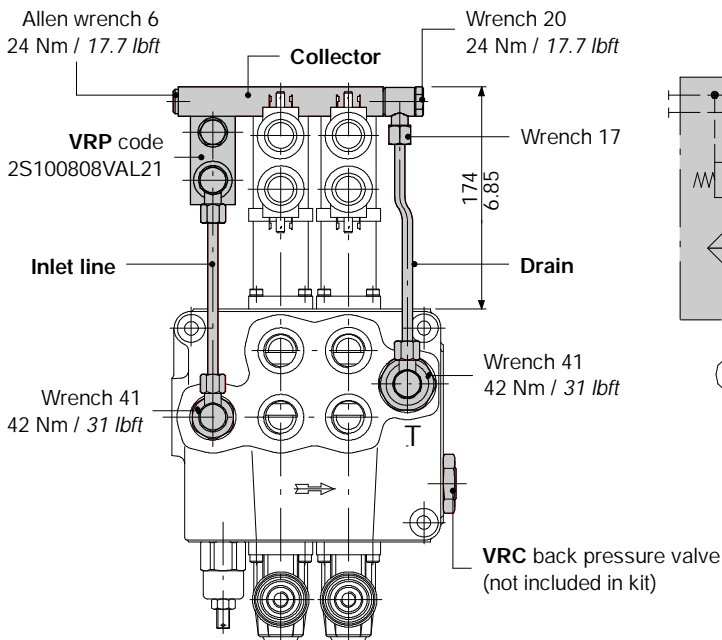
SD18

"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

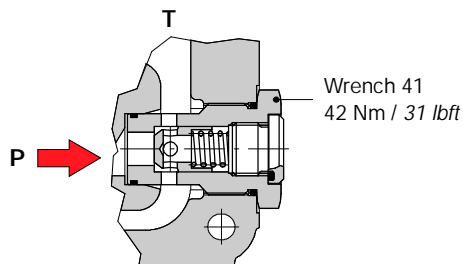
Ex: SD18/2-P(KG3-125)/18EI3L/18EI3L/VRC
-KE2R3-24VDC

Ordering codes (BSP thread)

| TYPE | CODE | DESCRIPTION |
|-------|------------|--------------------|
| KE1R3 | 5KE1R30630 | kit for 1 section |
| KE2R3 | 5KE2R30630 | kit for 2 sections |
| KE3R3 | 5KE3R30630 | kit for 3 sections |
| KE4R3 | 5KE4R30630 | kit for 4 sections |
| KE5R3 | 5KE5R30630 | kit for 5 sections |
| KE6R3 | 5KE6R30630 | kit for 6 sections |

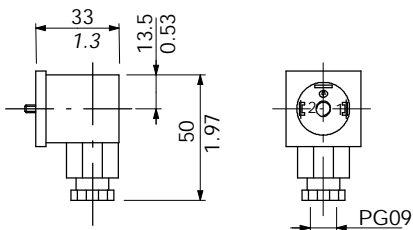
VRC valve : code XGIU541602

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



C02 connector code: 2X1001010

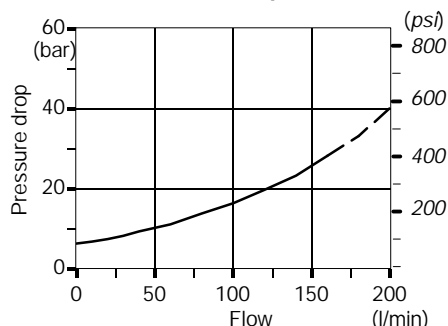
Connector according to ISO4400



Operating features

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

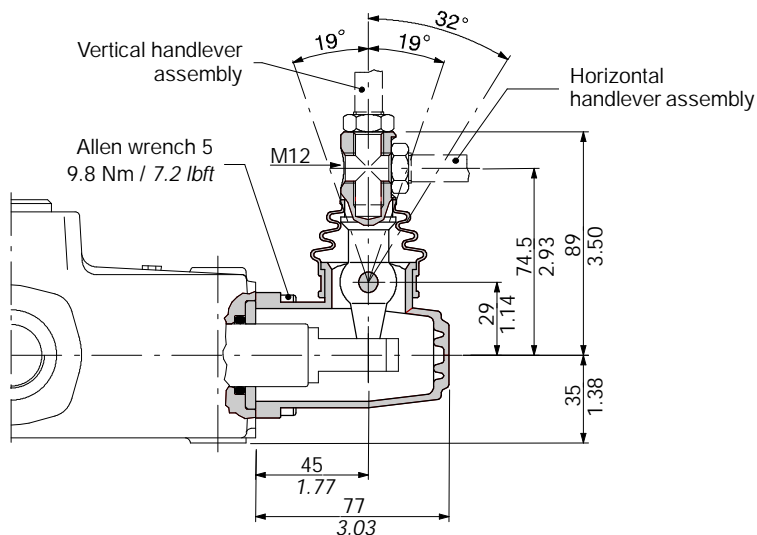
Pressure drop P→T



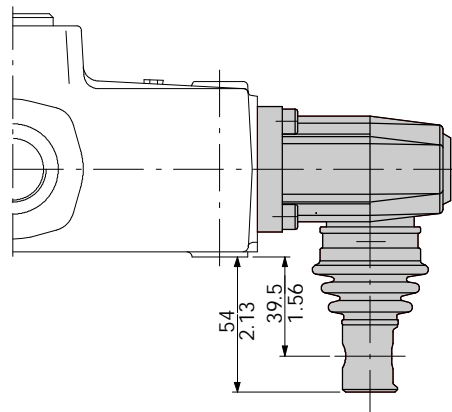
L lever box

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

| | | |
|---|---|---|
| 1 | 0 | 2 |
|---|---|---|



L180 configuration

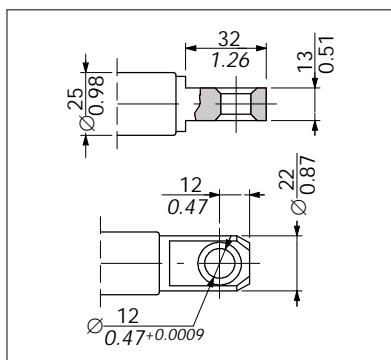
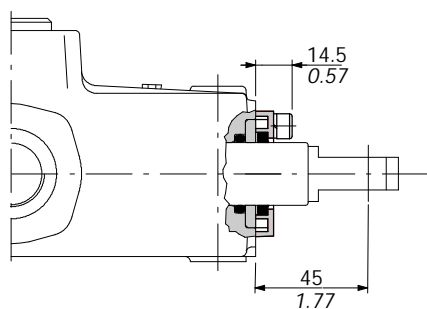


SLP dust proof plate

Mechanical control with dust proof plate.

| | | |
|---|---|---|
| 1 | 0 | 2 |
|---|---|---|

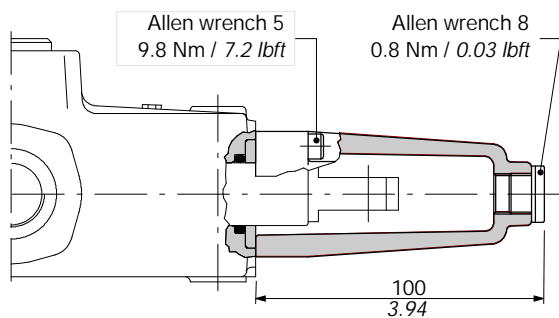
Spool dimension



SLC cap

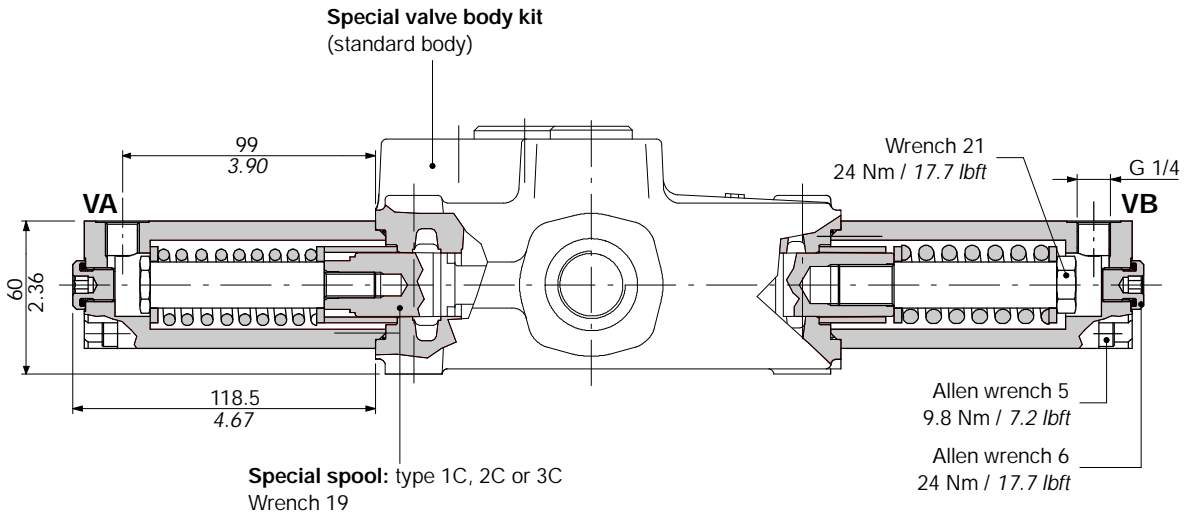
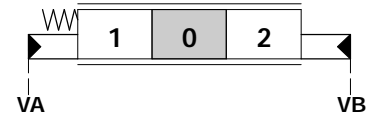
Protection cap usable with pneumatic spool and electro-hydraulic control kit.

| | | |
|---|---|---|
| 1 | 0 | 2 |
|---|---|---|



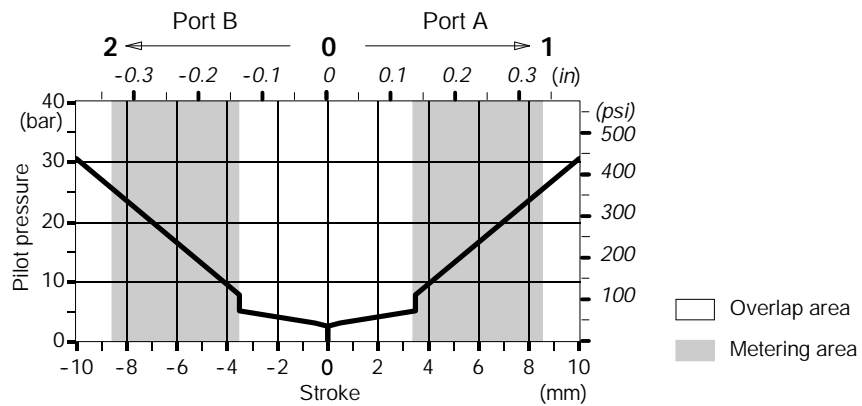
Hydraulic spool control

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

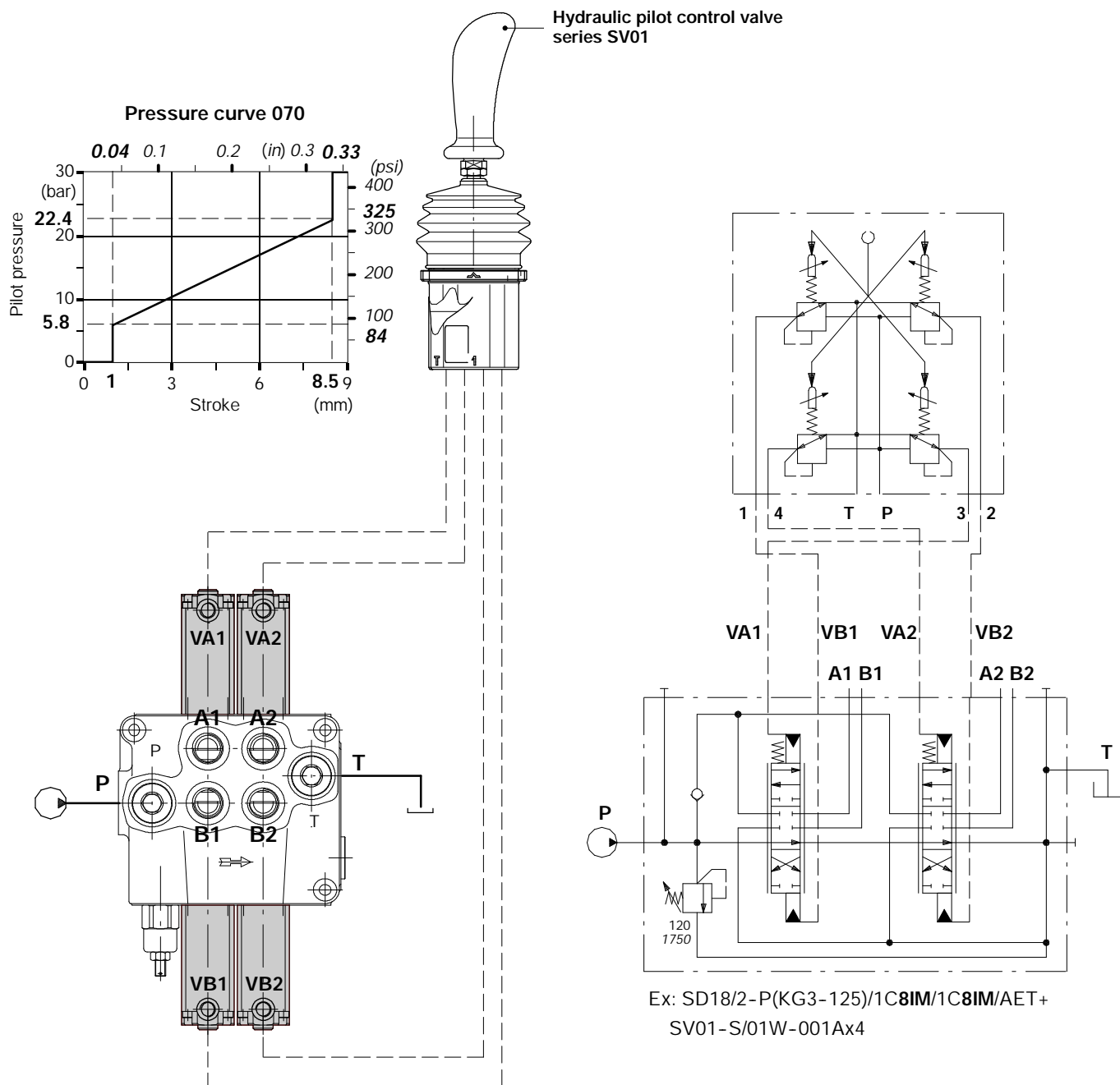


Pressure-stroke diagram

Max. pilot pressure 50 bar / 725 psi



Connection example

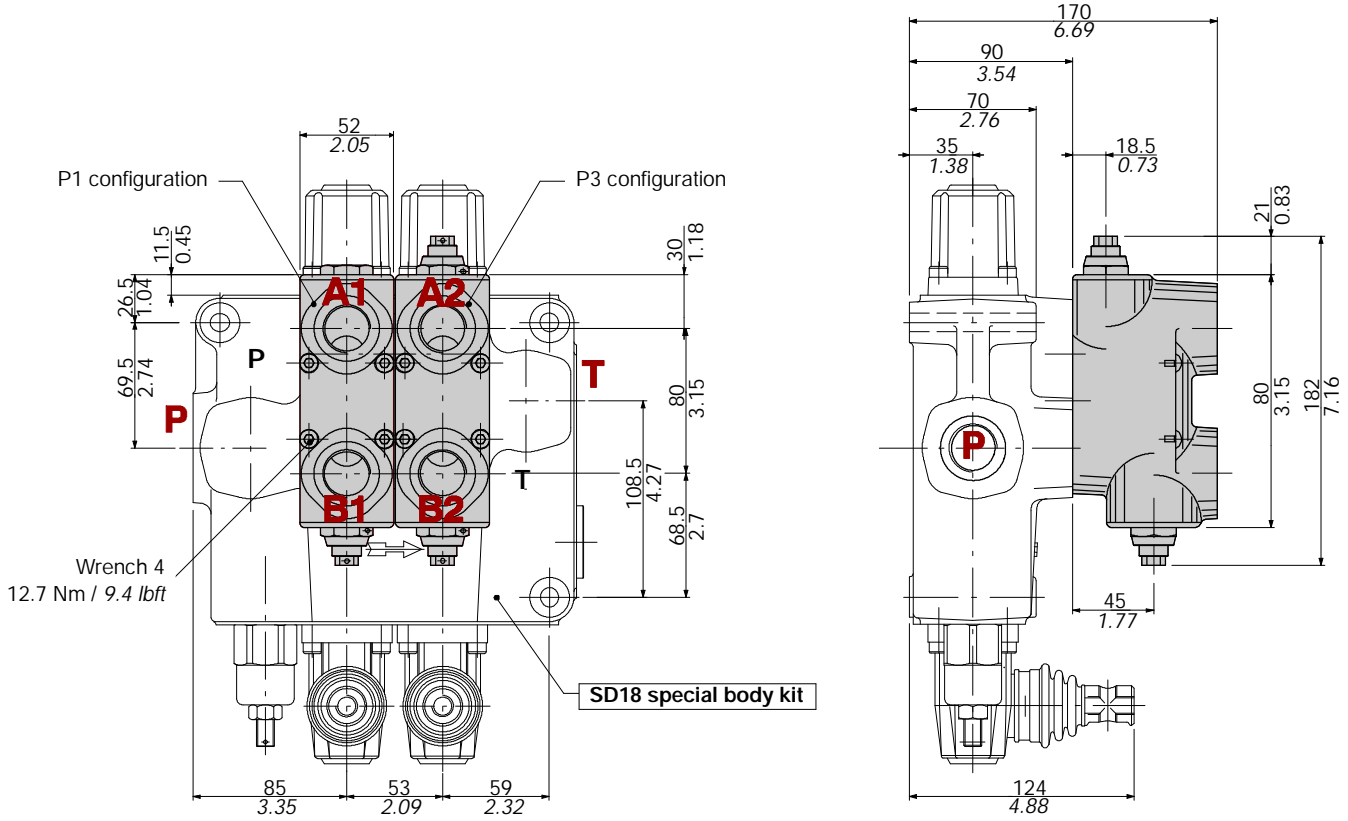


SD18

Port relief options

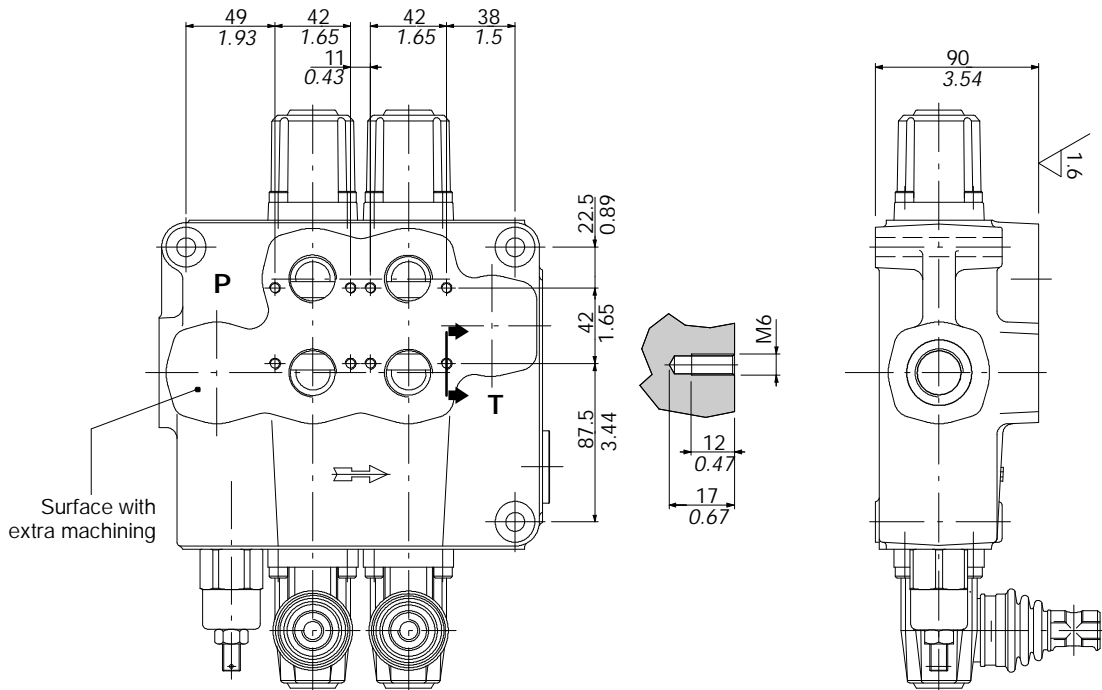
Complete kit with cast iron block and anti-shock valves

Example of mounting on directional valve



Example of SD18 valve with extra machining

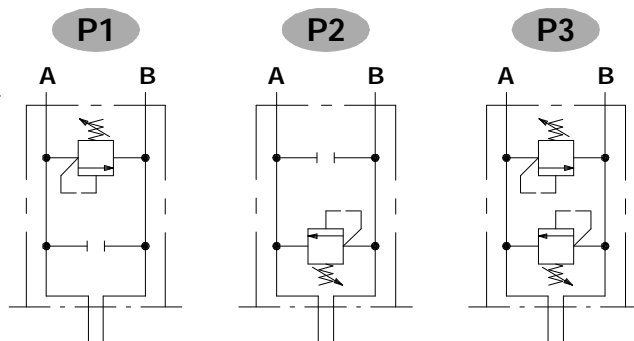
When port valves are flanged on the first or the last section of the body, top inlet and outlet are not available.



Circuit

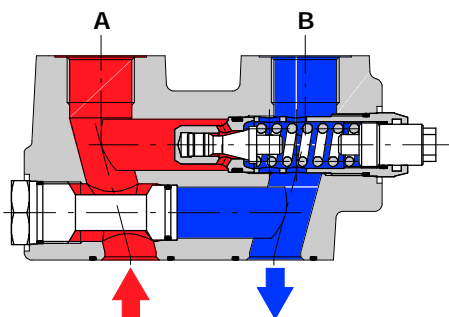
P 1 (G 3 - 120)

- 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.



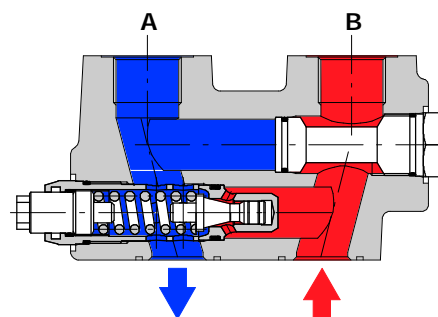
P1 configuration

Example of pressure on port A and port B to tank



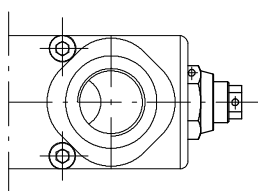
P2 configuration

Example of pressure on port B and port A to tank

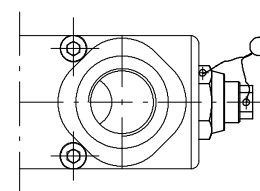


Adjustment type

G: with screw

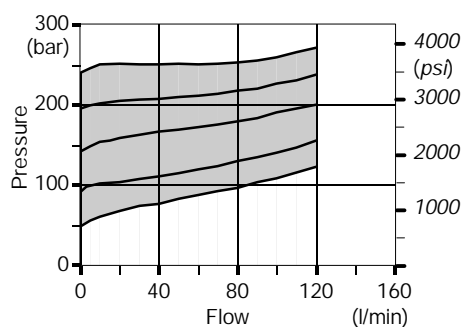


H: valve set and locked

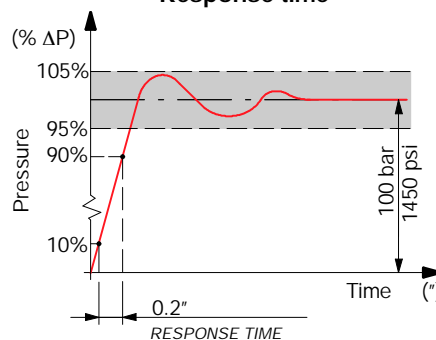


Performance data

Spring # 3 (blue band)



Response time



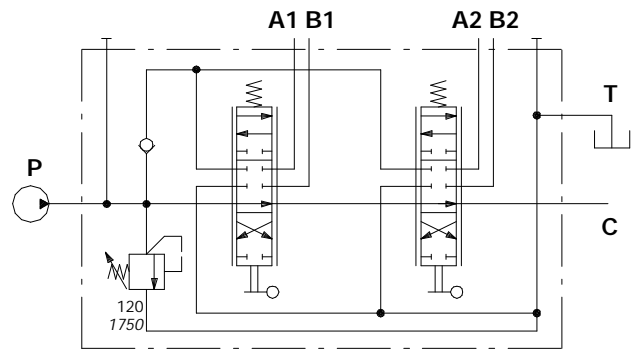
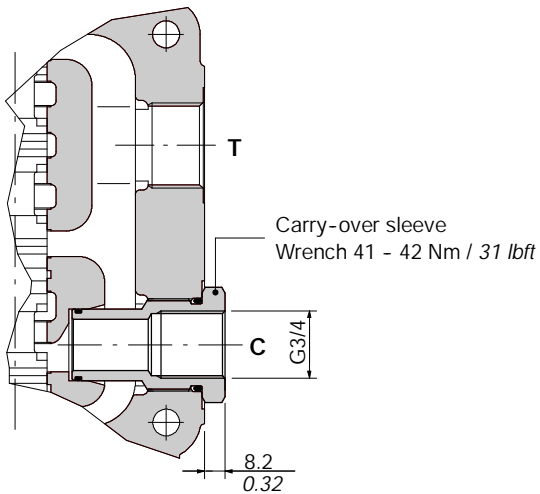
SD18

Outlet port conversion

AET: (standard)

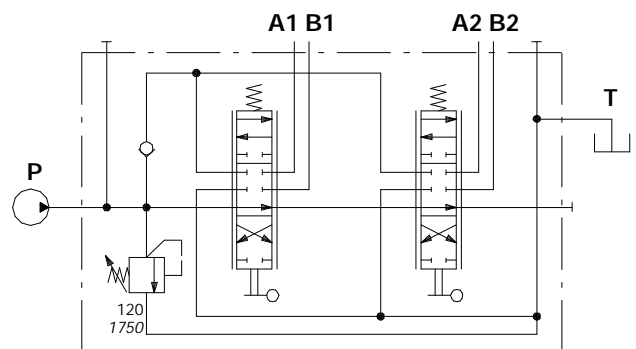
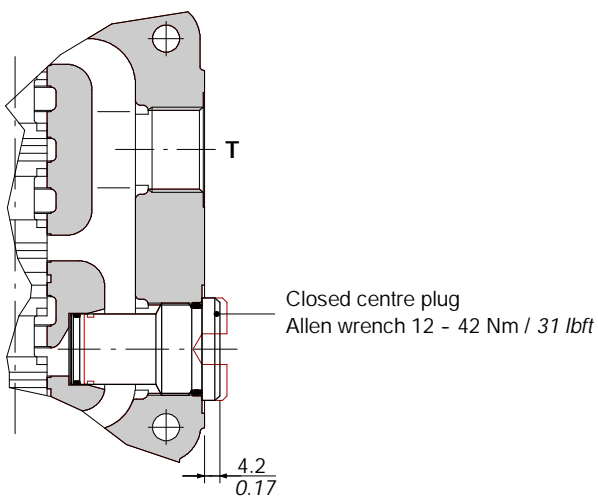
See page 6

AE: with carry-over



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

AEK: closed centre



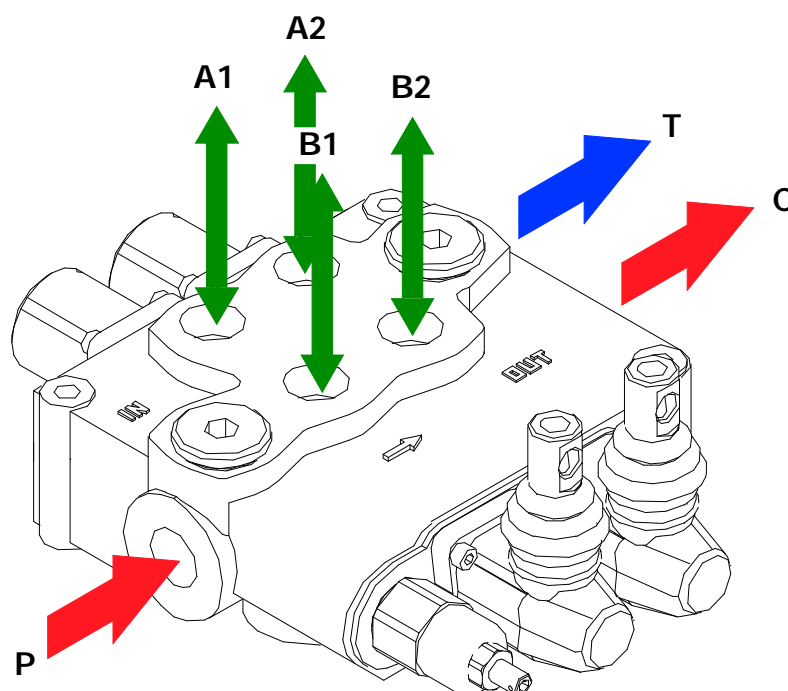
Ex: SD18/2-P(KG3-120)/18L/18L/AEK

Installation and maintenance

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

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.



Carry-over configuration

Fitting tightening torque - Nm / lbft

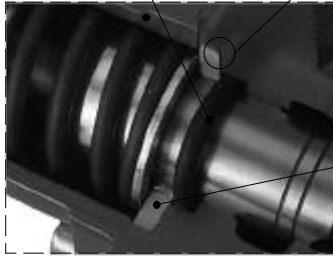
| THREADS TYPE | P and C ports | A and B ports | T port |
|------------------------------|--------------------------|--------------------------|--------------------------|
| BSP (ISO 228/1) | G 3/4 | G 3/4 | G 1 |
| With O-Ring seal | 90 / 66.4 | 90 / 66.4 | 100 / 73.7 |
| With copper washer | 90 / 66.4 | 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.

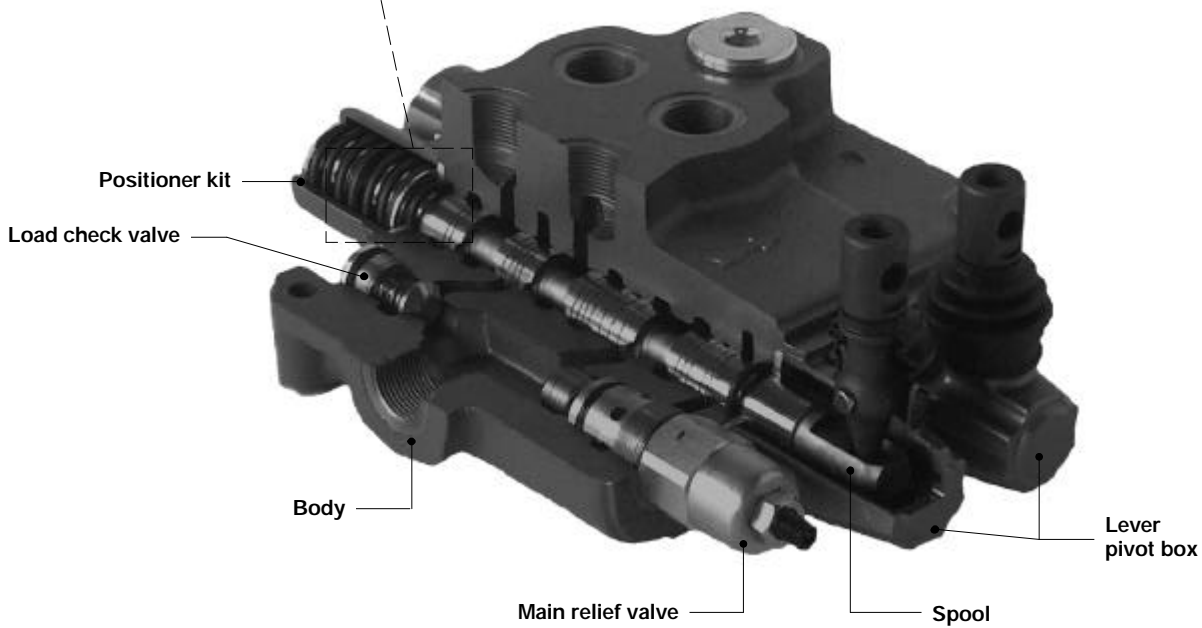
Installation and maintenance

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. |



WALVOIL S.P.A.

42100 REGGIO EMILIA • ITALY • VIA ADIGE, 13/D
TEL. +39.0522.932411 • FAX +39.0522.300984
E-MAIL: INFO@WALVOIL.COM • HTTP: //WWW.WALVOIL.COM

SALES DEPARTMENT

TEL. +39.0522.932555 • FAX +39.0522.932455

DAT006E