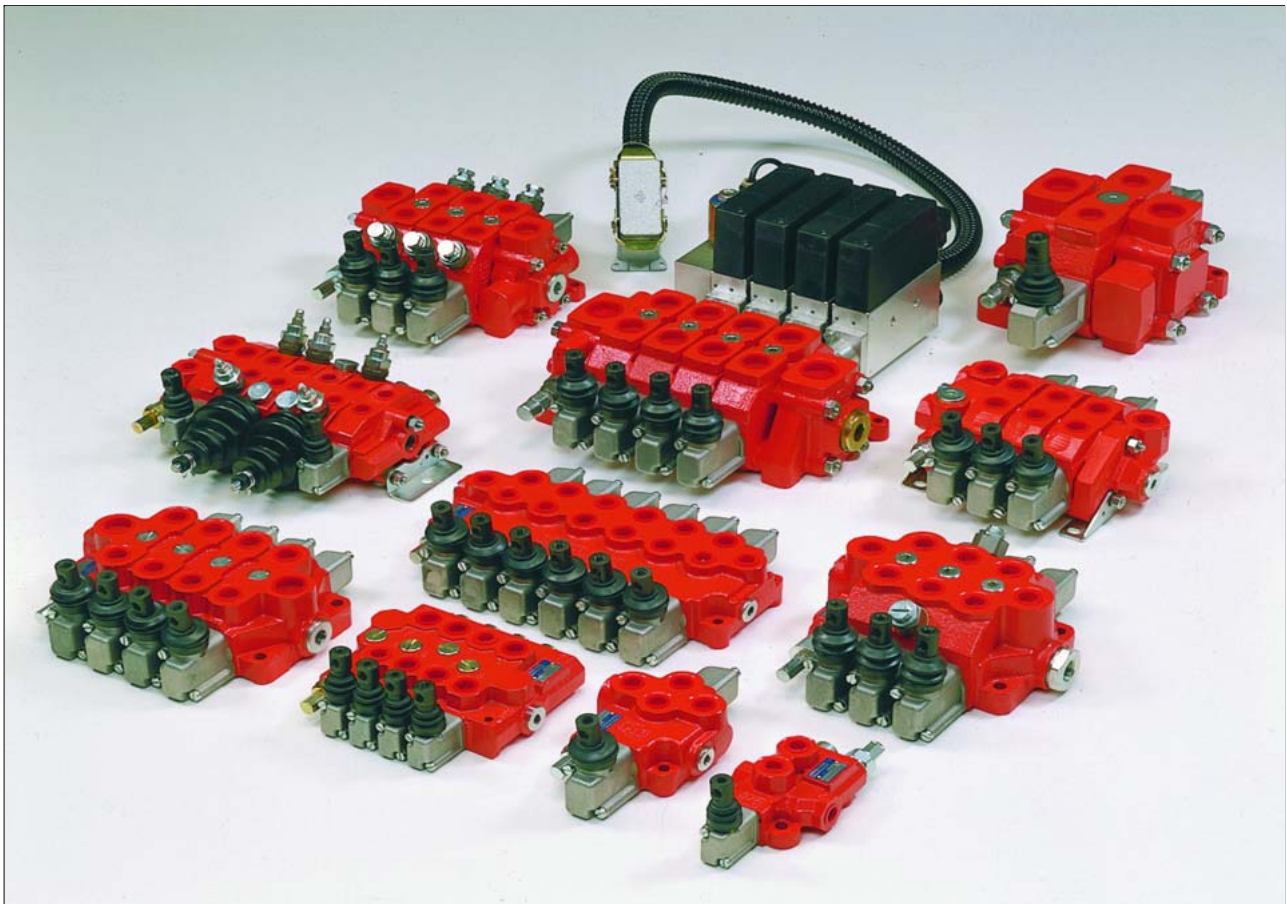


Monobloc and Sectional Directional Control Valves



motion and progress

9 Sectional directional control valves HDS15

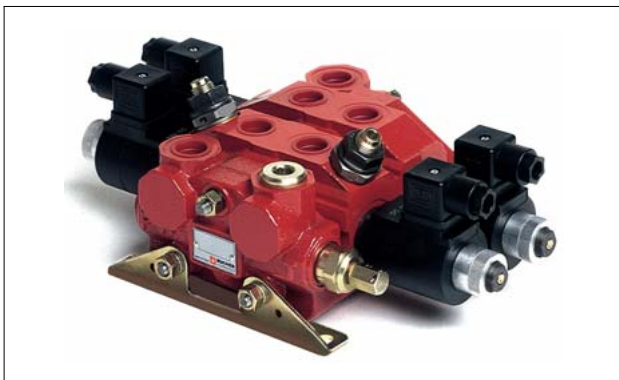
9A Standard valves p. 138



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9A Standard valves

9A.1 General specifications

Technical specification		
Max flow rate	l/min U.S.G.P.M.	60 15
Max continuous operating pressure supply port P	bar PSI	250 3600
Max intermittent peak pressure work port A/B	bar PSI	320 4600
Max back pressure tank port T	bar PSI	30 430
Oil temperature	° C ° F	-10 to +80 14 to 180
Oil viscosity	mm ² /s	16 to 75
Oil filtration	μ	≤ 30

Spool leakage at 100 bar (1450 PSI), Temp. 50° C (120° F), viscosity 27 mm ² /s:		
Maximum	cm ³ /min Cu. In./min	14 0.854
Average	cm ³ /min Cu. In./min	7 0.427

Number of spools	1 to 10
Adjustable direct acting relief valve (tamper-proof seal available on request)	RV
Load hold check valve in each section	LC
Cartridge anti-shock, anti-cavitation and service relief valve	OA-UC-C

9A.1.1 Weight

Version	kg	lb
Inlet with RV	1.8	3.96
1 spool section (standars, without options)	2.5	5.5
End cover standard	0.8	1.76
End cover with T3 and H.P.C.O.	1.25	2.75

9A.1.2 Material specification:

Body: High strength cast-iron.
Spool: Hardened steel – Chrome plated.
Seals: Buna "N".

9A.1.3 Standard features:

- 1) Internal load holding check valves (prevent reverse flow through valve when shifting)
- 2) Parallel circuit.
- 3) Balanced interchangeable spools (provides minimum leakage, smooth operation)
- 4) Wide selection inlets, work ports, and outlets threaded ports.
- 5) Negative overlapping of the spool.

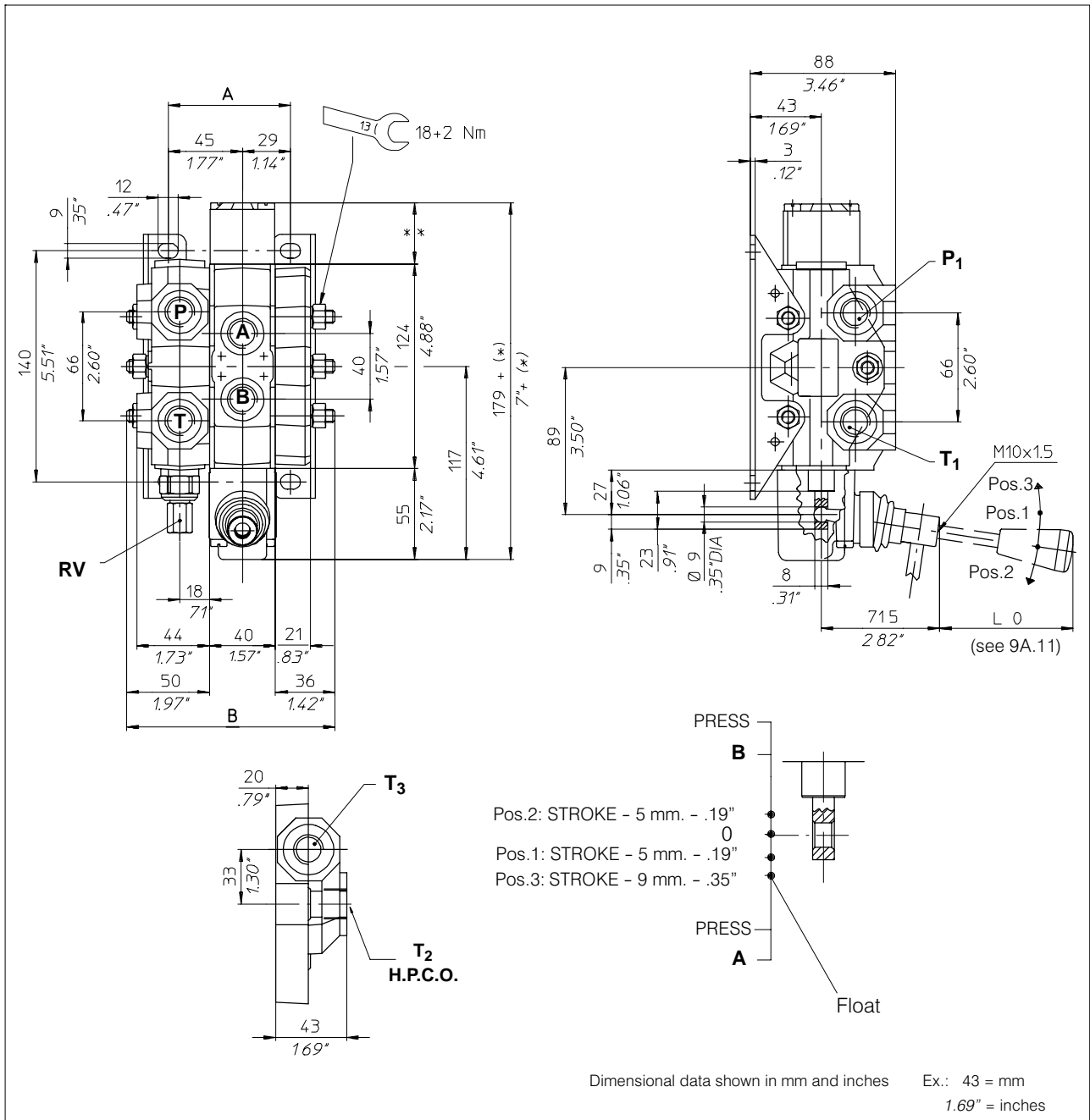
9A.1.4 Optional features available:

- 1) Open or closed centre circuit, 3 or 4 way operations, 2-3 or 4 position (float position), full open centre (motor spool) and other spool options.
- 2) Carry over.
- 3) Series connection and priority pressure.
- 4) Pressure compensated flow control.
- 5) Port release and anti-cavitation valves
- 6) Adjustable direct acting relief valve (Tamper-proof sealed on demand)
- 7) Complete lever assembly.

9A.1.5 Symbols:

P: inlet port
T: outlet port
A/B: work ports
H.P.C.O.: carry-over
RV: relief valve
P₁T₁: side inlet and outlet
T₂: side outlet
T₃: side top outlet
 3.1.0.2: spool position
P: pressure line
T: exhaust line
E: centre line (by pass).

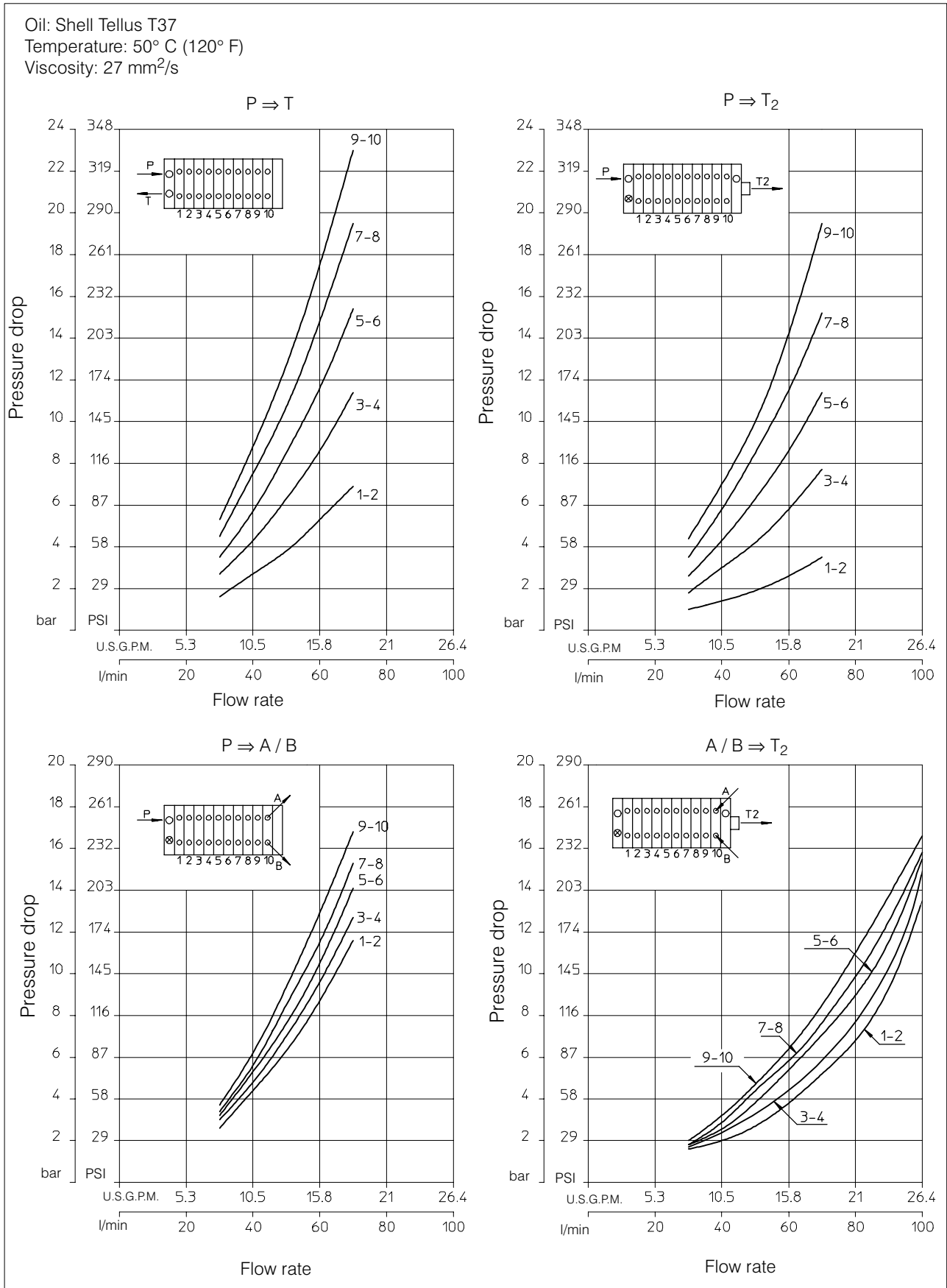
9A.2 Dimensional data



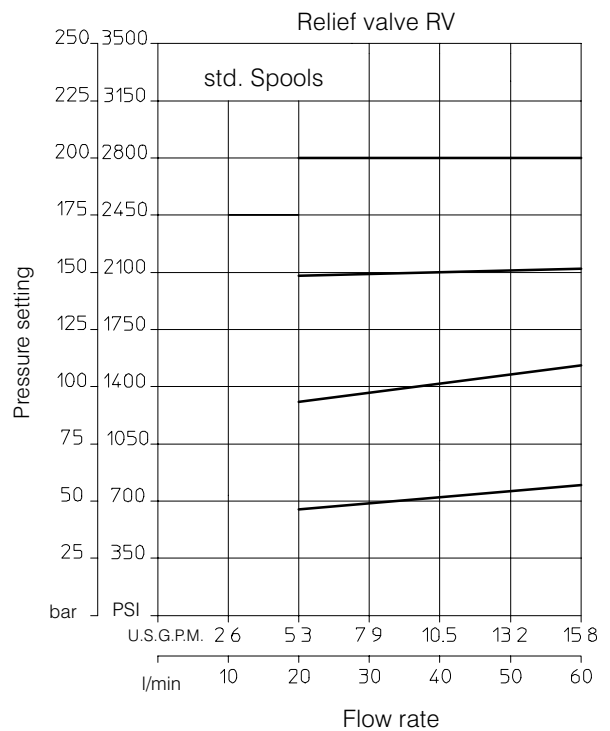
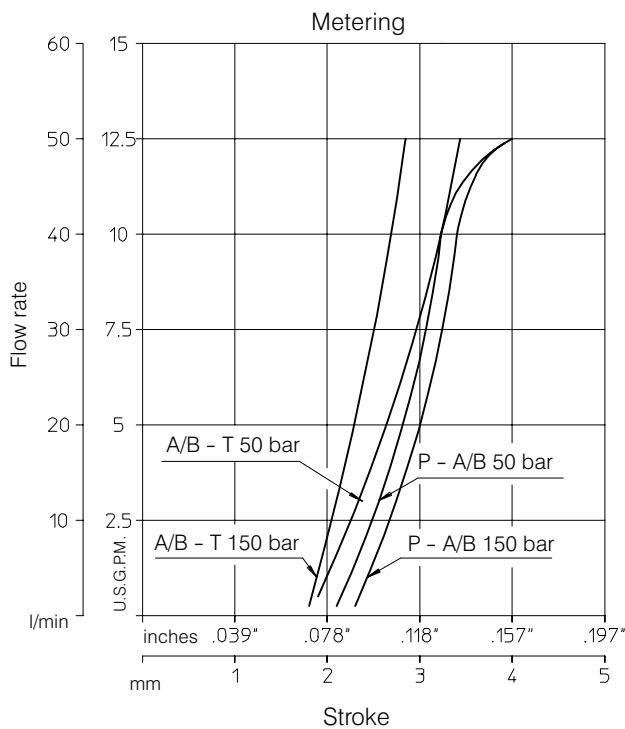
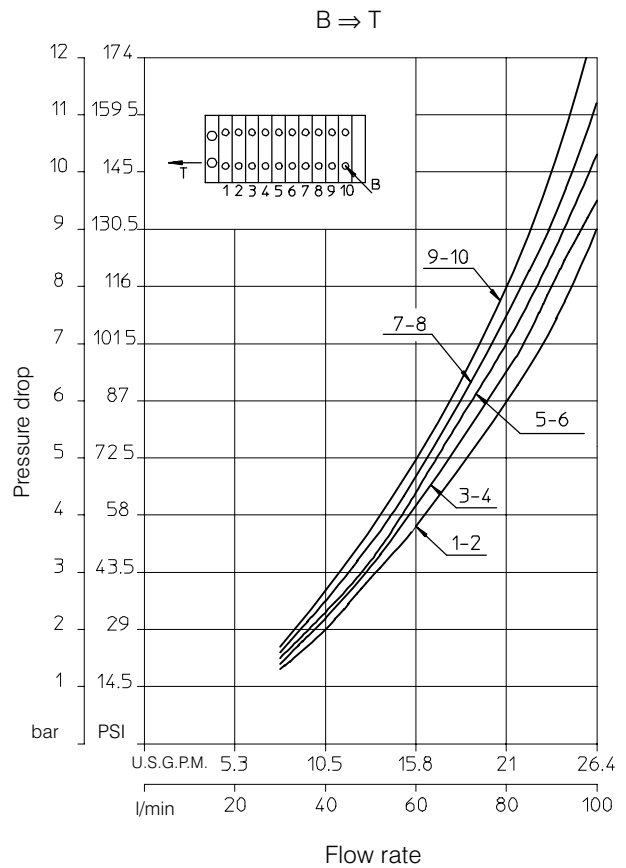
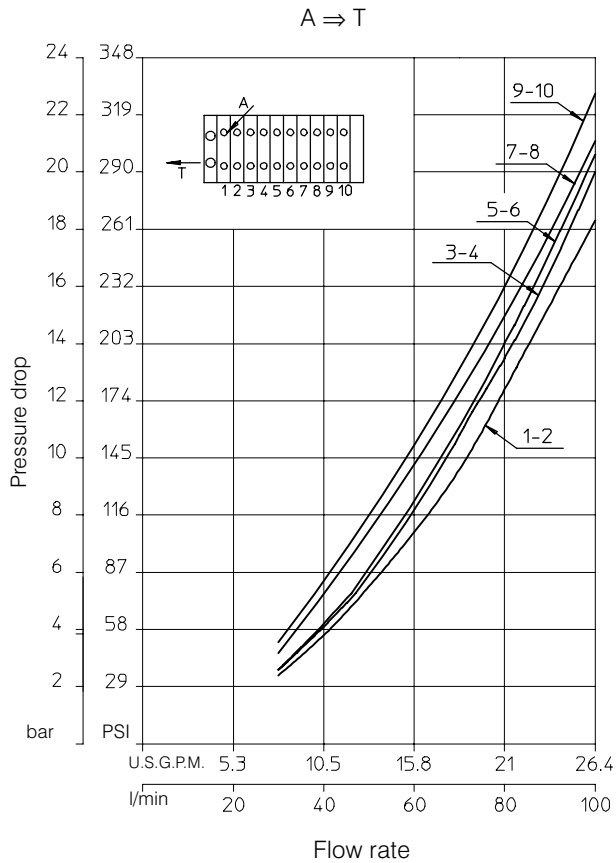
N. of sections		1	2	3	4	5	6	7	8	9	10
Dimension	A	74	114	154	194	234	274	314	354	394	434
		2.91"	4.49"	6.06"	7.63"	9.21"	10.78"	12.36"	13.93"	15.51"	17.08"
Dimension	B	126	166	206	246	286	326	366	406	446	486
		4.96"	6.53"	8.11"	9.68"	11.26"	12.83"	14.40"	15.98"	17.56"	19.13"

9A.3 Performance curves

Oil: Shell Tellus T37
 Temperature: 50° C (120° F)
 Viscosity: 27 mm²/s

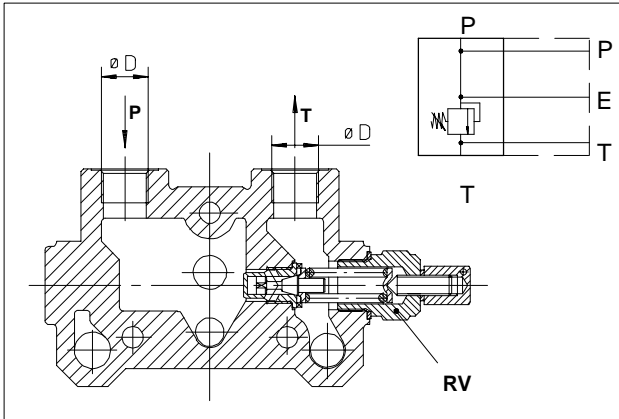


Oil: Shell Tellus T37
 Temperature: 50° C (120° F)
 Viscosity: 27 mm²/s

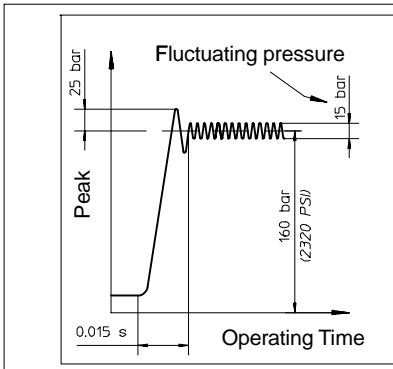


9A.4 Inlet and outlet covers

9A.4.1 Adjustable direct acting Relief Valve RV



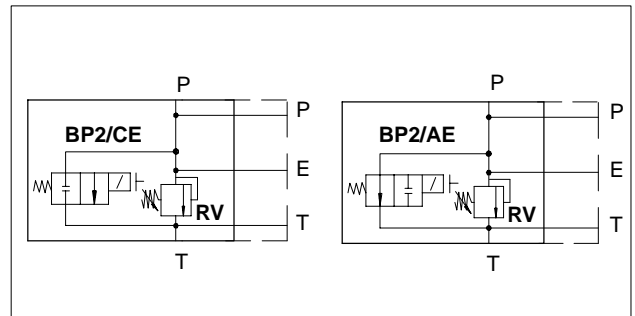
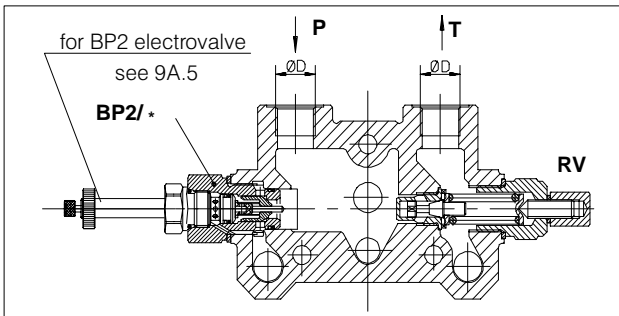
Inlet cover with P-T and RV		
Ø D	Parallel circuit (standard)	For series and tandem circuit
M18X1.5	T01 *200.9312.1007.0	T41 *200.9312.1005.0
3/8" BSP	T02 *200.9312.2006.0	T42 *200.9312.2005.0
1/2" BSP Standard	T03 *200.9312.3011.0	T43 *200.9312.3008.0
SAE10	T05 *200.9312.8002.0	T45 *200.9312.8001.0
* Group code with RV set at standard pressure 150 bar (2100 PSI)		



Relief valve set at 30 l/min (8 U.S.G.P.M.)

Pressure set range bar (PSI)	Std. setting bar (PSI)	Setting Code	Spring colour
30 - 95 (400 - 1300)	60 (860)	06	Yellow (YE)
96 - 210 (1300 - 3000)	150 (2100)	15	Green (GR)
211 - 320 (3000 - 4600)	260 (3700)	26	Blue (BL)

9A.4.2 Unloading solenoid valve BP2/CE and BP2/AE



9A.4.3 Inlet cover with P-T, RV, BY-PASS Solenoid Valve (without solenoid)

Parallel circuit				Series Circuit			
Ø D	By-pass solenoid valve circuit	Inlet cover type	Inlet cover group code	Ø D	By-pass solenoid valve circuit	Inlet cover type	Inlet cover group code
M18X1.5	BP2/AE BP2/CE	T21	200.9312.1015.0 200.9312.1016.0	M18X1.5	BP2/A BP2/C	T121	
3/8" BSP	BP2/AE BP2/CE	T22	200.9312.2018.0 200.9312.2019.0	3/8" BSP	BP2/A BP2/C	T122	
1/2" BSP Std	BP2/AE BP2/CE	T23	200.9312.3022.0 200.9312.3023.0	1/2" BSP Std	BP2/A BP2/C	T123	200.9312.3081.0 200.9312.3080.0
SAE10	BP2/AE BP2/CE	T25	200.9312.8007.0 200.9312.8008.0	SAE10	BP2/A BP2/C	T125	

Note: For availability of -T- inlet cover without ordering code please contact our Sales Department.

9A.5 By-Pass solenoid valve - BP2 -

9A.5.1 Normally closed with manual override

Voltage	Type	Code
without coil	BP2/CE HDS15 p.m.	200.7572.00440
12 V. D.C.	BP2/CE 13HC HDS15	200.9570.1003.3
24 V. D.C.	BP2/CE 23HC HDS15	200.9570.2003.4

9A.5.2 Normally open with manual override

Voltage	Type	Code
without coil	BP2/AE HDS15 p.m.	200.7572.00450
12 V. D.C.	BP2/AE 13HC HDS15	200.9570.1003.4
24 V. D.C.	BP2/AE 23HC HDS15	200.9570.2003.5

9A.5.3 Dimensions

9A.5.4 BP2 Solenoid valve performances

Max. pressure	315 bar
Max. flow	60 l/min
Power	22 Watt
Intermittence	ED 100%
Voltage tolerance	± 10%
Temperature range	-20/+80 °C
Oil filtration	≤ 25 micron
Pressure drop Q= 30 l/min	7.5 bar
Pressure drop Q= 50 l/min	12.7 bar

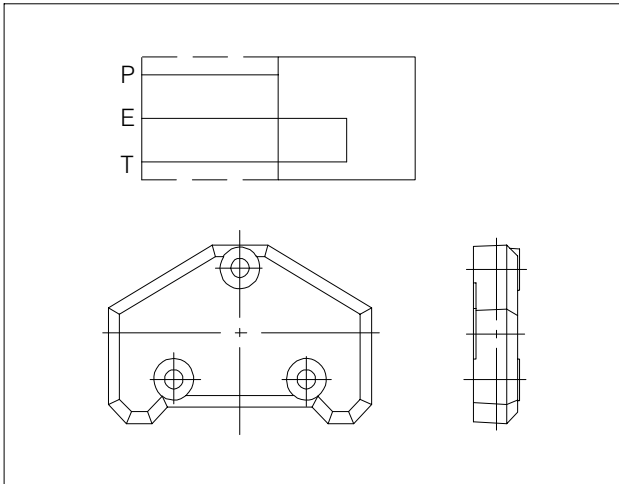
9A.5.5 Spare parts

9A.5.6 Coil specifications

Voltage	12	24	V. D.C.
Power	22.8	22.5	Watt
Resistance (Ambient Temp.)	6.3	25.6	Ohm
Resistance (Stabilized Temp.)	8.9	36.4	Ohm
Current (Ambient Temp.)	1.9	0.94	Ampere
Current (Stabilized Temp.)	1.35	0.66	Ampere

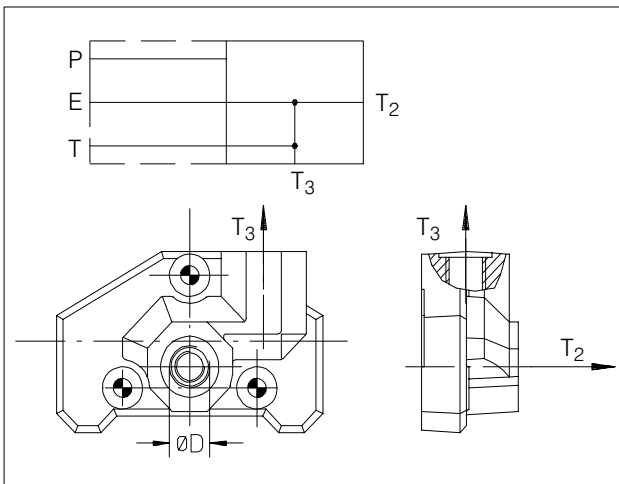
9A.6 End covers

9A.6.1 Standard end cover



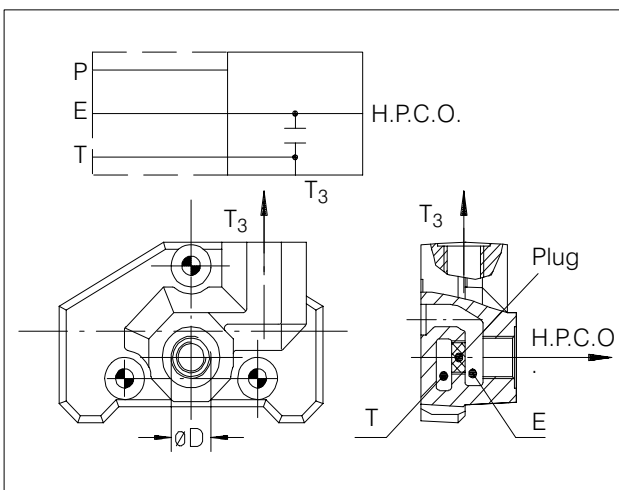
Type/Code	
Standard circuit parallel	Optional circuit series and tandem
P31 200.6302.9010.0	P32 200.9302.9011.0

9A.6.2 Cover with end outlet T₂ and T₃



Ø D	Type/Code	
	Standard circuit parallel	Optional circuit series and tandem
M18X1.5	P01 200.9302.1006.0	P41 200.9302.1004.0
3/8" BSP	P02 200.9302.2007.0	P42 200.9302.2005.0
1/2" BSP	P03 200.9302.3007.0	P43 200.9302.3005.0
SAE10	P05 200.9302.8003.0	P45 200.9302.8006.0
3/4" BSP	P09 200.9302.4001.0	P49 200.9302.4003.0

9A.6.3 Cover with end outlet T₃ and H.P.C.O. (carry-over)



Ø D	Type/Code	
	Standard circuit parallel	Optional circuit series and tandem
M18X1.5	P11 200.9302.1003.0	P51 200.9302.1005.0
3/8" BSP	P12 200.9302.2004.0	P52 200.9302.2006.0
1/2" BSP	P13 200.9302.3004.0	P53 200.9302.3006.0
SAE10	P15 200.9302.8002.0	P55 200.9302.8004.0
3/4" BSP	P19 200.9302.4002.0	P59 200.9302.4004.0

9A.7 Sectional bodies

9A.7.1 Standard circuit: parallel

Ø D	Type/Code	
	Standard	Section with valve UC - OA - C
M18X1.5	K01 200.9413.1242.0	K11 200.9413.1243.0
3/8" BSP	K02 200.9413.2577.0	K12 200.9413.2578.0
1/2" BSP	K03 200.9413.3074.0	K13 200.9413.3075.0
SAE 10	K05 200.9413.8001.0	K15 200.9413.8002.0

cyl. A
cyl. B

9A.7.2 Optional circuit: series and tandem

Ø D	Type/Code	
	Standard	Section with valve UC - OA - C
M18X1.5	K41 200.9413.1244.0	K51 200.9413.1245.0
3/8" BSP	K42 200.9413.2579.0	K52 200.9413.2580.0
1/2" BSP	K43 200.9413.3076.0	K53 200.9413.3077.0
SAE10	K45 200.9413.8003.0	K55 200.9413.8004.0

cyl. A
cyl. B

Attention
In case of series, tandem, parallel/series circuits, it is necessary to reverse the positioner and the lever group, even for standard parallel sections (see the indications on the side of the valve body):
: Lever position for parallel circuit
: Lever position for series circuit

Note: Body code consist of machined casting, seals and hold check valve only. Not to be used for complete valve order.

9A.8 Spool charts

Spool scheme	Spool features	Type
	4 way - 3 position A/B: blocked E: open by pass	A AS*
	4 way - 3 position A/B: blocked E: closed	B
	4 way - 3 position A/B to tank in neutral E: open by pass	C CS*
	4 way - 3 position A: blocked B: to tank in neutral	D
	3 way - 3 position B: blocked E: open by pass	G GS*
	4 way - 3 position B: blocked A: to tank in neutral	L
	4 way - 3 position with regenerative spool in 2 nd pos.	R**

**: special body required

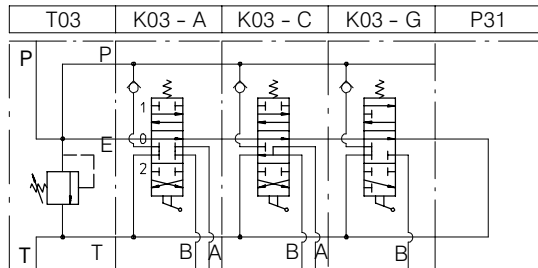
	3 way - 3 position A: blocked E: open by pass	S SS*
	4 way - 3 position A/B: blocked series connection	X XS*
	4 way - 3 position A/B: to tank in neutral series connection	Z ZS*
	4 way - 4 position 4 th float position	Z ZS*
	4 way - 3 position A/B: blocked Load Sensing	LSA **
	4 way - 3 position A/B: to tank in neutral Load Sensing	LSC **
	3 way - 3 position B: blocked Load Sensing	LSG **
	3 way - 3 position A: blocked Load Sensing	LSS **

*: high metering spool (max flow suggested 40 l/min)

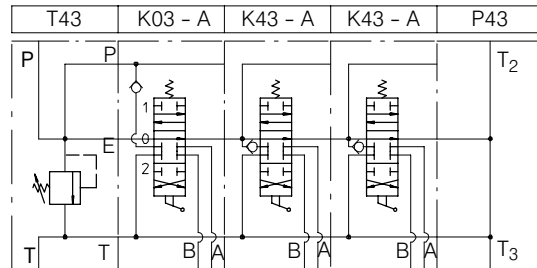
Note: For availability of L/S versions please contact our Sales Department

9A.9 Hydraulic circuits

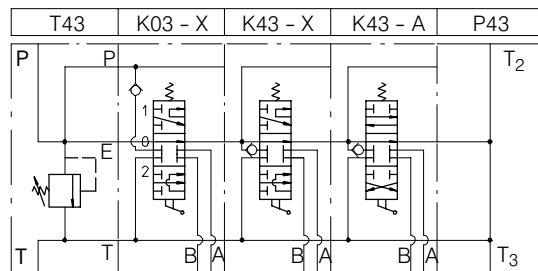
9A.9.1 Standard parallel circuit



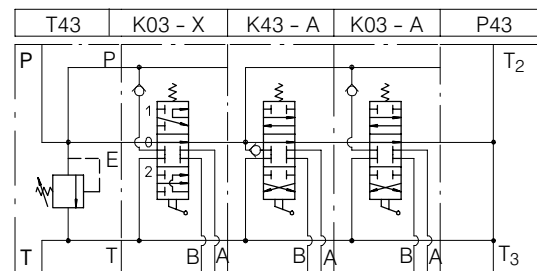
9A.9.3 Optional tandem circuit



9A.9.2 Optional series circuit



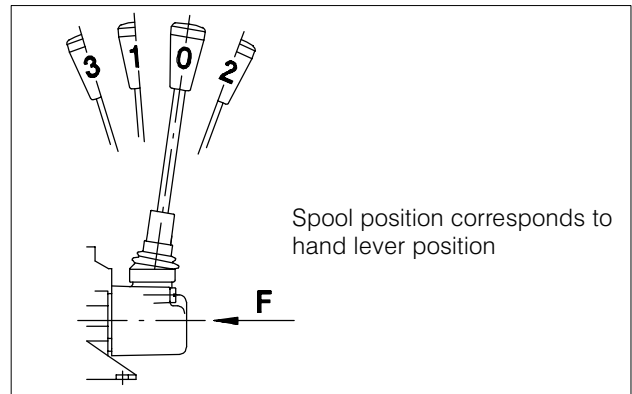
9A.9.4 Combined parallel/series circuit



9A.10 Spool positioners

Spool position				Stroke mm	Type	Code
3	1	0	2			
	○	*	○	5	08	200.9686.1008.0
	●	●	○	5	10	200.9686.3004.0
	●	●	●	5	17	200.9686.2014.0
	○	●	●	5	20	200.9686.3009.0
		●	●	5	25	200.9686.2015.0
	*		○	10	27	200.9686.1044.0
		*	○	5	29	200.9686.3025.0
	○	*	○	5	30	200.9686.1048.0
	○	*	○	5	32	200.9686.1061.0
	○	*	○	5	34	200.9686.1065.0
	●		●	10	36	200.9686.2017.0
	○		*	10	37	200.9686.1066.0
	○	*		5	38	200.9686.1069.0
	○	*	○	5	79	200.9686.1091.0
	○	*	○	5	84	200.9686.1098.0
	○	*	○	5	133	200.9686.1031.0
●	○	*	○	4- 5- 5	136	200.9686.4012.0

- * Initial hand lever position
- Hand lever in detent position
- Spring return position of hand lever

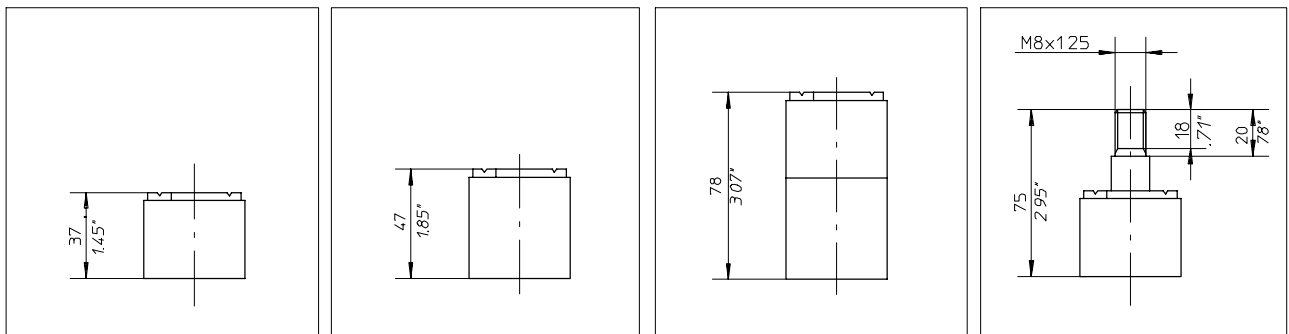


F (N) = force in Newton (N) needed to operate the spool

F (N)	Spool position control
260	08
130	79
190	133 (standard)

Note: consult factory for different configurations.

9A.10.1 Spool positioners dimensions

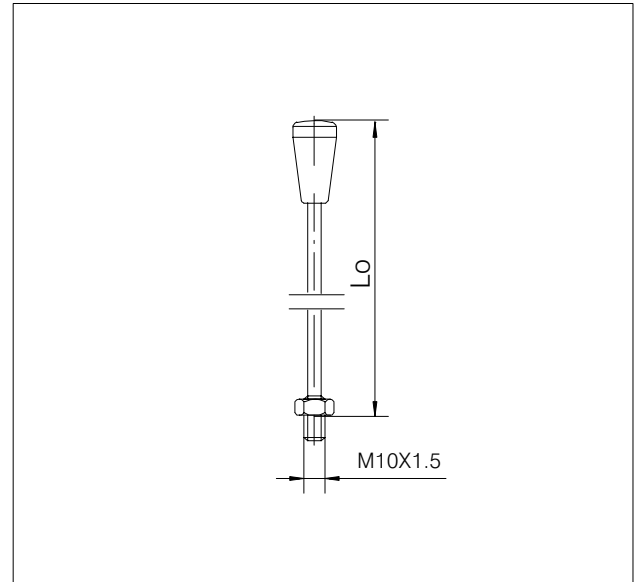
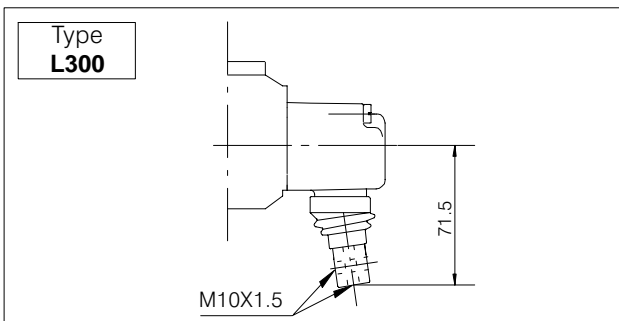
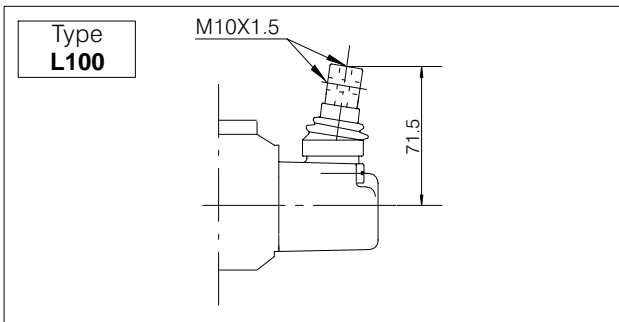
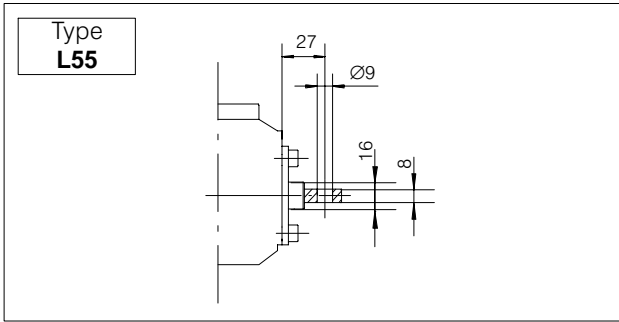


Spool positioners: 08 - 38 - 79 - 133	Spool positioners: 10 - 17 - 20 - 25 - 27 29 - 36 - 37	Spool positioner: 136 (Z spool type)	Spool positioner: 84
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9A.10.2 Microswitch control for multisectional directional valve

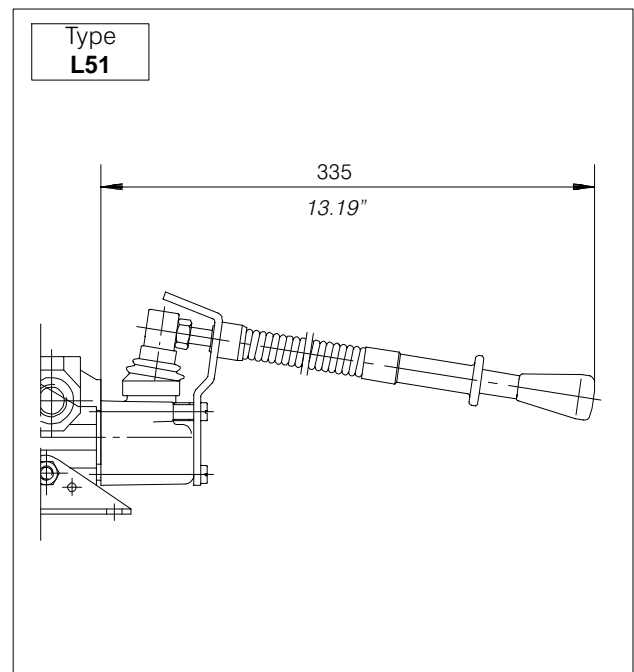
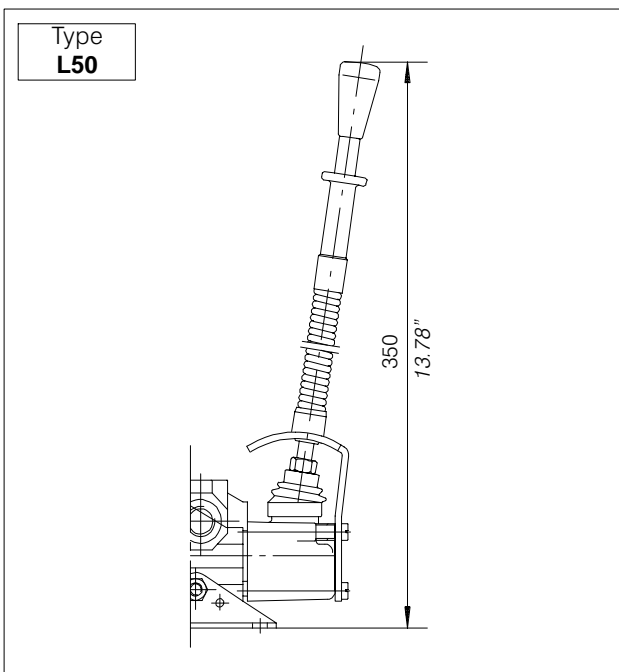
Type 30	Microswitch is operated when the spool is in pos.1		<p>The microswitch is supplied only on customer's request.</p>
Type 32	Microswitch is operated when the spool is in pos.2		
Type 34	Microswitch is operated when the spool is in pos.1 and 2		

9A.11 Lever styles



Lo		Type	Code
mm	inches		
185	7.28	AL001	200.7022.2001.0
250	9.84	AL002	200.7022.2003.0
300	11.81	AL003	200.7022.2004.0
350	13.78	AL004	200.7022.2005.0

9A.11.1 Safety levers



9A.11.2 Remote cable control

Lever Support	Code 200.7609.0013.0
----------------------	-------------------------

M10X1.5

Optional
200.6772.0048.0

Lo		Type	Code
mm	inches		
185	7.28	AL001	200.7022.2001.0
250	9.84	AL002	200.7022.2003.0
300	11.81	AL003	200.7022.2004.0
350	13.78	AL004	200.7022.2005.0

Cable	Cable length	Code
--------------	--------------	------

Cables are assembled on the valve only on request and with an extra charge.

1000 mm	200.5441.04002
1500 mm	200.5441.04005
2000 mm	200.5441.04006
2500 mm	200.5441.04007
3000 mm	200.5441.04008
4000 mm	200.5441.04009

Spool Kit	Code 200.9609.0001.0
------------------	-------------------------

Type L142	Code 200.7071.2012.0
------------------	-------------------------

M10X1.5

122
4.8"

42
1.65"

M8x1.25

150
5.9"

35
1.38"

40
1.57"

68
2.68"

40
1.57"

9
0.35"

Optional
200.6772.0048.0

Only for rod remote control

Type L133	Code 200.9759.3009.0	L133-L134 are supplied complete with rubber boot protection
------------------	-------------------------	---

Fulcrum

Spool

(AL010)

Type L134	Code 200.9759.3009.0	Stick Lever M12X1.75
------------------	-------------------------	----------------------

Fulcrum

Spool

Fulcrum

9A.11.3 Cross joystick for dual axis control

Type AL010	Code 200.7022.3004.0
-------------------	-------------------------

L0=250

M12X1.75

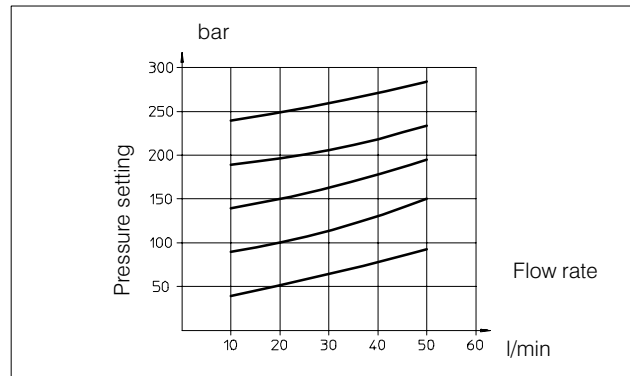
9A.12 Anti-shock and anti-cavitation valves

Port relief valve settings

Pressure set range bar (PSI)	Std. setting bar (PSI)	Type	Spring colour
30 - 130 (400 - 1850)	60 (860)	06	Yellow (YE)
131 - 320 (1850 - 4600)	150 (2100)	15	Green (GR)

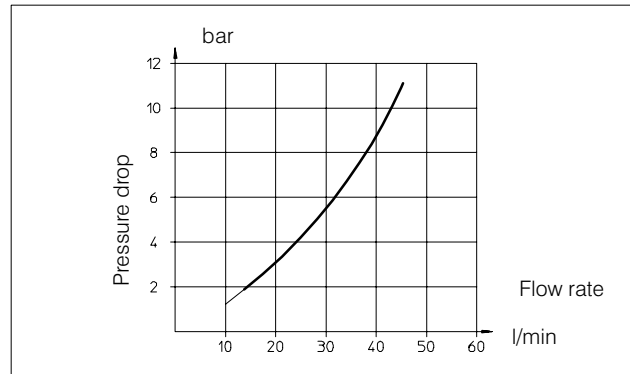
9A.12.1 Port relief valve

Type
OA



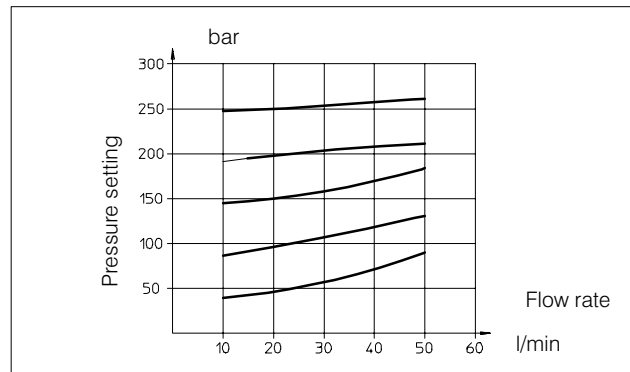
9A.12.2 Anti-cavitation valve

Type
C



9A.12.3 Combined port relief and anti-cavitation valve

Type
UC



9A.13 Hydraulic - Pneumatic control ON-OFF

Type	Code	
HP 24	200.9686.5011.0	

Operating conditions:
 Hydraulic controls
 Pressure range: (bar): Min. 6 - Max. 15
 (PSI): Min. 85 - Max. 215

Pneumatic controls
 Pressure range: (bar): Min. 6 - Max. 10
 (PSI): Min. 85 - Max. 145

9A.14 Pneumatic controls

9A.14.1 Pneumatic proportional control

Type	Code	
PP 150	200.9686.5009.0	

9A.14.2 Electro-pneumatic control ON-OFF

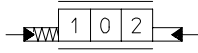
Voltage	Type	Code
12 VDC	EP 77	200.9686.6023.0
24 VDC	EP 78	200.9686.6026.0

Electrical data
 Insulation class H - 180° C (356° F)
 Encapsulation material: nylon
 Temperature range:
 -10° C to 80° C (14° F to 170° F)
 Duty cycle: 100% at 68° F ambient
 Voltage variation: -10% to + 15% of nominal voltage
 Power consumption DC - 10 W
 Electrical connection: DIN43650/A (2P + E)
 Cable connection PG9
 Protection class: IP65 (with connector)

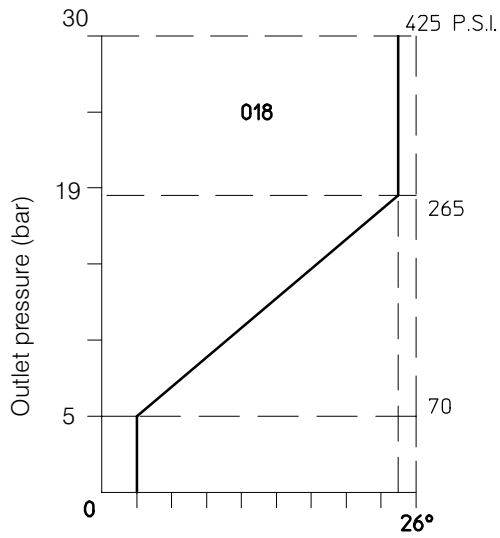
Operating conditions
 Pressure range: (bar): Min. 6 - Max. 10
 (PSI): Min. 85 - Max. 145
 Ambient temperature: -10° C to 50° C (14° F to 122° F)
 Response time: 6 - 8 milliseconds
 Mounting in any position

9A.15 Hydraulic Proportional control

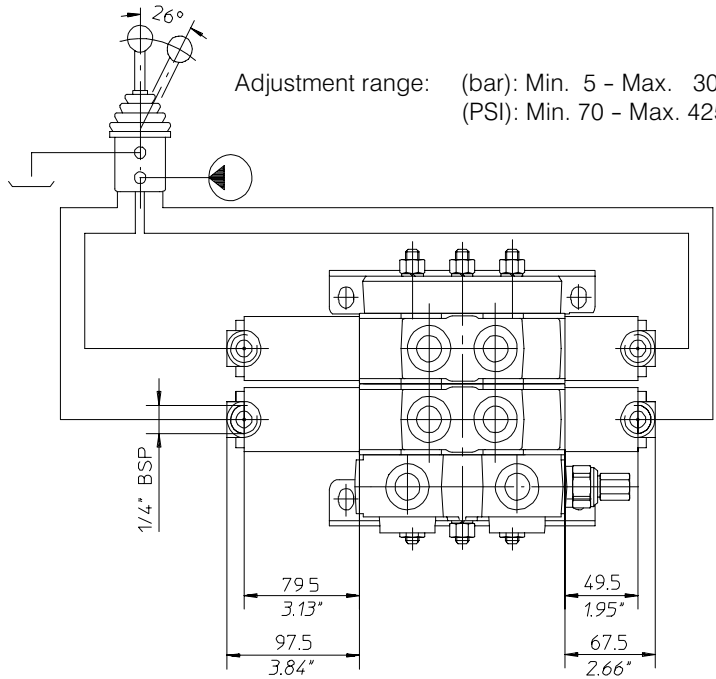
Type	Code
HP 50	200.9686.5019.0



Joystick adjustment diagram

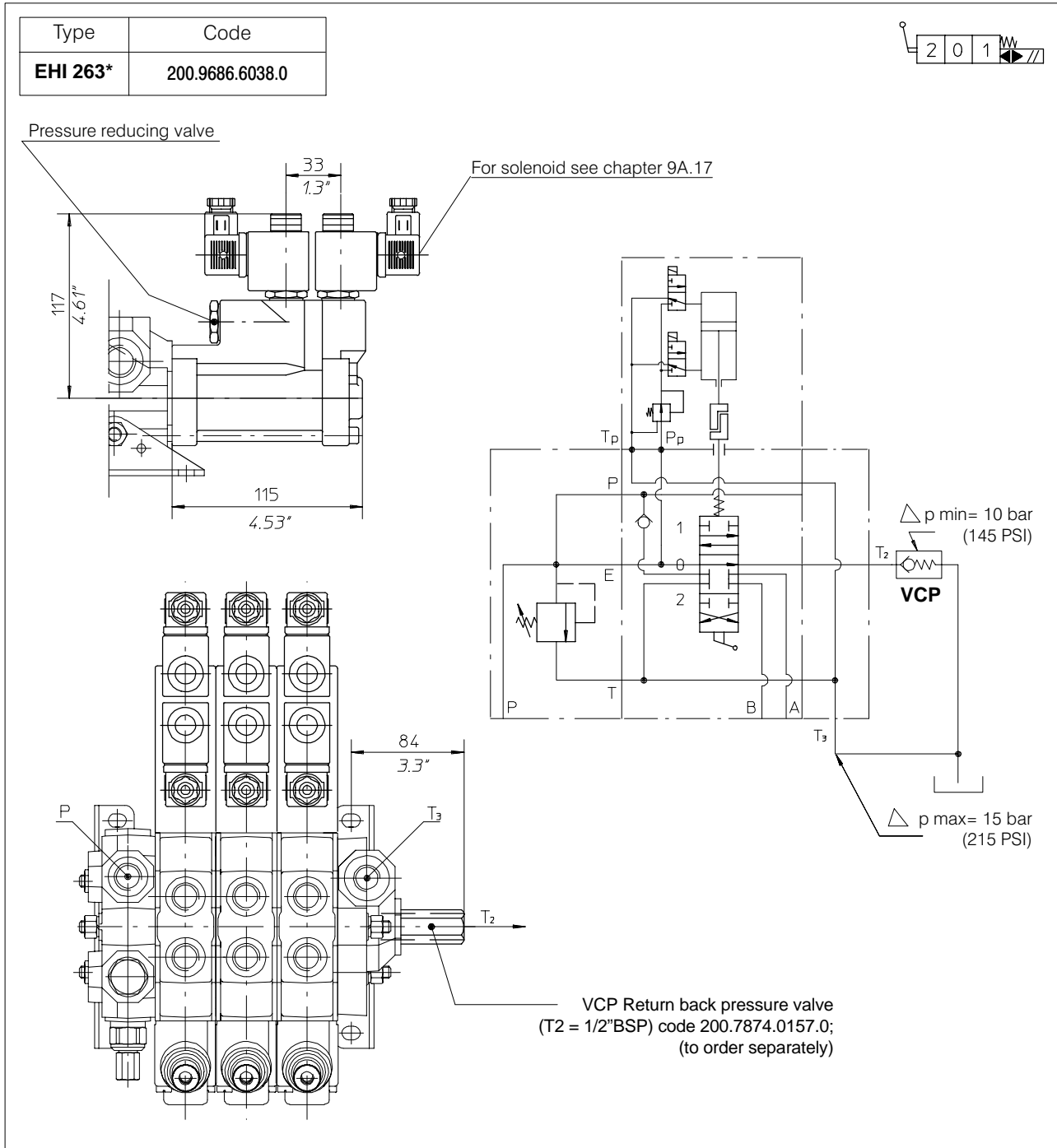


Adjustment range: (bar): Min. 5 - Max. 30
(PSI): Min. 70 - Max. 425



9A.16 Electro-Hydraulic controls

**9A.16.1 Electro-hydraulic control internal pilot version
ON-OFF with pressure reducing valve**



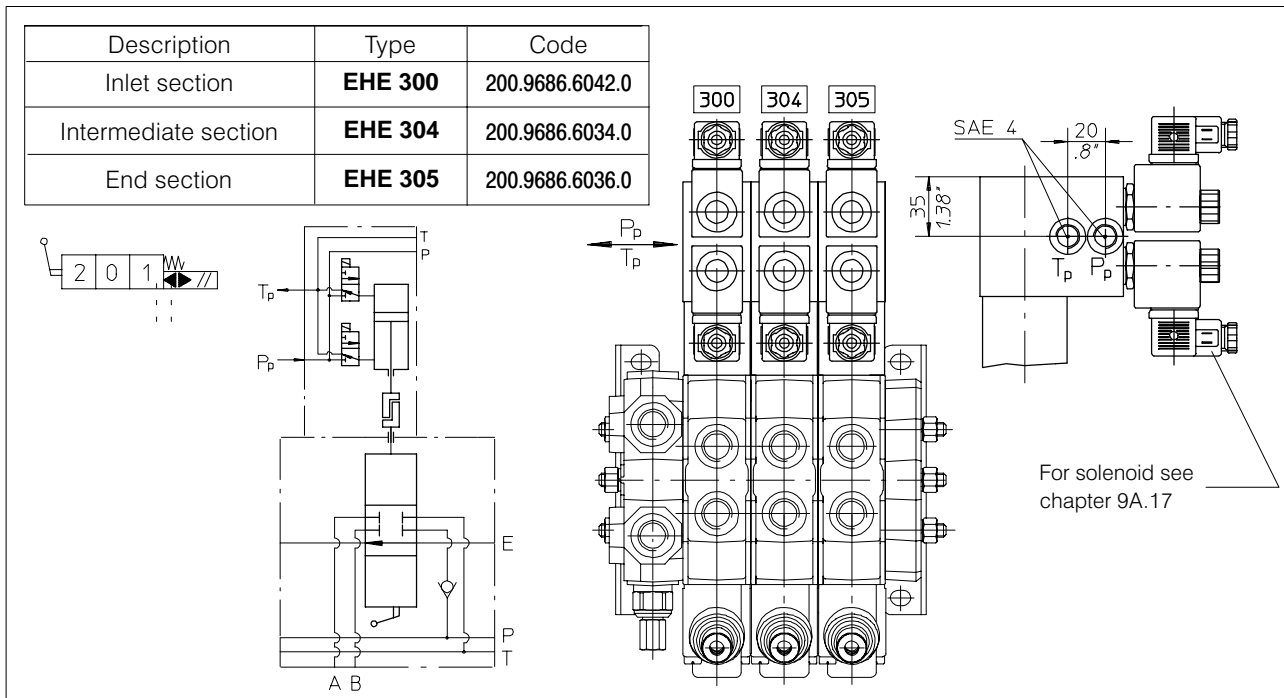
Mechanical and hydraulic features

Max pressure on P_p port 300 bar (4200 PSI)
 Reduced pressure after pressure reducing valve 10 bar (145 PSI)
 Fixed delivery on P_p pilot line 1 l/min (0.26 U.S.G.P.M)

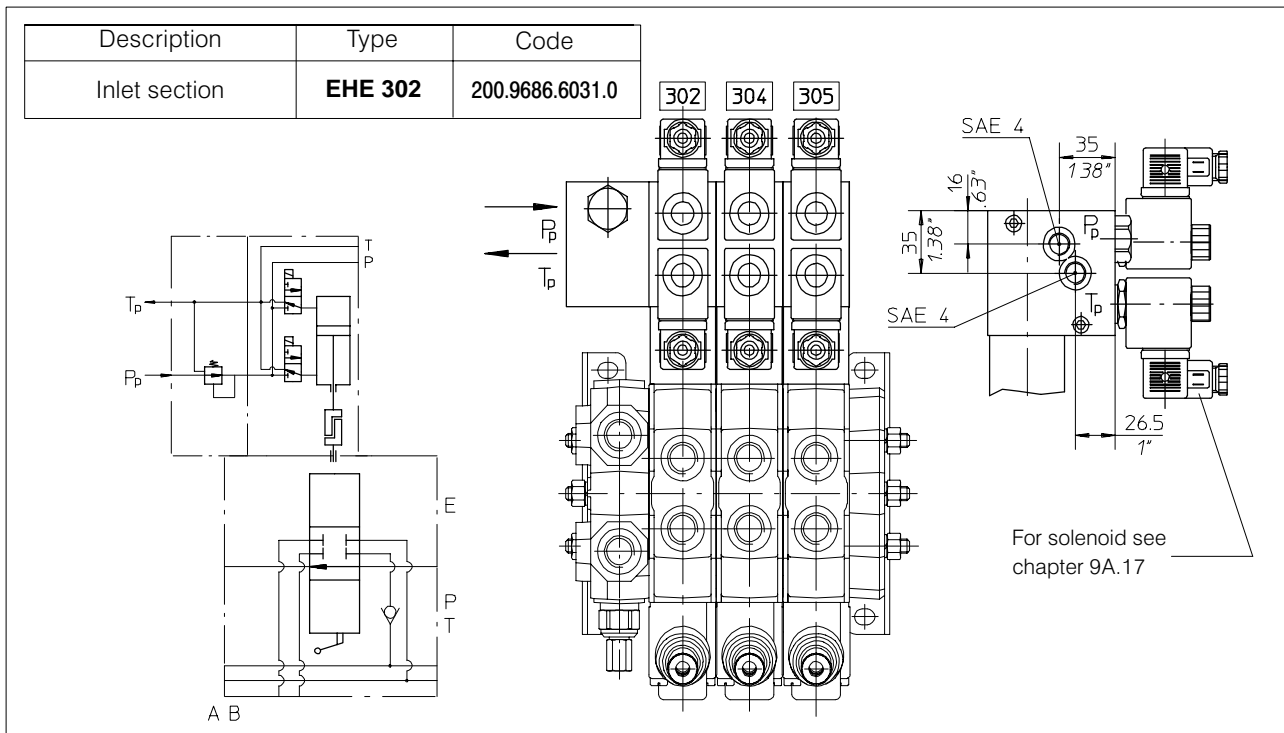
Leakage of pressure reducing valve (in neutral pos.) 100 ml/min (6.1 in³/min)
 Min. suggested filtration 25 micron
 Operating oil temperature min.-30°C- max. 90°C
 min.-22°F - max 194°F

* EHI263: special body required

9A.16.2 Electro-hydraulic control external pilot version
ON-OFF



9A.16.3 Electro-hydraulic control external pilot version
ON-OFF with pressure reducing valve on inlet manifold

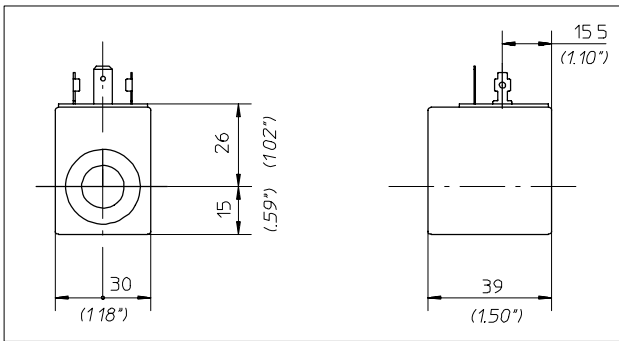


Mechanical and hydraulic features

Pilot pressure with pressure reducing valve 12 bar (175 PSI)
 Pilot flow to each working section 1 l/min (0.26 U.S.G.P.M.)
 Operating oil temperature min.-30°C- max. 90°C
 min.-22°F - max 194°F

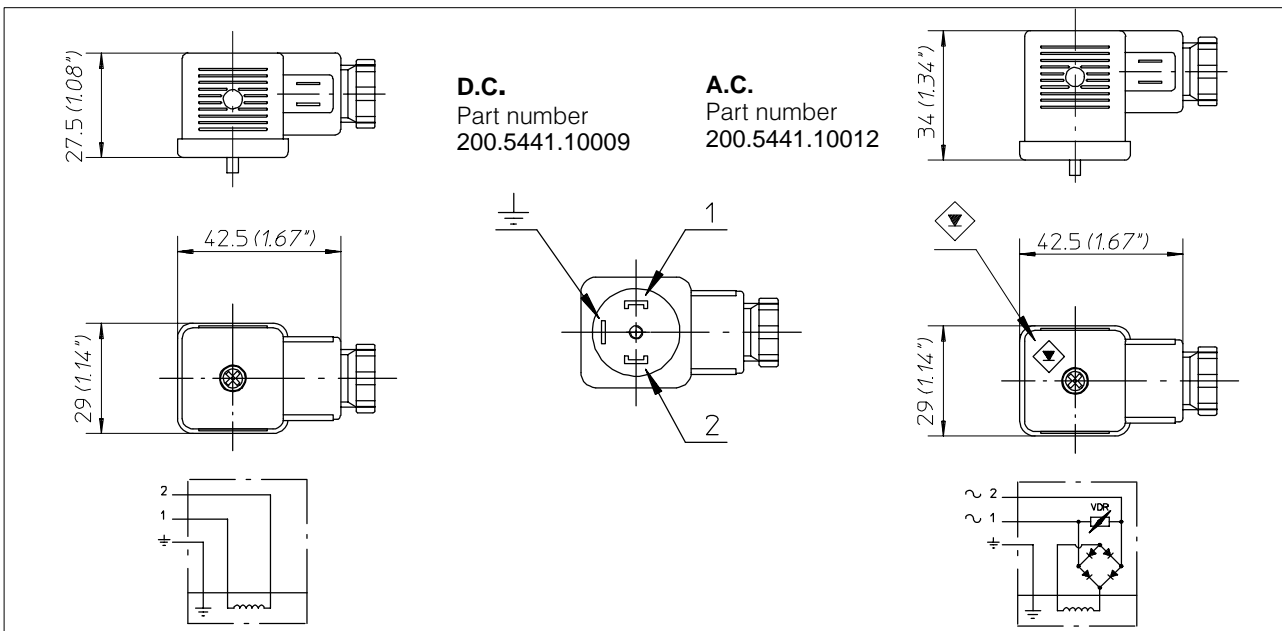
Leakage of pressure reducing valve (in neutral pos.) 100 ml/min (6.1 in³/min)
 Min. suggested filtration 25 micron

9A.17 Solenoids for pilot electrovalves EHI-EHE



Wire class	F (VDE 0580)
Coil insulation	IP65 (DIN 40050)
Duty rating	ED 100%
Stabilized temperature	70 °C
Voltage tolerance	± 10%

Supply voltage	Nominal coil voltage	Power (Watt)	Resistance (Ohm)		Current (Ampere)		Coil code
			Ambient temp.	Stabilized temp.	Ambient temp.	Stabilized temp.	
12 V. DC	12 V. DC	18.7	7.7	10.8	1.56	1.11	200.6749.1003.0
24 V. DC	24 V. DC	18.6	31	41.4	0.77	0.58	200.6749.2003.0
24 V. AC	21.6 V. DC	17.3	27	36	0.80	0.60	200.6748.2003.0
110 V. AC	98 V. DC	15.6	630	825	0.157	0.120	200.6748.4003.0
220 V. AC	198 V. DC	15.7	2500	3300	0.08	0.06	200.6748.6003.0

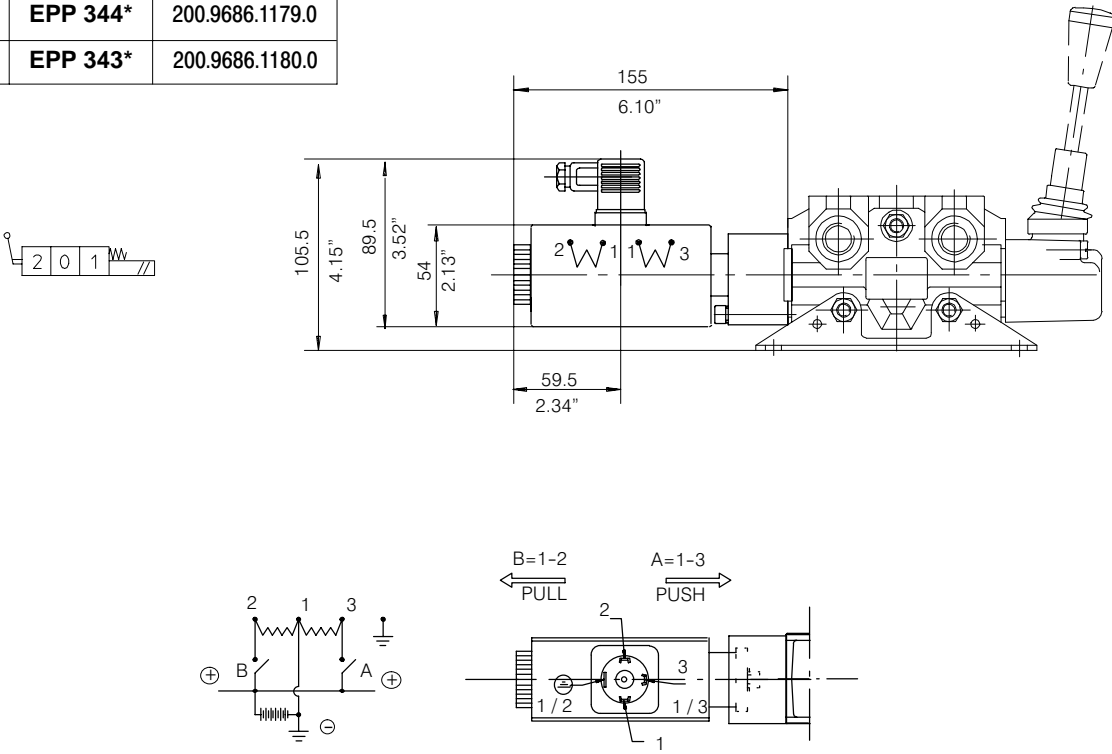


Armour clamp	Pg 9
Ø cable	6 - 8 mm
Diodes	1N 4007 GP
Overvoltage protection	VDR
Connector type	DIN 43650
Number of poles	2 + $\frac{1}{2}$
Supply voltage	max. 220 V
Nom. capacity at contacts	10 Ampere

Max capacity at contacts	16 Ampere
Resistance at contacts	≥ 4 mOhm
Max section of cable	1.5 mm ²
Outer material	Glass fibre reinforced nylon
Protection factor	IP65 (DIN 40050)
Insulation class	C (VDE 0110)
Temperature range	-40° +90°C

9A.18 Electromagnetic control ON-OFF

Voltage	Type	Code
12 VDC	EPP 344*	200.9686.1179.0
24 VDC	EPP 343*	200.9686.1180.0



* special body required

To be used with special spools only: the spool definition is different from the standard one because of the double "P". For example A spool become AP3.
 Ex.: (A spool + 24 VDC positioner)= AP3343

Mechanical and hydraulic features

- Max operating pressure 150 bar (2800 PSI)
- Max back pressure 5 bar (70 PSI)
- Max flow 40 l/min (15 U.S.G.P.M.)
- Operating oil temperature 80° C (180° F)

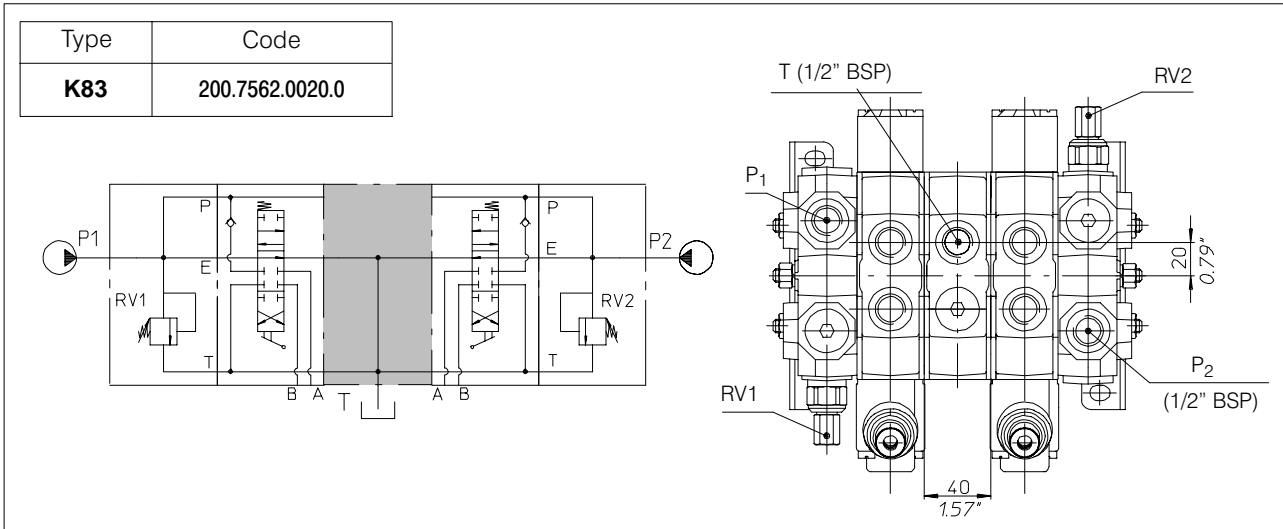
Electromagnetic specification

- Input tension 12 V DC [24 V DC] ± 10%
- Power consumption 60 W
- ED: 100%

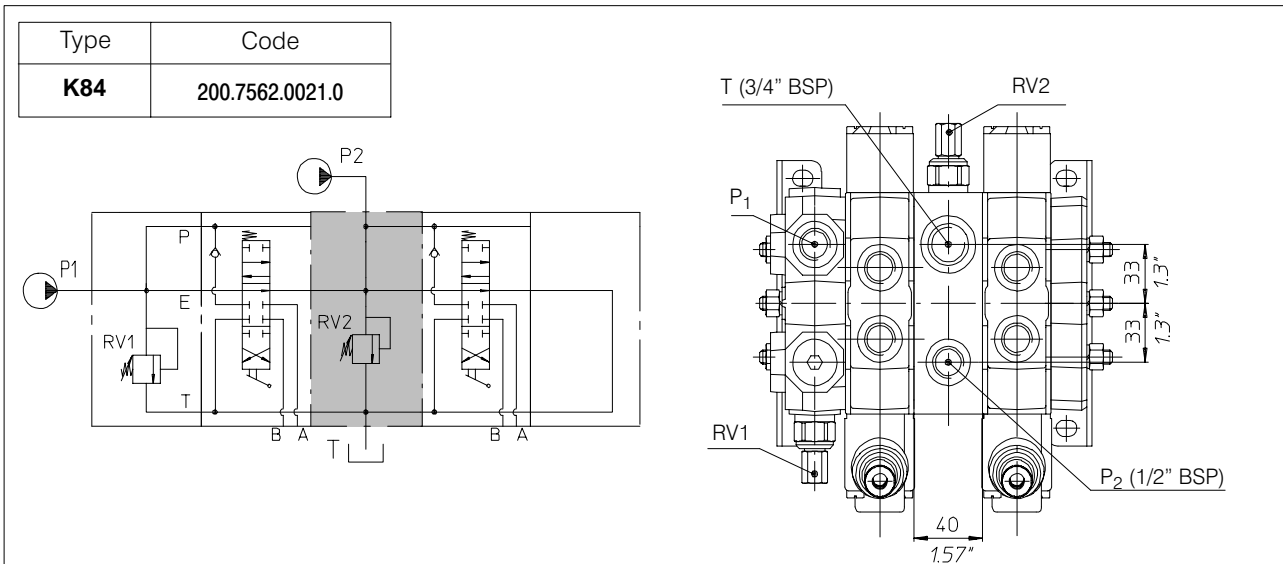
- Ohms resistance (cold T°): 2.4 Ω [9.6 Ω]
 - Ohms resistance (stabilized T°): 3.1 Ω [12.5 Ω]
 - Intensity of current (cold T°) 5 A (2.5 A)
 - Intensity of current (stabilized T°) 3.8 A (1.9 A)
 - Ambient operating temperature range: ... -25° C/+60° C
 - Average stabilized coil temperature operated continuously +105° C
- The above mentioned average temperature is obtained with a nominal voltage of 12 V (24 V), with an ambient temperature of 25° C and with an electromagnet assembled on an hydraulic valve with oil circulation.
- Insulation class:
 According to VDE 0580 standard H
- Electrical connection:
 with Hirschmann connector per DIN 43650 IP 65

9A.19 Intermediate sections

9A.19.1 Section with outlet return ports



9A.19.2 Section with intermediate flow inlet pressure and outlet return ports (with combined flow)



9B Electromagnetic control EMC (ON-OFF)

9B.1 General specifications

Technical specification		
Max flow rate	l/min U.S.G.P.M.	60 16.5
Max continuous operating pressure supply port P	bar PSI	250 3600
Max intermittent peak pressure Work port A/B	bar PSI	320 4600
Max back pressure Tank port T	bar PSI	20 290
Oil temperature	° C ° F	-10 to +80 14 to 180
Oil viscosity	mm ² /s	20 to 50
Oil filtration	μ	≤ 25

Spool leakage at 100 bar (1450 PSI), Temp. 50° C (120° F), viscosity 27 mm ² /s:		
Maximum	cm ³ /min Cu. In./min	25 1.780
Average	cm ³ /min Cu. In./min	15 1.068

Number of spools	1 to 10
Adjustable direct operated relief valve (tamper-proof seal available on request)	RV
Load hold check valve in each section	LC
Cartridge anti-shock, anti-cavitation and service relief valve	OA-UC-C

9B.1.1 Material specification:

Body: High strength cast-iron.
Spool: Hardened steel.
Seals: Buna "N".

9B.1.2 Optional features available

Series circuit;
Load sensing circuit;
Spool 3-way or 4-way at 2-3 positions;
Port relief and anti-cavitation valves -OA-UC-C-

9B.1.3 Ports

P-T-P₁-T₁-T₂-T₃-A-B (M18X1.5-3/8" BSP
1/2" BSP SAE10)
T₂ - T₃ - HPCO 3/4" BSP

9B.1.4 Input voltages

Direct current 12V.DC. - 24V.DC.*

9B.1.5 Solenoid specification

Technical specification		
Voltage	V.D.C.	12 (24) ± 10%
Power consumption	Watts (W)	34
Intensity of current	Ampere (A)	2.8 (1.4)
Resistance	Ohms (Ω)	4.2 (17.1)
Duty cycle (continuous)	ED	100%
Stabilized temperature at nominal voltage	° C	110
Ambient temperature	° C	-20 to +40

Protection class IP65 (DIN 40050)
Coil insulation class H (VDEO 0580)
STD. connection (DIN 43650)
Manual override.
Explosion-proof version on demand.

9B.1.6 Mechanical specification

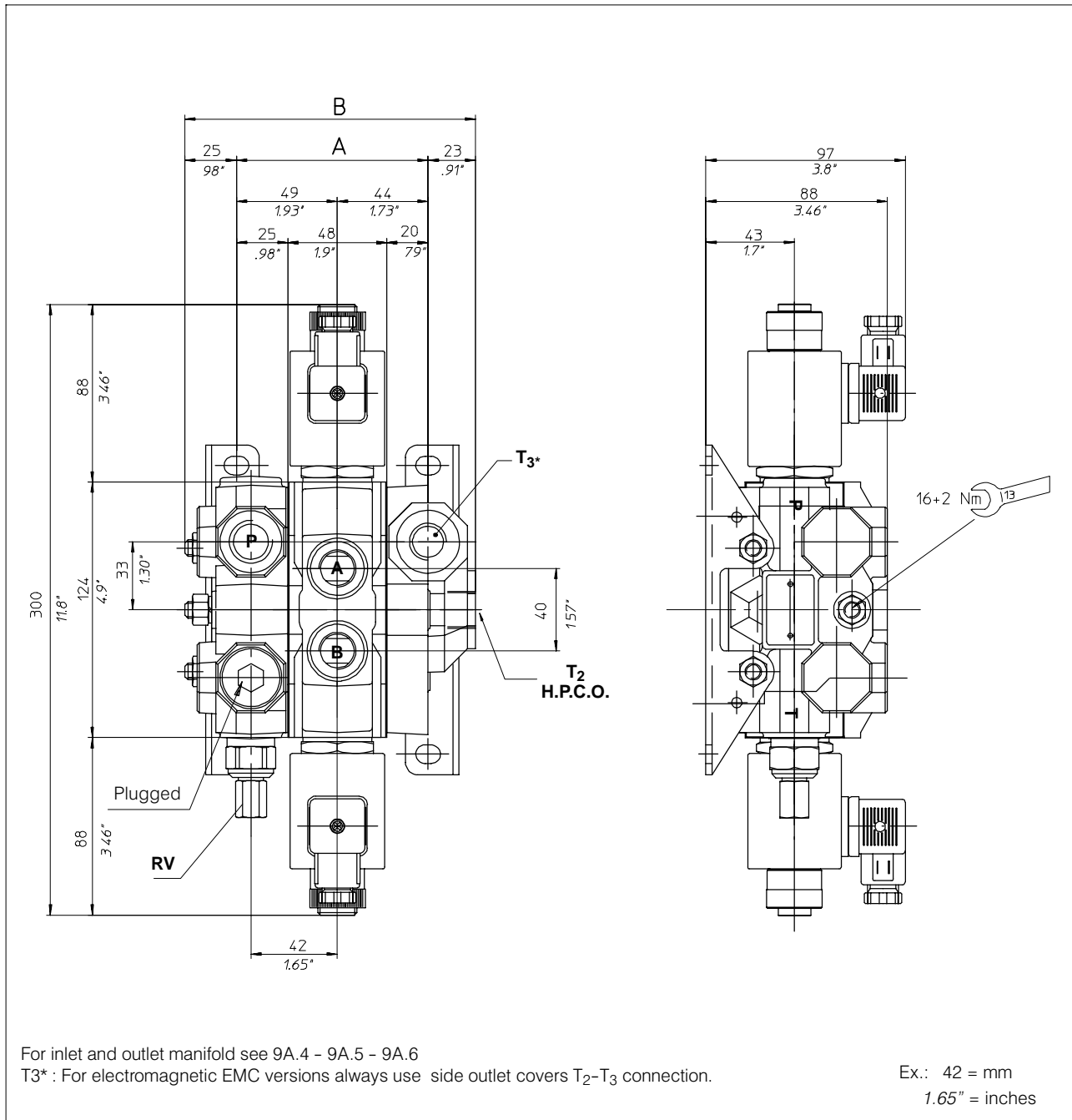
Spool diameter 14 mm
Spool stroke 2.75 mm
Overlapping 1.5 mm
Internal passage 12 mm
Dimensional section (width) 48 mm

9B.1.7 Weight

Version	kg	lb
Inlet with RV and P	1.8	3.96
1 spool section with 2 solenoid	3.5	7.70
1 spool with 1 solenoid	3.1	6.82
End cover P2-P3	1.3	2.86

* for non indicated tensions, please contact our Sales Department

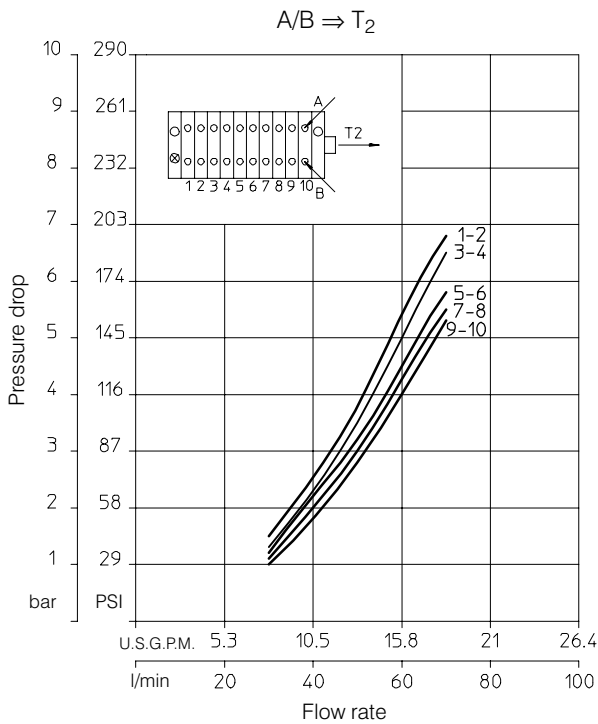
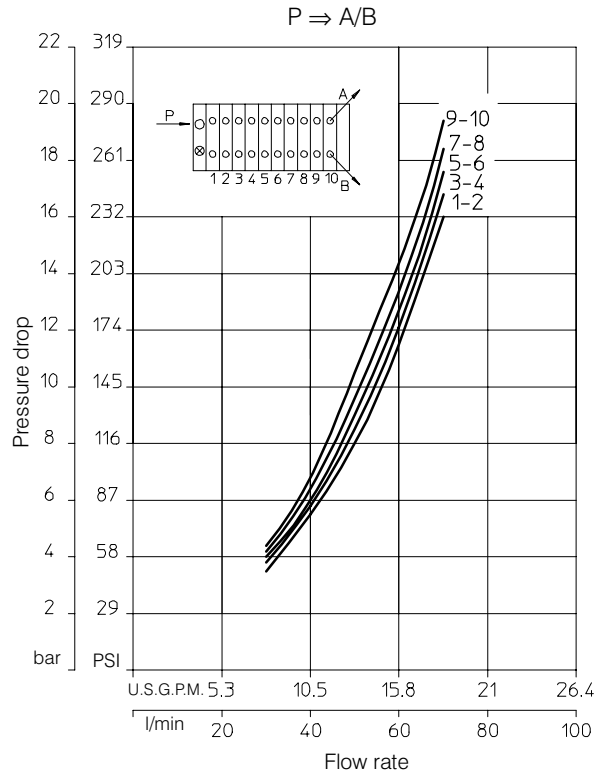
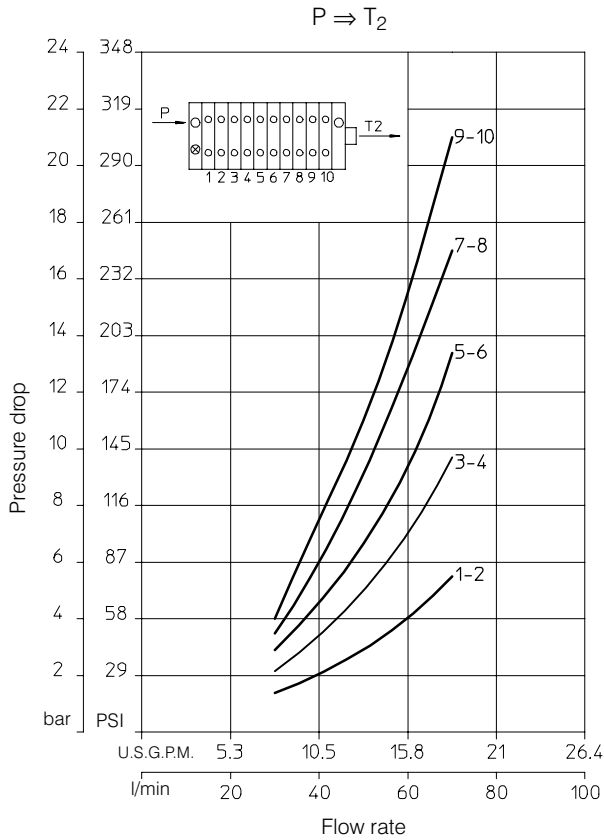
9B.2 Dimensional data



N. of sections		1	2	3	4	5	6	7	8	9	10
Dimension	A	93	141	189	237	285	333	381	429	477	525
		3.66"	5.55"	7.44"	9.33"	11.22"	13.11"	15"	16.89"	18.78"	20.67"
Dimension	B	141	189	237	285	333	381	429	477	525	573
		5.55"	7.44"	9.33"	11.22"	13.11"	15"	16.89"	18.78"	20.67"	22.56"

9B.3 Performance curves

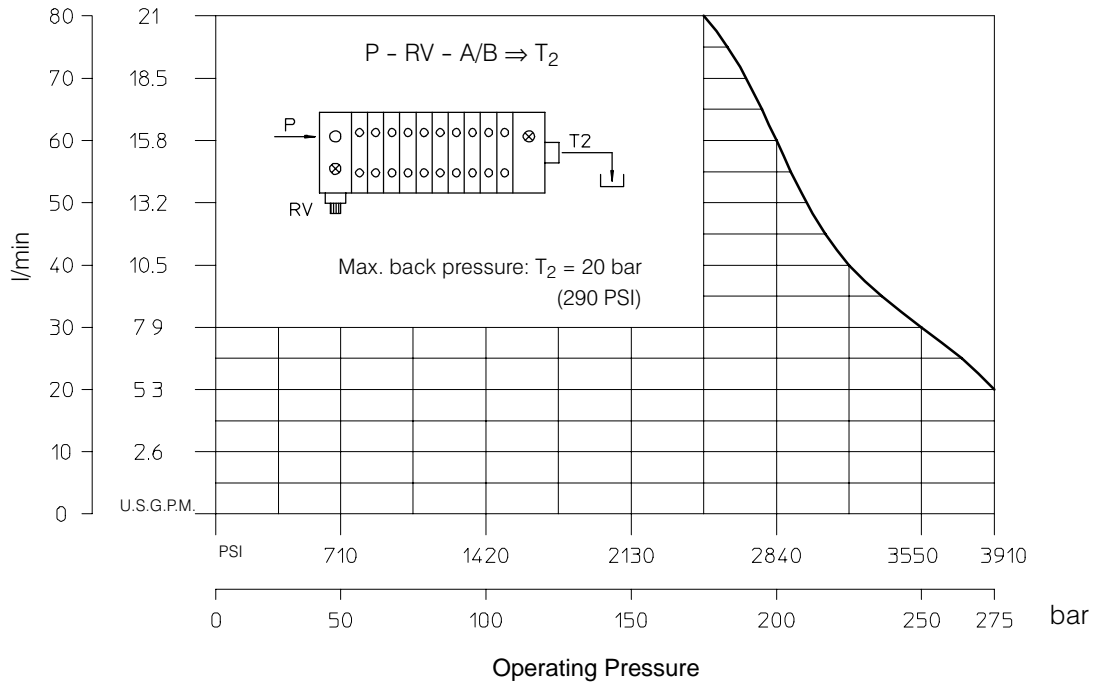
Oil: Shell Tellus T37
 Temperature: 50°C (120°F)
 Viscosity: 27 mm²/s



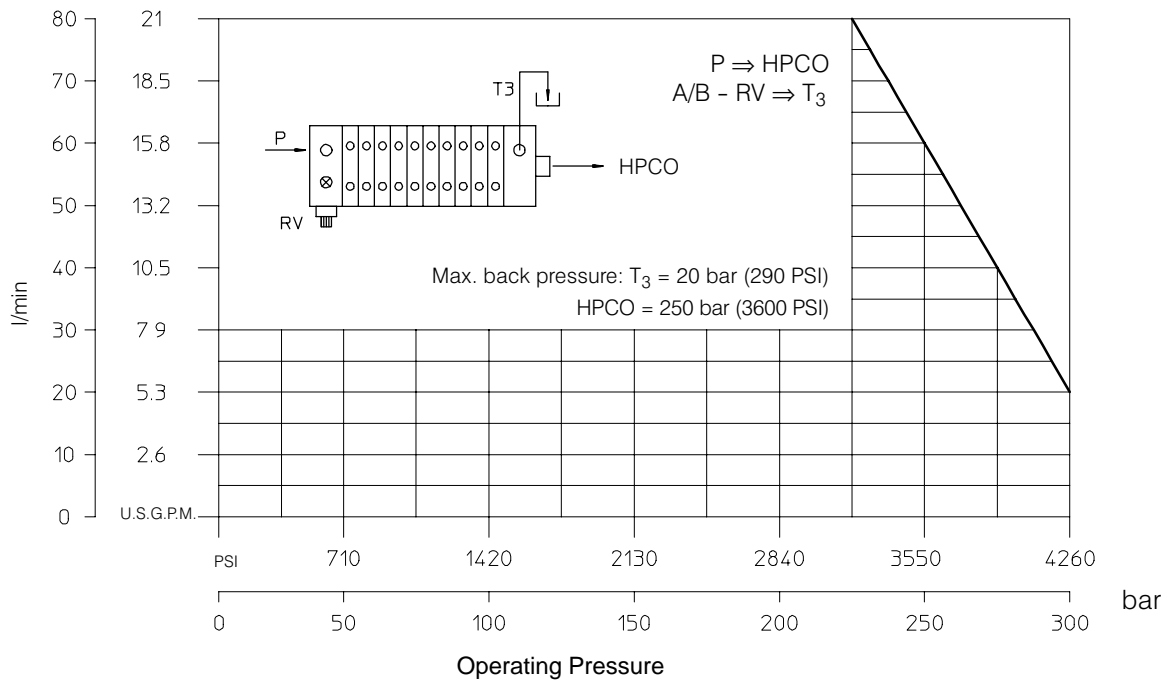
9B.4 Operating limits

Oil: Shell Tellus T37
 Temperature: 50°C (120°F)
 Viscosity: 27 mm²/s
 Tested with voltage V = -10%

Standard Circuit



Carry-over circuit



9B.5 Sectional bodies

9B.5.1 Standard circuit: parallel

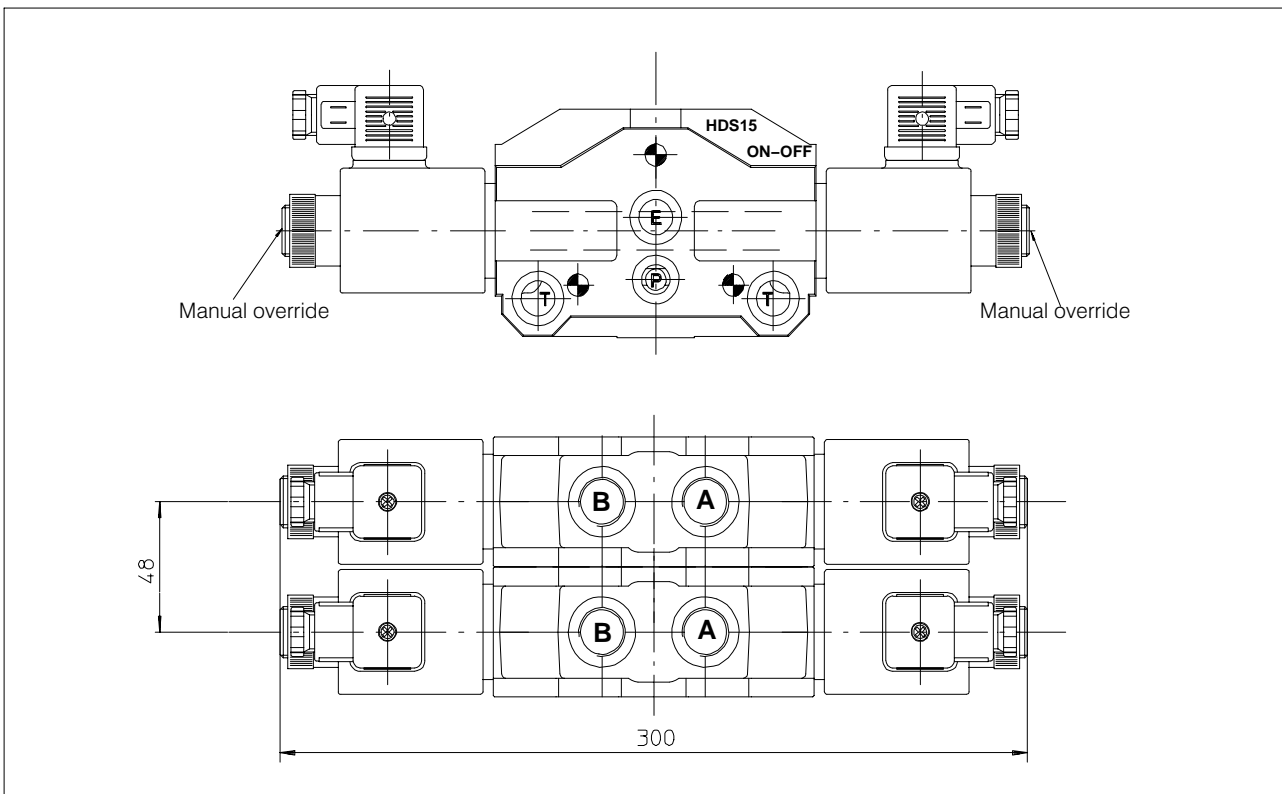
Ø D	Type/Code	
	Standard	Section with valve UC- OA- C
M18X1.5	K201 200.9413.1270.0	K211 200.9413.1271.0
3/8" BSP	K202 200.9413.2622.0	K212 200.9413.2623.0
1/2" BSP	K203 200.9413.3106.0	K213 200.9413.3107.0
SAE10	K205 200.9413.8012.0	K215 200.9413.8015.0

9B.5.2 Optional circuit: series and tandem

Ø D	Type/Code	
	Standard	Section with valve UC- OA- C
M18X1.5	K241 200.9413.1029.0	K251 200.9413.1036.0
3/8" BSP	K242	K252
1/2" BSP	K243 200.9413.3101.0	K253 200.9413.3109.0
SAE10	K245 200.9413.8013.0	K255 200.9413.8016.0

Attention: in case of series and tandem circuits use always inlet and end covers for series circuits (ex. - T41, T42, etc. - P32, P41, etc.).

Note: For availability of -K- bodies without code please contact our Sales Department.
 ... Body code consist of machined casting, seals and hold check valve only. Not to be used for complete valve order.



9B.6 Spool charts

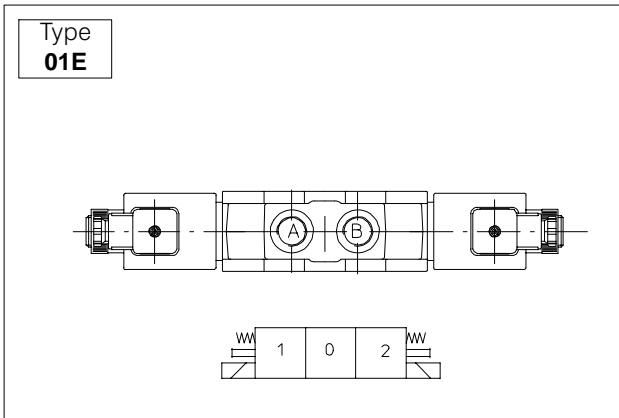
Spool scheme	Spool features	Type
	4 way - 3 position A/B: blocked E: open by pass	AE
	4 way - 3 position A/B: blocked E: closed	BE
	4 way - 3 position A/B to tank in neutral E: open by pass	CE
	4 way - 3 position A: blocked B: to tank in neutral	DE
	3 way - 3 position B: blocked E: open by pass	GE
	4 way - 3 position B: blocked A: to tank in neutral	LE
	3 way - 3 position A: blocked E: open by pass	SE

	4 way - 3 position A/B: blocked series connection	XE*
	4 way - 3 position A/B: to tank in neutral series connection	XCE*
	4 way - 3 position A/B: blocked Load Sensing	LAE**
	4 way - 3 position A/B to tank in neutral Load Sensing	LCE**
	3 way - 3 position B: blocked Load Sensing	LGE**
	3 way - 3 position A: blocked Load Sensing	LSE**
* series body required ** special body required		

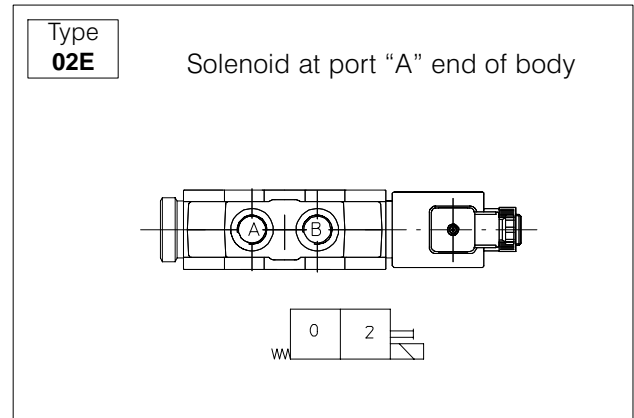
Note: For availability of L/S versions please contact our Sales Department

9B.7 Spool actions

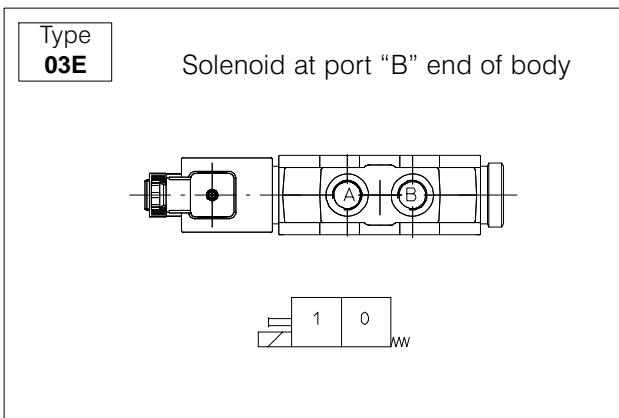
9B.7.1 Double-Solenoid spring-centered valves



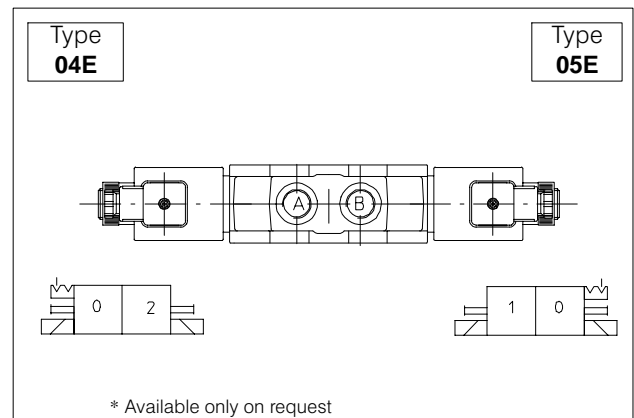
9B.7.2 Single Solenoid spring offset valves



9B.7.3 Single Solenoid spring offset valves



9B.7.4 Double Solenoid, two detent position valves*



9C Elements with pressure and flow control PQ

9C.1 General specifications

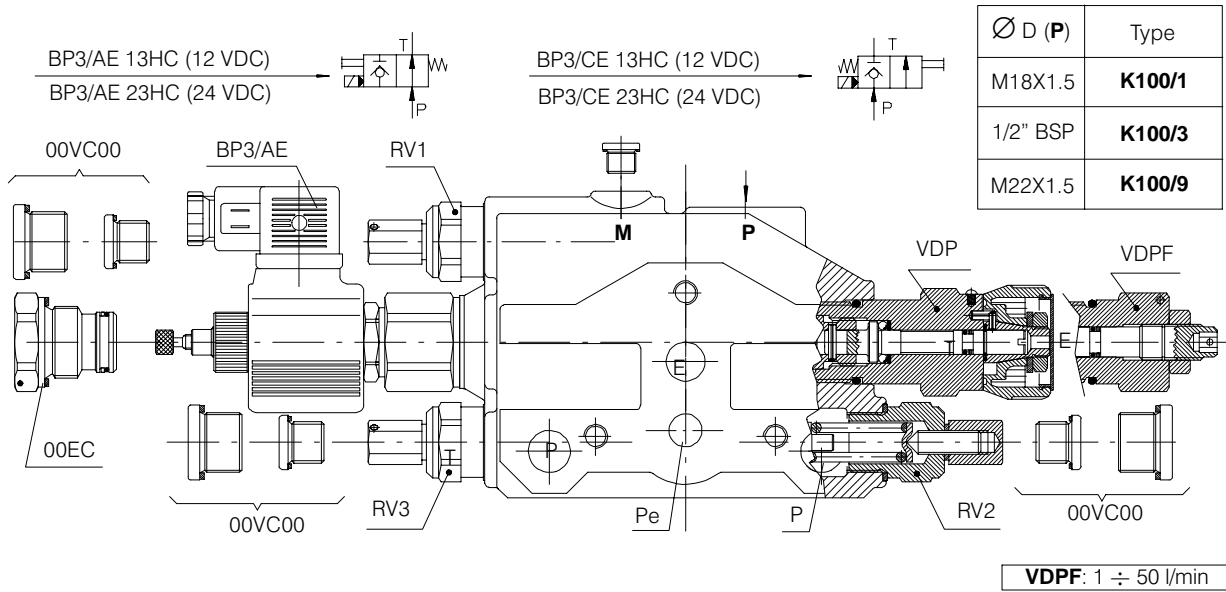
Max continuous operating pressure	
supply port P	250 bar
Max intermittent peak pressure	
work port A/B	320 bar
Max back pressure tank port T	30 bar
Nominal flow	max. 60 l/min
Adjustable setting flow range on 350 turning-knob:	
Min flow	0 l/min
Max flow (input)	50 l/min
Fixed priority flow	VDPF = 0 to 50 l/min
Adjustable priority flow	VDP 06 = 0 to 6 l/min
	VDP 12 = 0 to 12 l/min
	VDP 25 = 0 to 25 l/min
	VDP 50 = 0 to 50 l/min

Control accuracy	± 5 %
Pressure difference Δp	max. 6 bar
Oil temperature range	-10° to +80° C
Viscosity range	16 to 75 mm ² /s
Recommended filtration	≤ 25 micron
Adjustable direct acting:	
Relief valve on the lines	Inlet flow: RV1
	Priority flow: RV2
	Residual flow: RV3
By-pass solenoid valve	BP3/AE
	BP3/CE
Manometer port (M)	1/8" BSP

9C.2 Sectional body K100

9C.2.1 Application variation

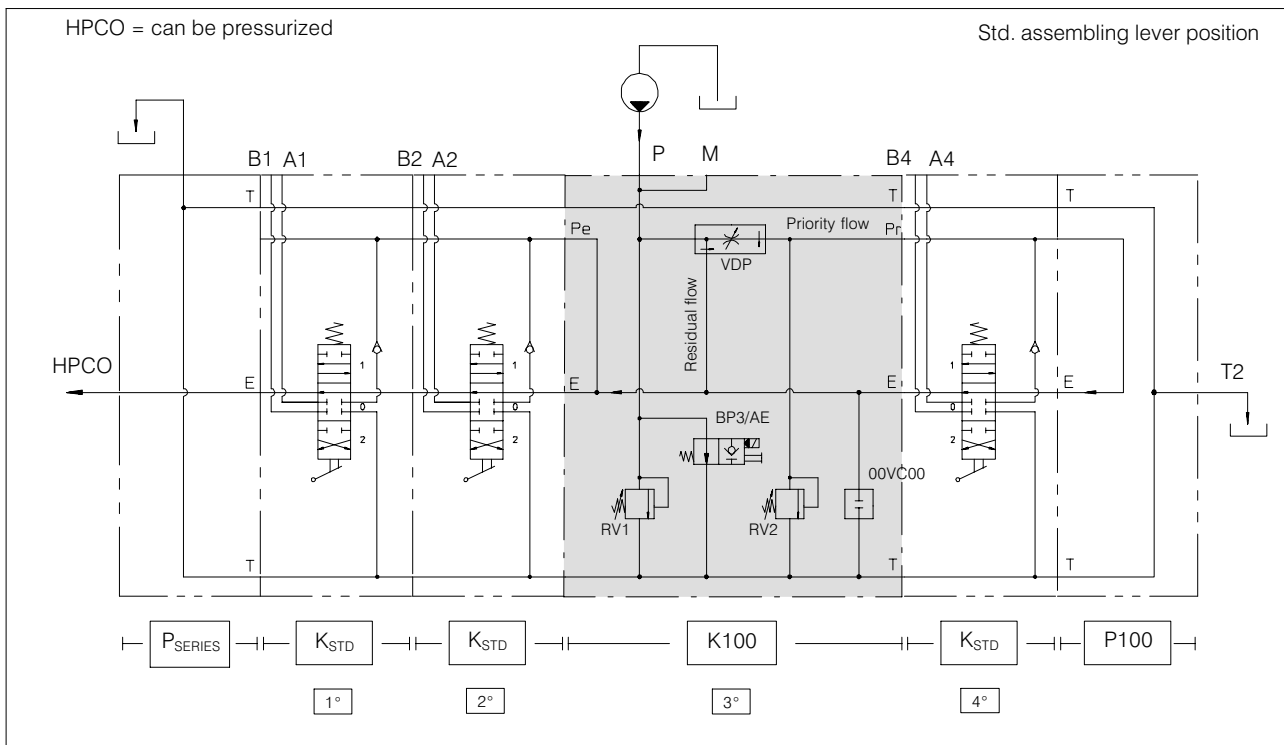
Intermediate section with priority flow divider pressure compensated valve, pressure relief valves and by-pass valve.



Pressure set range (bar)	Standard Setting (bar)	Relief valves Type
30 ÷ 95	60	RV1 / RV2 / RV3 -06
96 ÷ 210	150	RV1 / RV2 / RV3 -15
211 ÷ 320	260	RV1 / RV2 / RV3 -26

Flow set range (l/min)	Standard Setting l/min	Flow regulator Type
0 ÷ 6	06	VDP 06
0 ÷ 12	12	VDP 12
0 ÷ 25	25	VDP 25
0 ÷ 50	50	VDP 50

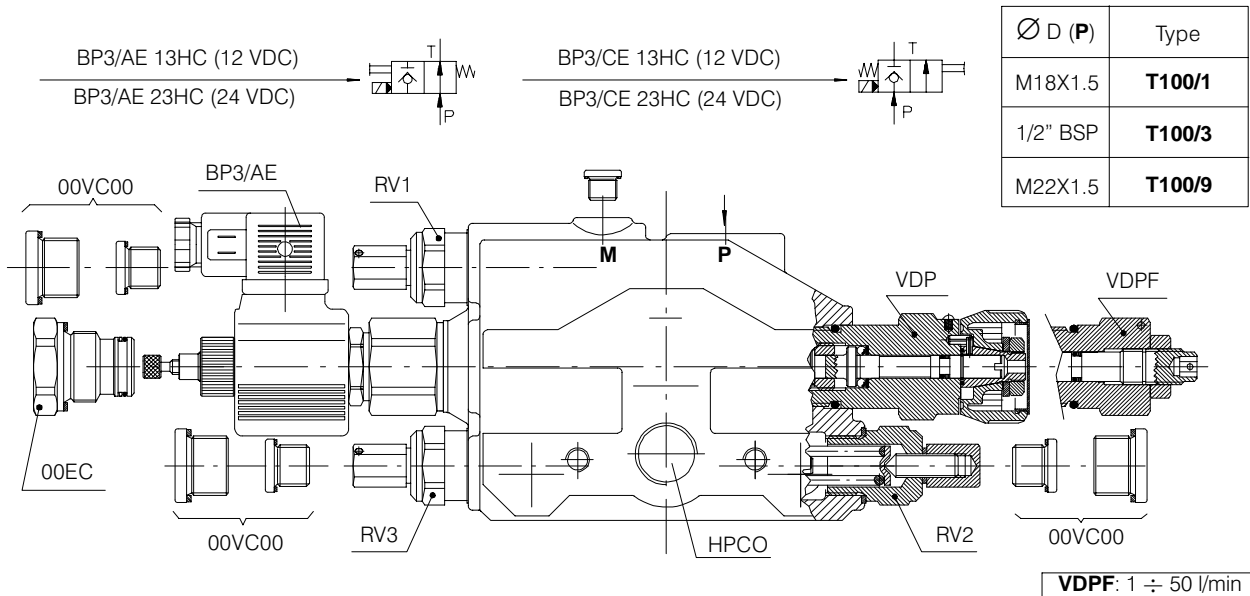
9C.2.2 Scheme example



9C.3 Inlet cover T100

9C.3.1 Application variation

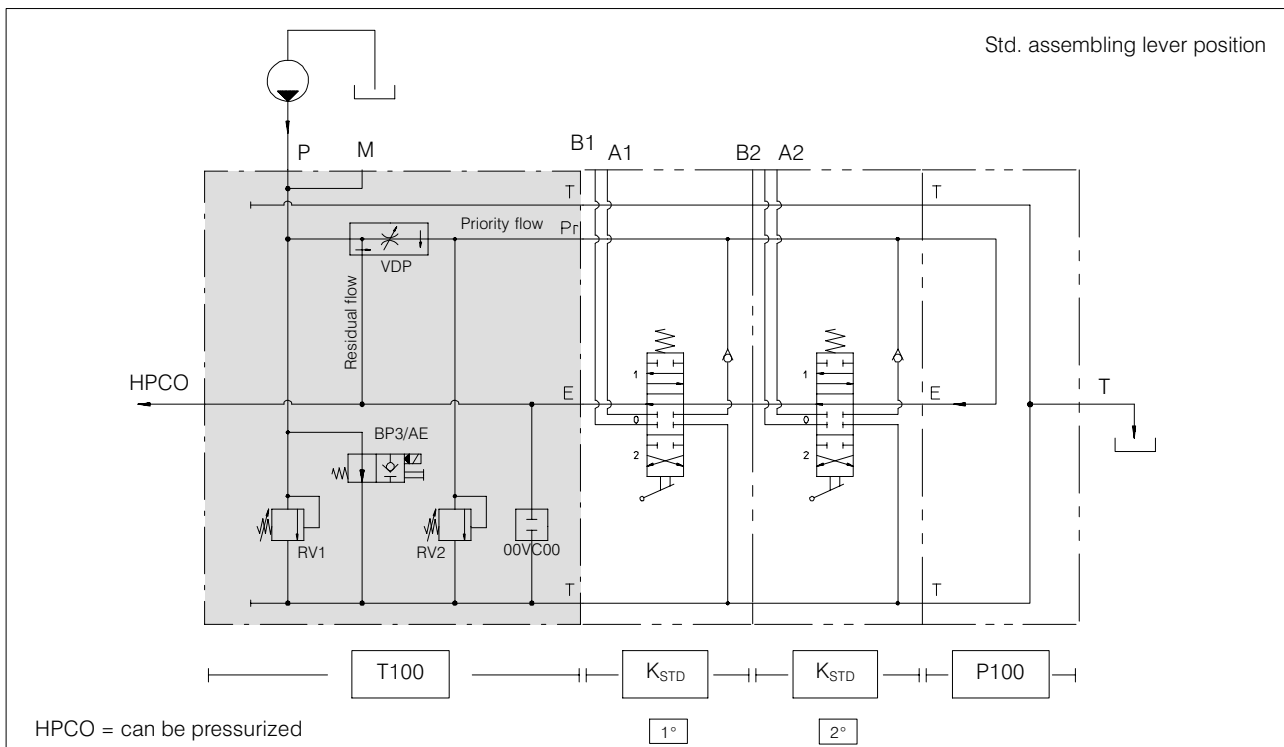
Inlet cover with priority flow divider pressure compensated valve, pressure relief valves and by-pass valve.



Pressure set range (bar)	Standard Setting (bar)	Relief valves Type
30 ÷ 95	60	RV1 / RV2 / RV3 -06
96 ÷ 210	150	RV1 / RV2 / RV3 -15
211 ÷ 320	260	RV1 / RV2 / RV3 -26

Flow set range (l/min)	Standard Setting l/min	Flow regulator Type
0 ÷ 6	06	VDP 06
0 ÷ 12	12	VDP 12
0 ÷ 25	25	VDP 25
0 ÷ 50	50	VDP 50

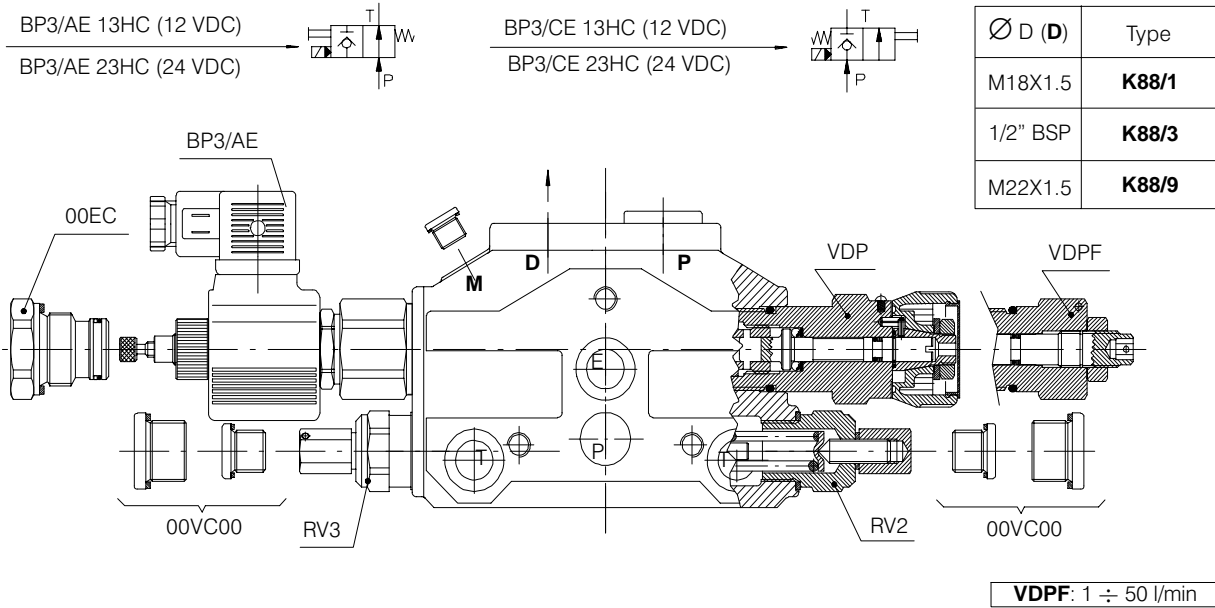
9C.3.2 Scheme example



9C.4 Sectional body K88

9C.4.1 Application variation

Intermediate section with priority flow divider pressure compensated valve, pressure relief valves and by-pass valve.

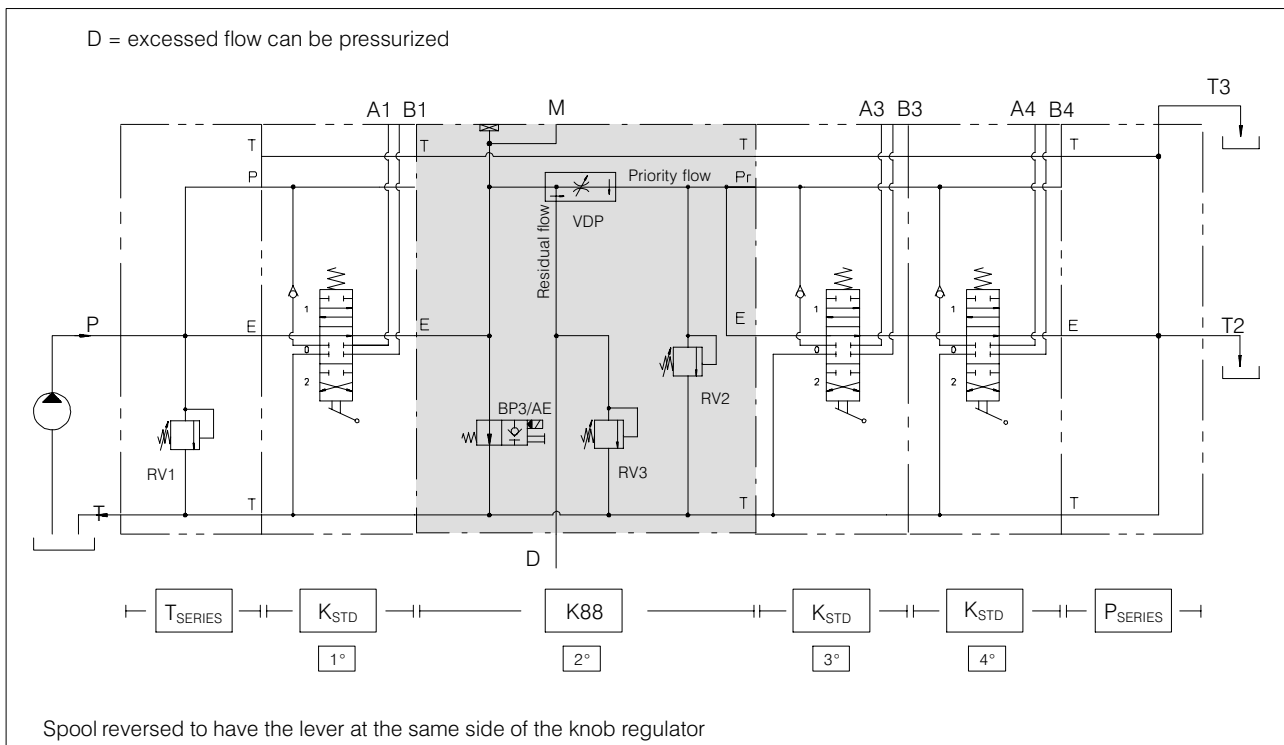


VDPF: 1 ÷ 50 l/min

Pressure set range (bar)	Standard Setting (bar)	Relief valves Type
30 ÷ 95	60	RV2 or RV3 – 06
96 ÷ 210	150	RV2 or RV3 – 15
211 ÷ 320	260	RV2 or RV3 – 26

Flow set range (l/min)	Standard Setting l/min	Flow regulator Type
0 ÷ 6	06	VDP 06
0 ÷ 12	12	VDP 12
0 ÷ 25	25	VDP 25
0 ÷ 50	50	VDP 50

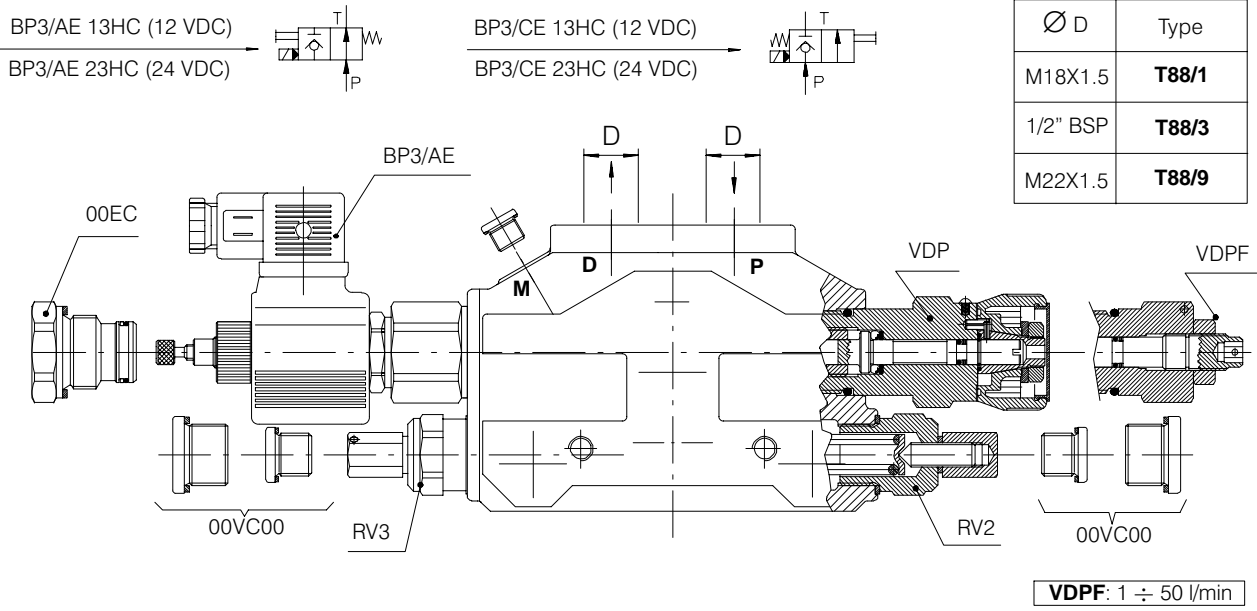
9C.4.2 Scheme example



9C.5 Inlet cover T88

9C.5.1 Application variation

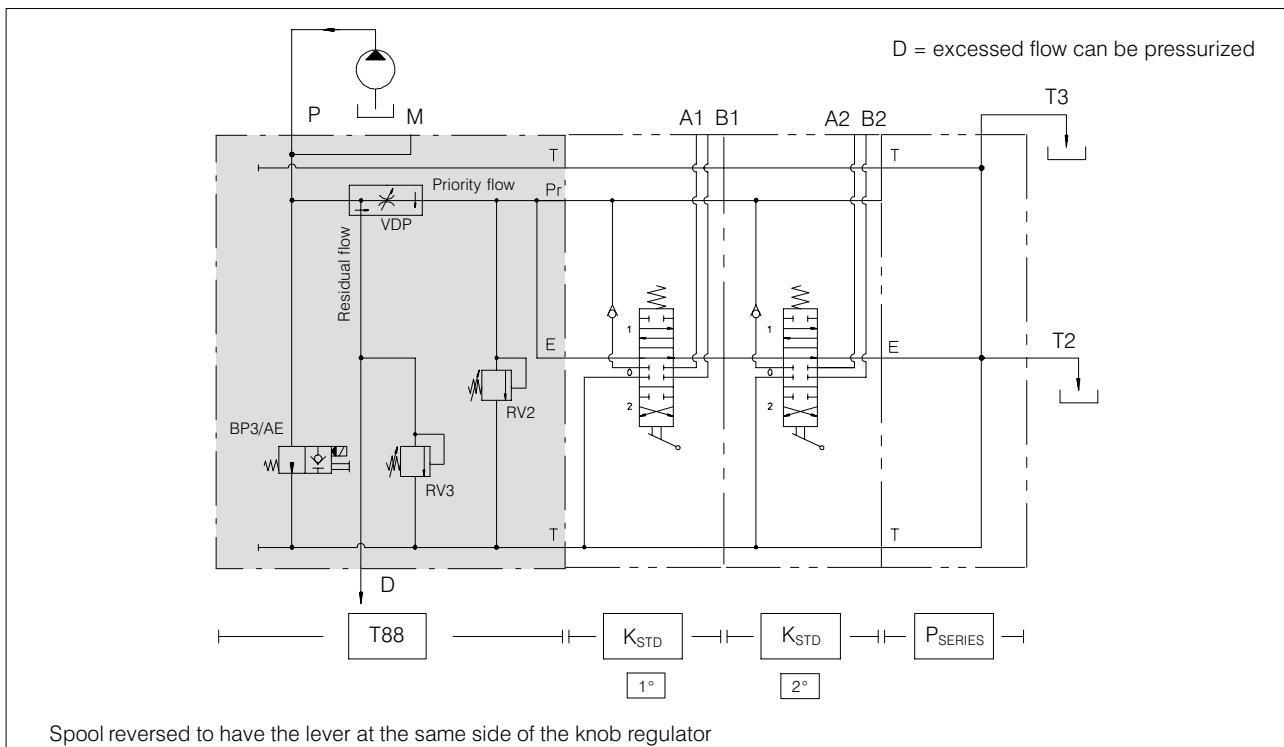
Inlet cover with priority flow divider pressure compensated valve, pressure relief valves and by-pass valve.



Pressure set range (bar)	Standard Setting (bar)	Relief valves Type
30 ÷ 95	60	RV2 or RV3 - 06
96 ÷ 210	150	RV2 or RV3 - 15
211 ÷ 320	260	RV2 or RV3 - 26

Flow set range (l/min)	Standard Setting l/min	Flow regulator Type
0 ÷ 6	06	VDP 06
0 ÷ 12	12	VDP 12
0 ÷ 25	25	VDP 25
0 ÷ 50	50	VDP 50

9C.5.2 Scheme example



9C.6 Sectional body K90

9C.6.1 Application variation

Intermediate section with priority flow divider pressure compensated valve, pressure relief valves and by-pass valve. Excess flow to tank.

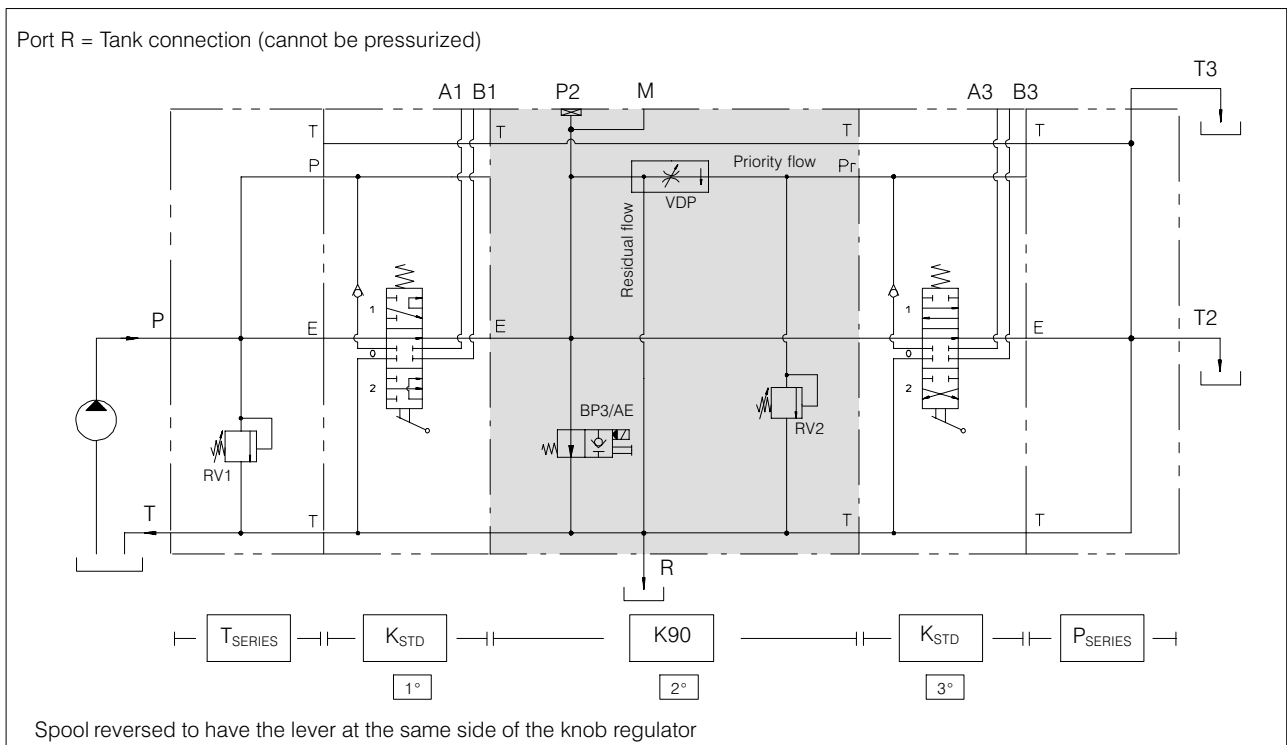
∅ D (R-P)	Type
M18X1.5	K90/1
1/2" BSP	K90/3
M22X1.5	K90/9
SAE10	K90/5

Pressure set range (bar)	Standard Setting (bar)	Relief valves Type
30 ÷ 95	60	RV2 - 06
96 ÷ 210	150	RV2 - 15
211 ÷ 320	260	RV2 - 26

Flow set range (l/min)	Standard Setting l/min	Flow regulator Type
0 ÷ 6	06	VDP 06
0 ÷ 12	12	VDP 12
0 ÷ 25	25	VDP 25
0 ÷ 50	50	VDP 50

VDPF: 1 ÷ 50 l/min

9C.6.2 Scheme example



9C.7 Inlet cover T90

9C.7.1 Application variation

Inlet cover with priority flow divider pressure compensated valve, pressure relief valves and by-pass valve.
Excess flow to tank.

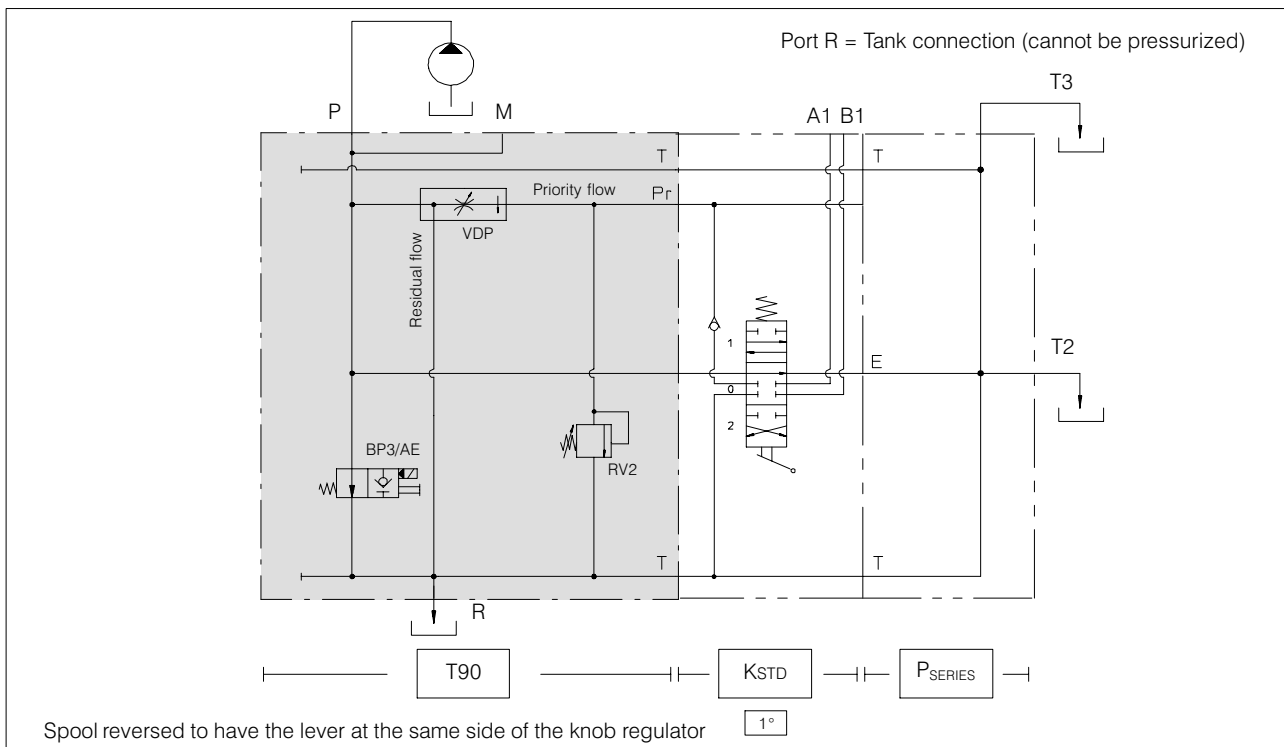
∅ D (R-P)	Type
M18X1.5	T90/1
1/2" BSP	T90/3
M22X1.5	T90/9
SAE10	T90/5

Pressure set range (bar)	Standard Setting (bar)	Relief valves Type
30 ÷ 95	60	RV2 - 06
96 ÷ 210	150	RV2 - 15
211 ÷ 320	260	RV2 - 26

Flow set range (l/min)	Standard Setting l/min	Flow regulator Type
0 ÷ 6	06	VDP 06
0 ÷ 12	12	VDP 12
0 ÷ 25	25	VDP 25
0 ÷ 50	50	VDP 50

VDPF: 1 ÷ 50 l/min

9C.7.2 Scheme example

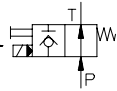


9C.8 Sectional body K91

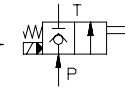
9C.8.1 Application variation

Intermediate section with priority flow divider pressure compensated valve, pressure relief valves and by-pass valve.
Excess flow to tank with crossing bolt-holes.

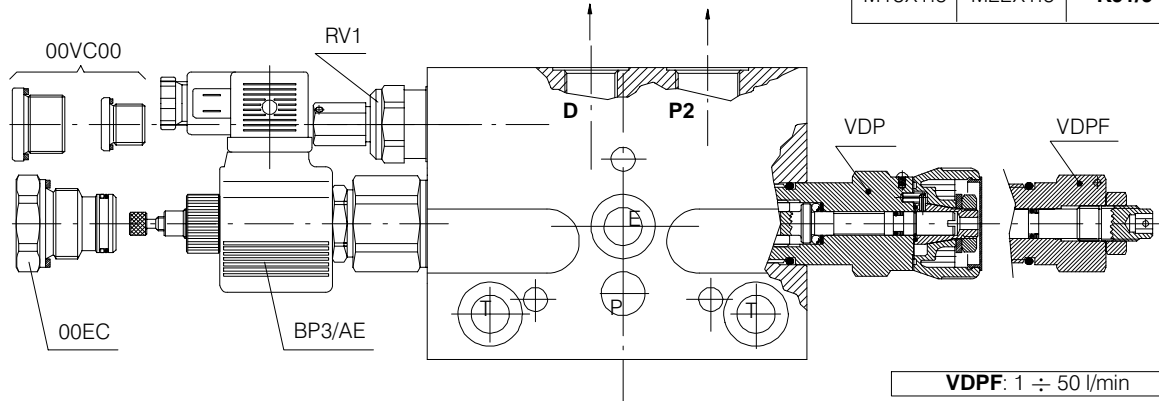
BP3/AE 13HC (12 VDC)
BP3/AE 23HC (24 VDC)



BP3/CE 13HC (12 VDC)
BP3/CE 23HC (24 VDC)



Ø D (D)	Ø D (P2)	Type
M18X1.5	M18X1.5	K91/1
3/8" BSP	1/2" BSP	K91/3
M18X1.5	M22X1.5	K91/9

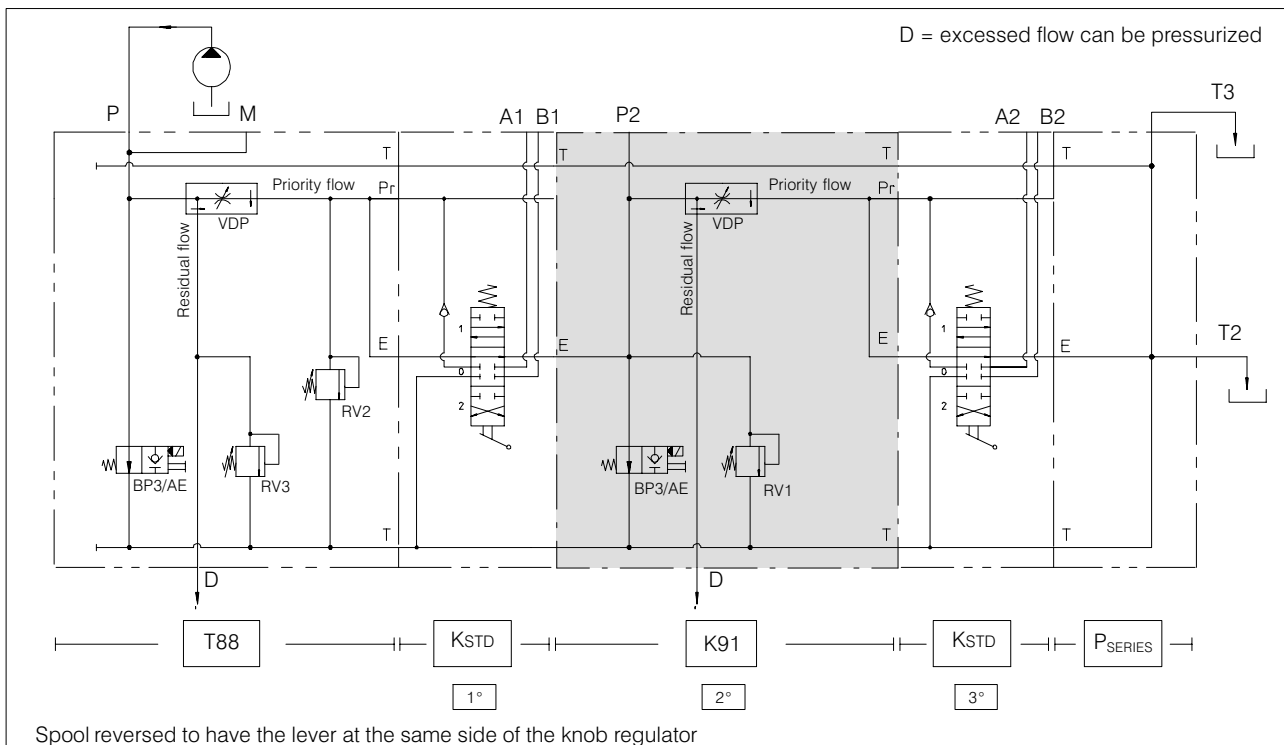


VDPF: 1 ÷ 50 l/min

Pressure set range (bar)	Standard Setting (bar)	Relief valves Type
30 ÷ 95	60	RV1 - 06
96 ÷ 210	150	RV1 - 15
211 ÷ 320	260	RV1 - 26

Flow set range (l/min)	Standard Setting l/min	Flow regulator Type
0 ÷ 6	06	VDP 06
0 ÷ 12	12	VDP 12
0 ÷ 25	25	VDP 25
0 ÷ 50	50	VDP 50

9C.8.2 Scheme example

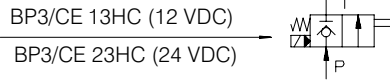
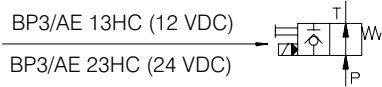


Spool reversed to have the lever at the same side of the knob regulator

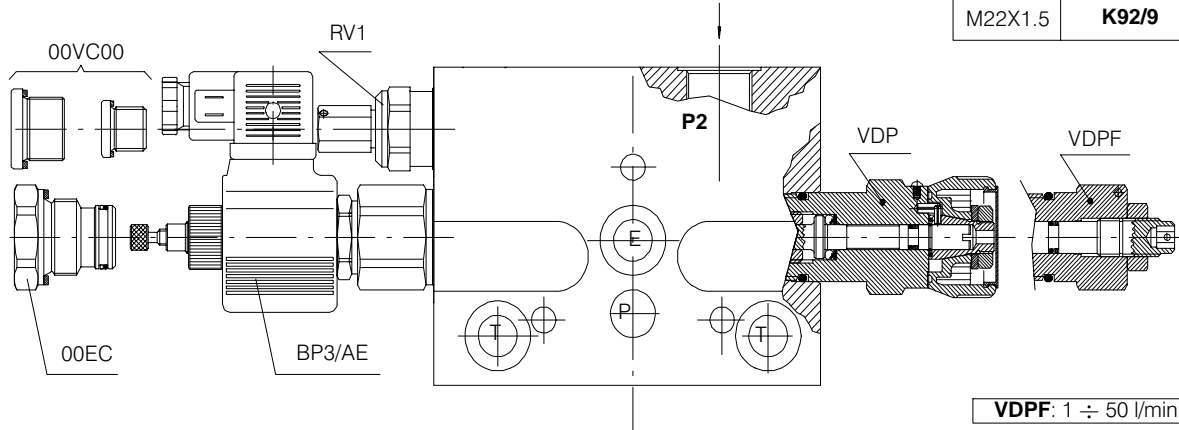
9C.9 Sectional body K92

9C.9.1 Application variation

Intermediate section with priority flow divider pressure compensated valve, pressure relief valves and by-pass valve.
Excess flow to tank with crossing bolt-holes.



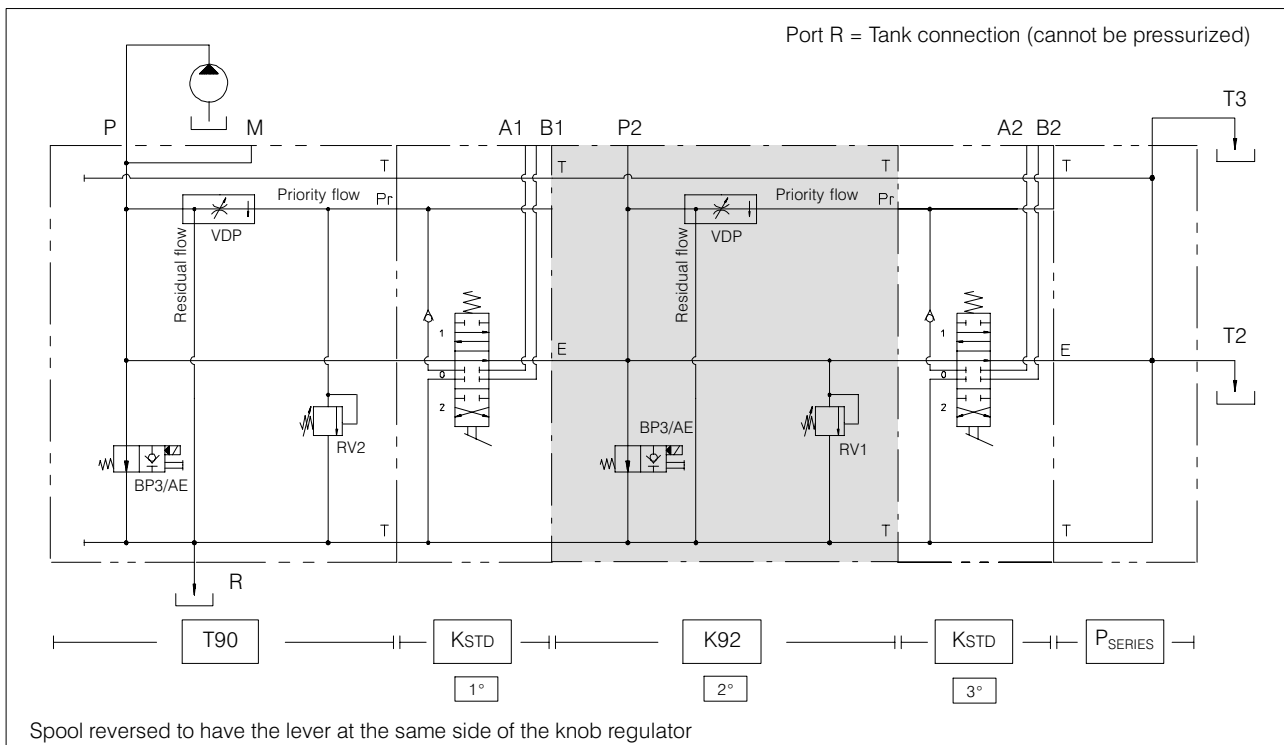
∅ D (P2)	Type
M18X1.5	K92/1
1/2" BSP	K92/3
M22X1.5	K92/9



Pressure set range (bar)	Standard Setting (bar)	Relief valves Type
30 ÷ 95	60	RV1 - 06
96 ÷ 210	150	RV1 - 15
211 ÷ 320	260	RV1 - 26

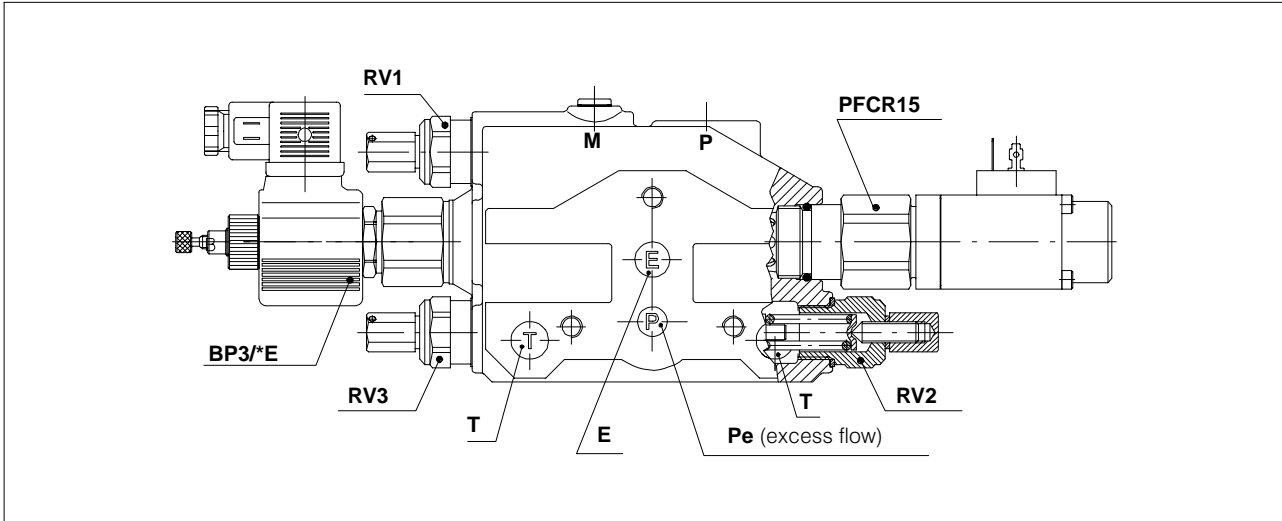
Flow set range (l/min)	Standard Setting l/min	Flow regulator Type
0 ÷ 6	06	VDP 06
0 ÷ 12	12	VDP 12
0 ÷ 25	25	VDP 25
0 ÷ 50	50	VDP 50

9C.9.2 Schematic example

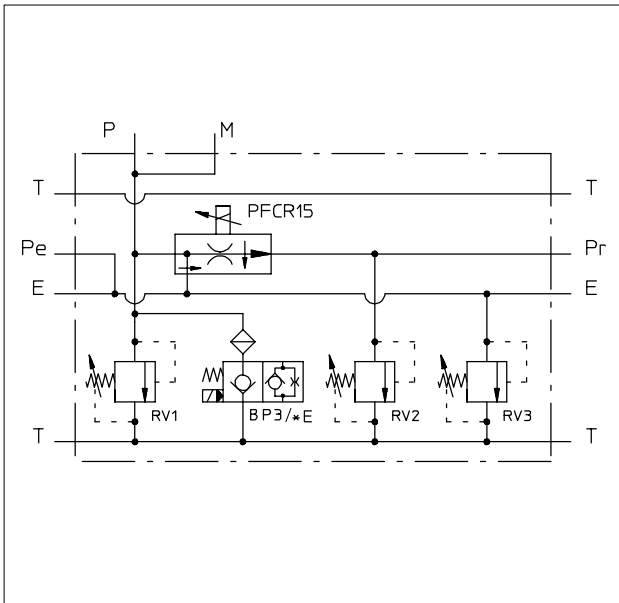


9C.10 Proportional Flow Control PFCR15

9C.10.1 Example of application on K100 body



9C.10.2 Example of hydraulic scheme K100



9C.10.3 Electric performances

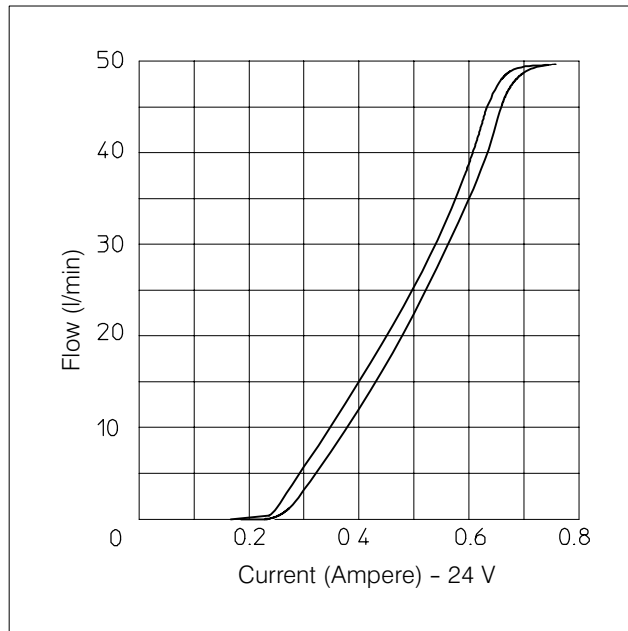
Coil according to	VDE 0580
Connector type	DIN 43650
Max. current	0.75 A (24 V. DC)
Duty rating	ED= 100%
Suggested dither	110 Hz
Insulation class with std. plug	IP54 (DIN 40050)

Voltage ±5%	12	24	V (DC)
Nominal current	1.25	0.68	Ampere
Resistance at 20°C	7.2	24.6	Ohm
Nominal power	17.2	17.4	Watt

9C.10.4 Hydraulic performances

Max. pressure	270 bar
Max. recommended pressure	230 bar
Regulated flow range	0 - 45 l/min
Temperature range	-5/+70° C

9C.10.5 Current/flow regulated diagram



9C.10.6 Code

Voltage	Type	Code*
12 V	PFCR15/V8-45-P2-13	200.7880.0010.0
24 V	PFCR15/V8-45-P2-23	200.7880.0013.0

(* code without connector)

9C.11 By-Pass solenoid valve - BP3 -

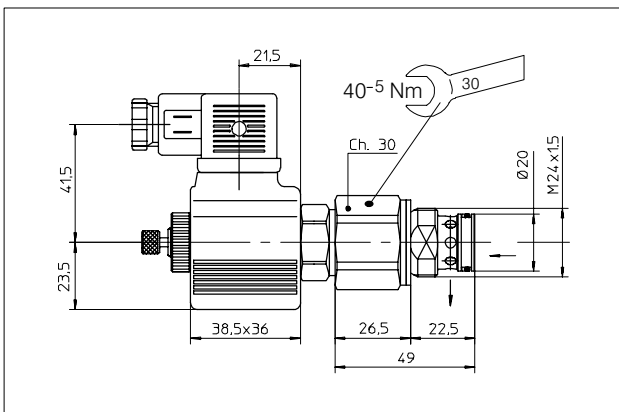
9C.11.1 Normally closed with manual override

Voltage	Type	Code
without coil	BP3/CE HDS15PQ p.m.	200.7572.0048.0
12 V. D.C.	BP3/CE 13HC HDS15PQ	200.9570.1003.5
24 V. D.C.	BP3/CE 23HC HDS15PQ	200.9570.2003.6

9C.11.2 Normally open with manual override

Voltage	Type	Code
without coil	BP3/AE HDS15PQ p.m.	200.7572.0049.0
12 V. D.C.	BP3/AE 13HC HDS15PQ	200.9570.1003.6
24 V. D.C.	BP3/AE 23HC HDS15PQ	200.9570.2003.7

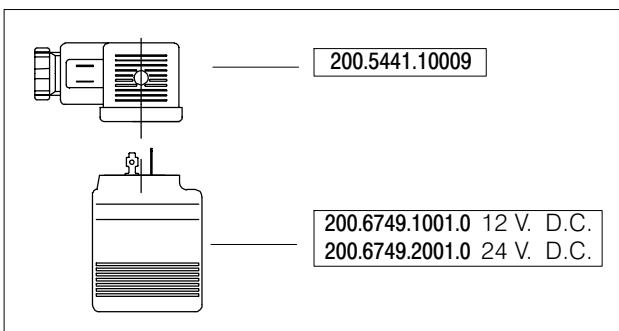
9C.11.3 Dimension



9C.11.4 BP3 Solenoid valve performances

Max. pressure	315 bar
Max. flow	60 l/min
Power	22 Watt
Intermittence	ED 100%
Voltage tolerance	± 10%
Temperature range	-20/+80 °C
Oil filtration	≤ 25 micron
Pressure drop Q= 30 l/min	7.5 bar
Pressure drop Q= 50 l/min	12.7 bar

9C.11.5 Spare parts



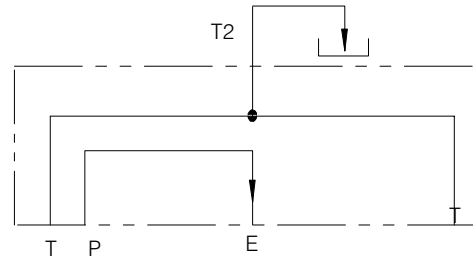
9C.11.6 Coil specifications

Voltage	12	24	V. D.C.
Power	22.8	22.5	Watt
Resistance (Ambient Temp.)	6.3	25.6	Ohm
Resistance (Stabilized Temp.)	8.9	36.4	Ohm
Current (Ambient Temp.)	1.9	0.94	Ampere
Current (Stabilized Temp.)	1.35	0.66	Ampere

9C.12 End covers

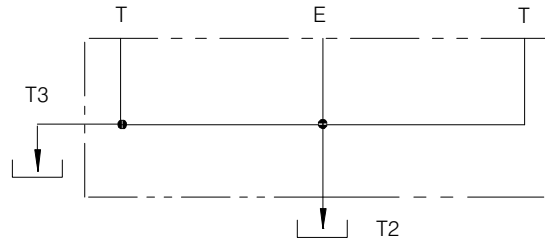
9C.12.1 Right cover for K100 and T100

Ø D	Type	Code
M18X1.5	P100/1	200.6302.1005.0
1/2" BSP	P100/3	200.6302.3009.0



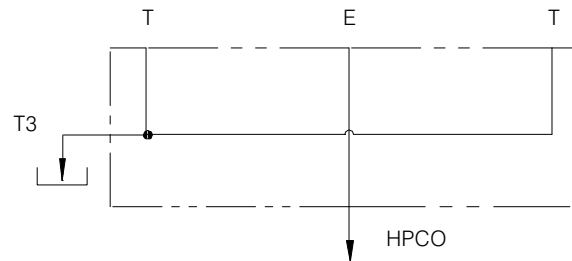
9C.12.2 Standard cover for series circuit

Ø D	Type	Code
M18X1.5	P41	200.9302.1004.0
3/8" BSP	P42	200.9302.2005.0
1/2" BSP	P43	200.9302.3005.0
SAE 10	P45	200.9302.8006.0
3/4" BSP	P09	200.9302.4001.0



9C.12.3 Carry-over cover for series circuit

Ø D	Type	Code
M18X1.5	P51	200.9302.1005.0
3/8" BSP	P52	200.9302.2006.0
1/2" BSP	P53	200.9302.3006.0
SAE 10	P55	200.9302.8004.0
3/4" BSP	P59	200.9302.4004.0



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We reserve the right of modification without prior notice.