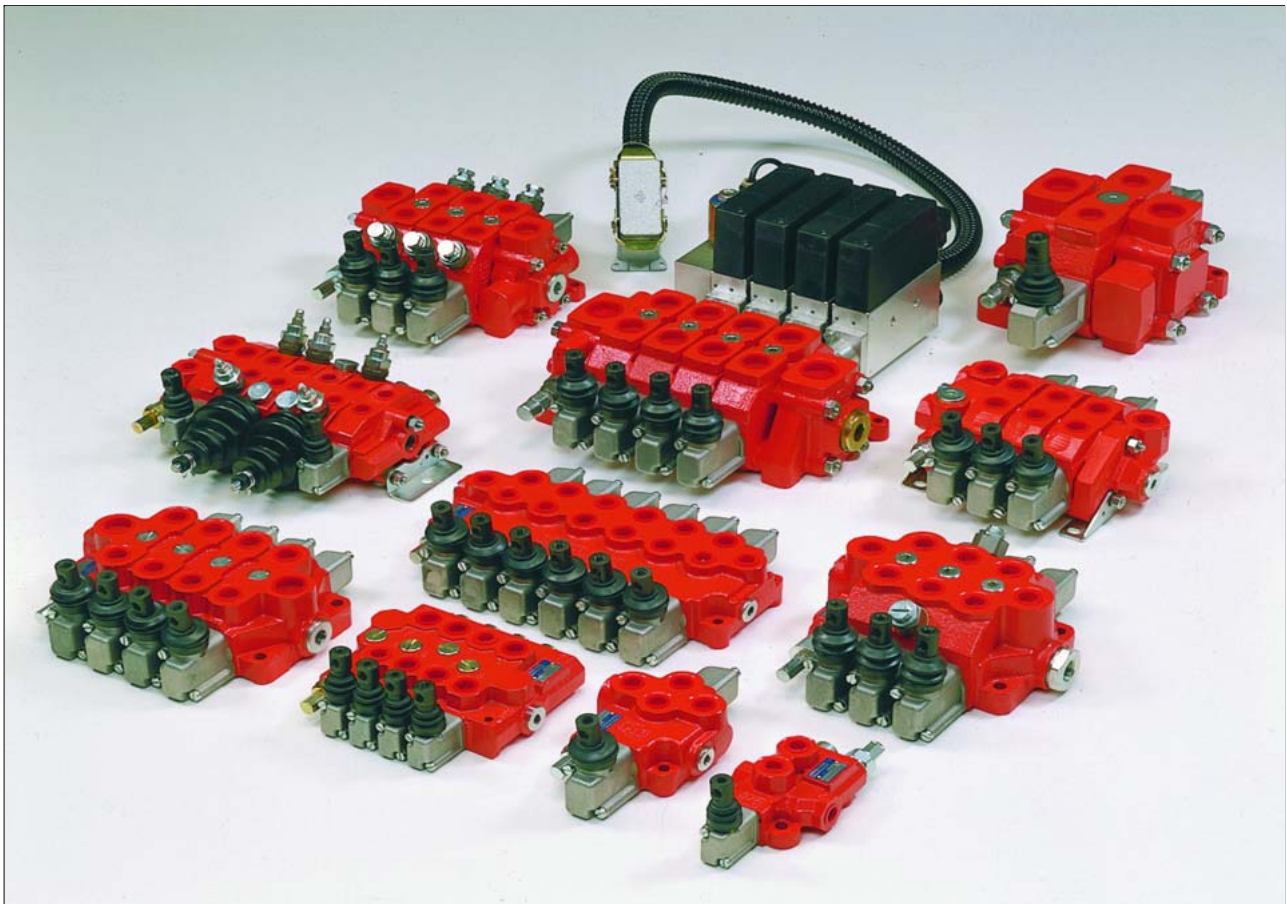


## Monobloc and Sectional Directional Control Valves



motion and progress

#### 4 Monobloc directional control valves HDM11S



##### Contents

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#### 4.1 General specifications

Technical specification		
Max flow rate	l/min U.S.G.P.M.	45 12
Max continuous operating pressure supply port P Parallel circuit	bar PSI	350 5000
Max intermittent peak pressure work port A/B Parallel circuit	bar PSI	400 5800
Max back pressure tank port T	bar PSI	30 430
Oil temperature	° C ° F	-10 to 80 14 to 180
Oil viscosity	mm <sup>2</sup> /s	16 to 75
Oil filtration	μ	≤ 30

Spool leakage at 100 bar (1450 PSI), Temp. 50° C (120° F), viscosity 27 mm <sup>2</sup> /s:		
Maximum	cm <sup>3</sup> /min Cu. In./min	12 0.732
Average	cm <sup>3</sup> /min Cu. In./min	6 0.366
Lower values on demand (to be agreed with our Sales Dept..)		

Number of spools	1 to 6
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
Mechanical release check valve	RSM3

##### 4.1.1 Weight (standard version; without options)

Version	kg	lb
HDM11S/1	3.5	7.7
HDM11S/2	5.2	11.45
HDM11S/3	6.9	15.20
HDM11S/4	8.6	18.94
HDM11S/5	10.3	22.69
HDM11S/6	12	26.43

##### 4.1.2 Material specification:

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

##### 4.1.3 Standard features:

- 1) Parallel circuit
- 2) Balanced interchangeable spools (provides minimum leakage, smooth operation)
- 3) Wide selection inlets, work ports, and outlets threaded ports.
- 4) Negative overlapping of the spool.

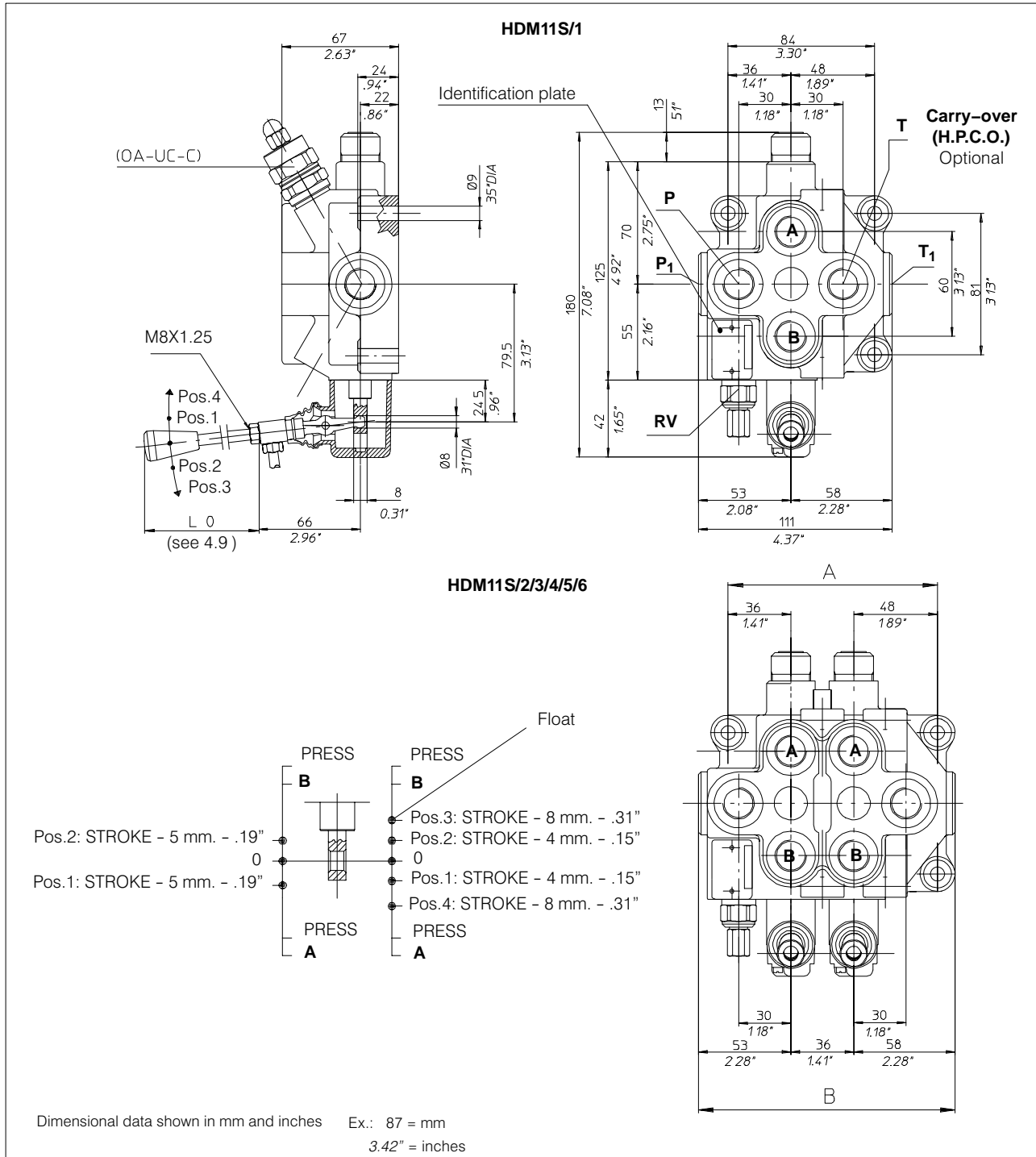
##### 4.1.4 Optional features available:

- 1) Open or closed centre positions, 3 or 4 way operations, 3 or 4 position (float position), full open centre (motor spool) and other spool options.
- 2) Carry over.
- 3) Series circuit
- 4) Load Sensing circuit closed centre for variable displacement pump
- 5) Complete lever assembly
- 6) Wide range of positioners

##### 4.1.5 Symbols:

**P**: inlet port  
**T**: outlet port  
**A/B**: work ports  
**H.P.C.O.**: carry-over  
**RV**: relief valve  
**P<sub>1</sub>T<sub>1</sub>**: side inlet and outlet ports  
3.1.0.2: spool position  
P: pressure line  
T: exhaust line  
E: centre line (by pass).

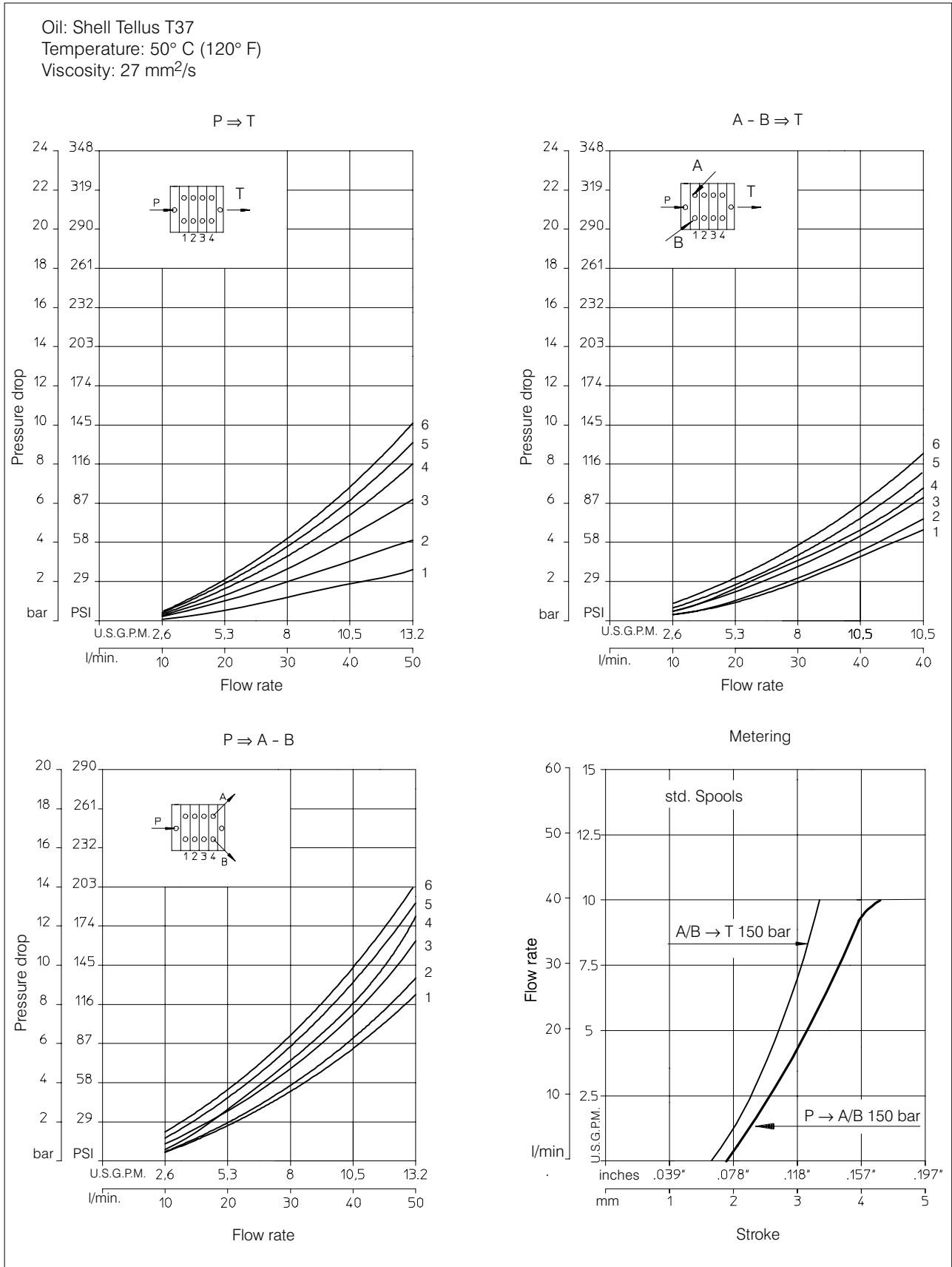
4.2 Dimensional data



N. of sections		HDM11S/2	HDM11S/3	HDM11S/4	HDM11S/5	HDM11S/6
Dimension	A	120	156	192	228	264
		4.72"	6.14"	7.56"	9.98"	10.40"
	B	147	183	219	255	291
		5.78"	7.20"	8.62"	10.04	11.45"

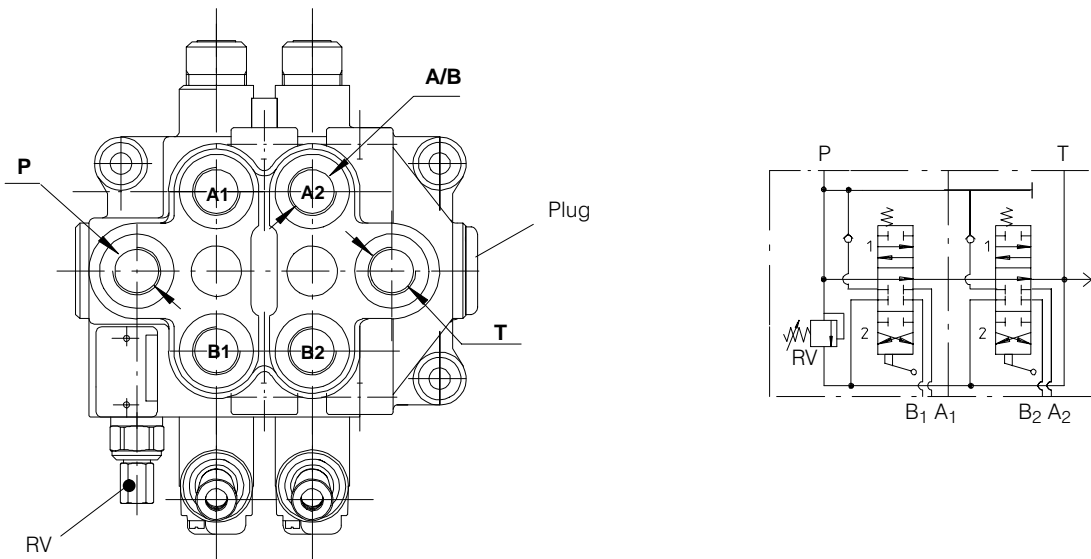
4.3 Performance curves

Oil: Shell Tellus T37  
 Temperature: 50° C (120° F)  
 Viscosity: 27 mm<sup>2</sup>/s



**4.4 Monobloc bodies**

4.4.1 Standard circuit: parallel  
Open center with P – T – RV (Standard)



P-T A/B	Type/Code					
	HDM11S/1	HDM11S/2	HDM11S/3	HDM11S/4	HDM11S/5	HDM11S/6
SAE 6	<b>K01</b>	<b>K01</b>	<b>K01</b>	<b>K01</b> 200.9434.6005.0	<b>K01</b>	<b>K01</b>
SAE 8	<b>K02</b> 200.9431.7004.0	<b>K02</b> 200.9432.7006.0	<b>K02</b> 200.9433.7006.0	<b>K02</b> 200.9434.7006.0	<b>K02</b> 200.9435.7006.0	<b>K02</b>
3/8" BSP	<b>K04</b> 200.9431.2018.0	<b>K04</b> 200.9432.2048.0	<b>K04</b> 200.9433.2056.0	<b>K04</b> 200.9434.2036.0	<b>K04</b> 200.9435.2027.0	<b>K04</b> 200.9436.2014.0
M18X1.5	<b>K05</b> 200.9431.1024.0	<b>K05</b> 200.9432.1045.0	<b>K05</b> 200.9433.1045.0	<b>K05</b> 200.9434.1027.0	<b>K05</b> 200.9435.1020.0	<b>K05</b> 200.9436.1012.0

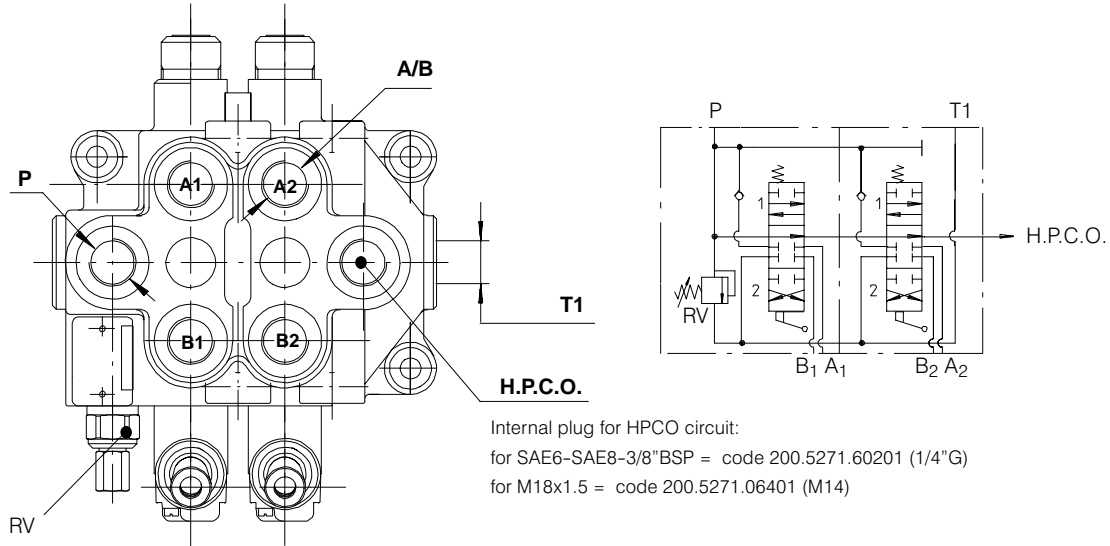
P-T A/B	Section with valve UC-OA-C -Type/Code					
	HDM11S/1	HDM11S/2	HDM11S/3	HDM11S/4	HDM11S/5	HDM11S/6
SAE 6	<b>K06</b>	<b>K06</b>	<b>K06</b>	<b>K06</b>	<b>K06</b>	<b>K06</b>
SAE 8	<b>K07</b> 200.9431.7005.0	<b>K07</b> 200.9432.7007.0	<b>K07</b> 200.9433.7007.0	<b>K07</b> 200.9434.7007.0	<b>K07</b> 200.9435.7007.0	<b>K07</b> 200.9436.7006.0
3/8" BSP	<b>K09</b> 200.9431.2020.0	<b>K09</b> 200.9432.2050.0	<b>K09</b> 200.9433.2057.0	<b>K09</b> 200.9434.2037.0	<b>K09</b>	<b>K09</b>
M18X1.5	<b>K10</b> 200.9431.1023.0	<b>K10</b> 200.9432.1046.0	<b>K10</b> 200.9433.1046.0	<b>K10</b> 200.9434.1028.0	<b>K10</b> 200.9435.1021.0	<b>K10</b> 200.9436.1013.0

Note 1: Body codes consist of: machined casting, seals, plugs and check valve only. Not to be used for complete valve order.

Note 2: For availability of -K- bodies without ordering code please contact our Sales Department.

Note 3: 1/2" BSP size ports are available only under demand. Please take care that max continuous operating pressure must not exceed 180 bar.

4.4.2 Standard circuit: parallel  
Open centre and carry-over with P – T1 – R  
H.P.C.O.

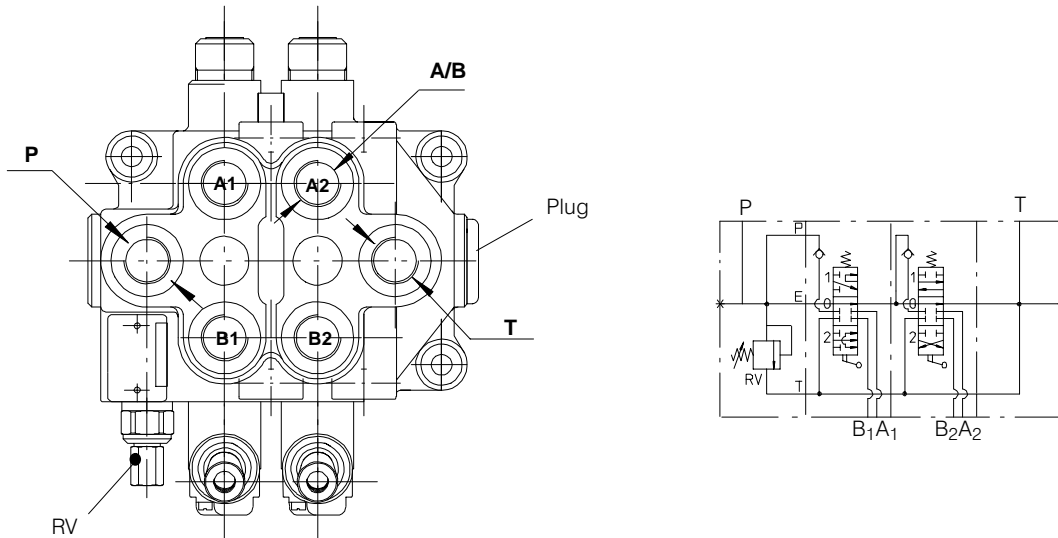


P-T1 A/B	Type/Code					
	HDM11S/1	HDM11S/2	HDM11S/3	HDM11S/4	HDM11S/5	HDM11S/6
SAE 6	<b>K11</b>	<b>K11</b>	<b>K11</b>	<b>K11</b>	<b>K11</b>	<b>K11</b>
SAE 8	<b>K12</b> 200.9431.7006.0	<b>K12</b> 200.9432.7008.0	<b>K12</b> 200.9433.7008.0	<b>K12</b> 200.9434.7004.0	<b>K12</b>	<b>K12</b>
3/8" BSP	<b>K14</b> 200.9431.2019.0	<b>K14</b> 200.9432.2049.0	<b>K14</b> 200.9433.2054.0	<b>K14</b> 200.9434.2038.0	<b>K14</b>	<b>K14</b>
M18X1.5	<b>K15</b> 200.9431.1025.0	<b>K15</b> 200.9432.1043.0	<b>K15</b> 200.9433.1051.0	<b>K15</b> 200.9434.1029.0	<b>K15</b>	<b>K15</b>

P-T1 A/B	Section with valve UC-OA-C - Type/Code					
	HDM11S/1	HDM11S/2	HDM11S/3	HDM11S/4	HDM11S/5	HDM11S/6
SAE 6	<b>K21</b>	<b>K21</b>	<b>K21</b>	<b>K21</b>	<b>K21</b>	<b>K21</b>
SAE 8	<b>K22</b> 200.9431.7007.0	<b>K22</b> 200.9432.7009.0	<b>K22</b> 200.9433.7009.0	<b>K22</b> 200.9434.7009.0	<b>K22</b>	<b>K22</b>
3/8" BSP	<b>K24</b> 200.9431.2021.0	<b>K24</b> 200.9432.2051.0	<b>K24</b> 200.9433.2055.0	<b>K24</b> 200.9434.2039.0	<b>K24</b>	<b>K24</b>
M18X1.5	<b>K25</b> 200.9431.1026.0	<b>K25</b> 200.9432.1044.0	<b>K25</b> 200.9433.1052.0	<b>K25</b> 200.9434.1030.0	<b>K25</b>	<b>K25</b>

Note 1: Body codes consist of machined foundry, seals, plugs and check valve only. Not to be used ordering a complete valve  
 Note 2: For availability of -K- bodies without ordering code please contact our Sales Department.  
 Note 3: 1/2" BSP size ports are available only under demand. Please take care that max continuous operating pressure must not exceed 180 bar.

4.4.3 Optional circuits: series and tandem  
Open centre with P – T – RV



P-T A/B	Type/Code				
	HDM11S/2	HDM11S/3	HDM11S/4	HDM11S/5	HDM11S/6
SAE 6	<b>K31</b>	<b>K31</b>	<b>K31</b>	<b>K31</b>	<b>K31</b>
SAE 8	<b>K32</b>	<b>K32</b>	<b>K32</b>	<b>K32</b>	<b>K32</b>
3/8" BSP	<b>K34</b>	<b>K34</b> 200.9433.2058.0	<b>K34</b> 200.9434.2040.0	<b>K34</b>	<b>K34</b>
M18X1.5	<b>K35</b> 200.9432.1047.0	<b>K35</b> 200.9433.1054.0	<b>K35</b> 200.9434.1031.0	<b>K35</b>	<b>K35</b>

P-T A/B	Section with valve UC-OA-C - Type/Code				
	HDM11S/2	HDM11S/3	HDM11S/4	HDM11S/5	HDM11S/6
SAE 6	<b>K36</b>	<b>K36</b>	<b>K36</b>	<b>K36</b>	<b>K36</b>
SAE 8	<b>K37</b>	<b>K37</b>	<b>K37</b>	<b>K37</b>	<b>K37</b>
3/8" BSP	<b>K39</b>	<b>K39</b> 200.9433.2059.0	<b>K39</b> 200.9434.2041.0	<b>K39</b>	<b>K39</b>
M18X1.5	<b>K40</b> 200.9432.1048.0	<b>K40</b> 200.9433.1055.0	<b>K40</b> 200.9434.1032.0	<b>K40</b>	<b>K40</b>

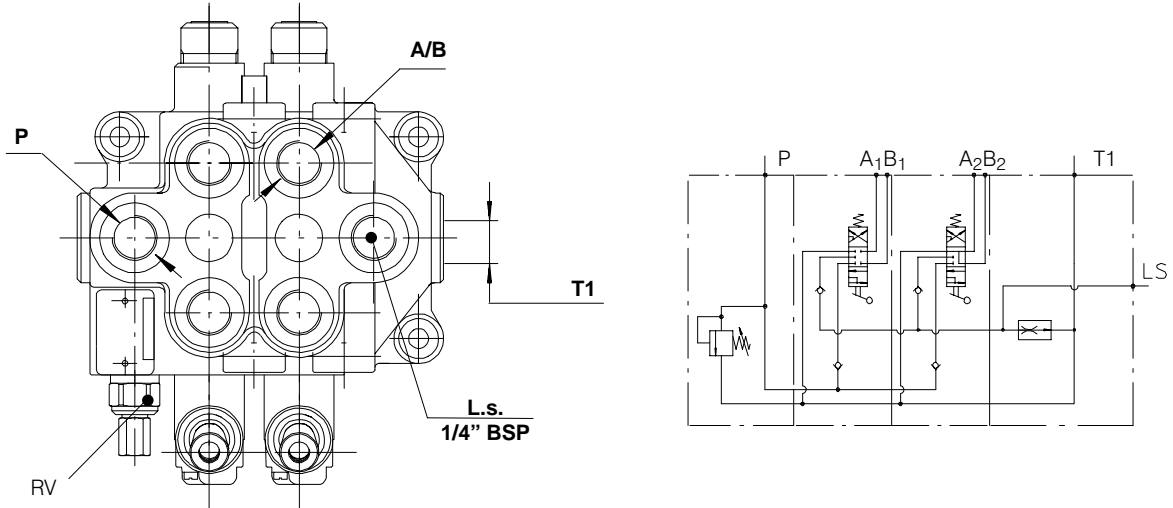
Note 1: Body codes consist of machined foundry, seals, plugs and check valve only. Not to be used ordering a complete valve

Note 2: For availability of -K- bodies without ordering code please contact our Sales Department.

Note 3: 1/2" BSP size ports are available only under demand. Please take care that max continuous operating pressure must not exceed 180 bar.



4.4.4 Optional circuit: load sensing  
 Closed centre for variable-displacement pump  
 with P – T1– RV and L.s.



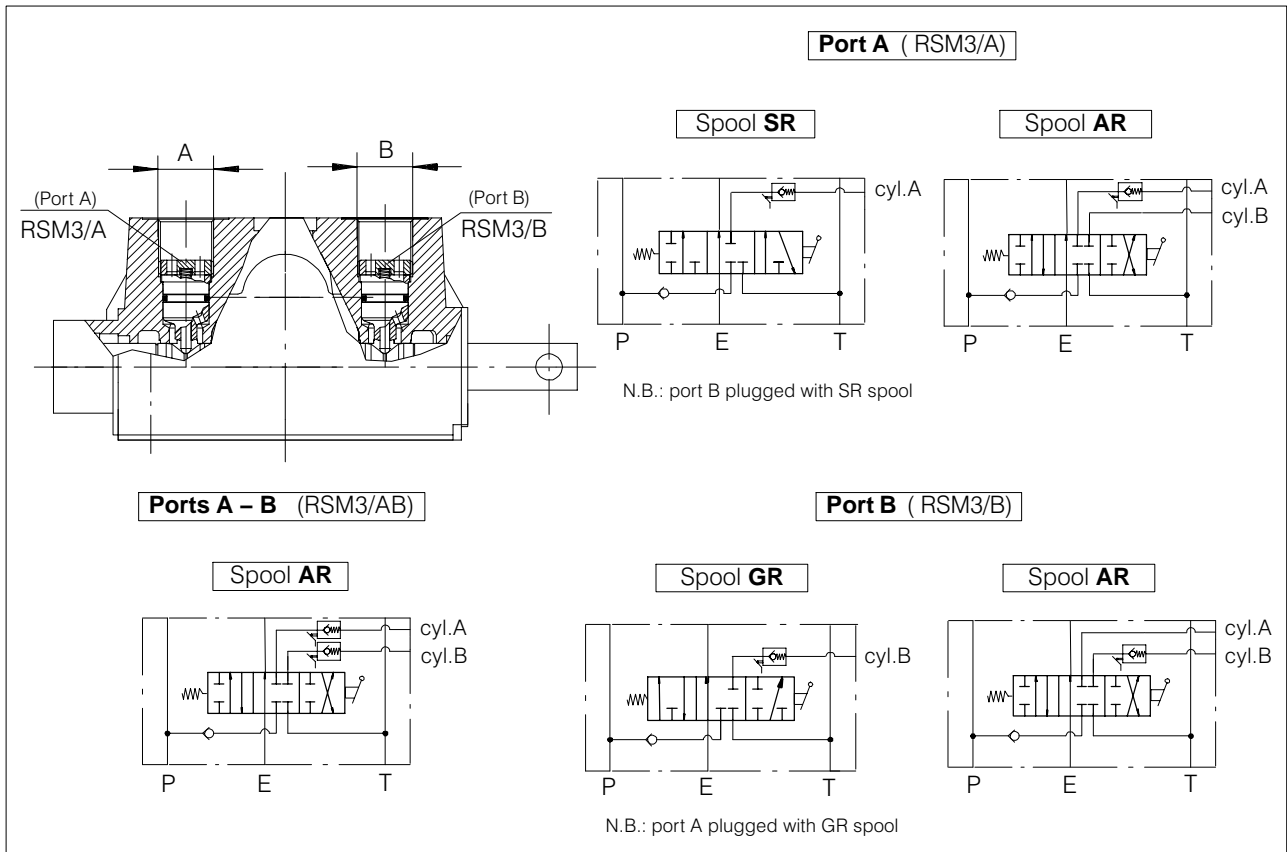
P-T1 A/B	Type/Code					
	HDM11S/1	HDM11S/2	HDM11S/3	HDM11S/4	HDM11S/5	HDM11S/6
SAE 6	<b>K51</b>	<b>K51</b>	<b>K51</b>	<b>K51</b>	<b>K51</b>	<b>K51</b>
SAE 8	<b>K52</b>	<b>K52</b>	<b>K52</b> 200.9433.7014.0	<b>K52</b>	<b>K52</b>	<b>K52</b>
3/8" BSP	<b>K54</b>	<b>K54</b>	<b>K54</b>	<b>K54</b>	<b>K54</b>	<b>K54</b>
M18X1.5	<b>K55</b>	<b>K55</b>	<b>K55</b>	<b>K55</b>	<b>K55</b>	<b>K55</b>

P-T1 A/B	Section with valve UC-OA-C - Type/Code					
	HDM11S/1	HDM11S/2	HDM11S/3	HDM11S/4	HDM11S/5	HDM11S/6
SAE 6	<b>K56</b>	<b>K56</b>	<b>K56</b>	<b>K56</b>	<b>K56</b>	<b>K56</b>
SAE 8	<b>K57</b>	<b>K57</b>	<b>K57</b>	<b>K57</b>	<b>K57</b>	<b>K57</b>
3/8" BSP	<b>K59</b>	<b>K59</b>	<b>K59</b>	<b>K59</b>	<b>K59</b>	<b>K59</b>
M18X1.5	<b>K60</b>	<b>K60</b>	<b>K60</b>	<b>K60</b>	<b>K60</b>	<b>K60</b>

Note 1: Body codes consist of machined foundry, seals, plugs and check valve only. Not to be used ordering a complete valve  
 Note 2: For availability of -K- bodies without ordering code please contact our Sales Department.  
 Note 3: 1/2" BSP size ports are available only under demand. Please take care that max continuous operating pressure must not exceed 180 bar

4.4.5 Check valves with mechanical release RSM3

The check valve taper seal is released by means of a taper on the spool and by a push rod.



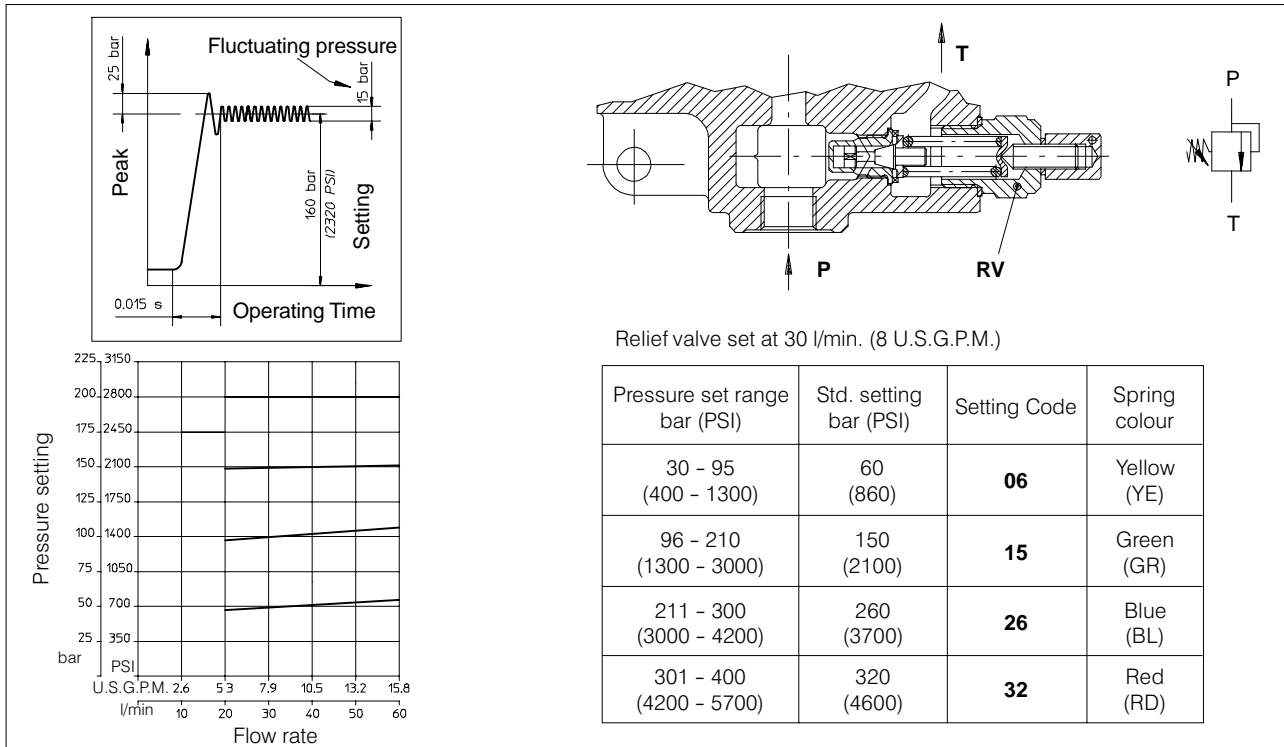
7A.1.1 Directional control valve bodies for RSM3 valve

A/B	Type/Code						RSM3 Code
	HDM11S/1	HDM11S/2	HDM11S/3	HDM11S/4	HDM11S/5	HDM11S/6	
SAE 8	<b>K82</b>	<b>K82</b>	<b>K82</b>	<b>K82</b>	<b>K82</b>	<b>K82</b>	
3/8" BSP	<b>K84</b> 200.9431.2022.0	<b>K84</b>	<b>K84</b>	<b>K84</b>	<b>K84</b>	<b>K84</b>	200.7876.0234.1
M18X1.5	<b>K85</b> 200.9431.1027.0	<b>K85</b>	<b>K85</b>	<b>K85</b>	<b>K85</b>	<b>K85</b>	200.7876.0229.1

A/B	Section with valve UC-OA-C - Type/Code						RSM3 Code
	HDM11S/1	HDM11S/2	HDM11S/3	HDM11S/4	HDM11S/5	HDM11S/6	
SAE 8	<b>K92</b>	<b>K92</b>	<b>K92</b>	<b>K92</b>	<b>K92</b>	<b>K92</b>	
3/8" BSP	<b>K94</b>	<b>K94</b>	<b>K94</b>	<b>K94</b>	<b>K94</b>	<b>K94</b>	200.7876.0234.1
M18X1.5	<b>K95</b>	<b>K95</b>	<b>K95</b>	<b>K95</b>	<b>K95</b>	<b>K95</b>	200.7876.0229.1

Note 1: Body codes consist of machined foundry, seals, plugs and check valve only. Not to be used ordering a complete valve  
 Note 2: For availability of -K- bodies without ordering code please contact our Sales Department.  
 Note 3: RSM3 check valve for SAE6 bodies is not available.

### 4.5 Adjustable direct acting Relief Valve RV



### 4.6 Spool charts

Spool scheme	Spool features	Type
	4 way - 3 position A/B closed E open by pass	<b>A</b> <b>AR**</b>
	4 way - 3 position A/B-E closed	<b>B</b>
	4 way - 3 position A/B to tank in neutral E open by pass	<b>C</b>
	4 way - 3 position A closed B to tank in neutral	<b>D</b>
	3 way - 3 position B closed E open by pass	<b>G</b> <b>GR**</b>
	4 way - 3 position B closed A to tank in neutral	<b>L</b>
	4 way - 3 position with differential spool in 2 <sup>nd</sup> position	<b>R**</b>
	3 way - 3 position A closed E open by pass	<b>S</b> <b>SR**</b>

	4 way - 3 position series connection	<b>X</b>
	4 way - 3 position A/B to tank in neutral series connection	<b>XC</b>
	4 way - 4 position 4 <sup>th</sup> floating position	<b>Z</b>
	4 way - 4 positions 4 <sup>th</sup> floating position	<b>* WW</b>
	4 way - 3 position A/B closed Load Sensing	<b>** LSA</b>
	4 way - 3 position A/B to tank in neutral Load Sensing	<b>** LSC</b>
	3way - 3 position B closed Load Sensing	<b>** LSG</b>
	3 way - 3 position A closed Load Sensing	<b>** LSS</b>

Note: For availability of L/S versions please contact our Sales Department  
 \* "WW": special body required (K...), positioner (240) and lever (L192)  
 \*\*: special body required (please contact our Sales Dept..)

### 4.7 Load Sensing

#### Load-sensing control and working principle

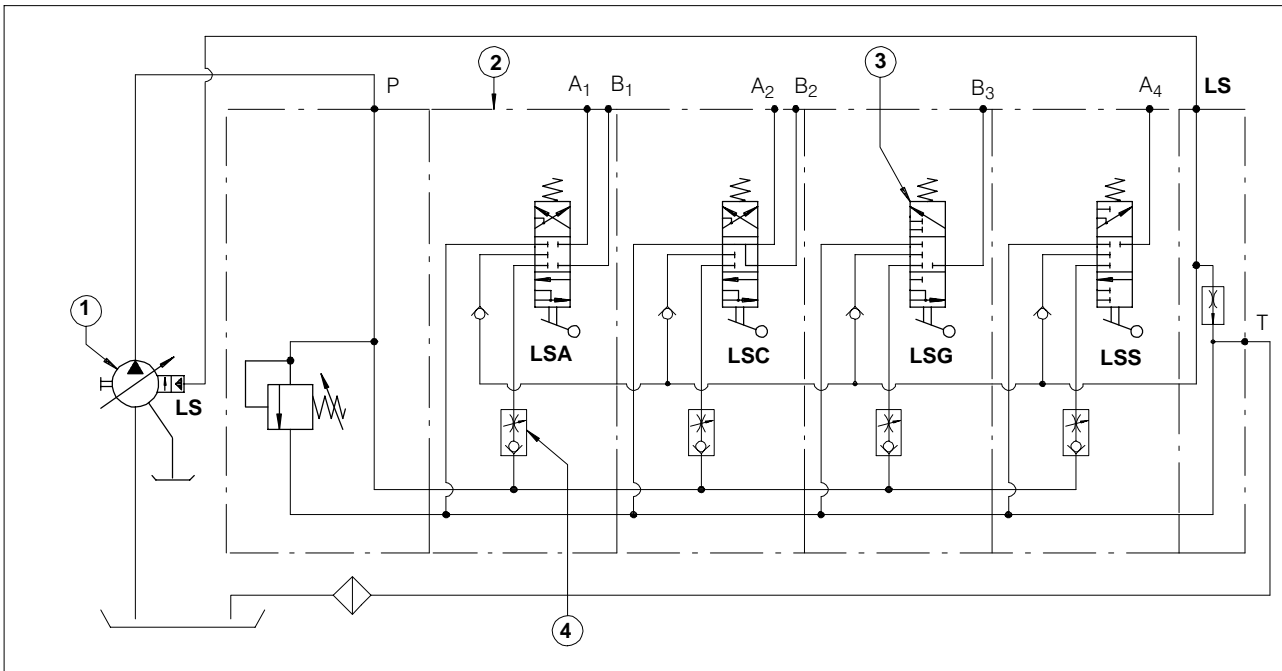
Through the use of variable flow pumps provided with a pressure and flow compensator the pressure and flow parameters can be adapted according to the different and real working conditions.

These pumps require the use of special valves provided with Load Sensing control which “feels” the hydraulic components (cylinder and motor) requirements and through a special pilot line (L.S.) controls the pump compensator conforming capacity and pressure to such requirements which can be variable in time within the limits of the pump performance.

The Load Sensing brings following advantages:

- a) Energy saving.
- b) Smaller heat exchangers can be used due to a smaller heat energy dissipation.
- c) Longer life of the pump and driving motor, due to reduced heavy working cycles.
- d) Excellent control of the load by using 100% of the spool metering.

The L.s. option requires specific bodies and spools. Please ask to Bucher Hydraulics S.p.A. for their availability



- 1) Variable flow pump provided with pressure and flow compensator.
- 2) Load Sensing valve.

- 3) Special spools: LSA – LSC – LSG – LSS
- 4) Check valve provided with max flow control

### 4.8 Spool positioners

F (N)**	Type	Code*
200	<b>01</b> standard	200.7685.1001.0
140	<b>79</b>	200.7685.1092.0

3 position spring return to neutral

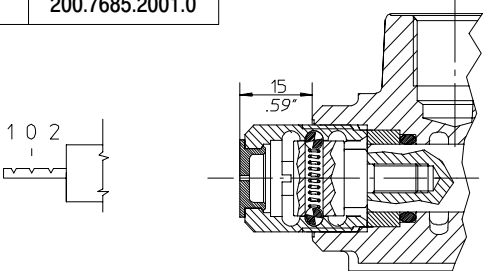
Type	Code*
<b>02</b>	200.7685.3001.0

2 position detent - spring center

\* : code without plastic plug; plastic plug code: 200.6780.0008.0

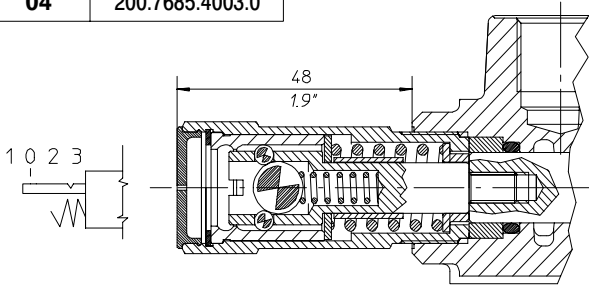
Code F (N)\*\*: force in Newton (N) needed to operate the spool

Type <b>03</b>	Code* 200.7685.2001.0
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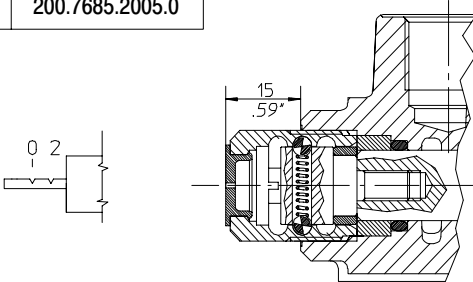
3 position detent

Type <b>04</b>	Code 200.7685.4003.0
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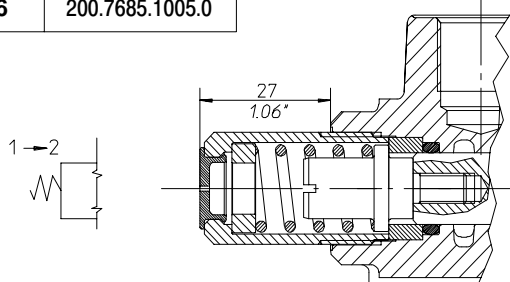
4 position float Plastic plug code: 200.6780.0009.0

Type <b>05</b>	Code* 200.7685.2005.0
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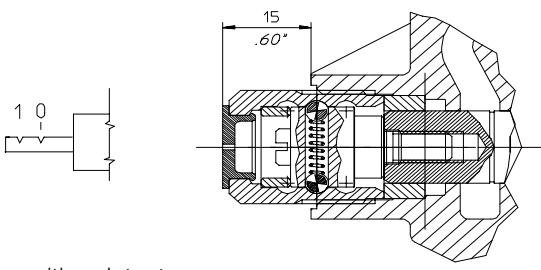
2 position detent

Type <b>06</b>	Code* 200.7685.1005.0
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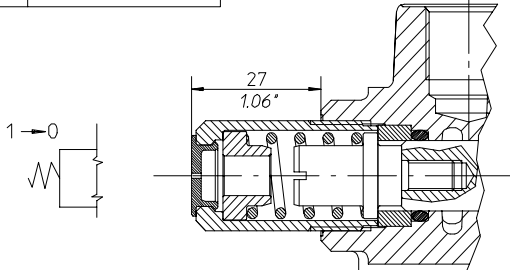
2 position spring return

Type <b>07</b>	Code* 200.7685.2027.0
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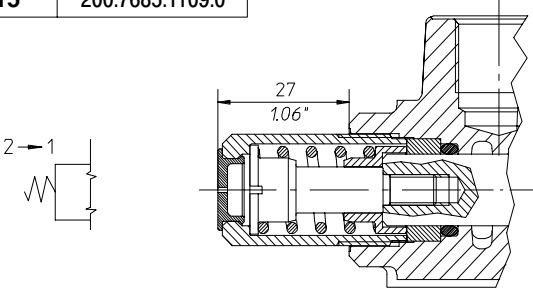
2 position detent

Type <b>12</b>	Code* 200.7685.1021.0
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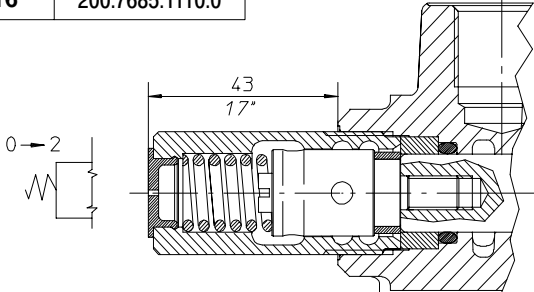
2 position spring return

Type <b>15</b>	Code* 200.7685.1109.0
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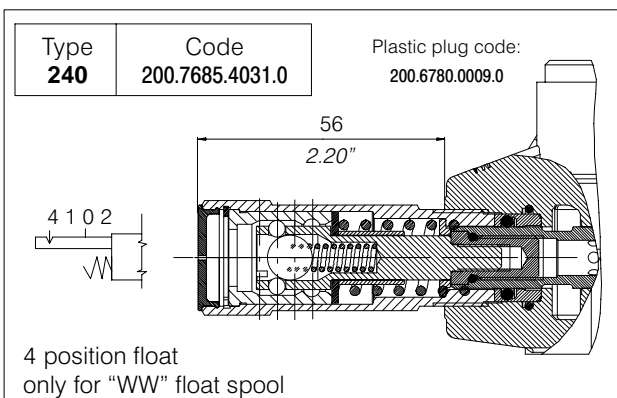
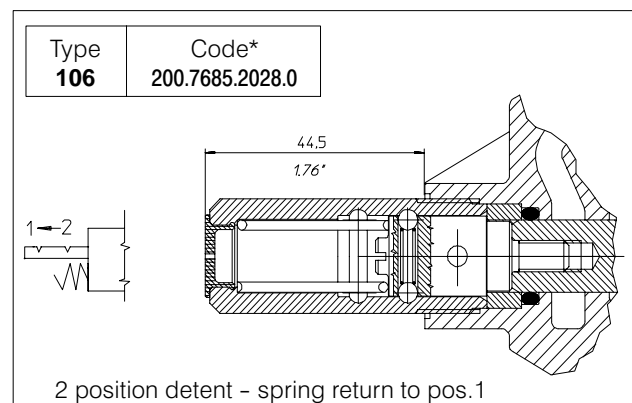
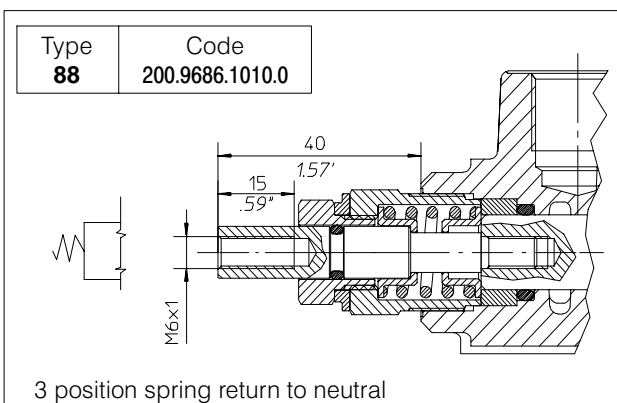
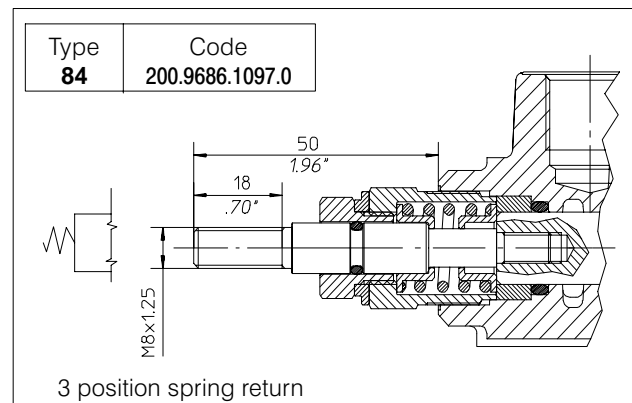
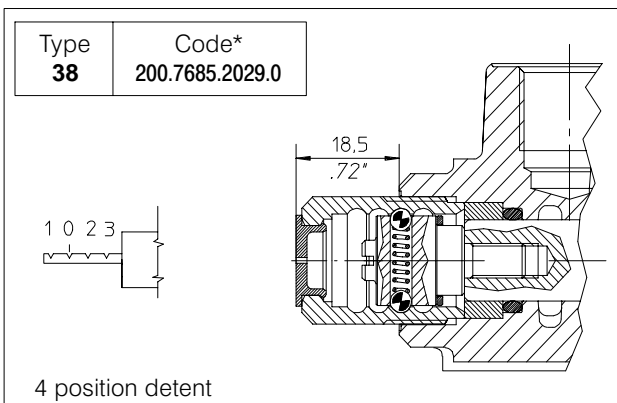
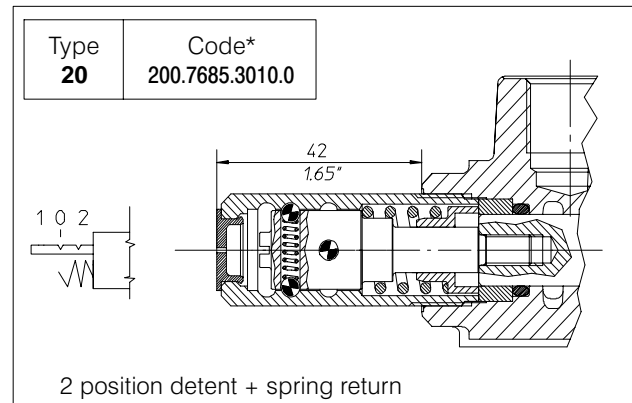
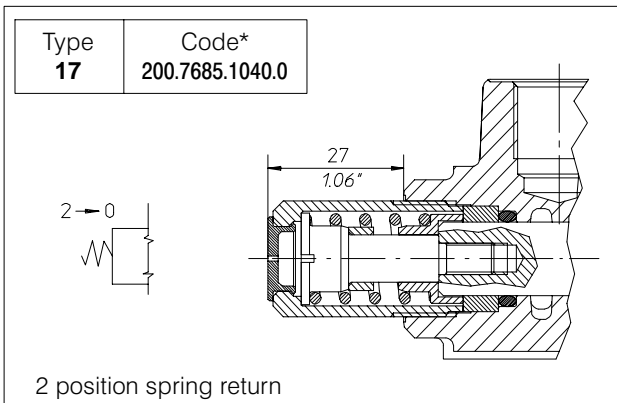
2 position spring return

Type <b>16</b>	Code* 200.7685.1110.0
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2 position spring return

\* : code without plastic plug; plastic plug code: 200.6780.0008.0



\* : code without plastic plug; plastic plug code: 200.6780.0008.0

4.8.1 Microswitch control on each single element

Type <b>30</b>	Code 200.9686.1050.0	Microswitch is operated when the spool is in pos. 1			
Type <b>32</b>	Code 200.9686.1060.0	Microswitch is operated when the spool is in pos. 2			
Type <b>34</b>	Code 200.9686.1064.0	Microswitch is operated when the spool is in pos. 1 and 2			

\* The microswitch is supplied only on customer's request.

4.8.2 Single microswitch control for multi-sectional valves (from 1<sup>st</sup> up to second-last element).

Type <b>39 (MSF)</b>	Code 200.9686.1139.0			
Microswitch is operated when the spool is in pos. 1 and 2				

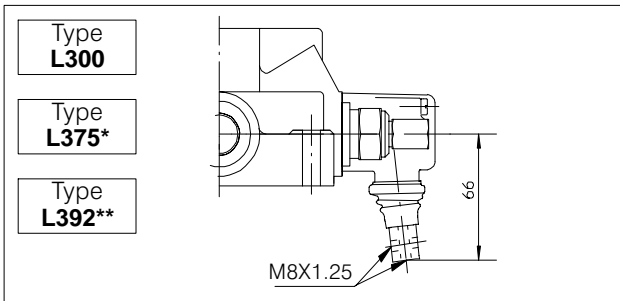
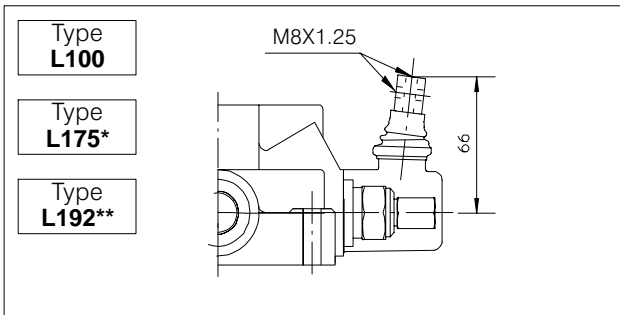
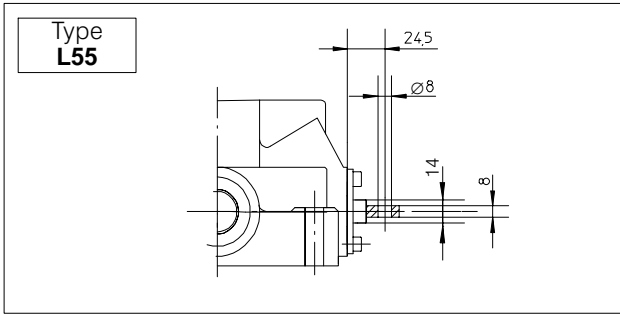
4.8.3 Single microswitch control for multi-sectional valves (last element, T side).

Type <b>40 (MFL)</b>	Code 200.9686.1140.0			
Microswitch is operated when the spool is in pos. 1 and 2				

\* The microswitch is supplied only on customer's request.

Positioner 40 must be assembled only on the last element.

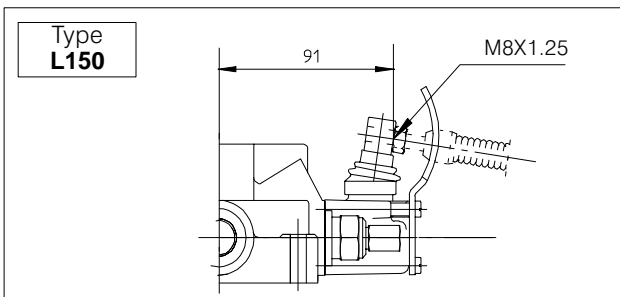
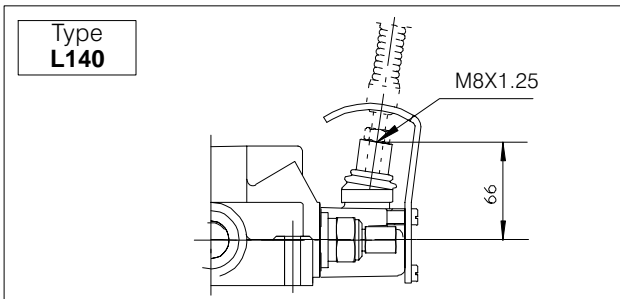
### 4.9 Lever styles



Lo		Type	Code
mm	inches		
150	5.90	<b>AL001</b>	200.7022.1019.0
200	7.87	<b>AL002</b>	200.7022.1003.0
250	9.84	<b>AL003</b>	200.7022.1005.0
300	11.81	<b>AL004</b>	200.7022.1006.0

\* L175 - L375 only for "Z" spool application  
\*\* L192 - L392 only for "WW" spool application

#### 4.9.1 Safety levers



Lo		Type	Code
mm	inches		
160	6.30	<b>AL014</b>	200.7022.1009.0
180	7.08	<b>AL018</b>	200.7022.1011.0



4.9.2 Remote cable control

<b>Lever Support</b>	Code 200.7609.0013.0
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M10X1.5

Optional 200.6772.0048.0

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

<b>Cable</b>	Cable length	Code
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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

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

<b>Spool Kit</b>
------------------

Code 200.9609.0037.0  
200.9609.0039.0\*

\* only for "Z" spool application

<b>Type L142</b>	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"

Optional 200.6772.0048.0

Only for rod remote control

<b>Type L218</b>	Code 200.7759.2028.0	L218 is supplied complete with rubber boot protection
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Spool 1 Spool 2

RV

M12

X

① ②

A A A

B B B

B<sub>1</sub> B<sub>2</sub>

B<sub>1</sub> B<sub>2</sub>

A<sub>2</sub> A<sub>2</sub>

A<sub>1</sub> A<sub>1</sub>

Fulcrum (Bottom left) Fulcrum

X

4.9.3 Cross joystick for dual axis spool control

<b>Type AL010</b>	Code 200.7022.3004.0
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Lo=250

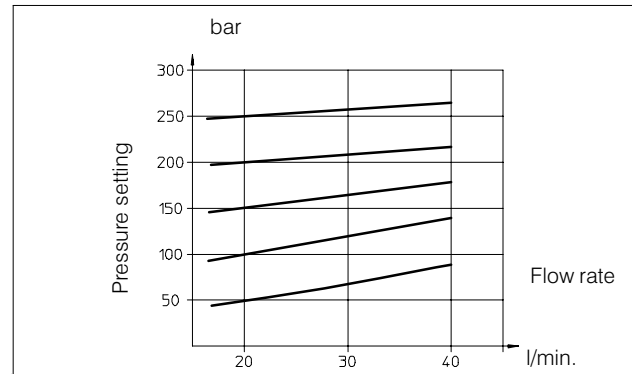
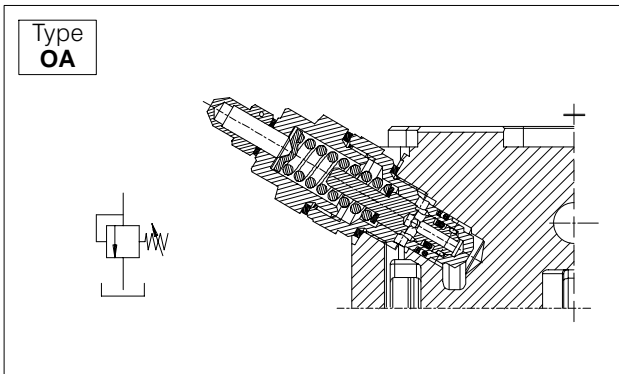
M12X1.75

4.10 Port relief and anti-cavitation valves

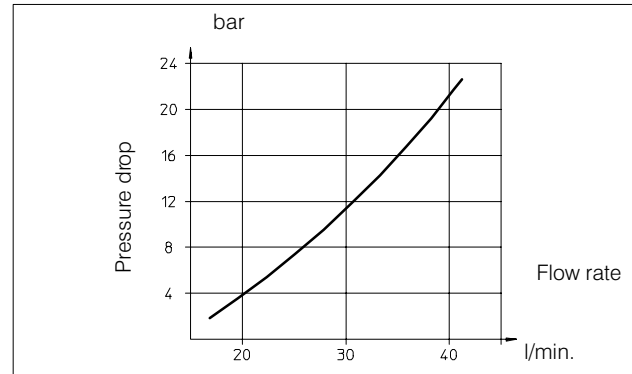
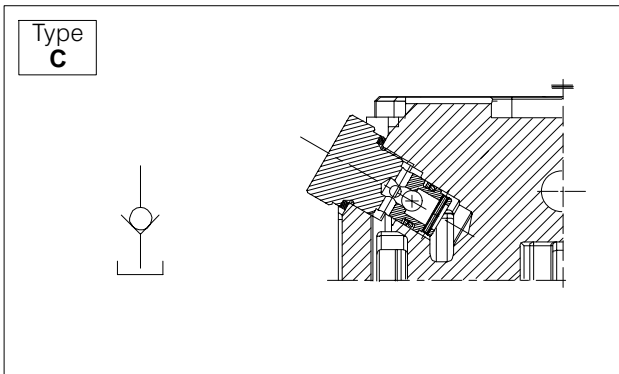
Port relief valve settings

Pressure set range bar (PSI)	Std. setting bar (PSI)	Type	Spring colour
31 - 130 (400 - 1850)	60 (860)	<b>06</b>	Yellow (YE)
131 - 320 (1850 - 4600)	150 (2100)	<b>15</b>	Green (GR)

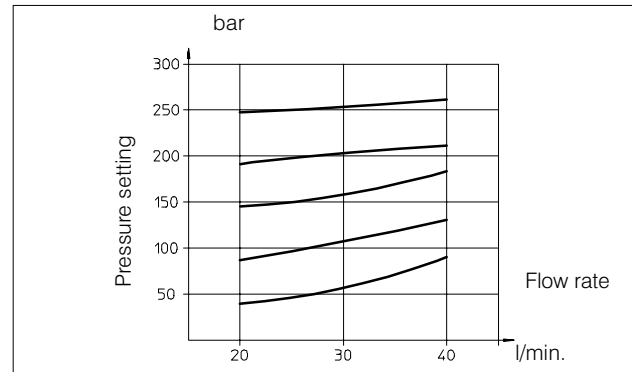
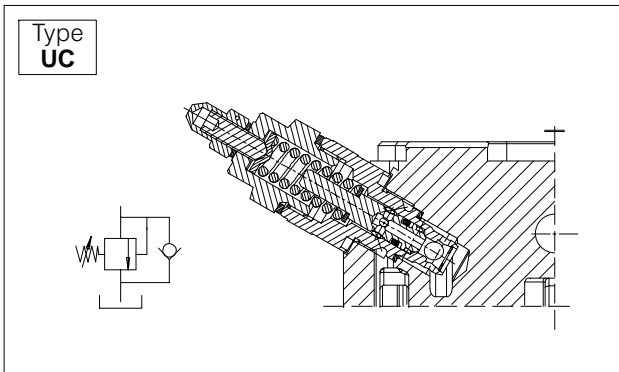
4.10.1 Port relief valve



4.10.2 Anti-cavitation valve

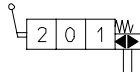


4.10.3 Combined port relief and anti-cavitation valve



**4.11 Hydraulic-Pneumatic control ON-OFF**

Type	Code
<b>HP 24</b>	200.9686.5049.0



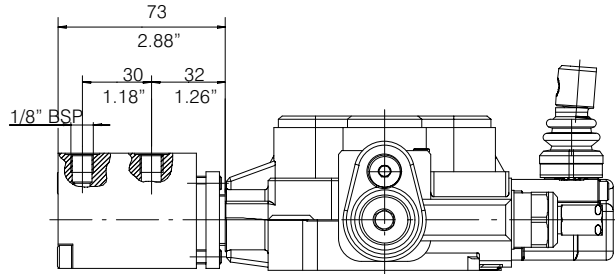
Operating conditions

Hydraulic control:

Pressure range: (bar) Min. 6 - Max. 15  
 (PSI) Min. 85 - Max. 215

Pneumatic control:

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



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