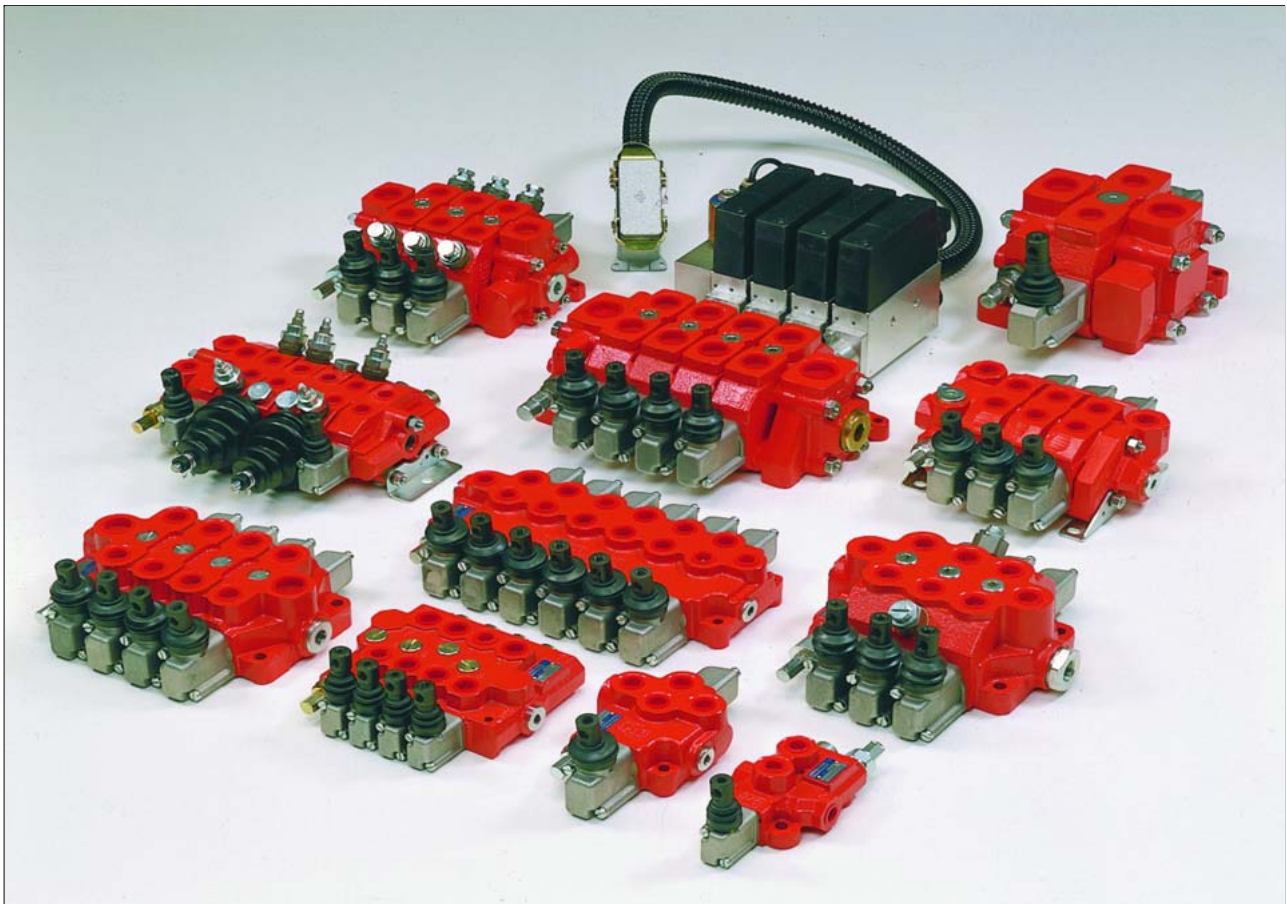


## Monobloc and Sectional Directional Control Valves



**5 Monobloc directional control valves HDM18****Contents**

5.1	General specifications	49
5.2	Dimensional data	50
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## 5.1 General specifications

Technical specification		
Max flow rate	l/min. U.S.G.P.M.	70 18
Max continuous operating pressure supply port P	bar PSI	350 5000
Max intermittent peak pressure Work port A/B	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.	14 0.854
Average	cm <sup>3</sup> /min. Cu. In./min.	7 0.427
Lower values on demand (to be agreed with our Sales Dept.)		

Number of spools	1 to 4
Adjustable direct operated relief valve (tamper-proof seal available on request)	RV
Load hold check valve in each section	LC

### 5.1.1 Weight

Version	kg	lb
HDM18/1	4.3	9.60
HDM18/2	6.0	13.2
HDM18/3	9.0	19.8
HDM18/4	12.0	26.4

### 5.1.2 Material specification:

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

### 5.1.3 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.

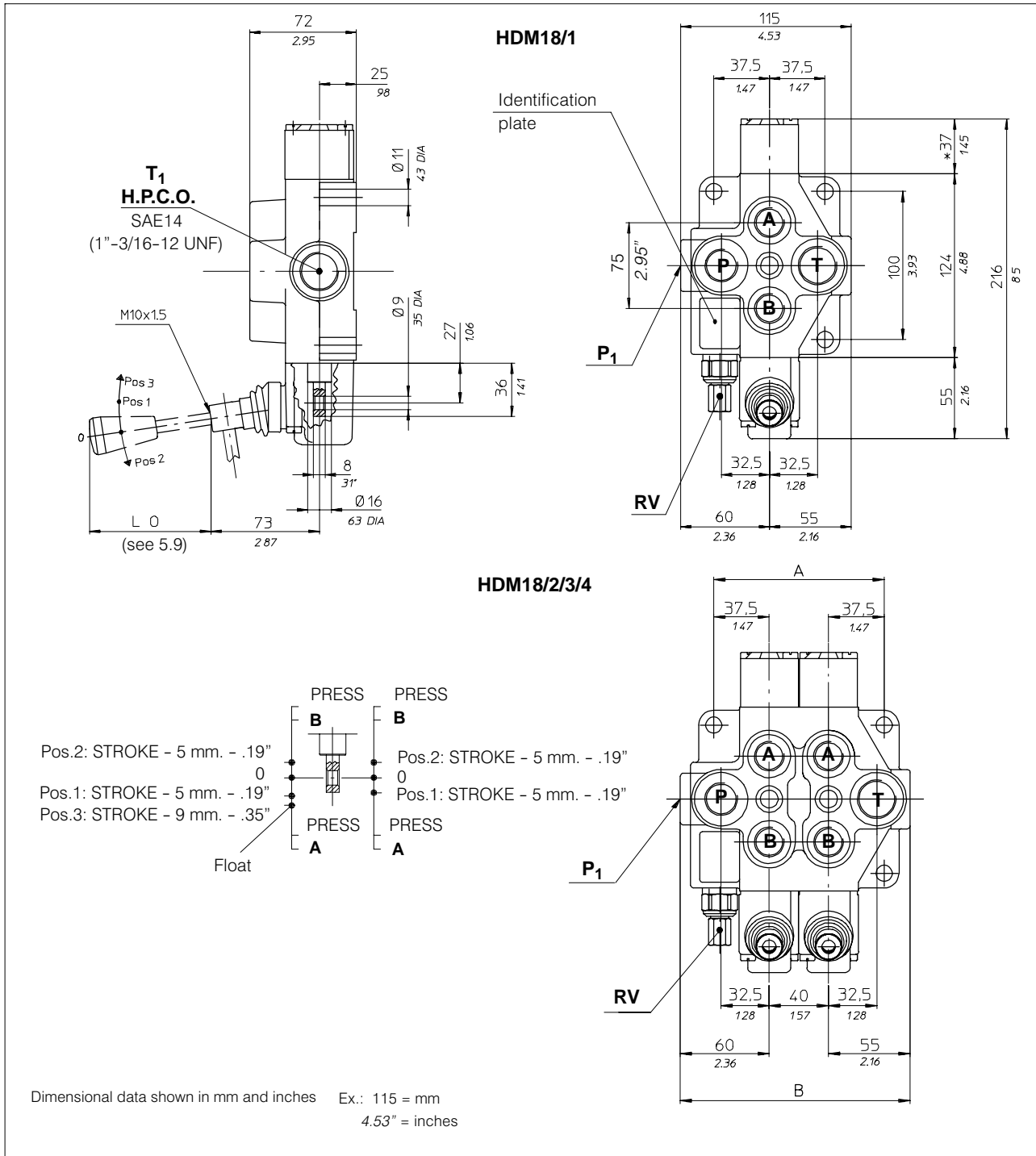
### 5.1.4 Optional features available:

- 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

### 5.1.5 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).

**5.2 Dimensional data**

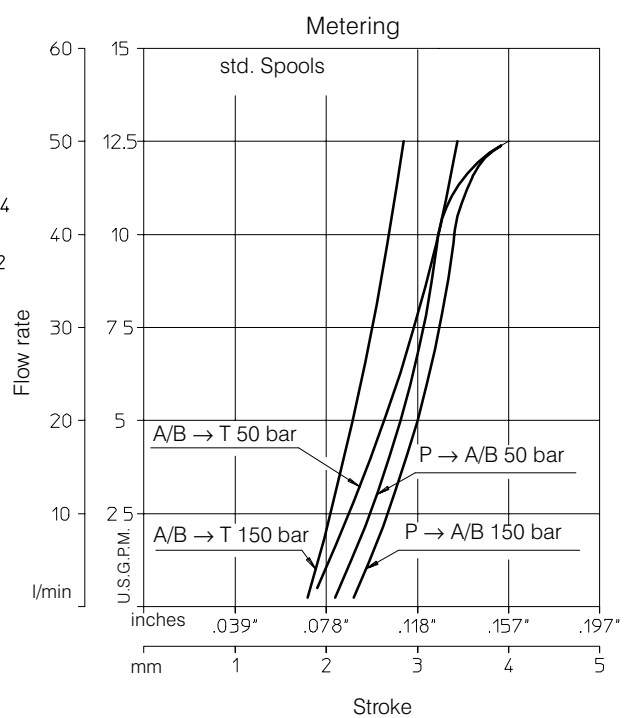
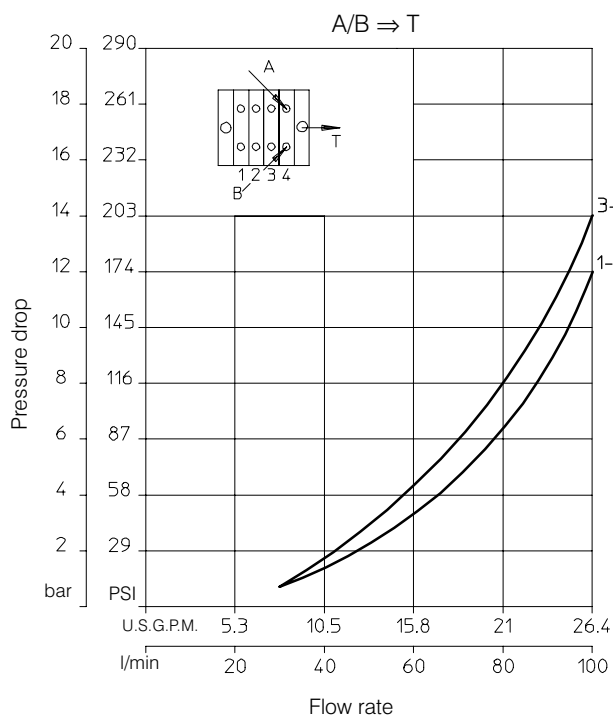
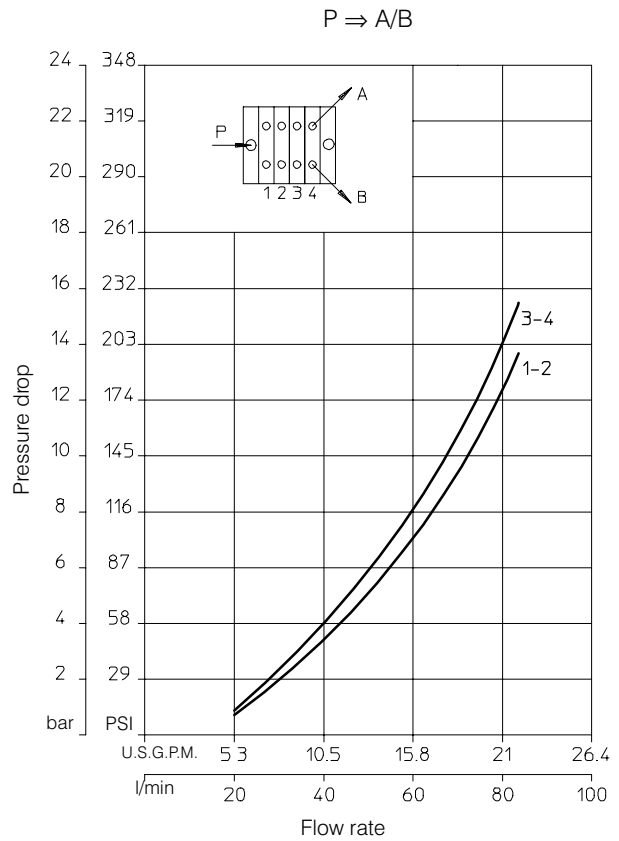
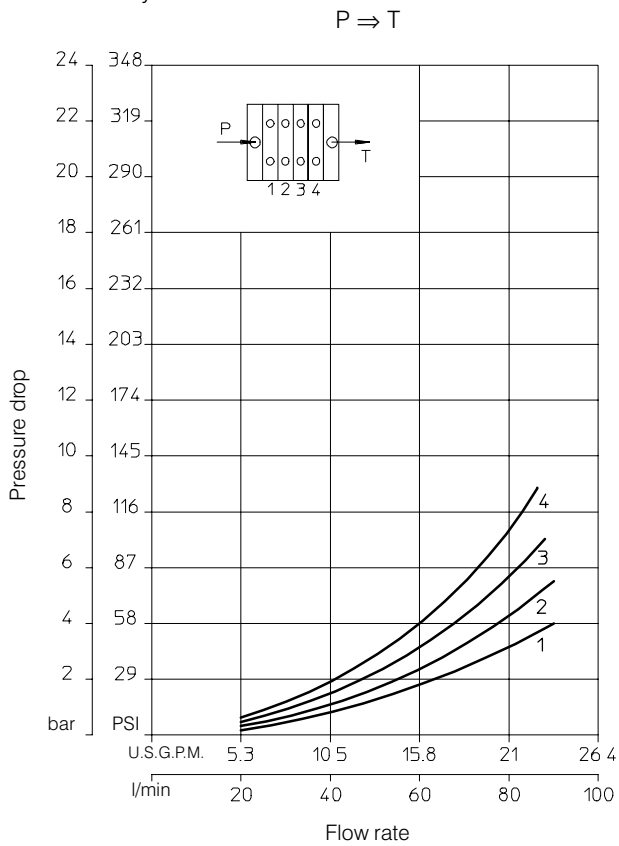


N. of sections		HDM18/2	HDM18/3	HDM18/4
Dimension	<b>A</b>	115	155	195
		4.53"	6.11"	7.69"
Dimension	<b>B</b>	155	195	235
		6.11"	7.69"	9.25"

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**5.3 Performance curves**

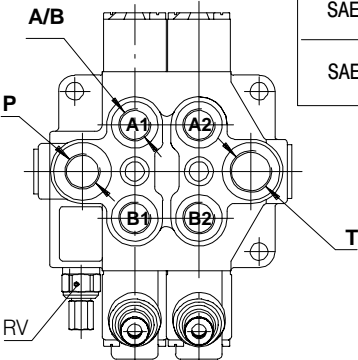
Oil: Shell Tellus T37  
Temperature: 50° C (120° F)  
Viscosity: 27 mm<sup>2</sup>/s



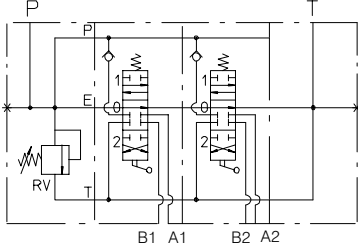
HDM18

**5.4 Monobloc bodies**

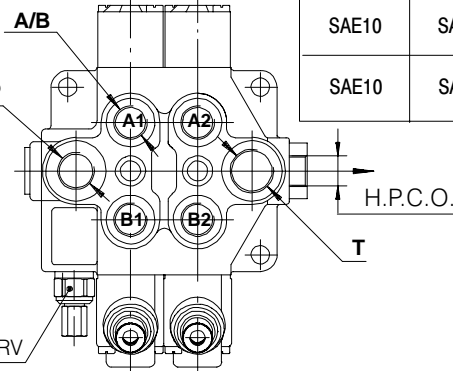
**5.4.1 Standard circuits: parallel  
Open centre with P – T – RV**



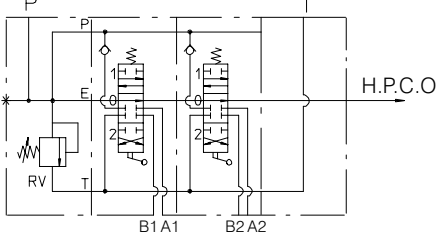
P	A/B	T	Type/Code			
			HDM18/1	HDM18/2	HDM18/3	HDM18/4
M18X1.5	M18X1.5	M18X1.5	<b>K01</b> 200.9441.1001.0	<b>K01</b> 200.9442.1001.0	<b>K01</b> 200.9443.1001.0	<b>K01</b> 200.9444.1001.0
M18X1.5	M18X1.5	M22X1.5	<b>K03</b> 200.9441.1002.0	<b>K03</b> 200.9442.1002.0	<b>K03</b> 200.9443.1002.0	<b>K03</b> 200.9444.1002.0
1/2" BSP	1/2" BSP	1/2" BSP	<b>K02</b> 200.9441.3006.0	<b>K02</b> 200.9442.3004.0	<b>K02</b> 200.9443.3006.0	<b>K02</b> 200.9444.3002.0
1/2" BSP	1/2" BSP	3/4" BSP	<b>K05</b> 200.9441.3007.0	<b>K05</b> 200.9442.3005.0	<b>K05</b> 200.9443.3007.0	<b>K05</b> 200.9444.3003.0
SAE10	SAE10	SAE10	<b>K04</b> 200.9441.8004.0	<b>K04</b> 200.9442.8003.0	<b>K04</b> 200.9443.8003.0	<b>K04</b> 200.9444.8003.0
SAE10	SAE10	SAE12	<b>K06</b> 200.9441.8005.0	<b>K06</b> 200.9442.8004.0	<b>K06</b> 200.9443.8004.0	<b>K06</b> 200.9444.8004.0



**5.4.2 Standard circuits: parallel  
Open centre and carry-over with P – T – RV  
H.P.C.O.**



P	A/B	T - HPCO	Code			
			HDM18/1	HDM18/2	HDM18/3	HDM18/4
M18X1.5	M18X1.5	M18X1.5	<b>K21</b> 200.9441.1003.0	<b>K21</b> 200.9442.1003.0	<b>K21</b> 200.9443.1003.0	<b>K21</b> 200.9444.1003.0
M18X1.5	M18X1.5	M22X1.5	<b>K23</b> 200.9441.1004.0	<b>K23</b> 200.9442.1004.0	<b>K23</b> 200.9443.1004.0	<b>K23</b> 200.9444.1004.0
1/2" BSP	1/2" BSP	1/2" BSP	<b>K22</b> 200.9441.3008.0	<b>K22</b> 200.9442.3006.0	<b>K22</b> 200.9443.3008.0	<b>K22</b> 200.9444.3004.0
1/2" BSP	1/2" BSP	3/4" BSP	<b>K25</b> 200.9441.3009.0	<b>K25</b> 200.9442.3007.0	<b>K25</b> 200.9443.3009.0	<b>K25</b> 200.9444.3005.0
SAE10	SAE10	SAE10	<b>K24</b> 200.9441.8006.0	<b>K24</b> 200.9442.8005.0	<b>K24</b> 200.9443.8005.0	<b>K24</b> 200.9444.8005.0
SAE10	SAE10	SAE12	<b>K26</b> 200.9441.8007.0	<b>K26</b> 200.9442.8006.0	<b>K26</b> 200.9443.8006.0	<b>K26</b> 200.9444.8006.0



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

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

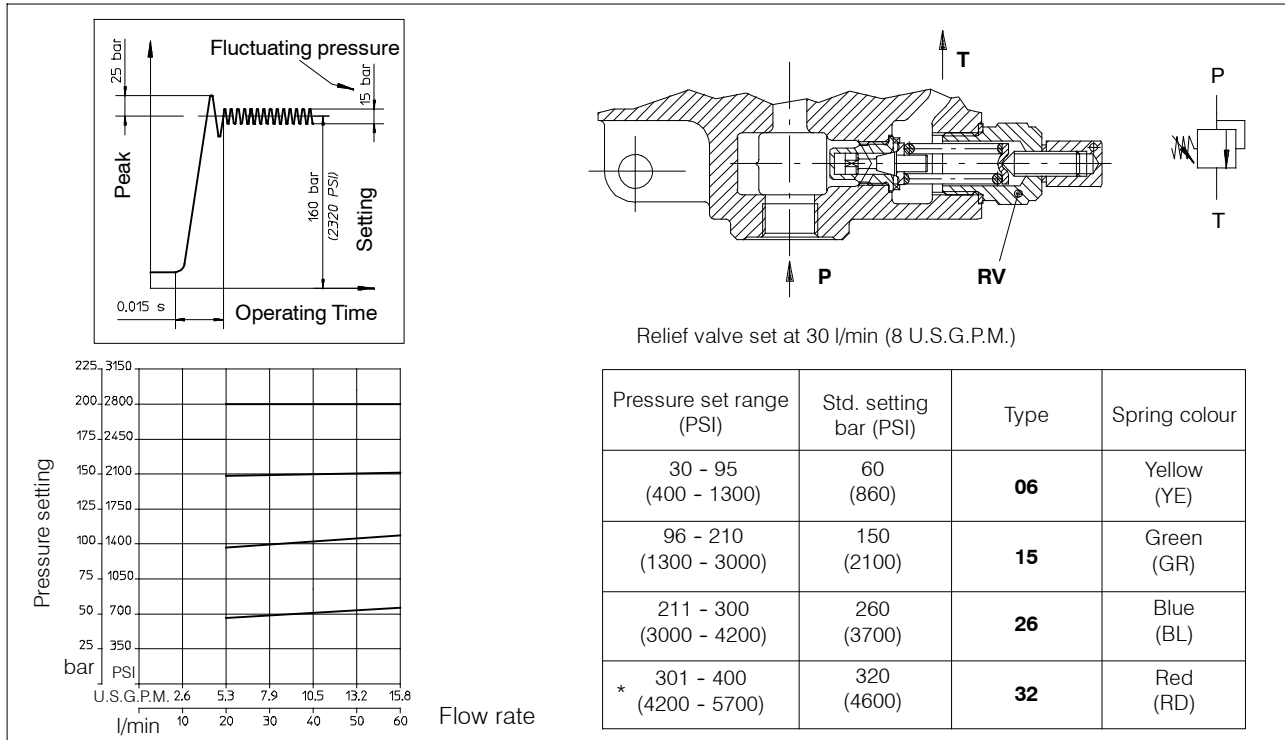
P	A/B	T	Type/Code			
			HDM18/1	HDM18/2	HDM18/3	HDM18/4
M18X1.5	M18X1.5	M18X1.5	<b>K31</b>	<b>K31</b>	<b>K31</b>	<b>K31</b>
M18X1.5	M18X1.5	M22X1.5	<b>K33</b>	<b>K33</b>	<b>K33</b>	<b>K33</b>
1/2" BSP	1/2" BSP	1/2" BSP	<b>K32</b>	<b>K32</b>	<b>K32</b>	<b>K32</b> 200.9444.3006.0
1/2" BSP	1/2" BSP	3/4" BSP	<b>K35</b>	<b>K35</b> 200.9442.3008.0	<b>K35</b>	<b>K35</b>
SAE10	SAE10	SAE10	<b>K34</b>	<b>K34</b>	<b>K34</b>	<b>K34</b>
SAE10	SAE10	SAE12	<b>K36</b>	<b>K36</b>	<b>K36</b>	<b>K36</b>

### 5.4.4 Optional circuit: load sensing Closed centre for variable-displacement pump with P – T – RV and L.S.

P	A/B	T	Type/Code			
			HDM18/1	HDM18/2	HDM18/3	HDM18/4
M18X1.5	M18X1.5	M18X1.5	<b>K61</b> 200.9441.1006.0	<b>K61</b>	<b>K61</b>	<b>K61</b>
M18X1.5	M18X1.5	M22X1.5	<b>K63</b>	<b>K63</b>	<b>K63</b>	<b>K63</b>
1/2" BSP	1/2" BSP	1/2" BSP	<b>K62</b>	<b>K62</b>	<b>K62</b>	<b>K62</b>
1/2" BSP	1/2" BSP	3/4" BSP	<b>K65</b>	<b>K65</b> 200.9442.3009.0	<b>K65</b>	<b>K65</b>
SAE10	SAE10	SAE10	<b>K64</b>	<b>K64</b>	<b>K64</b>	<b>K64</b>
SAE10	SAE10	SAE12	<b>K66</b>	<b>K66</b>	<b>K66</b>	<b>K66</b>

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

## 5.5 Adjustable direct acting Relief Valve RV



\* The maximum operating pressure for each valve series is indicated in the "Technical specification" at the first page of each valve section.

## 5.6 Spool charts

Spool scheme	Spool features	Type
	4 way - 3 position A/B closed E open by pass	<b>A</b> <b>AS*</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> <b>CS*</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>GS*</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>SS*</b>

	4 way - 3 position series connection	<b>X</b> <b>XS*</b>
	4 way - 3 position A/B to tank in neutral series connection	<b>XC</b>
	4 way - 4 position 4 <sup>th</sup> float position	<b>Z</b> <b>ZS*</b>
	4 way - 3 position A/B closed Load Sensing	<b>**</b> <b>LSA</b>
	4 way - 3 position A/B to tank in neutral Load Sensing	<b>**</b> <b>LSC</b>
	3way - 3 position B closed Load Sensing	<b>**</b> <b>LSG</b>
	3 way - 3 position A closed Load Sensing	<b>**</b> <b>LSS</b>
** : special body required		
* : High metering spool (max. flow suggested 40 l/min)		

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



## 5.7 Load Sensing

### Load-sensing control and working principle

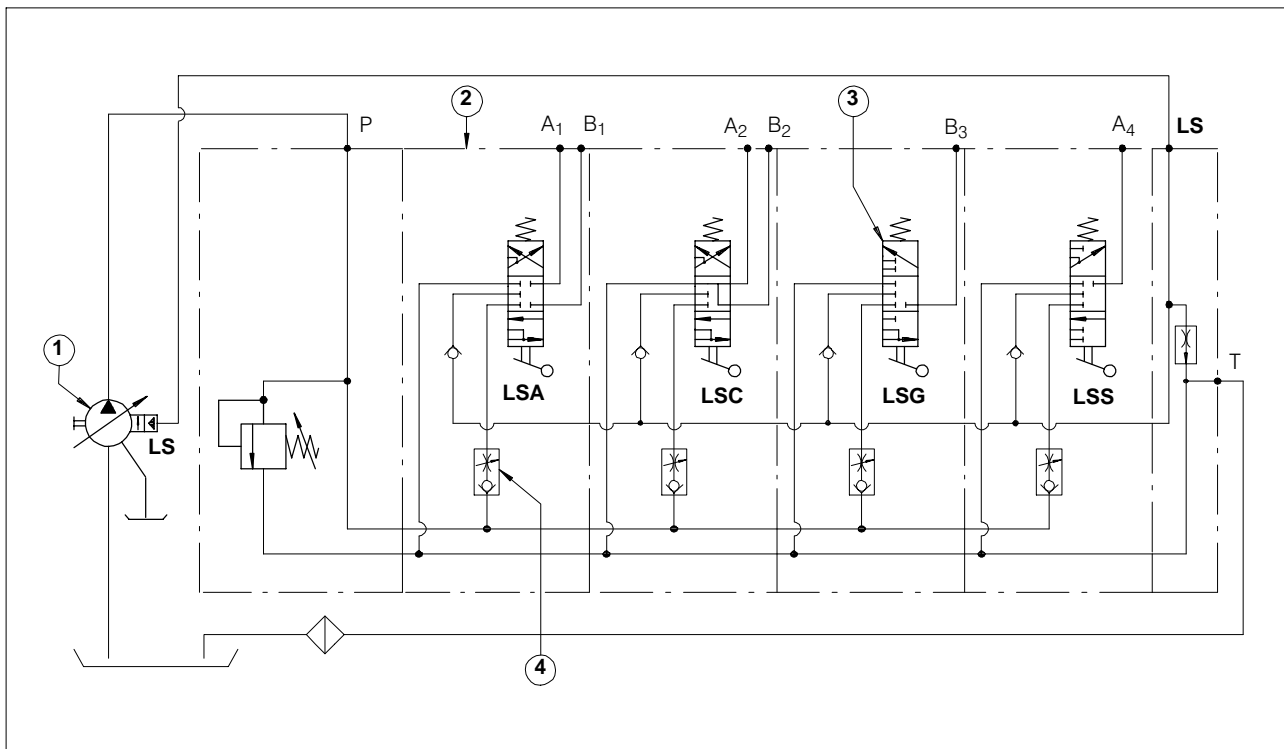
Through the use of variable flow pumps provided with a pressure and flow compensator the pressure and flow parameters can be adapted according to the different and real working conditions.

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

The Load Sensing brings following advantages:

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



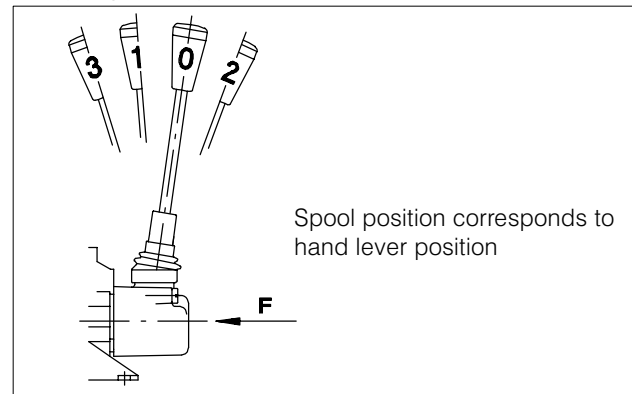
- Variable flow pump provided with pressure and flow compensator.
- Load Sensing valve.

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

## 5.8 Spool positioners

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

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

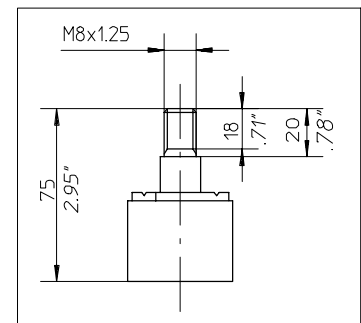
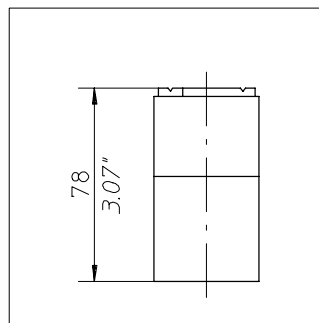
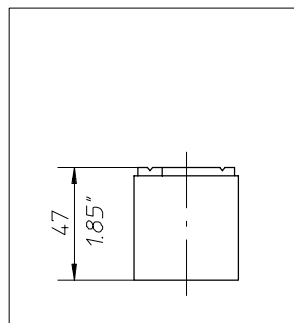
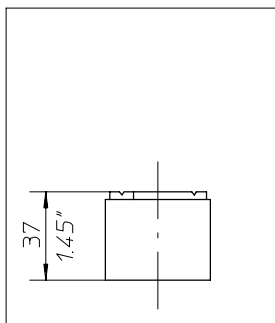


F (N) = Force in Newton (N) needed to operate the spool

F (N)	Spool position control
260	<b>08</b>
130	<b>79</b>
190	<b>133</b> (standard)

Note: consult factory for different configurations.

### 5.8.1 Spool positioners dimensions



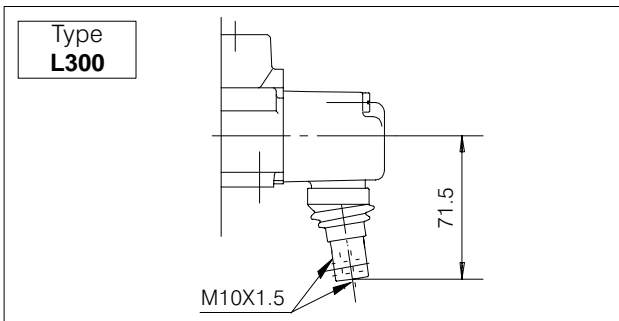
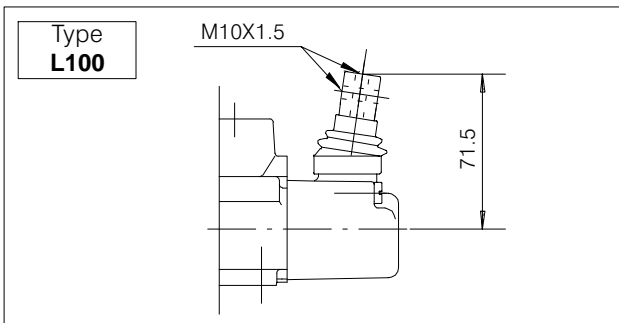
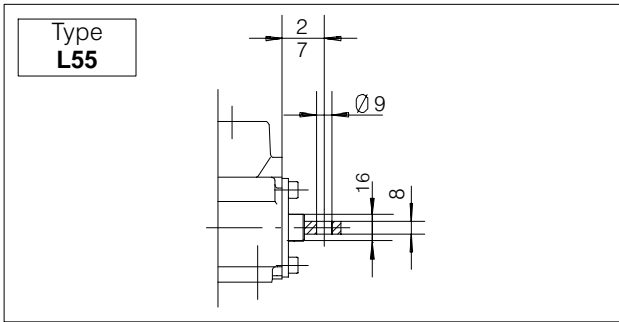
Spool positioners <b>08 – 38 – 79 – 133</b>	Spool positioners <b>10 – 17 – 20 – 25 – 27 29 – 36 – 37</b>	Spool positioner (Z spool type) <b>136</b>	Spool positioner <b>84</b>
--	---	--	-------------------------------

### 5.8.2 Microswitch control

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

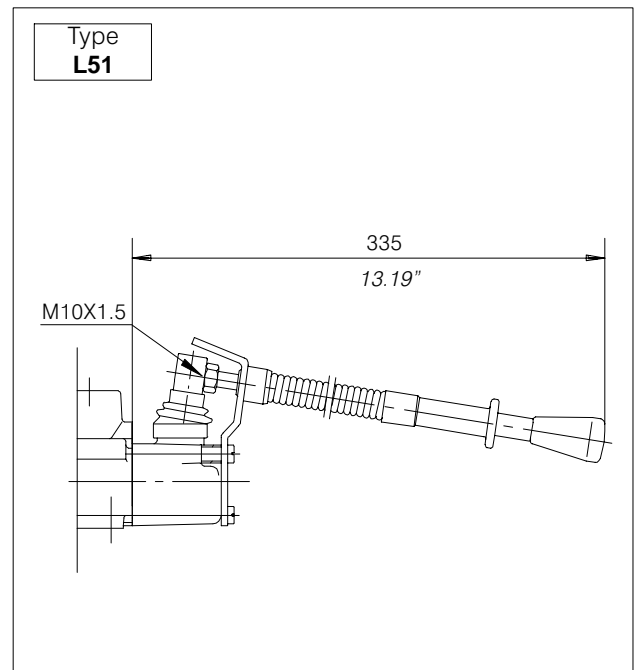
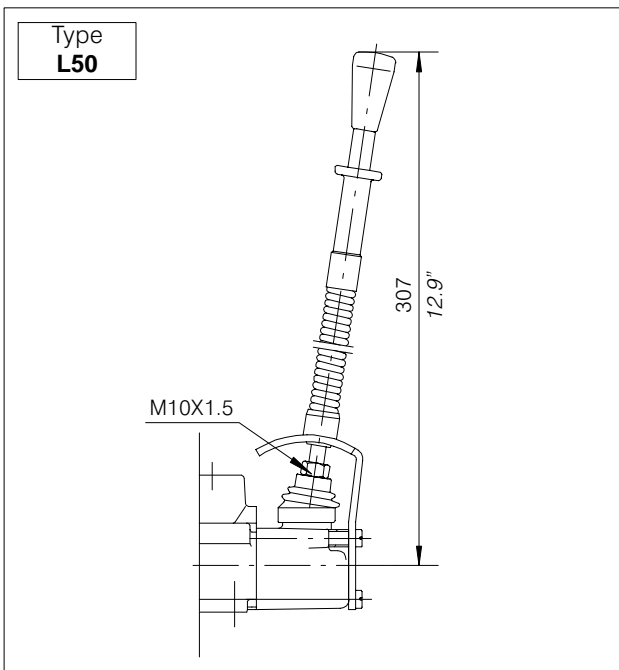
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## 5.9 Lever styles



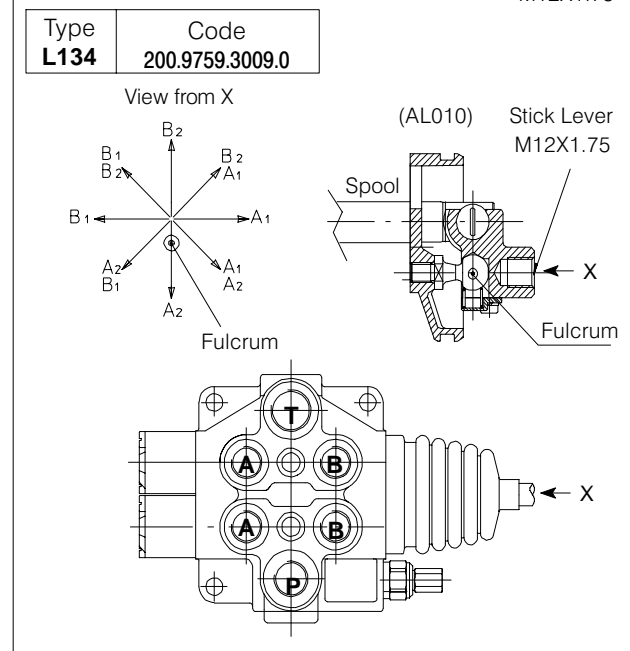
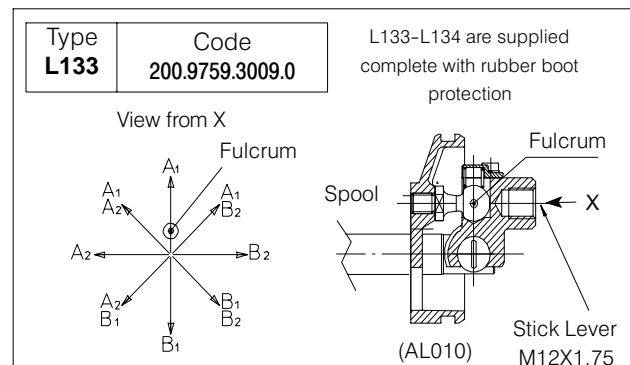
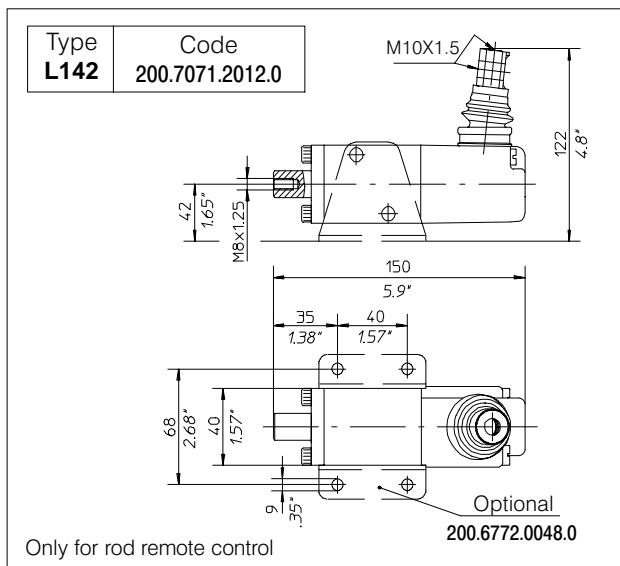
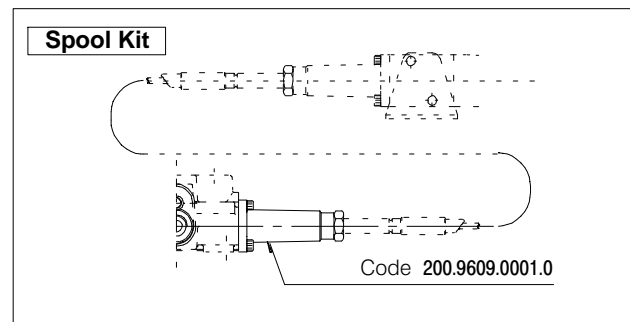
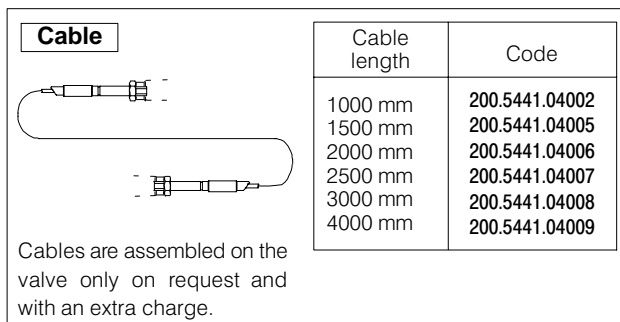
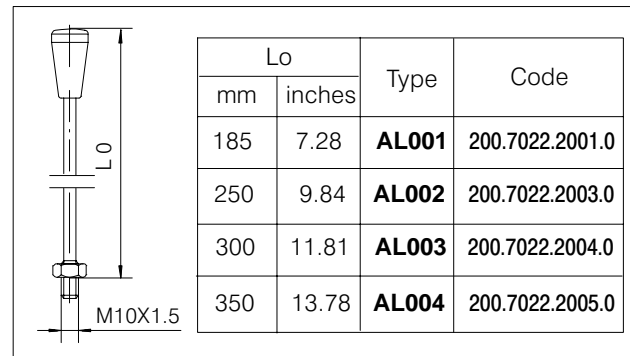
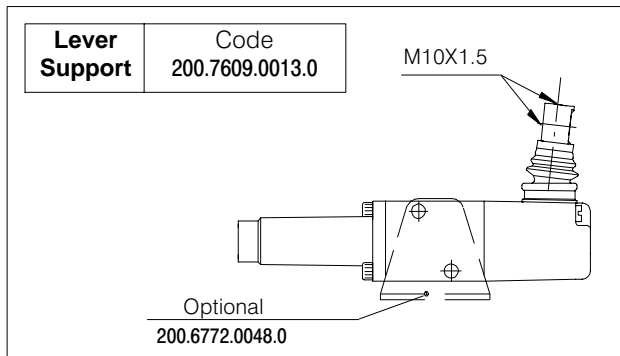
Lo		Type	Code
mm	inches		
185	7.28	<b>AL001</b>	200.7022.2001.0
250	9.84	<b>AL002</b>	200.7022.2003.0
300	11.81	<b>AL003</b>	200.7022.2004.0
350	13.78	<b>AL004</b>	200.7022.2005.0

### 5.9.1 Safety levers

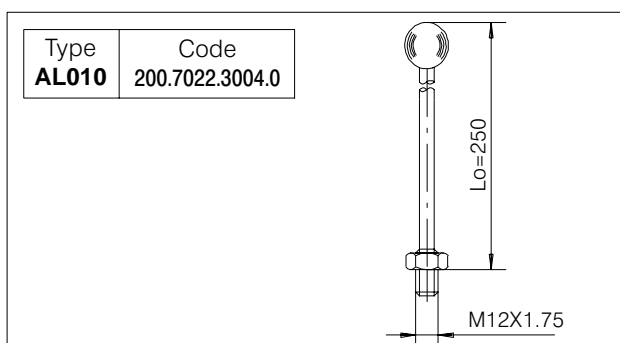


HDM18

## 5.9.2 Remote cable control



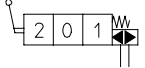
## 5.9.3 Cross joystick for dual axis spool control



HDM18

## 5.10 Hydraulic-Pneumatic control ON-OFF

Type	Code
<b>HP 24</b>	<b>200.9686.5011.0</b>

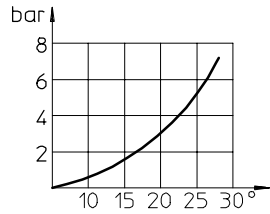
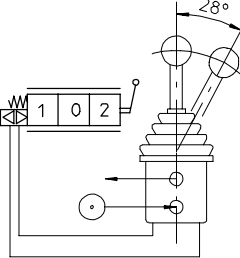


Operating conditions  
 Hydraulic:  
 Pressure range: (bar) Min. 6 - Max. 15  
 (PSI) Min. 85 - Max. 215  
 Pneumatic:  
 Pressure range: (bar) Min. 6 - Max. 10  
 (PSI) Min. 85 - Max. 145

## 5.11 Pneumatic controls

### 5.11.1 Pneumatic proportional control

Type	Code
<b>PP 150</b>	<b>200.9686.5009.0</b>

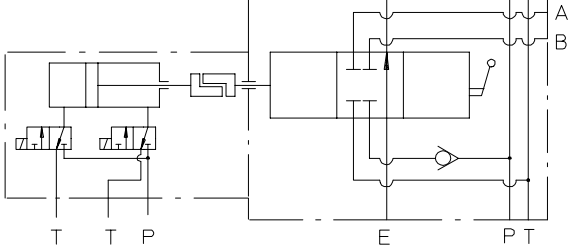
Technical drawing of PP 150 valve with dimensions: 115 (4.53\"/>

### 5.11.2 Electro-pneumatic control ON-OFF

Voltage	Type	Code
12 VDC	<b>EP 77</b>	<b>200.9686.6023.0</b>
24 VDC	<b>EP 78</b>	<b>200.9686.6026.0</b>

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)

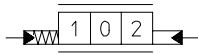
Operating conditions  
 Pressure range: (bar) Min. 6 - Max. 10  
 (PSI) Min. 85 - Max. 145  
 Ambient temperature: -10° C to 50° C (14° F to 122° F)  
 Response time: 6 - 8 milliseconds  
 Mounting in any position



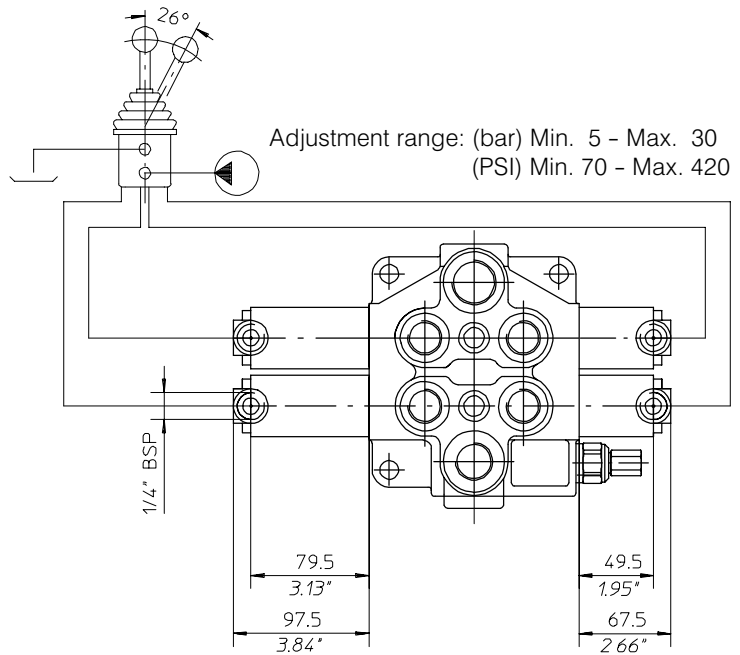
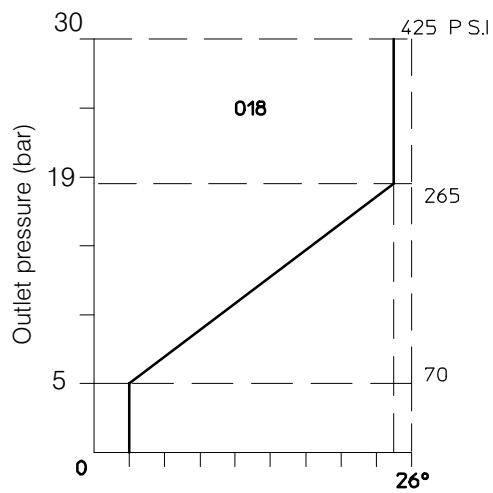
HDM18

**5.12 Hydraulic Proportional control**

Type	Code
<b>HP 50</b>	200.9686.5019.0



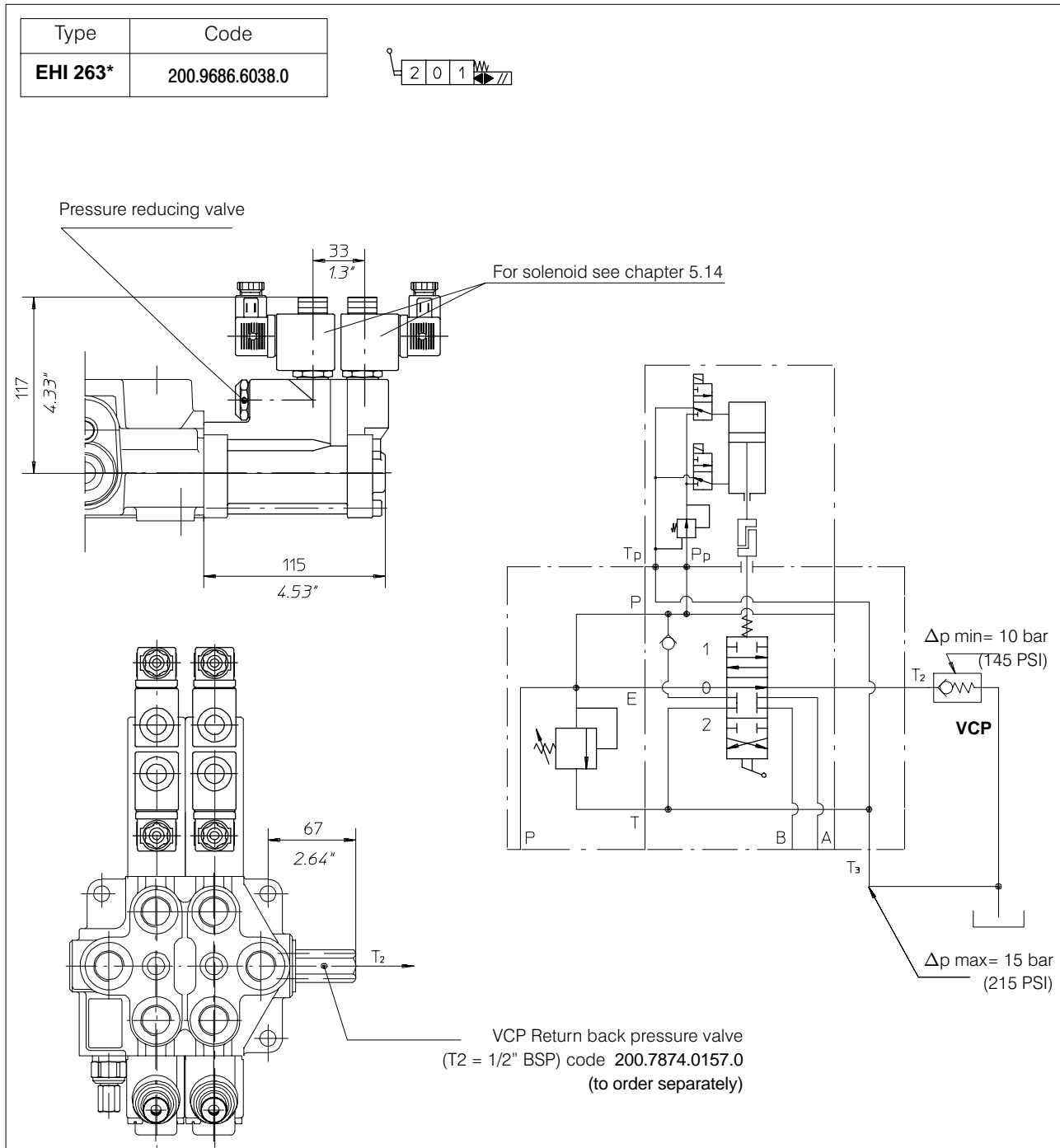
Joystick adjustment diagram



HDM18

## 5.13 Electro-Hydraulic controls

### 5.13.1 Electro-hydraulic control internal pilot version ON-OFF with pressure reducing valve



#### Mechanical and hydraulic features

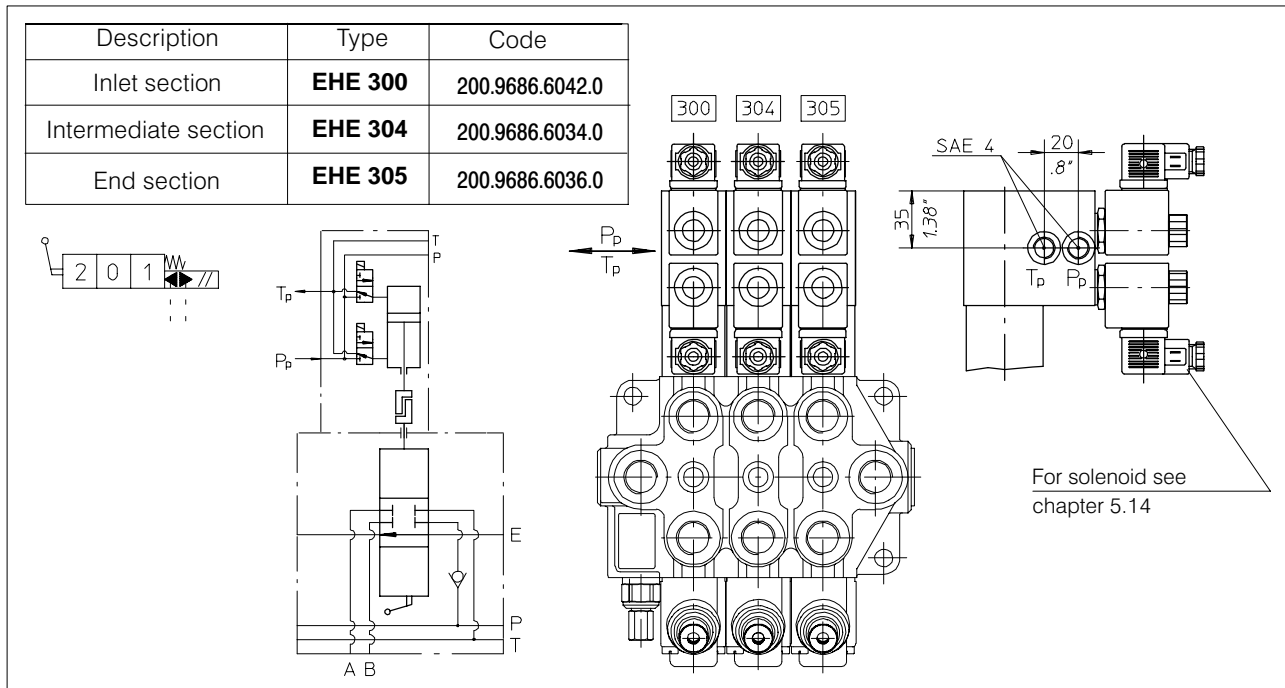
Max pressure on P<sub>p</sub> port . . . . . 300 bar (4200 PSI)  
 Reduced pressure after pressure reducing valve . . . . . 10 bar (145 PSI)  
 Fixed delivery on P<sub>p</sub> pilot line . . . . . 1 l/min (0.26 U.S.G.P.M)

Leakage of pressure reducing valve (in neutral pos.) . . . . . 100 ml/min ( 6.1 in<sup>3</sup>/min )  
 Min. suggested filtration . . . . . 25 micron  
 Operating oil temperature . . . . . min.-30°C- max. 90°C  
 . . . . . min.-22°F - max 194°F

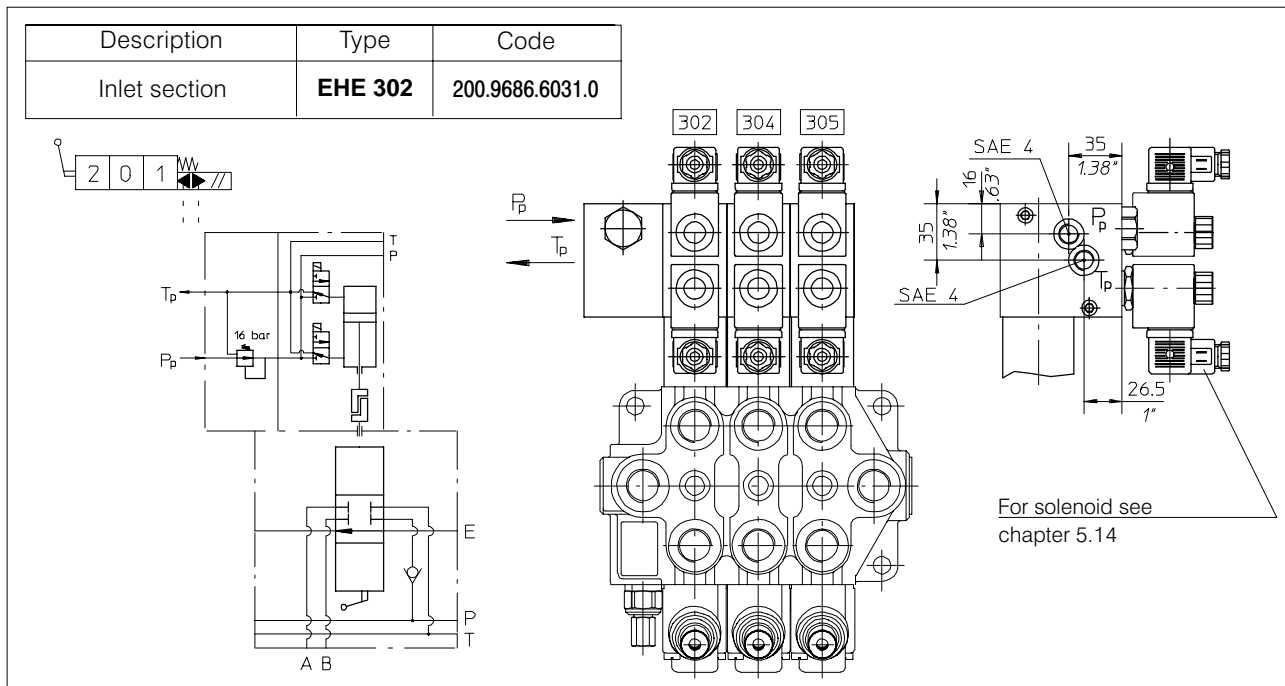
\* EHI 263: special body required.

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### 5.13.2 Electro-hydraulic controls external pilot version ON-OFF



### 5.13.3 Electro-hydraulic control external pilot version ON-OFF with pressure reducing valve on inlet manifold



#### Mechanical and hydraulic features

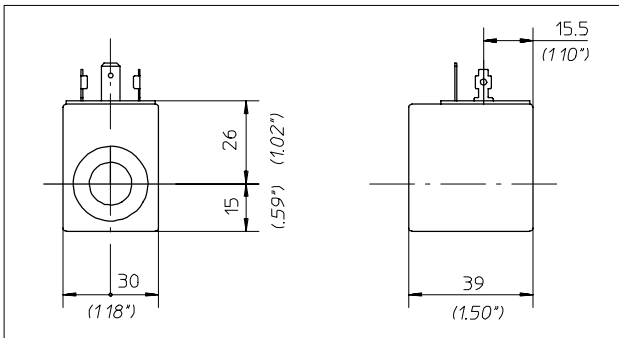
Pilot pressure min. .... 10 bar (140 PSI)  
 Pilot pressure max. .... 30 bar (420 PSI)  
 Pilot pressure with pressure reducing valve .... 12 bar (175 PSI)  
 Pilot flow to each working section .... 1 l/min (0.26 U.S.G.P.M.)

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 in<sup>3</sup>/min)  
 Min. suggested filtration .... 25 micron



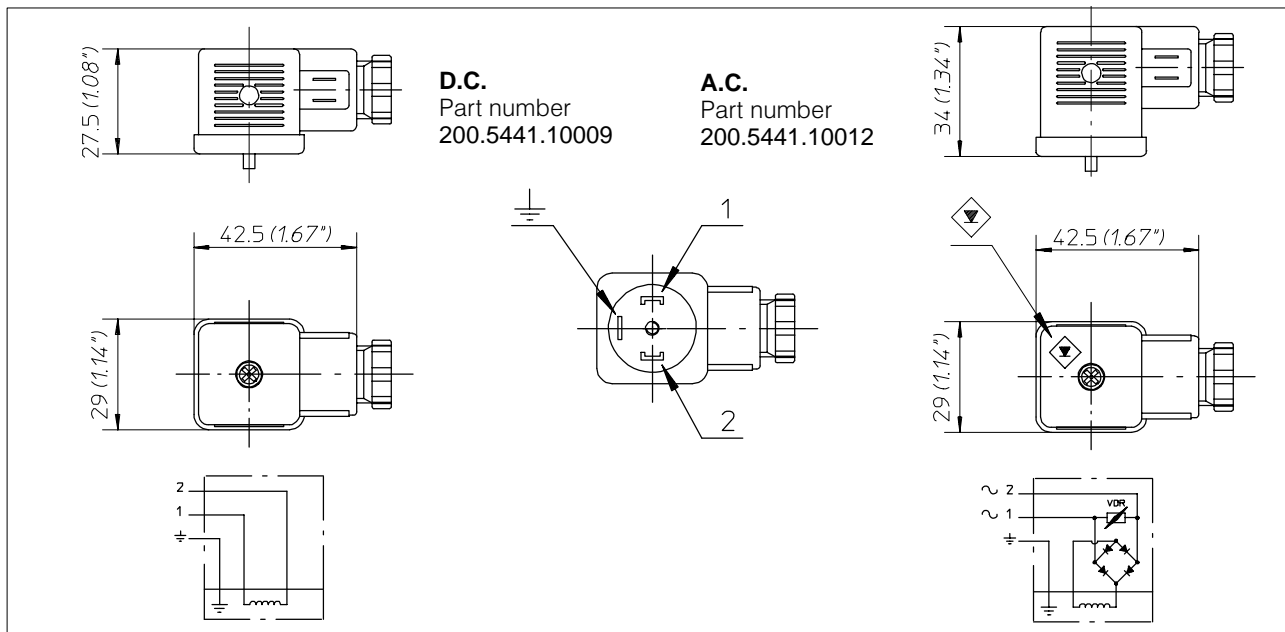
HDM18

## 5.14 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 temperature	Stabilized temperature	Ambient temperature	Stabilized temperature	
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 + $\perp$
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 <sup>2</sup>
Outer material	Glass fibre reinforced nylon
Protection factor	IP65 (DIN 40050)
Insulation class	C (VDE 0110)
Temperature range	-40° +90°C

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## 5.15 Electromagnetic controls ON-OFF

+

Voltage	Type	Code
12 VDC	<b>EPP 344*</b>	200.9686.1179.0
24 VDC	<b>EPP 343*</b>	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 flow ..... 40 l/min (15 U.S.G.P.M.)  
Max back pressure ..... 5 bar (70 PSI)  
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 a hydraulic valve with oil circulation.  
Insulation class:  
according to VDE 0580 standard ..... H  
Electrical connection:  
with Hirschmann connector per DIN 43650 ..... IP 65

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