

Part number:

HYDROMA

HYDRAULICKÉ SYSTÉMY

HIDROMA
SYSTEMS

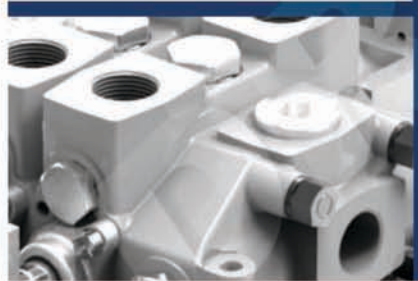
UKŁADY HYDRAULICZNE

HYDROMA

ГИДРАВЛИЧЕСКИЕ СИСТЕМЫ

D12

SECTIONAL VALVE



QUICK REFERENCE GUIDE

GENERAL SPECIFICATION	D9	D3M	DVS10	D4	D6	D16	D12	DVS20	D20	D25	D40
Working sections number	1-12	1-12	1-12	1-12	1-12	1-12	1-12	1-12	1-12	1-12	1-10
CIRCUIT											
Parallel	•	•	•	•	•	•	•	•	•	•	•
Series	•	•	•	•	•	•	•		•	•	
Tandem	•	•	•	•	•	•		•	•		
Parallel circuit stroke (mm)	6	5	6	6	7	7	9,5	9,5	9,5	12	15
Series circuit stroke (mm)	6	5	6	6	5	7	6,5		6,5	8,5	
Float spool extra stroke (mm)	5	5	5	5,5	6	7	7	7	7	9,5	10
Spools pitch (mm)	31	38	35	40	46	46	56	56	64	75	91
RATED FLOW											
Max recommended flow rate (l/min)	35	55	45	80	100	150	180	250	250	380	700
Max recommended flow rate (GPM)	10	15	12	22	27	40	48	67	67	100	185
RATED PRESSURE											
Max working pressure (bar)	350	350	350	350	350	350	350	250	350	350	350
Max working pressure (PSI)	5000	5000	5000	5000	5000	5000	5000	4000	5000	5000	5000

OPTION CHART	D9	D3M	DVS10	D4	D6	D16	D12	DVS20	D20	D25	D40
Direct acting pressure relief valve	•	•	•	•							
Pilot operated pressure relief valve		•		•	•	•	•	•	•	•	•
2 stage pilot operated relief valve		•		•	•	•	•		•	•	•
Externally piloted valve	•	•	•	•	•	•	•		•	•	•
Solenoid dump valve (12 Vdc)	•	•	•	•	•	•	•				
Solenoid dump valve (24 Vdc)	•	•	•	•	•	•	•				
Main anticavitation check valve		•		•	•	•	•	•	•	•	•
Clamping valve		•	•	•							
SPOOL ACTUATION											
Manual control	•	•	•	•	•	•	•	•	•	•	•
Without lever	•	•	•	•	•	•	•	•	•	•	•
90° joystick control		•	•	•	•	•					
Hydraulic control	•	•	•	•	•	•	•	•	•	•	•
Direct electric control (12-24 Vdc)		•		•							
SPOOL RETURN ACTION											
Spring return	•	•	•	•	•	•	•	•	•	•	•
Detent in A - in B - in A/B	•	•	•	•	•	•	•	•	•	•	•
Detent in 4 th position	•	•	•	•	•	•	•	•	•	•	•
Arrangement for dual control	•	•		•	•	•	•		•		
Hydraulic load limit	•	•		•	•	•					
Pneumatic control ON - OFF		•	•	•	•	•	•	•	•		
Proportional pneumatic control		•	•	•	•	•	•	•	•		
Electrical load limit	•	•		•	•	•					
Electrohydraulic control ON-OFF (12-24 Vdc)		•	•	•	•	•	•	•	•		
Electrohydraulic control PROP. (12-24 Vdc)		•	•	•	•	•	•	•	•		
Electropneumatic control (12-24 Vdc)		•	•	•	•	•	•		•		
AUXILIARY VALVES											
Antishock valve	•	•	•	•	•	•	•	•	•	•	•
Anticavitation valve	•	•		•	•	•	•	•	•	•	•
Combined valve	•	•	•		•	•	•		•	•	•
Pilot combined valve						•		•	•	•	•

GENERAL INDEX

4	General specifications Standard working conditions Fluid options
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GENERAL SPECIFICATIONS

Standard working conditions

Description	Value
Ambient operating temperature range	-40°C / +60°C
Kinematic viscosity range	10 ÷ 300 cSt
Max contamination level	9 (NAS 1638) - 20/18/15 (ISO 4406:1999)
Recommended filtration level	b10 > 75 (ISO 16889:2008)
Internal filter (on electroproportional valves pilot line)	30 µm

All information and diagrams in this catalogue refer to a mineral base oil VG46 at 50°C temperature (32 cSt kinematic viscosity)

Fluid options

Types of fluid (according to ISO 6743/4) Oil and Solutions	Temperature (°C)		Compatible gasket
	min	max	
Mineral Oil HL, HM (or HLP acc. to DIN 51524)	-25	+80	NBR
Oil in water emulsions HFA	+5	+55	NBR
Water in oil emulsions HFB	+5	+55	NBR
Polyglycol-based aqueous solution HFC	-10	+60	NBR

For special applications and different fluids, please call our Technical Department.

ORDER EXAMPLE

D12/1: IR 009 150 A G05 W001A H101 F001A RP G05 01 PA 100 05 PB TJ A G06

TYPE:

D12: product type
/1: working section number

1) INLET ARRANGEMENT: pag. 10

IR 009 inlet side and valve type
150 setting (bar)
A G05 inlet position and available thread type

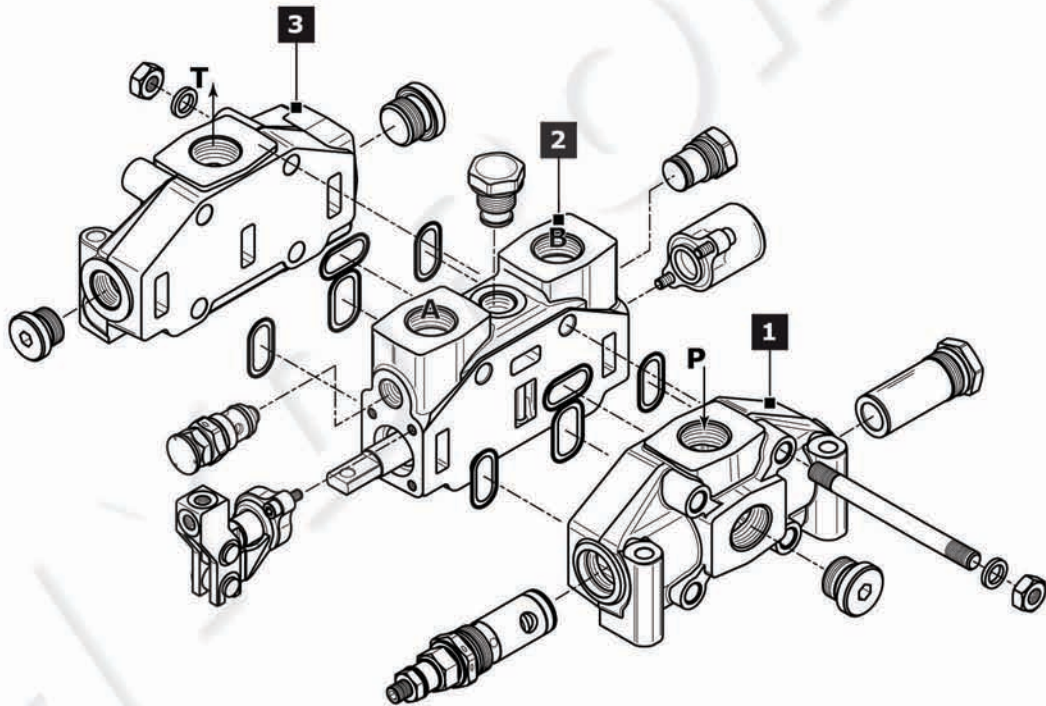
2) WORK SECTION ARRANGEMENT: pag. 13

W001A spool type
H101 spool actuation type
F001A spool return action type
RP G05 type and thread section
01 PA 100 auxiliary valve (port A)
05 PB auxiliary valve (port B)

3) OUTLET ARRANGEMENT: pag. 32

TJ outlet type
A G06 outlet position and available thread type

Ordering row 2 must be repeated for every work section



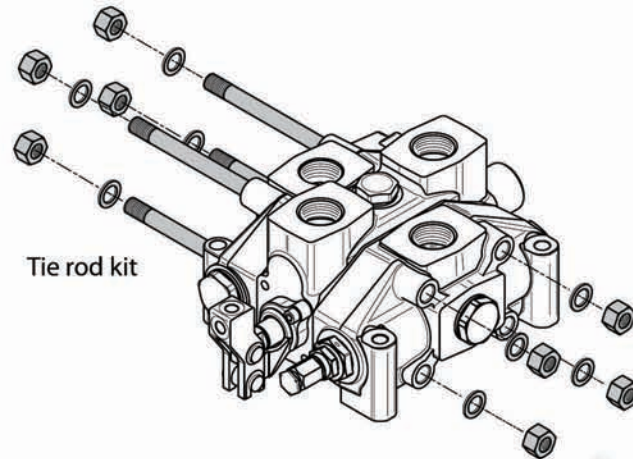
Standard thread

The connection ports size is indicated by an ordering code common for all Hydrocontrol products. Following table shows all available connections; for ordering code refer to table on page 40.

Ports	BSP (ISO - 228)	Code	UN-UNF (ISO - 725)	Code	METRIC (ISO-262)	Code
Inlet Port (P)	G 3/4 - G 1	G05-G06	1"1/16 - 12 UNF	U05	3/4" (MA) - 3/4" (UNC)	S03-S04
Ports (A - B)	G 3/4 - G 1	G05-G06	1"1/16 - 12 UNF	U05	3/4" (MA) - 3/4" (UNC)	S03-S04
Outlet (T) - Carry over (HPCO)	G 1	G06	1"5/16 - 12 UNF	U06	3/4" (MA) - 3/4" (UNC)	S03-S04
Hydraulic Pilot	G 1/4	G02	9/16" - 18 UNF	U02		
Pneumatic Pilot	G 1/8	-	NPTF 1/8-27			

Tie-rod kit classification (appendix "A")

Tie rod kit allows the correct assembly of sectional valves. Tie rod's length depends on the number of sections; each valve is assembled with tie rod kits including a tie rod, two nuts and two washers. D12 requires 4 tie-rod kits.



Tie rod kit	Order Code	Lenght (mm)	Clamping Torque (Nm)	Quantity
D12/1	300107001	208		
D12/2	300107002	264		
D12/3	300107003	320		
D12/4	300107004	376		
D12/5	300107005	432		
D12/6	300107006	488		
D12/7	300107007	544	70	4
D12/8	300107008	600		
D12/9	300107009	656		
D12/10	300107010	712		
D12/11	300107011	768		
D12/12	300107012	824		

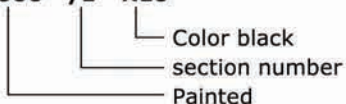
Painting

On request, all Hydrocontrol valves can be delivered painted (RAL 9005 black primer).

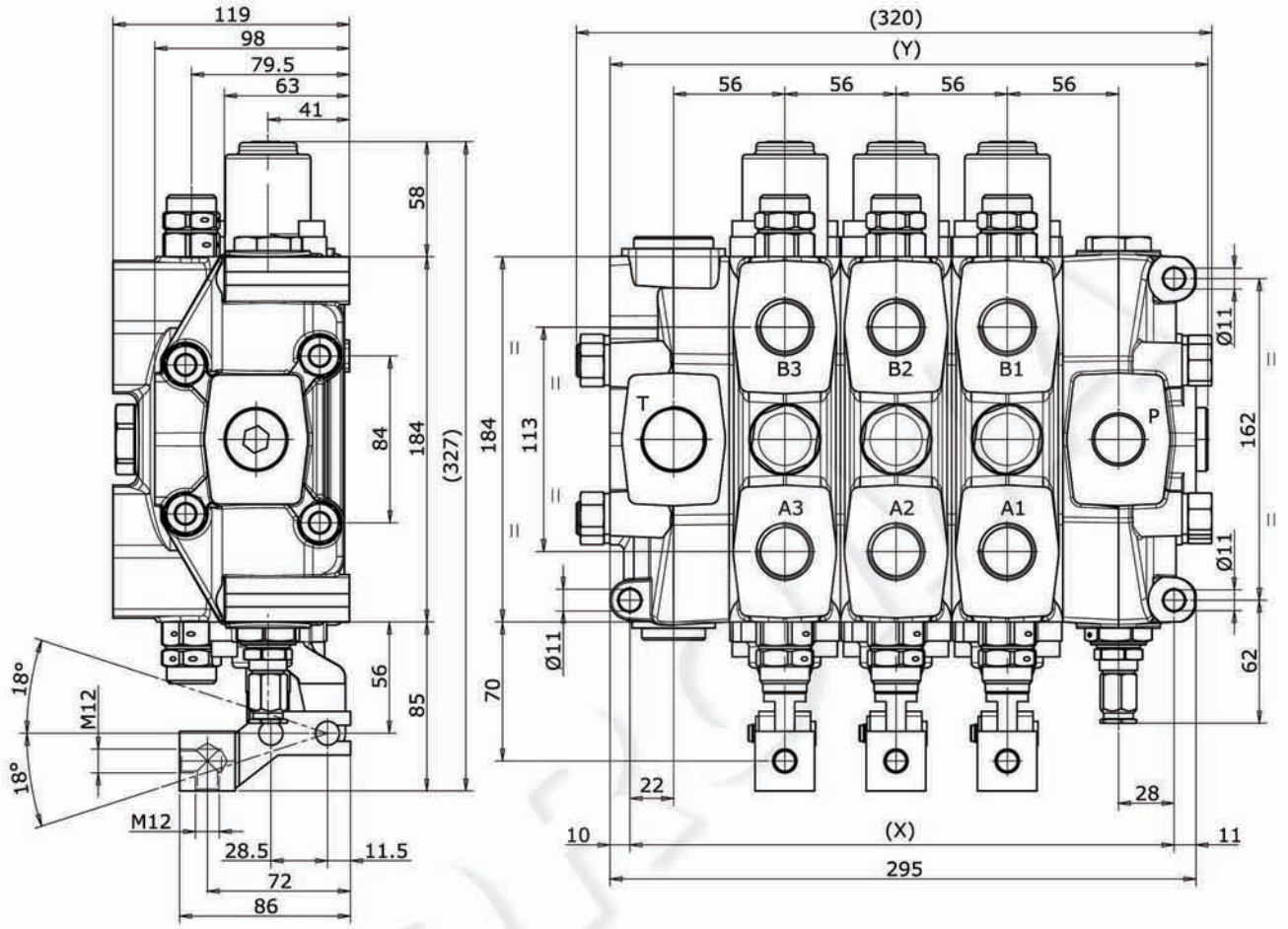
Order example of D12/1 painted:

D12/1
 IR 009 150 A G05
 W001A H101 F001A RP G05 01 PA 100 05 PB
 TJ A G06
P006/1 N10

The painting is indicated with the following value:

P006 - /1 - N10

DIMENSIONS

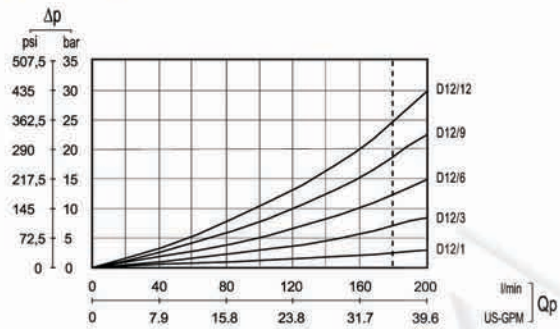
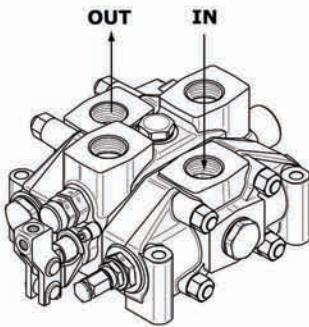


TYPE	/1	/2	/3	/4	/5	/6	/7	/8	/9	/10	/11	/12
X (mm)	162	218	274	330	386	442	498	554	610	666	722	778
Y (mm)	183	239	295	351	407	463	519	575	631	687	743	799
Weights (kg)	18,4	26	33,6	41,2	48,8	56,4	64	71,6	79,2	86,7	94,3	102

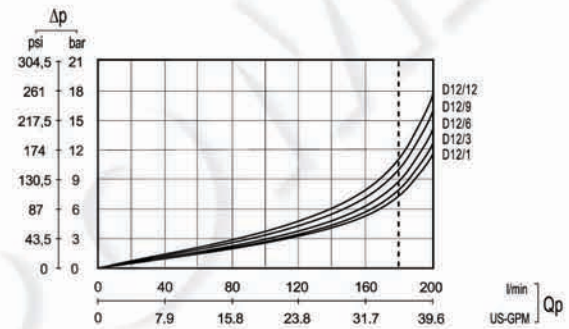
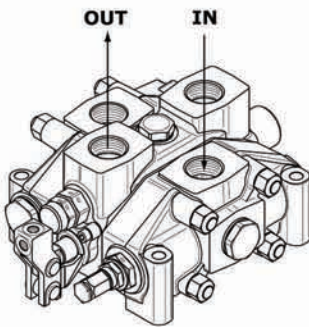
TYPICAL CURVES

Indicated values have been tested with standard sectional valve and W001A spool.

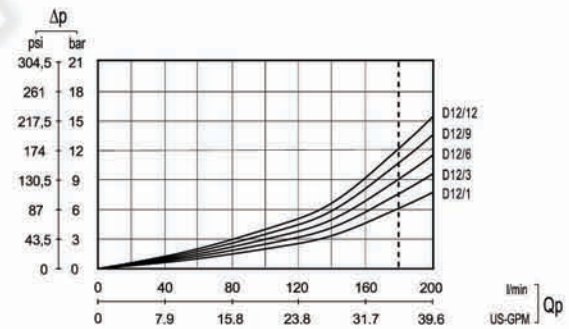
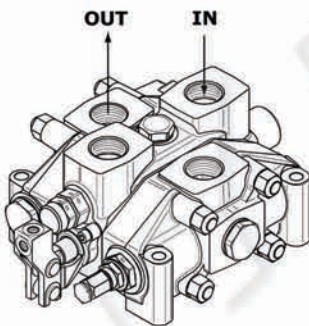
Pressure drop (P - T)



Pressure drop (P - A/B)

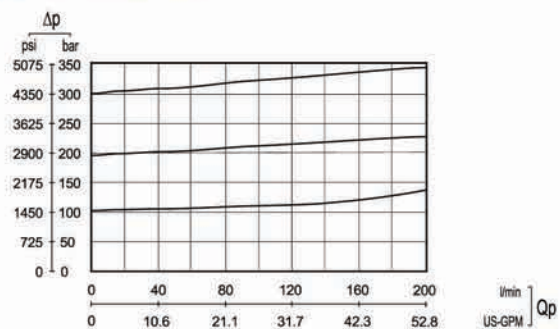


Pressure drop (A/B - T)



Pilot operated relief valve curve

Setting ranges	
type	pressure (bar)
A	0 - 40
B	41 - 180
C	181 - 250
D	251 - 350

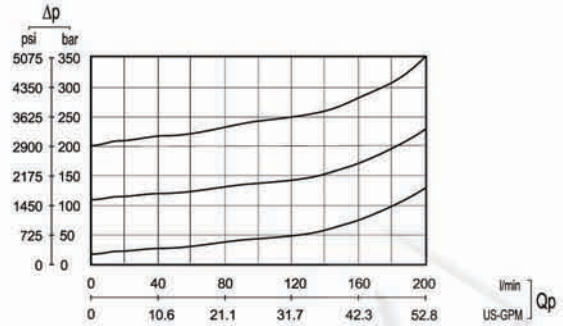


TYPICAL CURVES

Indicated values have been tested with standard sectional valve and W001A spool.

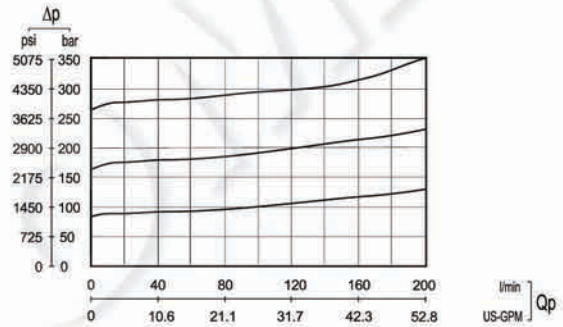
Antishock valve curve

type	Setting ranges	
	pressure (bar)	
	at full flow	at min. flow
A	70 - 150	70-A / 120-A
B	151 - 230	121-A / 200-A
C	231 - 280	201-A / 250-A
D	281 - 350	251-A / 350-A

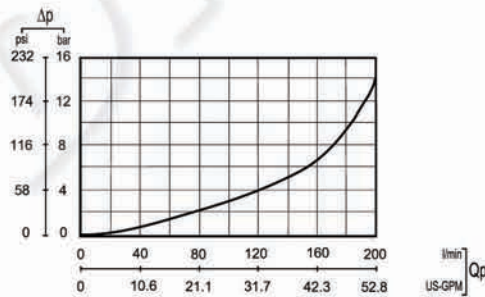


Combined valve curve

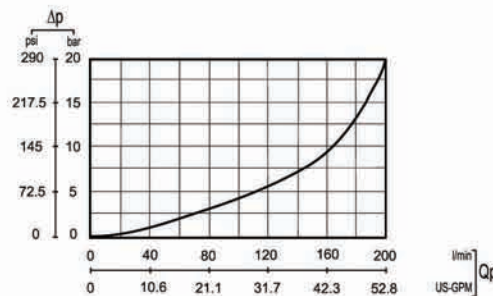
type	Setting ranges	
	pressure (bar)	
	at full flow	at min. flow
A	30 - 95	30-A / 65-A
B	96 - 150	71-A / 120-A
C	151 - 260	121-A / 230-A
D	261 - 350	231-A / 350-A



Main anticavitation check valve curve



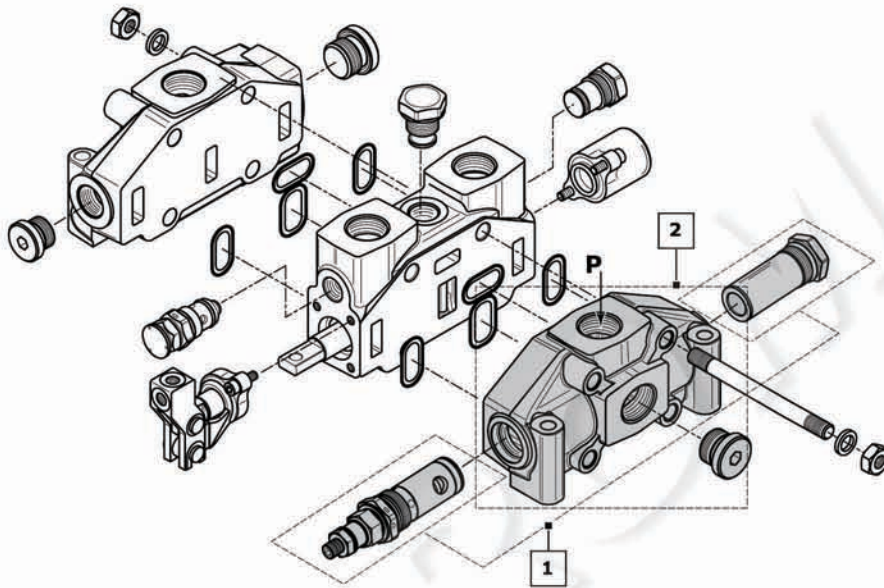
Anticavitation check valve curve



INLET SECTION

Order example

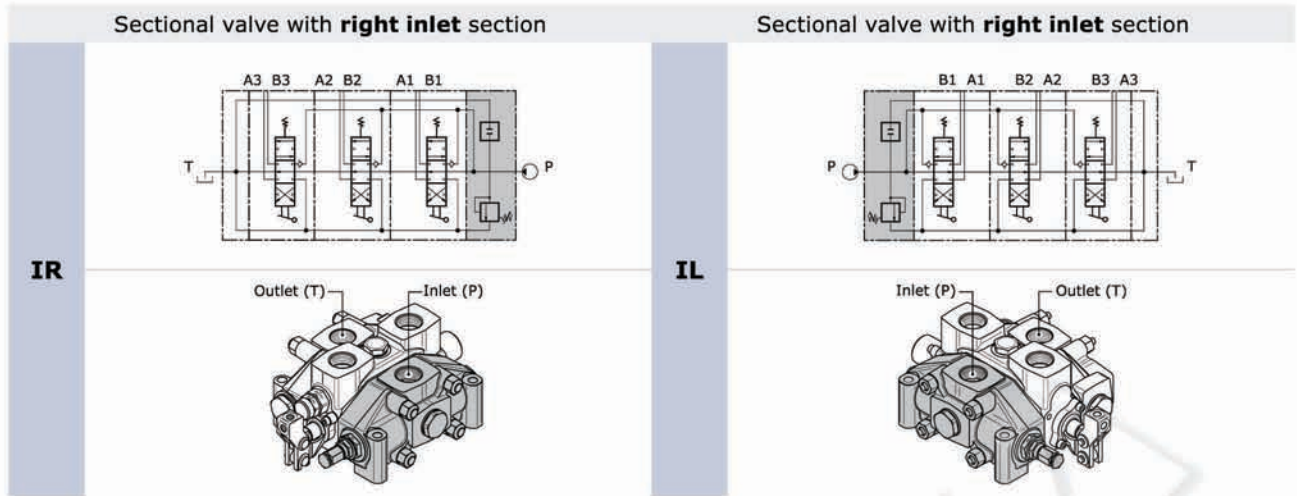
	IR	009	150	A G05
IR	inlet side classification			
1. 009	valve arrangement			
150	setting (bar)			
2. A G05	inlet position and available thread type			



Rif.	Code	Description	Page
-	IR	Sectional valve with right inlet section	11
	IL	Sectional valve with left inlet section	
1	009	Pilot operated pressure relief valve	12
	010	Pilot operated pressure relief valve and Main anticavitation check valve	
	012	Pilot operated pressure relief valve and Solenoid dump valve 12 Vdc	
	013	Pilot operated pressure relief valve and Solenoid dump valve 24 Vdc	
	019	Without valves	
	020	Main anticavitation check valve	
2	A G05	Upper inlet (thread G 3/4)	12
	C G05	Central side inlet (thread G 3/4)	
	A U05	Upper inlet (thread 1"1/16-12 UNF)	
	C U05	Central side inlet (thread 1"1/16-12 UNF)	
	A S03	Upper inlet (thread SAE 3000 3/4" MA)	
	C S03	Central side inlet (thread SAE 3000 3/4" MA)	

NOTE: when ordering a relief valve it is necessary to specify factory setting (example 150).

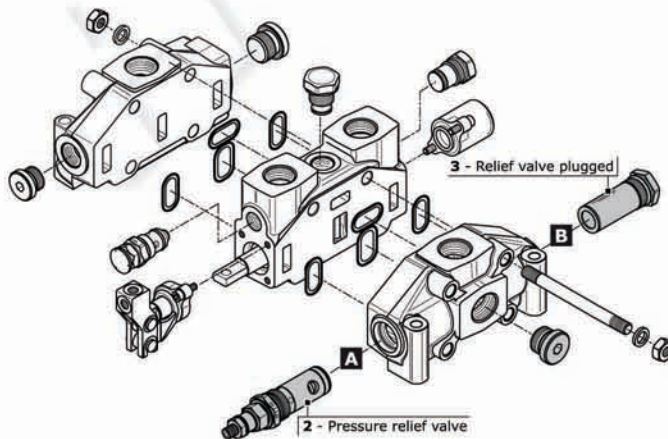
Inlet side classifications



Valve identification

type	schema	layout	description	type	schema	layout	description
2			Pilot operated pressure relief valve	6			Externally piloted valve
3			Relief valve plugged	7			Solenoid dump valve 12 Vdc
4			Main anticavitation check valve	8			Solenoid dump valve 24 Vdc
5			2 stage pilot operated relief valve	11			Plug with pressure-gauge connection

Valve arrangement



















Combination valve example: 009 = 2A - 3B

- 009** Combination valve
- 2A** Pressure relief valve in port A
- 3B** Relief valve plugged in port B

The code identifies:
with a number, the type of valve; with a letter its position on the inlet section.

- (A) = spool action side
- (B) = spool return action side

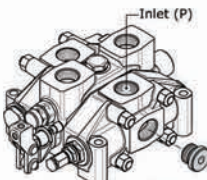
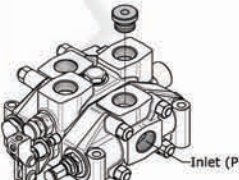
NOTE: when ordering a main relief valve it is necessary to specify setting

VALVE COMBINATION INLET SECTION		Valve type on port B								
										
		2	3	4	5	6	7	8	11	
Valve type on port A		2	009	010		011	012	013	016	
		3	018	019	020	021	022	023	024	027
		4	029	030		031	032	033	034	037
		5		038						
		6	047	048						
		7	054	055						
		8	061	062						
		11	085							

NOTE: Valve combinations 021, and 038 requires double setting (see example).

Order example for inlet section: IR **038 200*280** A G05

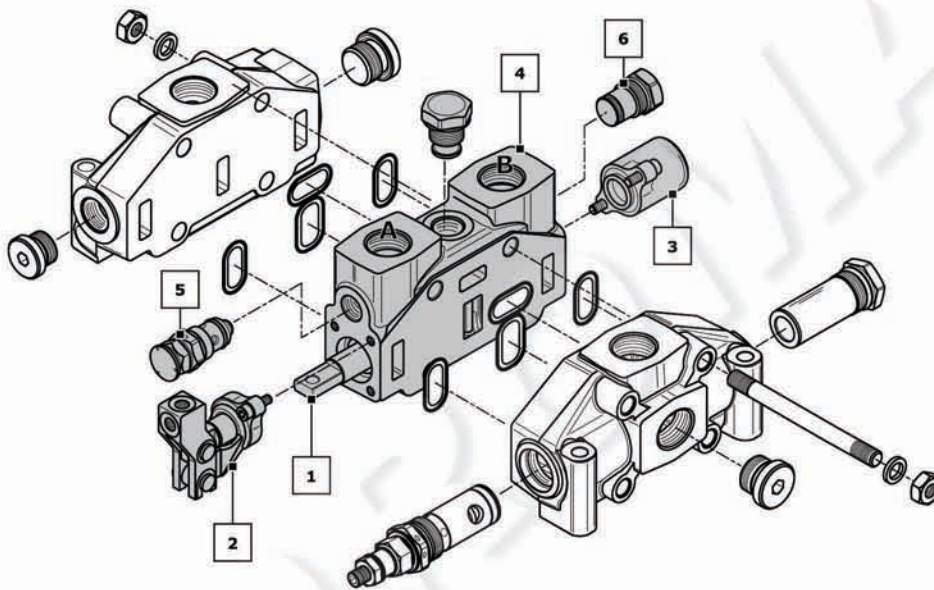
038 valve combination _____
200*380 double range setting (bar) _____

Inlet combination and thread available				
A G05		Upper inlet (thread G 3/4)	B G05	Upper inlet (P1) with pressure gauge connection G 1/4 (thread G 3/4)
A G06		Upper inlet (thread G 1)	B G06	Upper inlet (P1) with pressure gauge connection G 1/4 (thread G 1)
A U05		Upper inlet (thread 1"1/16-12 UNF)	B U05	Upper inlet (P1) with pressure gauge connection G 1/4 (thread 1"1/16-12 UNF)
A S03		Upper inlet (thread SAE 3000 3/4"MA)	B S03	Upper inlet (P1) with pressure gauge connection G 1/4 (thread SAE 3000 3/4"MA)
A S04		Upper inlet (thread SAE 3000 3/4"UNC)	B S04	Upper inlet (P1) with pressure gauge connection G 1/4 (thread SAE 3000 3/4"UNC)
C G05		Central side inlet (thread G 3/4)	D G05	Central side inlet (P1) with pressure-gauge connection G 1/4 (thread G 3/4)
C G06		Central side inlet (thread G 1)	D G06	Central side inlet (P1) with pressure-gauge connection G 1/4 (thread G 1)
C U05		Central side inlet (thread 1"1/16-12 UNF)	D U05	Central side inlet (P1) with pressure-gauge connection G 1/4 (thread 1"1/16-12 UNF)
C S03		Central side inlet (thread SAE 3000 3/4"MA)	D S03	Central side inlet (P1) with pressure-gauge connection G 1/4 (thread SAE 3000 3/4"MA)
C S04		Central side inlet (thread SAE 3000 3/4"UNC)	D S04	Central side inlet (P1) with pressure-gauge connection G 1/4 (thread SAE 3000 3/4"UNC)

WORKING SECTION

Order example:

	W001A	H101	F001A	RP G05	01 PA 100	05 PB
1. W001A	spool type					
2. H101	spool actuation type					
3. F001A	spool return action type					
4. RP G05	section and thread type					
5. 01 PA 100	auxiliary valve (port A - handle side)					
6. 05 PB	auxiliary valve (port B - cap side)					



Rif.	Code	Description	Page
1	W001	3 positions double-acting	14
	W002	3 positions double-acting A-B to tank	
2	H101	Unprotected lever	16
	H005	hydraulic actuation	
3	F001A	3 positions spring-centred spool (spring A)	17
	F002A	3 positions spring-centred spool detent in A and B (spring A)	
4	RP G05	Parallel circuit (G 3/4)	23
	RP U05	Parallel circuit (1"1/16-12 UNF)	
	RS G05	Series circuit (G 3/4)	
	RS U05	Series circuit (1"1/16-12 UNF)	
5	01 PA 100	Antishock valve (port A)	24
	05 PA	Prearrangement for auxiliary valve (port A)	
6	01 PB 100	Antishock valve (port B)	
	05 PB	Prearrangement for auxiliary valve (port B)	

NOTE: (*) Leave out the spool return action code when choosing H005.
 Sections designed to house auxiliary valve option require double choice on work ports A and B.
 Always indicate setting value when using antishock and combined valve: **01 PA (100) - 03 PA (100)**

Spool identification

order example of spool: **W001 A J10**

W001	spool schema	3 positions double-acting
A	spool type	standard spool
J10	restricted service ports	restriction on diameter (0,10 mm in A and B)

W001	3 positions double-acting	
W002	3 positions double-acting A and B to tank	
W003	3 positions double-acting A to tank B blocked	
W004	3 positions double-acting A blocked B to tank	
W005	3 positions single - acting on A	
W006	3 positions single - acting on B	
W009	3 positions double-acting with anticavitation valves	
W010	3 positions double-acting switch port closed (A - B blocked)	
W011	3 positions double-acting switch port closed (A - B to tank)	
W012	4 positions double-acting with float in the 4th position	
W013	3 positions double-acting regenerative	
W015	3 positions double-acting series	
W016	3 positions double-acting series A and B to tank	

code	circuit	spools with restricted service ports		hydraulic schema
		restriction on diameter (mm)	section (mm ²)	
J10	A-B IN T	0,10	3,45	
K10	A IN T	0,10	3,45	
Y10	B IN T	0,10	3,45	

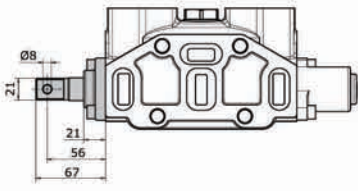
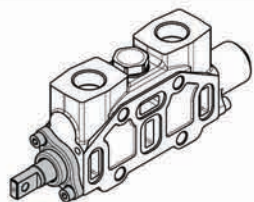
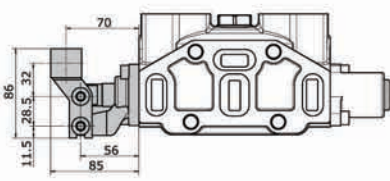
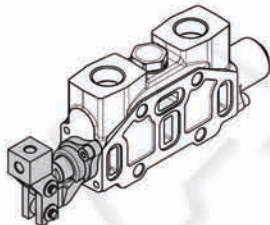
CODE	spool type available	
	STANDARD	METERED
	A	B
W001	W001A	W001B
W002	W002A	W002B
W003	W003A	W003B
W004	W004A	W004B
W005	W005A	W005B
W006	W006A	W006B
W009	W009A	W009B
W010	W010A	
W011	W011A	
W012	W012A	
W013	W013A	
W015	W015A	
W016	W016A	

NOTE:

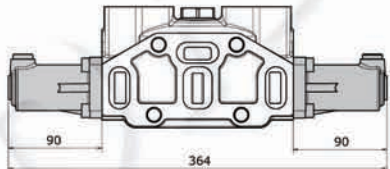
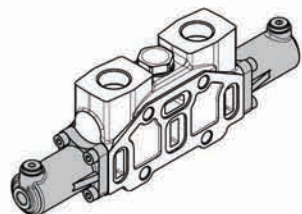
- W012, W013, spools need a special machining on the valve body.
- W015, W016, spools need RS type body.
- Float spool (W012) need special detent kit (F005).
- Regenerative spool (W013) need special return spring kits.
- Different spools are available on request.

Plaese contact our Sales department for more information.

Spool actuation classification for manual control

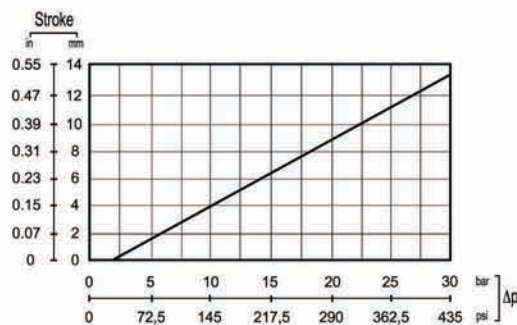
code	description	dimensions	configuration
H004	Control without lever		
H101	Unprotected lever		
H102	Unprotected lever rotated 180°		

Spool actuation classification for Hydraulic control

code	description	dimensions	configuration
H005 <small>leave out the spool return action code</small>	Hydraulic actuation with side ports BSP ports = G 1/4 UNF ports = 9/16-18 UNF		
H006 <small>leave out the spool return action code</small>	Hydraulic actuation with side ports and cast-iron end caps BSP ports = G 1/4 UNF ports = 9/16-18 UNF		

Hydraulic pilot control curve

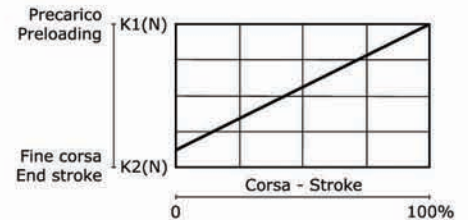
The diagram shows the spool stroke as a function of the pressure operating.



Spool return action classification - Springs load values

Spool return kits have three different spring types; following the codes depending on spring loads.

Spring type			
Code	A (standard spring)	B (soft spring)	C (heavy spring)
Preloading	151 N	112.8 N	253 N
End of stroke	186.4 N	141.2 N	430.6 N
Spool return action identification example			
Code	F001A	F001B	F001C



Spool return action classification

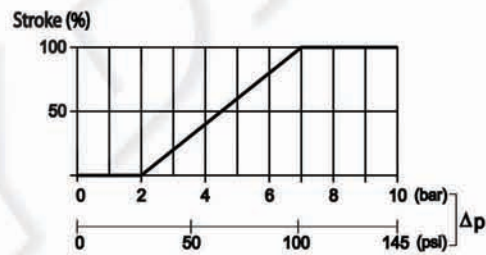
code	description	schema	dimensions	configuration
F001A F001B F001C	3 positions spring-centred spool			
F002A	3 positions spring-centred spool detent in A and B			
F003A	3 positions spring-centred spool detent in A			
F004A	3 positions spring-centred spool detent in B			
F005A	4 positions spring-centred spool detent in 4 th position (only for W012 spool)			
F013A F013B F013C	3 positions spring-centred spool prearrangement dual command			

Pneumatic control classification

code	description	schema	dimensions	configuration
F020A	Pneumatic control ON - OFF			
F021A	Pneumatic control ON - OFF rotated 180°			
F022A	Proportional Pneumatic control		Proportional control with port BSP: G 1/8	
F023A	Proportional Pneumatic control rotated 180°			
F135A	Pneumatic control ON - OFF			
F136A	Pneumatic control ON - OFF rotated 180°			
F126A	Proportional Pneumatic control		Proportional control with port NPTF: 1/8-27	
F127A	Proportional Pneumatic control rotated 180°			

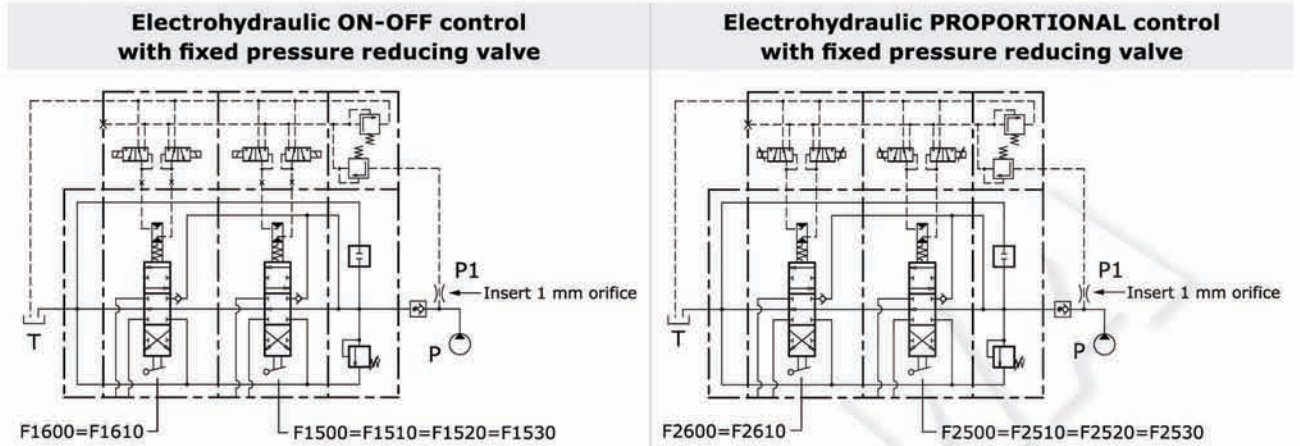
Proportional pneumatic control curve

The diagram shows the spool stroke as a function of the pneumatic pressure operating.



Electrohydraulic control specifications

Operating temperature range	-20°C / +80°C
Max inlet pressure	350 bar
Reduced pressure	16 bar
Back pressure on (T)	3 bar
Filtering degree	25 μ assoluti
Raccommended pilot pipe size	Ø 6 mm - G 1/4



Proportional control kit, mechanically retrooperated, allows the maximum precision of positioning, limiting the hysteresis. The control is operated with PWM control of the current. PWM frequency suggest: 60-80 Hz

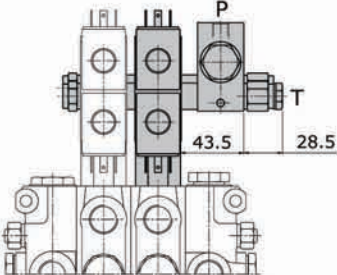
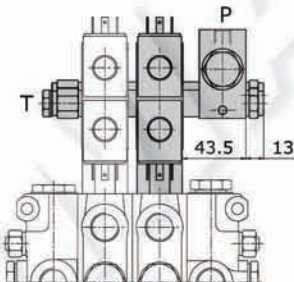
Nominal voltage (V)	regulation currents		
	Resistance R ₂₀ (Ohm)	Current min (A)	Current max (A)
12 vdc	3,7	0,9	1,7
24 vdc	15,5	0,45	0,85

Electrohydraulic control classification

code	description	dimensions	configuration
F1600	3 positions electrohydraulic control ON - OFF 12 Vdc		
F1610	3 positions electrohydraulic control ON - OFF 24 Vdc		
F2600	3 positions electrohydraulic control PROPORTIONAL 12 Vdc		
F2610	3 positions electrohydraulic control PROPORTIONAL 24 Vdc		

Electrohydraulic ON-OFF control is stackable with electrohydraulic PROPORTIONAL control (F2600 = F2610). Control kit already includes orifice to make spool displacement more gradual.

Electrohydraulic control with fixed pressure reducing valve classification

code	description	configuration
F1500	Electrohydraulic control ON - OFF (fixed pressure reducing valve) P - T inlet side (12 vdc)	 <p>Port BSP (P - T) = G 1/4 Port UNF (P - T) = 9/16"18 UNF</p>
F1510	Electrohydraulic control ON - OFF (fixed pressure reducing valve) P - T inlet side (24 vdc)	
F2500	Electrohydraulic control PROPORTIONAL (fixed pressure reducing valve) P - T inlet side (12 vdc)	
F2510	Electrohydraulic control PROPORTIONAL (fixed pressure reducing valve) P - T inlet side (24 vdc)	
F1520	Electrohydraulic control ON - OFF (fixed pressure reducing valve) P inlet - T outlet (12 vdc)	 <p>Port BSP (P - T) = G 1/4 Port UNF (P - T) = 9/16"18 UNF</p>
F1530	Electrohydraulic control ON - OFF (fixed pressure reducing valve) P inlet - T outlet (24 vdc)	
F2520	Electrohydraulic control PROPORTIONAL (fixed pressure reducing valve) P inlet - T outlet (12 vdc)	
F2530	Electrohydraulic control PROPORTIONAL (fixed pressure reducing valve) P inlet - T outlet (24 vdc)	

Control tie rod assembly

The length of the control tie rod, will change depending on the section numbers; in this way it will be easy to install in the right way the sections and avoid any misassembly. Each kit is composed by 2 tie rods, 2 plugs, 2 connection ports and spacers according to the section number.

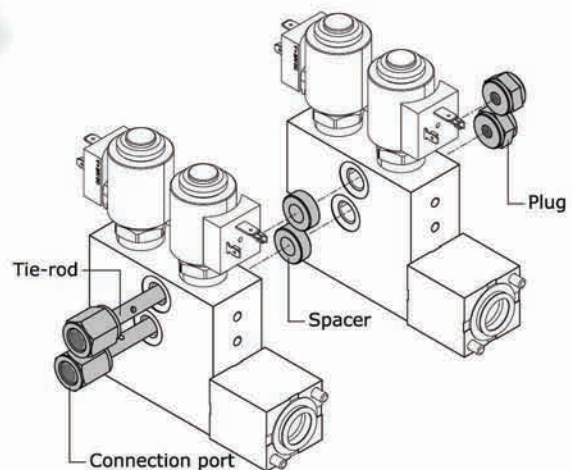
NOTE: the control tie rod kit has always to be ordered separately.

Reducing valve, combined with electrohydraulic control kit has to be calculated as a normal working section.

ORDER EXAMPLE:

Complete valves with 3 sections F1600 requires a complete tie-rod kit /3.

Complete valves with 2 sections F1600 and 1 section with F1500 (reducing valve) requires a complete tie-rod kit /4.



Order code fixed pressure reducing valve:

915000303 = reducing valve for BSP ports

915000312 = reducing valve for UNF ports

Order code for control tie rod (BSP):

320103001 = control tie rod /1

320107001 = control tie rod /2

320107002 = control tie rod /3

320107003 = control tie rod /4

320107004 = control tie rod /5

320107005 = control tie rod /6

320107006 = control tie rod /7

320107007 = control tie rod /8

320107008 = control tie rod /9

Order code for control tie rod (UNF):

320103026 = control tie rod /1

320107026 = control tie rod /2

320107027 = control tie rod /3

320107028 = control tie rod /4

320107029 = control tie rod /5

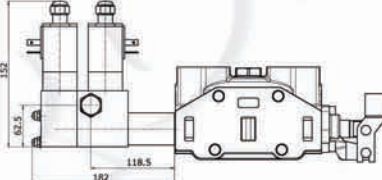
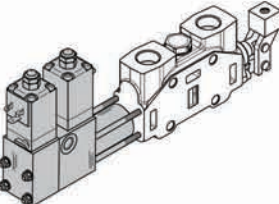
320107030 = control tie rod /6

320107031 = control tie rod /7

320107032 = control tie rod /8

320107033 = control tie rod /9

Electropneumatic control classification

code	description	dimensions	configuration
F0620	3 positions electropneumatic control ON-OFF (12 vdc) 7 W - 0,58 A		
F0630	3 positions electropneumatic control ON-OFF (24 vdc) 7 W - 0,29 A		

Minimum
working
pressure
5 bar

Control tie rod assembly

The length of the control tie rod, will change depending on the section numbers; in this way it will be easy to install in the right way the sections and avoid any misassembly. Each kit is composed by 1 tie rod and 2 plugs.

NOTE: the control tie rod kit has always to be ordered separately.

Order code for control tie rod (BSP):

320107014 = control tie rod /1

320107015 = control tie rod /2

320107016 = control tie rod /3

320107017 = control tie rod /4

320107018 = control tie rod /5

320107019 = control tie rod /6

320107020 = control tie rod /7

320107021 = control tie rod /8

Order code for control tie rod (UNF):

320107039 = control tie rod /1

320107040 = control tie rod /2

320107041 = control tie rod /3

320107042 = control tie rod /4

320107043 = control tie rod /5

320107044 = control tie rod /6

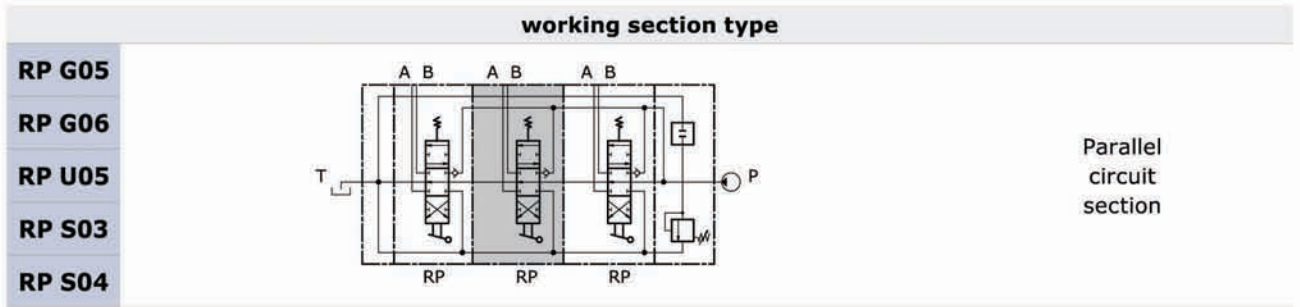
320107045 = control tie rod /7

320107046 = control tie rod /8

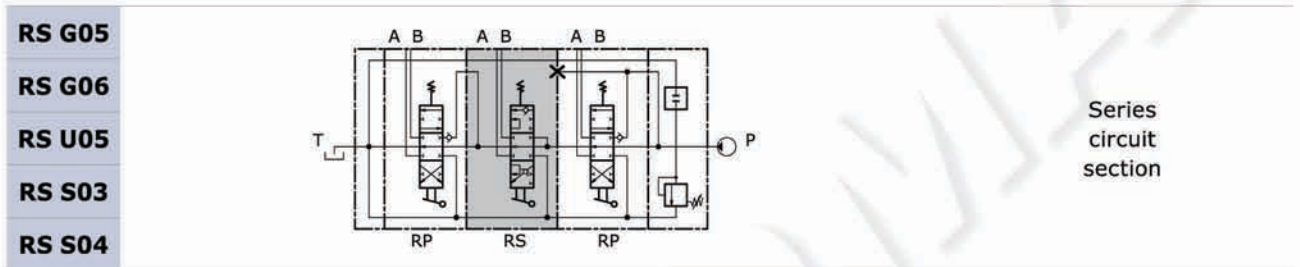
Compatibility table

SPOOL ACTION TYPE	SPOOL TYPE																				
	W001A	W001B	W002A	W002B	W003A	W003B	W004A	W004B	W005A	W005B	W006A	W006B	W009A	W009B	W010A	W011A	W012A	W013A	W015A	W016A	
H101	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H102	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H004	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H005	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
H006	•	•	•	•	•	•	•	•									•		•	•	•
SPOOL RETURN ACTION TYPE	SPOOL TYPE																				
	W001A	W001B	W002A	W002B	W003A	W003B	W004A	W004B	W005A	W005B	W006A	W006B	W009A	W009B	W010A	W011A	W012A	W013A	W015A	W016A	
F001	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•
F002	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•
F003	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•
F004	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			•	•	•
F005																	•				
F013	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•
F020=F021	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•
F022=F023	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•
F135=F136	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•
F126=F127	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•
F0620=F0630	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•
F1500=F1510	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•
F1520=F1530	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•
F2500=F2510	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•
F2520=F2530	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•
F1600=F1610	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•
F2600=F2610	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•

Work section identification























When the spool is operated it intercepts the by-pass gallery by diverting the flow of oil to service port A or B. If two or more spools are actuated at the same time, the oil will power the service port that has the lower load; by throttling the spools, the flow of oil can be divided between two or more service ports.



When the spool is operated it intercepts the switch gallery by diverting the flow of oil to service port A or B. The oil that flows back from the actuator is carried to the switch gallery thus making it available to the service ports downstream from the series section. The pressure drop downstream is added to the pressure drop of the section itself.

Auxiliary valve identification

code	description	schema	sonfiguration	setting range (bar)			
				type	at full flow	type	at min. flow
01 PA	Antishock valve (port A)			A	70 / 150	A	70-A / 120-A
				B	151 / 230	B	121-A / 200-A
				C	231 / 280	C	201-A / 250-A
				D	281 / 350	D	251-A / 350-A
02 PA	Anticavitation valve (port A)						
03 PA	Combined valve (port A)			A	30 / 95	A	30-A / 65-A
				B	96 / 150	B	66-A / 120-A
				C	151 / 260	C	121-A / 230-A
				D	261 / 350	C	231-A / 350-A
04 PA	Pilot combined valve (port A)			A	50 / 420	A	50-A / 420-A
05 PA	Prearrangement for auxiliary valve (port A)						

code	description	schema	sonfiguration	setting range (bar)			
				type	at full flow	type	at min. flow
01 PB	Antishock valve (port A)			A	70 / 150	A	70-A / 120-A
				B	151 / 230	B	121-A / 200-A
				C	231 / 280	C	201-A / 250-A
				D	281 / 350	D	251-A / 350-A
02 PB	Anticavitation valve (port A)						
03 PB	Combined valve (port A)			A	30 / 95	A	30-A / 65-A
				B	96 / 150	B	66-A / 120-A
				C	151 / 260	C	121-A / 230-A
				D	261 / 350	C	231-A / 350-A
04 PB	Pilot combined valve (port A)			A	50 / 420	A	50-A / 420-A
05 PB	Prearrangement for auxiliary valve (port A)						

Auxiliary valve - Setting range

Sections designed to house auxiliary valve option require double choice on work ports A and B.
Always indicate setting value when using antishock valve:

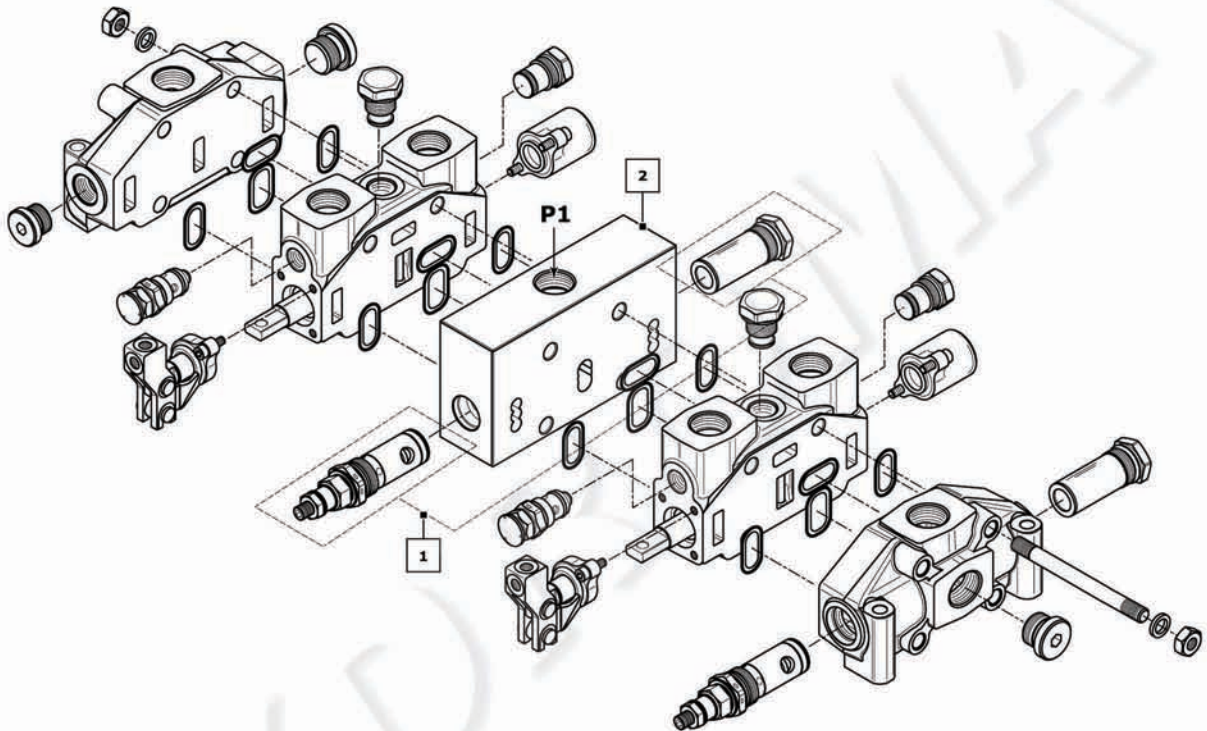
01 PA (120) = setting at full flow
01 PA (120-A) = setting at min. flow

INTERMEDIATE INLET SECTION

Order example

BE	009	150	A G05
-----------	------------	------------	--------------

- BE** inlet side
- 1. 009** valve arrangement
- 150** setting (bar); when ordering a main relief valve it is necessary to specify setting
- 2. A G05** inlet position and available thread type



Rif.	Code	Description	Page
-	BE BV*	Intermediate inlet section Intermediate inlet section with pressure relief valve	26
1	009 010 019 020	Pilot operated pressure relief valve Pilot operated pressure relief valve and Main anticavitation check valve Without valves Main anticavitation check valve	27
2	A G05 A U05	Upper inlet (thread G 3/4) Upper inlet (thread 1"1/16-12 UNF)	

NOTE: when ordering a relief valve it is necessary to specify factory setting (example 150).
* = omit the code for inlet positioning and thread

Intermediate inlet section classifications

intermediate inlet type

BE			Intermediate inlet section
-----------	--	--	----------------------------

The intermediate inlet section is driven by two pumps (P + P1). The downstream elements can be set to a lower pressure than the upstream ones by adjusting the pressure relief valve of the intermediate section in question.

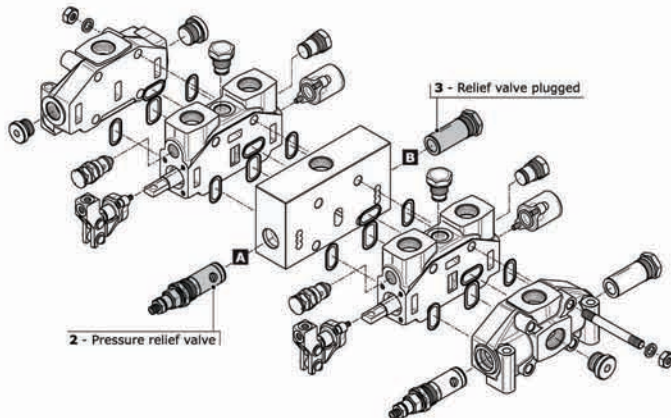
BV			Intermediate inlet section with pressure relief valve
-----------	--	--	---

The intermediate inlet section and the elements are driven by a single pump (P). The downstream elements can be set to a lower pressure than the upstream ones by adjusting the pressure relief valve of the intermediate section in question.

Valve identification on intermediate inlet section

type	schema	layout	description	type	schema	configurazione	descrizione
2			Pilot operated pressure relief valve	4			Externally piloted valve
3			Relief valve plugged	11			Plug with pressure-gauge connection

Valve arrangement on intermediate inlet section



Combination valve example: 009 = 2A - 3B

- 009** Combination valve
- 2A** Pressure relief valve in port A
- 3B** Relief valve plugged in port B

The code identifies:
with a number, the type of valve; with a letter its position on the inlet section.

- (A) = spool action side
- (B) = spool return action side

NOTE: when ordering a main relief valve it is necessary to specify setting

VALVE COMBINATION INLET SECTION		Valve type on port B			
		2	3	4	11
Valve type on port A	2		009	010	016
	3	018	019	020	027
	4	029	030		
	11	085	086		

Inlet position and available thread type

Inlet combination and thread available	
A G05	
A U05	

Upper inlet (P1)

Complete configuration samples for D12/2 with intermediate inlet section (BE)

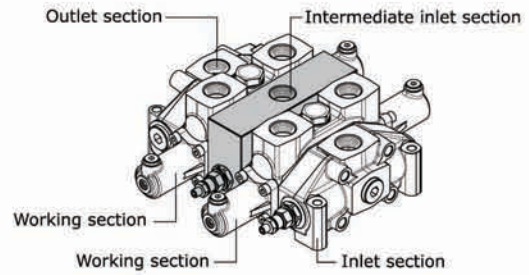
IR 009 150 A G05..... Right inlet section

W001A H101 F001A RP G05..... Working section

BE 009 120 A G05Intermediate inlet section

W001A H101 F001A RP G05..... Working section

TJ A G06 Outlet section



Complete configuration samples for D12/2 with intermediate inlet section (BV)

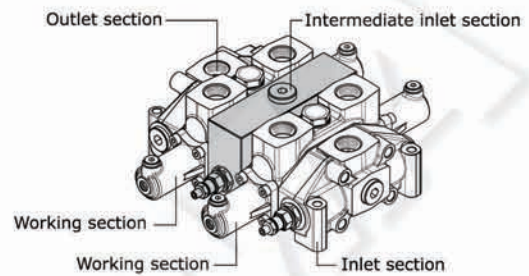
IR 009 150 A G05..... Right inlet section

W001A H101 F001A RP G05..... Working section

BV 009 120Intermediate inlet section

W001A H101 F001A RP G05..... Working section

TJ A G06 Outlet section



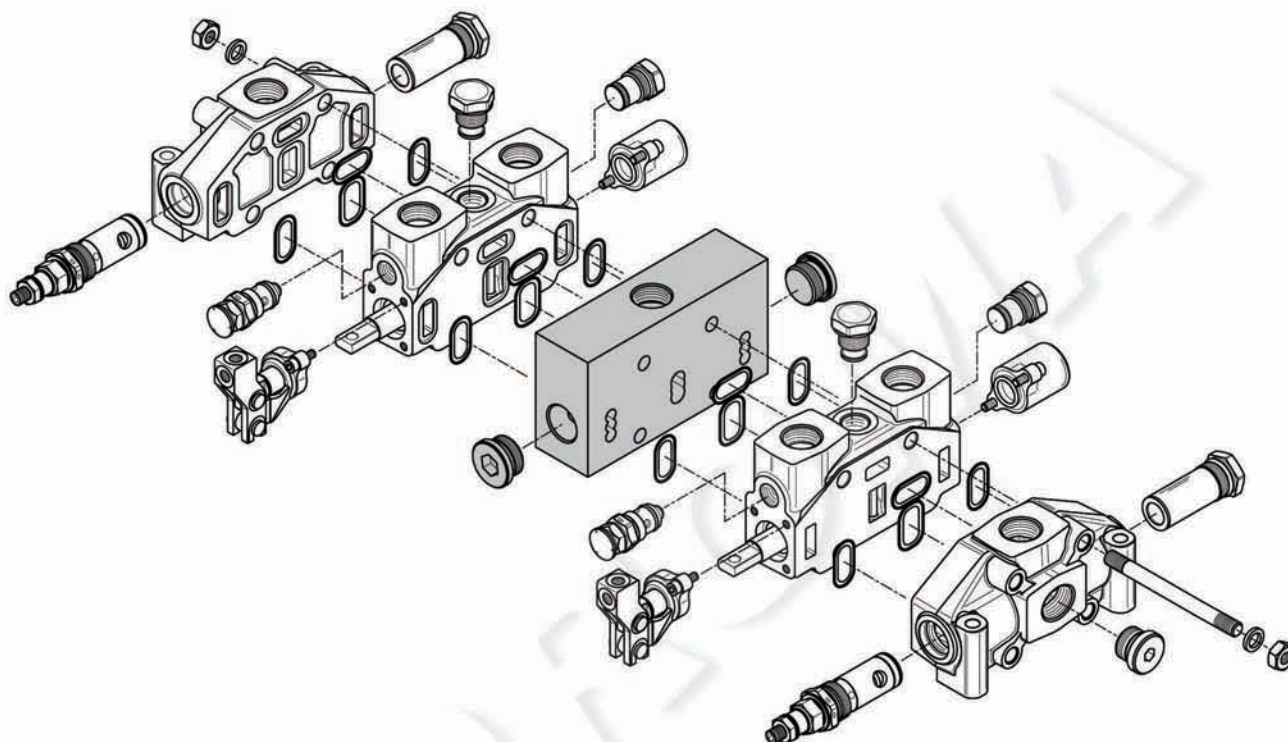
INTERMEDIATE OUTLET SECTION

Order example

BF

A G06

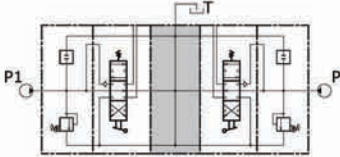
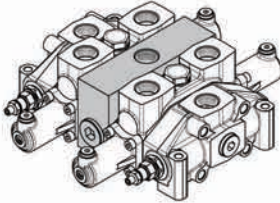
- 1.** **BF** inlet side _____
A G06 inlet position and available thread type _____



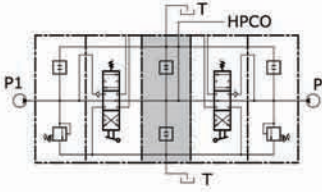
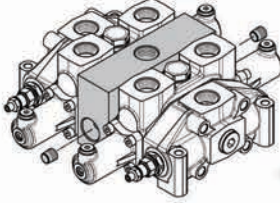
Rif.	Code	Type	Description	Page
-	BF		Intermediate outlet section with single tank return	
	BG		Intermediate outlet section with two tank returns	
1	A G06		Upper outlet (thread G 1)	30
	A U06		Upper outlet (thread 1"5/16-12 UNF)	
	G G06	for	Front outlet side A (thread G 1)	
	G U06	BF	Front outlet side A (thread 1"5/16-12 UNF)	
	H G06		Rear outlet side B (thread G 1)	
	H U06		Rear outlet side B (thread 1"5/16-12 UNF)	
	J G06	for	Upper outlet HPCO - front side A and rear side B to T (thread G 1)	
	J U06	BG	Upper outlet HPCO-front side A and rear side B to T (thread 1"5/16-12 UNF)	

Intermediate outlet section classifications

intermediate outlet type

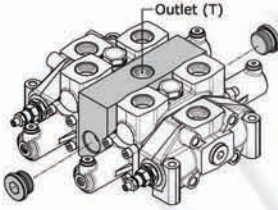
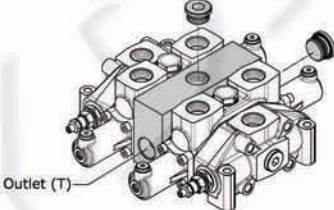
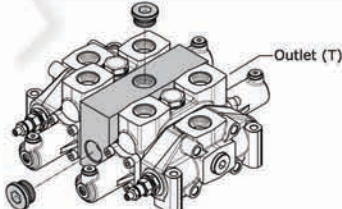
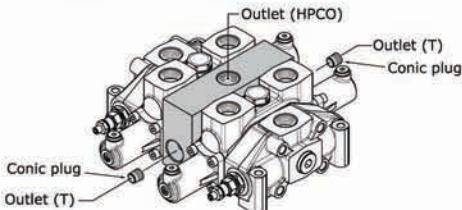
BF			<p>Intermediate outlet section with single tank return</p>
-----------	---	--	---

The above outlet section allows the flow of oil of the two pumps and the tank ports to be piped to a single outlet T.

BG			<p>Intermediate outlet section with two tank returns</p>
-----------	---	--	---

The section in question allows the flow of oil of the two pumps to be piped in two outlets: HPCO for powering another directional control valve, T for discharge of the work ports. In order to obtain this, the two T need to be linked.

Outlet combination and thread available

A G06		<p>available only for BF</p>	<p>Upper outlet (T)</p>
A U06			
G G06		<p>available only for BF</p>	<p>Front outlet side A (T)</p>
G U06			
H G06		<p>available only for BF</p>	<p>Rear outlet side B (T)</p>
H U06			
J G06		<p>available only for BG</p>	<p>Upper outlet HPCO front side A and rear side B to T</p>
J U06			

Complete configuration samples for D12/2 with intermediate outlet section (BF)

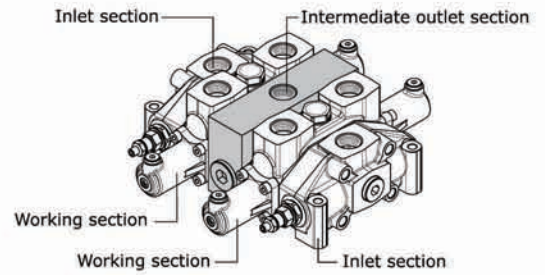
IR 009 150 A G05..... Right inlet section

W001A H101 F001A RP G05..... Working section

BF A G06**Intermediate outlet section**

W001A H101 F001A RP G05..... Working section

IL 009 150 A G05..... Left inlet section



Complete configuration samples for D12/2 with intermediate outlet section (BG)

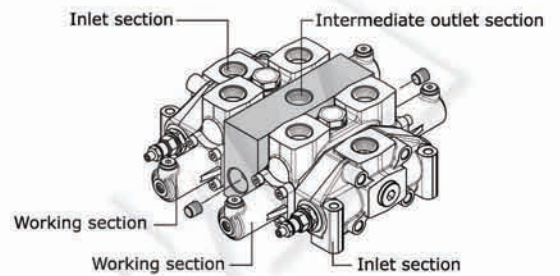
IR 009 150 A G05..... Right inlet section

W001A H101 F001A RP G05..... Working section

BG J G06**Intermediate outlet section**

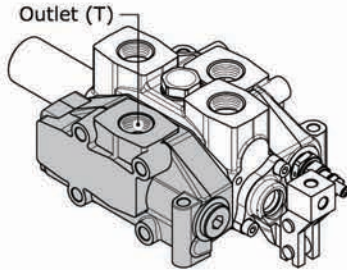
W001A H101 F001A RP G05..... Working section

IL 009 150 A G05..... Left inlet section



OUTLET SECTION (VERSION 1 OUTLET)

Order example

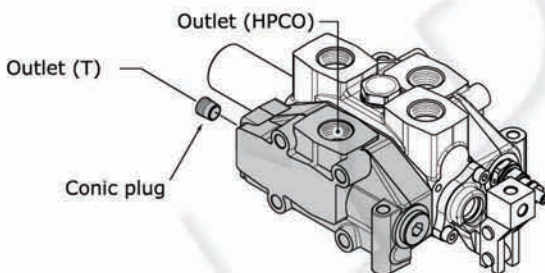


- | | | |
|--|--------------|--|
| | TJ | |
| | A G06 | |
- 1. TJ** outlet section type
 - 2. A G06** outlet position and available thread type

Rif.	Code	Description	Page
1	TJ	Outlet section with single return (T) right-side inlet (P)	33
	TK	Outlet section with single return (T) left-side inlet (P)	
2	A G06	Upper outlet (thread G 1)	
	A U06	Upper outlet (thread 1"5/16-12 UNF)	
	A S03	Upper outlet (thread SAE 3000 - 3/4"MA)	
	A S04	Upper outlet (thread SAE 3000 - 3/4"UNC)	
	C G06	Central outlet (thread G 1)	
	C U06	Central outlet (thread 1"5/16-12 UNF)	
	C S03	Central outlet (thread SAE 3000 - 3/4"MA)	
	C S04	Central outlet (thread SAE 3000 - 3/4"UNC)	

OUTLET SECTION (HPCO VERSION OUTLET)

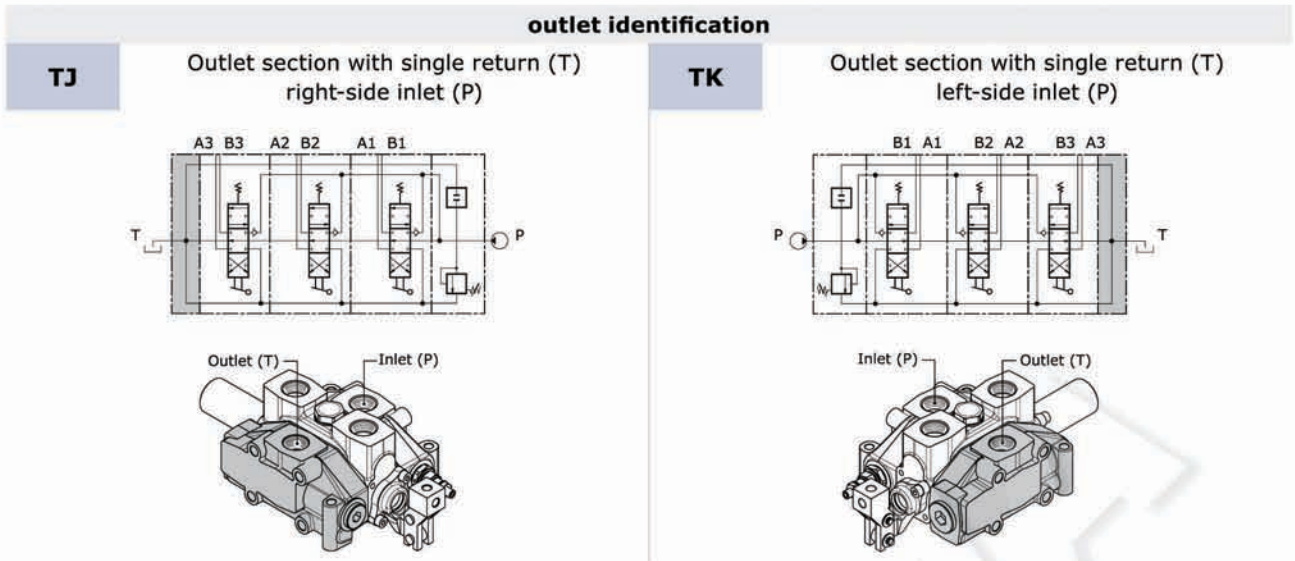
Order example - HPCO version Outlet



- | | | |
|--|--------------|--|
| | TM | |
| | M G06 | |
- 1. TM** outlet section type
 - 2. M G06** outlet position and available thread type

Rif.	Code	Description	Page
1	TM	Outlet section with two return (T-HPCO) right-side inlet (P)	34
	TN	Outlet section with two return (T-HPCO) left-side inlet (P)	
2	M G06	HPCO upper outlet T (tank) rear outlet side B (thread G 1)	
	M U06	HPCO upper outlet T (tank) rear outlet side B (thread 1"5/16-12 UNF)	
	M S03	HPCO upper outlet T (tank) rear outlet side B (thread SAE 3000 - 3/4"MA)	
	M S04	HPCO upper outlet T (tank) rear outlet side B (thread SAE 3000 - 3/4"UNC)	
	N G06	HPCO upper outlet T (tank) front outlet side A (thread G 1)	
	N U06	HPCO upper outlet T (tank) front outlet side A (thread 1"5/16-12 UNF)	
	N S03	HPCO upper outlet T (tank) front outlet side A (thread SAE 3000 - 3/4"MA)	
	N S04	HPCO upper outlet T (tank) front outlet side A (thread SAE 3000 - 3/4"UNC)	

Outlet with single tank classification



outlet combination and thread available

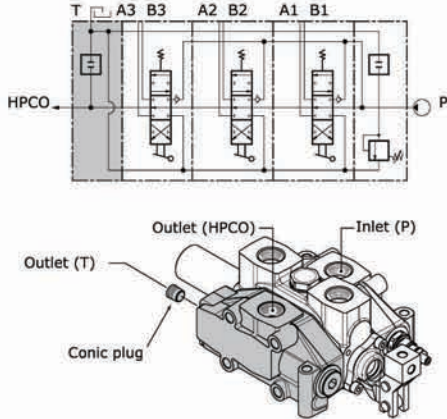
A G06		Upper outlet (thread G 1)	
A U06		Upper outlet (thread 1"5/16-12 UNF)	
A S03		Upper outlet (thread SAE 3000 - 3/4" MA)	
A S04		Upper outlet (thread SAE 3000 - 3/4" UNC)	
C G06		Central outlet (thread G 1)	
C U06		Central outlet (thread 1"5/16-12 UNF)	
C S03		Central outlet (thread SAE 3000 - 3/4" MA)	
C S04		Central outlet (thread SAE 3000 - 3/4" UNC)	
F G06		Lateral outlet (thread G 1)	
F U06		Lateral outlet (thread 1"5/16-12 UNF)	
G G06		only for TK	Front outlet side A (thread G 1)
G U06			Front outlet side A (thread 1"5/16-12 UNF)
G S03			Front outlet side A (thread SAE 3000 - 3/4" MA)
G S04			Front outlet side A (thread SAE 3000 - 3/4" UNC)
H G06		only for TJ	Rear outlet side B (thread G 1)
H U06			Rear outlet side B (thread 1"5/16-12 UNF)
H S03			Rear outlet side B (thread SAE 3000 - 3/4" MA)
H S04			Rear outlet side B (thread SAE 3000 - 3/4" UNC)

Outlet with two tanks classification

outlet identification

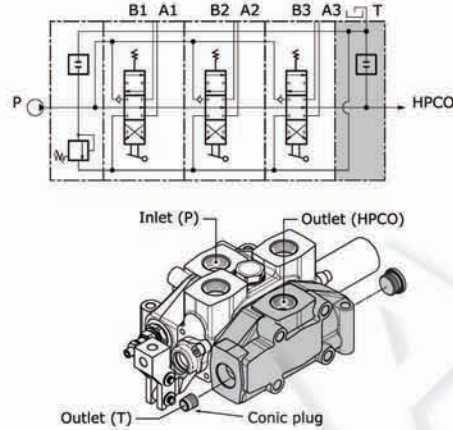
TM

Outlet section with two return (T-HPCO) right-side inlet (P)



TN

Outlet section with two return (T-HPCO) left-side inlet (P)

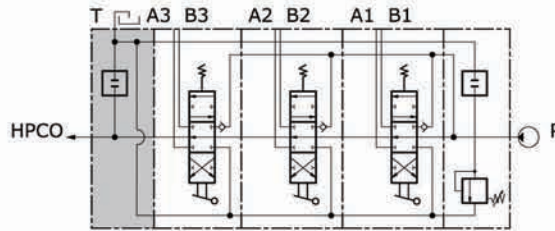


outlet combination and thread available

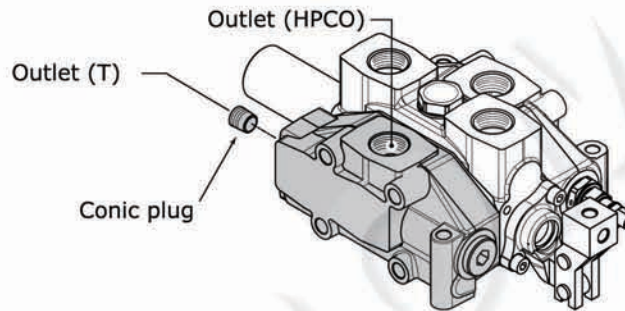
M G06		only for TM	HPCO Upper outlet T rear outlet side B (thread G 1)	Q G06		only for TN	HPCO Central outlet T front outlet side A (thread G 1)
M U06			HPCO Upper outlet T rear outlet side B (thread 1"5/16-12 UNF)	Q U06			HPCO Central outlet T front outlet side A (thread 1"5/16-12 UNF)
M S03			HPCO Upper outlet T rear outlet side B (thread SAE 3000 3/4 MA)	Q S03			HPCO Central outlet T front outlet side A (thread SAE 3000 3/4 MA)
M S04			HPCO Upper outlet T rear outlet side B (thread SAE 3000 3/4 UNC)	Q S04			HPCO Central outlet T front outlet side A (thread SAE 3000 3/4 UNC)
N G06		only for TN	HPCO Upper outlet T front outlet side A (thread G 1)	R G06		only for TM	HPCO Upper outlet T central outlet (thread G 1)
N U06			HPCO Upper outlet T front outlet side A (thread 1"5/16-12 UNF)	R U06			HPCO Upper outlet T central outlet (thread 1"5/16-12 UNF)
N S03			HPCO Upper outlet T front outlet side A (thread SAE 3000 3/4 MA)	S G06			HPCO Upper outlet T lateral outlet (thread G 1)
N S04			HPCO Upper outlet T front outlet side A (thread SAE 3000 3/4 UNC)	S U06			HPCO Upper outlet T lateral outlet (thread 1"5/16-12 UNF)
P G06		only for TM	HPCO Central outlet T rear outlet side B (thread G 1)	S G06		only for TN	HPCO Upper outlet T lateral outlet (thread G 1)
P U06			HPCO Central outlet T rear outlet side B (thread 1"5/16-12 UNF)	S U06			HPCO Upper outlet T lateral outlet (thread 1"5/16-12 UNF)
P S03			HPCO Central outlet T rear outlet side B (thread SAE 3000 3/4 MA)				
P S04			HPCO Central outlet T rear outlet side B (thread SAE 3000 3/4 UNC)				

Carry-over connection (HPCO)

This option, available on all D12, allows the sectional valve to feed a second valve, by extending the free flow channel. In this configuration, the valve need a separated port for connection to tank.

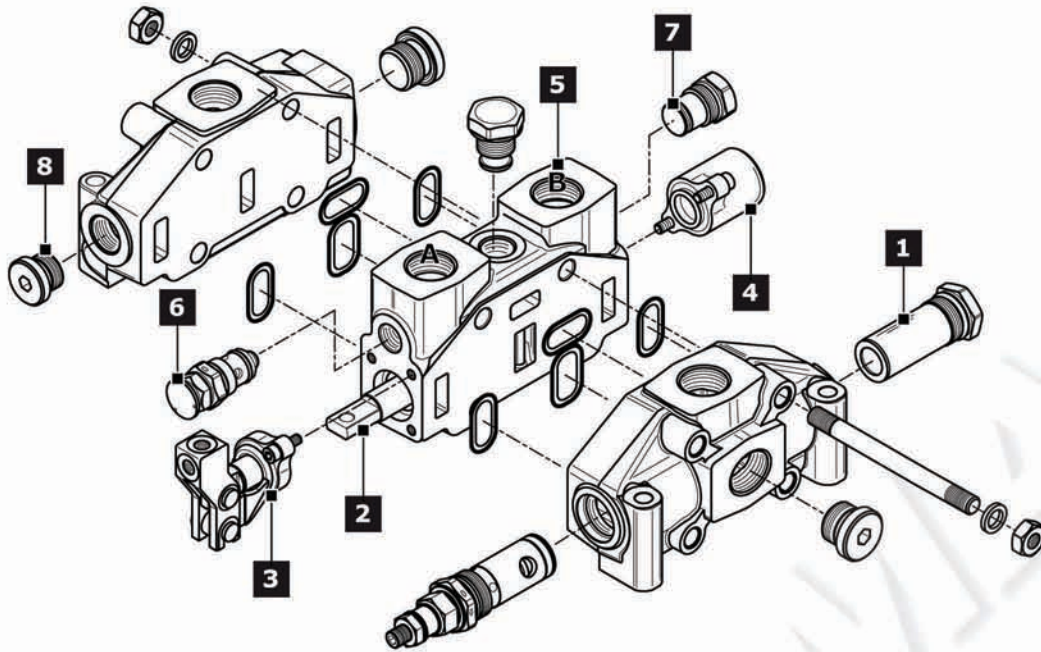


It is possible to transform sectional valve from standard to HPCO version just by ordering the appropriate conic plug:



code (HPCO Plug identification)	description	q.ty
413010207	conic plug G 3/8 x 15	1

D12 SPARE PARTS LIST



Ref.	Description	Order code	Q.ty	Code	Note
		6364			Setting: 100 bar
	Pilot operated pressure relief valve (*)	2608	1		Setting: 200 bar
		2744			Setting: 300 bar
	Relief valve plugged	430107001	1		
1	Main Anticavitation check valve	915050701	1	-	
	External piloted valve	915040701	1		
	Solenoid dump valve (12 vdc (**))	915040702	1		
	Solenoid dump valve (24 vdc (**))	915040703	1		
	Plug with pressure-gauge connection	430107003	1		
	3 positions double-acting spool	421207015	1	W001A	for protected lever
		421207001	1	W001A	for hydraulic actuation
	3 positions double-acting A and B to tank spool	421207007	1	W002A	for protected lever
2		421207002	1	W002A	for hydraulic actuation
	3 positions single-acting on A	421207024	1	W005A	for protected lever
	3 positions single-acting on B	421207025	1	W006A	for protected lever
	4 positions double-acting with float in the 4 th pos.	421207020	1	W012A	for protected lever
	Control without lever	320307002	1	H004	
		320307005	1		only for W012 spool
3	Protected vertical safety lever	320307001	1	H101 = H102	
		320307003	1		only for W012 spool
	Hydraulic actuation with side ports	320507001	2	H005	

D12 SECTIONAL VALVE

Ref.	Description	Order code	Q.ty	Code	Note
4	3 position spring centred spool	320707001	1	F001A	
	Detent in A and B	320807001	1	F002A	
	Detent in A	320807002	1	F003A	
	Detent in B	320807003	1	F004A	
	Detent in 4 th position	320807004	1	F005A	only for W012 spool
	Prerangement dual command	320707007	1	F013A	
	Pneumatic control ON-OFF	321107004	1	F020A=F021A	BSP ports
	Proportional Pneumatic control	321207007	1	F022A=F023A	BSP ports
	Electropneumatic control ON-OFF (12 vdc)	321607001	1	F0620	
	Electropneumatic control ON-OFF (24 vdc)	321607002	1	F0630	
	Electrohydraulic ON-OFF (12 vdc)	321407021	1	F1600	
	Electrohydraulic ON-OFF (24 vdc)	321407022	1	F1610	
	Electrohydraulic Proportional (12 vdc)	322007001	1	F2600	
	Electrohydraulic Proportional (24 vdc)	322007002	1	F2610	
	Electrohydraulic ON-OFF (12 vdc) with reducing valve	321407023	1	F1500=F1520	BSP ports
	Electrohydraulic ON-OFF (24 vdc) with reducing valve	321407024	1	F1510=F1530	BSP ports
	Electrohydraulic Proportional (12 vdc) with reducing valve	322007003	1	F2500=F2520	BSP ports
	Electrohydraulic Proportional (24 vdc) with reducing valve	322007004	1	F2510=F2530	BSP ports
	Electrohydraulic ON-OFF (12 vdc) with reducing valve	321407031	1	F1500=F1520	UNF ports
Electrohydraulic ON-OFF (24 vdc) with reducing valve	321407032	1	F1510=F1530	UNF ports	
Electrohydraulic Proportional (12 vdc) with reducing valve	322007005	1	F2500=F2520	UNF ports	
Electrohydraulic Proportional (24 vdc) with reducing valve	322007006	1	F2510=F2530	UNF ports	
5	Check valve on the work section	320207001	1	-	only for RP and RT section
6	Antishock valve on port A	4209			Setting: 100 bar
		2743		01 PA	Setting: 200 bar
		2948	1		Setting: 300 bar
	Anticavitation valve on port A	915080601		02 PA	
	Prerangement for auxiliary valve on port A	430406001		05 PP	
7	Antishock valve on port B	4209			Setting: 100 bar
		2743		01 PB	Setting: 200 bar
		2948	1		Setting: 300 bar
	Anticavitation valve on port B	915080601		02 PB	
	Prerangement for auxiliary valve on port B	430406001		05 PB	
8	Plug kit (G 3/4)	430000020		G05	
	Plug kit (G 1)	430000021	1	G06	
	Plug kit (1"1/12"-16 UNF)	300007002		U05	

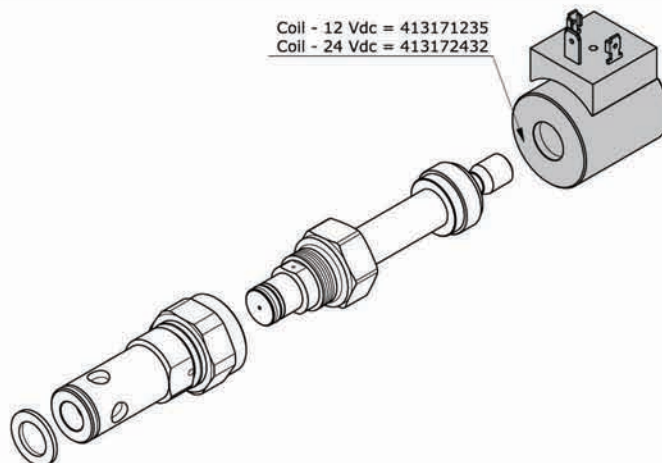
Note

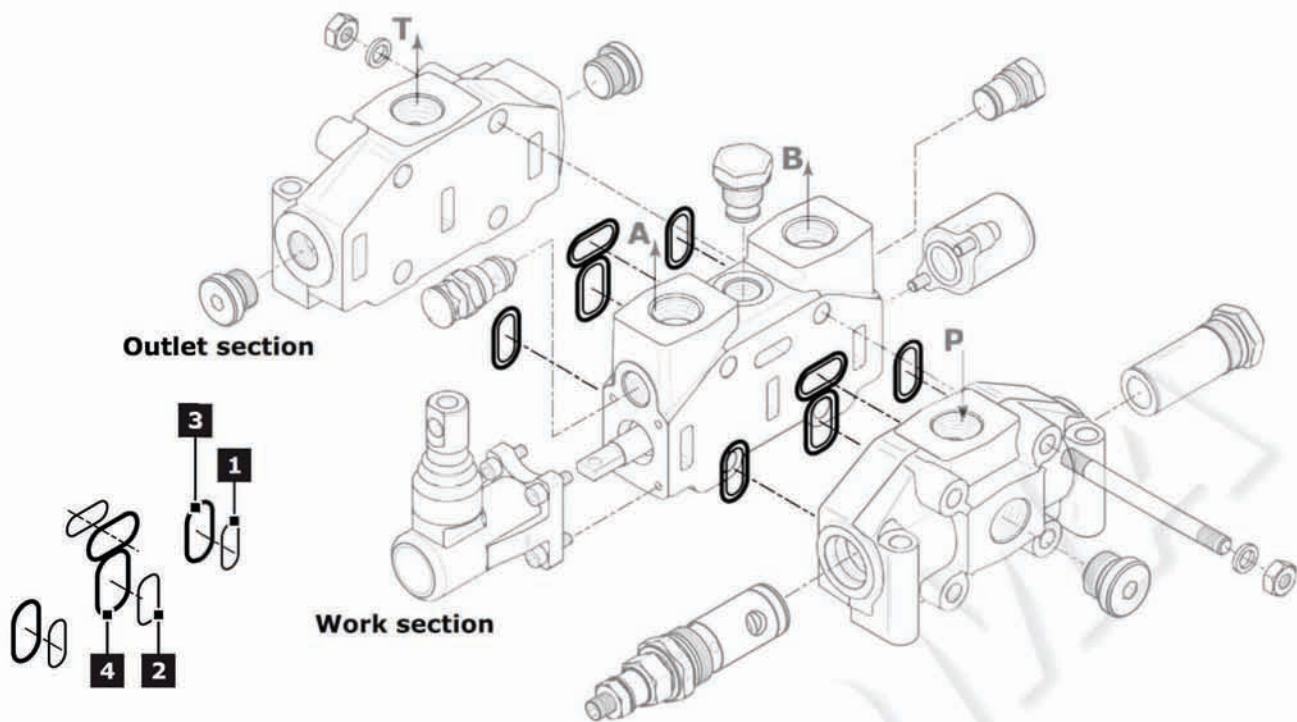
(*) = for different settings please contact our Sales Dpt.

(**) = electric dump valve coil can be ordered separately as spare part: (see drawing "A")
 Ordering code Coil 12 vdc: 413171235
 Ordering code Coil 24 vdc: 413172432

(#) = Detent in A and B Kick-out is available only with special spool assembly

Coil - 12 Vdc = 413171235
 Coil - 24 Vdc = 413172432





Outlet and work section			
Rif.	Order code	Description	Q.ty
1	423401016	Ring	3
2	423401015	Ring	1
3	412020601	O.R. 90SH 28,25 x 2,62 (2-122)	3
4	412020602	O.R. 90SH 32,99 x 2,62 (2-125)	1

Complete Gasket kit: order code - 350907001

INSTALLATION

Guidelines

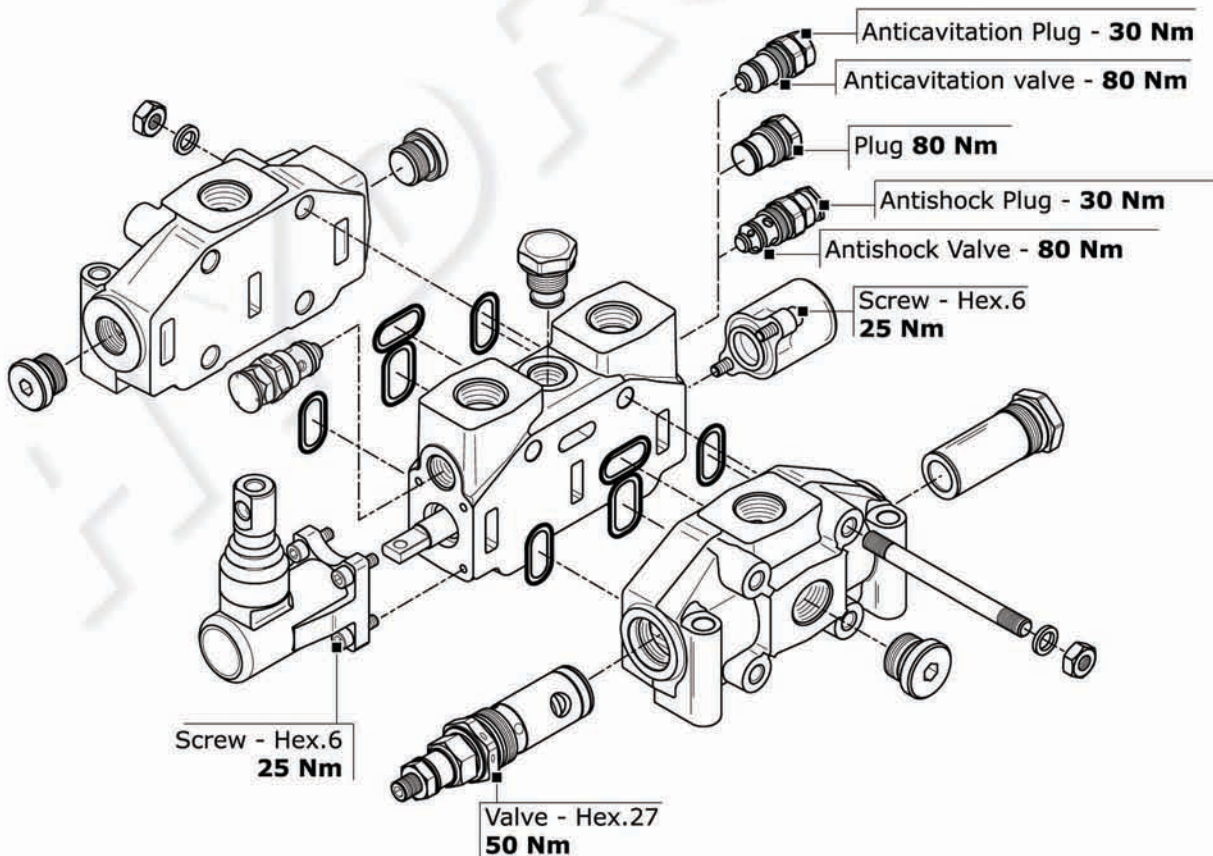
- Mount the control valve securely to a flat surface (recommended 3 point fixing); at the time do not use a hammer to positioning by hitting.
- When handling the control valve, be careful not hold the pilot cover or return spring cap of the spool or accessory valves such as main relief valves and anti-shock relief valves.
- Clean piping materials sufficiently before use.
- Make sure to prevent the port openings from being entered with dust or foreign matters.
- Tighten the port connectors surely with the recommended fastening torques.
- Do not direct the jet of a pressure washing unit directly to the valve.

Fittings tightening torque (Nm)

thread type	port P	Port A - B	Port T
BSP (ISO - 228)	G 3/4	G 3/4	G 3/4
with rubber sealing (DIN 3869)	120	120	120
with copper or steel and rubber washer	120	120	120
BSP (ISO - 228)	G 1	G 1	G 1
with rubber sealing (DIN 3869)	150	150	150
with copper or steel and rubber washer	150	150	150
UN-UNF (ISO - 725)	1"1/16 12 UNF	1"1/16 12 UNF	1"1/16 12 UNF
with O.R.	120	120	120

General clamping torque

The following table provides the main tightening torques of the distributor D12:



Dimensions - Thread codes

The connection ports size is indicated by an ordering code common for all Hydrocontrol products. Following table shows all available connections.

METRIC THREAD (ISO 9974-1)

Type	M18x1,5	M22x1,5	M27x2
Code	M01	M02	M03

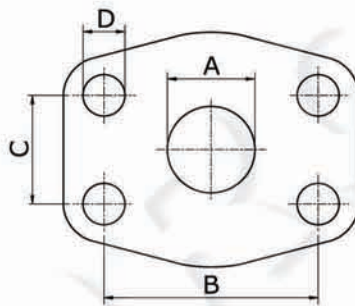
BSP THREAD (ISO 1179-1)

Type	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
Code	G02	G03	G04	G05	G06	G07	G08	G09

UN / UNF THREAD (ISO 11926-1)

Type	9/16" 18 UNF SAE6	3/4" 16 UNF SAE8	7/8" 14 UNF SAE10	1 1/16" 12 UNF SAE12	1 5/16" 12 UNF SAE16	1 5/8" 12 UNF SAE20
Code	U02	U03	U04	U05	U06	U07

Dimensions - SAE Flange codes



SAE / 3000 FLANGE (ISO 6162-1)

Type	3/4" (MA)	3/4" (UNC)	1" (MA)	1" (UNC)	1 1/4" (MA)	1 1/4" (UNC)	1 1/2" (MA)	1 1/2" (UNC)	2" (MA)	2" (UNC)	3" (MA)	3" (UNC)
Code	S03	S04	S05	S06	S07	S08	S09	S10	S11	S12	S15	S16
A	19	19	25	25	32	32	38	38	51	51	76	76
B	47,6	47,6	52,4	52,4	58,7	58,7	69,9	69,9	77,8	77,8	106,4	106,4
C	22,3	22,3	26,2	26,2	30,2	30,2	35,7	35,7	42,9	42,9	61,9	61,9
D	M10	3/8-16	M10	3/8-16	M10	7/16-14	M12	1/2-13	M12	1/2-13	M16	5/8-11

SAE / 6000 FLANGE (ISO 6162-2)

Type	3/4" (MA)	3/4" (UNC)	1" (MA)	1" (UNC)	1 1/4" (MA)	1 1/4" (UNC)	1 1/2" (MA)	1 1/2" (UNC)
Code	S33	S34	S35	S36	S37	S38	S39	S40
A	19	19	25	25	32	32	38	38
B	50,8	50,8	57,2	57,2	66,6	66,6	79,3	79,3
C	23,8	23,8	27,8	27,8	31,8	31,8	36,5	36,5
D	M10	3/8-16	M12	7/16-14	M14	1/2-13	M16	5/8-11