

# EX38

LOAD SENSING VALVE



TECHNICAL CATALOGUE

A member of



 **walvoil**  
FLUID POWER EMOTION

**1<sup>st</sup> edition EX38.03**

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*This catalogue shows the product in the most standard configurations.  
Please contact our Sales Dpt. for more detailed information or special requests.*

**WARNING!**

*All specifications of this catalogue refer to the standard product at this date.  
Walvoil, oriented to a continuous improvement, reserves the right to  
discontinue, modify or revise the specifications, without notice.*

**WALVOIL IS NOT RESPONSIBLE FOR ANY DAMAGE CAUSED BY AN  
INCORRECT USE OF THE PRODUCT.**

## PATENTED SYSTEM

All the control valves belonging to the EX family work according to a principle designed by Hydrocontrol's R&D department and covered by patents EP1860327 (A1) EP1860327 (B1) US2008282691 (A1) and US7581487 (B2).

The valve LS signal is managed according to innovative technique which is an absolute first in the flow sharing world, ensuring:

- elimination of any LS signal bleed off, which can be observed in most systems currently available commercially, and is often the cause of poor compensation accuracy, slow response and excessive sensitivity to operating conditions.
- LS signal picking downstream of the local compensator: this will make signal detection "neater" improving control efficiency and accuracy.

## RESPONSE RATE

The EX control valve's strength resides in its quick, prompt response, achieved thanks to the functional advantages built into our patented system. Even the most critical applications such as excavator bucket shacking and the swift dynamics of forestry machinery, usually hard to achieve on flow sharing systems, can be successfully implemented by using EX family products.

## ACCURACY AND STABILITY

The unique technical characteristics of the Hydrocontrol's patent allows for outstanding flow control and compensation precision, not likely to be affected even by the most diverse operating conditions. Simultaneous functions are never mutually influenced, not even in the presence of the same load factors (an aspect best highlighted in crawler machinery travelling). System stability itself is greatly benefited by the EX design; the system, also in combination with traditional overcenter valves, appears well balanced and able to effectively reduce oscillation and dynamic instability.

## EFFICIENCY

In addition to the well known advantages typically offered by flow sharing systems which, associated with a variable pump, will drastically reduce the machine operating consumption, the EX family introduces a number of interesting options, including pressure relief on the LS signal to further increase energy saving and guarantee top efficiency levels.

## FLEXIBILITY

The EX family control valves can be easily adjusted to a variety of applications, thanks to the wide range of available options and different types of available control systems.

## COMPACT DIMENSIONS

The carefully designed features and integrated electrohydraulic control ensure a highly compact and optimised layout. Integrated end plates are available in the final working section (only EX54 and EX72), adding to the system dimensional and functional efficiency.

## PRIORITY

The EX family allow to install side by side pre-compensated section with post-compensated section. This feature allow to establish a priority in the way the oil is directed and increase the number of application where the EX family can be applied solving technical difficulties that before required external components. Both Inlets and Outlets remain common for the pre and post compensated sections making the assembling of the valve particularly convenient.

## APPLICATIONS

Flow Sharing valve for 150 l/min inlet flow rate. Suitable applications including truck-mounted cranes up to 25 tm, forestry cranes, tractors and mini-excavators up to 6 t.





## QUICK REFERENCE GUIDE

GENERAL SPECIFICATIONS	EX38	EX46	EX54	EX72
Working section number	1 - 10	1 - 10	1 - 8	1 - 8
<b>CIRCUIT</b>				
Spool stroke (mm)	7	7	9	11
Spool pitch (mm)	38	46	54	72
<b>RATED FLOW</b>				
Pump flow rate (l/min)	150	220	300	450
A/B port flow rate (l/min) (*)	100	180	250	350
<b>RATED PRESSURE</b>				
working pressure inlet port P (bar)	350	350	350	350
<b>BACK PRESSURE MAX</b>				
Max pressure outlet port T (bar)	10	10	10	10

(\*) with fixed Pump inlet compensator

OPTION CHART	EX38	EX46	EX54	EX72
LS Signal pressure relief valve	•	•	•	•
Pump pressure relief valve	•	•	•	•
LS Signal dump valve (electric 12/24 Vdc)	•	•	•	•
Pump dump valve (electric 12/24 Vdc)	•	•		
<b>SPOOLS TYPE</b>				
Single acting	•	•	•	•
Double acting	•	•	•	•
Float spool	•	•	•	•
<b>SPOOL ACTUATION</b>				
Hydraulic actuation	•	•	•	•
Mechanical lever actuation	•	•	•	
Mechanical cloche actuation	(•)			
Prop. electrohydraulic actuation 12-24 Vdc (*)	•	•	•	•
ON/OFF electrohydraulic actuation 12-24 Vdc (*)	•	•	•	•
CAN BUS interface actuation	on development	on development	on development	•
<b>SPOOL RETURN ACTION</b>				
Return spring	•	•	•	•
Mechanical detent	•	•		
Pneumatic control	•	•		
Spools displacement sensor (HLPS)	•	•	•	•
<b>PORT RELIEF VALVE</b>				
Direct operated antishock valve			•	•
Anticavitation valve	•	•	•	•
Pilot operated combined valve			•	•
Direct operated combined valve (fixed setting)	•	•		
Plug	•	•	•	•

• = available

(•) = available on request

(\*) = we recommend to keep the T line for the electrohydraulic cartridges separate from the T line of the valve.





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The specifications detailed in this catalogue show standard products. Special applications are available to order subject to contacting our Engineering Department for an estimate. The data and specifications indicated are to be considered a guide only and Hydrocontrol S.p.A. reserves the right to introduce improvements and modifications without prior notice. Hydrocontrol is not responsible for any damage caused by an incorrect use of the product.

**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**

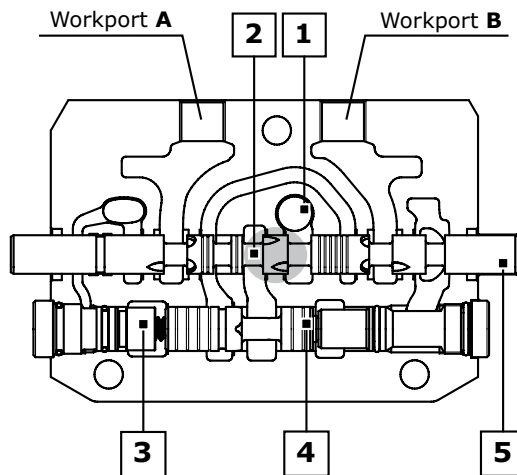
Types of fluid (according to ISO 6743/4) Oil and Solutions	Temperature (°C)		Compatible gasket
	min	max	
Mineral Oil HL, HM (or HLP acc. to DIN 51524)	-25	+80	NBR
Oil in water emulsions HFA	+5	+55	NBR
Water in oil emulsions HFB	+5	+55	NBR
Polyglycol-based aqueous solution HFC	-10	+60	NBR

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



## Operating principle

The flow sharing technology applied to the standard load sensing system characterizes the new control valves EX. The valve, completely pressure compensated, guarantees great controllability to all actuations, making workport flow dependent only on metering area (spool position). When flow saturation occurs the system reacts by implementing an equal reduction of pressure margin across all spools, generating a proportional reduction of workport flow.



### LEGEND:

1. Inlet line (High pressure)
2. Metering notches
3. Load sensing line
4. Local compensator
5. Metering spool

## Single section

Referring to picture it's possible to remark some aspects of system functionality. Coming from the common inlet line the main flow, passing across the metering area, reaches local compensator. Metering area, according to the pressure margin, controls the total amount of flow to the workport selected by the main spool. The load sensing signal, picked up downstream the local compensator, feeds the common load-sensing line. When a single section is actuated, the local compensator fully opens to the left side, reaching its complete balanced position. The control of the LS system is made by the inlet compensator for fixed displacement pump or pump compensator for variable displacement pump.

## Multi-section

When two or more sections are actuated only one, characterized by the highest pressure (dominant), is involved in the LS signal transmission, working as briefly described in the previous paragraph. The other functions (slaves) become directly dependent on it. The common LS line transfers the information coming from the dominant local compensator to all dependent compensators. Driven by the LS signal, the unbalanced slave compensators activate the pressure compensation creating an artificial pressure drop able to keep pressure margin nominally the same on all the spools. Workport flow becomes only a function of metering area making the system totally load independent.

## Flow Sharing function

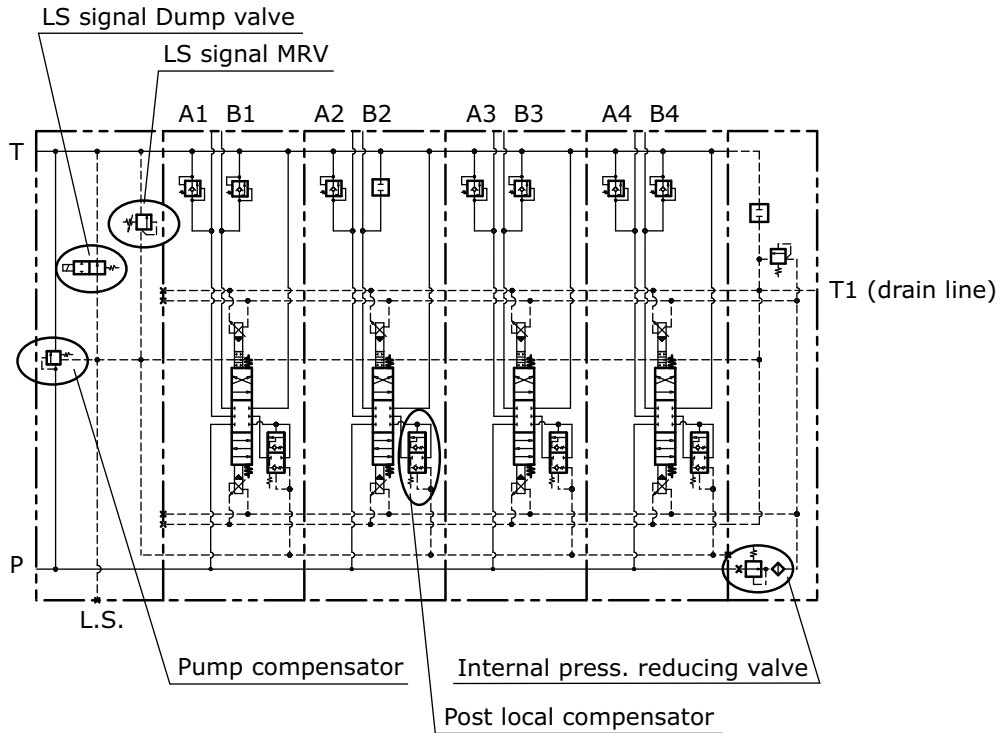
When saturation occurs the total amount of flow required by actuations is higher than the maximum pump flow rate. The system is able to keep the nominal pressure margin no more. The actual pressure margin reduces according to real flow demand. Since all the local compensators feel the same LS signal and the same pressure drop is applied to different metering areas, then workport flows are reduced proportionally in order to keep all actuations completely under control.



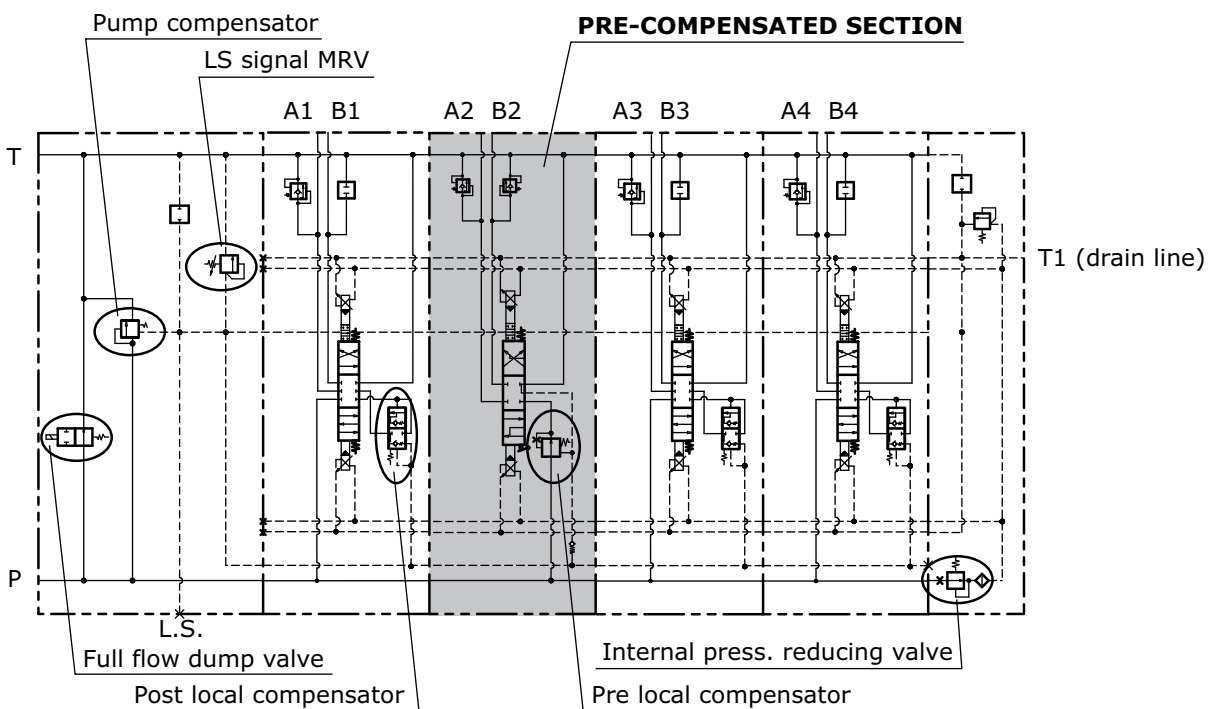
HYDRAULIC SCHEMA

EX38 family offers a precious additional feature: the possibility to mix pre and post compensated technologies, to improve the control capabilities and manage flows with different priorities. Following schematics show an example for a full post-compensated system and for mixed system. Further detail are explained on page 35.

Post compensated system



Pre compensated system





**ORDER EXAMPLE**

**EX38/1:** **ML V1A 200 V7B C12AJ V10C KV G05** **W001C 2525 HP04 FP04 B12AJ RC1 G04 05TF PA 05TF PB** **KZ20EH**

**TYPE:**

**EX38:** product type  
**/1:** working section number

**1) INLET ARRANGEMENT: p. 15**

- ML** Inlet side
- V1A** LS pressure relief valve on port A
- 200** Setting (bar)
- V7B** Full flow relief plug on port B
- C12AJ** Coil-connector kit type
- V10C** LS plug on port C
- KV G05** Inlet body arrangement

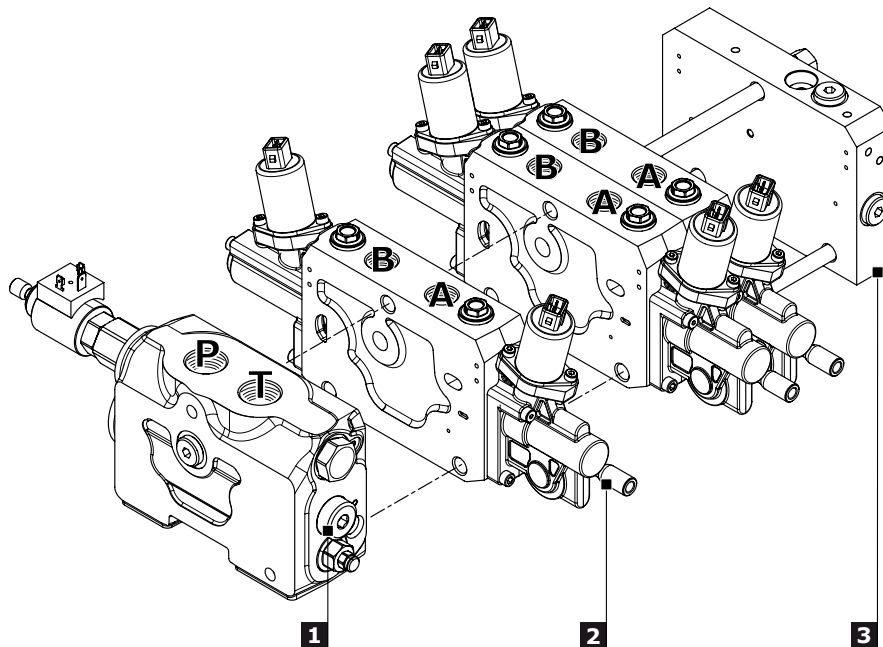
**2) WORK SECTION ARRANGEMENT: p. 21**

- W001C 2525** Spool delivery
- HP04** Spool actuation type
- FP04** Spool return action type
- B12AJ** Coil-connector kit type
- RC1 G04** Work section arrangement
- 05TF PA** Auxiliary valve (port A)
- 05TF PB** Auxiliary valve (port B)

**3) OUTLET ARRANGEMENT (END PLATE): p. 44**

- KZ20EH** Plate type

Ordering row 2 must be repeated for every work section



**Standard thread**

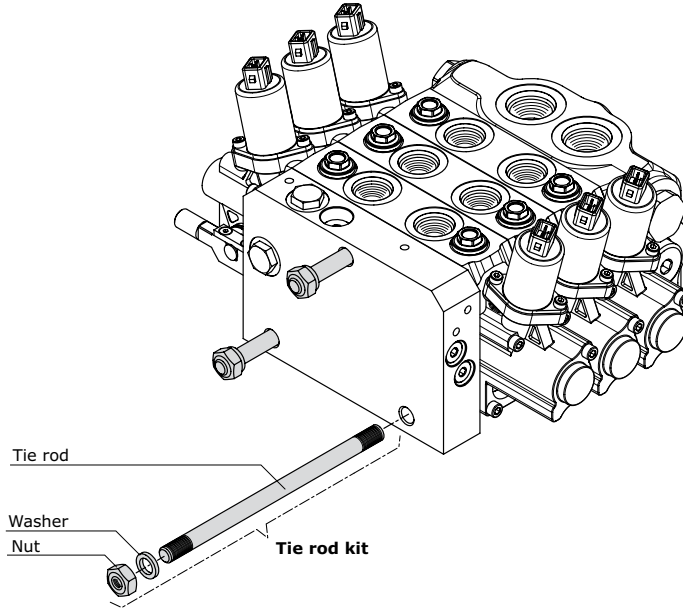
The connection ports size is indicated by an ordering code common for all Hydrocontrol products. Following table shows all available connections; for ordering code refer to table on page 60.

Ports	BSP (ISO - 228)	Code	UN-UNF (ISO - 725)	Code
(P - T)	G 3/4	<b>G05</b>	1"1/16 - 12 UNF	<b>U05</b>
(A - B)	G 1/2	<b>G04</b>	7/8" - 14 UNF	<b>U04</b>



**Tie-rod kit classification**

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, nut and washer. EX38 requires 3 tie-rod kits.



Tie rod kit	Order Code	Lenght (mm)	Clamping Torque (Nm)	Quantity
EX38/1	300193022	95		
EX38/2	300193015	133		
EX38/3	300193016	172		
EX38/4	300193017	210		
EX38/5	300193010	248		
EX38/6	300193011	287	40	3
EX38/7	300193012	324		
EX38/8	300193013	361		
EX38/9	300193014	400		
EX38/10	300193018	438		

**Painting**

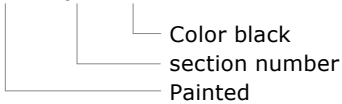
On request, all Hydrocontrol valves can be delivered painted (RAL 9005 black primer).

**Order example of EX38/1 painted:**

EX38/1  
 ML V1A 200 V7B C12AJ V10C KV G05  
 W001C 2525 HP04 FP04 B12AJ RC1 G04 05TF PA 05TF PB  
 KZ20EH  
**P006/1 N10**

The painting is indicated with the following value:

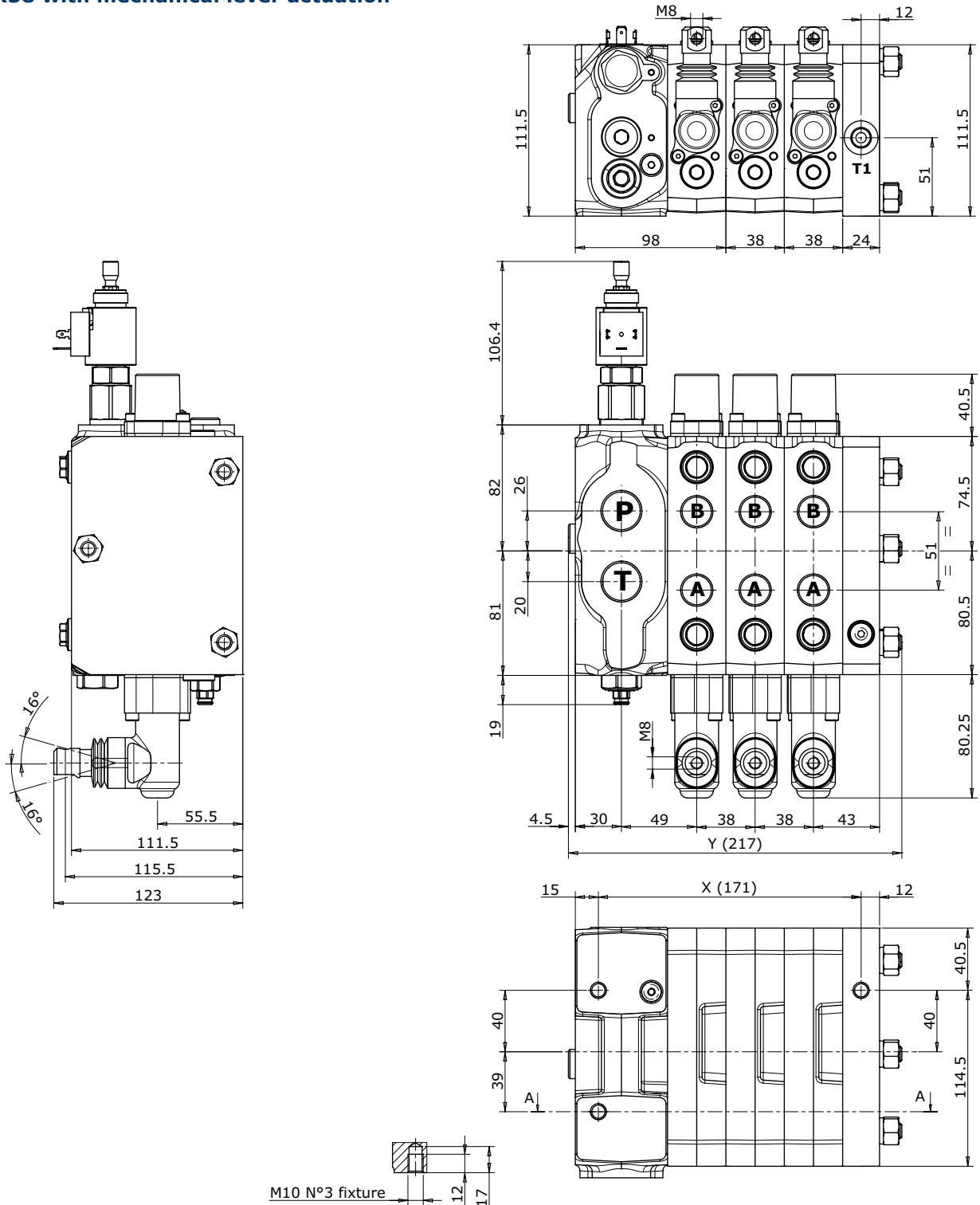
**P006 - /1 - N10**





**DIMENSIONS**

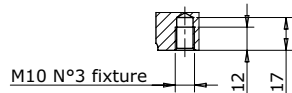
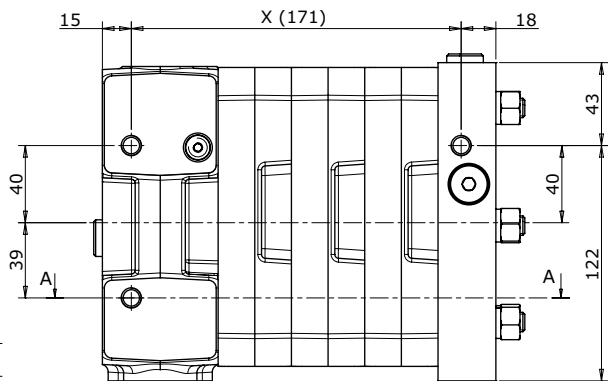
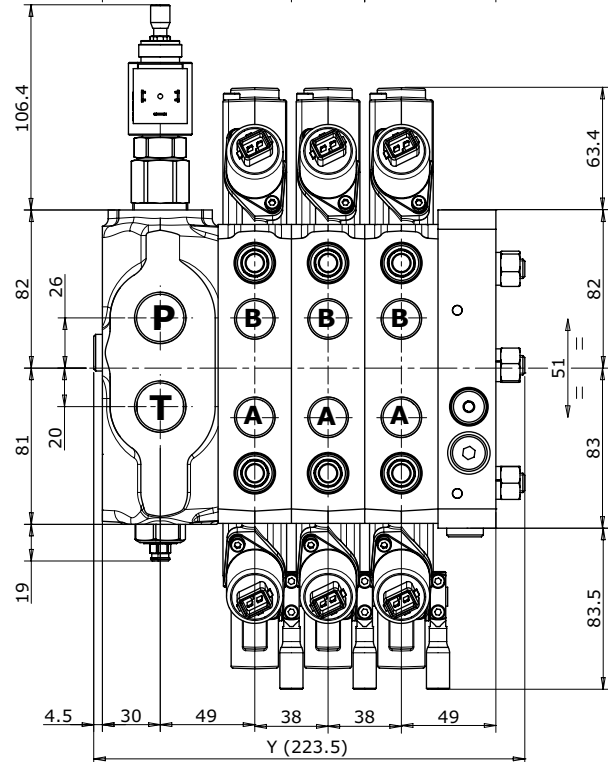
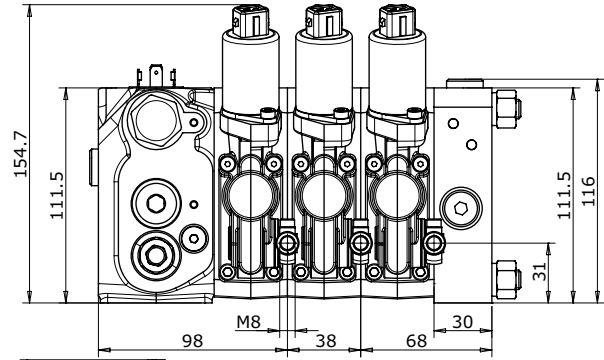
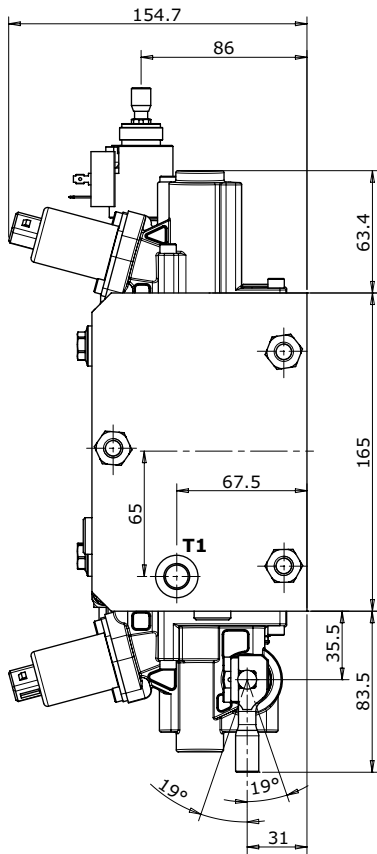
**EX38 with mechanical lever actuation**



Type	/1	/2	/3	/4	/5	/6	/7	/8	/9	/10
X (mm)	95	133	171	209	247	285	323	361	399	437
Y (mm)	141	179	217	255	293	331	369	407	445	483
Weights (kg)	14,5	18,5	22,5	26,5	30,5	34,5	38,5	42,5	46,6	50,5



EX38 with electrohydraulic actuation



Type	/1	/2	/3	/4	/5	/6	/7	/8	/9	/10
X (mm)	95	133	171	209	247	285	323	361	399	437
Y (mm)	147.5	185.5	223.5	261.5	299.5	337.5	375.5	413.5	451.5	489.5
Weights (kg)	15	19.5	24	28.5	33	37,5	42	46.5	51	55.5

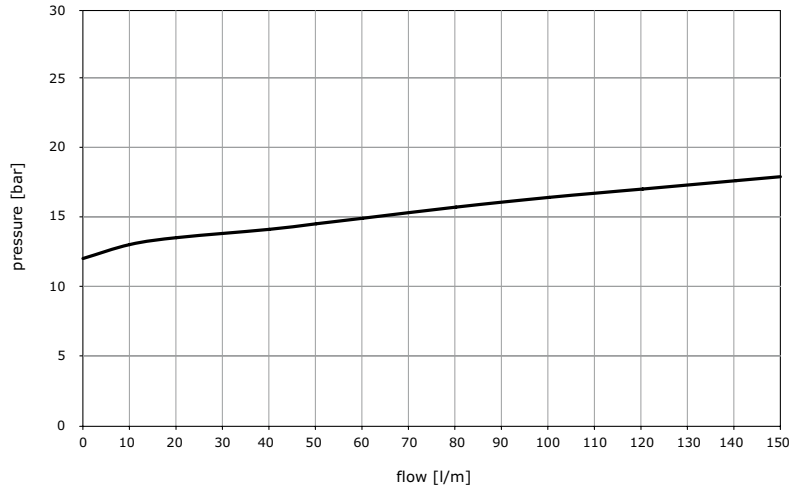




**TYPICAL CURVES**

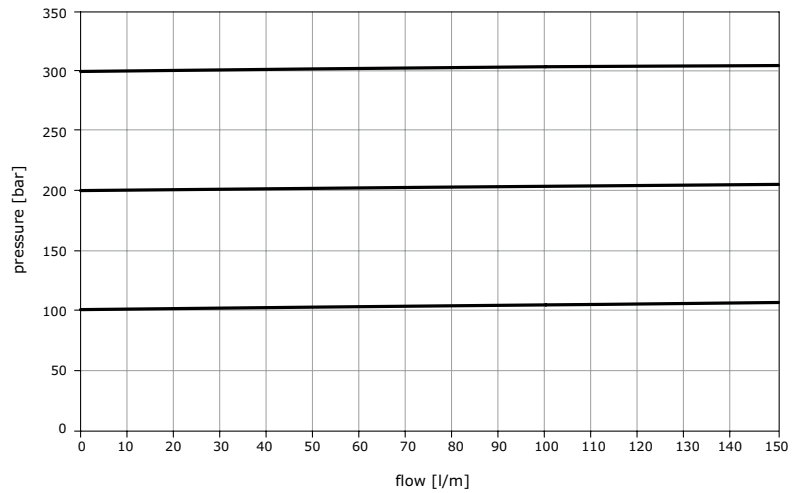
**Inlet compensator Pressure drop (P-T)**

Fixed displacement system (KV): pressure drop across the inlet compensator as function of pump flow



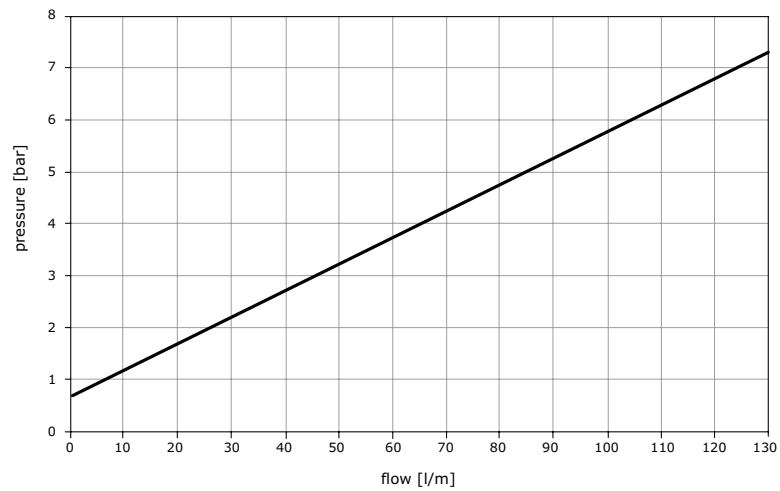
**LS Signal pressure relief valve**

Fixed displacement system (KV): LS Signal pressure relief valve characteristic



**Full flow dump valve (valve type 7, 8)**

Fixed displacement systems (KV): pressure drop across open electric dump valve as function of pump flow

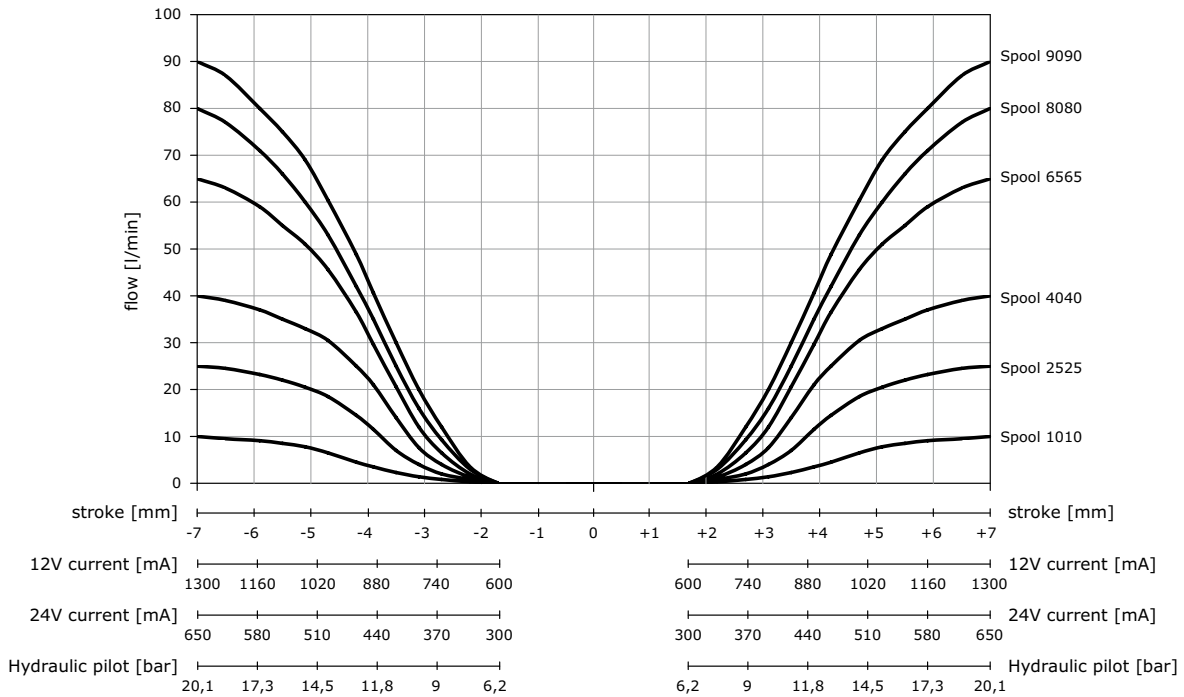




**Post compensated spool flow characteristic**

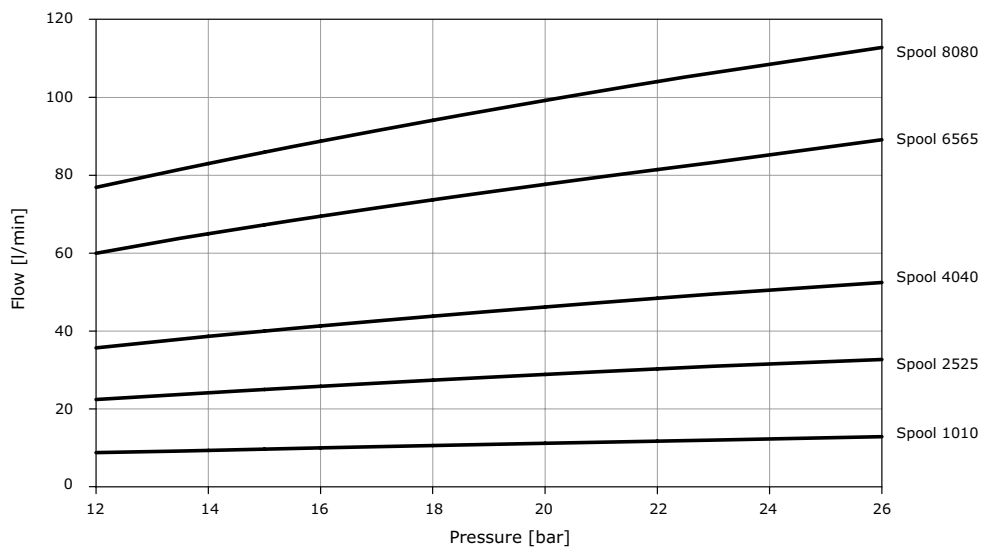
Fixed displacement systems (KV): flow on ports A and B as function of spool stroke, pilot pressure, control current  
Inlet flow: 120 l/min

Pump inlet compensator at 14 bar  $\Delta p$



**Post compensated spool flow with variable displacement pumps**

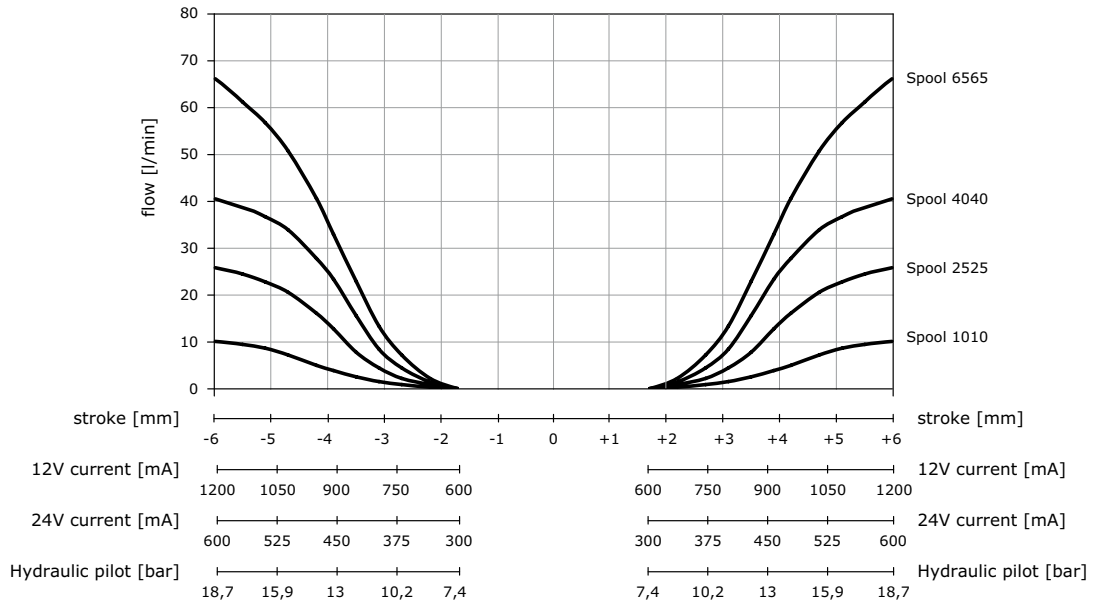
Variable displacement systems (JV): spools maximum delivered flow as function of pump  $\Delta P$  setting





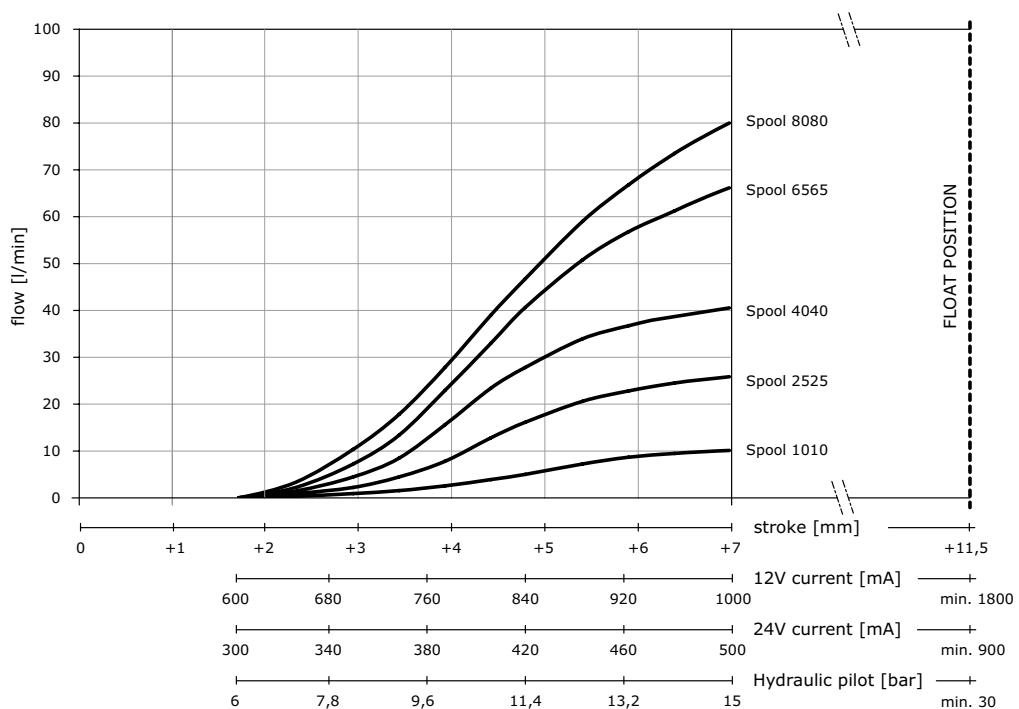
**Pre compensated spool flow characteristic**

Fixed displacement systems (KV): flow on ports A and B as function of spool stroke, pilot pressure, control current  
 Inlet flow: 120 l/min



**Post compensated float spool characteristic**

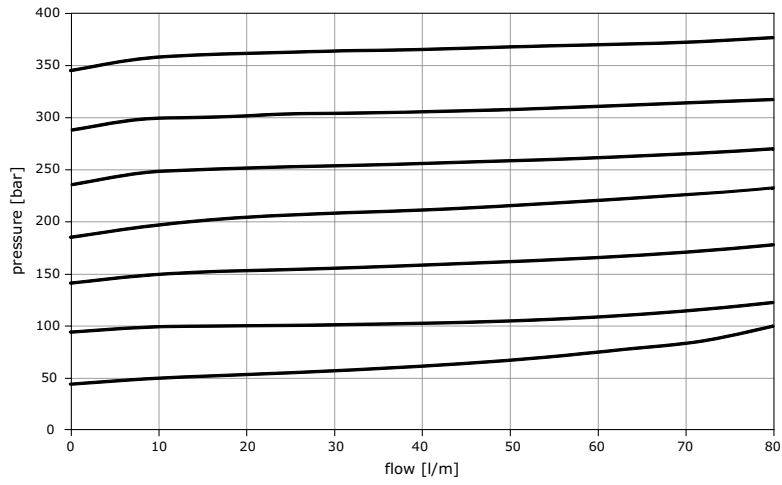
Fixed displacement systems (KV): flow and float position as function of spool stroke, pilot pressure, control current  
 Inlet flow: 120 l/min





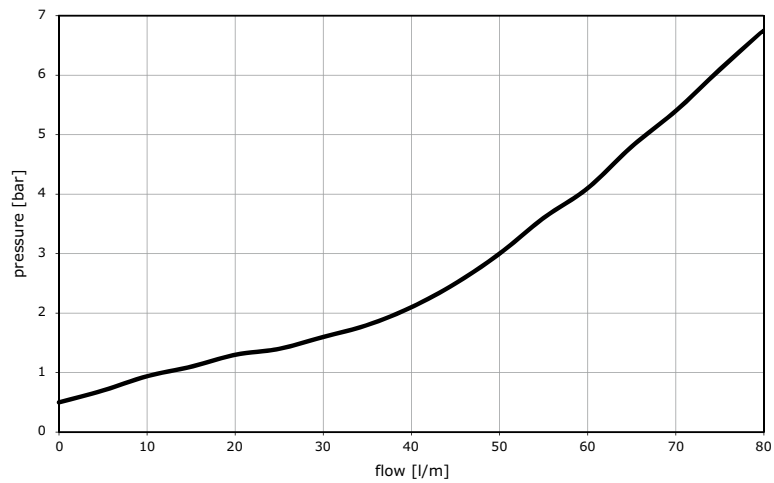
**Combined valves (antishock function)**

Pressure characteristic as function of flow



**Combined valves (anticavitation function)**

Opening and pressure characteristic as function of flow

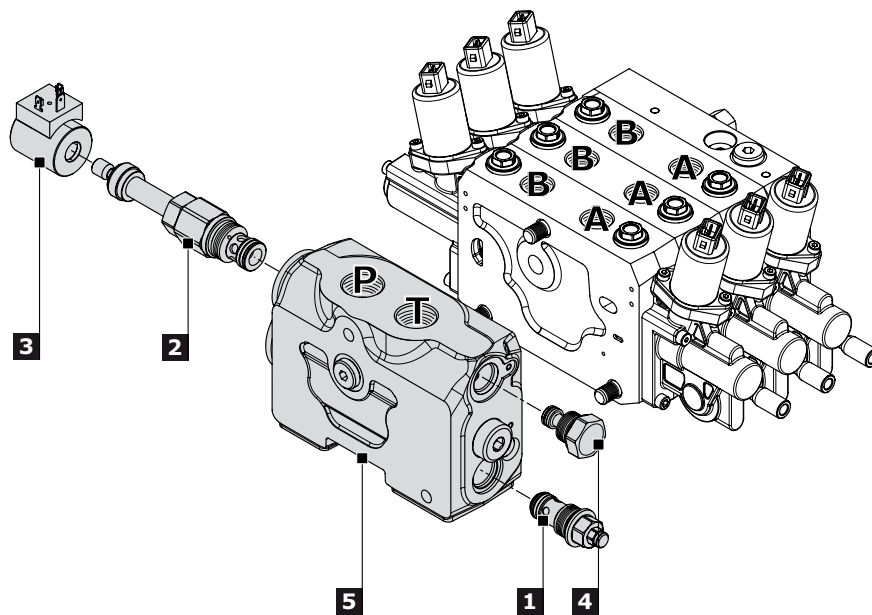




**INLET SECTION**

**Order example**

	<b>ML</b>	<b>V1A</b>	<b>200</b>	<b>V7B</b>	<b>C12AJ</b>	<b>V10C</b>	<b>KV G05</b>
1.	<b>ML</b>	Inlet side					
	<b>V1A</b>	LS pressure relief valve on position A					
	<b>200</b>	setting (bar)					
2.	<b>V7B</b>	Full flow electric dump valve on position B					
3.	<b>C12AJ</b>	Coil-Connector kit type					
4.	<b>V10C</b>	LS plug on position C					
5.	<b>KV G05</b>	Inlet body classification					



Rif.	Code	Description	Page
-	<b>MR</b>	Flow sharing valve with right inlet section	<b>16</b>
	<b>ML</b>	Flow sharing valve with left inlet section	
<b>1</b>	<b>V1A</b>	LS pressure relief valve - on position A	<b>16</b>
	<b>V2A</b>	LS relief plug - on position A	
<b>2</b>	<b>V3B</b>	Full flow direct operated pressure relief valve - on position B	<b>16</b>
	<b>V4B</b>	Full flow relief plug - on position B	
	<b>V7B</b>	Full flow electric dump valve - on position B	
<b>3</b>	<b>C12AJ</b>	AMP Junior connector - 12 Vdc	<b>18</b>
<b>4</b>	<b>V10C</b>	LS plug - on position C	<b>16</b>
	<b>V11C</b>	LS electric dump valve - on position C	
<b>5</b>	<b>KV G05</b>	Open centre inlet section for fixed displacement pumps (G 3/4)	<b>19</b>
	<b>JV G05</b>	Closed centre inlet section for variable displacement pumps (G 3/4)	
	<b>KV U05</b>	Open centre inlet section for fixed displacement pumps (1"1/16 - 12 UN)	
	<b>JV U05</b>	Closed centre inlet section for variable displacement pumps (1"1/16 - 12 UN)	

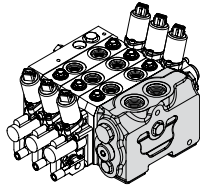
**NOTE:** when ordering a relief valve it is necessary to specify factory setting (example 200).



Inlet side classification

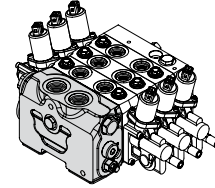
**MR**

Flow sharing valve with **RIGHT INLET** section



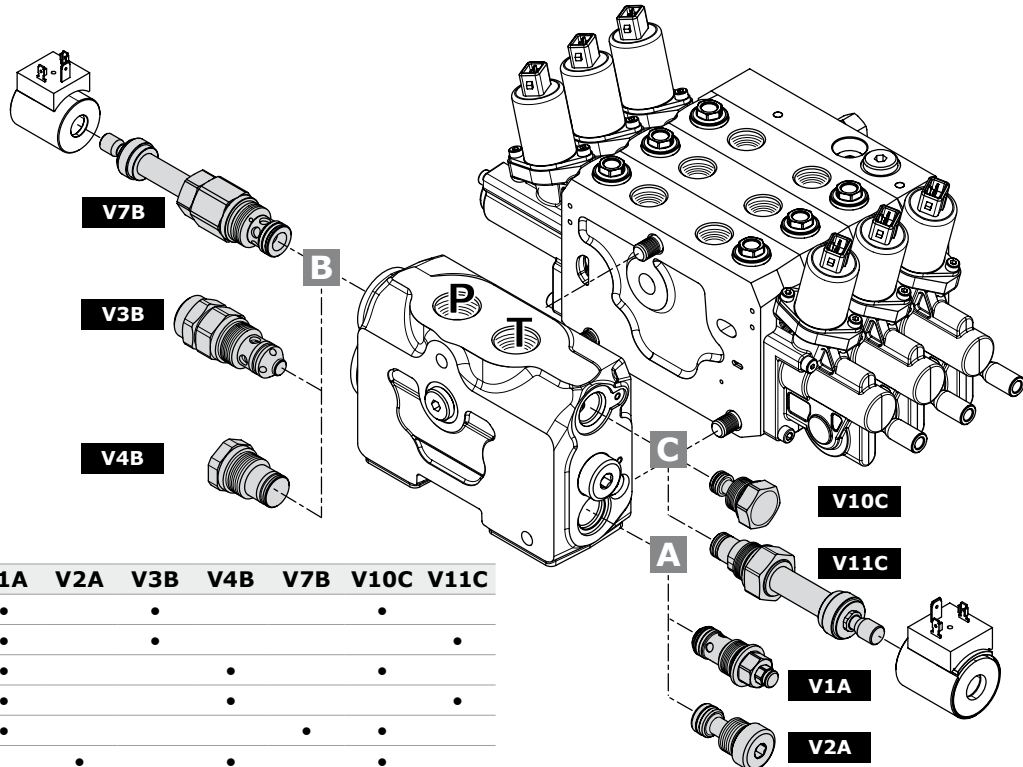
**ML**

Flow sharing valve with **LEFT INLET** section



Order code	Schema	Description	Setting Range (bar)
<b>V1A</b>			LS pressure relief valve
			50 - 250
<b>V2A</b>			LS relief plug
			251 - 350
<b>V3B</b>			Full flow direct operated pressure relief valve
			40 - 200
<b>V4B</b>			Full flow relief plug
			201 - 420
<b>V7B</b>			Full flow electric dump valve
<b>V10C</b>			LS plug
<b>V11C</b>			LS electric dump valve

Combinations valve available



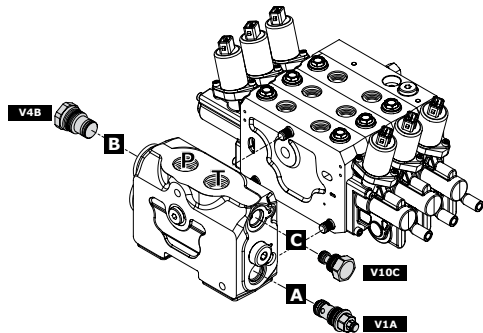
combination	V1A	V2A	V3B	V4B	V7B	V10C	V11C
V1A - V3B - V10C	•		•			•	
V1A - V3B - V11C	•		•				•
V1A - V4B - V10C	•			•		•	
V1A - V4B - V11C	•			•			•
V1A - V7B - V10C	•				•	•	
V2A - V4B - V10C		•		•		•	
V2A - V4B - V11C		•		•			•
V2A - V7B - V10C		•			•	•	



**Inlet valve arrangement examples**

**NOTE:**

when ordering a valve type V1A or V3B, it is necessary to specify pressure setting.

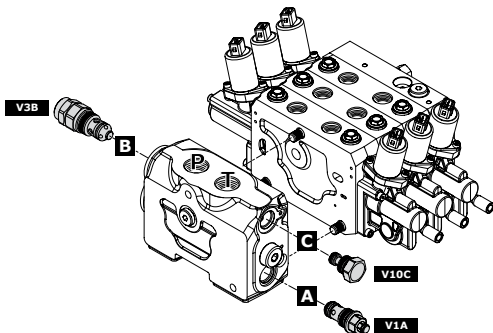


**ML - V1A (200) - V4B - V10C - KV G05**

- V1A** LS relief valve \_\_\_\_\_  
on position A
- 200** setting (bar) \_\_\_\_\_  
pressure relief valve
- V4B** Full flow relief plug \_\_\_\_\_  
on position B
- V10C** LS plug \_\_\_\_\_  
on position C

**NOTE:**

requires minimum 40 bar difference in setting of valve V1A (LS relief valve) and valve V3B (Full flow relief valve)

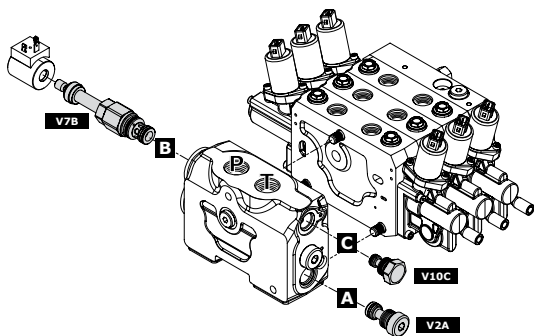


**ML - V1A (200) - V3B (240) - V10C - KV G05**

- V1A** LS relief valve \_\_\_\_\_  
on position A
- 200** setting (bar) \_\_\_\_\_  
pressure relief valve
- V3B** Full flow direct operated pressure  
relief valve on position B
- 240** setting (bar) \_\_\_\_\_  
Full flow direct operated pressure relief valve
- V10C** LS plug on position C

**NOTE:**

when ordering a valve type V7B, it is necessary to specify connector type (see table "A" page 18)

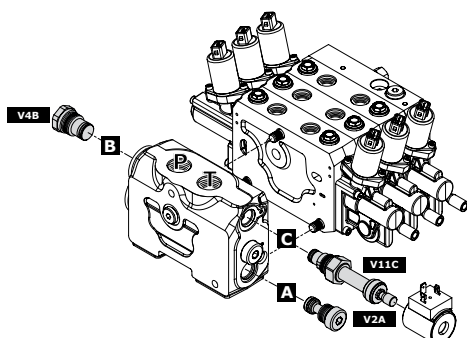


**ML - V2A - V7B (C12AJ) - V10C - KV G05**

- V2A** LS relief plug \_\_\_\_\_  
on position A
- V7B** Full flow \_\_\_\_\_  
electric dump valve
- C12DI** Connector DIN - 12 Vdc \_\_\_\_\_
- V10C** LS plug on position C

**NOTE:**

when ordering a valve type V11C, it is necessary to specify connector type (see table "A" page 18)



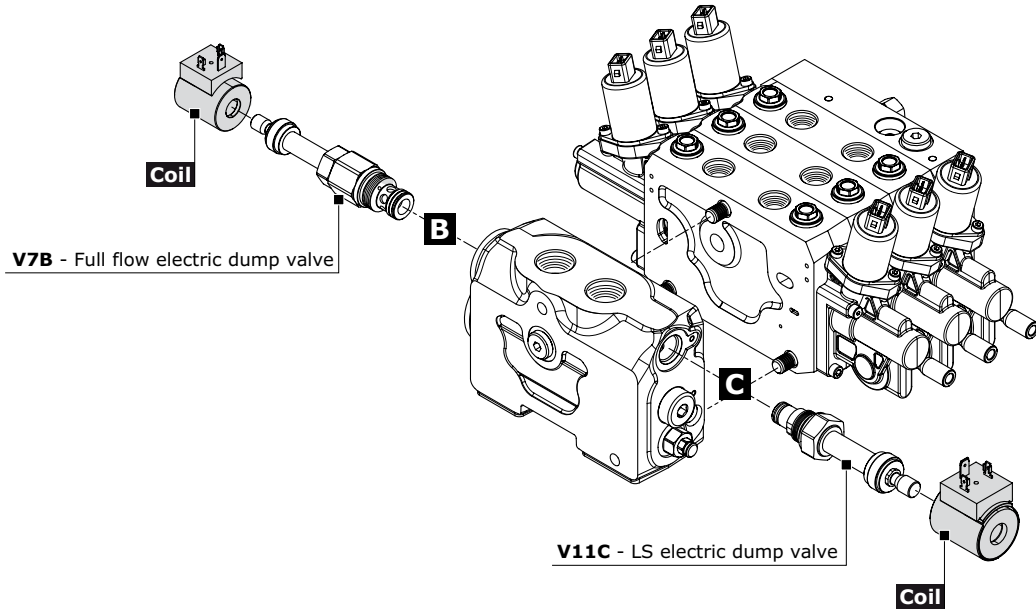
**ML - V2A - V4B - V11C (C24DE) - KV G05**

- V2A** LS relief plug \_\_\_\_\_  
on position A
- V4B** Full flow relief plug \_\_\_\_\_  
on position B
- V11C** LS electric dump valve \_\_\_\_\_  
on position C
- C24DE** Connector DEUTSCH - 24 Vdc \_\_\_\_\_



**Table "A"**  
**Coil and Connectors specifications for inlet section**

Coil kit must be ordered separately



Coil Type	Order Code	supply voltage (Vdc)	weather protection	Coil resistance R20 (Ω)	connector Material	coil body	duty cycle	Coil Insulation	power
DIN 43650 ISO 4400	<b>C12DI</b>	413171235	IP65	7	Nylon	Zinc plated steel	ED 100%	Class H coil as from IEC 85 standard	20.5 W
	<b>C24DI</b>	413172432		24					
DEUTSCH DT 4	<b>C12DE</b>	413171238	IP67	7					
	<b>C24DE</b>	413172440		24					
AMP JUNIOR	<b>C12AJ</b>	413171237	IP65	7 Vdc					
	<b>C24AJ</b>	413172433		24 Vdc					

**NOTE:** mating connector for DIN 43650 can be ordered separately with code 413000313.





**Inlet body classification**

The inlet section with KV configuration enables control valve usage with fixed displacement pumps. With this configuration the presence of LS relief valve (valve type 1) is suitable to adjust the system maximum pressure. Full flow electric dump valve (valve type 7) can also be added as safety device. The inlet section with JV configuration enables control valve usage with variable displacement pumps. With this configuration the presence of LS relief valve (valve type 1) is suitable to adjust the system maximum pressure. LS electric dump valve (valve type 11) can also be added as safety device. An additional full flow relief valve (valve type 3) can be added to protect the system from pump regulator failures. Additional solution for variable displacement pumps is available on request to allow a constant reduced free flow in stand by condition through the system: this is sometime required to guarantee a stand by flow for oil cooling.

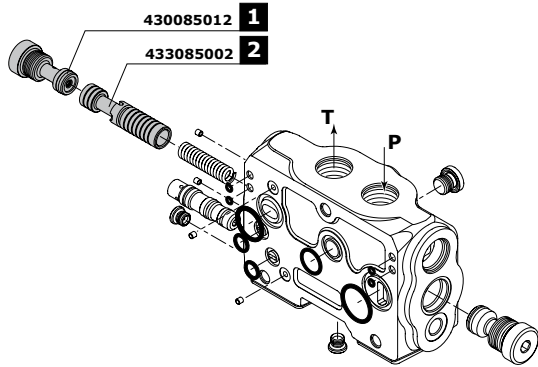
INLET BODY ARRANGEMENT AND THREAD AVAILABLE		
code	schema	description
<b>KV G05</b>		<b>Open centre inlet section</b> for fixed displacement pumps
<b>KV U05</b>		
<b>JV G05</b>		<b>Closed centre inlet section</b> for variable displacement pumps
<b>JV U05</b>		

**NOTE:**  
transformation of the inlet section from closed center to open center and vice versa is possible by ordering the appropriate kit 320093007 or 320093008 (see page 20)



Trasformation kits

Transformation on the inlet section from open center to closed center is possible by ordering the complete kit code: **320093007 (transformation kit from KV to JV)**

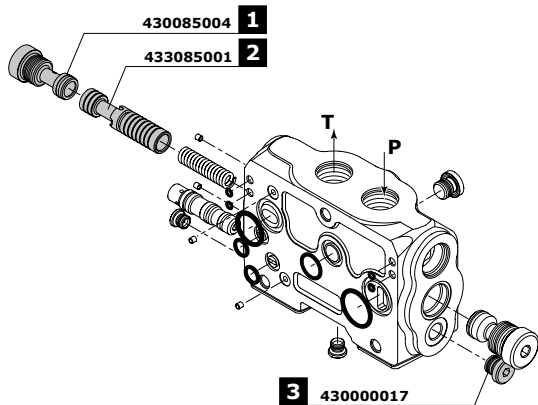


**CLOSED CENTER CONFIGURATION (JV)  
VARIABLE PUMP**

Ref.	order code	Description	Q.ty
1	430085012	Inlet compensator kit	1
2	433085002	Spool assembly	1

**Complete transformation kit:  
order code - 320093007**

Transformation on the inlet section from closed center to open center is possible by ordering the complete kit code: **320093008 (transformation kit from JV to KV)**



**OPEN CENTER CONFIGURATION (KV)  
FIXED PUMP**

Ref.	order code	Description	Q.ty
1	430085004	Inlet compensator kit	1
2	433085001	Spool assembly	1
3	430000017	Plug G1/4"	1

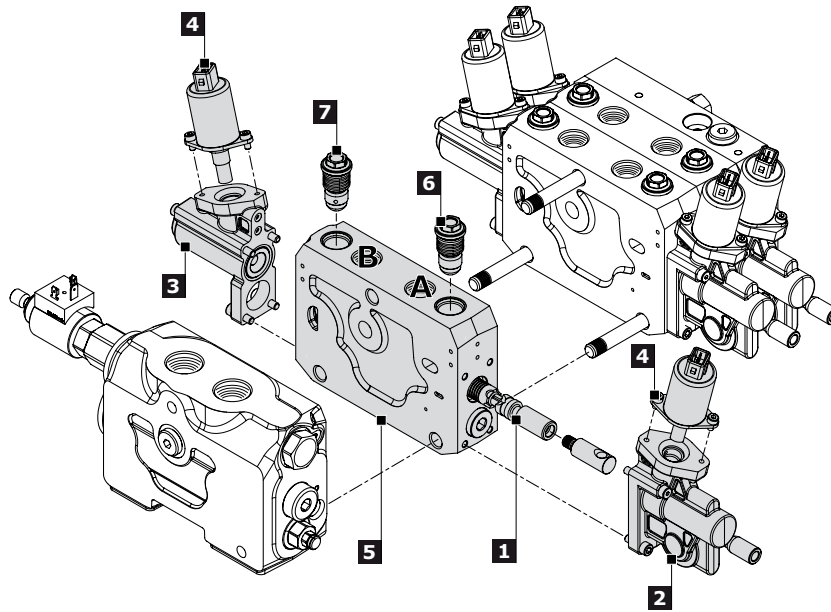
**Complete transformation kit:  
order code - 320093008**



**WORKING SECTION**

**Order example:**

	<b>W001C 2525</b>	<b>HP04</b>	<b>FP04</b>	<b>B12AJ</b>	<b>RC1 G04</b>	<b>05TF PA</b>	<b>05TF PB</b>
1.	<b>W001C 2525</b>	spool type					
2.	<b>HP04</b>	spool actuation type					
3.	<b>FP04</b>	spool return action type					
4.	<b>B12AJ</b>	coil-connector kit type					
5.	<b>RC1 G04</b>	section type					
6.	<b>05TF PA</b>	auxiliary valve type (port A)					
7.	<b>05TF PB</b>	auxiliary valve type (port B)					



Rif.	Code	Description	Page
<b>1</b>	<b>W001C 2525</b>	3 positions double-acting (2525 = l/min Spool flow)	<b>22</b>
	<b>W002C 2525</b>	3 positions double-acting A-B to tank (2525 = l/min Spool flow)	
<b>2</b>	<b>H001</b>	Lever actuation	<b>25</b>
	<b>HP04</b>	Lever actuation + electrohydraulic actuation	
	<b>HP05A</b>	hydraulic actuation (pilot ports on the top)	
<b>3</b>	<b>F001A</b>	3 positions spring-centred spool (spring A)	<b>28</b>
	<b>FP04</b>	Electrohydraulic return action	
<b>4</b>	<b>B12AJ</b>	Solenoid kit 12 vdc (AMP connector)	<b>33</b>
	<b>B24AJ</b>	Solenoid kit 24 vdc (AMP connector)	
<b>5</b>	<b>RC1 G04</b>	Post-Compensated section with auxiliary valve (G 1/2)	<b>35</b>
	<b>RC2 G04</b>	Post-Compensated section without auxiliary valve (G 1/2)	
	<b>RC1 U04</b>	Post-Compensated section with auxiliary valve (7/8"-14 UN)	
	<b>RC2 U04</b>	Post-Compensated section without auxiliary valve (7/8"-14 UN)	
<b>6</b>	<b>03TF PA 350</b>	Fixed setting combined valve (port A)	<b>43</b>
	<b>05TF PA</b>	Fixed setting Prearrang. for aux. valve (port A)	
<b>7</b>	<b>03TF PB 350</b>	Fixed setting combined valve (port B)	<b>43</b>
	<b>05TF PB</b>	Fixed setting Prearrang. for aux. valve (port B)	

EX38 work sections are available in two configuration: POST COMPENSATED - PRE COMPENSATED  
 - Sections designed to house auxiliary valve option require double choice on work ports A and port B.  
 - Always indicate setting value when using fixed setting combined valve: 03TF PA (120) - 03TF PB (120)  
 - When ordering a section with electrohydraulic actuation, it is necessary to specify Solenoid type (page 33).

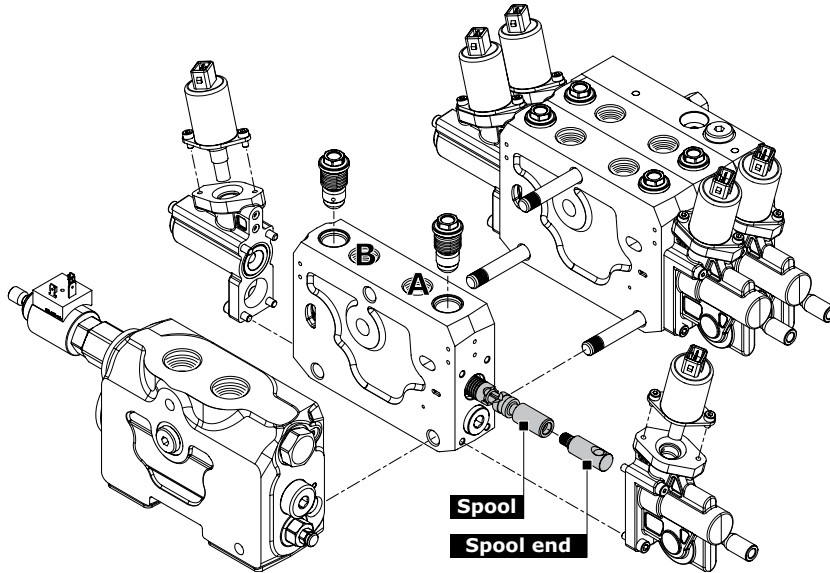


### Spool identification

EX38 spools are available in two configurations: **POST COMPENSATED** and **PRE COMPENSATED**.

Each work section contains a spool; each spool is compatible with all actuations.

For the correct operation of all actuations, each work section requires a spool end which changes according to the type of actuations. (see tables "C" on page 23)



POST - COMPENSATED SECTION		
Code	Description	Schema
<b>W001C</b>	3 positions double-acting	
<b>W002C</b>	3 positions double-acting A and B to tank	
<b>W012C</b>	4 positions double-acting with float in the 4 <sup>th</sup> position	

PRE - COMPENSATED SECTION		
Code	Description	Schema
<b>W001C</b>	3 positions double-acting	
<b>W002C</b>	3 positions double-acting A and B to tank	



**Spool flow**

Flow rates delivered to the A and B ports are identified in following table. Rated flows refer to simmetrical spools.

POST - COMPENSATED SECTION (FLOW RATES L/MIN)									
Spool type	0505	1010	1515	2525	3535	5050	6565	8080	100100
<b>W001C</b>	•	•	•	•	•	•	•	•	•
<b>W002C</b>	•	•	•	•	•	•	•	•	•
<b>W012C</b>		•			•		•	•	

PRE - COMPENSATED SECTION (flow rates l/min)				
Spool type	1515	2525	4040	6565
<b>W001C</b>	•	•	•	•
<b>W002C</b>	•	•	•	•

**Spool end identification (Tables "C")**

All work section contain end spool, that changes as a function of spool actuation control. Ends spool are different between Post-compensated and Pre-compensated sections.

POST - COMPENSATED SECTION		
Code	Description	Layout
<b>422501205</b>	Pin hole end (only available with H001 actuation)	
<b>422501153</b>	Male clevis end (only available with H004 actuation)	
<b>422501217</b>	Pin hole end (Available with hydraulic and electrohydraulic actuation)	

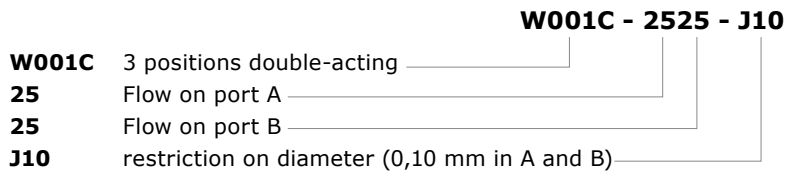
PRE - COMPENSATED SECTION		
Code	Description	Layout
<b>430085044</b>	Pin hole end (only available with H001 actuation)	
<b>430085045</b>	Male clevis end (only available with H004 actuation)	
<b>430085026</b>	Pin hole end (Available with hydraulic and electrohydraulic actuation)	



**Spool with restricted service ports**

Code	Circuit	Restriction on diameter (mm)	Section (mm <sup>2</sup> )	Schema
<b>J10</b>	A-B IN T	0,10	2,19	
<b>K10</b>	A IN T	0,10	2,19	
<b>Y10</b>	B IN T	0,10	2,19	

**Classification spool example**



**NOTE:**

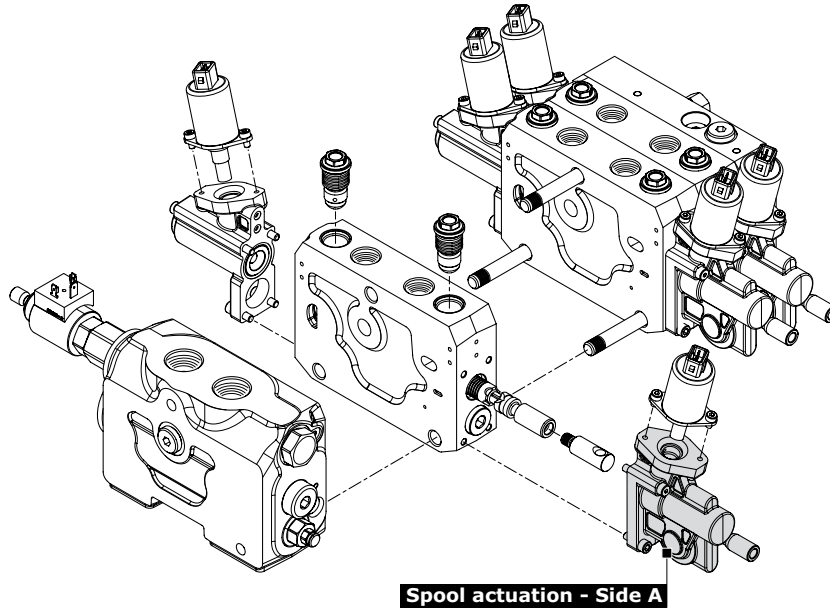
- not simmetric spools (such as 1025, 6535...) are available on request; for availability we suggest to contact our Sales department.
- rated flows are defined for 14 bar ΔP (as per KV inlet arrangement); for different ΔP values on variable pump systems, refer to diagram on page 12 (Post compensated spool flow with variable displacement pumps).
- Regenerative spools and spools with restricted service ports are available on request. Plaese contact our Sales department for more information.
- Regenerative spools needs a special machining on the valve body.
- W012 spool needs a special machining on the valve body and a special detent kit.
- W012 spool is available only as float-in and right inlet



**Spool actuation classification - SIDE A**

Spool actuations are divided in three types:

- **Mechanical lever actuation**
- **Hydraulic actuation**
- **Electrohydraulic actuation**



MECHANICAL LEVER ACTUATION			
Code	Description	Dimensions	Configuration
<b>H001</b>	<p><b>Lever actuation</b></p> <p>(only with manual and hydraulic section body)</p>		
<b>H004</b>	<p><b>Without lever actuation</b></p> <p>(only with manual and hydraulic section body)</p>		

**Note:**

- H001 and H004 require the choice of spool return action (side B)
- H001 and H004 require a mechanical version body.



**COMPLETE HYDRAULIC ACTUATION**

Code	Description	Dimensions	Configuration
HP05A	<b>Hydraulic actuation (pilot ports on the top)</b>  (only with manual and hydraulic section body)		
HP05C	<b>Hydraulic actuation (pilot ports on the sides)</b>  (only with manual and hydraulic section body)		
HP05L	<b>Hydraulic actuation with stroke limiter</b>  (only with manual and hydraulic section body)		

**HYDRAULIC ACTUATION - SIDE A**

Code	Description	Dimensions	Configuration
HP01	<b>Lever actuation + hydraulic actuation</b>		
HP02	<b>lever + hydraulic actuation with electrohydraulic arrangement</b>		
HP03	<b>Without lever + hydraulic actuation with electrohydraulic arrangement</b>		

**HYDRAULIC ACTUATION SPECIFICATIONS**

Regulating pressure (bar)	<b>6,2 - 20,1</b>
Max Pressure on pilot line (bar)	<b>40</b>
Max Pressure on pilot Tank line (bar)	<b>5</b>

**NOTE:**

- HP05A, HP05C, HP05L are different between Post-compensated and Pre-compensated sections.
- Leave out the spool return action code when choosing hydraulic actuation HP05A, HP05C and HP05L
- H001, H004, HP05A, HP05C, HP05L requires a mechanical version body.
- All hydraulics actuation are available in BSP or UNF version: (Port Pilot: 1/4" BSP or 9/16" UNF)
- Recommended control curve for HC Remote Control: A01 for standard spool, A07 for float spool





ELECTROHYDRAULIC ACTUATION - SIDE A			
Code	Description	Dimensions	Configuration
<b>HP00</b>	<b>Lever actuation + electrohydraulic arrangement</b>		
<b>HP04</b>	<b>Lever actuation + electrohydraulic actuation</b>		
<b>HP04L</b>	<b>Lever actuation + electrohydraulic actuation with stroke limiter</b>		
<b>HP07</b>	<b>Without lever + electrohydraulic actuation</b>		
<b>HP07L</b>	<b>Without lever + electrohydraulic actuation with stroke limiter</b>		
<b>HP08</b>	<b>lever + hydraulic actuation electrohydraulic actuation</b>		
<b>HP09</b>	<b>Without lever + hydraulic actuation electrohydraulic actuation</b>		

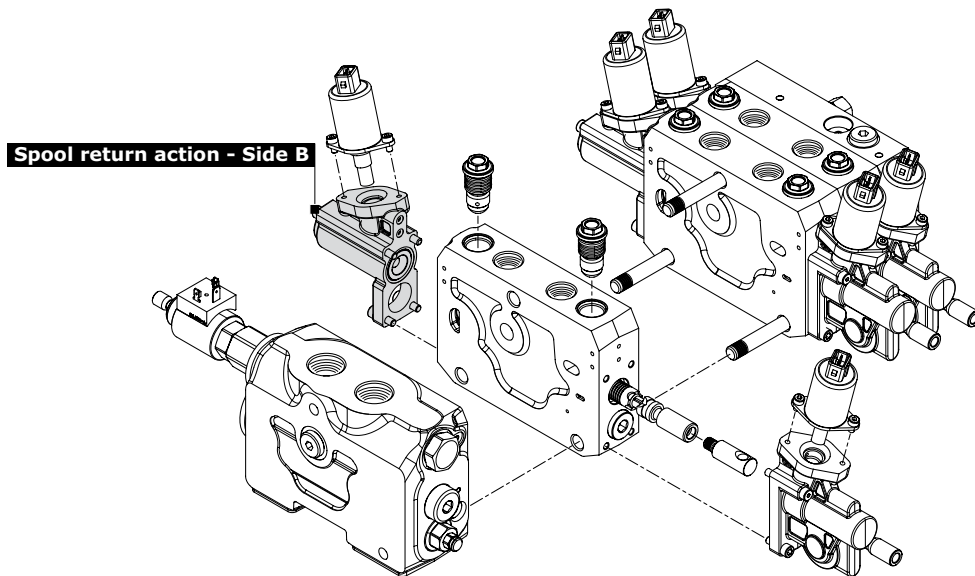
**Note:** Require electrohydraulic version body. External drainage recommended (see page 44).

**Spools return action classification - SIDE B**

Spool return action are mandatory for all mechanical actuations and for all electrohydraulics actuation; only HP01, HP02 and HP03 hydraulic actuations requires spool return action.

Also Spool return action are divided in three types:

- **Mechanical lever spool return action**
- **Hydraulic spool return action**
- **Electrohydraulic spool return action**

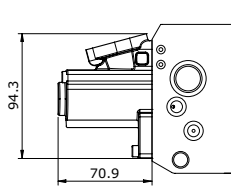
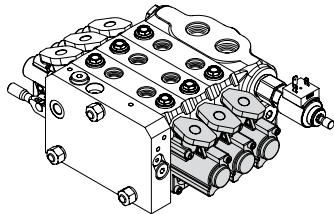
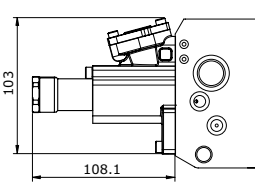
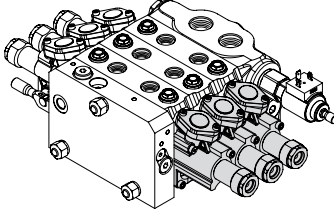
**NOTE:**

- F001A and F001B are different between Post-compensated and Pre-compensated sections.
- F002A, F005A, F145, F022A, F023A, F126A, F127A and F0470 are available only with Post-compensated version.
- F005A and available only with W012 spool
- F001A, F001B, F002A, F005A, F145, F022A, F023A, F126A, F127A and F0470 requires a special body



MECHANICAL LEVER ACTUATION - SIDE B			
Code	Description	Dimensions	Configuration
<b>F001A</b>	<b>3 position spring centered spool</b> Standard spring		
<b>F001B</b>	<b>3 position spring centered spool</b> Soft spring		
<b>F002A</b>	<b>Detent in A and B</b>		
<b>F005A</b>	<b>Detent in 4<sup>th</sup> position</b> (only with W012 spool)		
<b>F145</b>	<b>Friction kit</b>		
<b>F022A</b>	<b>Proportional Pneumatic control</b> (port BSP: G 1/8)		
<b>F023A</b>	<b>Proportional Pneumatic control rotated 180°</b> (port BSP: G 1/8)		
<b>F126A</b>	<b>Proportional Pneumatic control</b> (port NPTF: 1/8-27)		
<b>F127A</b>	<b>Proportional Pneumatic control rotated 180°</b> (port NPTF: 1/8-27)		
<b>F0470</b>	<b>Spool position indicator for mechanical lever actuation</b>		



HYDRAULIC ACTUATION - SIDE B			
Code	Description	Dimensions	Configuration
<b>FP01</b>	Hydraulic actuation <b>Only available with HP01</b>		
<b>FP02</b>	Hydraulic actuation with electrohydraulic arrangement <b>available with HP02 - HP03</b>		

**NOTE:** FP01 and FP02 are available in BSP or UNF version: (Port Pilot: 1/4" BSP or 9/16" UNF)



ELECTROHYDRAULIC ACTUATION - SIDE B			
Code	Description	Dimensions	Configuration
<b>FP00</b>	Electrohydraulic arrangement <b>Only available with HP00</b>		
<b>FP04</b>	Electrohydraulic actuation <b>available with HP04 - HP04L - HP07</b>		
<b>FP04L</b>	Electrohydraulic actuation with stroke limiter <b>Only available with HP07L</b>		
<b>FP08</b>	Electrohydraulic actuation and hydraulic actuation <b>available with HP08 - HP09</b>		

**NOTE:** FP08 is available in BSP or UNF version: (Port Pilot: 1/4" BSP or 9/16" UNF)



**Hall effect Linear Position Sensor HLPS**

HLPS is a Hall effect sensor based device used in conjunction with spool position transducer kits available for EX38. HC-HLPS is based on a state of the art programmable Hall effect sensor device; after the final assembly of the valve a computer assisted calibration procedure is performed that compensates for mechanical inaccuracies and uncertainties allowing to attain high accuracy and linearity in spool position detection. Spool position is output as an analog voltage signal in the 0.5 - 4.5V range. The unit works in 12V and 24V environments and is protected against load-dump and other major electrical faults. Fault signalling is carried out through the output signal. HLPS with the companion mechanical kit is therefore applicable in close loop feedback control applications and whenever determining spool position reliably is, as in safety functions, a major concern.

ELECTROHYDRAULIC ACTUATION - SIDE B			
Code	Description	Dimensions	Configuration
<b>FP04S</b>	<p>Spool position indicator for electrohydraulic actuation</p> <p><b>Only available with HP04 - HP07</b></p>		

**Technical specifications**

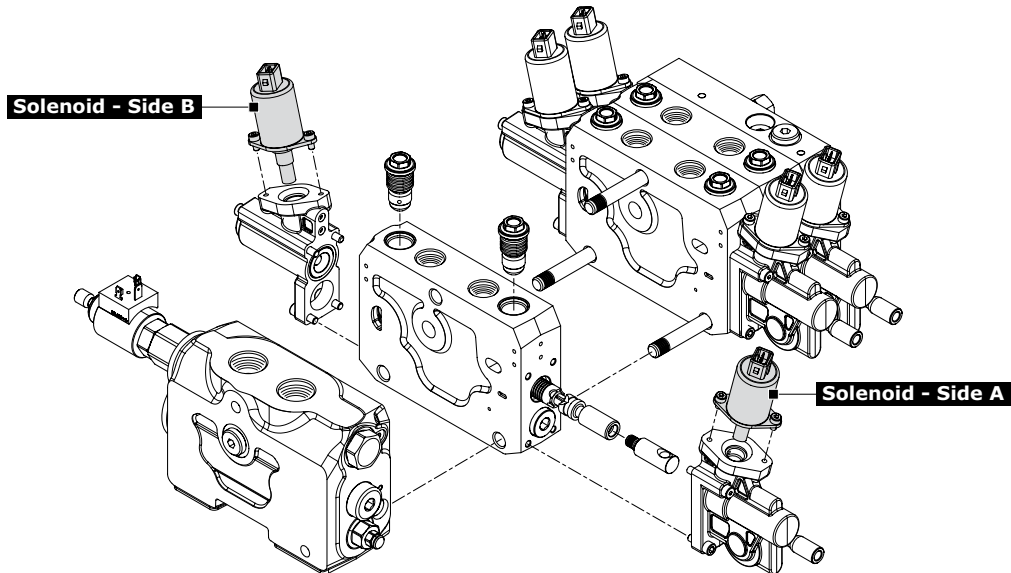
<p><b>Electrical</b></p> <p>Operating voltage</p> <p>Max current consumption</p> <p><b>Output</b></p> <p>Output voltage spanning</p> <p>Quiescent voltage</p> <p>Output current</p> <p>Minimum output load resistance</p> <p>Overall accuracy</p> <p>Resolution</p> <p>Fault signalling levels</p> <p>Protections</p> <p>EM Immunity</p> <p><b>Mechanical, Environmental</b></p> <p>Operating temperature</p> <p>Ingress Protection Rating</p> <p>Dimensions</p> <p><b>Connections</b></p> <p>I/O</p> <p>PIN 1</p> <p>PIN 2</p> <p>PIN 3</p> <p>PIN 4</p> <p><b>Applied Standards</b></p> <p>Immunity for industrial environments</p> <p>Emission standard for residential commercial and light-industrial environments</p> <p>EMC - Agricultural and forestry machines</p> <p>EMC - Earth-moving machinery</p>	<p>6 - 30 Vdc</p> <p>20.5 mA</p> <p>0.5 - 4.5 Vdc</p> <p>2.5 Vdc</p> <p>-1 - +1 mA</p> <p>4.5 kOhm</p> <p>± 2.5%</p> <p>12 bit</p> <p>4.8V &lt; Vout &lt; 0.2 Vdc</p> <p>short circuit protection, reverse, battery protection, thermal shutdown, overvoltage, undervoltage, load-dump &gt; 60 Vdc/m</p> <p>-40 / +85 °C</p> <p>IP 65</p> <p>28 x 18 x 23 mm (L x W x H)</p> <p>DIN 43650-C male</p> <p>Vout</p> <p>Vcc</p> <p>OV</p> <p>Chassis (connected to valve body)</p> <p>EN 61000-6-2</p> <p>EN 61000-6-3</p> <p>EN 14982</p> <p>ISO 13766</p>
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**NOTE:** mating connector for DIN 43650-C can be ordered separately with code 487200314



**Solenoid specifications for Electrohydraulic actuation**

Solenoid kit must be ordered separately. Each work section require two solenoid kit.



<b>COIL AND CONNECTOR SPECIFICATIONS</b>				
Type	DEUTSCH DT 4		AMP JUNIOR POWER TIMER	
Order Code	B12DE	B24DE	B12AJ	B24AJ
	430093102	430093103	430093100	430093101
Supply voltage (Vdc)	12	24	12	24
Coil resistance R20 (Ω)	4,7	20,8	4,7	20,8
ON-OFF control current (mA)	2500	1150	2500	1150
Proportional control current (mA)	500 - 1300	250 - 650	500 - 1300	250 - 650
PWM frequency suggested (Hz)	70 - 90		70 - 90	
Connector	DEUTSCH DT 4		AMP Junior Power Timer	
Feeding reducing pressure (bar)	40		40	
Max Pressure on pilot Tank line (bar)	5		5	

**NOTE:**

Mating connector for AMP Junior Power Timer can be ordered separately with code 413000223 (including 2 m wire). Mating connector for Deutsch DT 4 can be ordered separately with code 487200802.



Compatibility table

COMBINATION		SPOOL ACTION AND RETURN SPRING TYPE - SIDE B																
		F001A	F001B	F002A*	F005A*	F145*	F022A*	F023A*	F126A*	F127A*	F0470*	FP00	FP01	FP02	FP04	FP04L	FP04S	FP08
SPOOL ACTION AND RETURN SPRING TYPE - SIDE A	H001	•	•	•	•	•	•	•	•	•	•							
	H004	•	•	•	•	•	•	•	•	•	•							
	HP05A																	
	HP05C																	
	HP05L																	
	HP00											•						
	HP01												•					
	HP02													•				
	HP03													•				
	HP04														•		•	
	HP04L														•			
	HP07														•		•	
	HP07L															•		
	HP08																	•
HP09																	•	

**NOTE:**

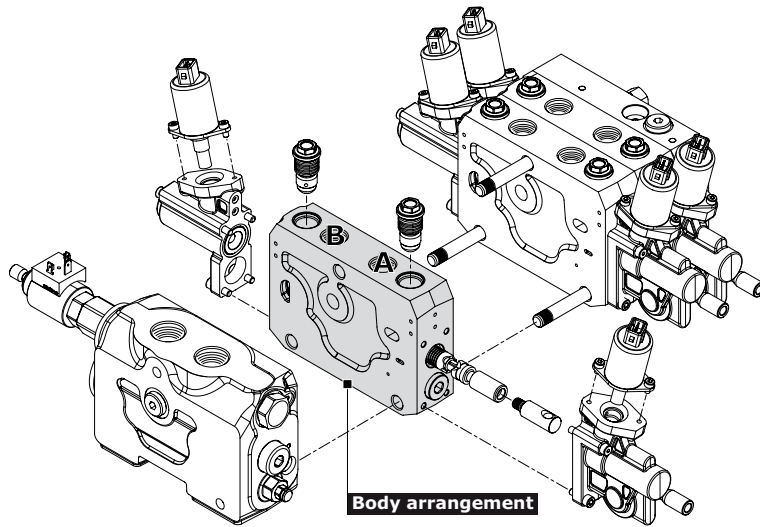
Leave out the spool return action code when choosing hydraulic actuation HP05A, HP05C and HP05L

\*= Available only with Post-Compensated section





**Work section arrangement**



EX38 has been conceived as a post compensated flow sharing valve, but completely interchangeable pre compensated sections are also available.

Pre compensated section can be freely mixed with post compensated ones.

When using a pre-compensated section between post-compensated, priority is established for this section; if the system reaches flow saturation condition, all post compensated sections will reduce proportionally their delivered flows, while the pre compensated will keep a constant delivered flow.

This function is particularly appreciated on applications where the loss of the speed for a specific function must be avoided when other functions are simultaneously activated.

**Work section available**

Functions	Order code	Setting range	Type	PRE compensated	POST compensated
Standard section	<b>RC1</b>		with auxiliary valve		•
	<b>RC2</b>		without auxiliary valve		•
	<b>RL1</b>		with auxiliary valve	•	
	<b>RL2</b>		without auxiliary valve	•	
Section with local LS relief valve	<b>RCD1</b>	30 - 80	with auxiliary valve		•
		81 - 200			•
		201 - 350			•
	<b>RCD2</b>	30 - 80	without auxiliary valve		•
		81 - 200			•
		201 - 350			•
<b>RLD1</b>	50 - 170	with auxiliary valve	•		
	171 - 350		•		
	<b>RLD2</b>		50 - 170	•	
		171 - 350	•		
Section with additional port for remoted LS relief valve	<b>RCS1</b>		with auxiliary valve		•
	<b>RCS2</b>		without auxiliary valve		•
	<b>RLS1</b>		with auxiliary valve	•	
	<b>RLS2</b>		without auxiliary valve	•	
Section with local Flow limiter	<b>RCE1</b>		with auxiliary valve		•
	<b>RCE2</b>		without auxiliary valve		•

**NOTE:**

- Local LS relief valve work on both ports; setting for A and B ports is the same.
- Local LS relief valve setting must be specified as follow: RCD1 G04 (120) - RLD1 G04 (120)
- RCD1, RCD2, RCS1, RCS2 in combination with HP01, HP02, HP03, HP04, HP07, HP08, HP09, requires left inlet assembly (ML)
- RLD1, RLD2, RLS1, RLS2 in combination with HP01, HP02, HP03, HP04, HP07, HP08, HP09, requires right inlet assembly (MR)
- RCE1, RCE2 in combination with HP01, HP02, HP03, HP04, HP07, HP08, HP09, requires right inlet assembly (MR)



### PRE-COMPENSATED Section with local LS relief valve

The purpose to use a local LS relief instead of a standard port shock relief is to improve the efficiency of the system. When a standard port shock relief is used, the full flow across the relief will be directed to tank, if the pressure system exceeds the setting.

By using a local LS relief, only a very minimal part of oil will be directed to tank in the same condition, with great advantage for the system efficiency.

Furthermore, by saving oil from going to tank, more oil will be available for simultaneous operations and this will improve the performance of the machine.

The pressure limitation generated by the local LS relief applies to both section ports, A and B.

A typical case showcasing the advantages offered by this design is the grab function in loading cranes, or any other feature requiring that applied pressure be maintained, without affecting the speed of other simultaneous movements.

The local LS relief can be easily installed as a retrofit too.

### POST-COMPENSATED Section with local LS relief valve

Another feature not commonly found in flow sharing systems is the possibility to have a Load Sensing relief valve on individual sections.

The purpose to use a local LS relief instead of a standard port shock relief is to improve the efficiency of the system. When a standard port shock relief is used, the full flow across the relief will be directed to tank, if the pressure system exceeds the setting.

By using a local LS relief, only a very minimal part of oil will be directed to tank in the same condition, with great advantage for the system efficiency.

Furthermore, by saving oil from going to tank, more oil will be available for simultaneous operations and this will improve the performance of the machine.

The pressure limitation generated by the local LS relief applies to both section ports, A and B.

**The local pressure limitation works properly if the section is actuated alone or if the section is the most charged.**

The local LS relief can be easily installed as a retrofit too.

### PRE-COMPENSATED section with additional port for remoted LS relief valve

Similarly to RLD option, it is possible to bring local signal to a remoted relief valve by means of a dedicated 1/4 BSP or 9/16" UNF port.

Remoted relief valve must be provided separately in the hydraulic circuit. The pressure limitation generated by relieving the local LS applies to both section ports, A and B.

The additional port can be easily installed as a retrofit too.

### POST-COMPENSATED section with additional port for remoted LS relief valve

Similarly to RCD option, it is possible to bring local signal to a remoted relief valve by means of a dedicated 1/4 BSP or 9/16" UNF port.

Remoted relief valve must be provided separately in the hydraulic circuit. The pressure limitation generated by relieving the local LS applies to both section ports, A and B.

**The local pressure limitation works properly if the section is actuated alone or if the section is the most charged.**

The additional port can be easily installed as a retrofit too.

### POST-COMPENSATED section with local Flow limiter

The local compensator of a section can be equipped with a special knob which can be operated to adjust the maximum flow delivered by the section concerned.

**This device acts by limiting the working flow of the local compensator and is working properly when a single section is operated.**

This feature is highly appreciated because it ensures a certain degree of operating flexibility especially for those machines which must be equipped with different accessories (tractors and farming applications in general being a typical example).

The flow control device can be easily installed as a retrofit kit too.



**Work section trasformation kits**

Transformation on the work section from RC/RL type to RCD, RCS, RCE, RLD and RLS types is possible by ordering the following plug kit codes. Configurations below are from EX38 flow sharing valve, with left inlet (ML).

Section Type	Order Code	Setting Range	Thread	Description	Configuration	
<b>POST - COMPENSATED SECTION</b>	<b>RC</b>	<b>430085006</b>		Standard section		
	<b>RCD</b>	<b>915008501</b>	30 - 80		Section with local LS relief valve	
		<b>915008502</b>	81 - 200			
		<b>915008503</b>	201 - 350			
	<b>RCS</b>	<b>430085041</b>		GAS	Section with additional port for remoted LS relief valve	
<b>430085035</b>			UNF			
<b>RCE</b>	<b>320085002</b>			Section with local flow limiter		
<b>PRE - COMPENSATED SECTION</b>	<b>RL</b>	<b>430085029</b>		Standard section		
	<b>RLD</b>	<b>915008504</b>	50 - 170		Section with local LS relief valve	
		<b>915008505</b>	171 - 350			
	<b>RLS</b>	<b>430085042</b>		GAS	Section with additional port for remoted LS relief valve	
		<b>430085066</b>		UNF		



PRE compensated section arrangement

STANDARD SECTION			
code	schema for mechanical lever actuation	schema for electrohydraulic actuation	description
RL1 G04			<b>PRE compensated section</b> Arranged for auxiliary valves
RL1 U04			
RL2 G04			<b>PRE compensated section</b> Not arranged for auxiliary valves
RL2 U04			

PRE-COMPENSATED SECTION WITH LOCAL LS RELIEF VALVE			
code	schema for mechanical lever actuation	schema for electrohydraulic actuation	description
RLD1 G04			<b>PRE compensated section with local LS relief valve</b> Arranged for auxiliary valves
RLD1 U04			
RLD2 G04			<b>PRE compensated section with local LS relief valve</b> Not arranged for auxiliary valves
RLD2 U04			



**PRE compensated section arrangement**

SECTION WITH ADDITIONAL PORT FOR REMOTED LS RELIEF VALVE			
code	schema for mechanical lever actuation	schema for electrohydraulic actuation	description
<b>RLS1 G04</b>			<p><b>PRE compensated section with additional port for remotd LS relief valve</b></p> <p>Arranged for auxiliary valves</p>
<b>RLS1 U04</b>			
<b>RLS2 G04</b>			<p><b>PRE compensated section with additional port for remotd LS relief valve</b></p> <p>Not arranged for auxiliary valves</p>
<b>RLS2 U04</b>			



POST compensated arrangement

STANDARD SECTION			
code	schema for mechanical lever actuation	schema for electrohydraulic actuation	description
RC1 G04			<b>POST compensated section</b> Arranged for auxiliary valves
RC1 U04			
RC2 G04			<b>POST compensated section</b> Not arranged for auxiliary valves
RC2 U04			

SECTION WITH LOCAL LS RELIEF VALVE			
code	schema for mechanical lever actuation	schema for electrohydraulic actuation	description
RCD1 G04			<b>POST compensated section with local Load Sensing relief valve</b> Arranged for auxiliary valves
RCD1 U04			
RCD2 G04			<b>POST compensated section with local Load Sensing relief valve</b> Not arranged for auxiliary valves
RCD2 U04			

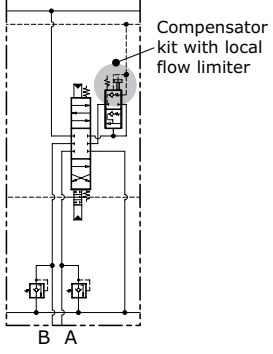
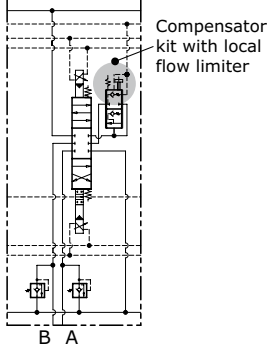
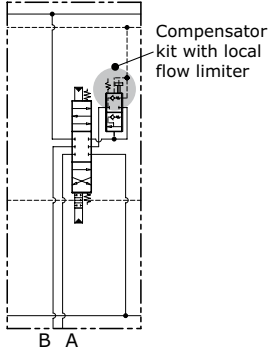
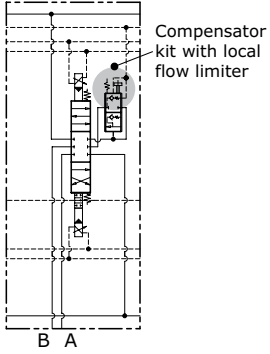


**POST compensated arrangement**

SECTION WITH ADDITIONAL PORT FOR REMOTED LS RELIEF VALVE			
code	schema for mechanical lever actuation	schema for electrohydraulic actuation	description
<b>RCS1 G04</b>			<p><b>POST compensated section with additional port for remotd LS relief valve</b></p> <p>Arranged for auxiliary valves</p>
<b>RCS1 U04</b>			
<b>RCS2 G04</b>			<p><b>POST compensated section with additional port for remotd LS relief valve</b></p> <p>Not arranged for auxiliary valves</p>
<b>RCS2 U04</b>			



POST compensated arrangement

SECTION WITH LOCAL FLOW LIMITER			
code	schema for mechanical lever actuation	schema for electrohydraulic actuation	description
RCE1 G04			<b>POST compensated section with local flow limiter</b> arranged for auxiliary valves
RCE1 U04			
RCE2 G04			<b>POST compensated section with local flow limiter</b> Not arranged for auxiliary valves
RCE2 U04			





**Auxiliary valves identification**

Valve setting is defined at 10 l/min flow. Look at Auxiliary valves diagram on page 14 to evaluate setting at actual flow.

code	description	schema	configuration	setting range (bar)	
<b>02TF PA</b>	<b>Fixed setting Anticavitation valve</b> (port A)				
<b>03TF PA</b>	<b>Fixed setting combined valve</b> (port A)			<b>A</b>	40 / 350
<b>05TF PA</b>	<b>Fixed setting Prearrangement for auxiliary valve</b> (port A)				

code	description	schema	configuration	setting range (bar)	
<b>02TF PB</b>	<b>Fixed setting Anticavitation valve</b> (port B)				
<b>03TF PB</b>	<b>Fixed setting combined valve</b> (port B)			<b>A</b>	40 / 350
<b>05TF PB</b>	<b>Fixed setting Prearrangement for auxiliary valve</b> (port B)				

**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 fixed setting combined valve:

**03TF PA (120) = setting**

**NOTE:** Auxiliary valves are not adjustable: factory settings are available from 40 to 350 bar with 10 bar steps



OUTLET SECTION (END PLATE)

There are two main types of End Plate:

- **Manual and Hydraulic actuation version:** to be used when no electrohydraulic controls are present in the valve: this plate is simply collecting the LS signal drain that can be connected to tank internally or externally without significant differences
- **Electrohydraulic version:** to be used when at least one section in the valve has electrohydraulic actuation: this plate is collecting LS signal and electrohydraulic controls drain and is providing electrohydraulic actuation feeding by means of a pressure reducing valve

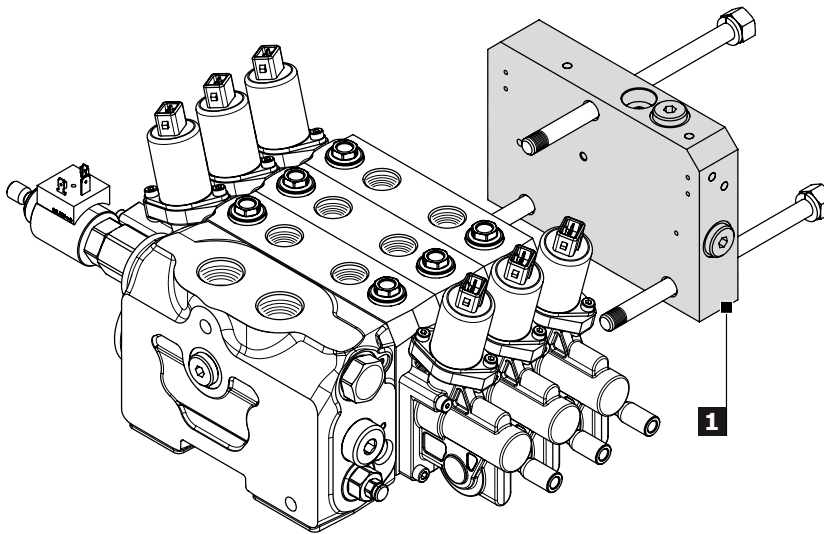
**IMPORTANT:**

with electrohydraulic actuation, only external drain outlet is provided. We recommend to connect drain directly to tank without any other additional pressure drop, in order to avoid control system damages and poor control properties.

Order example

KZ20EH

1. **KZ20EH** Outlet section type \_\_\_\_\_



Rif.	Code	Description	Page
1	<b>KZ10I</b>	End plate without RDP internal drain (only for manual and hydraulic actuation)	45
	<b>KZ10E</b>	End plate without RDP external drain (only for manual and hydraulic actuation)	
	<b>KZ20EC</b>	End plate with RDP external drain (only for electrohydraulic actuation)	
	<b>KZ20EH</b>	End plate with RDP external-side drain (only for electrohydraulic actuation)	

**NOTE:** we recommend to keep the T line for the electrohydraulic cartridges separate from the T line of the valve.



**End plate classification**

**END PLATE FOR MECHANICAL LEVER ACTUATION AND HYDRAULIC ACTUATION**

code	schema	configuration	description
<b>KZ10I</b>			<p><b>End plate without RDP internal drain</b></p> <p>to be used with:                      H001-H004                      HP05A-HP05C-HP05L                      HP01-HP02-HP03</p>
<b>KZ10E</b>			<p><b>End plate without RDP external drain</b></p> <p>to be used with:                      H001-H004                      HP05A-HP05C-HP05L                      HP01-HP02-HP03</p>

**END PLATE FOR ELECTROHYDRAULIC ACTUATION**

code	schema	configuration	description
<b>KZ20EC</b>		<p>R - Reduced pressure port</p>	<p><b>End plate with RDP external drain</b></p> <p>to be used with:                      HP04-HP07                      HP08-HP09</p>
<b>KZ20EH</b>		<p>R - Reduced pressure port</p>	<p><b>End plate with RDP external-side drain</b></p> <p>to be used with:                      HP04-HP07                      HP08-HP09</p>

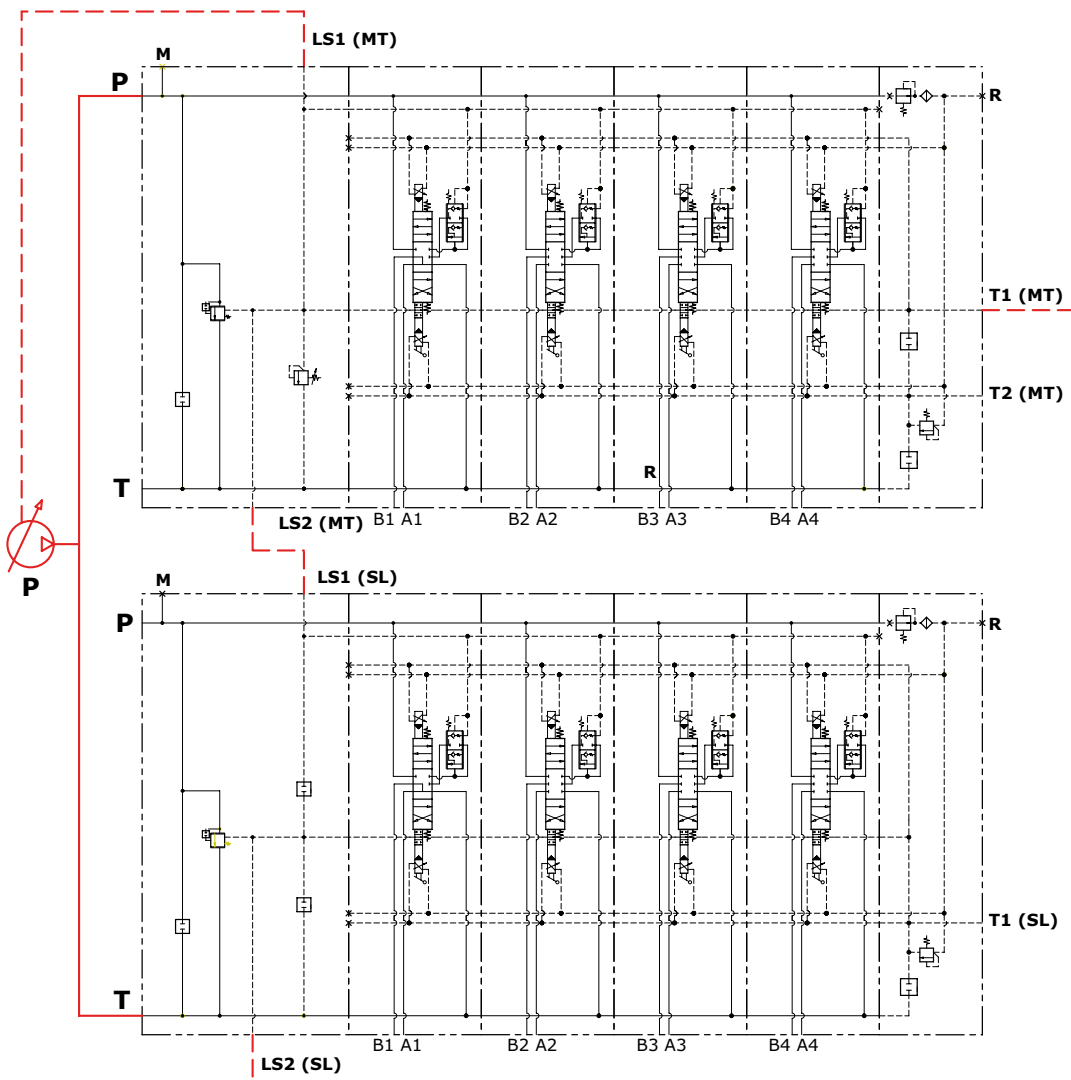
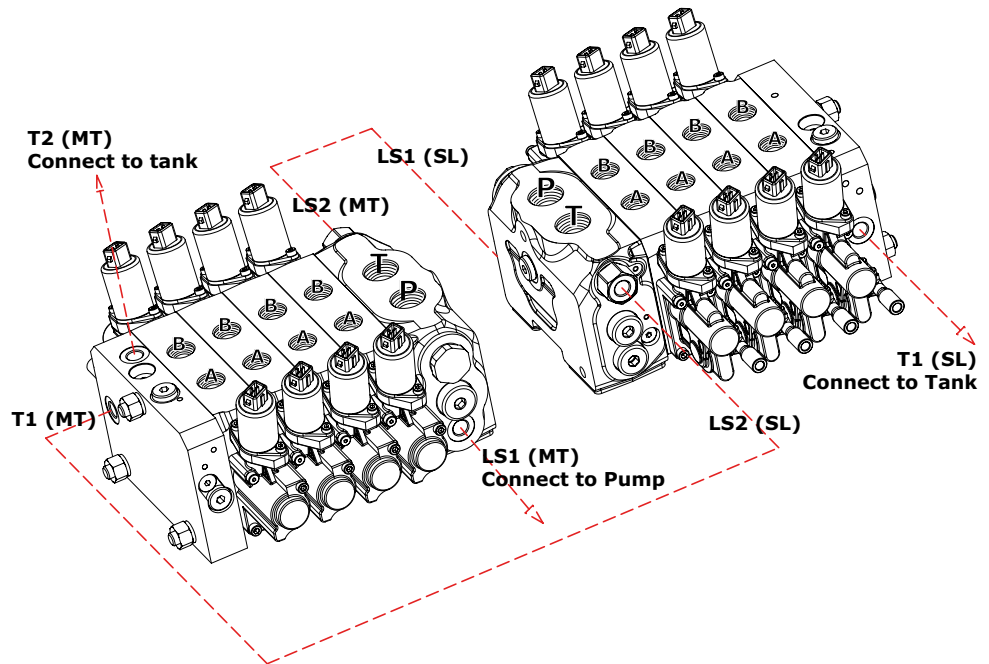
**NOTE:**  
 Left inlet assembled valve with lever kit HP01, HP02, HP03, HP04 and HP08 on the last section accepts only KZ20EH and KZ10I end plate.



SPECIAL FUNCTIONS

Parallel connection of several valves

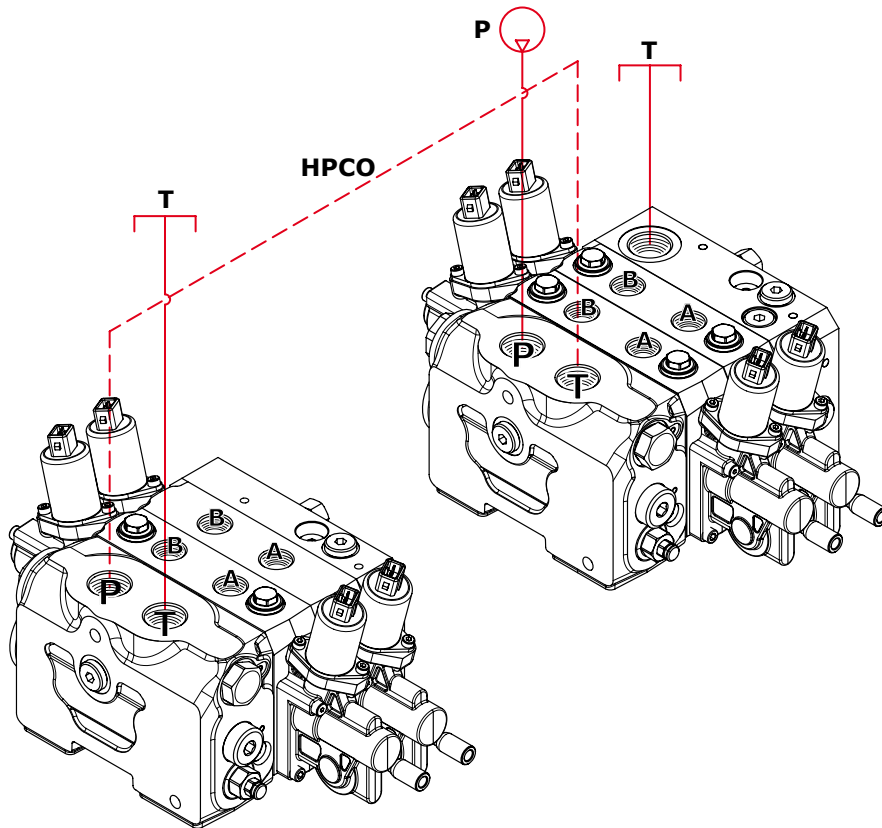
Thanks to an interesting construction design, it is possible to obtain parallel connection of several control valves without that the flow sharing function efficiency and simultaneity of movement being affected. The circuit available either for fixed or variable pump, requires P, T and LS signal connection according to the following diagram. This solution is especially successful in the loading crane or forestry crane industries for single pump circuits.



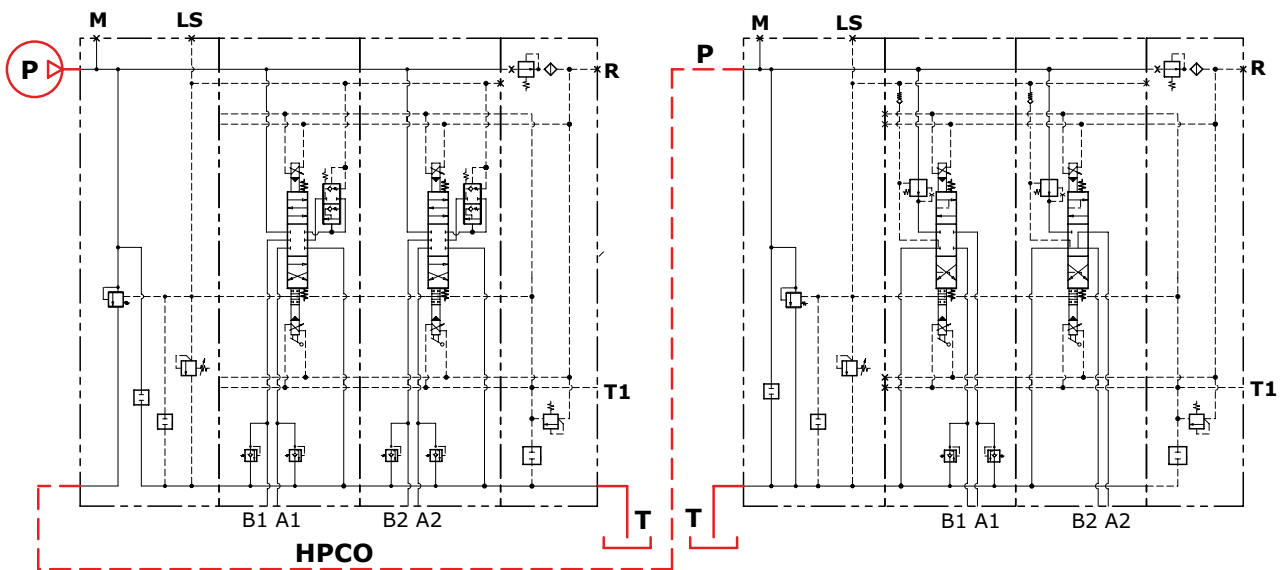


**SPECIAL FUNCTIONS**

**High pressure carry over function**



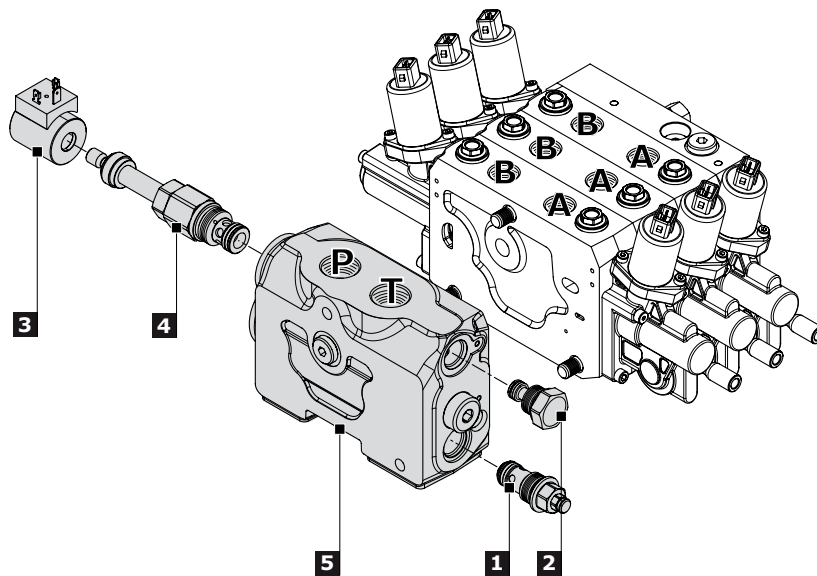
The Carry Over function is yet another unique option offered by the EX family. In fixed pump circuits, two control valves connected in succession can be used to ensure flow through both valves' inlet compensators. This special design is obtained by using a special inlet cover on the first valve. This circuit is ideally suitable for trailer-equipped machines, since the connection between the two control valves is achieved by simply using one pipe for P and one pipe for T (no additional LS signal connections are necessary).





EX38 SPARE PARTS LIST

Inlet Section

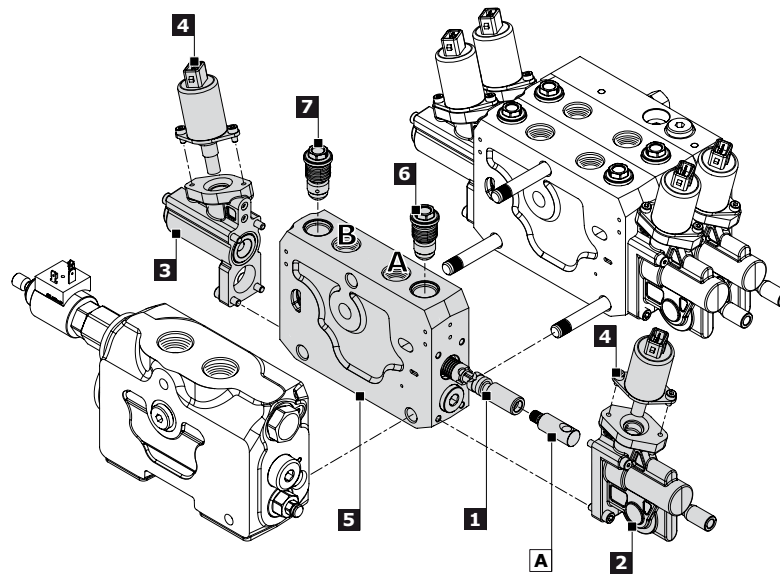


Ref.	Description	Order code	Q.ty	Code	Note
<b>1</b>	LS pressure relief valve	<b>915028503</b>	1	V1A	Setting range: 50-250 bar
		<b>915028504</b>	1	V1A	Setting range: 251-420 bar
	LS relief plug	<b>430085034</b>	1	V2A	
<b>2</b>	LS plug	<b>430059003</b>	1	V10C	
		<b>413150077</b>	1	V11C	
<b>3*</b>	Coil kit	<b>413171235</b>	1	C12DI	DIN 43650 ISO 4400 - 12 Vdc
		<b>413172432</b>	1	C24DI	DIN 43650 ISO 4400 - 24 Vdc
		<b>413171238</b>	1	C12DE	DEUTSCH DT 4 - 12 Vdc
		<b>413172440</b>	1	C24DE	DEUTSCH DT 4 - 24 Vdc
		<b>413171237</b>	1	C12AJ	AMP JUNIOR - 12 Vdc
		<b>413172433</b>	1	C24AJ	AMP JUNIOR - 24 Vdc
<b>4</b>	Full flow direct operated pressure relief valve	<b>915065501</b>	1	V3B	Setting range: 40-200 bar
		<b>915065502</b>	1	V3B	Setting range: 201-420 bar
	Full flow relief plug	<b>430175001</b>	1	V4B	
	Full flow electric dump valve	<b>915049301</b>	1	V7B	
<b>5</b>	Open centre inlet section	<b>029300001</b>	1	KV G05	for fixed displacement pumps
		<b>029300002</b>	1	KV U05	
	Closed centre inlet section	<b>029300011</b>	1	JV G05	for variable displacement pumps
		<b>029300012</b>	1	JV U05	

(\* ) = Coil kit must be ordered separately: see table "A" pg. 18



**Post-Compensated Section**



Ref.	Description	Order code	Q.ty	Code	Note
<b>1</b>	3 positions double-acting spool	421293035	1	W001C 1010	spool 10 l/min
		421293040	1	W001C 2525	spool 25 l/min
		421293015	1	W001C 3535	spool 35 l/min
		421293010	1	W001C 5050	spool 50 l/min
		421293020	1	W001C 6565	spool 65 l/min
		421293032	1	W001C 100100	spool 100 l/min
	3 positions double-acting spool A and B to tank	421293049	1	W002C 1010	spool 10 l/min
		421293043	1	W002C 2525	spool 25 l/min
		421293131	1	W002C 3535	spool 35 l/min
		421293130	1	W002C 5050	spool 50 l/min
		421293039	1	W002C 6565	spool 65 l/min
		421293132	1	W002C 100100	spool 100 l/min
	4 positions double-acting with float in the 4th pos.	421293093	1	W012C 1010	spool 10 l/min
		421293092	1	W012C 8080	spool 80 l/min
<b>A</b>	Spool end kit	422501217	1		
		422501205	1		only for h001
		422501153	1		only for h004
<b>2</b>	Lever actuation kit	320366001	1	H001	
	Without lever actuation kit	320366003	1	H004	
	Hydraulic actuation (ports on the top)	320593100	1	HP05A	
	Hydraulic actuation (ports on the sides)	320593106	1	HP05C	
	Hydraulic actuation with stroke limiter	320593112	1	HP05L	
	Lever actuation + hydraulic actuation	320593130	1	HP01	BSP version
	Lever actuation + hydraulic actuation with electrohydraulic arrangement	320593134	1	HP02	
	Without lever actuation + hydraulic actuation with electrohydraulic arrangement	320593138	1	HP03	
	Hydraulic actuation (ports on the top)	320593103	1	HP05A	
	Hydraulic actuation (ports on the sides)	320593109	1	HP05C	
	Hydraulic actuation with stroke limiter	320593115	1	HP05L	
	Lever actuation + hydraulic actuation	320593132	1	HP01	UNF version
	Lever actuation + hydraulic actuation with electrohydraulic arrangement	320593136	1	HP02	
	Without lever actuation + hydraulic actuation with electrohydraulic arrangement	320593139	1	HP03	
	Lever actuation + electrohydraulic arrangement	322593001	1	HP00	
	Lever actuation + electrohydraulic actuation	322593002	1	HP04	
	Lever actuation + electrohydraulic actuation with stroke limiter	322593003	1	HP04L	
	Without lever + electrohydraulic actuation	322593004	1	HP07	
	Without lever + electrohydraulic actuation with stroke limiter	322593005	1	HP07L	
	Lever + hydraulic actuation + electrohydraulic actuation	322593006	1	HP08	BSP version
		322593007	1	HP08	UNF version
	Without Lever + hydraulic actuation + electrohydraulic actuation	322593008	1	HP09	BSP version
		322593009	1	HP09	UNF version



Ref.	Description	Order code	Q.ty	Code	Note
3	3 position spring centered spool	320793001	1	F001A	
		320793002	1	F001B	
	Detent in A and B	320893001	1	F002A	
	Detent in 4th position	320874005	1	F005A	only with W012 spool
	Friction kit	320085011	1	F145	
	Proportional pneumatic control	321293002	1	F022A=F023A	BSP version
		321293001	1	F126A=F127A	NPT version
	Spool position indicator for mechanical lever	320093001	1	F0470	
	Lever actuation + hydraulic actuation (BSP)	320593131	1	FP01	only with HP01
	Lever actuation + hydraulic actuation (UNF)	320593133			
	Lever + hydraulic actuation with electrohydraulic arrangement (BSP)	320593135	1	FP02	only with HP02-HP03
	Lever + hydraulic actuation with electrohydraulic arrangement (UNF)	320593137			
	Lever actuation + electrohydraulic arrangement	322593101	1	FP00	only with HP00
	Lever actuation + electrohydraulic actuation	322593102	1	FP04	only with HP04-HP07
	Without lever + electrohydraulic actuation with stroke limiter	322593103	1	FP04L	only with HP07L
Lever + hydraulic actuation + electrohydraulic actuation (BSP version)	322593104	1	FP08	only with HP08-HP09	
Lever + hydraulic actuation + electrohydraulic actuation (UNF version)	322593105				
Spool position indicator for electrohydraulic actuation	322593106	1	FP04S	only with HP04-HP07	
4	Coil-connector kit	430093100	2	B12AJ	AMP JUNIOR - 12 Vdc
		430093101	2	B24AJ	AMP JUNIOR - 12 Vdc
		430093102	2	B12DE	DEUTSCH DT 4 - 12 Vdc
		430093103	2	B24DE	DEUTSCH DT 4 - 24 Vdc
5	Post compensated section standard with auxiliary valve	039300001	1	RC1 G04	
	Post compensated section standard without auxiliary valve	039300003	1	RC2 G04	
	Post compensated section with local LS relief valve with auxiliary valve	039300005	1	RCD1 G04 30/80	
		039300006	1	RCD1 G04 81/200	
		039300007	1	RCD1 G04 201/350	
	Post compensated section with local LS relief valve without auxiliary valve	039300011	1	RCD2 G04 30/80	(BSP version) only for manual and hydraulic actuation
		039300012	1	RCD2 G04 81/200	
		039300013	1	RCD2 G04 201/350	
	Post compensated section with additional port for remoted LS relief valve with auxiliary valve	039300021	1	RCS1 G04	
	Post compensated section with additional port for remoted LS relief valve without auxiliary valve	039300023	1	RCS2 G04	
	Post compensated section with flow limiter with auxiliary valve	039300017	1	RCE1 G04	
	Post compensated section with flow limiter without auxiliary valve	039300018	1	RCE2 G04	
	Post compensated section standard with auxiliary valve	039300002	1	RC1 U04	
	Post compensated section standard without auxiliary valve	039300004	1	RC2 U04	
	Post compensated section with local LS relief valve with auxiliary valve	039300008	1	RCD1 U04 30/80	
		039300009	1	RCD1 U04 81/200	
039300010		1	RCD1 U04 201/350		
Post compensated section with local LS relief valve without auxiliary valve	039300014	1	RCD2 U04 30/80	(UNF version) only for manual and hydraulic actuation	
	039300015	1	RCD2 U04 81/200		
	039300016	1	RCD2 U04 201/350		
Post compensated section with additional port for remoted LS relief valve with auxiliary valve	039300022	1	RCS1 U04		
Post compensated section with additional port for remoted LS relief valve without auxiliary valve	039300024	1	RCS2 U04		
Post compensated section with flow limiter with auxiliary valve	039300019	1	RCE1 U04		
Post compensated section with flow limiter without auxiliary valve	039300020	1	RCE2 U04		





Ref.	Description	Order code	Q.ty	Code	Note	
5	Post compensated section standard with auxiliary valve	<b>039300101</b>	1	RC1 G04	BSP version only for electrohydraulic actuation	
	Post compensated section standard without auxiliary valve	<b>039300103</b>	1	RC2 G04		
	Post compensated section with local LS relief valve with auxiliary valve	<b>039300105</b>	1	RCD1 G04 30/80		
		<b>039300106</b>	1	RCD1 G04 81/200		
		<b>039300107</b>	1	RCD1 G04 201/350		
	Post compensated section with local LS relief valve without auxiliary valve	<b>039300111</b>	1	RCD2 G04 30/80		
		<b>039300112</b>	1	RCD2 G04 81/200		
		<b>039300113</b>	1	RCD2 G04 201/350		
	Post compensated section with additional port for remoted LS relief valve with auxiliary valve	<b>039300121</b>	1	RCS1 G04		UNF version only for electrohydraulic actuation
	Post compensated section with additional port for remoted LS relief valve without auxiliary valve	<b>039300123</b>	1	RCS2 G04		
	Post compensated section with flow limiter with auxiliary valve	<b>039300117</b>	1	RCE1 G04		
	Post compensated section with flow limiter without auxiliary valve	<b>039300118</b>	1	RCE2 G04		
	Post compensated section atandard with auxiliary valve	<b>039300102</b>	1	RC1 U04		
	Post compensated section atandard without auxiliary valve	<b>039300104</b>	1	RC2 U04		
	Post compensated section with local LS relief valve with auxiliary valve	<b>039300108</b>	1	RCD1 U04 30/80		
		<b>039300109</b>	1	RCD1 U04 81/200		
		<b>039300110</b>	1	RCD1 U04 201/350		
	Post compensated section with local LS relief valve without auxiliary valve	<b>039300114</b>	1	RCD2 U04 30/80		
		<b>039300115</b>	1	RCD2 U04 81/200		
		<b>039300116</b>	1	RCD2 U04 201/350		
Post compensated section with additional port for remoted LS relief valve with auxiliary valve	<b>039300122</b>	1	RCS1 U04			
Post compensated section with additional port for remoted LS relief valve without auxiliary valve	<b>039300124</b>	1	RCS2 U04			
Post compensated section with flow limiter with auxiliary valve	<b>039300119</b>	1	RCE1 U04			
Post compensated section with flow limiter without auxiliary valve	<b>039300120</b>	1	RCE2 U04			

### Auxiliary valve

Post-compensated and Pre-compensated sections use the same auxiliary valves.

Ref.	Description	Order code	Q.ty	Code	Note
6	Anticavitation valve on port A	<b>915089001</b>	1	02TF PA	
	Combined valve fixed setting on port A (*)	<b>915870100</b>	1	03TF PA	fixed setting: 100 bar
		<b>915870150</b>	1		fixed setting: 150 bar
		<b>915870200</b>	1		fixed setting: 200 bar
		<b>915870250</b>	1		fixed setting: 250 bar
		<b>915870300</b>	1		fixed setting: 300 bar
		<b>915870350</b>	1		fixed setting: 350 bar
Prearrangement for auxiliary valve on port A	<b>430490001</b>	1	05TF PA		
7	Anticavitation valve on port B	<b>915089001</b>	1	02TF PB	
	Combined valve fixed setting on port B (*)	<b>915870100</b>	1	03TF PB	fixed setting: 100 bar
		<b>915870150</b>	1		fixed setting: 150 bar
		<b>915870200</b>	1		fixed setting: 200 bar
		<b>915870250</b>	1		fixed setting: 250 bar
		<b>915870300</b>	1		fixed setting: 300 bar
		<b>915870350</b>	1		fixed setting: 350 bar
Prearrangement for auxiliary valve on port B	<b>430490001</b>	1	05TF PB		



Pre-Compensated Section

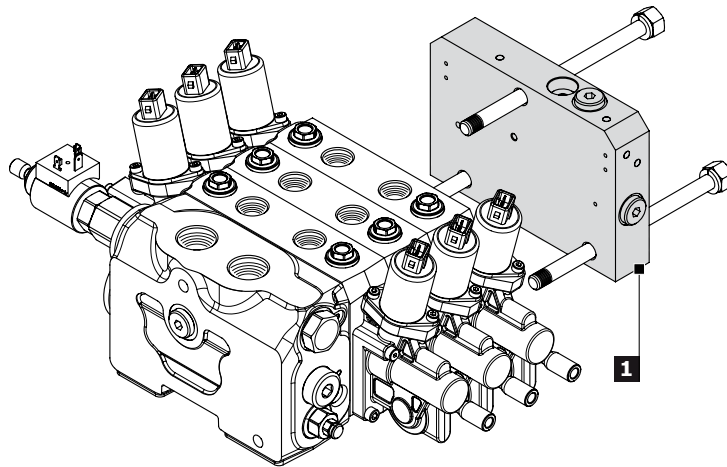
Ref.	Description	Order code	Q.ty	Code	Note
<b>1</b>	3 positions double-acting spool	<b>421293048</b>	1	W001C 1515	spool 15 l/min
		<b>421294063</b>	1	W001C 2525	spool 25 l/min
		<b>421293064</b>	1	W001C 4040	spool 40 l/min
		<b>421293075</b>	1	W001C 6565	spool 65 l/min
	3 positions double-acting spool A and B to tank	<b>421293091</b>	1	W002C 1515	spool 15 l/min
		<b>421293082</b>	1	W002C 2525	spool 25 l/min
		<b>421293081</b>	1	W002C 4040	spool 40 l/min
		<b>421293080</b>	1	W002C 6565	spool 65 l/min
<b>A</b>	Spool end kit	<b>430085026</b>	1		
		<b>430085044</b>	1		only for h001
		<b>430085045</b>	1		only for h004
<b>2</b>	Lever actuation kit	<b>320366001</b>	1	H001	
	Without lever actuation kit	<b>320366003</b>	1	H004	
	Hydraulic actuation (ports on the top)	<b>320593200</b>	1	HP05A	
	Hydraulic actuation (ports on the sides)	<b>320593206</b>	1	HP05C	
	Hydraulic actuation with stroke limiter	<b>320593212</b>	1	HP05L	BSP version
	Lever actuation + hydraulic actuation	<b>320593130</b>	1	HP01	
	Lever actuation + hydraulic actuation with electrohydraulic arrangement	<b>320593134</b>	1	HP02	
	Without actuation + hydraulic actuation with electrohydraulic arrangement	<b>320593138</b>	1	HP03	
	Hydraulic actuation (ports on the top)	<b>320593203</b>	1	HP05A	
	Hydraulic actuation (ports on the sides)	<b>320593209</b>	1	HP05C	
	Hydraulic actuation with stroke limiter	<b>320593215</b>	1	HP05L	
	Lever actuation + hydraulic actuation	<b>320593132</b>	1	HP01	UNF version
	Lever actuation + hydraulic actuation with electrohydraulic arrangement	<b>320593136</b>	1	HP02	
	Without lever + hydraulic actuation with electrohydraulic arrangement	<b>320593139</b>	1	HP03	
	Lever actuation + electrohydraulic arrangement	<b>322593001</b>	1	HP00	
	Lever actuation + electrohydraulic actuation	<b>322593002</b>	1	HP04	
	Lever actuation + electrohydraulic actuation with stroke limiter	<b>322593003</b>	1	HP04L	
	Without lever + electrohydraulic actuation	<b>322593004</b>	1	HP07	
	Without lever + electrohydraulic actuation with stroke limiter	<b>322593005</b>	1	HP07L	
	Lever + hydraulic actuation + electrohydraulic actuation	<b>322593006</b>	1	HP08	BSP version
	<b>322593007</b>	1	HP08	UNF version	
Without Lever + hydraulic actuation + electrohydraulic actuation	<b>322593008</b>	1	HP09	BSP version	
	<b>322593009</b>	1	HP09	UNF version	
<b>3</b>	3 position spring centered spool	<b>320785001</b>	1	F001A	
		<b>320785002</b>	1	F001B	
	Lever actuation + hydraulic actuation (BSP)	<b>320593231</b>	1	FP01	only with HP01
	Lever actuation + hydraulic actuation (UNF)	<b>320593233</b>	1	FP01	
	Lever + hydraulic actuation with electrohydraulic arrangement (BSP)	<b>320593233</b>	1	FP02	only with HP02-HP03
	Lever + hydraulic actuation with electrohydraulic arrangement (UNF)	<b>320593234</b>	1	FP02	
	Lever actuation + electrohydraulic arrangement	<b>322593201</b>	1	FP00	only with HP00
	Lever actuation + electrohydraulic actuation	<b>322593202</b>	1	FP04	only with HP04-HP07
	Without lever + electrohydraulic actuation with stroke limiter	<b>322593203</b>	1	FP04L	only with HP07L
	Lever + hydraulic actuation + electrohydraulic actuation (BSP)	<b>322593204</b>	1	FP08	only with HP08-HP09
Lever + hydraulic actuation + electrohydraulic actuation (UNF)	<b>322593205</b>	1	FP08		
Spool position indicator for electrohydraulic actuation	<b>322593206</b>	1	FP04S	only with HP04-HP07	
<b>4</b>	Solenoid kit	<b>430093100</b>	2	B12AJ	AMP JUNIOR - 12 Vdc
		<b>430093101</b>	2	B24AJ	AMP JUNIOR - 24 Vdc
		<b>430093102</b>	2	B12DE	DEUTSCH DT 4 - 12 Vdc
		<b>430093103</b>	2	B24DE	DEUTSCH DT 4 - 24 Vdc



Ref.	Description	Order code	Q.ty	Code	Note
<b>5</b>	Pre compensated section atandard with auxiliary valve	<b>039300051</b>	1	RL1 G04	
	Pre compensated section atandard without auxiliary valve	<b>039300053</b>	1	RL2 G04	
	Pre compensated section with local LS relief valve with auxiliary valve	<b>039300055</b>	1	RLD1 G04 50/170	(BSP version) only for manual and hydraulic actuation
		<b>039300056</b>	1	RLD1 G04 171/350	
	Pre compensated section with local LS relief valve without auxiliary valve	<b>039300059</b>	1	RLD2 G04 50/170	
		<b>039300060</b>	1	RLD2 G04 171/350	
	Pre compensated section with additional port for remoted LS relief valve with auxiliary valve	<b>039300063</b>	1	RLS1 G04	
	Pre compensated section with additional port for remoted LS relief valve without auxiliary valve	<b>039300065</b>	1	RLS2 G04	
	Pre compensated section standard with auxiliary valve	<b>039300052</b>	1	RL1 U04	(UNF version) only for manual and hydraulic actuation
	Pre compensated section standard without auxiliary valve	<b>039300054</b>	1	RL2 U04	
	Pre compensated section with local LS relief valve with auxiliary valve	<b>039300057</b>	1	RLD1 U04 50/170	
		<b>039300058</b>	1	RLD1 U04 171/350	
	Pre compensated section with local LS relief valve without auxiliary valve	<b>039300061</b>	1	RLD2 U04 50/170	
		<b>039300062</b>	1	RLD2 U04 171/350	
	Pre compensated section with additional port for remoted LS relief valve with auxiliary valve	<b>039300064</b>	1	RLS1 U04	
	Pre compensated section with additional port for remoted LS relief valve without auxiliary valve	<b>039300066</b>	1	RLS2 U04	
	Pre compensated section standard with auxiliary valve	<b>039300151</b>	1	RL1 G04	(BSP version) only for electrohydraulic actuation
	Pre compensated section standard without auxiliary valve	<b>039300153</b>	1	RL2 G04	
	Pre compensated section with local LS relief valve with auxiliary valve	<b>039300155</b>	1	RLD1 G04 50/170	
		<b>039300156</b>	1	RLD1 G04 171/350	
Pre compensated section with local LS relief valve without auxiliary valve	<b>039300159</b>	1	RLD2 G04 50/170		
	<b>039300160</b>	1	RLD2 G04 171/350		
Pre compensated section with additional port for remoted LS relief valve with auxiliary valve	<b>039300163</b>	1	RLS1 G04		
Pre compensated section with additional port for remoted LS relief valve without auxiliary valve	<b>039300165</b>	1	RLS2 G04		
Pre compensated section atandard with auxiliary valve	<b>039300152</b>	1	RL1 U04	(UNF version) only for electrohydraulic actuation	
Pre compensated section atandard without auxiliary valve	<b>039300154</b>	1	RL2 U04		
Pre compensated section with local LS relief valve with auxiliary valve	<b>039300157</b>	1	RLD1 U04 50/170		
	<b>039300158</b>	1	RLD1 U04 171/350		
Pre compensated section with local LS relief valve without auxiliary valve	<b>039300161</b>	1	RLD2 U04 50/170		
	<b>039300162</b>	1	RLD2 U04 171/350		
Pre compensated section with additional port for remoted LS relief valve with auxiliary valve	<b>039300164</b>	1	RLS1 U04		
Pre compensated section with additional port for remoted LS relief valve without auxiliary valve	<b>039300166</b>	1	RLS2 U04		



Outlet Section (End plate)



End plate for Mechanical and hydraulic actuation

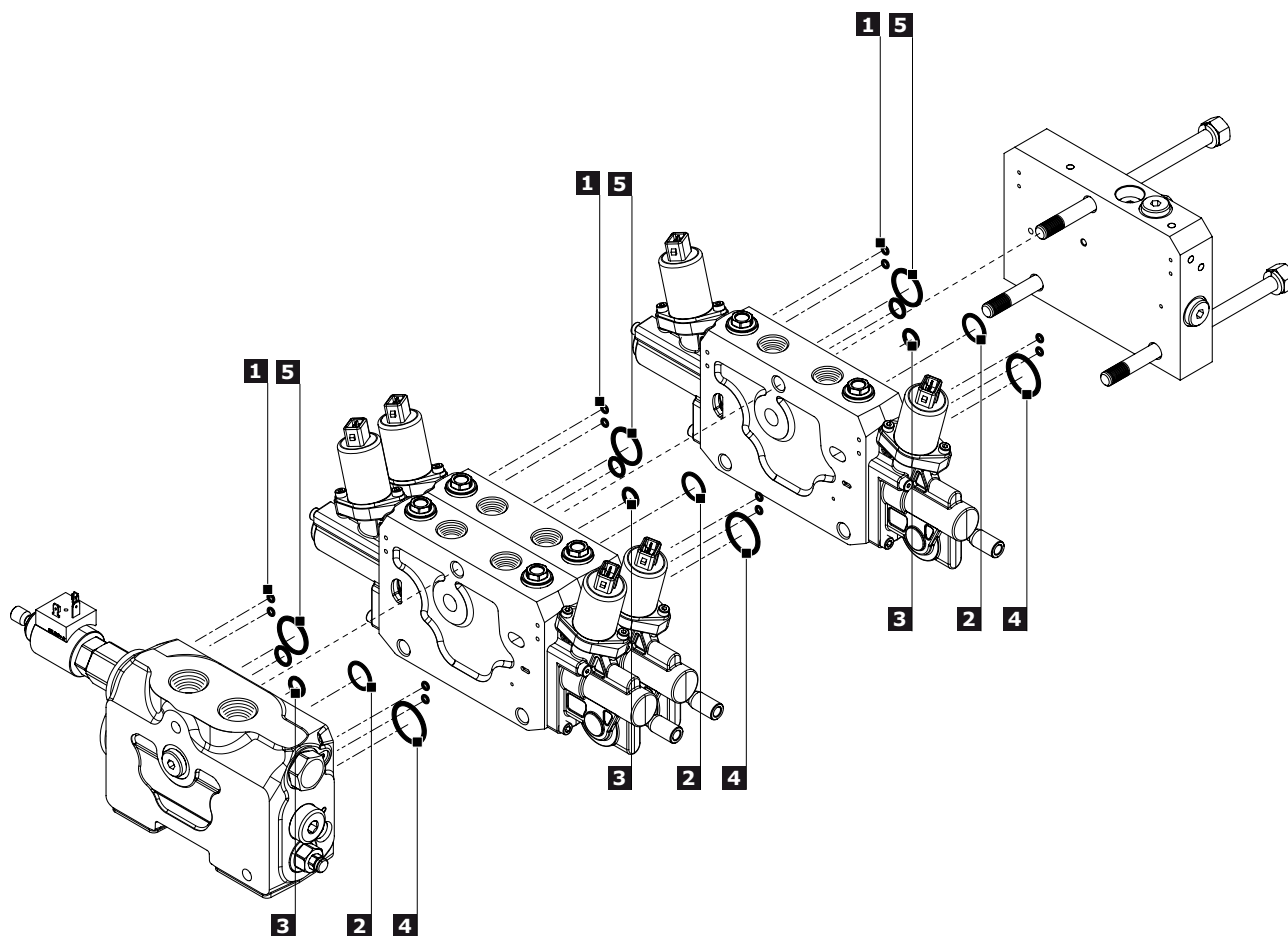
Ref.	Description	Order code	Q.ty	Code	Note
<b>1</b>	End plate without RDP (internal drain)	<b>320093101</b>	1	KZ10I	BSP version
		<b>320093103</b>	1		UNF version
	End plate without RDP (external drain)	<b>320093102</b>	1	KZ10E	BSP version
		<b>320093104</b>	1		UNF version

End plate for electrohydraulic actuation

Ref.	Description	Order code	Q.ty	Code	Note
<b>1</b>	End plate with RDP (external drain)	<b>320093123</b>	1	KZ20EC	BSP version
		<b>320093127</b>	1		UNF version
	End plate with RDP (external-side drain)	<b>320093124</b>	1	KZ20EH	BSP version
		<b>320093128</b>	1		UNF version



**Gasket kits**



Ref.	Order Code	Description	Q.ty
<b>1</b>	<b>412020118</b>	O.R. 90SH 3.10 x 1,6 (N270R050)	4
<b>2</b>	<b>412020302</b>	O.R. 90SH 16.36 x 2.21 (3-908)	1
<b>3</b>	<b>412020303</b>	O.R. 90SH 10 x 2.20 (6-532)	2
<b>4</b>	<b>412020605</b>	O.R. 90SH 25.07 x 2.62 (2-120)	1
<b>5</b>	<b>412020610</b>	O.R. 90SH 21.89 x 2.62 (2-118)	1
<b>Complete Gasket kit: order code - 350993001</b>			



## INSTALLATION

## Guidelines

- Never use the Control Valve at a pressure exceeding the rated pressure; if not, there is the possibility of leakage in the Control Valve;
- Use the Control Valve within the rated flow; if not there might be malfunction or a deterioration in heat balance. If it is unavoidable to use the Control Valve at a level exceeding the rated flow, carry out various confirmatory tests and use it within the verified range. If the Control Valve is used under a condition beyond the verified range, we shall not be responsible for any accidents occurred as a result of the use.
- Using low-cleanliness hydraulic fluid might cause seal failure or damage to the seal part, resulting in operation failure, or operation mistake of the machine; the customer is requested to check the cleanliness of the hydraulic fluid without fail.

## Storage

Do not store the HC product in:

- Places where it might be damaged;
- Very hot/humid areas;
- Where it could get wet;
- Where it could come into contact with organic solvents, acids, alkalis and/or dangerous gases;
- In places subject to sudden, significant changes in temperature;
- only remove the packaging when you have decided to assemble the product.

**Warning**

- Hydrocontrol is not responsible for any damages due to a storage not in compliance with our prescriptions;
- For any doubts, please contact our aftersales department.

## Installation procedures

On receiving the Hydrocontrol product make sure you:

- Check if there are some sign of damage of the packaging;
- Check that the dimensions of the product seat are compatible with those of the product itself;
- Check that assembly seat is compatible with the dimensions of the part and that it has been prepared for part set-up (connection hoses ready etc.);
- Remove the plastic caps that protect the service ports and be careful not to introduce any dirt or foreign matters inside the control valve as this could damage it;
- 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; any distortion in assembly can result in spool sticking and poor control;
- Clean piping materials sufficiently before use;
- Prevent the port openings from being entered with dust or foreign matters;
- Double check that hoses are correctly connected following prescription and indication of hydraulic schema, especially:
  - (in case of EH control) be sure that drain line is directly connected to tank (avoid any back pressure)
  - (in case of variable displacement system) be sure that LS signal line is correctly connected to the pump regulator.
- tighten the port connectors surely with the recommended fastening torques (Nm) as shown in the following table;
- If possible, install the valve in a protected environment, avoiding direct exposure to weathering, water, salt or any other corrosion substances

## Fittings tightening torque (Nm)

Thread Type	Port P	Port A - B	Port T
<b>BSP (ISO - 228)</b>	<b>G 3/4</b>	<b>G 1/2</b>	<b>G 3/4</b>
with rubber sealing (DIN 3869)	70	60	70
with copper or steel and rubber washer	70	60	70
<b>UN-UNF (ISO - 725)</b>	<b>1"1/16 - 12 UNF</b>	<b>7/8" - 14 UNF</b>	<b>1"1/16 - 12 UNF</b>
with O.R.	95	90	95



## INSTALLATION



### Warning

- Falling or hitting the Control Valve might bend the Spool so as to cause an accident due to an operation failure;
- If the Control Valve is mounted in a uneven surface, the Control Valve Body might be deformed, which results on a malfunction or external leakage;
- If there are foreign matters in each port, the Control Valve operation might fail so as to cause an accident;
- Do not tighten fittings with torque more than the recommended value; If not there might be strains or damage to Control Valve so as to cause a serious accident;
- If the piping are not connected to the correspondent ports, unintentional movements might cause a serious accident;
- Hydrocontrol is not responsible for any damages due to an installation procedure not in compliance with our prescriptions;
- For any doubts, please contact our aftersales department.

### Handling Precautions

When the Control Valve is handled, ensure:

- that you do not drop, hit or damage the product;
- that you do 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

### Handling Precautions

Disassembly and assembly should be carried out by Hydrocontrol technicians. If the Control Valve doesn't work in the adequate way, we advise you to contact our aftersales department. However if the disassembly and assembly operations are strictly unavoidable, you must observe the following prescriptions and charge the carrying out of the operations to technicians high qualified in hydraulic field.

- The Control Valve reaches high temperature after operating the machine; start the work only after checking that the temperature is low;
- The valve can hold high internal pressure; release the inside pressure and ensure all machine actuators are in a rest position before removing the piping. In any case safely and carefully unscrew connections and fittings. If not, there might be a fall of attachments or high-temperature hydraulic fluid jet. Remind to wear the safety equipment and goggles;
- Pay attention in removing electrical connectors;
- Since hydraulic devices are all machined precisely with very accurate clearances, carry out the disassembly adassembly work at a clean place;
- Make sure to prevent the device form being entered with dust, sand and the like;
- Before removing the pipes, attach suitable indications on them to be able to locate their positions late. It is also advisable to label dismantled parts and write down their original location;
- Before disassembly work, get the assembly instructions by requiring to our aftersales department and prepare all the material needed for the task;
- To disassemble and assemble the valve observe strictly our mounting instructions;
- Since there is the possibility of rust when the disassembled parts are left, apply anticorrosive oil to the parts and seal them;
- If it is unavoidable to dismount spring kit from the spool, ensure to clamp the spool through plastic or aluminum devices;
- Before remounting the Control Valve on the operating machine, ensure that the Control Valve has not been affected by carrying out various hydraulic tests (e.g. Relief Valve setting, Leak test..);
- Before reassembling electrical connectors, verify their integrity and check if they are dry



### Warning

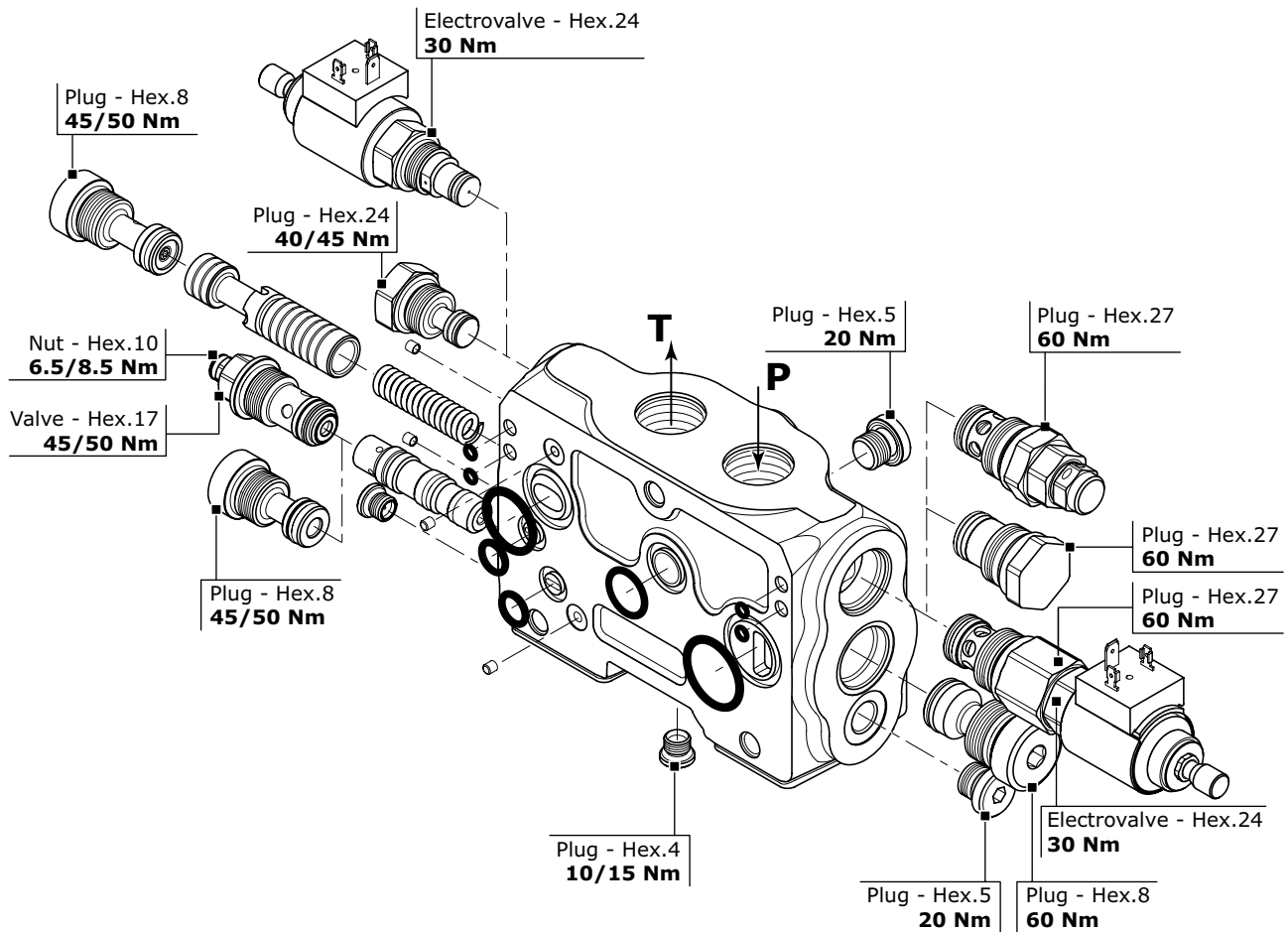
- Always bear in mind that "all workers must act responsibly to ensure their own health and safety"; use of personal protection equipment is therefore essential. All the disassembly and assembly operations must observe strictly the procedures listed in the Hydrocontrol Mounting Instruction.
- Hydrocontrol is not responsible for any damages due to disassembly and assembly procedures not in compliance with our prescriptions.
- For any doubts, please contact our aftersales department.



### General clamping torque

The following table provides the main tightening torques of the distributor EX38; are highlighted in 3 separate drawings depicting the inlet section, the working section and the outlet section.

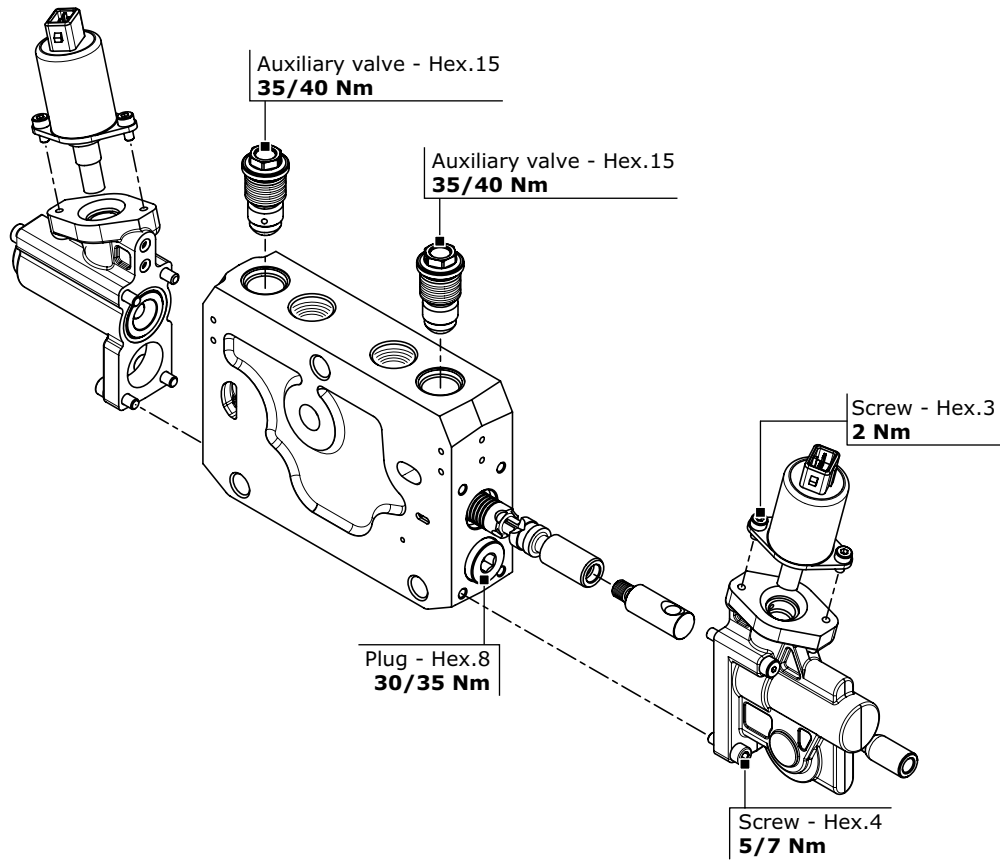
#### Inlet Section



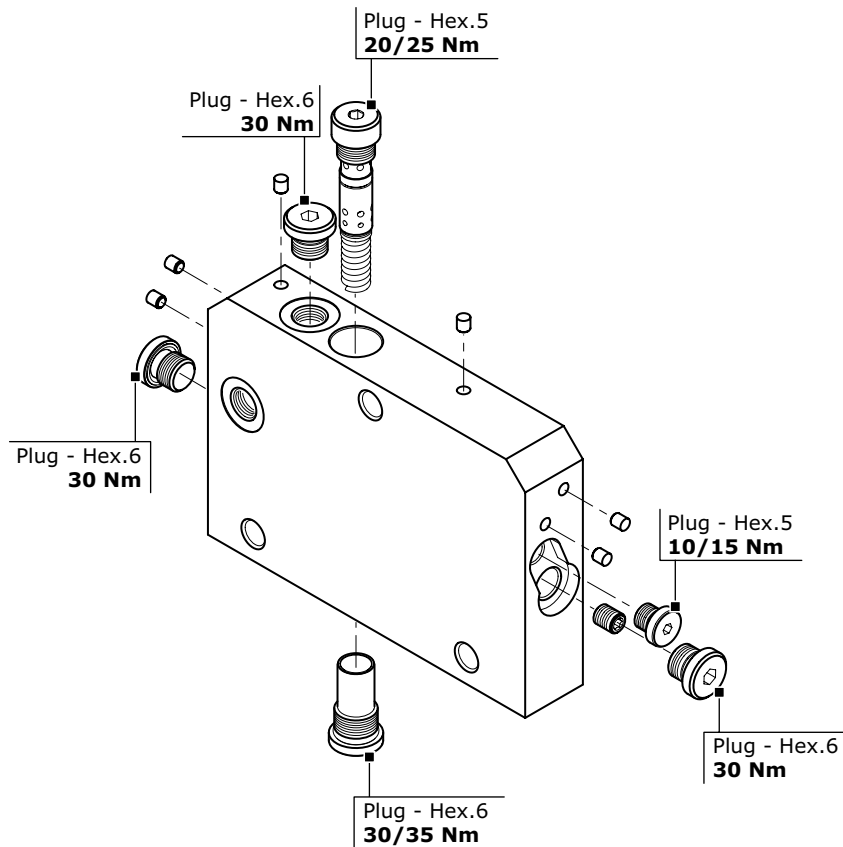




Work Section



Outlet Section





**Dimensions - Thread codes**

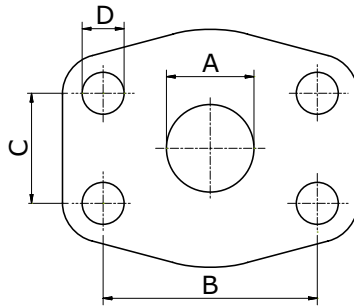
The connection ports size is indicated by an ordering code common for all Hydrocontrol products. Following table shows all available connections.

<b>METRIC THREAD (ISO 9974-1)</b>			
Type	M18x1,5	M22x1,5	M27x2
Code	<b>M01</b>	<b>M02</b>	<b>M03</b>

<b>BSP THREAD (ISO 1179-1)</b>								
Type	1/4"	3/8"	1/2"	3/4"	1"	1"1/4	1"1/2	2"
Code	<b>G02</b>	<b>G03</b>	<b>G04</b>	<b>G05</b>	<b>G06</b>	<b>G07</b>	<b>G08</b>	<b>G09</b>

<b>UN / UNF THREAD (ISO 11926-1)</b>						
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	<b>U02</b>	<b>U03</b>	<b>U04</b>	<b>U05</b>	<b>U06</b>	<b>U07</b>

**Dimensions - SAE Flange codes**



<b>SAE / 3000 FLANGE (ISO 6162-1)</b>												
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	<b>S03</b>	<b>S04</b>	<b>S05</b>	<b>S06</b>	<b>S07</b>	<b>S08</b>	<b>S09</b>	<b>S10</b>	<b>S11</b>	<b>S12</b>	<b>S15</b>	<b>S16</b>
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

<b>SAE / 6000 FLANGE (ISO 6162-2)</b>								
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	<b>S33</b>	<b>S34</b>	<b>S35</b>	<b>S36</b>	<b>S37</b>	<b>S38</b>	<b>S39</b>	<b>S40</b>
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



## GENERAL CONDITIONS AND PATENTS

### Product identification

All Hydrocontrol products have an identifying plate placed in specific position.



Serial number

**Serial number:**  
It univocally identifies the physical valve: this provides an easy way to find all sales and production details.

Product code

**Product code:**  
It is a number univocally identifying the configuration and pressure settings of a valve.

### Introduction

These general conditions apply to all general supplies from Hydrocontrol s.p.a., after receiving orders from the Customer. Should commercial terms such as EXW, DDP, etc be mentioned, of course the Incoterms of the International Chamber of Commerce must be referred to, according to the test existing when the general supply conditions are agreed on.

### Management of orders

No Customer's order is binding to Hydrocontrol s.p.a. if Hydrocontrol s.p.a. has not confirmed the order in writing. Hydrocontrol s.p.a. commits to supplying the orders in compliance with the order confirmation that has been issued. Any disagreement with the content of the order confirmation must be communicated in writing to Hydrocontrol s.p.a. within and no later than 5 days from the delivery of the order confirmation. The Customer commits to paying for the goods supplied by Hydrocontrol s.p.a., according to the prices indicated on the order confirmation.

### Payment conditions

The Parties agree on the payment terms at the beginning of the supply. The terms will be indicated on the order confirmation. Should the Customer be late with the payments, Hydrocontrol S.p.a. will be entitled to require the payment of interests on arrears based on the exiting Prime Rate increased by 2%. Should there be any payment delay, Hydrocontrol s.p.a. will be entitled not to process the Customer's purchase order, even if it has already been confirmed.

### Delivery and shipment

The goods are always supplied Ex Works, even when Hydrocontrol s.p.a. agrees with the Customer that the shipment, or a part of it, will be arranged by Hydrocontrol s.p.a. It is agreed that the Customer will bear the risk of goods deterioration or damaging from the moment the goods are handed by Hydrocontrol s.p.a. to the first carrier.

### Product characteristics

Hydrocontrol s.p.a. commits to supplying good quality products, compliant with the technical specifications declared on the technical tables and on the catalogue. Hydrocontrol s.p.a, even without notice, at its own discretion, reserves the right to modify the products as necessary, without these changes altering the main characteristics of the products.

### Claims

Any claims about defects on delivered products (just as an example: claims about the packaging, the number, the quantity or the external product characteristics) will have to be notified to Hydrocontrol s.p.a. in writing, within and no later than 7 days from reception of the goods, otherwise the claims will be considered as null and void. Occult defects (the defects of the goods that cannot be spotted with a careful control of the goods received by the Customer), will have to be notified in writing to Hydrocontrol s.p.a. within 7 days from the discovery of the defect, and anyhow no later than 12 months from the delivery of the goods, otherwise the claim will be considered as null and void. Even in case of claim or objection, the Customer will never be entitled to suspend or delay the payments to Hydrocontrol s.p.a. for the products subject to claim or objection nor for any other supply.

**GENERAL CONDITIONS AND PATENTS****Warranty**

Should the products supplied by Hydrocontrol not be compliant or have the required quality and should this defect be due to Hydrocontrol, Hydrocontrol s.p.a. commits, at its choice, to replace or repair the faulty products, as long as the defect or lack of compliance is notified to Hydrocontrol s.p.a. in writing, as specified at point 6, within and no later than 12 months from product delivery. On the products that have been fixed or replaced in accordance with what specified above, the above-mentioned warranty applies. The 12 month duration starts from the date of repair or replacement. In case of defects, lack of quality or in case of lack of compliance for the supplied products, with the exception of fraud or serious offence, Hydrocontrol s.p.a. only commits to repairing or replacing the faulty products, according to what specified above. This warranty replaces any other Supplier's warranty or liability established by the law. This warranty excludes any other liability contractual or extra-contractual by Hydrocontrol s.p.a. on the products supplied by Hydrocontrol (as a mere example: damage refund, loss of profit, product recall campaign, etc). Hydrocontrol s.p.a. has signed a product civil liability police, with a suitable maximum coverage.

**Ownership retention**

The products supplied by Hydrocontrol s.p.a. will be owned by the latter until Hydrocontrol receives the complete payment for the supplied goods.

**Obligation confidentiality**

Hydrocontrol s.p.a. commits to not disclosing the technical and commercial information it receives from the Customer, unless this information has already been publicly disclosed.

**Patents**

The Customer is not allowed to use the provided Products, or a part of them, their descriptions or drawings protected or not protected by Patent or registered trademark in order to design or make similar products, unless Hydrocontrol s.p.a. previously issues its written authorization. Should Hydrocontrol s.p.a. give its written authorization, all patents, trademarks, registered designs, copyrights and intellectual property rights related or connected to the Products provided by Hydrocontrol s.p.a. will stay Hydrocontrol's property. The Customer commits to respecting the highest confidentiality.

**Applicable law and court of jurisdiction**

Hydrocontrol s.p.a.'s supplies are regulated by these General Supply Conditions and, for anything not defined here, by the Italian law. Any controversy related, generated or connected to the supply of Products by Hydrocontrol s.p.a., where Hydrocontrol s.p.a. is involved, will be exclusively dealt with by the Court of Bologna.



**NOTES**

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**Walvoil nel mondo - Walvoil worldwide**  
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