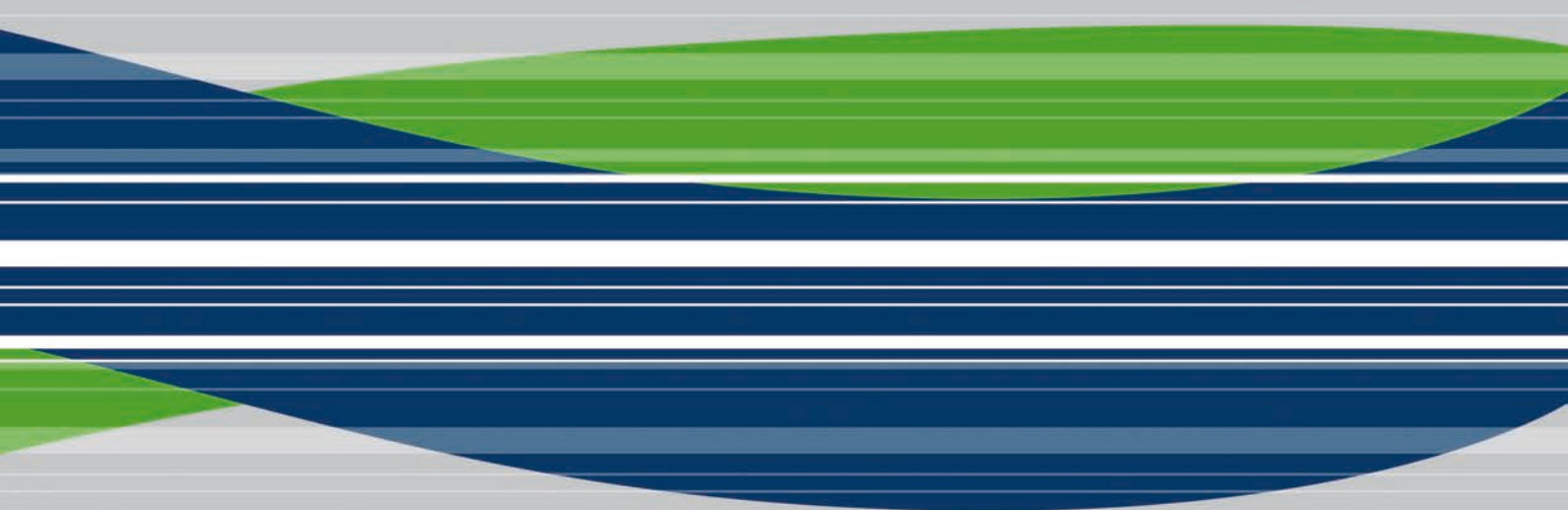


HC-EX38

Flow sharing pre/post compensated valve



A global partner for innovative solutions

Functional advantages offered by the EX Family

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, 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.



GENERAL SPECIFICATIONS	EX34	EX38	EX46	EX54	EX72
Working section number	1 - 10	1 - 10	1 - 10	1 - 10	1 - 8
CIRCUIT					
Spool stroke (mm)	7	7	8	9	11
Spool pitch (mm)	34	38	46	54	72
RATED FLOW					
Pump flow rate (l/min)	130	150	220	300	450
A/B port flow rate (l/min) (*)	80	100	180	250	350
RATED PRESSURE					
working pressure inlet port P (bar)	350	350	350	350	350
BACK PRESSURE MAX					
Max pressure outlet port T (bar)	10	10	10	10	10

(*) Pump inlet compensator at 14 bar Δp

OPTION CHART	EX34	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)	•	•	•	•	
SPOOLS TYPE					
Single acting	•	•	•	•	•
Double acting	•	•	•	•	•
Float spool	•	•	•	•	•
SPOOL ACTUATION					
Hydraulic actuation	•	•	•	•	•
Lever actuation	•	•	•	•	
Without lever	•	•	•	•	•
Cloche control		•	•		
Prop. electrohydraulic actuation 12-24 Vdc (*)	•	•	•	•	•
ON/OFF electrohydraulic actuation 12-24 Vdc (*)	•	•	•	•	•
CAN BUS interface actuation				on development	•
SPOOL RETURN ACTION					
Return spring	•	•	•	•	•
Mechanical detent	•	•	•	(•)	(•)
Hydraulic load limit	(•)	(•)	(•)		
Pneumatic control	(•)	(•)	(•)		
Spools displacement sensor (HLPS)	•	•	•	•	•
PORT RELIEF VALVE					
Antishock valve				•	•
Anticavitation valve	•	•	•	•	•
Antishock and anticavitation valve	•	•	•	•	•
Plug	•	•	•	•	•

• = available

(•) = special arrangement available on request

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

GENERAL INDEX

4	General specifications Standard working conditions Fluid options Applications Operating principle
6	Pre and post compensated solutions Hydraulic schema - Post Compensated system Hydraulic schema - Pre Compensated system
7	Order example Standard thread Thread codes Tie-rod kit classification Lever kit identification Painting
9	Dimensions
11	Typical curves Inlet compensator Pressure drop (P-T) LS relief valve Full flow dump valve Post compensated spool flow characteristic Post compensated spool flow with variable displacement pumps Pre compensated spool flow characteristic Post compensated float spool characteristic Combined valves (antishock function) Combined valves (anticavitation function)
15	Inlet Section Order example Inlet side classification Valve identification Valve arrangement Inlet classification
19	Working section Order example Spool identification Spool flow Spool actuation classification for manual control Spool return action classification for manual control Spool actuation classification for hydraulic control Spool actuation classification for electrohydraulic control Spool return action with hall effect linear position sensor Work section arrangement Auxiliary valves identification
31	Outlet section (end plate) Order example End plate for manual and hydraulic control End plate for electrohydraulic control Parallel connection of several valves High pressure carry over function
34	HC-EX38 Spare parts list Gasket kits Trasformation kits
38	Installation and maintenance Guidelines General clamping torque
40	General conditions and patents Product identification

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 SPECIFICATION

Standard working conditions

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	β10 > 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.

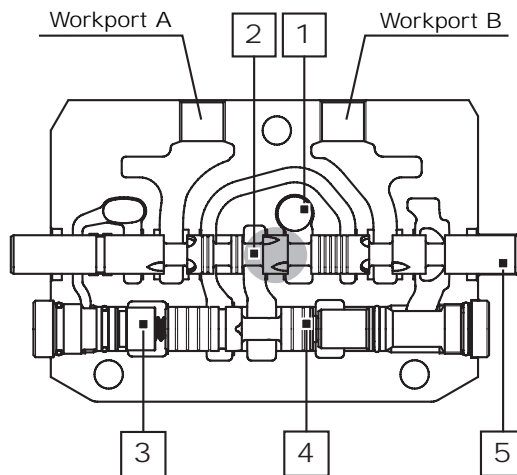
Applications

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



Operating principle

The flow sharing technology applied to the standard load sensing system characterizes the new control valves HC-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.

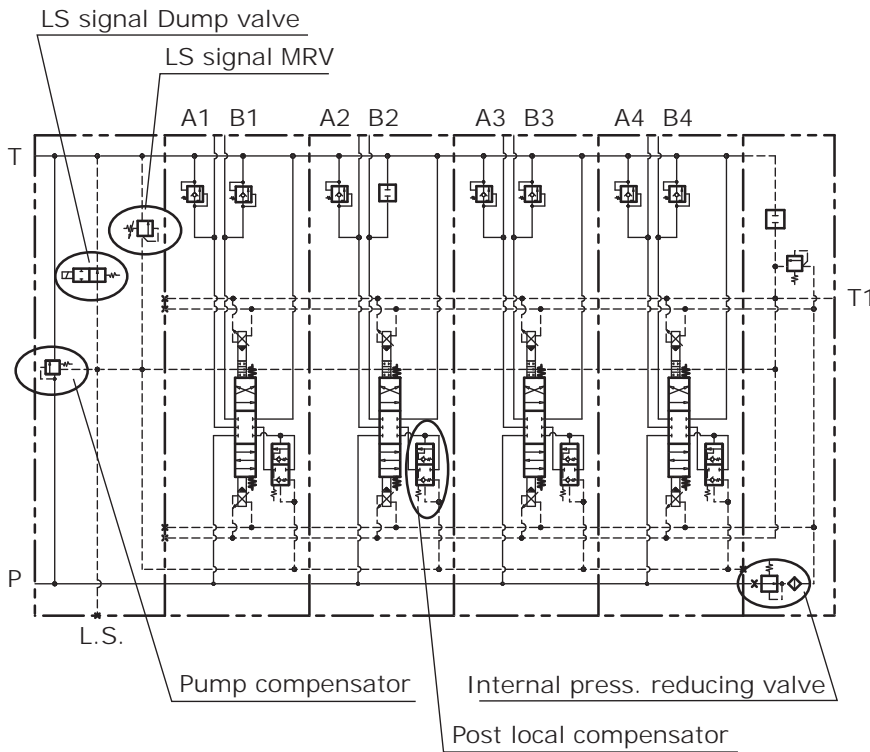
Flow Sharing function

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.

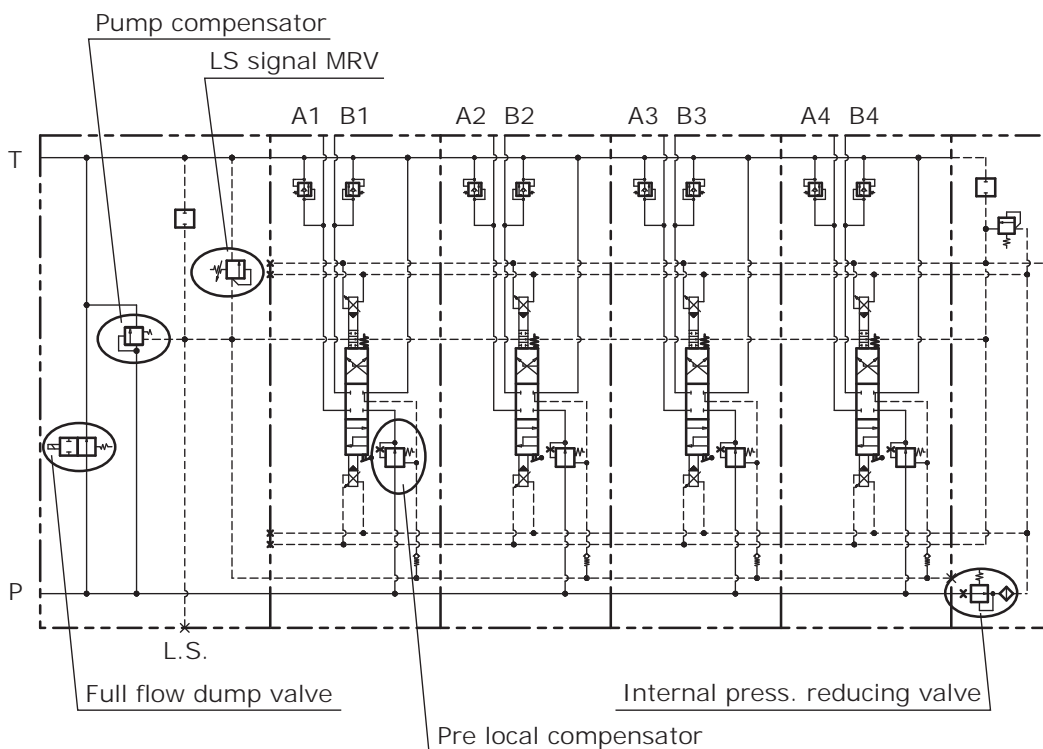
PRE AND POST COMPENSATED SOLUTIONS

HC-EX 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 the two systems. Further detail are explained on page 26.

HYDRAULIC SCHEMA - Post compensated system



HYDRAULIC SCHEMA - Pre compensated system

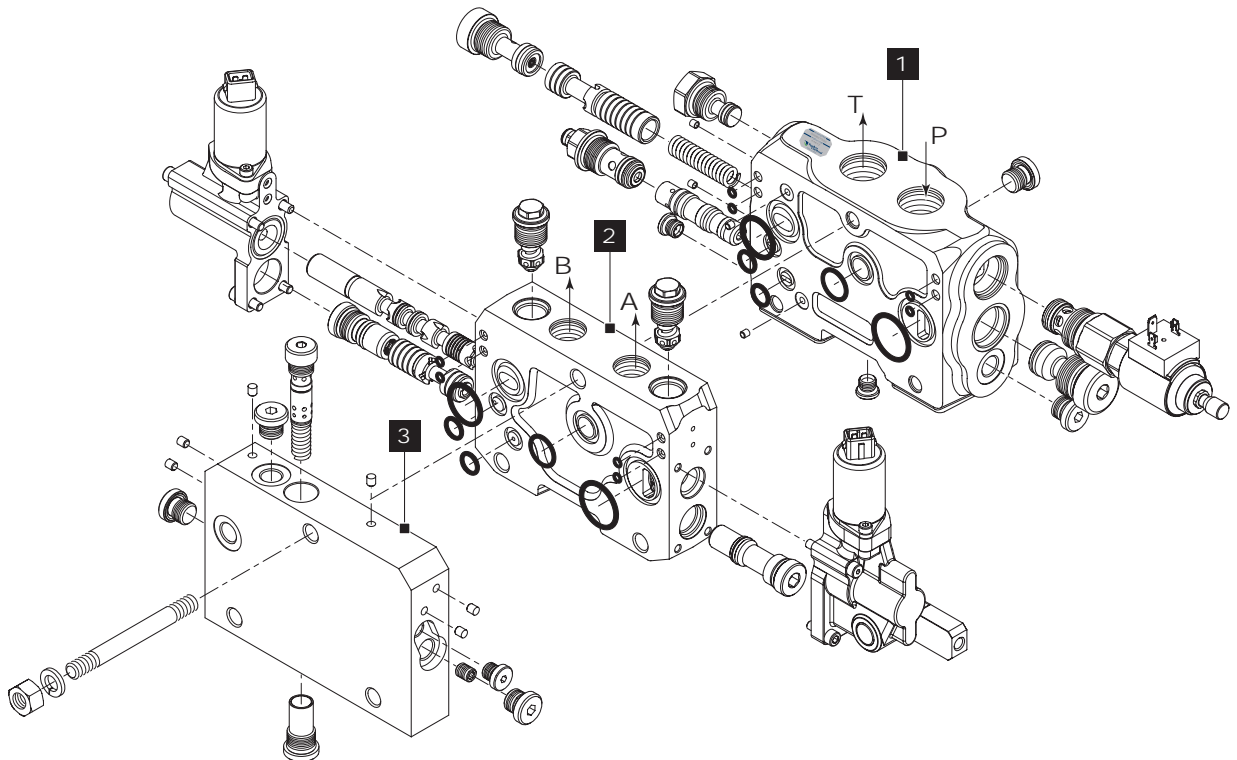


ORDER EXAMPLE

HC-EX38/1: MR 701 200 KV G05 - W001C 4025 H404 RC1 G04 03 PA 100 03 PB 150 - KZ20EI

TYPE:					
EX38	product type				
/1	working section number				
1) INLET ARRANGEMENT:					
1.1 MR 701	inlet side and valve type				
200	setting (bar)				
KV G05	inlet position and available thread type				
2) WORK SECTION ARRANGEMENT:					
2.1 W001C 4025	type and spool delivery				
2.2 H404	spool actuation type				
2.3 RC1 G04	section type and port threads				
2.4 03 PA 100	auxiliary valve (port A)				
2.5 03 PB 150	auxiliary valve (port B)				
3) OUTLET ARRANGEMENT (END PLATE):					
3.1 KZ20EI	plate type				

Ordering row 2 must be repeated for every work section



Standard thread

ports	BSP (ISO - 228)	UN-UNF (ISO - 725)
Ports (P - T)	G 3/4	1"1/16 - 12 UNF
Ports (A - B)	G 1/2	7/8" - 14 UNF

Thread codes

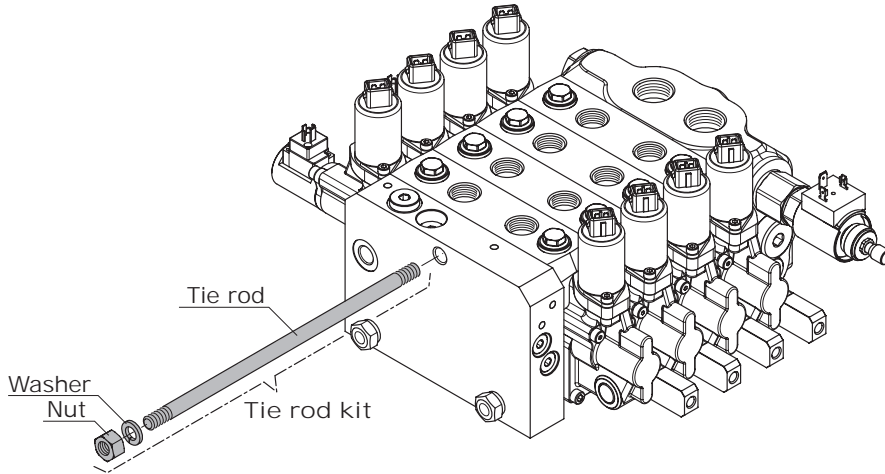
The connection ports size is indicated by an ordering code common for all Hydrocontrol products. Following table shows all available connections.

BSP thread (ISO - 228)		
Type	G 1/2	G 3/4
Code	G04	G05

UN / UNF thread (ISO - 725)		
Type	7/8" - 12 UNF	1"1/16 - 12 UNF
Code	U04	U05

Tie-rod kit classification (appendix "A")

Tie rod kit allows the correct assembly of sectional valves. Tie rod's length depends on the number of sections; each valve is assembled with tie rod kits including a tie rod, nut and washer.



tie rod length for electrohydraulic control	/1	/2	/3	/4	/5	/6	/7	/8	/9	/10
(mm)	95	133	172	210	248	287	324	361	400	438
Tie rod clamping torque	40 Nm									

In case of HC-EX38 operated only with manual and hydraulic control (end plate KZ10) shorter tie rod kits are normally used, see following table:

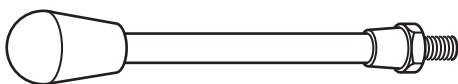
tie rod length for manual and hydraulic control	/1	/2	/3	/4	/5	/6	/7	/8	/9	/10
(mm)	91	129	166	205	241	281	318	356	394	432
Tie rod clamping torque	40 Nm									

Lever kit identification (appendix "B")

Hydrocontrol can supply a lever kit to be assembled on the valve's manual controls; different lengths and threads are available. Lever kits must be ordered separately.

type	description	code
ZA - M8 - 135	Lever with knob (135 mm)	430503001
ZA - M8 - 210	Lever with knob (210 mm)	430503002

Order example:



ZA - M8 - 210

- Lever length (mm)
- Lever thread
- Lever type

Painting

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

Order example of EX38/1 painted:

HC-EX38/1
 MR 701 200 KV G05
 W001C 4025 H404 RC1 G04 03 PA 100 03 PB 150
 KZ20EI
P006/1 N10

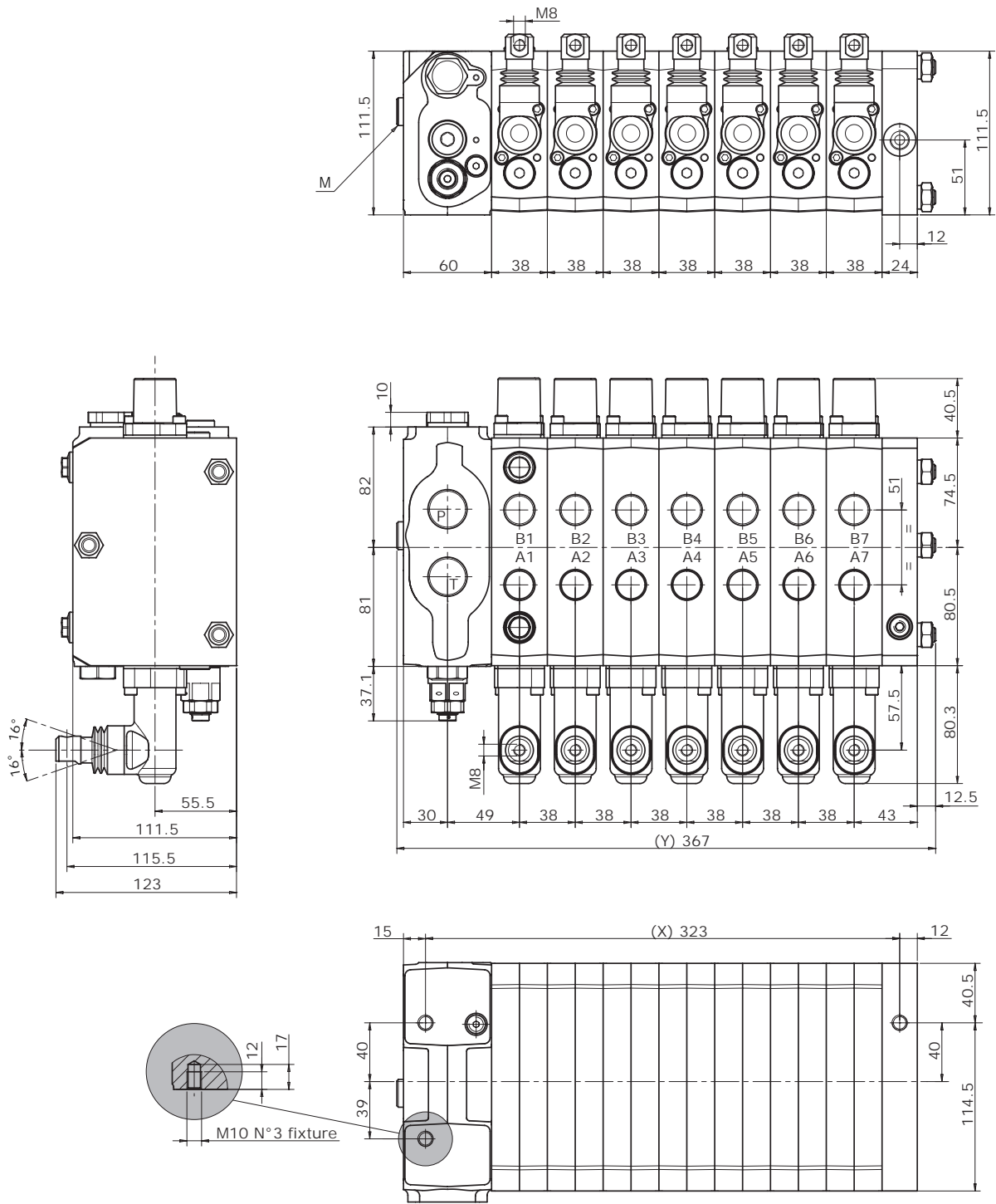
The painting is indicated with the following value:

P006 - /1 - N10

- Color black
- section number
- Painted

DIMENSIONS

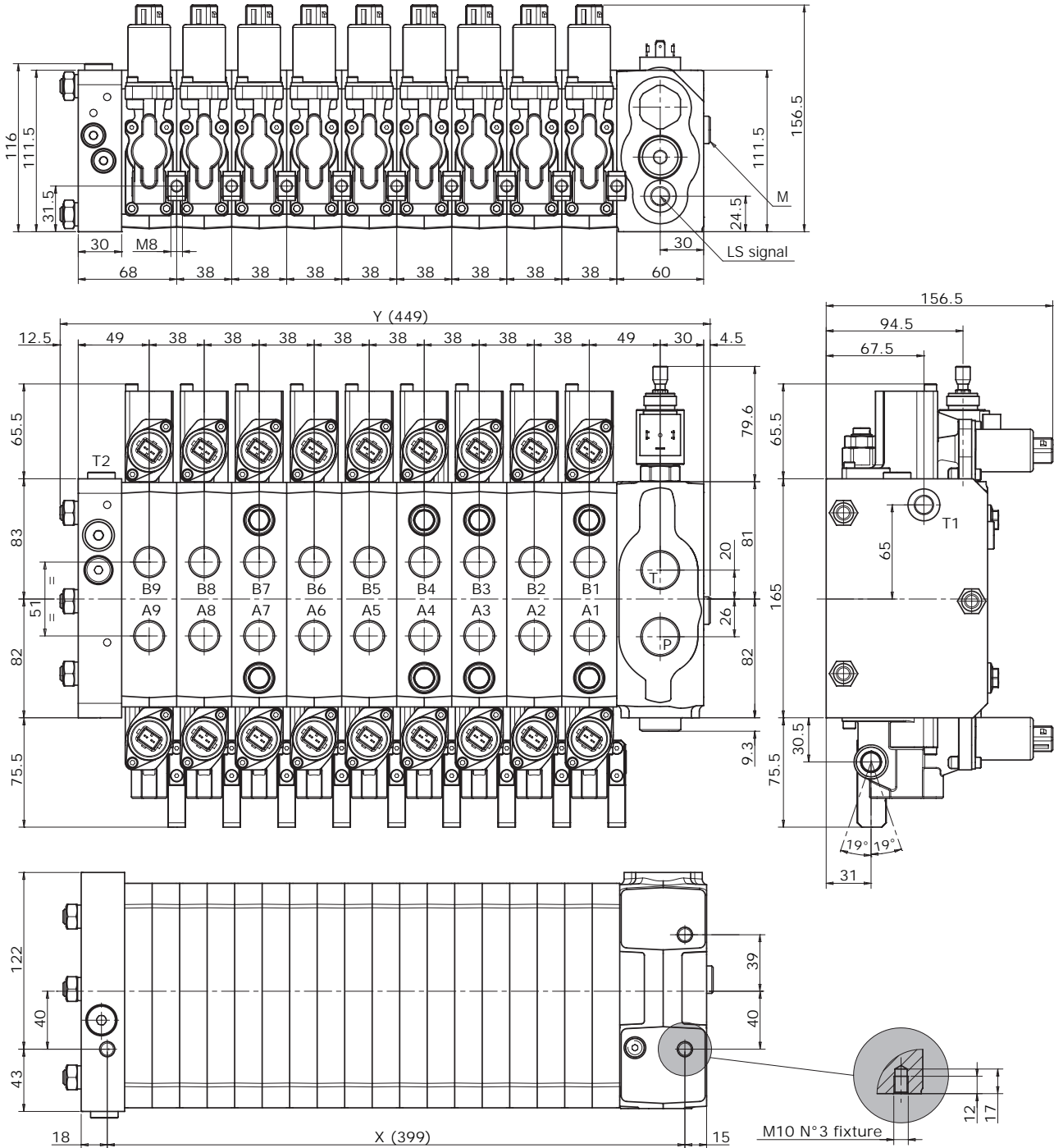
HC-EX38 with manual control



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)	139	177	215	253	291	329	367	405	443	481
Weights (kg)	14,5	18,5	22,5	26,5	30,5	34,5	38,5	42,5	46,6	50,5

DIMENSIONS

HC-EX38 with electrohydraulic control

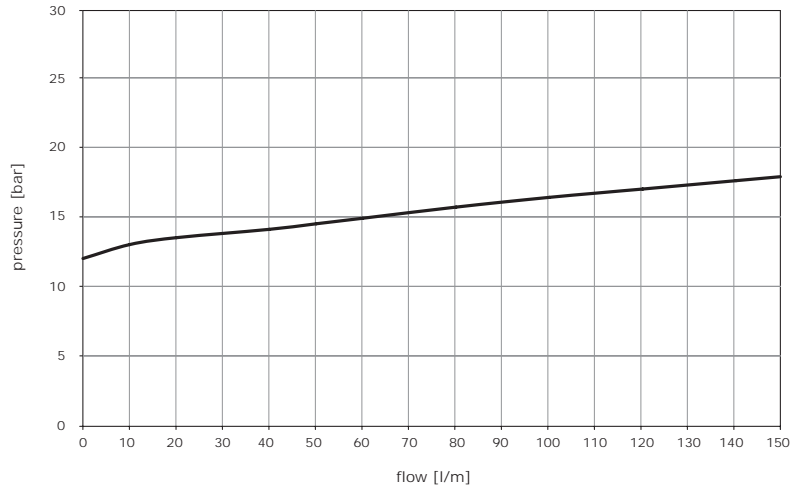


type	/1	/2	/3	/4	/5	/6	/7	/8	/9	/10
X (mm)	95	133	171	209	247	285	323	361	399	437
Y (mm)	145	183	221	259	297	335	373	411	449	487
Weights (kg)	15	19,5	24	28,5	33	37,5	42	46,5	51	55,5

TYPICAL CURVES

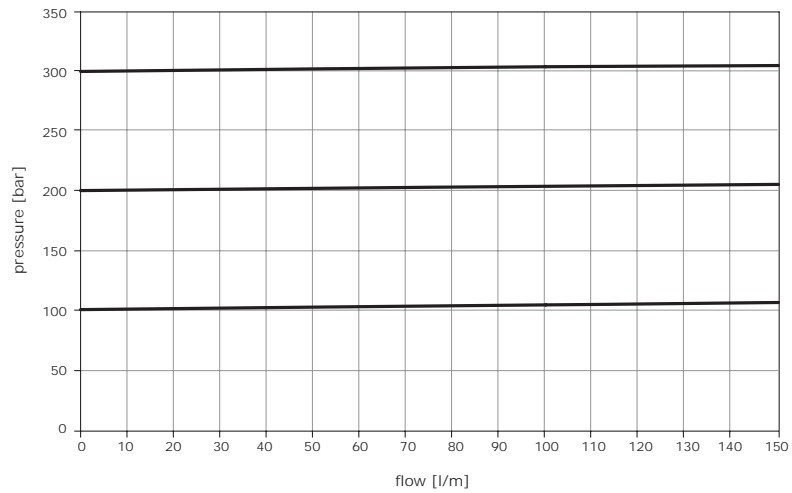
Inlet compensator Pressure drop (P-T)

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



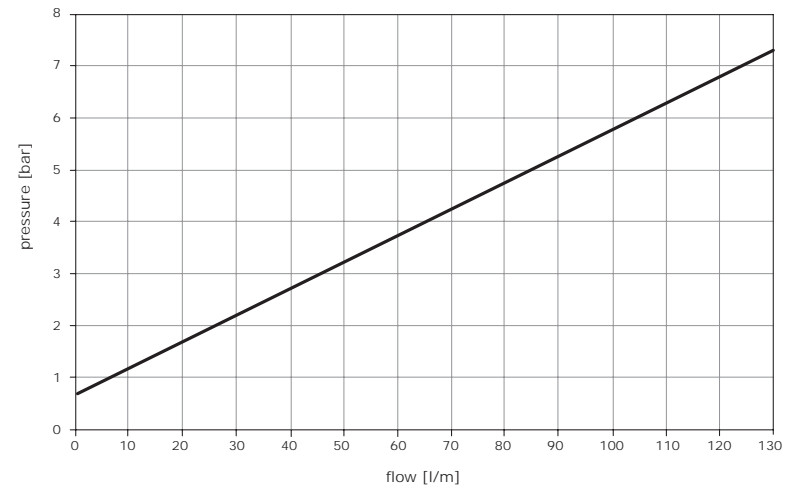
LS relief valve

Fixed displacement system (KV): LS relief valve characteristic



Full flow dump valve (valve type 7, 8)

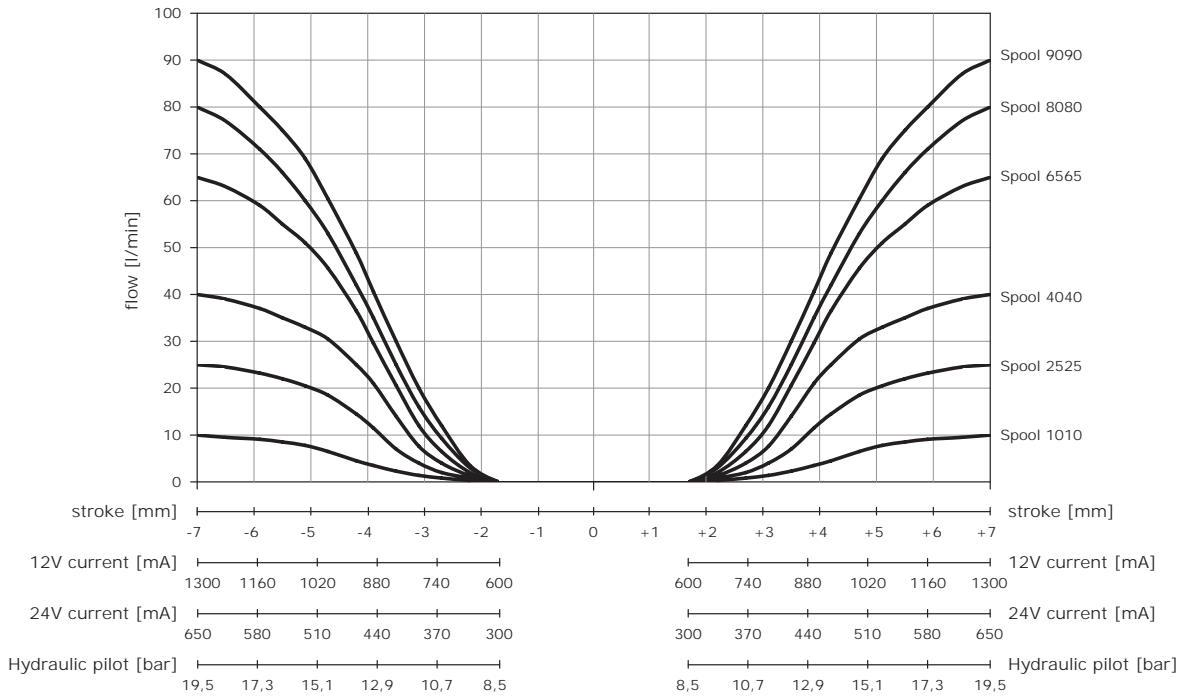
Fixed displacement systems (KV): pressure drop across open electric dump valve as function of pump flow



TYPICAL CURVES

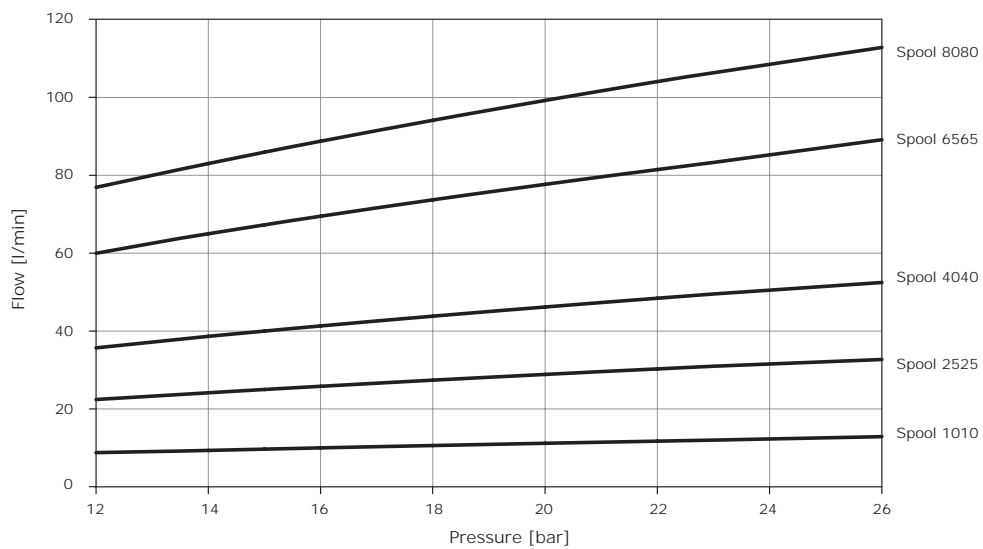
Post compensated spool flow characteristic

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



Post compensated spool flow with variable displacement pumps

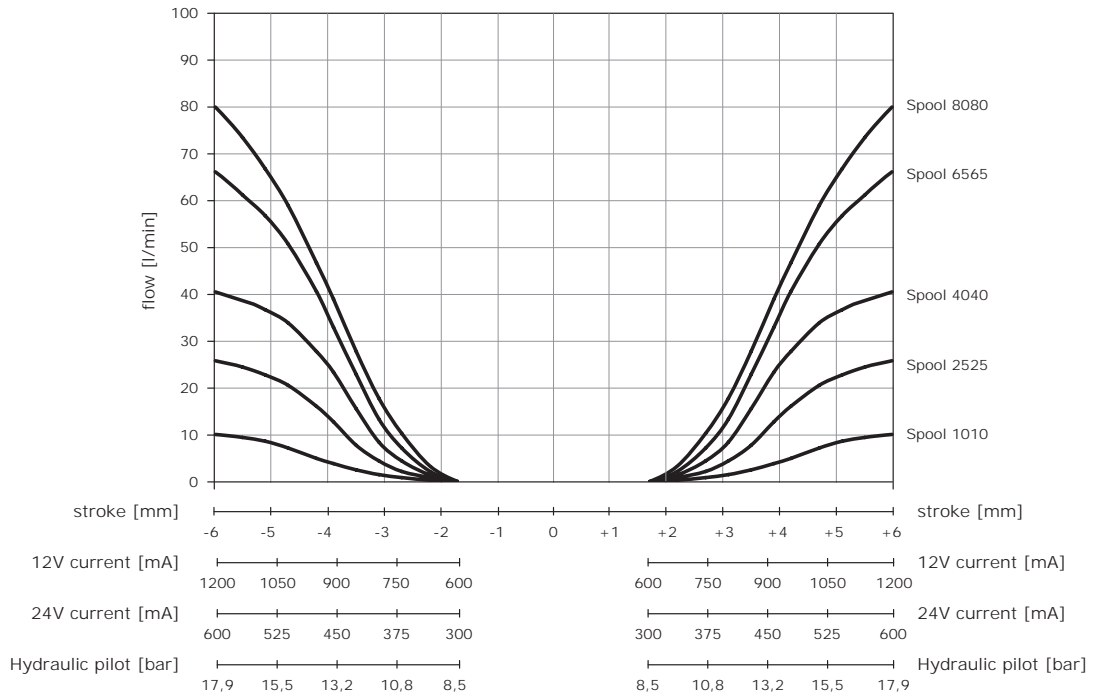
Variable displacement systems (JV): spools maximum delivered flow as function of pump ΔP setting



TYPICAL CURVES

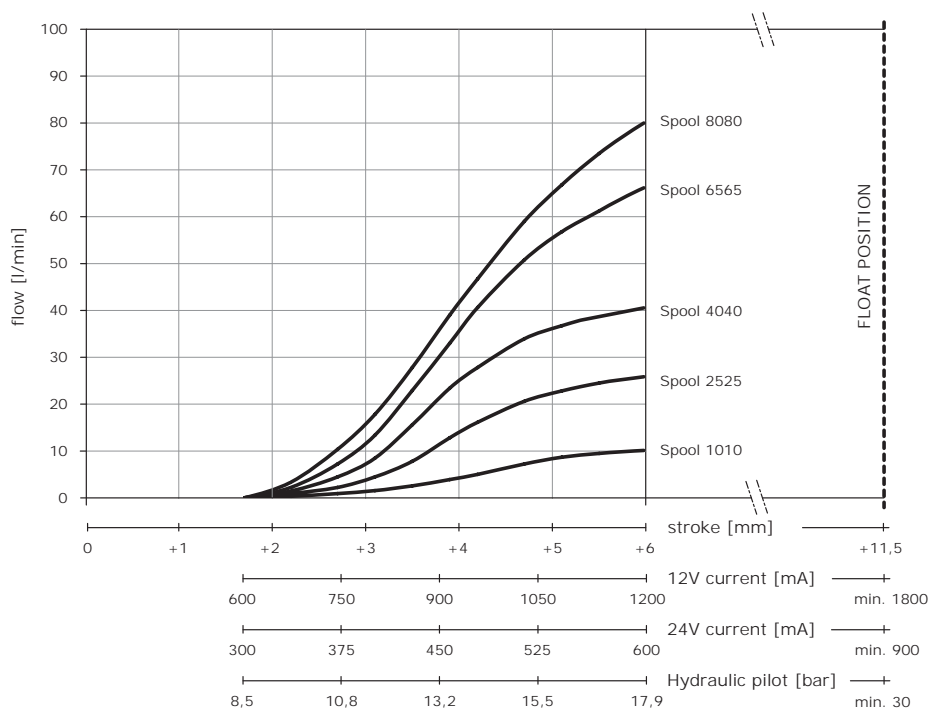
Pre compensated spool flow characteristic

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

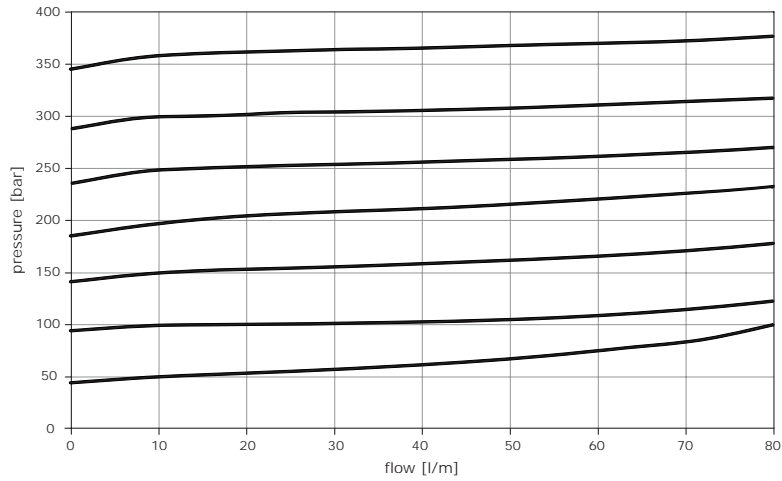
Fixed displacement systems (KV): flow and float position as function of spool stroke, pilot pressure, control current
 Inlet flow: 120 l/min



TYPICAL CURVES

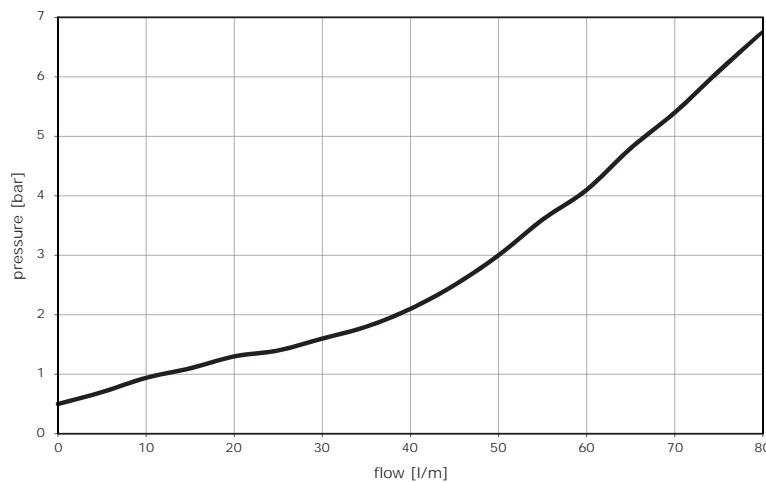
Combined valves (antishock function)

Pressure characteristic as function of flow



Combined valves (anticavitation function)

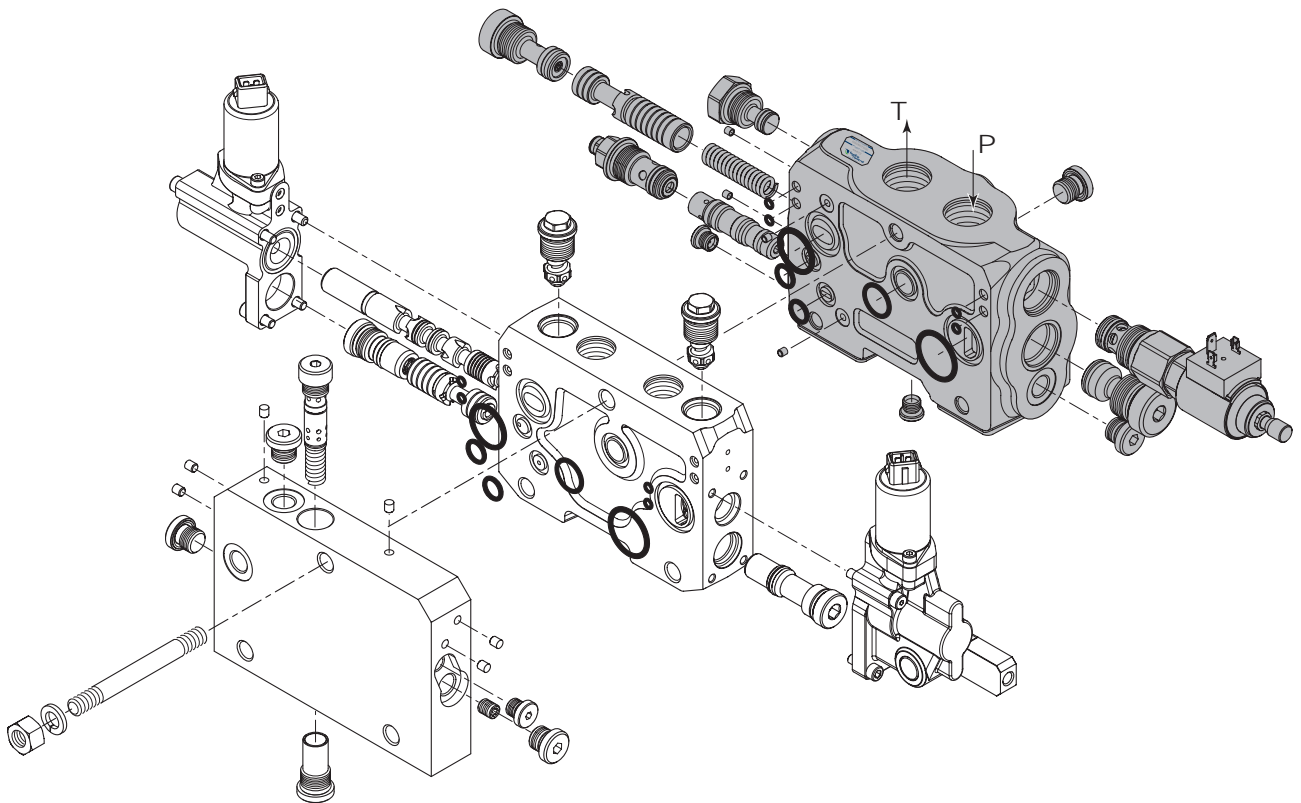
Opening and pressure characteristic as function of flow



INLET SECTION

Order example

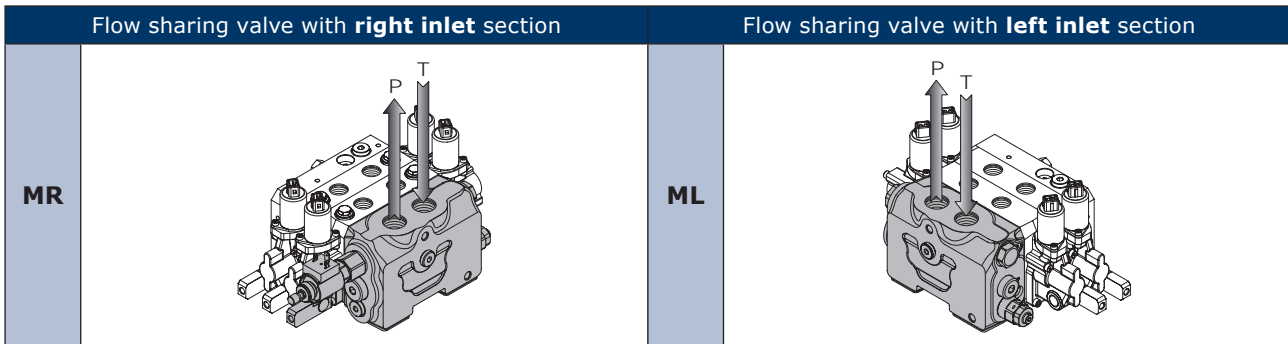
			MR 701 200 KV G05
1.	MR	inlet side	_____
2.	701	valve arrangement	_____
	150	setting (bar)	_____
3.	KV G05	inlet position and available thread type	_____



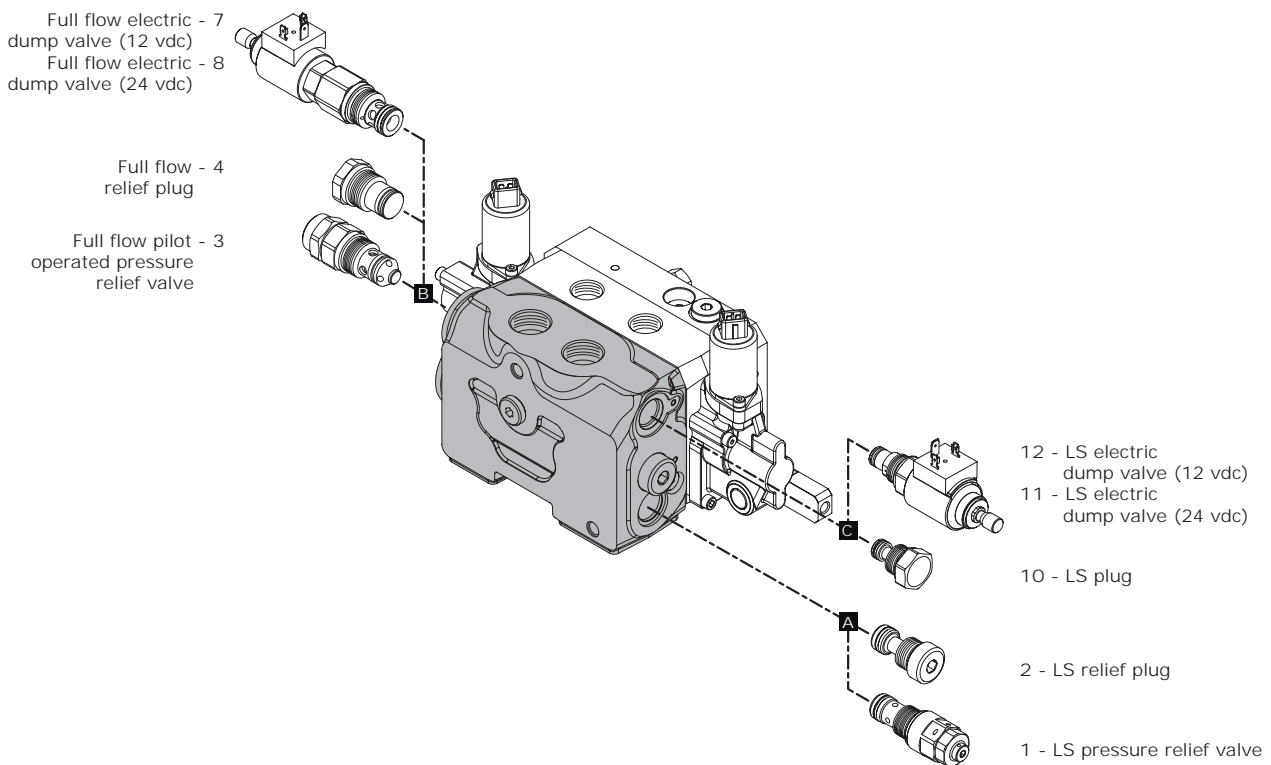
1.	INLET SIDE:		pg. 16
MR	Flow sharing valve with right inlet section		
ML	Flow sharing valve with left inlet section		
2.	VALVE ARRANGEMENT: (standard combinations)		pg. 17
700	Inlet section with LS pressure relief valve and full flow pilot operated pressure relief valve		
701	Inlet section with LS pressure relief valve		
702	Inlet section with LS pressure relief valve and LS electric dump valve 12 Vdc		
703	Inlet section with LS pressure relief valve and LS electric dump valve 24 Vdc		
704	Inlet section with LS pressure relief valve and full flow electric dump valve 12 Vdc		
705	Inlet section with LS pressure relief valve and full flow electric dump valve 24 Vdc		
706	Inlet section without valves		
3.	INLET CLASSIFICATION:		pg. 18
KV G05	Open centre inlet section for fixed displacement pumps (G 3/4)		
JV G05	Closed centre inlet section for variable displacement pumps (G 3/4)		
KV U05	Open centre inlet section for fixed displacement pumps (1"1/16 - 12 UN)		
JV U05	Closed centre inlet section for variable displacement pumps (1"1/16 - 12 UN)		


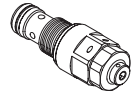

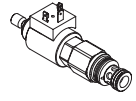





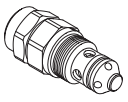

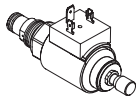


NOTE: when ordering a relief valve it is necessary to specify factory setting (example 200 bar).

Inlet side classification

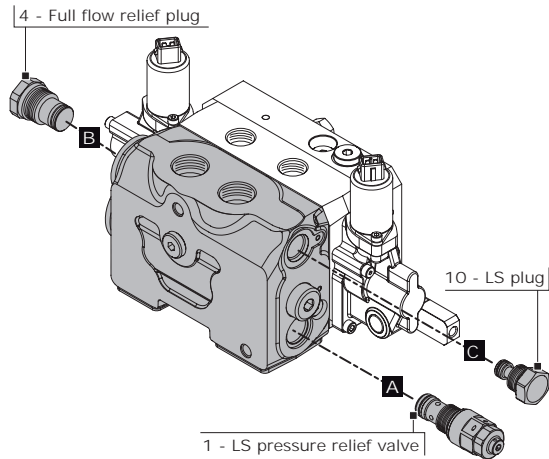


Valve identification



type	schema	layout	description	type	schema	layout	description
1			LS pressure relief valve	7			Full flow electric dump valve (12 vdc)
				8			Full flow electric dump valve (24 vdc)
2			LS relief plug	10			LS plug
3			Full flow pilot operated pressure relief valve	11			LS electric dump valve (12 vdc)
4			Full flow relief plug	12			LS electric dump valve (24 vdc)

Valve arrangement



Valve combination example: 701 = 1A - 4B - 10C

- 701** Valve combination
- 1A** LS pressure relief valve in port A
- 4B** Full flow relief plug in port B
- 10C** LS plug in port C

The code identifies:

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

NOTE: when ordering a combination type 701, 702, 703, 704 and 705 it is necessary to specify pressure setting.

VALVE COMBINATION INLET SECTION	Port - A			Port - B			Port - C		
	1	2	3	4	7	8	10	11	12
700	•		•				•		
701	•			•			•		
702	•			•				•	
703	•			•					•
704	•				•		•		
705	•					•	•		
706		•		•			•		
707		•		•				•	
708		•		•					•
709		•			•		•		
710		•				•	•		

NOTE: Valve combination 700 requires minimum 40 bar difference in setting of full flow and LS relief valves (see example).

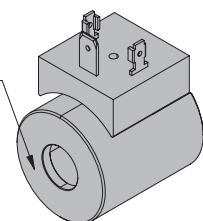
MR 700 200*240 KV G05

- 700** valve combination
- 200** setting (bar); LS pressure relief valve
- 240** setting (bar); Full flow pilot operated pressure relief valve

Dump valve coil specifications

GENERAL AND TECHNICAL SPECIFICATIONS		
Ordering code	413171235	413172432
Supply voltage (Vdc)	12	24
Coil resistance R ₂₀ (Ω)	7	28
Connector	DIN 43650 / ISO 4400	
Connector material	Nylon	
Coil Body	Zinc plated steel	
ED 100%		
Class H coil as from IEC 85 standard		
Class H wire (200°C)		

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



NOTE:
different connector available on request

Inlet classification

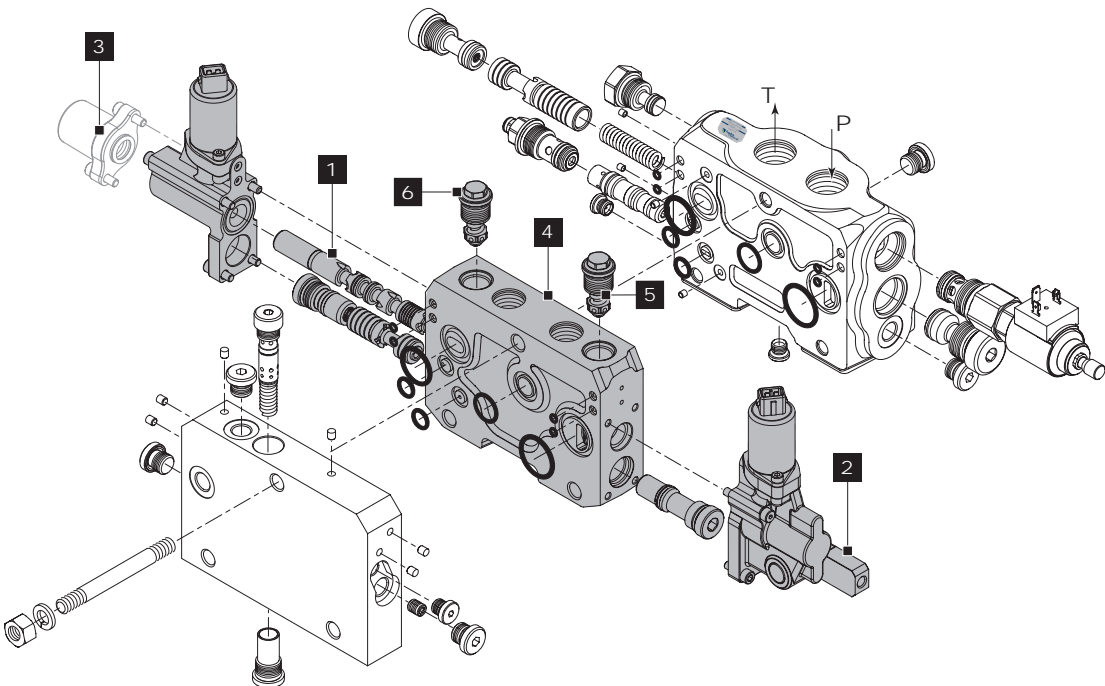
Inlet combination and thread available			
KV G05			<p>Open centre inlet section</p> <p>for fixed displacement pumps</p>
KV U05			
<p>The inlet section with KV configuration enables control valve usage with fixed displacement pumps. With this configuration the presence of LS relief valve (valve type 1) is suitable to adjust the system maximum pressure. Full flow electric dump valve (valve type 7, 8) can also be added as safety device.</p>			
JV G05			<p>Closed centre inlet section</p> <p>for variable displacement pumps</p>
JV U05			
<p>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, 12) 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.</p>			

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 37)

WORKING SECTION

Order example:

W001C 4025 H404 RC1 G04 03 PA 100 03 PB 150

- | | |
|---|---|
| <p>1. W001C spool type</p> <p>4025 spool flow</p> <p>2. H404 spool actuation type</p> <p>4. RC1 section type</p> <p>G04 thread type</p> <p>5. 03 PA 100 auxiliary valve type (port A - handle side)</p> <p>6. 03 PB 150 auxiliary valve type (port B - end cap side)</p> |  |
|---|---|

1. SPOOL TYPE:

- W001C** 3 positions double-acting
- W002C** 3 positions double-acting A and B to tank
- W005C** 3 positions single-acting on A
- W006C** 3 positions single-acting on B
- W012C** 4 positions double-acting with float in the 4th pos.

A 4 digit code identify the flow required on port A/B. These flows are available: 10 - 25 - 40 - 65 - 80 l/min
Example : W001C - 4025

2. SPOOL ACTUATION TYPE:

- H001** lever actuation
- H005A** hydraulic actuation (pilot ports on the top)
- H403** lever actuation + hydraulic actuation
- H404** lever actuation + electrohydraulic actuation 12 vdc
- H405** lever actuation + electrohydraulic actuation 24 vdc

3. SPOOL RETURN ACTION TYPE (*):

- F001A** 3 positions spring-centred spool (spring A)
- F002A** Detent in A and B (spring A)

4. SECTION TYPE

- RC1 G04** Post-Compensated section arranged for auxiliary valve (G1/2)
- RC2 G04** Post-Compensated section not arranged for auxiliary valve (G1/2)
- RL1 G04** Pre-Compensated section arranged for auxiliary valves (G1/2)
- RL2 G04** Pre-Compensated section not arranged for auxiliary valve (G1/2)
- RC1 U04** Post-Compensated section arranged for auxiliary valve (7/8"-14 UN)
- RC2 U04** Post-Compensated section not arranged for auxiliary valve (7/8"-14 UN)
- RL1 U04** Pre-Compensated section arranged for auxiliary valve (7/8"-14 UN)
- RL2 U04** Pre-Compensated section not arranged for auxiliary valve (7/8"-14 UN)

5. AUXILIARY VALVE TYPE (PORT A)

- 02 PA** Anticavitation valve (port A)
- 03 PA** Fixed setting combined valve (port A)
- 05 PA** Prearrangement for auxiliary valve (port A)

6. AUXILIARY VALVE TYPE (PORT B)

- 02 PB** Anticavitation valve (port B)
- 03 PB** Fixed setting combined valve (port B)
- 05 PB** Prearrangement for auxiliary valve (port B)

NOTE: (*) Leave out the spool return action code when choosing H403, H404, H405, H407, H408, H424, H425, H426, H427, H428, H429 and hydraulic actuation H005A, H005C and H005L.

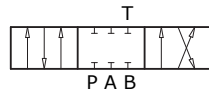
Sections designed to house auxiliary valve option require double choice on work ports A and B.

Always indicate setting value when using fixed setting combined valve: **03 PA (120) - 03 PB (120)**

Spool identification

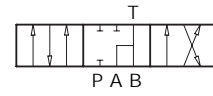
W001C

3 positions double-acting



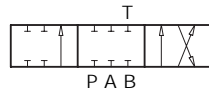
W002C

3 positions double-acting
A and B to tank



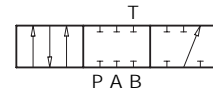
W005C

3 positions
single-acting on A



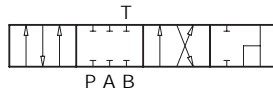
W006C

3 positions
single-acting on B



W012C

4 positions double-acting
with float in the 4th position

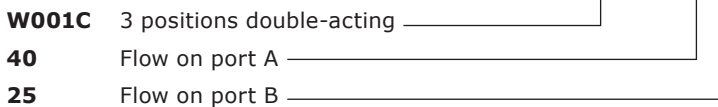


NOTE: W012 spool needs a special machining on the valve body and a special detent kit.

Spool flow

Flow rates delivered to the A, B ports are identified after the spool type as explained below:

W001C - 4025



A and B flow rates combination (such as 1025, 6540...) can be chosen between following values:

flow rates (l/min)	10	25	40	65	80
--------------------	----	----	----	----	----

For complete simmetric spools (ex. 2020, 3535, 9090), following flow rates are also available:

flow rates (l/min)	5	15	20	35	50	90	100
--------------------	---	----	----	----	----	----	-----

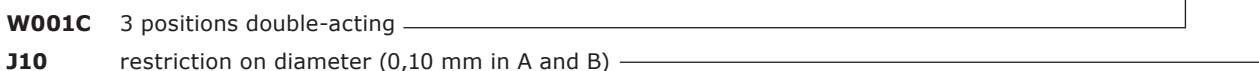
NOTE: for pre compensated spool flow availability we suggest to contact our technical department.

Spools with restricted service ports

code	circuit	restriction on diameter (mm)	section (mm ²)	hydraulic schema
J10	A-B IN T	0,10	2,19	
K10	A IN T	0,10	2,19	
Y10	B IN T	0,10	2,19	

Order example

W001C J10



Spool actuation classification for manual control

code	description	dimensions	configuration
H001	Lever actuation (only with manual section body)		
H004	Without lever actuation (only with manual section body)		

Joystick control spool actuation

The configuration of joystick control interests always two working sections with relative four ports:

A1 – B1 – A2 - B2.

For convention:

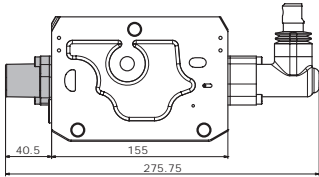
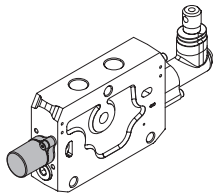
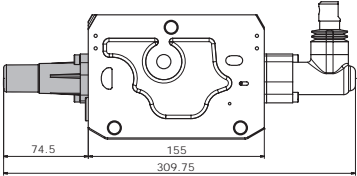
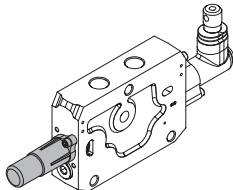
- section 1 is the first invested from the flow of the oil: it depends from the right or left inlet of the control valve
- Port A = spool action side
- Port B = spool return action side

The position of the fulcrum is identified by a code and stands in four configurations as shown in the following table:

Fulcrum / Inlet side	fulcrum - 1 st section	fulcrum - 2 nd section
Right inlet	H009	H010
Left inlet	H011	H012

code	description	configuration	code	description	configuration
H009	Right side inlet fulcrum on 1 st section (compulsory code for second section: H120) (only with manual section body)		H011	Left side inlet fulcrum on 1 st section (compulsory code for second section: H120) (only with manual section body)	
H010	Right side inlet fulcrum on 2 nd section (compulsory code for first section: H120) (only with manual section body)		H012	Left side inlet fulcrum on 2 nd section (compulsory code for first section: H120) (only with manual section body)	

Spools return action classification for manual control

code	description	dimensions	configuration
F001A	3 position spring centered spool (only with manual section body)		
F001B			
F001C			
F002A	Detent in A and B (only with manual section body)		

Spool actuation classification for Hydraulic control

code	description	dimensions	configuration
H005A	Hydraulic actuation (pilot ports on the top) (only with manual section body)		
		<p>Port pilot: 1/4" BSP - 9/16" UNF</p>	
H005C	Hydraulic actuation (pilot ports on the sides) (only with manual section body)		
		<p>Port pilot: 1/4" BSP - 9/16" UNF</p>	
H005L	Hydraulic actuation with stroke limiter (only with manual section body)		
		<p>Port pilot: 1/4" BSP - 9/16" UNF</p>	
H403	Lever actuation + hydraulic actuation		
		<p>Port pilot: 1/4" BSP - 9/16" UNF</p>	
H428	lever + hydraulic actuation with electrohydraulic arrangement		
		<p>Port pilot: 1/4" BSP - 9/16" UNF</p>	
H429	Without lever + hydraulic actuation with electrohydraulic arrangement		
		<p>Port pilot: 1/4" BSP - 9/16" UNF</p>	

NOTE:
 Leave out the spool return action code when choosing hydraulic control.
 Recommended control curve for HC Remote Control: A01 for standard spool, A07 for float spool

Spool actuation classification for electrohydraulic control

code	description	dimensions	configuration
H404	Lever actuation + electrohydraulic actuation (12 vdc)		
H405	Lever actuation + electrohydraulic actuation (24 vdc)		
H407	Without lever + electrohydraulic actuation (12 vdc)		
H408	Without lever + electrohydraulic actuation (24 vdc)		
H424	lever + hydraulic actuation electrohydraulic actuation (12 vdc)		
H425	lever + hydraulic actuation electrohydraulic actuation (24 vdc)		
H426	Without lever + hydraulic actuation electrohydraulic actuation (12 vdc)		
H427	Without lever + hydraulic actuation electrohydraulic actuation (24 vdc)		

NOTE:

Leave out the spool return action code when choosing electrohydraulic control.
External drainage recommended (see page 32).

PROPORTIONAL ELECTROHYDRAULIC SPECIFICATIONS		
Feeding reducing pressure (bar)	35	
Supply voltage (Vdc)	12	24
Coil resistance R_{20} (Ω)	4,7	20,8
ON-OFF control current (mA)	2500	1150
Proportional control current (mA)	600 - 1300	300 - 650
PWM frequency suggested (Hz)	70 - 90	
Connector	AMP Junior Power Timer	

NOTE:

different connector available on request

Spools return action with hall effect Linear Position Sensor HLPS2

HLPS is a Hall effect sensor based device used in conjunction with spool position transducer kits available for HC-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.



code	description	dimensions	configuration
F0470	Spool position indicator for manual control (only with manual section body)		
H404S	Spool position indicator for electrohydraulic actuation (12 vdc)		
H405S	Spool position indicator for electrohydraulic actuation (24 vdc)		

Technical specifications

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

Work section arrangement

HC-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. Following pages are showing ordering code for pre and post compensated section in their standard version and in combination with some specific applicable devices.

POST-COMPENSATED section standard

code	schema for manual control	schema for electrohydraulic control	configuration	description
RC1 G04				POST COMPENSATED section Arranged for auxiliary valves
RC1 U04				
RC2 G04				POST COMPENSATED section Not arranged for auxiliary valves
RC2 U04				

PRE-COMPENSATED section standard

code	schema for manual control	schema for electrohydraulic control	configuration	description
RL1 G04				PRE COMPENSATED section Arranged for auxiliary valves
RL1 U04				
RL2 G04				PRE COMPENSATED section Not arranged for auxiliary valves
RL2 U04				

Work section arrangement

POST-COMPENSATED section with compensator relief valve

Another feature not commonly found in flow sharing systems is the possibility to have a compensator relief on the single sections. The purpose to use a compensator relief instead of a standard shock relief is to improve the efficiency loss and save energy in the system. When a standard shock relief is used, the full flow across the relief will be directed to tank, if the pressure system exceeds the one setted on the particular relief.

By using a compensator relief we avoid this and only a very minimal part of oil will be directed to tank in the same condition with great advantage for the all system. By saving oil from going to tank, more oil will be available for simultaneous operation and this will improve the efficiency and performance of the system.

In the EX family we have the possibility to install a compensator relief on a post compensated section. The pressure limitation generated by the local compensator relief applies to both section ports, A and B.

When using a compensator relief in a post compensated section, few things need to be kept in mind as general rules and because of this we suggest you to contact our technical department for more information about the correct way to do this application.

code	schema for manual control	schema for electrohydraulic control	configuration	description
RCD1 G04				POST COMPENSATED section with compensator relief valve Arranged for auxiliary valves
RCD1 U04				
RCD2 G04				POST COMPENSATED section with compensator relief valve Not arranged for auxiliary valves
RCD2 U04				

NOTE:

Compensator relief valve works on both ports; setting for A and B ports is the same

Compensator relief valve in combination with H404, H405, H407, H408, H424, H425, H426, H427, H428, H429 requires left inlet assembly.

Work section arrangement

PRE-COMPENSATED section with LS relief valve

The purpose to use a Load Sense relief instead of a standard shock relief is to improve the efficiency loss and save energy in the system. When a standard shock relief is used, the full flow across the relief will be directed to tank, if the pressure system exceeds the one setted on the particular relief.

By using a Load Sense relief we avoid this and only a very minimal part of oil will be directed to tank in the same condition with great advantage for the all system. By saving oil from going to tank, more oil will be available for simultaneous operation and this will improve the efficiency and performance of the system.

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 Load Sense relief can be easily installed as a retrofit too.

code	schema for manual control	schema for electrohydraulic control	configuration	description
RLD1 G04				<p>PRE COMPENSATED section with LS relief valve</p> <p>Arranged for auxiliary valves</p>
RLD1 U04				
RLD2 G04				<p>PRE COMPENSATED section with LS relief valve</p> <p>Not arranged for auxiliary valves</p>
RLD2 U04				

NOTE:

Compensator relief valve works on both ports; setting for A and B ports is the same.

LS relief valve in combination with H404, H405, H407, H408, H424, H425, H426, H427, H428, H429 requires right inlet assembly.

Work section arrangement

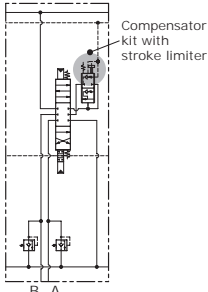
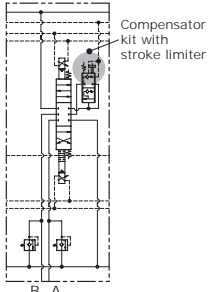
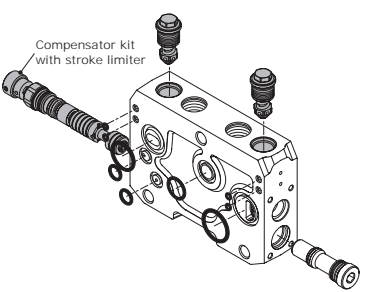
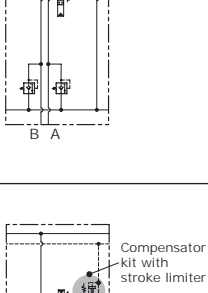
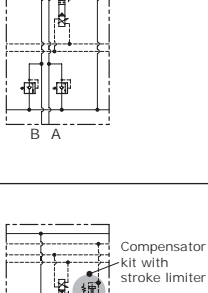
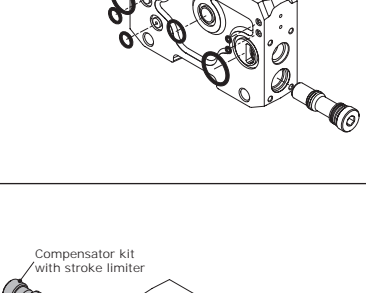
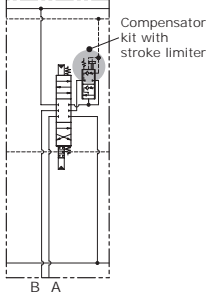
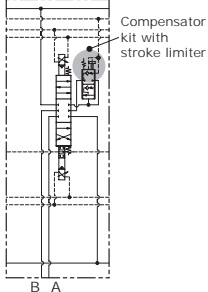
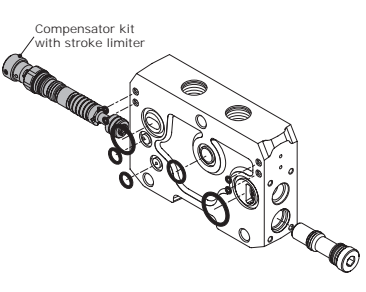
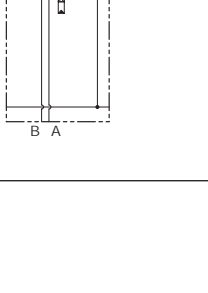
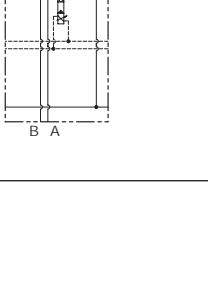
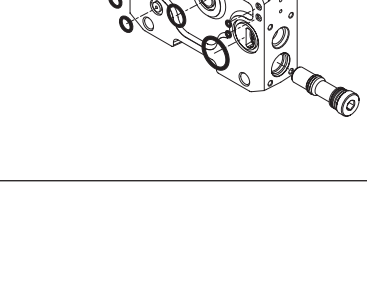
POST-COMPENSATED section with compensator stroke limiter

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 stroke of the local compensator and is operated when a single section is actuated.

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.


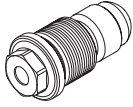

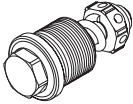


code	schema for manual control	schema for electrohydraulic control	configuration	description
RCE1 G04				POST COMPENSATED section with stroke limiter arranged for auxiliary valves
RCE1 U04				
RCE2 G04				POST COMPENSATED section with stroke limiter Not arranged for auxiliary valves
RCE2 U04				


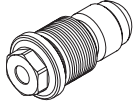

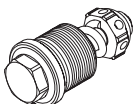

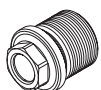
NOTE:

Compensator stroke limiter in combination with H404, H405, H407, H408, H424, H425, H426, H427, H428, H429 requires right inlet assembly.

Auxiliary valve 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)	
02 PA	Anticavitation valve (port A)				
03 PA	Fixed setting combined valve (port A)			A	40 / 350
05 PA	Prearrangement for auxiliary valve (port A)				

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

03 PA (120) = setting

OUTLET SECTION (END PLATE)

There are two main types of End Plate:

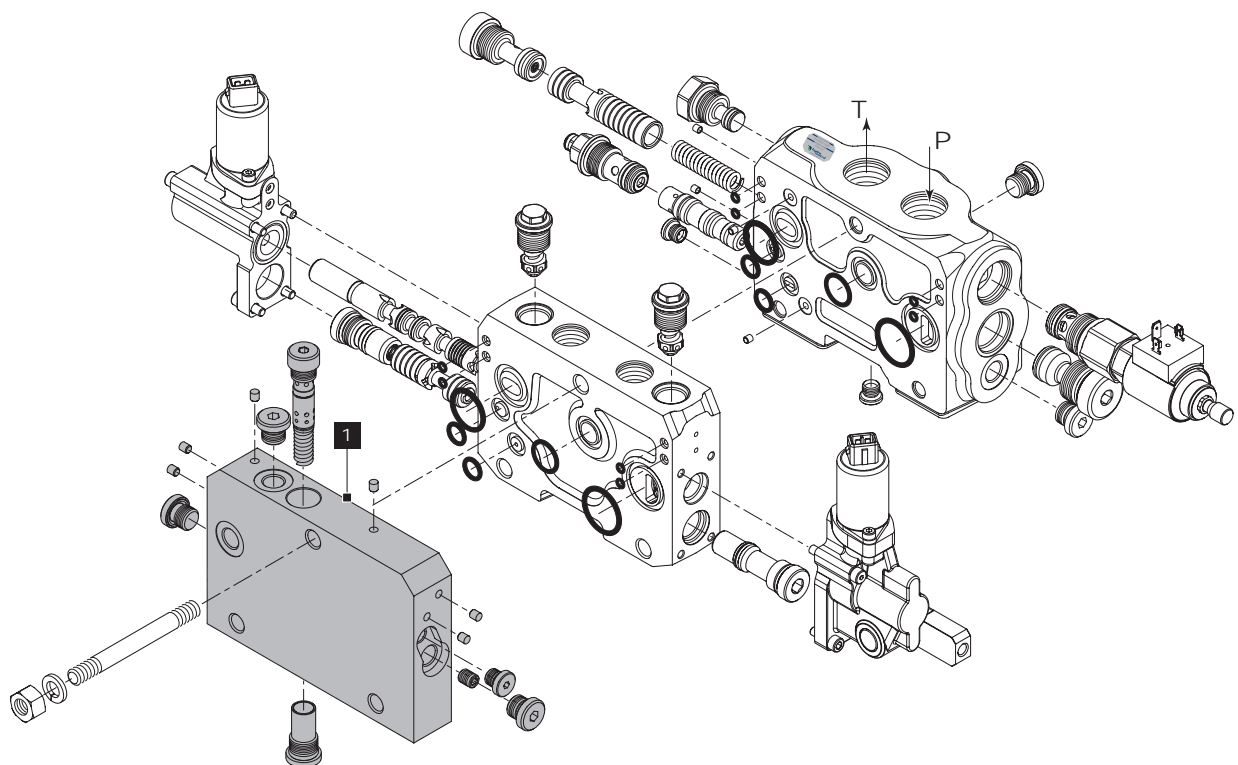
- **Manual and Hydraulic control version:** to be used when no electrohydraulic controls are present in the valve: this plate is simply collecting the LS signal drain that can be connected to tank internally or externally without significant differences

- **Electrohydraulic version:** to be used when at least one section in the valve has electrohydraulic control: this plate is collecting LS signal and electrohydraulic controls drain and is providing electrohydraulic control feeding by means of a pressure reducing valve

IMPORTANT:

when electrohydraulic controls are present, the external drain to the tank, without any other additional pressure drop, is highly recommended to avoid control system damages and poor control properties.

An internal drain version is also provided (KZ20IC) but the use must be previously discussed with Hydrocontrol Technical Dpt.

Order example**KZ20EI****1. KZ20EC** Plate type**1. OUTLET SECTION (END PLATE):****pg. 32**

KZ10I End plate without RDP internal drain (only for manual and hydraulic control)

KZ10E End plate without RDP external drain (only for manual and hydraulic control)

KZ20IC End plate with RDP internal drain (only for electrohydraulic control)

KZ20EC End plate with RDP external-side drain (only for electrohydraulic control)

KZ20EH End plate with RDP external-rear drain (only for electrohydraulic control)

NOTE:

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

End plate for manual and hydraulic control

code	schema	configuration	description
KZ10I			End plate without RDP internal drain to be used with: H001-H004 H005A-H005C-H005L H403-H428-H429
KZ10E			End plate without RDP external drain to be used with: H001-H004 H005A-H005C-H005L H403-H428-H429

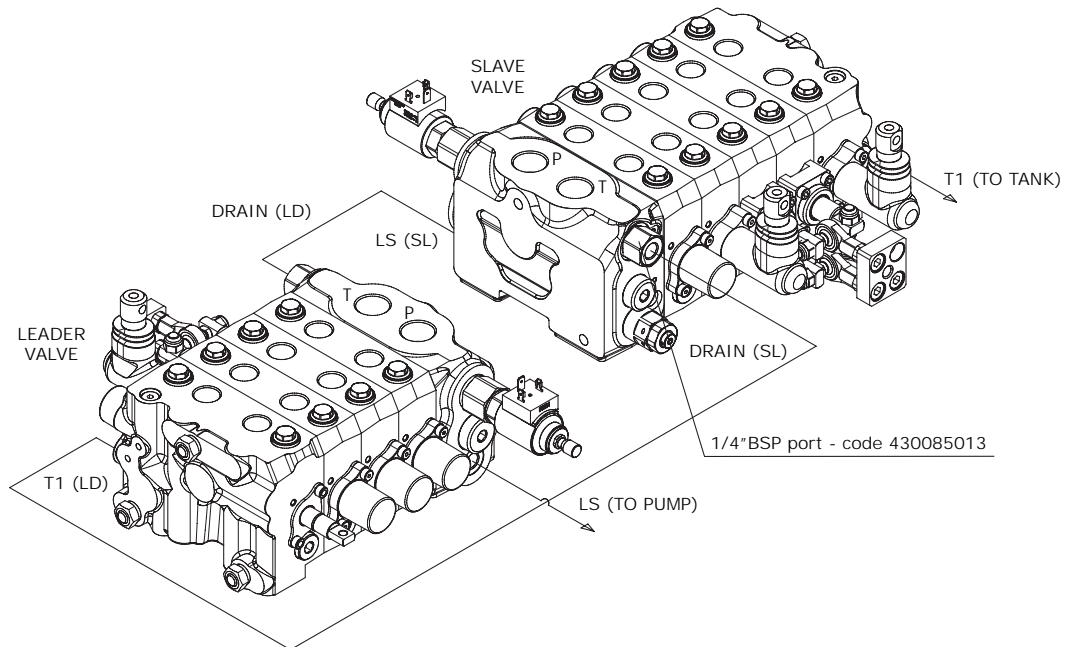
End plate for electrohydraulic control

code	schema	configuration	description
KZ20IC			End plate with RDP internal drain to be used with: H404-H405-H407 H408-H424-H425-H426
KZ20EC			End plate with RDP external-side drain to be used with: H404-H405-H407 H408-H424-H425-H426
KZ20EH			End plate with RDP external-rear drain to be used with: H404-H405-H407 H408-H424-H425-H426

NOTE: Left inlet assembled valve with lever kit H403, H404, H405, H424, H425, H428 on the last section accepts only KZ20IC, KZ20EH and KZ10I end plate.

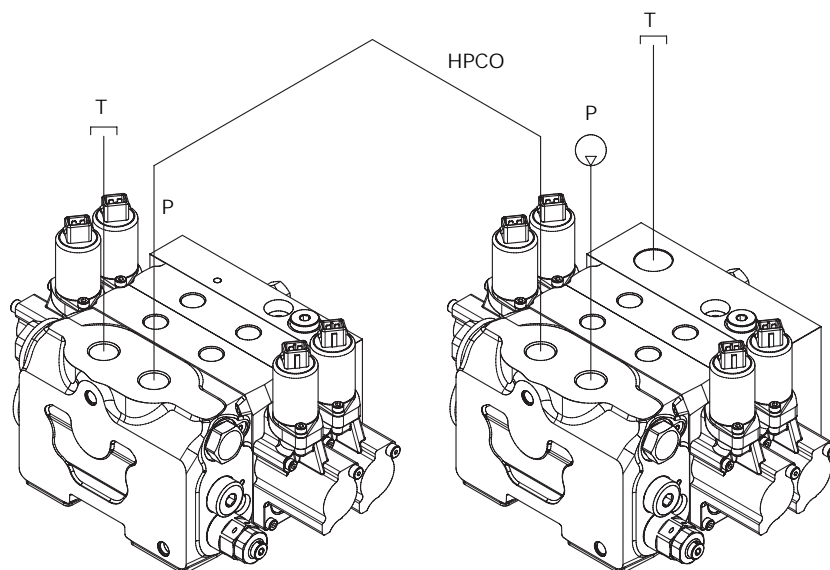
Parallel connection of several valves

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.

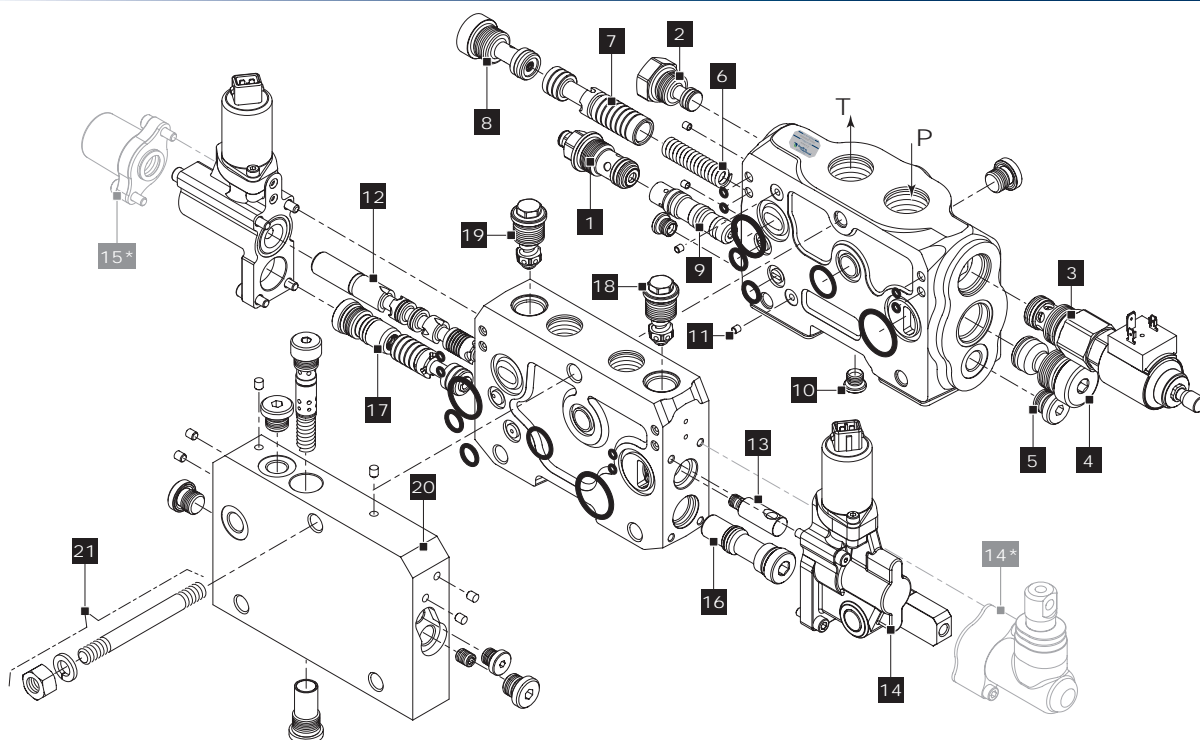


High pressure carry over function

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



Rif.	Description	Order code	Q.ty	Type	Note
1	LS pressure relief valve (*)	80741	1		Setting: 100 bar
		80742	1		Setting: 200 bar
		80743	1		Setting: 300 bar
	LS relief plug	430085034	1		
2	LS plug LS electric dump valve (12 vdc) (**) LS electric dump valve (24 vdc) (**)	430059003	1		
		915040410	1		
		915040411	1		
3	Full flow pilot operated pressure relief valve (*)	35824	1		Setting: 100 bar
		26698	1		Setting: 250 bar
		80208	1		Setting: 400 bar
	Full flow relief plug	430455001	1		
	Full flow electric dump valve (12 vdc) (**) Full flow electric dump valve (24 vdc) (**)	915045501 915045502	1 1		
4	Plug kit	430085001	1		
5	Plug kit 1/4"G DIN 3852 E	430000017	2		(q.ty = 1 for JV version)
6	Inlet compensator spring	421803249	1		
7	Assembly inlet Compensator Spool	433085001	1		only for KV
		433085002	1		only for JV
8	Inlet compensator plug kit	430085004	1		only for KV
		430085012	1		only for JV
9	Valve	430085005	1		only for KV
		430085046	1		only for JV
10	Plug kit G(PF) 1/8"	320062003	2		
11	Plug MB 700-040	413180005	4		
12	3 positions double-acting spool	421293035	1	W001C-10	spool 10 l/min
		421293040	1	W001C-25	spool 25 l/min
		421293041	1	W001C-40	spool 40 l/min
		421293020	1	W001C-65	spool 65 l/min
		421293013	1	W001C-80	spool 80 l/min
13	Spool end kit	422501217	1		
		422501205	1		only for H001
		422501153	1		only for H004

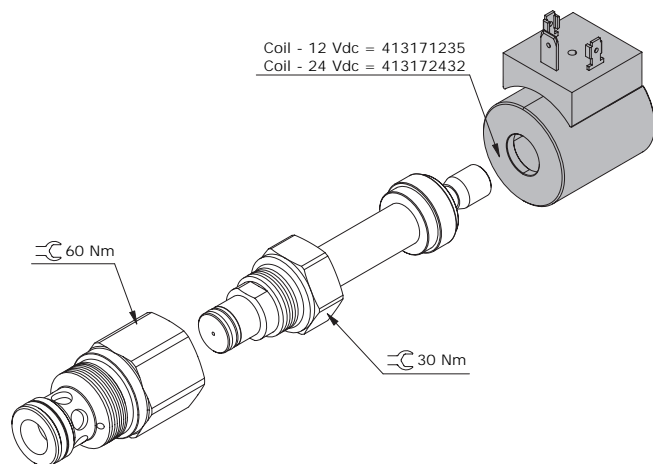
Rif.	Description	Order code	Q.ty	Type	Note
14	Anterior lever and hydraulic kit	320585011	1	H403	BSP version
	Anterior lever and hydraulic kit	320585013	1	H403	UNF version
	Anterior lever and electrohydraulic kit (12 V)	322093001	1	H404	
	Anterior lever and electrohydraulic kit (24 V)	322093003	1	H405	
	Anterior without lever and electrohydraulic kit (12 V)	322093008	1	H407	
	Anterior without lever and electrohydraulic kit (24 V)	322093009	1	H408	
	Anterior lever + hydraulic + electrohydraulic kit (12 V)	322098010	1	H424	BSP version
	Anterior lever + hydraulic + electrohydraulic kit (12 V)	322098011	1	H424	UNF version
	Anterior lever + hydraulic + electrohydraulic kit (24 V)	322098017	1	H425	BSP version
Anterior lever + hydraulic + electrohydraulic kit (24 V)	322098012	1	H425	UNF version	
15	Posterior lever + hydraulic kit	320585012	1	H403	BSP version
	Posterior lever + hydraulic kit	320585014	1	H403	UNF version
	Posterior lever + electrohydraulic kit (12 V)	322093002	1	H404	
	Posterior lever + electrohydraulic kit (24 V)	322093004	1	H405	
	Posterior without lever + electrohydraulic kit (12 V)	322093002	1	H407	
	Posterior without lever + electrohydraulic kit (24 V)	322093004	1	H408	
	Posterior lever + hydraulic + electrohydraulic kit (12 V)	322098018	1	H424	BSP version
	Posterior lever + hydraulic + electrohydraulic kit (12 V)	322098013	1	H424	UNF version
	Posterior lever + hydraulic + electrohydraulic kit (24 V)	322098019	1	H425	BSP version
Posterior lever + hydraulic + electrohydraulic kit (24 V)	322098014	1	H425	UNF version	
14*	Lever actuation kit	320366001	1	H001	Manual version
	Without lever actuation kit	320366003	1	H004	Manual version
	Anterior hydraulic kit (upper)	320585007	1	H005A	Hydraulic version
	Anterior hydraulic kit (side)	320585009	1	H005C	Hydraulic version
	Anterior hydraulic kit (with stroke limiter)	320585003	1	H005L	Hydraulic version
15*	Posterior hydraulic kit (upper)	320585008	1	H005A	Hydraulic version
	Posterior hydraulic kit (side)	320585010	1	H005C	Hydraulic version
	Posterior hydraulic kit (with stroke limiter)	320585004	1	H005L	Hydraulic version
	3 position spring centered spool	320793001	1	F001A	only with H001 or H004
	Detent in A and B	320893001	1	F002A	only with H001 or H004
	Spool position indicator kit	320093001	1	F0470	only with H001 or H004
16	Plug kit	430085006	1		
	L.S. relief valve kit	915008501	1	30/80 bar	only with body RCD1-RCD2
		915008502	1	85/200 bar	only with body RCD1-RCD2
		915008503	1	205/350 bar	only with body RCD1-RCD2
		915008504	1	50/170 bar	only with body RLD1-RLD2
		915008505	1	175/420 bar	only with body RLD1-RLD2
17	Section compensator kit	320085001	1		
	Section compensator kit with stroke limiter	320085006	1		only with body RCE1-RCE2
18	Anticavitation valve on port A	915089001	1	02 PA	
	Combined valve fixed setting on port A (*)	915870100	1	03 PA	Fixed setting: 100 bar
		915870150	1	03 PA	Fixed setting: 150 bar
		915870200	1	03 PA	Fixed setting: 200 bar
		915870250	1	03 PA	Fixed setting: 250 bar
		915870300	1	03 PA	Fixed setting: 300 bar
		915870350	1	03 PA	Fixed setting: 350 bar
	Prearrangement for auxiliary valve on port A	430085036	1	05 PA	
19	Anticavitation valve on port B	915089001	1	02 PB	
	Combined valve fixed setting on port B (*)	915870100	1	03 PB	Fixed setting: 100 bar
		915870150	1	03 PB	Fixed setting: 150 bar
		915870200	1	03 PB	Fixed setting: 200 bar
		915870250	1	03 PB	Fixed setting: 250 bar
		915870300	1	03 PB	Fixed setting: 300 bar
		915870350	1	03 PB	Fixed setting: 350 bar
	Prearrangement for auxiliary valve on port B	430085036	1	05 PB	
20	End plate without RDP (internal drain)	320093101	1	KZ10I	BSP version
	End plate without RDP (internal drain)	320093103	1	KZ10I	UNF version
	End plate without RDP (external drain)	320093102	1	KZ10E	BSP version
	End plate without RDP (external drain)	320093104	1	KZ10E	UNF version
	End plate with RDP (internal drain)	320093121	1	KZ20IC	BSP version
	End plate with RDP (internal drain)	320093125	1	KZ20IC	UNF version
	End plate with RDP (external-side drain)	320093123	1	KZ20EC	BSP version
	End plate with RDP (external-side drain)	320093127	1	KZ20EC	UNF version
	End plate with RDP (external-rear drain)	320093123	1	KZ20EH	BSP version
	End plate with RDP (external-rear drain)	320093127	1	KZ20EH	UNF version

Rif.	Description	Order code	Q.ty	Type	Note
21	Tie rod kit EX38/1	320093021	3		for manual control
	Tie rod kit EX38/2	320093008	3		for manual control
	Tie rod kit EX38/3	320093007	3		for manual control
	Tie rod kit EX38/4	320093001	3		for manual control
	Tie rod kit EX38/5	320093002	3		for manual control
	Tie rod kit EX38/6	320093003	3		for manual control
	Tie rod kit EX38/7	320093004	3		for manual control
	Tie rod kit EX38/8	320093005	3		for manual control
	Tie rod kit EX38/9	320093006	3		for manual control
	Tie rod kit EX38/10	320093009	3		for manual control
	Tie rod kit EX38/1	320093022	3		for electrohydraulic control
	Tie rod kit EX38/2	320093015	3		for electrohydraulic control
	Tie rod kit EX38/3	320093016	3		for electrohydraulic control
	Tie rod kit EX38/4	320093017	3		for electrohydraulic control
	Tie rod kit EX38/5	320093010	3		for electrohydraulic control
	Tie rod kit EX38/6	320093011	3		for electrohydraulic control
	Tie rod kit EX38/7	320093012	3		for electrohydraulic control
	Tie rod kit EX38/8	320093013	3		for electrohydraulic control
	Tie rod kit EX38/9	320093014	3		for electrohydraulic control
	Tie rod kit EX38/10	320093018	3		for electrohydraulic control
	Tie rod kit EX38/11	320093019	3		for electrohydraulic control
	Tie rod kit EX38/12	320093020	3		for electrohydraulic control

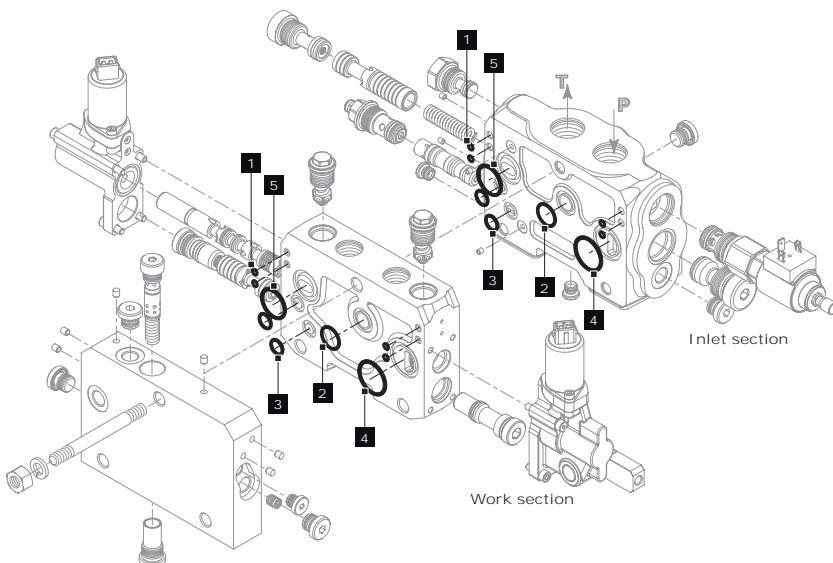
Note

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

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



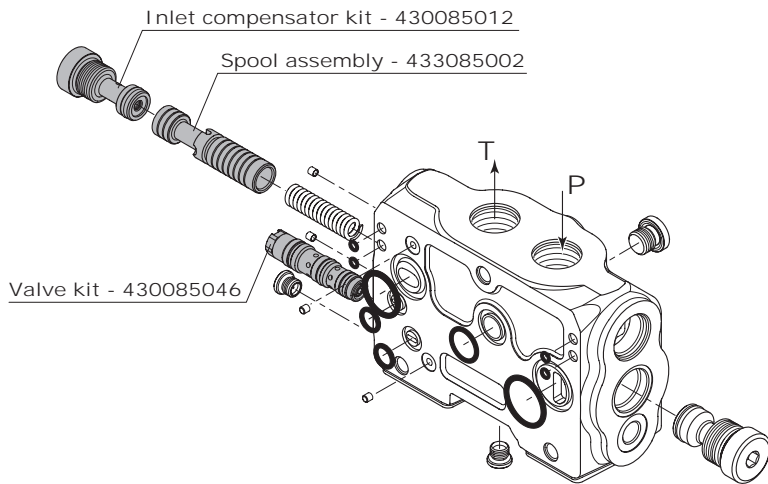
GASKET KITS



INLET AND WORK SECTION			
Rif.	order code	Description	Q.ty
1	412020118	O.R.90SH (N27OR050)	4
2	412020302	O.R.90SH (3-908)	1
3	412020303	O.R.90SH (6-532)	2
4	412020605	O.R.90SH (2-120)	1
5	412020610	O.R.90SH (2-118)	1
Complete Gasket kit: order code - 350993001			

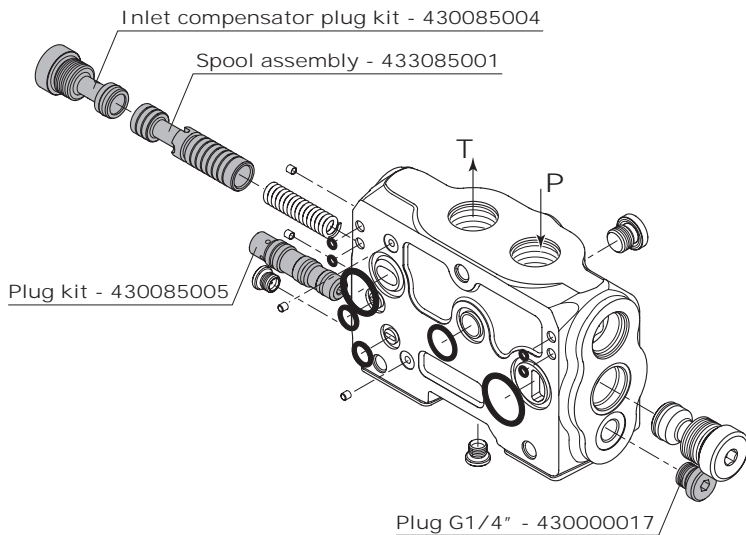
TRASFORMATION KITS

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)**



OPEN CENTER CONFIGURATION (JV) VARIABLE PUMP		
order code	Description	Q.ty
430085012	Inlet compensator kit	1
430085046	Valve kit	1
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		
order code	Description	Q.ty
430000017	Plug G1/4"	1
430085004	Inlet compenator plug kit	1
430085005	Plug kit	1
433085001	Spool assembly	1
Complete transformation kit: order code - 320093008		

INSTALLATION AND MAINTENANCE

Guidelines

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

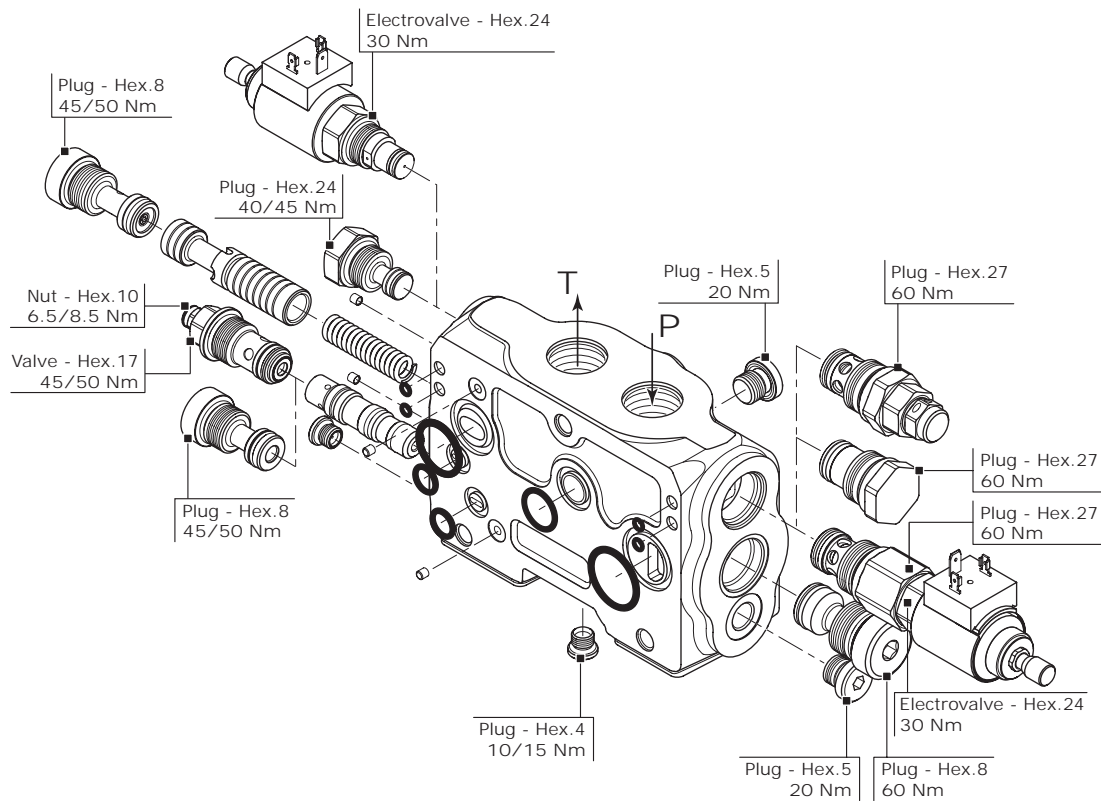
Fittings tightening torque (Nm)

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

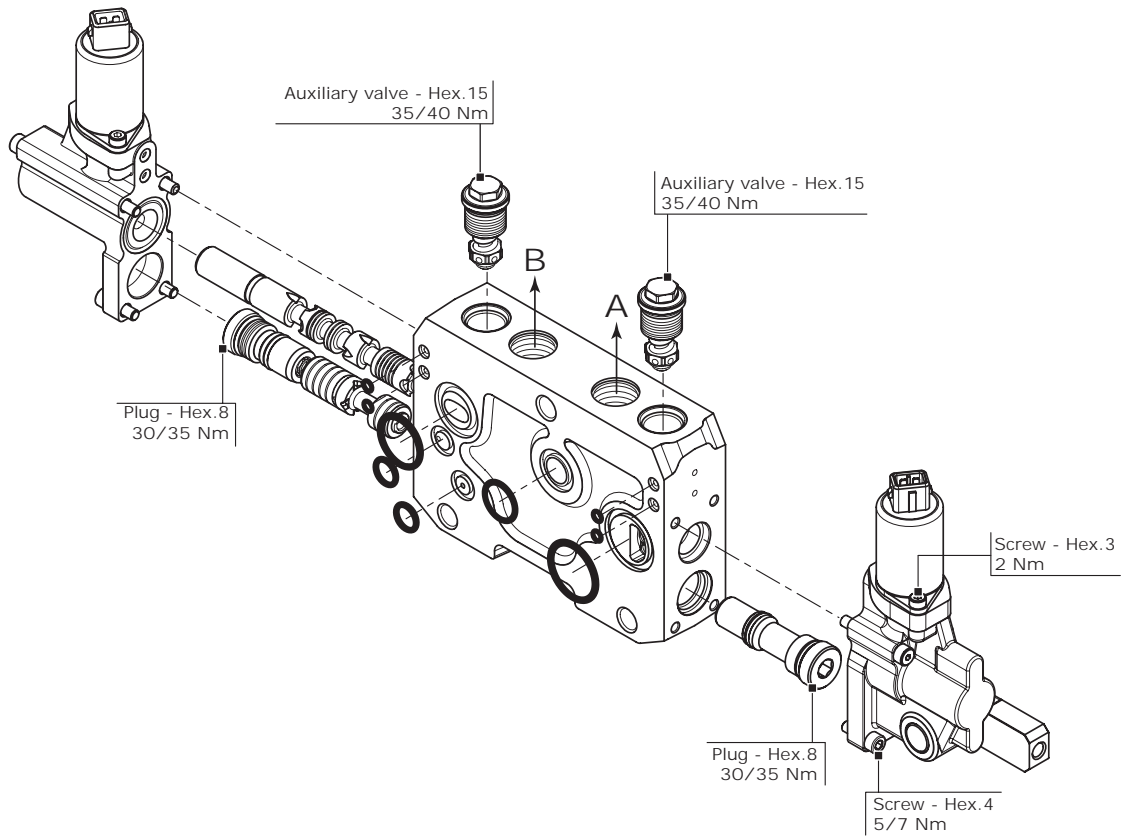
General clamping torque

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

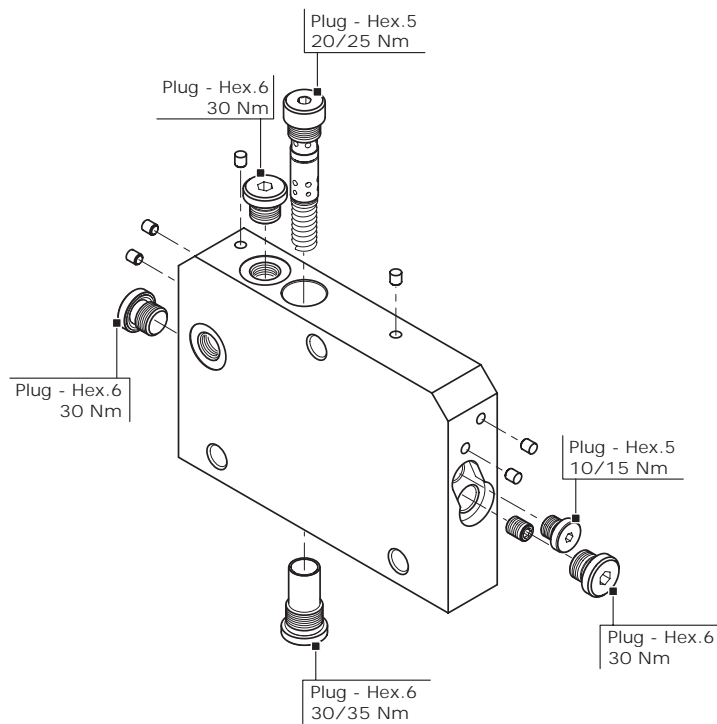
Inlet Section



Work Section



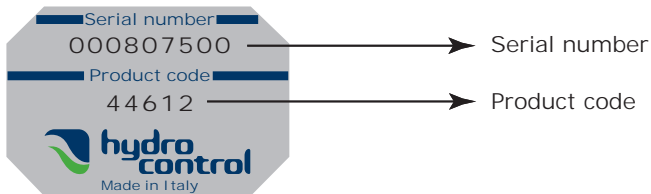
Outlet Section



GENERAL CONDITIONS AND PATENTS

Product identification

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

**Serial number:**

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

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 18 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.

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