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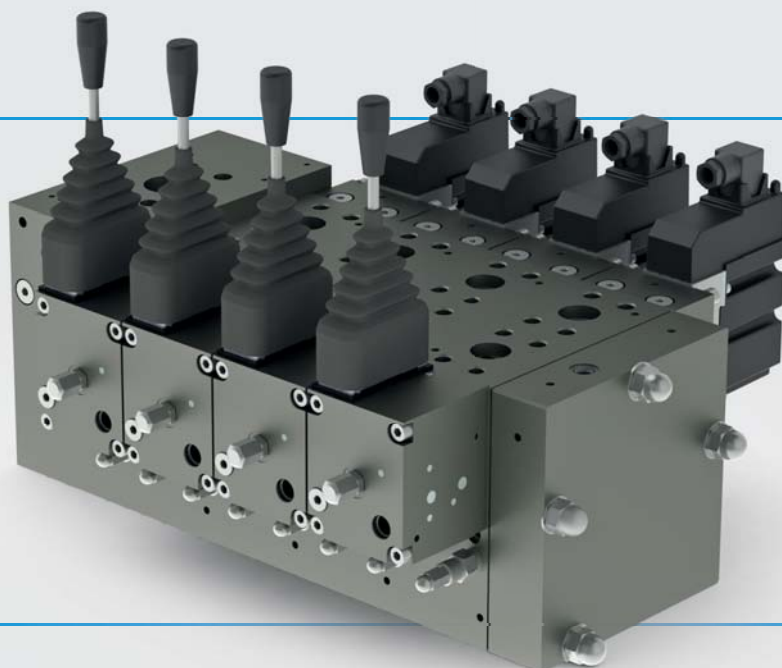
Motion Systems

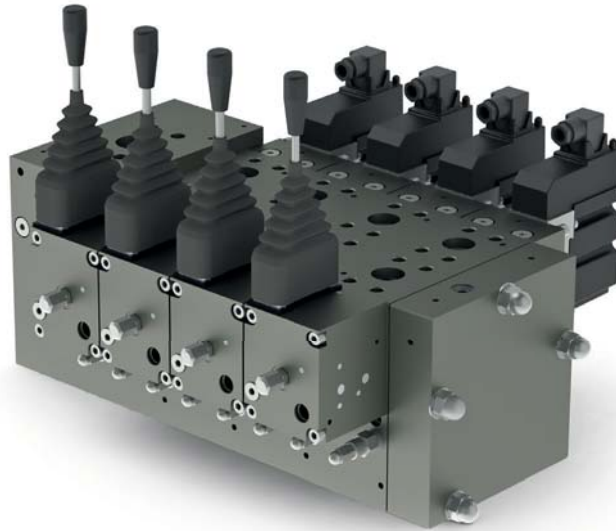
HPV3 I0 PROPORTIONAL DIRECTIONAL VALVES

Technical Catalogue

January
2018

web edition





General

Optimised performances and integration of the greatest number of functions are the objectives planned and achieved through the development of the HPV valves, a range of the latest generation of proportional directional valves that perform two simultaneous functions: directional control and flow control that is unaffected by load variations. Their operation is based on the proportional hydraulic principle, e.g. keeping pressure loss constant through a variable section.

The HPV spool can assume an infinite number of positions making the crossing areas infinitely variable, thus regulating the flow in relation to the pressure difference (Δp) throughout the entire operating range. By means of logical selection, an LS signal (feedback) is taken from the highest pressure ports and sent to the pump flow regulator through the LS port so that when a main spool is activated the pump regulator will adjust the displacement, so that, the set different pressure between P and LS is maintained.

The pressure compensation provided by the two-way pressure compensators installed on each element, allows multiple operations to be performed at the same time without reciprocal effects.

With HPV proportional directional valves program Dana Brevini is committed to supplying products that meet the ever increasing demands to suit different market applications.

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Use of the products in this catalogue must comply with the operating limits given in the technical specifications. The type of application and operating conditions must be assessed as normal or in malfunction in order to avoid endangering the safety of people and/or items.

Mineral oil hydraulic fluids

All mineral oil fluids are more or less suitable for use.

The properties required for such fluid include:

- high viscosity index
- low yield point
- high thermal stability
- high hydrolytic stability (minimum formation of corrosive phenomena in the presence of water)
- excellent anti-wear, anti-corrosion and demulsification properties.

The requirements described above are generally met by the normal mineral oil fluids designated as HPL and HVLP according to DIN 51524.

Ecological hydraulic fluids

Considering the minimum requirements according to DIN 51524, the HPV can also be used with vegetal oil hydraulic fluids HGT (cole or rape oil) without particular precautions. Vegetal-based fluids can be mixed with mineral oils; however, it should be recalled that if the oil is changed, only the part consisting of the vegetal oil is biodegradable.

The polyglycol biodegradable oils HPG or synthetic phosphoric ester biodegradable fluids HPDR can be used with the HPV, replacing the usual gaskets with those made with FPM (Viton).

Therefore, when ordering, we recommend to indicate the use of the HPV with these types of synthetic fluids. It should also be pointed out that the synthetic fluids cannot be mixed with mineral oils.

Hydraulic fluid filtering

It has been widely demonstrated that efficient hydraulic equipment operation depends to a great extent on the degree of contamination of the circulating oil.

Today, users require hydraulic plants to have:

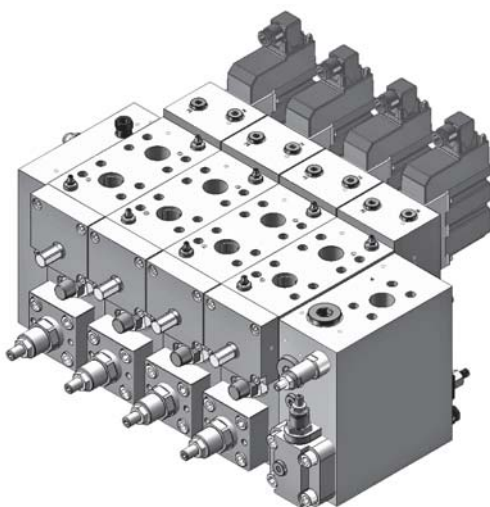
- high performances
- operation precision
- sensitive controls
- reduced maintenance expenses without giving up extended plant service life.

Carefully considering these requirements, it can be understood that specific filtering measures are needed with high-quality filtering elements to satisfy such conditions.

The maximum degree of contaminations for particles tolerated in HPV proportional directional valves cannot be greater than contamination class 9 according to NAS 1638 (20/18/15 according to ISO 4406). This required contamination class is generally achieved using filters with a retention capacity of $\beta_{20} \geq 100$.

Our experience suggests that a pressurised filter with a nominal rating of nominal 20 μm [787 μin] or absolute 10 μm [394 μin] is suitable to maintain the required oil cleaning parameters. In addition, it is always recommended to use pressurised filters with a clogging indicator.

The HPV are equipped with some built-in filters which are not suitable to filter the oil of the entire hydraulic circuit, but only some pilot lines order to protect some important components of the HPV against large-sized contaminating particles. The internal filters of the load sensing line and the low-pressure line are easy to replace and are available as spare parts.



HPV310 General characteristics

- Pressure compensated flow control;
- Excellent flow control;
- High repeatability accuracy;
- Low hysteresis;
- Built in general pilot oil supply;
- Energy saving
- Built in pump overflow system (working in progress, not available yet);
- Different spool interchangeable variants;
- Open loop PWM electrical activation;
- Closed loop electrical actuation (0÷10 V - 0÷20 mA - 0.5 Udc signal , working in progress, not available yet);
- Manual / hydraulic spool control;
- Flow control spool;
- Motion control spool (working in progress, not available yet);
- Up to 5 working sections;
- Hybrid composition with HPV group valves.

HPV310 Hydraulic features

The hydraulic features reported below were measured using a mineral based hydraulic oil according to DIN 51524 or ISO 6743/4 with a viscosity of 25 mm²/s [130 SUS] at a temperature of 50 °C [122 °F]

Rated flow	HSE inlet section, P port		600 l/min	159 US gal/1'
	Mid inlet section, HFLS			
	A, B ports		550 l/min	145 US gal/1'
Max. working pressure	P port	Pressure relief valve setting	400 bar	5800 psi
		Working pressure	370 bar	5370 psi
	A, B ports		370 bar	5370 psi
	Y port		to tank	
	T port	Static	25 bar	363 psi
		Dynamic	35 bar	508 psi
Max. pilot pressure oil supply			up to 30 bar	up to 428 bar
Oil temperature	Recommended		-30 ÷ 60 °C	-22 ÷ 140 °F
	Min.		-25 °C	-13 °F
	Max.		+80 °C	+176 °F
Ambient temperature			-30 ÷ 60 °C	-22 ÷ 140 °F
Viscosity	Recommended		12 ÷ 80 mm²/s	65 ÷ 366 SUS
	Min.		4 mm²/s	39 SUS
	Max.		460 mm²/s	2090 SUS
Filtering	class 9 according to NAS 1638 (20/18/15 according to ISO 4406)			
Stroke	Spool stroke		± 9 mm	± 0.354 in
	Proportional		± 7.5 mm	± 0.295 in
Dead band			± 1.5 mm	± 0.059 in
	A, B → T	Without anti-shock valves	98 cm³/min	5.98 in³/min
Nominal internal leakage		With anti-shock valves	115 cm³/min	7.02 in³/min

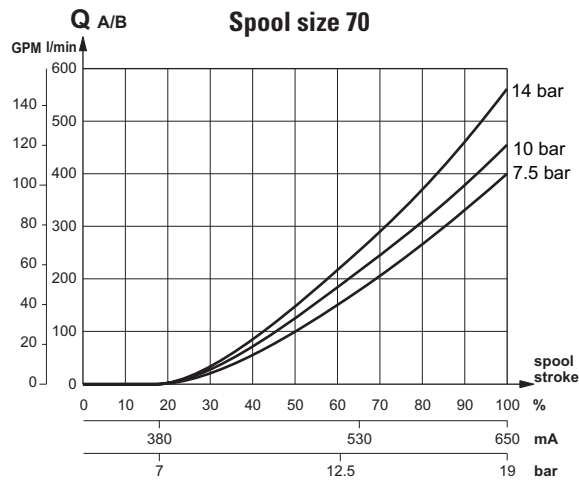
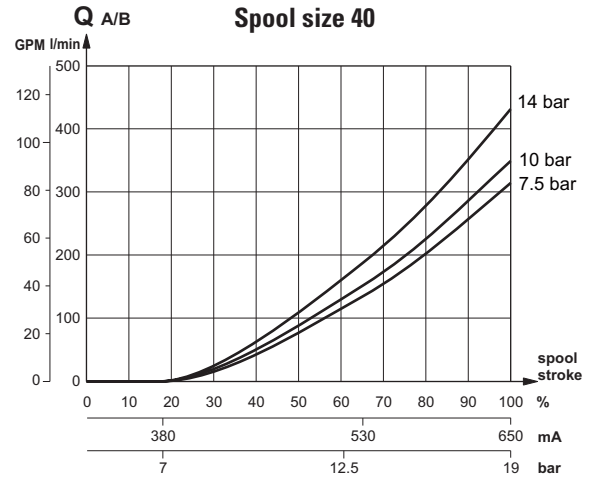
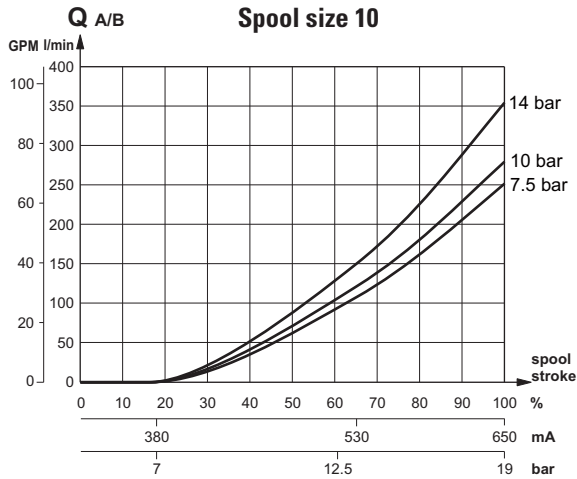
HPV 310 internal (easy replacement) filters, mesh 100 µm

Mineral oil hydraulic fluid: according to DIN 51524 and 51525 or ISO 6743/4

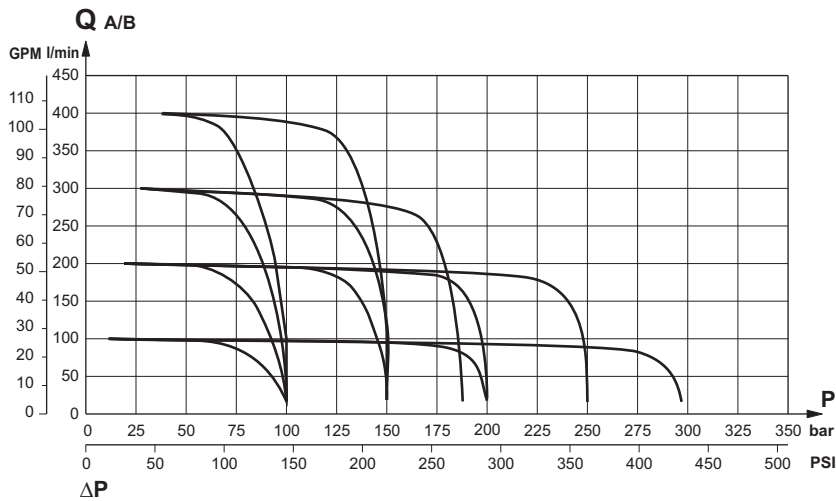
HPV 310 can also be used with phosphorous esters (HFDR), water-glycol /HFC) or water-oil (HFB) mixes, subject to our Technical Dept. approval.

Hydraulic operation			
Pilot pressure	Start	5 bar	72 psi
	End stroke	19 bar	275 psi
Max. pilot pressure		30 bar	436 psi

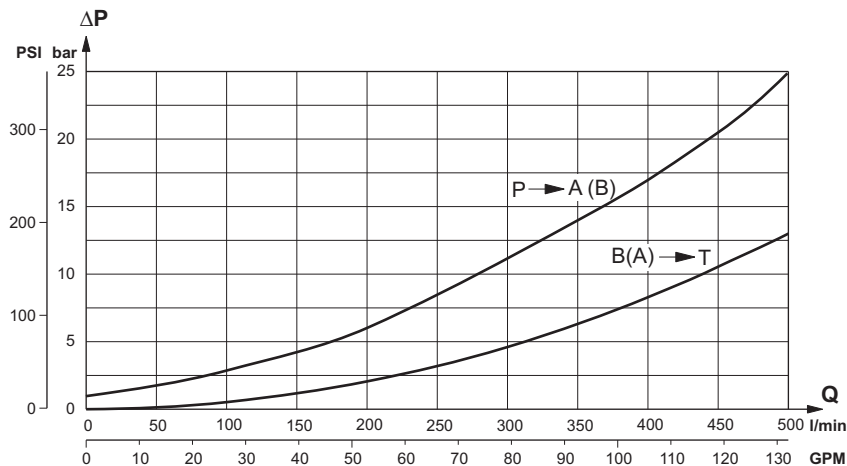
HPV310, hydraulic features



Spool flow characteristics

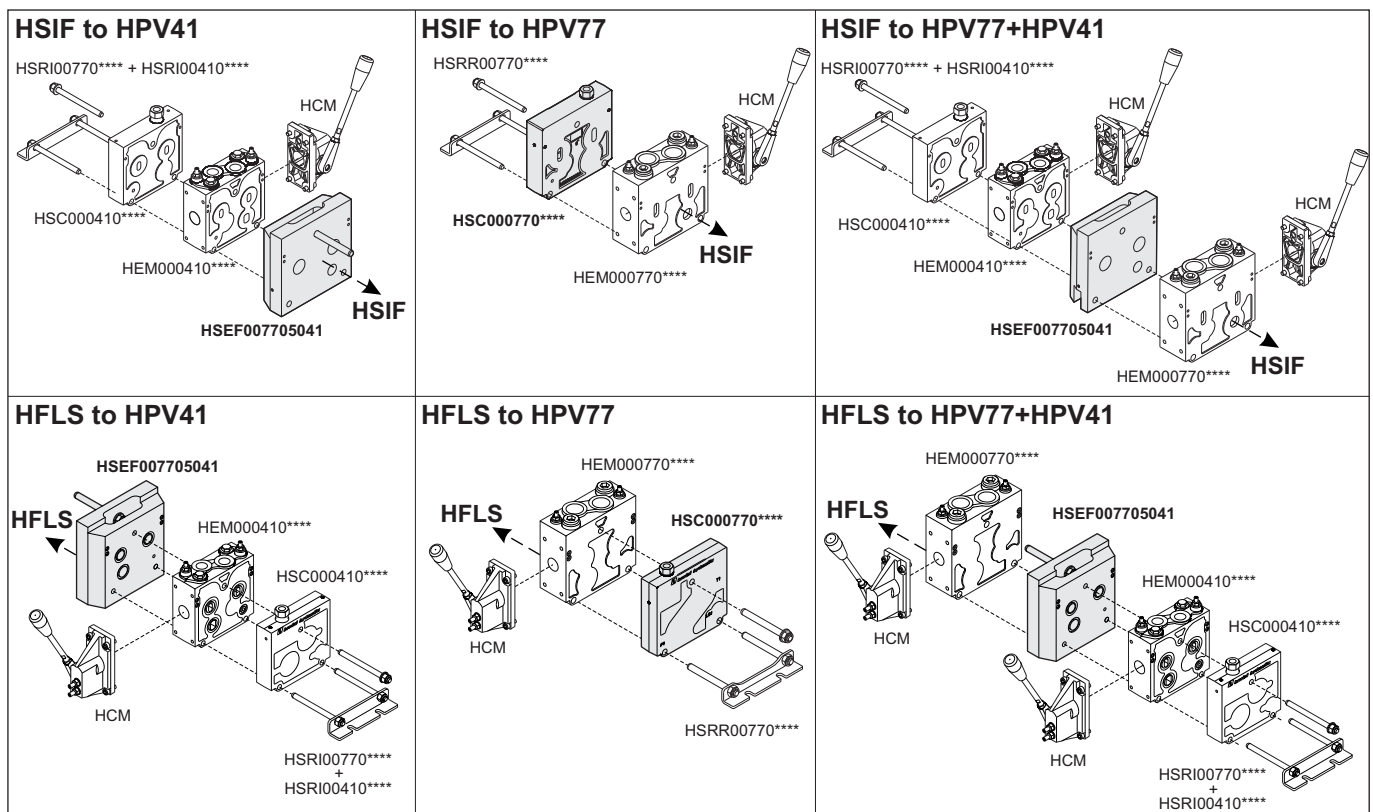
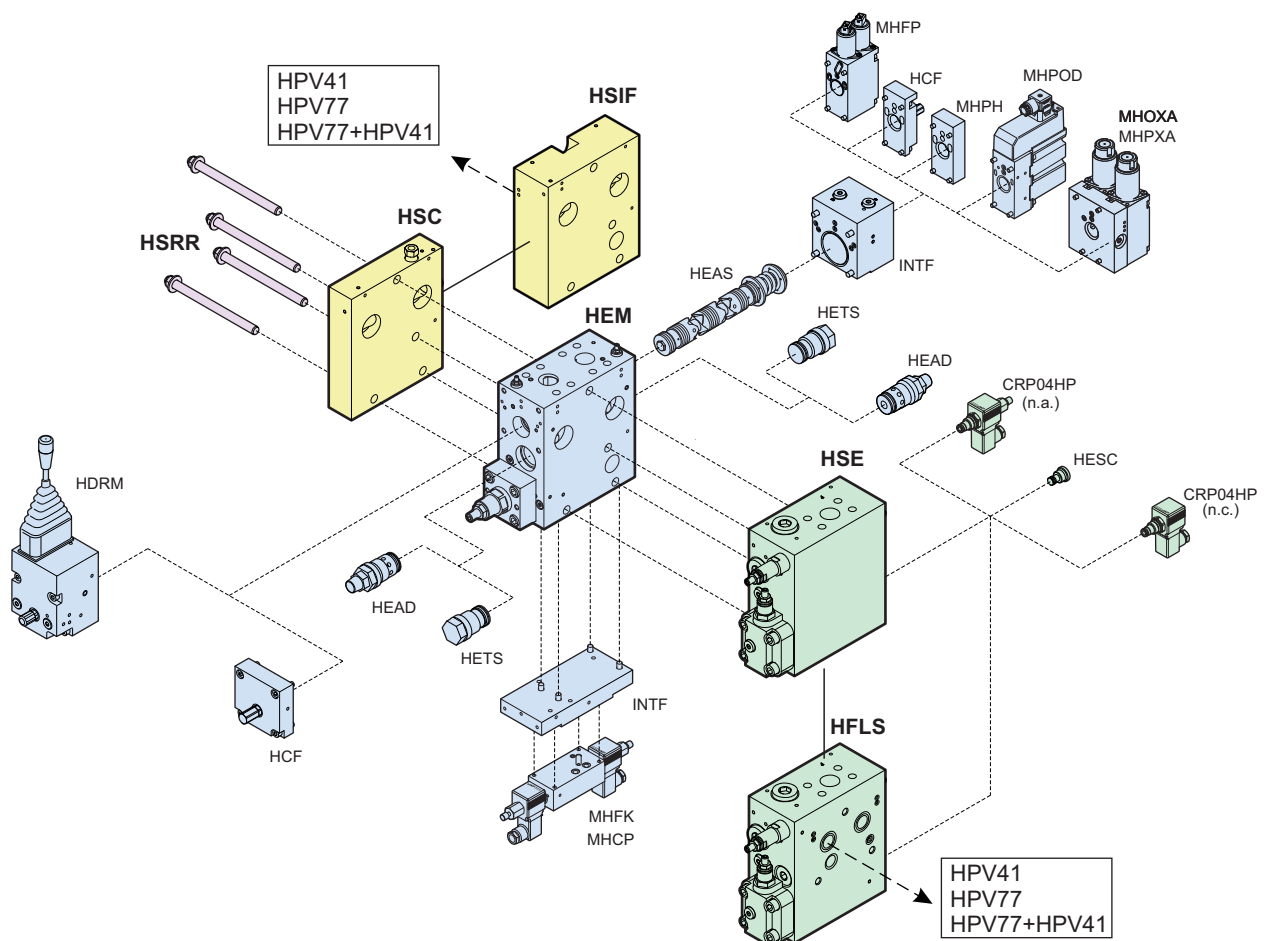


HEM oil flow with LS A/B pilot relief valves (pressure compensated)

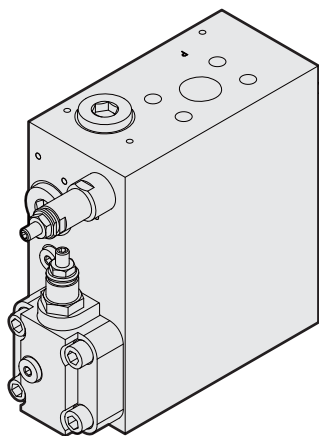


HEM pressure drop

HPV310 module selection chart, basic and hybrid configuration (mit inlet plus HPV77 - HPV41)



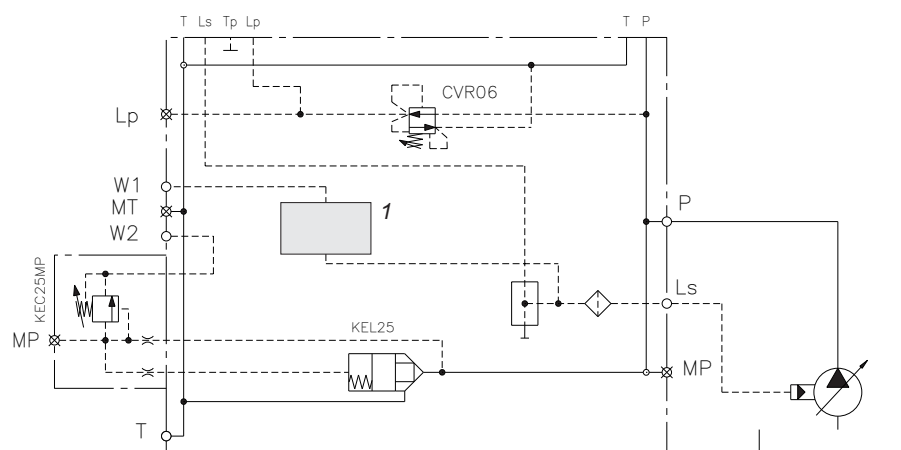
HPV41 and HPV77, see catalogue code DOC00079



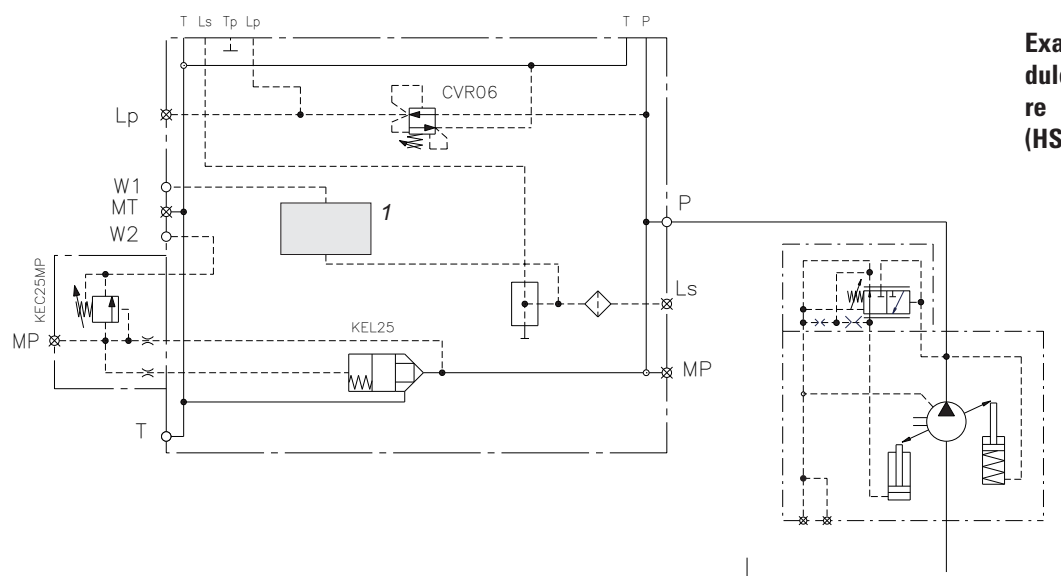
Inlet section

- Built in pilot pressure relief valve;
- System with **LS** variable displacement pumps;
- System with constant pressure variable displacement pumps;
- Built in central pilot oil supply;
- Solenoid **LS** unloading valve;
- **P** port gauge connection;
- **T** port gauge connection.

Code	Description
HSE0003101012	Inlet module for LS or constant pressure pumps



Example with HSE inlet module for LS variable displacement pumps with LS open not plugged

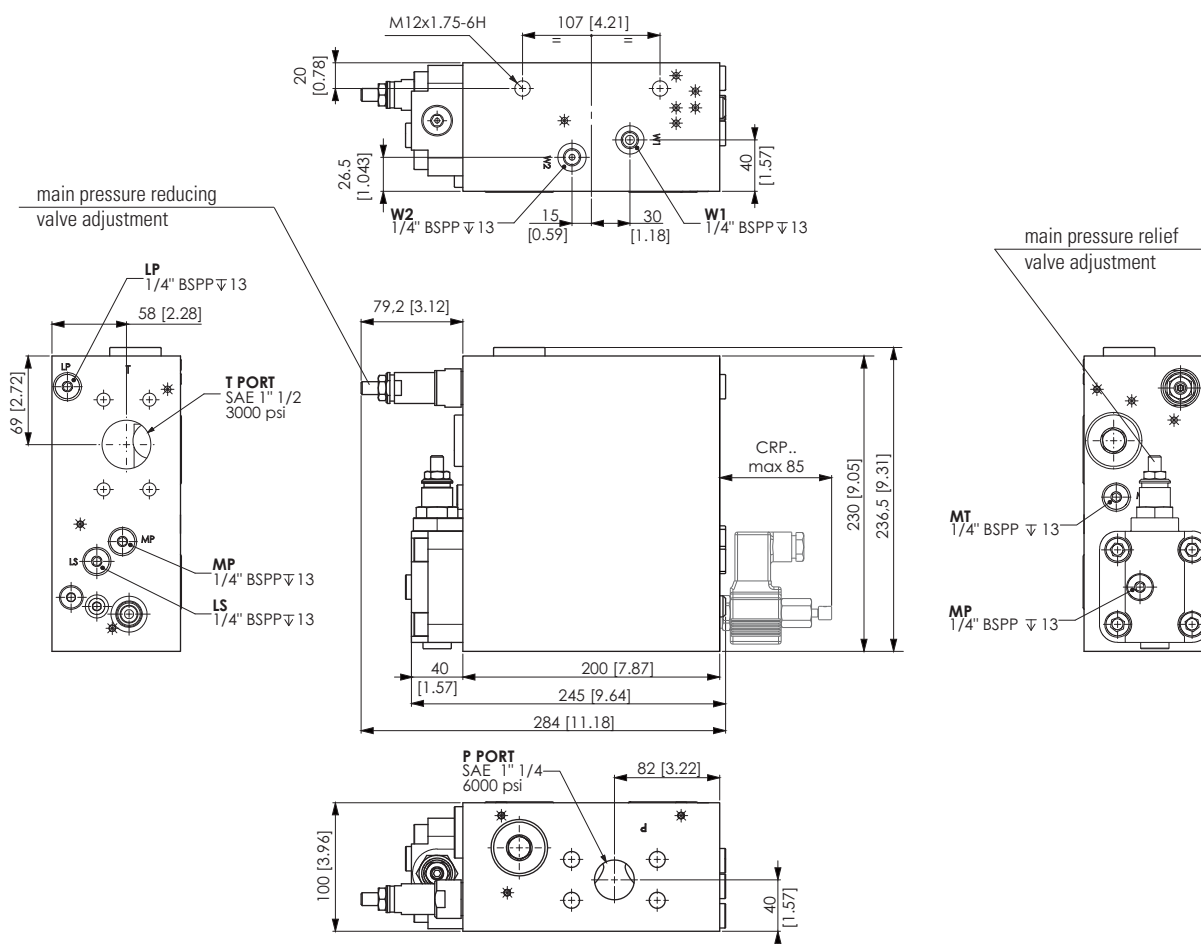


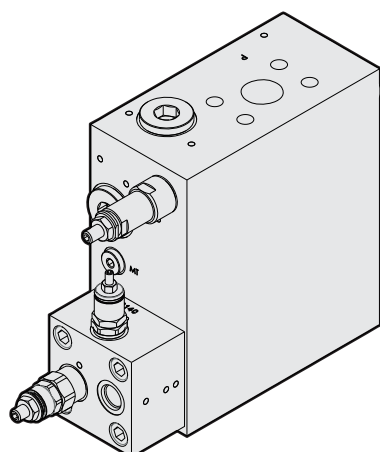
Example with HSE inlet module for constant pressure systems with LS plugged (HSE0003101010)

Plug or solenoid valves for HSE module position 1

Pos.	Code	Description	Symbol
1	HESC003103015	Kit with closing cover for CRP04 and W1 threaded holes	
	CRP04HPNAAELP31	High pressure piloted operated solenoid valve normally open 14VDC	
	CRP04HPNAAEMP31	High pressure piloted operated solenoid valve normally open 28VDC	
	CRP04HPNCAEL001	High pressure piloted operated solenoid valve normally closed 14VDC	
	CRP04HPNCAEM001	High pressure piloted operated solenoid valve closed closed 28VDC	

For CRP04HP with different voltages see catalogue "Cartridge valves / In-line valves" code DOC00044



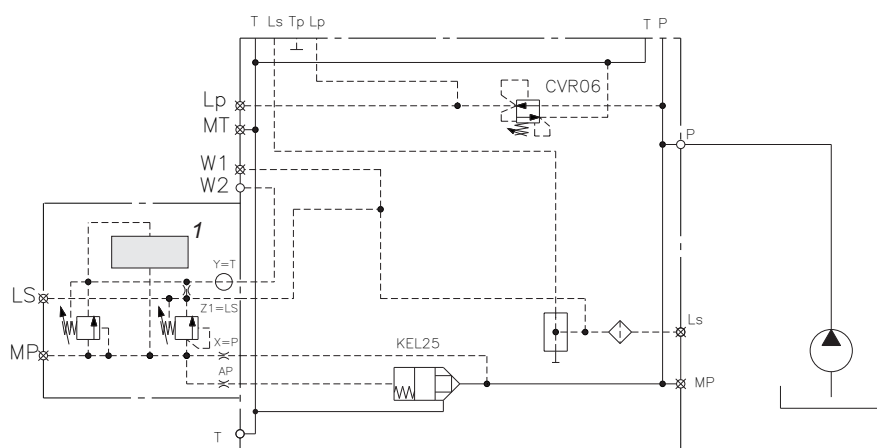


Inlet section

- Built in pilot pressure relief valve;
- System or fixed displacement pumps;
- Built in central pilot oil supply;
- Solenoid **LS** unloading valve;
- **P** port gauge connection;
- **T** port gauge connection.

Code	Description
HSE0003101310	Inlet module for fixed displacement pumps

If connected with HPV41 or HPV77 proportional valves use only HPV41 or HPV77 special elements code HEM00S*** (S identify elements without cap on LS line).

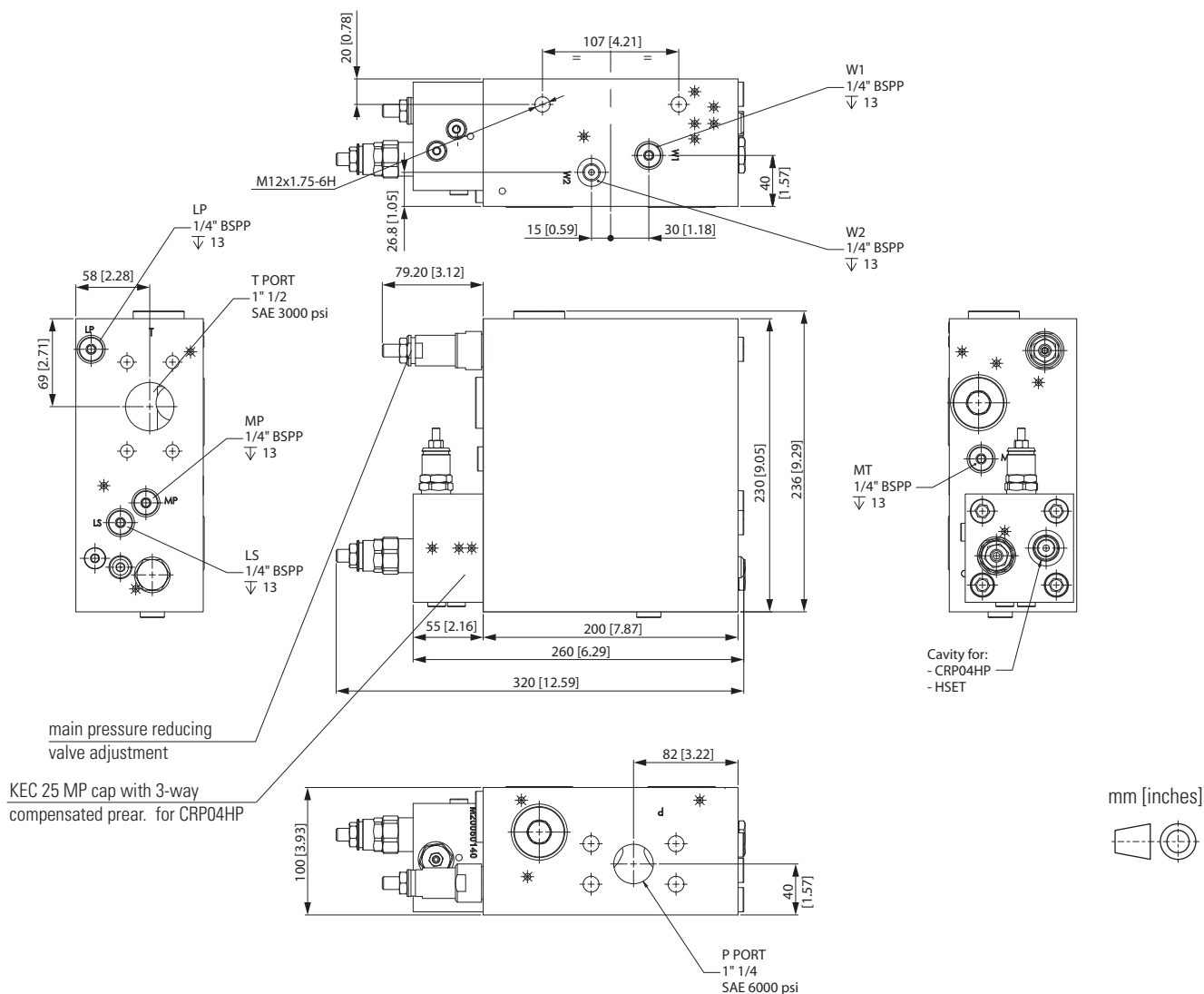


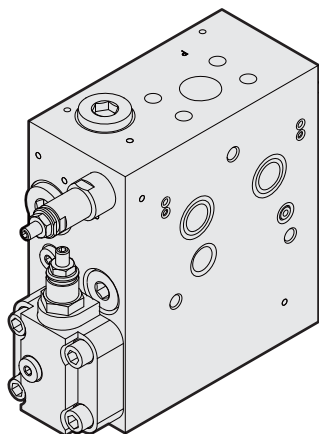
Example with HSE inlet module for fixed displacement pumps

Plug or solenoid valves for HSE module position 1

Pos.	Code	Description	Symbol
1	HESC003103015	Kit with closing cover for CRP04 and W1 threaded holes	
	CRP04HPNAAELP31	High pressure piloted operated solenoid valve normally open 14VDC	
	CRP04HPNAAEMP31	High pressure piloted operated solenoid valve normally open 28VDC	
	CRP04HPNCAEL001	High pressure piloted operated solenoid valve normally closed 14VDC	
	CRP04HPNCAEM001	High pressure piloted operated solenoid valve closed closed 28VDC	

For CRP04HP with different voltages see catalogue "Cartridge valves / In-line valves" code DOC00044

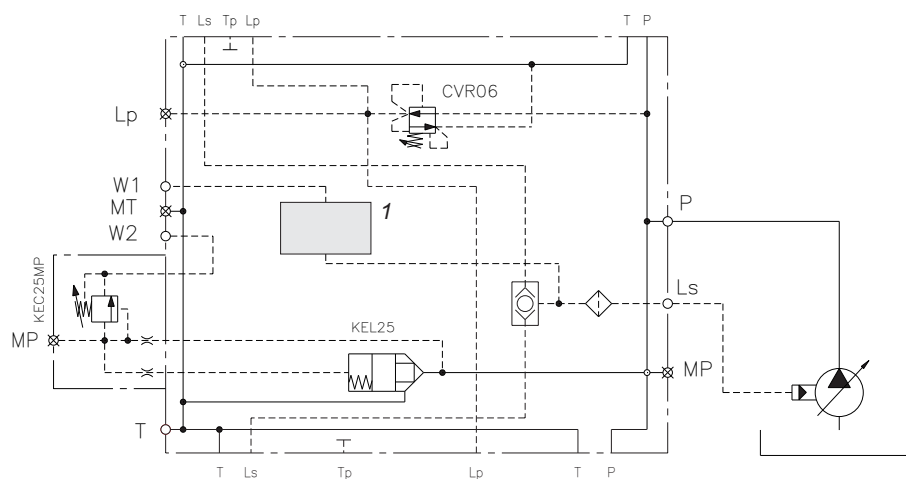




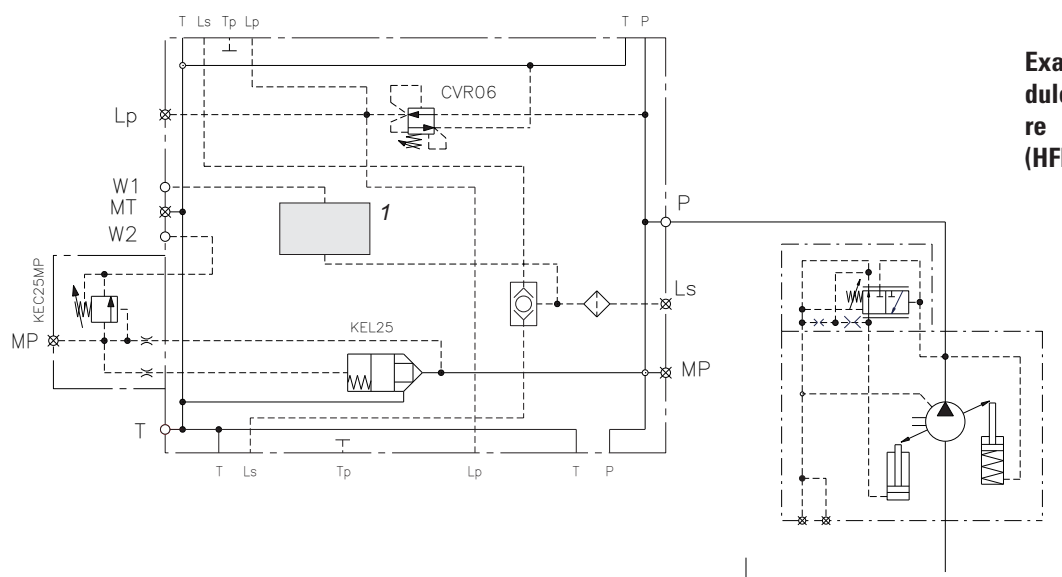
Mid inlet section

- For hybrid assembling with HPV 77 and /or HPV 41;
- Built-in pilot pressure relief valve;
- System with LS variable displacement pump;
- System with constant pressure variable displacement pump;
- Built-in central pilot oil supply;
- Solenoid LS unloading valve;
- P port, gauge connection;
- T port, gauge connection.

Code	Description
HFLS003101212	Mid inlet module for LS or constant pressure pumps



Example with HFLS inlet module for LS variable displacement pumps with LS open not plugged

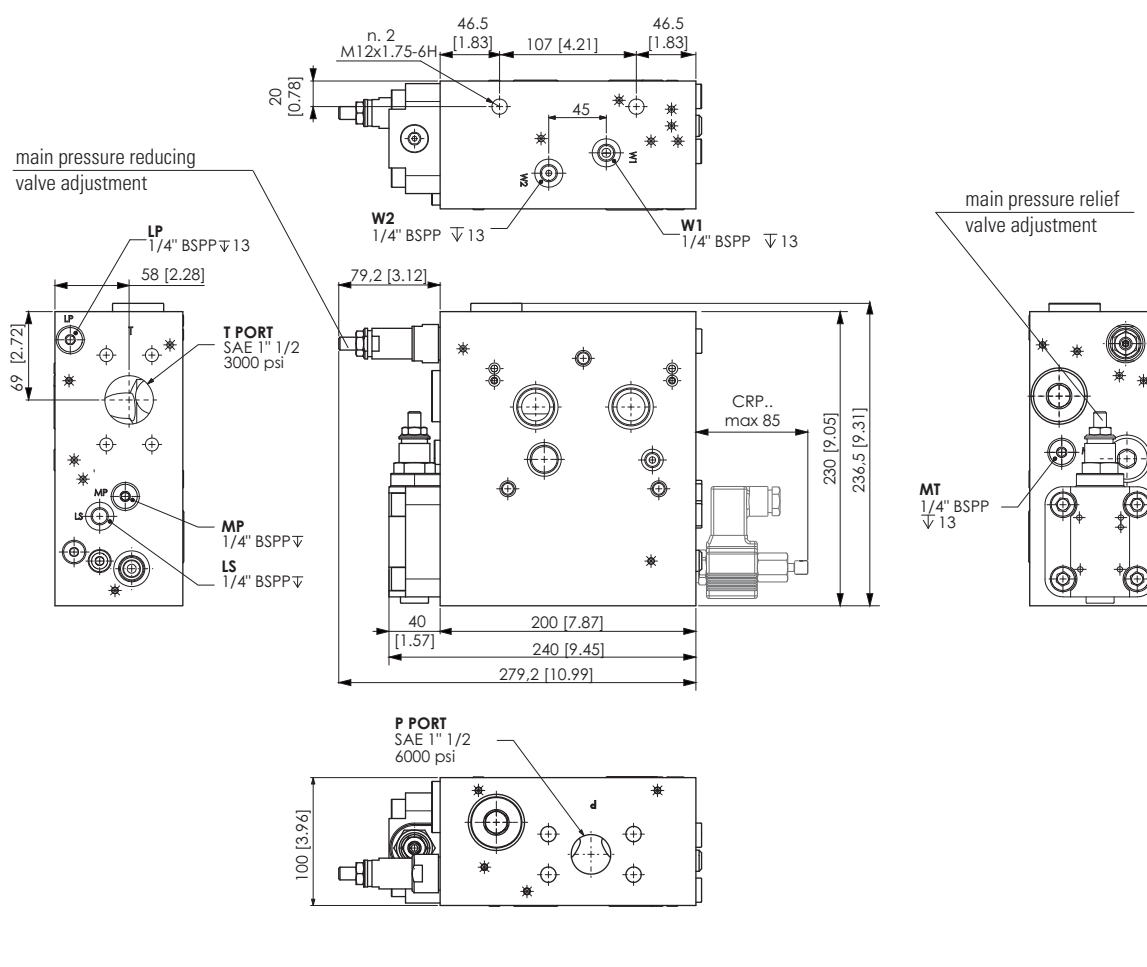


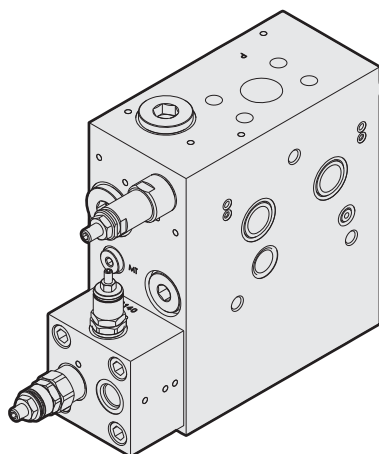
Example with HFLS inlet module for constant pressure systems with LS plugged (HFLS003101210)

Plug or solenoid valves for HSE module position 1

Pos.	Code	Description	Symbol
1	HESC003103015	Kit with closing cover for CRP04 and W1 threaded holes	
	CRP04HPNAAELP31	High pressure piloted operated solenoid valve normally open 14VDC	
	CRP04HPNAAEMP31	High pressure piloted operated solenoid valve normally open 28VDC	
	CRP04HPNCAEL001	High pressure piloted operated solenoid valve normally closed 14VDC	
	CRP04HPNCAEM001	High pressure piloted operated solenoid valve closed closed 28VDC	

For CRP04HP with different voltages see catalogue "Cartridge valves / In-line valves" code DOC00044



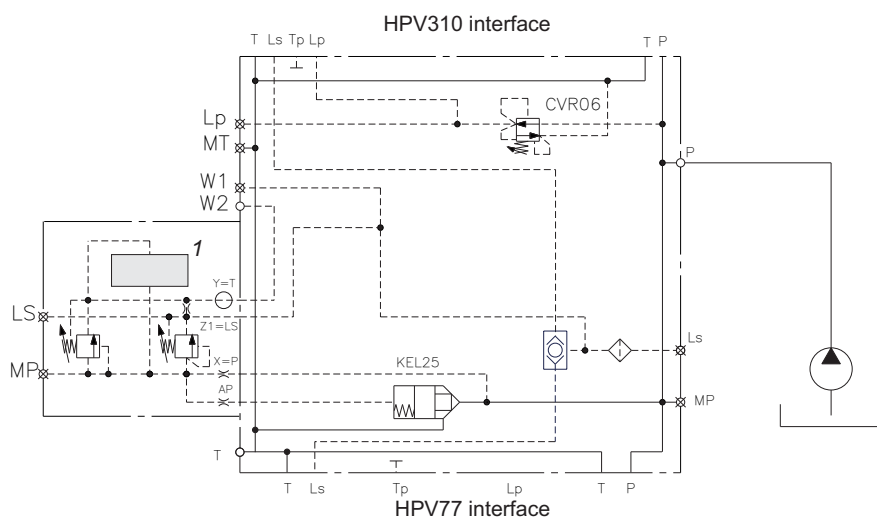


Mid inlet section

- For hybrid assembling with HPV 77 and /or HPV 41;
- Built-in pilot pressure relief valve;
- System for fixed displacement pumps;
- System with constant pressure variable displacement pump;
- Built-in central pilot oil supply;
- Solenoid LS unloading valve;
- P port, gauge connection;
- T port, gauge connection.

Code	Description
HFLS003101310	Mid inlet module for fixed displacement pumps

If connected with HPV41 or HPV77 proportional valves use only HPV41 or HPV77 special elements code HEM00S*** (S identify elements without cap on LS line).

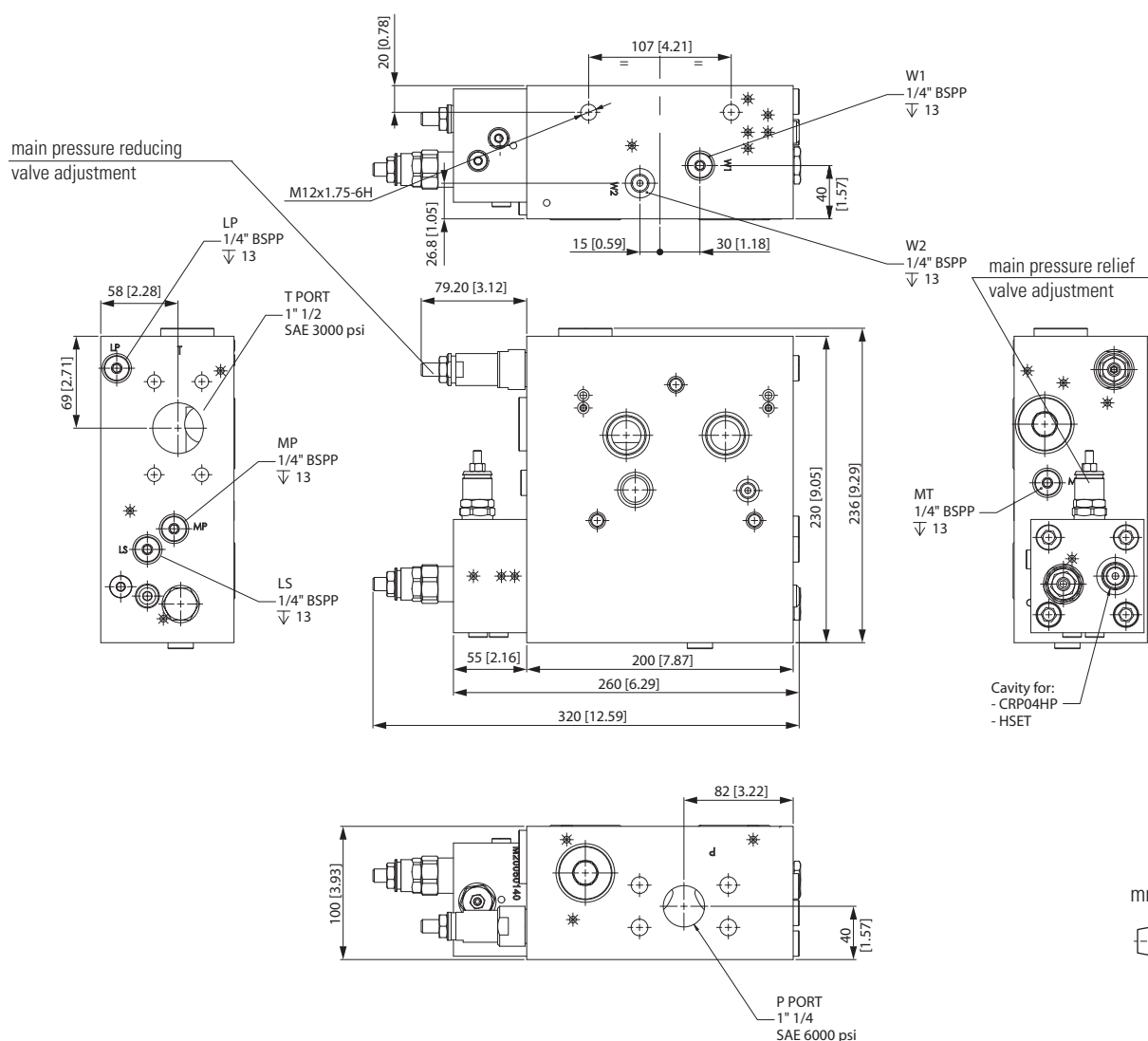


Example with HFLS inlet module for fixed displacement pumps

Plug or solenoid valves for HSE module position 1

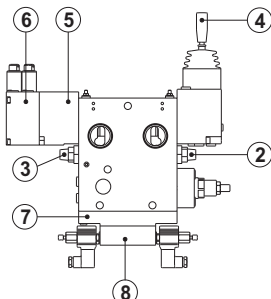
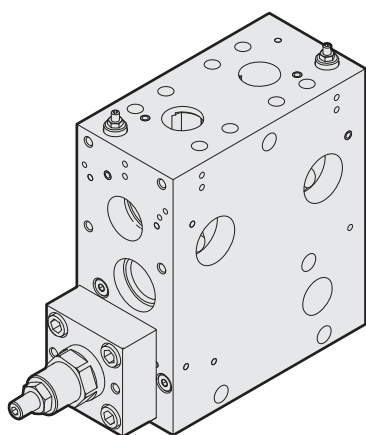
Pos.	Code	Description	Symbol
1	HESC003103015	Kit with closing cover for CRP04 and W1 threaded holes	
	CRP04HPNAAELP31	High pressure piloted operated solenoid valve normally open 14VDC	
	CRP04HPNAAEMP31	High pressure piloted operated solenoid valve normally open 28VDC	
	CRP04HPNCAEL001	High pressure piloted operated solenoid valve normally closed 14VDC	
	CRP04HPNCAEM001	High pressure piloted operated solenoid valve closed closed 28VDC	

For CRP04HP with different voltages see catalogue "Cartridge valves / In-line valves" code DOC00044

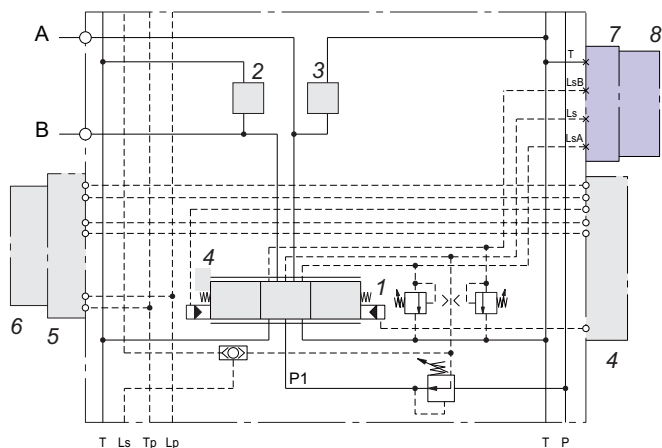


Working section

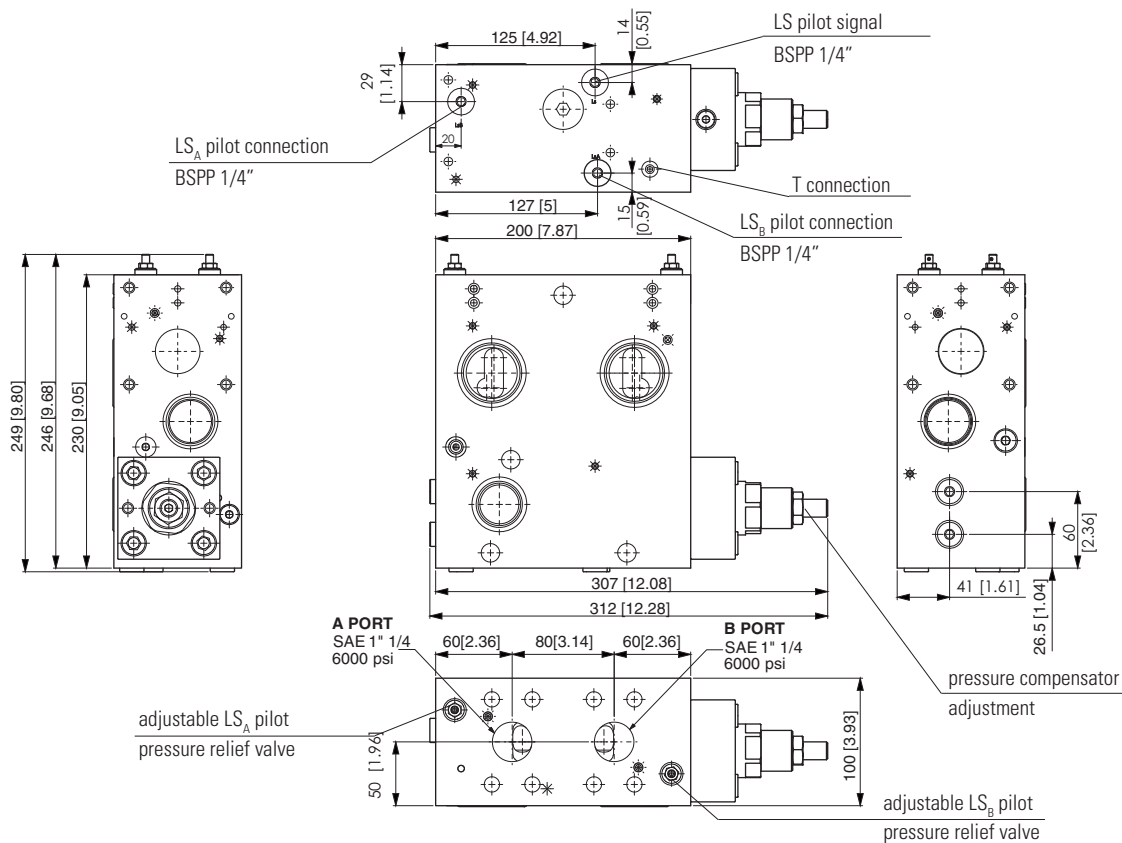
- Built-in adjustable pressure compensator
- Symmetrical distribution that allows the manual activation position to be reversed with all servocontrols
- Built-in adjustable pilot operated shock-suction valves
- Interchangeable spools
- LS and LSA/B pilot connections
- LSA/B pilot relief valves
- LS and LSA/B electrical unloading (work in progress, not available yet)
- Electrical actuation
 - MHPF, PWM signal, open loop control
 - MHPD, 0-10 V, 0-20 mA, 0,5 UDC signal, open loop control
 - MHPED, 0-10 V, 0-20 mA, 0,5 UDC signal, closed loop control (work in progress, not available yet)
- Mechanical flow adjustment

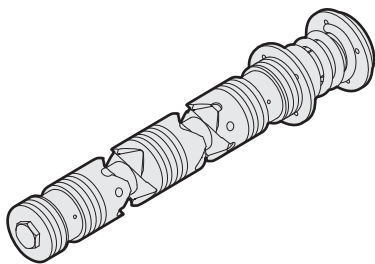


Code	Description
HEM0003103010	Working section with holes LsA-B for electrical unloading plugged



Pos.	Description	Type	Page
1	Spool	Complements	11
2	Shock valve or plug	Complements	12
3	Shock valve or plug	Complements	12
4	Manual actuation or flange	Complements	13
5	Adapter interface	Complements	16
6	Control	Complements	17
7	Adapter interface (bottom side)	Accessory	22
8	LSA / LSB / LS electrical unloading signal (bottom side)	Accessory	23

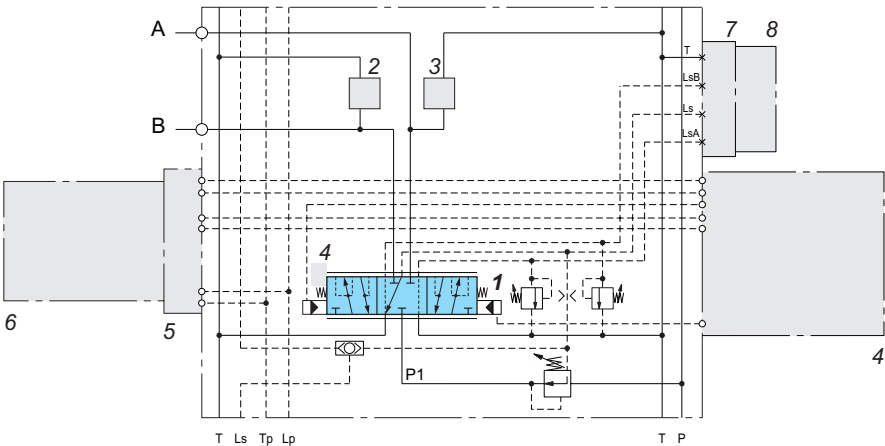




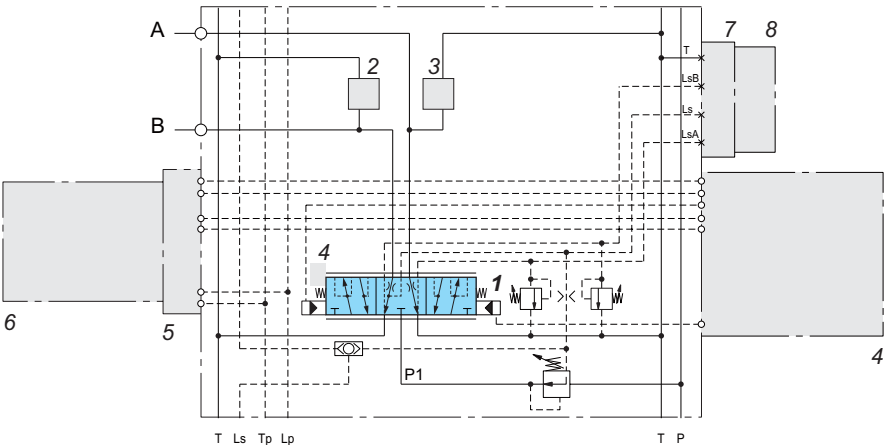
HEAS - Main spool for flow control, double acting (position 1)

Symmetrical distribution that allows the manual activation position to be reversed with all servocontrols

Spool type		Code	Size	Δp [bar]	Flow range [l/min]	Symbol
01N	4-way, 3-position A, B closed	HEAS003104200	05	8 ÷ 14	180 ÷ 270	
		HEAS003104225	10	8 ÷ 14	250 ÷ 320	
		HEAS003104240	40	8 ÷ 14	310 ÷ 410	
		HEAS003104265	70	8 ÷ 14	410 ÷ 500	
03N	4-way, 3-position A, B → T	HEAS003104300	05	8 ÷ 14	180 ÷ 270	
		HEAS003104325	10	8 ÷ 14	250 ÷ 320	
		HEAS003104340	40	8 ÷ 14	310 ÷ 410	
		HEAS003104365	70	8 ÷ 14	410 ÷ 500	



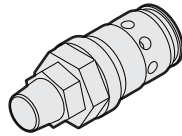
Example with HEAS0031042..
spool



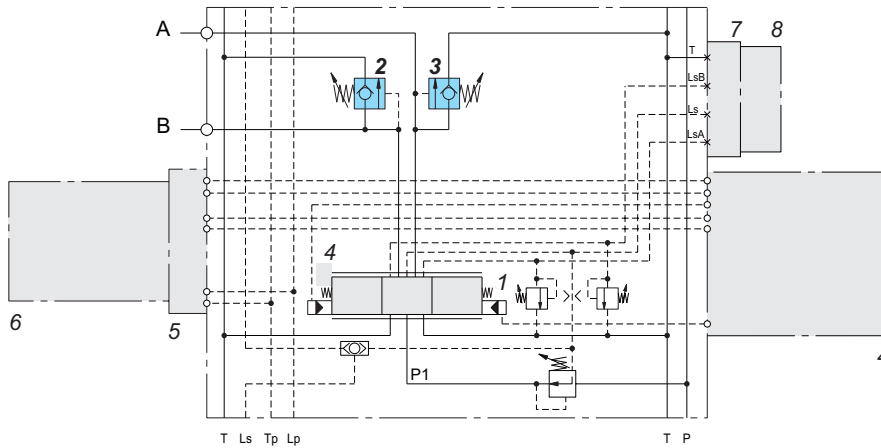
Example with HEAS0031043..
spool

HEAD - Shock and suction valve for A – B ports (position 2-3)

HEAD is designed to absorb shock effects only. Don't use it as a pressure relief valve.

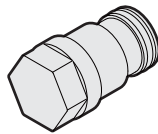


Code	Description
HEAD003101450	Shock and suction valve. Setting up to 400 bar

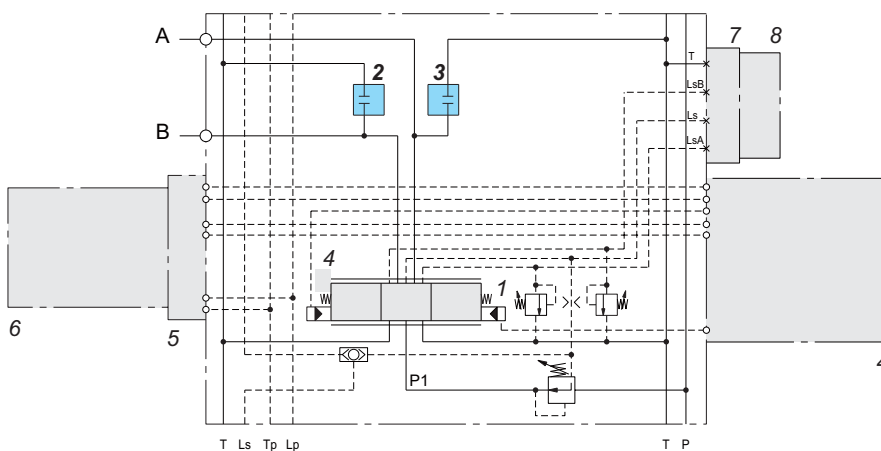


Example with HEAD.. valve

HETS - Plug for position 2 and 3



Code	Description
HETS003103000	Plug



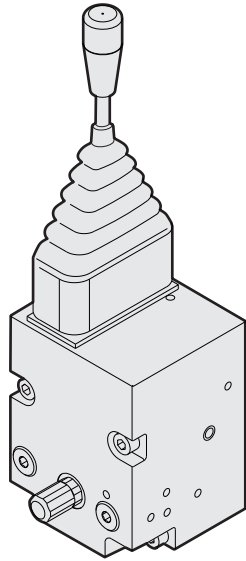
Example with HETS.. plug

HDRM - Manual activation (position 4)

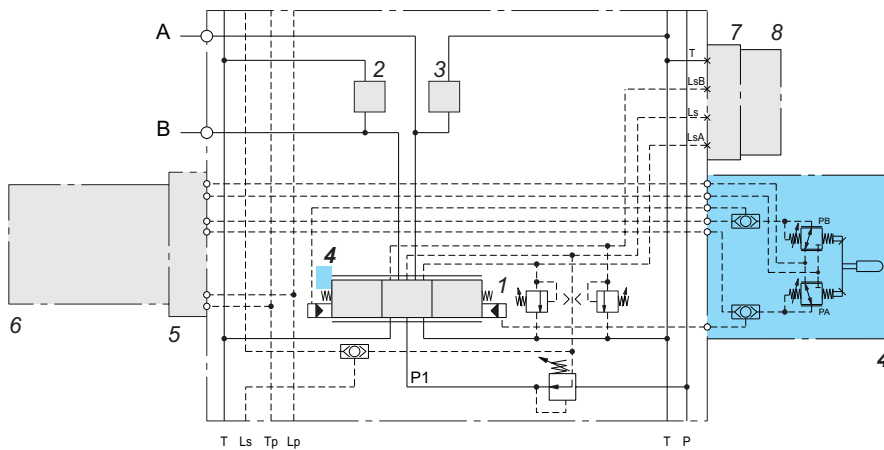
HDRM manual actuations operate on the basis of direct operated pressure reducing valves.

HDRM control devices basically comprise a control lever, two pressure reducing valves and a housing.

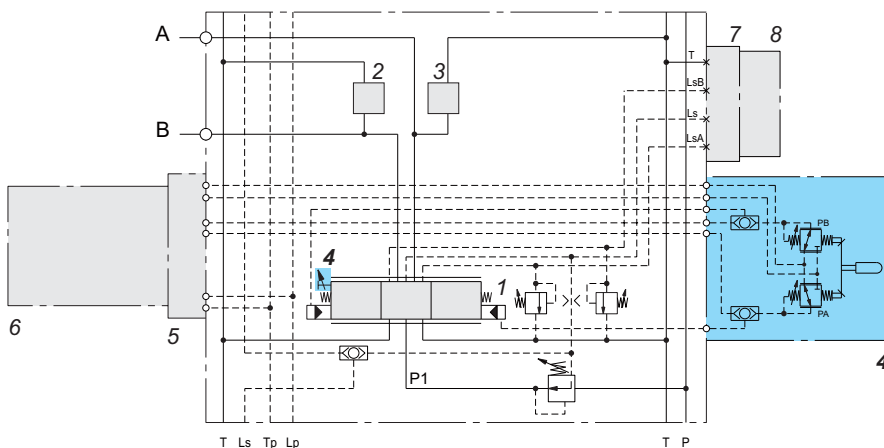
When the control lever is deflected, as a result of the interaction with the two pressure reducing valves the relevant pilot pressure is a function of the control lever position, enabling a highest metering spool control



Code	Description
HDRM003107001	Manual actuator for electric control without spool stroke limiter
HDRM003107002	Manual actuator for electric control with spool stroke limiter
HDRM003107003	Manual actuator for manual control without spool stroke limiter
HDRM003107004	Manual actuator for manual control with spool stroke limiter

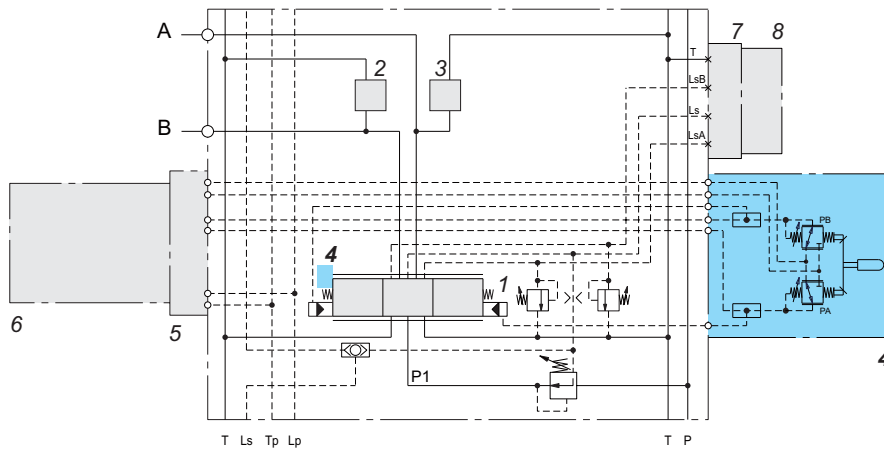


Example with HDRM003107001 for electric control (on position 6) without spool stroke limiter

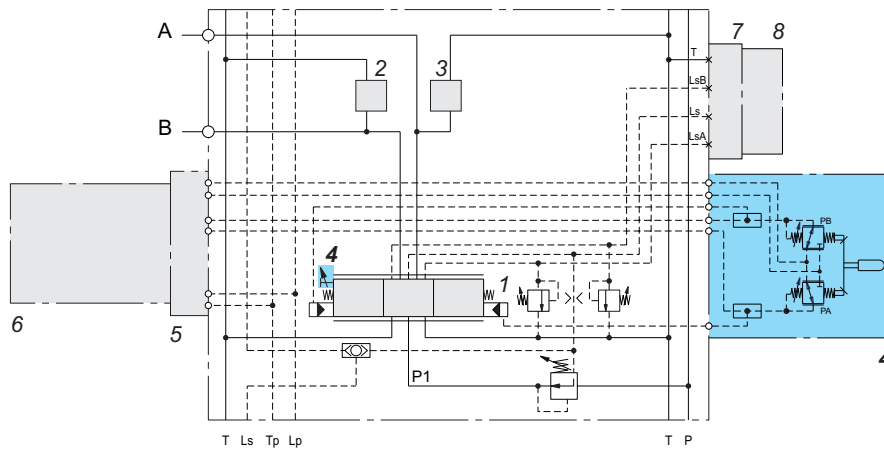


Example with HDRM003107002 for electric control (on position 6) with spool stroke limiter

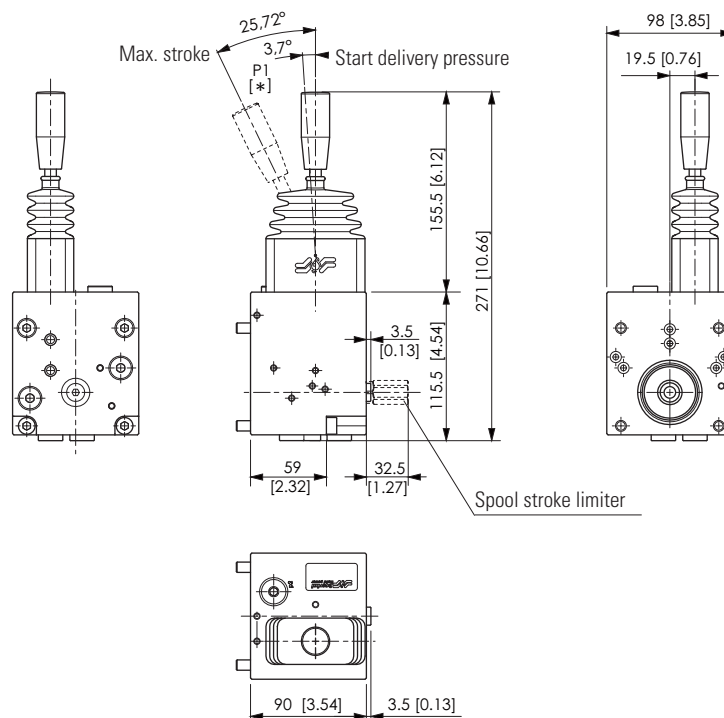
HDRM - Manual actuation (position 4)



Example with HDRM003107003
for manual (on position 6) wi-
thout spool stroke limiter



Example with HDRM003107004
for manual control (on position
6) with spool stroke limiter



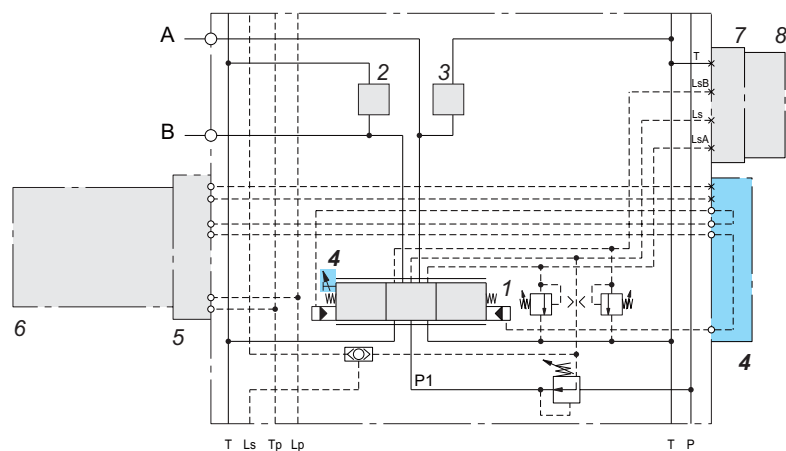
* = **PB** with standard right HPV feed
PA for left HPV feed

mm [inches]

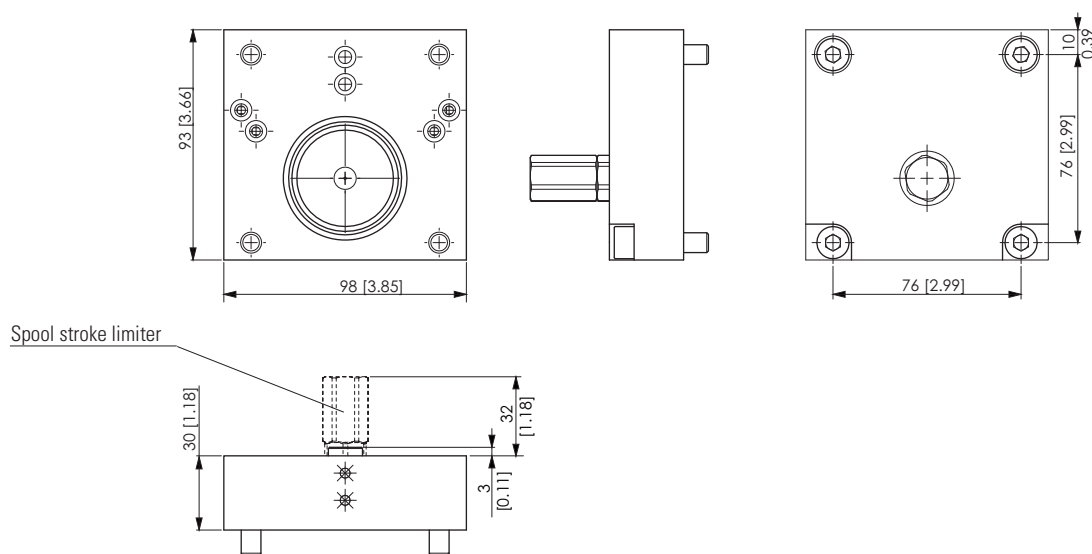


A technical drawing of a rectangular metal box, likely a component of a machine. The box is shown in a perspective view. It has a cylindrical protrusion on the front face, which appears to be a mounting point or a connector. There are four screws visible on the top surface, securing the lid. The drawing is a simple line drawing with no shading or color.

Code	Description
HCF0003104010	Flange with stroke limiter
HCF0003104011	Flange without stroke limiter

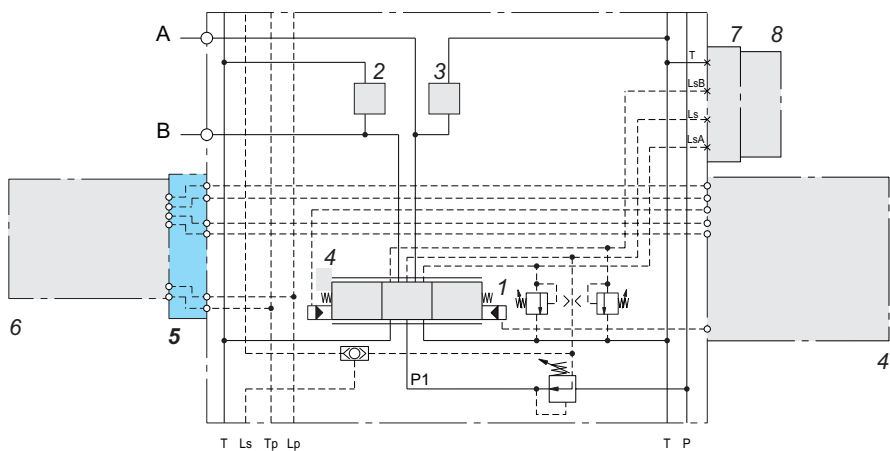
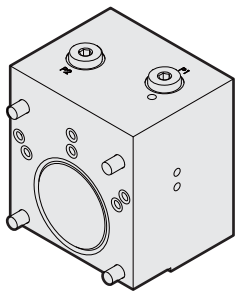


Example with HCF.. (on position 4) with spool stroke limiter

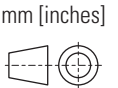
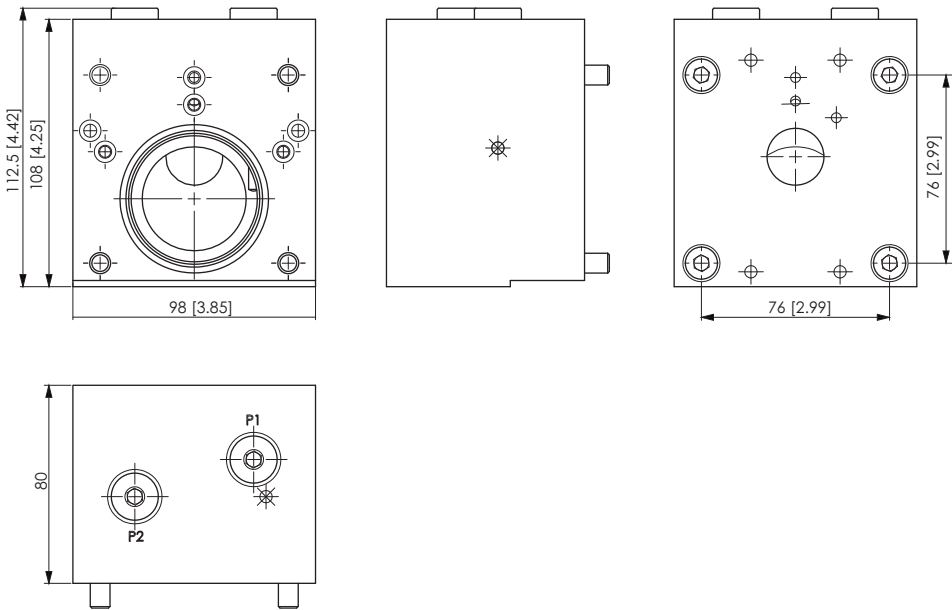


INTF - Adapter for controls (position 5)

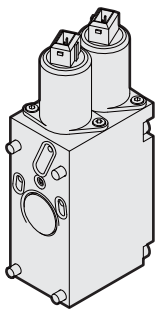
Code	Description
INTF003105015	Adapter for controls



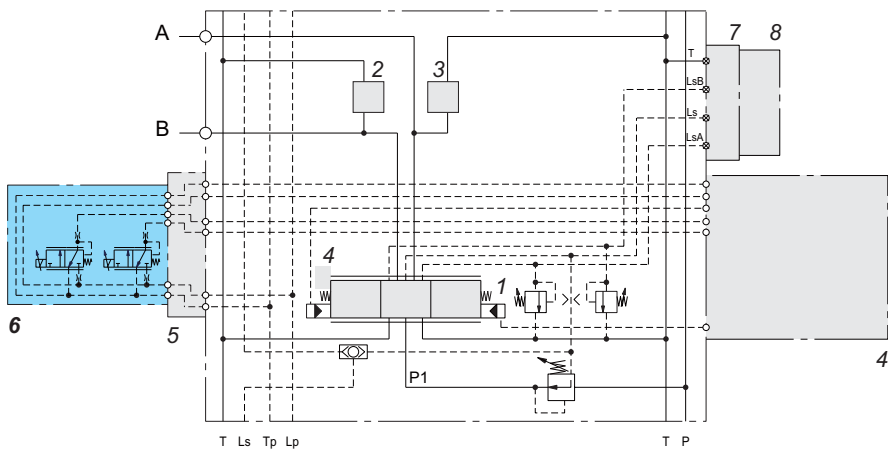
Example with INTF (on position 5)



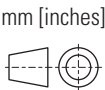
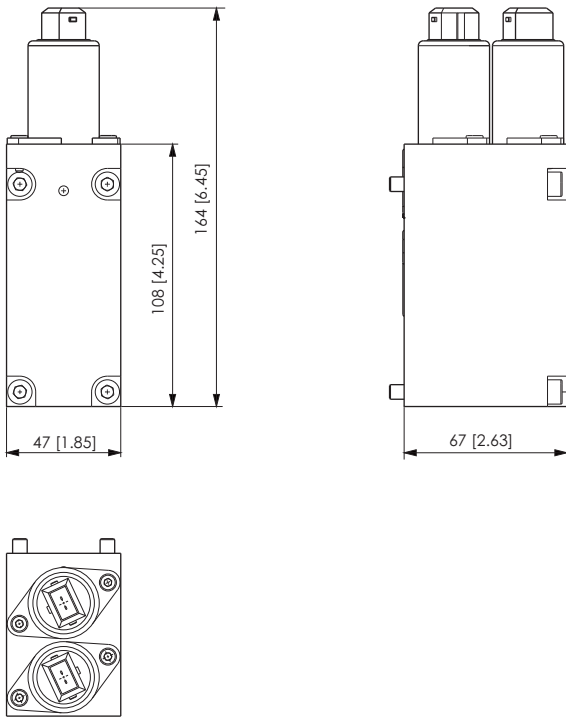
MHPF - Control (position 6)



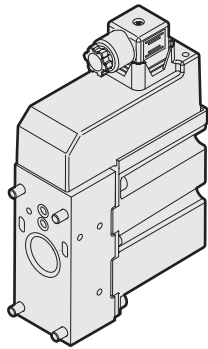
Code	Description
MHPF003107050	12 VDC control
MHPF003107051	24 VDC control



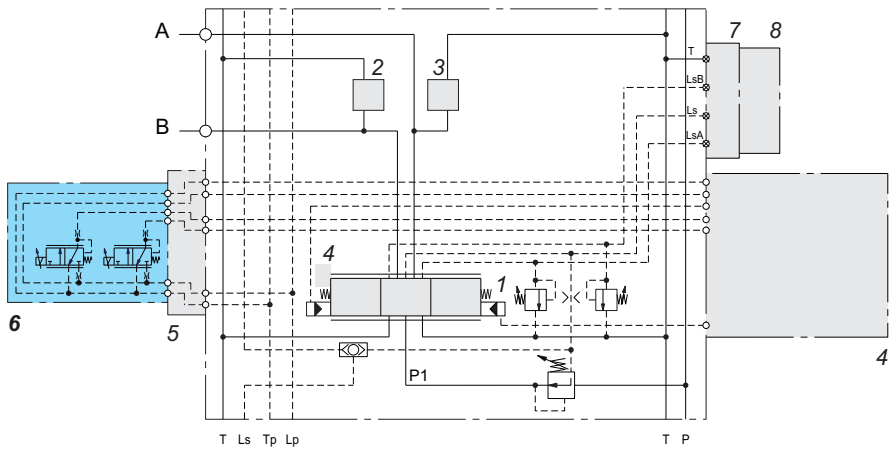
Example with MHPF.. control (on position 6)



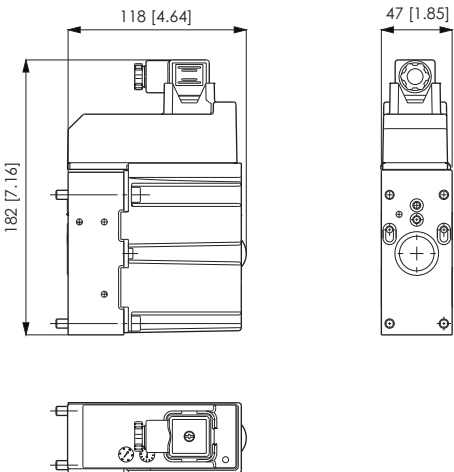
MHPOD - Control (position 6)



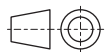
Code	Voltage	Description
MHPOD03108077	12 VDC	Input signal control 0.5 x UDC
MHPOD03108075	24 VDC	
MHPOD03108082	12 VDC	Input signal control 0 ÷ 10 VDC
MHPOD03108084	24 VDC	
MHPOD03108086	12 VDC	Input signal control 0 ÷ 20 mA
MHPOD03108088	24 VDC	



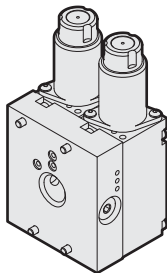
Example with MHPOD.. control
(on position 6)



mm [inches]

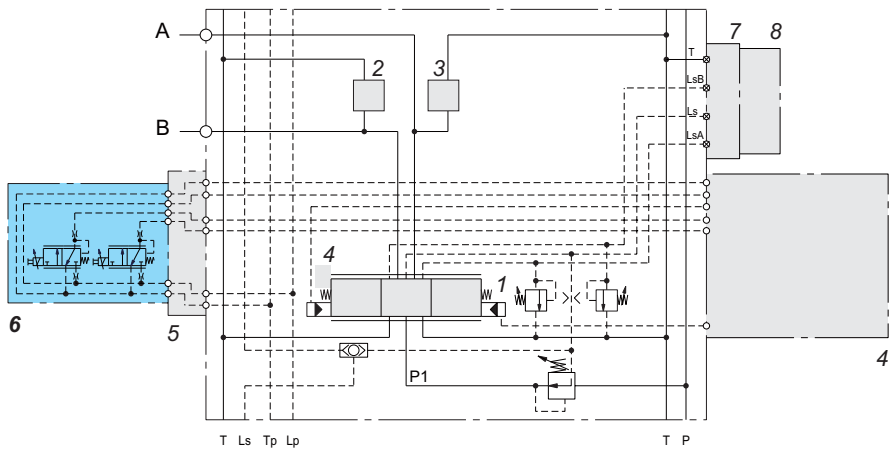


ATEX

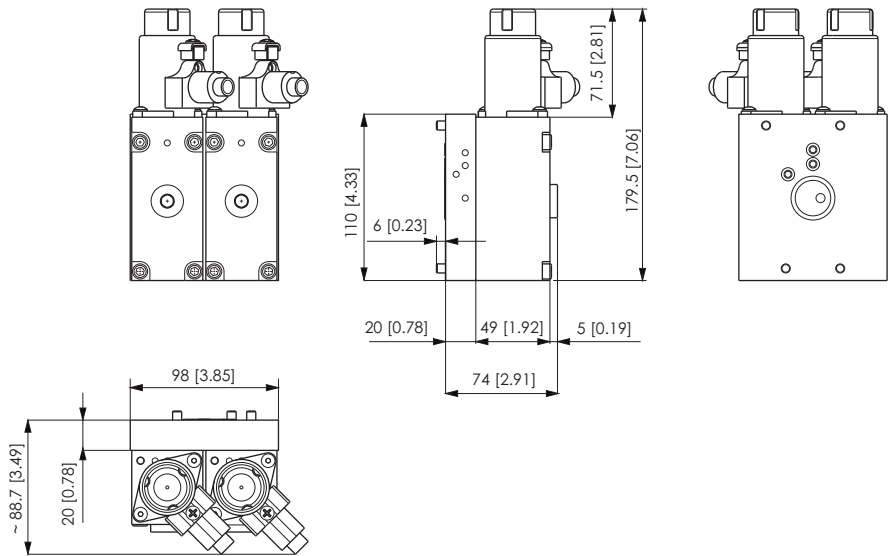


ATEX - Control (position 6)

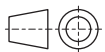
Code	Voltage	Description
MHOXAB3107381	12 VDC	ATEX Electro-hydraulic On/Off module
MHOXAB3107380	24 VDC	double acting
MHPXAB3107181	12 VDC	ATEX Electro-hydraulic proportional
MHPXAB3107180	24 VDC	module double acting



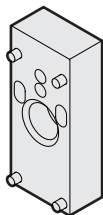
Example with ATEX control (on position 6)



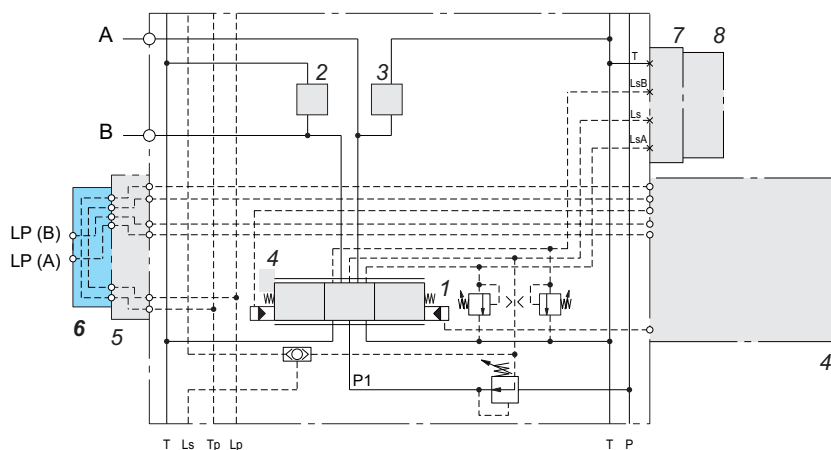
mm [inches]



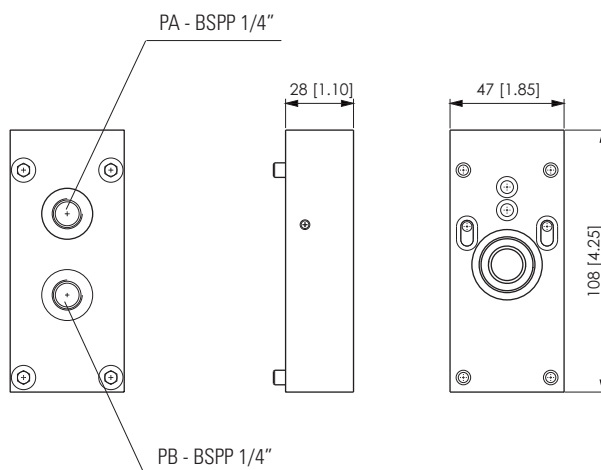
MHPH - Control (position 6)



Code	Description	Thread	Made
MHPH003104601	Hydraulic activation	BSPP	Aluminium
MHPH003104602	Hydraulic activation	UN - UNF	
MHPH003104621	Hydraulic activation	BSPP	Cast iron
MHPH003104622	Hydraulic activation	UN - UNF	



**Example with MHPH.. control
(on position 6)**

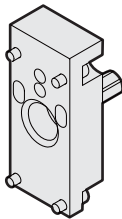


PB with standard right HPV feed
PA for left HPV feed

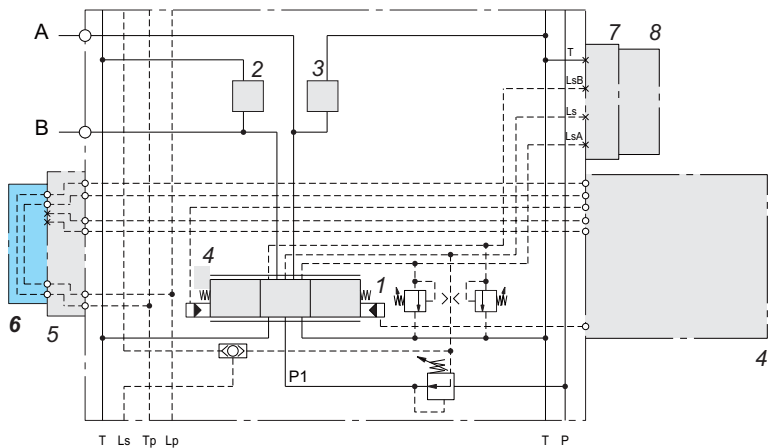
mm [inches]



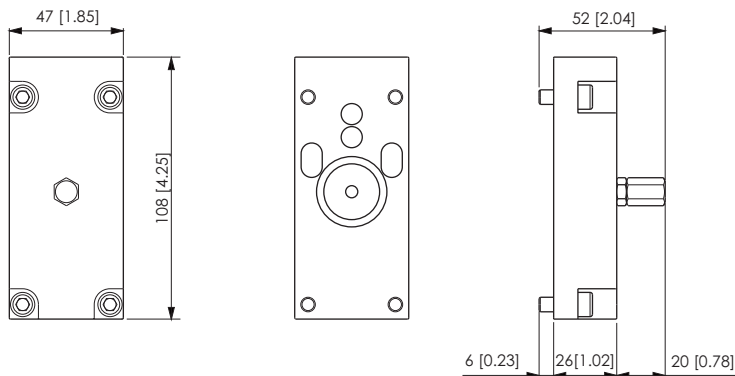
HCF - Flange (position 6)



Code	Description	Made
HCF0003104587	Rear cover flow adjustment	Aluminium
HCF0003104584		Cast iron

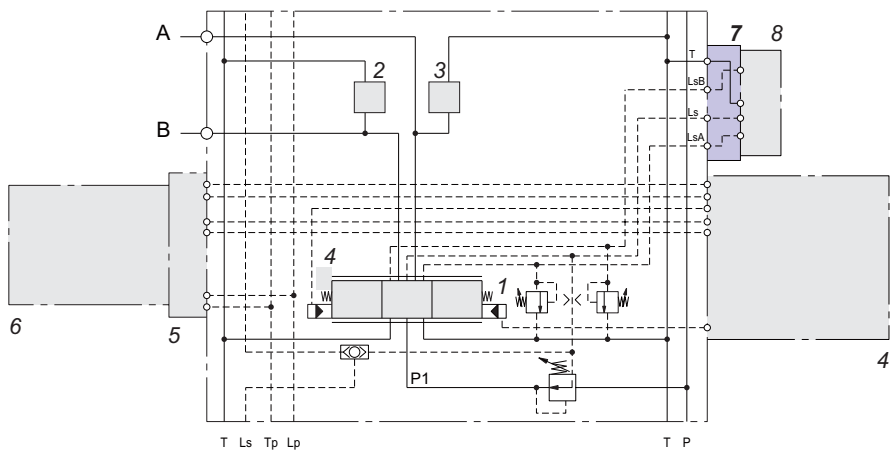
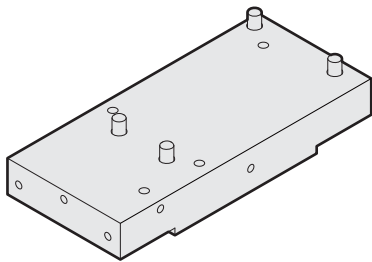


**Example with HCF.
(on position 6)**

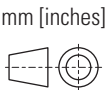
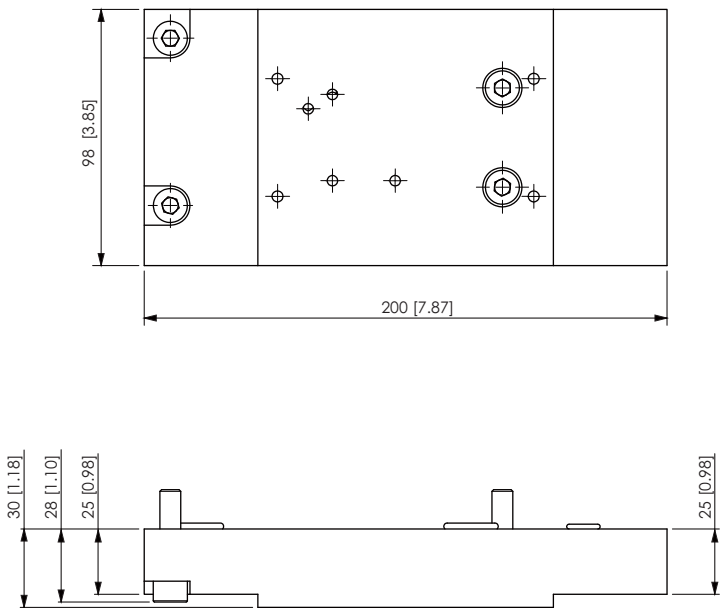


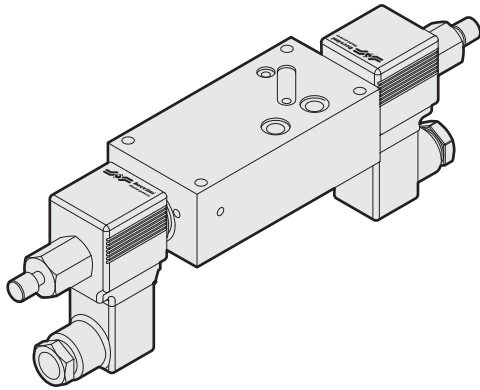
INTF - Adapter (position 7)

Code	Description
INTF003104005	Adapter



Example with INTF.. control
(on position 7)





MHFO - Unloading electrical modules LS_{A/B} signal (position 8)

LS_A / LS_B pilot signal unloading solenoid valve.

- **Normally open:** the on/off solenoids **are not energized**, there is no flow on A/B work ports;

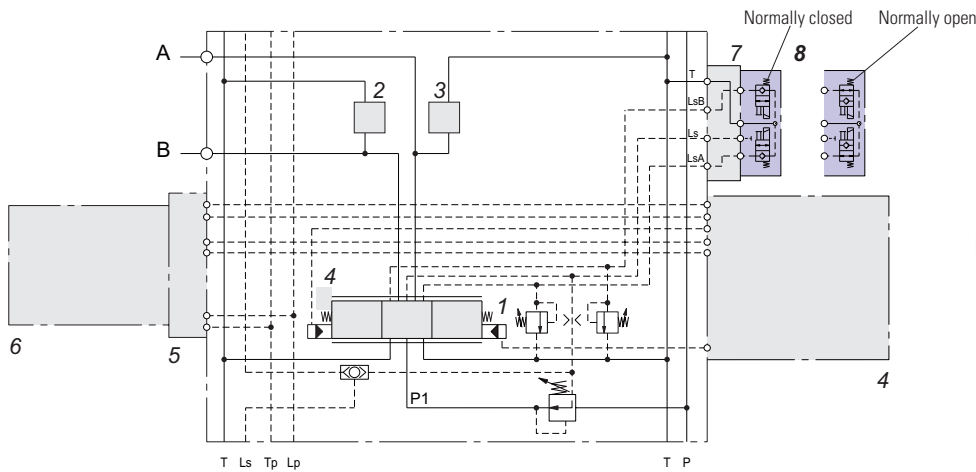
- **Normally closed:** the on/off solenoids **are energized**, there is no flow on A/B work ports;

while the pressure in the open will be equal to the P → T unloading pressure value on the inlet section, plus the counterpressure acting on T line.

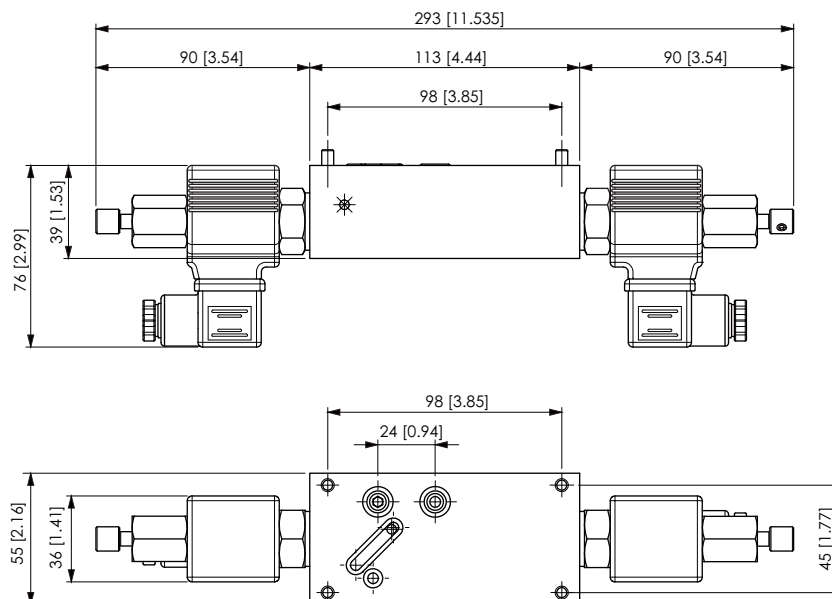
In closed centre circuits (under the same operating conditions) the pressure will be equal to the stand-by pump pressure.

Code 12VDC	Code 24VDC	Description
MHF0007706205	MHF0007706210	Active on LS _A - Normally open
MHF0007706215	MHF0007706220	Active on LS _B - Normally open
MHF0007706225	MHF0007706230	Active on LS _A + LS _B - Normally open
MHF0007706300	MHF0007706305	Active on LS - Normally open
MHF0007706235	MHF0007706240	Active on LS _A - Normally closed
MHF0007706245	MHF0007706250	Active on LS _B - Normally closed
MHF0007706255	MHF0007706260	Active on LS _A + LS _B - Normally closed
MHF0007706310	MHF0007706315	Active on LS - Normally closed

CRP04HP, see catalogue "Cartridge valves / In-line valves" code DOC00044



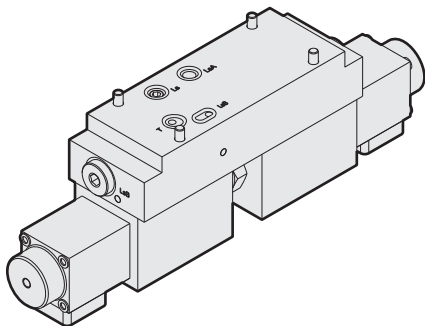
**Example with MHFO..
(on position 8)**



mm [inches]

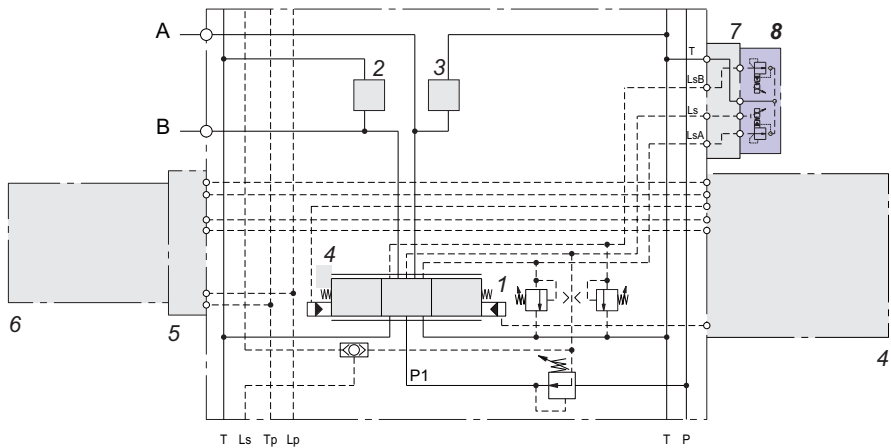


MHCP - Unloading electrical modules LS signal (position 8)

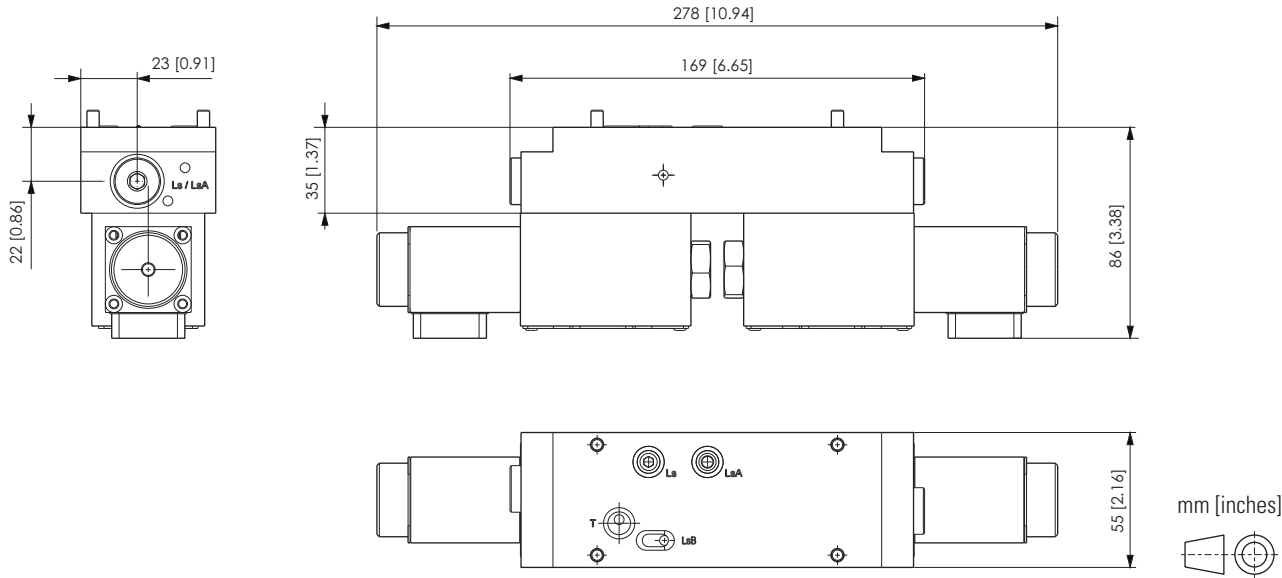


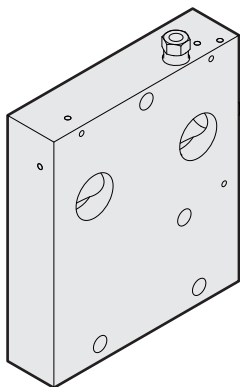
Code	Description
MHCP007706210	Active on LSA - 24VDC
MHCP007706220	Active on LSB - 24VDC
MHCP007706230	Active on LSA + LSB - 24VDC
MHCP007706305	Active on LS - 24VDC

XP3, pressure relief valve, see catalogue "Valves and electronics" code P35030200



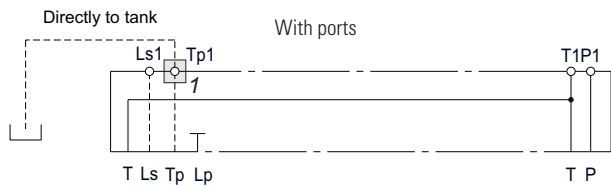
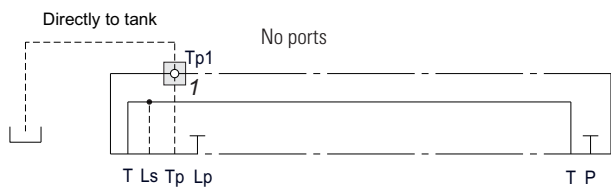
Example with MHCP..
(on position 8)





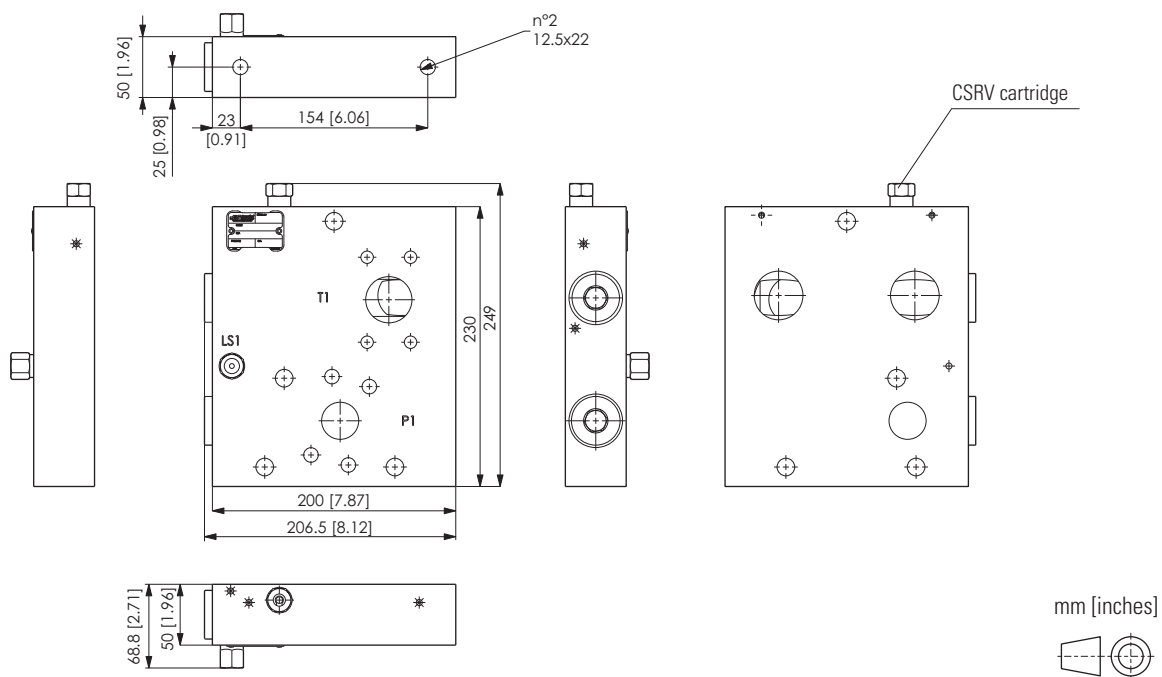
End section

Code	Description
HSC0003105005	No ports
HSC0003105010	P ₁ port - SAE 1" ¼ - 6000 psi
	T ₁ port - SAE 1" ½ - 3000 psi
	Ls ₁ port - BSPP ¼" - depth 13

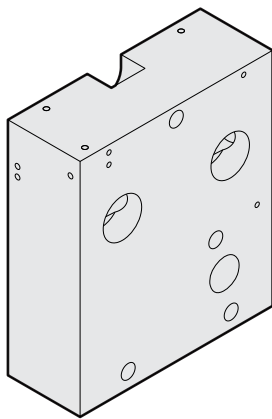


CSRV cartridge for HSC module

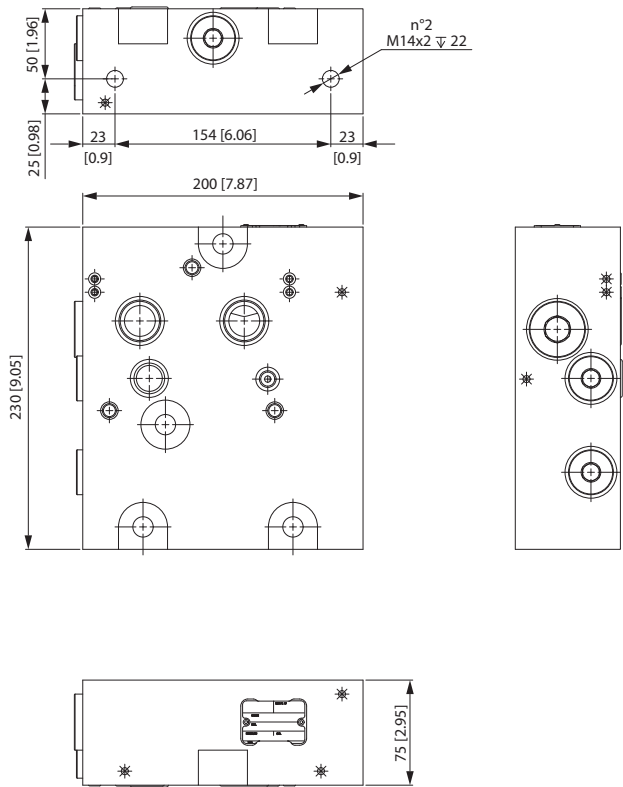
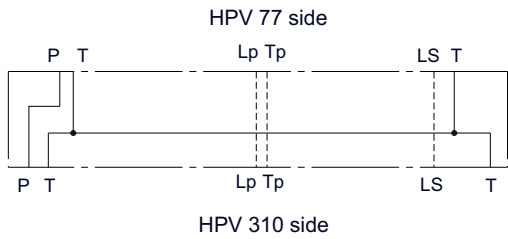
Pos.	Code	Description	Symbol
1	CSRV007701203	Port 1/4" BSPP	
	CSRV007701206	Port SAE 7/16" UNF	



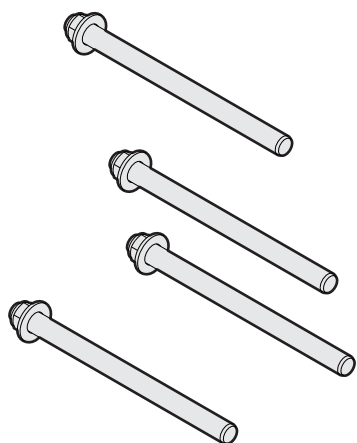
Interface between HPV310 and HPV77



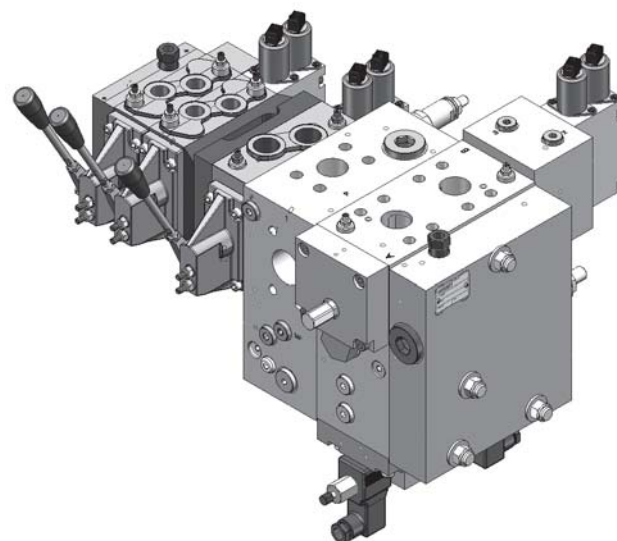
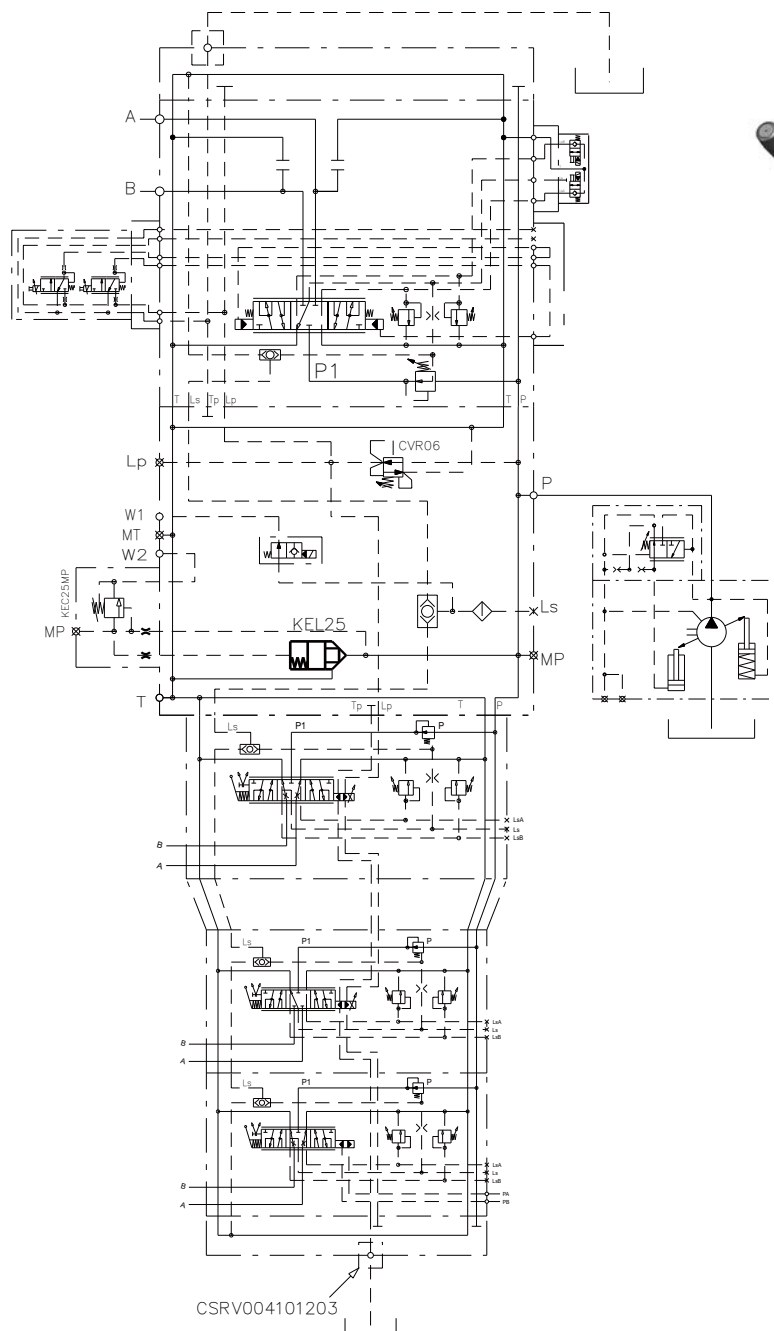
Code	Description
HSIF003105037	Interface HPV310 - HPV77

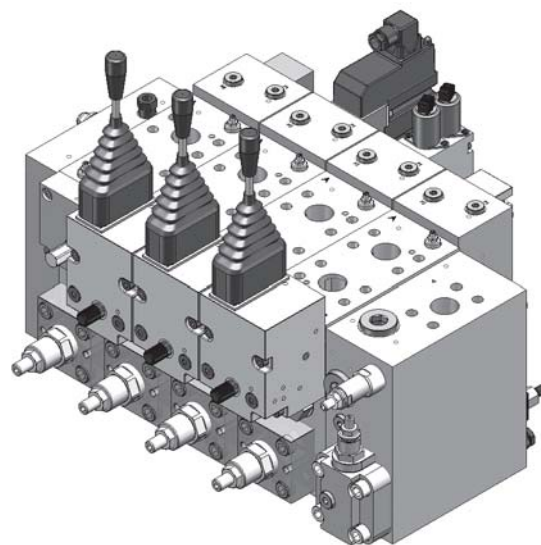
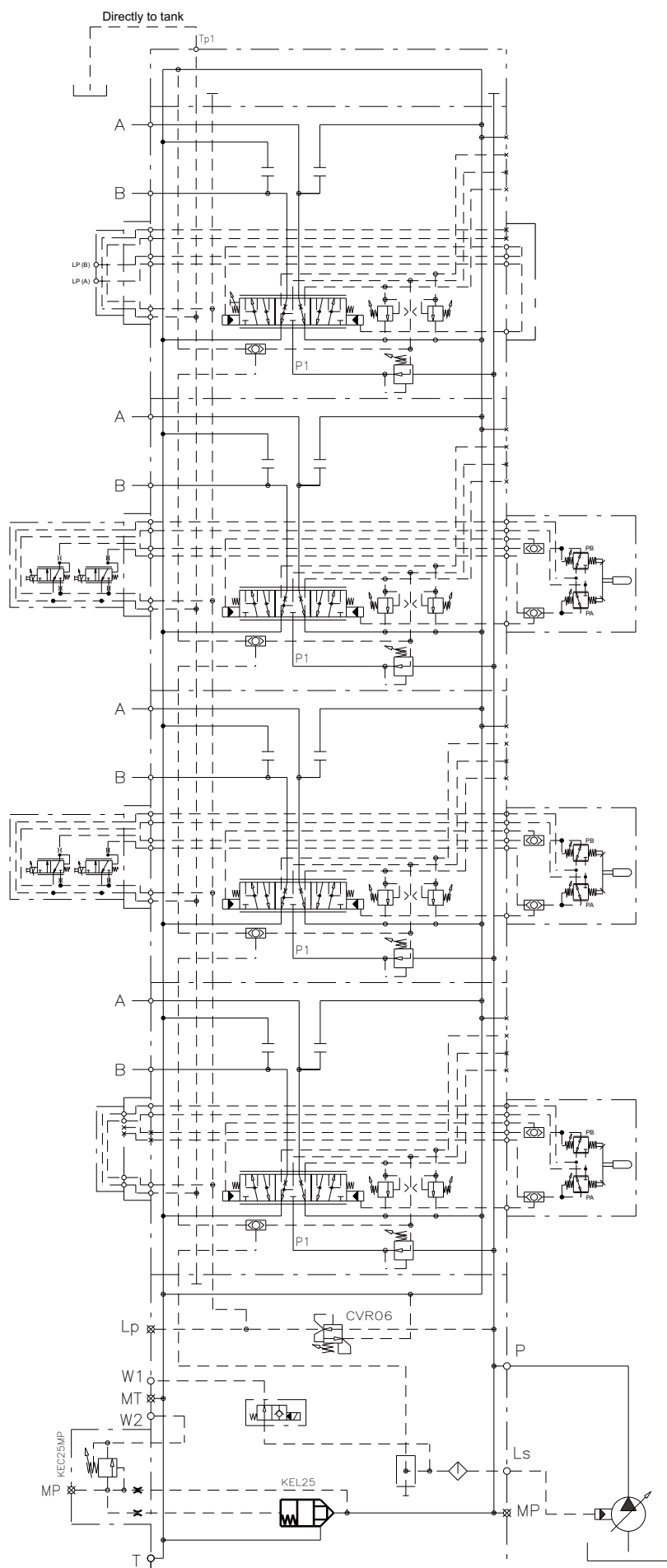


Stay bolts kit for HPV310 elements



Code	Elements	Description	Tightening torques
HSRR003105551	1	Stay bolts kit M14x1.5	140 ± 5 Nm
HSRR003105552	2		
HSRR003105553	3		
HSRR003105554	4		
HSRR003105555	5		
HSRR003105556	6		





Note

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Code DOC0006I - Rev. 05

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