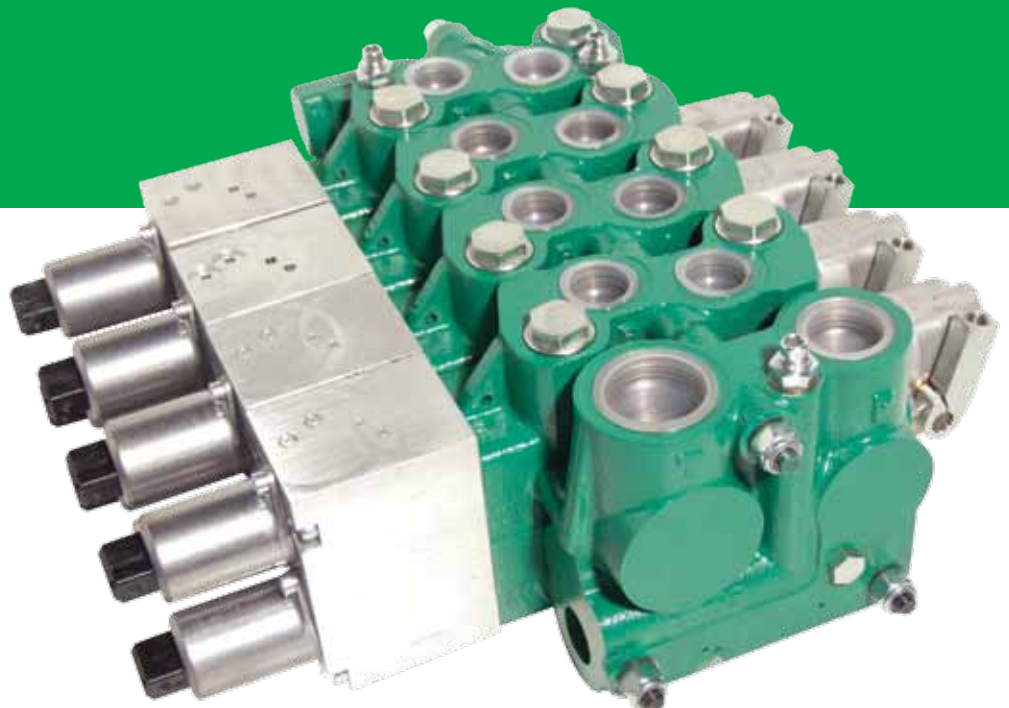


VDP08

Load-Sense Proportional Pressure Compensated Valve

SECTION A - Technical Catalogue



E0.241.0314.02.001M07

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SECTION A - VDP08 Technical Catalogue

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The data on this catalogue refer to the standard product. The policy of Salami consists of a continuous improvement of its products. It reserves the right to change the specifications of the different products whenever necessary and without giving any information. If any doubts, please get in touch with our sales department.



FEATURES**OPERATING PRINCIPLE**

Load sensing directional control valve VDP08 offers a load-independent flow control (flow in each section depends only by the spool position and not by the load acting on any function), good metering curves and chance of energy saving. The spool acts as a variable throttling on which the pressure drop is maintained constant, so that each spool position arouses a determinate flow rate.

Closed centre version for variable displacement pumps

The valve, through the LS signal, sets the pump displacement on the value required by the actuator plus a little leakage compensation flow, the pump always working almost at minimum power possible, with clear advantages in terms of energy saving.

When several spools are actuated, only the highest of the corresponding LS signals reaches the pump; in the remaining sections the compensators keep the pressure drop on the spool constant, maintaining the flow rate equal to that required by the actuator and independent of the pump pressure.

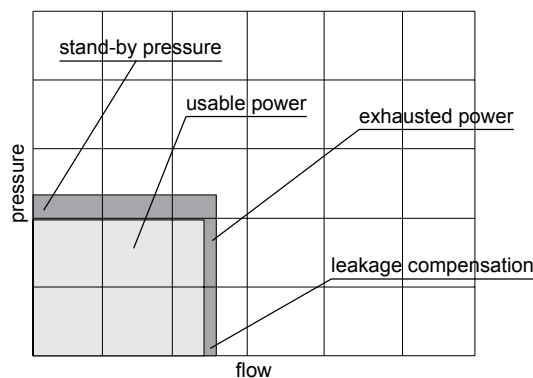
When all the spools are in neutral position (pump stand-by), the pump is required a very little flow (leakage compensation) at the stand-by pressure (14 bar - 200 psi).

Open centre version for fixed displacement pumps

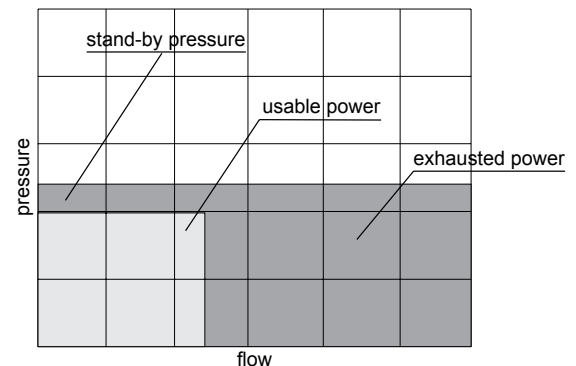
The flow regulator in the inlet module, controlled by the LS signal, drains to tank all the flow exceeding the value required by the actuators, generating in the valve the same working conditions as in case of variable displacement pump.

The advantages due to flow regulation hold, whereas energy saving is strongly cut down.

Load sensing circuit with variable displacement pump
(closed centre)



Load sensing circuit with fixed displacement pump
(open centre)

**GENERAL**

Among all hydraulic directional control valves used in the field of mobile equipment applications, the spool valve is the most popular.

The sectional valve type allows construction flexibility. Salami directional control valves are modular construction and consist of an inlet/outlet section, up to 8 working sections and an end plate. All these elements are secured in one block by means of tie-rods.

Salami directional control valves have the following features :

- Special cast-iron body;
- Spool construction in steel, hardened and chromium-plated to obtain a higher surface hardness, a better corrosion resistance, and wearing reduction;
- Minimum tolerance between spools and body to obtain a minimum internal leakage;
- Interchangeability of all spools;
- Possibility of auxiliary valves on port A and B
- Several spool controls.



FEATURES

WORKING CONDITION

HYDRAULIC FLUID	Mineral oil according DIN 51524
VISCOSITY	
Viscosity range	10 ÷ 460 mm ² /sec. 0,15 ÷ 7,13 sq.in./sec.
Optimal viscosity	12 ÷ 75 mm ² /sec. 0,19 ÷ 1,16 sq.in./sec.
TEMPERATURE	
Fluid temperature range	- 20 ÷ + 85°C - 4 ÷ + 185°F
Suggested range	+ 30 ÷ + 60° C + 86 ÷ + 140° F
MAXIMUM CONTAMINATION LEVEL	NAS 1638: class 9 ISO 4406: 19/16
ROOM TEMPERATURE	- 30 ÷ + 60°C - 22 ÷ + 140°F
WORKING LIMITS	See diagrams
PRESSURE DROPS	See diagrams
For operation with fire resistant fluids, please contact our sales department.	

DISTRIBUTION PHASES

There are two characteristic phases in the spool stroke (7 mm - 0,275 in.):

- a) the overlap phase (about 18% of the stroke) guarantees minimum internal leakages in neutral position;
- b) the progressive flow regulation phase (82% of the stroke).

TECHNICAL DATA

Max pressure	port P	315 bar	(4560 psi)
	ports A/B	350 bar	(5000 psi)
	port T*	10 bar	(145 psi)
Oil flow rate	port P	up to 130 l/min	(34 gpm)
	ports A/B	up to 95 l/min	(25 gpm)
Internal leakage			
at 160 bar (2285 psi)	ports A/B -->T	30 ÷ 35 cc/min	(1,8 ÷ 2,1 cu.in./min)
Spool stroke		±7 mm	(0,28 in.)
Dead stroke (for spool flow control)		1,8 mm	(0,07 in.)
Operating force (on the spool)	to start	90 N	(20 lbf)
	end stroke	180 N	(40 lbf)
*For higher back pressure please consult our Sales Department.			
All technical data carried out using mineral oil with viscosity of 16 cSt and contamination level 19/16 as ISO 4406.			

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FEATURES

VALVE AND DEVICE TYPES

In order to meet the most stringent demands and to offer a wider range of applications, the following types of auxiliary valves and devices are available:

· **Valves on the inlet**

Main relief valve - VSLS (see page 7A): controls the maximum pressure in the circuit acting on the LS signal that pilots the flow regulator.

Electric unloading valve - EV (see page 9A): if not excited drains the LS signal preventing the valve operation (pump pressure set at the stand-by value 14 bar - 200 psi).

Flow regulator (see page 7A): in the closed centre version serves the only function, driven by VS or EV, to drain the oil flow to tank;

in the open centre version it also regulates the flow rate.

· **Valves on the outlet**

Pressure reducing valve for electrically actuated valves (see pages 16A and 17A): supplies the piloting pressure to electro-hydraulic remote controls.

· **Valves on the section**

LS pressure limiting valves on A and/or B ports - VSLS (see page 14A): limiting the LS signal of the section control the pressure that the section can impose to the circuit. The shuttle valve allows different settings on the two ports.

Overload and anticavitation valve on port A and/or B - AR (see page 14A): avoids pressure peaks on ports A/B connecting the port to tank when pressure exceeds the setting. It also serves an anti-cavitation function.

Anti-cavitation valve on port A and/or B - VR (see page 14A): avoids cavitation due to inertia in the system.

Prearrangement for AR/VR and VSLS (see page 14A): PR and PRVSLS.

EACH DEVICE AND EACH CONFIGURATION REPORTED IN THIS CATALOGUE HAS A CORRESPONDING PART NUMBER IN THE DEALER CATALOGUE.

FOR ORDERING PART NUMBER, PLEASE CONSIDER THE DEALER CATALOGUE.

IN CASE OF MISSING PART NUMBER, PLEASE CONTACT OUR SALES DEPARTMENT.

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FEATURES

INSTALLATION

When proceeding to mount the unit on the structure and to connect fittings to work ports, it is necessary to comply with the values of tightening torques (see page 18A).

The attachment of linkages to spools should not affect their operation. The mounting position can be vertical with inlet module on the top or horizontal.

We recommend to fix the valve always using only 3 of the 4 fixing holes, otherwise make sure to interpose 4 rubber insulators between the valve and the machine frame, to avoid valve distortion and spool sticking.

FILTRATION

The contamination of the fluid circulating in the system greatly affects the life of the unit. Above all, contamination may result in irregular operation, wear of seals in valve housings and failures. Once the initial cleanliness of the system has been attained, it is necessary to limit any increase of contamination by installing an efficient filtration system (see working conditions page 2A).

PIPES

Pipes should be as short as possible, without restrictions or sharp bends (especially the return lines).

Before connecting pipes to the fittings of the corresponding components, make sure that they are free from burrs and other contamination.

As a first approximation, for a mobile machine with standard length pipes, their width should guarantee the following values of fluid speed*:

6 ÷ 10 m/sec
3 ÷ 5 m/sec

inlet pipe
outlet pipe

19,7 ÷ 32,8 ft/sec
9,9 ÷ 16,4 ft/sec

inlet pipe
outlet pipe

the lowest values of fluid speed are required in case of wide temperature range and/or for continuous duty.

$$* [v = \frac{21,2 \cdot Q}{d^2}]$$

v = fluid speed [m/sec], Q = flow [l/min], d = pipe internal diameter [mm]



FEATURES

HYDRAULIC FLUID

Usually a mineral-base oil with a good viscosity index should be used, preferably with good lubricating properties and corrosion, oxidation and foaming resistant.

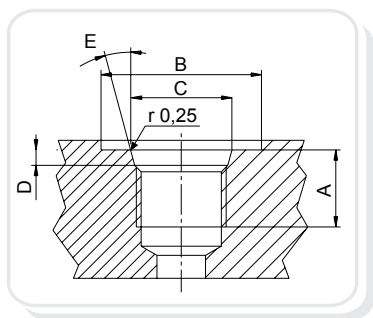
Sometimes the fluids supplied by the manufacturers do not satisfy purity requirements (see WORKING CONDITIONS). It is therefore necessary to filter the fluid carefully before filling. Your supplier can give you the information about NAS class of its fluids. To maintain the proper purity class, the use of filters of high dirt capacity with clogging indicator is recommended.

Under humidity conditions it is necessary to use hygroscopic salts.

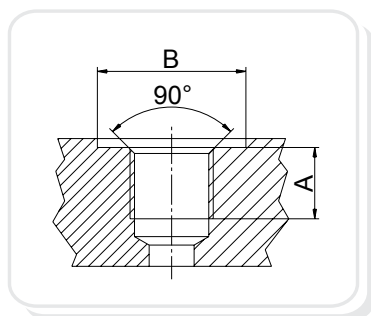
For operation with fire resistant and ecological fluids, please contact our technical department.

PORTS

Following are standard ports. For different port types, please contact our sales department.



SAE UN-UNF (ISO 725)							
Dimensions mm <i>In.</i>		7/8 -14 UNF SAE10		1"1/16 -12 UN SAE12		1"5/16 -12 UN SAE16	
A		17	0,67	20	0,79	20	0,79
B		34	1,34	41	1,61	49	1,92
C		23,9	0,94	29,2	1,15	35,5	1,40
D		2,5	0,10	3,3	0,13	3,3	0,13
E		15°		15°		15°	



BSP (ISO 228)					
Dimensions mm <i>In.</i>	G1/2		G3/4		G1
A	16	0,63	18	0,71	20 0,79
B	27	1.06	33	1.30	40 1.57

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DIMENSIONS

A/B: working ports

P: top inlet port

PL: side inlet port

T: top outlet port

TL: side outlet port

LS (see page 8A):

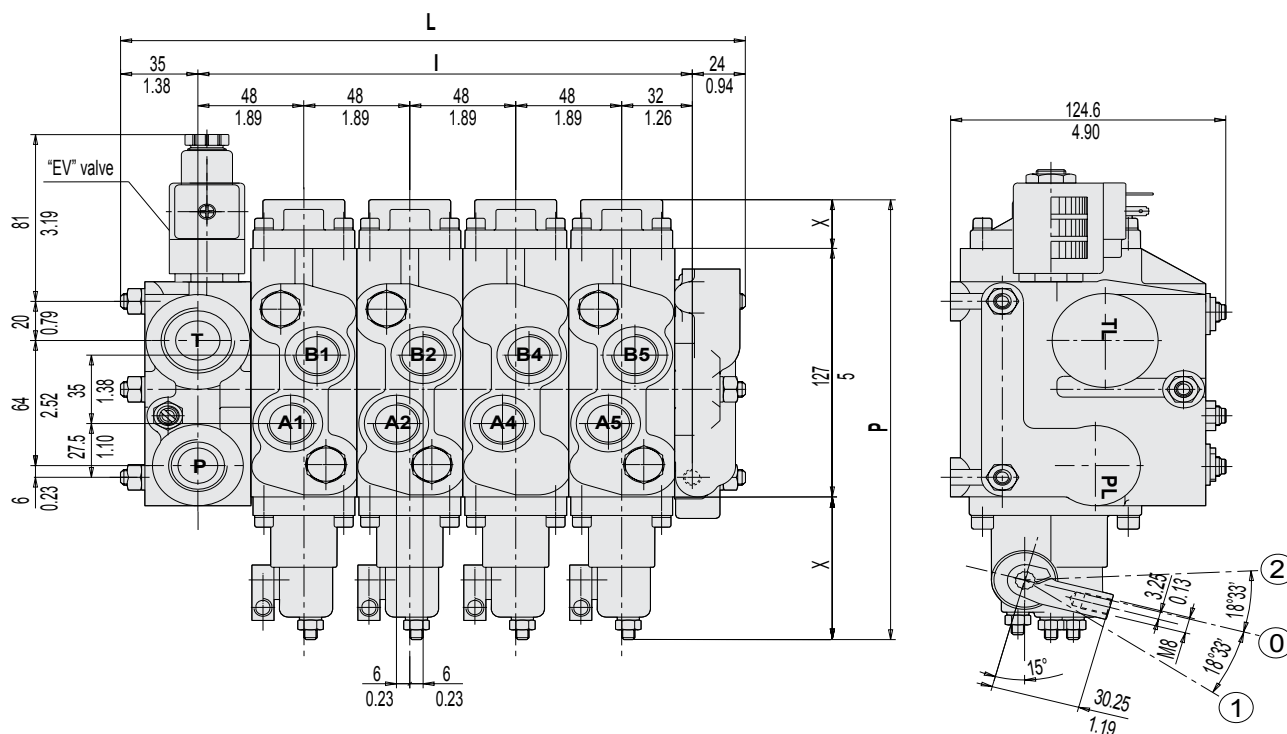
load-sensing signal port

PG (see page 8A):

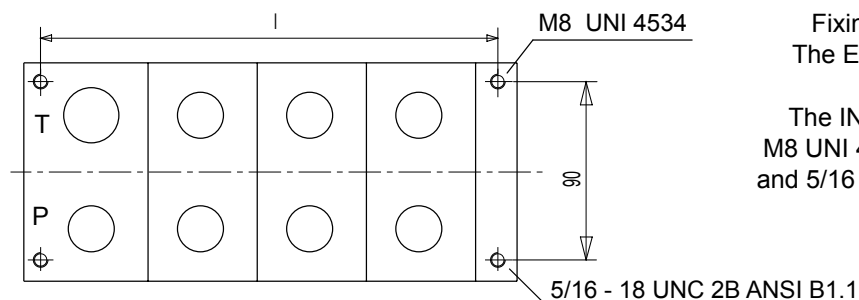
pressure gauge port

Ports Orifices	P/PL	T/TL	A/B	PG/LS
BSP ISO 228	G3/4	G1	G1/2	G1/4
SAE ISO 176	SAE12	SAE16	SAE10	SAE4

The drawing shown is just an example. The overall dimensions you read are valid for all the D.C.V. except the parametric dimensions "L" and "I" depending on the number of working sections. The parametric dimensions "P" depends on a fixed dimension of 127 mm (5 in.) to which you have to add the "X" dimensions that you can find in the following pages.



Nr. sections		1	2	3	4	5	6	7	8
I	mm	80	128	176	224	272	320	368	416
	in	3,14	5,03	6,92	8,81	10,70	12,59	14,48	16,37
L	mm	107	155	203	251	299	347	395	443
	in	4,21	5,47	7,99	9,88	11,77	13,66	15,55	17,44
Mass	kg	8,80	12,8	16,80	20,80	24,8	28,8	32,8	36,8
	lb	19,42	28,25	37,08	45,91	57,74	83,57	72,40	81,23



Fixing holes distance between centers.
The END PLATES are always threaded as shown beside.

The INLET/OUTLET modules are threaded M8 UNI 4534 when the ports are GAS threaded and 5/16 - 18 UNC 2B ANSI B1.1 when the ports are SAE threaded.



INLET/OUTLET MODULES

OPERATING PRINCIPLES



OPEN CENTRE CIRCUIT WITH FIXED DISPLACEMENT PUMP “CODE F” - SEE PAGE 8A

When the pump is started and main spools in the working modules are in neutral position, oil flows from the pump through P port across the flow regulator to tank T.

The oil flow led across the flow regulator determines the pump pressure (stand-by pressure of 14 bar - 200 psi).

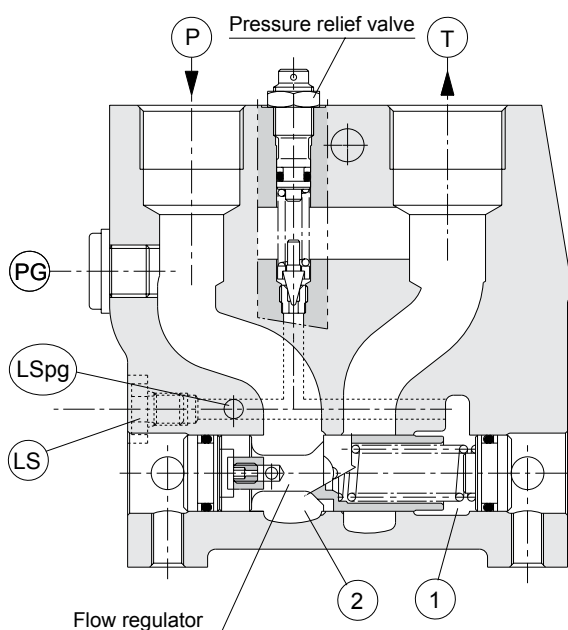
When one or more of the main spools are actuated, the highest load pressure is fed through the shuttle valve circuit ("LS" pilot gallery, see hydraulic circuit at pag.11A) to the spring chamber behind the flow regulator ①, completely or partially closes the connection to tank.

Pump pressure is applied to the left-hand side of the flow regulator ②. The pressure relief valve poppet will open as soon as the load pressure will exceed the set value, so that the flow regulator will shift right diverting pump flow back to tank.

CLOSED CENTER CIRCUIT WITH VARIABLE DISPLACEMENT PUMP “CODE V” - SEE PAGE 8A

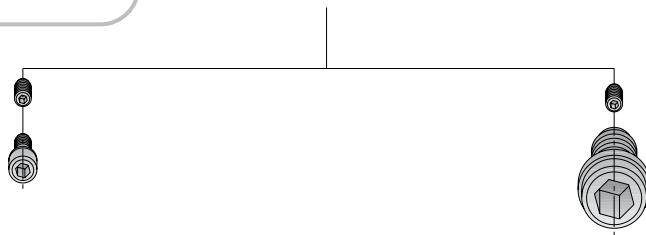
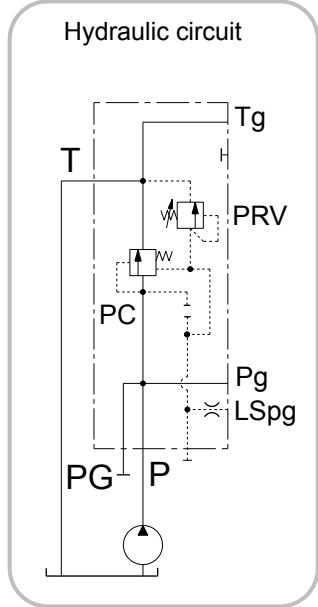
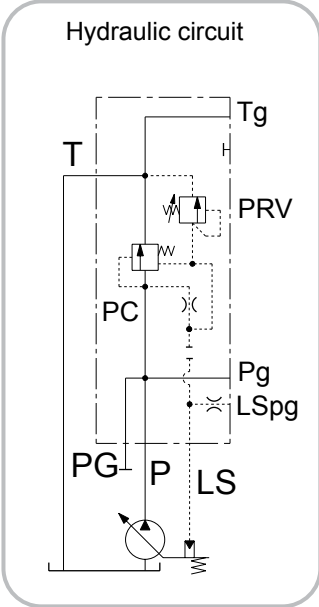
In the closed centre version a throttling ③ and a plug ② have been fitted instead of the plug ①.

This means that the flow regulator will only open to tank when the pressure in channel P exceeds the set value of the pressure relief valve. In load sensing systems the load pressure is led to the pump regulator via the “LS” port.



P INLET PORT
T OUTLET PORT
PG PRESSURE GAUGE PORT
LSpg "LOAD SENSING PILOT GALLERY"
LS LOAD SENSING PORT

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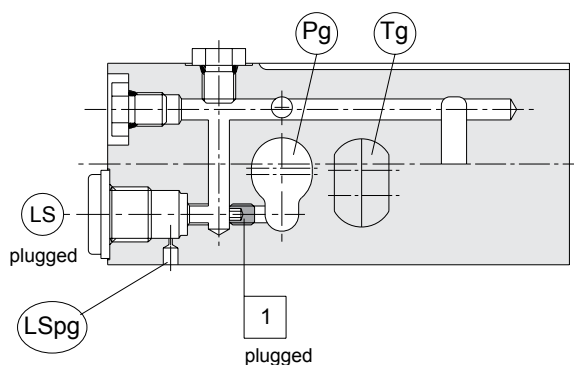
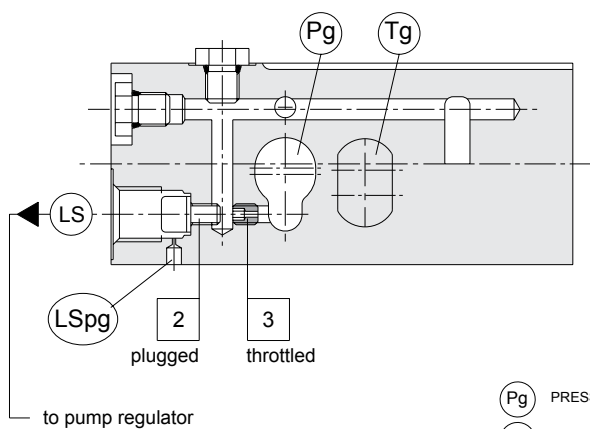


code V

code F

Closed centre for variable displacement pumps

Open centre for fixed displacement pumps

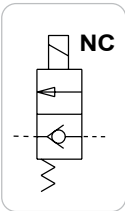
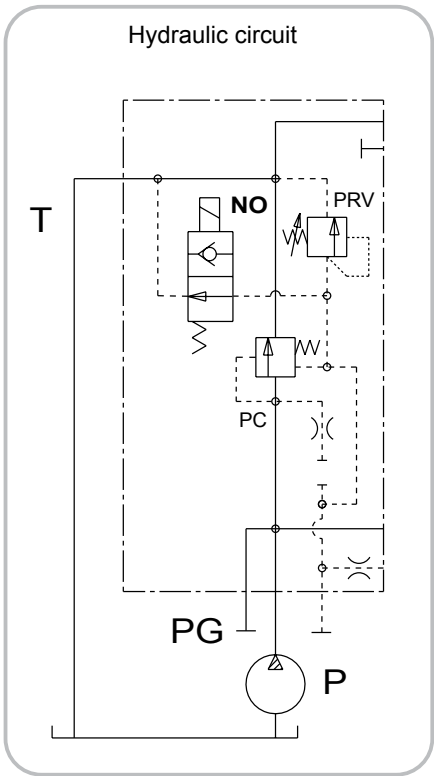


- | | |
|-----|------------------------|
| Pg | PRESSURE COMPENSATOR |
| Pg | PRESSURE GALLERY |
| Tg | TANK GALLERY |
| PRV | PRESSURE RELIEVE VALVE |

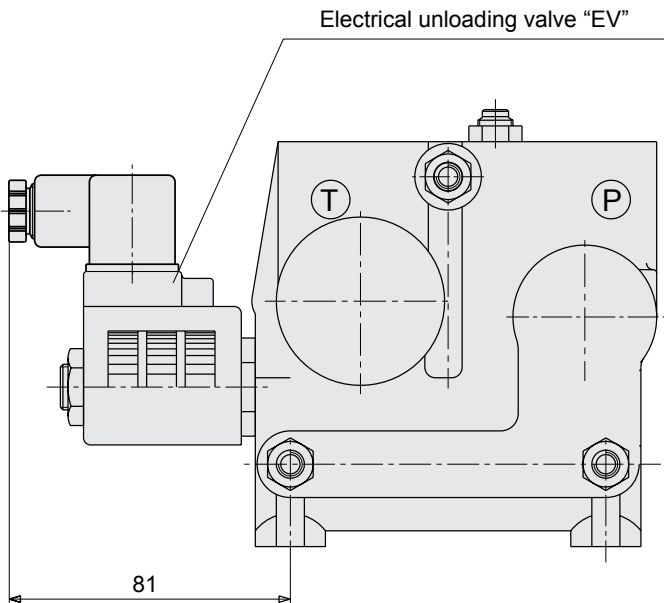
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INLET/OUTLET MODULES

Inlet module circuit with LS electrical unloading valve - “EV”



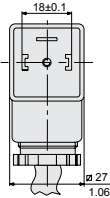
EV1	12 Vcc	normally open
EV2	24 Vcc	open
EV3	12 Vcc	normally closed
EV4	24 Vcc	closed



CIRCUIT DESCRIPTION:

“EV” is an unloading electrovalve of the “LS” signal. ”EV” is fitted into the inlet module enabling a connection between the “LS” and the tank lines. The “LS” signal can be relieved to tank switching the electrovalve by an electrical signal.

**CONNECTOR
DIN 43650 - A/ISO 4400**



“EV” VALVE IN THE OPEN CENTRE CIRCUIT “CODE F”

For an open centre inlet module the relief to tank of the “LS” signal means that the pressure in the system is reduced to the difference of the tank port pressure and the inlet module pressure.

“EV” VALVE IN THE CLOSED CENTRE CIRCUIT “CODE V”

For a closed centre inlet module the relief to tank of the “LS” signal means that the pressure in the system is reduced to the difference of the tank port pressure and the stand-by pressure of the pump.

SPECIFICATIONS	
- MAX PRESSURE IN P”	350 bar
- MAX FLOW	10 l/min
- OIL LEAKAGE	82 cc/min
- AVAILABLE VOLTAGE	12 - 24 Vcc
- COIL RESISTANCE	12Vcc:5.1 Ω - 24 Vcc:20.5 Ω
- PROTECTION INDEX WITH STANDARD CONNECTOR	IP 65

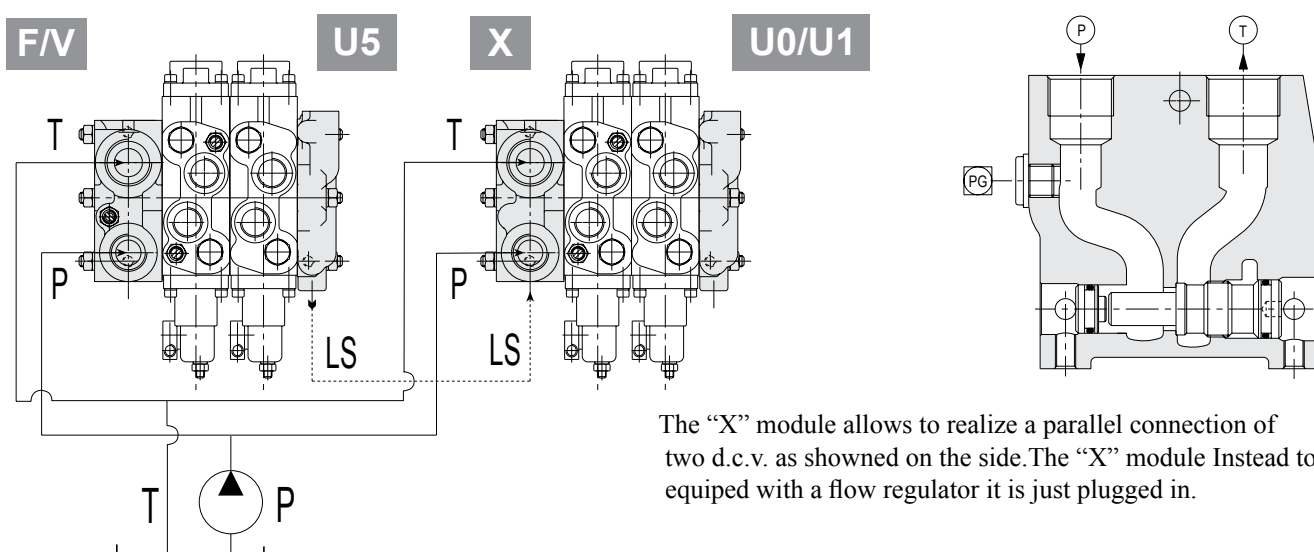
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INLET/OUTLET MODULES

Inlet module for parallel connected valves

code X

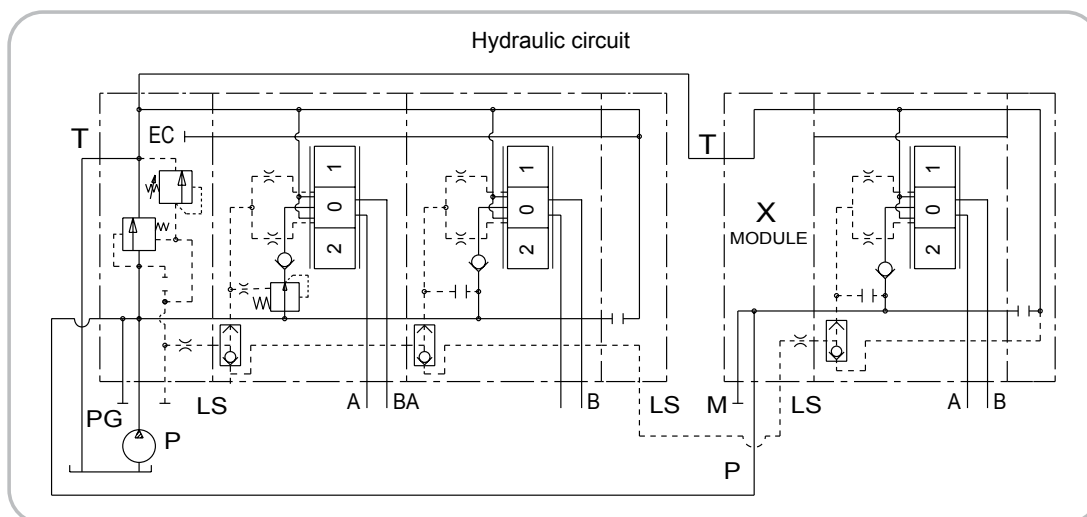
Before to order this code, please get in touch with our sales dept.



The “X” module allows to realize a parallel connection of two d.c.v. as shown on the side. The “X” module instead of being equipped with a flow regulator it is just plugged in.

The hydraulic circuit shows the upstream d.c.v. with “F” inlet module (for fixed displacement pump) and the downstream valve with the “X” inlet module. The downstream d.c.v. takes the “LS” signal from the end module of the upstream d.c.v. The same d.c.v. connection could be done with a “V” module in the upstream d.c.v. (for variable displacement pump). The end module of the upstream d.c.v. has to be designed as “U5”.

EXAMPLE OF CIRCUIT TYPE



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WORKING MODULES

WORKING MODULE WITH PRESSURE COMPENSATOR

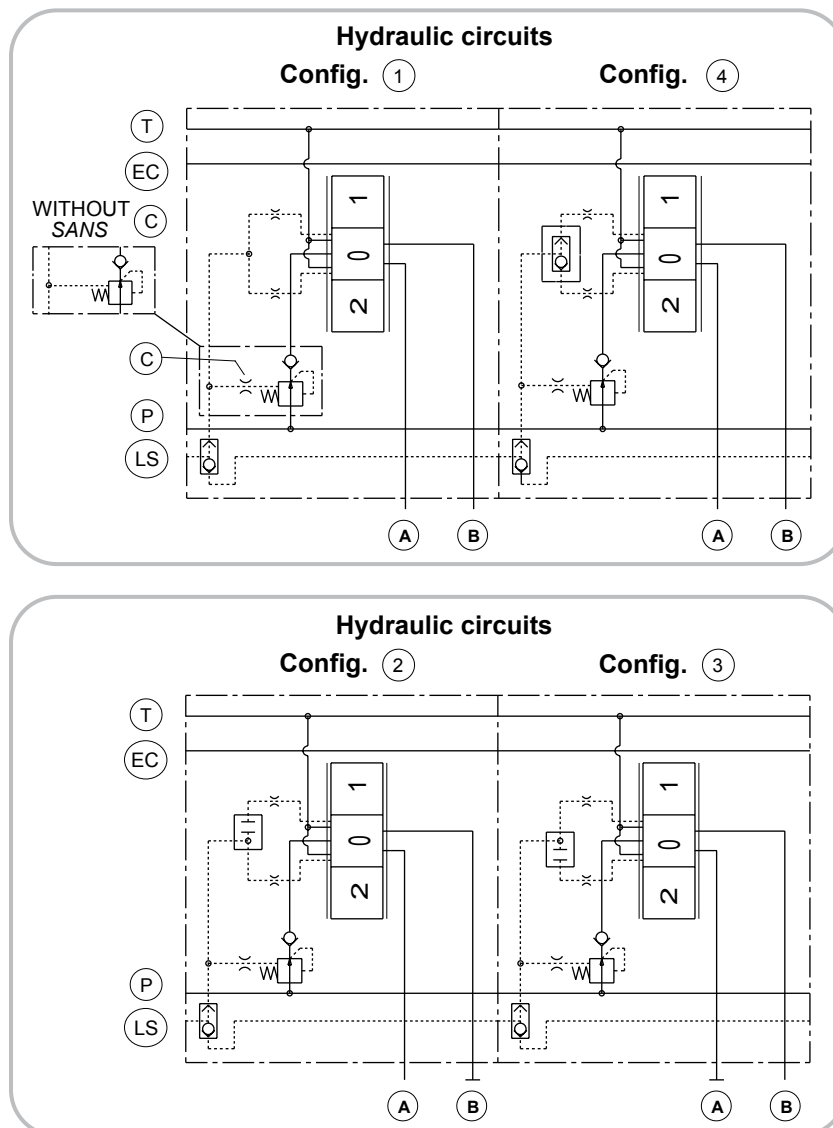
GENERAL FEATURES

In a pressure-compensated working module the compensator maintains a constant pressure drop across the main spool - both when the load changes and when a module with a higher load pressure is actuated.

CIRCUIT CONFIGURATIONS

The pressure compensated working module is available in four circuit configurations (see figures beside), where you can introduce all the spool circuits that you can find from page 19A to page 22A. In this way we can have a vast range of circuit types. The drawings at page 12A show the components required to obtain the four different circuit configurations.

The plug ① is used just to close a machining hole. The pivots ② and ③ replace the plug ① in case we have a single acting spool instead of a double. The pivot ④ is used with "LS" pressure limiting valves on A and B ports. It has a shuttle valve built-in that selects the "LSA" and "LSB" signals, coming from working ports and limited by "LS" pressure valves. To ensure a stabler "LS" signal the throttling ⑤ is always mounted. Throttling ⑤ can be removed if required.

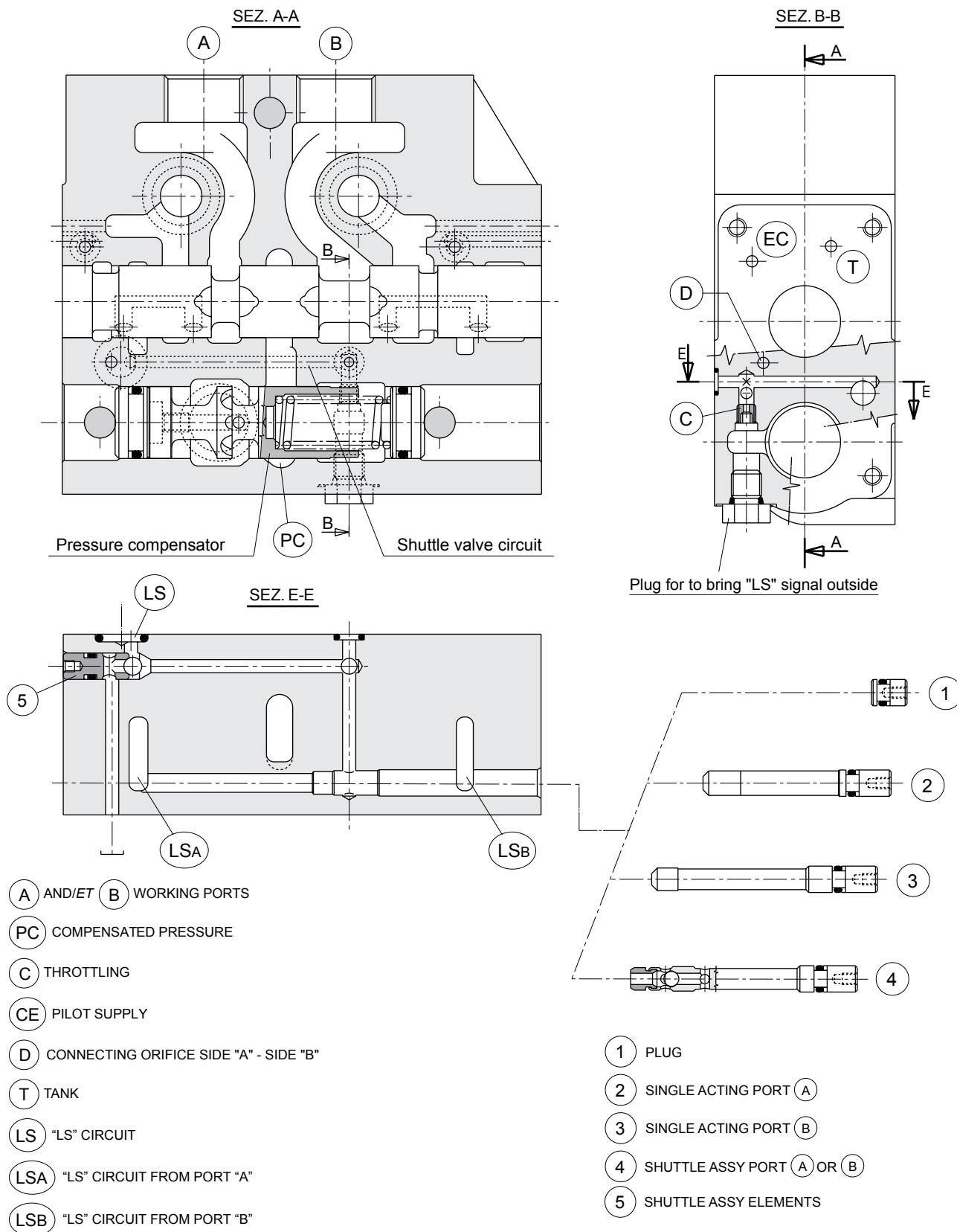


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WORKING MODULES

WORKING MODULE WITH PRESSURE COMPENSATOR



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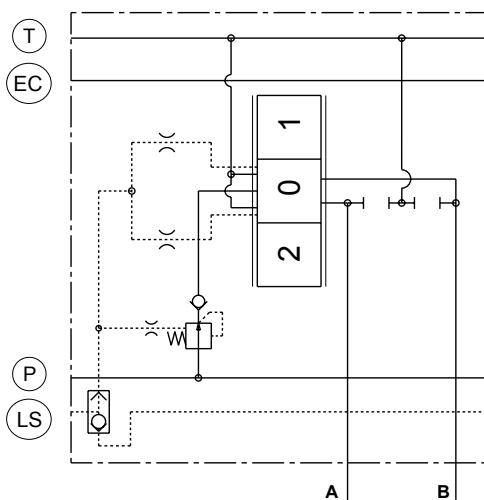


WORKING MODULES

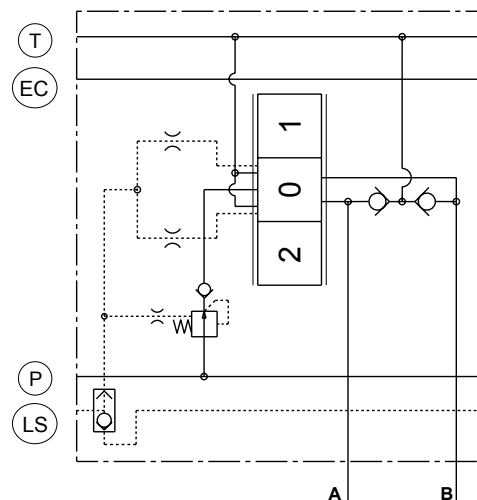
AVAILABLE VALVE TYPES ON A/B PORTS

Available circuits

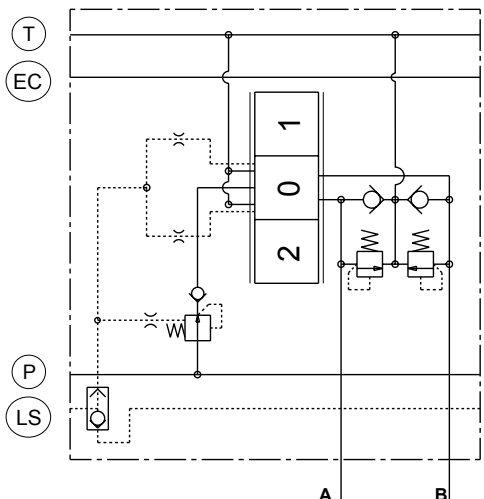
PR - Prearranged for VR - AR



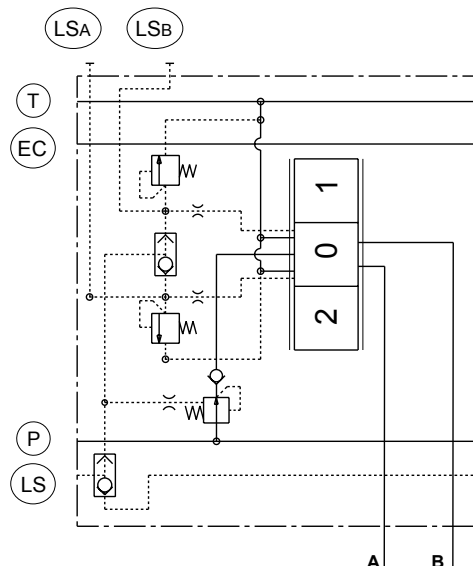
VR - Anti-cavitation valve



AR - Overload and anti-cavitation valve



VSLs - LS_{A/B} - Pressure limiting valve



GENERAL FEATURES

The hydraulic circuits of the different available valves are here shown, in the next page the valves location on the working module.

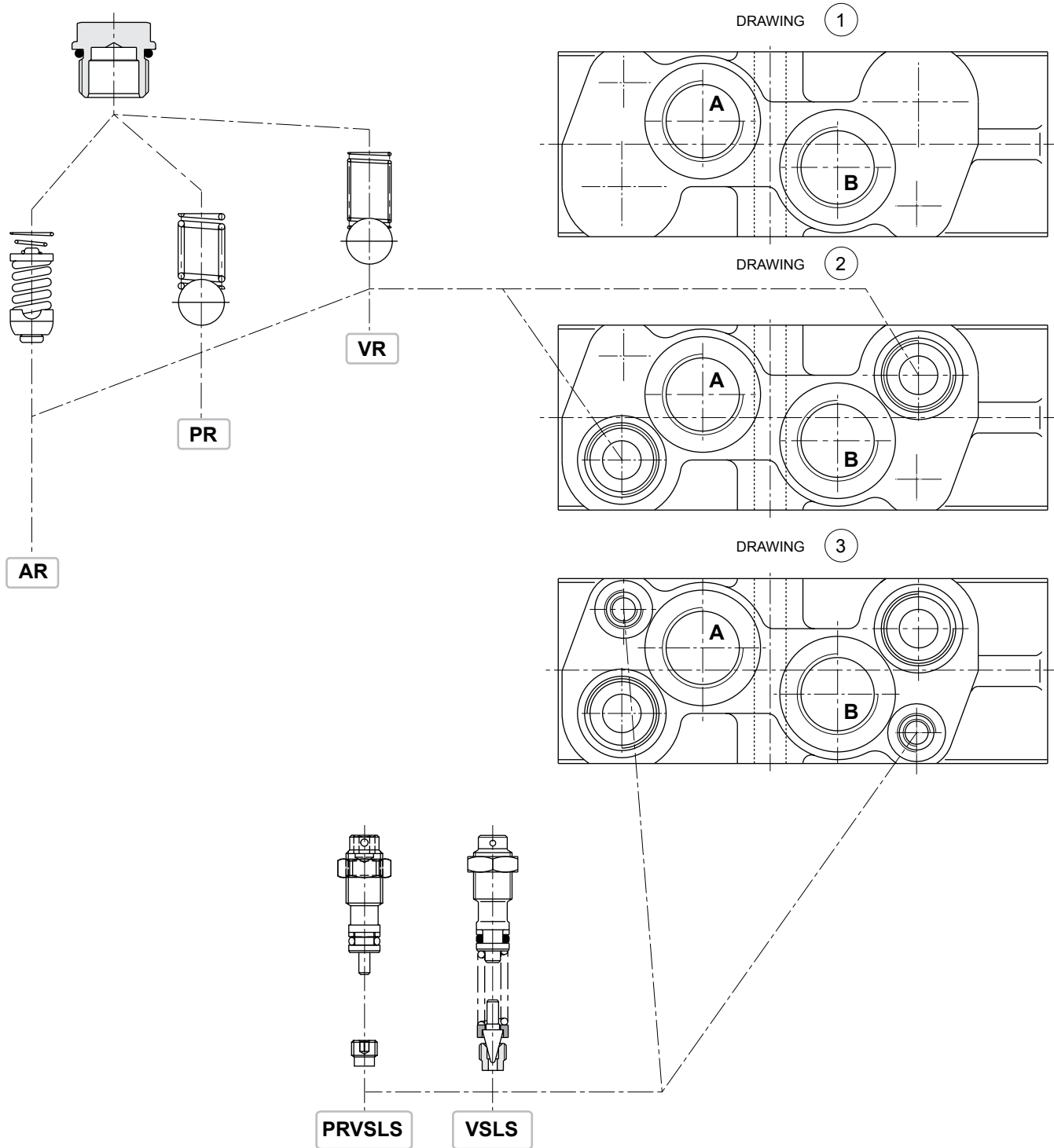
As shown on page 14A in drawing ① a working module without valves, in drawing ② a module with pre-arrangement for (VR) - (AR). Remind that the (AR) valve setting is fixed. In drawing ③ a module with two additional valve seats where the (VSLs) valves can be fitted. As shown in the circuit, this module offers the chance to pick up the "LS" signals from A and B ports removing the two plugs in the bottom of the module.

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WORKING MODULES

AVAILABLE VALVE TYPES ON A/B PORTS



AR - Overload and anticavitation valve

VR - Anticavitation valve

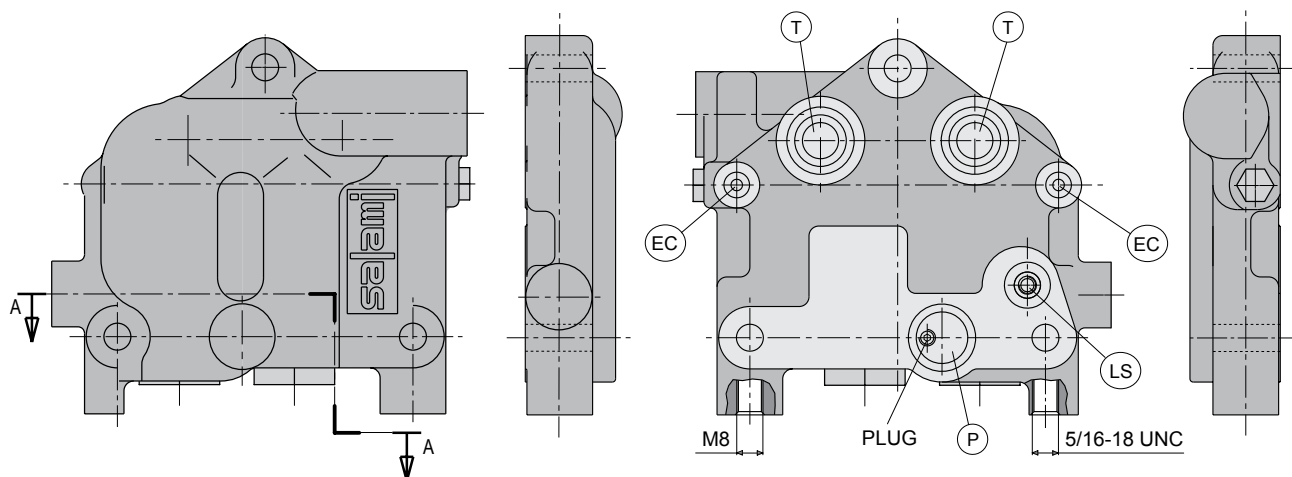
PR - Prearranged for AR / VR

PRVSLS - Prearranged for VSLS

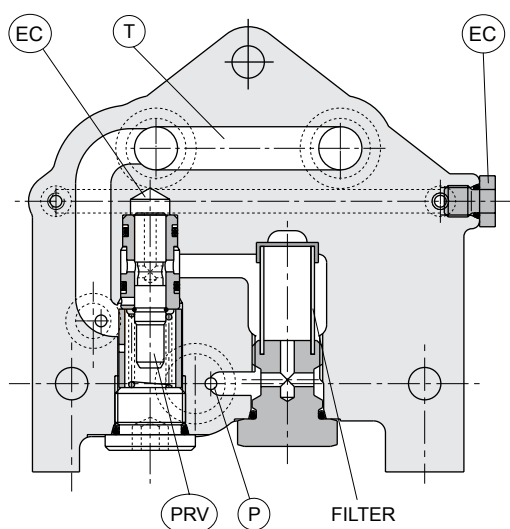
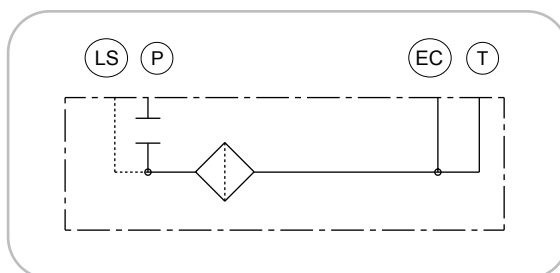
VSLS - LS pressure limiting valve

END PLATE

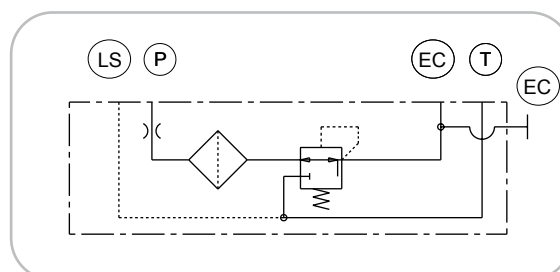
AVAILABLE CIRCUIT



code U0



code U1



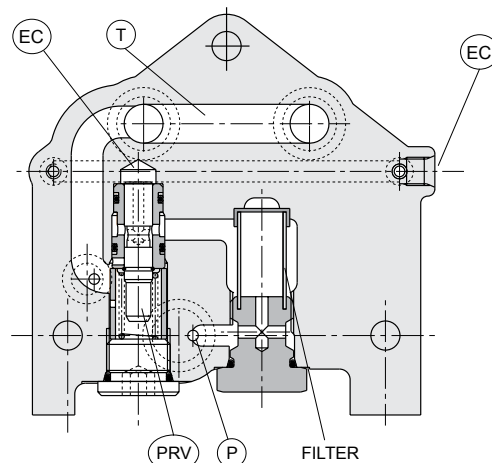
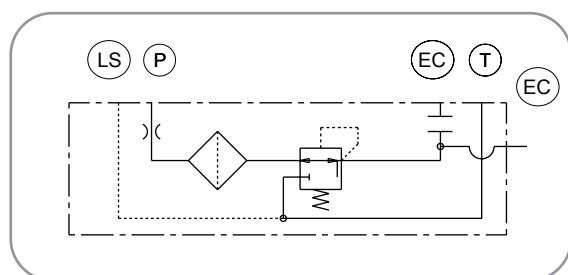
“U1” end plate integrates the reducing pressure valve (PRV) which draws “P” signal, when reducing it to a pressure of approx. 10 to 28 bar, sending it to “EC” circuit for feeding the electrohydraulic controls.

EO.241.0314.02.001M07

END PLATE

AVAILABLE CIRCUIT

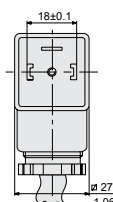
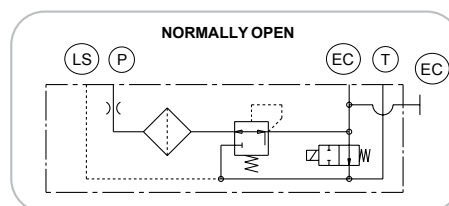
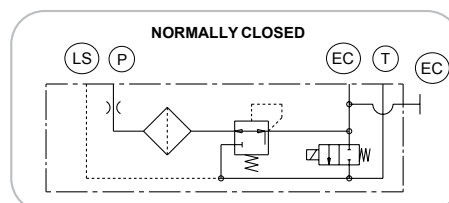
code U2



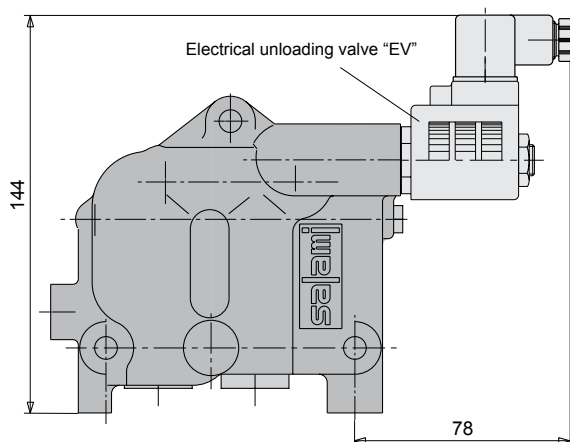
“U2” end plate integrates the reducing pressure valve (PRV) which draws “P” signal, when reducing it to a pressure of approx. 10 to 28 bar, obtaining in this way an external piloting signal which can be used by a joystic or an electrovalve for to operate “IP” controls. In this case “EC” piloting inside the valve is plugged.

SPECIFICATIONS

- MAX PRESSURE IN P”	207 bar
- MAX FLOW	10 l/min
- OIL LEAKAGE	82 cc/min
- AVAILABLE VOLTAGE	12 - 24 Vcc
- COIL RESISTANCE	12Vcc:5.1 Ω - 24 Vcc:20.5 Ω
- PROTECTION INDEX WITH STANDARD CONNECTOR	IP 65

CONNECTOR
DIN 43650 - A/ISO 4400

12 Vcc - code U3
24 Vcc - code U4

12 Vcc - code U6
24 Vcc - code U7


E0.241.0314.02.00IM07

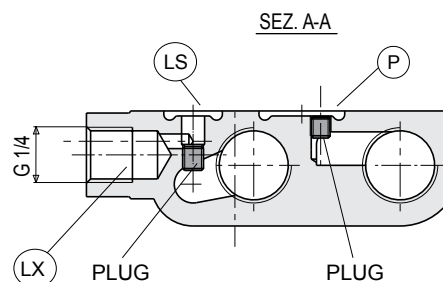
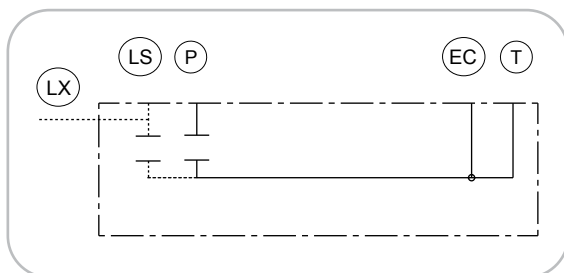


“U3-U4” and “U6-U7” end plates integrate (PRV) valve for electrohydraulic circuits and can also release the “EC” piloting by the electrovalve, which can be normally open or closed.

END PLATE

AVAILABLE CIRCUIT

code U5

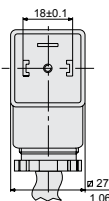


"U5" end plate allows to come out with "LS" signal in order to obtain a parallel circuit with a downstream VDP08 valve complete with a suitable inlet (see page 10A). This becomes possible when plugging "LS" signal (see figure).

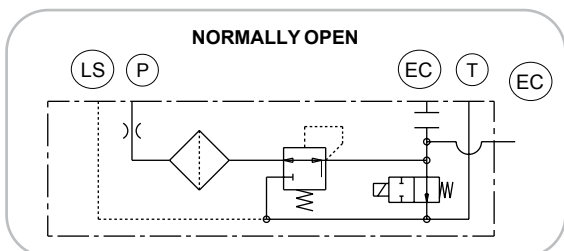
CONNECTOR DIN 43650 - A/ISO 4400

SPECIFICATIONS

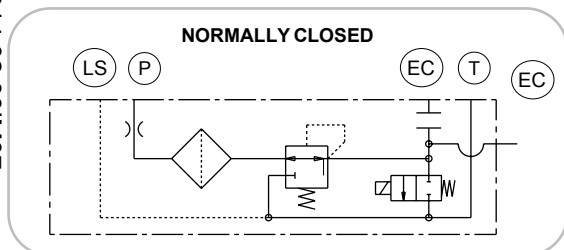
- MAX PRESSURE IN P"	207 bar
- MAX FLOW	10 l/min
- OIL LEAKAGE	82 cc/min
- AVAILABLE VOLTAGE	12 - 24 Vcc
- COIL RESISTANCE	12Vcc: 5.1 Ω - 24 Vcc: 20.5 Ω
- PROTECTION INDEX WITH STANDARD CONNECTOR	IP 65



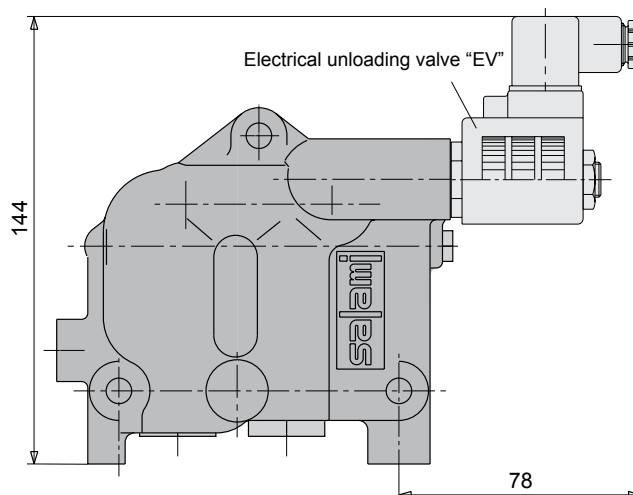
12 Vcc - code U8 24 Vcc - code U9



12 Vcc - code U10 24 Vcc - code U11



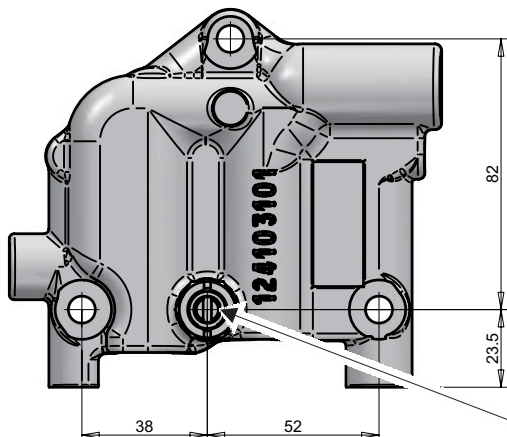
EO.241.0314.02.001M07



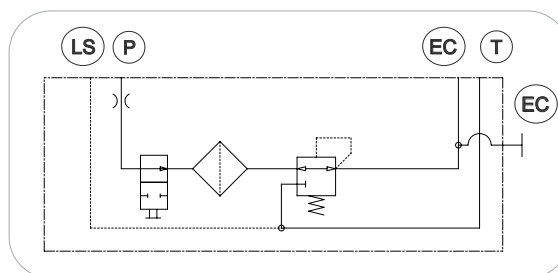
"U8-U9" and "U10-U11" end plates integrate (PRV) valve and can also release the "EC" external piloting by the electrovalve, which can be normally open or closed.

END PLATE

AVAILABLE CIRCUIT



code U12



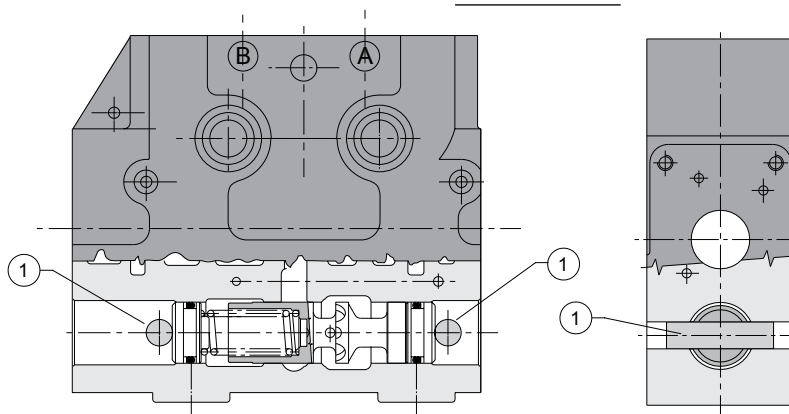
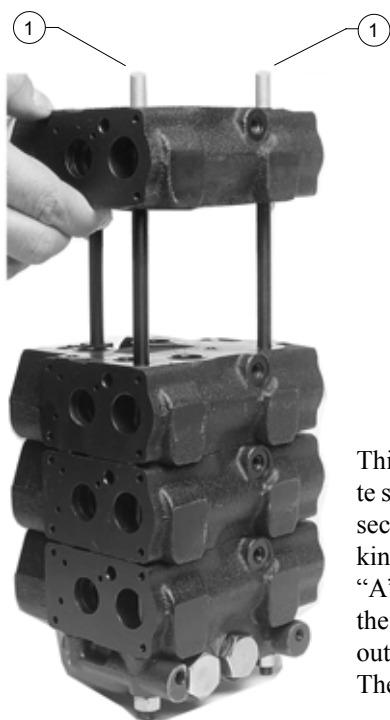
BY-PASS VALVE

“U12 “ end plate integrates the reducing pressure valve (PRV) which draws “ P “ signal when reducing it to a pressure of approx. 10 to 28 bar, sending it to “ EC “ circuit for feeding the electro-hydraulic controls. The by-pass valve can exclude the reducing pressure valve (PRV) and the electronic devices.

Special release made in order to be able to put in pressure VDP08 electro-hydraulic with a hand pump. The hand pump is commonly used as an emergency device in the field of aerial platforms. Before to order this code , please get in touch with our sales dept.

ASSEMBLYING SECTIONS ISTRUCTIONS

DRAWING "A"



This assembling procedure is mainly suitable for customers who purchase VDP08 complete sections and assemble them by themselves, but can also be useful to add further working sections or to modify the circuit, replacing, a few parts when having a complete valve. Working sections and inlet modules are equipped with a small cylinder of teflon (see drawing “A”). This cylinder has to keep compressed the pressure compensator. If not, it could stop the fixing holes of the tie-rods. When assembling, you have to insert the tie-rods, which take out the teflon cylinder from its hole without any obstacle (see side picture). The necessary torque for the screws is 28 Nm.

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TYPES OF SPOOLS AVAILABLE

During the spools construction by appropriate notches dimensioning we can to obtain different type depending of the flow rates.

Each spool has a description with three digits, that allow to understand immediatly the working principle and the flowrate.

FLOWRATE
↓
000
↓
SPOOLS CODE

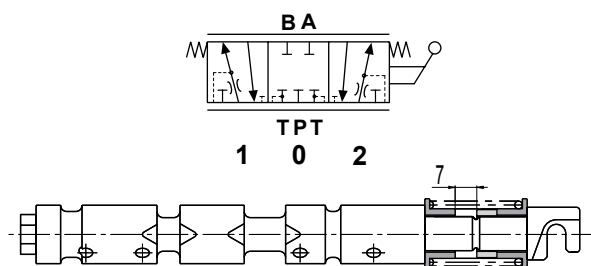
Type	Flow control from - up to
1	Working port flow rate 8 l/min. - 2,1 gpm.
2	Working port flow rate 16 l/min. - 4,2 gpm.
3	Working port flow rate 25 l/min. - 6,6 gpm.
4	Working port flow rate 45 l/min. - 11,8 gpm.
5	Working port flow rate 63 l/min. - 16,6 gpm.
6	Working port flow rate 95 l/min. - 25 gpm.

EACH SPOOL WILL BE SUPPLIED WITH THE CORRESPONDING POSITIONING KIT

STANDARD MAIN SPOOLS FOR - SPS / SL / NL - CONTROLS

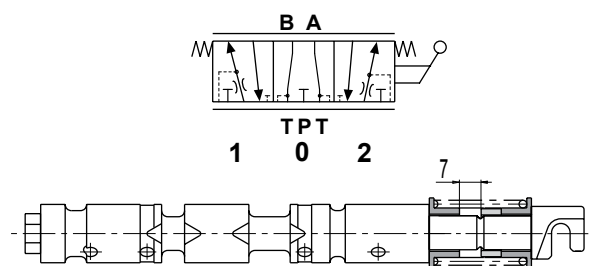
code 01

Double acting spool
(5 ways, 3 positions, A/B closed in neutral position)



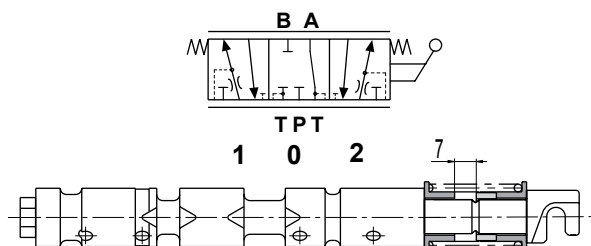
code 02

Motor spool
(5 ways, 3 positions, A/B → T in neutral position)



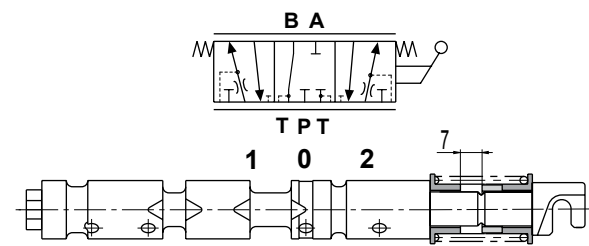
code 03

Double acting motor spool port A (B port blocked)
(5 ways, 3 positions, B closed in neutral position)



code 04

Double acting motor spool port B (A port blocked)
(5 ways, 3 positions, A closed in neutral position)



EO.241.0314.02.001M07



TYPE OF SPOOLS AVAILABLE

code 05

Single acting spool ("A" working port)
(5 ways, 3 positions, A/B closed in neutral position)

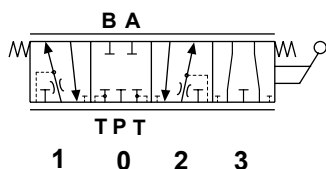
code 06

Single acting spool ("B" working port)
(5 ways, 3 positions, A/B closed in neutral position)

The choice to have a single acting spool must be done on the body of the valve with the plugs showed at page 12A
Therefore, for realizing spools code 05 and code 06 (single acting A or B) you need the spool code 01 in a circuit described at page 19A.

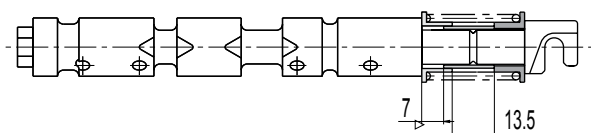
code 11

Double acting spool with float position
(5 ways, 4 positions, A/B closed in neutral position)



AVAILABLE ONLY WITH MANUAL CONTROL NL.
FLOAT POSITION CAN BE ACHIEVED ONLY PUSHING FORWARD THE LEVER.
THIS SPOOL CAN BE MOUNTED ONLY WITH LEVER ON "A" SIDE.

Before to order this code, please get in touch with our sales dept.



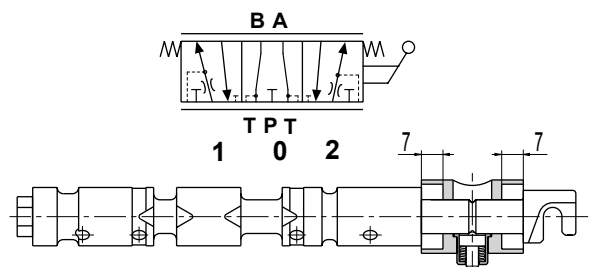
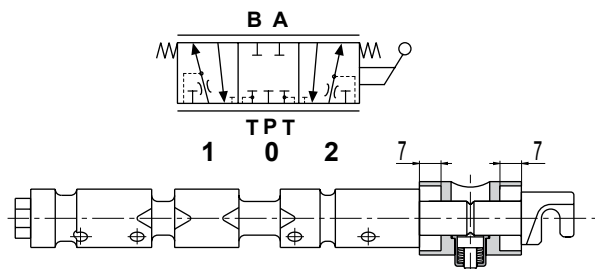
STANDARD MAIN SPOOLS FOR - FL - CONTROLS

code 01

Double acting spool
(5 ways, 3 positions, A/B closed in neutral position)

code 02

Motor spool
(5 ways, 3 positions, A/B → T in neutral position)

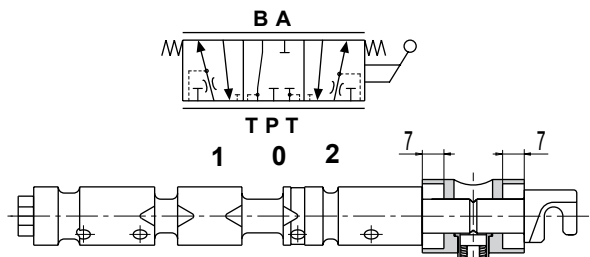
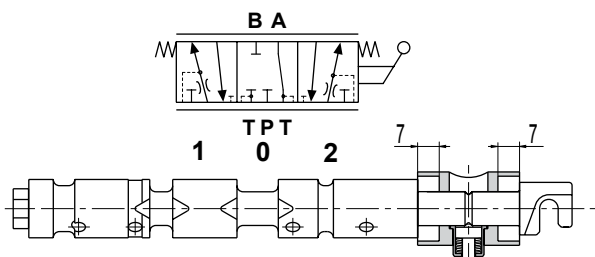


code 03

Double acting motor spool port A (B port blocked)
(5 ways, 3 positions, B closed in neutral position)

code 04

Double acting motor spool port B (A port blocked)
(5 ways, 3 positions, A closed in neutral position)



TYPE OF SPOOLS AVAILABLE

code 05

Single acting spool ("A" working port)
(5 ways, 3 positions, A/B closed in neutral position)

code 06

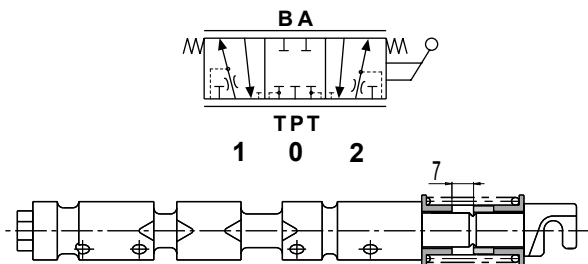
Single acting spool ("B" working port)
(5 ways, 3 positions, A/B closed in neutral position)

The choice to have a single acting spool must be done on the body of the valve with the plugs showed at page 12A. Therefore, for realizing spools code 05 and code 06 (single acting A or B) you need the spool code 01 in a circuit described at page 20A.

STANDARD MAIN SPOOLS FOR - IP - CONTROLS

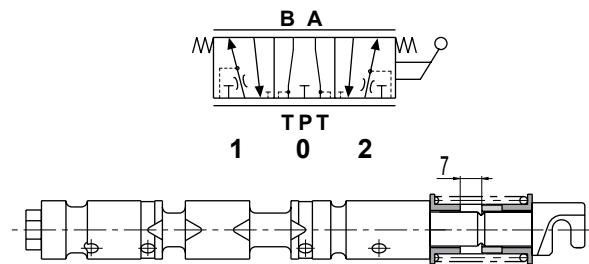
code 01

Double acting spool
(5 ways, 3 positions, A/B closed in neutral position)



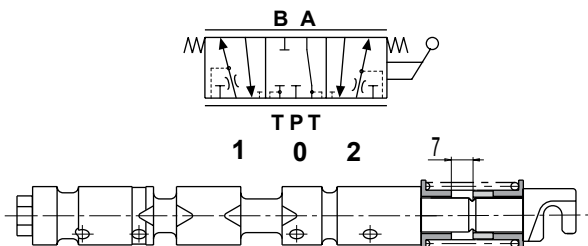
code 02

Motor spool
(5 ways, 3 positions, A/B → T in neutral position)



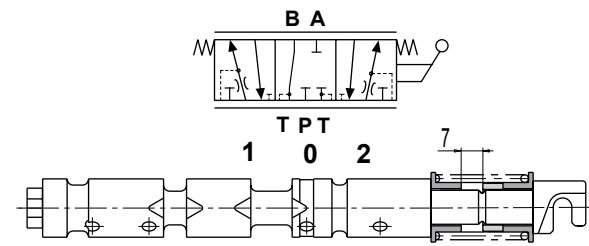
code 03

Double acting motor spool port A (B port blocked)
(5 ways, 3 positions, B closed in neutral position)



code 04

Double acting motor spool port B (A port blocked)
(5 ways, 3 positions, A closed in neutral position)



code 05

Single acting spool ("A" working port)
(5 ways, 3 positions, A/B closed in neutral position)

code 06

Single acting spool ("B" working port)
(5 ways, 3 positions, A/B closed in neutral position)

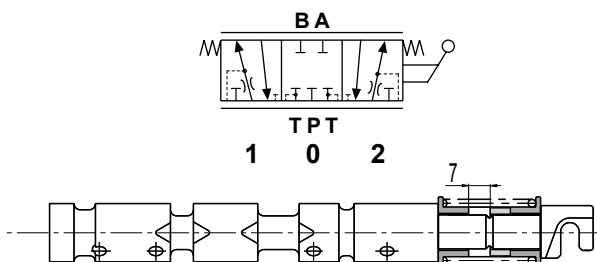
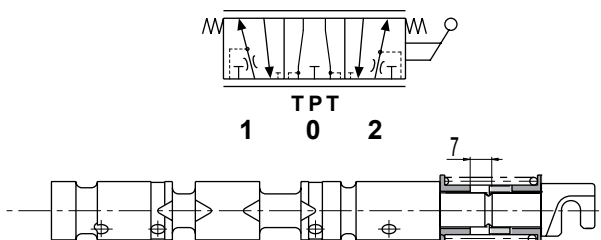
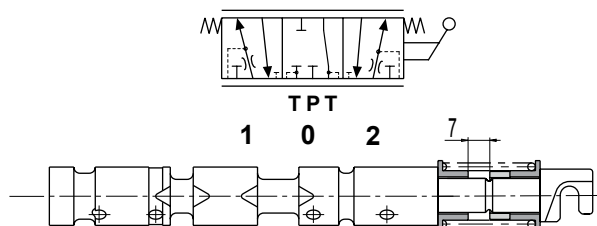
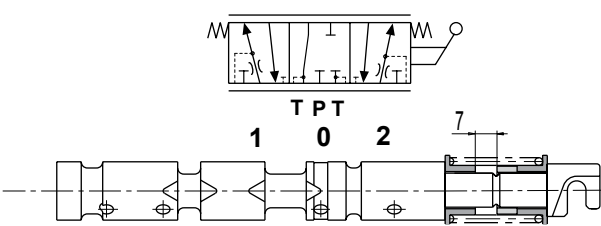
The choice to have a single acting spool must be done on the body of the valve with the plugs showed at page 12A. Therefore, for realizing spools code 05 and code 06 (single acting A or B) you need the spool code 01 in a circuit described above.

EO.241.0314.02.001M07



TYPE OF SPOOLS AVAILABLE

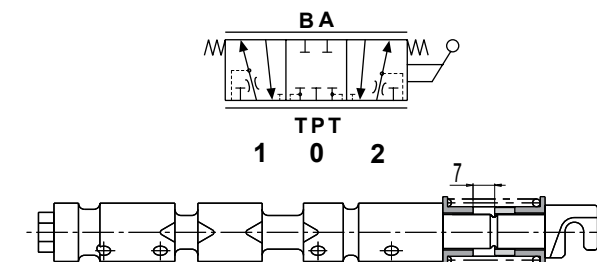
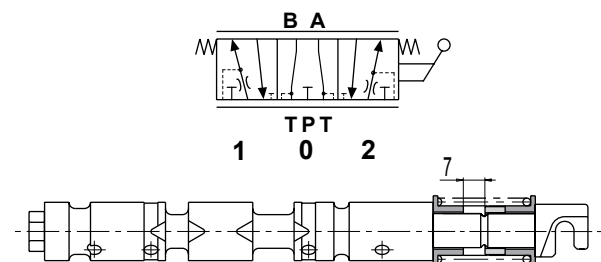
STANDARD MAIN SPOOLS FOR - PP - CONTROLS

code 01Double acting spool
(5 ways, 3 positions, A/B closed in neutral position)**code 02**Motor spool
(5 ways, 3 positions, A/B → T in neutral position)**code 03**Double acting motor spool port A (B port blocked)
(5 ways, 3 positions, B closed in neutral position)**code 04**Double acting motor spool port B (A port blocked)
(5 ways, 3 positions, A closed in neutral position)**code 05**Single acting spool ("A" working port)
(5 ways, 3 positions, A/B closed in neutral position)

The choice to have a single acting spool must be done on the body of the valve with the plugs showed at page 12A
Therefore, for realizing spools code 05 and code 06 (single acting A or B) you need the spool code 01 in a circuit described above.

code 06Single acting spool ("B" working port)
(5 ways, 3 positions, A/B closed in neutral position)

STANDARD MAIN SPOOLS FOR - KE / H - CONTROLS

code 01Double acting spool
(5 ways, 3 positions, A/B closed in neutral position)**code 02**Motor spool
(5 ways, 3 positions, A/B → T in neutral position)

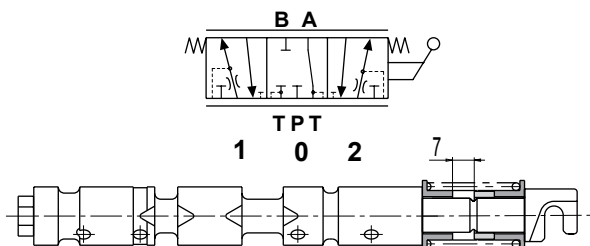
E0.241.0314.02.00IM07



TYPE OF SPOOLS AVAILABLE

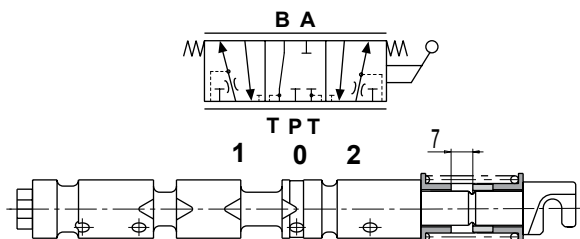
code 03

Double acting motor spool port A (B port blocked)
(5 ways, 3 positions, B closed in neutral position)



code 04

Double acting motor spool port B (A port blocked)
(5 ways, 3 positions, A closed in neutral position)



code 05

Single acting spool ("A" working port)
(5 ways, 3 positions, A/B closed in neutral position)

The choice to have a single acting spool must be done on the body of the valve with the plugs showed at page 12A
Therefore, for realizing spools code 05 and code 06 (single acting A or B) you need the spool code 01 in a circuit described at page 22A.

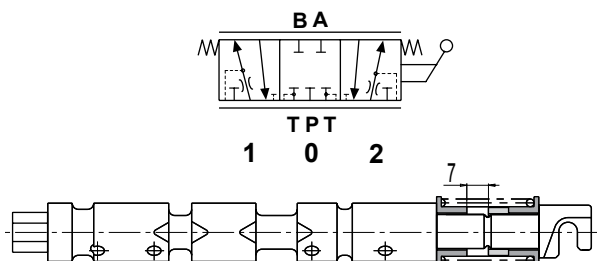
code 06

Single acting spool ("B" working port)
(5 ways, 3 positions, A/B closed in neutral position)

STANDARD MAIN SPOOLS FOR - KM - CONTROLS

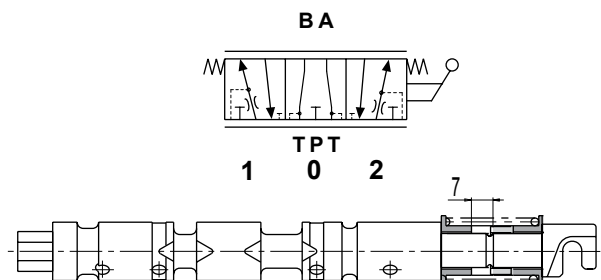
code 01

Double acting spool
(5 ways, 3 positions, A/B closed in neutral position)



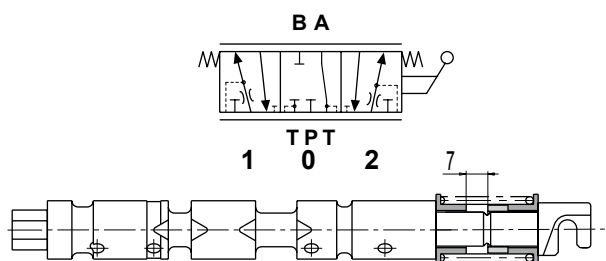
code 02

Motor spool
(5 ways, 3 positions, A/B → T in neutral position)



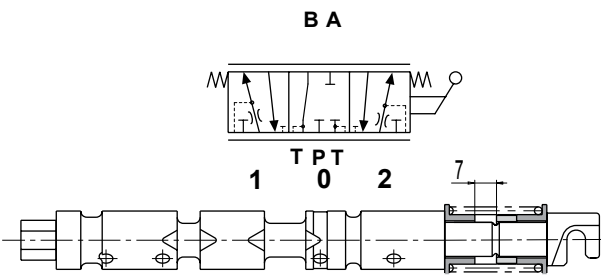
code 03

Double acting motor spool port A (B port blocked)
(5 ways, 3 positions, B closed in neutral position)



code 04

Double acting motor spool port B (A port blocked)
(5 ways, 3 positions, A closed in neutral position)



code 05

Single acting spool ("A" working port)
(5 ways, 3 positions, A/B closed in neutral position)

code 06

Single acting spool ("B" working port)
(5 ways, 3 positions, A/B closed in neutral position)

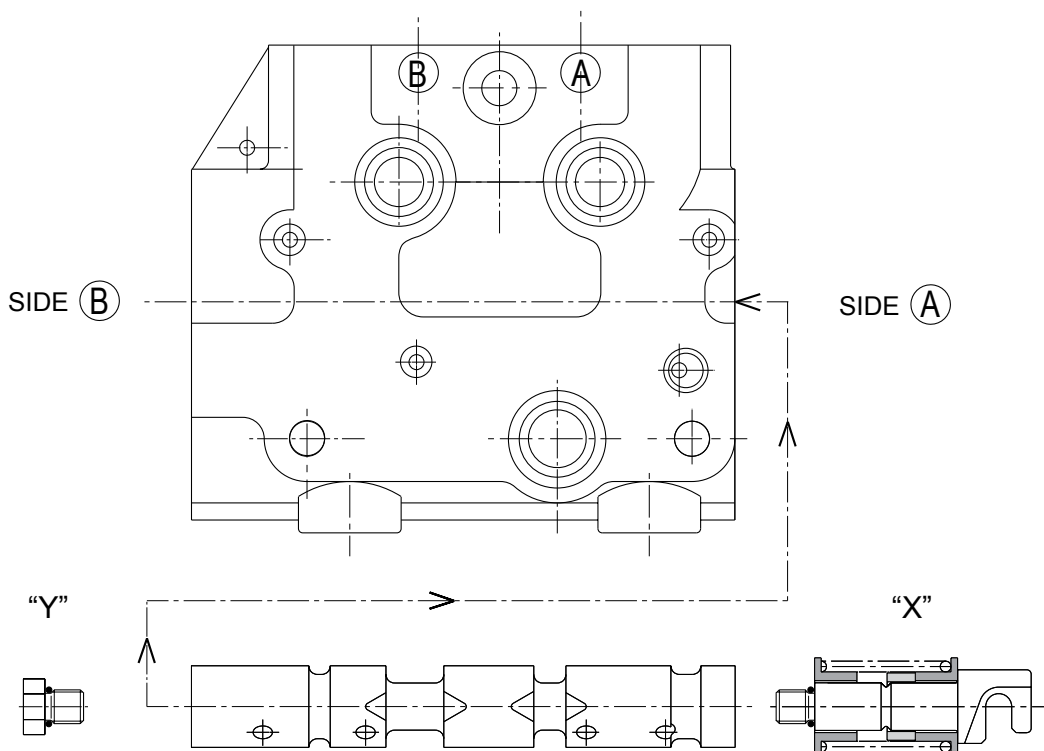
The choice to have a single acting spool must be done on the body of the valve with the plugs showed at page 12A
Therefore, for realizing spools code 05 and code 06 (single acting A or B) you need the spool code 01 in a circuit described at above.

EO.241.0314.02.001M07



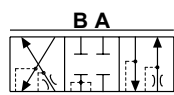
SPOOL CONTROL

GENERAL CAUTIONS FOR SPOOL CONTROL ASSEMBLING



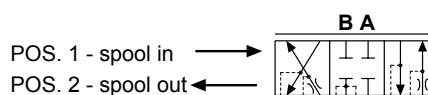
GENERAL FEATURES

On this and following pages are shown in details all the spool controls available. All the spool control and positioning devices can be mounted on both (A) and (B) sides, taking care to introduce always the spool in the (A) to (B) side direction. Because spool end threads are identical we can fit "X" hook spring device and "Y" plug on both spool end sides.



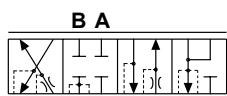
1 0 2

POS. 1 P → B T → A
POS. 2 P → A T → B



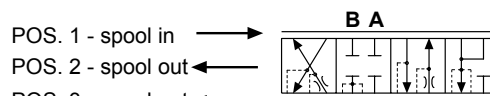
1 0 2

POS. 1 P → B T → A
POS. 2 P → A T → B



1 0 2 3

POS. 1 P → B T → A
POS. 2 P → A T → B
POS. 3 A/B → T



1 0 2 3

POS. 1 P → B T → A
POS. 2 P → A T → B
POS. 3 A/B → T

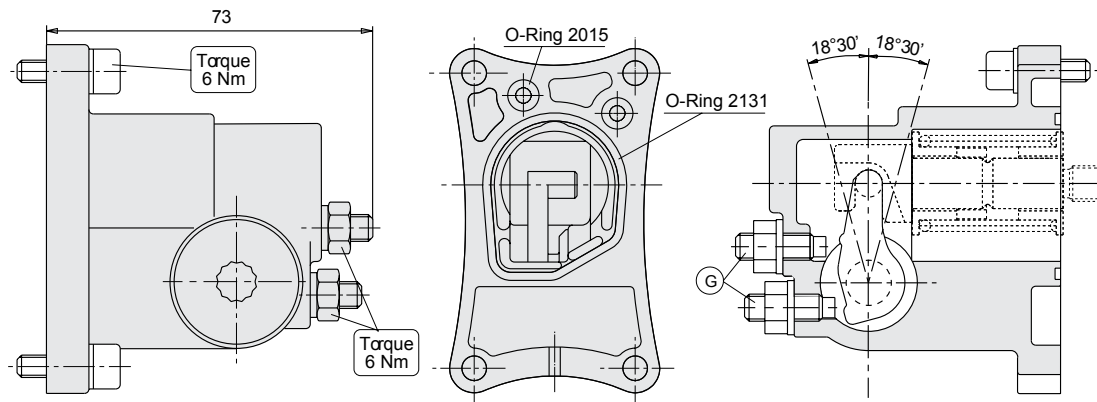
E0.241.0314.02.00IM07



SPOOL CONTROL

SPS

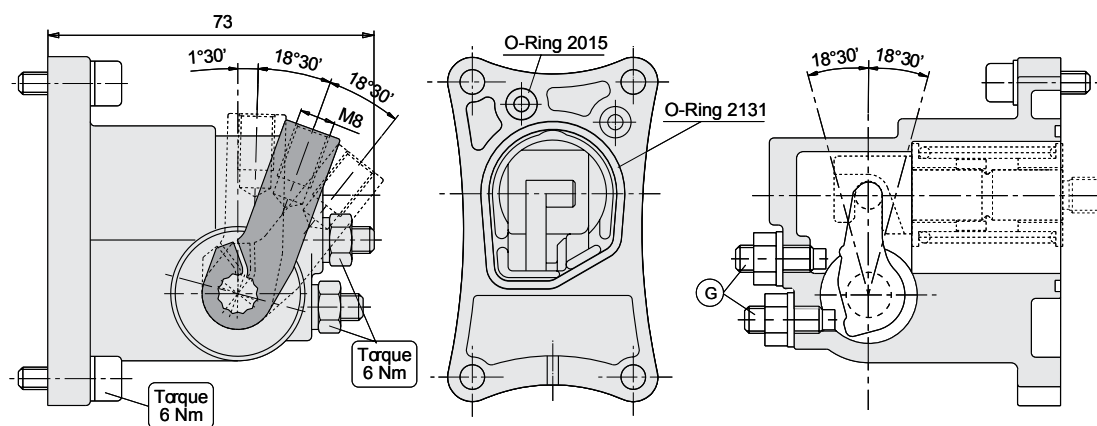
WITHOUT SHAFT SUPPORT



The code “ SPS “ is a spool positioning kit that can be used with spool controls “ PP-IP-KM “. The external adjusting screws “ G “ have to be used to reduced the spool stroke and consequently the port flow.

SL

WITH SHAFT SUPPORT (WITHOUT LEVER)



The code “ SL “ is the standard lever mechanism and can be used together with all spool controls. In case we have spool remote controls the “ SL “ device can be used as emergency lever. Also in this case the external adjusting screws “ G “ have to be used to reduced the spool stroke and consequently the port flow.

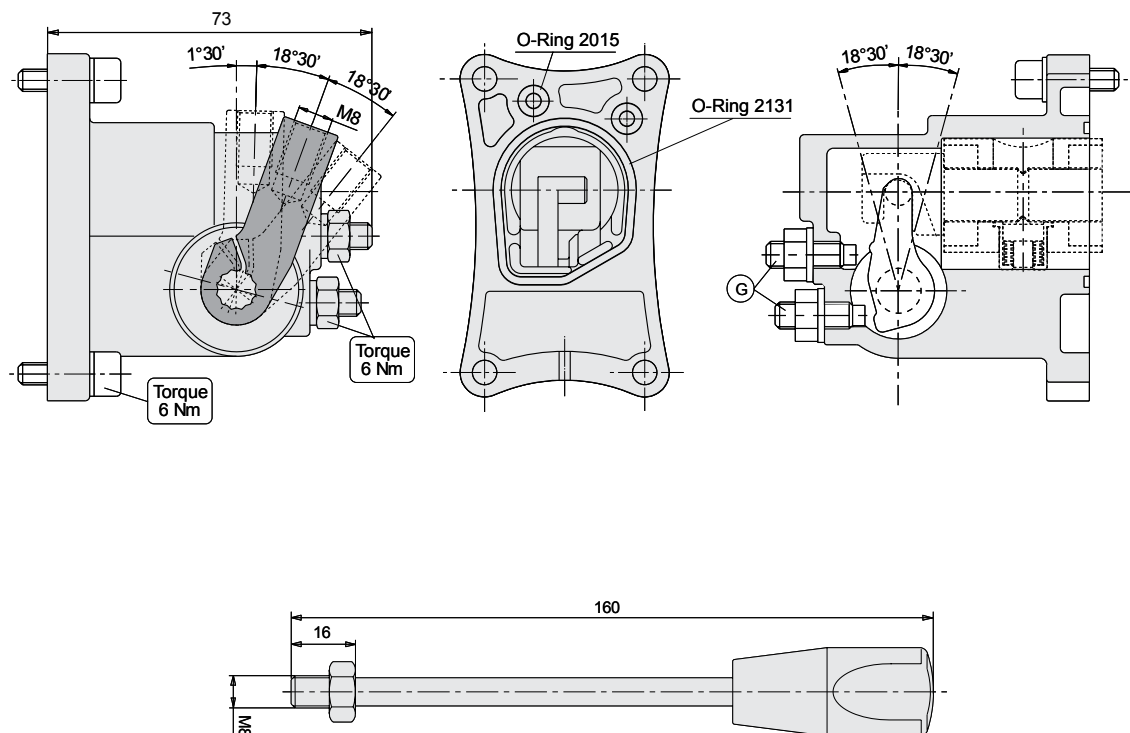
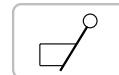
EO.241.0314.02.001M07



SPOOL CONTROL

NL / FL

WITH LEVER



The code “NL” is the standard lever mechanism and can be used together with all spool controls. In case we have spool remote controls the “NL” device can be used as emergency lever. Also in this case the external adjusting screw “G” have to be used to reduce spool stroke and consequently port flow.

This device cannot be used with remote spool controls.

The code “FL” is a manual lever mechanism with friction detent built-in, this device has to be used with spools shown on page 20A

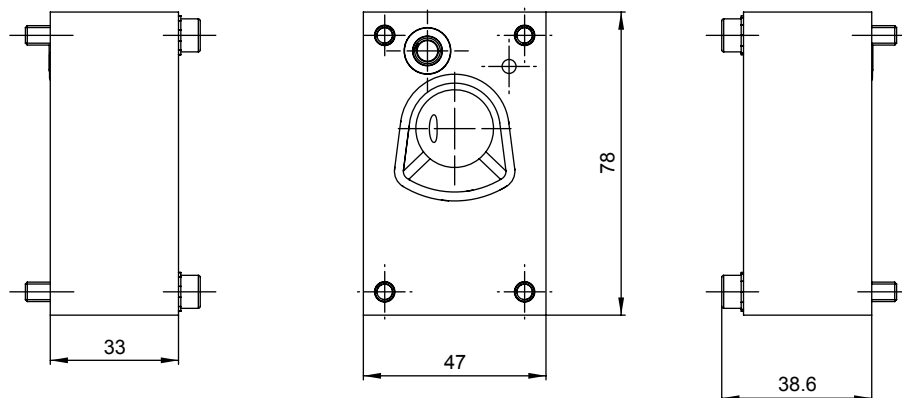
This device cannot be used with remote spool controls.

E0.241.0314.02.00IM07

SPOOL CONTROL

C0 - C2

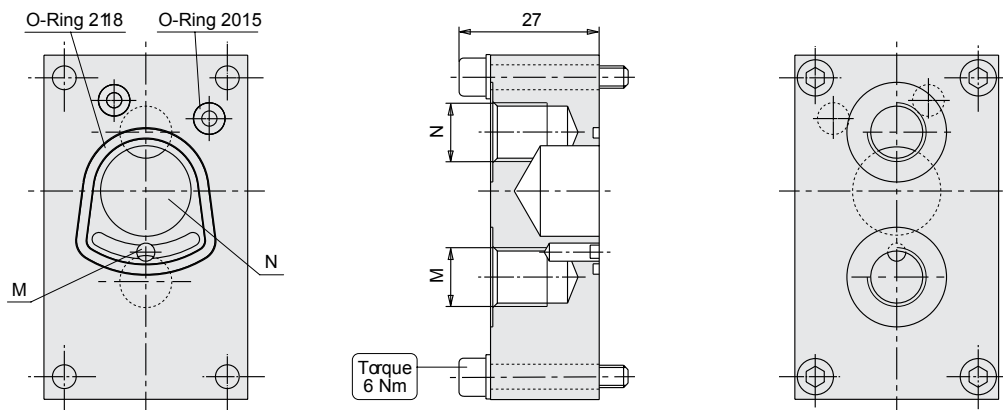
MANUAL CONTROL



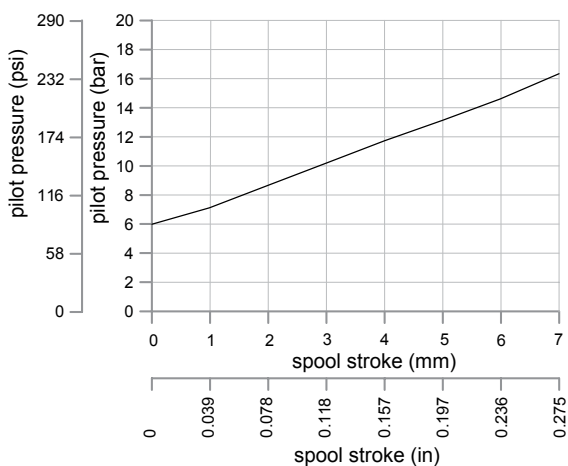
The code "C2-CO" is a simple end plate used all the time we have "NL-FL" spool controls.

IP

HYDRAULIC PROPORTIONAL CONTROL



E0.241.0314.02.001M07



PORT SIZES	M - N
BSP ISO 228	G 1/4
SAE ISO 176	SAE4 7/16 - 20 UNF

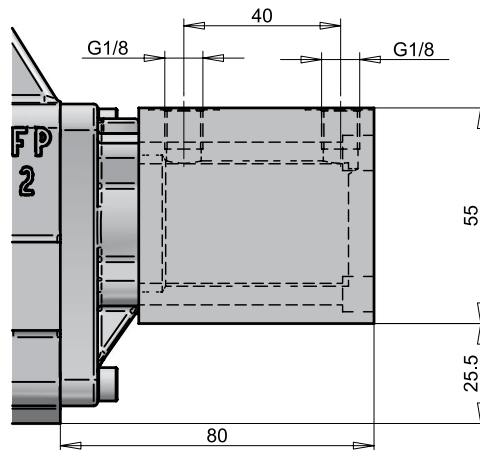
The code "IP" is a hydraulic proportional spool control. "M and N" are the pilot pressure ports.

For example if we fit the "IP" device on "A" side the pilot pressure going in "N" port push the spool to "B" side direction allowing pump flow through working port "A". When we supply pilot pressure to "M" port we pull the spool to "A" side allowing pump flow through working port "B".

SPOOL CONTROL

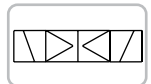
PP

PNEUMATIC PROPORTIONAL CONTROL



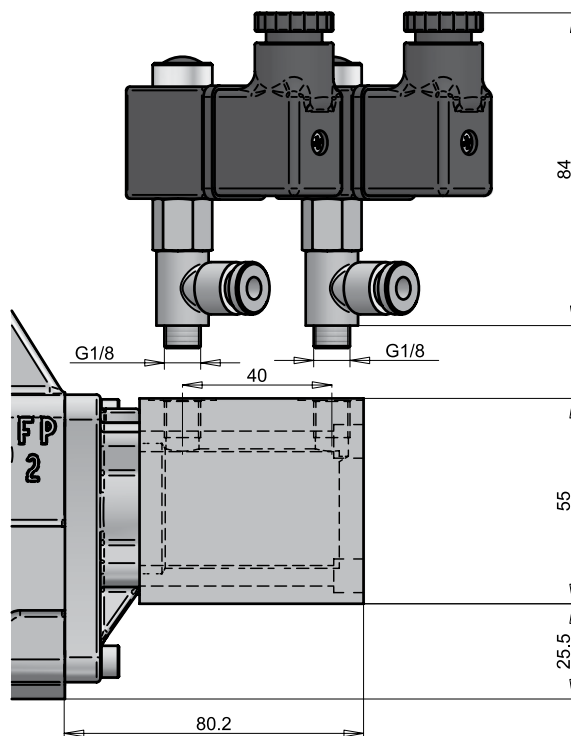
P1 - P2

ELECTRO-PNEUMATIC ON-OFF CONTROL



12 V.d.c. - code P1

24 V.d.c. - code P2

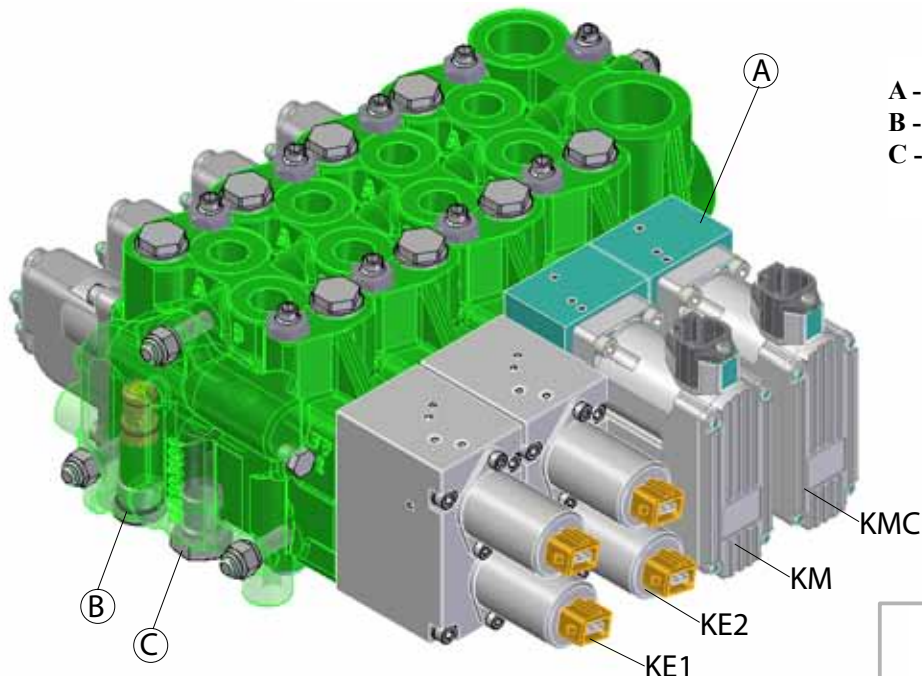


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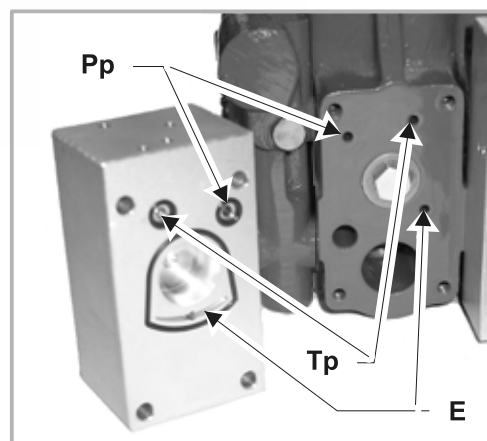


SPOOL CONTROL

ASSEMBLING COMPONENTS



A - mechanical interface.
B - pressure reducing valve.
C - filter before the Pp line.

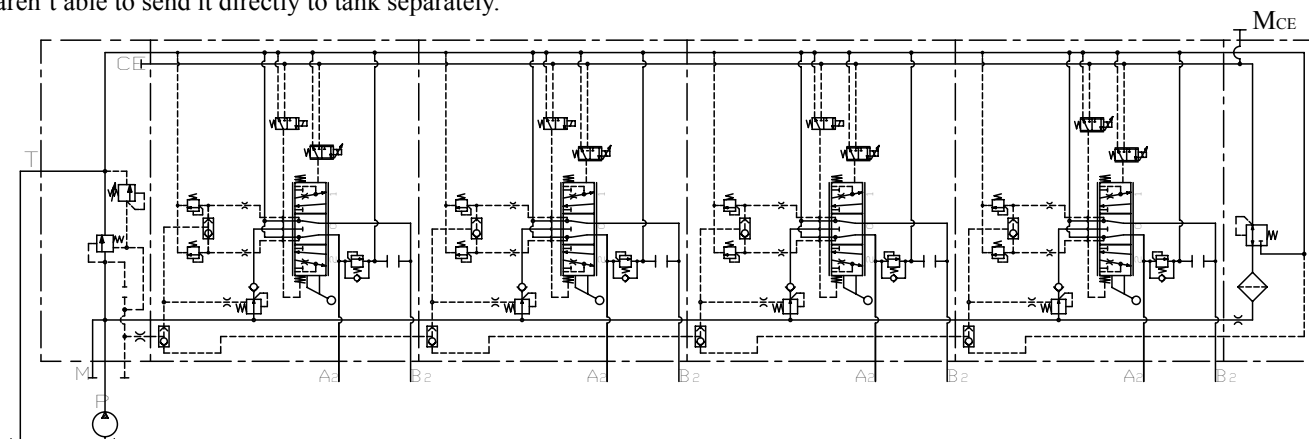


In this type of valve the piloting lines “Pp and Tp” are built-into the casting, for this reason we can assemble the pressure reducing valve “C”, and the filter “D” directly on the end cover. Moreover VDP08 doesn’t need of a servo-piston to slide the spool on the working positions, in this valve the Pp line acts directly on the area made by the spool diameter.

In order to send the Pp line at the other spool side, the casting is pre-arranged with the cavity “E”.

In this assembly the mechanical interfaces “A” need only to assemble the “KE1/KE2” rather than the “KM/KMC” on the VDP08 side.

With the actual working modules the Tp line goes into the main T line, we aren’t able to send it directly to tank separately.



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SPOOL CONTROL

KE1-KE2 / H1-H2

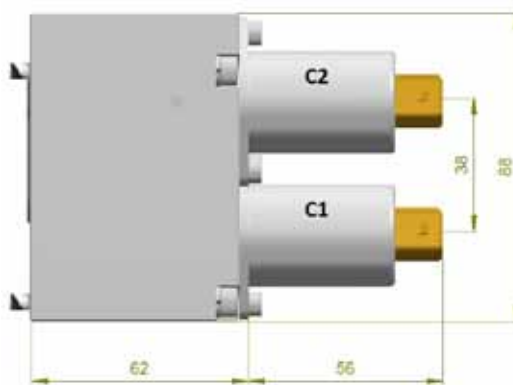
ELECTRO-HYDRAULIC CONTROL (PROPORTIONAL / ON-OFF)
OPEN LOOP

12 V.d.c. - code KE1 / H1

24 V.d.c. - code KE2 / H2

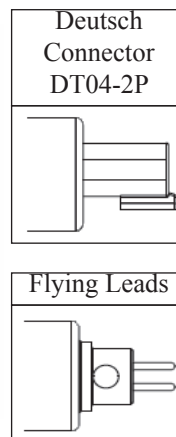
OPERATING INSTRUCTIONS
please see the hydraulic circuit.

Electrical Data		
Voltage	12V	24V
Current	1500 mA	750 mA
Resistance	$4.72 \Omega \pm 5\%$	$20.8 \Omega \pm 5\%$
Type of Control	Current Control PWM 100 Hz Recommended	
Connector	AMP Junior Timer (Standard) Deutsch Connector DT04-2P Flying Leads	



FUNCTIONAL SCHEME

C1 - C2 COILS DE-ENERGIZED => POS. 0
 C1 COIL ENERGIZED => POS. 2
 C2 COIL ENERGIZED => POS. 1



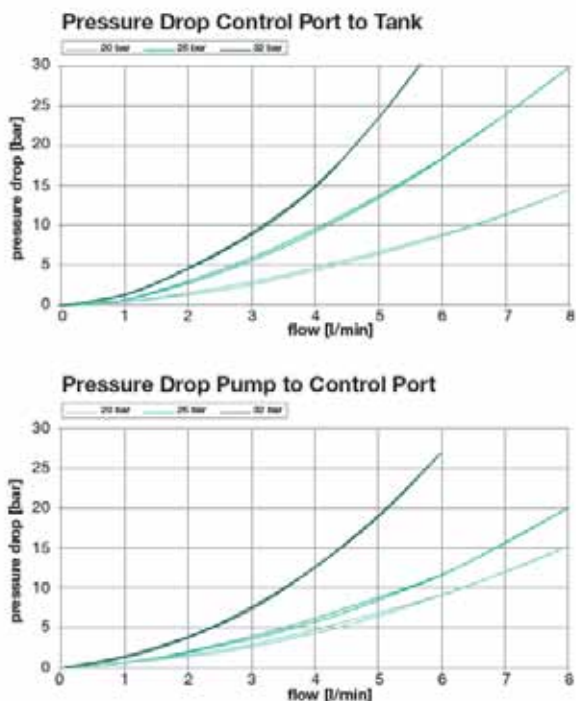
Hydraulic Data	
Max Pressure (P, T)	pP = 50 bar, pT = 30 bar
Hysteresis (w/ PWM)	< 0.7 bar (pA=20) < 1.0 bar (pA=25) < 1.5 bar (pA=35)
Filter Screen	125 μ m
Contamination Level	Min Filtration: 20/18/15 According to ISO 4406
Fluid	Mineral Oil According to DIN 51524
Temperature Range Fluid	-40 to +105°C
Valve Specifications According to Thomas LHP-39	

Features	Benefits
Integrated Relief Function	Protection Against Pressure Spikes
Compact Dimensions	Reduced Packaging Dimensions
Low Leakage	Lower Energy Losses
Precise Current vs Pressure Control	Excellent Controllability
Teflon Coated Bronze Bearings	Small Hysteresis, Improved Resolution
Excellent Repeatability	No Calibration Over The Lifetime of The Machine
Highest Quality Standards	No Maintenance, No Downtime
Small Valve to Valve Variance	Easy Replacement, No Service Calibration

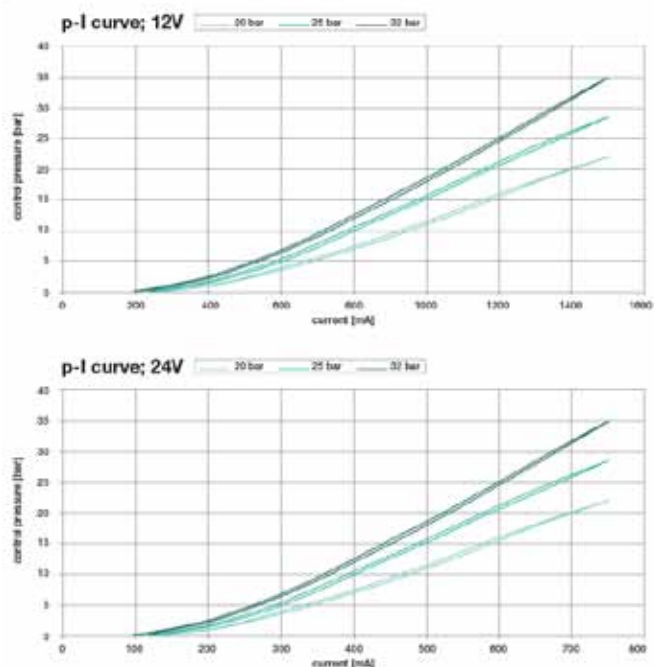


SPOOL CONTROL

Flow Characteristics

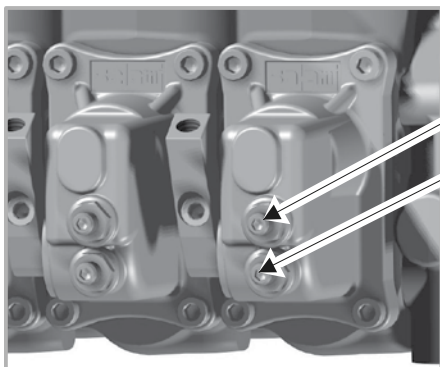
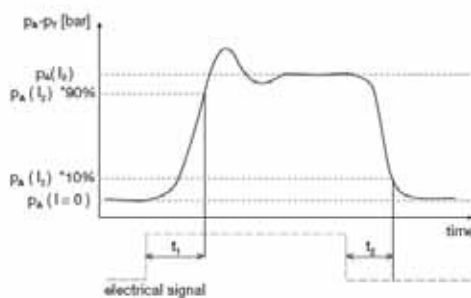


Current vs. Pressure Less than 2% Hysteresis



Step Response

(50°C Oil Temperature) $t_1, t_2 < 50$ ms



B

In the VDP08 assembling the electronic spool positioning slides together in axis with the spool.

A

In order to adjust the flow with accuracy, we can reduce the spool stroke with the registers showed on the left.

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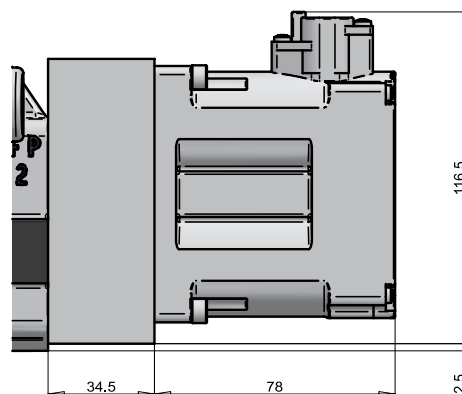
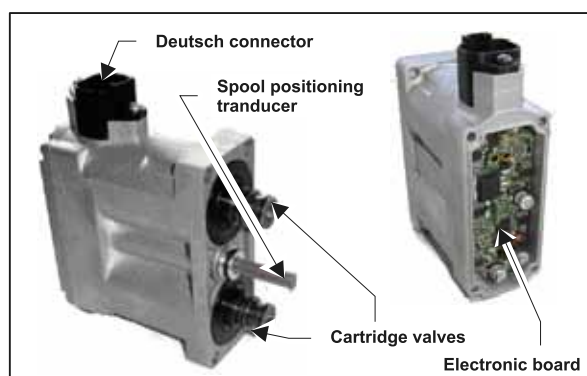
SPOOL CONTROL

KM - KMC

ELECTRONIC-HYDRAULIC CONTROL (PROPORTIONAL)
CLOSED LOOP

ANALOGIC - code KM

CAN BUS - code KMC



CLOSED-LOOP ELECTRONIC-HYDRAULIC PROPORTIONAL ACTUATOR

The KM proportional actuator is designed to control the stroke of the main spool of the Salami directional control valve in response to a control signal. The control signal can be provided by an analog voltage source (e. g. a potentiometer) or the module can be integrated in a digital control environment.

The KM carries its function by controlling the currents of two proportional electrovalves and by measuring the spool position by means of an Hall effect linear transducer. This internal closed-loop position control makes the valve spool achieve the desired position with accuracy levels approaching the performance of a servo-valve.

The KM may shift the valve spool either directly (VDP08 version) or by means of a servo-position mechanically connected to it.

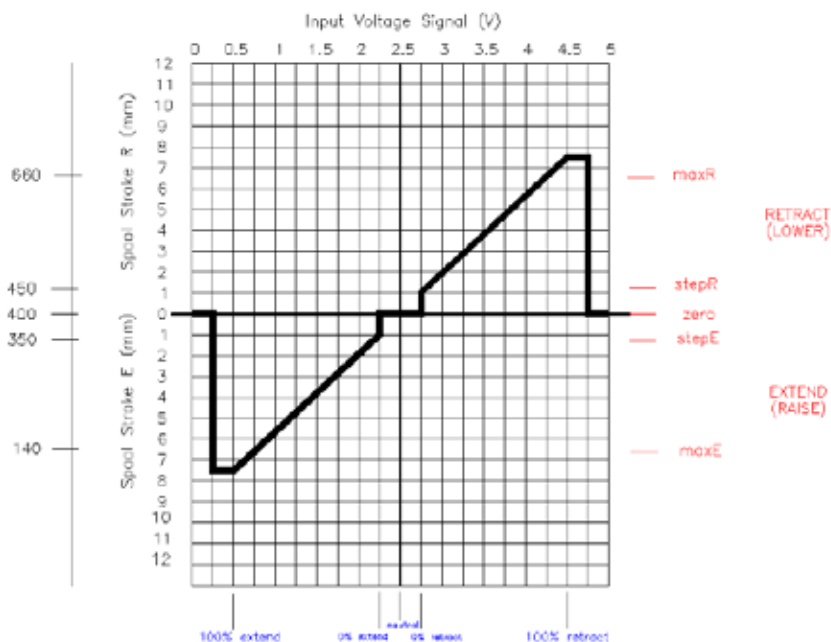
In a CAN bus operating mode, the remote control set point is processed via CAN bus according to ISO 11898 at 250 kbit/s by means of address-based (SAE J1939) or message-based (CAN 2.0B) protocols .

The microprocessor-based digital control of inherent functions (response time, flow rate presetting and spool position recovery after cut-off) makes it possible to adjust relevant parameters like PWM and DITHER frequencies, feedback algorithm during motion and under varying operative conditions (temperature changes, varying flow forces and off-set conditions of any kind) through a continuous teach-in process that will then maintain said parameters at their optimum level throughout the operative phase.

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SPOOL CONTROL



Remarks: Input Signal :

Neutral position on 2,5VDC - MAX stroke A at 4,5 VDC - MAX stroke B at 0,5 VDC

Neutral Position Dead Band from 2,25 to 2,75 VDC.

Signal cut-off is triggered at < 0,25V and > 4,75V

Dead band in neutral	±0.5mm
Step from neutral	±1 mm

Hydraulic Specifications

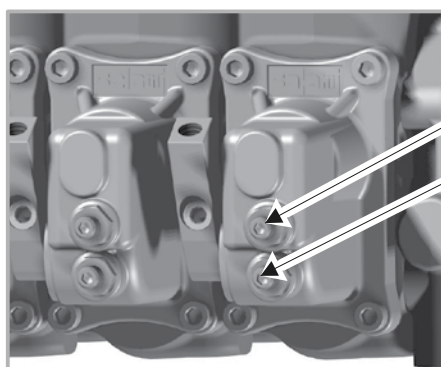
Max. spool stroke (each side):	8.5 mm up to 13.5 mm on "float"
Max. supply pressure:	35 bar
Min. supply pressure:	12 bar
Max. return line pressure:	5 bar
Pilot flow requirement:	0.2 lt/min
Oil temperature range:	-20 / + 95°C
Oil viscosity range:	3-650 cSt
Filtration:	18/15 (ISO 4406)
Weight	1.1 kg

Response time:	Neutral to max: < 180 ms Max to Neutral: < 250 ms
----------------	--

Electrical Specifications

Operating voltage:	8-30 VDC
Max current consumption:	750 mA/section
Operating temperature:	-20 / + 95°C
Analog Input impedance	>40 Kohm
Control pot. configuration:	3-pins
Typical control pot. resistance:	1-10 Kohm
Analog input signal (D/A version) :	0-5V
CAN bus interface (D/C version) :	ISO 11898
Environmental protection:	IP 68
EMC characteristics	ISO 7637

Resolution:	+/- 0.06 mm
Ramp time:	0 to 5 sec.



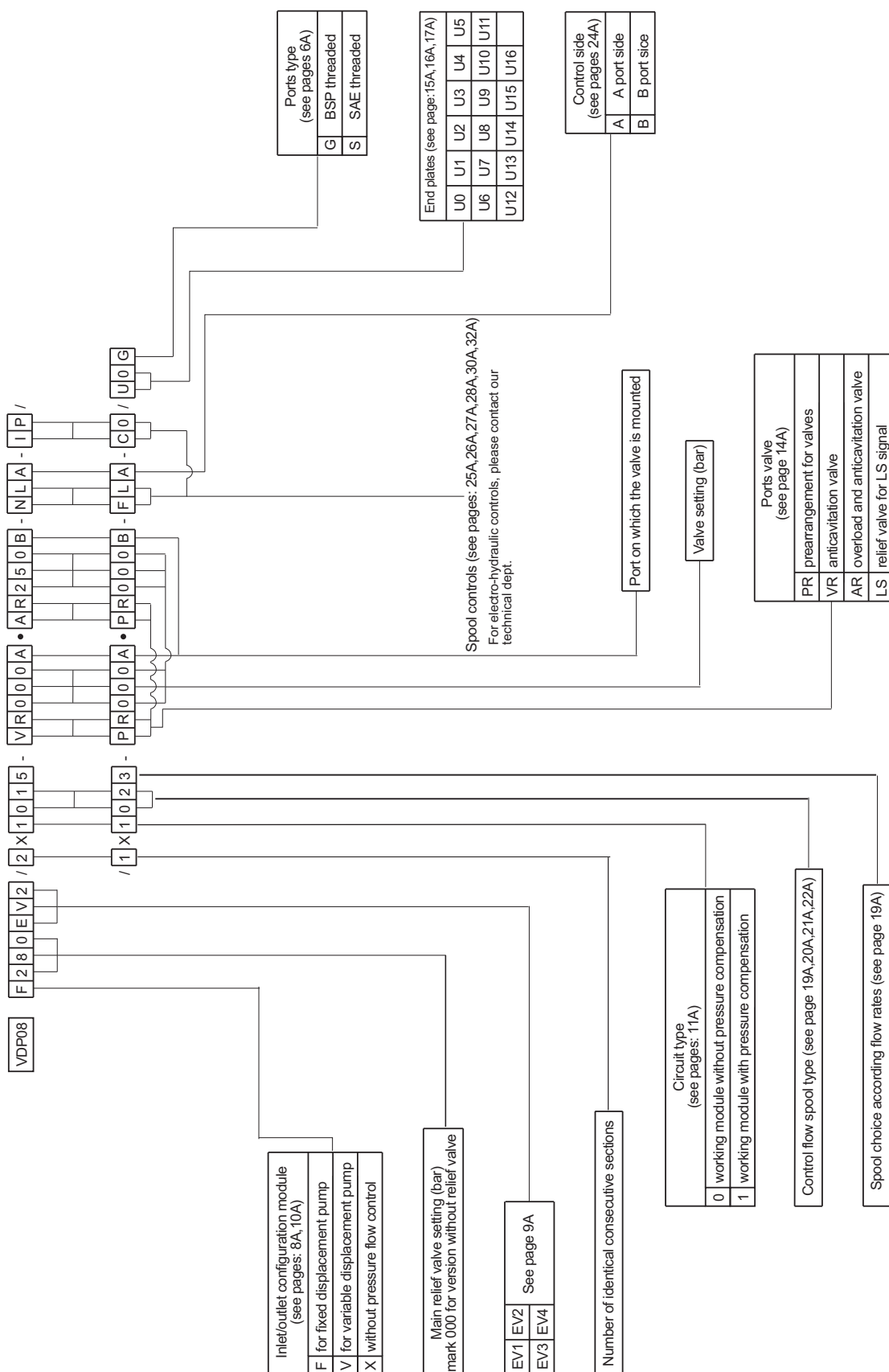
B
A

In the VDP08 assembling the electronic spool positioning slides together in axis with the spool.

In order to adjust the flow with accuracy, we can reduce the spool stroke with the registers showed on the left. In this case we are able to re-set the electronic board parameters to optimize the voltage signal with the new spool strokes. The working diagram above shows the comparison between the voltage signal and the standard spool stroke.

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HOW TO ORDER



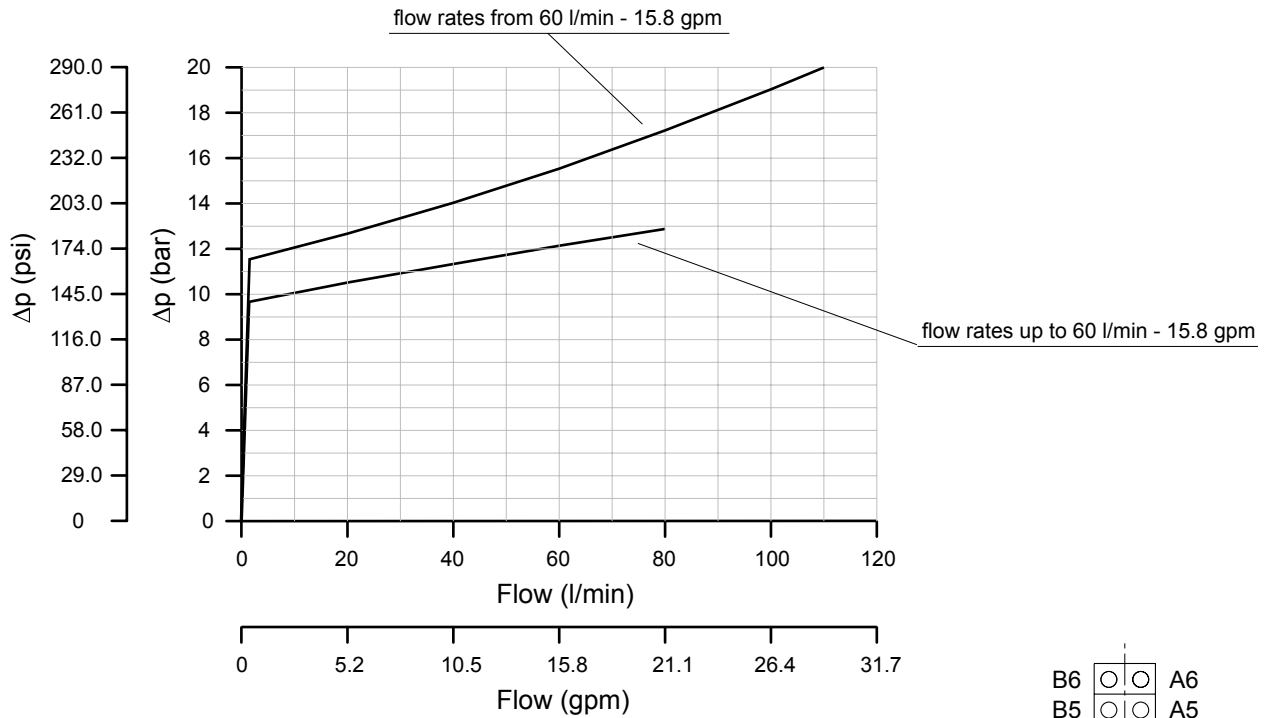
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TECHNICAL DATA

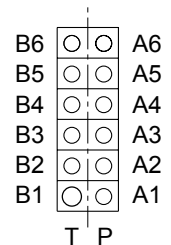
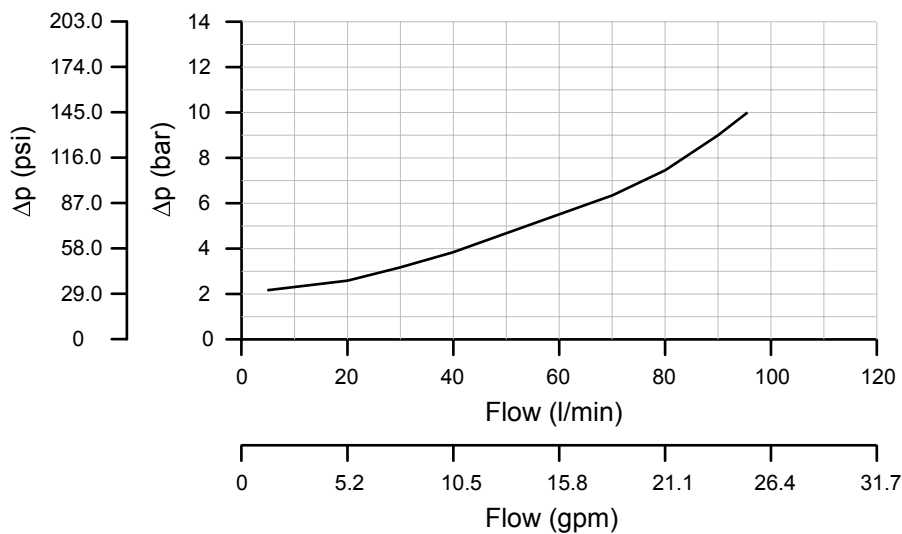
All the characteristics are measured using a mineral oil with a viscosity of
15 mm²/sec at a temperature of 60° C (140°F)

OPEN CENTER - NEUTRAL FLOW PRESSURE INLET/OUTLET MODULE



CLOSED CENTER - WORKING MODULES PRESSURE DROP

P → A3/B3



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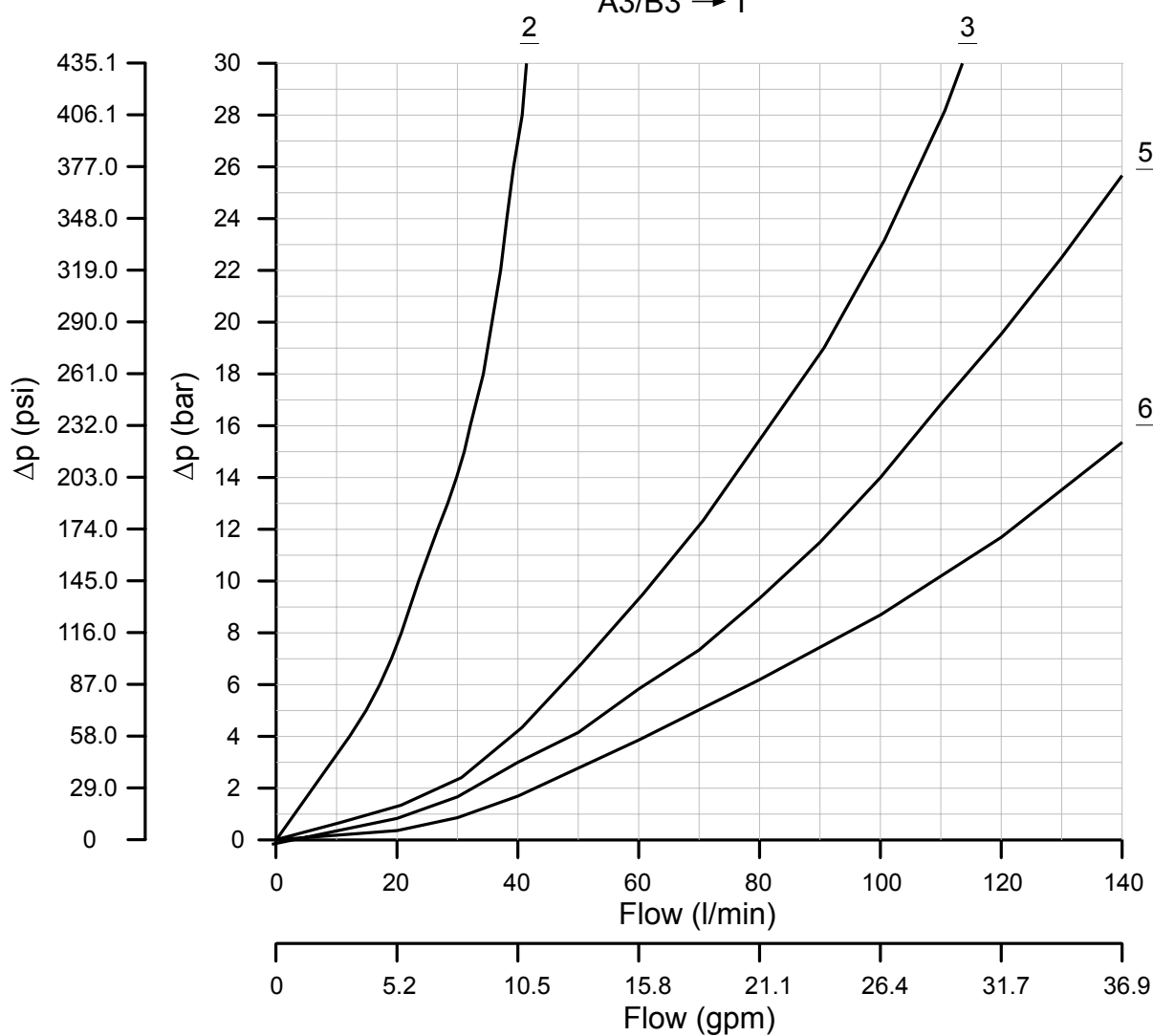


TECHNICAL DATA

All the characteristics are measured using a mineral oil with a viscosity of
15 mm²/sec at a temperature of 60° C (140°F)

WORKING MODULES PRESSURE DROP FROM A/B TO T

A3/B3 → T



SPOOLS (page 19A...)

Type Mod.
1
2
3
4
5
6

B6	○	○	A6
B5	○	○	A5
B4	○	○	A4
B3	○	○	A3
B2	○	○	A2
B1	○	○	A1
	T	P	

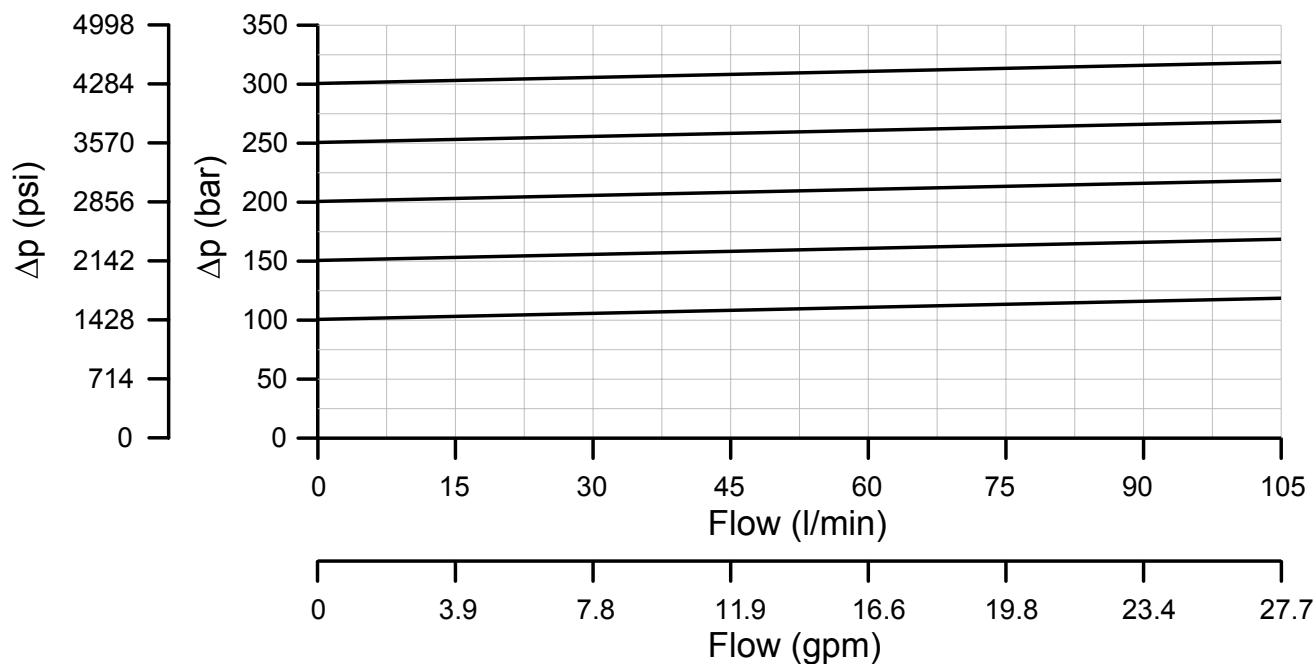
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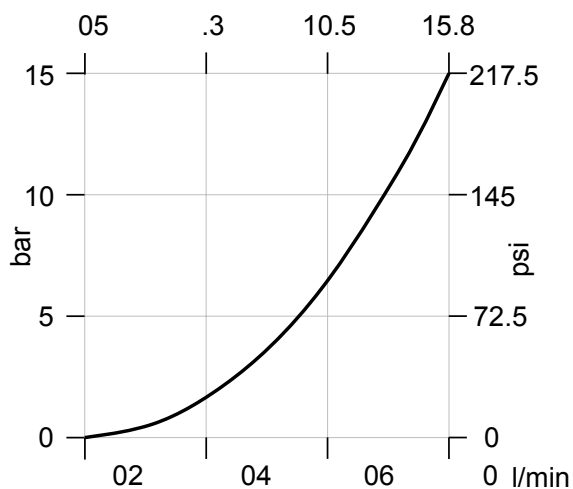
TECHNICAL DATA

All the characteristics are measured using a mineral oil with a viscosity of
15 mm²/sec at a temperature of 60° C (140°F)

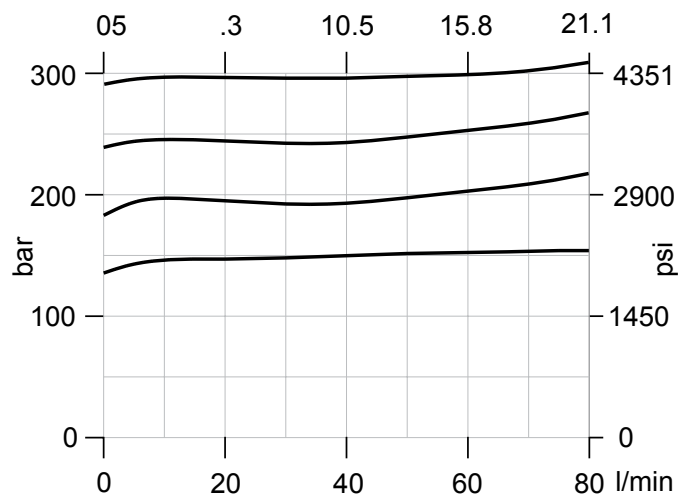
ADJUSTABLE PILOTED MAIN RELIEF VALVE



VR - Anti-cavitation valve (page 14 A)
US gal./min



AR - Overload and anti-cavitation valve (page 14 A)
US gal./min

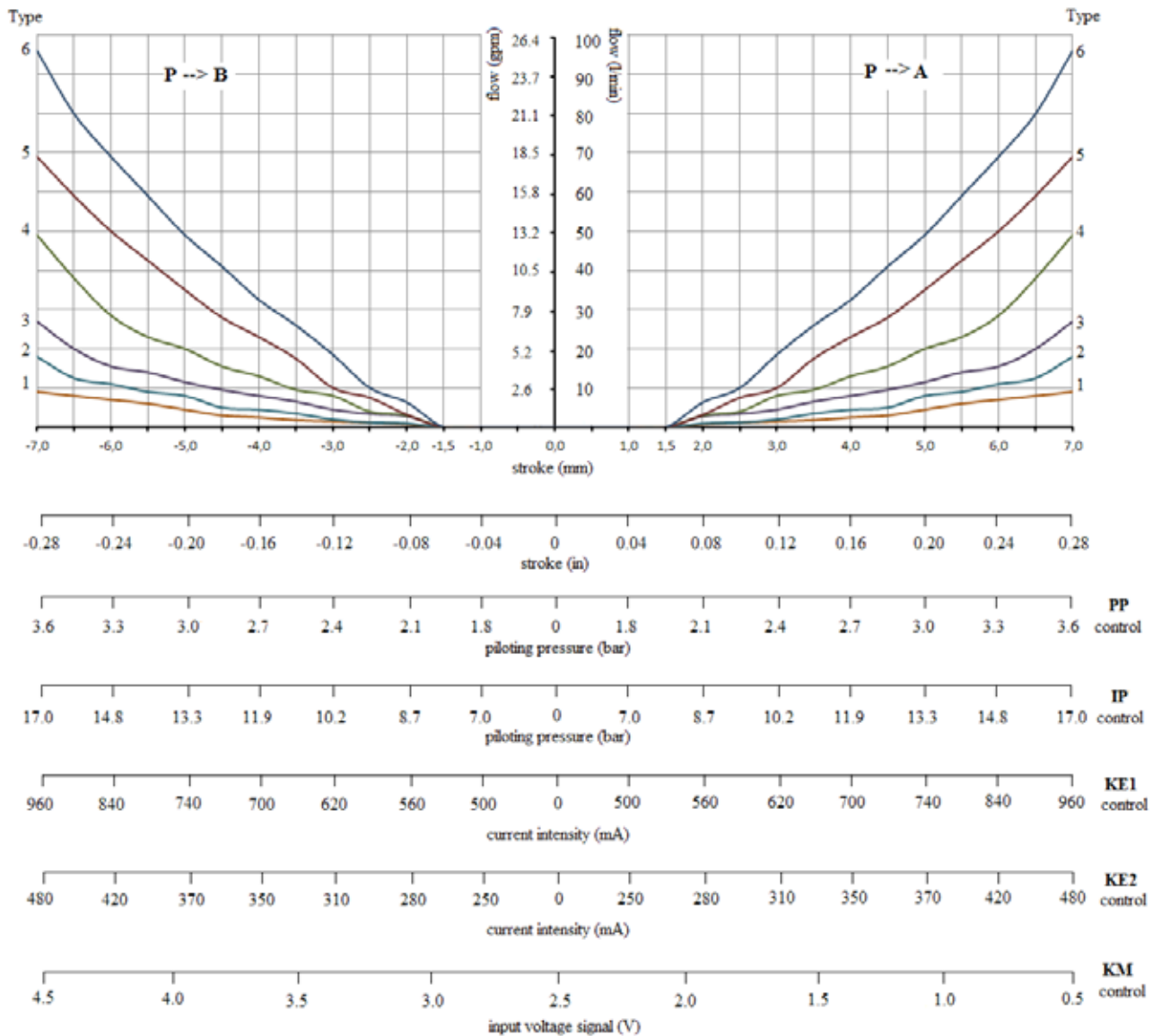


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TECHNICAL DATA

MEETERING CHARACTERISTICS WITH AVAILABLE CONTROLS



All the characteristics are measured using a mineral oil with a viscosity of 15 mm²/sec at a temperature of 60° C (140°F)

INLET FLOW = 130 l/min (34 GPM)

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