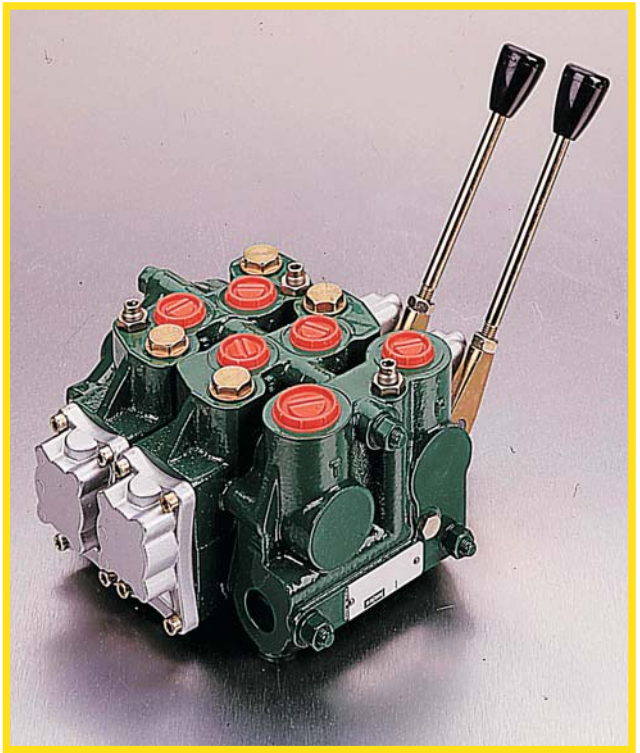
CERTIFIED QUALITY SYSTEM
UNI EN ISO 9001/2000
SINCERT DNV

PRODUCT CARD



VDP08
PRESSURE COMPENSATED SECTIONAL VALVE

salami™

E0.03.0204.02.01

LOAD SENSING
DIRECTIONAL CONTROL VALVE VDP08

INDEX

E0.03.0204.02.01

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 meetering 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.

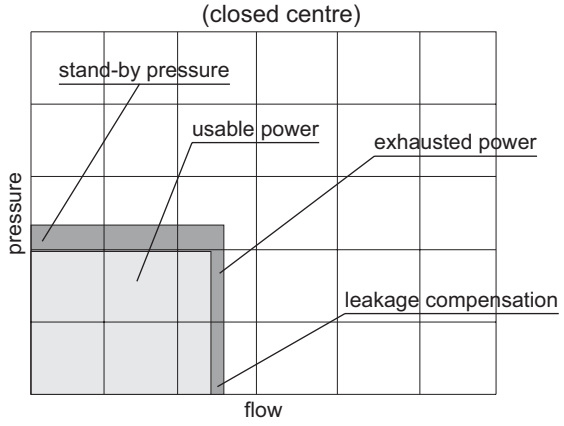
When all the spools are in neutral position (pump stand-by), the pump is required a very little flow (leakage compensation) at the stand-by pressure (14 bar - 200 psi).

Open centre version for fixed displacement pumps

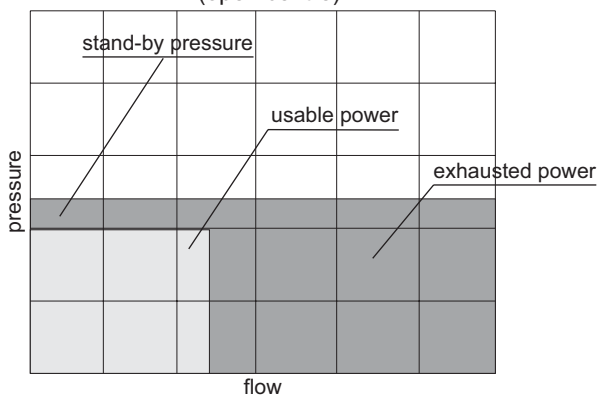
The flow regulator in the inlet module, controlled by the LS signal, drains to tank all the flow exceeding the value required by the actuators, generating in the valve the same working conditions as in case of variable displacement pump.

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.

WORKING CONDITIONS

HYDRAULIC FLUID		Mineral oil according DIN 51524
VISCOSITY		
	Viscosity range	10 ÷ 460 mm²/sec. 0,15 ÷ 7,13 sq.in./sec.
	Optimal viscosity	12 ÷ 75 mm²/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	(5000psi)
	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.

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 (see page 10 VS): controls the maximum pressure in the circuit acting on the LS signal that pilots the flow regulator.

Electric unloading valve (see page 12 EV): 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 10): 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 19 and 20): supplies the piloting pressure to electro-hydraulic remote controls.

- **Valves on the section**

LS pressure limiting valves on A and/or B ports (see page 17 VSLS): 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 (see page 17 AR): 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 (see page 17 VR): avoids cavitation due to inertia in the system.

PR (page 17): prearrangement for AR/VR.

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 21).
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 distorsion 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 3).

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	inlet pipe
3 ÷ 5 m/sec	outlet pipe

19,7 ÷ 32,8 ft/sec	inlet pipe
9,9 ÷ 16,4 ft/sec	outlet pipe

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

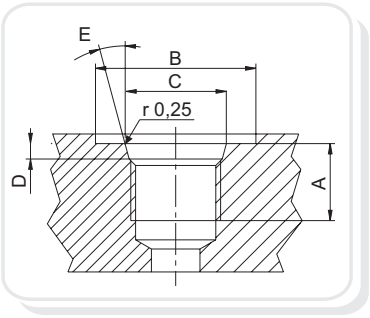
* $\left[v = \frac{21{,}2 \cdot Q}{d^2}\right.$ $\left.v = \text{fluid speed [m/sec]},\ Q = \text{flow [l/min]},\ d = \text{pipe internal diameter [mm]}\right]$

HYDRAULIC FLUIDS

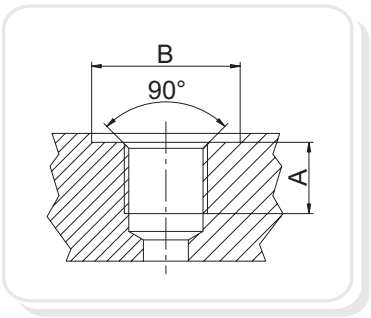
Usually a mineral-base oil with a good viscosity index should be used, preferably with good lubricating properties and corrosion, oxidation and foaming resistant.
Sometimes the fluids supplied by the manufacturers do not satisfy purity requirements (see WORKING CONDITIONS). It is therefore necessary 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 *In.*	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°	

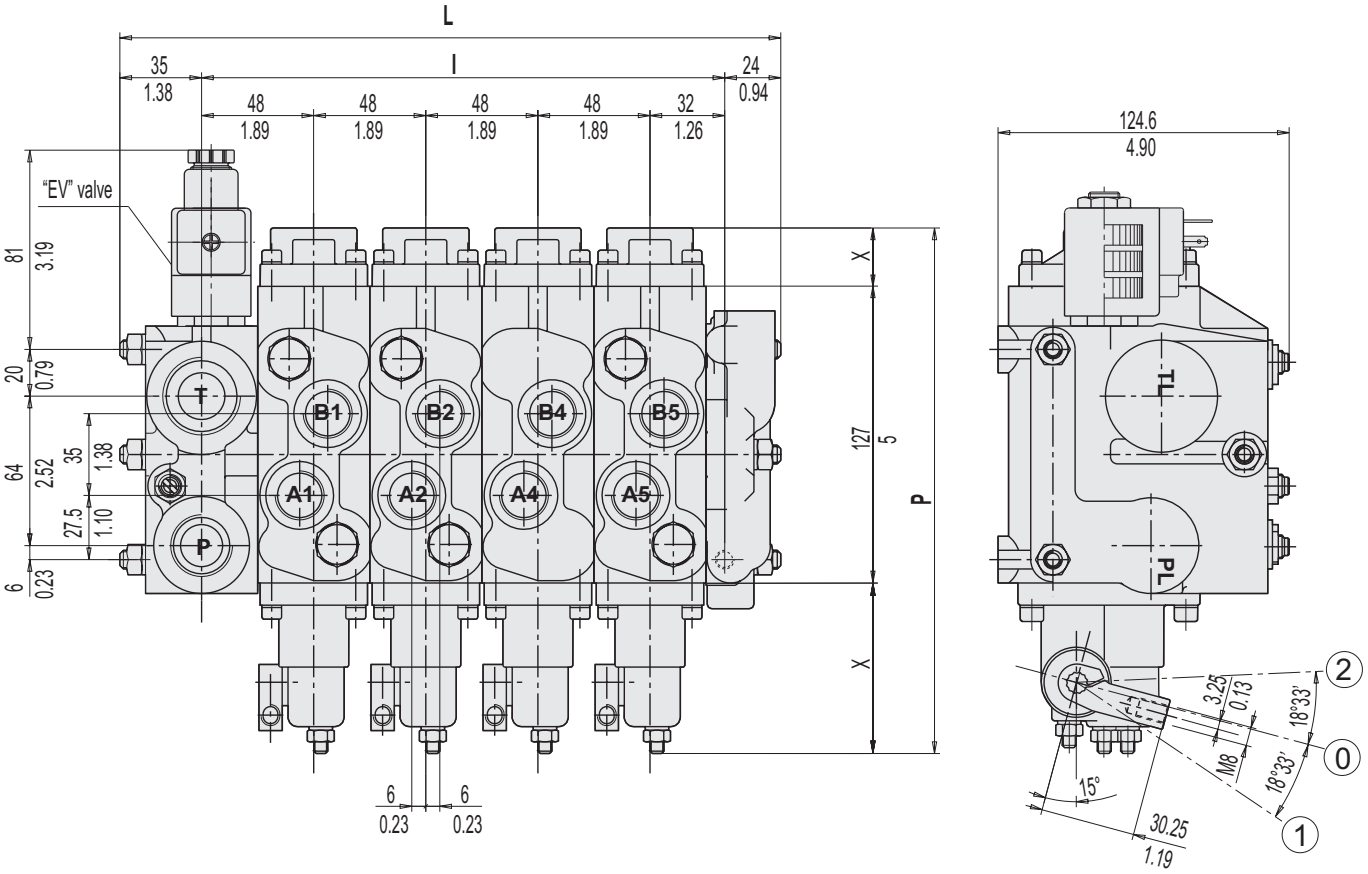


BSP (ISO 228)						
Dimensions mm *In.*	G1/2		G3/4		G1	
A	16	*0,63*	18	*0,71*	20	*0,79*
B	27	*1,06*	33	*1,30*	40	*1,57*

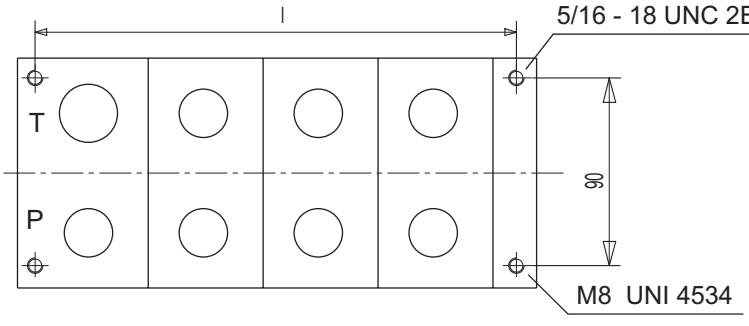
A/B: working ports
P: top inlet port
PL:side inlet port
T: top outlet port
TL:side outlet port
LS (see page 10):
load-sensing signal port
PG (see page 10):
pressure gauge port

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 showned 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 wich you have to had 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 showned 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.

LOAD SENSING DIRECTIONAL CONTROL VALVE VDP08

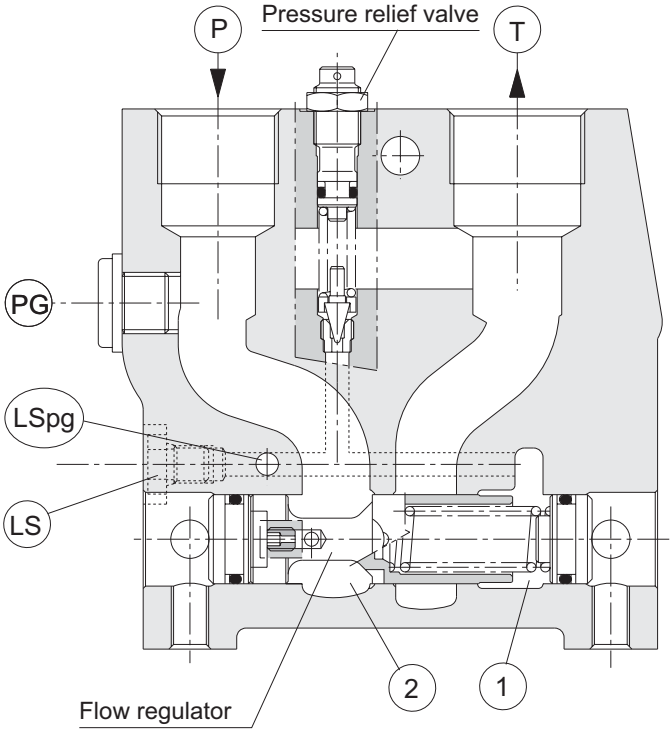
OPERATING PRINCIPLES

OPEN CENTRE CIRCUIT WITH FIXED DISPLACEMENT PUMP
"CODE F" - SEE PAGE 11

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.14) 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 11

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

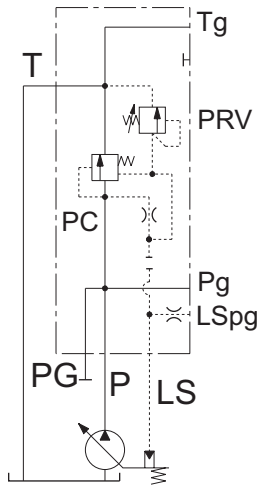
(PG) PRESSURE GAUGE PORT

(LSpg) "LOAD SENSING PILOT GALLERY

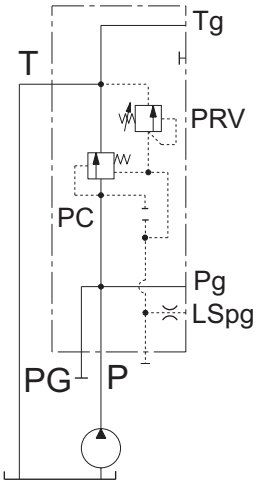
(LS) LOAD SENSING PORT

CODES AND CIRCUITS

Hydraulic circuit



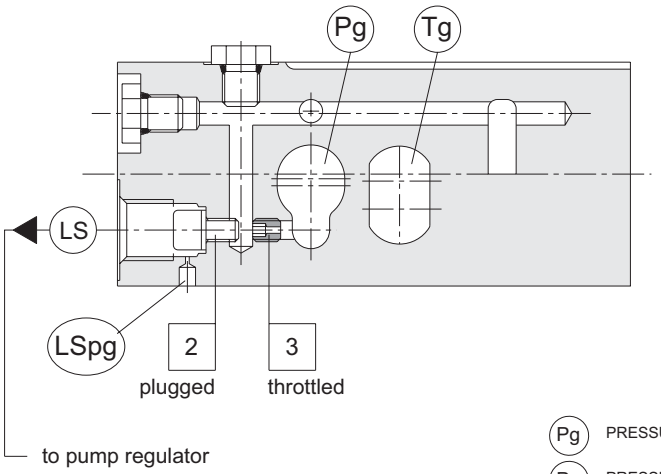
Hydraulic circuit



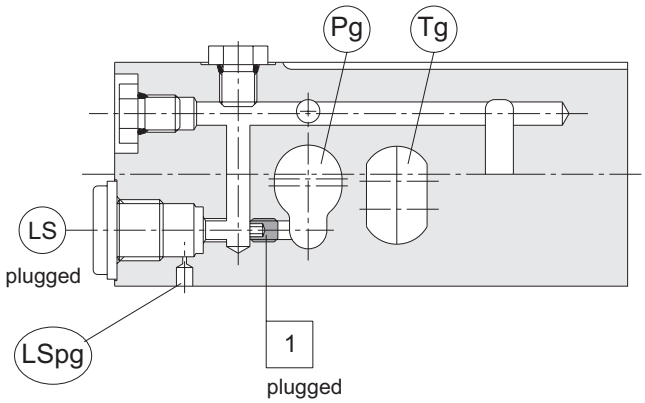
code V

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

ports type	description	part number
BSP SAE	V250/G V250/S	R241 780 30 R241 780 40

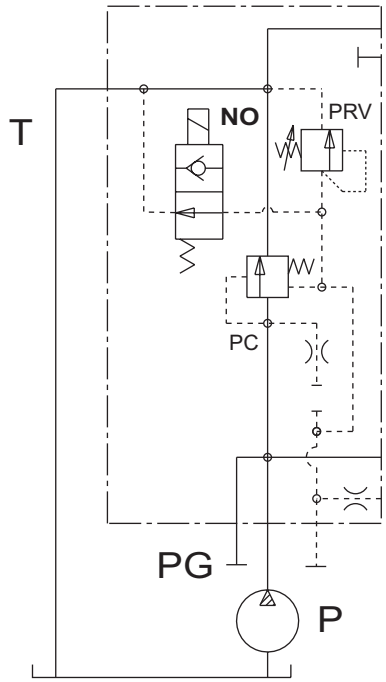
ports type	description	part number
BSP SAE	F250/G F250/S	R241 780 10 R241 780 20

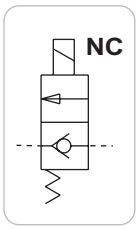
LOAD SENSING DIRECTIONAL CONTROL VALVE VDP08

CODES AND CIRCUITS

Inlet module with LS electrical unloading valve - “EV”

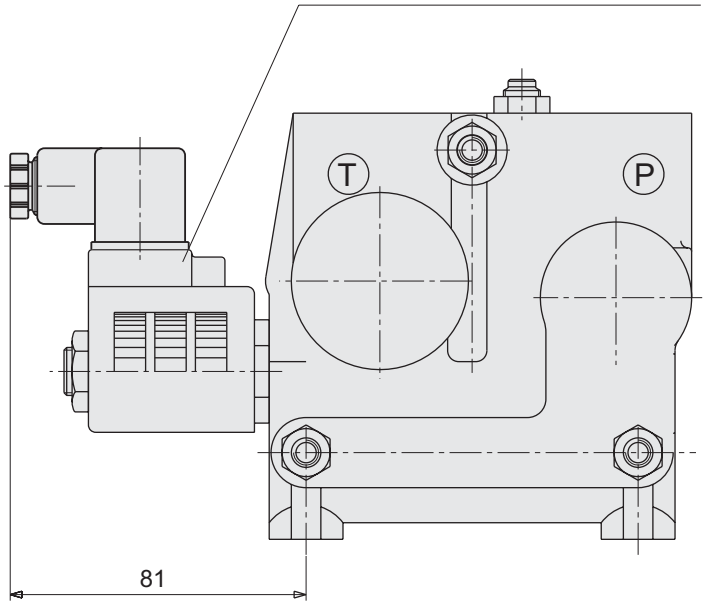
Hydraulic circuit





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

Electrical unloading valve “EV”

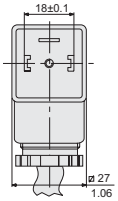


CIRCUIT DESCRIPTION:
“EV” is a solenoid “LS” unloading valve.
“EV” is fitted into the inlet module enabling a connection to be made between the “LS” and the tank lines. Thus the “LS” signal can be relieved to tank by means of an electrical signal.

“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 sum of the tank port pressure plus the neutral flow pressure of the inlet module.

“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 sum of the tank port pressure plus the stand-by pressure of the pump.

CONNECTOR
DIN 43650 - A/ISO 4400

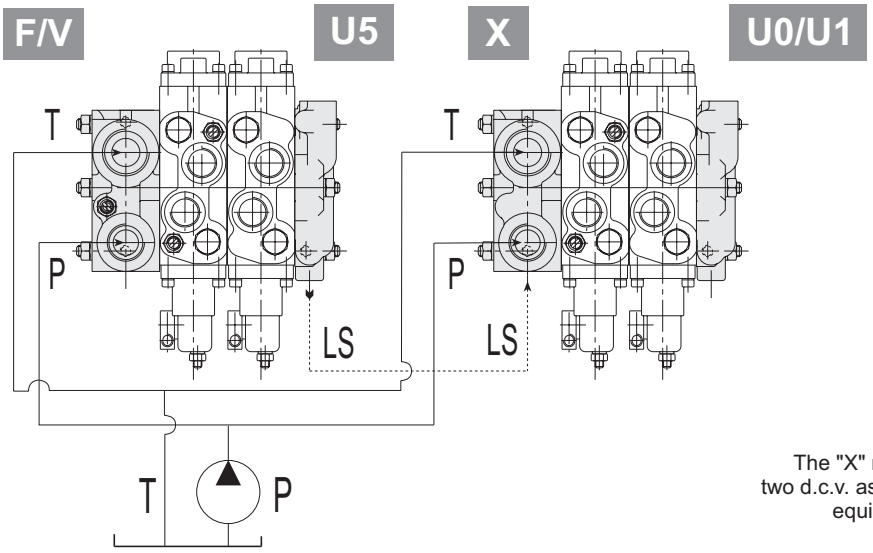


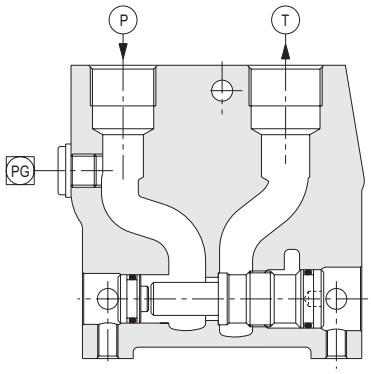
SPECIFICATIONS	
- MAX PRESSURE IN "P"	350 bar
- MAX FLOW	10 l/min
- OIL LEAKAGE	82 cc/min
- AVAILABLE VOLTAGE	12 - 24 Vcc
- COIL RESISTANCE	12Vcc:5.1Ω - 24Vcc:20.5 Ω
- PROTECTION INDEX WITH STANDARD CONNECTOR	IP 65

CODES AND CIRCUITS

code X

Inlet module for parallel connected valves



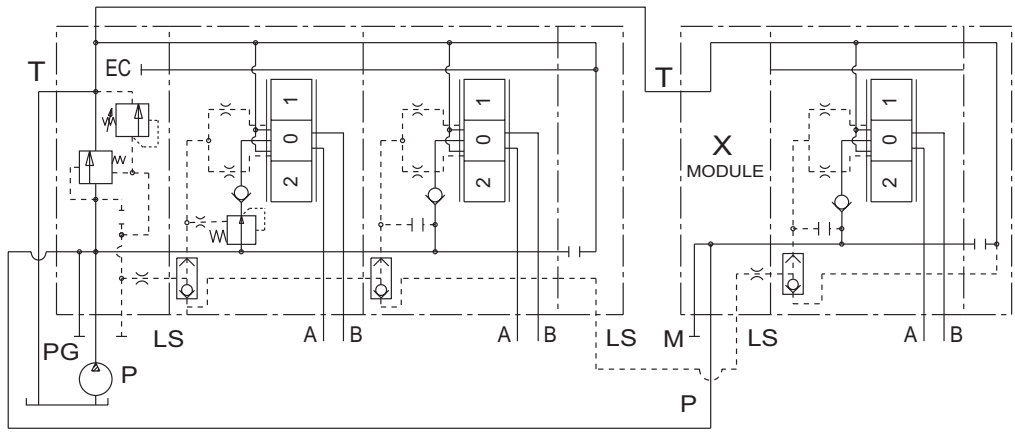


The "X" module allows to realize a parallel connection of two d.c.v. as showned on the side.The "X" module Instead to be equiped with a flow regulator it is just plugged in.

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

Hydraulic circuit



WORKING MODULE WITH PRESSURE COMPENSATOR

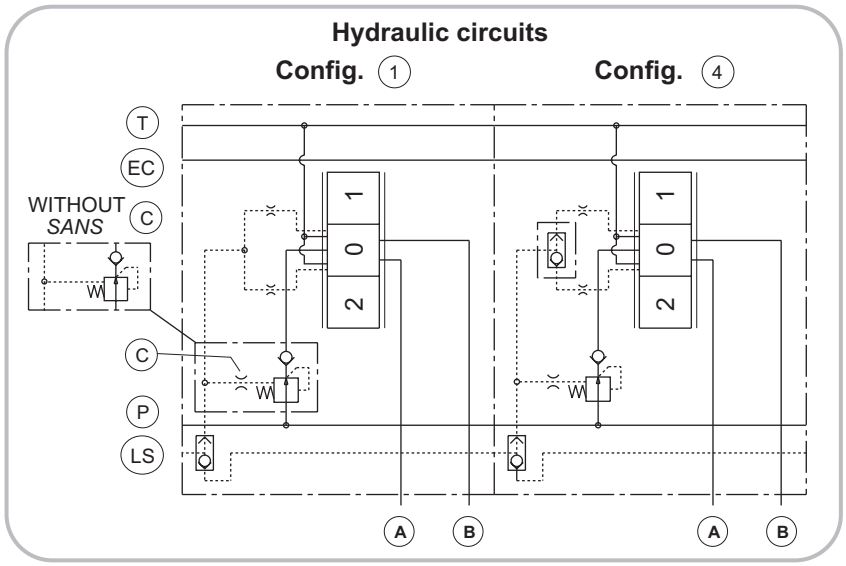
GENERAL FEATURES

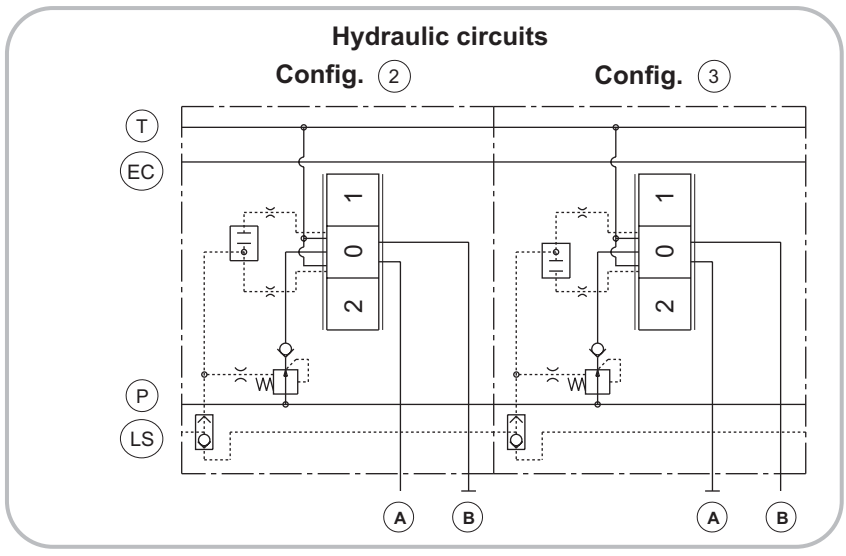
In a pressure-compensated working module the compensator maintains a constant pressure drop across the main spool - both when the load changes and when a module with a higher load pressure is actuated.

CIRCUIT CONFIGURATIONS

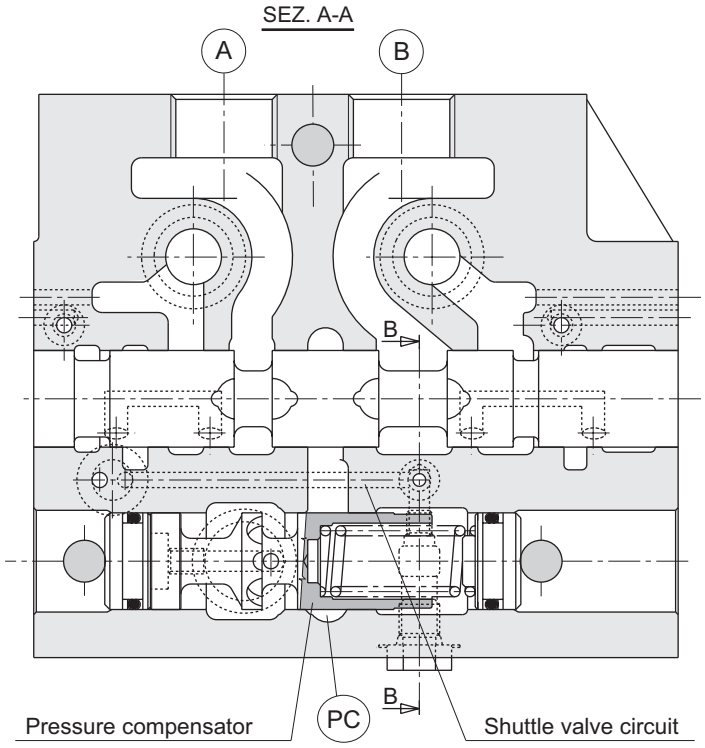
The pressure compensated working module is available in four circuit configurations (see figures beside), where you can introduce all the spool circuits that you can find from page 25 to page 28.In this way we can have a vaste range of circuit types. The drawings at page 15 show the components required to obtain the four different circuit configurations.

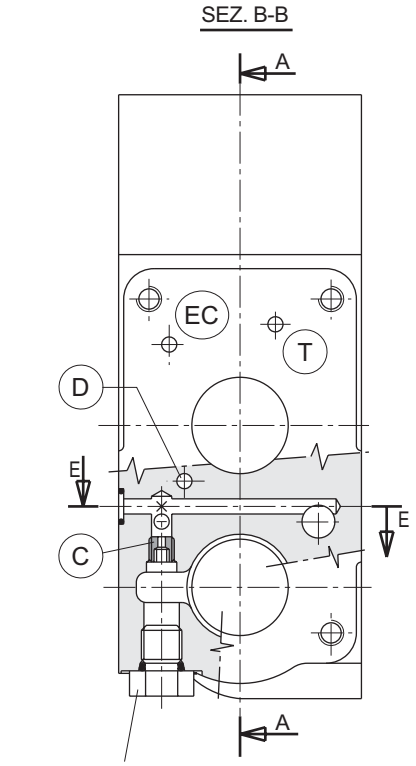
The plug (1) is used just to close a machining hole. The pivots (2) and (3) replace the plug (1) in case we have a single acting spool instead of a duoble. The pivot (4) is used with "LS" pressure limiting valves on A and B ports.It has a shuttle valve built-in that selects the “LSA” and “LSB” signals,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

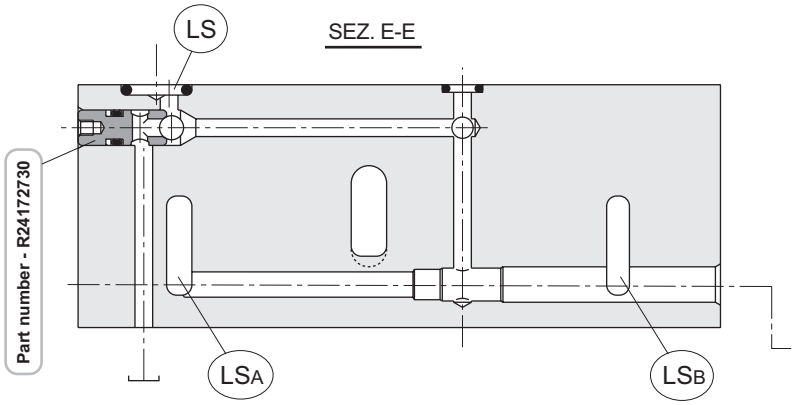


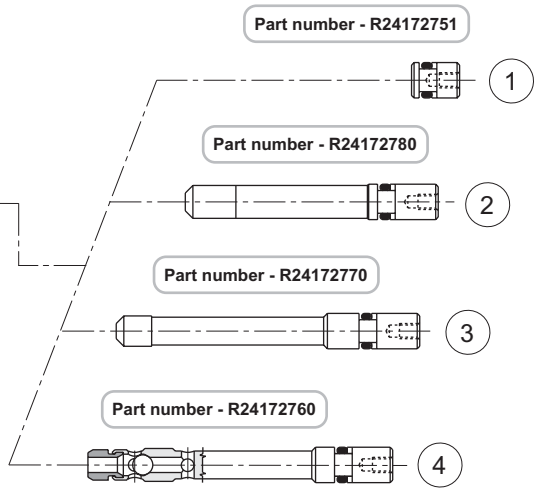


WORKING MODULE WITH PRESSURE COMPENSATOR









A AND/*ET* B WORKING PORTS

PC COMPENSATED PRESSURE

C THROTTLING

CE PILOT SUPPLY

D CONNECTING ORIFICE SIDE "A" - SIDE "B"

T TANK

LS "LS" CIRCUIT

LSA "LS" CIRCUIT FROM PORT "A"

LSB "LS" CIRCUIT FROM PORT "B"

1 PLUG

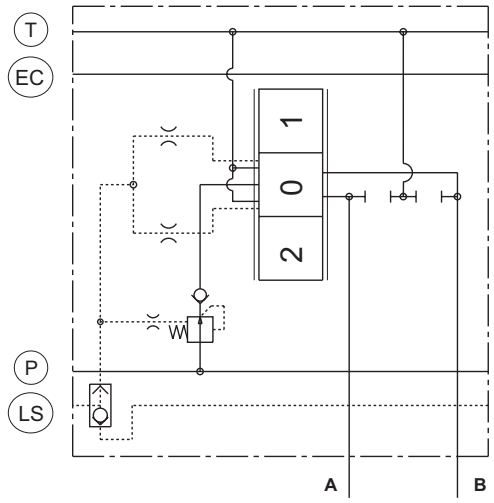
2 SINGLE ACTING PORT A

3 SINGLE ACTING PORT B

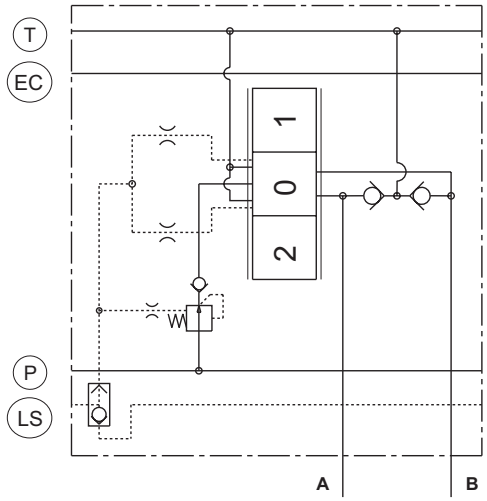
4 SHUTTLE ASSY PORT A OR B

AVAILABLE VALVE TYPES ON A/B PORTS AND RELATIVE CIRCUITS

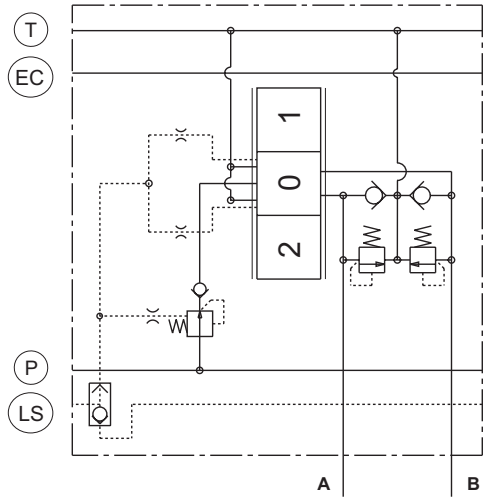
PR - Prearranged for VR - AR



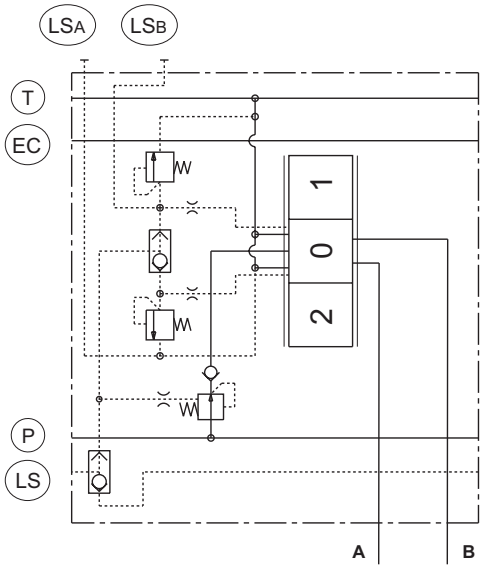
VR - Anti-cavitation valve



AR - Overload and anti-cavitation valve



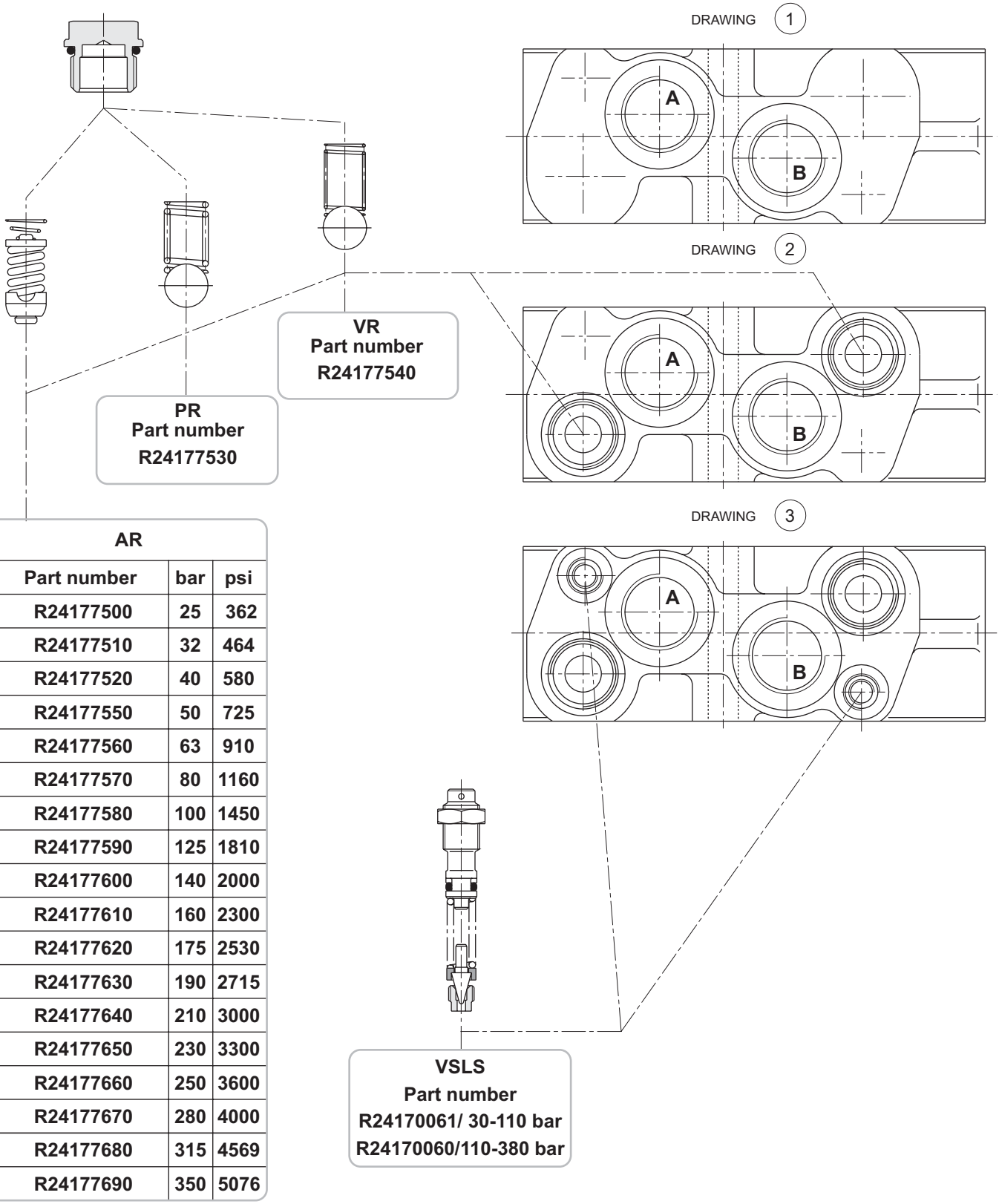
VSLS - $LS_{A/B}$- Pressure limiting valve



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 15 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 wiht 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.

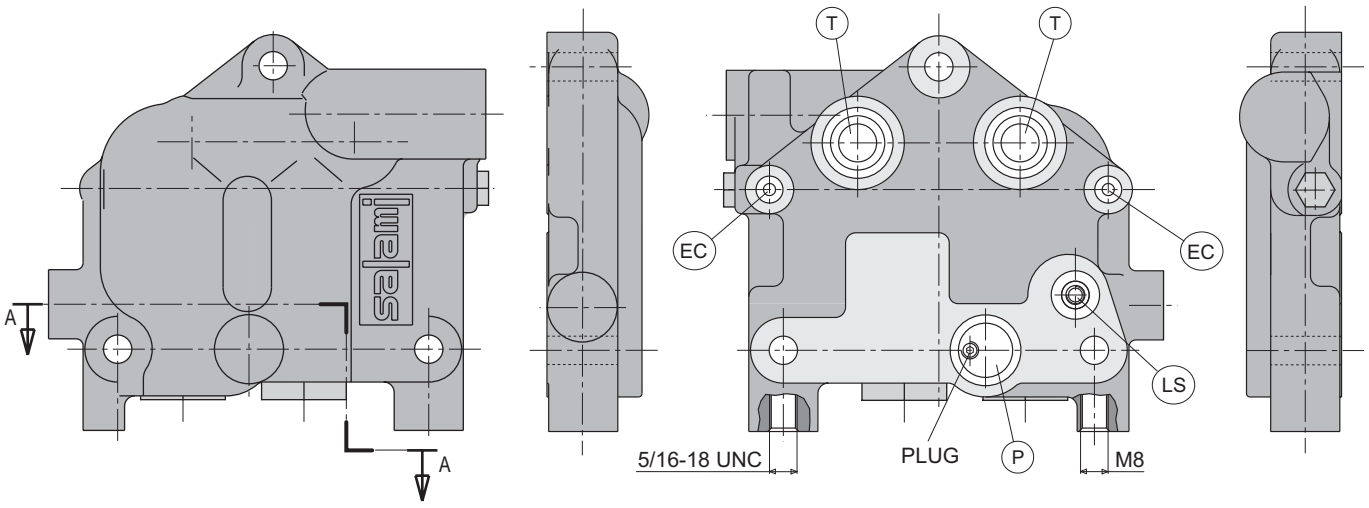
AVAILABLE VALVE TYPES ON A/B PORTS AND RELATIVE CIRCUITS



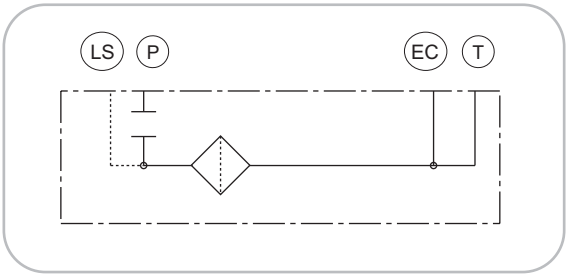
AR		
Part number	bar	psi
R24177500	25	362
R24177510	32	464
R24177520	40	580
R24177550	50	725
R24177560	63	910
R24177570	80	1160
R24177580	100	1450
R24177590	125	1810
R24177600	140	2000
R24177610	160	2300
R24177620	175	2530
R24177630	190	2715
R24177640	210	3000
R24177650	230	3300
R24177660	250	3600
R24177670	280	4000
R24177680	315	4569
R24177690	350	5076

End plate

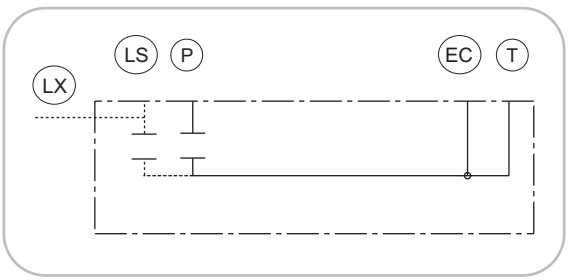
AVAILABLE CODES AND CIRCUITS

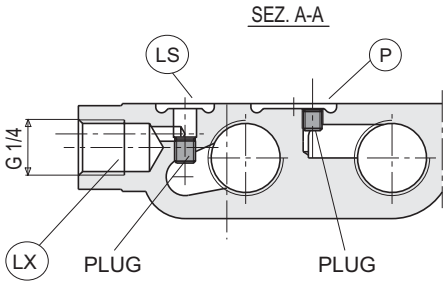


code U0



code U5

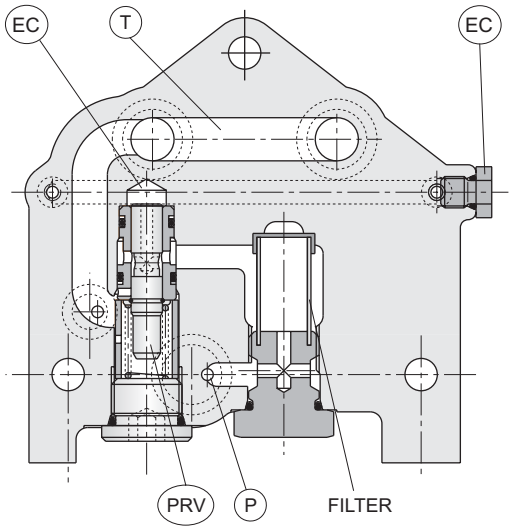




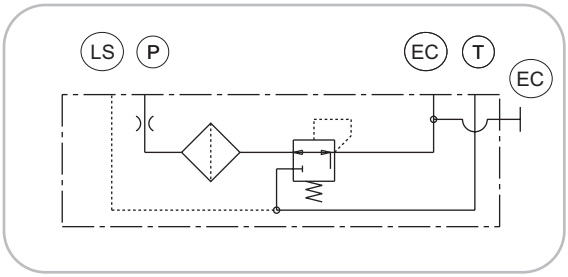
"U5" end plate allows to come out with "LS" signal in order to obtain a parellel circuit with a downstream VDP08 valve complete with a suitable inlet(see page 11).This becomes possible when plugging "LS" signal(see figure).

End plate

CODES AND CIRCUIT TYPES AVAILABLE



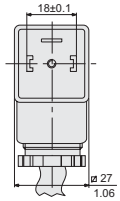
code U1

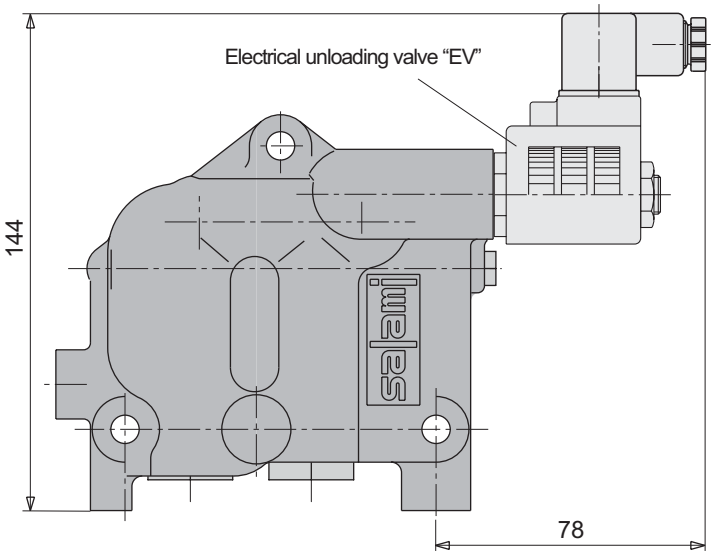


"U1" end plate integrates the reducing pressure valve(PRV) which draws "P" signal, when reducing it to a pressure of approx. 10 to 28 bar, sending it to "EC" circuit for feeding the electrohydraulic controls.

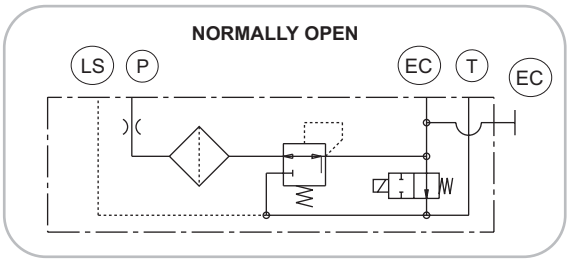
SPECIFICATIONS	
- MAX PRESSURE IN "P"	207 bar
- MAX FLOW	10 l/min
- OIL LEAKAGE	82 cc/min
- AVAILABLE VOLTAGE	12 - 24 Vcc
- COIL RESISTANCE	12Vcc:5.1Ω - 24Vcc:20.5 Ω
- PROTECTION INDEX WITH STANDARD CONNECTOR	IP 65

CONNECTOR
DIN 43650 - A/ISO 4400

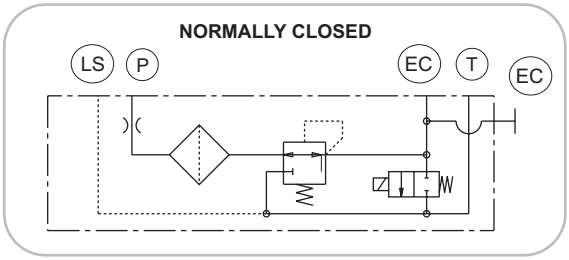




12 Vcc - code U3
24 Vcc - code U4



12 Vcc - code U6
24 Vcc - code U7

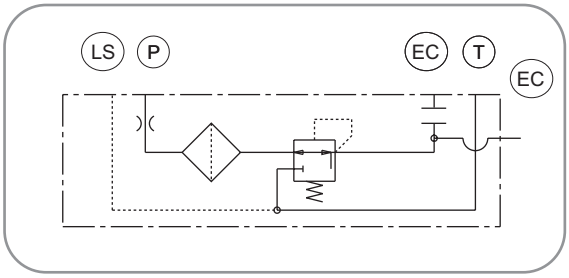


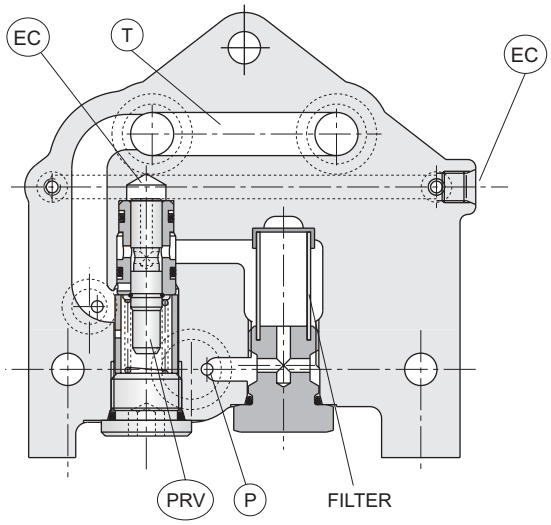
"U3-U4" and "U6-U7" end plates integrate (PRV) valve for electrohydraulic circuits and can also release the "EC" piloting by the electrovalve, which can be normally open or closed.

End plate

AVAILABLE CODES AND CIRCUITS

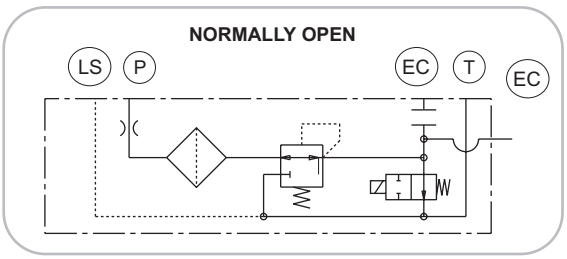
code U2



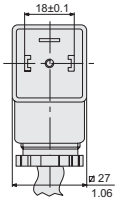


"U2" end plate integrates the reducing pressure valve(PRV) which draws "P" signal, when reducing it to a pressure of approx. 10 to 28 bar, obteining in this way an external piloting signal which can be used by a joystic or an electrovalve for to operate "IP" controls.In this case "EC" piloting inside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

12 Vcc - code U8
24 Vcc - code U9

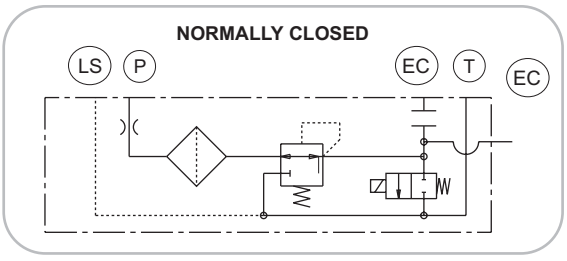


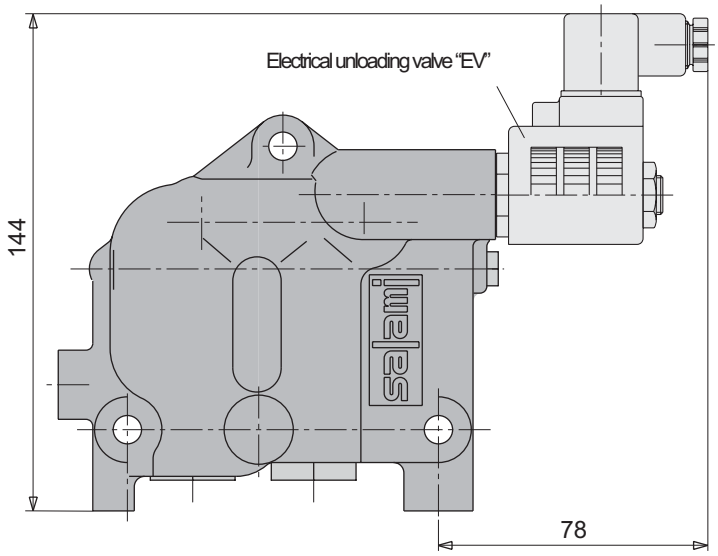
CONNECTOR
DIN 43650 - A/ISO 4400



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:5.1Ω - 24Vcc:20.5 Ω
- PROTECTION INDEX WITH STANDARD CONNECTOR	IP 65

12 Vcc - code U10
24 Vcc - code U11

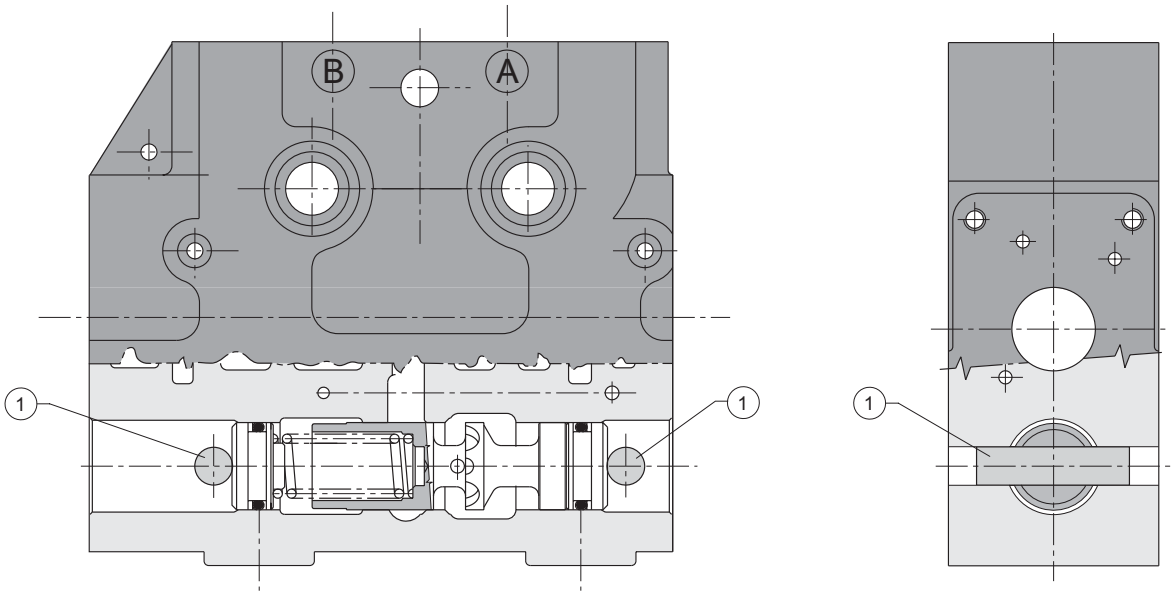




"U8-U9" and "U10-U11" end plates integrate (PRV) valve and can also release the "EC" external piloting by the electrovalve, which can be normally open or closed.

ASSEMBLYNG SECTIONS INSTRUCTIONS

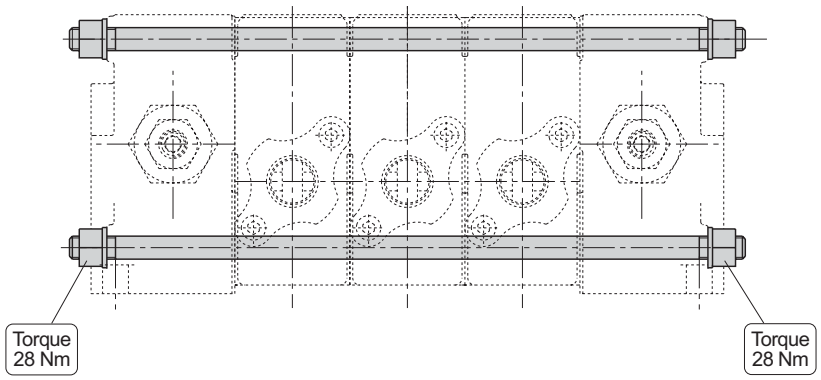
DRAWING "A"



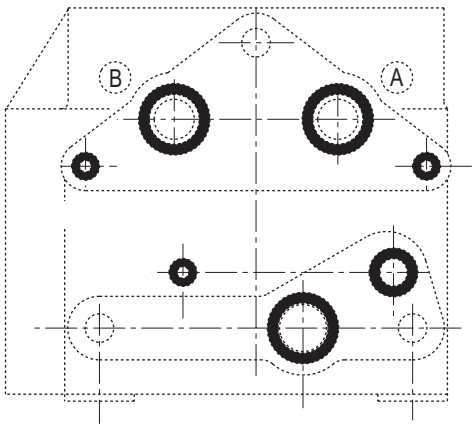
This assembling procedure is mainly suitable for customers who purchase VDP08 complete sections(see page 34) and assemble them by themselves, but can also be useful to add further working sections or to modify the circuit, replacing, a few parts when having a complete valve.Working sections and inlet modules are equiped with a small cylinder of teflon (1) (see drw "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.

ASSEMBLYNG KIT

Part number	n° spools
R24185010	1
R24185020	2
R24185030	3
R24185040	4
R24185050	5
R24185060	6
R24185070	7
R24185080	8



SECTION SIDE SEAL KIT



Part number - R24172580

TYPE OF SPOOLS AVAILABLE

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

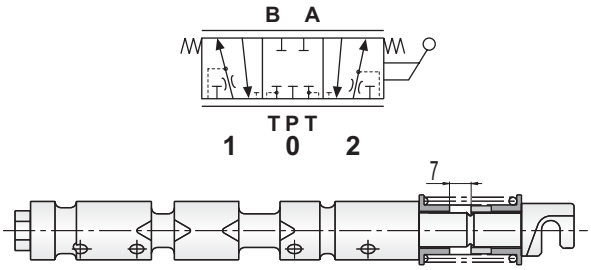
Type	Flow control from - up to
1	Working port flow rate 8 l/min - 2.1 gpm
2	Working port flow rate 16 l/min - 4.2 gpm
3	Working port flow rate 25 l/min - 6.6 gpm
4	Working port flow rate 45 l/min - 11.8 gpm
5	Working port flow rate 63 l/min - 16.6 gpm
6	Working port flow rate 95 l/min - 25 gpm

This part of page is intentionally empty for two reasons.
First, up to now we have treated the building of the cast iron assembly, so it needs an interruption from the next pages which introduces the available spools and controls range.
Second, we want to leave an empty page for your comments.

STANDARD MAIN SPOOLS FOR - NL - CONTROLS

code 01

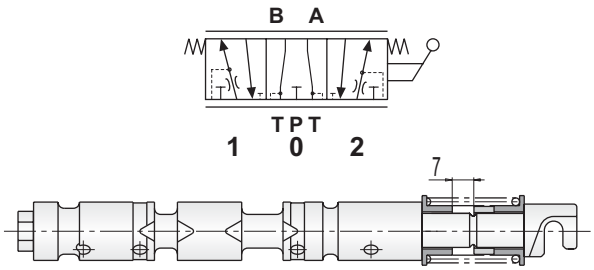
Double acting spool
(5 ways, 3 positions, A/B closed in neutral position)



Part number	Description	Flow control up to
R24175211	011	8 l/min - 2.1 gpm
R24175221	012	16 l/min - 4.2 gpm
R24175231	013	25 l/min - 6.6 gpm
R24175241	014	45 l/min - 11.8 gpm
R24175251	015	63 l/min - 16.6 gpm
R24175261	016	95 l/min - 25 gpm

code 02

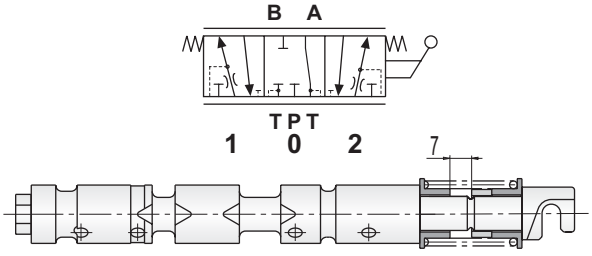
Motor spool
(5 ways, 3 positions, A/B → T in neutral position)



Part number	Description	Flow control up to
R24175212	021	8 l/min - 2.1 gpm
R24175222	022	16 l/min - 4.2 gpm
R24175232	023	25 l/min - 6.6 gpm
R24175242	024	45 l/min - 11.8 gpm
R24175252	025	63 l/min - 16.6 gpm
R24175262	026	95 l/min - 25 gpm

code 03

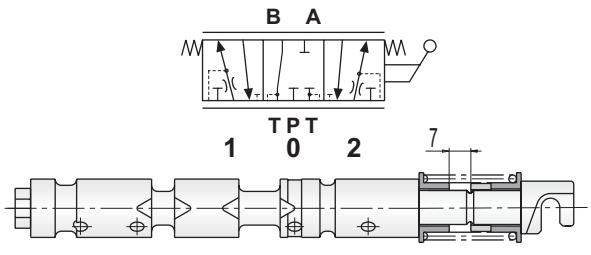
Double acting motor spool port A (B port blocked)
(5 ways, 3 positions, B closed in neutral position)



Part number	Description	Flow control up to
R24175371	031	8 l/min - 2.1 gpm
R24175381	032	16 l/min - 4.2 gpm
R24175391	033	25 l/min - 6.6 gpm
R24175401	034	45 l/min - 11.8 gpm
R24175412	035	63 l/min - 16.6 gpm
R24175431	036	95 l/min - 25 gpm

code 04

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



Part number	Description	Flow control up to
R24175372	041	8 l/min - 2.1 gpm
R24175382	042	16 l/min - 4.2 gpm
R24175392	043	25 l/min - 6.6 gpm
R24175402	044	45 l/min - 11.8 gpm
R24175413	045	63 l/min - 16.6 gpm
R24175432	046	95 l/min - 25 gpm

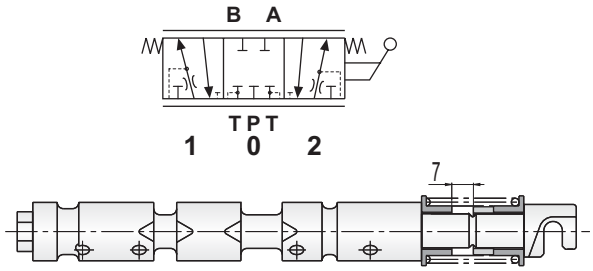
For spools code 05 and code 06 (single acting A or B) you need the spool code 01 in a circuit desribed at page 14

STANDARD MAIN SPOOLS FOR - IP - CONTROL

Part number	Description	Flow control up to
R24175213	011	8 l/min - 2.1 gpm
R24175223	012	16 l/min - 4.2 gpm
R24175233	013	25 l/min - 6.6 gpm
R24175243	014	45 l/min - 11.8 gpm
R24175253	015	63 l/min - 16.6 gpm
R24175263	016	95 l/min - 25 gpm

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

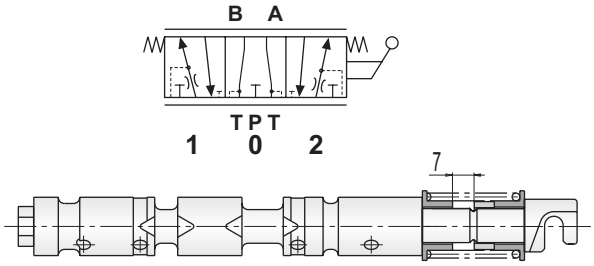
code 01



Part number	Description	Flow control up to
R24175214	021	8 l/min - 2.1 gpm
R24175224	022	16 l/min - 4.2 gpm
R24175234	023	25 l/min - 6.6 gpm
R24175244	024	45 l/min - 11.8 gpm
R24175254	025	63 l/min - 16.6 gpm
R24175264	026	95 l/min - 25 gpm

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

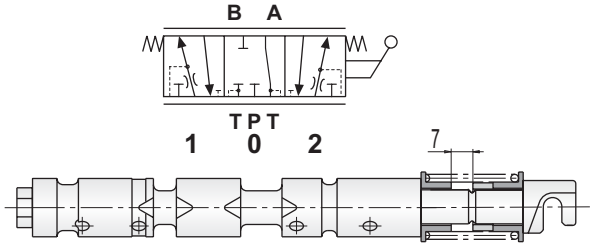
code 02



Part number	Description	Flow control up to
R24175373	031	8 l/min - 2.1 gpm
R24175383	032	16 l/min - 4.2 gpm
R24175393	033	25 l/min - 6.6 gpm
R24175403	034	45 l/min - 11.8 gpm
R24175414	035	63 l/min - 16.6 gpm
R24175433	036	95 l/min - 25 gpm

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

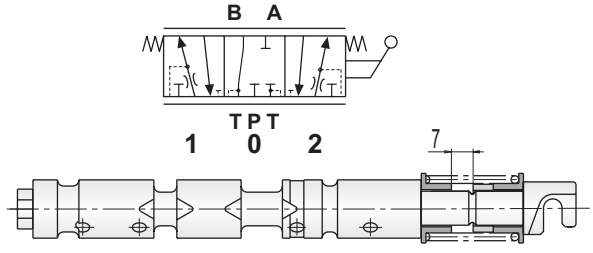
code 03



Part number	Description	Flow control up to
R24175374	041	8 l/min - 2.1 gpm
R24175384	042	16 l/min - 4.2 gpm
R24175394	043	25 l/min - 6.6 gpm
R24175404	044	45 l/min - 11.8 gpm
R24175415	045	63 l/min - 16.6 gpm
R24175434	046	95 l/min - 25 gpm

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

code 04

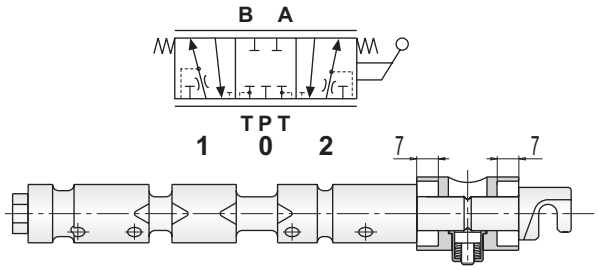


For spools code 05 and code 06 (single acting A or B) you need the spool code 01 in a circuit desribed at page 14

STANDARD MAIN SPOOLS FOR - FL - CONTROL

code 01

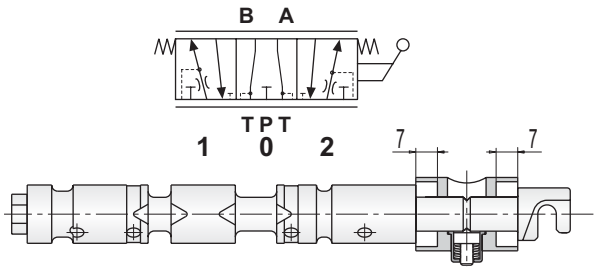
Double acting spool
(5 ways, 3 positions, A/B closed in neutral position)



Part number	Description	Flow control up to
R24175331	013	25 l/min - 6.6 gpm
R24175341	014	45 l/min - 11.8 gpm
R24175351	015	63 l/min - 16.6 gpm
R24175361	016	90 l/min - 23.8 gpm

code 02

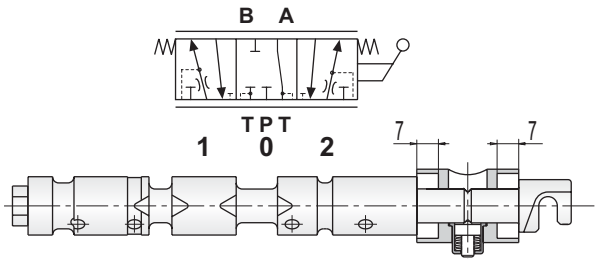
Motor spool
(5 ways, 3 positions, A/B → T in neutral position)



Part number	Description	Flow control up to
R24175332	023	25 l/min - 6.6 gpm
R24175342	024	45 l/min - 11.8 gpm
R24175352	025	63 l/min - 16.6 gpm
R24175362	026	90 l/min - 23.8 gpm

code 03

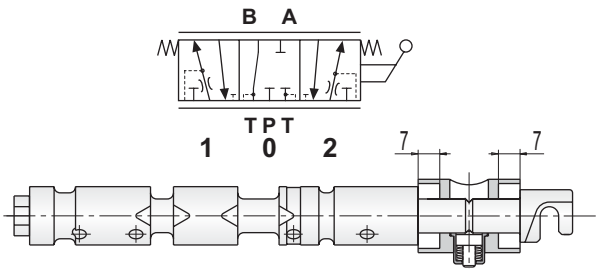
Double acting motor spool port A (B port blocked)
(5 ways, 3 positions, B closed in neutral position)



Part number	Description	Flow control up to
R24175440	033	25 l/min - 6.6 gpm
R24175442	034	45 l/min - 11.8 gpm
R24175444	035	63 l/min - 16.6 gpm
R24175446	036	90 l/min - 23.8 gpm

code 04

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



Part number	Description	Flow control up to
R24175441	043	25 l/min - 6.6 gpm
R24175443	044	45 l/min - 11.8 gpm
R24175445	045	63 l/min - 16.6 gpm
R24175447	046	90 l/min - 23.8 gpm

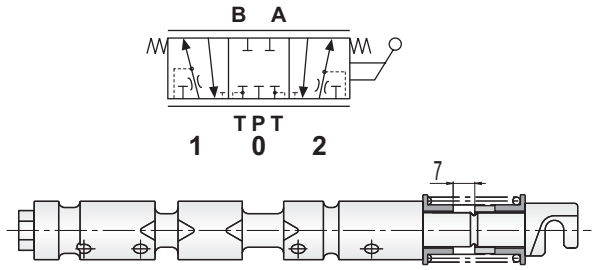
For spools code 05 and code 06 (single acting A or B) you need the spool code 01 in a circuit desribed at page 14

STANDARD MAIN SPOOLS FOR - PP - H1 - H2 - KM - CONTROLS

Part number	Description	Flow control up to
R24175215	011	8 l/min - 2.1 gpm
R24175226	012	16 l/min - 4.2 gpm
R24175230	013	25 l/min - 6.6 gpm
R24175245	014	45 l/min - 11.8 gpm
R24175250	015	63 l/min - 16.6 gpm
R24175260	016	95 l/min - 25 gpm

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

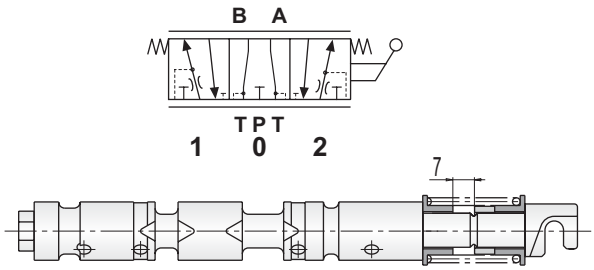
code 01



Part number	Description	Flow control up to
R24175216	021	8 l/min - 2.1 gpm
R24175225	022	16 l/min - 4.2 gpm
R24175235	023	25 l/min - 6.6 gpm
R24175246	024	45 l/min - 11.8 gpm
R24175255	025	63 l/min - 16.6 gpm
R24175265	026	95 l/min - 25 gpm

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

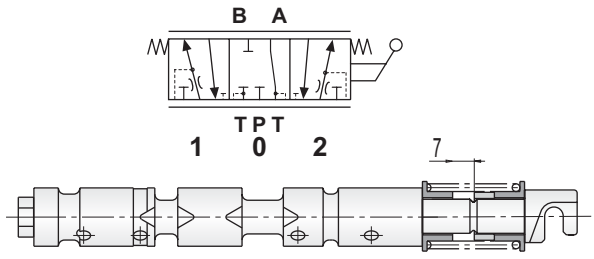
code 02



Part number	Description	Flow control up to
R24175370	031	8 l/min - 2.1 gpm
R24175380	032	16 l/min - 4.2 gpm
R24175390	033	25 l/min - 6.6 gpm
R24175400	034	45 l/min - 11.8 gpm
R24175410	035	63 l/min - 16.6 gpm
R24175430	036	95 l/min - 25 gpm

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

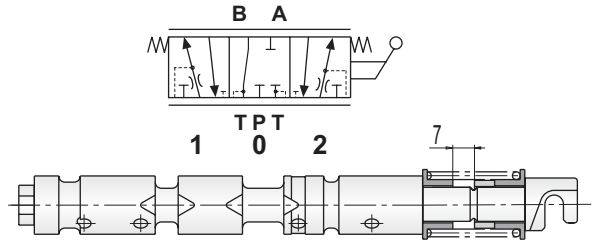
code 03



Part number	Description	Flow control up to
R24175375	041	8 l/min - 2.1 gpm
R24175385	042	16 l/min - 4.2 gpm
R24175395	043	25 l/min - 6.6 gpm
R24175405	044	45 l/min - 11.8 gpm
R24175416	045	63 l/min - 16.6 gpm
R24175435	046	95 l/min - 25 gpm

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

code 04

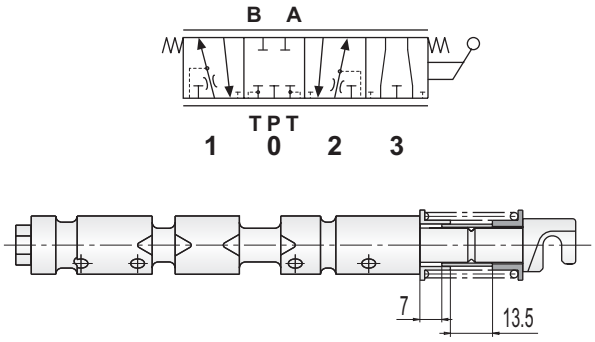


For spools code 05 and code 06 (single acting A or B) you need the spool code 01 in a circuit desribed at page 14

FLOAT SPOOL FOR - NL - CONTROL

code 11

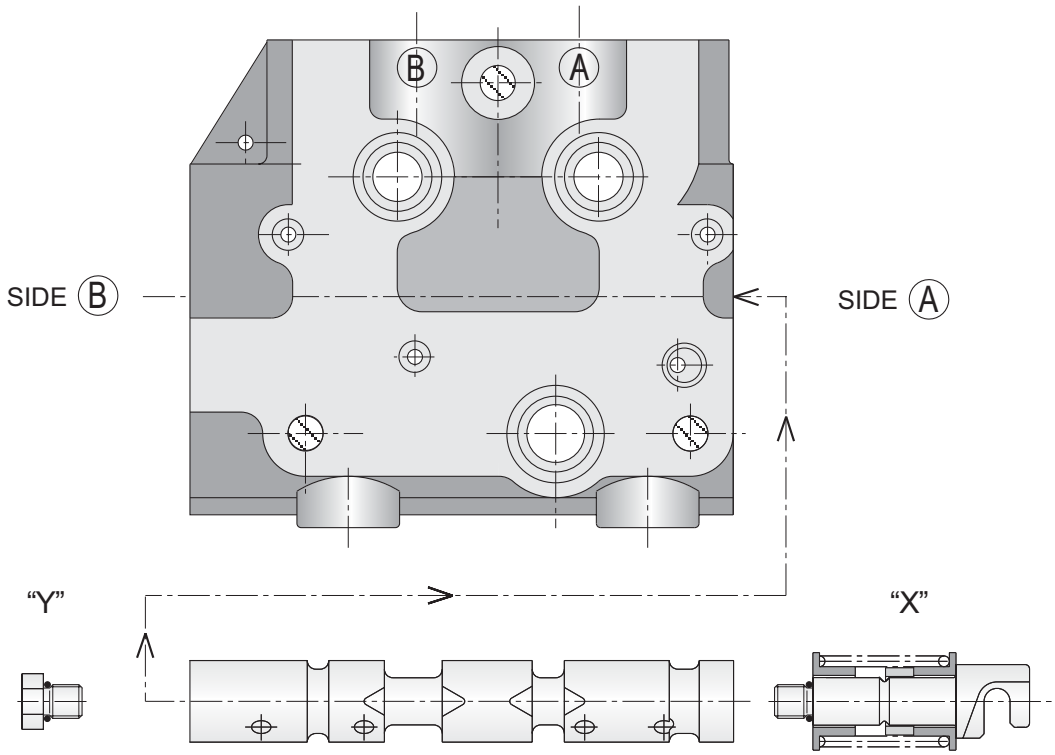
Double acting spool with float position
(5 ways, 4 positions, A/B closed in neutral position)



Part number	Description	Flow control up to
R24175450	111	8 l/min - 2.1 gpm
R24175451	112	16 l/min - 4.2 gpm
R24175452	113	25 l/min - 6.6 gpm
R24175453	114	45 l/min - 11.8 gpm
R24175454	115	63 l/min - 16.6 gpm
R24175455	116	95 l/min - 25 gpm

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

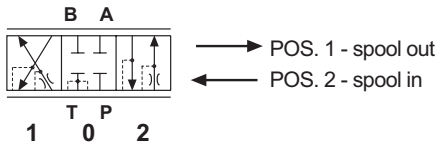
GENERAL CAUTIONS FOR SPOOL CONTROL ASSEMBLING



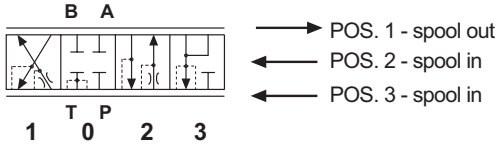
GENERAL FEATURES

On this and following pages are showned 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.

DISTRIBUTION WITH CONTROLS ON SIDE "A"

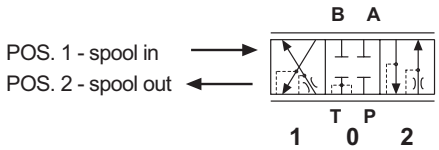


POS. 1 P → B T → A
POS. 2 P → A T → B

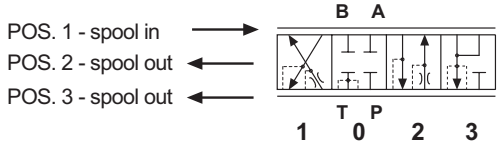


POS. 1 P → B T → A
POS. 2 P → A T → B
POS. 3 A/B → T

DISTRIBUTION WITH CONTROLS ON SIDE "B"



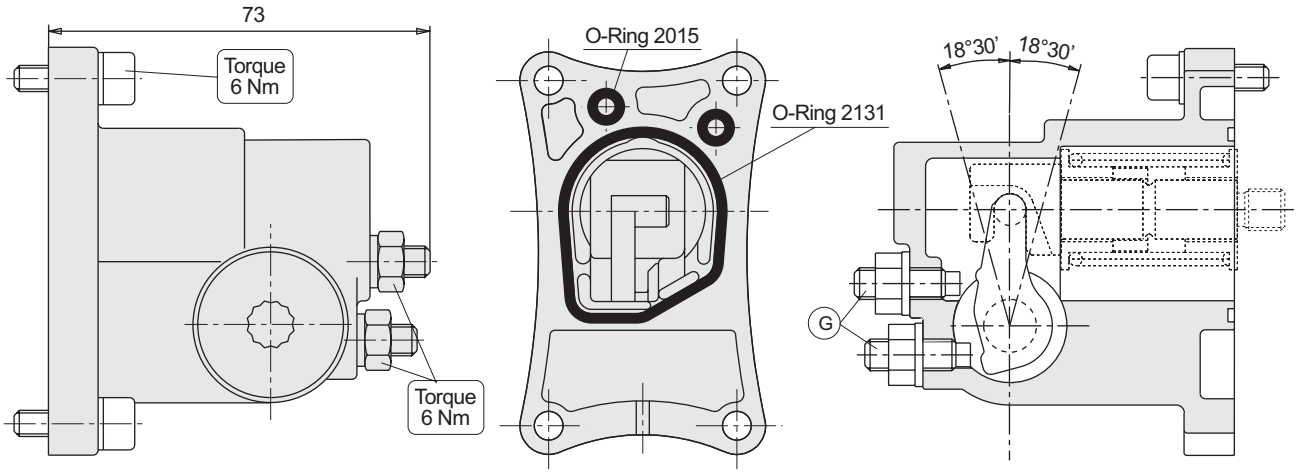
POS. 1 P → B T → A
POS. 2 P → A T → B



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

SL

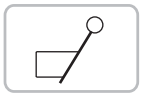
WITHOUT LEVER
PART NUMBER R24187650

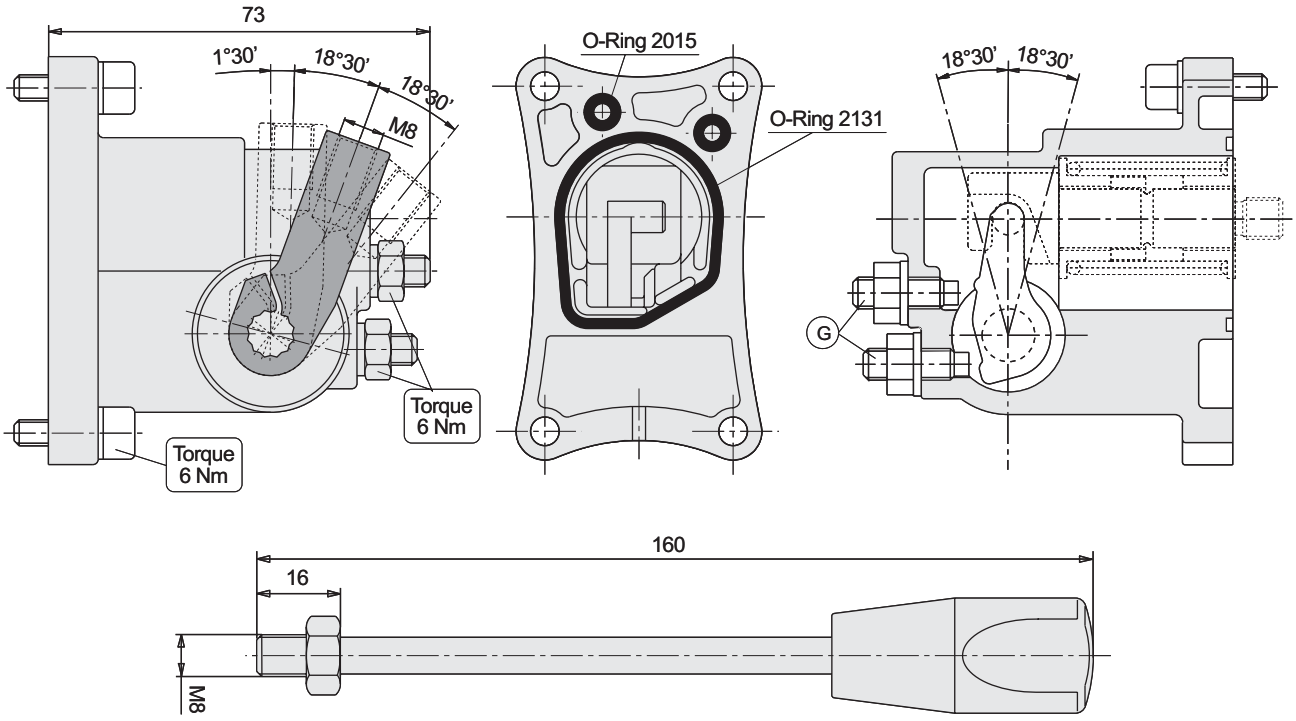


The code "SL" is a spool positioning kit that can be used with spool controls: "PP - IP - H1/H2 - KM".
The external adjusting screws "G" have to be used to reduce the spool stroke and consequently the port flow.

NL

WITH LEVER
PART NUMBER R24187651

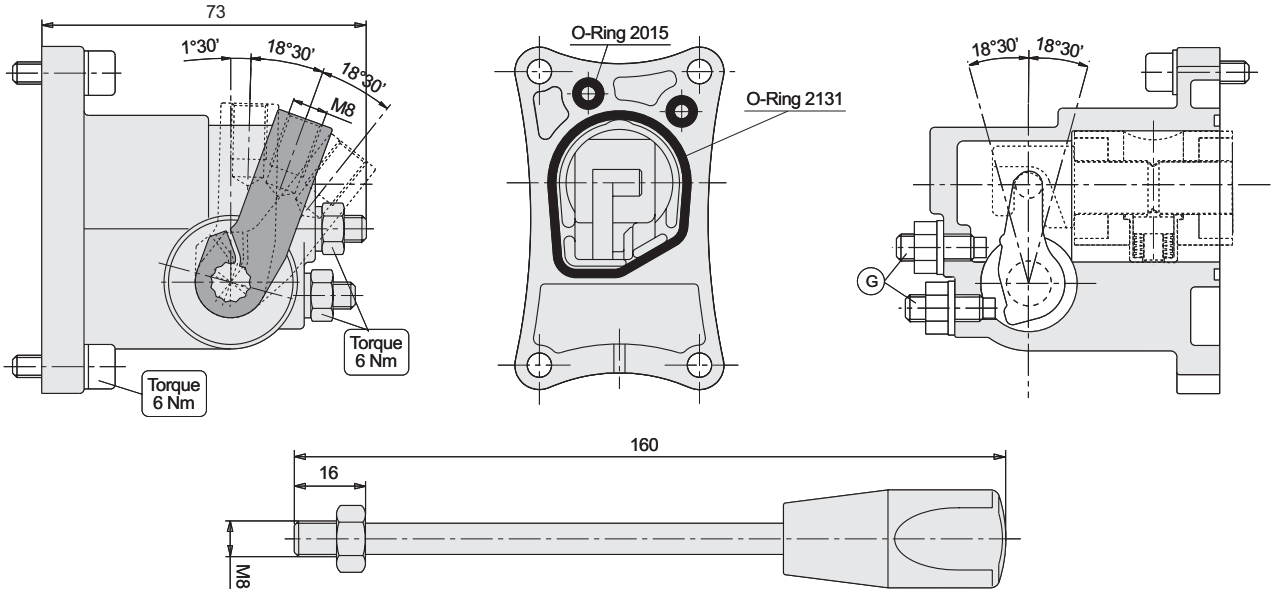




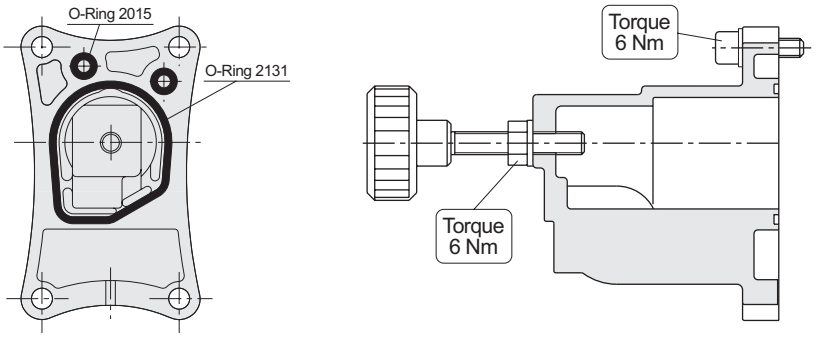
The code "NL" is the standard lever mechanism and can be used together with all spool controls.
In case we have spool remote controls the "NL" device can be used as emergency lever.
Also in this case the external adjusting screw "G" have to be used to reduce spool stroke and consequently port flow.

WITH LEVER
PART NUMBER R24187651

FL



The code "FL" is a manual lever mechanism with friction detent built-in, this device has to be used with spools shown on page 24.Thi device cannot be used with remote spool controls.

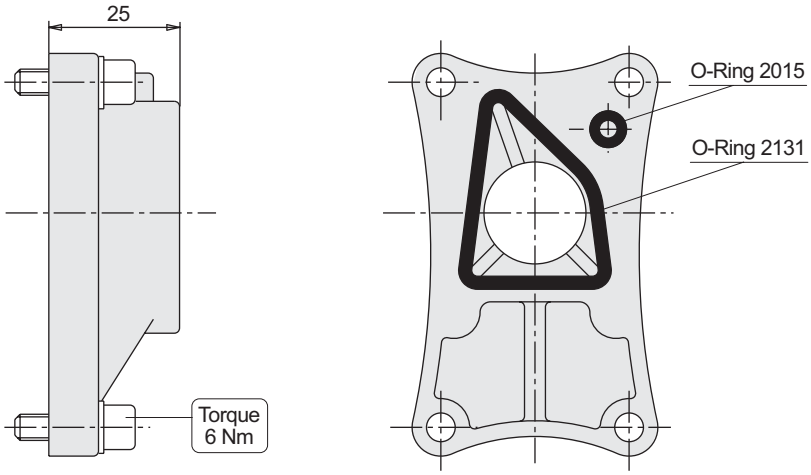


ES

The "ES" device is a rotative manual override that allow to push the spool in one just working position in case - H1/H2 - KM spool controls fails.

PART NUMBER R24175090

C2

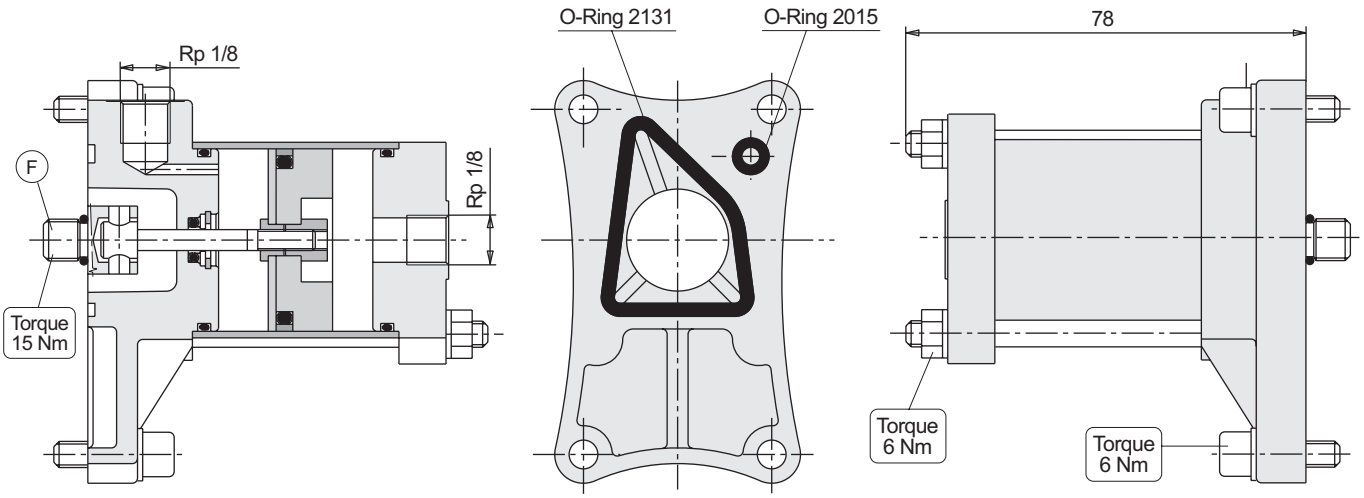


The code "C2" is a simple end plate used all the time we have: "NL - FL" spool controls.

LOAD SENSING DIRECTIONAL CONTROL VALVE VDP08

PP

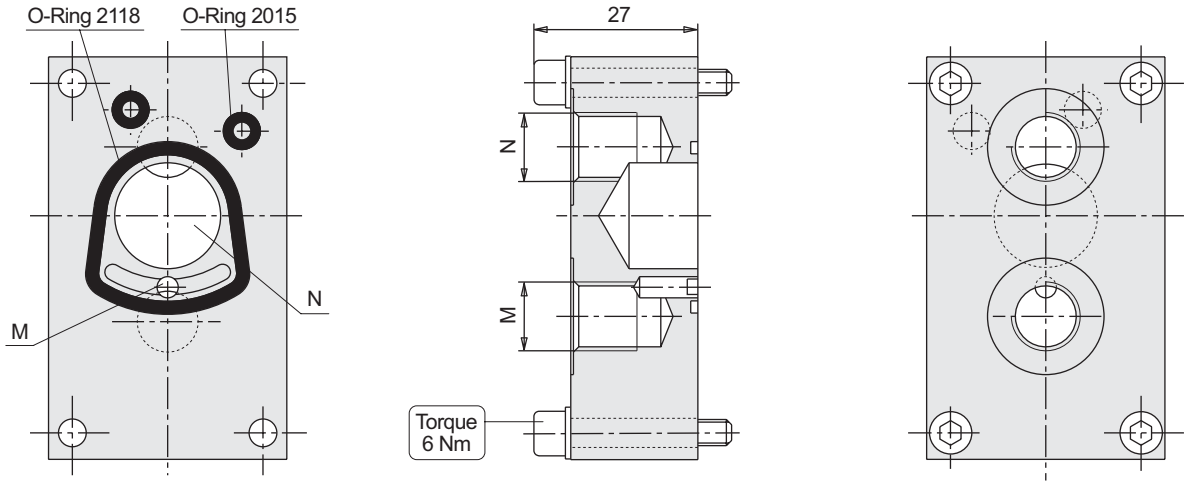
PNEUMATIC PROPORTIONAL
PART NUMBER R24175670



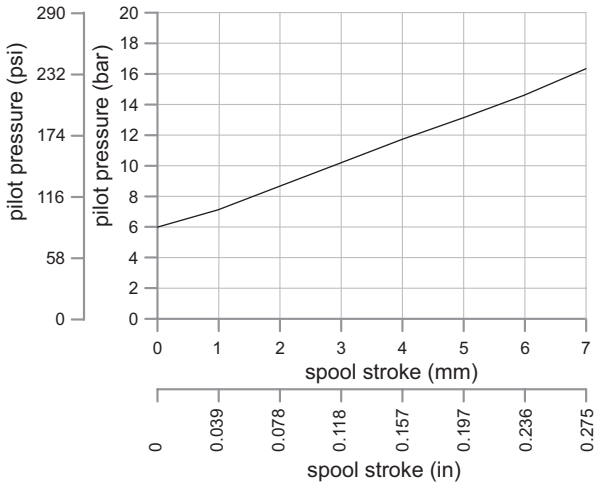
The code "PP" is a pneumatic proportional spool control.In the "PP" assembling we substitute the "Y" plug (see page 27) with the joint "F" shown in the picture.

IP

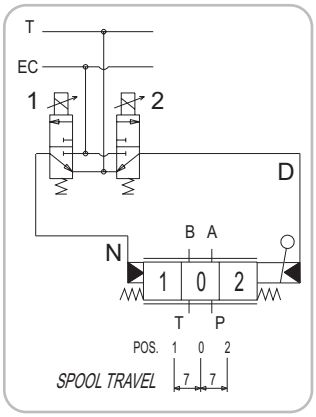
HYDRAULIC PROPORTIONAL
GAS THREADED PORTS - PART NUMBER R24175650
SAE THREADED PORTS - PART NUMBER R24175640



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



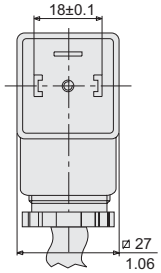
The code "**IP**" is a hydraulic proportional spool control.
"**M** and **N**" are the pilot pressure ports.
For example if we fit the "**IP**" device on "**A**" side the pilot pressure going in "**N**" port push the spool to "**B**" side direction allowing pump flow through working port "**A**".When we supply pilot pressure to "**M**" port we pull the spool to "**A**" side allowing pump flow through working port "**B**".



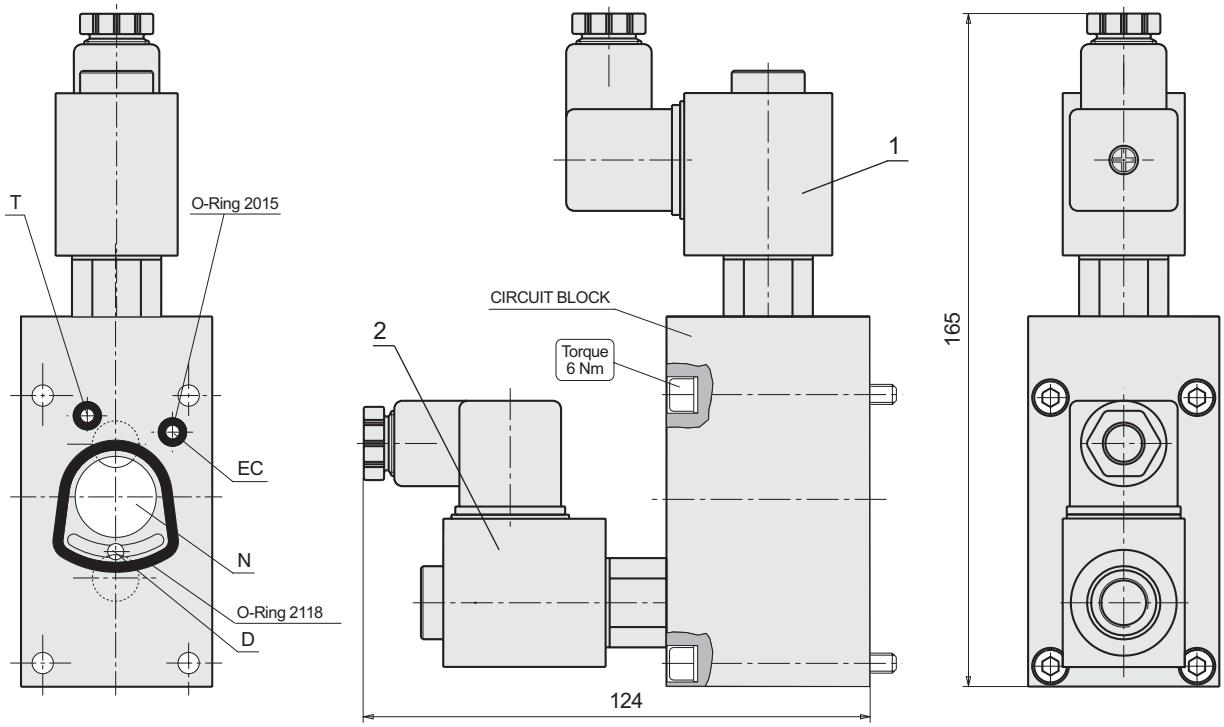
ON-OFF ELECTROHYDRAULIC CONTROL
H1 - 12Vcc - PART NUMBER R24102120
H2 - 24Vcc - PART NUMBER R24102240

H1/H2

CONNECTOR
DIN 43650 - A/ISO 4400



SPECIFICATIONS	
- *MAX PRESSURE IN "P"*	30 bar
- MAX FLOW	2 l/min
- OIL LEAKAGE	20 cc/min
- AVAILABLE VOLTAGE	12 - 24 Vcc
- COIL RESISTANCE	12Vcc:7.2Ω - 24Vcc:41.5 Ω
- COIL POWER AT 20° C	11 W
- INSULATION INDEX	F
- PROTECTION INDEX WITH STANDARD CONNECTOR	IP 65
- CARTRIDGE TORQUE	15 Nm

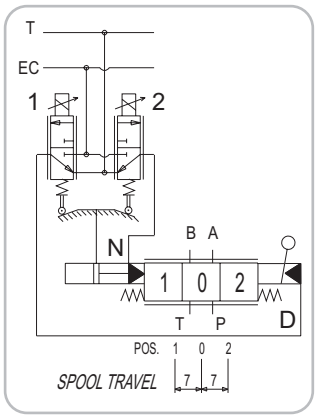


The electrohydraulic actuation **ON – OFF** can be with 12VDC (**H1** type) or 24VDC (**H2** type) voltage supplied. The structure of this command is shown on the drawing above.
This block, by means of the port "**EC**", takes the pressure signal directly from the working module (see page 13); when the solenoid of the electrovalves is de-energised the signal is closed and the 2 channels "**N**" and "**D**" are connected to tank. The pressure signal coming from the working module is held constant by a pressure reducing valve (PRV) situated on the outlet section (see scheme on page 17).
When you energise the electrovalve **1**, the pressure signal can go from "**EC**" to "**N**". If we have the actuator mounted on side "**B**" of the directional valve working section (see page 27), the spool is pushed toward "**A**" side; during this phase the hole "**D**" is connected to "**T**" (tank line) therefore to the homonymous hole on the side of working module (see page 13). To the contrary when the electrovalve **2** is energised the pressure signal goes from "**EC**" to "**D**" and through this channel (on the side of the module, see page 13) it pushes the spool from side "**A**" toward side "**B**", having naturally in this phase "**N**" connected to "**T**", that means to tank.

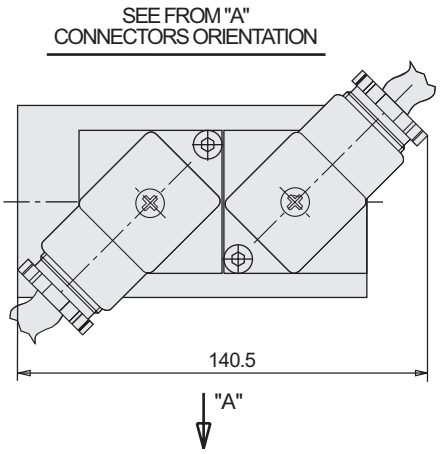
KM12

KM24

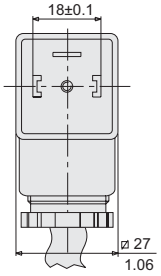
ELECTRO-HYDRAULIC PROPORTIONAL WITH MECHANICAL FEEDBACK
12 Vdc - PART NUMBER R24102500
24 Vdc - PART NUMBER R24102501

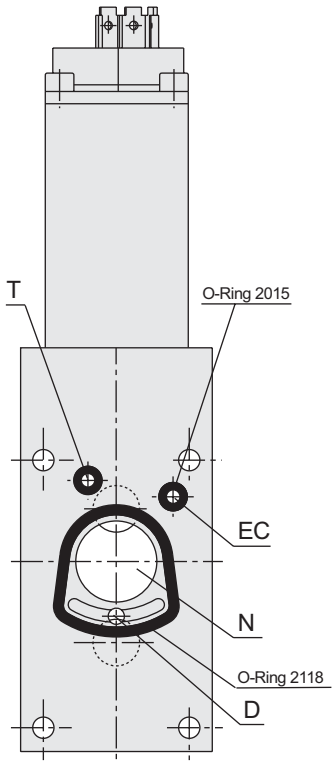


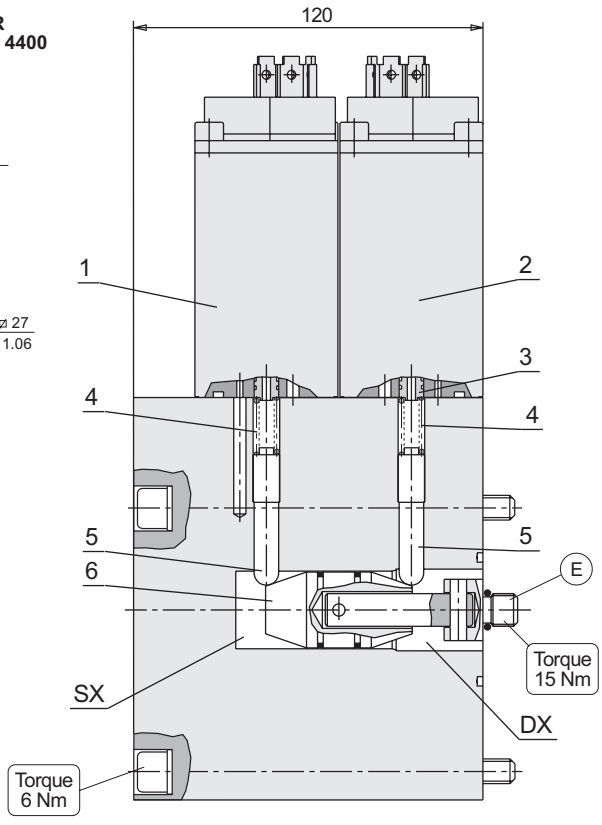
SPECIFICATIONS	
- *MAX PRESSURE IN "P"*	30 bar
- MAX FLOW	2 l/min
- OIL LEAKAGE	100 cc/min
- AVAILABLE VOLTAGE	12 - 24 Vcc
- COIL RESISTANCE	12Vcc:5.1Ω - 24Vcc:20.5 Ω
REGULATION MAX CURRENT	12 Vcc : 1400 mA
REGULATION MAX CURRENT	24Vcc : 800 mA
- PWM	120 Hz
- HISTERESIS	5%
- PROTECTION INDEX WITH STANDARD CONNECTOR	IP 65

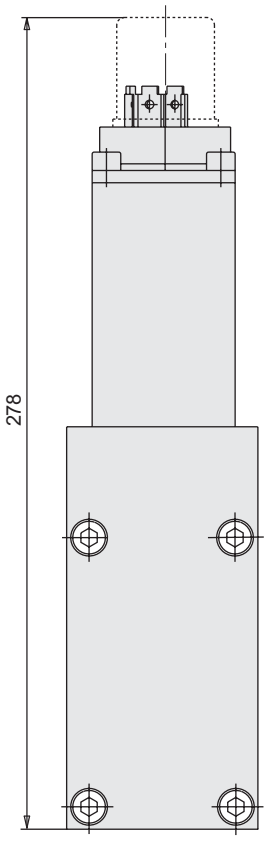


CONNECTOR
DIN 43650 - A/ISO 4400



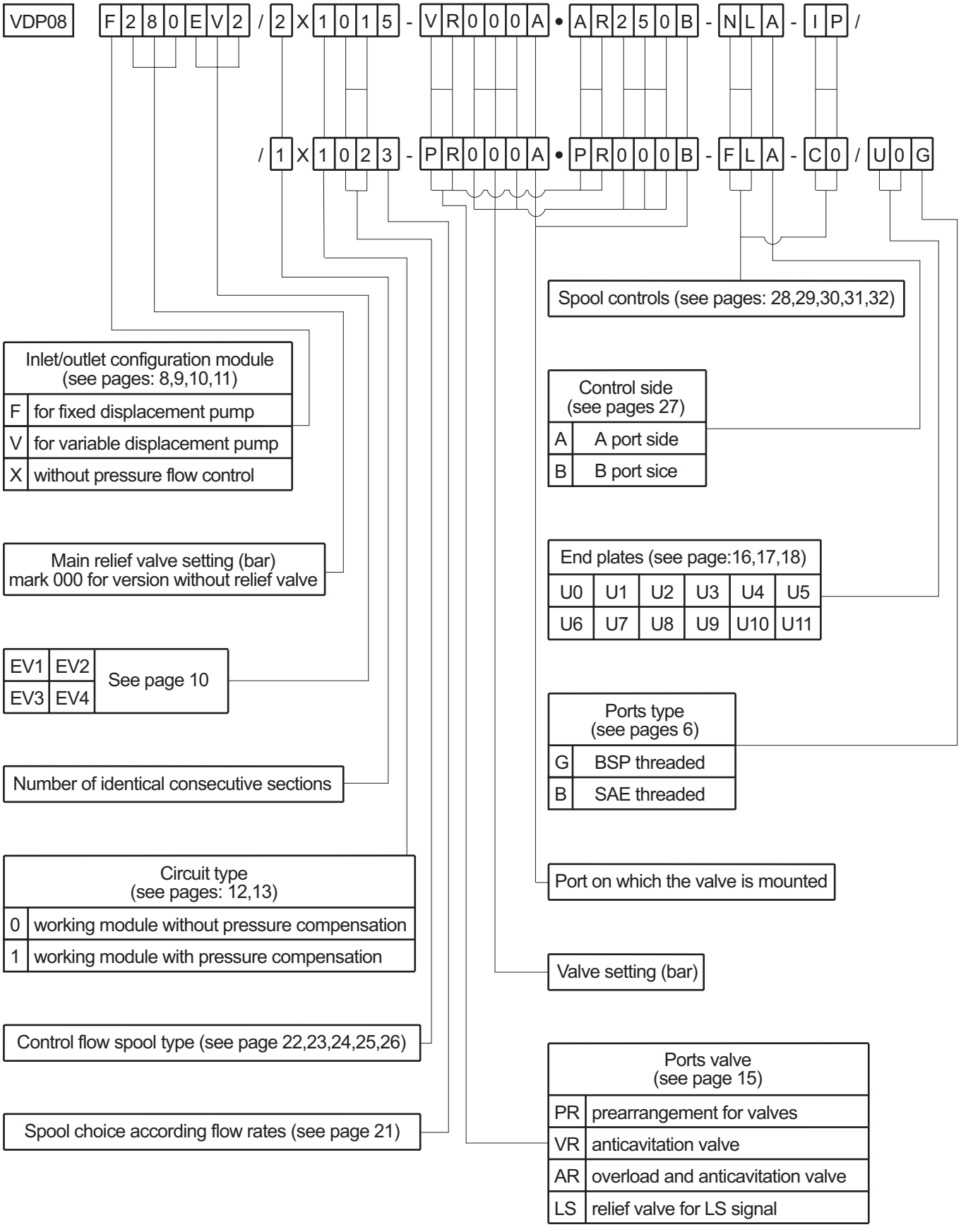




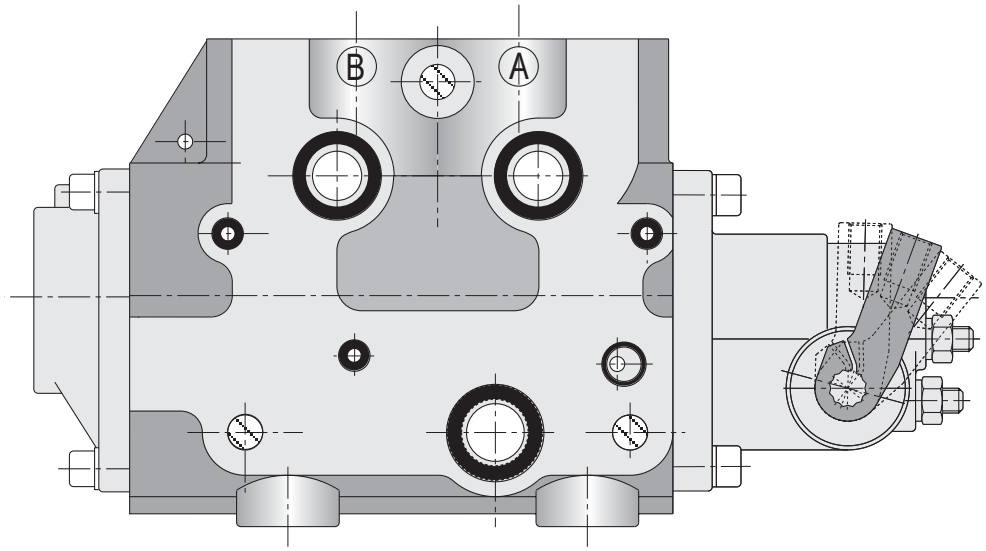


The electrohydraulic proportional control with mechanical feedback can be powered with a voltage of 12 Vcc or 24 Vcc.With de-energized electrovalves, the signal coming from "**EC**" (see page 13) is plugged.While the galleries "**D**" and "**N**" are connected through "**T**" (see page 13) to tank.Exiting the electrovalve "**1**", the circuit sends a signal under pressure to the gallery "**D**".The force determined by the signal pushes the spool toward "**SX**" side, the cam "**6**" move towards "**SX**" while moving the feeler pin "**5**" bottom-up.The feeler pin "**5**" compresses the spring "**4**" and holds up the spear valve "**3**" which tries to close the circuit(now the gallery "**N**" is connected with "**T**").At this stage acts the electrical setting which holds up the force of the spring, throughout the changing of current intensity(see electrical table) opening on this way the piloting circuit.Once obtains in this way a sensitive control at the same time as the spool move(mechanical feedback) and as the electrical current intensity increases.Obviously, exciting the electrovalve "**2**" the functioning is the same but symmetrical.
In the "**KM**" assembling we substitute the "**Y**" plug (see page 27) with the joint "**E**" shown in the drawing.

How to order


VDP08
F 2 8 0 E V 2 / 2 X 1 0 1 5 - V R 0 0 0 A • A R 2 5 0 B - N L A - I P /
/ 1 X 1 0 2 3 - P R 0 0 0 A • P R 0 0 0 B - F L A - C 0 / U 0 G
Spool controls (see pages: 28,29,30,31,32)
Inlet/outlet configuration module (see pages: 8,9,10,11)
F for fixed displacement pump
V for variable displacement pump
X without pressure flow control
Control side (see pages 27)
A A port side
B B port sice
Main relief valve setting (bar) mark 000 for version without relief valve
End plates (see page:16,17,18)
U0 U1 U2 U3 U4 U5
U6 U7 U8 U9 U10 U11
EV1 EV2 EV3 EV4 See page 10
Ports type (see pages 6)
G BSP threaded
B SAE threaded
Number of identical consecutive sections
Port on which the valve is mounted
Circuit type (see pages: 12,13)
0 working module without pressure compensation
1 working module with pressure compensation
Valve setting (bar)
Control flow spool type (see page 22,23,24,25,26)
Ports valve (see page 15)
PR prearrangement for valves
VR anticavitation valve
AR overload and anticavitation valve
LS relief valve for LS signal
Spool choice according flow rates (see page 21)

WORKING MODULE PRESSURE COMPENSATED

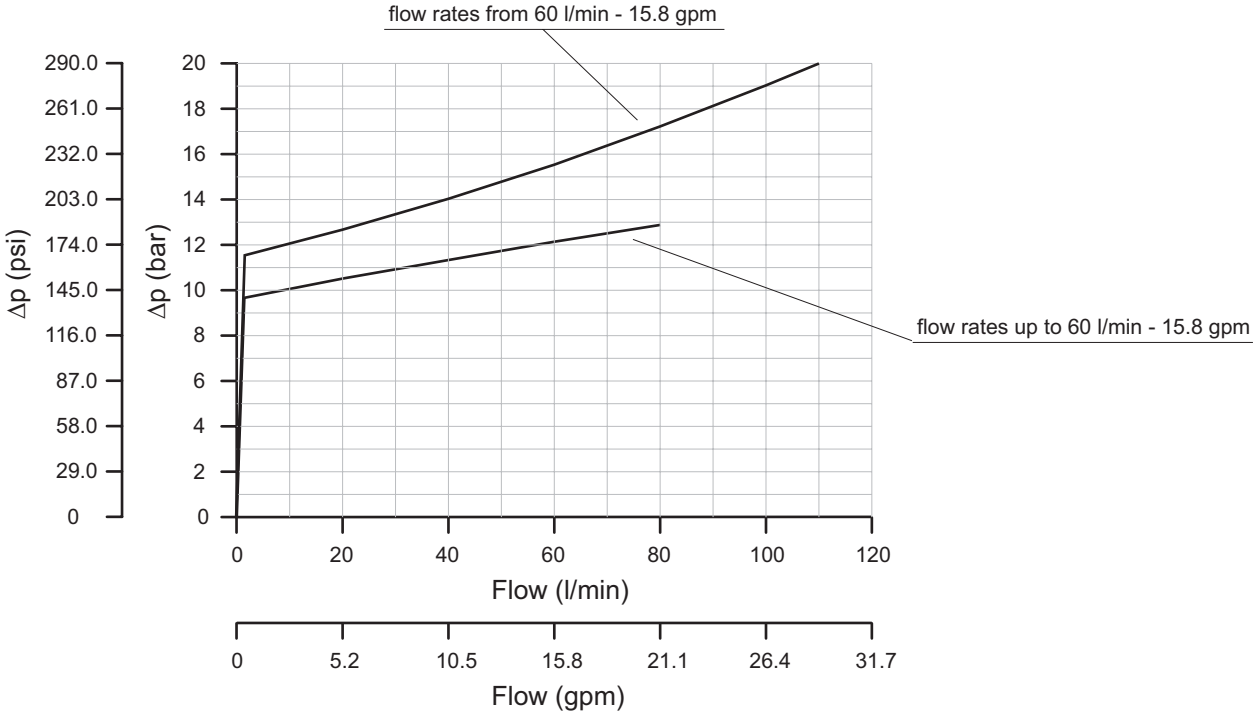


Ordering codes for sections with handle controls, positioning springs and spools, to be purchased separately

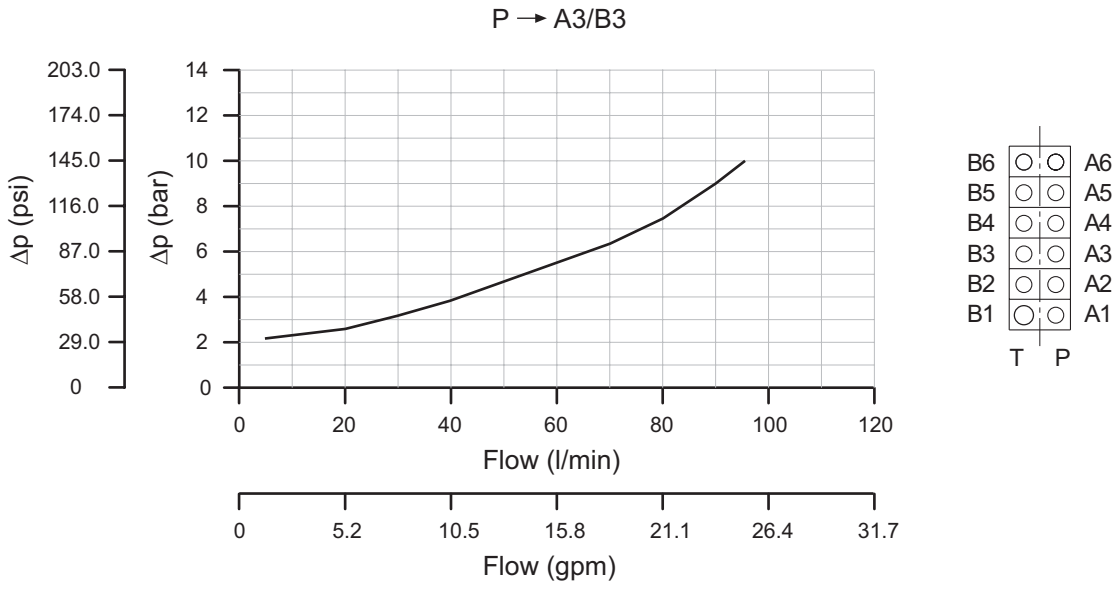
Part number	Flow ports A/B	Ordering code	A/B ports
S24180010	8 l/min	1011-PRA.PRB-NLA-C2/G	G 1/2
S24180020	16 l/min	1012-PRA.PRB-NLA-C2/G	G 1/2
S24180030	25 l/min	1013-PRA.PRB-NLA-C2/G	G 1/2
S24180040	45 l/min	1014-PRA.PRB-NLA-C2/G	G 1/2
S24180050	63 l/min	1015-PRA.PRB-NLA-C2/G	G 1/2
S24180060	95 l/min	1016-PRA.PRB-NLA-C2/G	G 1/2
S24180070	2.1 gpm	1011-PRA.PRB-NLA-C2/S	SAE 10
S24180080	4.2 l/min	1012-PRA.PRB-NLA-C2/S	SAE 10
S24180090	6.6 gpm	1013-PRA.PRB-NLA-C2/S	SAE 10
S24180100	11.8 gpm	1014-PRA.PRB-NLA-C2/S	SAE 10
S24180110	16.6 gpm	1015-PRA.PRB-NLA-C2/S	SAE 10
S24180120	25 gpm	1016-PRA.PRB-NLA-C2/S	SAE 10

ALL THE CHARACTERISTICS ARE MEASURED USING A MINERAL OIL WITH A VISCOSITY OF 15 mm^2/sec AT A TEMPERATURE OF 60 °C

OPEN CENTER - NEUTRAL FLOW PRESSURE INLET/OUTLET MODULE

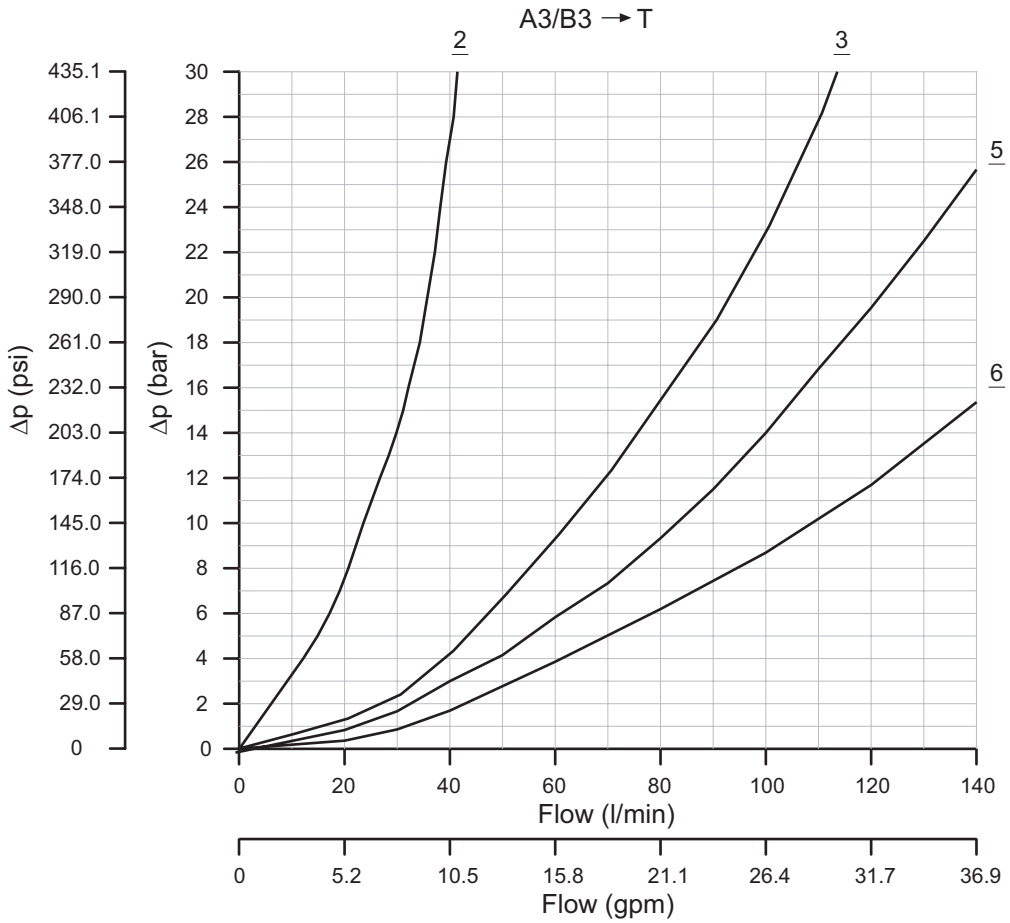


CLOSED CENTRE - WORKING MODULES PRESSURE DROP



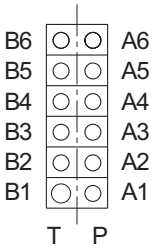
ALL THE CHARACTERISTICS ARE MEASURED USING A MINERAL OIL WITH A VISCOSITY OF 15 mm^2/sec AT A TEMPERATURE OF 60 °C

WORKING MODULES PRESSURE DROP FROM A/B TO T

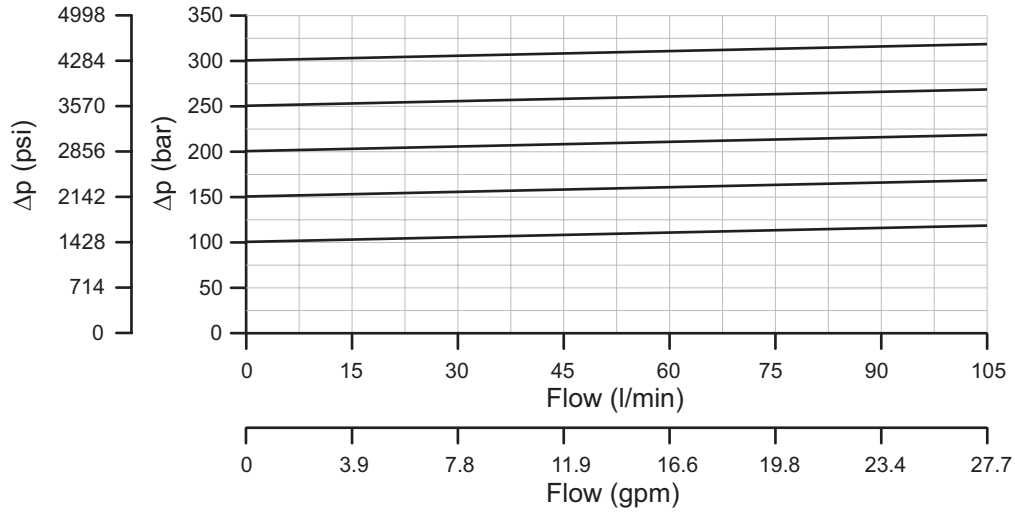


SPOOLS (page 21)

Type *Mod.*
1
2
3
4
5
6

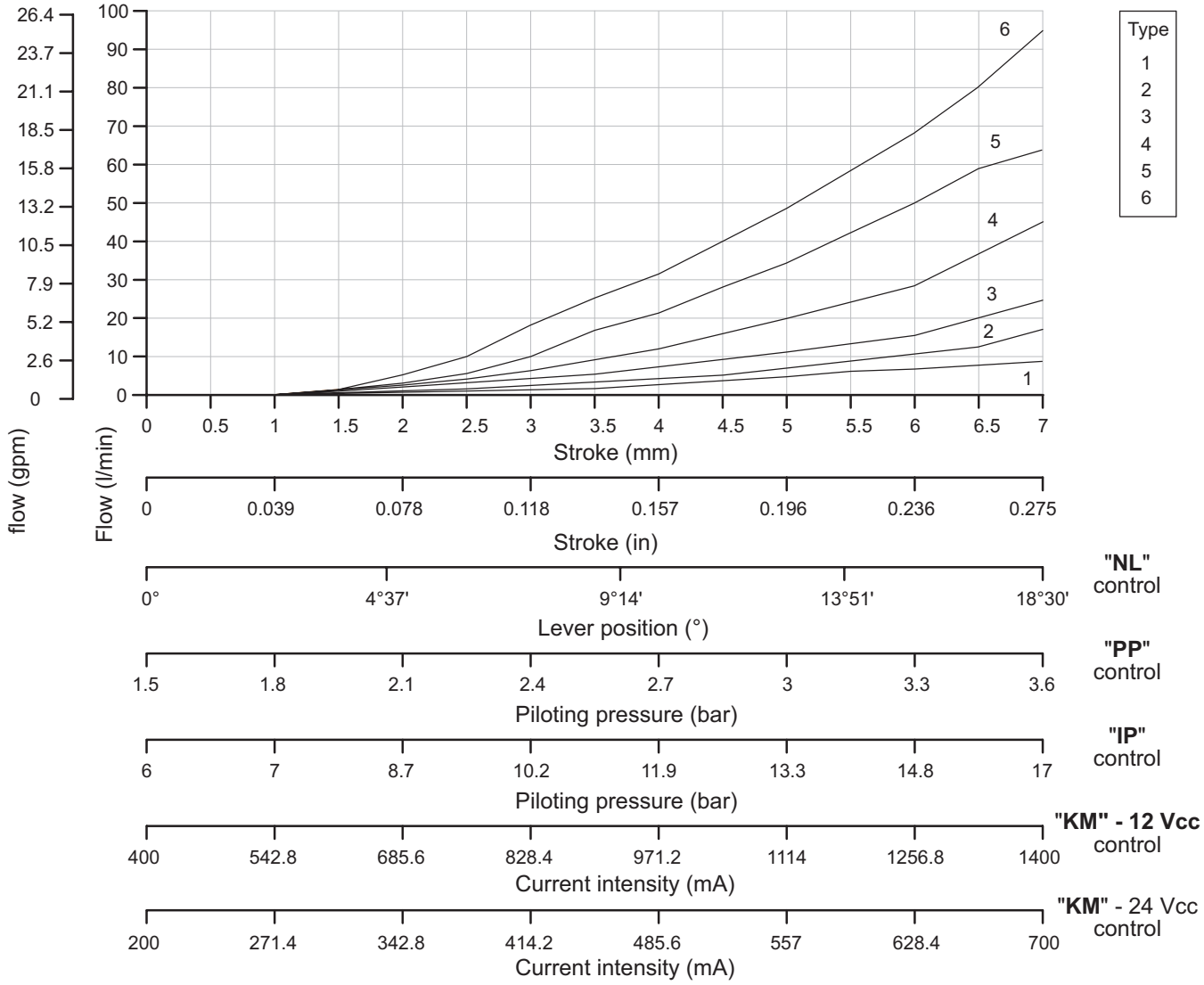


ADJUSTABLE PILOTED MAIN RELIEF VALVE

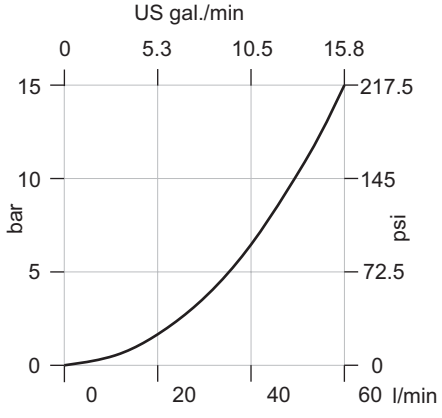


ALL THE CHARACTERISTICS ARE MEASURED USING A MINERAL OIL WITH A VISCOSITY OF 15 mm²/sec AT A TEMPERATURE OF 60 °C

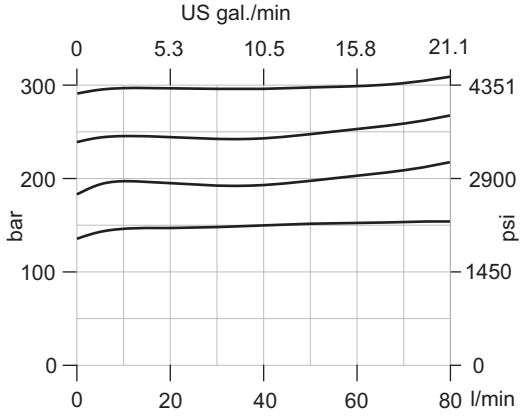
MEETERING CHARACTERISTICS WITH AVAILABLE CONTROLS



VR - Anti-cavitation valve(page 17)



AR - Overload and anti-cavitation valve(page 17)



WARRANTY

- We warrant products sold by us to be free from defects in material and workmanship.

- Our sole obligation to buyer under this warranty is the repair or replacement, at our option, of any products or parts thereof which, under normal use and proper maintenance, have proven defective in material or workmanship, this warranty does not cover ordinary wear and tear, abuse, misuse, overloading, alteration.

- No claims under this warranty will be valid unless buyer notifies Salami S.p.A. in writing whitin a reasonable time of the buyer's discovery of such defects, but in no event later than twelve (12) months from date of shipment to buyer.

- Our obligation under this warranty shall not include any trasportation charges or cost of installation, replacement, field repair, or other charges related to returning products to us; or any liability for directs, indirects or consequential damage or delay.If returned transportation prepaid to our factory.The risk of loss of any products or parts thereof returned to Salami S.p.A. will be on buyer.

- No employee or representative is authorised to change any warranty in any way or grant any other warranty unless such change is made in writing and signed by an officer of Salami S.p.A.

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