HPV Hydraulic Proportional Valves

AMCA HYDRAULIC CONTROLS

APV-16

front

back

- Modular assembly system, suitable for ‘Build Program’.
- Maximum operating pressure 420 Bar / 5076 PSI
- Different spool types up to 120 L/min / 31,5 GPM
- Compact sandwich design, suitable for mobile applications.
- Pressure compensated for simultaneous multi users.
- Several inlet plate types available for different types of pumps.
- Operating control in any combination (Electric-, Hydraulic and manual).
- Adjustable ΔP for setting the maximum flow for maximum proportional range.
- Several user port option functions.
- Designed for customisation.

TECHNICAL DATA

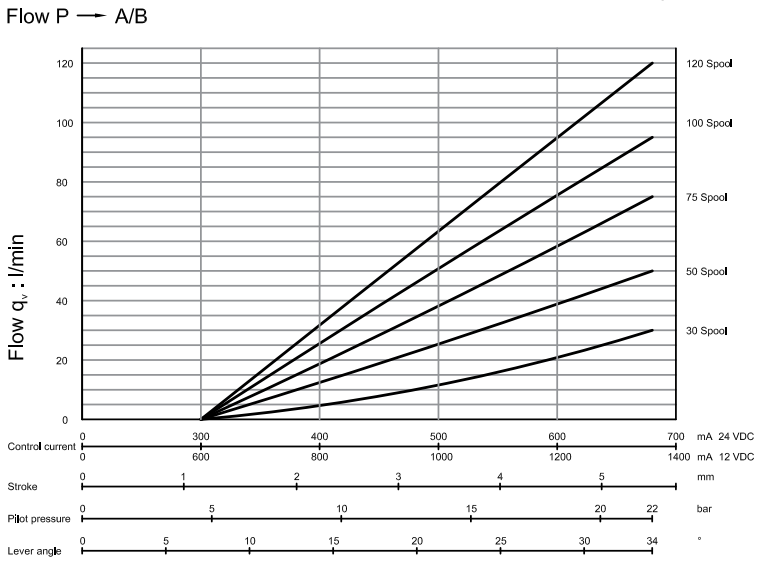
Max. flow :	port P1 or P2	160 l/min *
	port P1 + P2	260 l/min
	port A/B	120 l/min
	port A/B without compensator	140 l/min
Max. pressure:	port P/A/B	420 bar
	port T	35 bar
Pressure setting range		13-420 bar Manual operating 20-420 bar Electrical operating
Nominal pressure drop over 2-way compensator (A,B)		7 bar
Internal pilot pressure supply		28 bar
Pilot pressure for electrical and hydraulic control		6-22 bar
Spool stroke		5,25 mm
Spool overlap (dead band)		1,25 mm (24% of the spool stroke)
Fluid		Mineral oil according to DIN 51524/51525
Fluid temperature range		- 30 … + 80°C
Viscosity range		10 … 500 cSt, optimal 30cSt
Contamination level max		According to NAS 1638 Class 8 or ISO 4406: 18/16/13
Mounting position		Optional

Connections	BSP	SAE ORB
Port P/T	G3/4"	12
Port A/B	G3/4"	12
Port LS	G1/4"	6
Port L	G1/8"	4
Port Ya,Yb	G1/4"	6
Electrical connections	AMP Junior Power Timer	

Electrical	
Nominal voltage	12 VDC or 24 VDC
Nominal current	12 VDC = 1300 mA 24 VDC = 650 mA
Coil resistance	12 VDC = 5,3 ± 5% Ω 24 VDC = 21,2 ± 5% Ω
Recommended dither frequency	100 Hz
Type of protection	IP 65
Duty cycle	100%
Hysteresis	3%

* Pumpflow, see note page 14

Different flowtypes:
(with compensator)



TECHNICAL DATA

Technical information.

The unique modularity of the APV enables system solutions for manufacturers of mobile machines, as a wide range of functions can be integrated/changed by the customer in an easy, flexible and cost-effective way.

Inlet Plate.
Inlet plates are available for fixed and variable displacement pumps, and constant pressure networks.
Functions as:
- anti saturation;
- pump unloading;
- pressure relief;
- LS signal amplifier and combinations thereof; can be integrated into the inlet plate.

Control Valve.
The control valve consists of spool section and connection block.

Spool Section.
The main advantage of the APV-series is the standardization of the spool section. Different types of spools and control methods are available. Up to 12 control valves, with or without a 2-way compensator can be stacked. For perfect system stability the 2-way compensator can be equipped with a damping function. Check valve function is also available within this compensator. Stroke limitation per port and Δp-setting per section is standard.

Connection Block.
A very wide range of optional functions can be delivered using several, easy to mount, low cost, connection blocks. Besides a basic connection block, optimized customization can be achieved by the following functions:
- remote controlled pressure setting/unloading per port;
- adjustable secondary pressure setting per port;
- suction valves and shock/suction valves per port;
- adjustable primary port relief per port with excellent relieving characteristic.

Any other special functions can be easily integrated into special connection blocks on request.

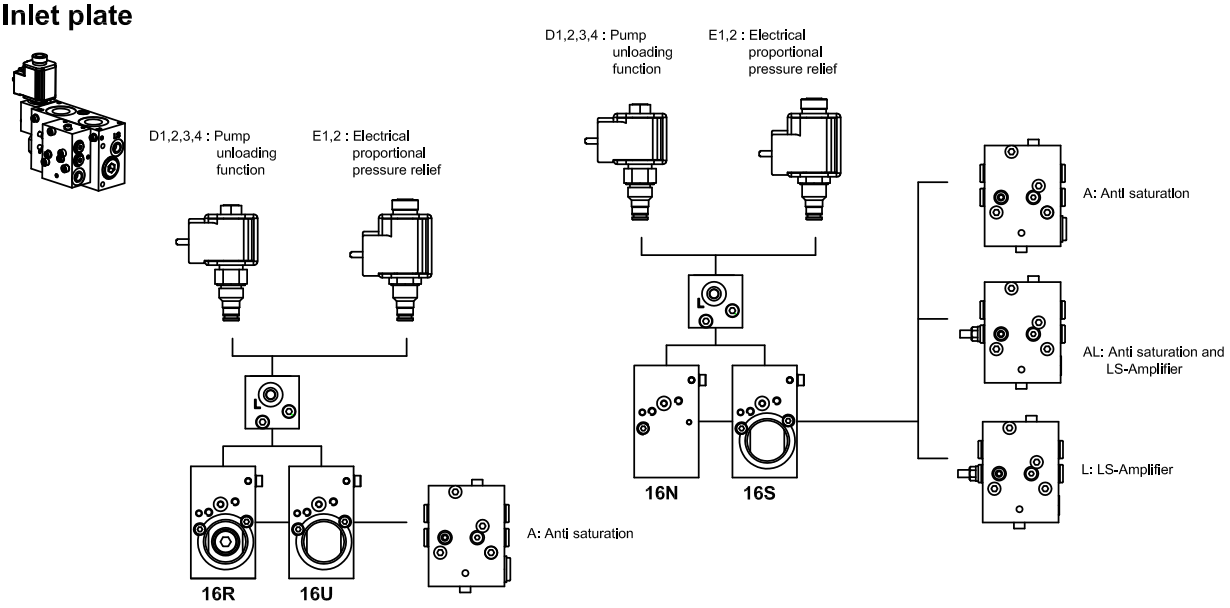
End Plate.
Also the end plates for different control methods can be equipped with optional functions as:
- additional P-port;
- Z-port to enable a LS-cascade with another valve;
- feeding point for hydraulic joysticks.

Safety.
To comply with national and international safety regulations, special safety functions can be integrated as described above.

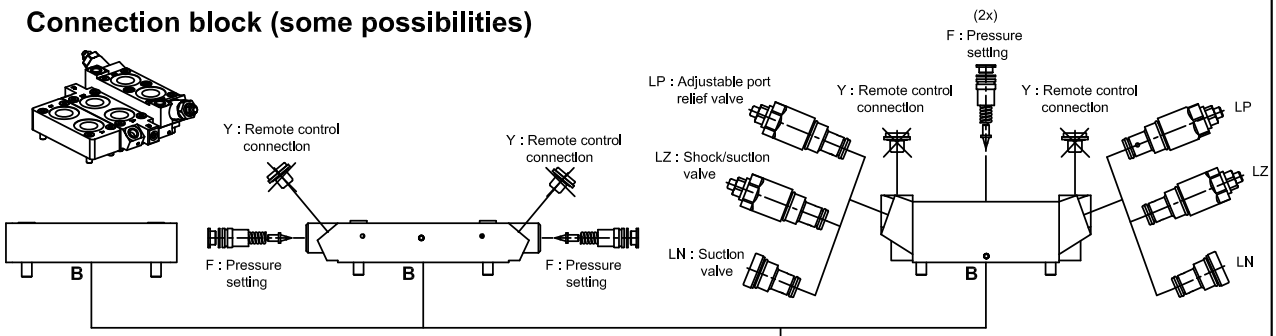
Serviceability.
The modular concept (build-program) improved the servicing of the APV.
All orifices and shuttle valves are directly attainable from the outside of the valves.

Symbols and Terminology.
Graphic symbols in accordance with ISO1219-1.
Identification of valve ports in accordance with ISO 9461.
For the purposes of this document, the definitions and terminology given in ISO 5598 and the following definitions apply:
- LS : load sensing
- Primary relief : relief function in the flow line, e.g. the 3-way compensator in the inlet plate and the shock/suction valve in the connection block.
- Secondary relief : relief function in the signal line, e.g. max. load pressure relief in the inlet plate.

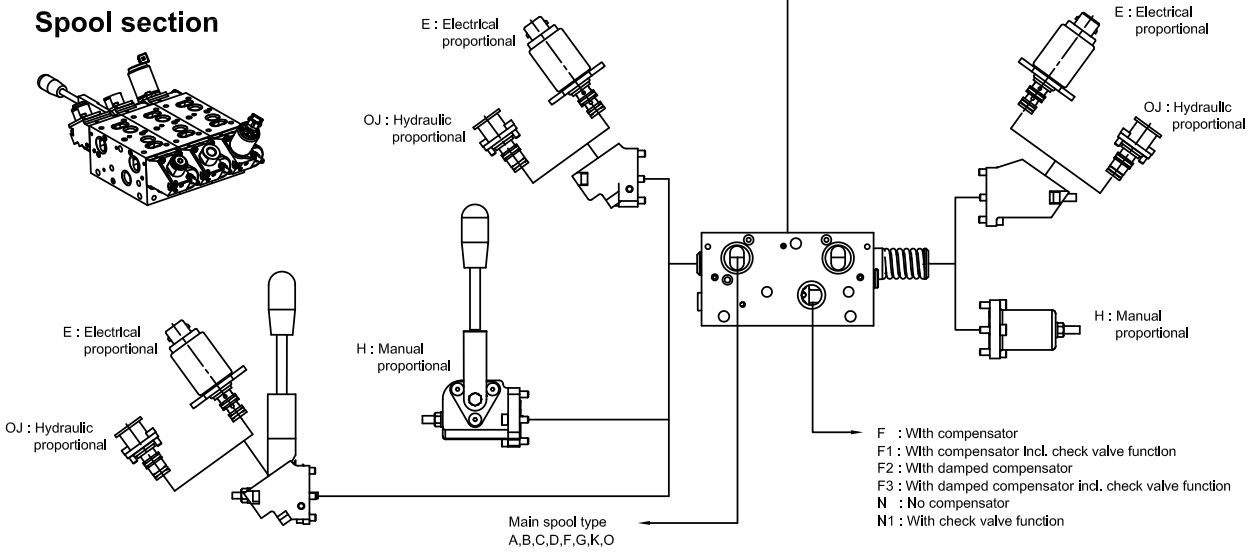
Inlet plate



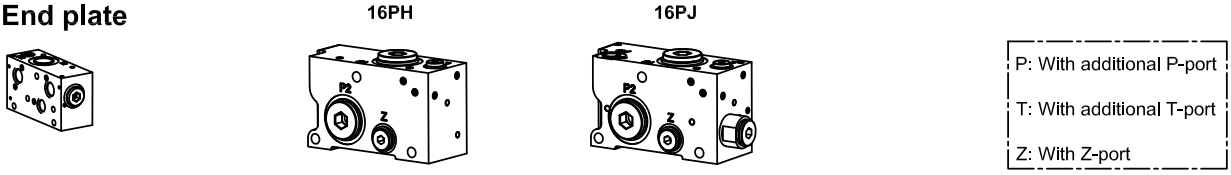
Connection block (some possibilities)



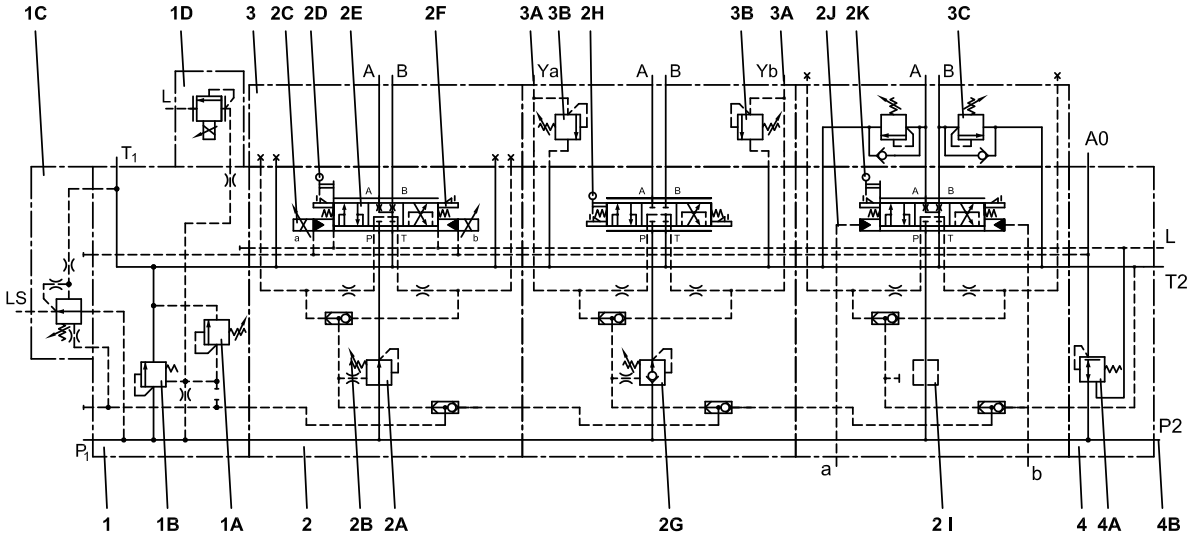
Spool section



End plate



Example:



Pos.	Description:
1	**Inlet plate**, several types available for different types of pumps
1A	Adjustable load pressure relief, standard on all types of inlet plate
1B	Pump relief function
1C	LS-amplifier, for strong signal and perfect stability of the LS-pump
1D	Electrical proportional pressure relief
2	**Spool section**, basic section for different main spool types and compensator variants
2A	2-way compensator for load-independent control and simultaneously operation
2B	Flow adjustment by regulating the pressure drop across the main spool
2C	Control method: Electrical proportional
2D	Additional manual control
2E	Main spool type
2F	Adjustable stroke limitation for adjusting the max. flow per port
2G	As 2A, with check valve to P-line
2H	Control method: Manual proportional
2I	No 2-way compensator per section
2J	Control method: Hydraulic Proportional
2K	Additional manual control
3	**Connection block**, separate block for all different types of options
3A	Remote control connection on port A and B (optional)
3B	Adjustable pressure setting on port A and B (optional)
3C	Shock/Suction valves port A and B (optional)
4	**End plate**
4A	Pressure reducing valve, for electrical control
4B	Additional pump connection (optional)

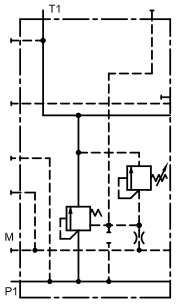
INLET PLATE

INLET PLATE
For every pumptype an inlet plate is available:

Fig.1

Fixed displacement pump

The APV inlet plate version 16U, fig. 1, is designed for fixed displacement pumps.
The main relief in this section is functioning as a 3-way compensator.
If none of the control sections are in operation, the inlet plate version 16U creates about 14 bar in the pumpline. Actuating one of the control sections, the specific load pressure is added as signal to the spring chamber. Actuating more control sections at the same time, the highest load pressure will be added.
The load signal pressure is also controlled by the max. load pressure relief.
This relief can be adjusted (14 ... 420 bar).
To feed also another circuit, an inlet plate 16R is available.
(see application examples).



16U420B

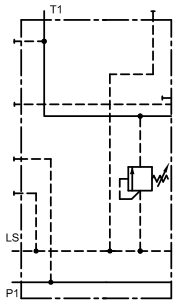
Variable displacement pump (LS-pump)

Fig.2 Fig.3

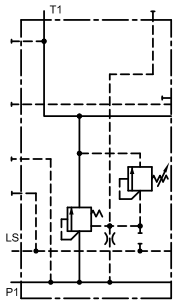
The APV inlet plate versions 16N and 16S are designed for this pump type.

The version 16N, fig. 2, has the function as inlet block for P, T and LS (load sense line). The load sense signal from the valveblock can be adjusted, up to 420 bar, with the relief valve.

Version 16S, fig. 3, has an overpressure safety function.
The relief valve can be adjusted to max. pumpline pressure and the relief spool reduces the overpressure by relieving the pumpflow to tank.



16N420B



16S420B

Pressure compensated pumps / Constant pressure networks

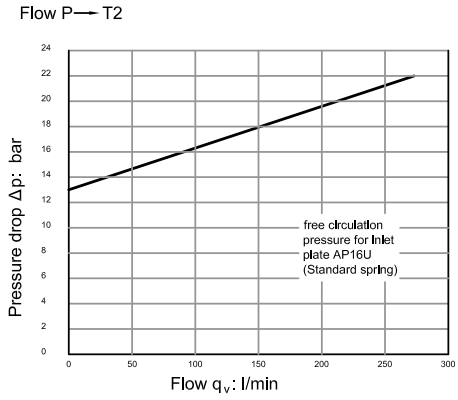
The APV inlet plate version 16N, fig. 2, is also designed for pressure compensated pumps and constant pressure networks.
It has the function as inletblock for P, T. The LS connection G1/4" (SAE 6) has to be blocked.
The load signal pressure is controlled by the max. load pressure relief.
The max. load pressure of the valve block can be adjusted (up to 420 bar).

Fig.1A Fig.2A Fig.3A

16U420B

16N420B

16S420B



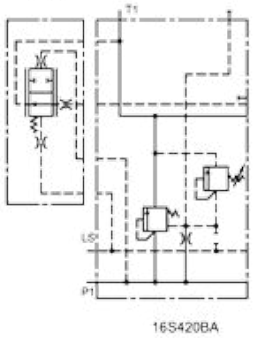
INLET PLATE

Additional functions for all types of pumps:

Anti saturation function, code A, fig. 4

The anti saturation function is developed for electrical and hydraulic controlled valves.
If the valve block has insufficient pumpflow, the user flow for every control section will be reduced with this function so that every control section keeps working simultaneously.

Fig.4

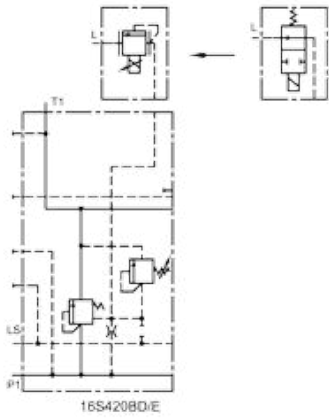


16S420BA

Electrical proportional pressure relief, code E, fig. 5

For remote control of the maximum pressure of the valve block, the electrical proportional pressure relief is available in 12 VDC and 24 VDC.

Fig.5 Fig.6



16S420BD/E

Pump unloading function, code D, fig. 6

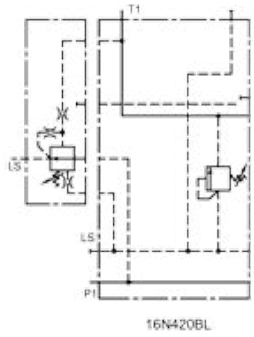
For emergency stop function the load pressure signal from the control sections can be unloaded directly to tank.
The electrical control is available in 12 VDC and 24 VDC with 2/2-way cartridge in normal-open or normal-closed configuration.
The example shows a normal-open configuration.
Please note that the recirculation pressure or stand-by pressure is still on the P-line.

Additional function for LS pumps:

LS-Amplifier, code L, fig. 7

This option enables increasing the LS pressure signal if some LS-pumps have a continuous leak of the load-pressure signal to tank.
This option can also be used for fine-tuning of the stability of the pump and the proportional control.
With the adjustment screw the stand-by pressure of the LS-pump is adjustable within 4 bar.

Fig.7



16N420BL

Fig.4A

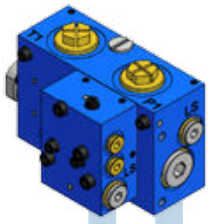


Fig.5A

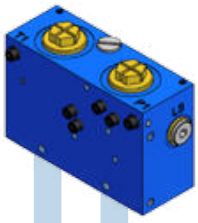
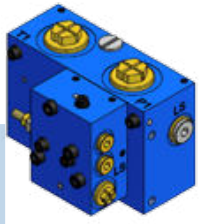
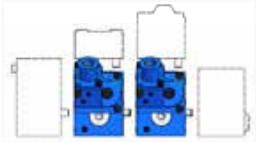


Fig.7A



CONTROL VALVE

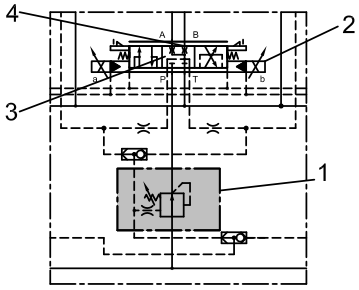
CONTROL VALVE.



On the basis of the build-program principles the APV-16 control valve consists of Ⅰ standardized spool section and Ⅱ basic or customized connection blocks and spring- and endcaps. Max. 12 control sections.

Ⅰ Spool section:

Fig.8



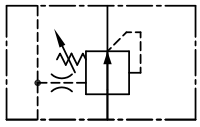
1 Compensator types;
2 Control method : electrical, hydraulic and manual control;
3 Spool types;
4 Flow per port.

1. Compensator types :

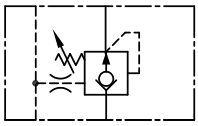
The various compensators enable load independent flow control and possibility of simultaneous operation.
The max. flow can be pre-adjusted by adjusting the compensator spring.
At part 1 from fig. 8 the following types can be mounted:

Code:

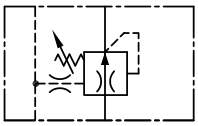
F: 2-way compensator



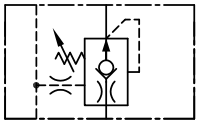
F1: 2-way compensator with load-hold check valve



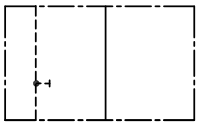
F2: 2-way compensator with damping function.



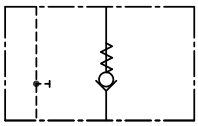
F3: 2-way compensator with load-hold check valve and damping function.



N: Without compensator.
Note: Max. flow depends on stand-by pressure setting in case of using LS-pump



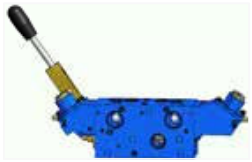
N1: Load-hold check valve.
Note: Max. flow depends on stand-by pressure setting in case of using LS-pump



CONTROL VALVE

2. Control method :

E = electrical control



H = manual control

OJ = hydraulic control

The electrical- and hydraulic control can be configured in combination with an additional manual control. All the control methods are standard equipped with stroke limiters for separate fine-tuning the flow of A and/or B port. The cartridge cavity in the end-caps is suitable for all three control methods.

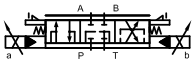
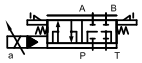
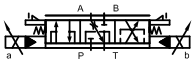
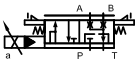
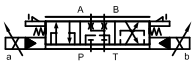
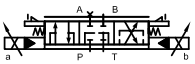
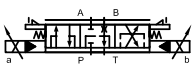
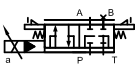
E: electrical control:
The reducing cartridge is integrated within the proportional solenoid 24 VDC or 12 VDC.
All the control sections have a pilot supply pressure and return line, which must be fed through the end plate type 16PE. The 16PE end plate is equipped with a separate "L"-connection to drain the pilot return line to tank, which creates a perfect system stability.

H: manual control:
If the handle is not actuated, the spring assembly keeps the spool in neutral position (code HF).
The manual control can be configured with detent or friction brake.
Detent (code HR): the spool can be set in any position, the center position and both end positions are perceptible.
Friction brake (code HB): the spool can be set in any position, the center position is perceptible.

OJ: hydraulical control:
For hydraulic remote control, the endcaps have G1/4" connections.

3. Spool types .

The spool is available for different types of users, like single and double acting cylinders and hydraulic motors.

Code:	Symbol:	Remark	Code:	Symbol:	Remark
A		In neutral position all ports blocked	F		In neutral position all ports blocked
B		In neutral position port A throttled flow to T (approx.20% of nominal flow)	G		In neutral position port A+B throttled flow to T (approx.20% of nominal flow)
C		In neutral position port A+B throttled flow to T (approx.20% of nominal flow)	K		In neutral position all ports blocked, A port blended *
D		In neutral position port B throttled flow to T (approx.20% of nominal flow)	O		In neutral position all ports blocked, B port blended *

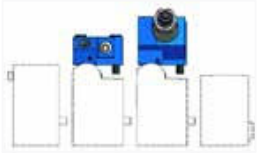
* Port is blended with stop in the connection block

4. Flow per port .

Each user port can be set at different flow. The flow with compensator is up to 120 l/min and without compensator the flow is up to 140 l/min.
By adjusting the compensator spring (Δp adjustment) the flow of A and B port can be pre-adjusted. By using the stroke limiters the flow of A and/or B port can be adjusted separately.

CONTROL VALVE

II Connection block.



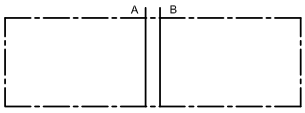
The main flexibility of APV series is realized by various connection blocks with a very wide range of optional functions. The connection block is the only part to be customized in order to meet special requirements.
The available connection blocks are:

1 - basic version only with A and B ports
2 - version with secondary safety functions
3 - version with primary safety functions
4 - version with primary and secondary safety functions
5 - customized versions

The code of the connection block has to start with the type of the thread of the connection port (3/4" BSP or SAE 12). The other threads are on request.

1. Basic version:

The basic version is a connection block with only A and B ports.

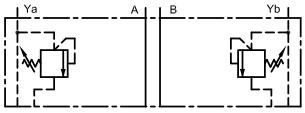


xxxxx-B
xxxxx-S

code:
B: The connection A and B port is 3/4" BSP.
S: The connection A and B port is SAE 12

2. Version with secondairy safety functions:

The version with secondary safety functions is a connection block with possibility of two secondary safety functions. Secondary safety functions are active at the load pressure signal lines, so overpressure (reached maximum load pressure) causes a small amount of oil from the load sense signal vented to tank at maximum pressure. This in contrast with the primary relief valves, whereby the full userflow has to be vented to tank at maximum pressure. Secondary reliefs are only in function if the control valve is actuated.

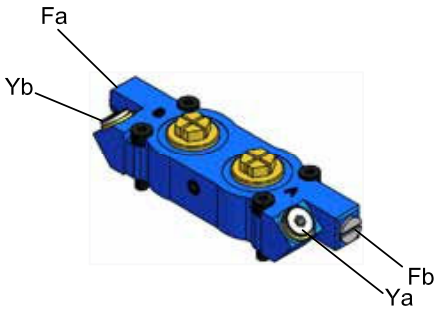


xxxxx-BFY
xxxxx-SFY

Code:
F: Adjustable pressure setting on port A and B:
Each user port can be set with a separate maximum load pressure relief (LS-relief).
Factory pressure setting (first A-port then B-port) has to be mentioned in the order code.
Adjustable pressure setting only on one port, state "-" for the other port.
Example: A-port = 380 bar and B-port = 320 bar: "F= 380/320 bar"
or only A-port = 380 bar: "F= 380/- bar"

Y: Remote control connection on port A and B:
The load pressure signal of each userport can be connected to sytem safety relief devices, through Ya and Yb(1/4"BSP or SAE 6).
Example: cylinder stroke limiting or overload control function in combination with a 2/2-way valve to tank.

1.



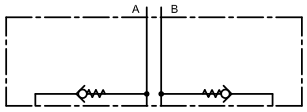
2.

3. Version with primary safety functions:

The version with primary safety functions is a connection block with possibility of two primary safety functions.
Primary safety functions are active at the user port, even if the control section is not operated.
Primary safety functions are available in 2 different types. These types can be used in the same cartridge cavity.
A-port as well B-port can be configured as a specific primary safety function.

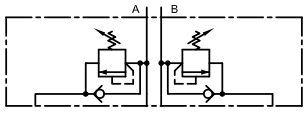
Code:

CN: Suction valves port A and B
The suction valve per userport prevents cavitation in the user line.



xxxxx-BCN
xxxxx-SCN

CZ: Shock/Suction valves in port A and B
Combined shock/suction valves prevents the user line to relief temporary pressure peaks and prevent cavitation.
Factory pressure setting (first A-port then B-port) has to be mentioned on configuration code. Adjustable pressure setting only on one port, state "-" for the other port.



xxxxx-BCZ
xxxxx-SCZ

Example: A-port = 350 bar and B-port = 320 bar: "CZ= 350/320 bar"
or for only A-port = 350 bar: "CZ=350/- bar"

Note:
- Max. operating pressure for CN and CZ is 350 bar

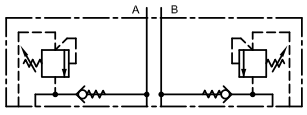
3.

4. Version with primary and secondary safety functions:

The version with primary and secondary safety functions is a connection block available in 2 different types.
4A. Connection block exist from 2 primary and 2 secondary safety function with a max. operating pressure off 345 bar.
Primary safety functions are active at the user port, even if the control section is not operated.
Primary safety functions are available in 2 different types. These types can be used in the same cartridge cavity.
A-port as well B-port can be configured as a specific primary safety function.

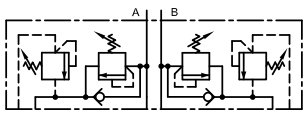
Code:

CN: Suction valves port A and B
The suction valve per userport prevents cavitation in the user line.



xxxxx-BFCN
xxxxx-SFCN

CZ: Shock/Suction valves in port A and B
Combined shock/suction valves prevents the user line to relief temporary pressure peaks and prevent cavitation.
Factory pressure setting (first A-port then B-port) has to be mentioned on configuration code. Adjustable pressure setting only on one port, state "-" for the other port.



xxxxx-BFCZ
xxxxx-SFCZ

Example: A-port = 350 bar and B-port = 320 bar: "CZ= 350/320 bar"
or for only A-port = 350 bar: "CZ=350/- bar"

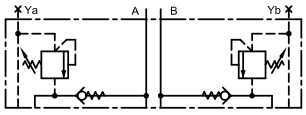
Note:
- Max. operating pressure for CN and CZ is 350 bar

CONTROL VALVE

4B. Connection block exist from 3 primary and 2 secondary safety function with a max. operating pressure off 420 bar.
Primary safety functions are active at the user port, even if the control section is not operated.
Primary safety functions are available in 3 different types. These types can be used in the same cartridge cavity.
A-port as well B-port can be configured as a specific primary safety function.

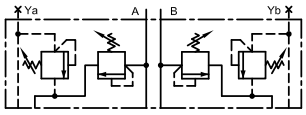
Code:

LN: Suction valves port A and B
The suction valve per userport prevents cavitation in the user line.



xxxxx-BFLNY
xxxxx-SFLNY

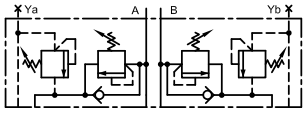
LP: Adjustable port relief on port A and B
Adjustable primary port relief valve prevents the user line against overpressure during operation and also in neutral position. The flow over the relief is maximum 120 l/min.
For the range up to 420 bar the adjustable port relief has to be configured for the following steps:
LPB: range 35 - 140 bar
LPV: range 70 - 280 bar
LPG: range 140 - 420 bar
Factory pressure setting (first A-port then B-port) has to be mentioned on configuration code.
Adjustable pressure setting only on one port, state "-" for the other port.



xxxxx-BFLPY
xxxxx-SFLPY

Example: A-port = 320 bar and B-port = 280 bar give orderingcode "LPG=320/280"
A-port = 320 bar and B-port = no port relief give orderingcode "LPG=320/-"

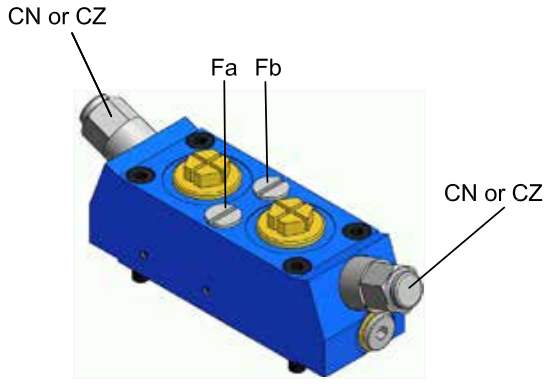
LZ: Shock/Suction valves in port A and B
Combined shock/suction valves prevents the user line to relief temporary pressure peaks and prevent cavitation.
Factory pressure setting (first A-port then B-port) has to be mentioned on configuration code. Adjustable pressure setting only on one port, state "-" for the other port.



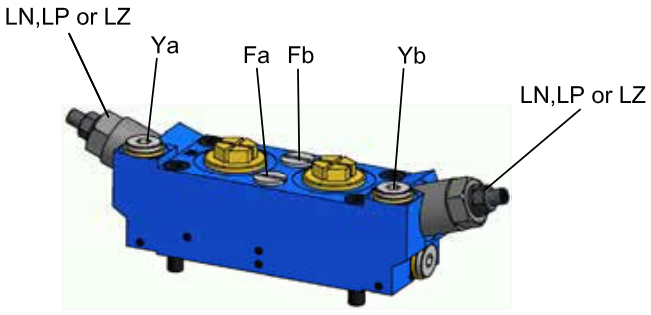
xxxxx-BFLZY
xxxxx-SFLZY

Example: A-port = 380 bar and B-port = 320 bar: "LZ= 380/320 bar"
or for only A-port = 380 bar: "LZ=380/- bar"

Note:
- If A-port needs LZ-function 280 bar and B-port needs LP-function 280 bar, please note at the connection plate configuration: "LZ=280/-" and "LP= -/280".
- Additional, options "F" and/or "Y" can be configured.



4A.



4B.

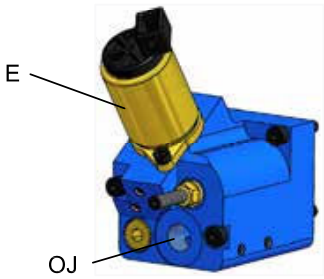
5. Customized version:

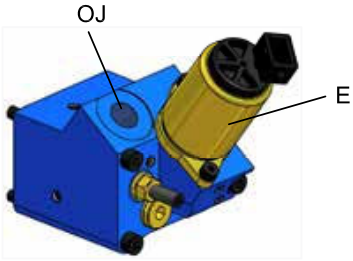
Connection block with integrated counterbalance valve, LS-reliefs and electrically controlled 2/2-way valve.

Connection block with integrated LS-reliefs and counterbalance valves in the user ports A and B.

The unique modularity of the APV enables system solutions for manufacturers of mobile machines, as a wide range of functions can be integrated/changed by the customer in an easy, flexible and cost-effective way.

Some examples are shown below.

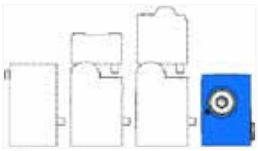




Spring and endcap with double control method electrical and hydraulic proportional.

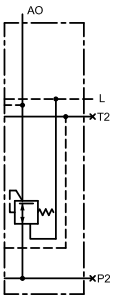
END PLATE

APV..PH



Code PH: For control method H or O

End plate for manual or hydraulic operated valves.

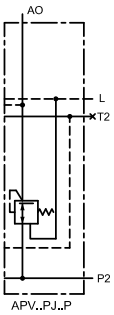


APV..PJ

Code PJ: For control method E or O

End plate with built-in pressure reducing valve for internal pilot pressure supply of 28 bar to the electrical pilot valves of each electrical proportional control valve or for external pilot pressure supply of 28 bar to the hydraulic joysticks.

Note: The L-connection has to be connected as seperate drain to tank.

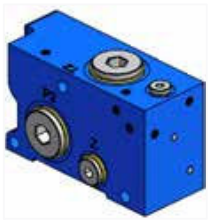


APV..PJ..P

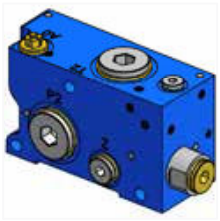
Code P: With additional P-port

Additional P-port to connect an extra P-line in systems with high pump flow.

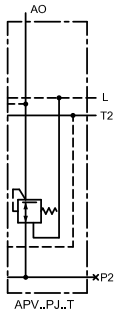
16PH



16PJ

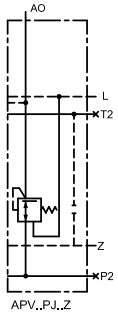


END PLATE



Code T: With additional T-port

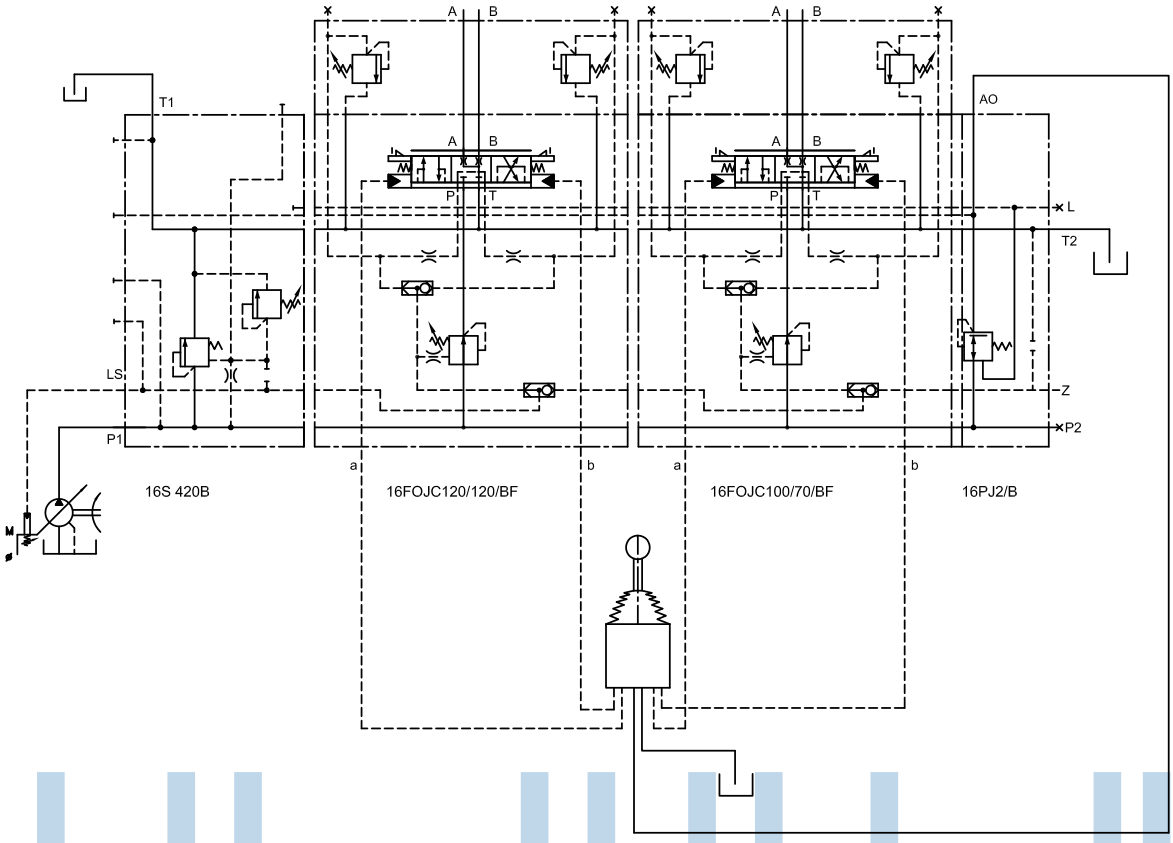
Additional T-port.



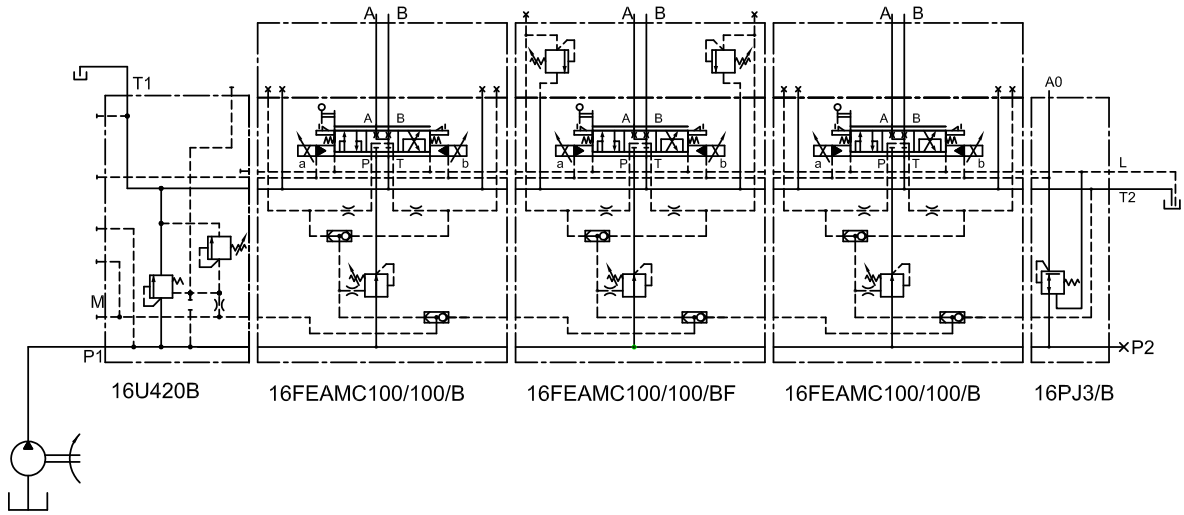
Code Z: With Z-port

Z-port to connect the LS-signal of a second valve to the LS-cascade of the first valve , to be able to use the compensator of the first valve.

Note: In systems with a pumpflow > 160l/min use endplate with P_2 port (Ordering code 16P...P). For reduction of the return pressure the use of the second tank connection T_2 on the end plate is possible (ordering code 16P...T).



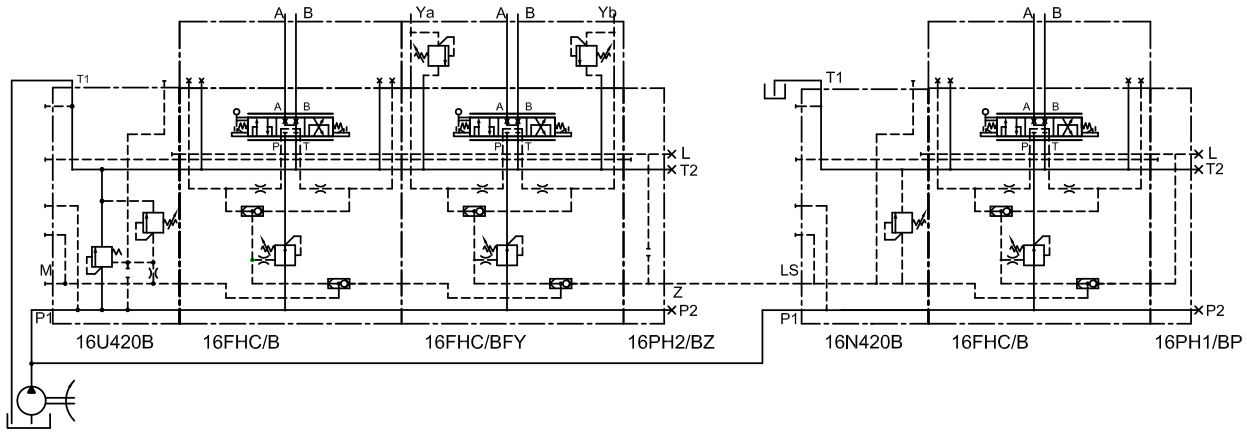
Example inlet plate code U.



Code U:

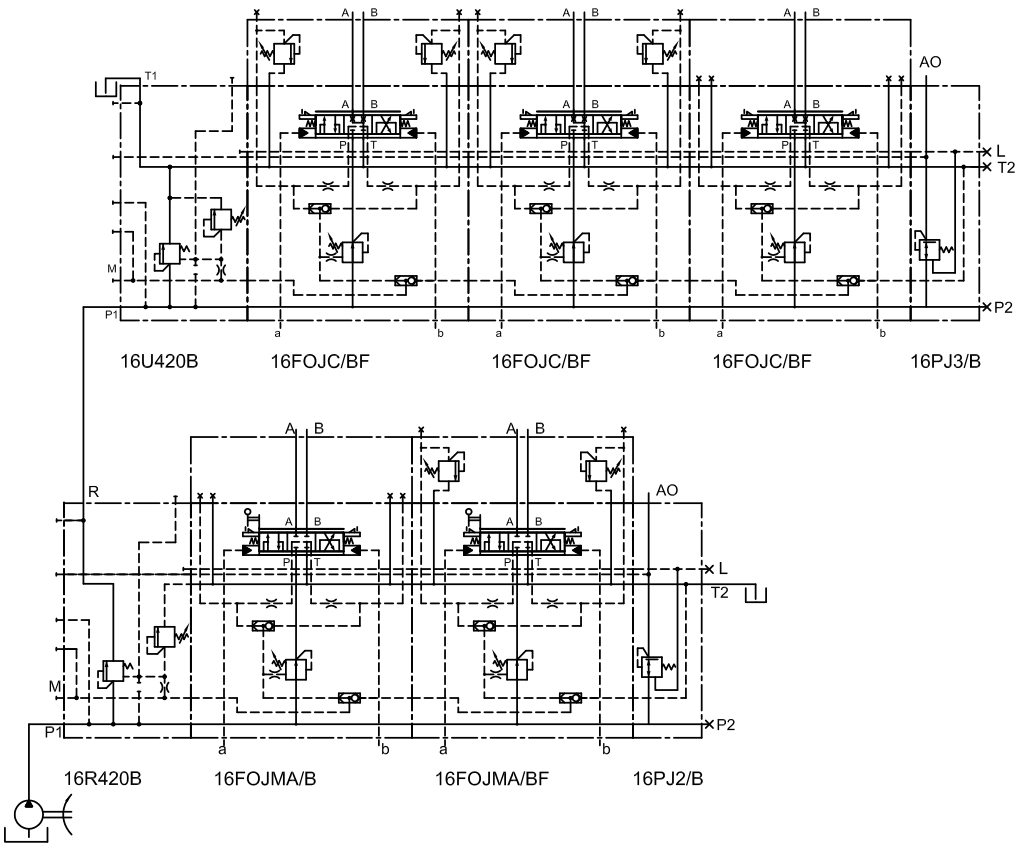
Inlet plate for fixed displacement pump: 16U420B

If none of the control sections are in operation, the integrated 3-way compensator of the inlet plate 16U recirculates the flow to tank.
Actuating one of the control sections, the specific load pressure is added as signal to the spring chamber. Actuating more control sections at the same time, the highest load pressure will be added (see shuttle valve cascade system).
The maximum load signal pressure is controlled by the max. load pressure relief.
If one or more of the users have to be set on a lower max. pressure, the control section can be configured with pressure reliefs per port (see for example the second section).



Parallel circuit with fixed displacement pump: 16U and 16N

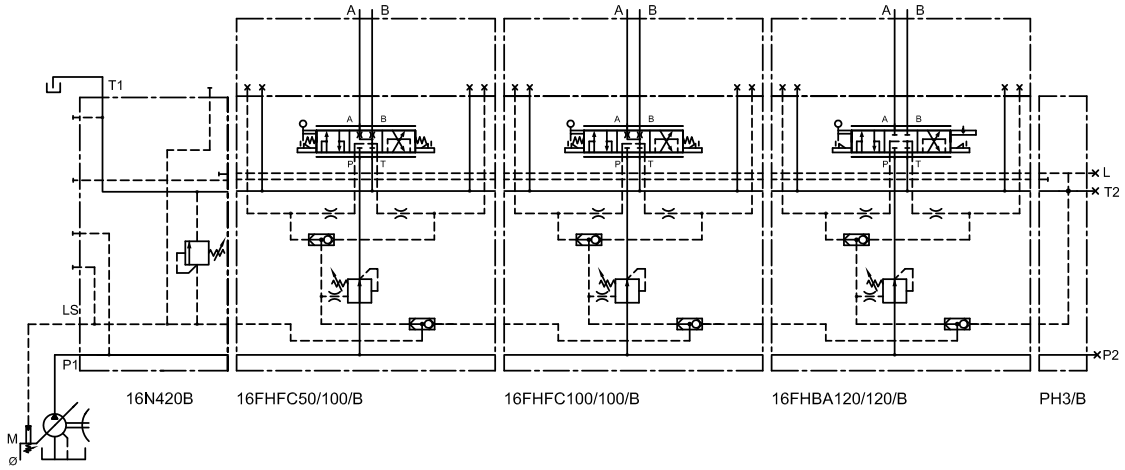
When two valve blocks should be mounted on different places in a system one valve block can be configured with a 16N inlet plate. The valve block with the 16U is regulating the pump flow and the end plate 16P-Z has to be connected to the LS port of the second valve block with a 16N inlet plate. The max. load pressure relief of the 16N inlet plate has to be adjusted equally or lower as the max. load pressure relief at the main inlet plate 16U.



Series circuit with fixed displacement pump: 16U and 16R

For the same condition as the parallel circuit a series circuit can be used. The advantage of a series circuit is that there is not a longer LS signal line that shall give a lower signal under colder conditions.
In the 16R inlet plate the tank circuit is disconnected from the control sections and there is an additional possibility of directing the pump flow from P to R in order to feed another circuit. Please note that with this type of valve block the T2 connection in the end plate has to be connected with tank.

Example inlet plate code N.

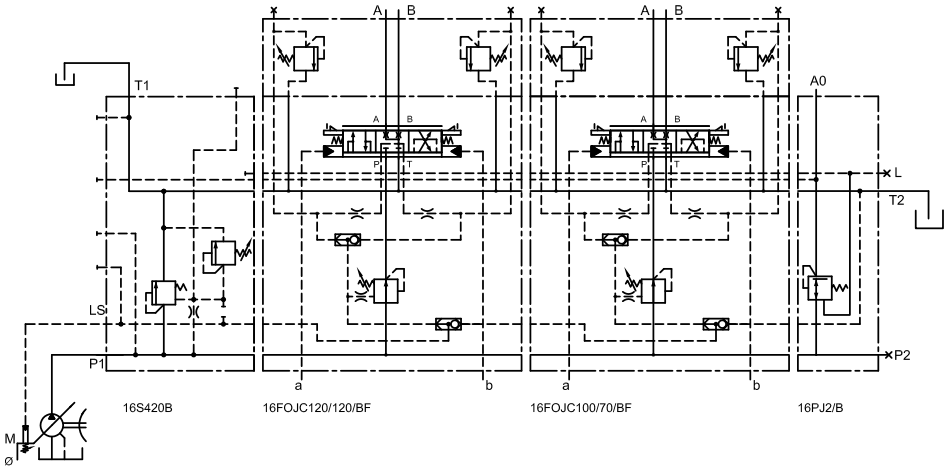


Code N:

Inlet plate for LS-pumps: 16N240B

The version 16N is the inlet plate for the P, T and LS connection.
The adjustable max. pressure relief for the load signal is standard integrated.

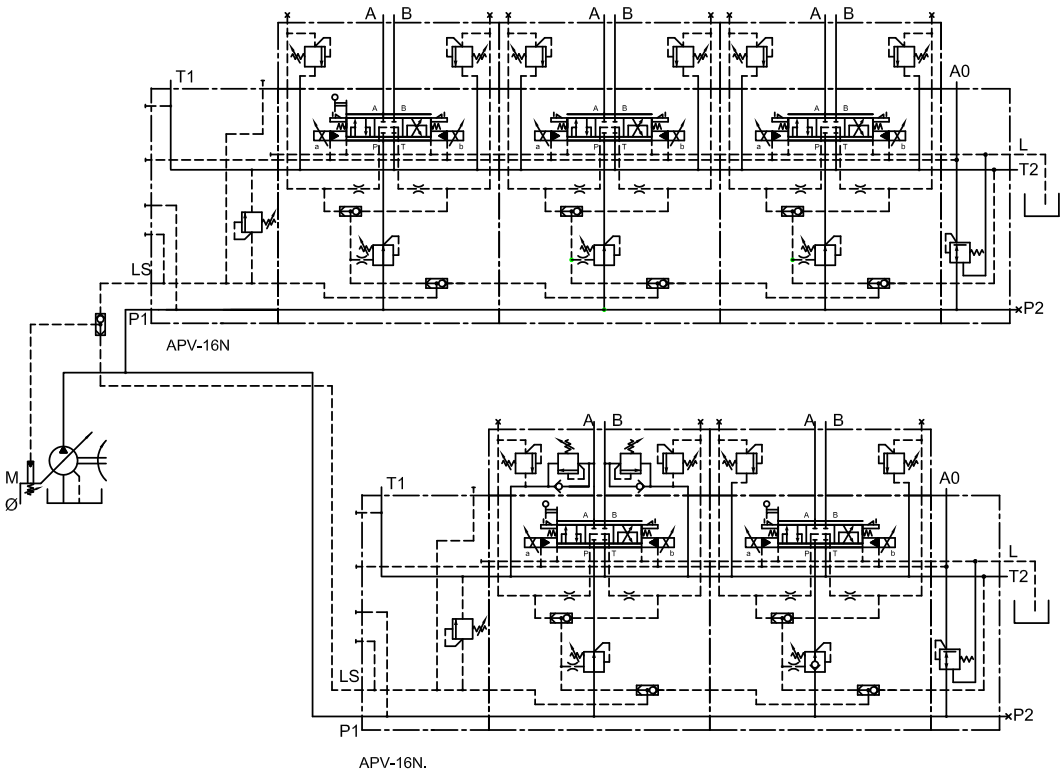
Example inlet plate code S.

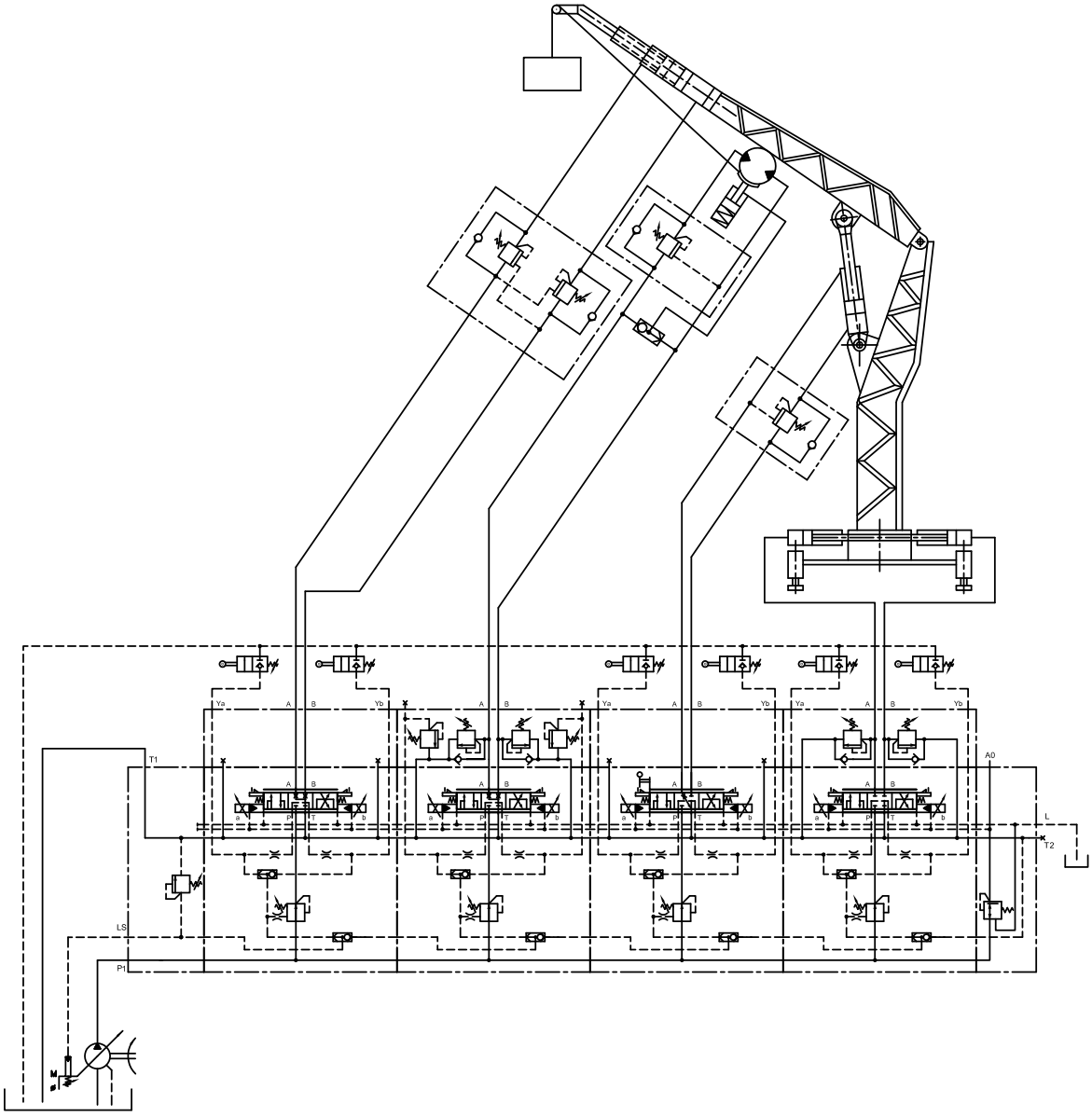


Code S:

Inlet plate for LS-pump: 16S420B

The version 16S has primary overpressure safety function.
The relief valve can be adjusted to max. pumpline pressure and the relief spool reduces the overpressure by relieving the pump flow to tank.

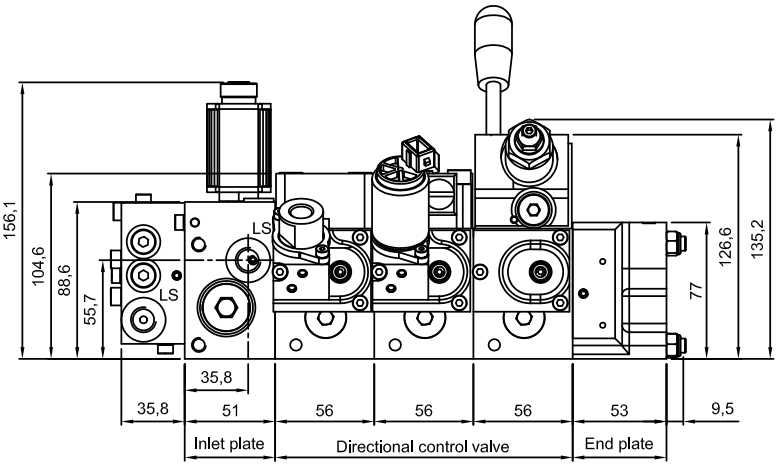


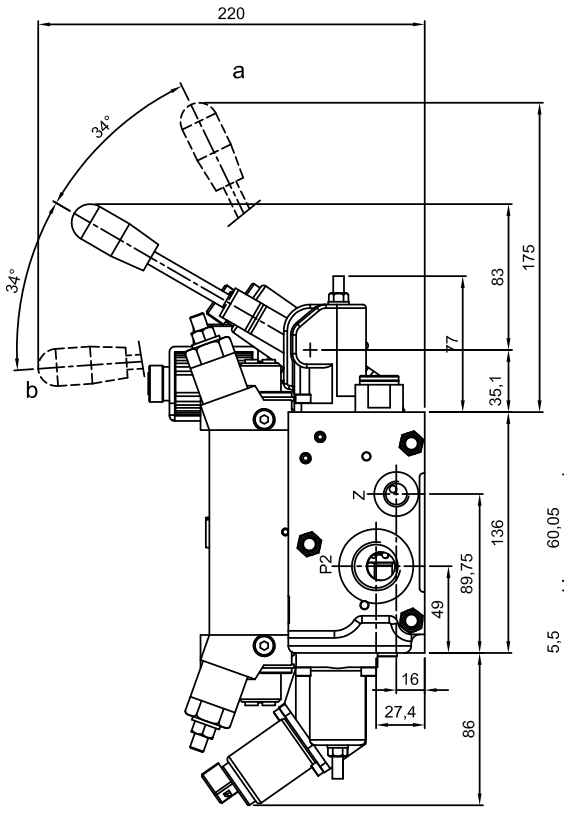


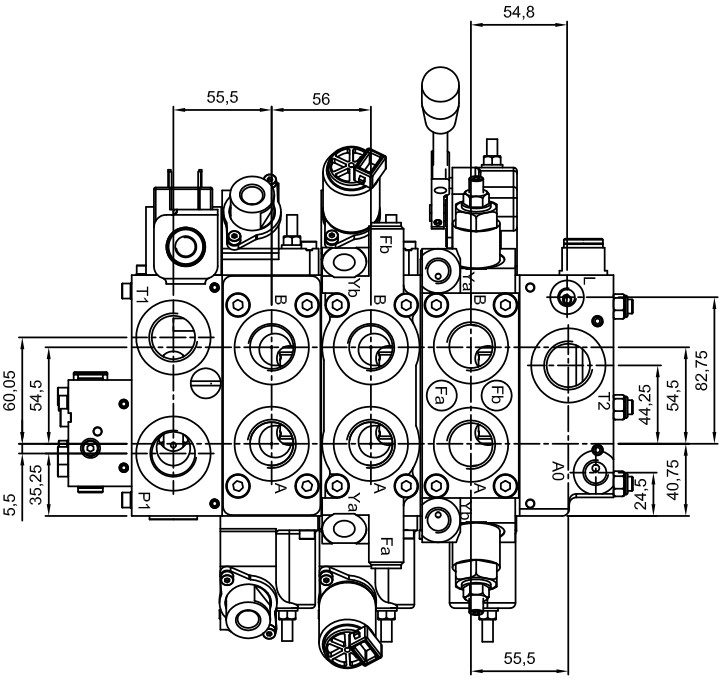
DIMENSIONS

Connection ports

	BSP	SAE ORB
P,T1,T2	: 3/4"	12
A,B	: 3/4"	12
LS	: 1/4"	6
L	: 1/8"	4
Ya,Yb	: 1/4"	6
A0	: 1/4"	6
Z	: 1/4"	6





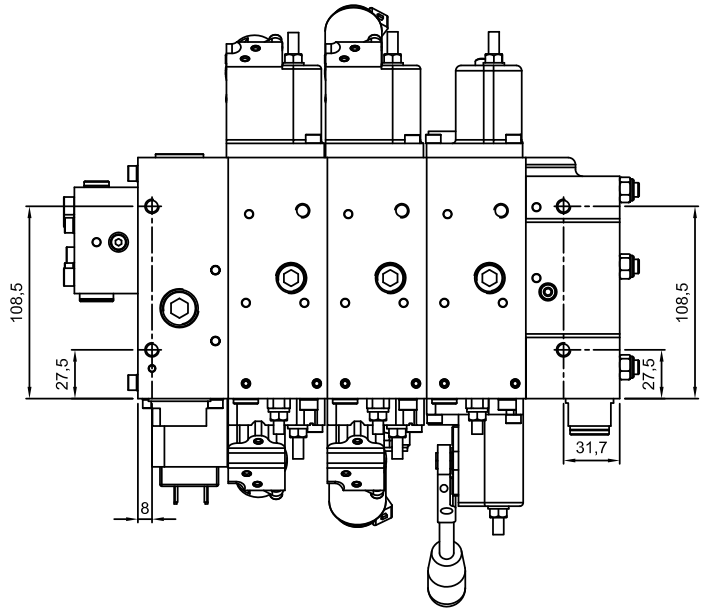


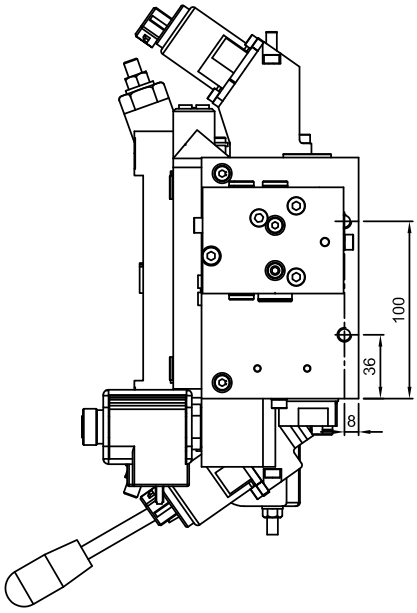
Weight:	*N*
Inlet plate	
16N	35
16U/S/R	36,5
Opt. D/E	7,5
Opt. A/L	12
Spool section	
16FE*	45
16FE*M	47
16FH	46
16FOJ	43
16FOJM	46

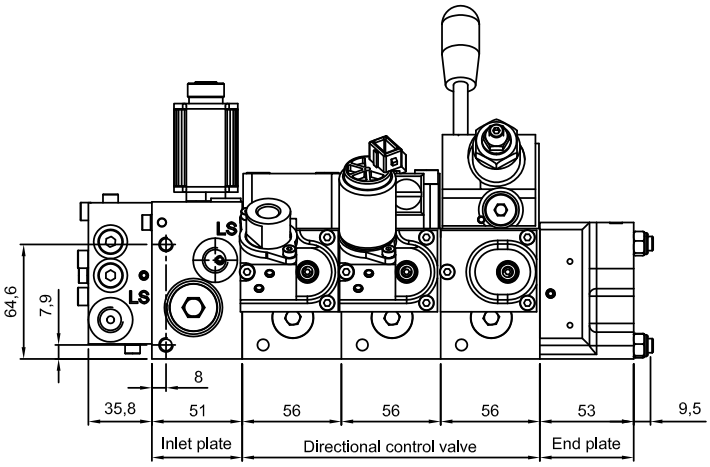
Weight:	*N*
Connection block	
B	14,4
BFY	16,5
BFLZY	26
End plate	
16PH	32,5
16PJ	32,5

DIMENSIONS

Mounting holes M8 x 12







Weight assembly kit:	*N*
with 1 control valve	1,59
with 2 control valve	2,25
with 3 control valve	2,91
with 4 control valve	3,57
with 5 control valve	4,23
with 6 control valve	4,89
with 7 control valve	5,55
with 8 control valve	6,21
with 9 control valve	6,87
with 10 control valve	7,53
with 11 control valve	8,19
with 12 control valve	8,85

CONFIGURATION CODE

INLET PLATE

16	K	S	420	B	A	O	A	-	-

	Size
16	16

	Build type
K	Sandwich
A	Subplate

	Plate version
U	For fixed displacement pump
UH	For fixed displacement pump (high flow)
S	For LS-pump and max. pressure valve in P
N	For S-pump and LS savety valve
R	For fixed displacement pump and serial connection
RH	For fixed displacement pump and serial connection High flow

	Pressure adjustment in bar
100	Max 100 bar
420	Max 420 bar

	Port connections
B	P&T thread in BSP 3/4"
S	P&T thread in SAE ORB 12
F	P&T thread in BSP 1" + pilot pressure supply

	Front options
A	Anti saturation function
L	LS Amplifier
AL	Anti saturation function / LS amplifier combined

	Side options LS
O	Pump unloading function, normally open
C	Pump unloading function, normally closed
E	prop pres relief increase current, increase pressure
F	prop pres relief increase current, decrease pressure

	Acturation
A	12 VDC
B	24 VDC
H	Manual

	Oring type
-	BUNA N (standard)
I	VITON
H	HNBR

	Surface treatment
-	none (standard)
A	Protalloy

-

CONFIGURATION CODE

CONTROL VALVE

PART: SPOOL SECTION

16	K	F1	S	H	E	B	A	M

Size

16	16

Bild type

K	Sandwich
A	Subplate

Compensator

F	With compensator
N	No compensator
P	Dummy Plate 1 section
Q	Dummy plate 1/2 section

1	Check valve function

Body type

S	Standard body type
H	high flow standard body type (low ΔP)

Compensator spring

S	standard flow compensator spring
L	Low flow compensator spring
H	High flow compensator spring

Control body

E	for electric or hydraulic control 4/3 version
F	for electric or hydraulic control 4/2 version
J	for electric and hydraulic control combined 1/4" BSP ports
I	for electric and hydraulic control combined SAE ORB 4 ports
O	for Hydraulic control only (port type chosen below)
H	for manual control

Actuating type		**Only with control bod**
B	24VDC	**E,F,J,I**
F	24VDC with pin	**E,F,J,I**
A	12VDC	**E,F,J,I**
E	12VDC with pin	**E,F,J,I**
H	24VDC with II 2G Ex mb II T4, flying leed	**E,F,J,I**
O	Hydraulic control 1/4" BSP	**E,F,O**
P	Hydraulic control SAE ORB 4	**E,F,O**

only in combination with manual control (H)

F	spring returm
B	friction brake
R	3 position detent

Connector type

A	Amp junior connector
D	Deutsch connector
-	

M	Additional manual control

CONFIGURATION CODE

CONTROL VALVE

PART: SPOOL SECTION

C 2- / 2-

	Main spool type
A	all ports blocked in neutral
B	B port blocked in neutral, A port throttled to tank (20%)
C	A&B to tank in neutral (20% of nominal flow)
D	A port blocked in neutral, B port throttled to tank (20%)
F	In neutral position all ports blocked
G	In neutral position port A + B throttled flow to T (20%)
K	In neutral position all ports blocked, A port blended
O	In neutral position all ports blocked, B port blended

	Max. flow (l/min) (APV-16) A port / B port
1	150
2	120
3	100
4	75
5	50
6	30
7	17
8	10
-	none

	Pre-tension (optional)
-	none
x	20 bar

- omit is standard

CONFIGURATION CODE

CONTROL VALVE

PART: CONNECTION BLOCK

B	L1	F	Z	/	Z	-	-

Port connections

B	Thread in BSP 3/4''
S	Thread in SAE ORB, size 12

Connection block body

FY	Lsa/Lsb + Y ports
L1	For shock / suction Z1, P1 ,2,3 and N1 with 'Y' port Lsa/b inlcuded
L2	For shock / suction Z2 and N2, suitable for max 300 bar
A1	For Pilot checks or counterbalance valve T11A cavity
A2	For Pilot checks or counterbalance valve T2A cavity
D1	for dump or Elec prop relief in common signal Lsa Lsb
D2	for dump or Elec prop relief in Lsa and Lsb

LS pressure setting range

E	A and B < 100 bar
F	A and B > 100 bar
G	A> 100 bar B< 100 bar
H	A<100 bar B> 100 bar

Cartridge A-side / B side

		only with body:
Z1	shock suction	L1
N1	suction	L1
P1	shock, range 35-140bar	L1
P2	shock, range 70-280bar	L1
P3	shock, range 140-420bar	L1
XX	dummy	L1
Z2	shock suction, max 350 bar	L2
N2	suction, max 350 bar	L2

Oring type

-	BUNA N (standard)
I	VITON
H	HNBR

Surface treatment

-	none (standard)
A	Protalloy

CONFIGURATION CODE

END PLATE

16 K PJ Z B 3 - -

Size	
16	16
Bild type	
K	Sandwich
A	Subplate
palte version	
PH	For manual control only including P2 and T2
PJ	For Electrical control including P2 and T2
PX	closing plate with no additional ports.
variant	
Z	for LS signal from other valve
thread type	
B	BSP
S	SAE ORB
Tie Rod kit Length	
1-12	Amount of sections
Oring type	
-	BUNA N (standard)
I	VITON
H	HNBR
Surface treatment	
-	none (standard)
A	Protalloy

-

HPV Hydraulic Proportional Valves

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