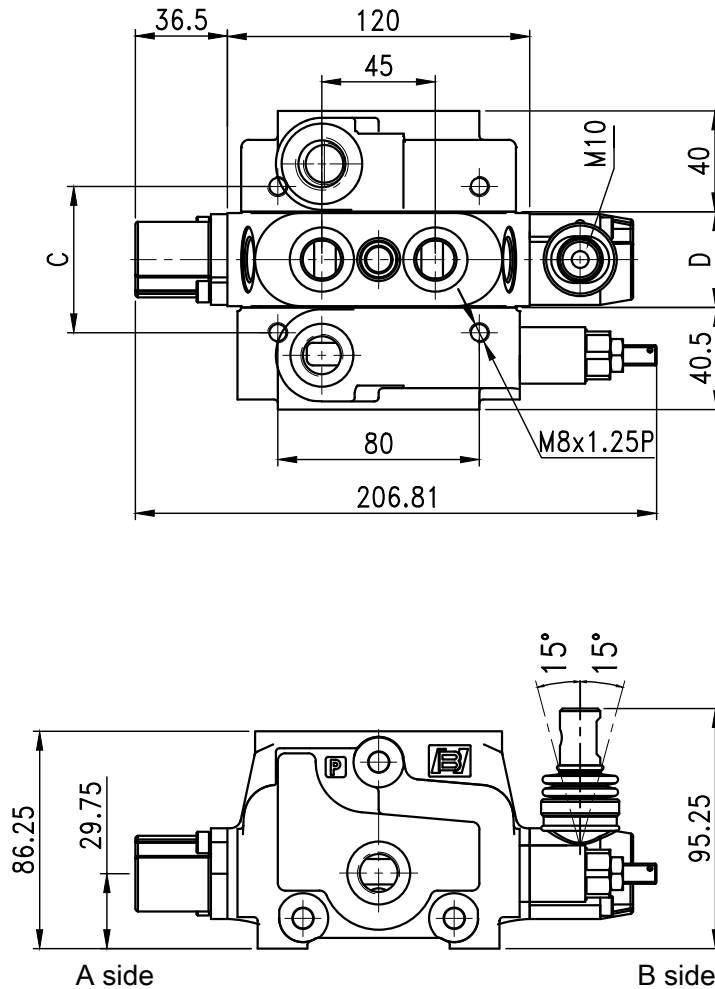


# Sectional Directional Control Valves

## MS-060

### DIMENSIONS



Type	Dimensions	
	C	D
MS-060/1	58	38
MS-060/2	96	76
MS-060/3	134	114
MS-060/4	172	152
MS-060/5	210	190
MS-060/6	248	228
MS-060/7	286	266
MS-060/8	324	304
MS-060/9	362	342
MS-060/10	400	380
MS-060/11	438	418
MS-060/12	476	456

unit : mm

### PERFORMANCE

Nominal flow rating : 45 l/min

Operating pressure (Max.) : parallel or tandem circuit : 315 bar  
 series circuit : 210 bar

Back pressure (Max.): 25 bar (on outlet port T)

Oil leaks from A (B) to T: 3 c.c./min at 100 bar (1450 psi)

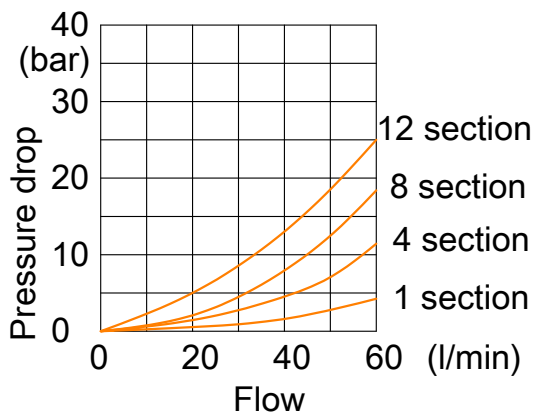
Fluid: best use mineral oil with viscosity ranging between 15 to 75 mm<sup>2</sup>/s

Fluid temperature : Min. -20°C , Max 80°C ,with NBR (BUNA-N) gaskets  
 Min. -20°C ,Max 100°C ,with FPM (VITON) seals gaskets

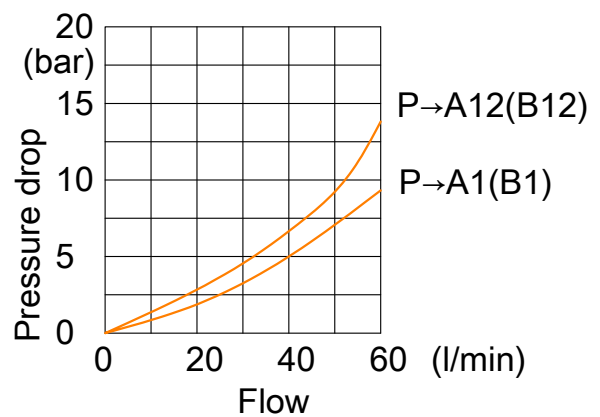
# MS-060

## RATING DIAGRAM

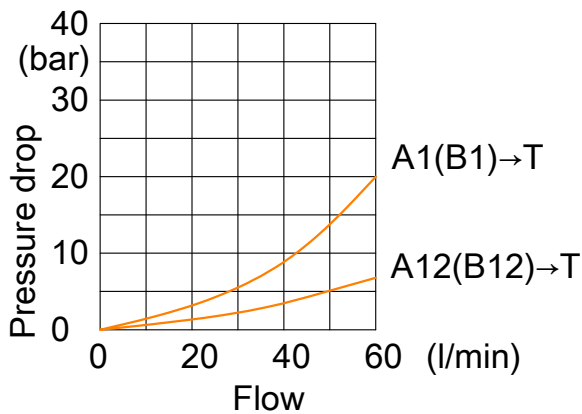
Open centre  
From side inlet to side outlet



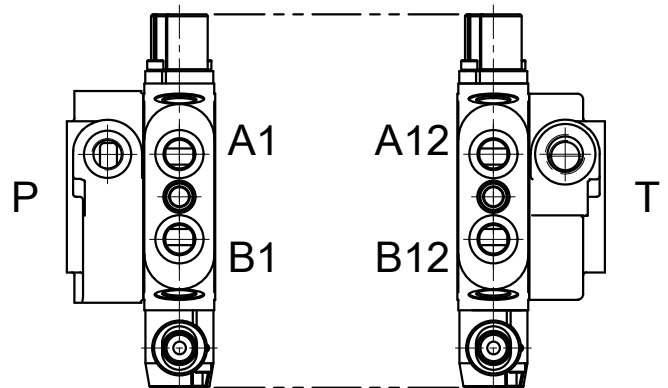
Inlet to work port  
From side inlet to A port (spool in position 1) or B port (spool in position 2)



Work port to outlet  
From A port (spool in position 2) or B port (spool in position 1) to side outlet



1 to 12 section

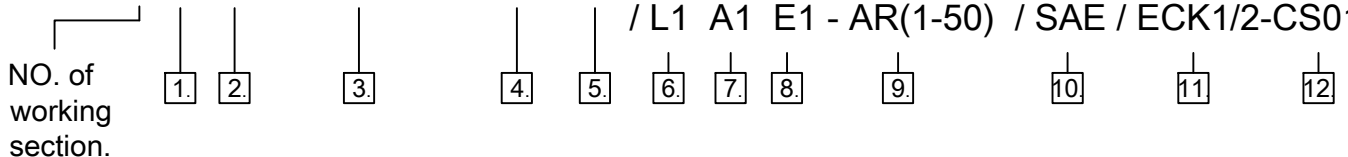




# MS-060

## ORDERING CODE NUMBER EXAMPLE

MS-060/2/ L - S - A ( S - 200 ) / PB / PC / L3 A2 S - NA /  
 / L1 A1 E1 - AR(1-50) / SAE / ECK1/2-CS01



### 1. Inlet alimentation page.5

Type	Description
L	Left side alimentation
R	Right side alimentation

### 2. Inlet cover page.6

Type	Description
S	Side inlet.
T	Top inlet.

### 3. Inlet cover main relief valve page.7

Type	Description
NR	Relief valve blanking plug.
(D-200)	Direct-acting relief valve, range 200 to 315 bar/ 2900 to 4570 psi. standard setting 220 bar / 3200psi.
(DL-200)	Direct-acting relief valve with capping, range 200 to 315bar/ 2900 to 4570 psi. standard setting 220 bar / 3200psi.

### 4. Outlet cover page.8

Type	Description
PB	Top outlet with power beyond.
CC	Top outlet with closed center.
SO	Side outlet to tank.
BP	Back pressure option.
TO	Top outlet to tank.

### 5. Hydraulic circuit page.11

Type	Description
PC	Parallel circuit.
TC	Tandem circuit.

### 6. "B" side option page.12

Type	Description
L1	Standard lever aluminum pivot box. with neoprene gatieer.
L2	Without lever with L2 dust cover.
L3	joystick lever(+axis) with left fulcrum.

### 7. Spool option page.13

Type	Description
A1	Double acting,3 positions with A and B closed in centre.
A2	Double acting,3 positions with A and B open to tank in neutral position.
2A	Double acting,3 positions with A open to tank in neutral position.
2B	Double acting,3 positions with B open to tank in neutral position.
A3	Single acting on A,3 position.B plugged.
A4	Single acting on B,3 position.A plugged.

### 8. "A" side spool positioners page.14

Type	Description
S	Spring return to neutral.
P	On/off pneumatic control. Min. pressure 5 bar(70 psi) Max. pressure 10 bar (140 psi).
D1R	Detent in positions1.Spring return to neutral.
D2R	Detent in positions2.Spring return to neutral.
D12R	Detent in positions 1 or 2.Spring return to neutral.
D3	Detent in three positions.
LH1	External hydraulic pilot to position 1. Spring return to neutral.
LH2	external hydraulic pilot to position 2. Spring return to neutral.
LH3	external hydraulic pilot to position 1 and 2. Spring return to neutral.



# MS-060

## ORDERING CODE NUMBER EXAMPLE

### 8."A" side spool positioners page.14

Type	Description
E1	On/off electro-hydraulic control with external pilot and solenoid function to position 1.Spring return to neutral.
E2	On/off electro-hydraulic control with external pilot and solenoid function to position 2.Spring return to neutral.
E3	On/off electro-hydraulic control with external pilot and solenoid function to position 1 and 2.Spring return to neutral.
EP1	On/off electro-pneumatic control with external pilot and solenoid function to position 1. Spring return to neutral.
EP2	On/off electro-pneumatic control with external pilot and solenoid function to position 2. Spring return to neutral.
EP3	On/off electro-pneumatic control with external pilot and solenoid function to position 1 and 2. Spring return to neutral.
SW1	With spring return in neutral position, operation signalling in position 1 ,prearranged for centralized microswitch control.
SW2	With spring return in neutral position, operation signalling in position 2 ,prearranged for centralized microswitch control.
SW3	With spring return in neutral position, operation signalling in position 1 and 2, prearranged for centralized microswitch control.

### 9.Port Relief valves page.18

Type	Description
NA	No relief valve. (can be omitted)
A	Mounted on port A.
B	Mounted on port B.
C	Mounted on port A and B.
Relief valve	
R(1-50)	Range 20 to 80 bar/ 290 to 1160 psi. standard setting 50 bar / 725psi.
R(2-100)	Range 50 to 220 bar/ 725 to 3190 psi. standard setting 100 bar / 1450psi.
R(3-200)	Range 180 to 350 bar/ 2610 to 5076 psi. standard setting 200 bar / 2900psi.
Anti-shock valve	
RC(1-50)	Range 20 to 80 bar/ 290 to 1160 psi. standard setting 50 bar / 725psi.
RC(2-100)	Range 50 to 220 bar/ 725 to 3190 psi. standard setting 100 bar / 145psi.
RC(3-200)	Range 180 to 350 bar/ 2610 to 5076 psi. standard setting 200 bar / 2900psi.
Anti-cavitation valve	
C	Anti-cavitation

### 10.EL control pilot kit page.20

Type	Description
ECK1/1-12	Complete kit with pressure reducing valve, manifold and pipes. (1-12 sections)
ECK2/1-12	Manifold kit and pressure reducing valve for connection to the main circuit.(1-12 sections)

### 11.Coil series page.21

Type	Description
CS01	Connection:A EN 175301-803 ISO 4400 (DIN.43650) Voltage : 12-24VDC
CS02	Connection:lead wires connection Voltage : 12-24VDC
CS03	Connection:AMP Junior connection Voltage : 12-24VDC
CS04	Connection:M27x1 connection Voltage : 12-24VDC

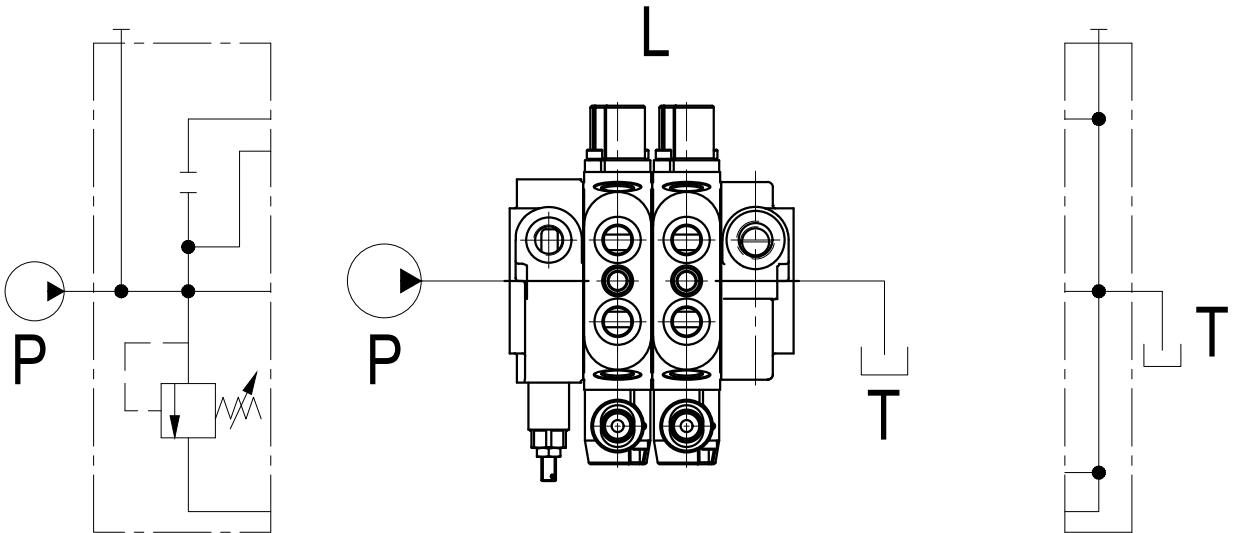
### 12.Port threads option page.25

Type	Description
BSP	G.
SAE	UN-UNF.

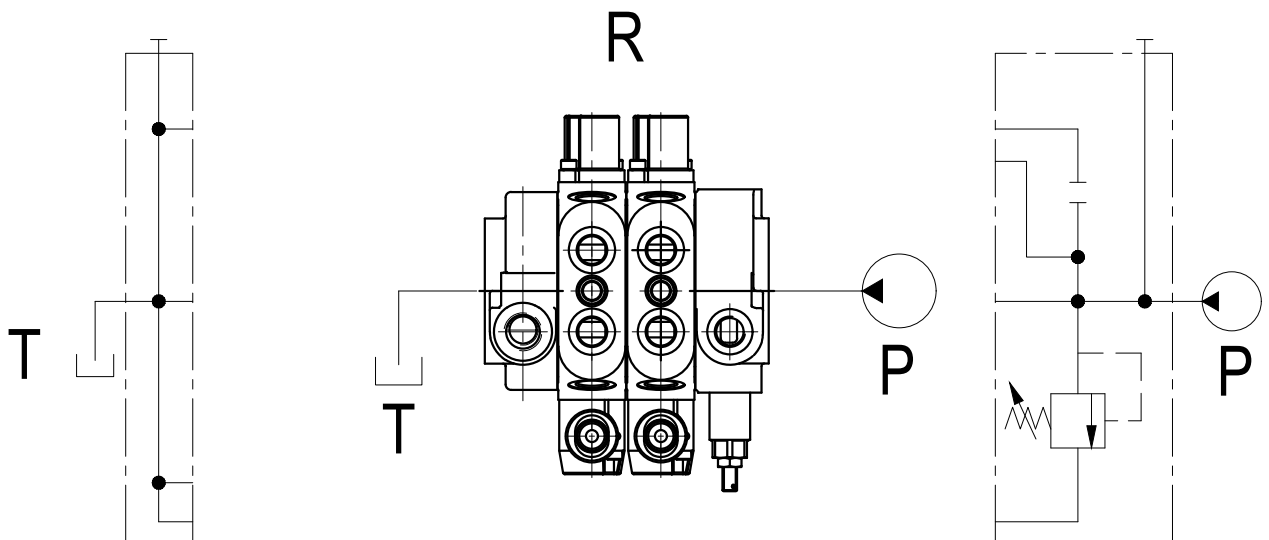
# MS-060

## 1. Inlet alimentation

### Left inlet



### Right inlet

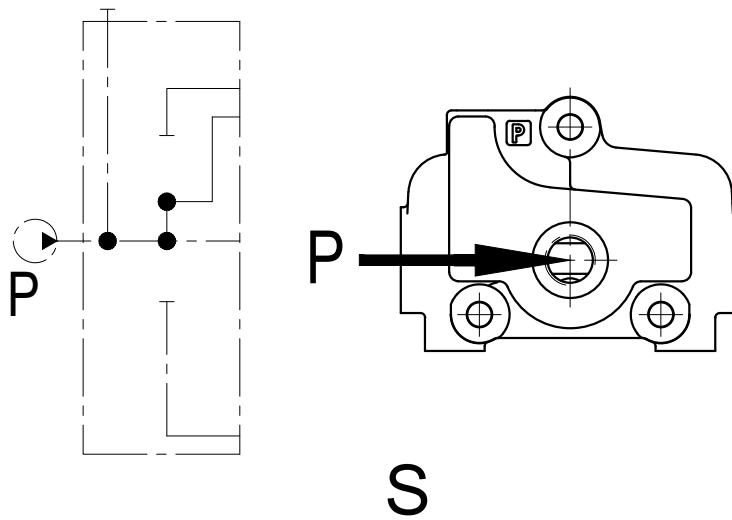


# MS-060

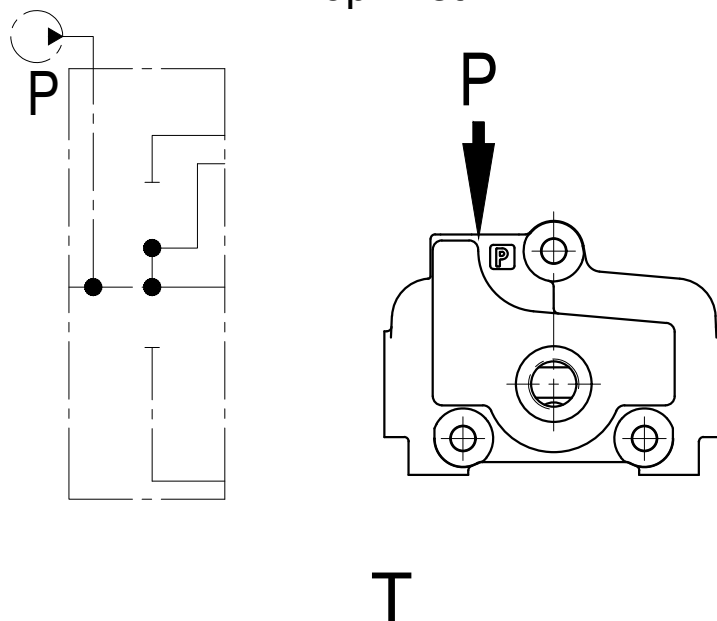
## 2. Inlet cover

### Inlet cover and position

Side inlet.



Top inlet.

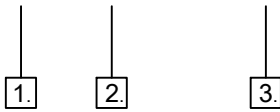


# MS-060

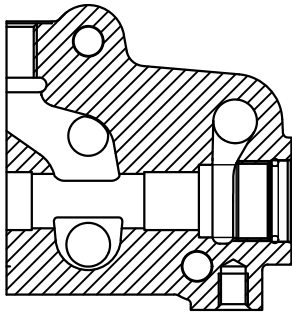
## 3. Inlet cover main relief valve

Main relief valve position

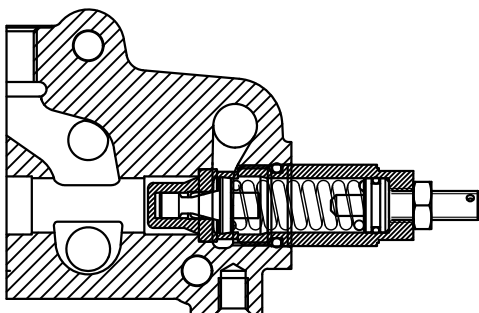
A (D - 200)



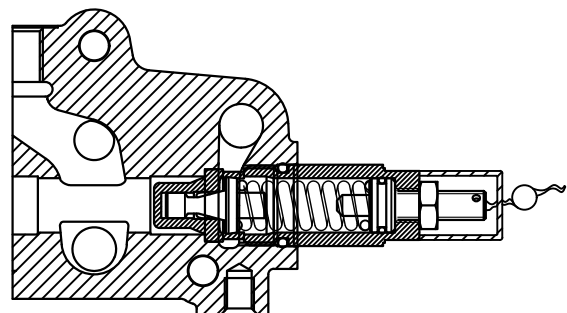
- 1. NR=None relief valve.  
A=Mounted on port A.  
B=Mounted on port B.
- 2. Main relief type(D)  
Optional: with capping (DL)
- 3. D / DL :Standard pressure setting in  
200~315bar.  
Standard pressure 220bar/3200psi.



NR : Relief valve blanking plug



D : Direct-acting relief valve



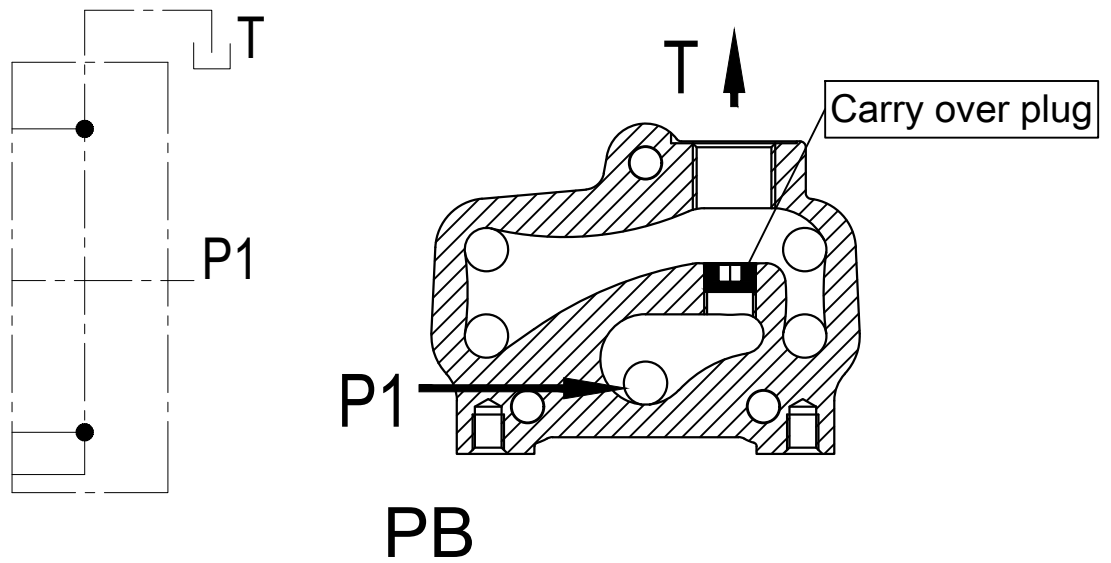
DL : Direct-acting relief valve  
with capping

# MS-060

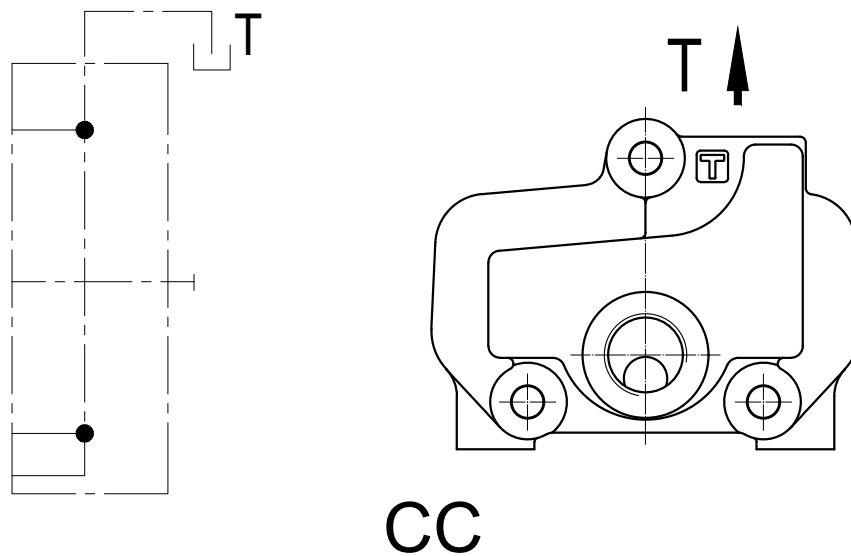
## 4. Outlet cover

### Outlet cover and position

Top outlet with power beyond



Top outlet with closed center



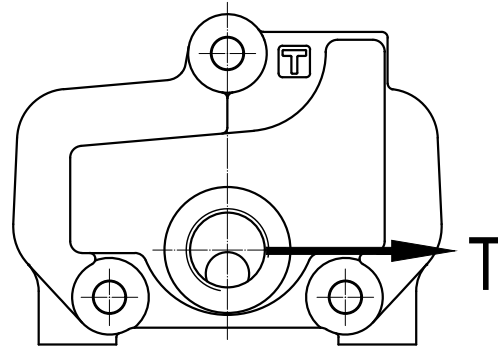
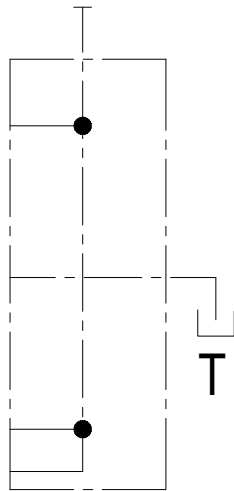


# MS-060

## 4. Outlet cover

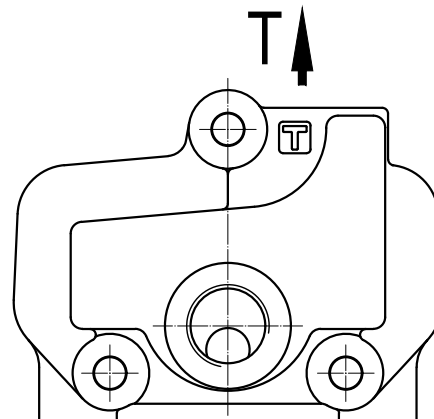
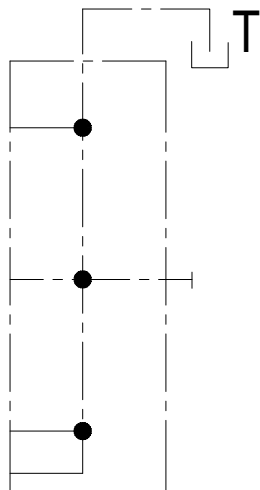
### Outlet cover and position

Side outlet to tank



SO

Top outlet to tank



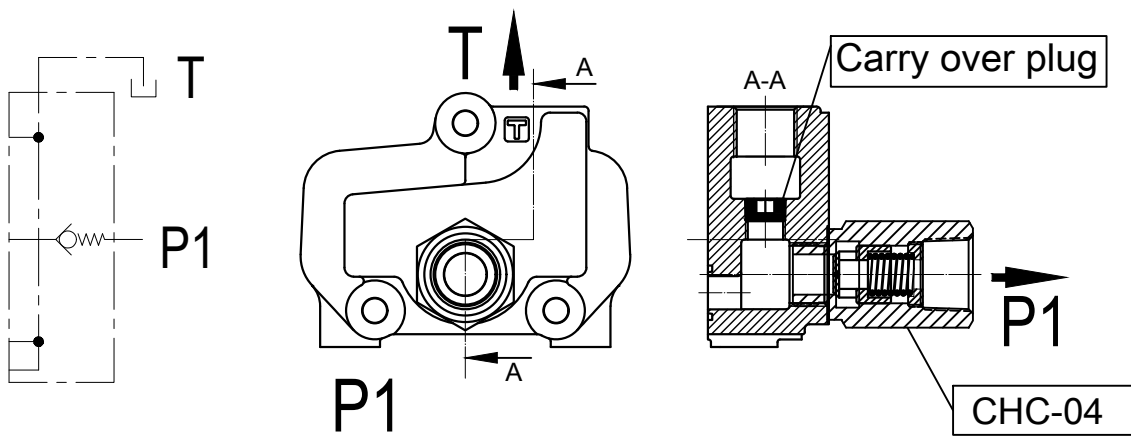
TO

# MS-060

## 4. Outlet cover

### Outlet cover and position

Back pressure option  
(For use with electro-hydraulic control)



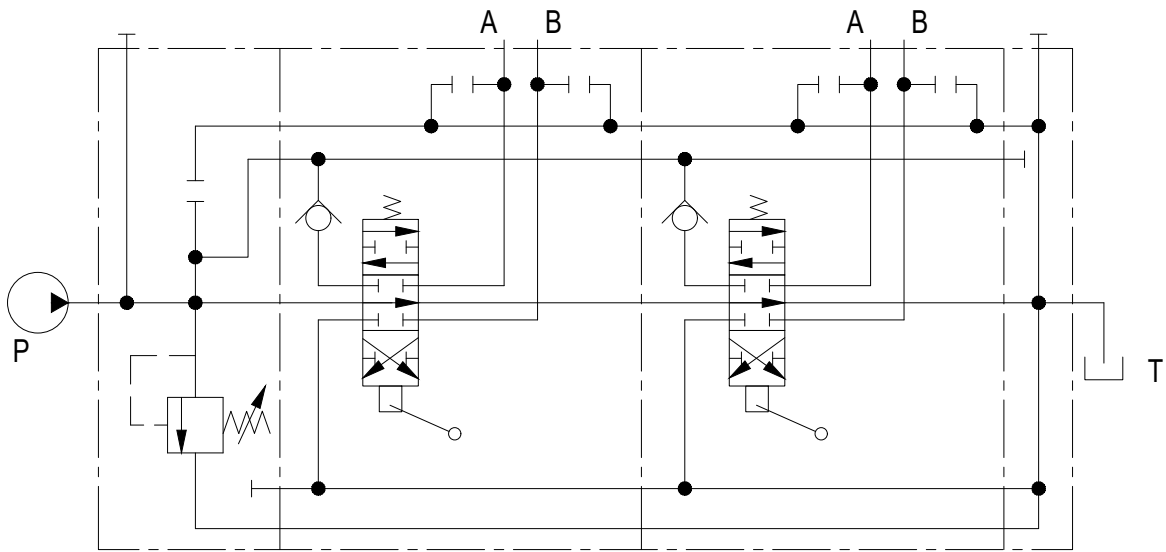
Carry-over with CHC-04 back pressure valve set at 10bar(145 psi) on the free line(side outlet). Used for electro-hydraulic controls.

BP

# MS-060

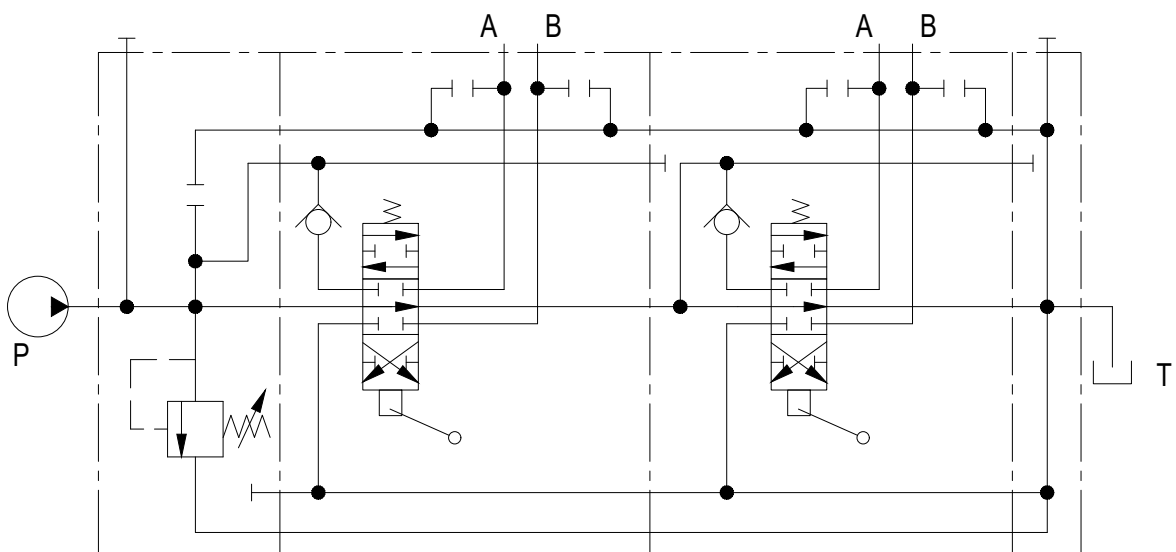
## 5. Hydraulic circuit

### Parallel circuit



PC

### Tandem circuit

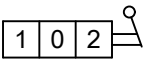
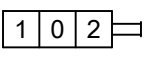
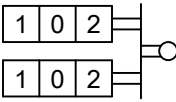


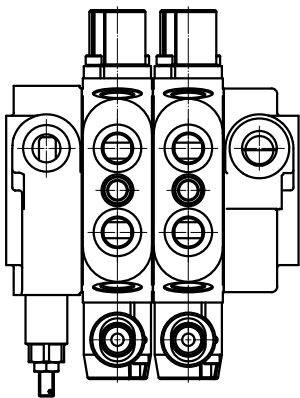
TC

# MS-060

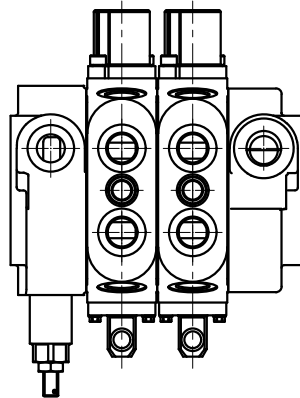
## 6. "B" side option

Spool control B port side

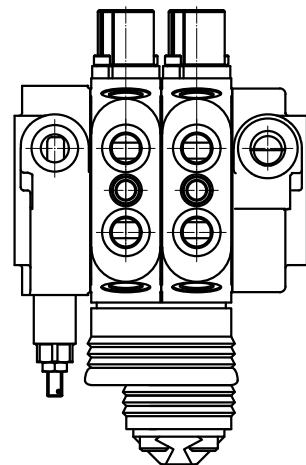
Type	Scheme	Description
L1		Standard lever aluminum pivot box with neoprene gaiter.
L2		Without lever with L2 dust cover.
L3		"L3 of 4 Type" joystick lever(+ axis) with left fulcrum.



L1



L2



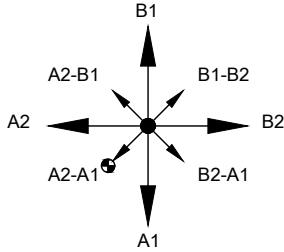
L3



# MS-060

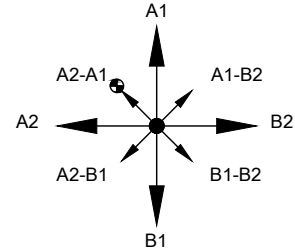
L3-1

View from B side



Bottom fulcrum

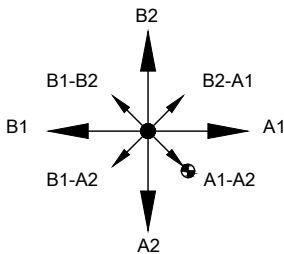
L3-3\*



Top fulcrum

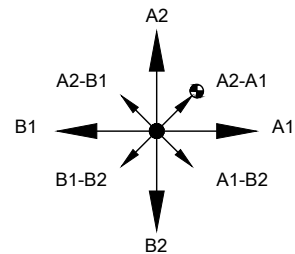
L3-2

View from B side



Bottom fulcrum

L3-4\*



Top fulcrum

Note: \* Configurations not available with service port valve.

## 7. Spool option

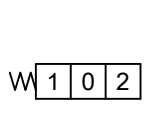
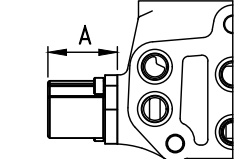
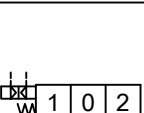
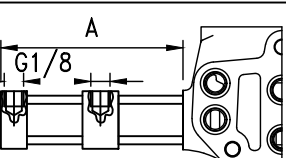
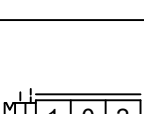
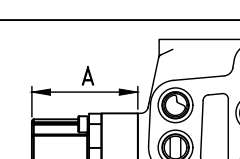
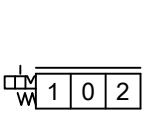
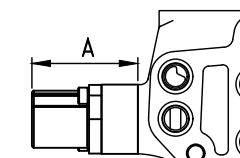
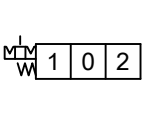
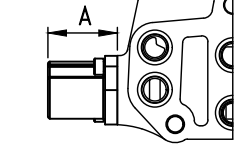
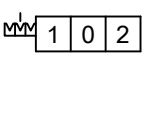
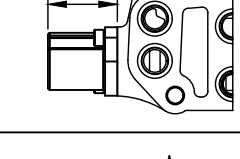
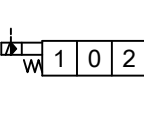
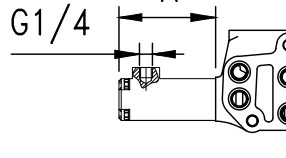
### Spool

Type	Scheme
A1	
A2	
2A	
2B	
A3	
A4	

# MS-060

## 8."A" side spool positioners

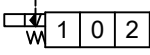
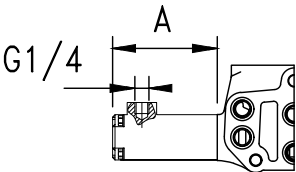
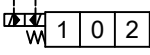
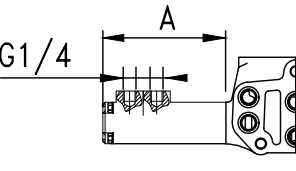
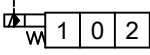
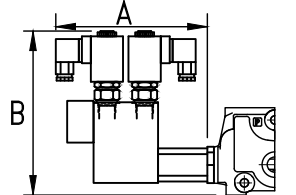
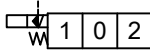
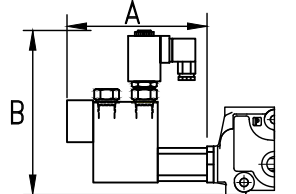
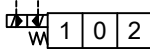
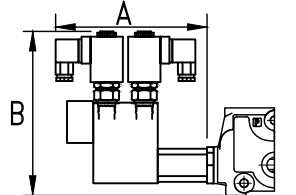
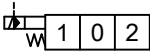
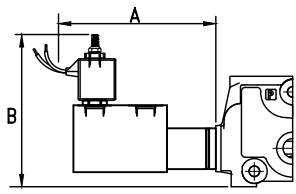
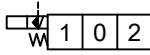
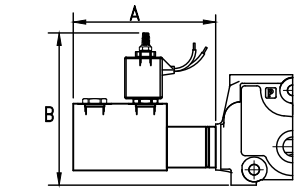
### Spool control A port side

Type	Scheme	Description	Dimensions
S		S = Spring centered	 37 (1.46)
P		P = On/off pneumatic control Min. pressure 5 bar (70 psi) Max. pressure 10 bar (140 psi)	 111.5 (4.38)
D1R		D1R = Detent in positions1. Spring return to neutral.	 68 (2.68)
D2R		D2R = Detent in position2. Spring return to neutral.	 68 (2.68)
D12R		D12R = Detent in positions1 or 2. Spring return to neutral.	 37 (1.46)
D3		D3 = Detent in three positions	 37 (1.46)
LH1		LH1 = External hydraulic pilot to position 1. Spring return to neutral.	 88 (3.46)

# MS-060

## 8."A" side spool positioners

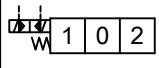
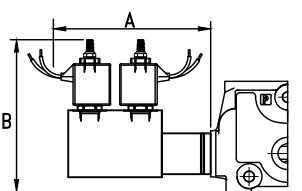
### Spool control A port side

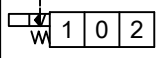
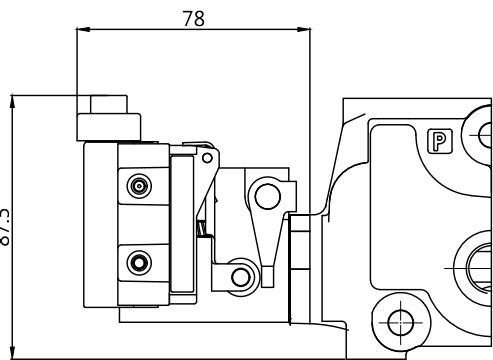
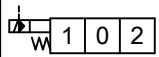
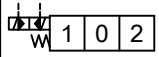
Type	Scheme	Description	Dimensions
LH2		LH2 = External hydraulic pilot to position 2. Spring return to neutral.	 93 (3.66)
LH3		LH3 = External hydraulic pilot to position 1 and 2. Spring return to neutral.	 122 (4.80)
E1		E1=On/off electro-hydraulic control with external pilot and solenoid function to position 1. Spring return to neutral. Voltage:12VDC,24VDC	 A 150 (5.90) B 162 (6.40)
E2		E2=On/off electro-hydraulic control with external pilot and solenoid function to position 2. Spring return to neutral. Voltage:12VDC,24VDC	 A 140 (5.51) B 162 (6.40)
E3		E3=On/off electro-hydraulic control with external pilot and solenoid function to position 1 and 2. Spring return to neutral. Voltage:12VDC,24VDC	 A 150 (5.90) B 162 (6.40)
EP1		EP1=On/off electro-pneumatic control with external pilot and solenoid function to position 1. Spring centered. Voltage:12VDC,24VDC	 A 120 (4.72) B 120 (4.72)
EP2		EP2=On/off electro-pneumatic control with external pilot and solenoid function to position 2. Spring centered. Voltage:12VDC,24VDC	 A 110 (4.33) B 120 (4.72)

# MS-060

## 8."A" side spool positioners

Spool control A port side

Type	Scheme	Description	Dimensions				
EP3		EP3=On/off electro-pneumatic control with extrnal pilot and solenoid function to position 1 and 2. Spring centered. Voltage: 12VDC,24VDC	 <table style="margin-left: 20px;"> <tr> <td style="font-size: 24px;">A</td> <td style="padding-left: 10px;">120 (4.72)</td> </tr> <tr> <td style="font-size: 24px;">B</td> <td style="padding-left: 10px;">120 (4.72)</td> </tr> </table>	A	120 (4.72)	B	120 (4.72)
A	120 (4.72)						
B	120 (4.72)						

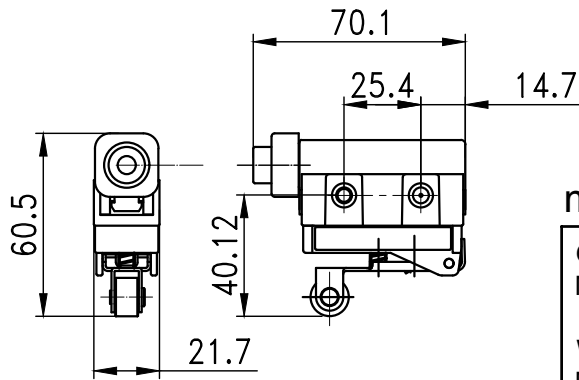
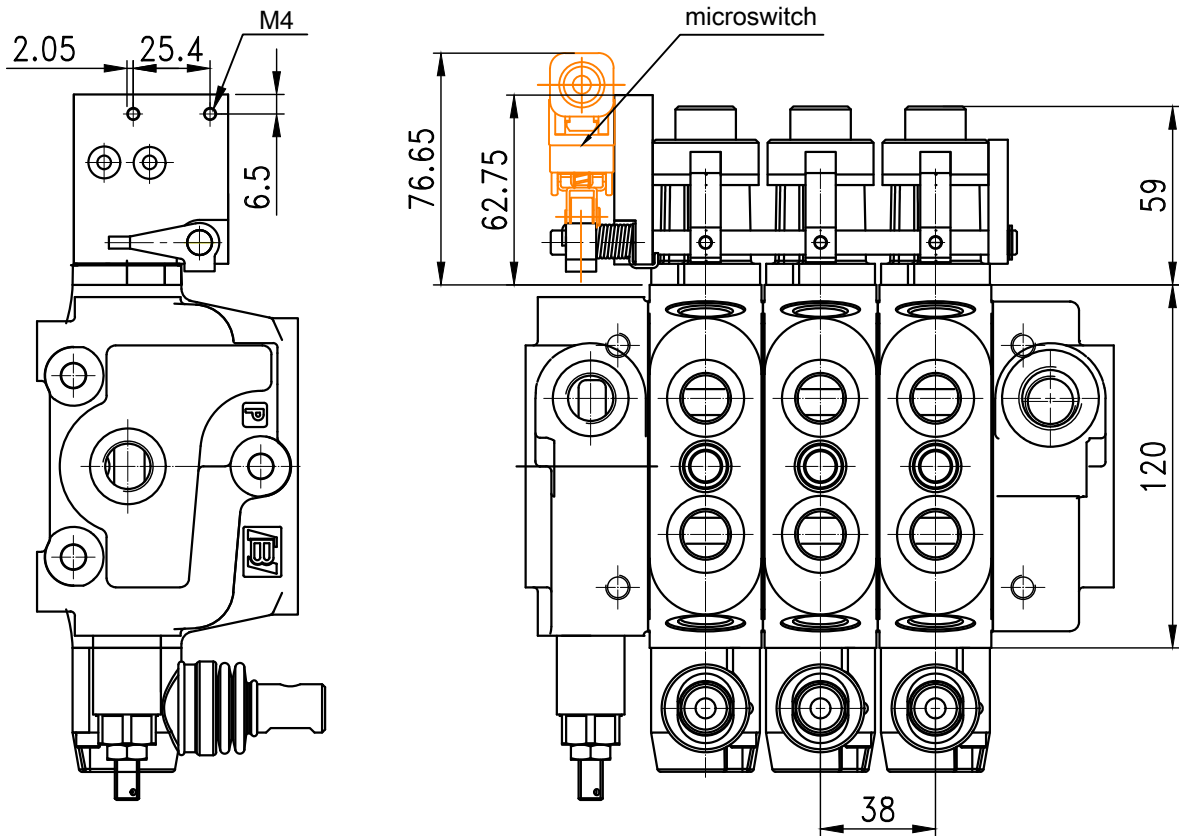
Type	Scheme	Description	Dimensions
SW1		SW1=With spring return in neutral position,operation signalling in position 1 ,prearranged for centralized microswitch control	
SW2		SW2=With spring return in neutral position,operation signalling in position 2 ,prearranged for centralized microswitch control	
SW3		SW3=With spring return in neutral position,operation signalling in position 1 and 2 ,prearranged for centralized microswitch control	



# MS-060

## 8."A" side spool positioners

### Spool control A port side



#### microswitch

Operating features:  
 Max. current / voltage : 5 A / 250 VAC  
 0.25 A / 230VDC  
 Weather protection: IP67  
 Mechanical durability: 10,000,000 operations min.

# MS-060

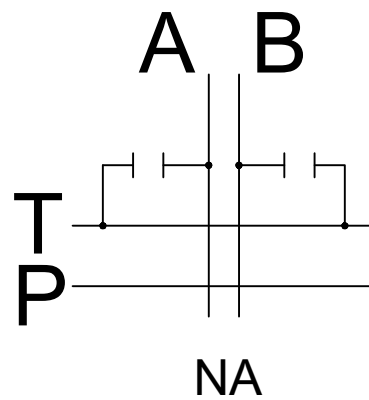
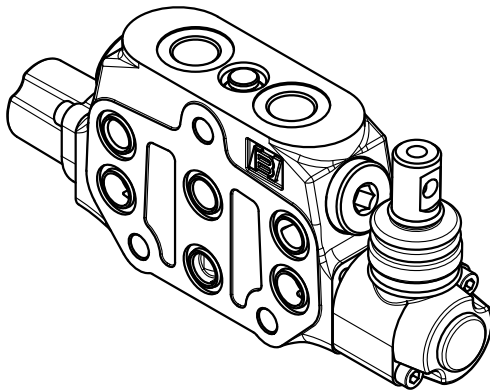
## 9.Port Relief valves

### Valve Banking Plug

L1 A2 S - NA

1. NA= No relieve valve (can be omitted)

1.



### Anti-shock Valves

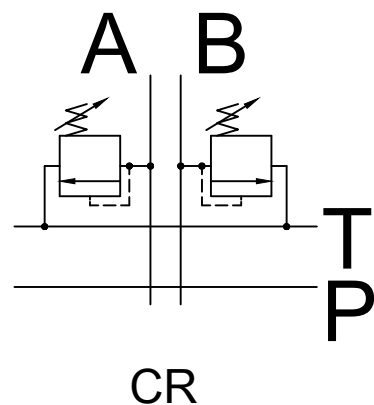
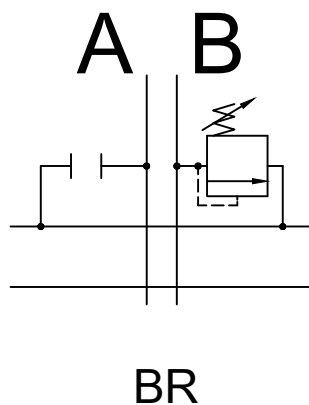
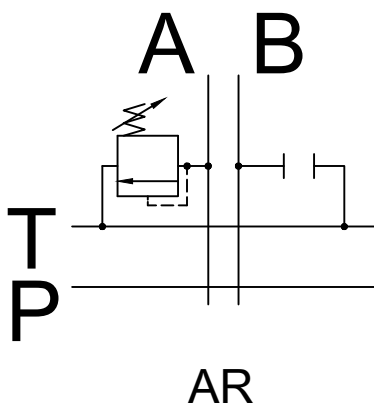
A R ( 2 - 100 )

1. 2. 3. 4.

- 1. A= On A side  
B= On B side  
C= On both sides
- 2. Valve options
- 3. Spring options
- 4. Pressure setting

Spring type	01	02	03
Max. Pressure	80	220	350
Min. Pressure	20	50	180

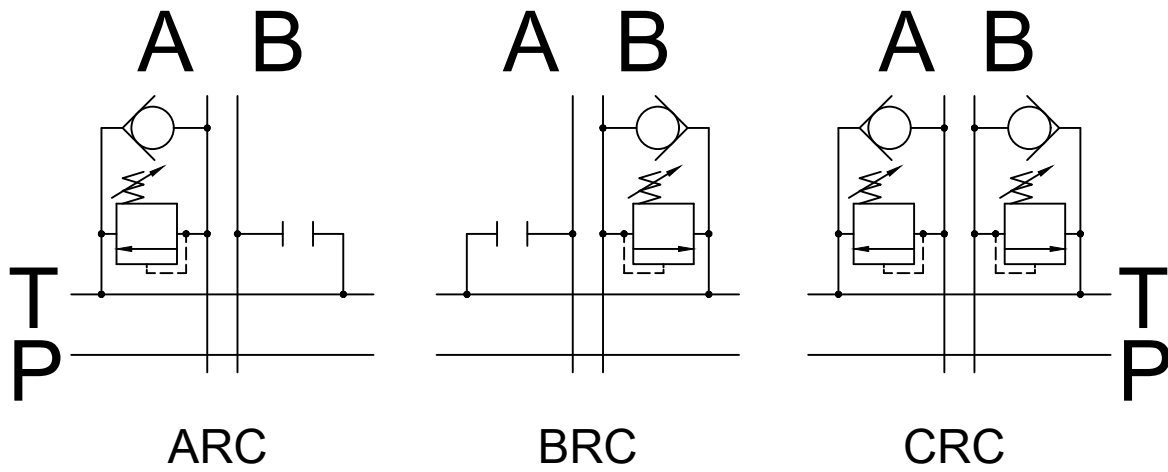
unit : bar



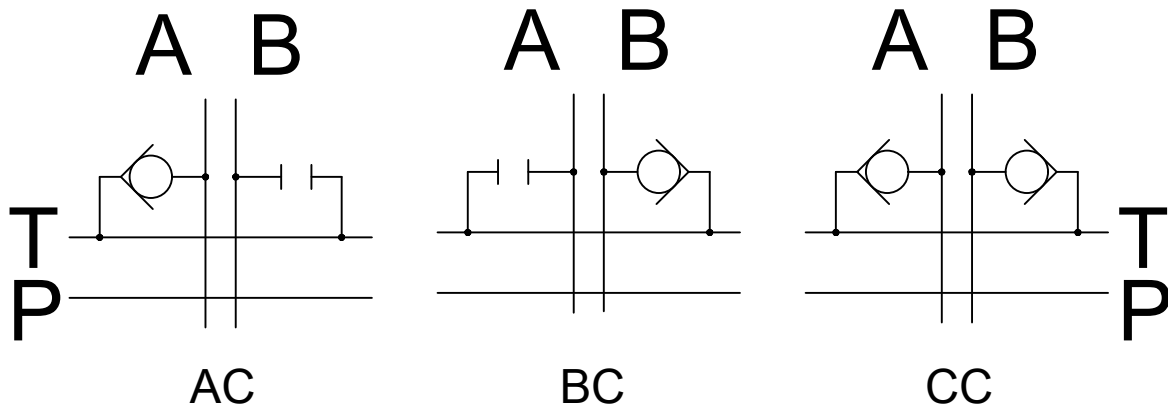
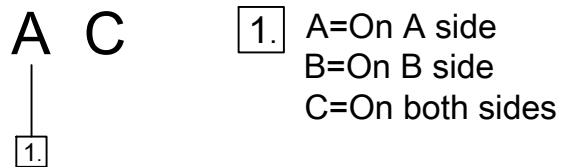
# MS-060

## 9.Port Relief valves

Anti-shock and Anti-cavitation Valves



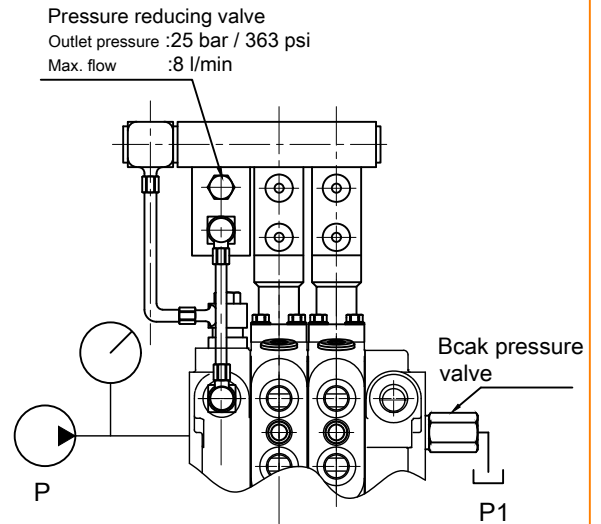
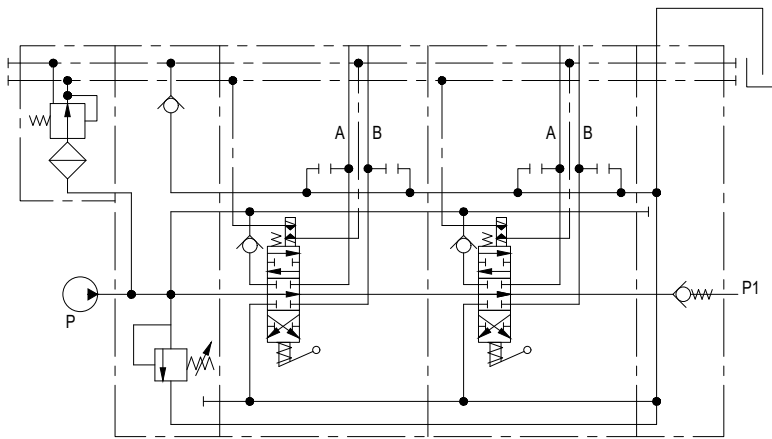
Anti-cavitation Valves



# MS-060

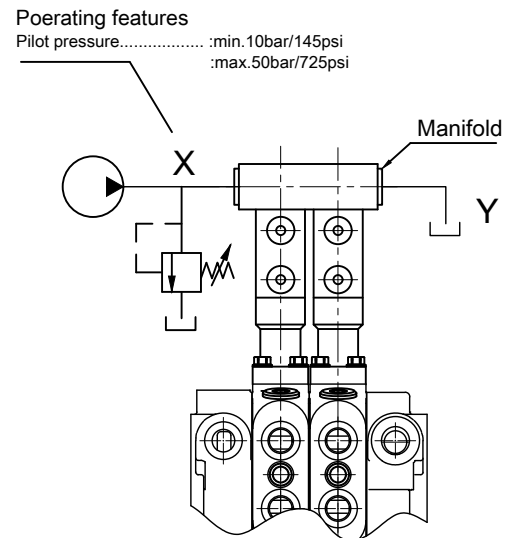
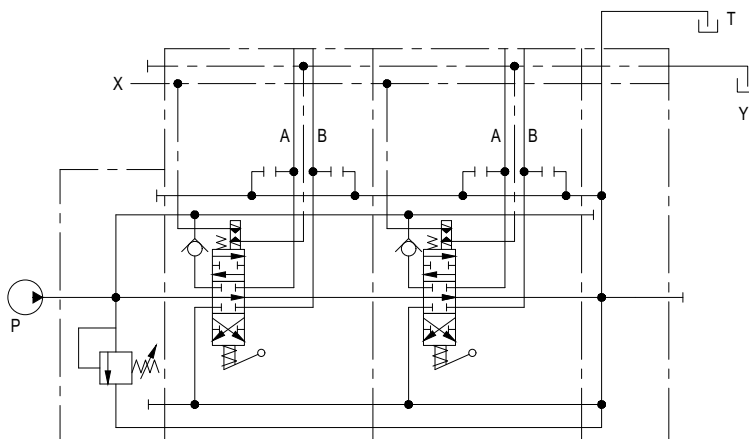
## 10.EL control pilot kit

### EL control pilot kit



Complete kit with pressure reducing valve, manifold and pipes.

ECK1/1-12



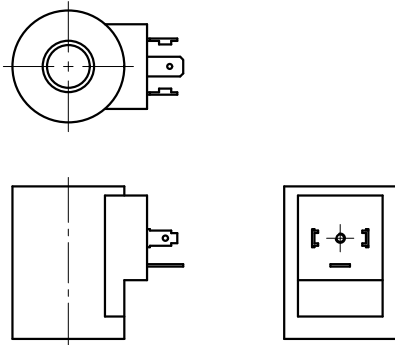
Manifold kit and pressure reducing valve for connection to the main circuit.

ECK2/1-12

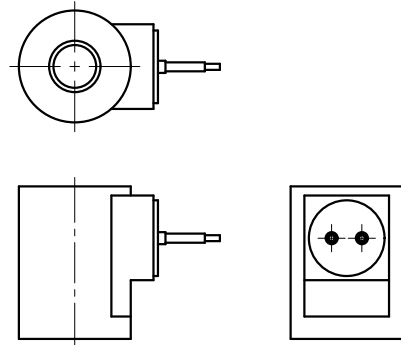
# MS-060

## 11.Coil Series

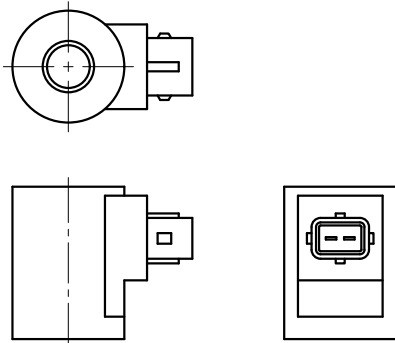
Coil series option



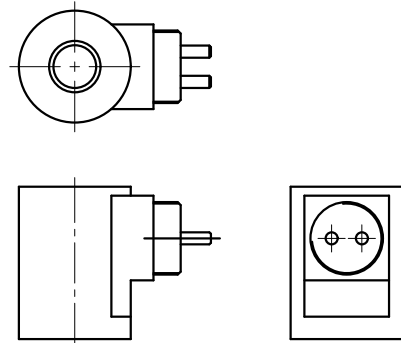
Type : CS01  
 Connection=A EN 175301-803 ISO 4400(DIN.43650)  
 Voltage : 12-24VDC



Type : CS02  
 Connection=lead wires connection  
 Voltage : 12-24VDC

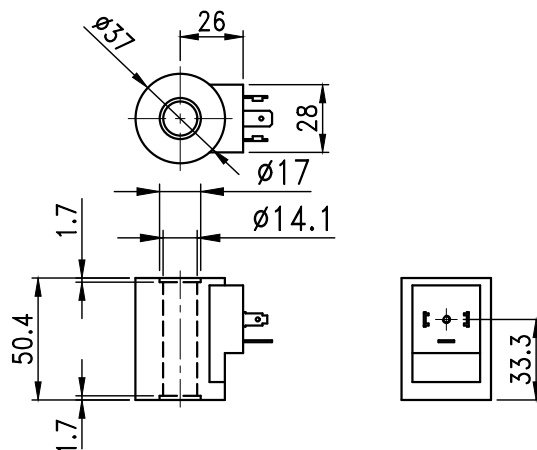


Type : CS03  
 Connection=AMP Junior connection  
 Voltage : 12-24VDC



Type : CS04  
 Connection=M27x1 connection  
 Voltage : 12-24VDC

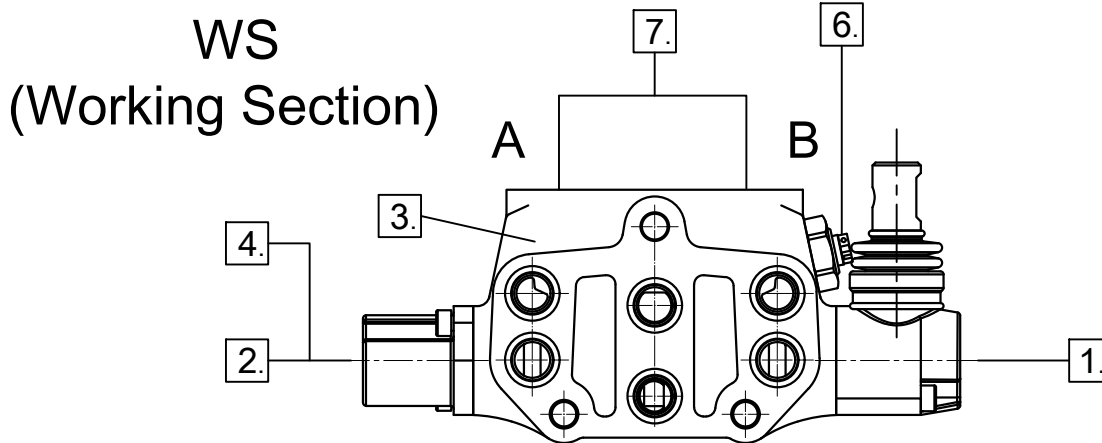
### DIMENSIONS



# MS-060-Working section

## ORDERING CODE NUMBER EXAMPLE

WS-MS-060/ 1. 2. 3. 4. 5. 6. 7.



### 1."B" side option

page.12

Type	Description
L1	Standard lever aluminum pivot box. with neoprene gasket.
L2	Without lever with L2 dust cover.
L3	joystick lever(+axis) with left fulcrum.

### 2.Spool option

page.13

Type	Description
A1	Double acting,3 positions with A and B closed in centre.
A2	Double acting,3 positions with A and B open to tank in neutral position.
2A	Double acting,3 positions with A open to tank in neutral position.
2B	Double acting,3 positions with B open to tank in neutral position.
A3	Single acting on A,3 position.B plugged.
A4	Single acting on B,3 position.A plugged.

### 3.Hydraulic circuit

page.11

Type	Description
PC	Parallel circuit.
TC	Tandem circuit.

### 4."A" side spool positioners

page.14

Type	Description
S	Spring return to neutral.
P	On/off pneumatic control. Min. pressure 5 bar(70 psi) Max. pressure 10 bar (140 psi).
D1R	Detent in positions 1.Spring return to neutral.
D2R	Detent in positions 2.Spring return to neutral.
D12R	Detent in positions 1 or 2.Spring return to neutral.
D3	Detent in three positions.
LH1	External hydraulic pilot to position 1. Spring return to neutral.
LH2	external hydraulic pilot to position 2. Spring return to neutral.
LH3	external hydraulic pilot to position 1 and 2. Spring return to neutral.
E1	On/off electro-hydraulic control with external pilot and solenoid function to position 1.Spring return to neutral.
E2	On/off electro-hydraulic control with external pilot and solenoid function to position 2.Spring return to neutral.
E3	On/off electro-hydraulic control with external pilot and solenoid function to position 1 and 2.Spring return to neutral.



# MS-060-Working section

## ORDERING CODE NUMBER EXAMPLE

### 4."A" side spool positioners page.14

Type	Description
EP1	On/off electro-pneumatic control with extrnal pilot and solenoid function to position 1. Spring return to neutral.
EP2	On/off electro-pneumatic control with extrnal pilot and solenoid function to position 2. Spring return to neutral.
EP3	On/off electro-pneumatic control with extrnal pilot and solenoid function to position 1 and 2. Spring return to neutral.
SW1	With spring return in neutral position, operation signalling in position 1 ,prearranged for centralized microswitch control.
SW2	With spring return in neutral position, operation signalling in position 2 ,prearranged for centralized microswitch control.
SW3	With spring return in neutral position, operation signalling in position 1 and 2, prearranged for centralized microswitch control.

### 5.Coil series page.20

Type	Description
CS01	Connection:A EN 175301-803 ISO 4400 (DIN.43650) Voltage : 12-24VDC
CS02	Connection:lead wires connection Voltage : 12-24VDC
CS03	Connection:AMP Junior connection Voltage : 12-24VDC
CS04	Connection:M27x1 connection Voltage : 12-24VDC

### 6.Port Relief valves page.18

Type	Description
NA	No relief valve. (can be omitted)
A	Mounted on port A.
B	Mounted on port B.
C	Mounted on port A and B.
Relief valve	
R(1-50)	Range 20 to 80 bar/ 290 to 1160 psi. standard setting 50 bar / 725psi.
R(2-100)	Range 50 to 220 bar/ 725 to 3190 psi. standard setting 100 bar / 1450psi.
R(3-200)	Range 180 to 350 bar/ 2610 to 5076 psi. standard setting 200 bar / 2900psi.
Anti-shock valve	
RC(1-50)	Range 20 to 80 bar/ 290 to 1160 psi. standard setting 50 bar / 725psi.
RC(2-100)	Range 50 to 220 bar/ 725 to 3190 psi. standard setting 100 bar / 145psi.

### 6.Port Relief valves page.18

Type	Description
RC(3-200)	Range 180 to 350 bar/ 2610 to 5076 psi. standard setting 200 bar / 2900psi.
Anti-cavitation valve	
C	Anti-cavitation

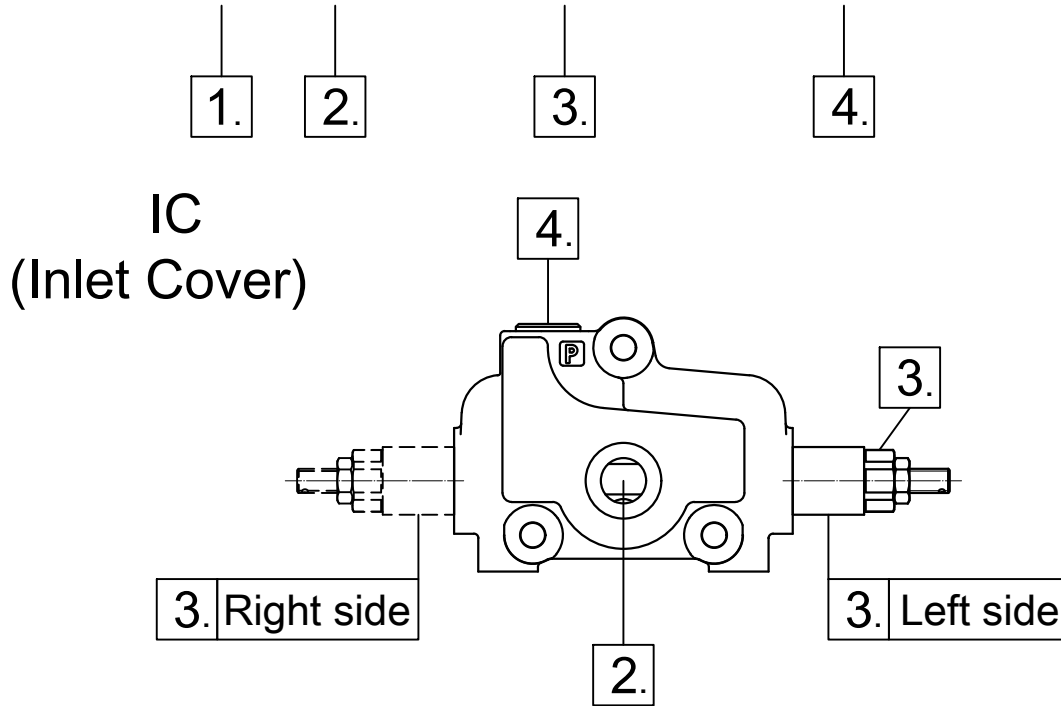
### 7.Port threads option page.25

Type	Description
BSP	G.
SAE	UN-UNF.

# MS-060-Inlet cover

ORDERING CODE NUMBER EXAMPLE

IC-MS-060/ L - S - A ( S- 200 ) - BSP



**1. Inlet Alimentation** page.5

Type	Description
L	Left side Alimentation
R	Right side Alimentation

**2. Inlet cover** page.6

Type	Description
S	Side inlet.
T	Top inlet.

**3. Inlet cover relief valve** page.7

Type	Description
NR	Relief valve blanking plug.
(D-200)	Direct-acting relief valve, range 200 to 315 bar/ 2900 to 4570 psi. standard setting 220 bar / 3200psi.
(DL-200)	Direct-acting relief valve with capping, range 200 to 315bar/ 2900 to 4570 psi. standard setting 220 bar / 3200psi.

**4. Port threads option** page.25

Type	Description
BSP	G.
SAE	UN-UNF.



# MS-060-Outlet cover

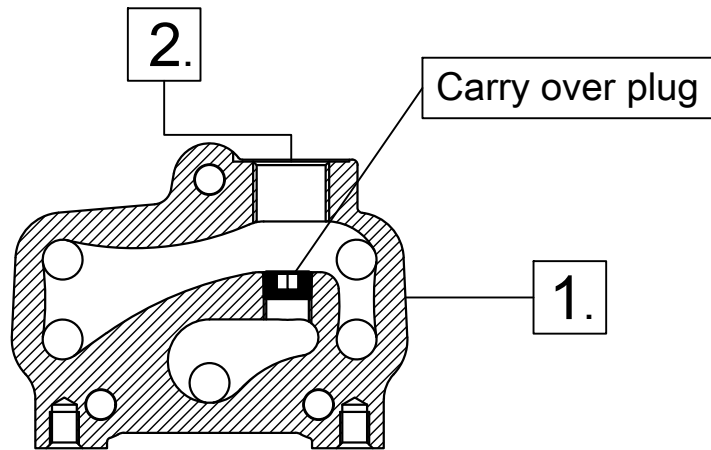
ORDERING CODE NUMBER EXAMPLE

OC-MS-060/ CC - BSP

1.

2.

OC  
(Outlet Cover)



## 1.Outlet cover

page.8

Type	Description
PB	Top outlet with power beyond.
CC	Top outlet with closed center.
SO	Side outlet to tank.
BP	Back pressure option.
TO	Top outlet to tank.

## 2.Port threads option

page.25

Type	Description
BSP	G.
SAE	UN-UNF.

## 12.Port threads option

### Port threads

PORT	BSP	SAE
P	G1/2	7/8-14UNF
A and B port	G1/2	3/4-16UNF
T	G3/4	7/8-14UNF