



RS(E)H5-16

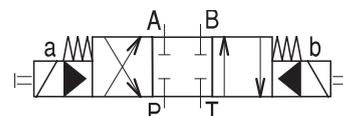
DIRECTIONAL CONTROL VALVES

| KE 2057 | 11/14 |

D_n 16 mm | p_{max} 32 MPa | Q_n 400 dm³/min

Pilot or hydraulic operated directional control valves RS(E)H5-16 are used to control start, stop and direction of flow in hydraulic circuit.

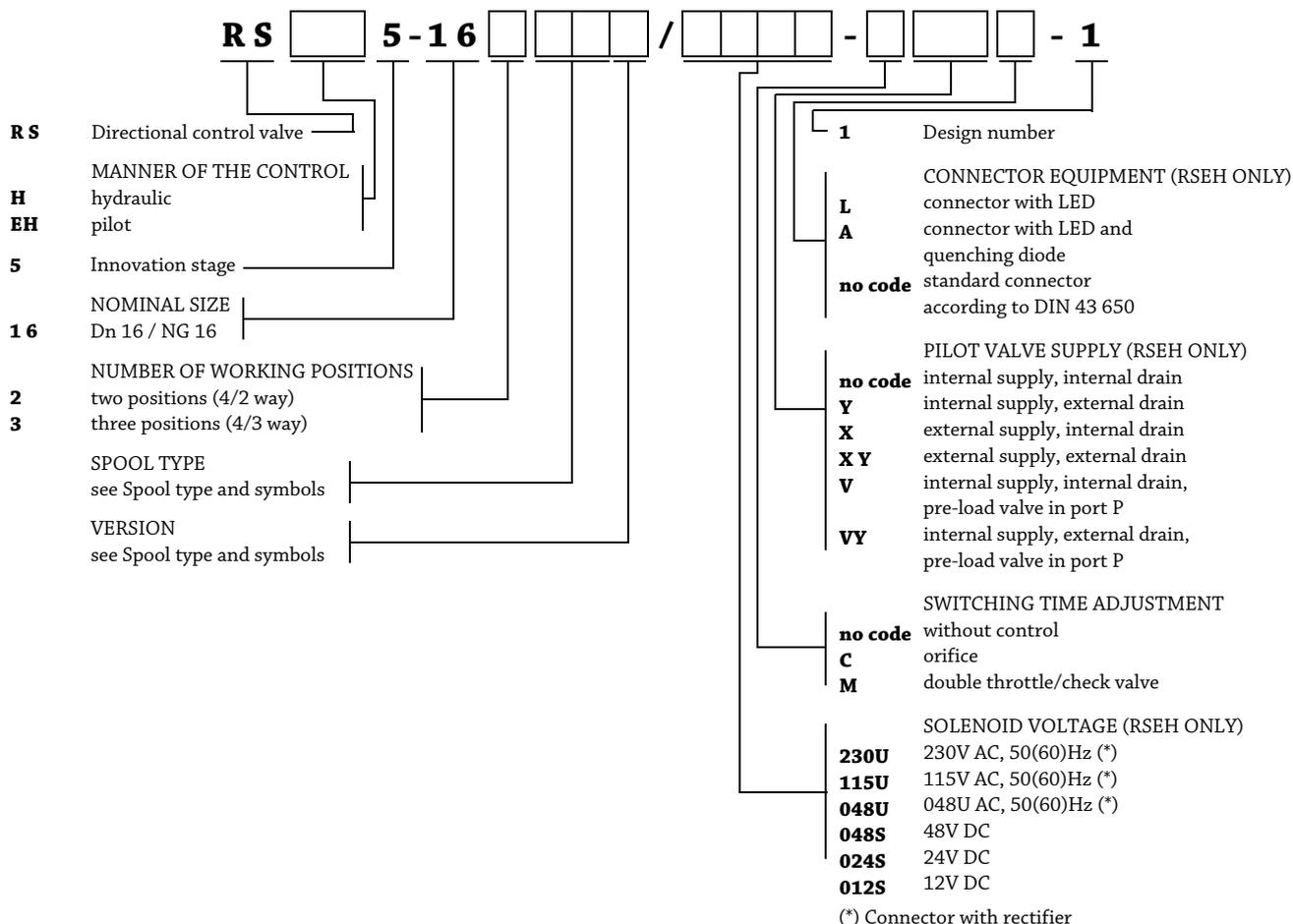
Installation dimensions according to DIN 24 340, ISO 4401, CETOP RP 121H-07 | pilot or hydraulic control | high reliability | manual override (only for RSEH) any working position



FUNCTIONAL DESCRIPTION

Pilot operated directional control valves RSEH5-16 consist of solenoid operated directional control valve RSE4-06 (see KE2020) and the main valve with connection surface according to ISO 4401 (CETOP 7), whereas RSH5-16 valves consist of the main valve only. Both pilot and hydraulic operated directional control valves are available in several configurations and spool types. To avoid pressure surges in hydraulic system the spool switching time of the main valve can be adjusted using orifices or double throttle check valve in both manners of control (see ordering code). Both pilot and drain connection can be either internal or external. Surface treatment of pilot and main valve housing is phosphate coated, solenoids of type RSEH are zinc coated.

ORDERING CODE





PILOT VALVE

The pilot valve can either be two or three positional. Two positional (4/2 way) pilot valves are manufactured in the one or two solenoid configuration. Control spool of the two positional pilot valve with one solenoid is moved in one direction by a solenoid and returned back to its initial position by a spring. Control spool of two positional pilot valves with two solenoids is moved between two end positions. For special application, 2 solenoid 4/2 way pilot valve is also available with detent assembly in both end position. The spool of such a valve is held in one of the end positions until being released and moved to the opposite end position. Control spool of 3 positional (4/3 way) pilot valve is moved from its central position in both direction to the left or right end position by one of two solenoids and returned back to its central position by springs. For safety purposes the solenoids are equipped with manual override.

MAIN VALVE

Number of positions of the pilot valve determines number of positions of the main valve. Control spool of 4/2 way main valve is either positioned between initial and end position by one-solenoid pilot valve or between two end positions by two-solenoid pilot valve (with/without detent assembly in both end positions). The control spool of 4/3 way main valve is held in the central position by two springs and moved to the end positions by the pressure from pilot valve. As soon as the pilot pressure relieves, the main spool returns to the initial (central position). The pilot and the drain connections can be internal or external:

- internal drain, internal pilot: T ports of both valves are connected, control and working pressure are the same,
- internal drain, external pilot: T ports of both valves are connected, control and working pressure are independent,
- external drain, internal pilot: T port (pilot) connected to port Y (main), control and working pressure are the same,
- external drain, external pilot: T port (pilot) connected to port Y (main), control and working pressure are independent.

(*) A pre-load valve in port P must be used in 4/3 way valves with internal oil supply of the pilot valve and spool types C, L and H. Such a valve increases flow resistance and thus increases the pressure in pilot valve to the level required for main spool positioning.

DOUBLE THROTTLE/CHECK VALVE

To avoid pressure surges in the hydraulic system controlled by directional control valve of type RS(E)H, the speed of main spool movement needs to be reduced using double throttle/check valve of sandwich plate design. Such a device consists of two opposite located throttle check valves that limit flow in one direction and provide free return in reverse direction. The flow rate in both channels is adjusted by the screw with internal hexagon. Installation dimensions of double throttle/check valve corresponds with Dn06/NG06 (CETOP 3) size. The valve can be used according to the desired throttled port. Both check valves in port A and B are equally arranged in the valve body (arrangement matches the symbol on the nameplate of the valve).

DELIVERY

Directional control valves RS(E)H5-16 are delivered assembled. Spare parts and mounting screws are not included in the package. These must be ordered separately.

INSTALLATION, SERVICE, MAINTENANCE

Directional control valves RS(E)H5-16 are designed for panel installation. They are being mounted by 2 screws M6x40 DIN 912-10.9 with torque 8Nm and 4 screws M10x45 DIN 912-10.9 with torque 40Nm. Valves can be installed in any working position. The reliability of the valves is conditional upon use of prescribed working fluid, especially its parameters such as purity and temperature. It is required that the contact surfaces of the valve must be clear and intact before installation. O-rings must not be disshaped or damaged by any means. Flatness deviation and roughness of the subplate shall not exceed 0,01/100 mm and Ra = 1,6 µm respectively. Directional control valves RS(E)H9-16 do not require any special maintenance.

SPOOL TYPE

In the ordering code, the spool type is understood as the spool type of the main valve. The spool type together with its position determines the interconnection of P, A, B, T channels.



TECHNICAL DATA

Technical data	Symbol	Unit	Value
Nominal size	Dn	mm	16
Max. flow	Q _{MAX}	dm ³ /min	400
Max. operating pressure in ports P, A, B	P _{MAX}	Mpa	32
Max. operating pressure in port T internal pilot oil drain external pilot oil drain	P _{MAX,T}	MPa	10 25
Max. pressure in port X for the pilot valve internal pilot oil supply external pilot oil supply	P _{MAX,X}	MPa	32 32
Max. pressure in port Y RSEH RSH	P _{MAX,Y}	MPa	10 10
Hydraulic fluid	Hydraulic oils of power classes (HL, HLP) according to DIN 51524		
Pressure drop	Δp	MPa	see Δp = f(Q) curves
Min. required pilot pressure	P _{MIN}	MPa	0.4
Viscosity range	v	mm ² /s	10 ... 400
Maximum degree of fluid contamination	Class 21/18/15 according to ISO 4406 (1999)		
Fluid temperature range RSEH RSH	t _{PO}	°C	-20...+60 -20...+80
Ambient temperature range RSEH RSH	t _A	°C	-20...+50 -20...+70
Weight (without throttle valve interplate) RSEH5-163, RSEH5-162K RSEH5-162 RSH5 -16	m	kg	10.2 9.6 8.5
Weight of the throttle valve interplate	m	kg	1.1
Mounting position			optional
Protection degree according to EN 60 529			IP65

Note: measured at v = 35mm²/s, T = 50°C

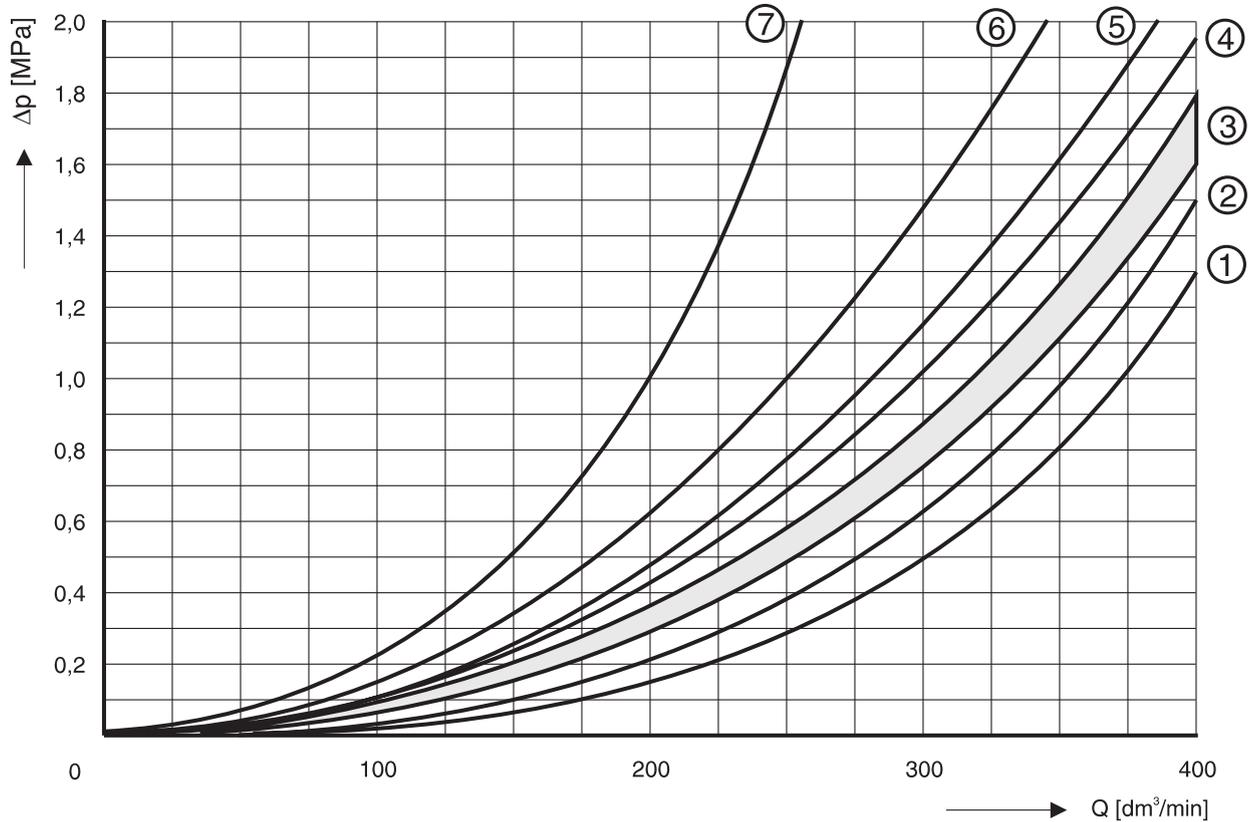
ELECTRICAL DATA

Technical data	Symbol	Unit	Value	
Nominal voltage of solenoids	U _N	V	12, 24, 48 (DC)	48, 110, 230 (AC)
Nominal voltage frequency	f _N	Hz		50, 60
Nominal power input	P _N	W	30	
Supply voltage range	ΔU	%	±10% U _N	
Maximal switching frequency	f _{SM}	1/h	10000	7200
Switching time (on)	t ₀ (T ₄)	ms	up to 80	up to 60
Switching time	t ₀ (T ₃)	ms	up to 100	up to 120

Note: Switching time according to ISO 6403

PRESSURE DROP $\Delta p = f(Q)$

Note: average values with upper deviation 20%, measured at $v = 35\text{mm}^2/\text{s}$, $T = 50^\circ\text{C}$,



Curve number	Spool type	Measured flow
1	C1	P → A, P → B
	N2, H2, L2, Y5	A → T
	B2	B → T
2	H2, Y5	B → T
3	N2, H2, Z3, P2, Y5, B2	P → A, P → B
	L2	P → A
	D1	P → B
	D1, P2	A → T, B → T
	B2, R5	A → T
	N2, Z3, L2, X5	B → T
4	R5, X5, E1, F1	P → A, P → B
	L2	P → B
	D1	P → A
	C1, X5	A → T
	R5	B → T
5	H2	P → T
	C1	B → T
6	L2, D1	P → T
7	C1	P → T

OPERATING LIMITS

Note: measured at $v = 35\text{mm}^2/\text{s}$, $T = 50^\circ\text{C}$,

Spool type	Flow Q [dm ³ /min] at the pressure p [MPa]			
	10	20	30	32
N2, Z2, P2, Y5, B2	400	400	400	400
H2 (*)	400	400	250	245
R5, X5	310	210	210	210
C1 (*)	400	230	175	170
L2, D1 (*)	370	170	140	135

(*) Spool type with P → T interconnection in central position: If internal pressure supply is used, control pressure 0.4MPa against port P must be achieved using pre-load valve.

SPOOL REACTION TIME

Measurement conditions: 2 edges throttling
 $Q = 150\text{dm}^3/\text{min}$
 Hydraulic medium: 50°C , viscosity $35\text{mm}^2/\text{s}$

Control pressure	5	10	20	30
Switching time [ms] (24 VDC 220 VAC, 50Hz)	85	67	57	50
Relief time [ms] (24VDC 220 VAC, 50Hz)	50	50	50	50

SPOOL TYPE AND CROSSOVERS

RSEH 4/2 way - initial position fixed by spring of the control valve

Type	Symbol	Crossover
RSEH 5-162 F 11		
RSEH 5-162 X 51		
RSEH 5-162 X 61		
RSEH 5-162 X 71		
RSEH 5-162 X 81		
RSEH 5-162 E 11		
RSEH 5-162 R 51		
RSEH 5-162 R 61		
RSEH 5-162 R 71		
RSEH 5-162 R 81		

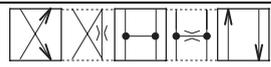
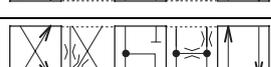
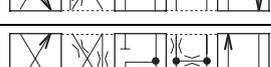
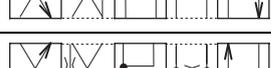
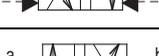
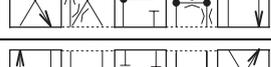
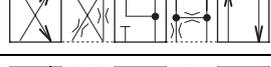
RSEH 4/2 way - initial position fixed by spring of the main valve

Type	Symbol	Crossover
RSEH 5-162 AN 22		
RSEH 5-162 AH 22		
RSEH 5-162 AZ 32		
RSEH 5-162 AL 22		
RSEH 5-162 AD 12		
RSEH 5-162 AP 22		
RSEH 5-162 AC 12		
RSEH 5-162 AY 52		
RSEH 5-162 AB 22		
RSEH 5-162 BN 22		
RSEH 5-162 BH 22		
RSEH 5-162 BZ 32		
RSEH 5-162 BL 22		
RSEH 5-162 BD 12		
RSEH 5-162 BP 22		
RSEH 5-162 BC 12		
RSEH 5-162 BY 52		
RSEH 5-162 BB 22		

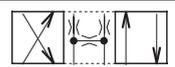
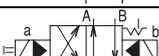
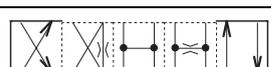
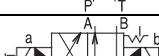
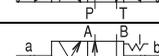
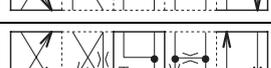
RSEH 4/2 way - initial position fixed by spring of the main valve

RSEH 5-162 K 54		
RSEH 5-162 K 64		
RSEH 5-162 K 74		
RSEH 5-162 K 84		

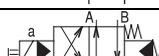
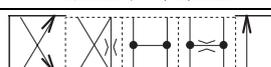
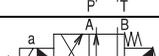
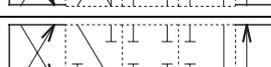
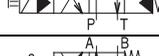
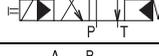
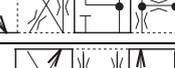
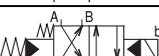
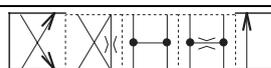
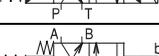
RSH 4/2 way - initial position indefinite

Type	Symbol	Crossover
RSH 5-162 N 24		
RSH 5-162 H 24		
RSH 5-162 Z 34		
RSH 5-162 L 24		
RSH 5-162 D 14		
RSH 5-162 P 24		
RSH 5-162 C 14		
RSH 5-162 Y 54		
RSH 5-162 B 24		

RSEH 4/2 way - initial position indefinite, pilot valve with detent assembly

RSEH 5-162 K55		
RSEH 5-162 K65		
RSEH 5-162 K75		
RSEH 5-162 K85		

RSEH 4/2 way - initial position fixed by spring of the main valve

RSEH 5-162 R 52		
RSEH 5-162 R 62		
RSEH 5-162 R 72		
RSEH 5-162 R 82		
RSEH 5-162 X52		
RSEH 5-162 X 62		
RSEH 5-162 X 72		
RSEH 5-162 X 82		

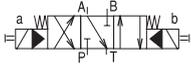
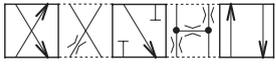
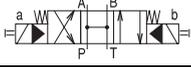
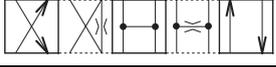
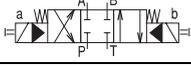
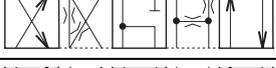
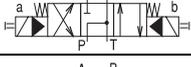
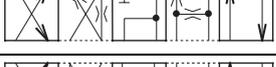
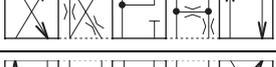
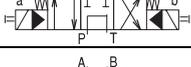
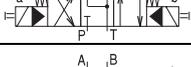
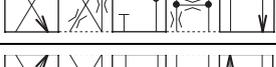
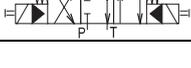
RSH 4/2 way - initial position fixed by spring - side A

Type	Symbol	Crossover
RSH 5-162 BN 22		
RSH 5-162 BH 22		
RSH 5-162 BZ 32		
RSH 5-162 BL 22		
RSH 5-162 BD 12		
RSH 5-162 BP 22		
RSH 5-162 BC 12		
RSH 5-162 BY 52		
RSH 5-162 BB 22		
RSH 5-162 X 52		
RSH 5-162 F 12		

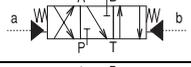
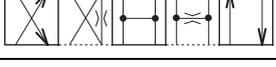
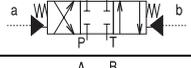
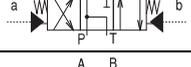
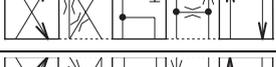
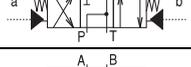
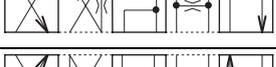
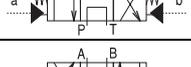
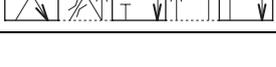
RSH 4/2 way - initial position fixed by spring - side B

RSH 5-162 AN 22		
RSH 5-162 AH 22		
RSH 5-162 AZ 32		
RSH 5-162 AL 22		
RSH 5-162 AD 12		
RSH 5-162 AP 22		
RSH 5-162 AC 12		
RSH 5-162 AY 52		
RSH 5-162 AB 22		
RSH 5-162 R 52		
RSH 5-162 E 12		

RSEH 4/3 way - initial position fixed by spring of the main valve

Type	Symbol	Crossover
RSEH 5-163 N 22		
RSEH 5-163 H 22		
RSEH 5-163 Z 32		
RSEH 5-163 L 22		
RSEH 5-163 D 12		
RSEH 5-163 P 22		
RSEH 5-163 C 12		
RSEH 5-163 Y 52		
RSEH 5-163 B 22		

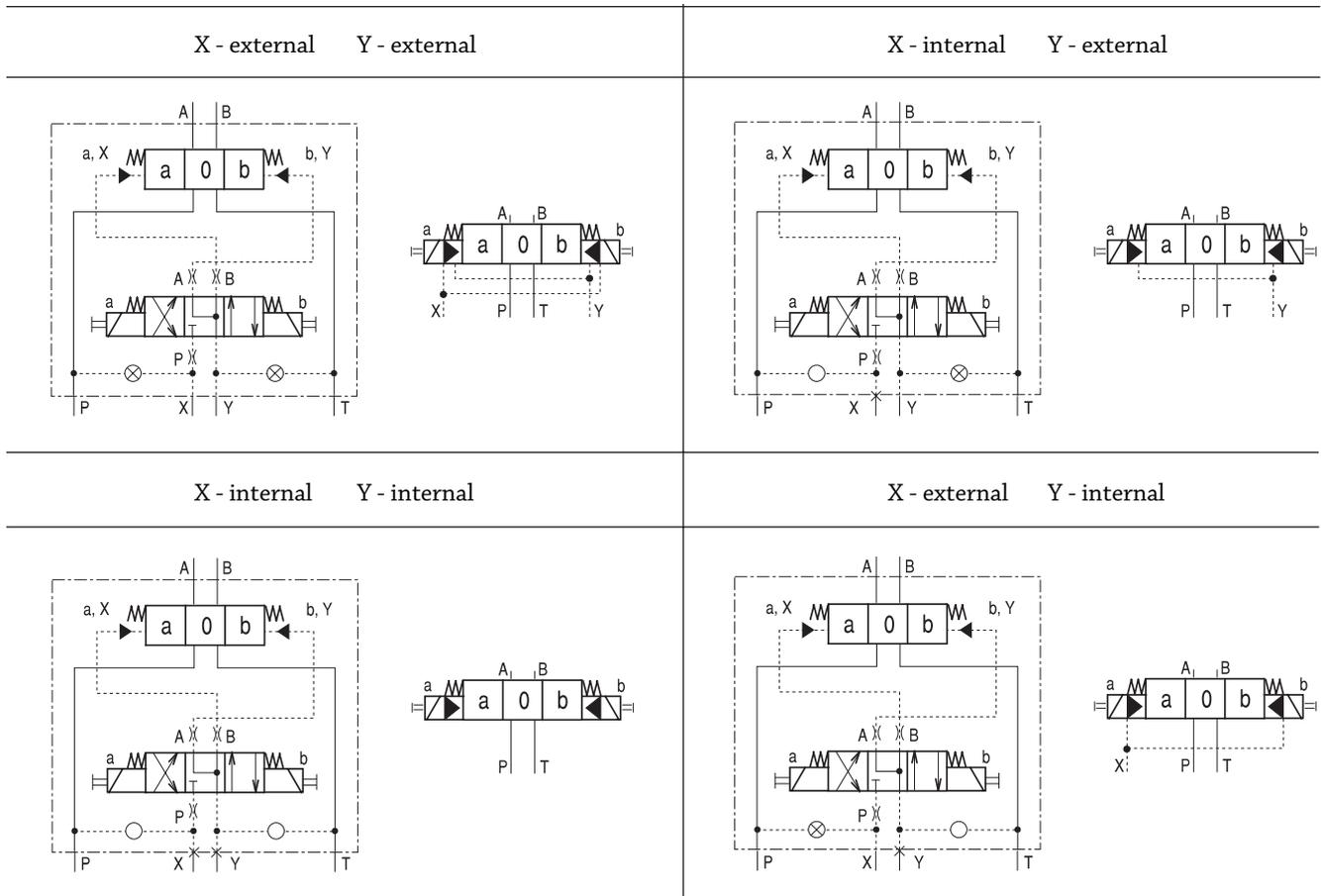
RSH 4/3 way - initial position fixed by spring

RSH 5-163 N 22		
RSH 5-163 H 22		
RSH 5-163 Z 32		
RSH 5-163 L 22		
RSH 5-163 D 12		
RSH 5-163 P 22		
RSH 5-163 C 12		
RSH 5-163 Y 52		
RSH 5-163 B 22		

INTERNAL CONNECTION OF RSEH5-162

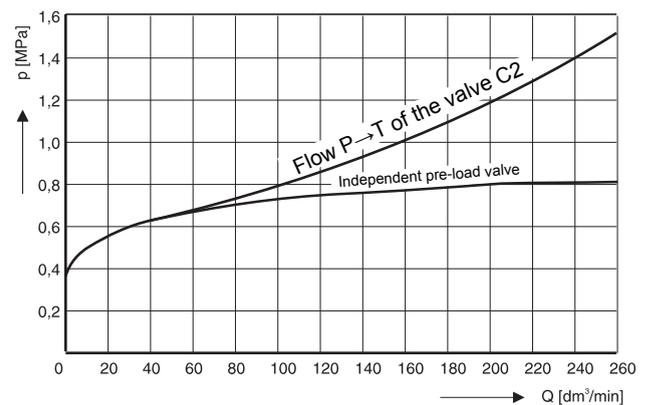
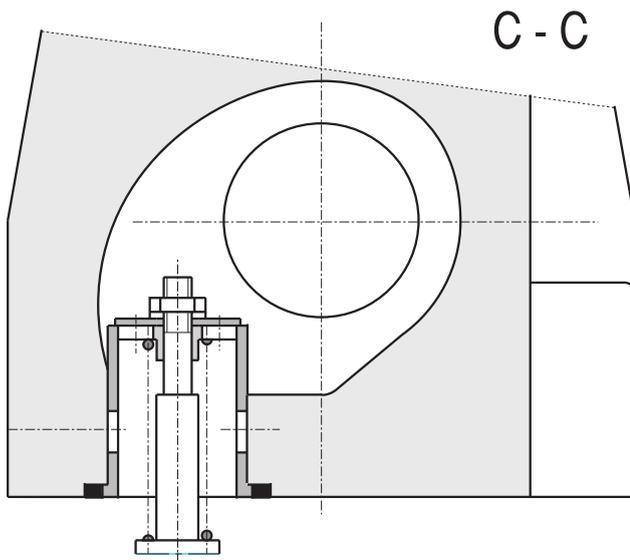
<p>Initial position fixed by spring of the main valve, X - external, Y - external</p>	<p>RSEH 5-162 A .. 2/....-XY-1 (solenoid - side A)</p>	<p>RSEH 5-162 B .. 2/....-XY-1 (solenoid - side B)</p>
<p>Initial position fixed by spring of the pilot valve, X - external, Y - external</p>	<p>RSEH 5-162 X . 1/....-XY-1</p>	<p>RSEH 5-162 R . 1/....-XY-1</p>
<p>Initial position fixed by spring of the main valve, X - external, Y - external</p>	<p>RSEH 5-162 X . 2/....-XY-1</p>	<p>RSEH 5-162 R . 2/....-XY-1</p>
<p>Initial position indefinite, pilot valve with two solenoids, X - external, Y - external</p>	<p>RSEH 5-162 K . 4/....-XY-1</p>	<p>RSEH 5-162 K . 5/....-XY-1</p>

INTERNAL CONNECTION OF RSEH5-163



PRE-LOAD VALVE

Pre-load valve in port P of the main valve



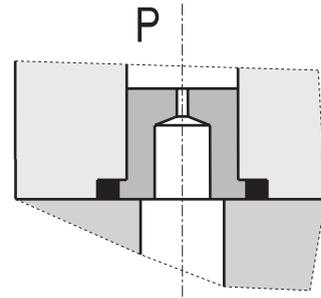
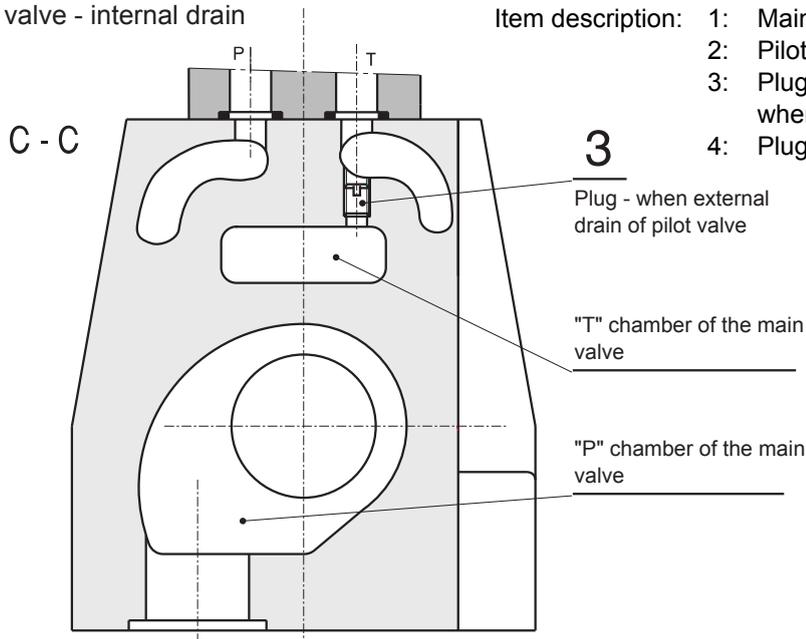
Maximal flow through pre-load valve 260dm³/min.



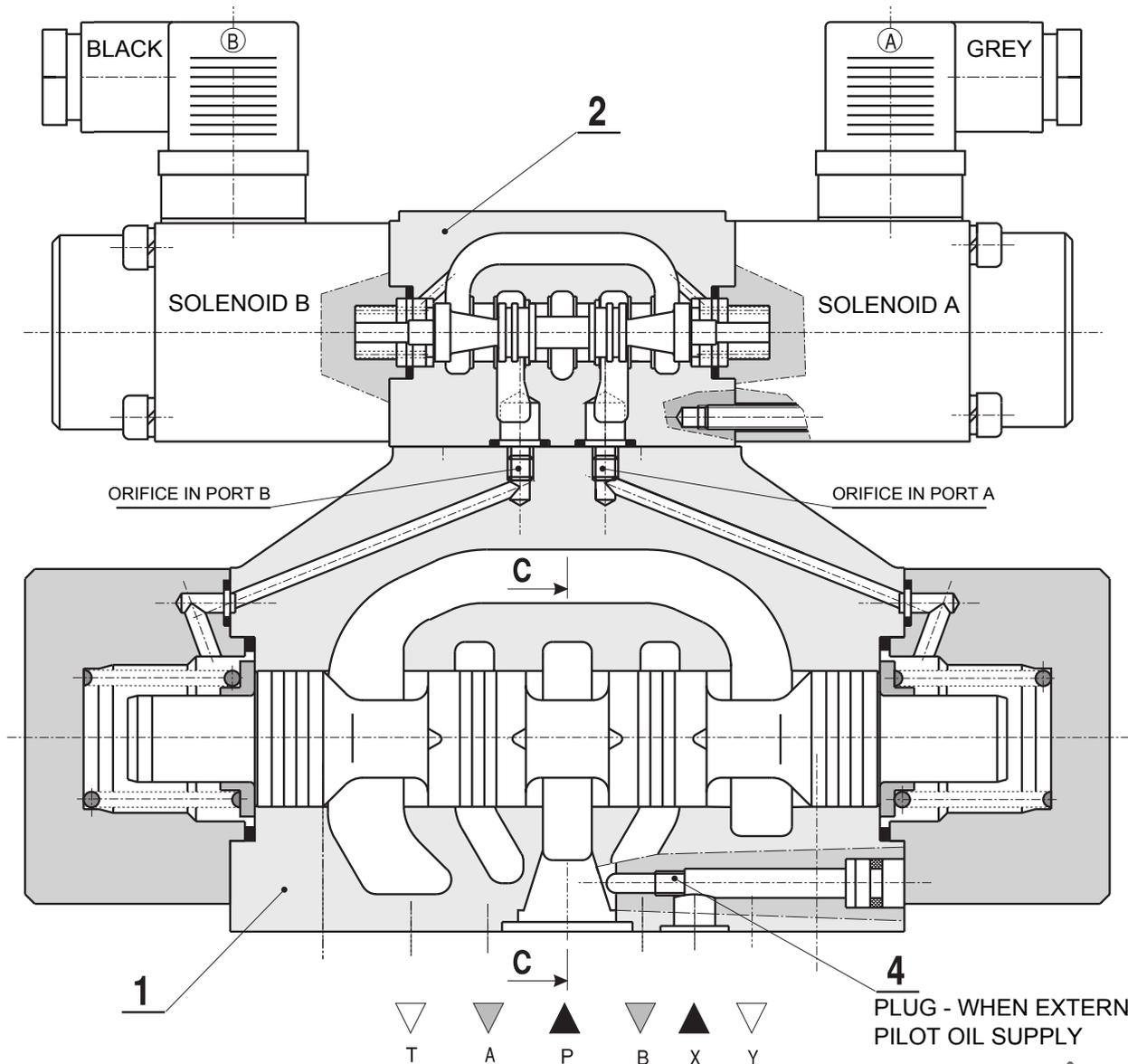
ORIFICES

Pilot valve - internal drain

- Item description:
- 1: Main valve
 - 2: Pilot valve
 - 3: Plug M5x6 - placed in port T of the main valve when external pilot oil drain
 - 4: Plug M5x6 - When external pilot oil supply



Orifice is placed in port P of the pilot valve when the pilot flow needs to be limited



ORIFICES

Operating time of the main spool can be adjusted using orifices in port P of the pilot valve (RSEH only) or in ports A and B of the main valve

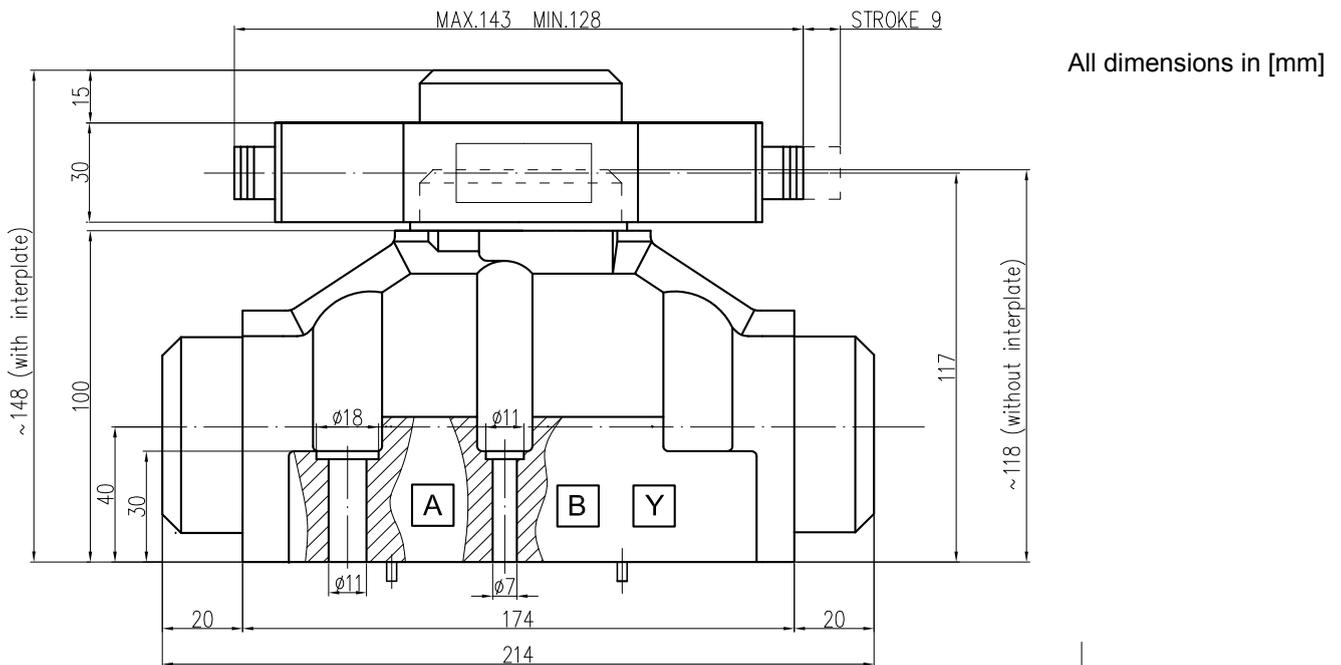
RSH

Bore	Port		
	A+B	A	B
0,5	F	H	P
0,7	G	J	T
1,0	C	K	W
1,2	D	R	I
1,4	E	N	Z

RSEH

Bore	Port		
	P	A	B
0,5	F	H	P
0,7	G	J	T
1,0	C	K	W
1,2	D	R	I
1,4	E	N	Z

DIMENSIONS RSH 5-16

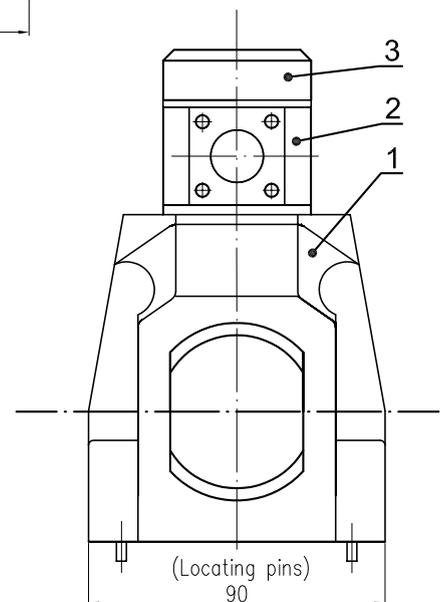


- Item numbers: 1: Main valve
2: Double throttle/check valve
3: Closing plate

O-rings

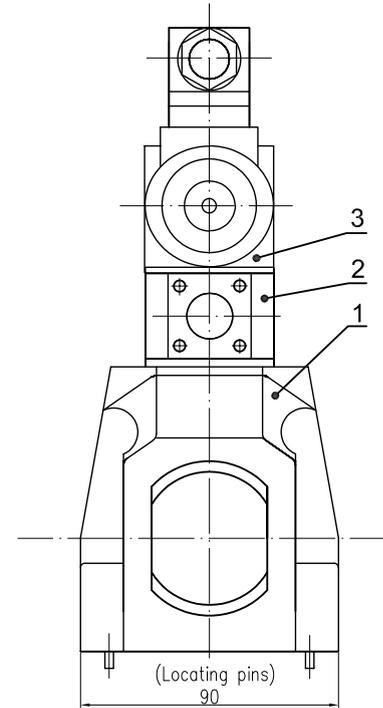
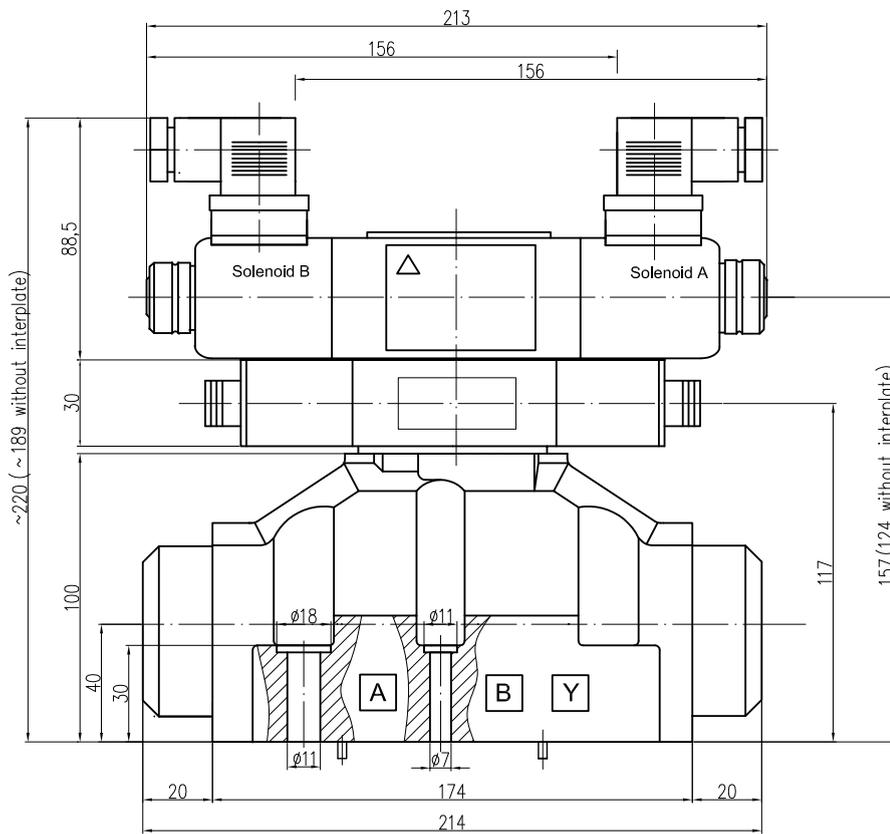
Size	pcs	type	note
9.25 × 1.78	4	O-ring	ports P, A, B, T closing plate
21.89 × 2.62	4	O-ring	ports P, A, B, T main valve
10.82 × 1.78	2	O-ring	ports X, Y
37.77 × 2.62	2	O-ring	flanges
8 × 2	1	O-ring	port P pre-load valve

O-rings material NBR 90° ShA.



DIMENSIONS RSEH5-16

All dimensions in [mm]



O-rings

Size	pcs	type	note
9.25 × 1.78	4	O-ring	ports P, A, B, T closing plate
21.89 × 2.62	4	O-ring	ports P, A, B, T main valve
10.82 × 1.78	2	O-ring	ports X, Y
37.77 × 2.62	2	O-ring	flanges
8 × 2	1	O-ring	port P pre-load valve

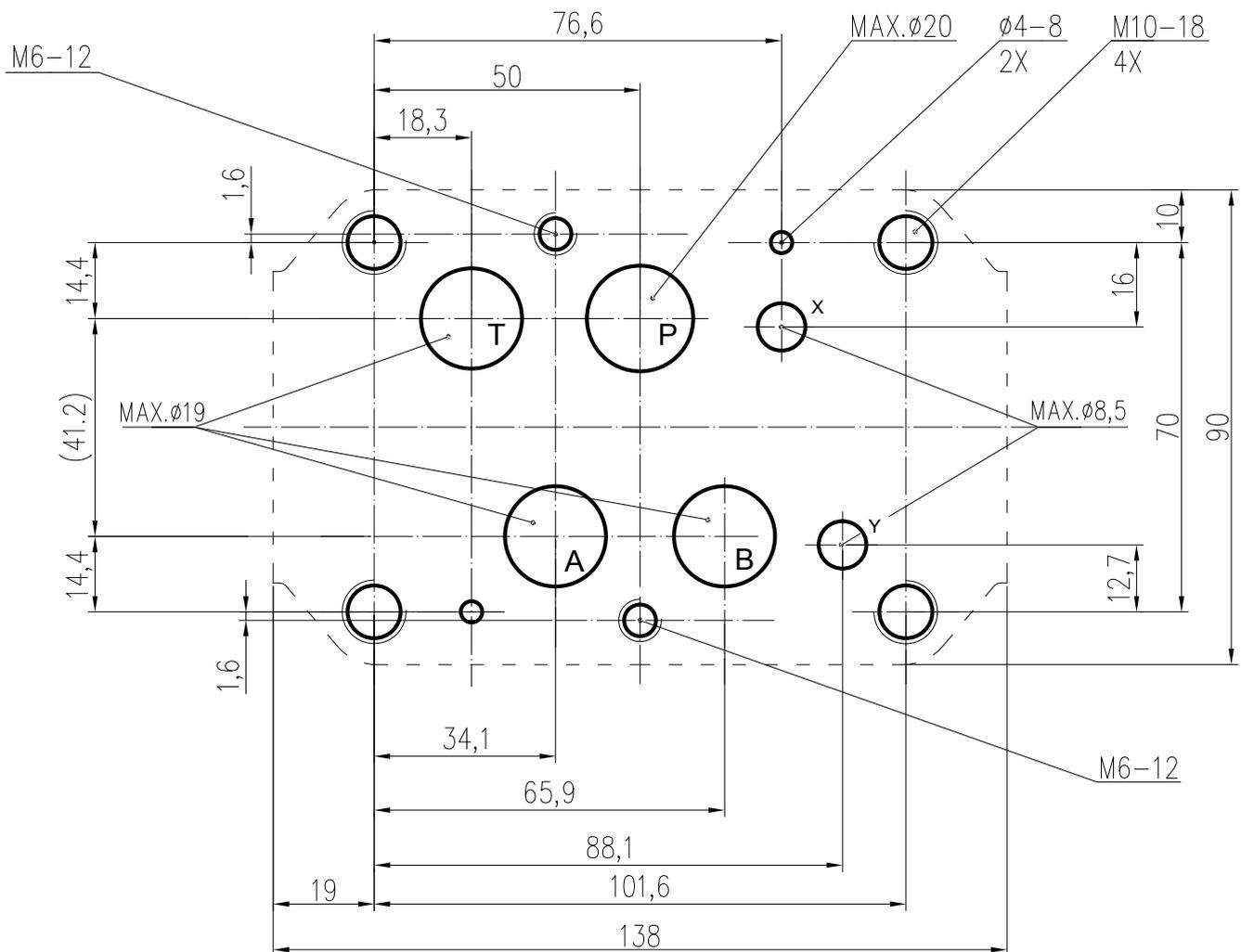
O-rings material NBR 90° Sha.

Items:

- 1: Main valve
- 2: Pilot valve
- 3: Double throttle/check valve

INSTALLATION DIMENSIONS

(panel view)



- Description of ports:
- P input of pressured oil into the main valve
 - A, B outputs from the main valve towards controlled devices
 - T oil drain from the main valve
 - X external oil supply of the pilot valve
 - Y oil drain of the pilot valve



NOTES

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