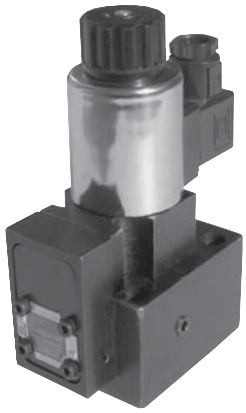
BEIJING HUADE HYDRAULIC INDUSTRIAL GROUP CO.,LTD.	3/2- and 4/2-way poppet directional valves, solenoid actuated Type M-.SEW 10			RE 22059/12.2004
	Size 10	up to 42/63MPa	up to 40L/min	

Features:

- Direct actuated directional poppet valve, solenoid actuated
- Closed port is leak-free
- Switching is ensured even after long periods of being under pressure
- Air gap DC solenoids with removable coil (AC voltages possible via rectifier)
- Solenoid coil can be rotated by 90°
- Individual electrical connection
- With protected hand override, optional
- Porting pattern to Din 24 340 form A, ISO 4401 and CETOP-RP 121H



Function,section

General:

The 2 type M-.SEW directional valve is a solenoid actuated directional poppet valve.They control the start, stop and direction of a flow.They basically consist of a housing (1),the solenoids (2), the hardened valve system (3) and the ball(s) (4) as the closing element.

Basic principle:

In the initial position the ball (4) is pressed onto the seat by the spring (9), and in the switched position by the solenoid (2). The solenoid (2) force acts via the lever (6) and the ball (7) on the actuator pin (8), which is sealed on two sides.The chamber between the two sealing elements is connected with port P. The valve system (3) is thereby pressure balanced with regard to the actuating forces (sole-noid or return spring). The valves can, therefore, be used up to a pressure of 63 MPa.

Note:

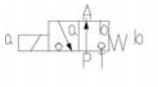
The 3/2-way poppet valves have a "negative switching overlap". Therefore, port T must always be connected.This means that during the switching process - from the start of opening one valve seat to the closing of the other seat - all of the ports P-A-T are connected with each other. This, however, takes place in such a short space of time that in most applications it is irrelevant.

The hand override (10) makes it possible to switch the valve without energizing the solenoids.

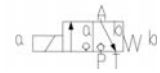
Care has to be taken to ensure that the stated maximum flows are not exceeded! If necessary a cartridge throttle for flow limitation has to be fitted (see below).

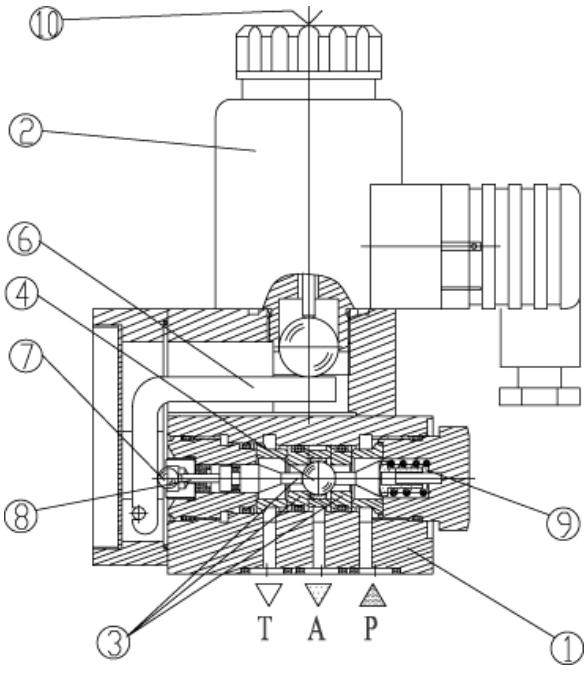
The following possibilities are obtainable via the seat orientation:

Symbol″ U″



Symbol″ C″





Type M-3SEW10U...

Illustration: 4/2-way poppet valve

In conjunction with a sandwich plate, a plus-1 plate, under the 3/2-way poppet valve this valve can be used as 4/2-way poppet valve.

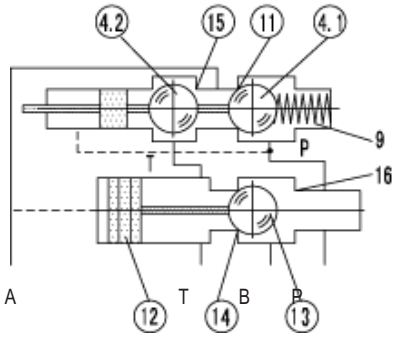
Function of the plus-1 plate:

Initial position:
The main valve is not actuated.The spring (9) holds the ball (4.1) on the seat (11). Port P is closed and A is connected to T. In addition, a control line runs from A to the large area of the control spool (12), which is thus unloaded to tank.The pressure applied via P now moves the ball (13) onto seat (14).Thus, P is connected to B and A with T.

Transition position:
When the main valve is operated, the ball (4.2) is pushed against the spring (9) and then pressed onto the seat (15).Port T is then blocked,P,A and B are connected to each other for a short time.

Switched postion:
P is connected to A. As the pump pressure acts via A on the large area of the control spool (12), the ball (13) is pushed onto seat (16). Thus, B is connected to T and P to A. Ball (13) in the plus-1 plate has a "positive switching overlap".
In order to avoid pressure intensification when single rod cylindes are used, the annulus area of the cylinder must be connected to A.

Schetatic illustration: initial position

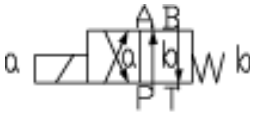


3/2-way poppet valve

Plus-1 plate

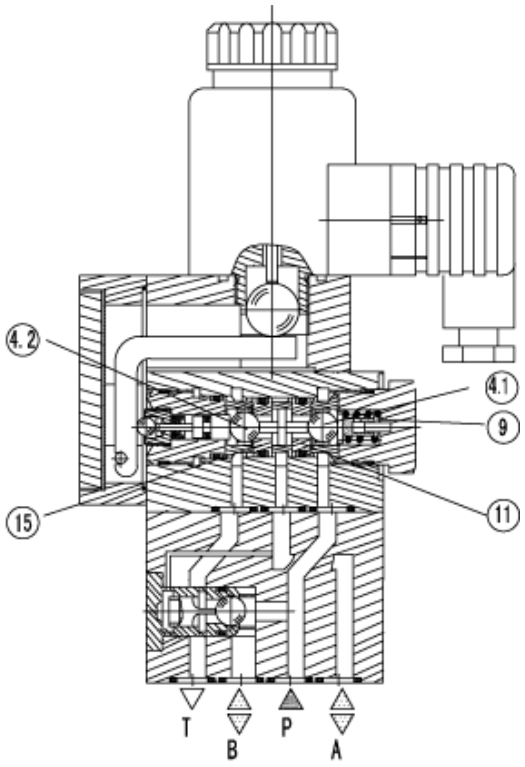
Due to the use of the plus-1 plate and the arrangement of the seats, the following combinations are possible:

Symbol″ D″



Symbol″ Y″





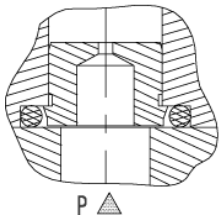
Type M-4SEW10Y...

Cartridge throttle

The use of the cartridge throttle is necessary when, due to operational conditions during the switching process, flows can occur that exceed the valve performance limits.
Example:
- Accumulator operation,
- Use as a pilot valve with internal pilot oil supply.

3/2-way poppet valve
The cartridge throttle is fitted into port P of the poppet valve.

4/2-way poppet valve
The cartridge throttle is fitted into port P of the plus-1 plate.

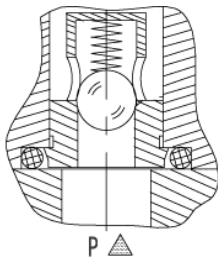


Cartridge check valve

The carteige check valve allows free flow from P to A and provides leak-free closure from A to P.
For examples.

3/2-way poppet valve
The cartridge check valve is inserted into port P of the poppet valve.

4/2-way poppet valve
The cartridge check valve is inserted intoport P of the plus-1 plate.

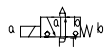
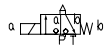
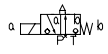
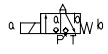


Ordering details

M -		SEW	10		10	B /		M			K4 /			*

3 service ports = 3
4 service ports = 4

Nominal size 10 = 10

Service ports	3	4	
	▪	–	=U
	▪	–	=C
	–	▪	=D
	–	▪	=Y

▪ = available

Series 10 to 19 = 10
(10 to 19: unchanged installation and connection dimensions)

Technology of Beijing Huade Hydraulic =B

Operating pressure up to 42 MPa = 420
(fixing screws M6)
Operating pressure up to 63 MPa = 630
(fixing screws M8)

M = Solenoid (air gap) with removable coil

G24 = 24VDC
G205 [2] = 205VDC

N9 = With protected manual override
No Code = Without manual override

Electrical connection
K4[1,2] = Individual connection; with component

No code = Without cartridge check valve,without throttle insert
P = With cartridge check valve
B12 = Throttle Φ1.2 mm
B15 = Throttle Φ1.5 mm
B18 = Throttle Φ1.8 mm
B20 = Throttle Φ2.0 mm
B22 = Throttle Φ2.2 mm

No code = mineral oils
V = phospate ester

Further details
in clear text

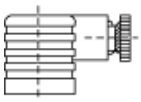
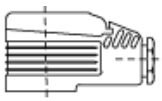
AC supply (permissible voltage tolerance ± P10%)	Nominal voltage of the DC solenoid when used with anAC voltage	Order detail
110V-50/60HZ 120V-60HZ	96V 110V	G96
230V-50/60HZ	205V	G205

Note: Other types of actuators e.g.pneumatic,hydraulic, rotary knob,rotary knob with lock,plunger,lever,roller lever on request!

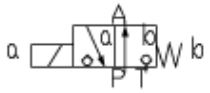
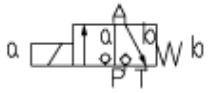
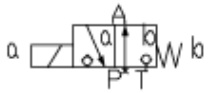
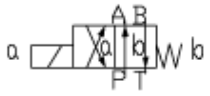
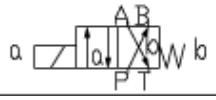
1) Plug-in connectors have to be ordered separately (see below).

2) For the connection to an AC supply a DC solenoid must be used which is controlled via a rectifier (see table on the left).
For individual connections a large plug-in connector with integrated rectifier can be used (separate order, see below).

Ordering details: plug-in connector

		Plug-in connections DIN 43 650 ISO 4400 				
			Without indicator light	With indicator light	Without indicator light	With indicator light and Z-diode protective circuit
a grey	Material no.	074 683	008 616	313 923/24V 313 926/180-240V	313 932	310 994

Performance limits (measured at v = 41 mm²/s and t= 50℃)

	Symbol	Comments	Operating pressure in MPa				Flow in L/min
			P	A	B	T	
3- way circuit	"U" 	Pressure at P ⩾ A ⩾ T	42/63	42/63		10	40
	"C" 		42/63	42/63		10	40
2- way circuit (only for unloading function)	"U" 	Before switching from the initial position to the switched position,pressure must be present in port A. Pressure at A ⩾ T		42/63		10	40
	"C" 	Pressure at A ⩾ T		42/63		10	40
4- way circuit	"D" 	Single ball valve (symbol "U")in conjunction with a plus-1 plate P > A \ ⩾ B > T	42/63	42/63	42/63	10	40
	"Y" 	Two ball valve (symbol "C") in conjunction with a plus-1 plate P ⩾ A ⩾ B > T	42/63	42/63	42/63	10	40

General guidelines

In order to operate the valve safely and to hold it safely in the switched position, the pressure in P must be ⩾A ⩾ T (for design reasons).

The ports P, A and T (3/2-way poppet valve) as well as P, A, B and T (4/2-way poppet valve) are positively assigned to their individual functions. They must not be interchanged or plugged.Flow is only permitted in the direction of the arrow.

When using the plus-1 plate (4/2-way function) the following lower operating values must be taken into account:p min = 0.8 MPa; q_V > 3 L/min.

The specified maximum flow must not be exceeded.

The performance limit was determined with the solenoids at operating temperature, 10% under voltage and with the tank not pressurized.

Technical data (for applications outside these parameters, please consult us!)

Installation			optional
Max. ambient temperature		(℃)	-30～+50
Weight	3/2-way poppet valve	(kg)	2.0
	4/2-way poppet valve	(kg)	3.5
Hydraulic data			
Max. operating pressure		(MPa)	see table above
Max. flow		(L/min)	40
Pressure fluid			Mineral oils(for NBR seal) or phospate ester(for FPM seal)
Pressure fluid temperature range		(℃)	- 30 to + 80
Viscosity range		(mm²/s)	2.8 to 500
Degree of contamination		(μm)	Maximum permissible degree of contamination of the pressure fluid is to NAS 1638 class 9. We, therefore, recommend a filter with a minimum retention rate of $\beta_{10} \geqslant 75$.

Technical data

Electrical data			
Type of voltage		DC	AC
Available voltages[1)]	(V)	12、24、42、96、110、205、220	only possible via rectifier 205, 220 (see ordering details)
Voltage tolerance (nominal voltage)	(%)	± 10	
Power consumption	(W)	30	
Duty		100%	
Switching time to ISO 6403		see table below	
Switching frequency cycle	(s/h)	15000	
Protection to DIN 40 050		IP65	
Max. coil temperature	(℃)	t0150	

1) Special voltages on request

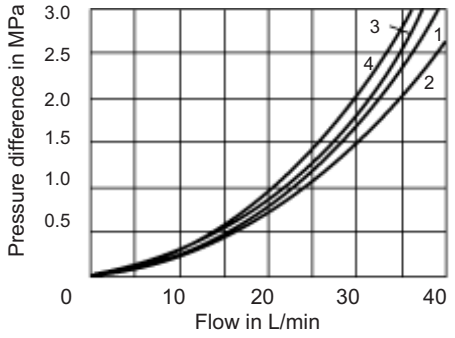
When connecting the electrics, the protective conductor (PE⏚) must be connected according to the relevant regulations.

Switching time in ms (installation: solenoid vertical)

Pressure in	Flow q_V	DC solenoid						DC solenoid + rectifier							
		t_{ON} Without tank pressure				t_{OFF}		t_{OFF} Without tank pressure				t_{OFF}			
MPa	L/min	U	C	D	Y	U、C	D、Y	U	C	D	Y	U	C	D	Y
14	40	20	40	20	40	12	17	20	40	20	40	60	45	40	50
28	40	25	45	20	45	12	17	20	45	25	45	60	45	45	55
32	40	25	45	20	45	12	17	25	45	25	45	60	45	45	55
42	40	30	45	20	50	12	17	25	45	25	50	60	45	45	55
50	40	30	45	20	50	12	17	30	50	30	50	65	50	60	60
60	40	30	50	20	50	12	17	30	50	30	50	65	50	60	60

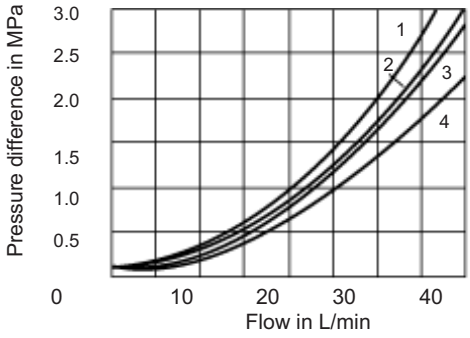
Characteristic curves (measured at v = 41 mm²/s and t = 50℃)

Δp- q_V -characteristic curves - 3/2-way poppet valve



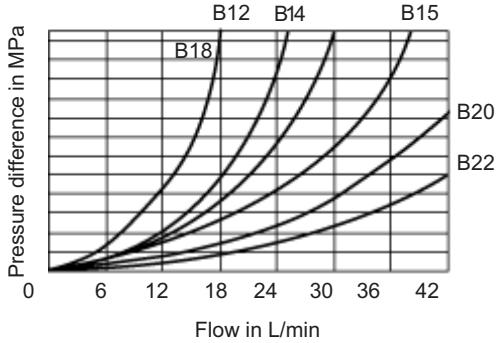
1 M-3SEW 10 C... P to A
2 M-3SEW 10 C... A to T
3 M-3SEW 10 U... P to A
4 M-3SEW 10 U...A to T

Δ p-q_V -characteristic curves - 4/2-way poppet valve

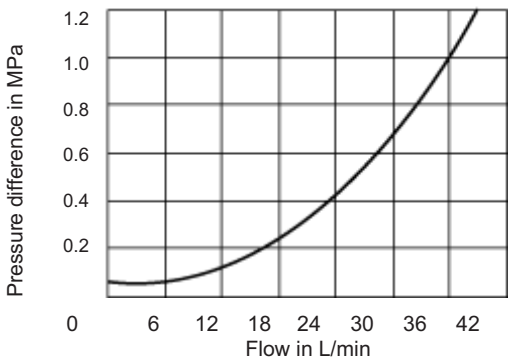


1 M-4SEW 10^{D}_{Y}...,A to T
2 M-4SEW 10^{D}_{Y}..., P to A
3 M-4SEW 10^{D}_{Y}..., P to B
4 M-4SEW 10^{D}_{Y}..., B to T

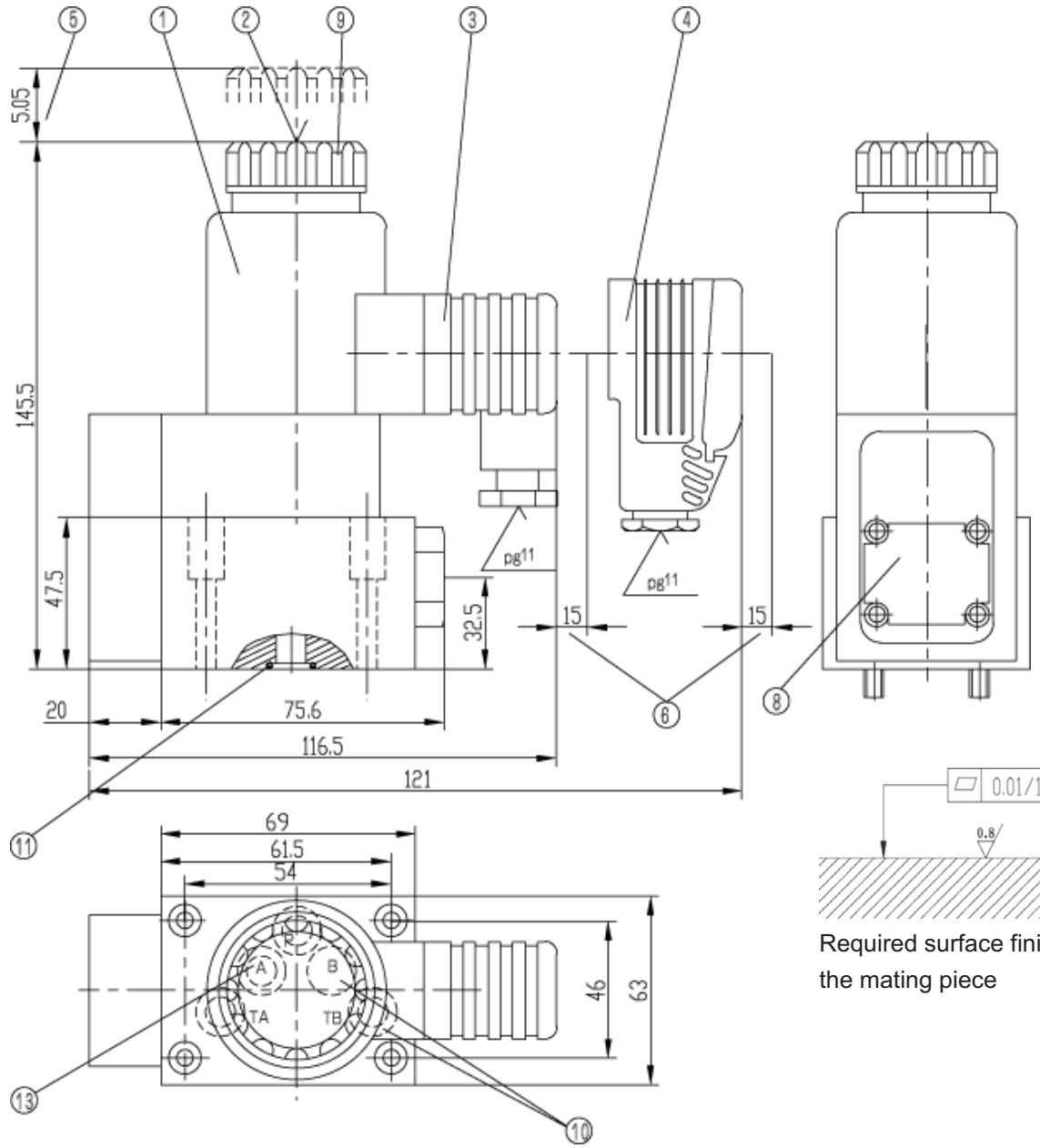
Δp- q_V -characteristic curve - cartridge check valve



Δp- q_V -characteristic curve - throttle insert



Unit dimensions: 3/2-way poppet valve(42 MPa version) **(Dimensions in mm)**

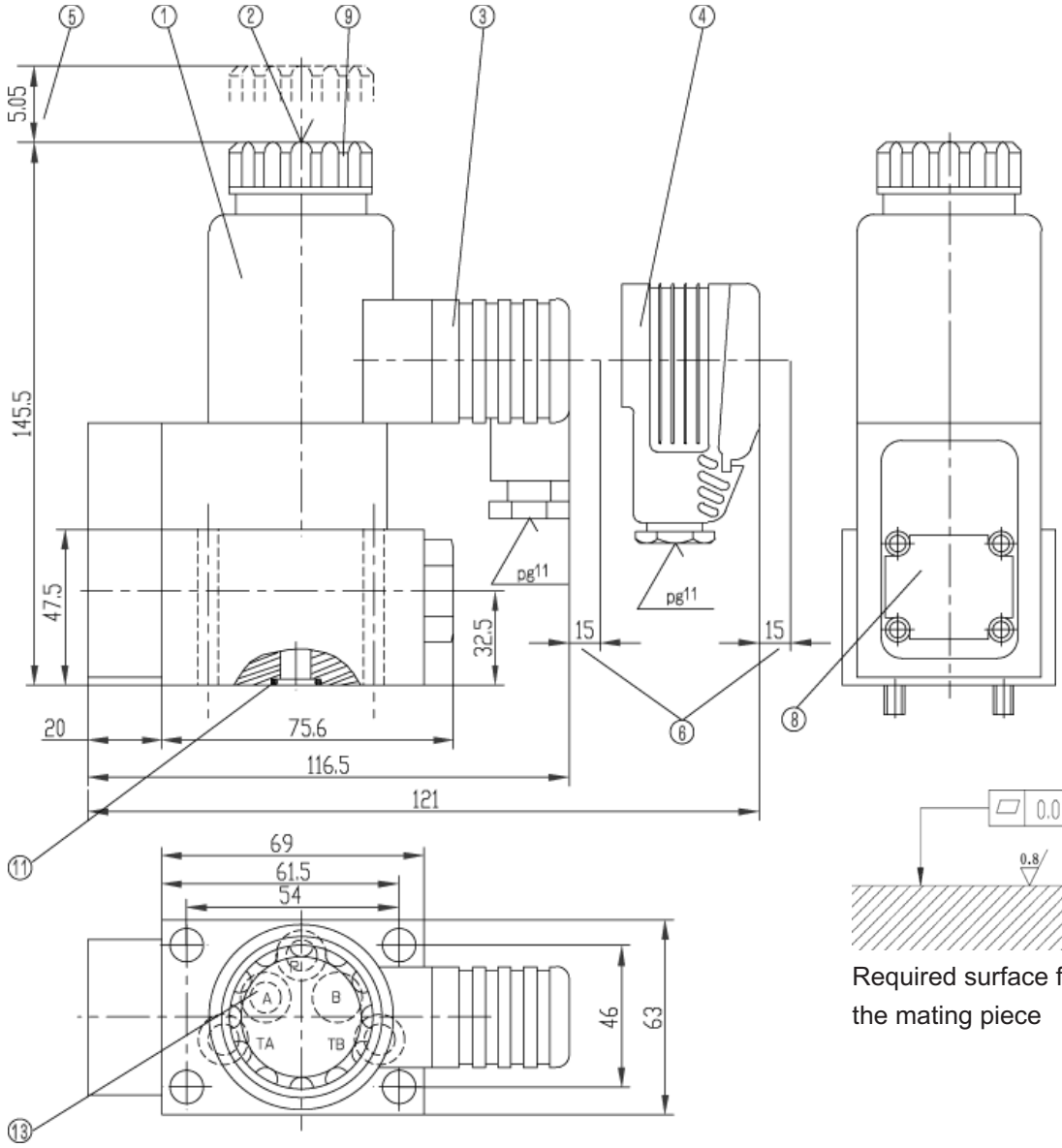


Required surface finish of the mating piece

1 Solenoid "a" (plug-in connector colour grey)
2 Protected hand override "N9"
3 Plug-in connector to DIN 43 650 [1] (may be rotated by 90°)
4 Large plug-in connector to DIN 43650 [1] (may be rotated by 90°)
5 Space required to remove the coil
6 Space required to remove the plug-in connector
8 Nameplate
9 Fixing nut, tightening torque M_A = 4 Nm
10 Attention!
On 3/2-way poppet valves ports B and TB for the 42MPa version are blind counter bores and are not present in the 63 MPa version.
11 O-rings 12 x 2
for ports A, B, TA and TB
O-ring 14 x 1.78
for port P
12 Valve fixing screws
4 - M6 x 40 DIN 912-10.9 (GB/T70.1-2000), M_A = 15.5 Nm
13 Porting pattern to DIN 24 340 form A, must be ordered separately. ISO 4401 and CETOP-RP 121 H

Subplates:(see page 206)
G66/01(G1/4″)
G67/01(G3/8″)
must be ordered separately.

1) must be ordered separately, see page 151.



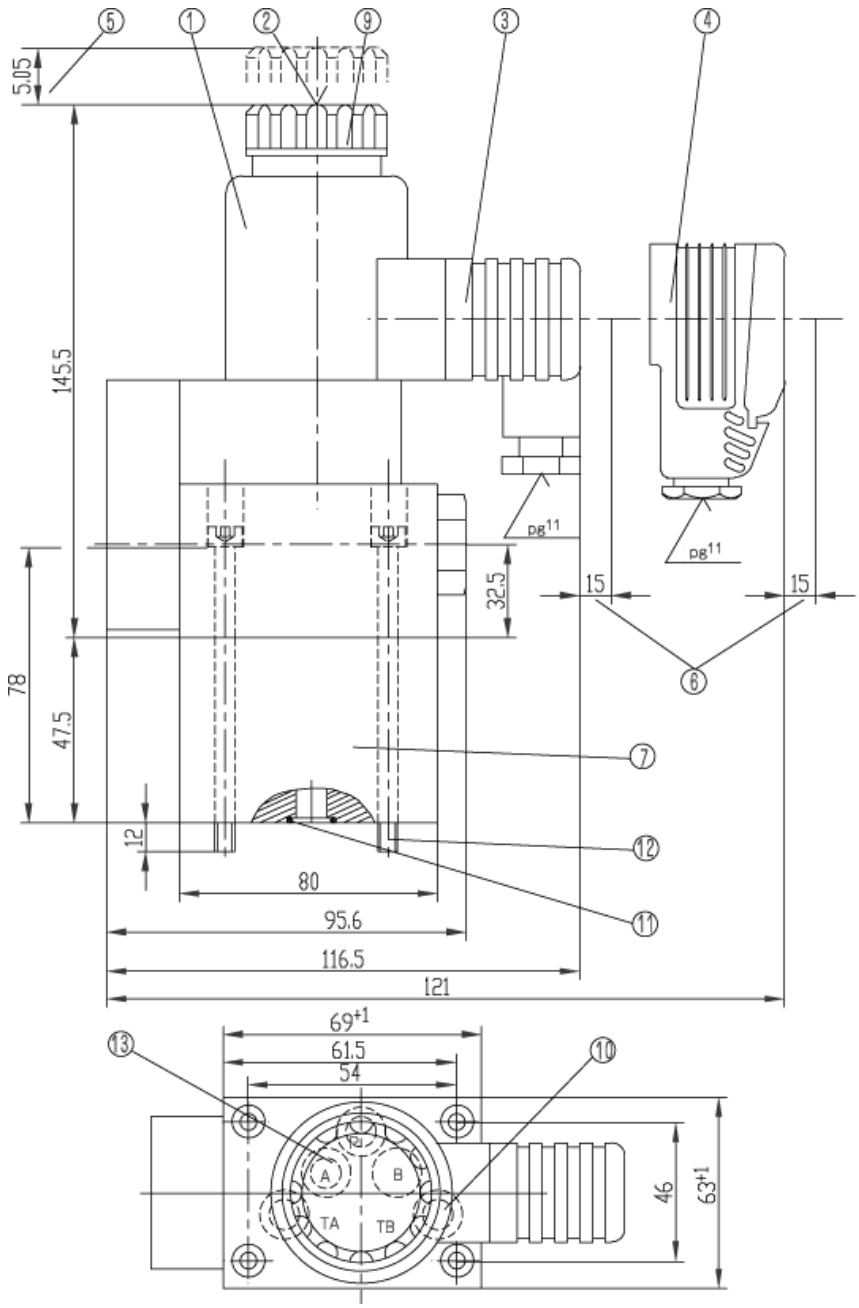
Required surface finish of the mating piece

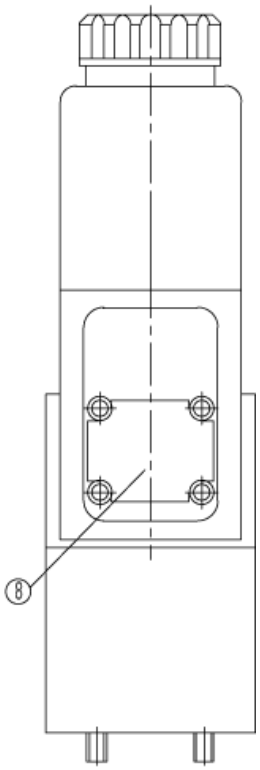
1 Solenoid "a" (plug-in connector colour grey)
2 Protected hand override "N9"
3 Plug-in connector to DIN 43 650 [1] (may be rotated by 90°)
4 Large plug-in connector to DIN 43650 [1] (may be rotated by 90°)
5 Space required to remove the coil
6 Space required to remove the plug-in connector
8 Nameplate
9 Fixing nut,
tightening torque M_A = 4 Nm
11 O-rings 12 x 2
for ports A and TA
O-ring 14x 1.78
for port P
12 Valve fixing screws
4 - M8 × 60-10.9
(GB/T70.1-2000);
M_A = 37 Nm
are included within the scope of supply.
13 Porting pattern to DIN 24 340 form A,ISO 4401 and CETOP-RP 121 H

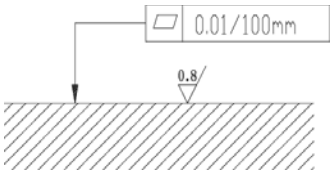
Subplates
G377/01(G3/8″)
G378/01(G1/2″)
must be ordered separately.

1) must be ordered separately, see page 151.

Unit dimensions: 4/2-way poppet valve (42 MPa version) **(Dimensions in mm)**







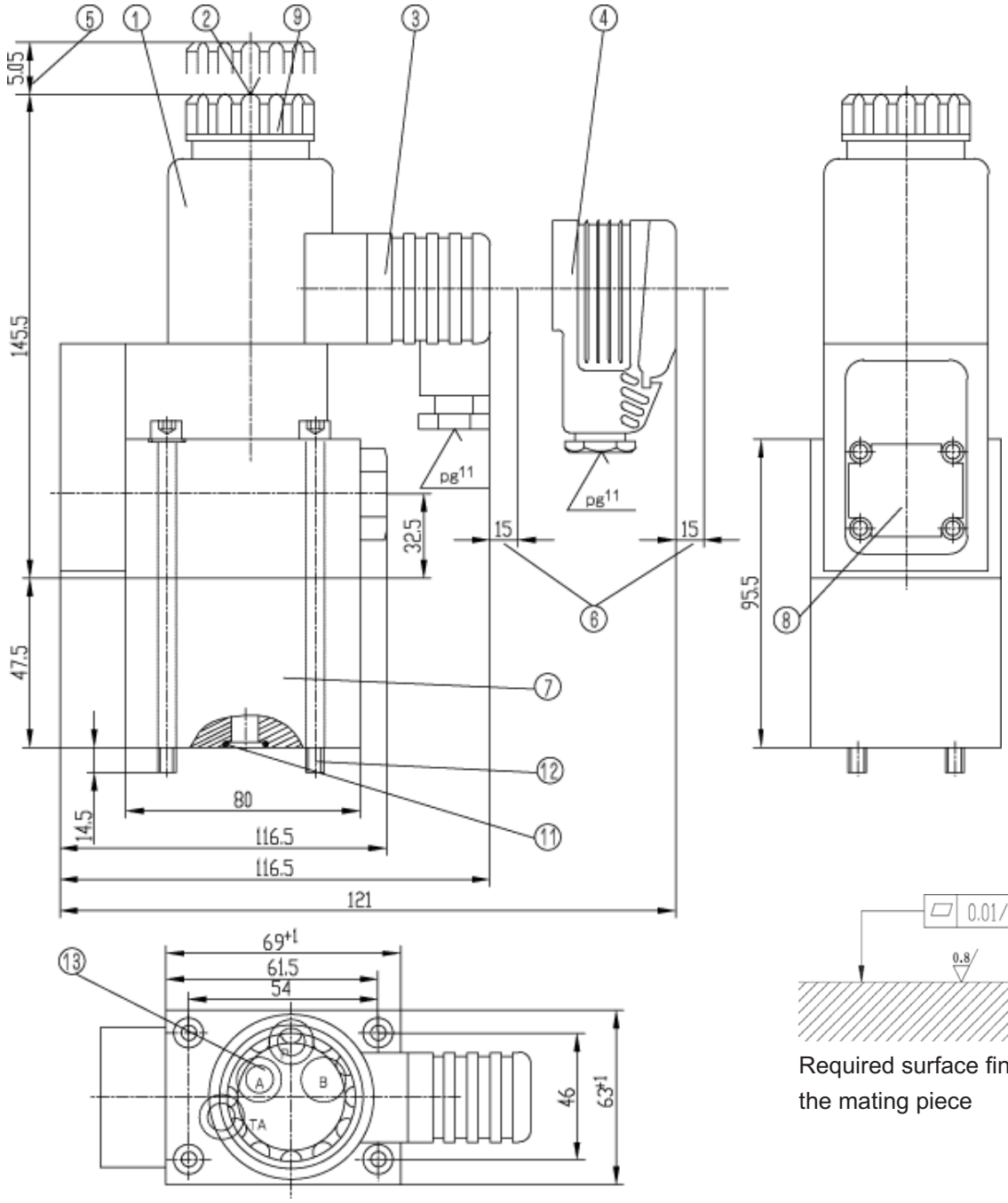
Required surface finish of the mating piece

1 Solenoid "a" (plug-in connector colour grey)
2 Protected hand override "N9"
3 Plug-in connector to DIN 43 650 [1] (may be rotated by 90°)
4 Large plug-in connector to DIN 43650 [1] (may be rotated by 90°)
5 Space required to remove the coil
6 Space required to remove the plug-in connector
7 Plus-1-Platte
8 Nameplate
9 Fixing nut,tightening torque M_A = 4 Nm
10 Attention!
On the 4/2-way poppet valves port TB is a blind counterbore.
11 O-rings 12 x 2
for ports A, B, TA and TB
O-ring 14 x 1.78
for port P
12 Valve fixing screws
4 - M6 x 90 -10.9 (GB/T70.1-2000), M_A = 15.5 Nm are included within the scope of supply.
13 Porting pattern to DIN 24 340 form A,ISO 4401 and CETOP-RP 121 H

Subplates
G377/01(G3/8″)
G378/01(G1/2″)
must be ordered separately.

1) must be ordered separately, see page 151.

Unit dimensions: 4/2-way poppet valve (63 MPa version) **(Dimensions in mm)**



Required surface finish of the mating piece

1 Solenoid "a" (plug-in connector colour grey)
2 Protected hand override "N9"
3 Plug-in connector to DIN 43 650 [1] (may be rotated by 90°)
4 Large plug-in connector to DIN 43650 [1] (may be rotated by 90°)
5 Space required to remove the coil
6 Space required to remove the plug-in connector
7 Plus-1 plate
8 Nameplate
9 Fixing nut, tightening torque M_A = 4 Nm
11 O-rings 12 x 2 for ports A,B and TA
O-ring 14 x 1.78 for port P
12 Valve fixing screws 4 - M8 x 110-10.9 (GB/T70.1-2000), M_A = 37 Nm are included within the scope of supply.
13 Porting pattern to DIN 24 340 form A, ISO 4401 and CETOP-RP 121 H

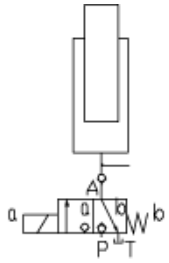
Subplates
G 377/01 (G3/8″)
G 378/01 (G1/2″)
must be ordered separately.

1) must be ordered separately, see page 2.

Application examples

These examples serve only to explain the possibilities offered by the poppet valve.They do not include the complete function.

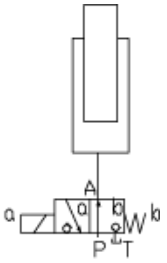
Symbol "C"



2/2-way circuit with a two poppet valve and check valve at port A

The check valve must be installed in the pipe work.
Initial position: Flow blocked, maximum pressure permissible. Pressure is held in the actuator, even when the pump is switched off, due to the check valve at port A.
Switched position: Free-flow, maximum pressure permissible. Leakage drained via port T. The only leakage occurring is that which flows to T during the switching process.

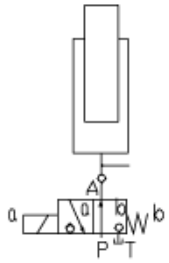
Symbol "C"



3/2-way circuit with a single poppet valve

Initial position: Lifting
Holding only due to limitation of travel and pressure in port P.
Switched position: Lowering

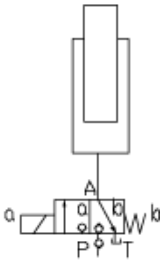
Symbol "U"



2/2-way circuit with a single poppet valve and check valve at port A

The check valve must be fitted in the pipe work.
Initial position: Free-flow, maximum pressure permissible. Pressue is held in the actuator, even when the pump is switched off, due to the check valve at port A.
Switched position: Flow blocked, maximum pressure permissible. Leakage drained via port T. The only leakage occurring is that which flows to T during the switching process.

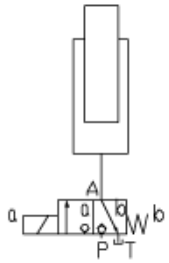
Symbol "C"



3/2-way circuit with a two poppet valve and cartridge check valve in port P

The check valve is fitted in the P port of the 3/2-way poppet valve.
Initial position: Lowering
Switched postion: Lifting
The load can be held in any position while the pump is switched off and the solenoid energized.

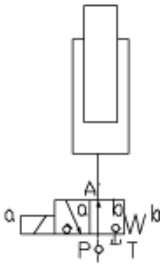
Symbol "C"



3/2-way circuit with a two poppet valve

Initial position: Lowering
Switched position: Lifting
Holding only due to limitation of travel and pressure in port P.

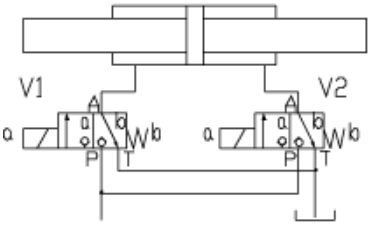
Symbol "U"



3/2-way circuit with a singlepoppet valve and cartridge check valve in port P

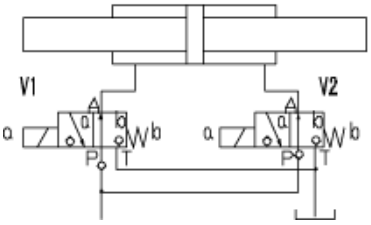
The check valve is fitted into the P port of the 3/2-way poppet valve.
Initial position: Lifting
The load can be held in any position while the pump is switched off.
Switched position: Lowering

Symbol "C"



4/3- (4/4-) way circuit with a 2 two poppet valves
V1 and V2 in the initial position: Both cylinder sides are connected to the tank port.
V2 in the switched position: The piston moves to the left
V1 in the switched position: The piston moves to the right
V1 and V2 in the switched position: Both cylinders sides are connected to the pump port.
Rapid traverse is possible when a single rod cylinder with an area ratio of 2 : 1, is used.
Attention!
When using single rod cylinders, the performance limit (double flow) and the maximum permissible operating pressure (pressure intensification) of the valve must be taken into account.

Symbol "U"



4/3- (4/4-) way circuit with a 2 two poppet valves and cartridge check valve in port P of the 3/2-way poppet valves
V1 and V2 in the initial position: The piston is locked externally to prevent movement.
V2 in the switched position: The piston moves to the right
V1 in the switched position: The piston moves to the left
V1 and V2 in the switched position: Both cylinder sides are connected to the tank port.
Attention!
When using single rod cylinders, the performance limit (double flow) and the maximum permissible operating pressure (pressure intensification) of the valve must be taken into account!

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