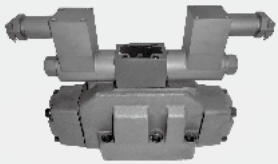
2.23

Explosion-proof electro-hydraulic directional valve

Type GWEH10,16,25../6B2

Sizes 10 ~ 25
Up to 280/350 bar
Up to 1100L/min



Contents

Features

- Valves used to control the start, stop and direction of a fluid flow
- Electro-hydraulic operation (WEH)
- 4/2- or 4/3-way version
- Porting pattern to DIN 24 340 form A, ISO 4401 and CETOP-RP 121 H
- Pressure-tight chamber needs not to be opened for a coil change

Function and configuration

The GWEH../6B2..type explosion-proof electro-hydraulic directional valve is a directional valve taking the electro-hydraulic solenoid valve as the pilot control; it applies the plate-type connection, and the connection dimension is in accordance with the DIN 2430 and ISO 4401 standards. There are many different performances and additional devices for choice.

Valves of type GWEH../6B2.. are directional spool valves with electrohydraulic operation, using the directional explosion-resistant valve as pilot control. They control the start, stop and direction of a fluid flow.

The directional valves basically consist of the main explosion-resistantvalve with housing (1), main control spool (2), one or two return springs, and the pilot explosion-resistant valve (4) with one or two solenoids.

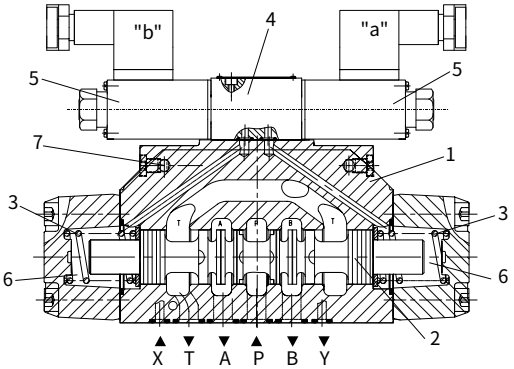
The main control spool (2) is held in the neutral or in the initial position either by the springs or by means of pressure. Pilot explosion-resistant valve has wet DC or AC solenoids (5), optional. The main control spool is shifted by pilot explosion-resistant valve (4).

There are four patterns on supply and drain of control oil, see the function diagram.
Following are descriptions of various types of valves:

1. Main valves are spring centered-type 3-position four-way directional valves

The main control spool (2) is held in the neutral position by two return springs (3), and the two spring chambers (6) are connected to the tank via the pilot explosion-resistant valve (4). The pilot oil is supplied via the pilot line (7). When the pilot explosion-resistant valve (4) switches direction(one solenoid of the pilot explosion-resistant valve energizes), the pilot fluid acts on the one end of the main spool (2) and pushes it (2) to move and the required port is connected, thus the flow direction of the fluid is changed.

When the solenoid is de-energized, the pilot spool returns to its initial position (exception: impulse valve). The spring chambers (6) are connected to tank by pilot explosion-resistant valve (4). Under the force of spring, the spool returns to its neutral position. The oil in the spring chamber (6) flows to return line from external port Y or internal line T via the pilot valve (4).

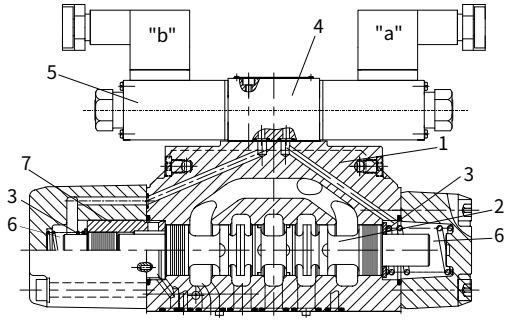


Structural drawing of GWEH..25/6B2..type spring aligned explosive-proof electro-hydraulic directional valve

1- Main valve body
2- Main valve spool
3- Reset spring
4- Pilot Explosion protection solenoid valve
5- Explosion protection solenoid
6- Spring chamber
7- Control oil passage

Function and configuration

2. Main valves are hydraulic centerend-type 3-position four-way directional valves
The main control spool (2) is held in the neutral position by pressure oil acting on the two end faces, and is located in the neutral position by a locating sleeve(7).
By removing the pressure from one of the spool(2) ends, the main control spool (2) is moved to the shifted position. The fluid in unload chamber flows into Y channel via the pilot valve(4) , and the internal drain fluid direct return to tank via port L.



Structure configuration of explosionproof directional valves type GWEH16H../6B2.. with hydraulic centred

1- Main valve body
2- Main valve spool
3- Spring
4- Pilot Explosion protection solenoid valve
5- Explosion protection solenoid
6- Spring chamber
7- Positioning sleeve

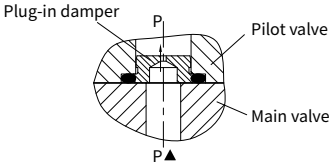
2-position four-way directional valves

(this kind of calve has four different structures and Types)

1. Type G4WEH.../6B2...
This kind of pilot valve and main valve have a reset spring each, resetting by spring force.
2. Type G4WEH...H.../6B2...
This kind of valve has a reset spring, making pilot valve spool stay in initial position. Main valve spools change directions under effect of pressure oil.
3. Type G4WEH...H.../O6B2...
This kind of valve has two solenoids. There are no reset springs in pilot valves and main valves, thus using solenoids and pressure oil to make pilot valves and main valve spools change directions. Therefore, at least one solenoid shall be under working sate.
4. Type G4WEH...H.../OF6B2...
This kind of valve has two solenoids and locators which makes pilot valve spools stay in working position(impulse valves). Main valve spools have no locating devices , moving downward to corresponding working positions under effect of pressure oil.
Structure 2, 3 and 4 preceding are hydraulic reset. Main valve spools can stay in the working position only under the effect of pressure oil.

Throttle insert

The use of a throttle insert is required if the pilot oil supply in the P channel of the pilot valve is to be limited. This throttle is inserted in the P channel of the pilot valve.

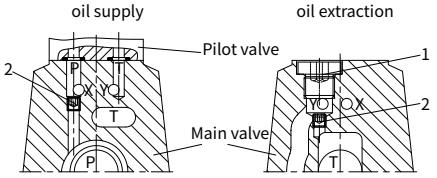


Structure chart of plug-in dampers

Function and configuration

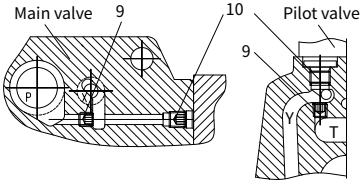
Pilot oil supply:

1. Type GWEH10.../6B2..
(1) Conversion between internal supply and external supply:
P hole on the top of main valve bodies with M6 bolt(2) is external supply and with M6 bolt (2)dismantled is internal supply.
(2) Conversion between internal drain and external drain:
Dismounting plug screws and installing M6 bolt(2) is external drain; Dismounting M6 bolt(2) is internal drain.



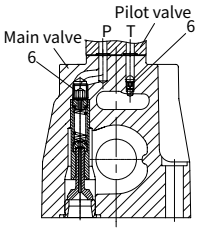
Structure chart of GWEH10.../6B2... model supply and discharge

2. Type GWEH16.../6B2..
(1) Conversion between internal supply and external supply:
Dismounting plug screw(10) form P hole on the undersurface of main valves and installing M6 bolt(9) is internal supply. Dismounting M6 plug bolt(9) id internal supply.
(2) Conversion between internal drain and external drain:
10 Pilot valveDismounting plug screw(10) form T hole on the top of main valves and installing M6 plug bolt(9) is internal drain. Dismounting M6 bolt(9) is external drain.



Structure chart of GWEH16.../6B2... model supply and discharge

3. Type GWEH25.../6B2..
(1) Conversion between internal supply and external supply:
P hole on the top of main valve bodies with M6 bolt(6) is external supply and with M6 bolt (6)dismantled is internal supply.
(2) Conversion between internal drain and external drain:
Dismounting plug bolt(6) form T hole on the top of main vlaves. Dismounting M6 bolt(6) is external drain.



Structure chart of GWEH25.../6B2...model supply and discharge

Function and configuration

Switching time adjustment:

In order to influence the switching time of the main valve a double throttle check valve has to be fitted between pilot valves and mian valves to control oil supply from pilot valves into main valve spools, thus adjusting the switching time of main valves.

Regulating bolt rotation clockwise, the time for switching of main valves is long, otherwise the time is short.

The throuttle check valve has two kinds: meter-in throttling and meter-out throttling. If there is a need of changing meter-in throttling into meter-out throttling, just install the valve after rotating 180° around the longitudinal axis again and then install pilot valves.

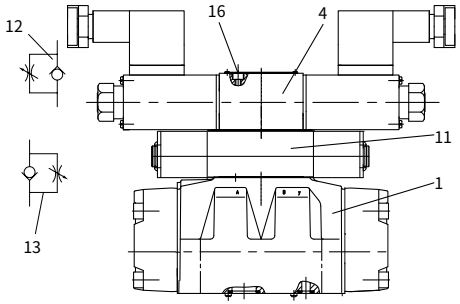


Figure of GWEH.../6B2...S or S2 type
commutating time regulator for valve installation

1- Main valve
4- Pilot valve
11- Switching time regulator(Z2FS6)
12- Meter-out throttling
13- Meter-in throttling
16- Set screw M5×L GB/T70.1-10.9 grade, the length of L is determined by height stacked, tightening torque 8.9 Nm.

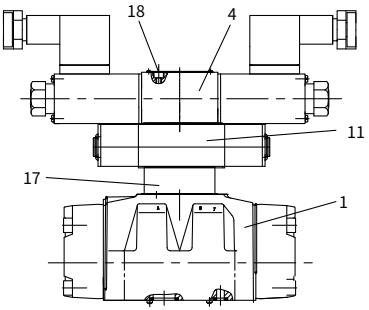
Pressure reducing valves:

The pressure reducing valve (8) must be used it the pilot pressure is higher than 250 bar .Pressure reducing ratio of constant-ratio pressure reducing valves(D1)1:0.66.

Pressure reducing pressure of constant-ratio pressure reducing valves shall not exceed 40bar.

Minimum control pressure of technical Ordering code shall improve 1/0.66=1.515 after installing bottom plate pressure reducing valves.

Constant-ratio pressure reducing valves shall not be used when controlling internal oil drain and using back pressure valves(P0.45) with control pressure decreased to 3bar.



Configuration of type GWEH.../6B2...S...D1
with proportional pressure reducing valve

1- Main valve
4- Pilot valve
11- Switching time regulator
17- Pressure reducing valve
18- Bolt M5×105 GB/T70.1-10.9

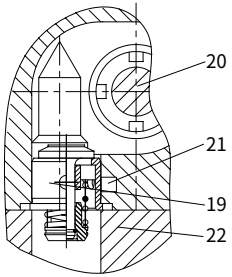
Function and configuration

Back pressure valve:

Valves controlling oil inner supply with unloading passages, such as C, Z, G, H, P, S, T and V, In valves with zero pressure circulation and internal pilot oil supply,

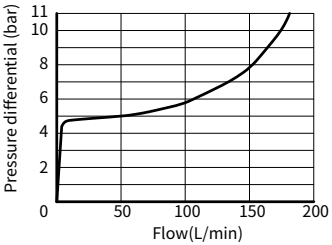
a back pressure valve (19) must be installed in the P-channel of the main valve to build up the minimum pilot pressure. The pressure differential of the back pressure valve must be added to the pressure differential of the main valve (see characteristic curves) in order to determine the actual value. The opening pressure of this valve is approx. 4.5 bar.

NG10 valves do not have back pressure valves.

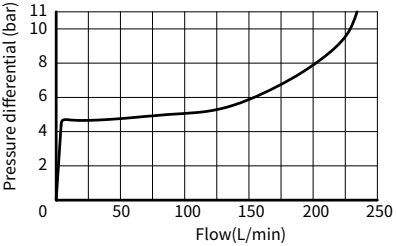


GWEH16.../.../6B2...PO.45 type
Structure chart of prepressing valve of electro-hydraulic directional valve

19- Prepressing valve
20- Main valve
21- Control oil chamber(X)
22- Connecting plate

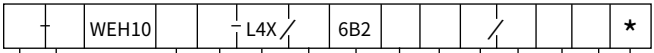


Pressure loss curve of **GWEH16.../6B2...** type electro-hydraulic directional valves passing through back pressure valves
(Test condition:use HLP46, ϑ_{oil}=40℃ ±5℃)



Pressure loss curve of **GWEH25.../6B2...** type electro-hydraulic directional valves passing through back pressure valves
(Test condition:use HLP46, ϑ_{oil}=40℃ ±5℃)

Ordering code



Explosion-resistant type I =G1
Explosion-resistant type II =G2

3 ways = 3
(For spool A and B)
4 ways = 4

Spool return By means of springs =No code
Hydraulic return = H
(only 2-position valve: spools C, D, K, Z, Y)

See the function symbol of slide valve

Series L40 to L49 =L4X
(L40 to L49:unchanged installation and connection dimensions)

If pilot valve is 2 positions with 2 solenoid, main valve is 2 position with hydraulic return,'H' should be noted in front of spool.
Without spring return = O
Without spring return with detent = OF
(not apply to B and Y for O and OF)

Explosion protection solenoidin threaded connection=6B2

DC 12V = G12
DC 24V = G24
DC 36V = G36
DC 110V = G110

Pilot oil supply external,Pilot oil drain external = No code
Pilot oil supply internal, Pilot oil drain external = E
Pilot oil supply internal,Pilot oil drain internal = ET
(exclusion: spool C, Z, F, G, H, P, T, V)
Pilot oil supply external, Pilot oil drain internal = T

No code = Without shifting time adjustment
S = Switching time adjustment as meter-in control
S2= Switching time adjustment as meter-out control

No code=Without throttle insert
B08= With throttle Φ0.8mm
B10= With Throttle Φ1.0 mm
B12= With Throttle Φ1.2 mm
B15 = With Throttle Φ1.5 mm

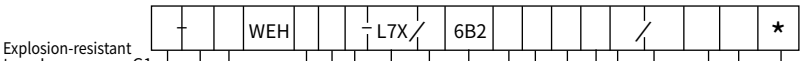
No code=without pressure reducing valves
D1= with pressure reducing valves(pressure ratio 1:0.66)
D3= with constant-value pressure reducing valves

No code=NBR seals
V =FKM seals

Further details in clear text

Note:
1. When the spools of type GWEH10../6B2.. is C, Z, F, G, H, P, T ,V and so on, if the pilot oil is internal supply, the pilot oil should be external drain. And enough back pressure should be exerted on the return oil port T (must not be on the Port Y) so that the valve can change directions reliably.
2. When the pilot pressure is higher than 250bar (It will be main pressure when the version is supply internal), the pressure reducing valve must be used.
3. G1 Explosion protection grade EX d I Mb; G2 Explosion protection grade EX d II C T4 Gb

Ordering code



Explosion-resistant
type I =G1
Explosion-resistant
type II =G2

Working pressure
280 bar = No code
350 bar = H-

3 ways(For spool A and B) = 3
4 ways = 4

Nominal size 16 = 16
25 = 25

Spool return
Spring return or centered =No code
Hydraulic return or centered = H

See the function symbol of slide valve

Series L70 to L79 = L7X
(L70 to L79:unchanged installation
and connection dimensions)

If pilot valve is 2 positions with 2 solenoid,
main valve is hydraulic return
Without spring return = O
Without spring return with detent = OF
(H should be noted in front of spools.
Not applied to spool Y for O and OF)

Explosion protection solenoid in threaded connection =6B2

DC 12V = G12
DC 24V = G24
DC 36V = G36
DC 110V = G110

Pilot oil supply external,Pilot oil drain external = No code
Pilot oil supply internal,Pilot oil drain internal = ET
Pilot oil supply internal, Pilot oil drain external = E
Pilot oil supply external, Pilot oil drain internal versions = T
3-position valve with hydraulic centred cannot use ET and T,
and it must be control P>=2×return oil P+min. control P

Further details
in clear text

No code=NBR seals
V =FKM seals

No code=without pressure
reducing valves
D1= with pressure
reducing valves
(pressure ratio 1:0.66)
D3= with constant-value
pressure reducing valves

No code = Without back pressure valve
P0.45= With back pressure valve,
cracking pressure 4.5 bar
P0.70= With back pressure valve,
crackingpressure 7 bar

No code= Without throttle insert
B08= With throttle Φ0.8mm
B10= Throttle Φ1.0 mm
B12= Throttle Φ1.2 mm
B15= Throttle Φ1.5 mm

Route adjuster number
(see the position drawing
of the route adjuster)

No code = Without shifting
time adjustment
S = Switching time
adjustment as meter-in control
S2 = Switching time adjustment
as meter-out control

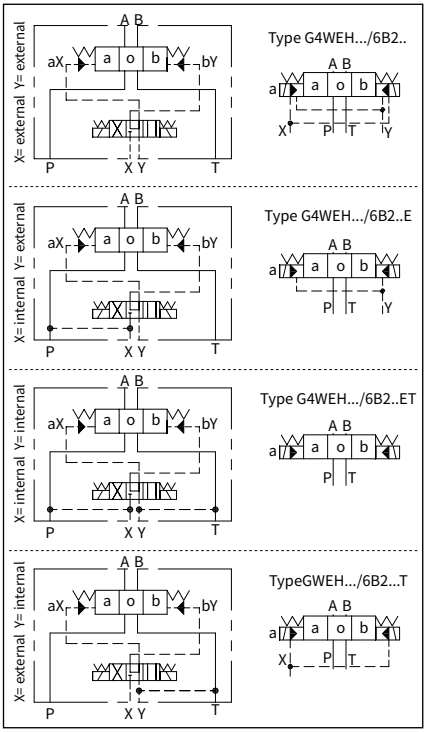
Note:

1. For function of GWEH16-25 such as C, Z, F, G, H, P, T, V, etc, if applying control oil internal supp, please try to use external add enough back pressure on return port T(port Y shall not have back pressure) to ensure valves can reverse properly.
2. Pressure reducing valves shall be applied when control pressure exceeds 250 bar.
3. G1 Explosion protection grade EX d Ⅰ Mb; G2 Explosion protection grade EX d Ⅱ C T4 Gb

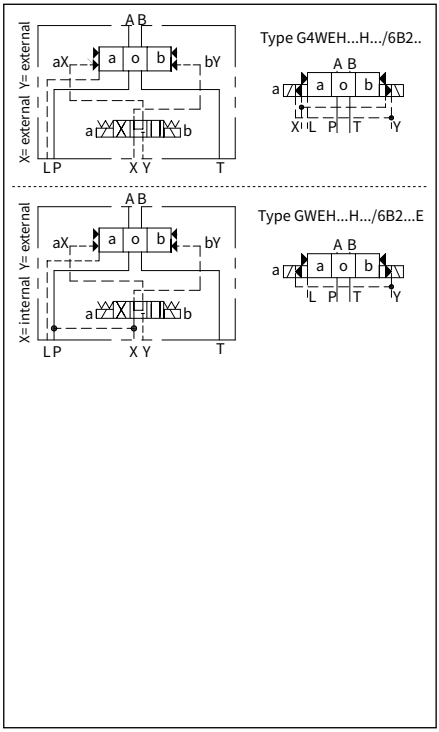
Symbols

Detailed and simplified symbols for 3-position valves

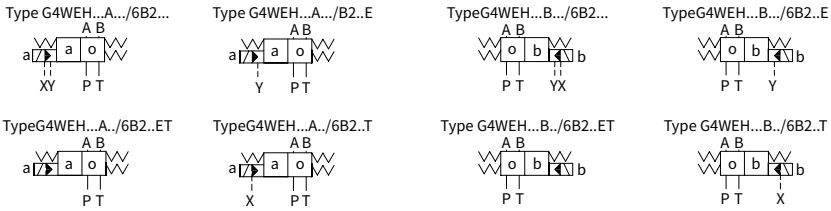
Valves with spring centered



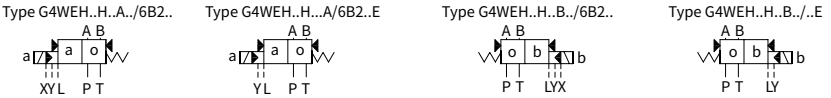
Valves with hydraulic centered



Valves with spring offset (At position A or B of 2-position valve derived from 3-position)



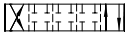
Valves with hydraulic offset (At position A or B of 2-position valve derived from 3-position)



Symbols

Detailed and simplified symbols for 3-position valves

3-position valve

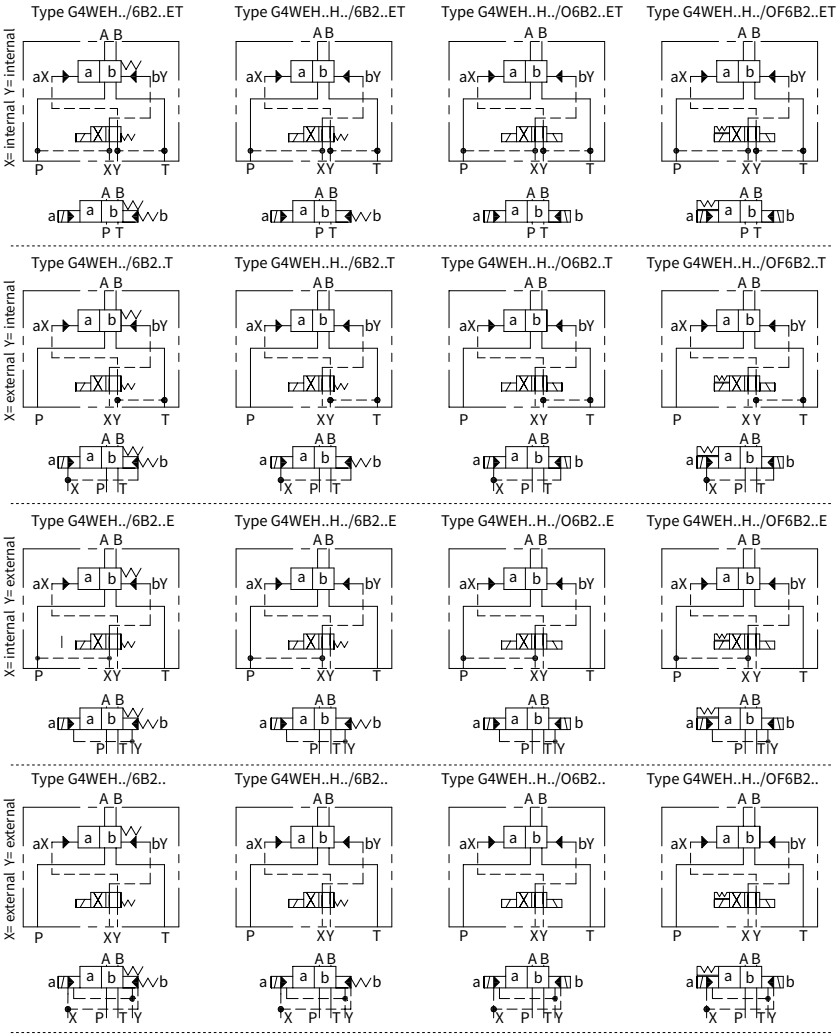
3-position valve type		Symbol	Crossover Symbol
G4WEH..E../6B2..	E		
G4WEH..F../6B2..	F		
G4WEH..G../6B2..	G		
G4WEH..H../6B2..	H		
G4WEH..J../6B2..	J		
G4WEH..L../6B2..	L		
G4WEH..M../6B2..	M		
G4WEH..P../6B2..	P		
G4WEH..Q../6B2..	Q		
G4WEH..R../6B2..	R		
G4WEH..S../6B2..	S		
G4WEH..T../6B2..	T		
G4WEH..U../6B2..	U		
G4WEH..V../6B2..	V		
G4WEH..W../6B2..	W		
G4WEH..M1../6B2..	M1		
G4WEH..M2../6B2..	M2		
G4WEH..J2../6B2..	J2		

2-positon derivative from 3-position

2-position valve type	Symbol (solenoid at A end)	2-position valve type	Symbol (solenoid at B end)
G4WEH..EA../6B2..		G4WEH..EB../6B2..	
G4WEH..FA../6B2..		G4WEH..FB../6B2..	
G4WEH..GA../6B2..		G4WEH..GB../6B2..	
G4WEH..HA../6B2..		G4WEH..HB../6B2..	
G4WEH..JA../6B2..		G4WEH..JB../6B2..	
G4WEH..LA../6B2..		G4WEH..LB../6B2..	
G4WEH..MA../6B2..		G4WEH..MB../6B2..	
G4WEH..PA../6B2..		G4WEH..PB../6B2..	
G4WEH..QA../6B2..		G4WEH..QB../6B2..	
G4WEH..RA../6B2..		G4WEH..RB../6B2..	
G4WEH..SA../6B2..		G4WEH..SB../6B2..	
G4WEH..TA../6B2..		G4WEH..TB../6B2..	
G4WEH..UA../6B2..		G4WEH..UB../6B2..	
G4WEH..VA../6B2..		G4WEH..VB../6B2..	
G4WEH..WA../6B2..		G4WEH..WB../6B2..	
G4WEH..M1A./6B2..		G4WEH..M1B./6B2..	
G4WEH..M2A./6B2..		G4WEH..M2B./6B2..	
G4WEH..J2A./6B2..		G4WEH..J2B./6B2..	

Symbols

Detailed and simplified symbols for 2-position valves



Spools of 2-position valves

Spools:	A	C	D,DE	K	Z	B	Y,YE
Spool symbols:	Port T for draining					Port T for draining	
Transition symbols:							

Technical details

1. Hydraulic section

1). GWEH10.../6B2... Type explosion-proof electro-hydraulic directional valve

Max. Operating pressure: ports P, A, B (bar)		315						
Port T (bar)	With external pilot oil drain	315						
	With internal pilot oil drain	210						
Port Y (bar)	With external pilot oil drain	210						
Min. control pressure (bar)	With external pilot oil supply With internal pilot oil supply (not apply to C, Z, F, G, H, P, T, V)	3-position valve 10						
		Spring-return 2-position valve 10						
		Hydraulic-return 2-position valve 7						
	Control oil internal supply (apply to C, Z, F, G, H, P, T, V)	4.5						
Max. control pressure (bar)		250						
Hydraulic fluid		Mineral oil, phosphate oil						
Temperature range of Hydraulic fluid (°C)		-30 to+80 (NBR seals)						
		-20 to+80 (FKM seals)						
Viscosity range (mm^2/s)		2.8 to 500						
Controlled quantity in commutating process (cm^3)		3-position valve 2.04 2-position valve 4.08						
Total commutating time of valve from zero position to switching position (DC)								
Control pressure (bar)		70		140		210		250
3-position valve (ms)		65		60		55		50
2-position valve (ms)		80		75		70		65
Total Switching time of valve from switching position to zero position								
3-position valve (ms)		30						
2-position valve (ms)		35	40	30	35	25	30	20	25
Flow of shorter Switching time (L/min)		About35						
Installation position		HC, HD, HK, HZ and HY of hydraulic return shall be installed horizontally. The rest are arbitrary						
Weight (kg)	Single solenoid valve	7.8						
	Double solenoid valve	9.1						
	Switching time regulator	1.0						
	Fixed ratio pressure reducing valve	0.5						

Technical details

1. Hydraulic section

2). GWEH16.../6B2... Type explosion-proof electro-hydraulic directional valve

Maximum working pressure: P, A, B (bar)		Type G-H-...WEH16../6B2...				Type G-..WEH16../6B2..		
		350				280		
Port T (bar)	With external pilot oil drain	250				250		
	With internal pilot oil drain	210 Hydraulic-centering 3-position valve With internal pilot oil drain is impossible						
Port Y (bar)	With external pilot oil drain	210						
Min. control pressure (bar)	With external pilot oil supply With internal pilot oil supply	3-position valve 14 Spring-return 2-position valve 14 Hydraulic-return 2-position valve 14						
	With internal pilot oil supply	When applying back pressure valve or the flow is large, enginery of spool valve is 4.5 bar as C, Z, F, G, H, P, S, T and V						
Max. control pressure (bar)		250						
Hydraulic fluid		Mineral oil, phosphate oil						
Temperature range of Hydraulic fluid (°C)		-30 to ＋ 80 (NBR seals)						
		-20 to ＋ 80 (FKM seals)						
Viscosity range (mm^2/s)		2.8 to 500						
Switching pilot oil volume								
- Spring-centering 3-position valve (cm^3)		5.72						
-2-position valve (cm^3)		11.45						
Hydraulic-centering 3-position valve								
-From"0"position to working position"a" (cm^3)		2.83						
-From working position"a" to "0"position(cm^3)		2.9						
-From"a"position to working position"b" (cm^3)		5.72						
-From working position"b" to "0"position(cm^3)		2.83						
*Switching time from '0' position to working position (DC solenoid)								
Control pressure (bar)		50		150		250		
-Spring-centering 3-position valve (ms)		65		60		58		
-2-position valve (ms)		65		55		50		
-Hydraulic-centering 3-position valve (ms)		a	b	a	b	a	b	
		65	65	55	63	55	60	
*Switching time from working position to "0" position								
-Spring-centering 3-position valve (ms)		30						
-2-position valve (ms)		45		35		30		
-Hydraulic-centering 3-position valve(ms)		a	b	a	b	a	b	
		20	20	20	20	20	20	
Installation position		C,D,K,Z,Y Type hydraulic-return valves are installed horizontally, the rest can be installed arbitrarily						
Flow of shorter switching time (L/min)		About 35						
Weight of the valve (kg)		About 10.6						

*Switching time refers to time from drawing of solenoid of pilot valve to full opening of main valve.

Technical details

1. Hydraulic section

3). GWEH25.../6B2... Type explosion-proof electro-hydraulic directional valve

Maximum working pressure: P, A, B (bar)		Type G-H-...WEH25../6B2...	Type G-..WEH25../6B2..
		350	280
Port T (bar)	With external pilot oil drain	250	250
	With internal pilot oil drain	210	
		Hydraulic-centering 3-position valve With internal pilot oil drain is impossible	
Port Y (bar)	With external pilot oil drain	210	
Min. control pressure (bar)	With external pilot oil supply With internal pilot oil supply	Spring-centering 3-position valve 13	
		Hydraulic-centering 3-position valve 18	
		Spring-return 2-position valve 13	
		Hydraulic-return 2-position valve 8	
	With internal pilot oil supply	When applying prepressing or the flow is large correspondingly ,enginery of spool valve is 4.5 bar as C,Z,F,G,H,P,S,T and V	
Max. control pressure (bar)		250	
Hydraulic fluid		Mineral oil, phosphate oil	
Temperature range of Hydraulic fluid (°C)		-30 to + 80 (NBR seals)	
		-20 to + 80 (FKM seals)	

Switching pilot oil volume									
- Spring-centering 3-position valve (cm^3)	14.2								
-2-position valve (cm^3)	28.4								
Hydraulic-centering 3-position valve									
-From"0"position to working position"a" (cm^3)	7.15								
-From working position"a" to "0"position (cm^3)	7.0								
-From"a"position to working position"b" (cm^3)	14.15								
-From working position"b" to "0"position (cm^3)	5.73								
*Switching time from '0' position to working position (DC solenoid)									
Pilot control pressure (bar)	50		140		210		250		
-Spring-centering 3-position valve (ms)	85		75		70		65		
-2-position valve (ms)	160		130		120		105		
-Hydraulic-centering 3-position valve (ms)	a	b	a	b	a	b	a	b	
	55	65	55	65	50	60	50	60	
*Switching time from working position to "0" position									
-Spring-centering 3-position valve (ms)	40								
-2-position valve (ms)	125		100		90		80		
-Hydraulic-centering 3-position valve (ms)	a	b	a	b	a	b	a	b	
	30	35	30	35	30	35	30	35	
Installation position	C,D,K,Z,Y Type hydraulic-return valves are installed horizontally, the rest can be installed arbitrarily								
Flow of shorter switching time (L/min)	About 35								
Weight of the valve (kg)	About 19								

*Switching time refers to time from drawing of solenoid of pilot valve to full opening of main valve.

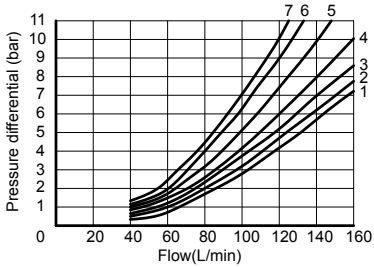
Technical details

2. Electrical data

Type of voltage		DC
Voltage (allowable fluctuation of ±10%)		12、24V、36V、110V
Power	W	30
Duty cycle		Continuous
Temperature range of environment	℃	～+50
Temperature range of coil	℃	～+150
Protection class to DIN40050		IP65

Characteristic curves (Measured at ϑ_{oil}=40°C ±5°C , using HLP46)

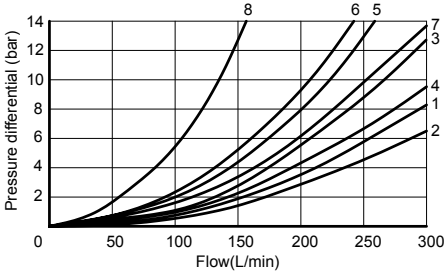
Type GWEH 10../6B2..



Pressure loss curve graph of **GWEH 16../6B2..**Type electro-hydraulic directional control valve

Enginery symbol	Switching position				Enginery symbol	Neutral position		
	P → A	P → B	A → T	B → T		A → T	B → T	P → T
E, Y, D	2	2	4	5				
F	1	4	1	4	F	3	-	6
G, T	4	2	2	6	G, T	-	-	7
H, C	4	4	1	4	H	1	3	5
J, K	1	2	1	3				
L	2	3	1	4	L	3	-	-
M	4	4	3	4				
P	4	1	3	4	P	-	7	5
Q, V, W, Z	2	2	3	5				
R	2	2	3	-				
U	3	3	3	4	U	-	4	-

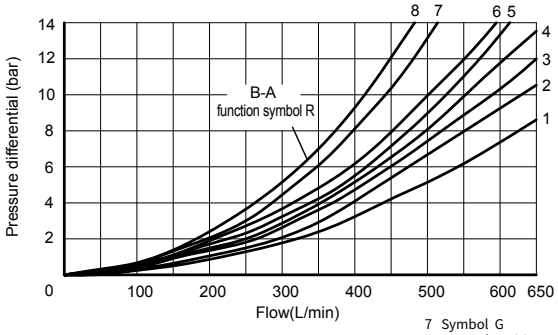
Type GWEH 16../6B2..



Pressure loss curve graph of **GWEH 16../6B2..** Type electro-hydraulic directional control valve

Symbol	Switching position				
	P → A	P → B	A → T	B → T	P → T
E, Y, D	1	1	1	3	-
F	2	2	3	3	-
G, T	5	1	3	7	6
H, C, Q, V, Z	2	2	3	3	-
J, K, L	1	1	3	3	-
M, W	2	2	4	3	-
R	2	2	4	-	-
U	1	1	4	7	-
S	4	4	4	-	8

Type GWEH 25../6B2..



Pressure loss curve graph of **GWEH 25../6B2..** Type electro-hydraulic directional control valve

7 Symbol G
Neutral position P-T
8 Symbol T
Neutral position P-T

Symbol	Switching position			
	P → A	P → B	A → T	B → T
E	1	1	1	3
F	1	4	3	3
G	3	1	2	4
H	4	4	3	4
J, Q	2	2	3	5
L	2	2	3	3
M	4	4	1	4
P	4	1	1	5
R	2	1	1	-
U	4	1	1	6
V	2	4	3	6
W	1	1	1	3
T	3	1	2	4

Characteristic curves (Measured at ϑ_{oil}=40℃ ±5℃ , using HLP46)

When valve is at the middle position, open area of all flow directions.

Size	Enginery	Open area (mm^2)			
		P → A	P → B	A → T	B → T
GWEH 10../6B2..	Q	-	-	13	13
	V	13	13	13	13
	W	-	-	2.4	2.4
GWEH 16../6B2..	Q	-	-	32	32
	V	32	32	32	32
	W	-	-	6	6
GWEH 25../6B2..	Q	-	-	83	83
	V	83	83	83	83
	W	-	-	14	14

Performance limit

The switching function of valves depends on filtration due to adhesive effects. To achieve the specified permissible flow values, we recommend full-flow filtration with 25 µm. The flow forces acting within the valves also have an influence on the flow performance. With 4-way directional valves, the specified flow data are therefore valid for normal applications with 2 directions of flow
(e.g. from P to A and simultaneous return flow from B to T) (see table).
If the fluid flows in only one direction, the permissible flow may be significantly lower in critical cases (e.g. use of a 4-way directional as 3-way directional valve with port A or B blocked).

02

Enginery limit table of GWEH 10../6B2.. Type electro-hydraulic directional control valve

3-position valve, spring centering			
Flow(L/min)	Pressure stage(bar)		
Symbol	200	250	315
E, J, L, M, Q, U, W, R, V	160		
H	160	150	120
G, T	160		140
F, P	160	140	120
2-position valve whose main valve has a returning spring			
C, D, K, Z, Y	160		

2-position valve, main valve without spring			
Flow(L/min)	Pressure stage(bar)		
Symbol	200	250	315
HC HD HK HZ HY	160		
HC.../O HD.../O	160		
HK.../O HZ.../O			
HC.../OF... HD.../OF... HK.../OF... HZ.../OF...	160		

Enginery limit table of GWEH 16../6B2.. Type electro-hydraulic directional control valve

Spring-centering 3-position valve						**2-position valve**					
Flow(L/min)	Pressure stage(bar)					Flow(L/min)	Pressure stage(bar)				
Symbol	70	140	210	280	350	Symbol	70	140	210	280	350
E, H, J, L, M, Q, U, W, R	300	300	300	300	300	C	300	300	300	300	300
						D, Y	300	270	260	250	230
F, P	300	250	180	170	150	K	300	250	240	230	210
G, T	300	300	240	210	190	Z	300	260	190	180	160
S	300	300	300	250	220	**Hydraulic-return 2-position valve**					
V	300	250	210	200	180	HC, HD, HK, HZ, HY	300	300	300	300	300
Hydraulic-centering 3-position valve (min.control pressure 16 bar)						When control oil is supplied internally and pressure valve is equipped, the flow of spool valve's enginery of H, F, P, G, T, S, V, C and Z Types reaches 160L/min.					
All functions	300	300	300	300	300						

Note: in the condition that working pressure of 3-position four-way directional control valve of hydraulic centering exceeds specified Performance limit, control pressure must be increased. When working pressure P=350bar, flow Q=300L/min, control pressure is needed to be 16bar.

Performance limits

Enginery limit table of GWEH 25../6B2.. Type electro-hydraulic directional control valve

<table>
<tr><td colspan="6">3-position valve of spring centering</td><td colspan="6">2-position valve</td></tr>
<tr><td>Flow(L/min)</td><td colspan="5">Pressure stage(bar)</td><td>Flow(L/min)</td><td colspan="5">Pressure stage(bar)</td></tr>
<tr><td>Symbol</td><td>70</td><td>140</td><td>210</td><td>280</td><td>350</td><td>Symbol</td><td>70</td><td>140</td><td>210</td><td>280</td><td>350</td></tr>
<tr><td>E, L, M</td><td rowspan="2">650</td><td rowspan="2">650</td><td rowspan="2">650</td><td rowspan="2">650</td><td rowspan="2">650</td><td>G, D, K, Z, Y</td><td>650</td><td>650</td><td>650</td><td>650</td><td>650</td></tr>
<tr><td>U, W, Q</td><td colspan="5">Hydraulic-return 2-position valve
(main valve without spring)</td></tr>
<tr><td>G, T</td><td>400</td><td>400</td><td>400</td><td>400</td><td>400</td><td rowspan="2">HC HD HK
HZ HY</td><td rowspan="2">650</td><td rowspan="2">650</td><td rowspan="2">650</td><td rowspan="2">650</td><td rowspan="2">650</td></tr>
<tr><td>F</td><td>650</td><td>550</td><td>430</td><td>330</td><td>300</td></tr>
<tr><td>H</td><td>650</td><td>650</td><td>550</td><td>400</td><td>360</td><td>HC.../O</td><td rowspan="4">650</td><td rowspan="4">650</td><td rowspan="4">650</td><td rowspan="4">650</td><td rowspan="4">650</td></tr>
<tr><td>J</td><td>650</td><td>650</td><td>650</td><td>600</td><td>520</td><td>HD.../O</td></tr>
<tr><td>P</td><td>650</td><td>550</td><td>430</td><td>330</td><td>300</td><td>HK.../O</td></tr>
<tr><td>V</td><td>650</td><td>550</td><td>400</td><td>350</td><td>310</td><td>HZ.../O</td></tr>
<tr><td>R</td><td>650</td><td>650</td><td>650</td><td>650</td><td>580</td><td>HC.../OF...</td><td rowspan="4">650</td><td rowspan="4">650</td><td rowspan="4">650</td><td rowspan="4">650</td><td rowspan="4">650</td></tr>
<tr><td colspan="6">Hydraulic-centering 3-position valve
(minimum control pressure 18bar)</td><td rowspan="2">HD.../OF...</td></tr>
<tr><td>E, F, H, J, L, M
P, Q, R, U, V, W</td><td>650</td><td>650</td><td>650</td><td>650</td><td>650</td></tr>
<tr><td>HK.../OF...</td></tr>
<tr><td>G, T</td><td>400</td><td>400</td><td>400</td><td>400</td><td>400</td><td>HZ.../OF...</td></tr>
<tr><td colspan="6">Hydraulic-centering 3-position valve
(minimum control pressure 30bar)</td><td colspan="6" rowspan="2">When control oil is supplied internally and pressure valve is equipped, the flow of spool valve's enginery of G, Z, V, F, H, P, T Types reaches 180L/min.</td></tr>
<tr><td>G, T</td><td>650</td><td>650</td><td>650</td><td>650</td><td>650</td></tr>
</table>

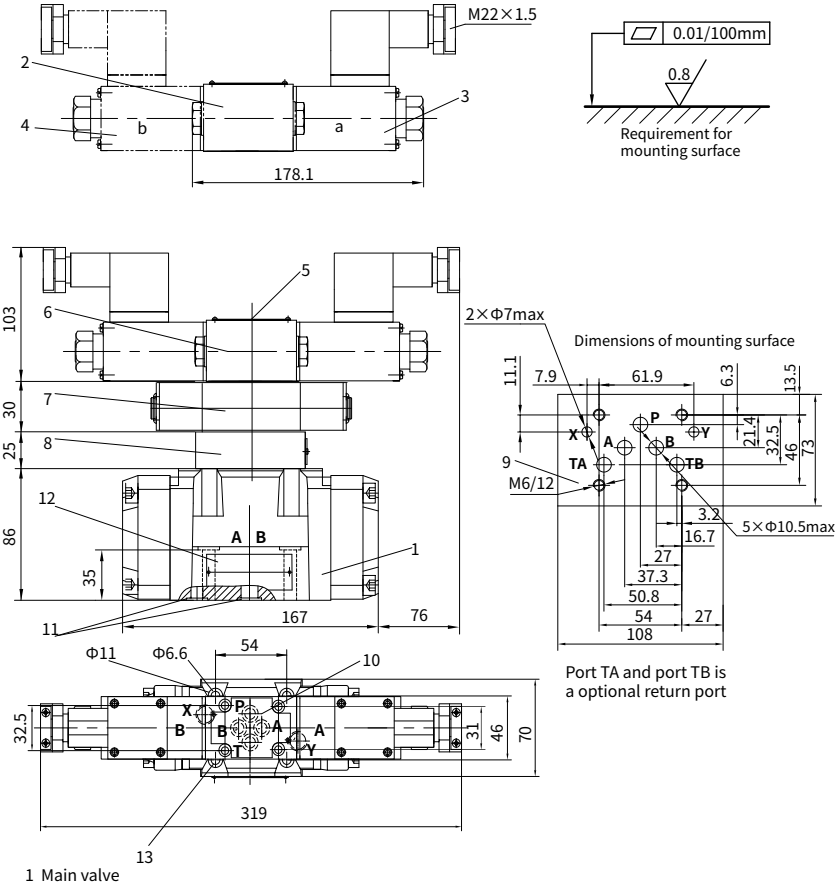
Pilot-operated solenoid valve

A four-way Explosion protection directional valve with NG 6 (G4WE6../B2..)is used as the pilot valve. The slide valve is kept in the middle or the initial position by the spring, and kept on the working position through the solenoid or the locator.
The valve applies the DC solenoid, and the function of the pilot solenoid valve applied to the main valve with various functions is shown as the Table below:

Main valve	**Pilot-operated solenoid valve**
Spring-centering 3-position valve/ transformed 2-position valve	Use G4WE6J-6X/B2...3-position valve/
Hydraulic-centering 3-position valve/ transformed 2-position valve	Use G4WE6J-6X/B2...3-position valve/
Structure of 2-position main valve: Y.../...and HY.../... B.../...and HB.../...	Use G4WE6J-6X/B2...2-position valve
2-position valve : A, C, D, K and Z Type functions HA, HC, HD, HK, HZ Type valves	Use 2-position valve with D Type enginery Types of main valve's structure: Spring return G4WE6D-6X/B2... No returning spring G4WE6D-6X/OB2... No returning spring, with a positioner G4WE6D-6X/OFB2...

Unit dimensions

Unit dimension of valve type GWEH10../6B2..



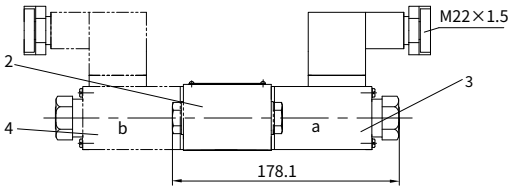
1 Main valve
2 2-position valve with one solenoid and plug Z4
3 Exprosion protection solenoid a
4 Exprosion protection solenoid b
5 Nameplate for the pilot valve
6 2-position valve with double solenoids
3-position valve with double solenoids
7 Switching time adjustment
8 Pressure reducing valve
9 Position of ports on main valve (mounting surface)
10 Pilot port position
11 O-rings 13×1.6×2 (or O-rings 12×2) of port A, B, P and O-rings 11.18×1.6×1.78 (or o-rings:10.82×1.78)of port X , Y and R
12 Nameplate for the whole valve
13 Valve fixing screws:
Internal hexagon screw GB/T70.1-2000-10.9, 4-M6×45 ,Tightening torque M_A=15.5Nm, (length accords with all the module sandwich actual height)must be ordered separately

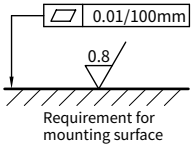
It must be ordered separately, if connection plate is needed.
Type:
G534/01; G534/02; G535/01;G535/02; G536/01; G536/02

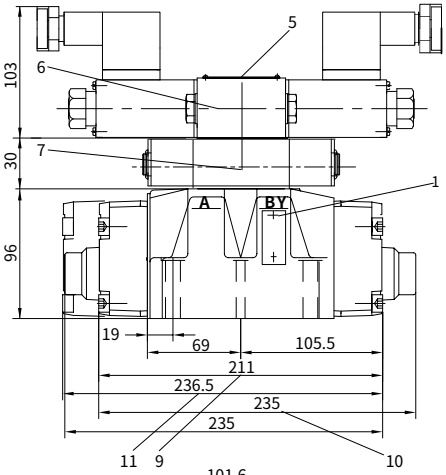
02

Unit dimensions

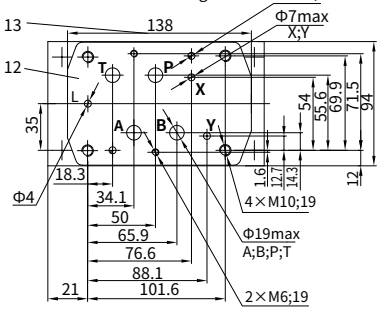
Unit dimension of valve type GWEH16../6B2..



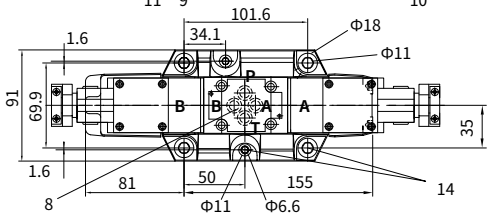




Dimensions of mounting surface Φ4H8;8



Note: L port only applies to hydraulic-centering 3-position valve and its derived 2-position valve



1 Main valve
2 2-position valve with one solenoid and plug Z4
3 Exprosion protection solenoid a
4 Exprosion protection solenoid b
5 Nameplate for the pilot valve
6 Override button
7 2-position with two solenoids
3-position with two solenoids
8 Switching time adjustment
9 Dimension of 3-position with spring-centred valve and 2-position with hydraulic-offset valve
10 2-position with spring-offset valve (graphic presentation is spool C, D,K and Z)

It must be ordered separately if connection plate is needed.
Type:
G172/01; G172/02/02;
G174/01; G174/02; G174/08

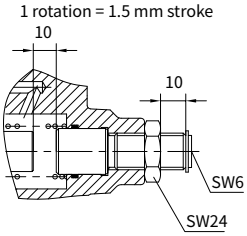
11 3-position with hydraulic-centred valve
12 Main valve connection sketch chart
13 Min. machined dimension of connection side of main valve
14 Valve fixing screws:Internal hexagon screw GB/T 70.1-2000-10.9, 4-M10×60
Tightening torque M_A=75 Nm,
2-M6×55 M_A =15.5 Nm,
(length is according to all the module sandwich actual height)
must be ordered separately.

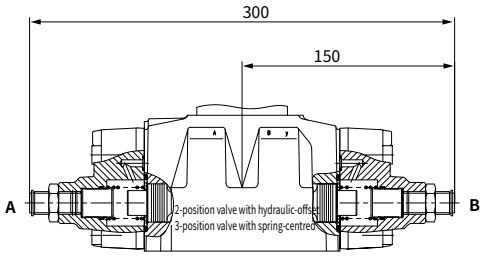
When the P opening is provided with a back pressure valve, the P opening uses an O-ring: 27×3, A, T, B openings shall use R-shaped ring 27.8×2.6×3 (or O-ring: 27×3)
When the P opening is free from the back pressure valve, the P, T, A and B openings shall use R-shaped ring:22.53×2.3×2.62(or O-ring: 22×2.5), the X, Y, and L openings shall use R-shaped ring: 10×2×2(or O-ring: 10×2)

Unit dimensions

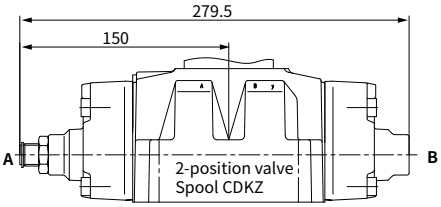
Dimension of additional devices of valve type GWEH16../6B2..

Range of stroke adjustment is 10 mm to adjust main spool stroke. Loosen the lock-up nut and rotate the rod clockwise, thus, shorten the main spool's stroke.
(Note: adjust can only be made under the condition that the controlling chamber has no pressure)

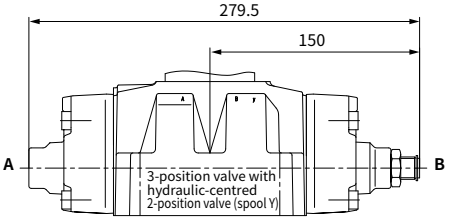




Stroke adjustment fixed on end "A"and "B" of main valve 10
Stroke adjustment fixed on end "A" of main valve 11
Stroke adjustment fixed on end "B" of main valve 12



Stroke adjustment fixed on end "A" of main valve 11

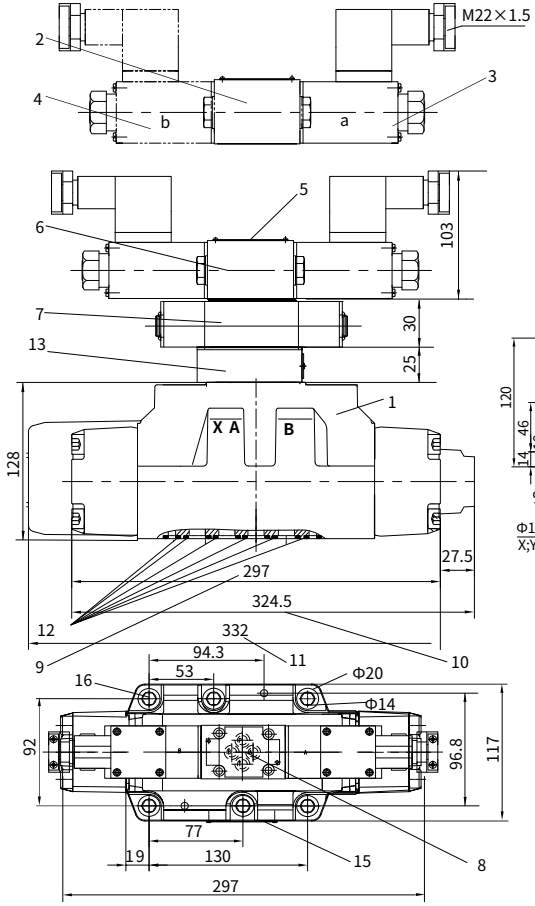


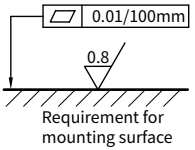
Stroke adjustment fixed on end "B" of main valve 12

02

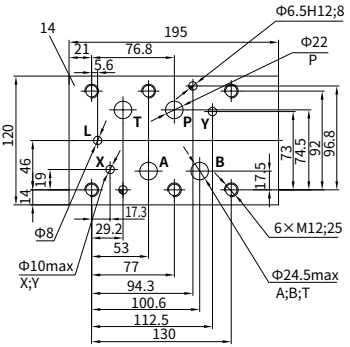
Unit dimensions

Unit dimension of valve type GWEH25../6B2..





Dimensions of mounting surface



Note: L port only applies to hydraulic-centering 3-position valve and its derived 2-position valve

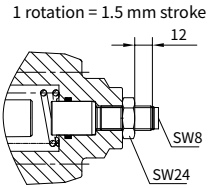
It must be ordered separately if connection plate is needed. Type
G151/01; G151/02; G153/01; G153/02; G154/01; G154/02; G156/01; G156/02; G154/08

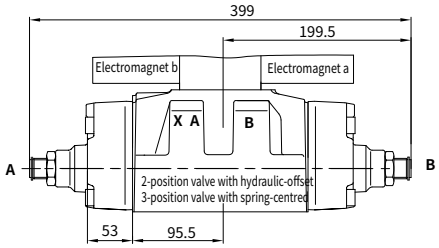
1 Main valve
2 2-position valve with one solenoid and plug Z4
3 Exprosion protection solenoid a
4 Exprosion protection solenoid b
5 Nameplate for the pilot valve
6 2-position with two solenoids; 3-position with two solenoids
7 Switching time adjustment
8 Pilot solenoid valve connection position sketch chart
9 Dimension of 3-position with spring-centred valve and 2-position
10 2-position with spring-offset valve
(graphic presentation is spool C, D, K and Z)
11 3-position with hydraulic-centered valve
12 Mount P with back pressure valve,
Mount P with the O-ring: 27×3, Mount A, T and B with R-shaped ring of 27.8×2.6×3 (or O-ring: 27×3)
Mount P without back pressure valve, P, T, A, B ,Mount with R-shaped ring: 27.8×2.6×3 (or O-ring: 27×3)
Mount X, Y and L with R-shaped ring: 19×3×3 (or O-ring: 19×3)
13 Definite proportion pressure reducing valve
14 Sketch chart of main valve connection
15 Nameplate
16 Valve fixing screws: Internal hexagon screw GB/T 70.1-2000-10.9, 6-M20×80
Tightening torque (M_A=130Nm)
(length is according to all the module sandwich actual height)
must be ordered separately

Unit dimensions

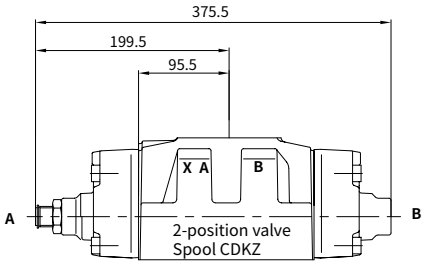
Dimension of additional devices of valve type GWEH25../6B2..

Range of stroke adjustment is 12 mm to adjust main spool stroke. Loosen the lock-up nut and rotate the rod clockwise, thus, shorten the main spool's stroke.
(Note: Adjustment can only be made under the condition that the controlling chamber has no pressure)

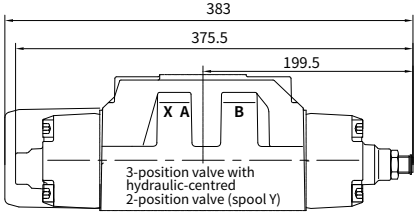




Stroke adjustment fixed on end "A"and "B" of main valve 10
Stroke adjustment fixed on end "A" of main valve 11
Stroke adjustment fixed on end "B" of main valve 12



Stroke adjustment fixed on end "A" of main valve 11



Stroke adjustment fixed on end "B" of main valve 12

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