2.18

Explosion-proof electro-hydraulic directional valve

Type GWEH10, 16, 25../6B2

Sizes 10 25
Up to 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 fuid 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.

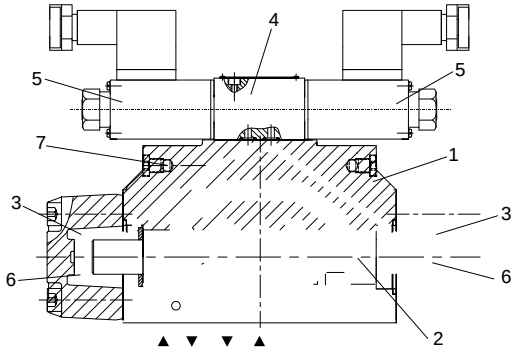
The main control spool (2) is held in the neutral or in the initial position either by the springs or by means of pressure. Pilot explosion-resistant valve has wet DC or AC solenoids (5), optional. The main control spool is shifted by pilot explosion-resistant valve (4).

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 fuid acts on the one end of the main spool (2) and pushes it (2) to move and the required port is connected, thus the fow direction of the fuid 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) fows 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-position four-way directional valves

(this kind of calve has four di f erent structures and Types)

1. Type G4WEH.../6B2...

This kind of pilot valve and main valve have a reset spring each, resetting by spring force.

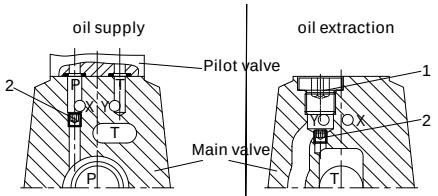
2. Type G4WEH...H.../6B2...

This kind of valve has a reset spring, making pilot valve spool stay in initial position. Main valve spools change direction Main each ! sprin Ĉ rese t t = sprin Ĉ 2 ″ T pe G4WEH...H.../6B2.

Function and configuration

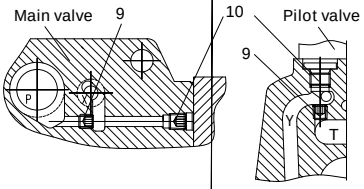
Pilot oil supply:

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.



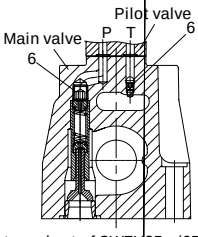
Structure chart of GWEH10.../6B2... model supply and discharge

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.

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.

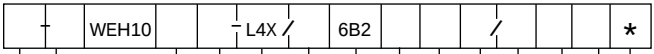
Minimum control pressure of technical Ordering code shall improve 1/0.66=1.515 after installing bottom plate pressure reducing valves.

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

Ordering code



Explosion-resistant type I =G1
Explosion-resistant type =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

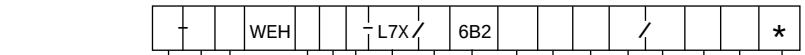
No code=without pressure reducing valves
D1= with pressure reducing valves(pressure ratio 1:0.66)
D3= with constant-value pressure reducing valves

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 Mb; G2 Explosion protection grade EX d C T4 Gb

Ordering code



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

Working pressure
350 bar = No code

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 = 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

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= Throttle Φ1.0 mm
B12= Throttle Φ1.2 mm
B15= Throttle Φ1.5 mm

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

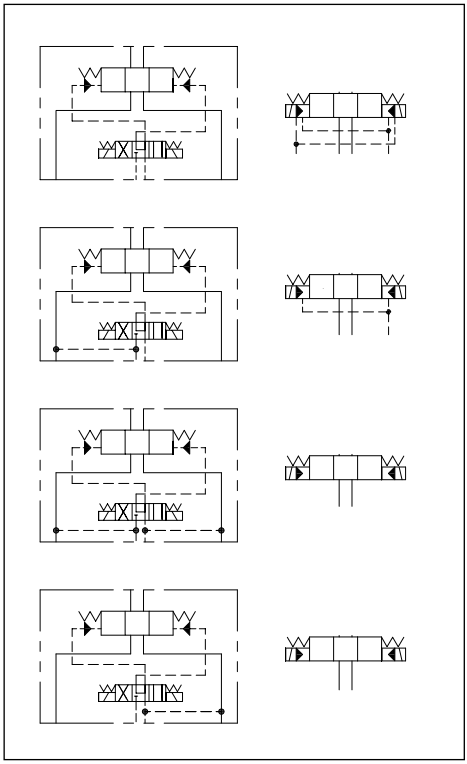
No code=without pressure reducing valves
D1= with pressure reducing valves (pressure ratio 1:0.66)
D3= with constant-value pressure reducing valves

No code=NBR seals
V =FKM seals

Further details in clear text

Note:

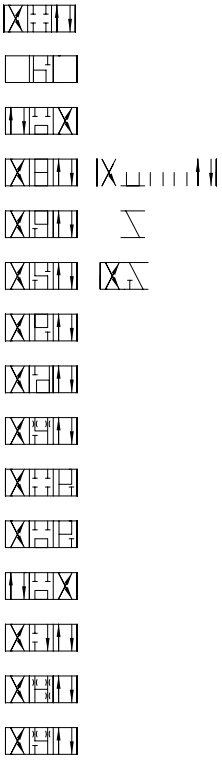
1. For function of GWEH16-25 such as C, Z, F, G, H, P, T, V, etc, if applying control oil internal supp, please try to use external add enough back pressure on return port T(port Y shall not have back pressure) to ensure valves can reverse properly.
2. Pressure reducing valves shall be applied when control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



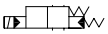
Symbols

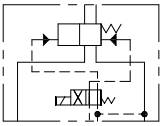
Detailed and simplified symbols for 3-position valves

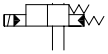
3-position valve

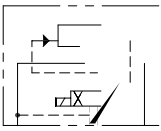


2-positon derivative from 3-position









Technical details

1. Hydraulic section

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

Maximum working pressure: P, A, B		bar	315						
Port T	With external pilot oil drain	bar	315						
	With internal pilot oil drain	bar	210						
Port Y	With external pilot oil drain	bar	210						
Min. control pressure	With external pilot oil supply	bar	3-position valve 10						
	With internal pilot oil supply	bar	Spring-return 2-position valve 10						
	(not apply to C, Z, F, G, H, P, T, V)	bar	Hydraulic-return 2-position valve 7						
	Control oil internal supply (apply to C, Z, F, G, H, P, T, V)	bar	4.5						
Max. control pressure		bar	250						
Hydraulic fuid			Mineral oil, phosphate oil						
Temperature range of Hydraulic fuid			-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 pressur		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	About 35						
Installation position			HC, HD, HK, HZ and HY of hydraulic return shall be installed horizontally. The rest are arbitrary						
Weight	Single solenoid valve	kg	7.8						
	Double solenoid valve	kg	9.1						
	Switching time regulator	kg	1.0						
	Fixed ratio pressure reducing valve	kg	0.5						

Technical details

1. Hydraulic section

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

*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...			
			350			
Port T	With external pilot oil drain	bar	250			
	With internal pilot oil drain	bar	210			
Port Y	With external pilot oil drain	bar	210			
Min. control pressure	With external pilot oil supply With internal pilot oil supply	bar	Spring-centering 3-position valve			13
			Spring-return 2-position valve			13
			Hydraulic-return 2-position valve			8
	With internal pilot oil supply	bar	When applying prepressing or the fow 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 fuid			Mineral oil, phosphate oil			
Temperature range of Hydraulic fuid			-30 to 80 (NBR seals)			
			-20 to 80 (FKM seals)			
Switching pilot oil volume		cm^3	Spring-centering 3-position valve			14.2
		cm^3	2-position valve			28.4
*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
*Switching time from working position to "0" position						
-Spring-centering 3-position valve		ms	40			
- 2-position valve		ms	125	100	90	80
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.

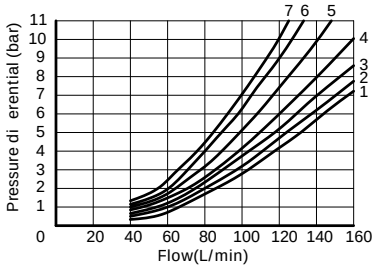
Technical details

2. Electrical data

Type of voltage		DC
Voltage (allowable fuctuation 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 ±5 , using HLP46)

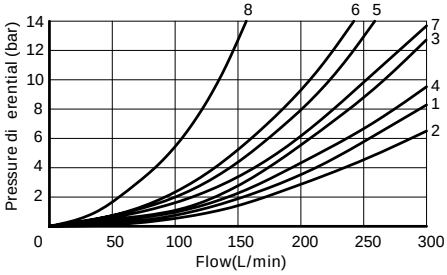
Type GWEH 10../6B2..



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	-

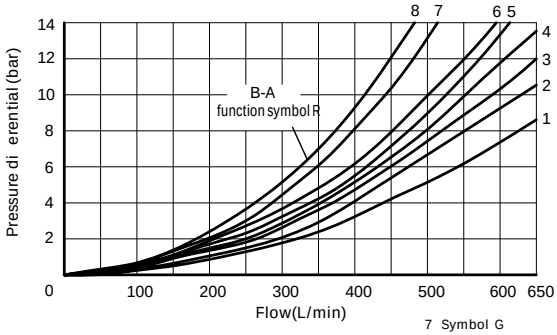
Type GWEH 16../6B2..



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..



7 Symbol G

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

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 limits

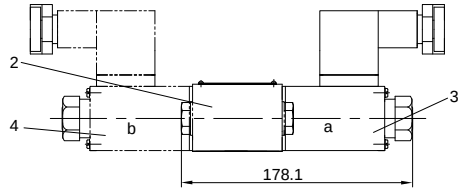
Enginery limit table of GWEH 25../6B2.. Type electro-hydraulic directional control valve

3-position valve of spring centering						**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, L, M	650	650	650	650	650	G, D, K, Z, Y	650	650	650	650	650
U, W, Q						**Hydraulic-return 2-position valve (main valve without spring)**					
G, T	400	400	400	400	400	HC HD HK HZ HY	650	650	650	650	650
F	650	550	430	330	300						
H	650	650	550	400	360	HC.../O	650	650	650	650	650
J	650	650	650	600	520	HD.../O					
P	650	550	430	330	300	HK.../O					
V	650	550	400	350	310	HZ.../O					
R	650	650	650	650	580	HC.../OF...	650	650	650	650	650
						HD.../OF...					
						HK.../OF...					
						HZ.../OF...					
						When control oil is supplied internally and pressure valve is equipped, the fow of spool valve's enginery of G, Z, V, F, H, P, T Types reaches 180L/min.					

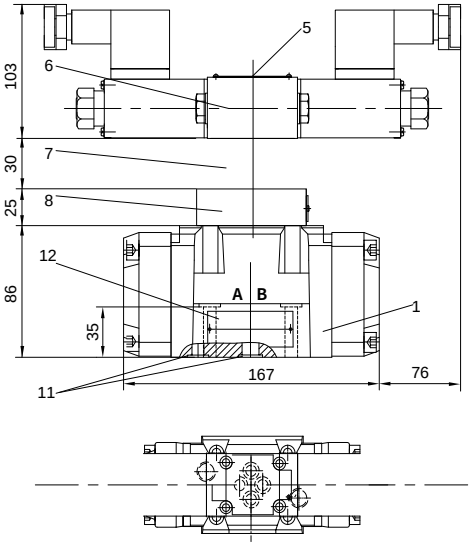
Pilot-operated solenoid valve

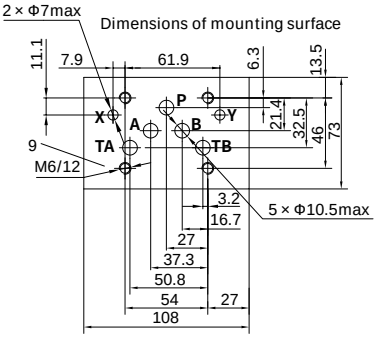
A four-way Explosion protection directional valve with NG 6 (G4WE6../B2..) is used as the pilot valve. The slide valve is kept in the middle or the initial position by the spring, and kept on the working position through the solenoid or the locator.
The valve applies the DC solenoid, and the function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



Requirement for
mounting surface





Port TA and port TB is
a optional return port