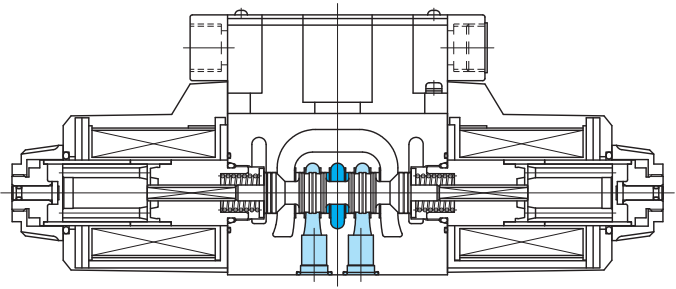
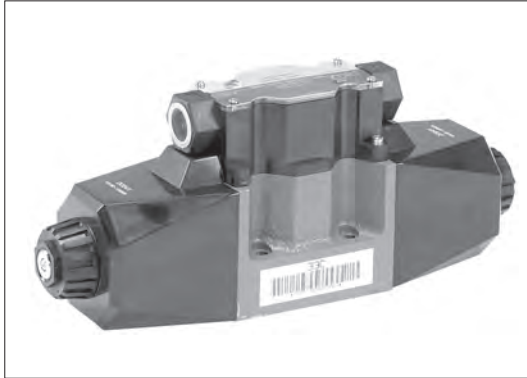


# Low-holding current solenoid operated directional control valves DG4VL-5

9-1

Directional Control Valves



- Energy-saving solenoid valve features reduced power consumption after switching (energized condition).
- Integrated solid state relay. Valve can be directly driven by connecting signal terminal to PLC, etc.

## Model Code

(F3)-DG4VL-5-2A(L)-M-PK2-H-7-40-(P10)

1 2 3 4 5 6 7 8 9 10 11 12

- 1 Hydraulic fluid  
Omit: mineral oil based fluid, water-glycol based fluid  
F3: Phosphate ester
- 2 Low-holding current solenoid operated directional control valve (gasket mounting)  
Wet armature type
- 3 Mounting dimensions  
5: ISO 4401-AC-05-4-A
- 4 Spool type  
See page E9-2 and E9-3
- 5 Spool/spring arrangement  
A: Spring offset, A type (2 position, single solenoid)  
B: Spring offset, B type (2 position, single solenoid)  
C: Spring centered type (3 position, double solenoid)  
N: No spring detented type (2 position, double solenoid)
- 6 Solenoid assembly configuration (for spring sets, type A and B)  
Omit: standard (energized: P to B, A to T)  
L: Left hand build (energized: P to A, B to T)
- 7 Electrical wiring (configuration, wiring connection port side)  
P: Plug-in solenoids, conduit box, G 1/2
- 8 Contact point input type  
K2: Sink connection  
E2: Source connection

- 9 Solenoid voltage  
H: DC24 V
- 10 Allowable T port back pressure  
7: 20.6 MPa
- 11 Design no.
- 12 Port orifice (option)  
Omit: no port orifices (standard)  
Port orifices  
<Example 1> P10 (1.0 mm orifice in P port)  
Orifice Diameter  
Port (A, B, P and T)  
<Example 2> B12 (1.2 mm orifice in B port)  
<Example 3> 2 port combinations  
Combination sequence, PTAB  
P10T12, P08B10

- Note:
- T port orifice is used in T port on A port side.
  - When using T port orifice, make sure that surge pressures do not exceed allowed back pressure.
  - When using port orifices, keep circuit pressure below 21 MPa.
  - When using in stacked module assemblies, consult Tokyo Keiki regarding use of port orifices.

## Specifications

Model Code	Max. Working Pressure MPa	Max. Flow L/min	Allowable Tank Port Back Pressure MPa	Max. Switching Frequency (cycles/min)	Weight kg	
					Single Solenoids	Double Solenoids
DG4VL-5	31.5	See "Pressure-Flow Characteristics"	20.6	180	4.4	6.1

# Electrical Specifications

Electrical Wiring System	Voltage Code	Supply Voltage	Supply Current at Switching (0.3 sec. from ON)	Supply Current During Holding	Power Consumption During Holding	Solenoid		Allowable Contact Voltage		Contact Current	
						Insulation Class	Allowable Temperature	Solenoid OFF	Solenoid ON	Solenoid OFF	Solenoid ON
PK2	H	DC24V ±10%	1.58A	0.3A	7.5W	H	180 °C	DC24V or open	0V±0.1V	Less than 100µA	4mA
PE2								0V±0.1V or open	DC24V±10%		

Note: Current values and power consumption varies with temperature conditions. Values shown in table are based on 20°C.

# Spool Types and Pressure-Flow Characteristics

## DC Solenoids (applied voltage 90% of rated)

Spool Center Position	Model Code, Functional Symbol			Max. Flow L/min														
	3 Position	2 Position		P → A ( B port block )					P → B ( A port block )									
	Spring Centered	Spring Offset, B Type		P → A ( B port block )					P → B ( A port block )									
	- C -	- B -	- BL -	7 MPa	14 MPa	21 MPa	28 MPa	31.5 MPa	7 MPa	14 MPa	21 MPa	28 MPa	31.5 MPa	7 MPa	14 MPa	21 MPa	28 MPa	31.5 MPa
0	DG4VL-5-0C 	DG4VL-5-0B 	DG4VL-5-0BL 	*	*	*	*	*	160	160	160	160	160	160	160	160	160	160
1	DG4VL-5-1C 	DG4VL-5-1B 	DG4VL-5-1BL 	*	*	*	*	*	60	50	40	40	40	60	50	40	40	40
2	DG4VL-5-2C 	DG4VL-5-2B 	DG4VL-5-2BL 	160	160	160	160	160	160	160	110	100	95	160	160	110	100	95
3	DG4VL-5-3C 	DG4VL-5-3B 	DG4VL-5-3BL 	160	160	120	110	100	160	160	110	100	95	160	160	110	90	85
6	DG4VL-5-6C 	DG4VL-5-6B 	DG4VL-5-6BL 	160	160	160	120	110	160	160	100	90	85	160	160	100	90	85
7	DG4VL-5-7C 	DG4VL-5-7B 	DG4VL-5-7BL 	160	160	160	160	160	120	35	30	25	20	120	35	30	25	20
8	DG4VL-5-8C 	DG4VL-5-8B 	DG4VL-5-8BL 	*	*	*	*	*	160	70	55	50	50	160	70	55	50	50
11	DG4VL-5-11C 	DG4VL-5-11B 	DG4VL-5-11BL 	*	*	*	*	*	60	50	40	40	40	60	50	40	40	40
22	DG4VL-5-22C 	DG4VL-5-22B 	DG4VL-5-22BL 	—	—	—	—	—	160	160	100	90	85	160	160	100	90	85
31	DG4VL-5-31C 	DG4VL-5-31B 	DG4VL-5-31BL 	160	160	120	120	110	160	160	100	90	85	160	160	110	100	95
33	DG4VL-5-33C 	DG4VL-5-33B 	DG4VL-5-33BL 	160	160	160	160	160	160	160	110	100	95	160	160	110	100	95
34	DG4VL-5-34C 	DG4VL-5-34B 	DG4VL-5-34BL 	160	160	160	160	160	160	160	110	100	95	160	160	110	100	95

Note: • Max. flow refers to limit flow without valve malfunction for valve switching.  
• Max. flow value for \* is with A port and B port blocked.

# Spool Types and Pressure-Flow Characteristics

## DC Solenoids (applied voltage 90% of rated)

Spool Transient Condition	Model Code, Functional Symbol			Max. Flow L/min														
	2 Position			N, A, AL					N, A		AL			N, A		AL		
	No Spring Detented	Spring Offset, A Type																
		- N -	- A -	- AL -														
			7 MPa	14 MPa	21 MPa	28 MPa	31.5 MPa	7 MPa	14 MPa	21 MPa	28 MPa	31.5 MPa	7 MPa	14 MPa	21 MPa	28 MPa	31.5 MPa	
0		DG4VL-5-0A 	DG4VL-5-0AL 	*	*	*	*	*	80	80	80	80	80	160	160	160	150	140
2		DG4VL-5-2A 	DG4VL-5-2AL 	160	160	90	60	50	120	40	30	20	20	160	140	100	75	70
		DG4VL-5-22A 	DG4VL-5-22AL 	—	—	—	—	—	120	40	30	20	20	160	140	100	75	70
		DG4VL-5-23A 	DG4VL-5-23AL 	160	160	160	160	160	120	40	30	20	20	—	—	—	—	—
		DG4VL-5-24A 	DG4VL-5-24AL 	160	60	45	35	30	120	40	30	20	20	160	160	160	160	160
		DG4VL-5-28A 	DG4VL-5-28AL 	160	160	160	160	160	120	40	30	20	20	160	140	100	75	70
		DG4VL-5-2N 							140	140	140	120	110	140	140	140	120	110
		DG4VL-5-22N 							140	140	140	120	110	140	140	140	120	110
		6		DG4VL-5-6N 						140	140	140	120	110	140	140	140	120

Note: • Max. flow refers to limit flow without valve malfunction for valve switching.  
 • Max. flow value for \* is with A port and B port blocked.

## Characteristics Curve

### Pressure Drop Characteristics

Pressure drop characteristics are the same as DG4V-5 (see page E3-4).

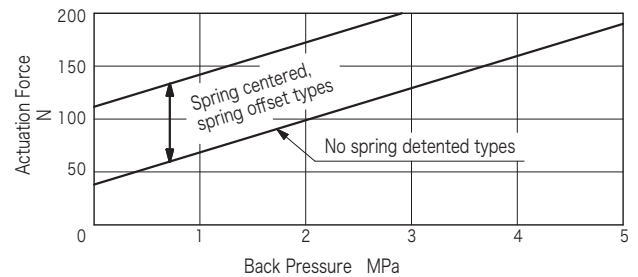
## Switching Times

Switching times are the same as DG4V-5 (see page E3-5). (DC power supply)

## Notes on Operation

- **Mounting orientation**  
To ensure sure switching of no spring detented type valves, mount valves so spool axis is horizontal. There are no mounting attitude restrictions for other spool/spring arrangements.
- **Solenoid energization**
  - Low power efficiencies are not attained with energization times less than 0.3 seconds.
  - Always ensure that one side of solenoid is deenergized before energizing the opposite side.
  - For spring centered and spring offset valves, solenoid should be continuously energized during circuit switching. Deenergization of solenoid will cause spool to return to prescribed position by spring force.
  - For no spring detented type valves, spool will be maintained in switched position by the detent but to ensure sure circuit switching, solenoid should be energized for more than 0.1 second.
- **T (tank) port piping**  
Prevent pressure surges above the allowable back pressure rating from being generated in T port. Valve is wet armature type so ensure that valve is always filled with oil.
- **Using valves as two-way and three-way**  
Valve is designed as four-way and max. flow is limited when using as two or three-way valves. Consult Tokyo Keiki for details.
- **Long periods of solenoid energization**  
Care should be paid as long periods of solenoid energization at high pressure may cause spool sticking and switching malfunction.

- **Malfunctions due to surge pressure**  
Avoid combining flows of tank lines prone to surge pressures. Surge pressures in T port may lead to spool malfunctions. No spring detented type valves are susceptible to such malfunctions during deenergization.
- **Manual operation**  
For manual switching, push the manual override pin. Be aware that actuation force increases with higher back pressure. (See graph)



- **Solenoid indicator lamp**  
Lamps will light when current flows to the solenoid.
- **Conduit box wiring**  
See page E9-5.

## Mounting Bolts (JIS B 1176, Strength Class 12.9)

Hex Socket Bolts	Qty
M6 × 40	4

- Mounting bolts must be ordered separately.
- Tightening torque of mounting bolts: 12 to 15 N•m

## Subplate

Subplate	Connection Port Dia. Rc
DGSM-01X-10-JA-M	3/8
DGSM-01Y-10-JA-M	1/2

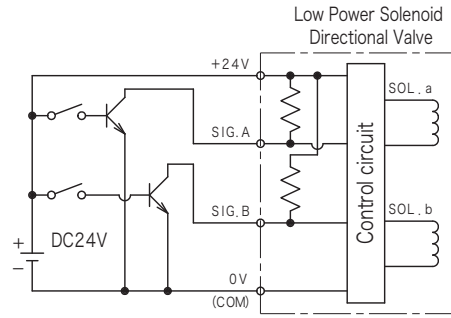
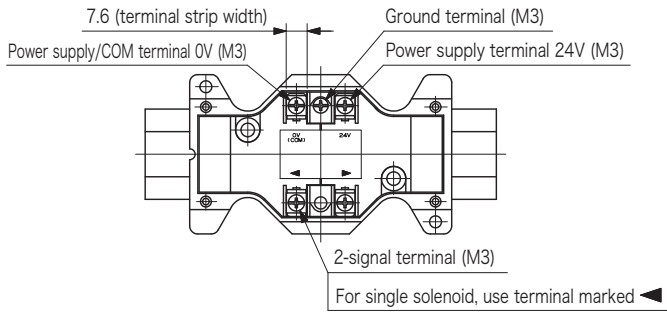
- Subplate and bolts must be ordered separately.
- See page R6-7 for dimensions.
- See page R6-7 for plural mount subplates.
- Max. working pressure is 21 MPa. For higher pressures, valve should be mounted on manifold block.

## Dimensions

Dimensions and mounting are same as DG4V-5. See page E3-6 (Mounting) and E3-7 (Dimensions).

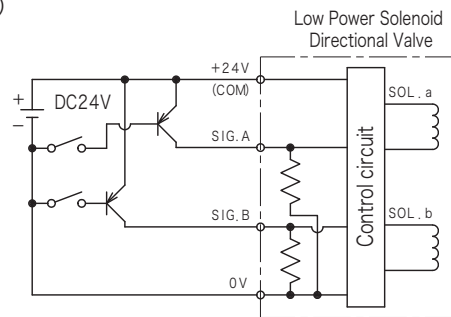
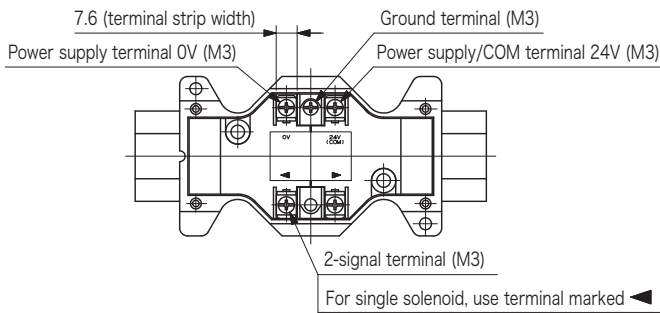
# Conduit Box Wiring

- K2: Sink Connection DG4VL-5-\*C/N-PK2 (double solenoid)  
DG4VL-5-\*A/B(L)-PK2 (single solenoid)

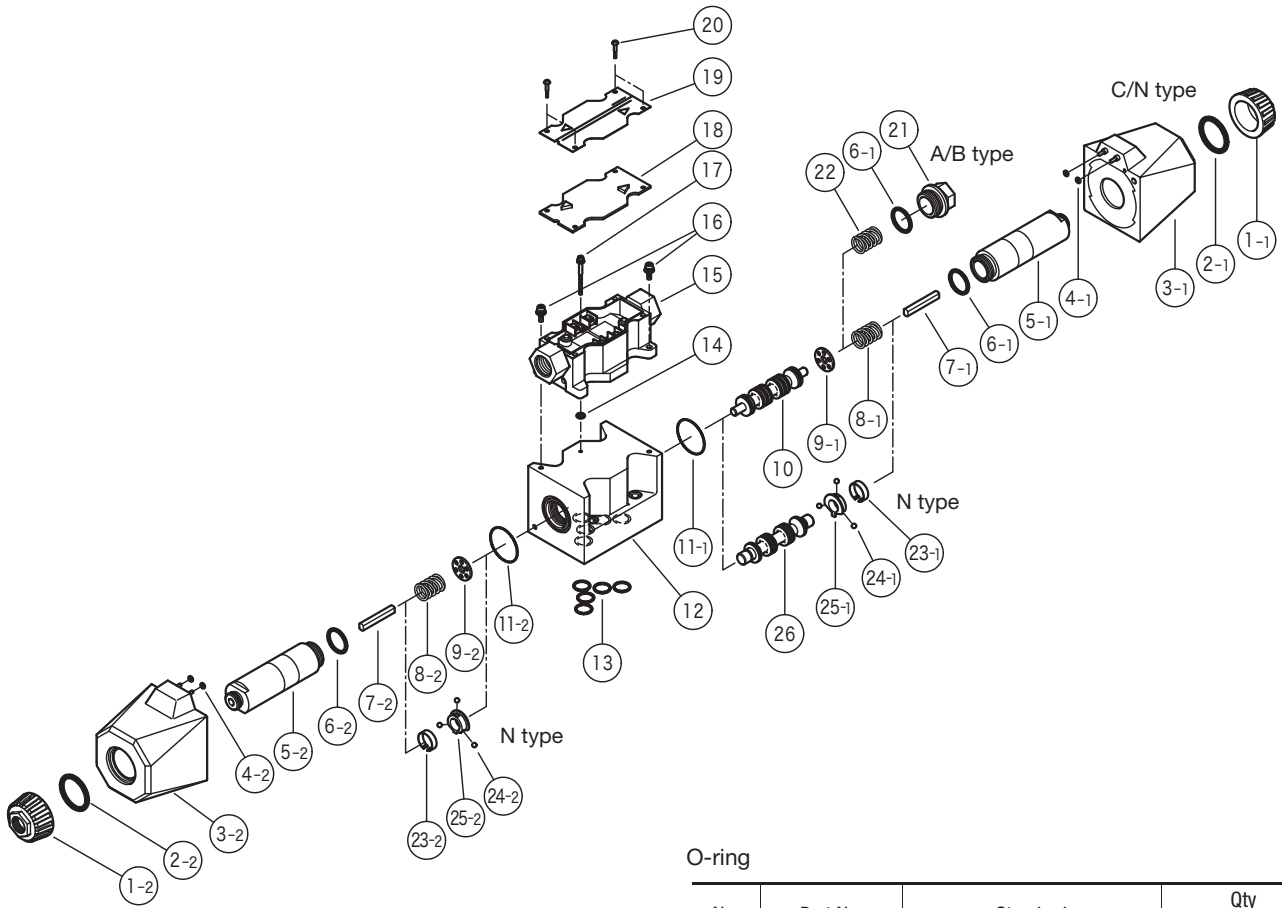


- Note:
- Power supply terminal should be wired to smoothed power supply and be always kept energized.
  - Signal terminals should be wired to relays or open collector (NPN) transistors.
  - Programmable controllers, etc., used should have leakage current of less than 200  $\mu$ A.

- E2: Source Connection DG4VL-5-\*C/N-PE2 (double solenoid)  
DG4VL-5-\*A/B(L)-PE2 (single solenoid)



- Note:
- Power supply terminal should be wired to smoothed power supply and be always kept energized.
  - Signal terminals should be wired to relays or open collector (PNP) transistors.
  - Programmable controllers, etc., used should have leakage current of less than 200  $\mu$ A.



O-ring

No.	Part No.	Standard	Qty	
			A/B	C/N
2	007921617	AS568-216 (NBR, Hs70)	1	2
4	008000217	JIS B 2401 1A-P4	2	4
6	007911729	AS568-117 (FKM, Hs90)	2	2
11	007902617	AS568-026 (NBR, Hs70)	1	2
13	007901419	AS568-014 (NBR, Hs90)	5	5
14	007900817	AS568-008 (NBR, Hs70)	1	1

Solenoid coil

No.	Voltage Code	Part No.
3	H	40018938