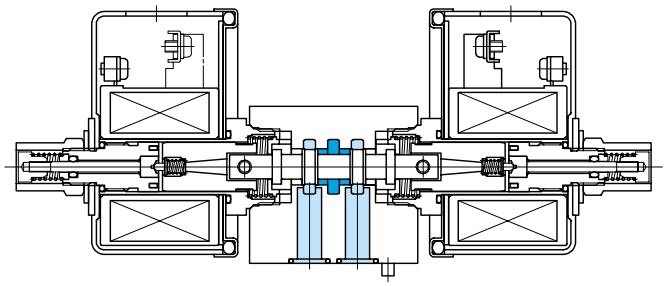
Directional control valves

Directional Control Valves

Description	Model	Maximum Operating Pressure MPa	Max. Flow L/min (1 2 5 10 20 50 100 200 500 1000)	Page
Miniature Solenoid Directional Valves	DG4M4	21		E3
CETOP 3 Solenoid Directional Valves	DG4V-3	35		E9
	DG4SM-3	16		E20
	DG4VC-3	35		E25
	DG4VL-3	35		E28
	DG4VS-3	35		E34
COMNICA Valves	COM-3~8	24.5 (20.6)	3 5 7 8	E39
CETOP 5 Solenoid Directional Valves	DG4V-5	31.5		E53
	DG4VC-5	31.5		E63
	DG4VL-5	31.5		E66
	DG4VS-5	31.5		E72
Solenoid Pilot Operated Directional Valves	DG5V-7	31.5		E78
	DG5V-H8	31.5		E78
	DG5S-10	21		E90
Pilot Operated Directional Valves	DG3V-7	31.5		E95
	DG3V-H8	31.5		E95
	DG3S-10	21		E102
Manually (Push Button) Operated Directional Valves	C-552-K C-572-K	14		E106
Mechnically Operated Directional Valves	C-552-E C-572-E	14		E106
Manually (Push Button) Operated Directional Valves	DG1M2 DT1M2	14		E108
Mechnically Operated Directional Valves	DG2M2 DT2M2	14		E108
	DG20S-3	21		E111
	DG2S2-01 DG2S4-01	21		E114
Manually (Lever) Operated Directional Valves	DG17V-7	31.5		E117

Solenoid operated directional control valves DG4M4



- Compact solenoid directional valve for use up to max. 21 MPa.
- Resin molded, 50/60 Hz dual frequency, two terminal coils do not require rewiring for differing frequencies.

Model Code

(F3) - DG4M4 - 30 C - 100AC50 - 20 - (LH) - (M12)- JA - (S7)

1 | 2 | 3 4 | 5 | 6 | 7 | 8 | 9

(F3) - DG4M4 - 30 C -20 - (LH)- 24DC - JA - S46/S47

1 | 2 | 3 4 | 6 | 7 | 5 | 10

1 Fluid
Omitted for mineral oil, water glycol
F3: phosphate ester

2 Miniature solenoid valve (gasket mounting)
Wet armature type

3 Spool type
See page E4.

4 Spool/spring arrangement
A: Spring offset, A type (2 position, single solenoid)
B: SPring offset, B type (2 position, single solenoid)
C: Spring center type (3 position, double solenoid)
Omitted for no spring (2 position, double solenoid)

5 Solenoid voltage
See 'Solenoid Specifications'

6 Design no.

7 Solenoid assembly configuration (for spring sets, type A and B)
Omitted for standard (energized, A type: P→B B type: P→A)
LH: Left hand build
(energize, A type: P → A B type: P → B)

8 Indicator lamp (option)
Omitted for no indicator lamp (standard)
M12: With indicator lamp (for AC solenoids)
DIN43650 connectors
W14: With indicator lamp and surge suppressor (for DC solenoids)
DIN43650 connectors

9 Special suffix (option)
S7: 1.0mm orifice in P port

10 Special suffix
S46: Lead wire type electrical connection (length 300mm)
S47: Lead wire type electrical connection
(with surge suppressor, length 300mm)

Specifications

Model	Maximum Operating Pressure MPa	Max. Flow L/min	Allowable Tank Port Back Pressure MPa	Max. Switch. Freq. (cycles/min.)		Weight kg	
				AC Solenoids	DC Solenoids	Single Solenoid	Double Solenoid
DG4M4	21	See 'Press-Flow Characteristics'	7	500	400	0. 9	1. 2

Solenoid Specifications

Power	Volt. Code	Volt. V	Freq. Hz	Initial Current A	Holding Current A	Weight W	Allow. Volt. Fluctuation %	Insul. Class. (Allow. Temp.)
AC	Z	100	50	0. 42	0. 30	18. 0	±10	F (155 ˚C)
			60	0. 36	0. 25	15. 3		
	V	200	50	0. 21	0. 14	18. 8		
			60	0. 18	0. 12	16. 5		
DC	P	12	—	—	1. 23	14. 8	±10	F (155 ˚C)
	N	24			0. 56	13. 4		
DC (Lead Wire)	—	12	—	—	1. 20	14. 5	±10	F (155 ˚C)
		24			0. 60	14. 5		

- Consult Tokimec for voltages not listed in Table.
- Current, power consumption may vary according to temperature. Values shown Table at left are based on 30degrees C.

Spool Types and Pressure-Flow Characteristics

＊ Max. flows - upper values for DC solenoids, lower values for AC solenoids.
Solenoid condiitions: 90% of rated voltages for both DC and AC during energization. AC solenoids values are for 60 Hz.

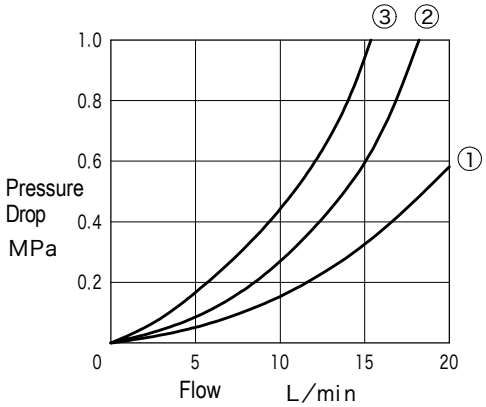
Spool Center Position	Valve Function Schematics			Max. Flow L/min						Press. Drop Curve No. Switched Condition				
	3 Position	2 Position												
	Spring Centered	Spring Offset												
			Left Hand Build	3. 5MPa	7MPa	10. 5MPa	14MPa	17. 5MPa	21MPa	P→A	B→T	P→B	A→T	P→T
	– C –	– B –	– B – LH –											
0	DG4M4-30C	DG4M4-30B	DG4M4-30B-LH	20	20	20	20	20	20	①	①	①	①	①
				20	20	20	20	20	20					
1	DG4M4-31C	DG4M4-31B	DG4M4-31B-LH	15	13	12	9	9	9	①	②	②	①	—
				15	13	12	9	9	9					
2	DG4M4-32C	DG4M4-32B	DG4M4-32B-LH	20	20	20	20	20	20	②	②	②	②	—
				20	20	16	5	5	5					
3	DG4M4-33C	DG4M4-33B	DG4M4-33B-LH	20	20	20	20	13	11	②	②	②	②	—
				20	20	16	5	5	5					
4	DG4M4-34C	DG4M4-34B	DG4M4-34B-LH	18	13. 5	9	7	7	4. 5	③	③	③	③	②
				18	13. 5	9	7	7	4. 5					
6	DG4M4-36C	DG4M4-36B	DG4M4-36B-LH	20	20	20	20	20	20	②	①	②	①	—
				20	20	20	20	13	8					
7	DG4M4-37C	DG4M4-37B	DG4M4-37B-LH	20	20	20	20	20	20	①	②	①	②	—
				20	20	20	20	20	20					

Spool Transient Condition	2 Position			Max. Flow L/min						Press. Drop Curve No. Switched Condition				
	No Spring	Spring Offset												
	Omitted	– A –	– A – LH –							P→A	B→T	P→B	A→T	P→T
2	DG4M4-32	DG4M4-32A	DG4M4-32A-LH	20	20	20	20	13	11	②	②	②	②	—
				20	20	20	20	13	11					

Note: Max. flow without valve malfunction.

Performance Curve (viscosity 20 mm²/s , specific gravity 0.87)

● Pressure Drop



1. For pressure drops ($\triangle P_1$) of viscosities other than 20mm²/s, calculate using multiplier coefficients shown in below table.
2. The formula to calculate pressure drops ($\triangle P_1$) for specific gravities other than 0.87 is as follows.

$\triangle P_1 = \triangle P \times G_1 / G$

$\triangle P$ ·····Evalues according to performance curve

G ·····0. 87

G_1 ·····Desired specific gravity value

Viscosity mm²/s	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Coefficient	0. 85	1. 00	1. 09	1. 17	1. 24	1. 29	1. 34	1. 38	1. 42	1. 46	1. 49	1. 52	1. 56	1. 59	1. 62

Switching Times

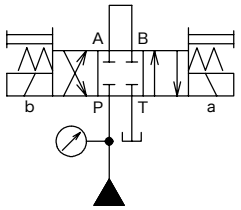
Unit : ms

Power Supply	Operation	Spring Centered	Spring Offset	No Spring
AC	Energize	12～17	7～12	12～17
	Spring Return	17～22	13～18	———
DC	Energize	32	29	30
	Spring Return	18	16	———

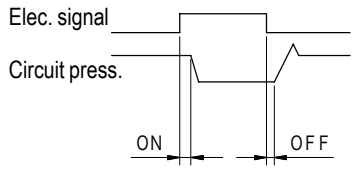
Note: Values shown may differ according to spool type and circuit conditions.

● Conditions: No. 2 spool, open loop circuit, flow 10 L/min., supply pressure 10.5 MPa, fluid viscosity 20 mm^2/s

[Circuit Example]



[Switching Time Definition]



Operating Considerations

• Mounting orientation

Mount no spring type valves so spool axis is horizontal. There are no mounting attitude restrictions for other spool/spring arrangements.

• Solenoid energization

Always insure that one side solenoid is deenergized before energizing the opposite side solenoid. For no spring type valves, one side solenoid should always be energized continuously.

• T (tank) port piping

Prevent abnormal pressure surges above the allowable back pressure rating from being generated in T port. Valve is wet armature type so insure that valve is always filled with oil.

• Malfunctions due to surge pressure

Avoid combining flows of tank lines prone to surge pressures. Surge pressures in valve T port may lead to spool malfunctions.

• Using valves as two-way and three-way

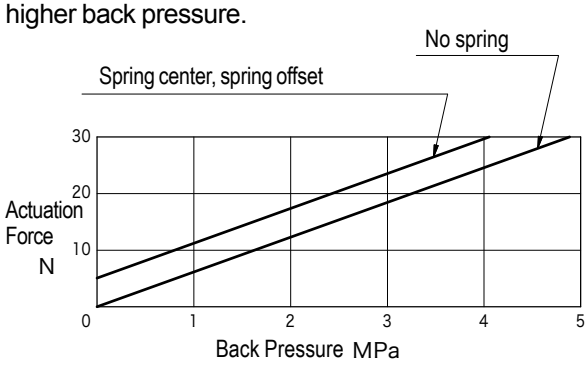
Valve is designed as four-way and as such max. flow is limited when using as two or three-way valves. Consult TOKIMEC for details.

• 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.

• Manual operation

Valve is solenoid "pull" type. For manual switching, push the manual override pin on the opposite side. This differs from "push" type solenoid switching valves. Also as shown in graph below, required actuation force increases with higher back pressure.



• Solenoid indicator lamp

For valves with indicator lamps, the lamps will light when current flows to the solenoid.

Mounting Bolts (JIS B1176,Strength Class 12.9)

Hex Socket Bolts		Qty
Metric	Unified	
M6×45	1/4–20UNC×44. 5	4

● Mounting bolts must be ordered separately.

● Mounting bolt tightening torque: 8 - 10Nm.

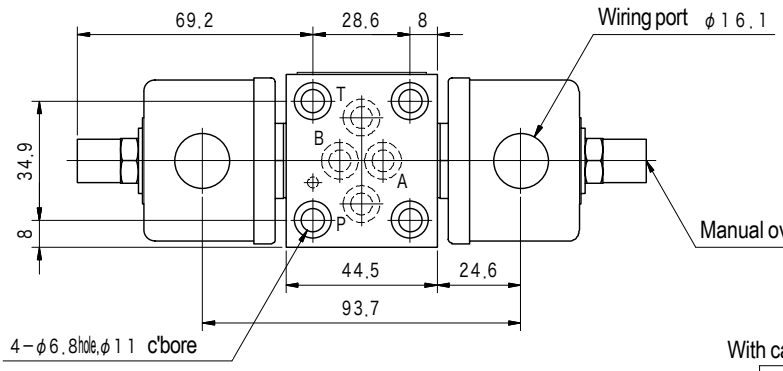
Subplate

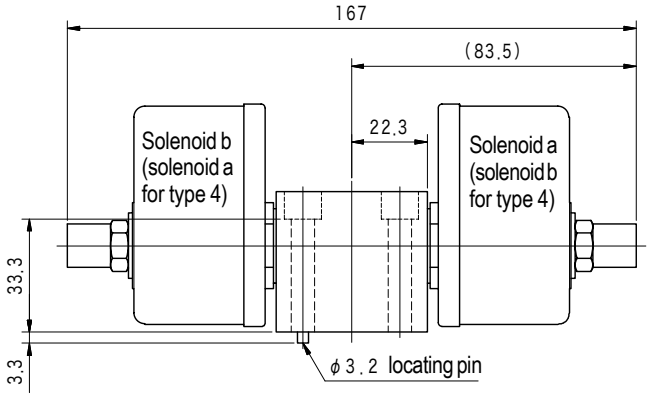
Model		Subplate Model	Port Dia. Rc	Mounting Bolts
DG4M4	Side Ported	DGME–02–JA–20–B–J	1/4	1/4–20UNC
		DGME–03–JA–20–B–J	3/8	
		DGME–02–JA–20–R–J	1/4	M6
		DGME–03–JA–20–R–J	3/8	
	Rear Ported	DGM–02–JA–20–B–J	1/4	1/4–20UNC
		DGM–03–JA–20–B–J	3/8	
		DGM–02–JA–20–R–J	1/4	M6
		DGM–03–JA–20–R–J	3/8	

• Subplate must be ordered separately.
• See page Q7 for dimensions.
• See page Q7 for multiple valve mount subplate.
• Mounting bolts are not included.

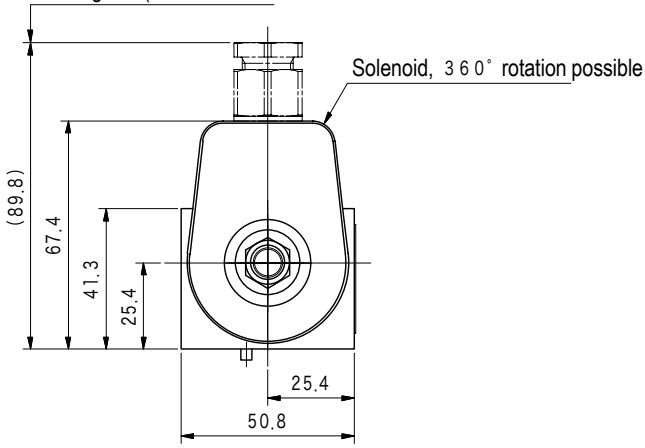
Dimensions

Spring Centered DG4M4−3∗C
No Spring DG4M4−32

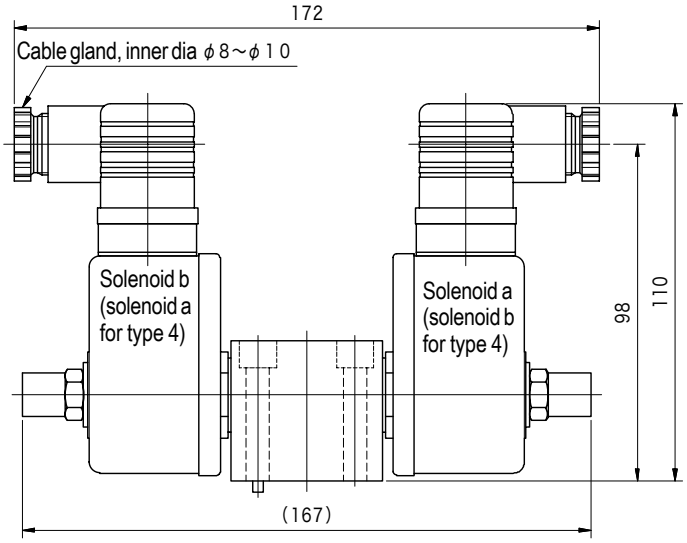




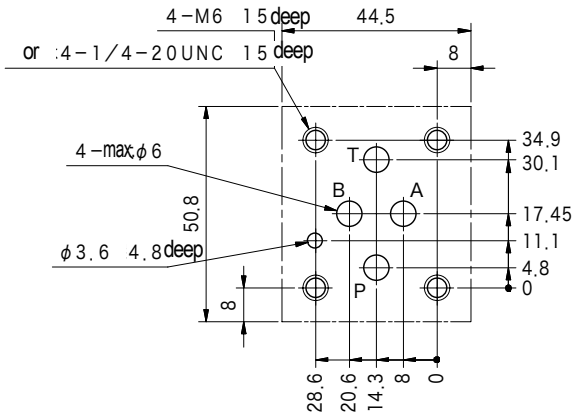
With cable gland (inner dia. φ8)



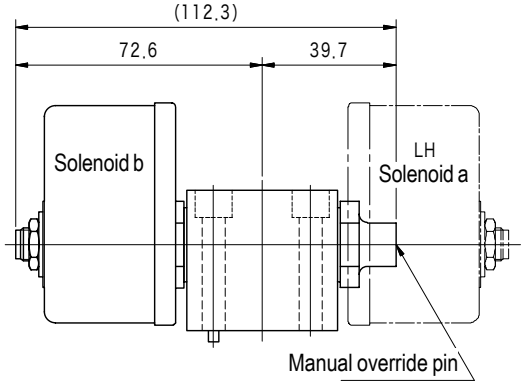
With Indicator Lamp (Option)



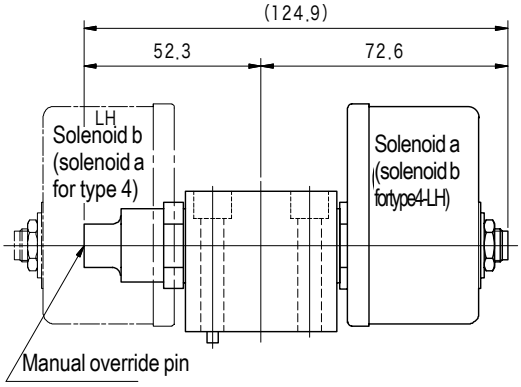
Mounting Dimensions



Spring Offset, A Type DG4M4−32A

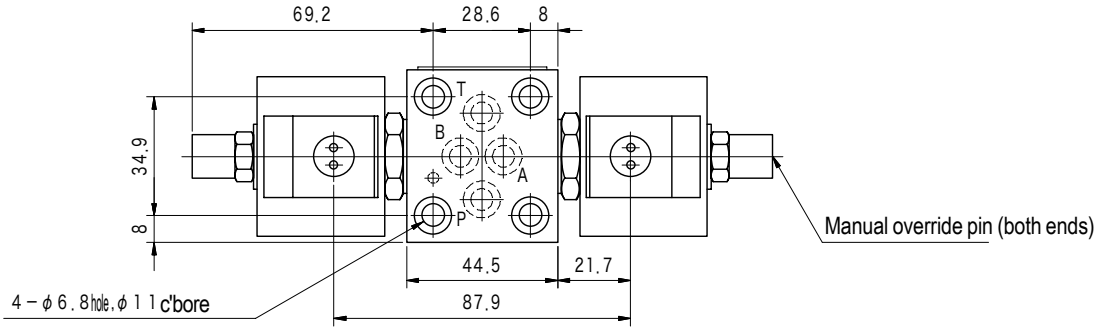


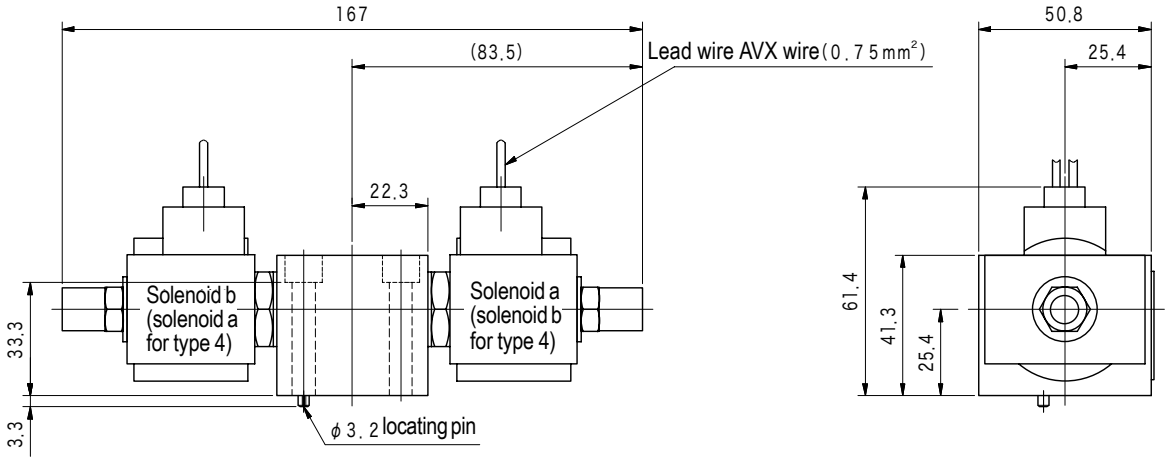
Spring Offset, B Type DG4M4−3∗B



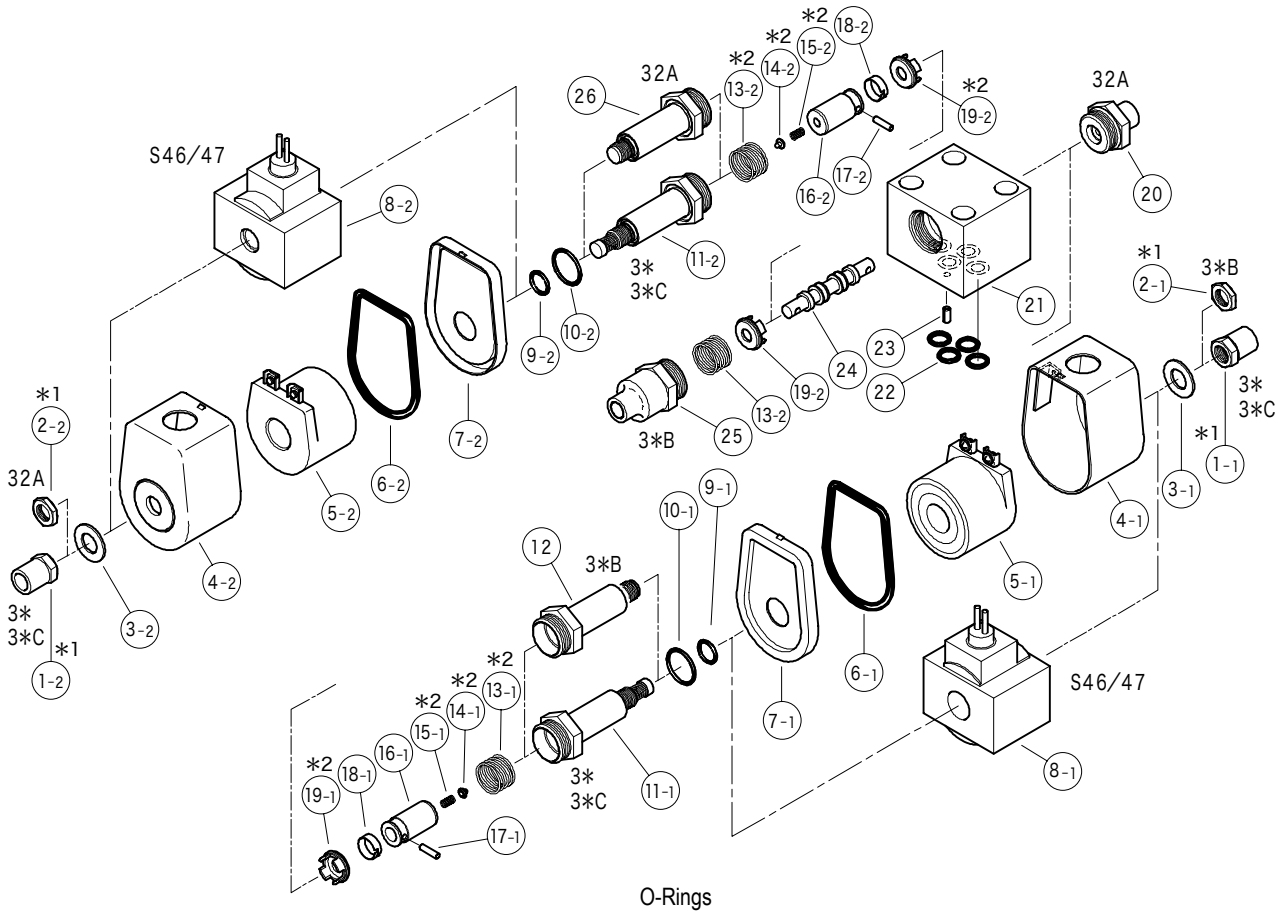
Dimensions

Spring Centered DG4M4−3∗C−S46/S47
No Spring DG4M4−32−S46/S47





Construction

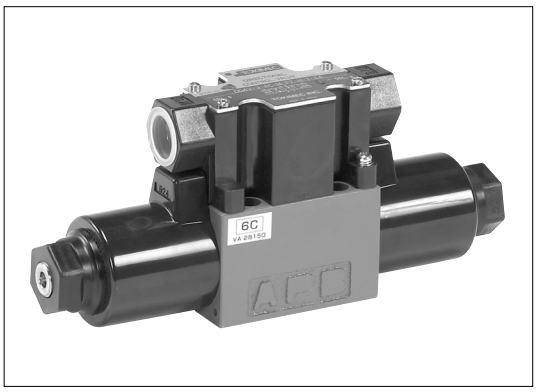


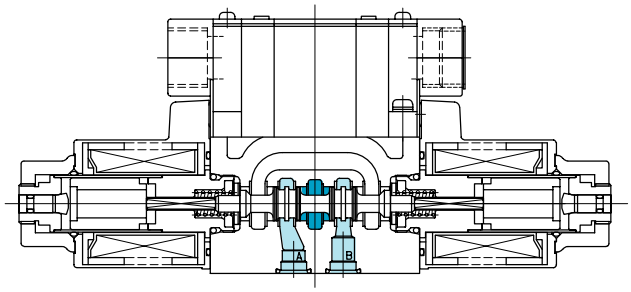
*1 ①, ② nut tightening torque: 4 - 6Nm
*2 、⑬, ⑭, ⑮, ⑲ not used for no spring valve

O-Rings

No.	Part No.	Standard	Quantity	
			3*A/B	3*/3*C
9	007901217	AS568–012 (NBR, Hs70)	1	2
10	007901617	AS568–016 (NBR, Hs70)	1	2
22	007901117	AS568–011 (NBR, Hs70)	4	4

Solenoid operated directional control valves DG4V-3





- Wet type solenoid valve boasts superior valve life with low switching noise. No seals on sliding surfaces eliminates leakage worries.
- Many valve options including 3 types of wiring connections, indicator lamp, surge suppressor, and AC/DC rectifier.

Model Code

(F3) - DG4V - 3 - 2A (L) -M-P2 - T - 7 - (P08) - 54

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

1 Fluid
Omitted for mineral oil, water glycol
F3: phosphate ester

2 CETOP 3 solenoid directional valve
Wet armature type (gasket mounting

3 Mounting
3: ISO 4401-03

4 Spool
See page E11 - 14.

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 (3 position, dual solenoid)
N: No spring detented (2 position, dual solenoid)

6 Solenoid assembly orientation (for spring sets A, B)
Omitted for standard (energized: P to B, A to T)
L: Left hand build (energized: P to A, B to T)

7 Coil connections
P: Plug-in solenoids, conduit box, G 1/2
U: DIN43650 connector, pg. 11
KU: Flying leads (st'd lead wire length 350mm, DC only

8 Electrical accessories
Omitted for no accessories (coil connections P, KU)
1: Connectors without accessories (coil connection U)
2: With indicator lamp (AC standard)
4: With surge suppressor (coil connection KU, slow solenoid deenergize)
7: With indicator lamp and surge suppressor (DC standard)
9: ADC solenoid rectifier (fast solenoid de-energization) and indicator lamp (ADC standard)
12: ADC solenoid rectifier (slow solenoid de-energization) and indicator lamp
Note 1: Electrical accessories - 9, 12
- ADC solenoids (AC-DC rectifier) only
- Wiring connection, P only
- With surge suppressor

Note 2: Re electrical accessories - 2, 7, not applicable for KU.

9 Solenoid coil voltage
T:AC100V 50/60Hz,AC110V 60Hz
V:AC200V 50/60Hz,AC220V 60Hz
G:DC12V
H:DC24V
TR:AC100V 50/60Hz (ADC• AC/DC rectifier)
VR:AC200V 50/60Hz (ADC• AC/DC rectifier)

10 Tport allowable back pressure

11 Port orifice (option)
Omitted for no port orifices (standard)
Port orifices
<Example 1> P08 (0.8m orifice in P port)
Orifice diameter
Port (A, B, P, T)
<Example 2> B12 (1.2mm orifice in B port)
<Example 2 >2 port combinations
Combination sequence, PTAB
P10T12,P08B10

12 Design no.

Specifications

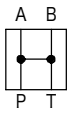
Model	Max. Operating Pressure MPa	Max. Flow L/min	Allowable Tank Port Back Pressure MPa	Max. Switching Freq. (cycles/min.)			Weight kg			
				AC	DC	ADC Rectified	Single Solenoid		Double Solenoid	
							AC	DC	AC	DC
DG4V-3	35	See 'Press-Flow Characteristics'	20. 6	300	300	120	1. 5	1. 6	1. 8	2. 0

Solenoid Specifications

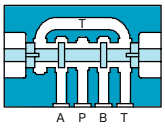
Power Supply	Volt. Code	Voltage V	Frequency Hz	Initial Current A	Holding Current A	Power Consumption W	Allow. Volt. Fluctuation %	Insul. Class (Allow. Temp)
AC	T	100	50	2. 42	0. 52	22	+10, −15	H (180 °C)
			60	2. 10	0. 40	19	+20, −10	
		110	60	2. 32	0. 46	23	+10, −15	
	B	110	50	2. 20	0. 47	22	+10, −15	
		115	60	2. 00	0. 36	21	+15, −10	
		120	60	2. 10	0. 42	23	+10, −15	
	V	200	50	1. 21	0. 26	22	+10, −15	
			60	1. 05	0. 20	19	+20, −10	
		220	60	1. 16	0. 23	23	+10, −15	
	D	220	50	1. 10	0. 24	22	+10, −15	
		230	60	1. 00	0. 18	21	+15, −10	
		240	60	1. 05	0. 21	23	+10, −15	
DC	G	12	——	——	2. 36	29	±10	H (180 °C)
	H	24			1. 16	28		
	J	48			0. 59	29		
	R	100			0. 29	29		
AC ↓ DC (rectified) ADC	TR	AC100 V 50/60 Hz ↓ DC90 V (coil)	——	——	0. 33	30	±10	H (180 °C)
	VR	AC200 V 50/60 Hz ↓ DC180 V (coil)			0. 17	31		

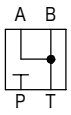
Notes:
- Current values and power consumption varies with temperature conditions. Values shown in table are based on 30°C.
- Integrated AC/DC rectifier enables AC power source to drive DC solenoids (see rectified DC solenoid characteristics). Maximum flow is based on DC solenoids.
- Contact TOKIMEC for other voltages not shown.

Spool Types (Neutral Position)

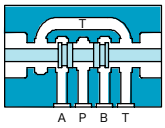


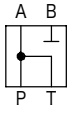
0 Open center



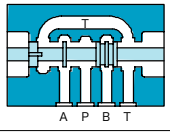


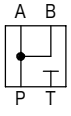
6 A-B-T Connected



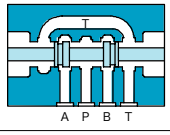


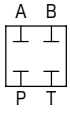
1 P-A-T Connected



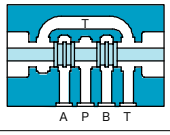


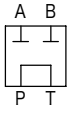
7 P-A-B Connected



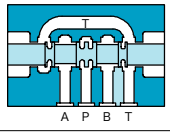


2 Closed center

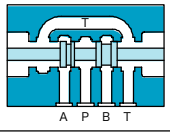


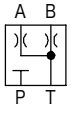


8 Tandem

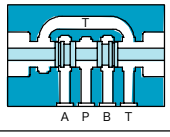


3 A-T Connected



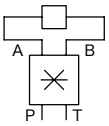
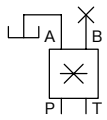
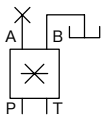


33 A-B-T Connected w/Restrictors in A & B



Spool Types and Pressure-Flow Characteristics

AC Solenoids (applied voltage 90% of rated, frequency 60Hz)

Spool Neutral Position	Valve Function Schematics			Max. Flow L/min															
	3 Position	2 Position		P → A → B → T, B → A					P→A (Port blocked)					P→B (Port blocked)				
	Spring Centered	Spring Offset, Type B																
	– C –	– B –	– BL –	7 MPa	14MPa	21MPa	28MPa	35MPa	7 MPa	14MPa	21MPa	28MPa	35MPa	7 MPa	14MPa	21MPa	28MPa	35MPa
0	DG4V-3-0C	DG4V-3-0B	DG4V-3-0BL	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
1	DG4V-3-1C	DG4V-3-1B	DG4V-3-1BL	45	45	45	30	25	70 (40)	25 (20)	20 (14)	20 (11)	18 (10)	45	45	45	45	45
2	DG4V-3-2C	DG4V-3-2B	DG4V-3-2BL	100	100	100	100	100	80	32	20	15	10	80	32	20	15	10
3	DG4V-3-3C	DG4V-3-3B	DG4V-3-3BL	80	80	50	20	10	80	22	10	5	5	80	26	18	10	5
6	DG4V-3-6C	DG4V-3-6B	DG4V-3-6BL	80	80	80	80	80	80	34	23	16	10	80	34	23	16	10
7	DG4V-3-7C	DG4V-3-7B	DG4V-3-7BL	100	100	100	100	100	70	21	14	12	10	70	21	14	12	10
8	DG4V-3-8C	DG4V-3-8B	DG4V-3-8BL	45	45	45	30	25	45 (45)	45 (45)	45 (38)	30 (33)	25 (30)	45	45	45	30	25
22	DG4V-3-22C	DG4V-3-22B	DG4V-3-22BL	—	—	—	—	—	80	20	10	5	5	80	20	10	5	5
31	DG4V-3-31C	DG4V-3-31B	DG4V-3-31BL	80	80	50	20	10	80	26	18	10	5	80	22	10	5	5
33 34	DG4V-3-33/34C	DG4V-3-33/34B	DG4V-3-33/34BL	80	80	80	80	80	80	32	20	15	10	80	32	20	15	10
52	DG4V-3-52C		DG4V-3-52BL	80	80	80	10	5	80	20	10	8	5	80	20	10	8	5
56	DG4V-3-56C		DG4V-3-56BL	80	80	80	10	5	80	20	10	8	5	80	20	10	8	5
62	DG4V-3-62C		DG4V-3-62BL	80	80	80	10	5	80	25	20	15	10	80	25	20	15	10
63	DG4V-3-63C	DG4V-3-63B		—	—	—	—	—	80	25	20	15	10	80	25	20	15	10
521	DG4V-3-521C	DG4V-3-521B		80	80	80	10	5	80	20	10	8	5	80	20	10	8	5
561	DG4V-3-561C	DG4V-3-561B		80	80	80	10	5	80	20	10	8	5	80	20	10	8	5
621	DG4V-3-621C			80	80	80	10	5	80	25	20	15	10	80	25	20	15	10

Note : • Values indicated in ( ) for spools 1, 8 are maximum flows with A, B port closed.
• Max. flow without valve malfunction.

Spool Types and Pressure-Flow Characteristics

AC Solenoids (applied voltage 90% of rated, frequency 60Hz)

Spool Transient Condition	Valve Function Schematics			Max. Flow L/min															
	2 Position			N, A, AL					N, A					AL					
	No Spring Detented	Spring Offset, A Type		P↔A↔B↔T					P→A B Port blocked					P→B A Port blocked					
	– N –	– A –	– AL –	7 MPa	14MPa	21MPa	28MPa	35MPa	7 MPa	14MPa	21MPa	28MPa	35MPa	7 MPa	14MPa	21MPa	28MPa	35MPa	
0		DG4V-3-0A	DG4V-3-0AL	80	80	80	80	80	60	60	60	60	60	80	80	80	80	80	
	DG4V-3-0N			70	70	70	70	70	60	60	60	60	60	60	60	60	60	60	
2		DG4V-3-2A	DG4V-3-2AL	80	80	75	55	50	50	15	10	10	10	55	35	33	30	30	
		DG4V-3-22A	DG4V-3-22AL	—	—	—	—	—	40	20	15	10	10	80	50	30	18	10	
		DG4V-3-23A	DG4V-3-23AL	80	80	80	80	80	40	20	15	10	10	—	—	—	—	—	
		DG4V-3-26A	DG4V-3-26AL	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
		DG4V-3-28A	DG4V-3-28AL	80	80	80	80	80	40	18	15	10	10	80	55	35	30	25	
		DG4V-3-32A	DG4V-3-32AL	65	65	65	65	65	60	20	15	10	10	80	25	15	10	5	
		DG4V-3-35A	DG4V-3-35AL	—	—	—	—	—	80	80	45	42	35	—	—	—	—	—	
	DG4V-3-2N			70	70	70	70	70	60	60	60	50	30	60	60	60	50	30	
6		DG4V-3-6A	DG4V-3-6AL	80	80	80	80	80	40	20	15	10	10	80	35	30	25	25	
	DG4V-3-6N			80	80	80	80	80	50	50	50	50	50	50	50	50	50	50	
7		DG4V-3-7A	DG4V-3-7AL	50	50	50	50	50	50	25	15	10	10	70	25	20	15	10	
		DG4V-3-27A	DG4V-3-27AL	—	—	—	—	—	80	25	15	15	15	80	50	45	40	40	
24		DG4V-3-24A	DG4V-3-24AL	60	60	60	60	60	60	25	15	10	10	—	—	—	—	—	

Note : • Max. flow without valve malfunction.

Spool Types and Pressure-Flow Characteristics

DC, ADC Rectified Solenoids (applied voltage 90% of rated)

Spool Neutral Position	Valve Function Schematics			Max. Flow L/min															
	3 Position	2 Position		P → A, B → B, A → T					P→A (B Port blocked)					P→B (A Port blocked)					
	Spring Centered	Spring Offset, Type B																	
	– C –	– B –	– BL –	7MPa	14MPa	21MPa	28MPa	35MPa	7MPa	14MPa	21MPa	28MPa	35MPa	7MPa	14MPa	21MPa	28MPa	35MPa
0	DG4V-3-0C	DG4V-3-0B	DG4V-3-0BL	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
1	DG4V-3-1C	DG4V-3-1B	DG4V-3-1BL	45	45	45	30	25	70 (40)	25 (20)	20 (14)	20 (11)	18 (10)	45	45	45	45	45
2	DG4V-3-2C	DG4V-3-2B	DG4V-3-2BL	100	100	100	100	100	80	45	30	23	19	80	45	30	23	19
3	DG4V-3-3C	DG4V-3-3B	DG4V-3-3BL	80	80	65	35	30	80	30	23	18	14	80	65	35	28	24
6	DG4V-3-6C	DG4V-3-6B	DG4V-3-6BL	80	80	80	52	42	80	60	38	27	23	80	60	38	27	23
7	DG4V-3-7C	DG4V-3-7B	DG4V-3-7BL	100	100	100	100	100	70	21	14	12	10	70	21	14	12	10
8	DG4V-3-8C	DG4V-3-8B	DG4V-3-8BL	45	45	45	30	25	45 (45)	45 (45)	45 (38)	30 (33)	25 (30)	45	45	45	30	25
22	DG4V-3-22C	DG4V-3-22B	DG4V-3-22BL	—	—	—	—	—	80	34	25	20	20	80	34	25	20	20
31	DG4V-3-31C	DG4V-3-31B	DG4V-3-31BL	80	80	65	35	30	80	65	35	28	24	80	30	23	18	14
33 34	DG4V-3-33/34C	DG4V-3-33/34B	DG4V-3-33/34BL	80	80	80	80	80	80	45	30	23	19	80	45	30	23	19
52	DG4V-3-52C		DG4V-3-52BL	80	80	40	27	22	80	37	25	20	20	80	37	25	20	20
56	DG4V-3-56C		DG4V-3-56BL	80	80	40	27	22	80	37	25	20	20	80	37	25	20	20
62	DG4V-3-62C		DG4V-3-62BL	80	80	40	27	22	80	37	25	20	20	80	37	25	20	20
63	DG4V-3-63C	DG4V-3-63B		—	—	—	—	—	80	37	25	20	20	80	37	25	20	20
521	DG4V-3-521C	DG4V-3-521B		80	80	40	27	22	80	37	25	20	20	80	37	25	20	20
561	DG4V-3-561C	DG4V-3-561B		80	80	40	27	22	80	37	25	20	20	80	37	25	20	20
621	DG4V-3-621C			80	80	40	27	22	80	37	25	20	20	80	37	25	20	20

Notes : • Values in ( ) for spool types 1 and 8 are max. flows with A, B ports blocked.
• Max. flow without valve malfunction.

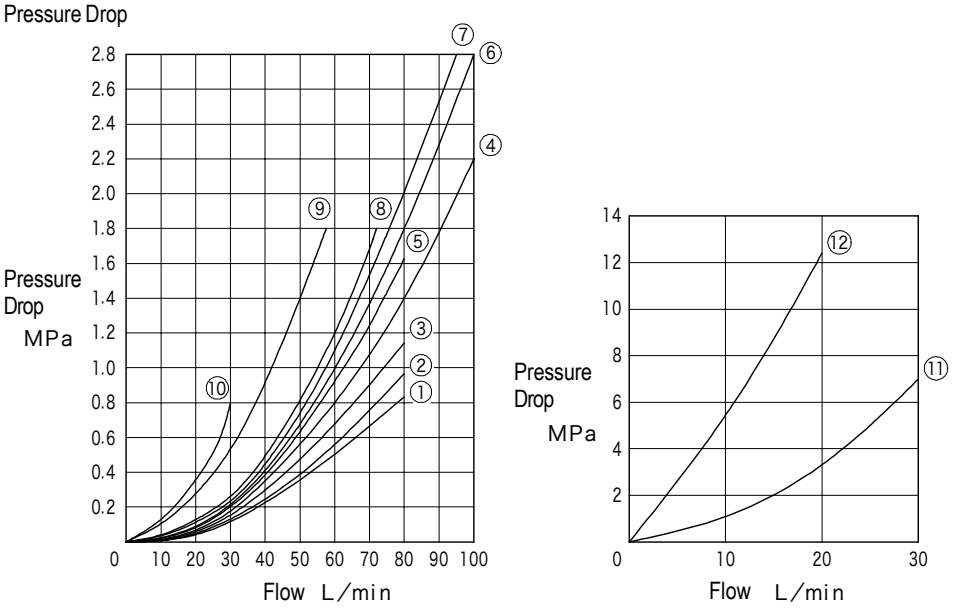
Spool Types and Pressure-Flow Characteristics

DC, ADC Rectified Solenoids (applied voltage 90% of rated)

Spool Transient Condition	Valve Function Schematics			Max. Flow L/min															
	2 Position			N, A, AL					N, A					AL					
	No Spring Detented	Spring Offset, A Type		P→A, B→T					P→A B Port blocked					P→B A Port blocked					
	– N –	– A –	– AL –	7MPa	14MPa	21MPa	28MPa	35MPa	7MPa	14MPa	21MPa	28MPa	35MPa	7MPa	14MPa	21MPa	28MPa	35MPa	
0		DG4V-3-0A	DG4V-3-0AL	80	80	80	80	80	60	60	60	60	60	80	80	80	80	80	
	DG4V-3-0N			70	70	70	70	70	60	60	60	60	60	60	60	60	60	60	
2		DG4V-3-2A	DG4V-3-2AL	80	80	80	63	60	50	15	10	10	10	80	40	26	22	20	
		DG4V-3-22A	DG4V-3-22AL	—	—	—	—	—	40	20	15	10	10	80	50	30	25	20	
		DG4V-3-23A	DG4V-3-23AL	80	80	80	80	80	40	20	15	10	10	—	—	—	—	—	
		DG4V-3-26A	DG4V-3-26AL	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
		DG4V-3-28A	DG4V-3-28AL	80	80	80	80	80	40	18	15	10	10	80	55	35	25	25	
		DG4V-3-32A	DG4V-3-32AL	65	65	65	65	65	60	20	15	10	10	80	40	30	25	20	
		DG4V-3-35A	DG4V-3-35AL	—	—	—	—	—	80	80	45	42	35	—	—	—	—	—	
	DG4V-3-2N			70	70	70	70	70	60	60	60	50	30	60	60	60	50	30	
6		DG4V-3-6A	DG4V-3-6AL	80	80	80	80	80	40	20	15	10	10	80	40	35	30	30	
	DG4V-3-6N			80	80	80	80	80	50	50	50	50	50	50	50	50	50	50	
7		DG4V-3-7A	DG4V-3-7AL	50	50	50	50	50	50	25	15	10	10	80	27	17	12	10	
		DG4V-3-27A	DG4V-3-27AL	—	—	—	—	—	80	25	15	15	15	80	50	45	40	40	
24		DG4V-3-24A	DG4V-3-24AL	60	60	60	60	60	60	25	15	10	10	—	—	—	—	—	

Note : • Max. flow without valve malfunction.

Performance Curve (viscosity 20 mm²/s , specific gravity 0.87)



1. For pressure drops ($\triangle P_1$) of viscosities other than 20mm²/s, calculate using multiplier coefficients shown in below table.

2. The formula to calculate pressure drops ($\triangle P_1$) for specific gravities other than 0.87 is as follows.

$\triangle P_1 = \triangle P \times G_1 / G$

$\triangle P$ ···· characteristics curve values

G ···· 0. 87

G_1 ··· any specific gravity value

Viscosity mm²/s	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Coefficient	0. 85	1. 00	1. 09	1. 17	1. 24	1. 29	1. 34	1. 38	1. 42	1. 46	1. 49	1. 52	1. 56	1. 59	1. 62

Pressure Drop Curve No.

C, B, BL										A, AL					N				
Spool	Switched Condition				Neutral Condition					Spool	Switched Condition				Spool	Switched Condition			
	P↓A	B↓T	P↓B	A↓T	P↓T	A↓T	B↓T	P↓A	P↓B		P↓A	B↓T	P↓B	A↓T		P↓A	B↓T	P↓B	A↓T
0	④	③	④	③	④	①	①	④	④	0	⑤	④	⑤	④	0	④	③	④	③
1	④	③	④	③	⑧	②	—	④	—	2	⑦	⑥	⑦	⑧	2	⑦	④	⑦	④
2	⑥	④	⑥	④	—	—	—	—	—	6	⑦	④	⑧	④	6	⑧	②	⑧	②
3	⑥	④	⑧	②	—	④	—	—	—	7	⑤	⑧	⑤	⑨					
6	⑧	②	⑧	②	—	④	④	—	—	22	⑥	—	⑦	—					
7	④	⑥	④	⑥	—	—	—	⑦	⑦	23	⑦	⑤	—	⑦					
8	⑦	⑤	⑦	⑤	⑧	—	—	—	—	24	⑦	④	⑦	④					
22	⑦	—	⑦	—	—	—	—	—	—	26	—	④	—	⑥					
31	⑧	②	⑥	④	—	—	④	—	—	27	⑤	—	⑤	—					
33	⑥	④	⑥	④	—	⑫	⑫	—	—	28	⑦	—	⑧	⑦					
34	⑥	④	⑥	④	—	⑪	⑪	—	—	32	⑦	⑤	⑧	—					
52	⑦	—	⑦	③	—	—	—	—	—	35	⑦	④	—	—					
56	⑥	—	②	③	—	⑩	⑧	—	—										
62	⑧	—	⑧	②	—	④	⑥	—	—										
63	⑧	—	⑧	—	—	⑥	⑥	—	—										
521	⑦	③	⑦	—	—	—	—	—	—										
561	⑦	③	⑦	—	—	⑧	⑩	—	—										
621	⑧	②	⑧	—	—	⑥	④	—	—										

Switching Times

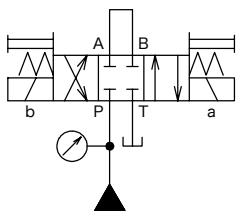
Unit : ms

Power Supply	Operation	De-energize Time	Spring Offset, Spring Centered Types C, B, BL	Spring Offset Types A, AL	No Spring Detent Types N
AC	Energized		10～15		10～15
	Spring Return		20		———
DC	Energized		30		30
	Spring Return		15 * (90)		———
ADC (With Rectifier)	Energized		20		30
	Spring Return	Fast	20		———
		Slow	90		———

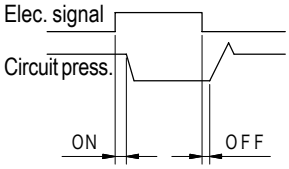
Notes: • Values many differ according to spool type, circuit conditions.
• indicates KU4 coil.

Conditions: Spool type 2, open loop circuit, flow 40 L/min, supply pressure 17.5, viscosity 20 mm²/s

[Circuit Example]



[Switching Time Definition]

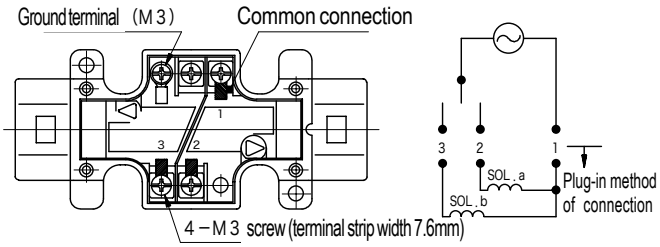


Operating Considerations

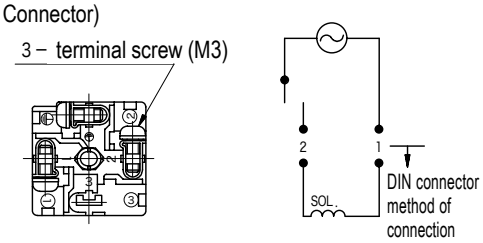
- Mounting orientation
  To ensure sure switching of no spring detented type valves, mount valves so spool axis is horizontal. There are no mounting attitude restrictions for other spool/spring arrangements.
- Solenoid energization
  Always insure that one side solenoid is deenergized before energizing the opposite side solenoid. 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 abnormal pressure surges above the allowable back pressure rating from being generated in T port. Valve is wet armature type so insure that valve is always filled with oil.
- Using valves as two-way and three-way
  Valve is designed as four-way and as such max. flow is limited when using as two or three-way valves. Consult TOKIMEC 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 valve 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
  For valves with indicator lamps, the lamps will light when current flows to the solenoid.

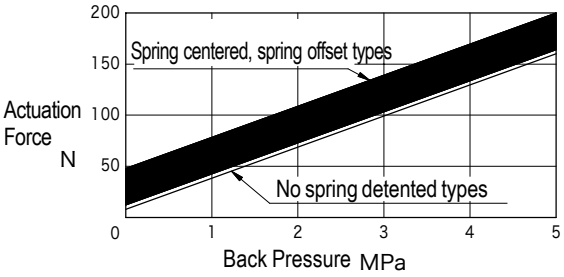
- Conduit box wiring
  Solenoid and conduit box are pre-wired. Refer to below diagrams for wiring from power source to conduit box or DIN connectors.

P Type



U Type
(DIN Connector)





Mounting Bolts (JIS B1176, Strength Class 12.9)

Hex Socket Bolts	Qty
M5 × 50	4

- Order mounting bolts separately.
- Mounting bolt tightening torque: 7 ~ 8Nm

Subplate

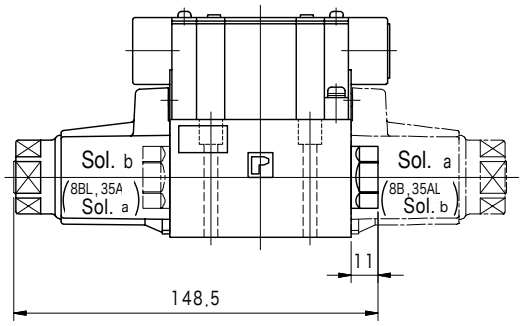
Subplate Model		Port Dia. Rc
Side Ported	DGMS-3-1E-10-T-JA-J	3/8
Rear Ported	DGVM-3-10-T-JA-J	

- Subplate and bolts must be ordered separately.
- See page Q8 for dimensions.
- See page Q8 for multiple valve mount subplates.
- Max. working pressure 21 MPa. For higher pressures, valve should be mounted on manifold block.

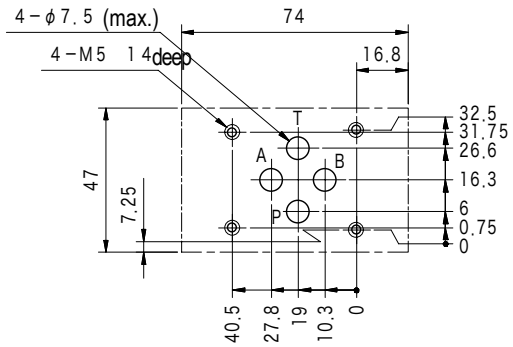
Dimensions

● DC Solenoids

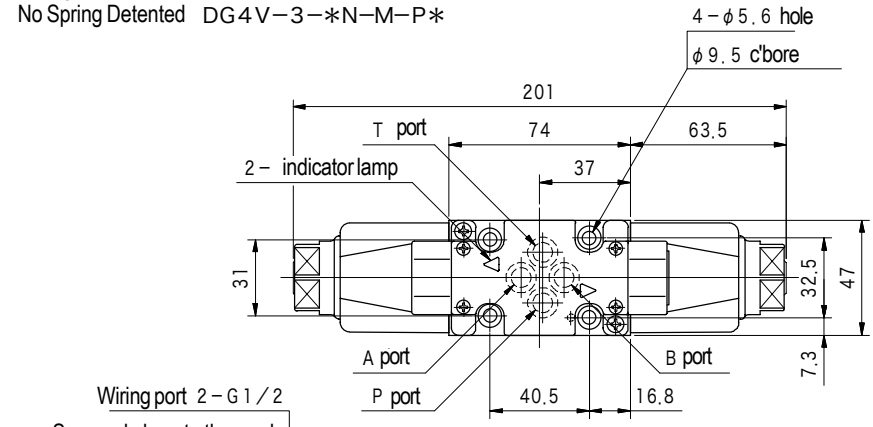
Spring Offset DG4V−3−∗A/B−M−P∗ (solid line)
Spring Offset DG4V−3−∗AL/BL−M−P∗ (dotted line)

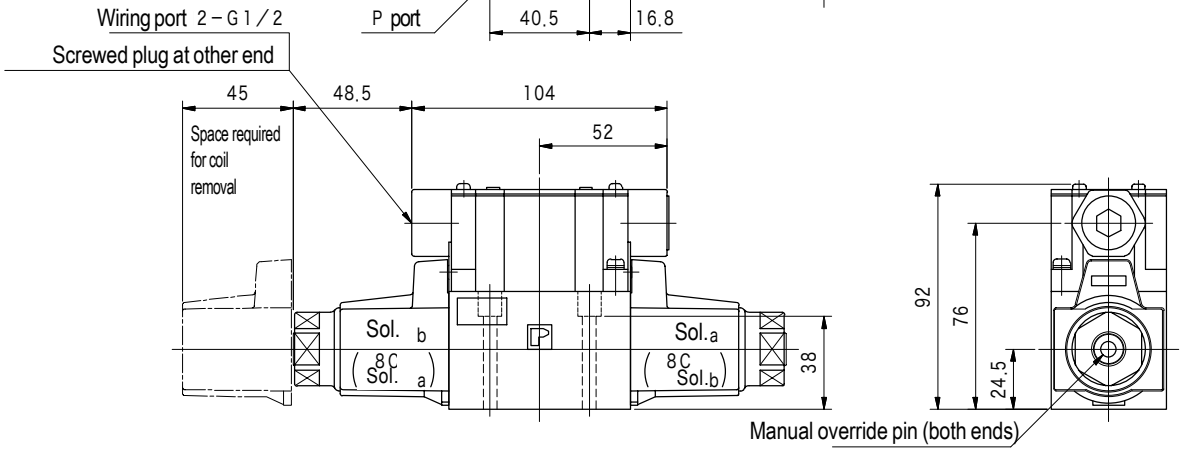


Mounting Dimensions (ISO 4401-03)

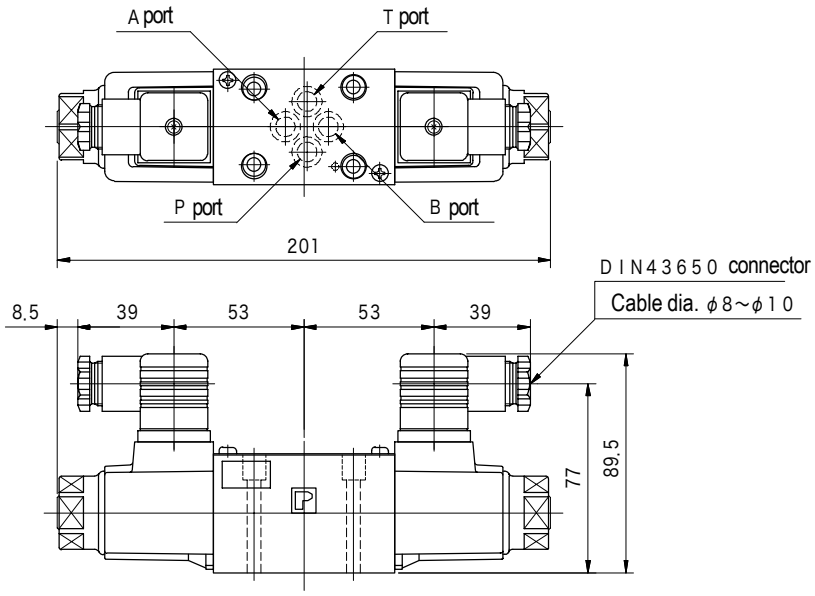


Spring Centered DG4V−3−∗C−M−P∗
No Spring Detented DG4V−3−∗N−M−P∗





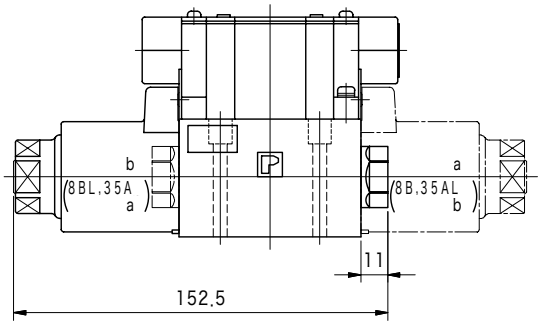
DG4V−3−∗C/N−M−U∗



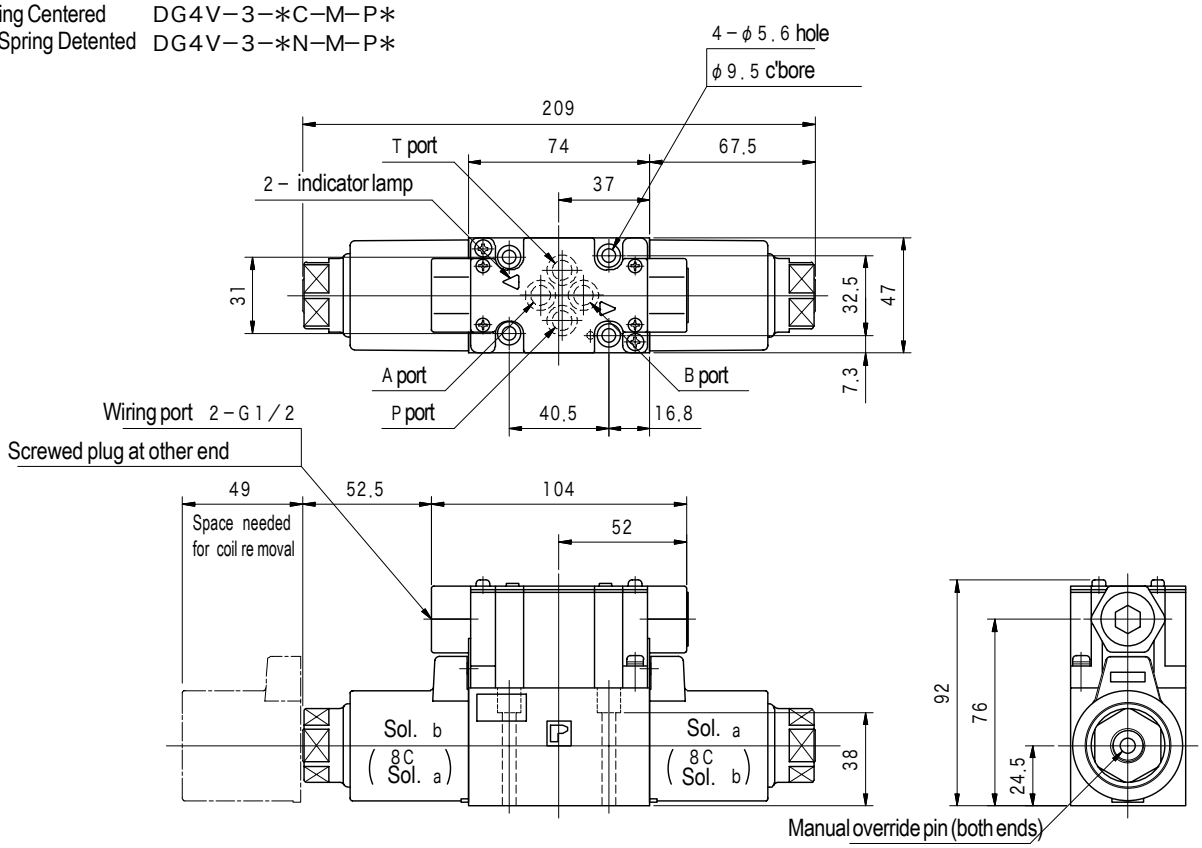
Dimensions

● DC Solenoids

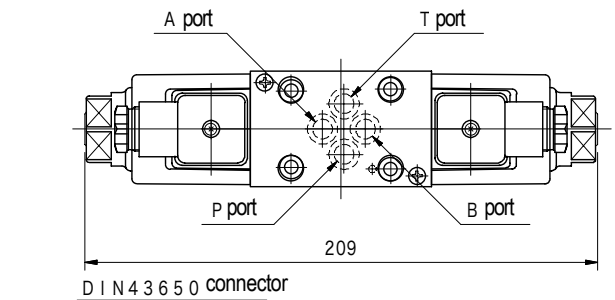
Spring Offset DG4V−3−∗A/B−M−P∗ (solid line)
Spring Offset DG4V−3−∗AL/BL−M−P∗ (dotted line)



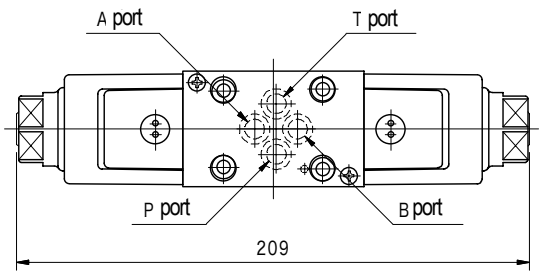
Spring Centered DG4V−3−∗C−M−P∗
No Spring Detented DG4V−3−∗N−M−P∗

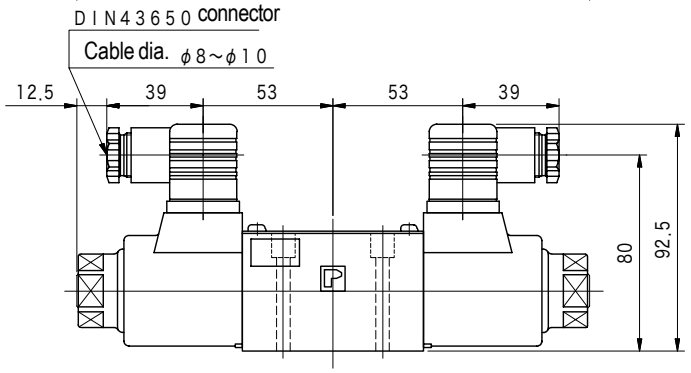


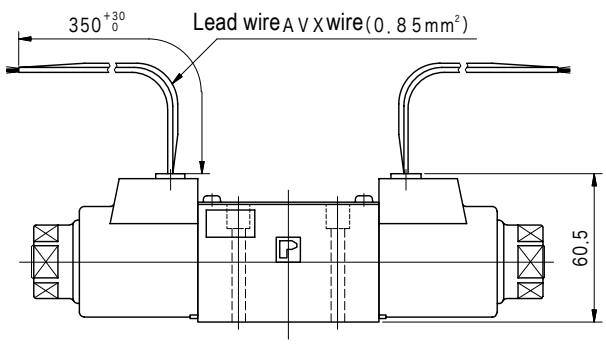
DG4V−3−∗C/N−M−U∗



DG4V−3−∗C/N−M−KU∗

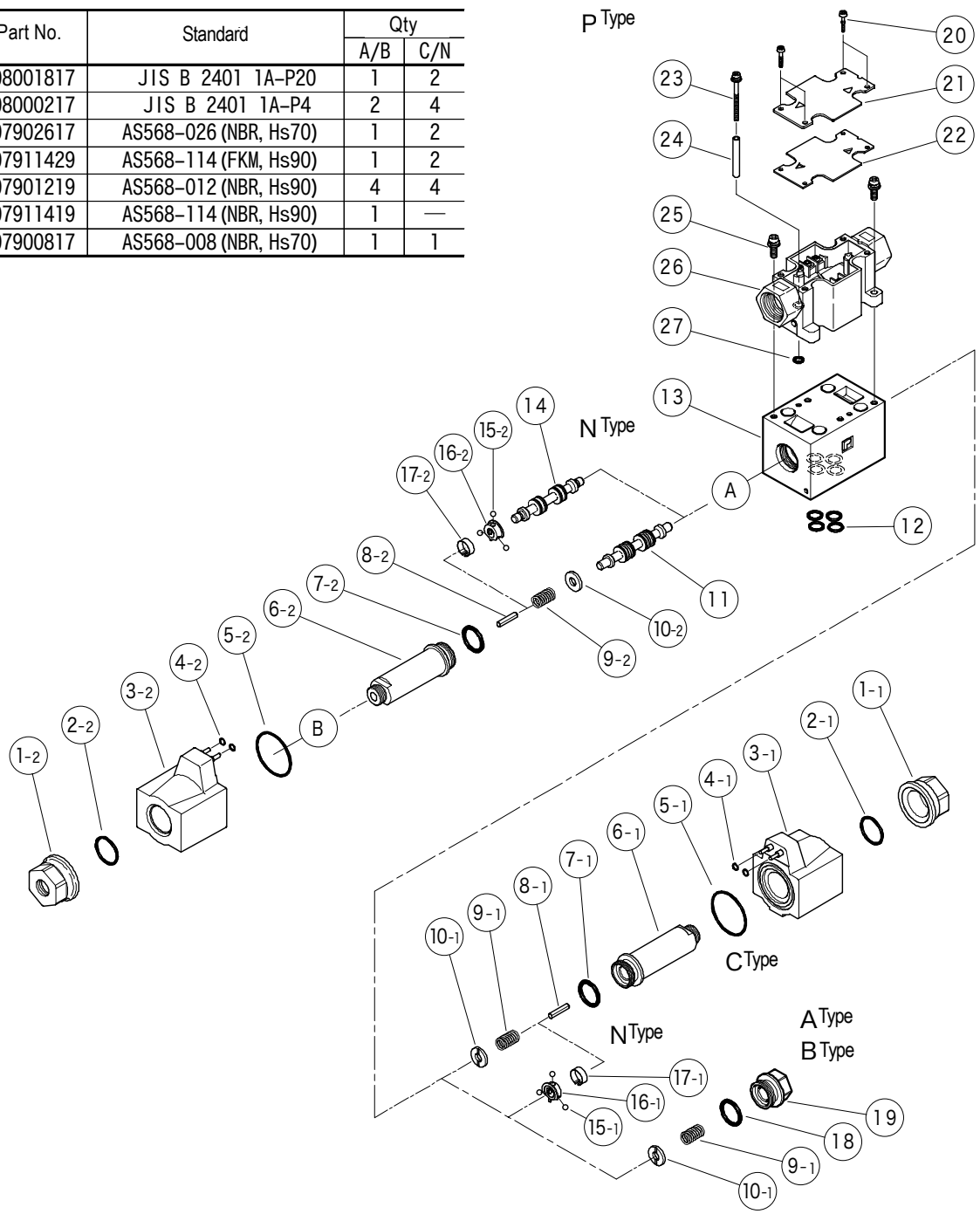




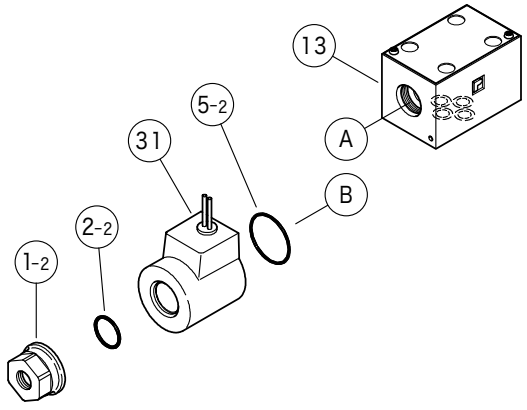


O-Rings

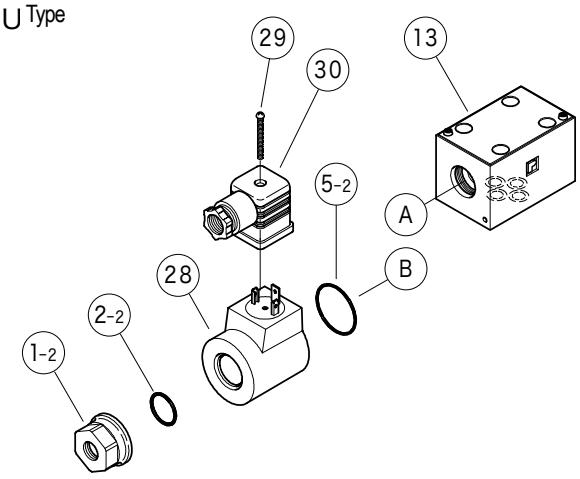
No.	Part No.	Standard	Qty	
			A/B	C/N
2	008001817	JIS B 2401 1A–P20	1	2
4	008000217	JIS B 2401 1A–P4	2	4
5	007902617	AS568–026 (NBR, Hs70)	1	2
7	007911429	AS568–114 (FKM, Hs90)	1	2
12	007901219	AS568–012 (NBR, Hs90)	4	4
18	007911419	AS568–114 (NBR, Hs90)	1	—
27	007900817	AS568–008 (NBR, Hs70)	1	1



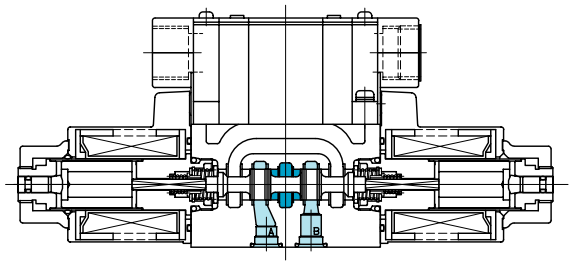
KU Type



U Type



Mini-watt solenoid operated directional control valves DG4SM-3



• This mini-watt valve uses 5W power consumption solenoids.

Model Code

(F3) - DG4SM - 3 -2 A(L) -P 7- H- (P08) - 54

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

1 Fluid
Omitted for mineral oil, water glycol
F3: phosphate ester

2 Mini-watt CETOP 3 solenoid directional valve
Wet armature type (gasket mounting)

3 Mounting
3: ISO 4401-03

4 Spool
See page E21

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 (3 position, double solenoid)
N: No spring detented (2 position, double solenoid)

6 Solenoid assembly orientation (for spool/spring arrangement A, B)
Omitted for standard (energized P to B, A to T)
L: Left hand build
(energized: P to A, B to T)

7 Electrical wiring (configuration, port thread size)
P: Plug-in type conduit box, G 1/2
KU: Flying lead type (standard lead wire length, 350mm)

8 Electrical accessories
Omitted for no accessories (for KU type electical wiring)
7: WIth indicator lamp and surge suppressor
(for P type conduit box wiring)

9 Solenoid coil voltage
G:DC12V
H:DC24V

10 Port orifice (option)
Omitted for no port orifice (standard)
Port orifices
<Example> P08 (0.8mm in P port)
Orifice diameter
Port (A, B, P, T)
<Example2> B12 (1.2mm orifice in B port)
<Example 3> 2 port orifice combinations
Combination sequence, PTAB
P10T12, P08B10

11 Design no.

Specifications

Model Code	Maximum Operating Press. MPa	Max. Flow L/min	Allowable Tank Port Back Pressure MPa	Max. Switching Freq. (cycles/min.)	Weight kg	
					Single Solenoid	Double Solenoid
DG4SM-3	16		15. 7	180	1. 6	2. 0

Solenoid Specifications

Power Supply	Volt. Code	Voltage V	Holding Current A	Power Consump. W	Allow. Tank Port Back Pressure %	Insul. Class (Allow. Temp.)
DC	G	12	0. 45	5. 4	±10	B (130 ˚C)
	H	24	0. 23	5. 5		

Note: • Current values and power consumption varies according to temperature conditions. Table at left is based on values at 20°C.

Spool Types and Pressure-Flow Characteristics

DC Solenoid (applied voltage 90% of rated)

Spool Neutral Position	Valve Function Schematics: 3 Position, Spring Centered – C –	Valve Function Schematics: 2 Position, Spring Offset, Type B – B –	Valve Function Schematics: 2 Position, Spring Offset, Type B – BL –	Max. Flow L/min: P→A and B→T (B Port blocked) 7 MPa	10.5 MPa	16 MPa	Max. Flow L/min: P→A (B Port blocked) 7 MPa	10.5 MPa	16 MPa	Max. Flow L/min: P→B (A Port blocked) 7 MPa	10.5 MPa	16 MPa
0	DG4SM-3-0C	DG4SM-3-0B	DG4SM-3-0BL	30	30	30	30	30	30	30	30	30
2	DG4SM-3-2C	DG4SM-3-2B	DG4SM-3-2BL	30	30	30	30	30	10	30	30	10
3	DG4SM-3-3C	DG4SM-3-3B	DG4SM-3-3BL	30	30	5	30	30	10	30	30	—
6	DG4SM-3-6C	DG4SM-3-6B	DG4SM-3-6BL	30	30	20	30	30	—	30	30	—
7	DG4SM-3-7C	DG4SM-3-7B	DG4SM-3-7BL	30	30	30	—	—	—	—	—	—
31	DG4SM-3-31C	DG4SM-3-31B	DG4SM-3-31BL	30	30	5	30	30	—	30	30	10
33	DG4SM-3-33C	DG4SM-3-33B	DG4SM-3-33BL	30	30	30	30	30	10	30	30	10

Spool Transient Condition	Valve Function Schematics: 2 Position, No Spring Detented – N –	Valve Function Schematics: 2 Position, Spring Offset, Type A – A –	Valve Function Schematics: 2 Position, Spring Offset, Type A – AL –	Max. Flow L/min: N, A, AL (P→A and B→T, B Port blocked) 7 MPa	10.5 MPa	16 MPa	Max. Flow L/min: N, A (P→A, B Port blocked) 7 MPa	10.5 MPa	16 MPa	Max. Flow L/min: AL (P→B, A Port blocked) 7 MPa	10.5 MPa	16 MPa	Max. Flow L/min: N, A (P→B, A Port blocked) 7 MPa	10.5 MPa	16 MPa	Max. Flow L/min: AL (P→A, B Port blocked) 7 MPa	10.5 MPa	16 MPa
2		DG4SM-3-2A	DG4SM-3-2AL	30	30	30	10	—	—	30	—	—						
	DG4SM-3-2N			30	30	30	30	20	10	30	20	10						
24		DG4SM-3-24A	DG4SM-3-24AL	20	20	20	10	—	—	—	—	—						

Note: • Max. flow without valve malfunction.

Switching Times

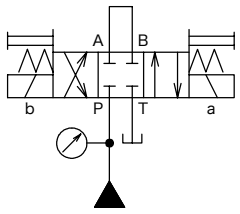
Unit : ms

Power Supply	Operation	Spring Offset, Spring Centered C, B, BL	Spring Offset A, AL	No Spring Detented N
DC	Energize	75		75
	Spring Return	35		———

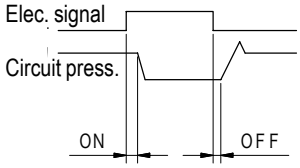
Note: • Values may differ according to spool type, circuit condition.

Conditions: Spool type 2, open loop circuit, flow 20 L/min, supply pressure 16 MPa, fluid viscosity 20 mm²/s

[Circuit Example]

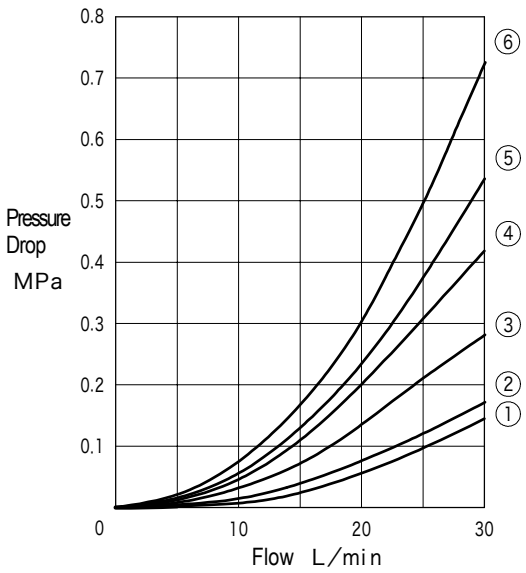


[Switching Time Definition]



Performance Curve (viscosity 20 mm²/s , specific gravity 0.87)

Pressure Drop Characteristics



Pressure Drop Curve No.

Spool	C, B, BL Switched Condition P↓A	B↓T	P↓B	A↓T	Neutral Condition P↓T	A↓T	B↓T	P↓A	P↓B
0	②	①	②	①	②	③	③	②	②
2	⑥	④	⑥	④	—	—	—	—	—
3	⑥	④	⑥	②	—	④	—	—	—
6	⑥	②	⑥	②	—	④	④	—	—
7	②	⑤	②	⑤	—	—	—	⑤	⑤
31	⑥	②	⑥	④	—	—	④	—	—
33	⑥	④	⑥	④	—	—	—	—	—

Spool	A, AL Switched Condition P↓A	B↓T	P↓B	A↓T
2	④	④	⑥	⑥
24	⑥	④	⑥	④

Spool	N Switched Condition P↓A	B↓T	P↓B	A↓T
2	⑥	⑥	⑥	⑥

1. For pressure drops ($\triangle P_1$) of viscosities other than 20mm²/s, calculate using multiplier coefficients shown in below table.

2. The formula to calculate pressure drops ($\triangle P_1$) for specific gravities other than 0.87 is as follows:

$$\triangle P_1 = \triangle P \times G_1 / G$$

$\triangle P$ ····· Value from press. drop curve
G ····· 0.87
G_1 ····· Selected specific gravity

Viscosity mm²/s	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Coefficient	0. 85	1. 00	1. 09	1. 17	1. 24	1. 29	1. 34	1. 38	1. 42	1. 46	1. 49	1. 52	1. 56	1. 59	1. 62

Operating Considerations

• 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
Always insure that one side solenoid is deenergized before energizing the opposite side solenoid. 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.

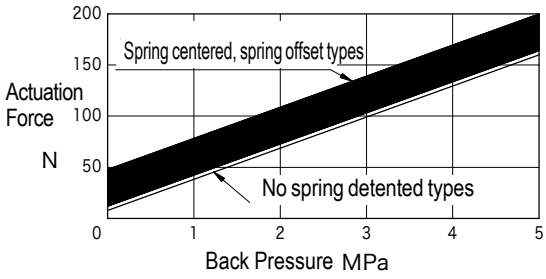
• T (tank) port piping
Prevent abnormal pressure surges above the allowable back pressure rating from being generated in T port. Valve is wet armature type so insure that valve is always filled with oil.

• Using valves as two-way and three-way
Valve is designed as four-way and as such max. flow is limited when using as two or three-way valves. Consult TOKIMEC for details.

• Long periods of solenoid eanergization
Care should be paid as long periods of solenoid energization at high pressure may cause spool "sticking" and switching malfunction.

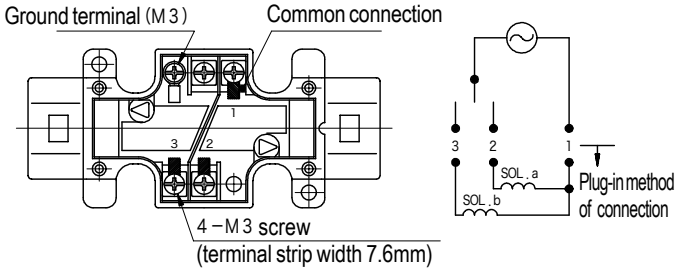
• Malfunctions due to surge pressure
Avoid combining flows of tank lines prone to surge pressures. Surge pressures in valve T port may lead to spool malfunctions. No spring detented type valves are susceptible to such malfunctions during deenergization.

• Manual operation
For manual switching, push the manual override pin. Be aware that actuation force increases with higher back pressure. (See graph)



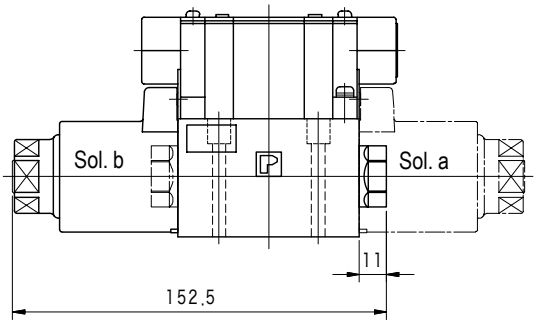
• Solenoid indicator lamp
For valves with indicator lamps, the lamps will light when current flows to the solenoid.

• Conduit box wiring
Solenoid and conduit box are pre-wired. Refer to below diagrams for wiring from power source to conduit box or DIN connectors.

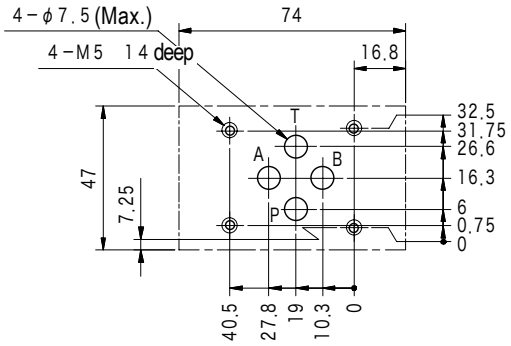


Dimensions

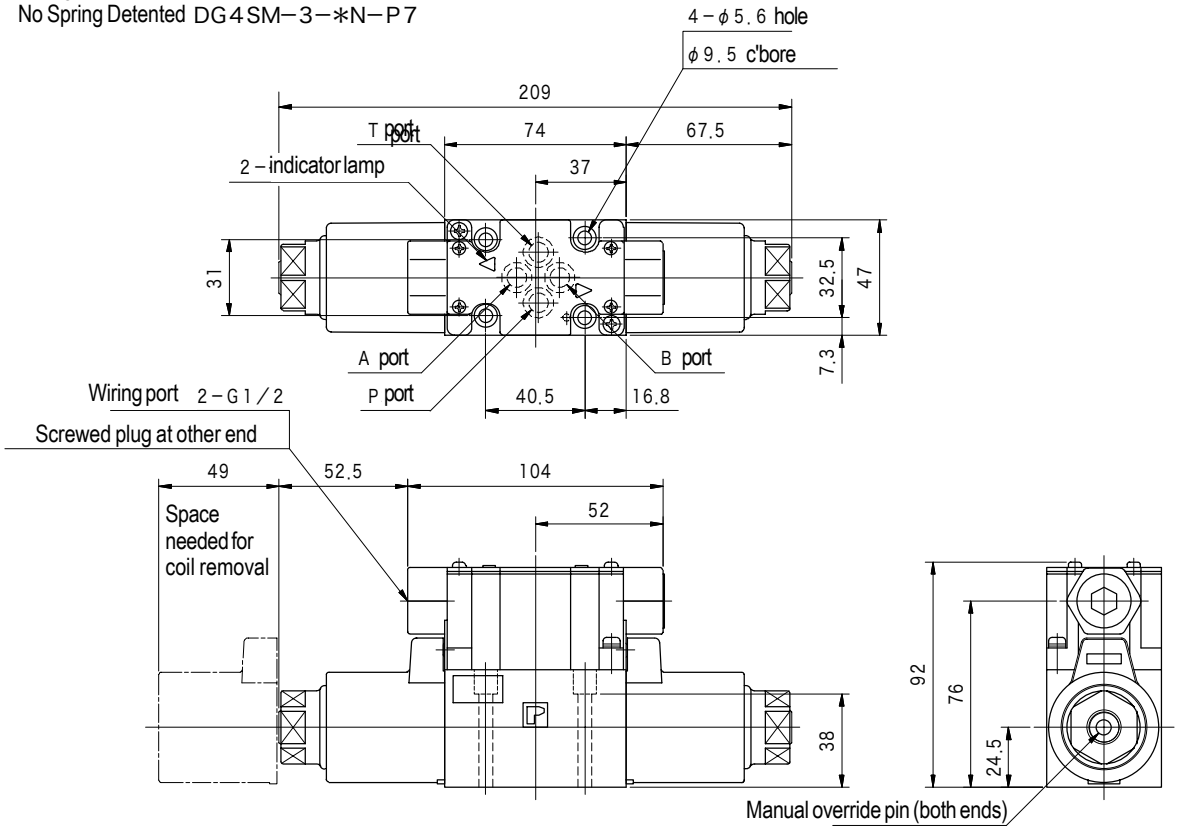
Spring Offset DG4SM-3-*A/B-P7
Spring Offset DG4SM-3-*AL/BL-P7



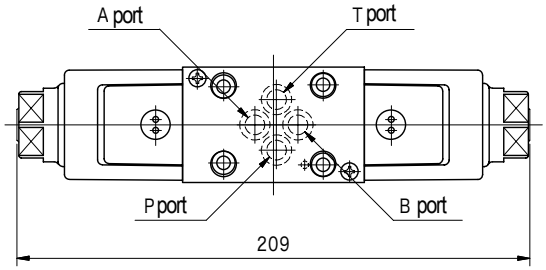
Mounting Dimensions (ISO 4401-03)

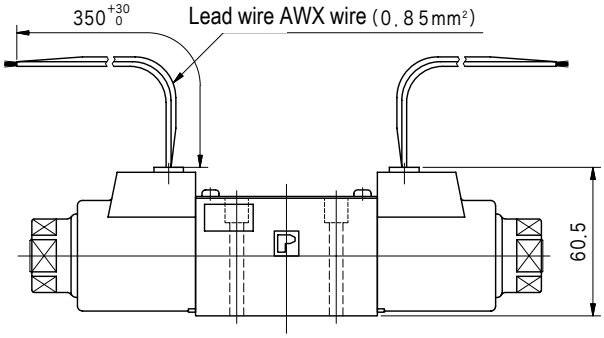


Spring Centered DG4SM-3-*C-P7
No Spring Detented DG4SM-3-*N-P7



DG4SM-3-*C/N-KU





Mounting Bolts (JIS B1176,Strength Class 12.9)

Hex Socket Bolts	Qty
M5 × 50	4

- Order mounting bolts separately.
- Mounting bolt tightening torque: 7 ~ 8Nm

Subplate

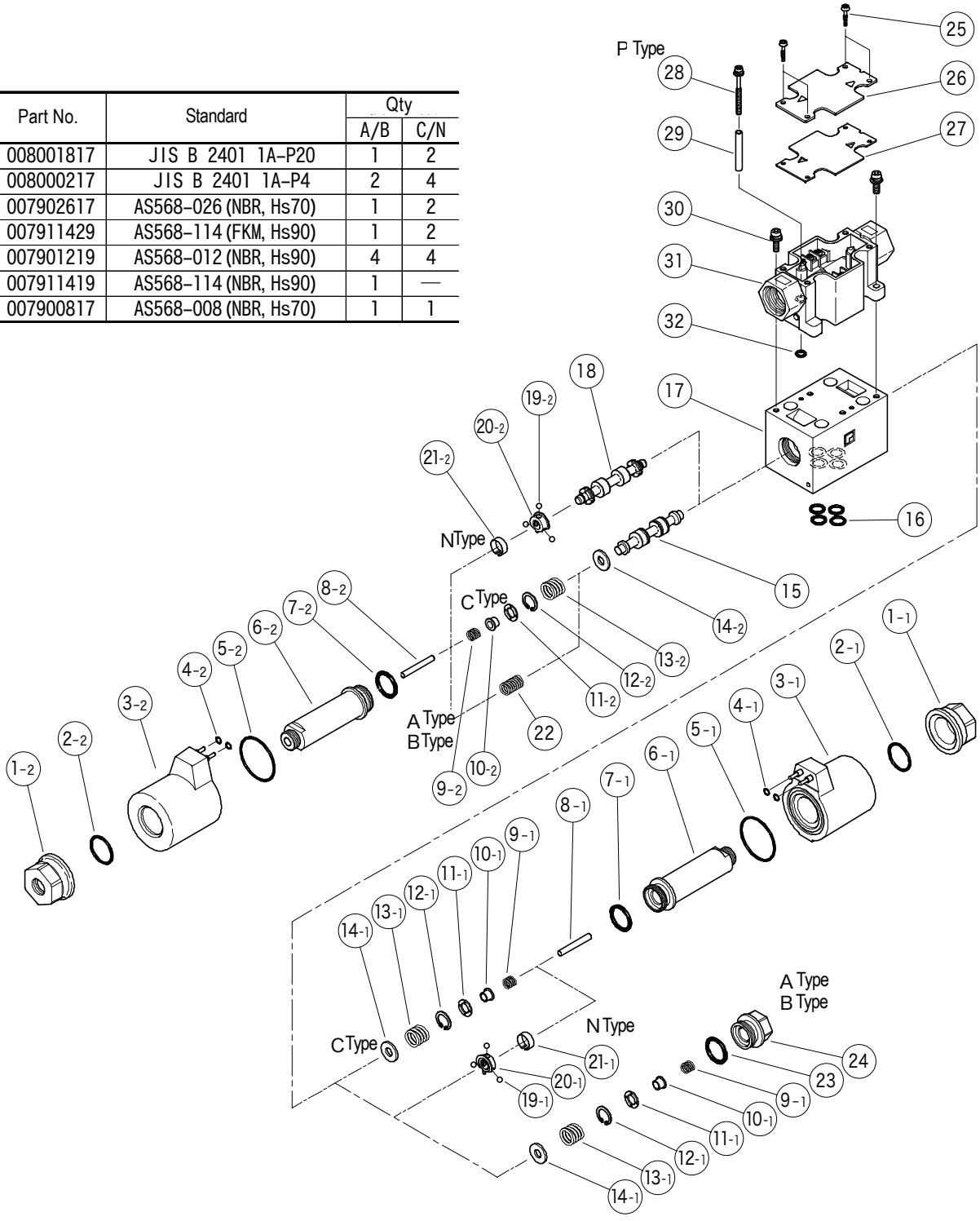
Subplate Model		Port Dia. Rc
Side Ported	DGMS-3-1E-10-T-JA-J	3/8
Rear Ported	DGVM-3-10-T-JA-J	

- Subplate and bolts must be ordered separately.
- See page Q8 for dimensions.
- See page Q8 for multiple valve mount subplates.

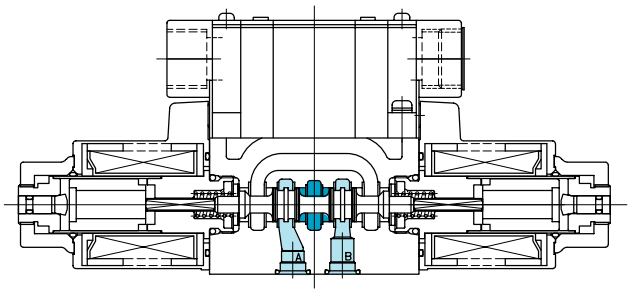
Construction

O-Rings

No.	Part No.	Standard	Qty A/B	Qty C/N
2	008001817	JIS B 2401 1A-P20	1	2
4	008000217	JIS B 2401 1A-P4	2	4
5	007902617	AS568-026 (NBR, Hs70)	1	2
7	007911429	AS568-114 (FKM, Hs90)	1	2
16	007901219	AS568-012 (NBR, Hs90)	4	4
23	007911419	AS568-114 (NBR, Hs90)	1	—
32	007900817	AS568-008 (NBR, Hs70)	1	1



Fine current signal solenoid operated directional control valves



- Integrated solid state relay.
- Valve can be directly driven by connecting signal terminal to PLC, etc.
- Performance same as standard DG4V-3 solenoid valve.

Model Code

(F3) - DG4VC - 3 - 2 A (L)- M -PS2 - H- 7- (P08) - 54

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

1 Fluid
Omitted for mineral oil, water glycol
F3: phosphate ester

2 Fine current control CETOP 3 solenoid valve
Wet armature type (gasket mounting)

3 Mounting
3: ISO 4401-03

4 Spool
See page E13, 14

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 (3 position, double solenoid)
N: No spring detented (2 position, double solenoid)

6 Solenoid assembly orientation (for spring sets A, B)
Omitted for standard (energized P to B, A to T)
L: Left hand build
(energized: P to A, B to T)

7 Electrical wiring (configuration, port thread size)
P: Plug-in type conduit box, G 1/2

8 Contact point input type
S2:Sink
N2:Source

9 Voltage
H:DC24V

10 Allowable tank port back pressure
7:20.6MPa

11 Port orifice (option)
Omitted for no port orifice (standard)
Port orifices
< Example 1>P08 (0.8mm in P port)
Orifice diameter
Port (A, B, P, T)
< Example 2>B12 (1.2mm orifice in B port)
< Example 3 >2 port orifice combinations
Combination sequence, PTAB
P10T12,P08B10

12 Design no.

Specifications

Model	Max. Operating Pressure MPa	Max. Flow L/min	Allowable Tank Back Press. MPa	Max. Switching Freq.(cycles/min)	Weight kg	
					Single Solenoid	Double Solenoid
DG4VC–3	35	See page E13, 14	20. 6	300	1. 6	2. 0

Electrical Specifications

Contact Point Input Type	Voltage Code	Supply Voltage	Holding Current	Power Consump.	Solenoid		Allowable Contact Voltage		Contact Current	
					Insul. Class	Allow. Temp.	Solenoid OFF	Solenoid ON	Solenoid OFF	Solenoid ON
PS2	H	DC24V±10%	1. 16A	28W	H	180 ℃	DC24V or Open	0V±0. 1V	Less than 100μA	10mA
PN2							0V±0. 1V or Open	DC2～24V	Less than 100μA	15mA

Note : • Current values and power consumption varies according to temperature conditions. Table at left are based on valves at 30°C.

Specifications

Spool Types and Pressure-Flow Characteristics

Spool type and pressure-flow characteristics are the same as DG4V-3 (see page E13,14).

Performance Curve

Pressure Drop Characteristics.

Pressure drop characteristics are the same as DG4V-3 (see page E15).

Switching Times

Switching times are the same as DG4V-3 (see page E15, DC power source)

Operating Considerations

• 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
Always insure that one side solenoid is deenergized before energizing the opposite side solenoid. 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.

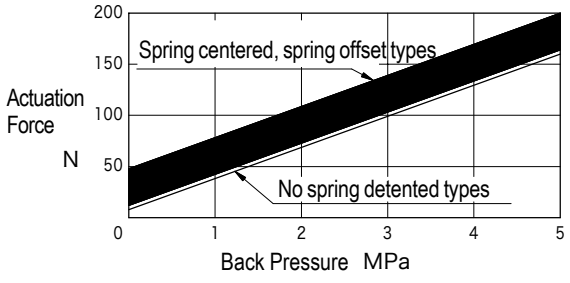
• T (tank) port piping
Prevent abnormal pressure surges above the allowable back pressure rating from being generated in T port. Valve is wet armature type so insure that valve is always filled with oil.

• Using valves as two-way and three-way
Valve is designed as four-way and as such max. flow is limited when using as two or three-way valves. Consult TOKIMEC 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.

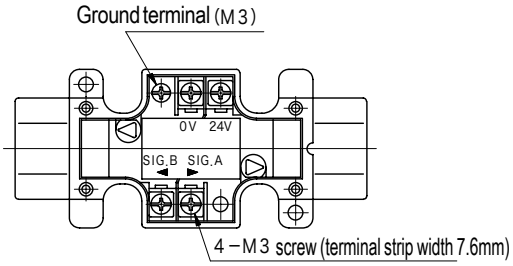
• Malfunctions due to surge pressure
Avoid combining flows of tank lines prone to surge pressures. Surge pressures in valve T port may lead to spool malfunctions. No spring detented type valves are susceptible to such malfunctions during deenergization.

• Manual operation
For manual switching, push the manual override pin. Be aware that actuation force increases with higher back pressure. (See graph)

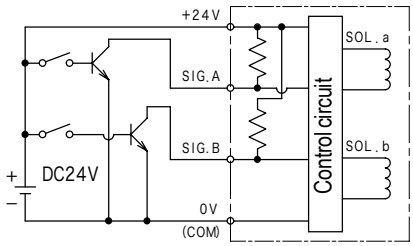


• Solenoid indicator lamp
For valves with indicator lamps, the lamps will light when current flows to the solenoid

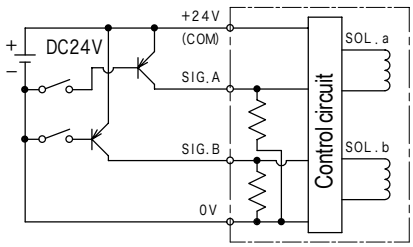
• Conduit box wiring
Solenoid and conduit box are pre-wired. Refer to below diagrams for wiring from power source to conduit box or DIN connectors.



PS2 Type Solenoid Directional Valve



PN2 Type Solenoid Directional Valve



• Terminal wiring
- Power source terminals should be connected to smoothed power source and always kept energized.
- Signal terminals should be connected to relays and open collector transistors (PS2type: NPN type, PN2 type, PNP type).
- Programmable controller, etc., used should have leakage current of less than 200ì A.
- DO NOT reverse connect COM terminals (0V or 24V) and signal terminals (SIG. A, SIG. B) as it may damage equipment.

Mounting Bolts (JIS B1176,Strength Class 12.9)

Hex Socket Bolts	Qty
M5 × 50	4

- Order mounting bolts separately.
- Mounting bolt tightening torque: 7~8Nm

Subplate

Subplate Model		Port Dia. Rc
Side Ported	DGMS-3-1E-10-T-JA-J	3/8
Rear Ported	DGVM-3-10-T-JA-J	

- Subplate and bolts must be ordered separately.
- See page Q8 for dimensions.
- See page Q8 for multiple valve mount subplates.
- Max. working pressure 21 MPa. For higher pressures, valve should be mounted on manifold block.

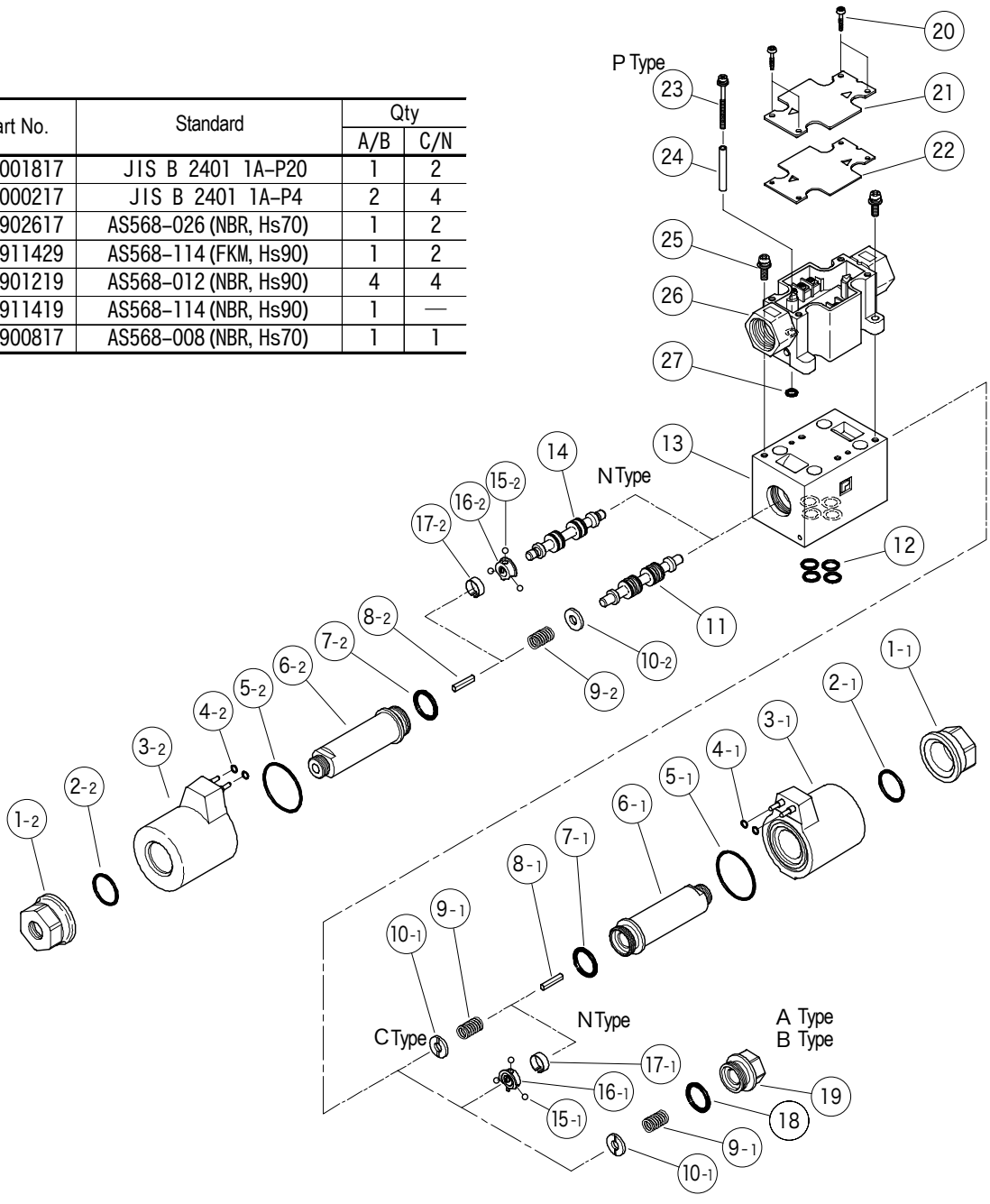
Dimensions

Dimensions and mounting are same as DG4V-3 (See E17, mounting dimensions) and E18 (valve dimensions).

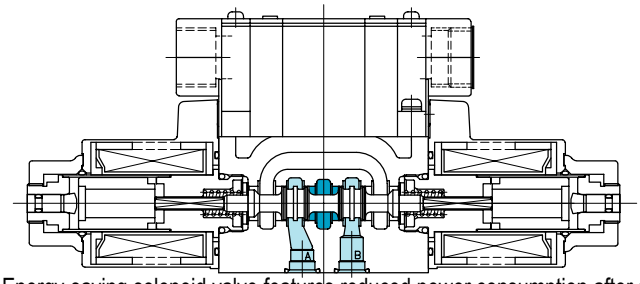
Construction

O-Rings

No.	Part No.	Standard	Qty A/B	Qty C/N
2	008001817	JIS B 2401 1A-P20	1	2
4	008000217	JIS B 2401 1A-P4	2	4
5	007902617	AS568-026 (NBR, Hs70)	1	2
7	007911429	AS568-114 (FKM, Hs90)	1	2
12	007901219	AS568-012 (NBR, Hs90)	4	4
18	007911419	AS568-114 (NBR, Hs90)	1	—
27	007900817	AS568-008 (NBR, Hs70)	1	1



Low-holding current solenoid operated directional control valves DG4VL-3



- 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's, etc. (K2, E2 type, 3 wire)
- Same wiring configurations as standard DG4V-3 valves available.(DK2, DE2 types)

Model Code

(F3) - DG4VL - 3 - 2A (L)- M -PK2 - H- 7 - (P08) - 54

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

1 Fluid
Omitted for mineral oil, water glycol
F3: phosphate ester

2 Low-holding CETOP 3 solenoid directional valve
Wet armature type (gasket mounting)

3 Mounting
3: ISO 4401-03

4 Spool
See page E29, 30

5 Spool/spring arrangment
A: Spring offset, A type (2 position, single solenoid)
B: Spring offset, B type (2 position, single solenoid)
C: Spring centered (3 position, double solenoid)
N: No spring detented (2 position, double solenoid)

6 Solenoid assembly orientation (for spring sets A, B)
Omitted for standard (energized P to B, A to T)
L: Left hand build
(energized: P to A, B to T)

7 Electrical wiring (configuration, port thread size)
P: Plug-in type conduit box, G 1/2

8 Electrical wiring (power, signal terminal connections)
K2: Sink connection, 3 wire (fine current control)
E2: Source connection, 3 wire (fine current control)
DK2: Sink connection, 2 wire (power ON/OFF control)
DE2: Source connection, 2 wire (power ON/OFF control)

9 Voltage
H:DC24V

10 T port allowable tank back pressure
7:20.6MPa

11 Port orifice (option)
Omitted for no port orifice (standard)
Port orifices
< Example1>P08(0.8mm in P port)
Orifice diameter
Port (A, B, P, T)
<Example2> B12 (1.2mm orifice in B port)
<Example 3> 2 port orifice combinations
Combination sequence, PTAB
P10T12, P08B10

12 Design no.

Specifications

Model	Max. Operating Pressure MPa	Max. Flow L/min	Allowable Tank Back Press. MPa	Max. Switching Freq.(cycles/min)	Weight kg	
					Single Solenoid	Double Solenoid
DG4VL–3	35	See Press.-Flow Characteristics	20. 6	＊300	1. 6	2. 0

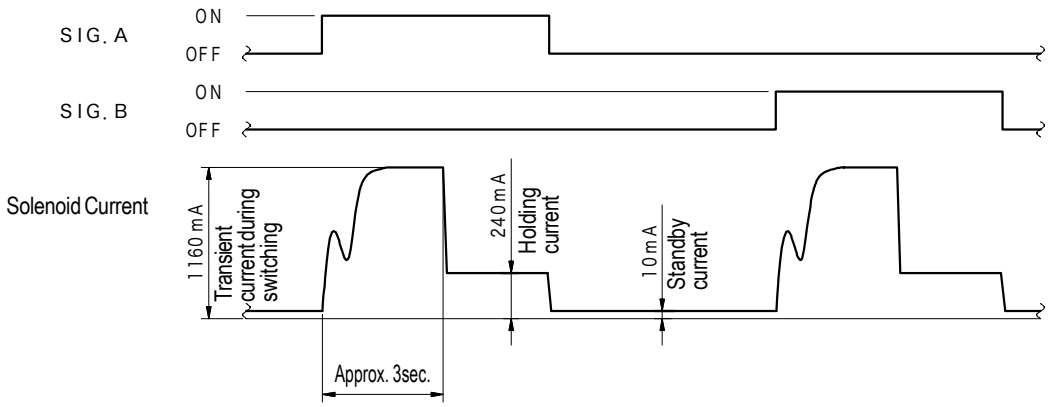
Note: ＊ Switching frequency of less than 200 (cycles/min) needed for low power benefits.

Electrical Specifications

Wiring Method	Voltage Code	Supply Voltage	Supply Current at Switching (0.3 sec. from ON)	Holding Current	Power Consump. During Hold	Solenoid		Allow. Contact Voltage		Contact Current	
						Insul. Class	Allow. Temp.	Solenoid OFF	Solenoid ON	Solenoid OFF	Solenoid ON
PK2	H	DC24V ±10%	1. 16A	0. 24A	6W	H	180 ℃	DC24V or Open	0V±0. 1V	Less than 100μA	4mA
PE2								0V±0. 1V or Open	DC24V±10%		
PDK2											
PDE2											

Current, power consumption may vary according to temperature conditions. Table values based on 30 C.

Switching Current



Spool Types and Pressure-Flow Characteristics

DC Solenoids (applied voltage 90% of rated)

Spool Neutral Position	Valve Function Schematics			Max. Flow L/min															
	3 Position	2 Position		P → A ⇄ B → T					P→A (B Port blocked)					P→B (A Port blocked)					
	Spring Centered	Spring Offset, Type B																	
	– C –	– B –	– BL –	7MPa	14MPa	21MPa	28MPa	35MPa	7MPa	14MPa	21MPa	28MPa	35MPa	7MPa	14MPa	21MPa	28MPa	35MPa
0	DG4VL-3-0C	DG4VL-3-0B	DG4VL-3-0BL	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
1	DG4VL-3-1C	DG4VL-3-1B	DG4VL-3-1BL	45	45	45	30	25	55 (40)	25 (20)	20 (14)	20 (11)	18 (10)	45	45	45	45	45
2	DG4VL-3-2C	DG4VL-3-2B	DG4VL-3-2BL	80	80	80	80	80	80	45	30	23	19	80	45	30	23	19
3	DG4VL-3-3C	DG4VL-3-3B	DG4VL-3-3BL	80	80	65	35	30	80	30	23	18	14	80	65	35	28	24
6	DG4VL-3-6C	DG4VL-3-6B	DG4VL-3-6BL	80	80	80	52	42	80	60	38	27	23	80	60	38	27	23
7	DG4VL-3-7C	DG4VL-3-7B	DG4VL-3-7BL	80	80	80	80	80	70	21	14	12	10	70	21	14	12	10
8	DG4VL-3-8C	DG4VL-3-8B	DG4VL-3-8BL	45	45	45	30	25	45 (45)	45 (35)	45 (30)	30 (26)	25 (24)	45	45	45	30	25
22	DG4VL-3-22C	DG4VL-3-22B	DG4VL-3-22BL	—	—	—	—	—	80	34	15	12	12	80	34	15	12	12
31	DG4VL-3-31C	DG4VL-3-31B	DG4VL-3-31BL	80	80	65	35	30	80	65	35	28	24	80	30	23	18	14
33	DG4VL-3-33C	DG4VL-3-33B	DG4VL-3-33BL	80	80	80	80	80	80	45	20	15	12	80	45	20	15	12
34	DG4VL-3-34C	DG4VL-3-34B	DG4VL-3-34BL	80	80	80	80	80	80	45	20	15	12	80	45	20	15	12

Note : •Values in ( ) for spool types 1, 8 are max. flow with ports A, B blocked.

Spool Types and Pressure-Flow Characteristics

DC Solenoid (applied voltage 90% of rated)

Spool Transient Condition	Valve Function Schematics			Max. Flow L/min															
	2 Position			N, A, AL					N, A					AL					
	No Spring Detented	Spring Offset, Type A		P A→B B→A T					P→A B Port blocked					P→B A Port blocked					
				A B P T					A B P T					A B P T					
	– N –	– A –	– AL –	7MPa	14MPa	21MPa	28MPa	35MPa	7MPa	14MPa	21MPa	28MPa	35MPa	7MPa	14MPa	21MPa	28MPa	35MPa	
0		DG4VL-3-0A	DG4VL-3-0AL	80	80	80	80	80	60	60	60	60	60	80	80	80	80	80	
	DG4VL-3-0N			70	70	70	70	70	60	60	60	60	60	60	60	60	60	60	
2		DG4VL-3-2A	DG4VL-3-2AL	80	80	80	63	60	35	15	10	10	10	80	40	26	22	20	
		DG4VL-3-22A	DG4VL-3-22AL	—	—	—	—	—	20	15	11	10	10	80	45	28	22	18	
		DG4VL-3-23A	DG4VL-3-23AL	70	70	70	70	70	25	15	12	10	10	—	—	—	—	—	
	DG4VL-3-2N			70	70	70	70	70	60	60	60	50	30	60	60	60	50	30	
6		DG4VL-3-6A	DG4VL-3-6AL	80	80	80	80	80	25	15	13	10	10	80	40	35	30	30	
	DG4VL-3-6N			80	80	80	80	80	50	50	50	50	50	50	50	50	50	50	
7		DG4VL-3-7A	DG4VL-3-7AL	50	50	50	50	50	45	20	15	10	10	80	27	17	12	10	
24		DG4VL-3-24A	DG4VL-3-24AL	60	60	60	60	60	36	20	13	10	10	—	—	—	—	—	

Performance Curve

Pressure Drop Characteristics

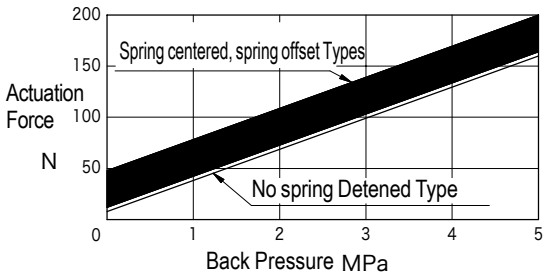
Pressure drop characteristics are same as DG4V-3, see page E15.

Switching Times

Switching times are same as DG4V-3, see page E15 (DC power supply).

Operating Considerations

- 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.
  - Coil can be energized (ON input) while other coil is energized but spool will not shift. Spool will shift when input to first energized coil is turned OFF.
  - 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 abnormal pressure surges above the allowable back pressure rating from being generated in T port. Valve is wet armature type so insure that valve is always filled with oil.
- Using valves as two-way and three-way
  Valve is designed as four-way and as such max. flow is limited when using as two or three-way valves. Consult TOKIMEC 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 valve 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
  For valves with indicator lamps, the lamps will light when current flows to the solenoid.
- Conduit box wiring
  See page E32.

Mounting Bolts (JIS B1176,Strength Class 12.9)

Hex Socket Bolts	Qty
M5 × 50	4

- Order mounting bolts separately.
- Mounting bolt tightening torque: 7~8Nm

Subplate

Subplate Model		Port Dia. Rc
Side Ported	DGMS-3-1E-10-T-JA-J	3/8
Rear Ported	DGVM-3-10-T-JA-J	

- Subplate and bolts must be ordered separately.
- See page Q8 for dimensions.
- See page Q8 for multiple valve mount subplates.
- Max. working pressure 21 MPa. For higher pressures, valve should be mounted on manifold block.

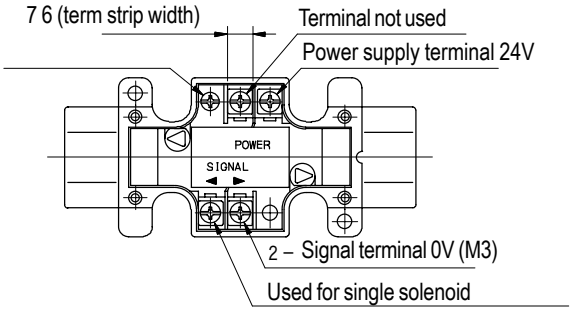
Dimensions

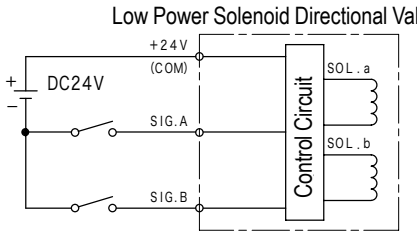
Dimensions and mounting are same as DG4V-3 (See E17, mounting dimensions) and E18 (valve dimensions).

Conduit Box Wiring

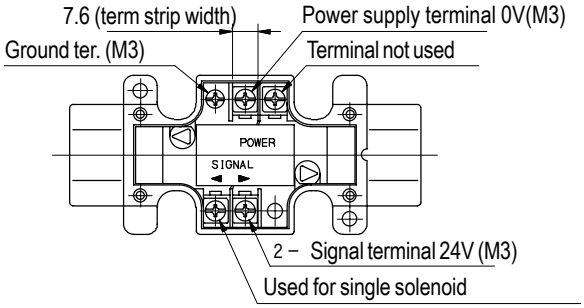
Solenoid and conduit box is pre-wired. Refer to below diagrams for wiring from power supply and control circuit to conduit box.

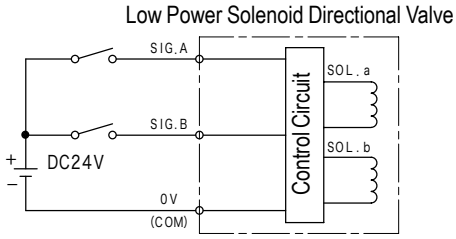
● DK2: Sink connection, 2 wire (Power ON/OFF control)
DG4VL−3−∗C/N−PDK2 (double solenoid)
DG4VL−3−∗A/B(L)−PDK2 (single solenoid)



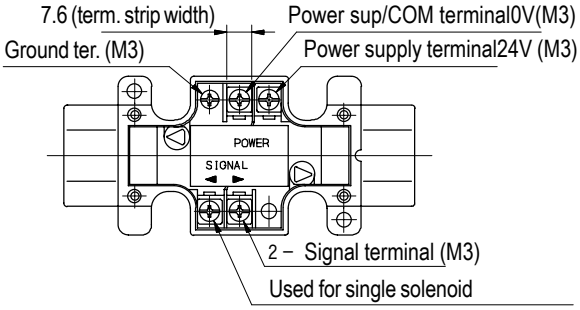


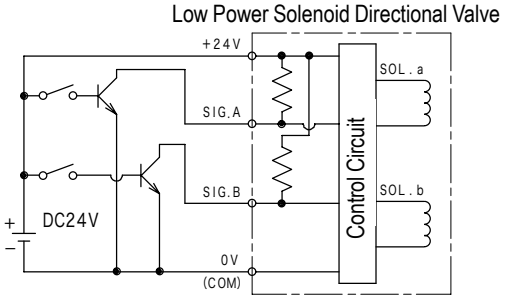
● DE2: Source connection, 2 wire (Power ON/OFF control)
DG4VL−3−∗C/N−PDE2 (double solenoid)
DG4VL−3−∗A/B(L)−PDE2 (single solenoid)





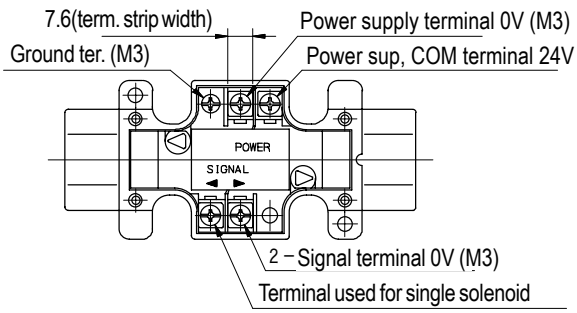
● K2: Sink connection, 3 wire (fine current control)
DG4VL−3−∗C/N−PK2 (double solenoid)
DG4VL−3−∗A/B(L)−PK2 (single solenoid)

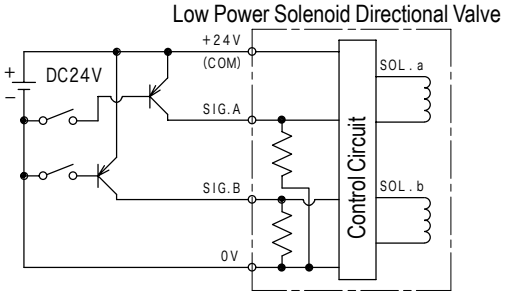




Note: - Terminal wiring to smoothed power supply, normally kept energized.
- Signal terminals should be wired to relays or open collector (NPN) transistors.
- Programmable controllers, etc., used should have leakage current of less than 200 microA.

● E2: Source connection, 3 wire (fine current control)
DG4VL−3−∗C/N−PE2 (double solenoid)
DG4VL−3−∗A/B(L)−PE2 (single solenoid)

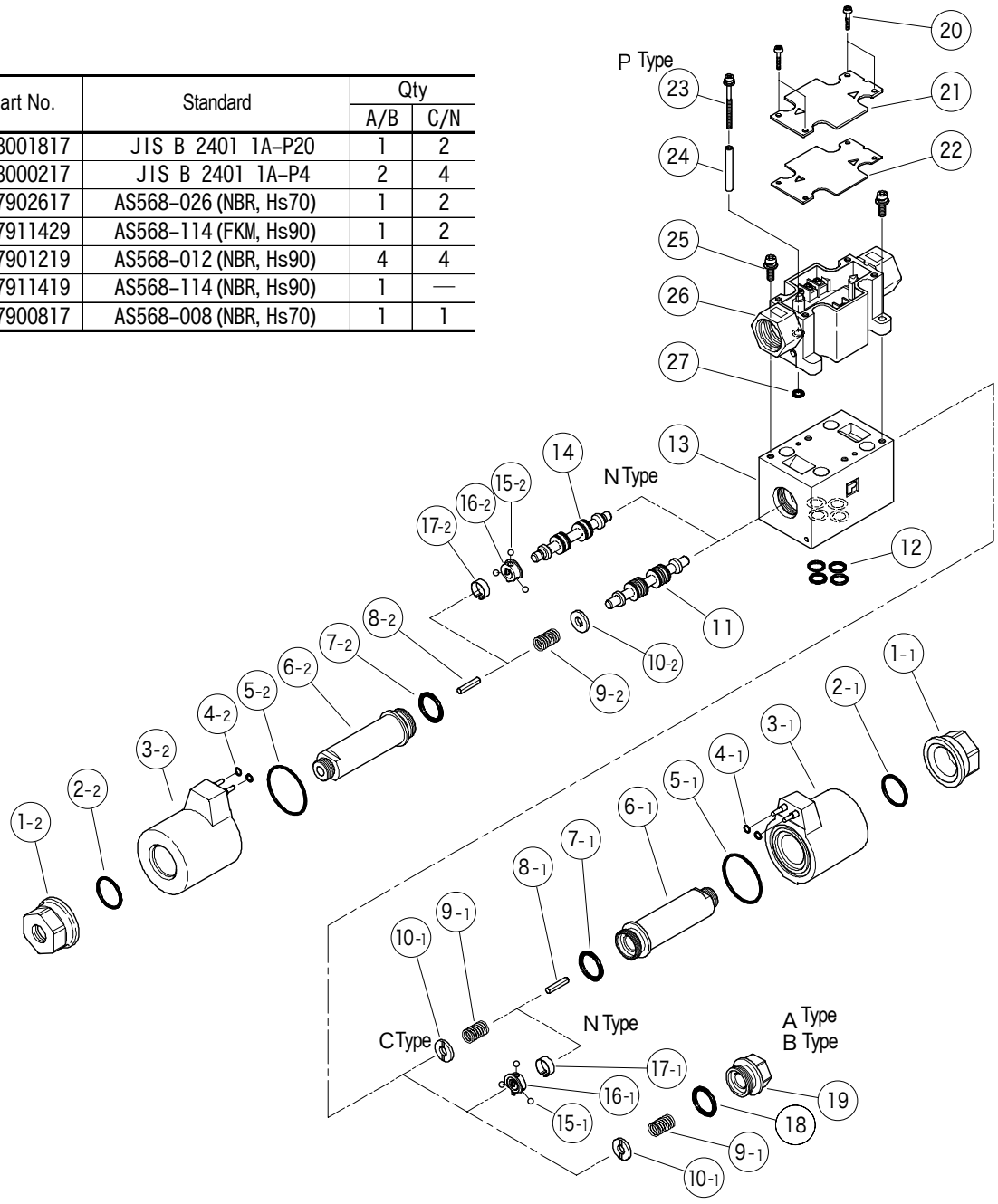




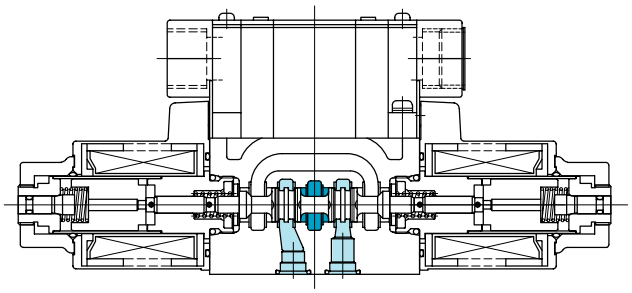
Note: - Terminal wiring to smoothed power supply, normally kept energized.
- Signal terminals should be wired to relays or open collector (PNP) transistors.
- Programmable controllers, etc., used should have leakage current of less than 200 microA.

O-Rings

No.	Part No.	Standard	Qty	
			A/B	C/N
2	008001817	JIS B 2401 1A–P20	1	2
4	008000217	JIS B 2401 1A–P4	2	4
5	007902617	AS568–026 (NBR, Hs70)	1	2
7	007911429	AS568–114 (FKM, Hs90)	1	2
12	007901219	AS568–012 (NBR, Hs90)	4	4
18	007911419	AS568–114 (NBR, Hs90)	1	—
27	007900817	AS568–008 (NBR, Hs70)	1	1



Shockless solenoid operated directional control valves DG4VS-3



• DG4VS-3 solenoid directional valves provides reduced shock during switching (compared to standard DG4V-3).

Model Code

(F3) - DG4VS - 3 - 2 A (L)- M -P 7- H- 7 - (P08) - 54

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

1 Fluid
Omitted for mineral oil, water glycol
F3: phosphate ester

2 Shockless CETOP 3 solenoid directional valve
Wet armature type (gasket mounting

3 Mounting
3: ISO 4401-03

4 Spool
See page E35

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 (3 position, double solenoid)

6 Solenoid assembly orientation (for spring sets A, B)
Omitted for standard (energized P to B, A to T)
L: Left hand build (energized: P to A, B to T)

7 Coil connections
P: Plug-in solenoids, conduit box, G 1/2
U: DIN43650 connector, pg. 11
KU: Flying leads (st'd lead wire length 350mm, DC only

8 Electrical accessories
Omitted for no accessories (coil connections P, KU)
1: Connectors without accessories (coil connection U)
2: With indicator lamp (AC standard)
4: With surge suppressor (coil connection KU, slow solenoid deenergize)
7: With indicator lamp and surge suppressor (DC standard)
9:ADC solenoid rectifier (fast solenoid de-energization) and indicator lamp (ADC standard)
12:ADC solenoid rectifier (slow solenoid de-energization) and indicator lamp
Note 1: Electrical accessories - 9, 12
• ADC solenoids (AC-DC conversion) only
• Coil connection, P only
• With surge suppressor

9 Solenoid coil voltage
G:DC12V
H:DC24V
TR:AC100V 50/60Hz(AC/DC rectifer)
VR:AC200V 50/60Hz(AC/DC rectifier)

10 T port allowable back pressure
7:20.6MPa

11 Port orifice (option)
Omitted for no port orifices (standard)
Port orifices
<Example1> P08(0.8m orifice in P port)
Orifice diameter
Port(A,B,P,T)
<Example 2>B12(1.2mm dia. orifice in B port)
<Example 3>Up to 2 port combinations
Combination sequence, PTAB
P10T12,P08B10

12 Design no.

Specifications

Model	Max. Operating Pressure MPa	Max. Flow L/min	Allowable Tank Back Press. MPa	Max.Switching Freq.(cycles/min)		Weight kg	
				DC	AC-DC Rectified	Single Solenoid	Double Solenoid
DG4VS–3	35	See Press.-Flow Characteristics	20. 6	200	120	1. 6	2. 0

Solenoid Specifications

Power Supply	Volt.: Code	Voltage V	Frequency Hz	Holding Current A	Power Consumption W	Allow. Voltage Fluctuation %	Insul.Class (Allow. Temp.)
DC	G	12	—	2. 36	29	±10	Class H (180°C)
	H	24		1. 16	28		
AC ↓ DC (AC-DC Rectifier) ADC	TR	AC 100 V 50/60 Hz ↓ DC 90 V (coil)		0. 33	30	±10	Class H (180°C)
	VR	AC 200 V 50/60 Hz ↓ DC 180 V (coil)		0. 17	31		

Notes: • Current values and power consumption varies with temperature conditions. Values in table are based on 30°C.
• Integrated AC/DC rectifier enables AC power source to drive DC solenoids (see rectified DC solenoid characteristics). Maximum flow is based on DC solenoids.
• Contact TOKIMEC for other voltages not shown.

Spool Types and Pressure-Flow Characteristics

DC,AC-DC Rectifier Solenoid (applied voltage 90% of rated)

Spool Neutral Position	Valve Function Schematics			Max. Flow L/min															
	3 Position	2 Position		P→A, P→B, B→A, B→T					P→A (B Port blocked)					P→B (A Port blocked)					
	Spring Centered	Spring Offset, Type B																	
	– C –	– B –	– BL –	7 MPa	14MPa	21MPa	28MPa	35MPa	7 MPa	14MPa	21MPa	28MPa	35MPa	7 MPa	14MPa	21MPa	28MPa	35MPa	
0	DG4VS-3-0C	DG4VS-3-0B	DG4VS-3-0BL	80	80	80	60	50	80	80	80	60	50	80	80	80	60	50	
2	DG4VS-3-2C	DG4VS-3-2B	DG4VS-3-2BL	80	80	80	80	80	80	45	30	23	19	80	45	30	23	19	
3	DG4VS-3-3C	DG4VS-3-3B	DG4VS-3-3BL	80	80	65	35	30	80	30	23	18	14	80	65	35	28	24	
6	DG4VS-3-6C	DG4VS-3-6B	DG4VS-3-6BL	80	80	80	52	42	80	60	38	27	23	80	60	38	27	23	
8	DG4VS-3-8C	DG4VS-3-8B	DG4VS-3-8BL	45	45	45	30	25	45 (45)	45 (45)	45 (38)	30 (33)	25 (30)	45	45	45	30	25	
31	DG4VS-3-31C	DG4VS-3-31B	DG4VS-3-31BL	80	80	65	35	30	80	65	35	28	24	80	30	23	18	14	

Note : Values in ( ) under spool type '8' is max. flow with A, B port blocked.

Spool Transient Condition	Valve Function Schematics		Max. Flow L/min																
	2 Position		A, AL					A					AL					A	
	Spring Offset, Type A		P→A, P→B, B→A, B→T					P→A (B Port blocked)					P→B (A Port blocked)					P→B (A Port blocked)	
	– A –	– AL –	7 MPa	14MPa	21MPa	28MPa	35MPa	7 MPa	14MPa	21MPa	28MPa	35MPa	7 MPa	14MPa	21MPa	28MPa	35MPa	7 MPa	14MPa
2	DG4VS-3-2A	DG4VS-3-2AL	80	80	80	63	60	50	15	10	10	10	80	40	26	22	20		

Notes : Max. flow without valve malfunction.

Performance Curve (viscosity 20 mm²/s , specific gravity 0.87)

Pressure Drop Characteristics

Pressure drop characteristics are same as DG4V-3 (see page E15)

Switching Times

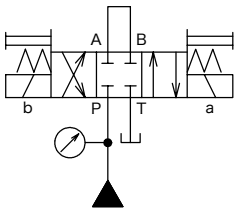
Unit : ms

Power Supply	Operation	Deenergize Time	Spring Offset, Spring Centered C, B, BL	Spring Offset A, AL
DC	Energized		80	
	Spring Return		30	
AC-DC	Energized		80	
Rectified rectifier integrated	Spring Return	Fast	40	
		Slow	120	

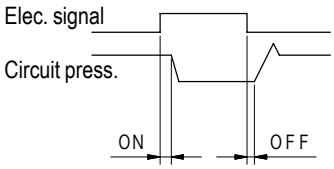
Note Values may differ depending on spool type, circuit conditions.

Conditions: spool type 2, open loop circuit, flow 40 L/min, supply pressure 17.5 MPa, fluid viscosity 20 mm²/s

[Circuit Example]

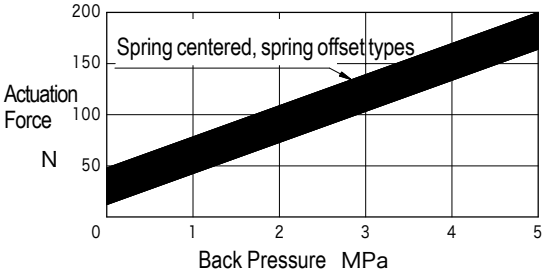


[Switching Time Definition]



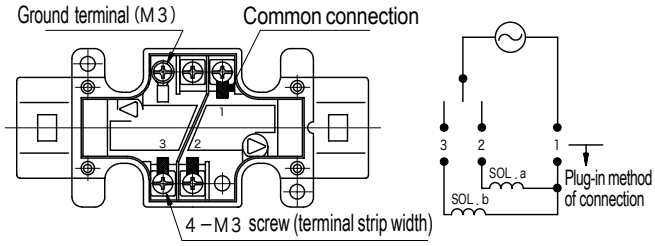
Operating Considerations

- Mounting orientation
  No restrictions on valve mounting attitude.
- Solenoid energization
  Always insure that one side solenoid is deenergized before energizing the opposite side solenoid. 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.
- T (tank) port piping
  Prevent abnormal pressure surges above the allowable back pressure rating from being generated in T port. Valve is wet armature type so insure that valve is always filled with oil.
- Using valves as two-way and three-way
  Valve is designed as four-way and as such max. flow is limited when using as two or three-way valves. Consult TOKIMEC 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 valve T port may lead to spool malfunctions.
- Manual operation
  For manual switching, push the manual override pin. Be aware that actuation force increases with higher back pressure. (See graph)

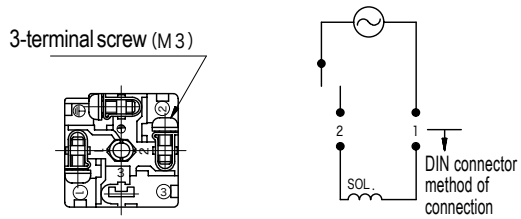


- Solenoid indicator lamp
  For valves with indicator lamps, the lamps will light when current flows to the solenoid.
- Conduit box wiring
  Solenoid and conduit box are pre-wired. Refer to below diagrams for wiring from power source to conduit box or DIN connectors.

P Type

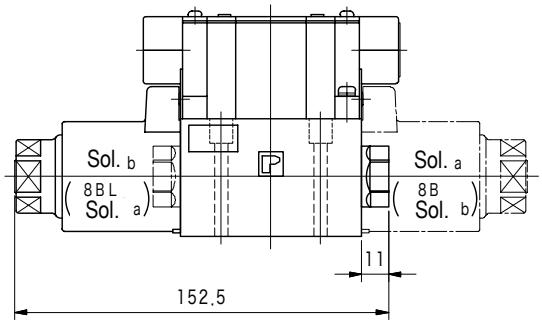


U Type
(DIN Connector)

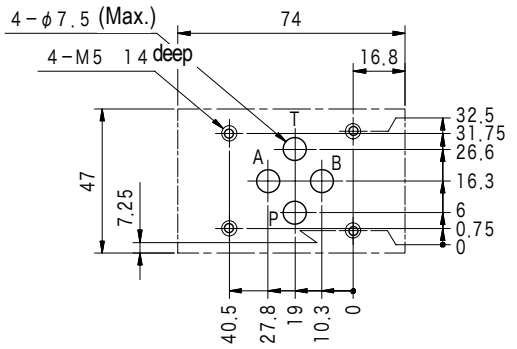


Dimensions

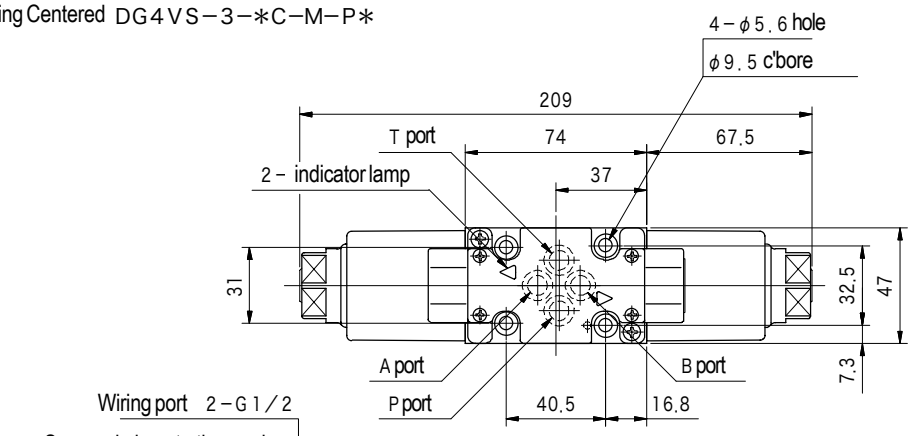
Spring Offset DG4VS−3−∗A/B−M−P∗ (solid line)
Spring Offset DG4VS−3−∗AL/BL−M−P∗ (dotted line)

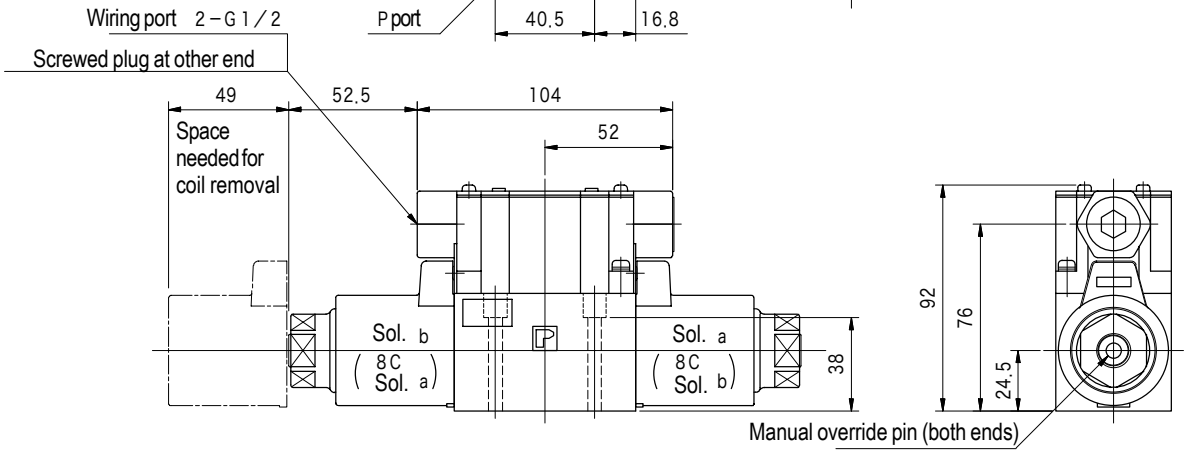


Mounting Dimensions (ISO 4401−03)

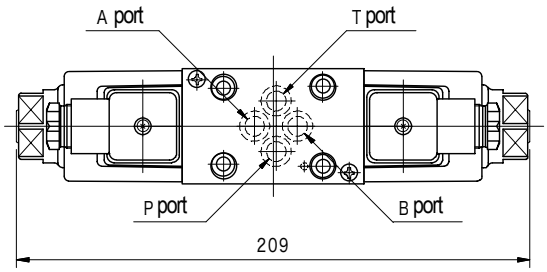


Spring Centered DG4VS−3−∗C−M−P∗

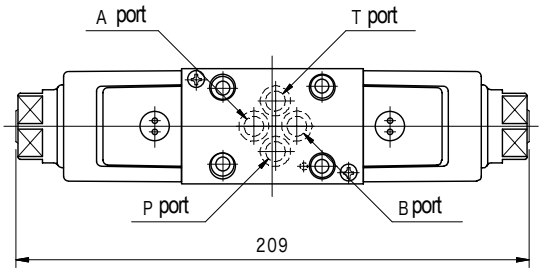


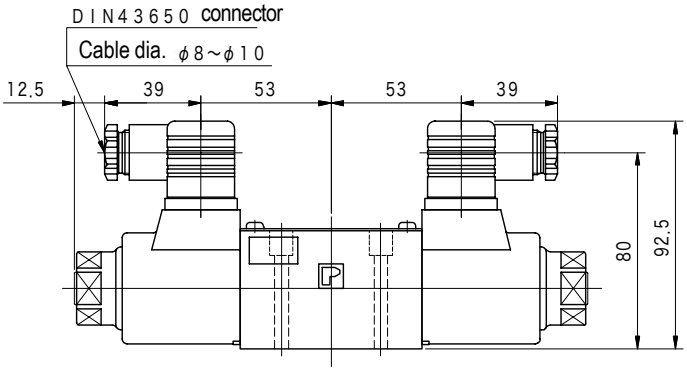


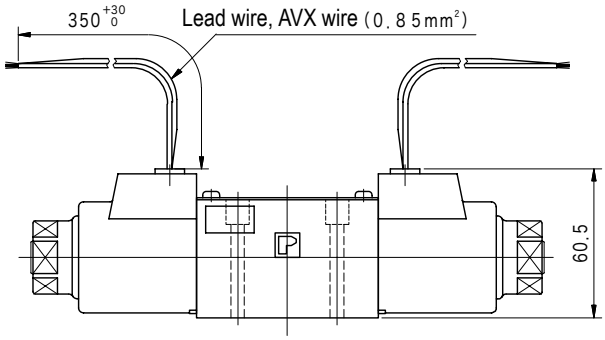
DG4VS−3−∗C−M−U∗



DG4VS−3−∗C−M−KU∗







Mounting Bolts (JIS B1176,Strength Class 12.9)

Mounting Bolts	Quantity
M5 × 50	4

- Order mounting bolts separately.
- Mounting bolt tightening torque: 7~8Nm

Subplate

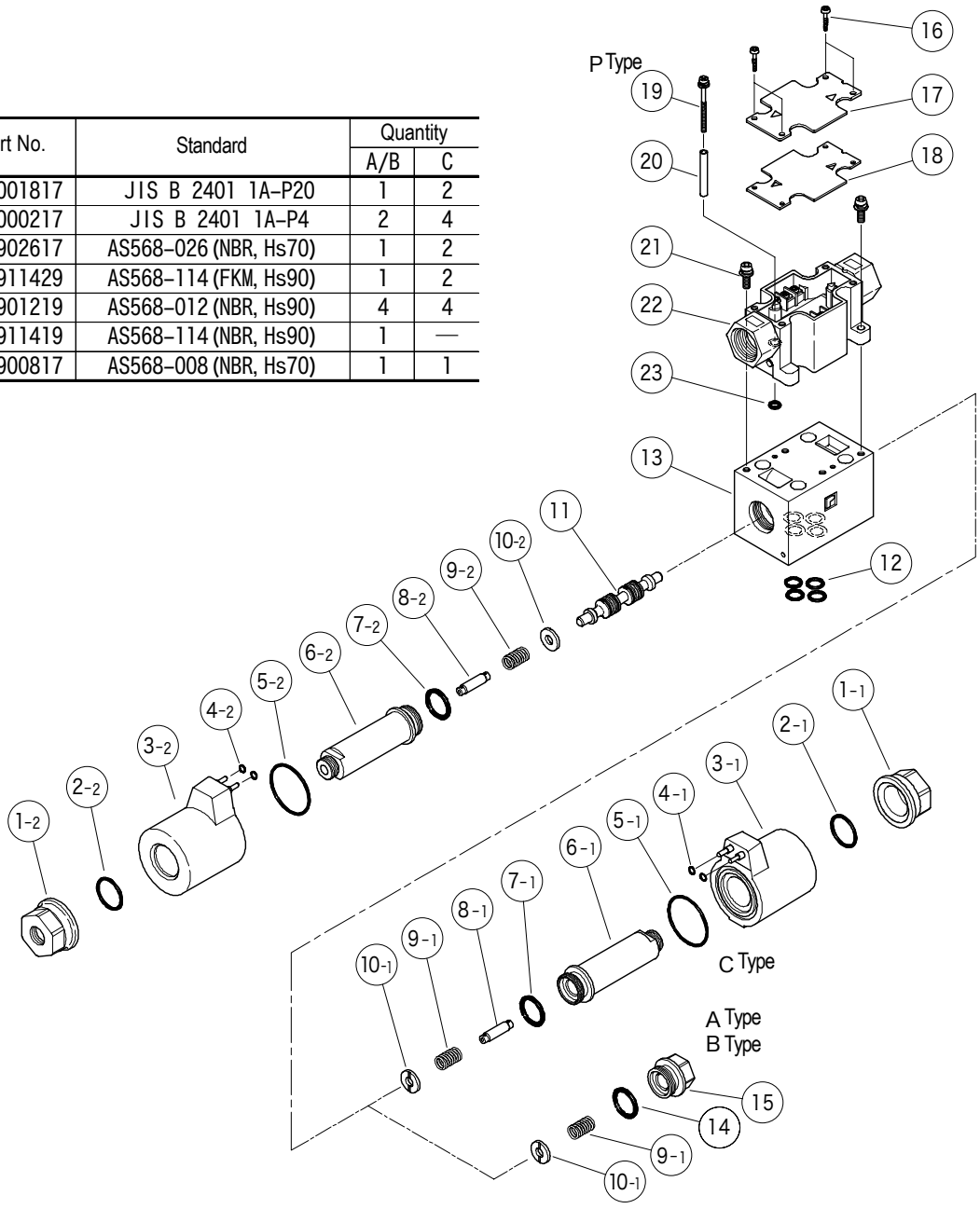
Subplate Model		Port Dia. Rc
Side ported	DGMS-3-1E-10-T-JA-J	3/8
Rear ported	DGVM-3-10-T-JA-J	

- Subplate and bolts must be ordered separately.
- See page Q8 for dimensions.
- See page Q8 for multiple valve mount subplates.
- Max. working pressure 21 MPa. For higher pressures, valve should be mounted on manifold block.

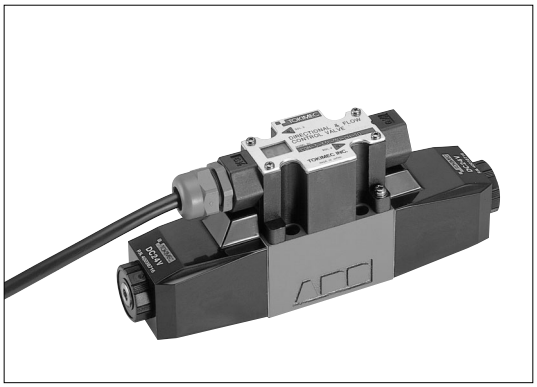
Construction

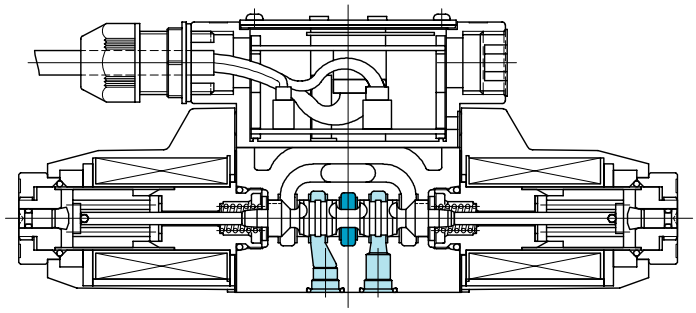
O-Rings

No.	Part No.	Standard	Quantity	
			A/B	C
2	008001817	JIS B 2401 1A-P20	1	2
4	008000217	JIS B 2401 1A-P4	2	4
5	007902617	AS568-026 (NBR, Hs70)	1	2
7	007911429	AS568-114 (FKM, Hs90)	1	2
12	007901219	AS568-012 (NBR, Hs90)	4	4
14	007911419	AS568-114 (NBR, Hs90)	1	—
23	007900817	AS568-008 (NBR, Hs70)	1	1



Directional and flow control valves "COMNICA"





- COMINCA valves offer independent setting for acceleration and deceleration which is indispensable for shockless operation. High speed positioning which is difficult with conventional shockless valves and adjustable speed setting is possible.
- Onboard microprocessor allows setting of required parameters without valve to valve variation. Push button operation while monitoring the integrated digital indicator enables simple, repeatable setting and adjustment. Handheld setting device provides same setting operation as on the valve.
- Compact, space-saving design with same configuration and robust construction as standard solenoid valves. Ease-of-use design facilitates operation as well as installation and maintenance with features such as operation confirmation when valve is deenergized, manual override pins, and reduced wiring.
- Like standard solenoid valves, can be connected to general purpose relays, PLC's, etc.

Model Code

COM−3/5 Series

COM -3 -2C - 30 - CH - 11

1 2 3 4 5 6 7

1 COMNICA Valve
2 Mounting
3:ISO 4401-03
5:ISO 4401-AC-05-4-A
3 Spool
2:Type 2
33:Type 33
4 Spring sets
C:Spring centered (3 position)
5 Max. control flow
See 'Specifications'
6 Control function
SH:Shockless
CH:3 Channel setting
AN:Analog input
7 Design no.
10:COM-5
11:COM-3

COM−7/8 Series

COM - 7 - 2 C - 130 - CH - (E) - (T) - 10

1 2 3 4 5 6 7 8 9

1 COMNICA Valve
2 Mounting
7:ISO 4401-AD-07-4-A
8:ISO 4401-AE-08-4-A
3 Spool
2:Type 2
33:Type 33
4 Spring set
C:Spring centered (3 position)
5 Max. control flow
See 'Specifications'
6 Control function
SH:Shockless
CH:3 Channel setting
AN:Analog input
7 Pilot
Omitted for internal pilot
E: External pilot
8 Drain
Omitted for external drain
T: Internal drain
9 Design no.

Specifications

Model	COM-3	COM-5	COM-7	COM-8
Rated pressure MPa	24.5	20.6	24.5	
Allowable tank port back pressure MPa	13.7		Internal dr. : 13.7 External dr. : 24.5	
Max. control flow L/min	*1 30	*1 70	*2 130	*2 250
Min. control flow L/min	*1 0.5	*1 1.5	*2 3	*2 5
Repeatability	Less than 1 % of max. flow			
Flow setting	Solenoids a ,b each 100 segments			
Response time ms	*3 50	*3 100	*3 70	
Acceleration-deceleration time setting	0～9.9 s(0.1 s unit)／ 0～0.99 s(0.01 s unit) switchable			
Ambient temp. ℃	0～60			
Fluid temp. ℃	7～60			
Fluid viscosity mm^2/s	20～300			
Vibration resistance	45 m/s^2 (JIS D 1601)			
Shock resistance	300 m/s^2 (JIS C 0041)			
Waterproof, dustproof	IP 54			
Voltage	DC 21.6～28 V			
Max. power consumption	40 W(DC24 V 1.67 A)			
Wiring	1 m lead wire included			
Input-Output Signals	See table below			
Weight kg	2.5	6.5	12	20

*1 Supply pressure (in case of 6.9 MPa)
*2 Valve differential pressure (in case of 1 MPa)
*3 0⇔100 % operation

Control Functions

SH Type (Shockless)
Simple shockless and speed control by selecting A or B direction with contact signal of PLC, etc. In addition easy position control can be achieved by using the HALT function.

CH Type (Contact Point Input)
Enables selection of three flows - high, medium, low speeds - for A, B direction and independent setting of acceleration, deceleration between the three flows.

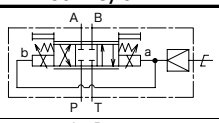
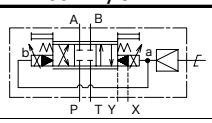
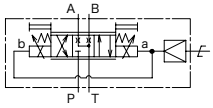
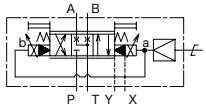
AN Type (Analog Input)
Speed (flow) setting in real time with analog voltage.
Acceleration, deceleration time setting possible.

Input-output signal

Control Function	Input	Output
SH	Standard signal a, b solenoid, each 1 point Stop (HALT) input (Photocoupler insulation, sink type)	—
CH	Setting selection signal a, b solenoid, each 3 points Emergency stop (STOP) input (Two-way photocoupler insulation; common source, sink)	READY (operation ready) output (Open collector output)
AN	* DC±10 V analog input Emergency stop (STOP) input (Photocoupler insulation, sink type)	—

- Contact point input ON: input common •Ì voltage between contact point input, DC15V~35V
- Contact point input OFF: input common •Ì voltage between contact point input, DC 0V~3V
- Contact point output: max. load current 50Ma
*All contact signal except for AN type DC±10V signal.

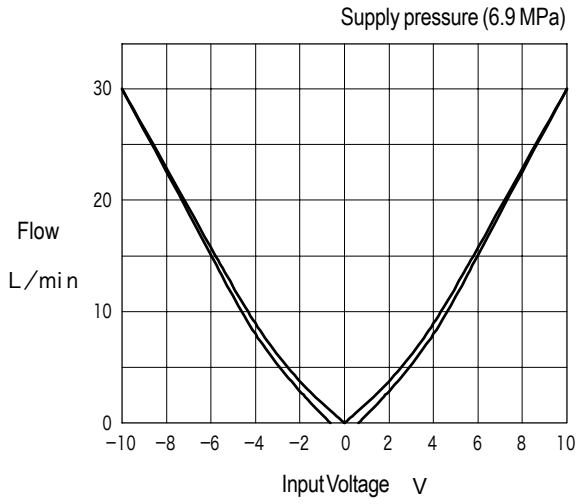
Spools

Neutral Position Spool Configuration			Functional Symbol COM-3/5	Functional Symbol COM-7/8
2		Closed centered		
33		A–B–T connection with restrictor		

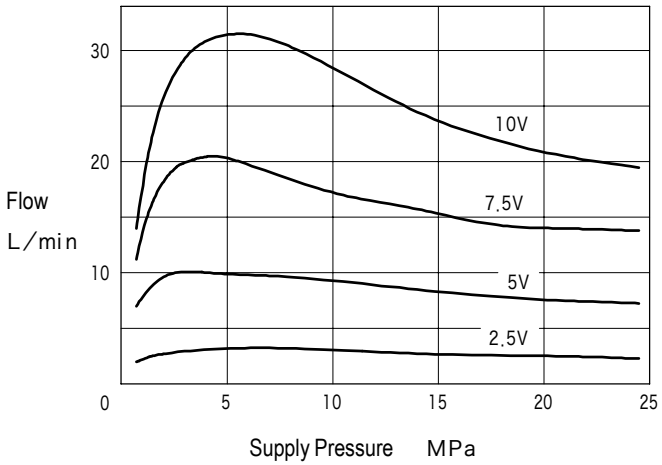
Performance Curve (viscosity 20 mm²/s , specific gravity 0.87)

(Example) COM-3-2C-30-AN-11

Input Voltage - Flow Characteristics

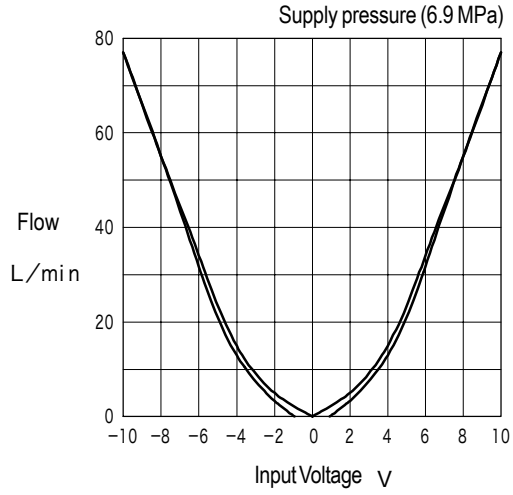


Supply Pressure - Flow Characteristics

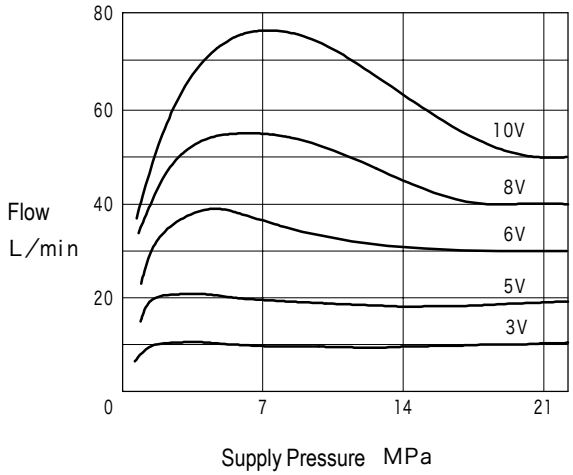


(Example) COM-5-2C-70-AN-10

Input Voltage - Flow Characteristics

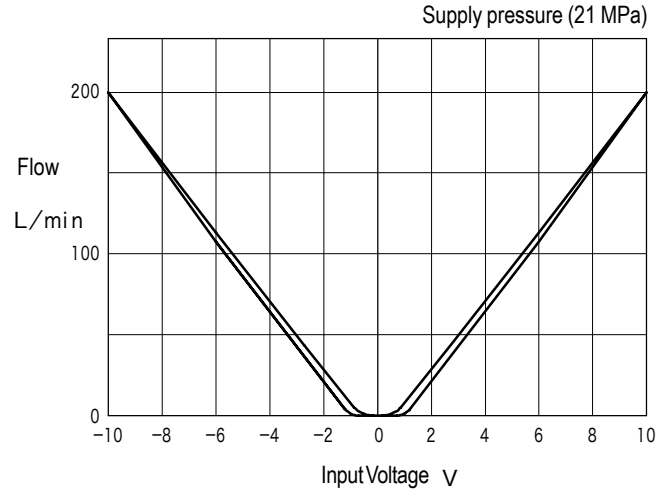


Supply Pressure - Flow Characteristics

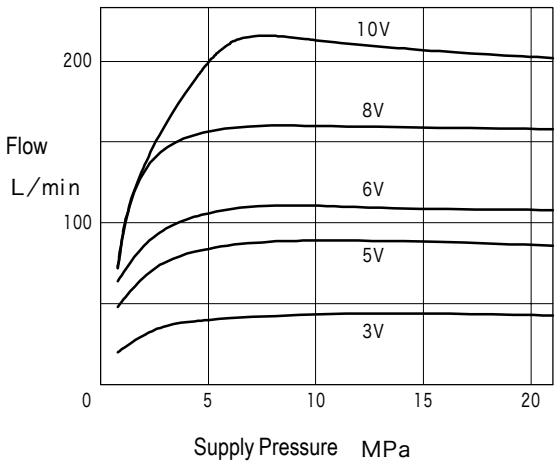


(Example) COM-7-2C-130-AN-10

Input Voltage - Flow Characteristics



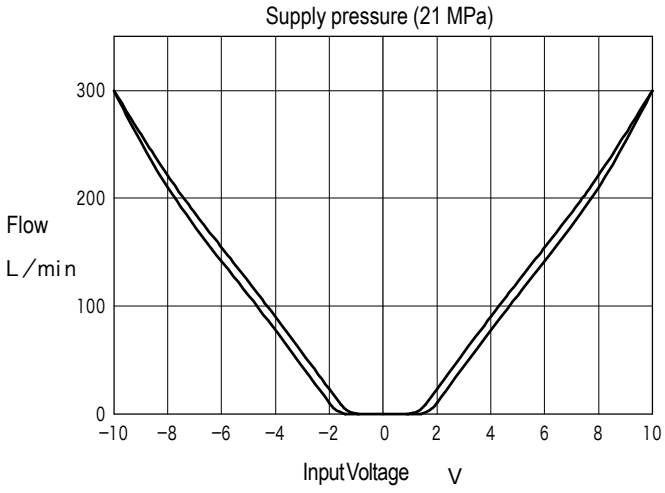
Supply Pressure - Flow Characteristics



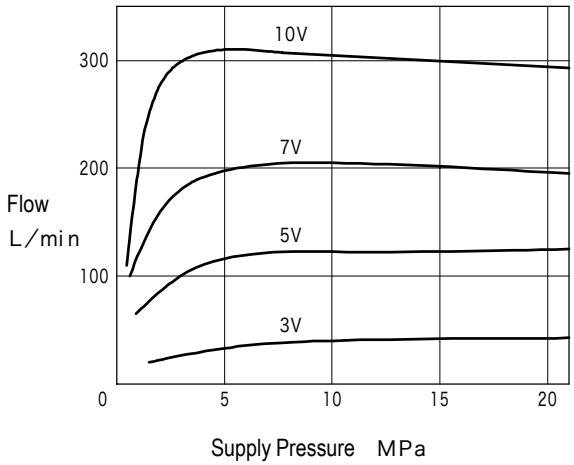
Performance Curves (viscosity 20 mm²/s, specific gravity 0.87)

(Example) COM-8-2C-250-AN-10

Input Voltage - Flow Characteristics



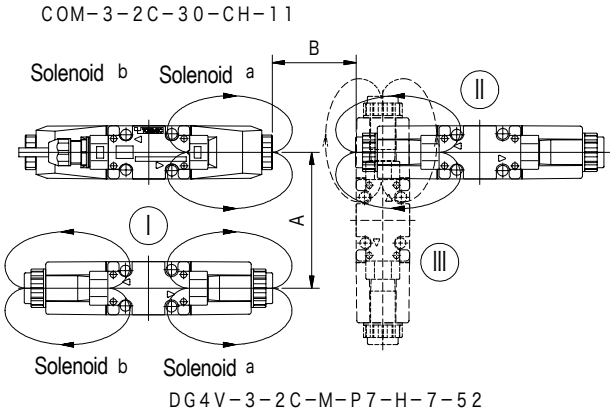
Supply Pressure - Flow Characteristics



Operating Considerations

1. Mounting orientation
   Valve should be mounted with spool axis oriented horizontally.
2. T port
   Abnormal surge pressures in T port should be kept to below 13.7 MPa. Valve should always be filled with oil.
3. Signal line
   Ends of signal wires not used should be insulated and short circuits should be prevented.
4. Wiring specifications
   When using extended lead wires for COMNICA valves, insure that cables are heat and oil resistant and of proper size as described below.
   • Power supply (24V or 0V)
   AWG18 or above 0.75mm²
   • Contact point signal or analog input
   AWG22 or above 0.3mm²
5. Contact point input-output current
   When contact signal is input, the following currents flow to the contact points of the PLC, relay, etc. Care should be paid to the current limitations of external devices.
   Setting point current (A)≒ (contact point input voltage -1)/15000
   Operation output (CH type only) max. load current is 50mA and care should be paid to the load on the PLC, relay, etc. Especially when connecting directly to LED, etc., serially connect resistance to operational output + or operational output -, and limit current.
   Minimum applicable load (Ω),≒ (load voltage-1.2)/0.05
6. Manual operation
   Valve can be manually shifted by pushing the manual override pins but force required will increase as tank line back pressure increases.
7. Water and dust protection class
   Water and dust protection class is IP54. Separate protection should be implemented for jets from nozzles, etc. In order to maintain water and dust resistance, nameplate and packing should be tightened with the tap pins after adjustment of settings. Tightening torque: 0.34 ~ 0.53Nm
8. EMI (electro-magnetic interference)
   Valve control flow may vary with changes in the magnetic field.
   As shown in the examples below, when flow is controlled by solenoid “a” and a nearby solenoid valve is energized, controlled flow of the COMNICA valve may increase or decrease as shown in the table.
   Therefore caution should be exercised when COMNICA valves are operated in proximity to solenoid valves

Example 1 .COM-3



Flow Variation of COMNICA Valve When Solenoid Valve Switched at 1 L/min

i)① Valve position

Flow variation :L/min

A mm	DG4V-3 Sol. 'a' energized	DG4V-3 Sol. 'b' energized
47	0. 50	0
57	0. 20	0
97	0. 10	0
147	0. 02	0

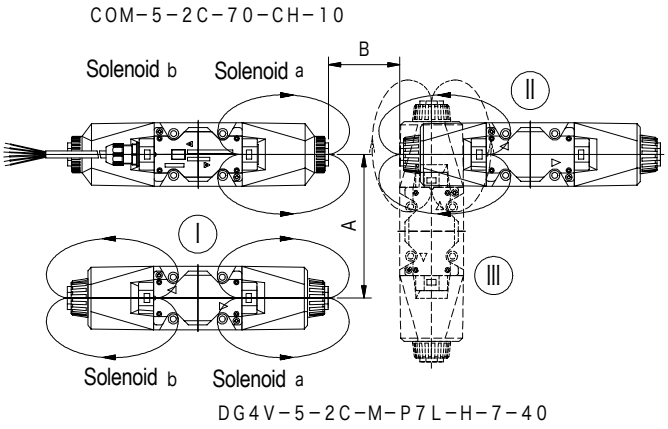
ii)②③ Valve position

Flow variation :L/min

B mm	DG4V-3 Sol. energized
25	0. 10
50	0. 05

Operating Considerations

(Example) 2.COM-5



Flow Variation of COMNICA Valve When Solenoid Valve Switched at 5 L/min

i) ① Valve position

Flow variation : L/min

A mm	DG4V-5 Sol. 'a' energized	DG4V-5 Sol. 'b' energized
70	1. 40	0
80	0. 65	0
120	0. 30	0
170	0. 10	0

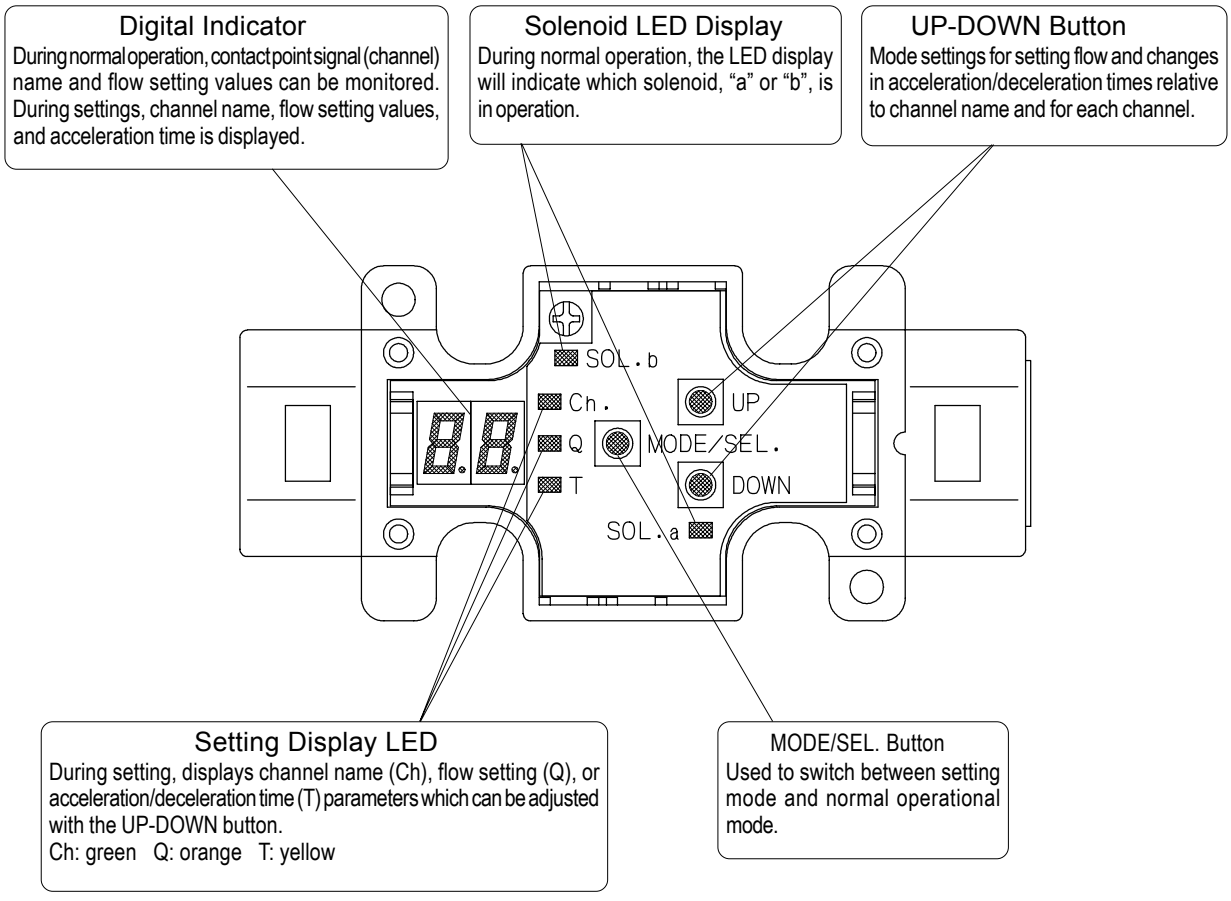
ii) ⑪⑬ Valve position

Flow variation : L/min

B mm	DG4V-5 Sol. energized
25	0. 30
50	0. 10

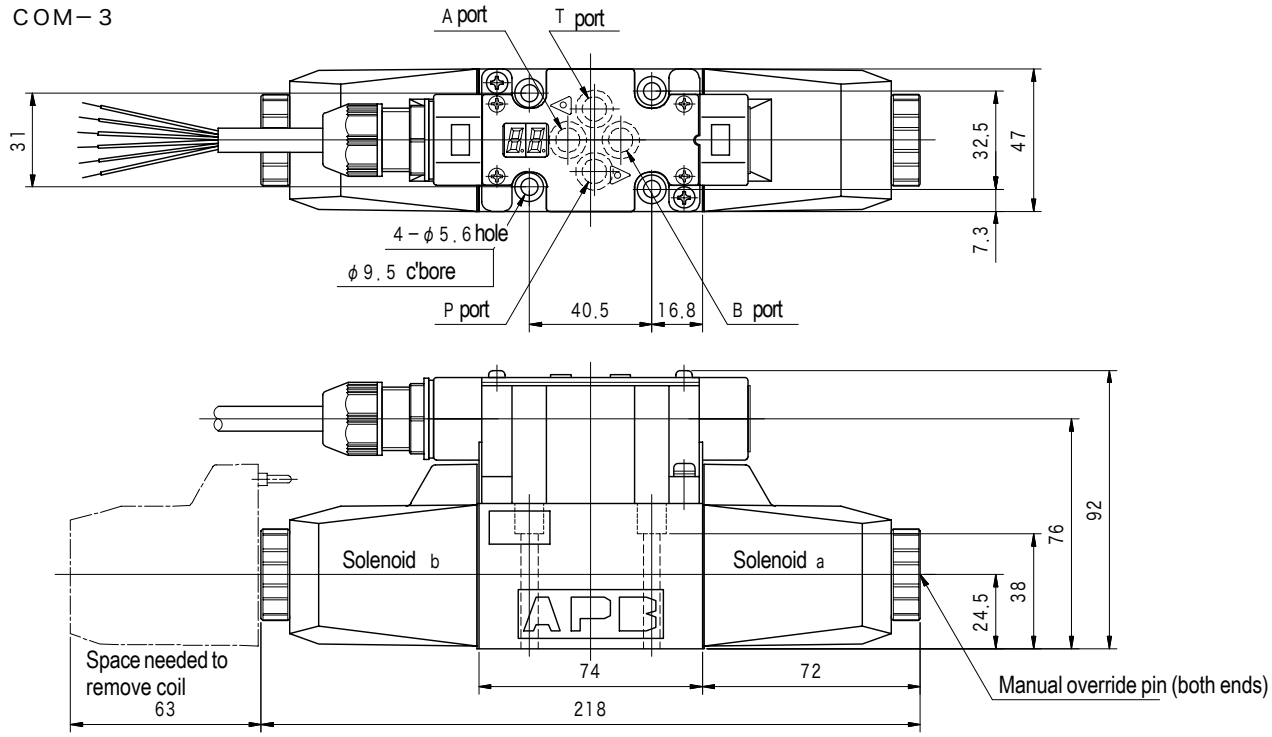
Notes regarding the above examples.
- Orientation of electromagnetic fields shown in the illustration may differ according to the electrical wiring.
- Solenoid valves placed in proximity in positions other than those illustrated may also increase/decrease COMNICA valve controlled flows.
- Similar interference may occur with COM-7/8. Consult TOKIMEC as necessary.

Controller Unit Nomenclature and Functions

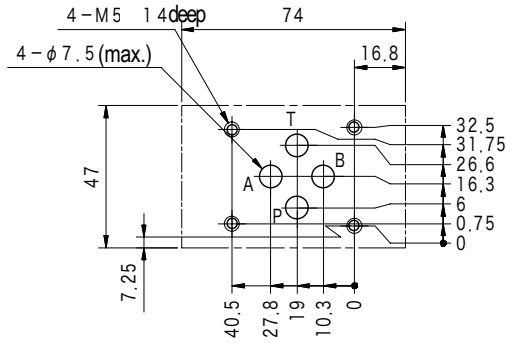


Dimensions

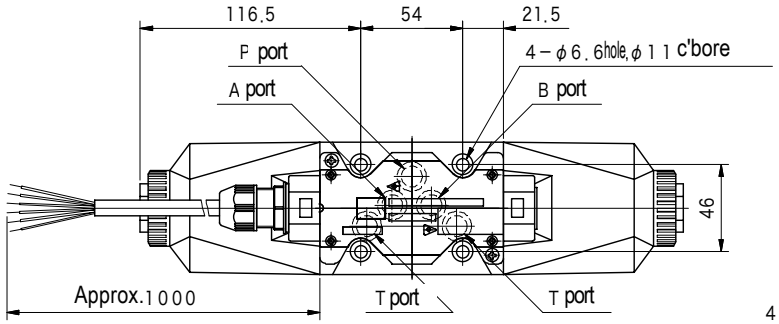
COM－3



• Mounting Dimensions（ISO 4401－03）

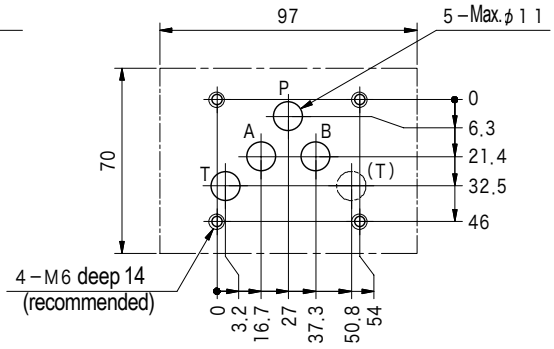


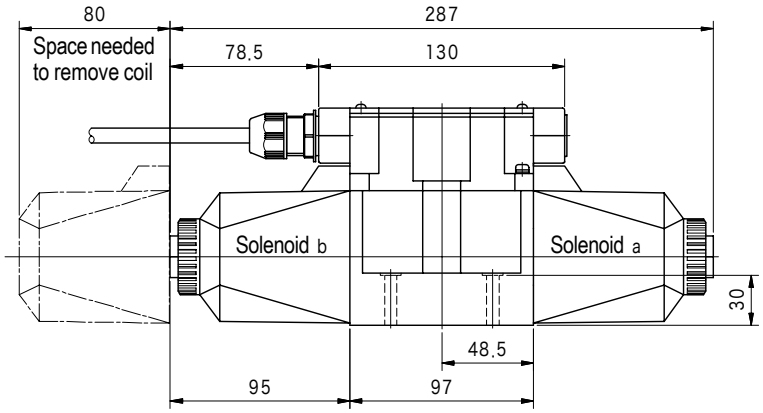
COM－5

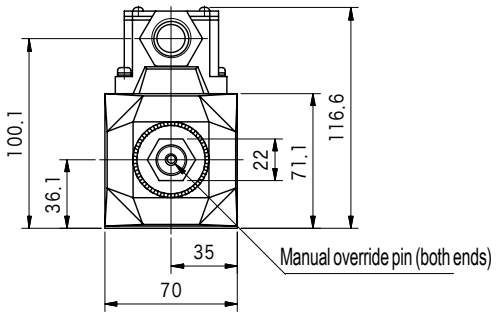


• Mounting Dimensions

ISO 4401－AC－05－4－A

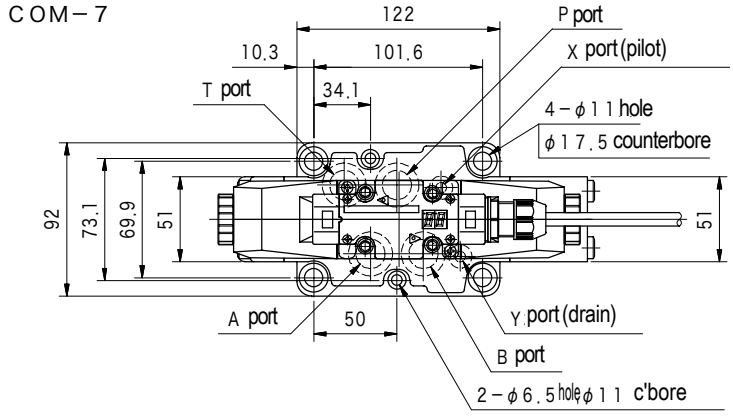




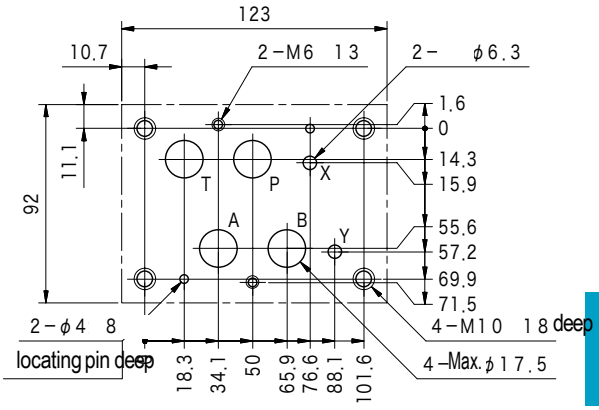


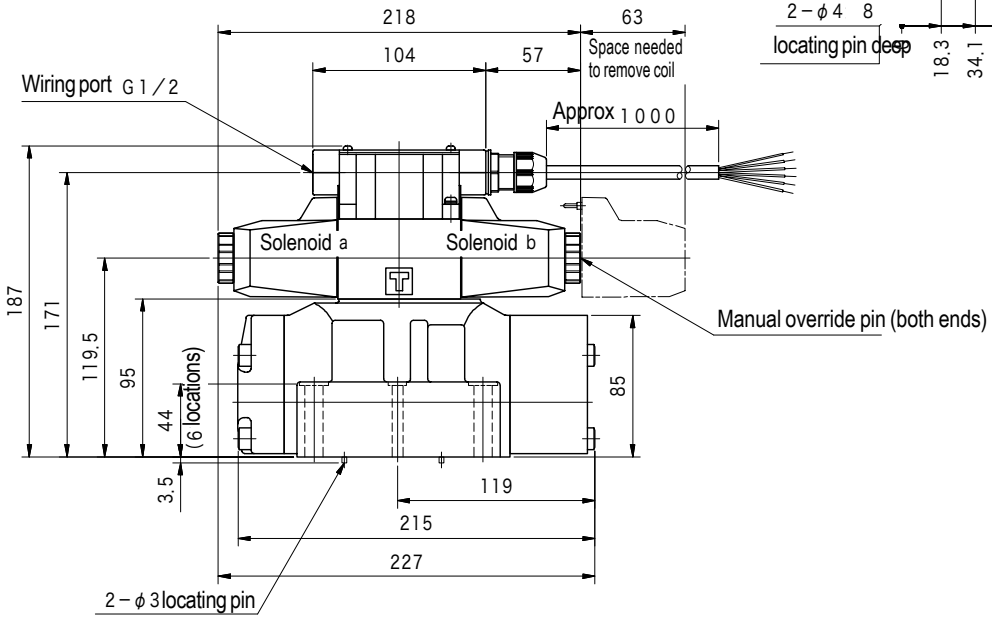
Dimensions

COM－7

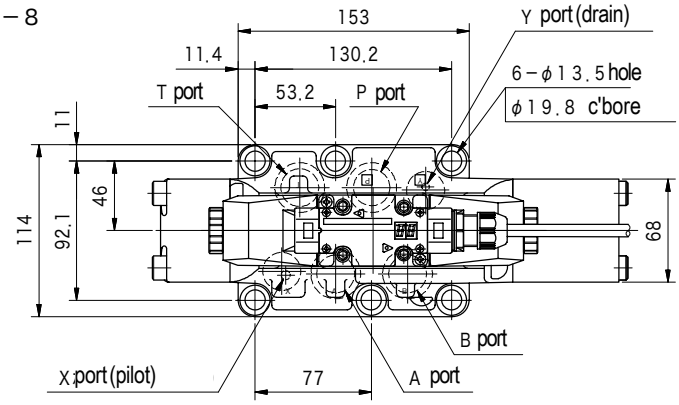


Mounting Dimensions
(ISO 4401－AD－07－4－A)

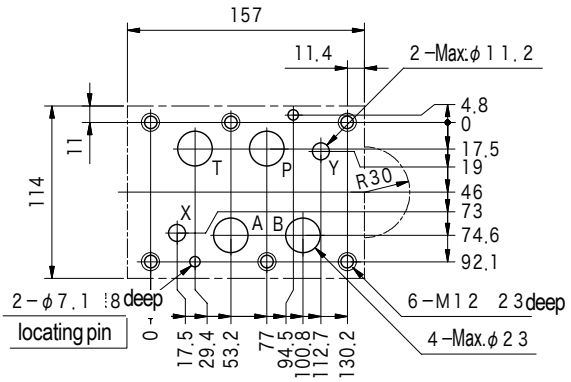


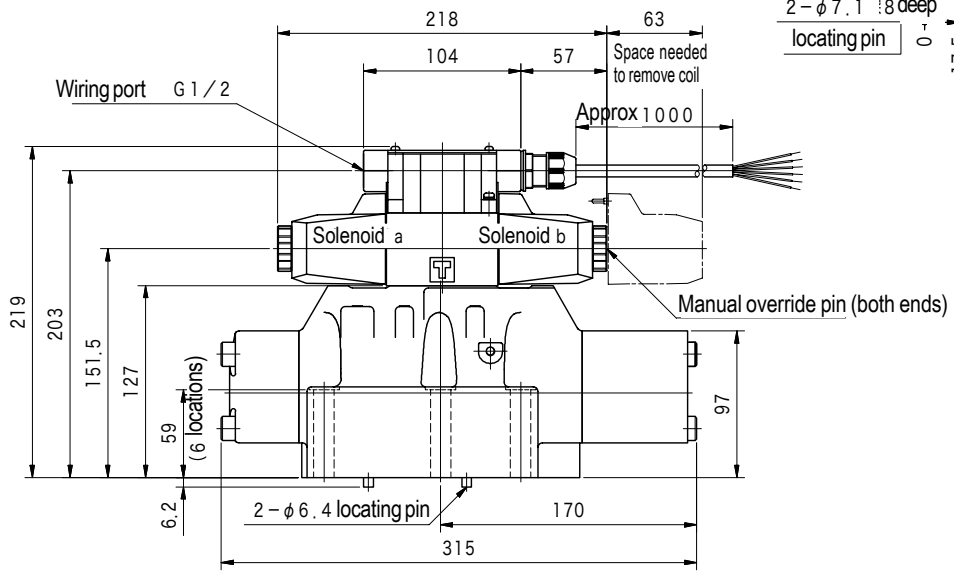


COM－8



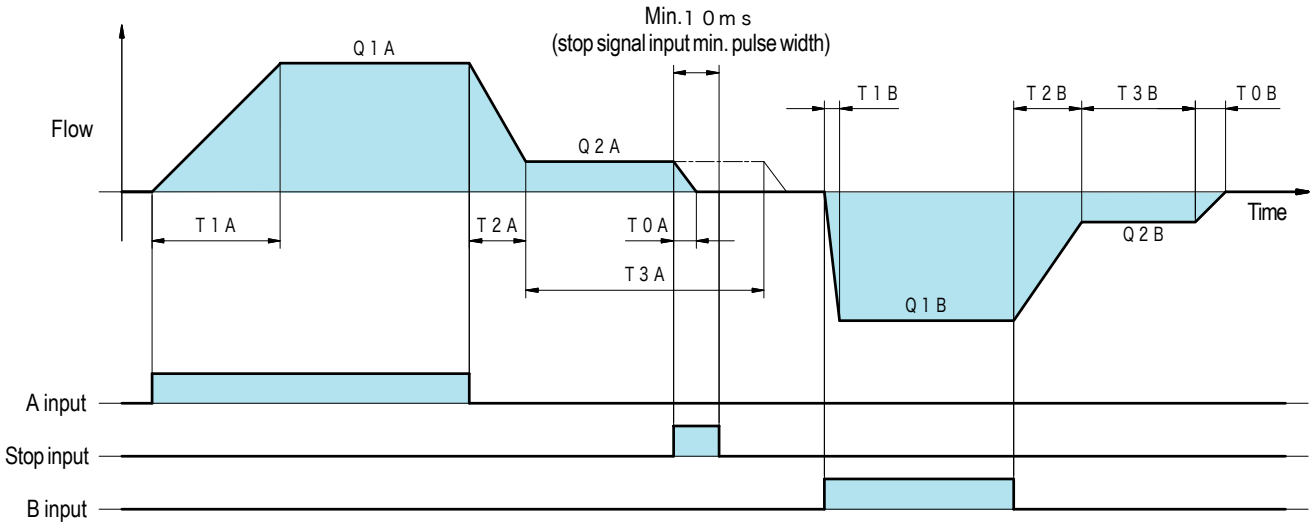
Mounting Dimensions
(ISO 4401－AE－08－4－A)





Operation

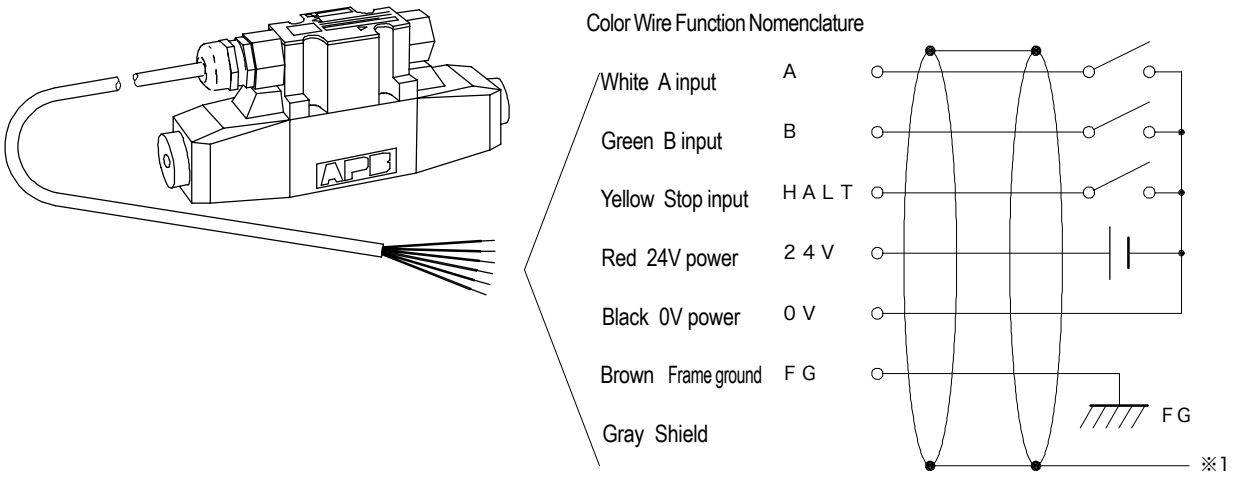
Two-high/low speed-flow levels, high/low speed arrival times, and low speed flow hold time can be independently set for solenoids "a" and "b". Shockless operation and speed control (flow control) can be easily obtained by selecting the A (solenoid 'a') or B (solenoid 'b') direction with the contact point signals of the sequencer. Also positioning control can be obtained by using the stop signal (HALT). (When the energize signal to the solenoid is cut, mode automatically switches to low speed.)



T0A~T3A, T0B~T3B setting range 0~9.9 sec. Q1A, Q2A, Q1B, Q2B setting range 0~100%

If stop (HALT) signal is input, COMNICA valve will stop according to deceleration time TOA or TOB setting.

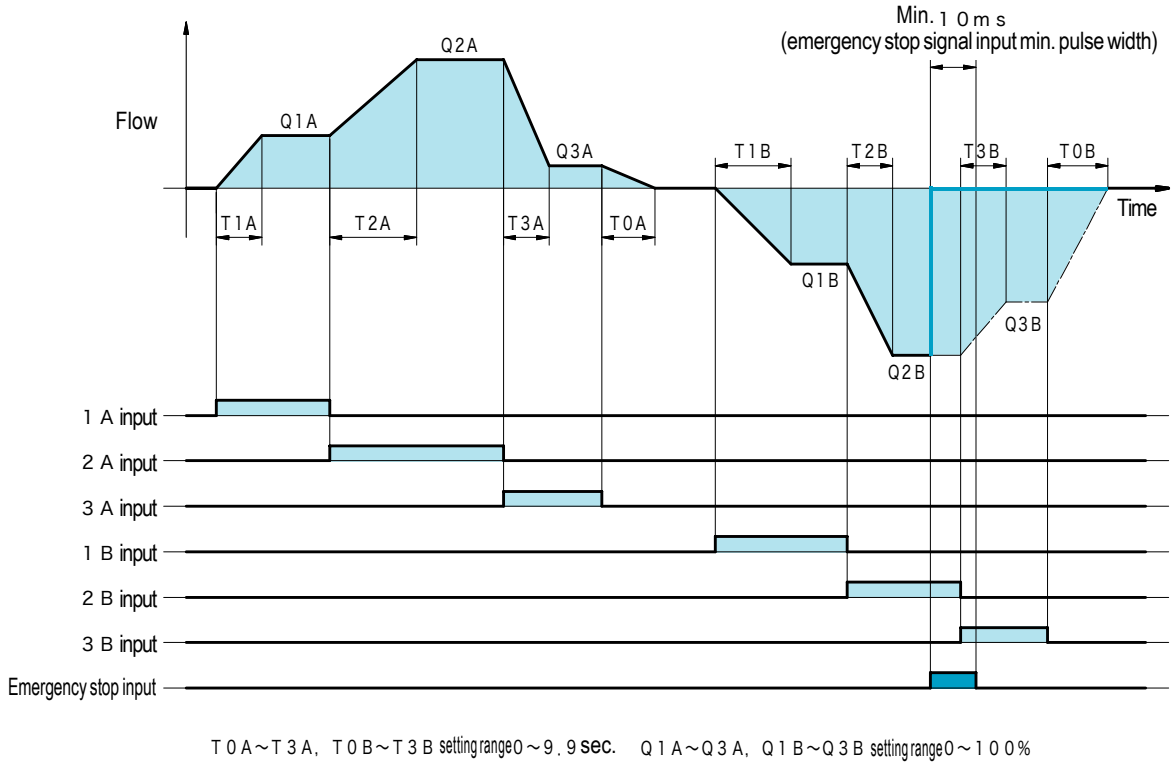
Wiring (Example)



※1 When using shielded cable, connect shielded cable to FG (ground) or to 0V.

Operation

Three flow levels - high speed, medium speed, low speed - and arrival times for solenoids “a” and “b” can be independently set. Valve can be directly connected to sequencers, general-purpose relays, proximity switches, etc., to provide simple management of shockless operation, speed control (flow control) and positioning.



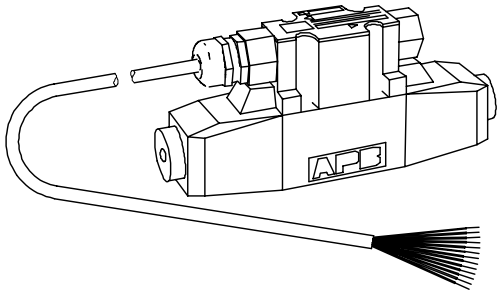
T0A～T3A, T0B～T3B setting range 0～9.9 sec. Q1A～Q3A, Q1B～Q3B setting range 0～100%

Input of emergency stop signal, will immediately generate zero output from amp to valve regardless of whether there are other contact point input signals and valve returns to neutral position and zero flow. Valve return time to neutral position will be the minimum time of the valve regardless of the TOA and TOB setting times.

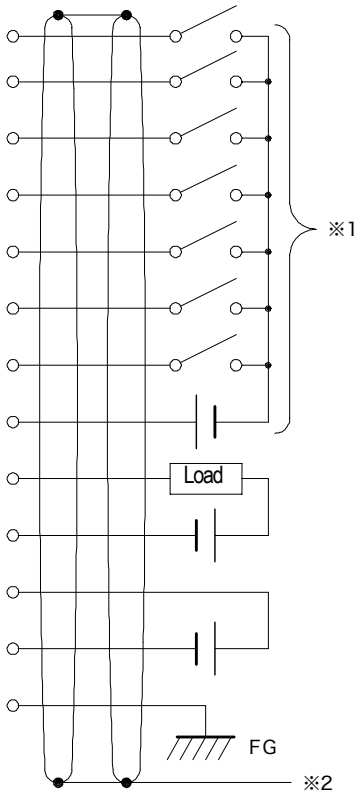
Operational output signal will be ON (contact point closed) when controller is operating normally and OFF (contact point open) under abnormal conditions and during data setting. Operational condition can be viewed with the monitor.

Wiring (Example)

Sink method



Wire Color	Function	Abbreviation
White-red dot	1 A input	1 A
White-black dot	2 A input	2 A
Yellow-red dot	3 A input	3 A
Yellow-black dot	1 B input	1 B
Pink-red dot	2 B input	2 B
Pink-black dot	3 B input	3 B
Orange-red dot	Emer. stop input	STOP
Orange-black dot	Input common	COM
Gray-red dot	Oper. OK output +	READY+
Gray-black dot	Oper. OK output -	READY−
Red	24V power	24V
Black	0V power	0V
Orange-red 2 dot	Frame ground	FG
Gray	Shield	

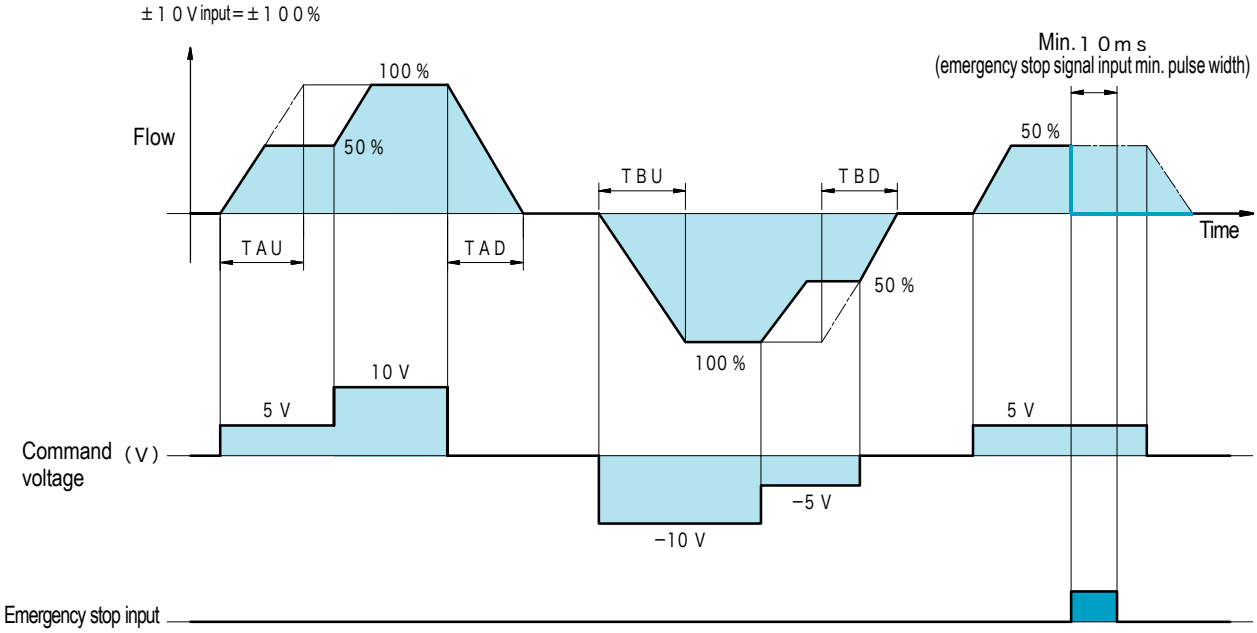


*1 Source method wiring possible. Reverse polarity of input common for source method.
* 2 When using shielded cables, connect shield cable to FG (ground earth) or OV.

Analog Input (AN)Type

Operation

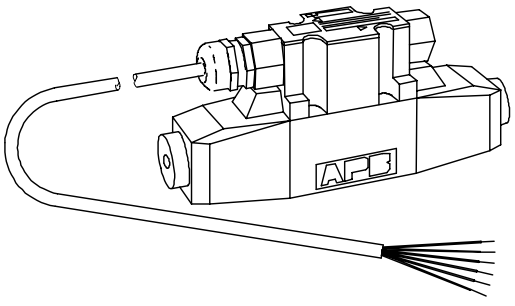
Operation is based on direction of analog voltage polarity with absolute values specified for flow. By setting lag time in advance, ramping can be achieved in response to step input. Lag time is set by arrival time against max. flow. 'A' direction ramp up time (TAU), ramp down time (TAD), 'B' direction ramp up time (TBU) and ramp down time (TBD) can be set separately.

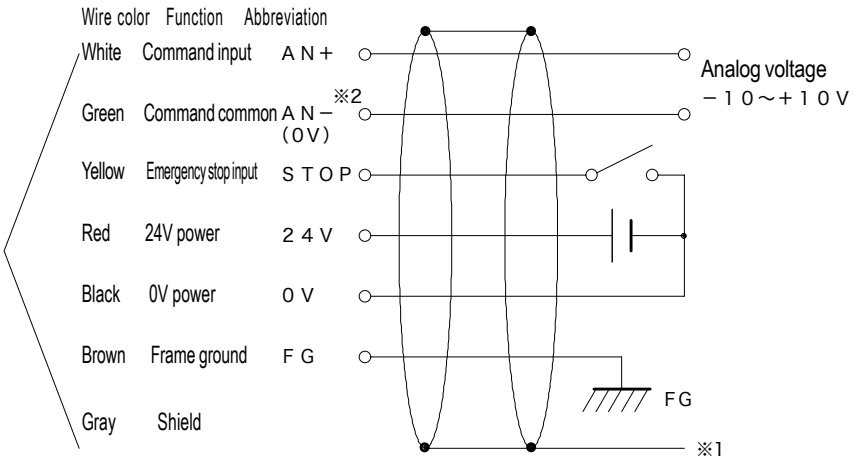


TAU, TAD, TBU, TBD settingrange 0～9.9sec. Flow setting range 0～100%

Input of emergency stop signal, will immediately generate zero output from amp to valve regardless of command voltage and valve returns to neutral position with zero flow. Time of valve return to neutral position will be the minimum time of the valve regardless of the TAD and TBD setting times.

Wiring (Example)





※1 PWhen using shielded cable, connect shielded cable to FG (ground) or 0V.
※2 Q Command signal common AN- is connected internally to 0V power.

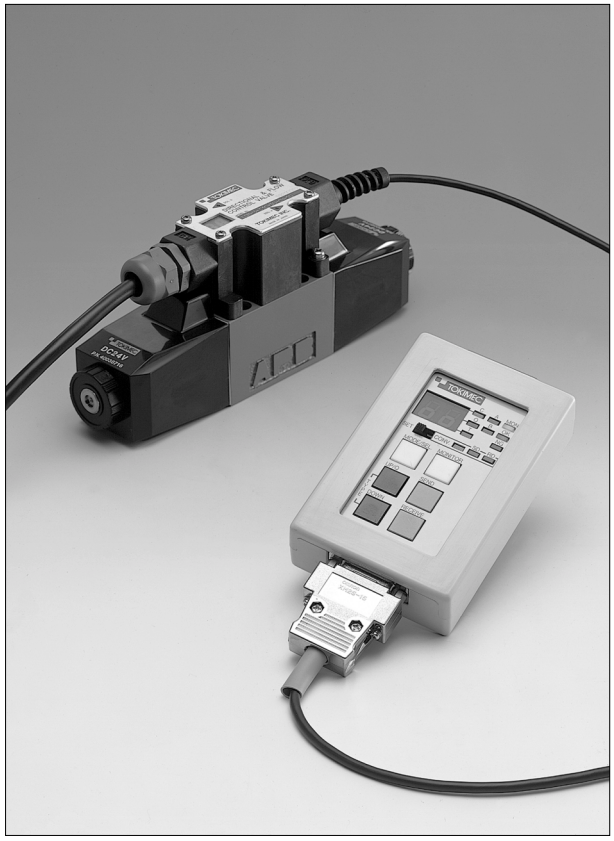
Options

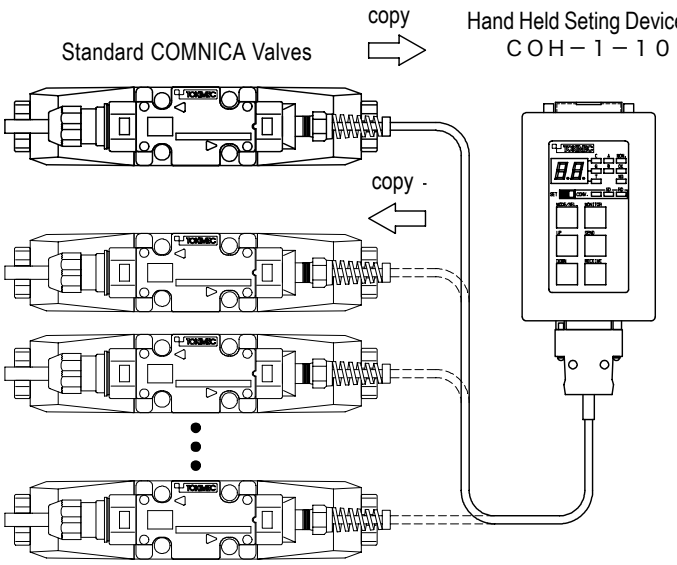
Handheld Setting Device

Model: COH-1-10 (for all COMNICA valves)

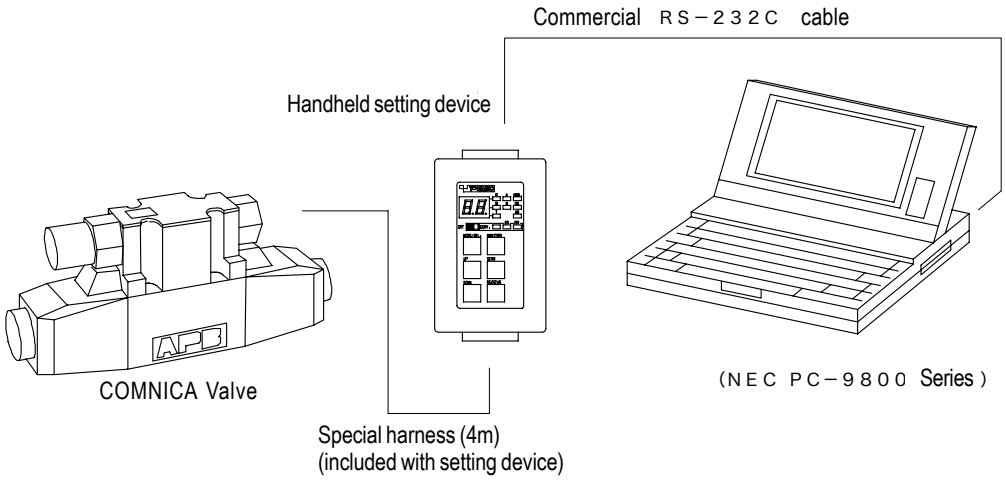
• Handheld setting device allows easy data setting of COMNICA valves in difficult locations.
• Contact point signal name and flow setting values selected during operation can monitored similar as with the valve display.

• COMNICA valve basic data can be copied to the handheld setting device and copied into other COMNICA valves enabling same settings for multiple valves.





• In addition as shown in the illustration at right, the device can also be used as a converter when a PC is used to set data for the COMNICA valve. As a result, by using a PC, various adjustment values can be copied to multiple COMNICA valves as settings. (integrated RS-232C/422 converter function)



Mounting Bolts (JIS B1176,Strength Class 12.9)

Valve Modela	Hex Socket Bolts	Quantity
COM-3	M5×50	4
COM-5	M6×40	4
COM-7	M10×60	4
	M6×55	2
COM-8	M12×80	6

- Mounting bolts must be ordered separately.
- Bolt tightening torque

M5 : 7～8 N·m
M6 : 9～14 N·m
M10 : 50～60 N·m
M12 : 75～81 N·m

Subplate

COM-3/5

Valve Model	Subplate Model	Port Dia. Rc	Porting
COM-3	DGMS-3-1E-10-T-JA-J	3/8	Side
	DGVM-3-10-T-JA-J		Rear
COM-5	DGSM-01X-10-JA-M	3/8	Rear
	DGSM-01Y-10-JA-M	1/2	

COM-7/8

Valve Model	Subplate Model	Port Dia. Rc	
		P, T, A, B	X, Y
COM-7	DGSMV-04-10	1/2	1/4
	DGSMV-04X-10	3/4	
COM-8	DGSMV-06-10	3/4	1/4
	DGSMV-06X-10	1	

- Subplate must be ordered separately.
- See page Q6, Q8 for dimensions.
- See page Q8 for multiple valve mount subplates.
- COM-3/5 mounting bolts must be ordered separately. COM-7/8 subplates are supplied with hex socket bolts for mounting.
- Max. working pressure 21 MPa. For higher pressures, valve should be mounted on manifold block.

Construction

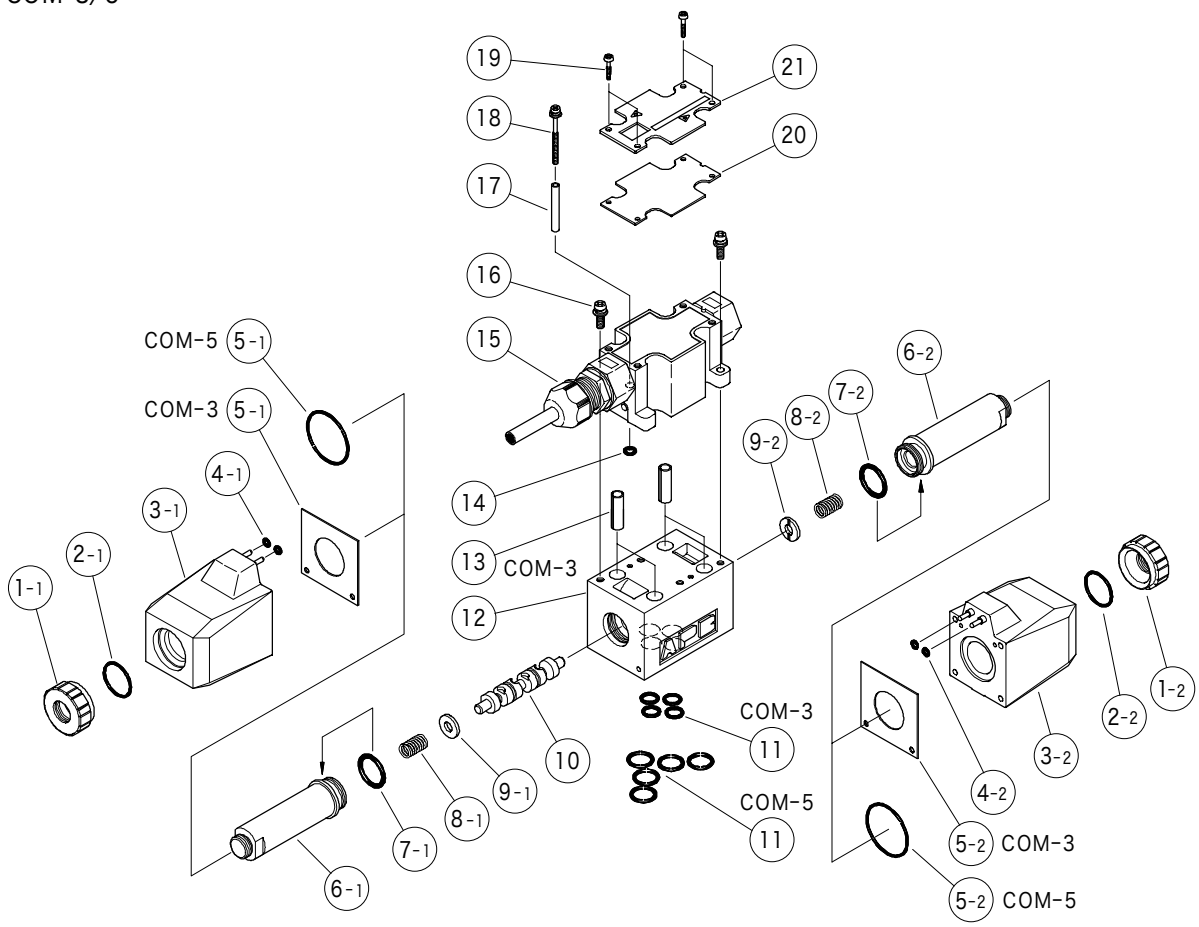
O-Rings COM-3

No.	Part No.	Standard	Qty
2	008001917	JIS B 2401 1A-P21	2
4	008000217	JIS B 2401 1A-P4	4
7	007911429	AS568-114 (FKM, Hs90)	2
11	007901219	AS568-012 (NBR, Hs90)	4
14	007900817	AS568-008 (NBR, Hs70)	1

O-Rings COM-5

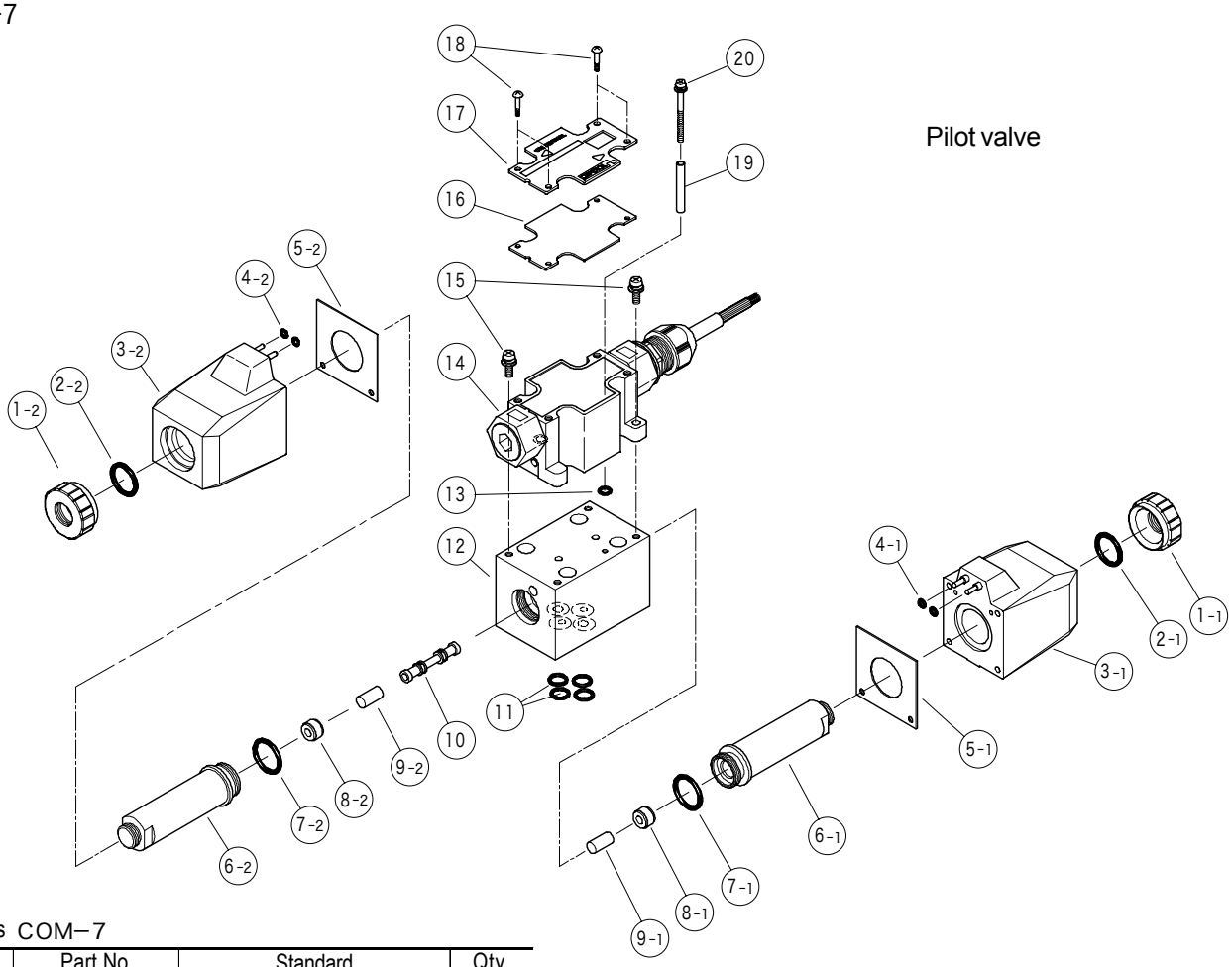
No.	Part No.	Standard	Qty
2	007912117	AS568-121 (NBR, Hs70)	2
4	008000217	JIS B 2401 1A-P4	4
5	007902617	AS568-026 (NBR, Hs70)	2
7	007911729	AS568-117 (FKM, Hs90)	2
11	007901419	AS568-014 (NBR, Hs90)	5
14	007900817	AS568-008 (NBR, Hs70)	3

COM-3/5



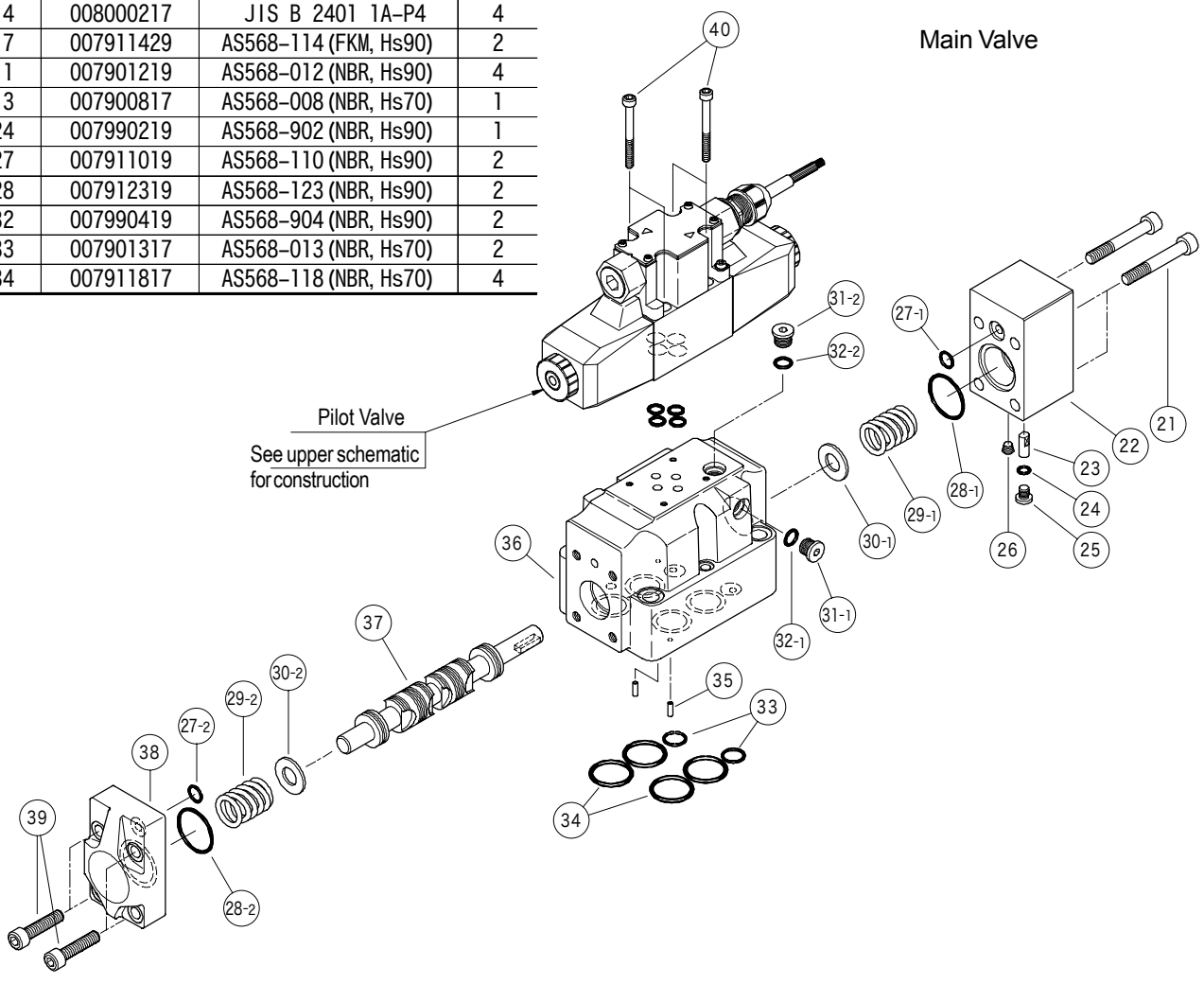
Construction

COM-7



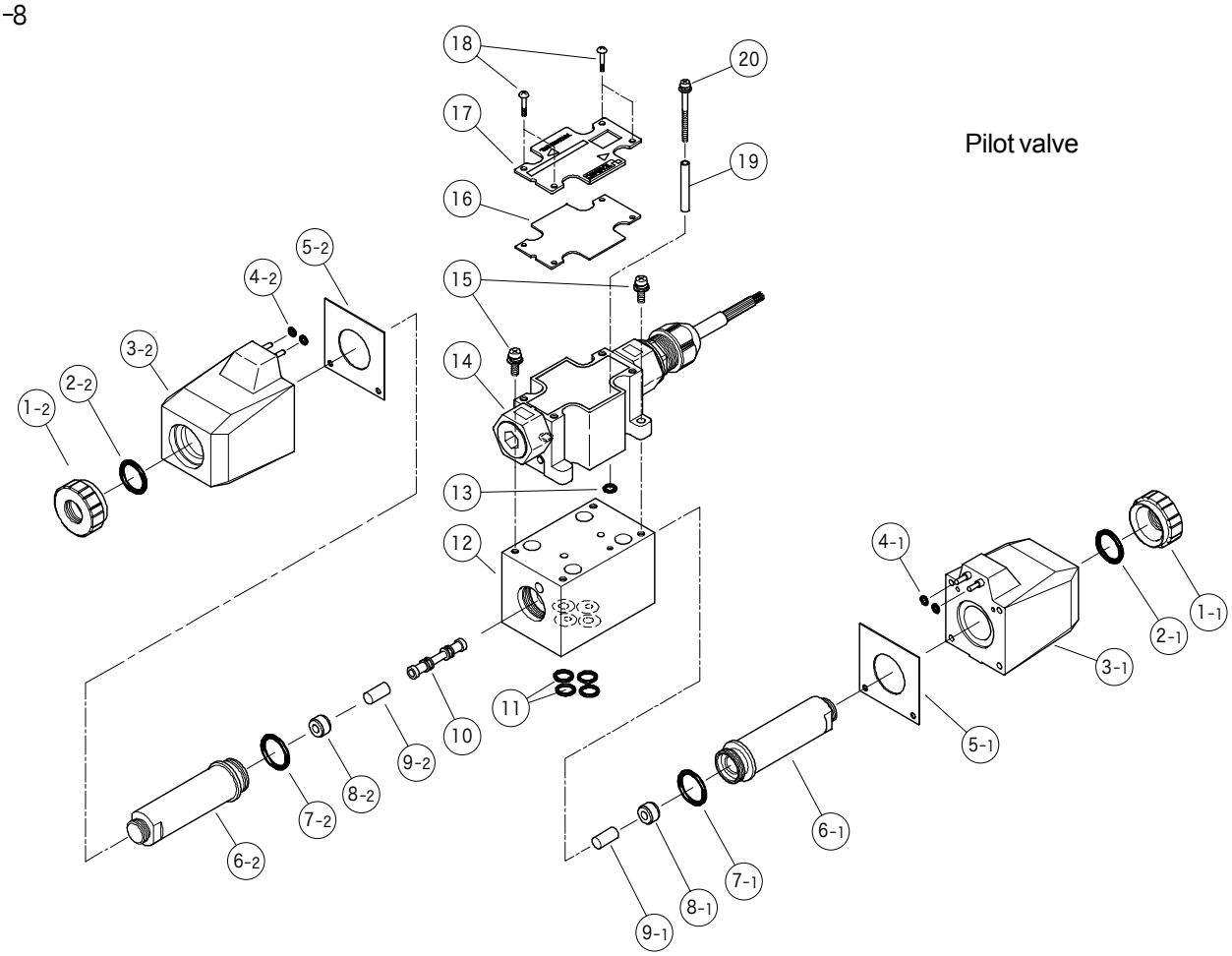
O-Rings COM-7

No.	Part No.	Standard	Qty
2	008001917	JIS B 2401 1A-P21	2
4	008000217	JIS B 2401 1A-P4	4
7	007911429	AS568-114 (FKM, Hs90)	2
11	007901219	AS568-012 (NBR, Hs90)	4
13	007900817	AS568-008 (NBR, Hs70)	1
24	007990219	AS568-902 (NBR, Hs90)	1
27	007911019	AS568-110 (NBR, Hs90)	2
28	007912319	AS568-123 (NBR, Hs90)	2
32	007990419	AS568-904 (NBR, Hs90)	2
33	007901317	AS568-013 (NBR, Hs70)	2
34	007911817	AS568-118 (NBR, Hs70)	4



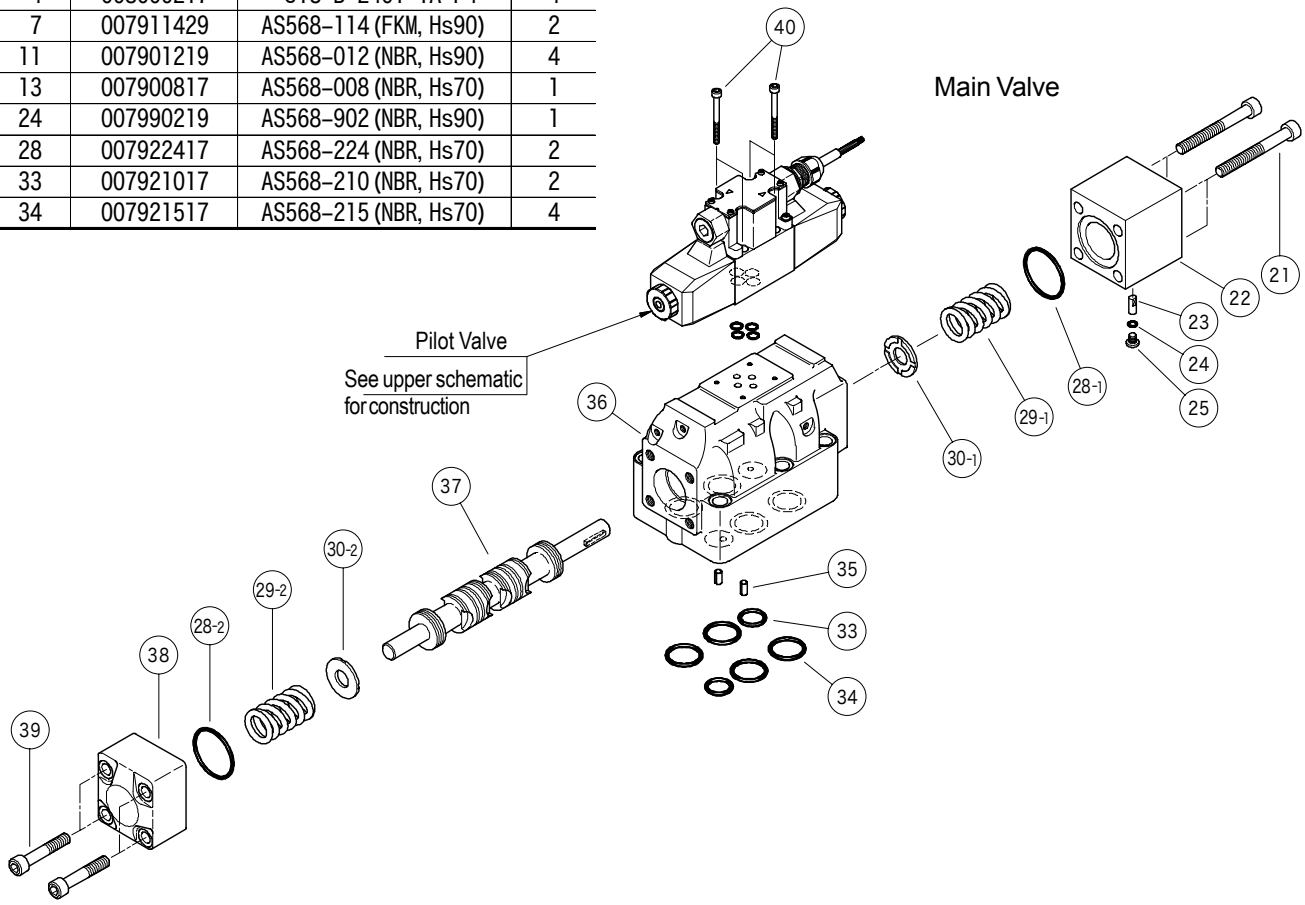
Construction

COM-8

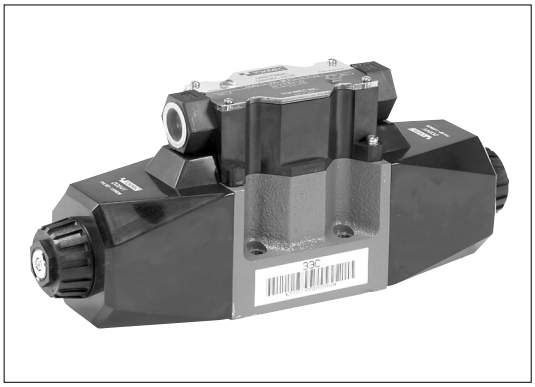


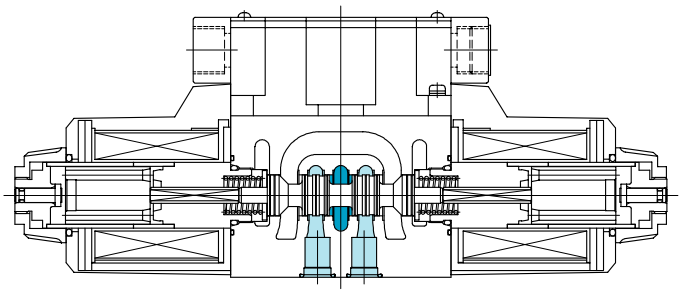
O-Rings COM−8

No.	Part No.	Standard	Qty
2	008001917	JIS B 2401 1A-P21	2
4	008000217	JIS B 2401 1A-P4	4
7	007911429	AS568-114 (FKM, Hs90)	2
11	007901219	AS568-012 (NBR, Hs90)	4
13	007900817	AS568-008 (NBR, Hs70)	1
24	007990219	AS568-902 (NBR, Hs90)	1
28	007922417	AS568-224 (NBR, Hs70)	2
33	007921017	AS568-210 (NBR, Hs70)	2
34	007921517	AS568-215 (NBR, Hs70)	4



Solenoid operated directional control valves DG4V-5,40





- Wet design for durability and low switching noise.
- Many valve options including 3 types of wiring connections, indicator lamp, surge suppressor, and AC/DC rectifier.

Model Code

(F3) - DG4V - 5-2 A (L)-M- PL- T- 6- 40 - (P10)

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

1 Fluid
Omitted for mineral oil, water glycol
F3: phosphate ester

2 Solenoid directional valve (gasket mounting)
Wet armature type

3 Mounting
5: ISO 4401-AC-05-4-A

4 Spool
See page E54, 55

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 (3 position, double solenoid)
N: No spring detented (2 position, double solenoid)

6 Solenoid assembly orientation (for spring arrangements A, B)
Omitted for standard (energized P to B, A to T)
L: Left hand build
(energized P to A, B to T)

7 Wiring connection
Plug-in conduit box G 1/2
connector, Pg. 11 (for DC only)
Lead wire (st'd length 350mm, for DC only)

8 Electrical accessories
Omitted for no accessories (for P, KU connection)
1: No accessories, with connector (for U connection)
L: Indicator lamp (AC standard)
4: Surge suppressor [diode] (for KU connection, delayed solenoid deenergization time)
7L: Indicator lamp and surge suppressor (DC st'd)
9L: ADC rectifier (fast solenoid deengergization time) and indicator lamp (ADC standard)
12L: ADC rectifier (delayed solenoid deenergization time) and indicator lamp
Note 1: Regarding elec. accessories 9L, 12L:
Applicable only to ADC solenoids (ADC rectifier).
Applicable only for P wiring connection.
With surge suppressor.
Note 2: Elec. accessories L, 7L not applicable to KU lead wire type wiring connection.

9 Solenoid voltage
T:AC100V 50/60Hz,AC110V 60Hz
OV:AC200V 50/60Hz,AC220V 60Hz
G:DC12V
H:DC24V
TR:AC100V 50/60Hz(ADC• AC-DC rectifier)
VR:AC200V 50/60Hz(ADC• AC-DC rectifier)

10 T port allowable back pressure
6:15.7MPa (for AC solenoids)
7:20.6MPa (for DC, ADC rectified solenoids)

11 Design no.

12 Port orifice (option)
Omitted for no port orifices (standard)
Port orifice indicators
<Example 1 >P10(1.0mm orifice in P port)
Orifice diameter
Port (A, B, P, T)
<Example 2 >B12(1.2mm orifice in B port)
<Example 3 >2 port combinations
Combination sequence, PTAB
P10T12,P10B10

Model Code

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 TOKIMEC regarding use of port orifices.

Specifications

Model	Max.Operating Pressure MPa	Max.Flow L/min	Allowable Tank Port Back Pressure MPa	Max. Switching Freq. (cycles/min)			Weight kg			
				AC	DC	ADC Rectified	Single Solenoid		Double Solenoid	
							AC	DC	AC	DC
DG4V-5	31.5	See Press.-Flow Charac.	15.7 (AC solenoids) 20.6 (DC solenoids)	240	180	120	3.6	4.4	4.6	6.1

Spool Types and Pressure - Flow Characteristics

Spool Neutral Position	Valve Function Schematics			Max. Flow L/min															
	3 Position	2 Position		P→A→B→T					P→A (B Port blocked)					P→B (A Port blocked)					
	Spring Centered	Spring Offset, Type B																	
	– 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	DG4V-5-0C	DG4V-5-0B	DG4V-5-0BL	※160	※160	※160	※160	※160	160	160	160	160	160	160	160	160	160	160
1	DG4V-5-1C	DG4V-5-1B	DG4V-5-1BL	※60 ※50	※50 ※40	※40 ※35	※40 ※30	※40 ※30	60 50	50 40	40 35	40 30	40 30	60 50	50 40	40 35	40 30	40 30
2	DG4V-5-2C	DG4V-5-2B	DG4V-5-2BL	160	160	160	160	160	160	160 160 100	110 160 15	100 160 10	95 160 10	160	160 160 100	110 160 15	100 160 10	95 160 10
3	DG4V-5-3C	DG4V-5-3B	DG4V-5-3BL	160	160	160	120 160	110 80	160	160 160 100	110 160 15	100 160 10	95 160 10	160	160 160 100	110 160 15	100 160 10	95 160 10
6	DG4V-5-6C	DG4V-5-6B	DG4V-5-6BL	160	160	160	120 160	110 80	160	160 160 100	110 160 15	100 160 10	95 160 10	160	160 160 100	110 160 15	100 160 10	95 160 10
7	DG4V-5-7C	DG4V-5-7B	DG4V-5-7BL	160	160	160	160	160	120 100	35 40	30 30	25 30	20 30	120 100	35 40	30 30	25 30	20 30
8	DG4V-5-8C	DG4V-5-8B	DG4V-5-8BL	※160	※70 ※55	※55 ※45	※50 ※40	※50 ※40	160	70 55	55 45	50 40	50 40	160	70 55	55 45	50 40	50 40
11	DG4V-5-11C	DG4V-5-11B	DG4V-5-11BL	※60 ※50	※50 ※40	※40 ※35	※40 ※30	※40 ※30	60 50	50 40	40 35	40 30	40 30	60 50	50 40	40 35	40 30	40 30
22	DG4V-5-22C	DG4V-5-22B	DG4V-5-22BL	—	—	—	—	—	160 160 160	160 160 100	110 160 15	100 160 10	95 160 10	160 160 160	160 160 100	110 160 15	100 160 10	95 160 10
31	DG4V-5-31C	DG4V-5-31B	DG4V-5-31BL	160	160	160	120 160	110 80	160	160 160 100	110 160 15	100 160 10	95 160 10	160	160 160 100	110 160 15	100 160 10	95 160 10
33 34	DG4V-5-33/34C	DG4V-5-33/34B	DG4V-5-33/34BL	160	160	160	160	160	160	160 160 100	110 160 15	100 160 10	95 160 10	160	160 160 100	110 160 15	100 160 10	95 160 10

Spool Types and Pressure - Flow Characteristics

Spool Transient Condition	Valve Function Schematics			Max. Flow L/min															
	2 Position			N, A, AL					N, A					AL					
	No Spring Detented	Spring Offset, Type A		P→A, B→A, A→B, B→T					P→A B Port blocked					P→B A Port blocked					
									P→B A Port blocked					P→A B Port blocked					
	– 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		DG4V-5-0A	DG4V-5-0AL	※120	※120	※120	※120	※120	80	80	80	80	80	160	160	160	150	140	
				※160	※160	※160	※160	※160	100	100	100	100	100		85	80	80	80	
															45	40	40	40	
		DG4V-5-2A	DG4V-5-2AL	160	160	90	60	50	120	40	30	30	20	160	140	100	75	70	
						160	90	90	160	40	30	30	30		30	20	20	20	
					100	40	20	20							30	20	20	20	
		DG4V-5-22A	DG4V-5-22AL	—	—	—	—	—	120	40	30	20	20	160	140	100	75	70	
									160	40	30	30	30		30	20	20	20	
															30	20	20	20	
		DG4V-5-23A	DG4V-5-23AL	160	160	160	160	160	120	40	30	20	20	—	—	—	—	—	
					100	75	35	30	100	35	25	20	20						
2		DG4V-5-24A	DG4V-5-24AL	160	60	45	35	30	120	40	30	20	20	160	160	160	160	160	
					40	30	30	30	160	40	30	30	30						
		DG4V-5-28A	DG4V-5-28AL	160	160	160	160	160	120	40	30	20	20	160	140	100	75	70	
									160	40	30	30	30		30	20	20	20	
															30	20	20	20	
	DG4V-5-2N								140	140	140	120	110	140	140	140	120	110	
											15	10	10			15	10	10	
											15	10	10			15	10	10	
	DG4V-5-22N			—	—	—	—	—	140	140	140	120	110	140	140	140	120	110	
											15	10	10			15	10	10	
											15	10	10			15	10	10	
6	DG4V-5-6N								140	140	140	120	110	140	140	140	120	110	
											15	10	10			15	10	10	
											15	10	10			15	10	10	

Notes • Max. flow without malfunction.

• Max. flow - 2nd and 3rd level values: upper level DC90%V, middle level AC50Hz85%, lower level AC60 Hz90%

• Max flow value for * is with A port and B port blocked.

Specifications

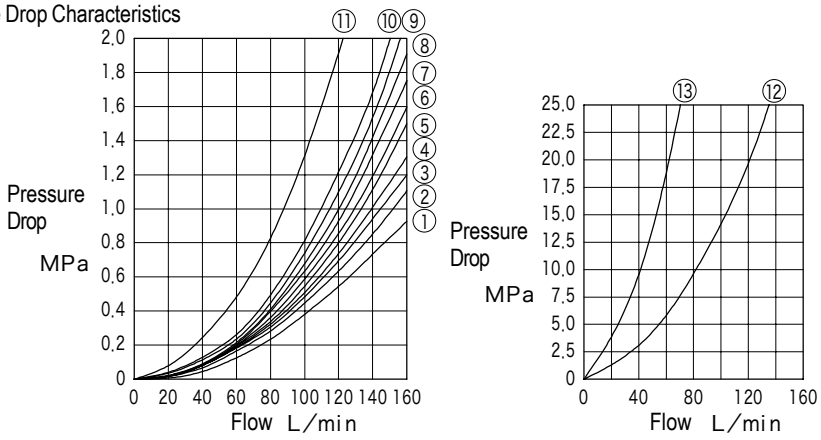
Solenoid Specifications

Power Supply	Volt. Code	Voltage V	Frequency Hz	Initial Current A	Holding Current A	Power Consumption W	Allow. Volt. Fluctuation %	Insul. Class (Allow. Temp)
AC	T	100	50	7. 7	0. 78	36	+10, −15	H (180°C)
			60	7. 4	0. 62	32	+20, −10	
		110	60	7. 9	0. 72	40	+10, −15	
	B	110	50	7. 0	0. 71	36	+10, −15	
		115	60	6. 9	0. 63	36	+15, −10	
		120	60	7. 3	0. 66	40	+10, −15	
	0V	200	50	3. 8	0. 39	36	+10, −15	
			60	3. 7	0. 31	32	+20, −10	
		220	60	4. 0	0. 36	40	+10, −15	
	D	220	50	3. 5	0. 36	36	+10, −15	
		230	60	3. 5	0. 32	36	+15, −10	
		240	60	3. 6	0. 33	40	+10, −15	
DC	G	12	——	——	3. 17	38	±10	H (180°C)
	H	24			1. 58			
	0J	48			0. 79			
	R	100			0. 38			
AC ↓ DC (rectifier) ADC	TR	AC100 V 50/60 Hz ↓ DC90 V (coil)	——	——	0. 42	38	±10	H (180°C)
	VR	AC200 V 50/60 Hz ↓ DC180 V (coil)			0. 21	38		

Notes:
- Current values and power consumption varies with temperature conditions. Values in table are based on 20°C.
- Integrated AC/DC rectifier enables AC power source to drive DC solenoids with valve characteristics based on DC solenoids. Maximum flow is based on DC solenoids.
- Contact TOKIMEC for other voltages not shown.
- AC initial current and holding current are effective

Performance Curves (viscosity 36 mm²/s, specific gravity 0.87)

Pressure Drop Characteristics



1. For pressure drops ($\triangle P_1$) of viscosities other than 36mm²/s, calculate using multiplier coefficients shown in table.

2. The formula to calculate pressure drops ($\triangle P_1$) for specific gravities other than 0.87 is as follows:

$\triangle P_1 = \triangle P \times G_1 / G$

$\triangle P$ ····· characteristics curve value

G ····· 0. 87

G_1 ····· desired specific gravity

Viscosity mm²/s	10	20	30	36	40	50	60	70	80	90	100	110	120	130	140	150
Coefficient	0. 73	0. 86	0. 96	1. 00	1. 03	1. 09	1. 14	1. 18	1. 22	1. 26	1. 29	1. 32	1. 35	1. 38	1. 40	1. 43

Pressure Drop Curve Number

C, B, BL										A *Note					N				
Spool	Switched Condition				Neutral Condition					Spool	Switched Condition				Spool	Switched Condition			
	P ↓ A	B ↓ T	P ↓ B	A ↓ T	P ↓ T	A ↓ T	B ↓ T	P ↓ A	P ↓ B		P ↓ A	B ↓ T	P ↓ B	A ↓ T		P ↓ A	B ↓ T	P ↓ B	A ↓ T
0	⑦	⑩	⑦	⑩	⑧	⑧	⑧	⑥	⑥	0	⑥	⑨	⑥	⑥	2	⑦	③	⑦	③
1	⑥	③	⑨	⑪	⑩	②	—	⑥	—	2	⑥	③	⑥	③	6	⑦	⑤	⑦	⑤
2	⑤	③	⑤	③	—	—	—	—	—	22	⑦	—	⑦	—	22	⑦	—	⑦	—
3	⑤	③	⑤	⑨	—	④	—	—	—	23	⑥	③	—	③					
6	⑤	⑨	⑤	⑨	—	④	④	—	—	24	⑥	③	—	—					
7	⑥	③	⑥	③	—	—	—	⑦	⑦	28	⑥	—	⑥	③					
8	①	⑩	①	⑩	⑪	—	—	—	—										
11	⑨	⑪	⑥	③	⑩	—	②	—	⑥										
22	⑤	—	⑤	—	—	—	—	—	—										
31	⑤	⑨	⑤	③	—	—	④	—	—										
33	⑤	③	⑤	③	—	⑬	⑬	—	—										
34	⑤	③	⑤	③	—	⑫	⑫	—	—										

*Note: for AL, use column A, and substitute A for B, and B for A. Example P to A would become P to B.

Switching Times

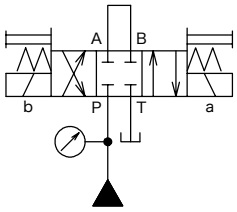
Unit : ms

Power Supply	Operation		Spring Centered	Spring Offset	No Spring Detented
AC	Energized		10		10
	Spring Return		25		—
DC	Energized		60		60
	Spring Return		25 * (150)		—
ADC (with integrated rectifier)	Energized		60		60
	Spring Return	F	50		—
		S	100		

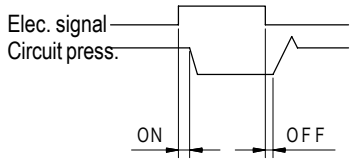
Note: Values for spool type may vary according to circuit conditions.
* Indicates KU4 coil.

Conditions: Spool type 2, open loop circuit, flow 80 L/min, supply pressure 17.5 MPa, fluid viscosity 36 mm²/s

[Circuit Example]



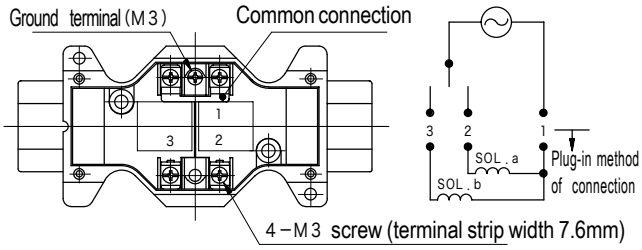
[Switching Time Definition]



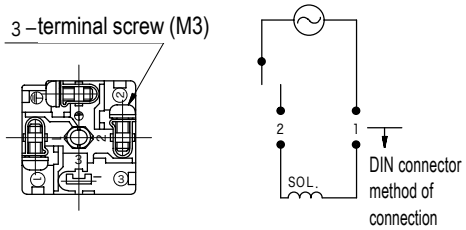
Operating Considerations

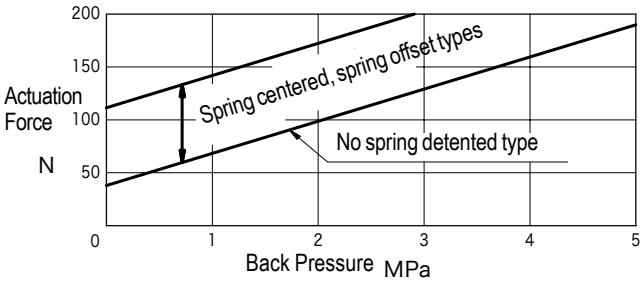
- Mounting orientation
  To ensure sure switching of no spring detented type valves, mount valves so spool axis is horizontal. There are no mounting attitude restrictions for other spool/spring arrangements.
- Solenoid energization
  Always insure that one side solenoid is deenergized before energizing the opposite side solenoid. 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 abnormal pressure surges above the allowable back pressure rating from being generated in T port. Valve is wet armature type so insure that valve is always filled with oil.
- Using valves as two-way and three-way
  Valve is designed as four-way and as such max. flow is limited when using as two or three-way valves. Consult TOKIMEC 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 valve 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
  For valves with indicator lamps, the lamps will light when current flows to the solenoid.
- Conduit box wiring
  Solenoid and conduit box are pre-wired. Refer to below diagrams for wiring from power source to conduit box or DIN connectors.

P Type



U Type
(DIN Connector)





Mounting Bolts (JIS B1176, Strength Class 12.9)

Hex Socket Bolts	Qty
M6 × 40	4

- Order mounting bolts separately.
- Mounting bolt tightening torque: 12~15Nm

Subplate

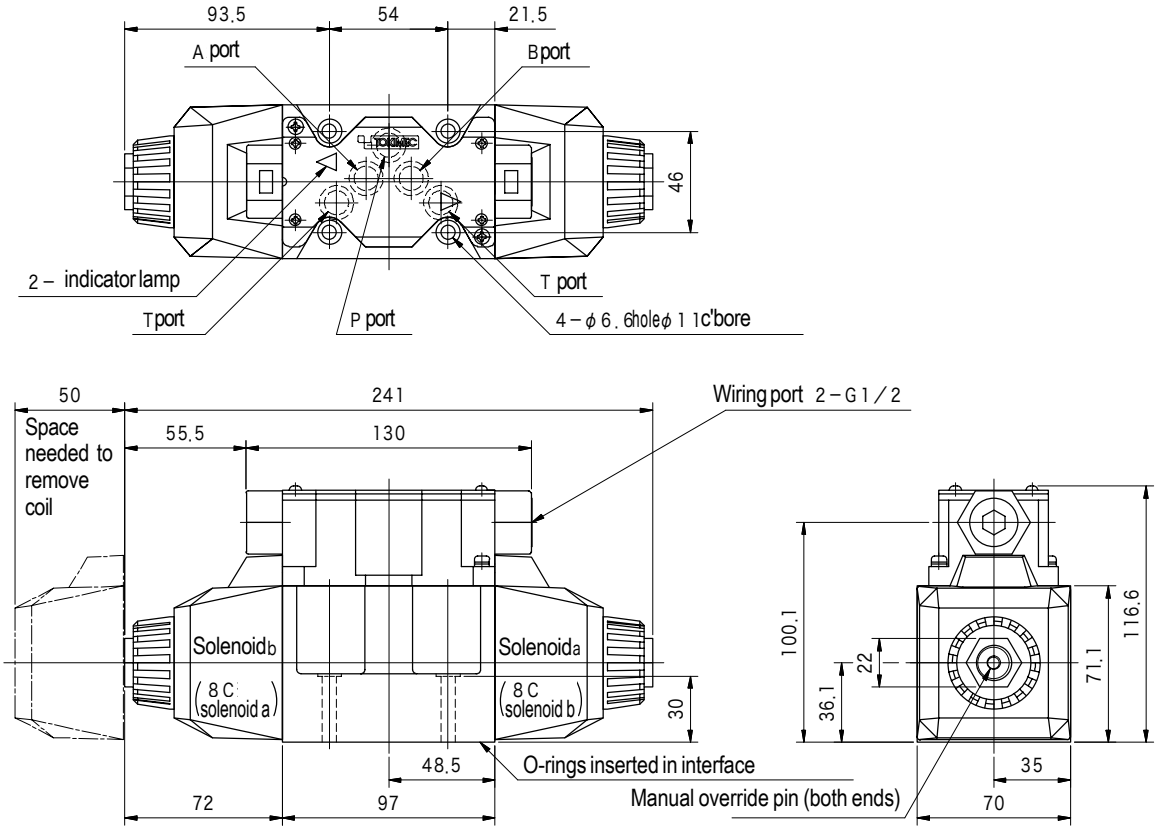
Subplate Model	Port Dia. Rc
DGSM-01X-10-JA-M	3/8
DGSM-01Y-10-JA-M	1/2

- Subplate and bolts must be ordered separately.
- See page Q8 for dimensions.
- See page Q9 for multiple valve mount subplates.
- Max. working pressure 21 MPa. For higher pressures, valve should be mounted on manifold block.

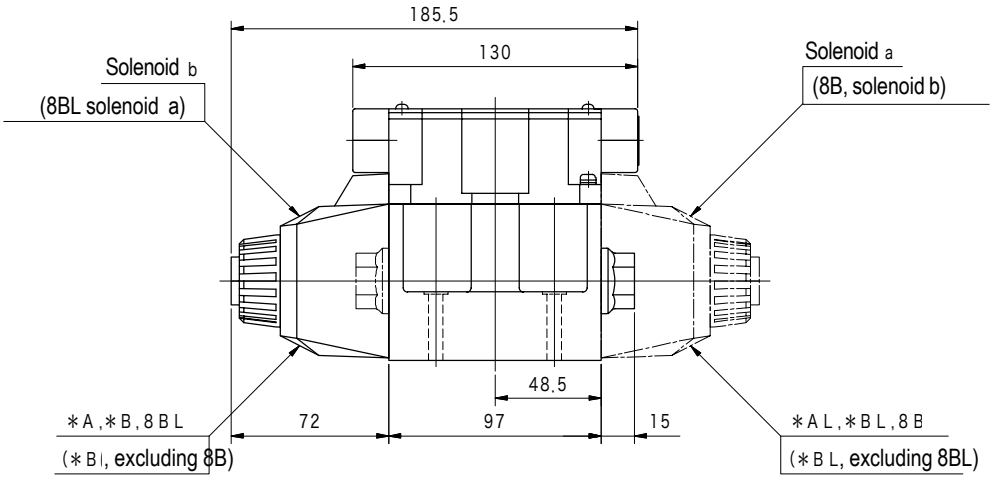
Dimensions

■ P Type Conduit Box Wiring

● AC Solenoids
Spring Centered DG4V-5-*C-M-P*-*-6-40
No Spring Detented DG4V-5-*N-M-P*-*-6-40

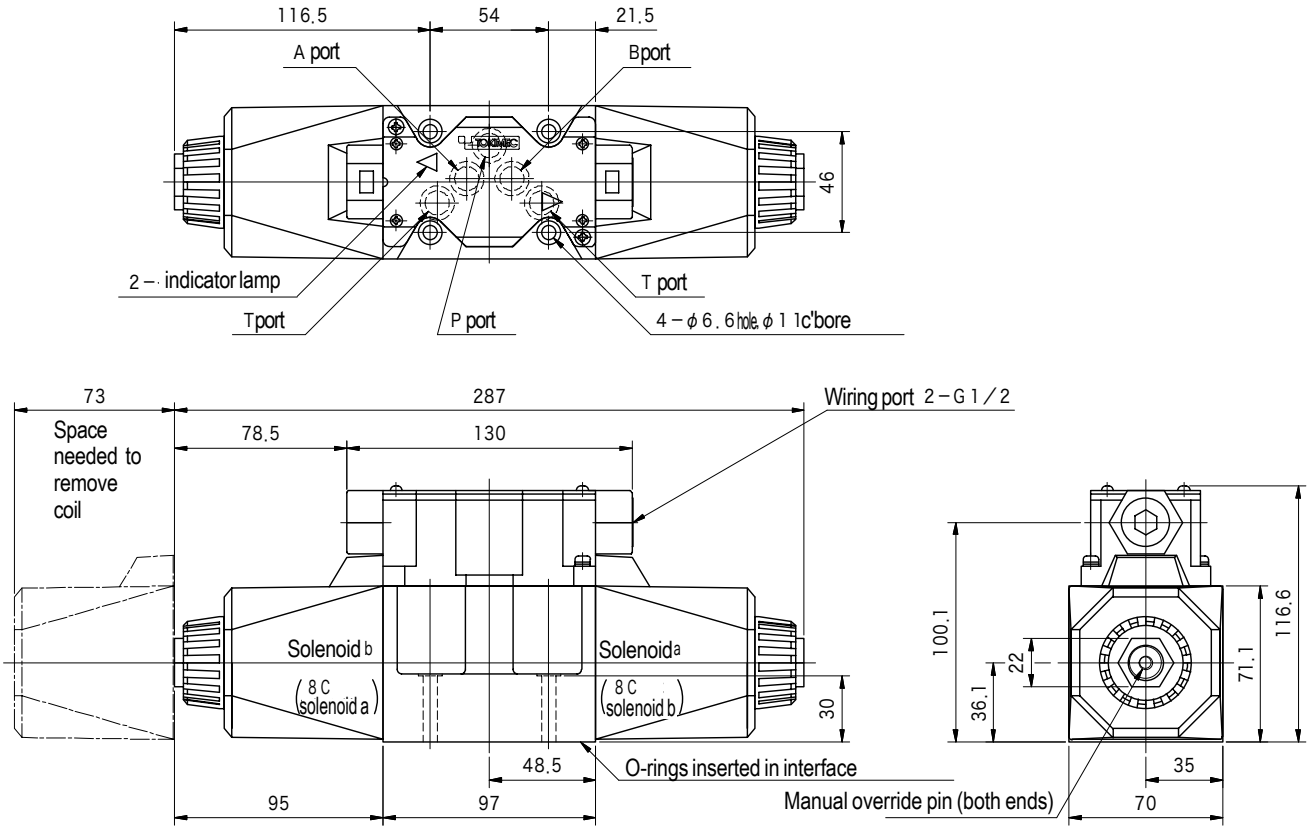


Spring Offset DG4V-5-*A/B-M-P*-*-6-40 (solid line)
Spring Offset DG4V-5-*AL/BL-M-P*-*-6-40 (dotted line)

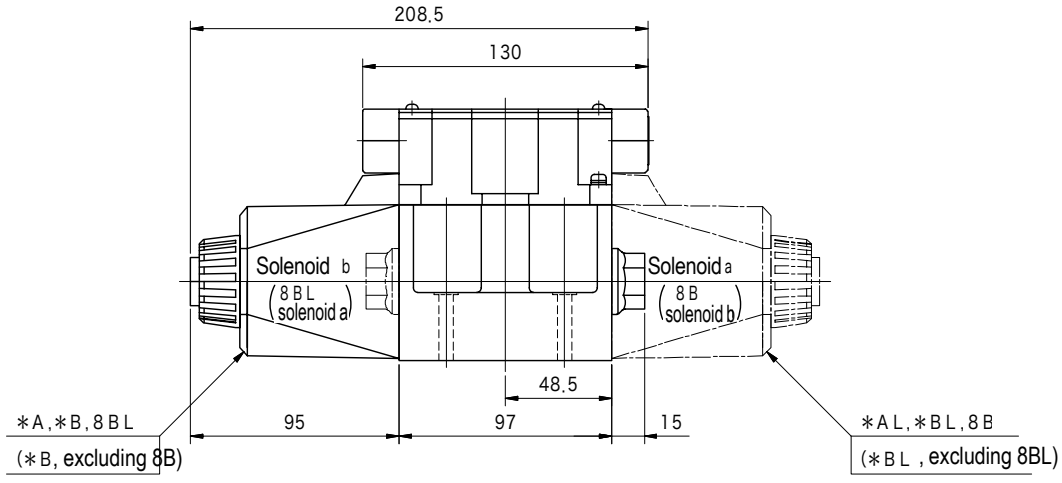


Dimensions

● Double Solenoid
Spring Centered DG4V-5-∗C-M-P∗-∗-7-40
No Spring Detented DG4V-5-∗N-M-P∗-∗-7-40



Spring Offset DG4V-5-∗A/B-M-P∗-∗-7-40 (solid line)
Spring Offset DG4V-5-∗AL/BL-M-P∗-∗-7-40 (dotted line)



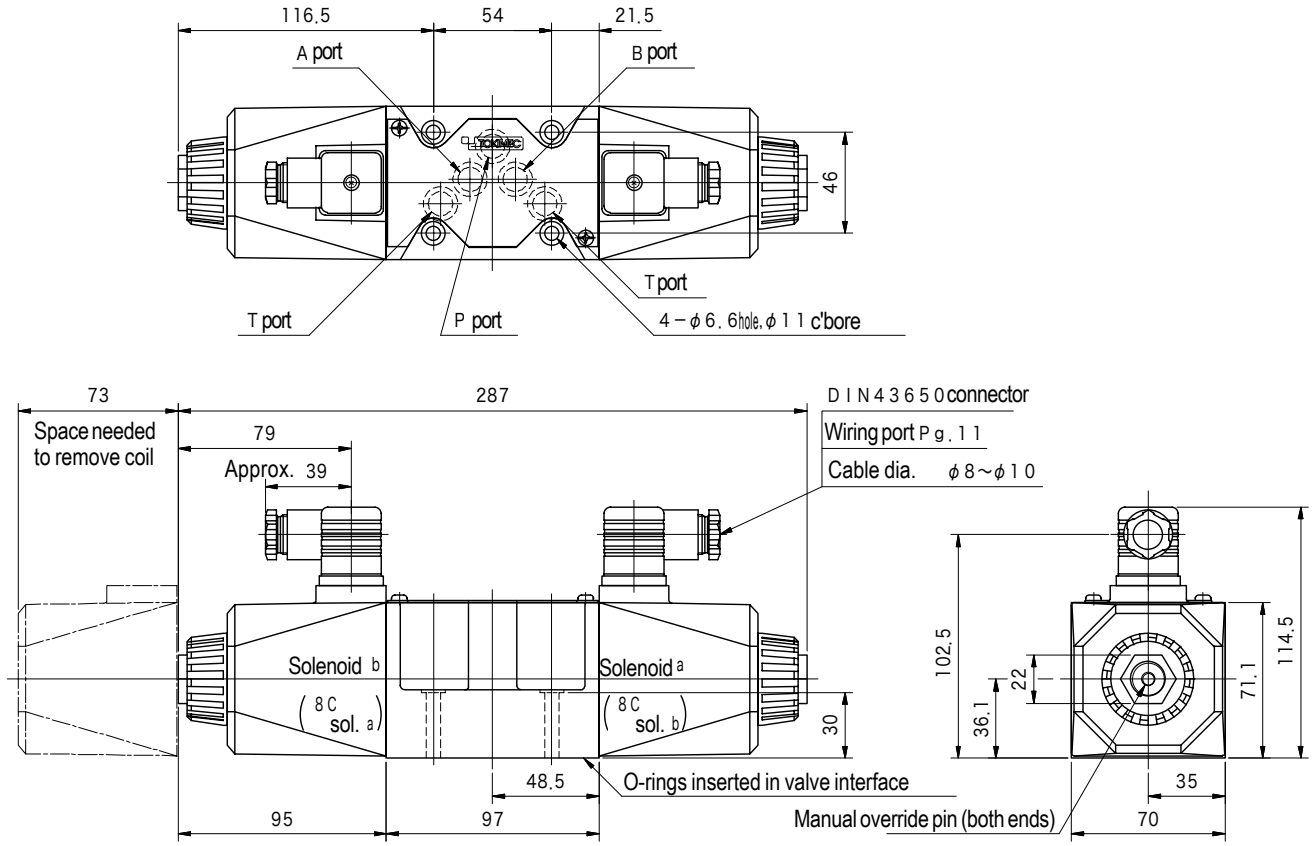
Dimensions

■ U Type DIN Connector Wiring

● DC Solenoids

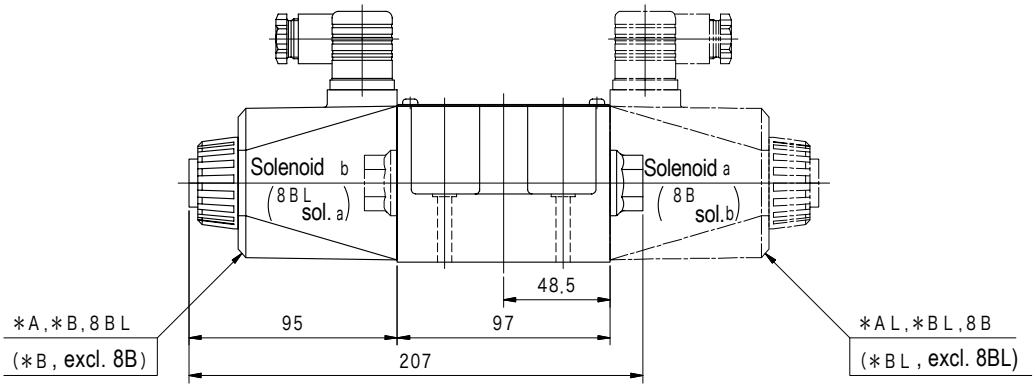
Spring Centered DG4V-5-＊C-M-U＊-＊-7-40

No Spring Detented DG4V-5-＊N-M-U＊-＊-7-40



Spring Offset DG4V-5-＊AL/B-M-U＊-＊-7-40 (solid line)

Spring Offset DG4V-5-＊AL/BL-M-U＊-＊-7-40 (dotted line)



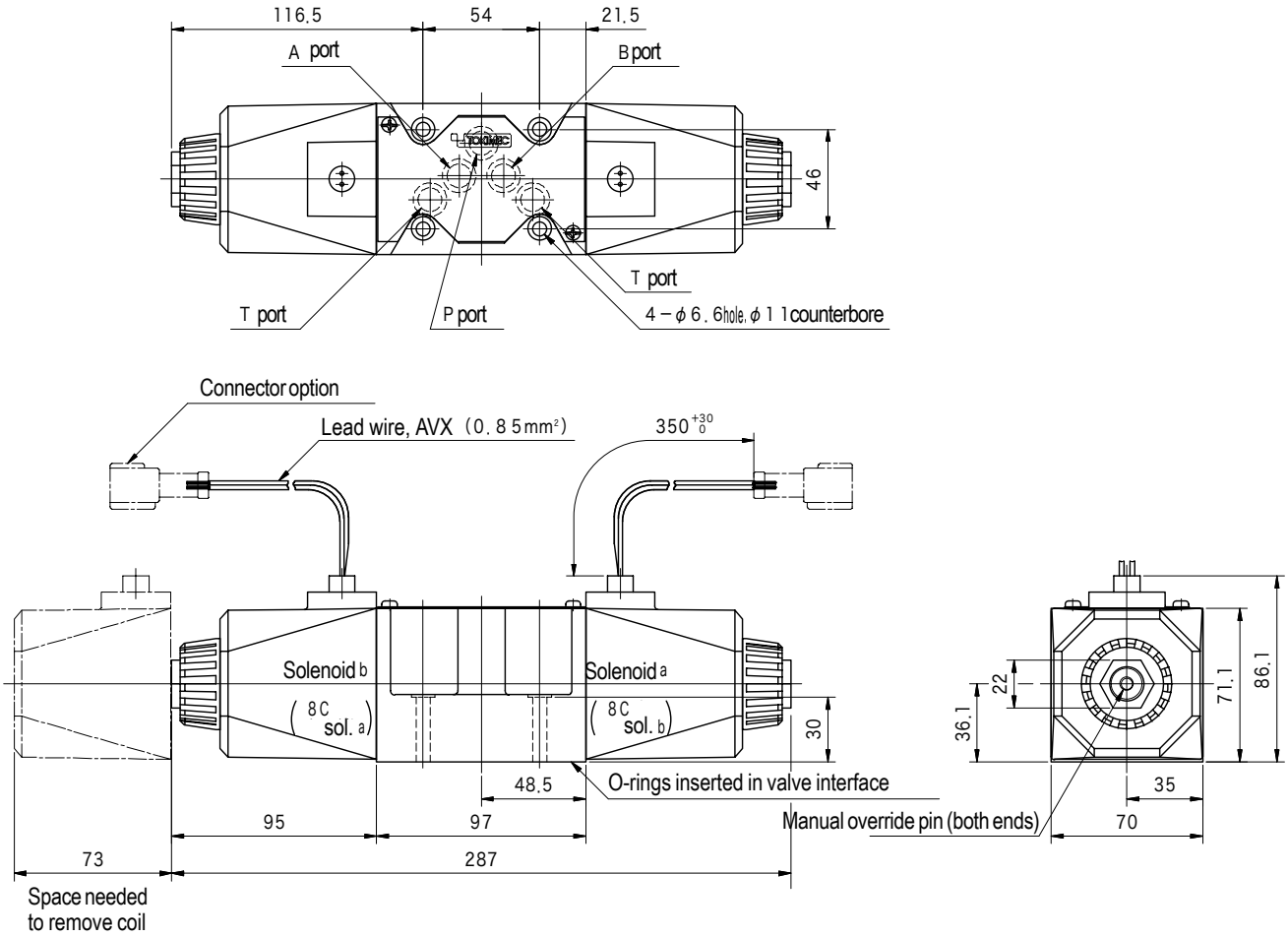
Dimensions

■ KU Type Flying Lead Wiring

● DC Solenoids

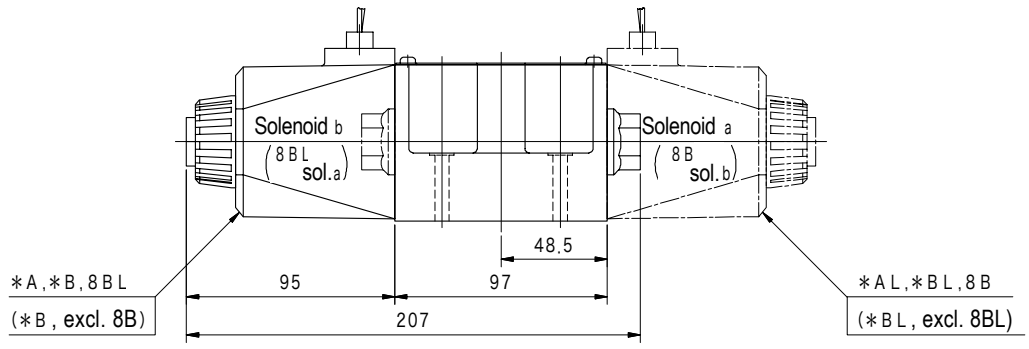
Spring Centered DG4V-5-＊C-M-KU＊-＊-7-40

No Spring Detented DG4V-5-＊N-M-KU＊-＊-7-40

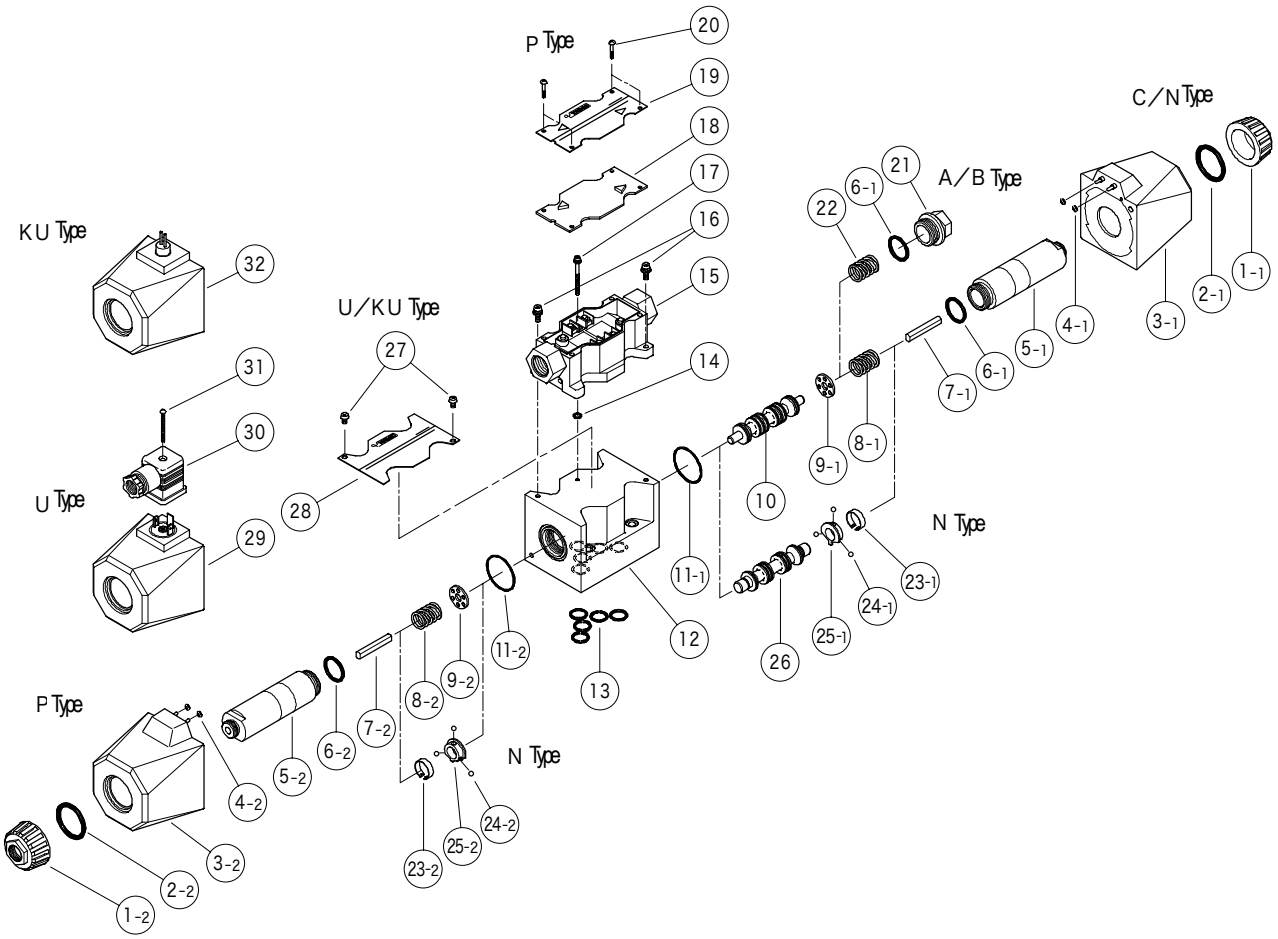


Spring Offset DG4V-5-＊A/B-M-KU＊-＊-7-40 (solid line)

Spring Offset DG4V-5-＊AL/BL-M-KU＊-＊-7-40 (dotted line)



Construction



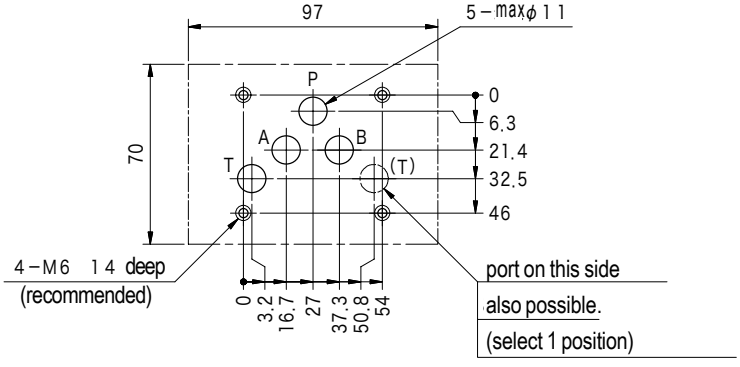
O-Rings

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

●④, ⑭used only for P type.

● Mounting Dimensions

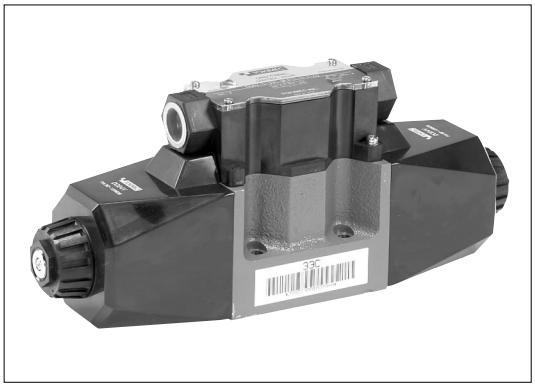
ISO 4401-AC-05-4-A

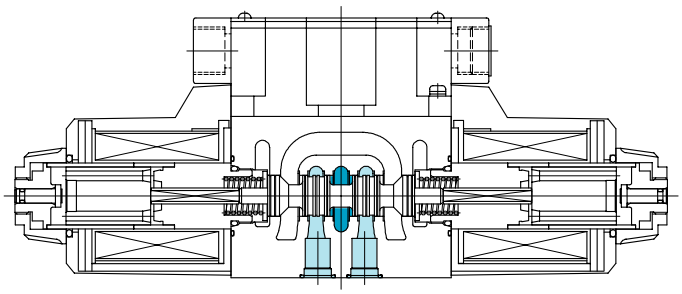


● Mounting Surface Tolerances

Surface Roughness	1.6μm Ra	1.6
Flatness	Less than 0.01 (per 100mm)	0.01 / □100
Permissible Tolerance	Mounting bolt hole : ±0.1 Ports : ±0.2	

Fine current signal solenoid operated directional control valves DG4VC-5





- Integrated solid state relay.
- Signal terminals can be connected to PLC's, etc., and directly driven.
- Performance same as standard DG4V-5 valve.

Model Code

(F3) - DG4VC - 5 -2 A (L)- M - P S2- H - 7- 40 - (P10)

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

1 Fluid
Omitted for mineral oil, water glycol
F3: phosphate ester

2 Fine current signal solenoid directional valve (gasket mounting)
Wet armature type

3 Mounting
5: ISO 4401-AC-05-4-A

4 Spool
See page E54, 55

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 (3 position, double solenoid)
N: No spring detented(2 position, double solenoid)

6 Solenoid assembly orientation (for spring arrangements A, B)
Omitted for standard (energized P to B, A to T)
L: Left hand build
(energized P to A, B to T)

7 Wiring connection
P: Plug-in conduit box G 1/2

8 Contact point input type
S2: Sink
N2: Source

9 Power voltage
H:DC24V

10 T port allowable back pressure
7:20.6MPa

11 Design no.

12 Port orifice (option)
Omitted for no port orifices (standard)
Port orifice indicators
<Example1>P10 (1.0mm orifice in P port)
Orifice diameter
Port (A, B, P, T)
<Example2>B12 (1.2mm orifice in B port)
<Example3>2 port combinations
Combination sequence, PTAB
P10T12,P10B10

- T port orifice, applicable to T port on A port side.
- When using T port orifice, ensure that surge pressure does not exceed allowable back pressure.
- When using port orifices, ensure that circut pressure is less than 21 MPa.
- When valve is used in modular valve stack assemblies, consult Tokimec regarding use of orifice plugs.

Specifications

Model	Max. Operating Pressure MPa	Max. Flow L/min	Allowable Tank Port Back Press. MPa	Max. Switching Frequency (cycles/min.)	Weight kg	
					Single Solenoid	Double Solenoid
DG4VC-5	31.5	See page E54, 55	20.6	180	4.4	6.1

Electrical Specifications

Contact Pt. Input	Voltage Code	Power Voltage	Holding Current	Power Consump.	Solenoid		Allow. Contact Pt. Voltage		Contact Point Current	
					Insul. Class	Allowable Temp.	Solenoid OFF	Solenoid ON	Solenoid OFF	Solenoid ON
PS2	H	DC24V±10%	1.58A	38W	H	180 ℃	DC24V or open	0V±0.1V	Less than 100μA	10mA
PN2							0V±0.1V or open	DC2～24V	Less than 100μA.	15mA

Note • Current and power consumption may vary with temperature. Table values are at 20°C.

Spool Types and Pressure-Flow Characteristics

Spool types and pressure-flow characteristics are same as DG4V-5.
See pages E54, 55 for DC solenoid values.

Performance Curves

Pressure Drop Characteristics

Pressure drop characteristics are same as DG4V-5.
See page E56.

Switching Times

Switching times are same as DG4V-5. See page E57 (DC).

Operating Considerations

• 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
Always insure that one side solenoid is deenergized before energizing the opposite side solenoid. 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.

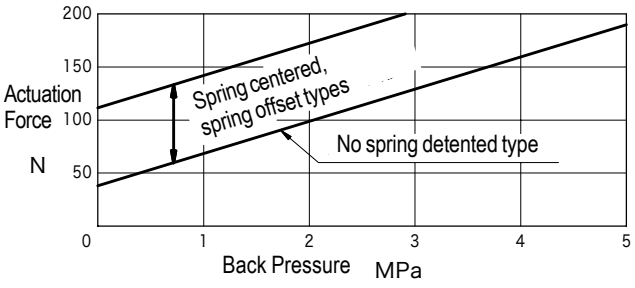
• T (tank) port piping
Prevent abnormal pressure surges above the allowable back pressure rating from being generated in T port. Valve is wet armature type so insure that valve is always filled with oil.

• Using valves as two-way and three-way
Valve is designed as four-way and as such max. flow is limited when using as two or three-way valves. Consult TOKIMEC 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.

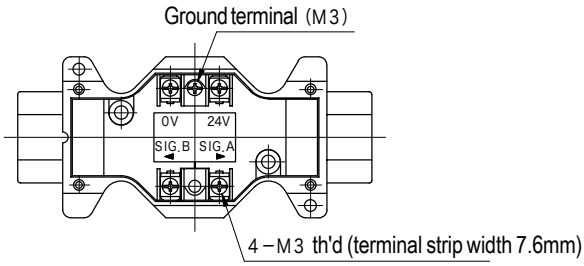
• Malfunctions due to surge pressure
Avoid combining flows of tank lines prone to surge pressures. Surge pressures in valve T port may lead to spool malfunctions. No spring detented type valves are susceptible to such malfunctions during deenergization.

• Manual operation
For manual switching, push the manual override pin. Be aware that actuation force increases with higher back pressure. (See graph)

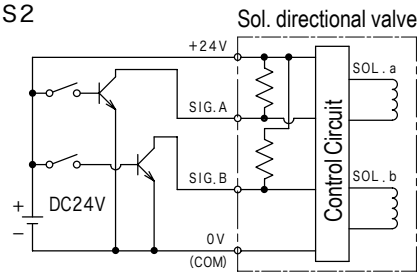


• Solenoid indicator lamp
For valves with indicator lamps, the lamps will light when current flows to the solenoid.

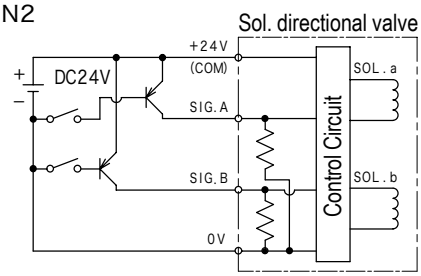
• Conduit box wiring
Solenoid and conduit box are pre-wired. Refer to below diagrams for wiring from power source to conduit box or DIN connectors.



PS2



PN2



• Terminal wiring
- Power source terminals should be connected to smoothed power source and always kept energized.
- Signal terminals should be connected to relays and open collector transistors (PS2 type: NPN type, PN2 type, PNP type).
- Programmable controller, etc., used should have leakage current of less than 200ì A.
- DO NOT reverse connect COM terminals (0V or 24V) and signal terminals (SIG. A, SIG. B) as it may damage programmable controller, etc.

Mounting Bolts (JIS B1176, Strength Class 12.9)

Hex Socket Bolts	Quantity
M6 × 40	4

• Order mounting bolts separately.
• Mounting bolt tightening torque: 12 ~ 15Nm

Subplate

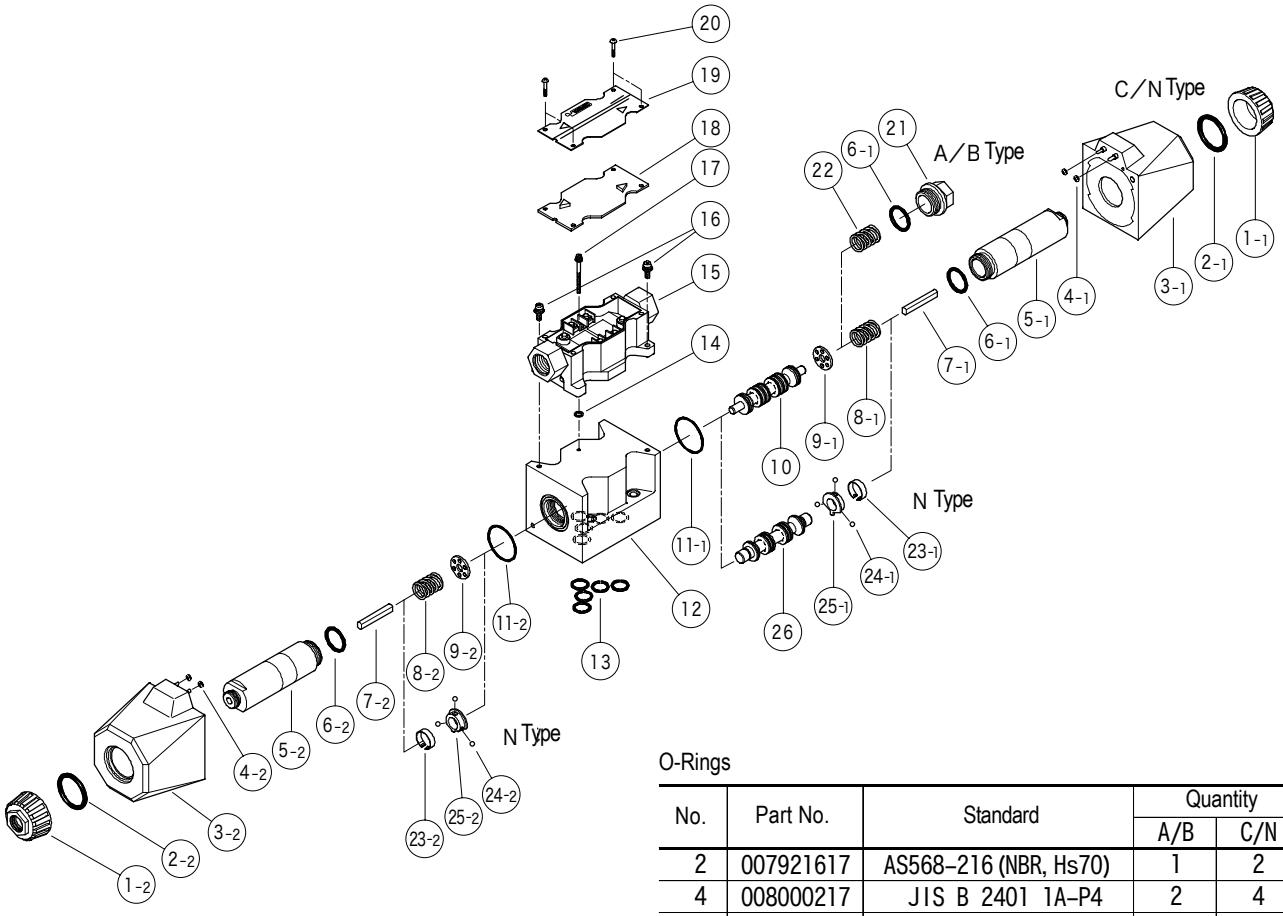
Subplate Model	Port Dia. Rc
DGSM–01X–10–JA–M	3/8
DGSM–01Y–10–JA–M	1/2

• Subplate and bolts must be ordered separately.
• See page Q8 for dimensions.
• See page Q9 for multiple valve mount subplates.
• Max. working pressure 21 MPa. For higher pressures, valve should be mounted on manifold block.

Dimensions

Dimensions and mounting are same as DG4V-5. See page E59 (Dimensions) and E62 (Mounting).

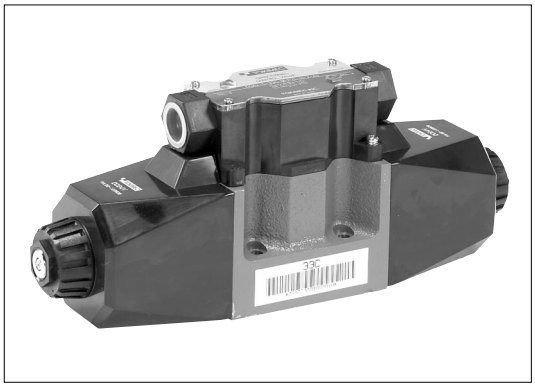
Construction

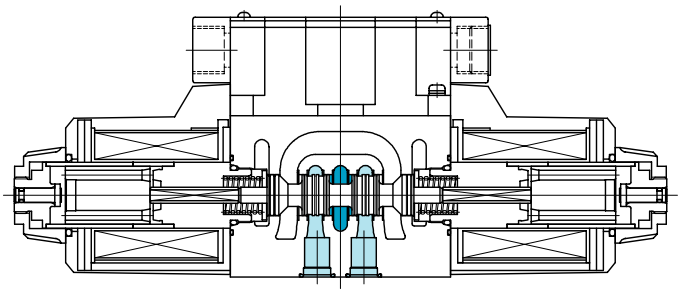


O-Rings

No.	Part No.	Standard	Quantity	
			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

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





- Energy saving type solenoid directional valve with low power consumption during energization.
- Integrated solid state relay, signal terminals can be connected to PLC and directly driven (K2, E2 type, 3 wire).
- Same wiring method as standard DG4V-5 valves (DK2, DE2 types).

Model Code

(F3) - DG4VL- 5 - 2 A (L)-M- P K2 -H- 7 - 40 - (P10)

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

1 Fluid
Omitted for mineral oil, water glycol
F3: phosphate ester

2 Low-holding current solenoid directional valve (gasket mounting)
Wet armature type

3 Mounting
5: ISO 4401-AC-05-4-A

4 Spool
See page E67, 68.

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 (3 position, double solenoid)
N: No spring detented (2 position, double solenoid)

6 Solenoid assembly orientation (for spring arrangements A, B)
Omitted for standard (energized P to B, A to T)
L: Left hand build
(energized P to A, B to T)

7 Wiring connection
P: Plug-in conduit box, G 1/2

8 Wiring methods (power, signal terminal connections)
K2:Sink connection, 3 wire (fine current control)
E2:Source connection, 3 wire (fine current control)
DK2:Sink connection, 2 wire (ON/OFF power control)
DE2:Source connection, 2 wire (ON/OFF power control)

9 Solenoid voltage
H:DC24V

10 T port allowable back pressure
7:20.6MPa

11 Design no.

12 Port orifice (option)
Omitted for no port orifices (standard)
Port orifice indicators
<Example1>P10 (1.0mm orifice in P port)
Orifice diameter
Port (A, B, P, T)
<Example2> B12 (1.2mm orifice in B port)
<Example3> 2 port combinations
Combination sequence, PTAB
P10T12,P08B10

- T port orifice, applicable to T port on A port side.
- When using T port orifice, ensure that surge pressure does not exceed allowable back pressure.
- When using port orifices, ensure that circuit pressure is less than 21 MPa.
- When valve is used in modular valve stack assemblies, consult Tokimec regarding use of orifice plugs.

Specifications

Model	Max. Operating Pressure MPa	Max. Flow L/min	Allowable Tank Port Back Press. MPa	Max. Switching Frequency (cycles/min.)	Weight kg	
					Single Solenoid	Double Solenoid
DG4VL-5	31. 5	See Press.-Flow Characteristics	20. 6	180	4. 4	6. 1

Solenoid Specifications

Wiring Method	Voltage Code	Voltage	Current at Switching (0.3 sec after ON)	Holding Current	Power Consumption-Holding	Solenoid		Allow. Contact Pt. Voltage		Contact Pt. Current	
						Insul. Class	Allow. Temp.	Solenoid OFF	Solenoid ON	Solenoid OFF	Solenoid ON
PK2	H	DC24V ±10%	1. 58A	0. 3A	7. 5W	H	180 ℃	DC24V or open	0V±0. 1V	Less than 100μA	4mA
PE2								0V±0. 1V or open	DC24V±10%		
PDK2											
PDE2											

Note • Current values and power consumption may vary with temperature. Table values are at 20°C.

Spool Types and Pressure-Flow Characteristics

DC Solenoid (applied voltage 90% of rated)

Neutral Spool Position	Valve Function Schematics			Max. Flow L/min													
	3 Position	2 Position		P→A, B→A, B→T					P→A (B port blocked)					P→B (A port blocked)				
	Spring Centered	Spring Offset, B Type																
	– 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	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	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	100	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	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	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

Notes • Max. flow without valve malfunction.
• Max. flow for ※ is with A port and B port blocked.

Spool Types and Pressure-Flow Characteristics

DC Solenoid (applied voltage 90% of rated)

Spool Transient Condition	Valve Function Schematics			Max. Flow L/min														
	2 Position			N, A, AL					N, A					AL				
	No Spring Detented	Spring Offset, A Type		P ⟷ A, B ⟷ T					P→A (B port blocked)					P→B (A port blocked)				
	– 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	※120	※120	※120	※120	※120	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	110

Notes • Max. flow without valve malfunction.
• Max. flow value for ※ is with A port and B port blocked.

Performance Curves

Pressure Drop Characteristics

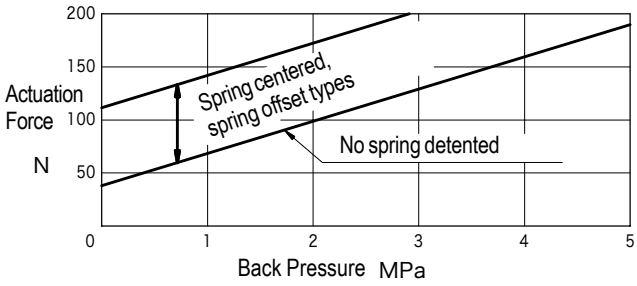
Pressure drop characteristics are same as stnadard DG4V-5. See page E56.

Switching Times

Switching times are same as standard DG4V-5. See page E57 (DC voltage).

Operating Considerations

- 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.
- Coil can be energized (ON input) while other coil is energized but spool will not shift. Spool will shift when input to first energized coil is turned OFF.
- 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 abnormal pressure surges above the allowable back pressure rating from being generated in T port. Valve is wet armature type so insure that valve is always filled with oil.
- Using valves as two-way and three-way
  Valve is designed as four-way and as such max. flow is limited when using as two or three-way valves. Consult TOKIMEC 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 valve 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
  For valves with indicator lamps, the lamps will light when current flows to the solenoid.
- Conduit box wiring
  See page E70.

Mounting Bolts (JIS B1176, Strength Class 12.9)

Hex Socket Bolts	Qty
M6 × 40	4

- Order mounting bolts separately.
- Mounting bolt tightening torque: 12~15Nm

Subplate

Subplate Model	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 Q8 for dimensions.
- See page Q9 for multiple valve mount subplates.
- Max. working pressure 21 MPa. For higher pressures, valve should be mounted on manifold block.

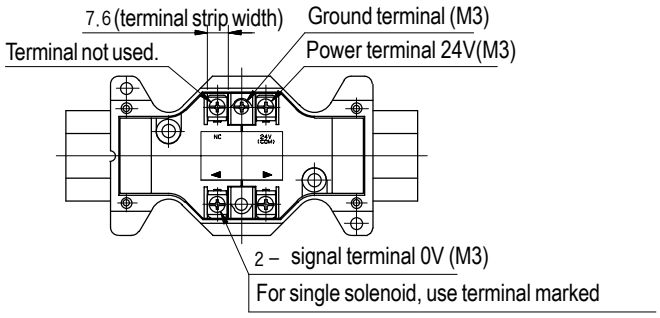
Dimensions

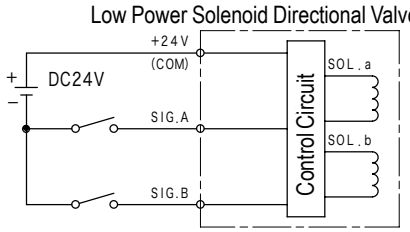
Dimensions and mounting are same as DG4V-5. See page E59 (dimensions) and E62 (mounting).

Conduit Box Wiring

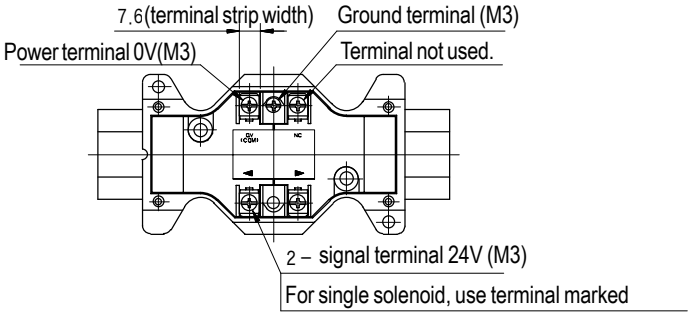
Solenoid and conduit box is pre-wired. Refer to below diagrams for wiring from power supply and control circuit to conduit box.

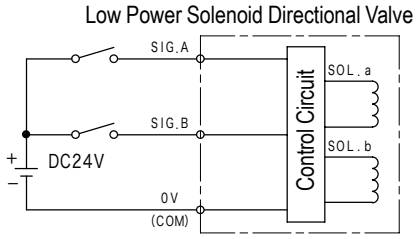
● DK2 : Sink connection; DG4VL−5−∗C/N−PDK2 (double solenoid)
2 wire (ON/OFF power control) DG4VL−5−∗A/B(L)−PDK2 (single solenoid)



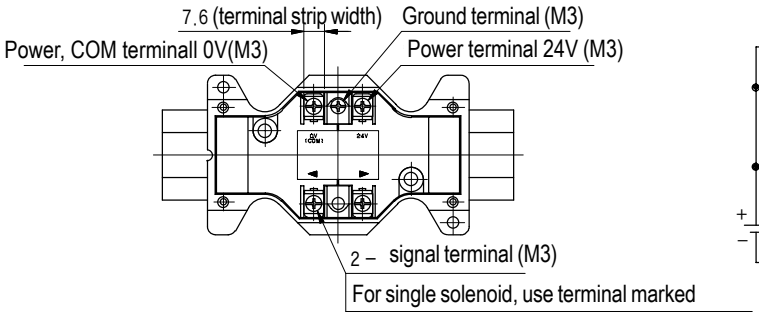


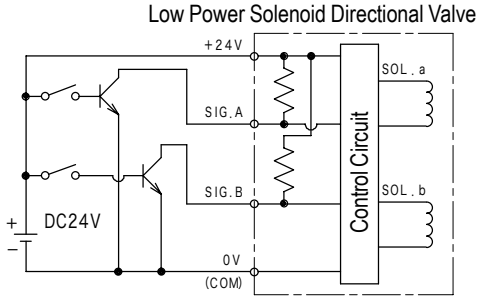
● DE2 : Source connection; DG4VL−5−∗C/N−PDE2 (double solenoid)
2 wire (ON/OFF power control) DG4VL−5−∗A/B(L)−PDE2 (single solenoid)





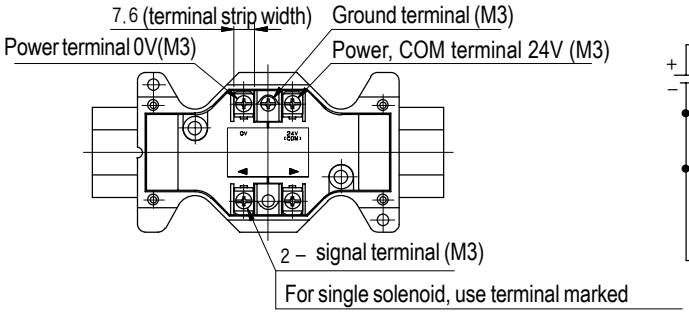
● K2 : Sink connection; DG4VL−5−∗C/N−PK2 (double solenoid)
3 wire (fine current control) DG4VL−5−∗A/B(L)−PK2 (single solenoid)

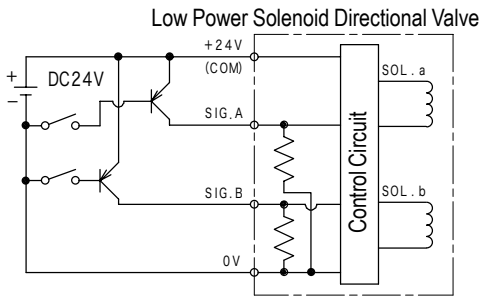




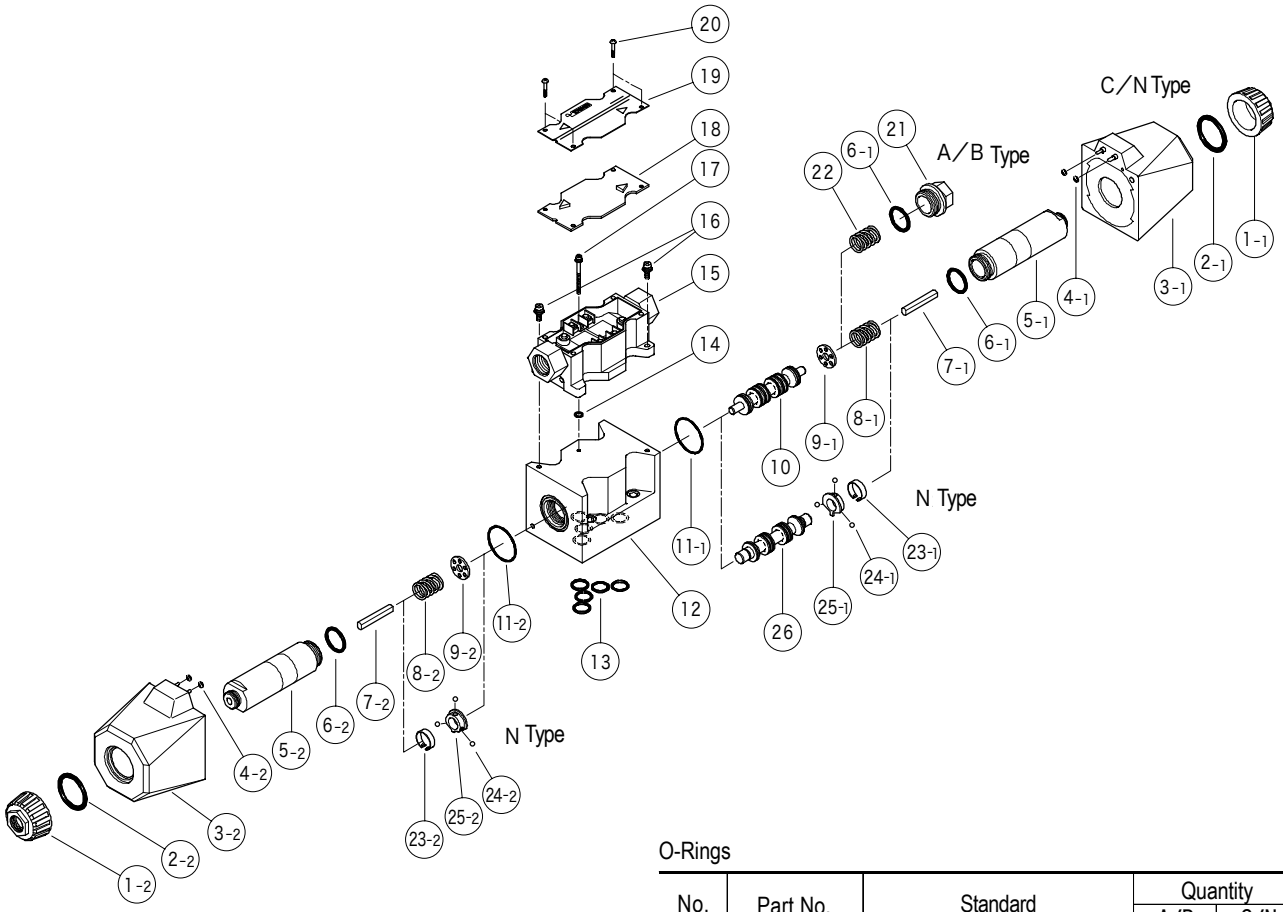
Note: - Power terminals should be connected to smoothed power supply and be continuously energized.
- Signal terminals should be connected to relays or open collector transistors (NPN type).
- Programmable controllers with leak current less than 200 μA should be used.

● E2 : Source connection; DG4VL−5−∗C/N−PE2 (double solenoid)
3 wire (fine current control) DG4VL−5−∗A/B(L)−PE2 (single solenoid)





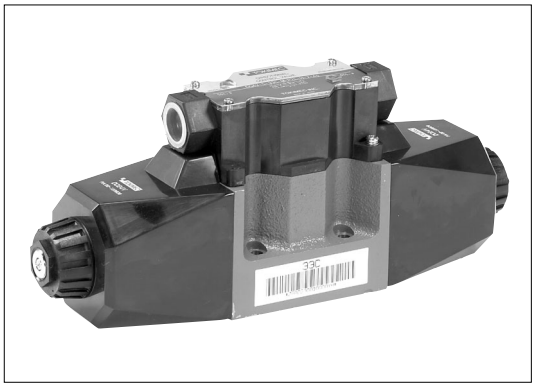
Note: - Power terminals should be connected to smoothed power supply and be continuously energized.
- Signal terminals should be connected to relays or open collector transistors (PNP type).
- Programmable controllers with leak current less than 200μA should be used.

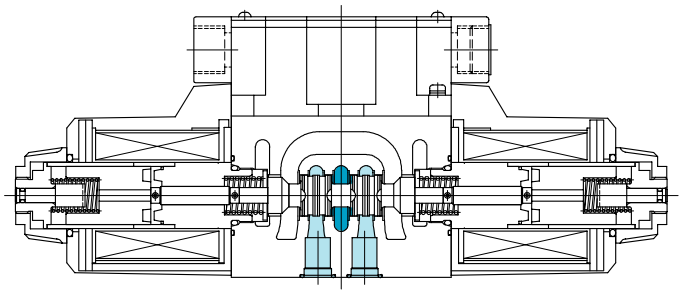


O-Rings

No.	Part No.	Standard	Quantity	
			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

Shockless solenoid operated directional control valves DG4VS-5





• Compared to standard DG4V-5 valve, this solenoid directional valve offers reduced shock during switching.

Model Code

(F3) - DG4VS - 5 -2 A (L)-M- P 7L - H - 7 - 40 - (P10)

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

1 Fluid
Omitted for mineral oil, water glycol
F3: phosphate ester

2 Shockless solenoid directional valve (gasket mounting)
Wet armature type

3 Mounting
5: ISO 4401-AC-05-4-A

4 Spool
See page E73, 74

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, (3 position, double solenoid)
N:No spring detented (2 position, double solenoid)

6 Solenoid assembly orientation (for spring arrangements A, B)
Omitted for standard (energized P to B, A to T)
L: Left hand build
(energized P to A, B to T)

7 Wiring connection
P:Plug-in conduit box, G 1/2
U:DIN43650 connector, pg. 11
KU:Lead wire (stand lead wire length, 350mm)

8 Electrical accessories
Omitted for no accessories (for wiring types P, KU)
1:No accessories, with connector (for U connection)
4:Surge suppressor [diode: (for KU connection, delayed solenoid deenergizatino time)
7L:Indicator lamp and surge suppressor (DC st'd)
9L:ADC rectifier (fast solenoid deenergization time) and indicator lamp (ADC standard)
12L:ADC rectifier (delayed solenoid deenergization time) and indicator lamp

Note 1: Regarding electrical accessories 9L, 12L:
• Applicable only to ADC solenoids (ADC rectifier)
• Applicable only for P wiring connection.
• With surge suppressor.

Note 2: Electrical accessories 7L not applicable to KU lead wire type wiring connection.

9 Solenoid voltage
G:DC12V
H:DC24V
TR:AC100V 50/60Hz(ADC• AC-DC rectifier)
VR:AC200V 50/60Hz(ADC• AC-DC rectifier)

10 Tport allowable back pressure
7:20.6MPa

11 Design no.

12 Port orifice (option)
Omitted for no port orifices (standard)
Port orifice indicators
<Example> P10 (1.0mm orifice in P port)
Orifice diameter
Port (A, B, P, T)
<Example> B12 (1.2mm orifice in B port)
<Example> 2 port combinations
Combination sequence, PTAB
P10T12,P10B10

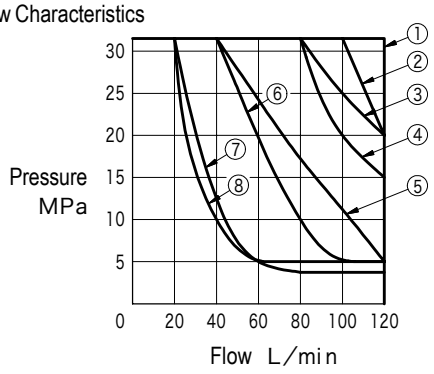
• T port orifice, applicable to T port on A port side.
• When using T port orifice, ensure that surge pressure does not exceed allowable back pressure.
• When using port orifices, ensure that circuit pressure is less than 21 MPa.
• When valve is used in modular valve stack assemblies, consult Tokimec regarding use of orifice plugs.

Specifications

Model	Max. Operating Pressure MPa	Max. Flow L/min	Allowable Tank Port Back Press. MPa	Max. Switching Freq. (cycles/min.)		Weight kg	
				DC	ADC Rectifier	Single Solenoid	Double Solenoid
DG4VS-5	31. 5	See Pressure-Flow Characteristics	20. 6	140	100	4. 4	6. 1

Spool Types and Pressure-Flow Characteristics

Pressure-Flow Characteristics



Note :Curves shown represent pressure, and max. flows corresponding to pressure.

Max. Flow
DC, ADC rectifier solenoid (energize voltage 90% or rated)

Spool Neutral Position	Valve Function Schematics			Pressure-Flow Characteristics Curve Numbers					
	3 Position	2 Position		P A B T		P→A (port blocked)		P→B (port blocked)	
	Spring Centered	Spring Offset, B Type							
	– C –	– B –	– BL –	SOL. a	SOL. b	SOL. a	SOL. b	SOL. a	SOL. b
0	DG4VS-5-0C	DG4VS-5-0B	DG4VS-5-0BL	※①		——	①	①	——
1	DG4VS-5-1C	DG4VS-5-1B	DG4VS-5-1BL	※②	※⑥	——	⑥	②	——
2	DG4VS-5-2C	DG4VS-5-2B	DG4VS-5-2BL	①		②		②	
3	DG4VS-5-3C	DG4VS-5-3B	DG4VS-5-3BL	①	②	②		②	
6	DG4VS-5-6C	DG4VS-5-6B	DG4VS-5-6BL	②		②		②	
7	DG4VS-5-7C	DG4VS-5-7B	DG4VS-5-7BL	①		⑦		⑦	
8	DG4VS-5-8C	DG4VS-5-8B	DG4VS-5-8BL	※⑤		——	⑤	⑤	——
11	DG4VS-5-11C	DG4VS-5-11B	DG4VS-5-11BL	※⑥	※②	——	②	⑥	——
22	DG4VS-5-22C	DG4VS-5-22B	DG4VS-5-22BL	——		②		②	
31	DG4VS-5-31C	DG4VS-5-31B	DG4VS-5-31BL	②	①	②		②	
33 34	DG4VS-5-33/34C	DG4VS-5-33/34B	DG4VS-5-33/34BL	①		②		②	

Notes • Max. flow without malfunction.
• Values circled in table indicate pressure-flow characteristics curve no.(max. flow).
• Max flow value for * is with A port and B port blocked.

Spool Types and Pressure-Flow Characteristics

Max. Flow
DC, ADC rectified solenoid (energize voltage 90% of rated)

Spool Transient Condition	Valve Function Schematics			Pressure-Flow Characteristics Curve Number				
	2 Postion			N, A, AL	N, A	AL	N, A	AL
	No Spring Detented	Spring Offset, A Type		P→A, B→A, A→B, B→T	P→A B port blocked	P→B A port blocked	P→B A port blocked	P→A B port blocked
	– N –	– A –	– AL –					
2		DG4VS-5-2A	DG4VS-5-2AL	⑦ ②	⑧		④	
		DG4VS-5-22A	DG4VS-5-22AL	———	⑧		④	
	DG4VS-5-2N			① ①	④		④	
	DG4VS-5-22N			———	④		④	

Notes
- Max. flow without malfunction.
- Values circled in table indicate pressure-flow characteristics curve no.(max. flow). (See page E73)
- Where two curve no's are shown, left side values are for free flow in neutral position and right side values are values with check valve to allow free flow during switching.

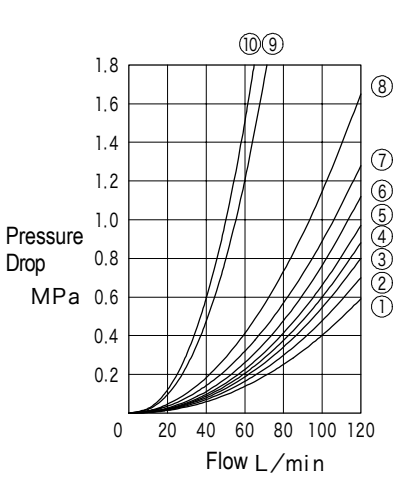
Solenoid Specifications

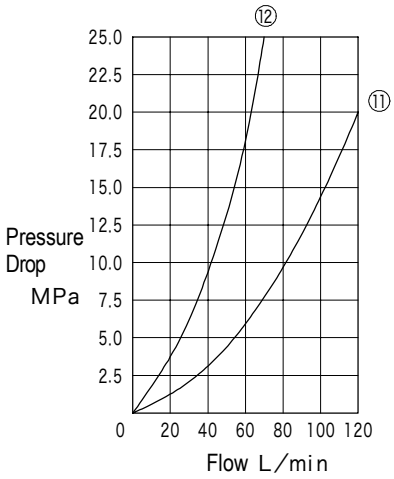
Power	Volt. Code	Voltage V	Frequency Hz	Initial Current A	Holding Current A	Power Consump. W	Allow.Volt. Fluctuation %	Insul.Class (Allow. Temp.)
DC	G	12	———	———	3. 17	38	±10	H (180°C)
	H	24			1. 58			
AC ↓ DC (Rectified) ADC	TR	AC100 V 50/60 Hz ↓ DC90 V (coil)		———	0. 42	38	±10	H (180°C)
	VR	AC200 V 50/60 Hz ↓ DC180 V (coil)			0. 21	38		

Notes:
- Current and power consumption may vary with temperature conditions. Values in table are based on 20°C.
- Integrated AC/DC rectifier enables AC power source to drive DC solenoids (see rectified DC solenoid characteristics). Maximum flow is based on DC solenoids.
- Contact TOKIMEC for other voltages not shown.

Performance Curve (viscosity 36 mm²/s , specific gravity 0.87)

Pressure Drop Characteristics





1. For pressure drops ($\triangle P_1$) of viscosities other than 36mm²/s, calculate using multiplier coefficients in below table.
2. The formula to calculate pressure drops ($\triangle P_1$) for specific gravities other than 0.87 is as follows.

$\triangle P_1 = \triangle P \times G_1 / G$

$\triangle P$ ····· characteristics curve value

G ····· 0. 87

G_1 ···· desired specific gravity

Viscosity mm²/s	10	20	30	36	40	50	60	70	80	90	100	110	120	130	140	150
Coefficient	0. 73	0. 86	0. 96	1. 00	1. 03	1. 09	1. 14	1. 18	1. 22	1. 26	1. 29	1. 32	1. 35	1. 38	1. 40	1. 43

Pressure Drop Curve No.

C, B, BL										A (Note)					N				
Spool	Switched Condition				Neutral Condition					Spool	Switched Condition				Spool	Switched Condition			
	P↓A	B↓T	P↓B	A↓T	P↓T	A↓T	B↓T	P↓A	P↓B		P↓A	B↓T	P↓B	A↓T		P↓A	B↓T	P↓B	A↓T
0	②	⑤	②	⑤	③	—	—	—	—	2	⑥	⑦	⑥	⑦	2	⑤	⑥	⑤	⑥
1	①	⑤	④	⑤	⑥	—	—	—	—	22	⑥	—	⑥	—	22	⑤	—	⑤	—
2	⑤	⑥	⑤	⑥	—	—	—	—	—										
3	⑤	⑥	⑤	④	—	⑩	—	—	—										
6	⑤	④	⑤	④	—	⑩	⑨	—	—										
7	③	⑥	③	⑥	—	—	—	⑥	⑥										
8	②	⑦	②	⑦	⑧	—	—	—	—										
11	④	⑤	①	⑤	⑥	—	—	—	—										
22	⑤	—	⑤	—	—	—	—	—	—										
31	⑤	④	⑤	④	—	—	⑨	—	—										
33	⑤	⑥	⑤	⑥	—	⑫	⑫	—	—										
34	⑤	⑥	⑤	⑥	—	⑪	⑪	—	—										

Note: Column A applicable in case of AL, with B transposed for A and A transposed for B for P to A and P to B.

Switching Times

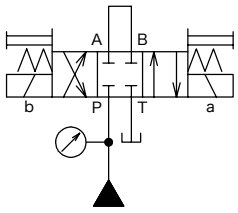
Unit : ms

Power	Operation		Spring Centered	Spring Offset	No Spring Detented
DC	Energize		120		120
	Spring Return		50 * (175)		——
AC-DC Rectifier Rectifier Integrated	Energize		120		120
	Spring Return	F	75		——
		S	175		

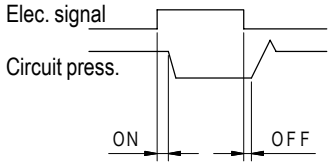
Note: Values may differ slightly according to spool type, circuit conditions.
* Mark indicates KU4 coil.

Conditions: spool type 2, open loop circuit, flow 80 L/min, supply pressure 17.5 MPa, fluid viscosity 36 mm²/s

[Circuit Example]

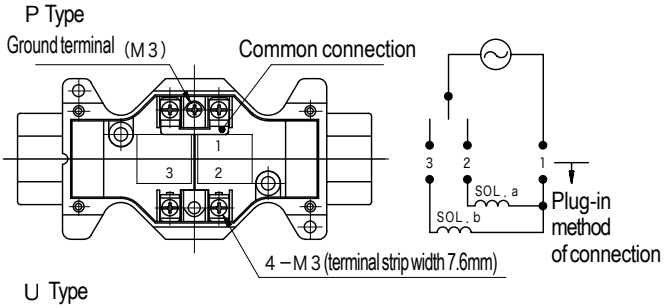


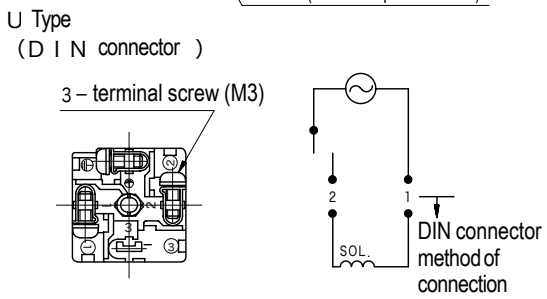
[Switching Time Definition]

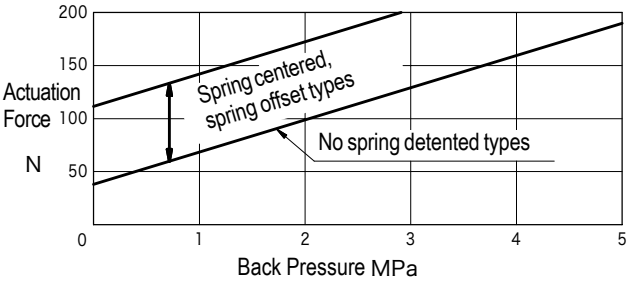


Operating Considerations

- 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
  Always insure that one side solenoid is deenergized before energizing the opposite side solenoid. 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 abnormal pressure surges above the allowable back pressure rating from being generated in T port. Valve is wet armature type so insure that valve is always filled with oil.
- Using valves as two-way and three-way
  Valve is designed as four-way and as such max. flow is limited when using as two or three-way valves. Consult TOKIMEC 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 valve 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
  For valves with indicator lamps, the lamps will light when current flows to the solenoid.
- Conduit box wiring
  Solenoid and conduit box are pre-wired. Refer to below diagrams for wiring from power source to conduit box or DIN connectors.







Mounting Bolts (JIS B1176, Strength Class 12.9)

Hex Socket Bolts	Quantity
M6 × 40	4

- Order mounting bolts separately.
- Mounting bolt tightening torque: 12 ~ 15Nm

Subplate

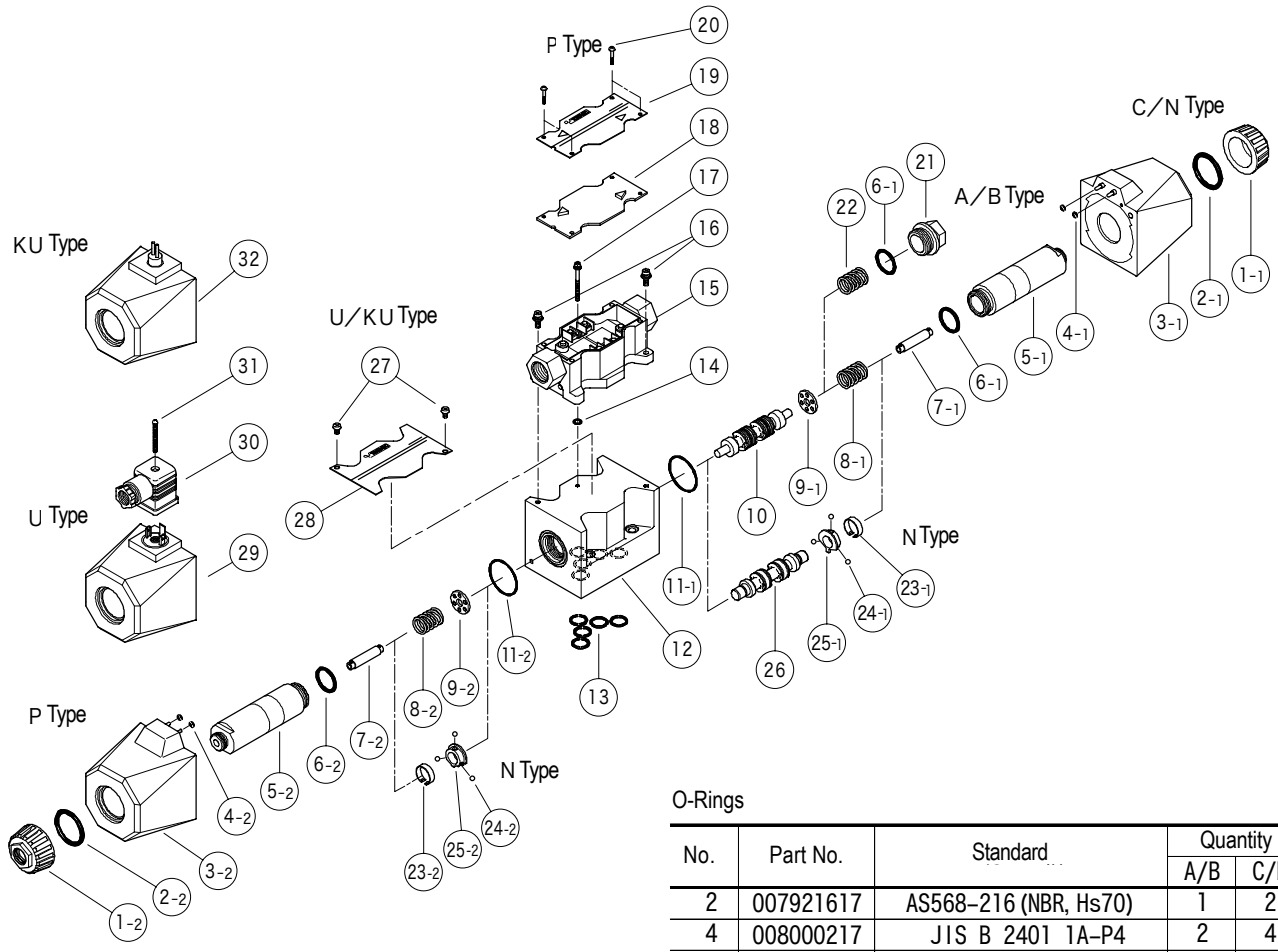
Subplate Model	Port Dia. Rc
DGSM-01X-10-JA-M	3/8
DGSM-01Y-10-JA-M	1/2

- Subplate and bolts must be ordered separately.
- See page Q8 for dimensions.
- See page Q9 for multiple valve mount subplates.
- Max. working pressure 21 MPa. For higher pressures, valve should be mounted on manifold block.

Dimensions

Dimensions and mounting same as standard DG4V-5. See pages E59-61 (dimensions), E62 (mounting).

Construction

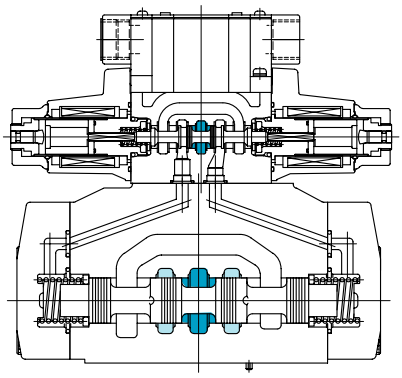


O-Rings

No.	Part No.	Standard	Quantity	
			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

●④, ⑭ applicable for P type only.

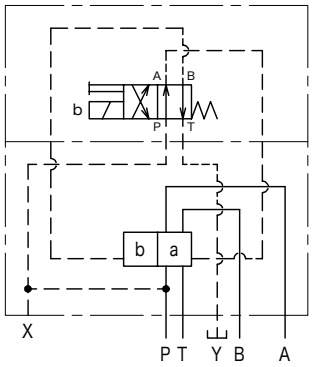
Solenoid controlled pilot operated directional control valves DG5V-7/DG5V-H8



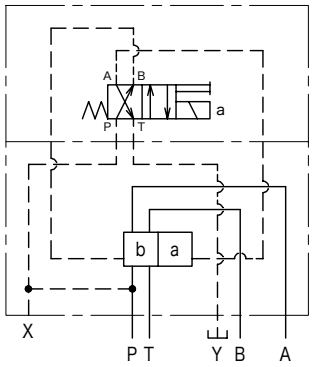
- Pilot operated directional control valves incorporate DG4V-3, 54 design pilot valves.

Functional Symbols
(Internal Pilot, External Drain Types)

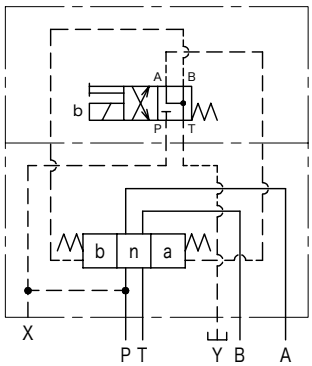
DG5V-7/H8-*A
Spring Offset, A Type



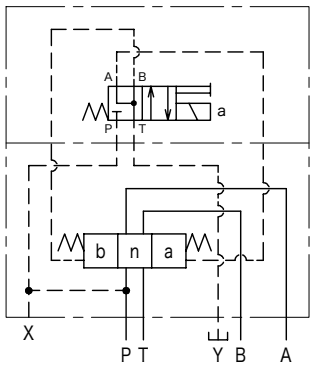
DG5V-7/H8-*AL
Spring Offset, AL Type



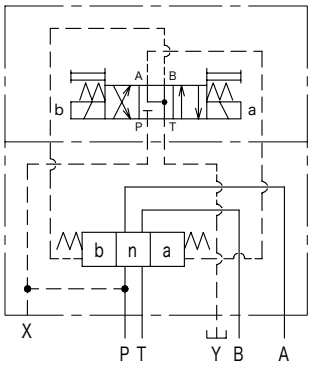
DG5V-7/H8-*B
Spring Offset, B Type



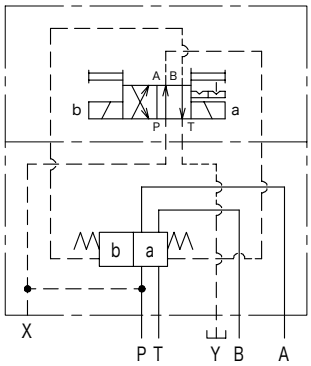
DG5V-7/H8-*BL
Spring Offset, BL Type



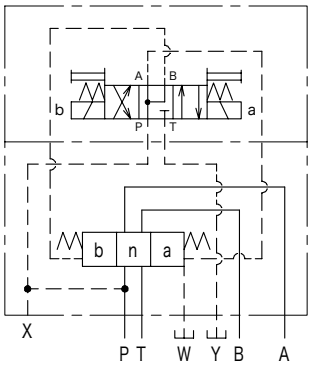
DG5V-7/H8-*C
Spring Centered Type



DG5V-7/H8-*N
No Spring Detented Type



DG5V-7/H8-*D
Pressure Centered Type



Model Code

(F3) - DG5V - 7-2A (L) - (1) - (E) -(T)- P 7- T - 84-JA

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13

1 Fluid
Omitted for mineral oil, water glycol
F3: phosphate ester

2 Solenoid pilot operated directional valve (gasket mounting)

3 Mounting
7 : ISO 4410-AD-07-4-A
H8 : ISO 4410-AE-08-4-A

4 Spool (See page E80-83)

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 (3 position, double solenoid)
D: Pressure centered (3 position, double solenoid)
N: No spring detented (2 positionk, double solenoid)

6 Solenoid assembly orientation (for spring arrangements A, B)
Omitted for standard (energized P to B, A to T)
L: Left hand build
(energized P to A, B to T)

7 Spool stroke control (option)
Omitted for no option (standard)
1: Stroke adjuster (both A, B ports)
2: Pilot restrictor (meter out control)
3: Pilot restrictor + stroke adjuster (both sides)
7: Stroke adjuster (A port side)
8: Stroke adjuster (B port side)
27: Pilot restrictor + stroke adjuster (A port side)
28: Pilot restrictor + stroke adjuster (B port side)

8 Pilot
Omitted for internal pilot
E: External pilot

9 Drain
Omitted for external drain
T: Internal drain

10 Wiring connection
Plug-in conduit box, G 1/2
connector, pg. 11

11 Electrical accessories
Omitted for no accessories (coil connections P, KU)
1: Connectors without accessories
(coil connection U)
2: With indicator lamp (AC standard)
4: With surge suppressor (coil connection KU, slow solenoid deenergize)
7: With indicator lamp and surge suppressor (DC standard)
9: ADC solenoid rectifier (fast solenoid de-energization) and indicator lamp (ADC standard)
12: ADC solenoid rectifier (delayed solenoid de-energization) and indicator lamp
Note: Electrical accessories - 9, 12
• ADC solenoids (AC-DC rectifier) only
• Wiring connection, P only
• With surge suppressor

12 Solenoid coil voltage
T:100V 50/60Hz,110V 60Hz
V:200V 50/60Hz,220V 60Hz
G:DC12V
H:DC24V
TR:100V 50/60Hz (AC/DC rectifier)
VR:200V 50/60Hz (AC/DC rectifier)

13 Design no.

Specifications

Model	Size	Max.Operating Pressure MPa	Max. Flow L/min	Allowable T (Tank) Port Back Pressure MPa	Minimum Pilot Pressure MPa	Maximum Pilot Pressure MPa	Weight kg	
							Single Solenoid	Double Solenoid
DG5V–7	04	31. 5	See Press.-Flow Charac.	20. 6	See Min. Pilot Pressure Curves	31. 5	8. 6	9. 1
DG5V–H8	06	31. 5	See Press.-Flow Charac.	20. 6	See Min. Pilot Pressure Curves	31. 5	16. 7	17. 2

Solenoid Specifications and Pilot Solenoid Directional Valve

DG4V-3 solenoid valve used as pilot. See page E10 for solenoid specifications.
Following spool/spring arrangement valves are used.

Spring offset, type A: DG4V-3-2A-M-**-*-7-54
Spring offset, type B: DG4V-3-6B-M-**-*-7-54
Spring center, type C: DG4V-3-6C-M-**-*-7-54
Spring center, type D: DG4V-3-7C-M-**-*-7-54
Spring offset, type AL: DG4V-3-2AL-M-**-*-7-54
Spring offset, type BL: DG4V-3-6BL-M-**-*-7-54
No spring detented, type N: DG4V-3-2N-M-**-*-7-54
Note: 4/8B uses DG4V-3-6BL and 4/8BL uses DG4V-3-6B.

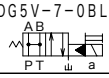
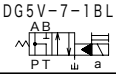
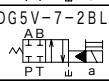
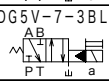
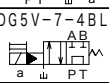
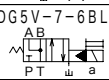
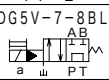
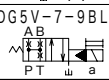
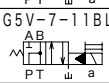
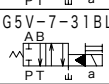
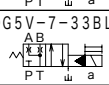
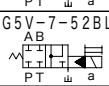
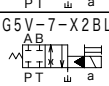
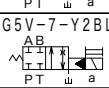
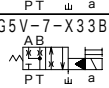
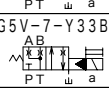
Two stage DG5VC-7 and DG4VC-H8 which incorporate fine current control pilot solenoid valves, DG4VC-3 (DC24V) also available. Consult Tokimec.

Spool Types and Pressure-Flow Characteristics (DG5V-7)

Spool Neutral Position			Valve Function Schematics		
			3 Position		2 Position
			Spring Centered – C –	Pressure Centered – D –	Spring Offset, B Type – B –
0		Open Center	DG5V-7-0C	DG5V-7-0D	DG5V-7-0B
1		P–A–T Connection	DG5V-7-1C	DG5V-7-1D	DG5V-7-1B
2		Closed Center	DG5V-7-2C	DG5V-7-2D	DG5V-7-2B
3		A–T Connection	DG5V-7-3C	DG5V-7-3D	DG5V-7-3B
4		Tandem	DG5V-7-4C	DG5V-7-4D	DG5V-7-4B
6		A–B–T Connection	DG5V-7-6C	DG5V-7-6D	DG5V-7-6B
8		Tandem	DG5V-7-8C	DG5V-7-8D	DG5V-7-8B
9		Open Center w/ A, B Restrictors	DG5V-7-9C	DG5V-7-9D	DG5V-7-9B
11		P–B–T Connection	DG5V-7-11C	DG5V-7-11D	DG5V-7-11B
31		B–T Connection	DG5V-7-31C	DG5V-7-31D	DG5V-7-31B
33		A–B–T Connection	DG5V-7-33C	DG5V-7-33D	DG5V-7-33B
52		Closed Center	DG5V-7-52C	DG5V-7-52D	
X2		Closed Center	DG5V-7-X2C	DG5V-7-X2D	DG5V-7-X2B
Y2		Closed Center	DG5V-7-Y2C	DG5V-7-Y2D	DG5V-7-Y2B
X33		A–B–T Connection w/ Restrictors	DG5V-7-X33C	DG5V-7-X33D	DG5V-7-X33B
Y33		A–B–T Connection w/ Restrictors	DG5V-7-Y33C	DG5V-7-Y33D	DG5V-7-Y33B

Spool Neutral Position			Valve Function Schematics		
			2 Position		
			Spring Offset, A Type		No Spring Detented
			– A –	– AL –	– N –
0		Open Center	DG5V-7-0A	DG5V-7-0AL	DG5V-7-0N
2		Closed Center	DG5V-7-2A	DG5V-7-2AL	DG5V-7-2N
6		A–B–T Connection	DG5V-7-6A	DG5V-7-6AL	DG5V-7-6N
9		Open Center w/ A, B Restrictors	DG5V-7-9A	DG5V-7-9AL	DG5V-7-9N
52		Closed Center	DG5V-7-52A	DG5V-7-52AL	DG5V-7-52N
X2		Closed Center	DG5V-7-X2A	DG5V-7-X2AL	DG5V-7-X2N
Y2		Closed Center	DG5V-7-Y2A	DG5V-7-Y2AL	DG5V-7-Y2N

Note • Maximum flow without malfunction.

2 Position Spring Offset, B Type – BL –	Max. Flow L/min					Pressure Drop Curve Number				
						Switched Condition				Neutral
	7 MPa	14 MPa	21 MPa	28 MPa	31.5 MPa	P→A	B→T	P→B	A→T	P→T
DG5V-7-0BL 	300	300	300	300	300	②	①	②	③	③
DG5V-7-1BL 	260	220	120	100	90	①	②	②	③	④
DG5V-7-2BL 	300	300	300	300	300	①	②	①	②	—
DG5V-7-3BL 	300	300	300	300	300	①	②	①	③	—
DG5V-7-4BL 	260	220	120	100	90	②	②	②	①	⑥
DG5V-7-6BL 	300	300	300	300	300	①	①	①	③	—
DG5V-7-8BL 	300	300	250	165	140	②	②	②	①	⑤
DG5V-7-9BL 	260	220	120	100	90	①	②	①	③	⑦
DG5V-7-11BL 	260	220	120	100	90	②	③	①	②	④
DG5V-7-31BL 	300	300	300	300	300	①	③	①	②	—
DG5V-7-33BL 	300	300	300	300	300	①	②	①	②	—
DG5V-7-52BL 	300	300	300	300	300	②	—	③	③	—
DG5V-7-X2BL 	120	120	120	120	120	—	②	—	②	—
DG5V-7-Y2BL 	120	120	120	120	120	①	—	①	—	—
DG5V-7-X33BL 	120	120	120	120	120	—	②	—	②	—
DG5V-7-Y33BL 	120	120	120	120	120	①	—	①	—	—

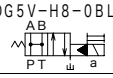
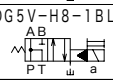
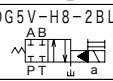
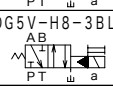
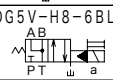
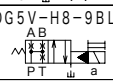
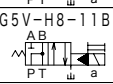
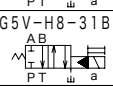
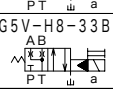
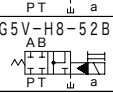
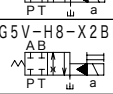
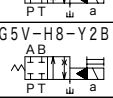
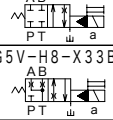
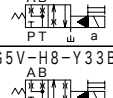
Max. Flow L/min					Pressure Drop Curve No.			
					Switched Condition			
7 MPa	14 MPa	21 MPa	28 MPa	31.5 MPa	P→A	B→T	P→B	A→T
300	300	300	300	300	②	①	②	③
300	300	300	300	300	①	②	①	②
300	300	300	300	300	①	①	①	③
260	220	120	100	90	①	②	①	③
300	300	300	300	300	②	—	③	③
120	120	120	120	120	—	②	—	②
120	120	120	120	120	①	—	①	—

Spool Types and Pressure-Flow Characteristics (DG5V-H8)

Spool Neutral Position			Valve Function Schematics		
			3 Position		2 Position
			Spring Centered – C –	Pressure Centered – D –	Spring Offset, B Type – B –
0		Open Center	DG5V-H8-0C	DG5V-H8-0D	DG5V-H8-0B
1		P–A–T Connection	DG5V-H8-1C	DG5V-H8-1D	DG5V-H8-1B
2		Closed Center	DG5V-H8-2C	DG5V-H8-2D	DG5V-H8-2B
3		A–T Connection	DG5V-H8-3C	DG5V-H8-3D	DG5V-H8-3B
4		Tandem	DG5V-H8-4C	DG5V-H8-4D	DG5V-H8-4B
6		A–B–T Connection	DG5V-H8-6C	DG5V-H8-6D	DG5V-H8-6B
8		Tandem	DG5V-H8-8C	DG5V-H8-8D	DG5V-H8-8B
9		Open Center w/ A, B Restrictors	DG5V-H8-9C	DG5V-H8-9D	DG5V-H8-9B
11		P–B–T Connection	DG5V-H8-11C	DG5V-H8-11D	DG5V-H8-11B
31		B–T Connection	DG5V-H8-31C	DG5V-H8-31D	DG5V-H8-31B
33		A–B–T Connection	DG5V-H8-33C	DG5V-H8-33D	DG5V-H8-33B
52		Closed Center	DG5V-H8-52C	DG5V-H8-52D	
X2		Closed Center	DG5V-H8-X2C	DG5V-H8-X2D	DG5V-H8-X2B
Y2		Closed Center	DG5V-H8-Y2C	DG5V-H8-Y2D	DG5V-H8-Y2B
X33		A–B–T Connection w/ Restrictors	DG5V-H8-X33C	DG5V-H8-X33D	DG5V-H8-X33B
Y33		A–B–T Connection w/ Restrictors	DG5V-H8-Y33C	DG5V-H8-Y33D	DG5V-H8-Y33B

Spool Neutral Position			Valve Function Schematics		
			2 Position		
			Spring Offset, A Type		No Spring Detented
			– A –	– AL –	– N –
0		Open Center	DG5V-H8-0A	DG5V-H8-0AL	DG5V-H8-0N
2		Closed Center	DG5V-H8-2A	DG5V-H8-2AL	DG5V-H8-2N
6		A–B–T Connection	DG5V-H8-6A	DG5V-H8-6AL	DG5V-H8-6N
9		Open Center w/ A, B Restrictors	DG5V-H8-9A	DG5V-H8-9AL	DG5V-H8-9N
52		Closed Center	DG5V-H8-52A	DG5V-H8-52AL	DG5V-H8-52N
X2		Closed Center	DG5V-H8-X2A	DG5V-H8-X2AL	DG5V-H8-X2N
Y2		Closed Center	DG5V-H8-Y2A	DG5V-H8-Y2AL	DG5V-H8-Y2N

Notes • Upper values for maximum flow for spring offset, types A, AL: lower values for no spring detent types.
• Max. flow without malfunction.

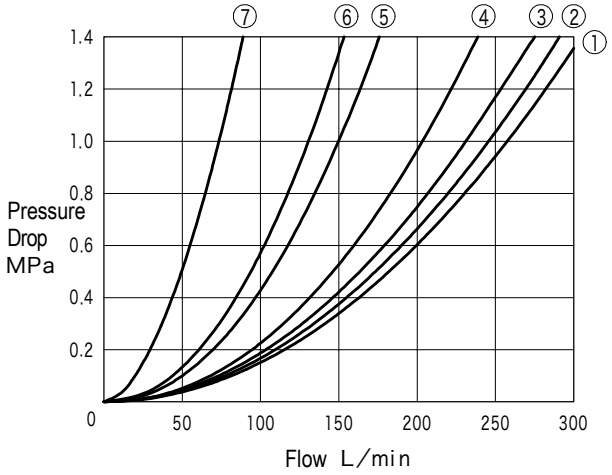
2 Position Spring Offset, B Type – BL –	Max. Flow L/min		Pressure Drop Curve Number				
	21 MPa	31.5 MPa	Switched Condition				Neutral
			P→A	B→T	P→B	A→T	P→T
DG5V-H8-0BL 	700	650	②	⑤	②	③	④
DG5V-H8-1BL 	650	500	①	②	②	②	⑤
DG5V-H8-2BL 	700	700	①	②	①	②	—
DG5V-H8-3BL 	700	700	①	②	①	④	—
DG5V-H8-4BL 	350	220	①	④	①	③	⑥
DG5V-H8-6BL 	650	600	①	④	①	④	—
DG5V-H8-8BL 	700	450	①	④	①	③	⑥
DG5V-H8-9BL 	350	220	②	④	②	③	—
DG5V-H8-11BL 	650	500	②	②	①	②	⑤
DG5V-H8-31BL 	700	700	①	④	①	②	—
DG5V-H8-33BL 	700	700	①	②	①	①	—
DG5V-H8-52BL 	700	700	②	—	⑤	②	—
DG5V-H8-X2BL 	300	300	—	②	—	②	—
DG5V-H8-Y2BL 	300	300	①	—	①	—	—
DG5V-H8-X33BL 	300	300	—	②	—	②	—
DG5V-H8-Y33BL 	300	300	①	—	①	—	—

Max. Flow L/min		Pressure Drop Curve Number			
		Switched Condition			
21 MPa	31.5 MPa	P→A	B→T	P→B	A→T
500/700	500/650	②	⑤	②	③
700	700	①	②	①	②
500/650	500/600	①	④	①	④
500/350	500/220	②	④	②	③
700	700	②	—	⑤	②
300	300	—	②	—	②
300	300	①	—	①	—

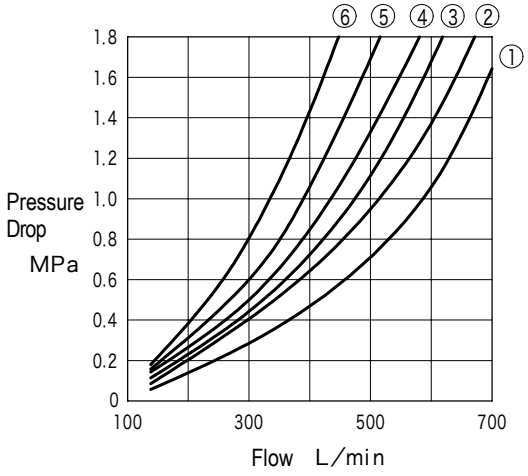
Performance Curve (viscosity 20 mm²/s , specific gravity 0.87)

Pressure Drop Characteristics

DG5V−7



DG5V−H8



1. For pressure drops ($\triangle P_1$)of viscosities other than 20mm²/s, calculate using multiplier coefficients in below table.
2. The formula to calculate pressure drops ($\triangle P_1$) for specific gravities other than 0.87 is as follows.

$\triangle P$ ····· characteristics curve value

$\triangle P_1 = \triangle P \times G_1 / G$ G ·····0. 87

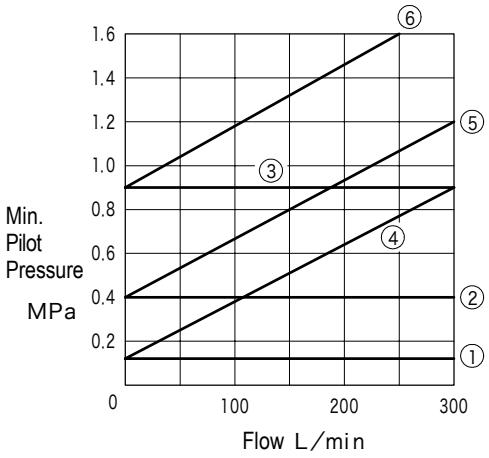
G_1 ····· desired specific gravity

Viscosity mm²/s	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Coefficient	0. 85	1. 00	1. 09	1. 17	1. 24	1. 29	1. 34	1. 38	1. 42	1. 46	1. 49	1. 52	1. 56	1. 59	1. 62

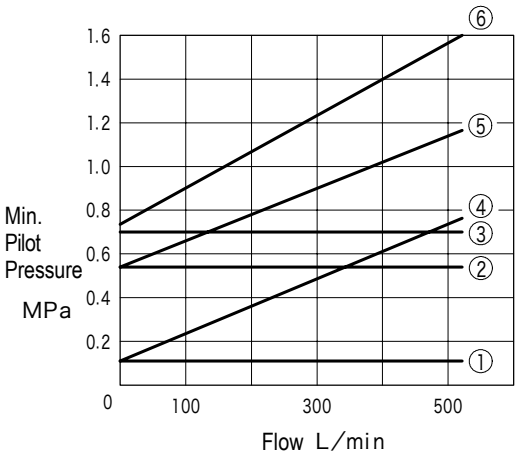
Pilot

Mininum Pilot Pressure

DG5V−7



DG5V−H8



Min. Pilot Pressure Curve No.

Spool/Spring Arrangement	Spool Types	Min. Pilot Press.Curve No.
A, AL	0, 9	①
	2, 6, 52, X2, Y2	④
B, BL, C, N	0, 1, 4, 8, 9, 11	②
	2, 3, 6, 31, 33, 52, X2, Y2, X33, Y33	⑤
D	0, 1, 4, 8, 9, 11	③
	2, 3, 6, 31, 33, 52, X2, Y2, X33, Y33	⑥

● In case of internal pilot,pilot pressure is equal to P port pressure.

Unit : cm³

Model	Spool/Spring Arrangement	Neutral to Stroke End	Stroke End to Stroke End
DG5V−7	A, AL, N	———	8. 1
	B, BL	4. 1	———
	C, D	4. 1	8. 1
DG5V−H8	A, AL, N	———	23
	B, BL	12	———
	C, D	12	23

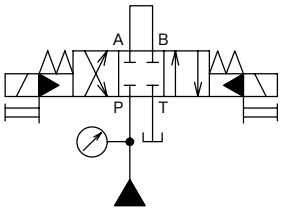
Switching Times

Unit : ms

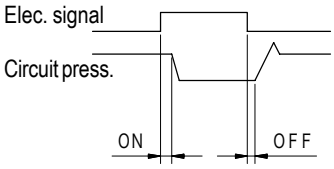
Model	Power	Operation	Pilot Pressure				
			1.5 MPa	5 MPa	15 MPa	21 MPa	25 MPa
DG5V-7-2C	AC	Solenoid Energize	50	30	25	20	18
		Spring Return	40	40	40	40	40
	DC	Solenoid Energize	60	40	35	30	28
		Spring Return	50	50	50	50	50
DG5V-H8-2C	AC	Solenoid Energize	120	60	45	40	35
		Spring Return	85	85	85	85	85
	DC	Solenoid Energize	145	85	70	60	45
		Spring Return	90	90	90	90	90

Note: Values may vary slightly according spool type, circuit conditions, and in case diode or rectifier is incorporated in electrical circuit.

[Circuit Example]

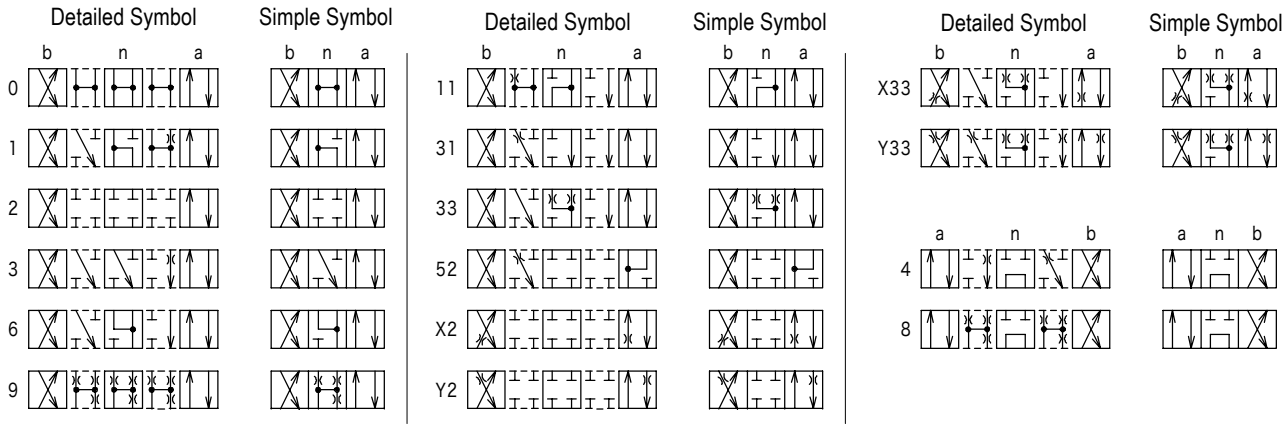


[Switching Time Definition]



Conditions: spool type 2, spring center type,
open loop circuit,
flow 300 L/min (DG5V-7),
350 L/min (DG5V-H8),
supply pressure 31.5 MPa,
fluid viscosity 20 mm²/s,
fluid temperature 50°C

Spool Transient Condition



Operating Considerations

- 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
  Always insure that one side solenoid is deenergized before energizing the opposite side solenoid. 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.
- 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.
- Drain and pilot
  1. For internal drain type valves, pilot pressure (P port pressure of internal pilot valves) must be higher than min. pilot pressure + tank line back pressure. Therefore the pressure difference must be maintained even when surge pressures occur in the tank line.
  2. External drain type valve is recommended when surge pressures may occur in tank line. Drain line should also be piped directly to tank.
  3. In case of internal drain valve with spring sets B, C, and D and spool types 0, 1, 4, 8, 9, and 11, internal pilot type valve cannot be used if P to T port pressure drop during solenoid deenergization falls below minimum pilot pressure. Use external pilot type valve in this case.
- Manual operation
  For manual switching, push the manual override pin. Be aware that actuation force increases with higher back pressure. (See page E16)
- Solenoid indicator lamp
  For valves with indicator lamps, the lamps will light when current flows to the solenoid.

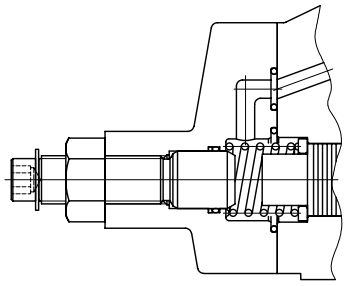
Options

Spool stroke adjustment

Spool stroke adjusters can be installed on one or both sides and provides flow control by adjustment of the spool maximum opening. Flow control can be enhanced by use X2, X33, Y2, Y33 type spools.

Pilot restrictor valve

A restrictor module valve incorporated with the pilot solenoid valve enables meter out control of oil from the pilot chamber during shifting of the main valve spool. This reduces transient shock. Stack valve restrictor valve model, TGMFN-3-Y-A2W-B2W-50.



Mounting Bolts (JIS B1176, Strength Class 12.9)

Model	Hex Socket Bolt	Quantity
DG5V-7	M10×60	4
	M 6×55	2
DG5V-H8	M12×80	6

- Order mounting bolts separately.
- Mounting bolt tightening torque:

M6: 9~14Nm
M10: 50~60Nm
M12: 75~81Nm

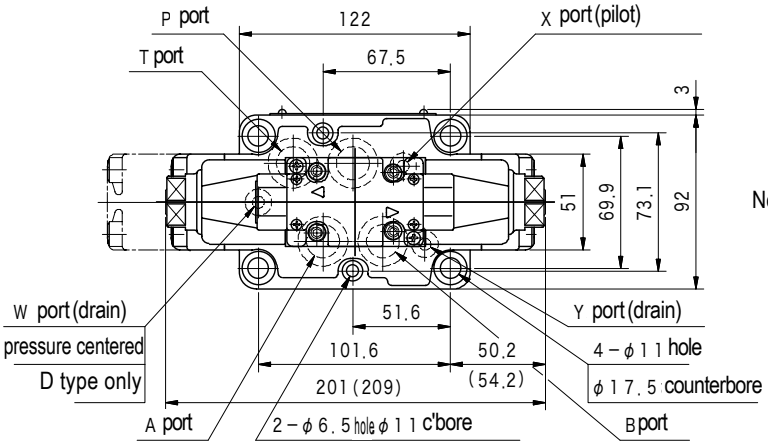
Subplate

Model	Subplate Model	Port Dia.	
		P, T, A, B	X, Y, W
DG5V-7	DGSMV-04-10	Rc1/2	Rc1/4
	DGSMV-04-D-10		
	DGSMV-04X-10	Rc3/4	
	DGSMV-04X-D-10		
DG5V-H8	DGSMV-06-10	Rc3/4	Rc1/4
	DGSMV-06-D-10		
	DGSMV-06X-10	Rc1	
	DGSMV-06X-D-10		

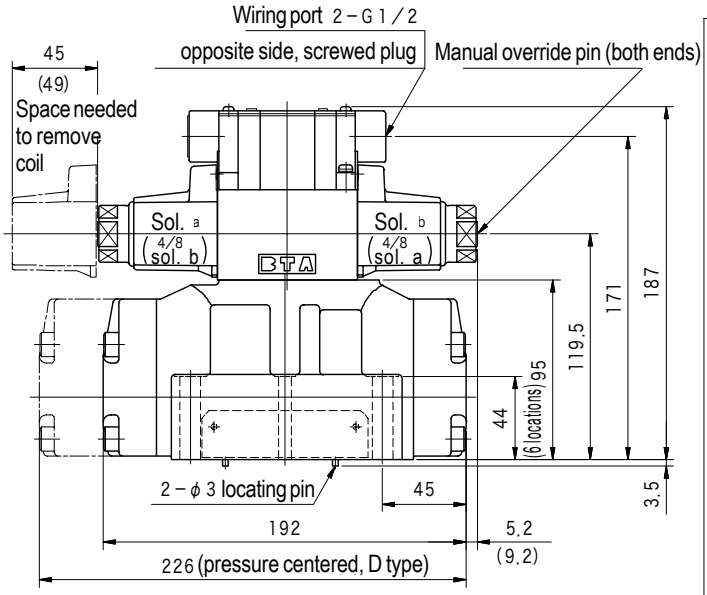
- Subplate must be ordered separately.
- Hex socket bolts for subplate mounting are included.
- See page Q6 for dimensions.
- DGSMV-**-D-10 used is pressure center type.
- Max. working pressure 21 MPa. For higher pressures, valve should be mounted on manifold block.

Dimensions

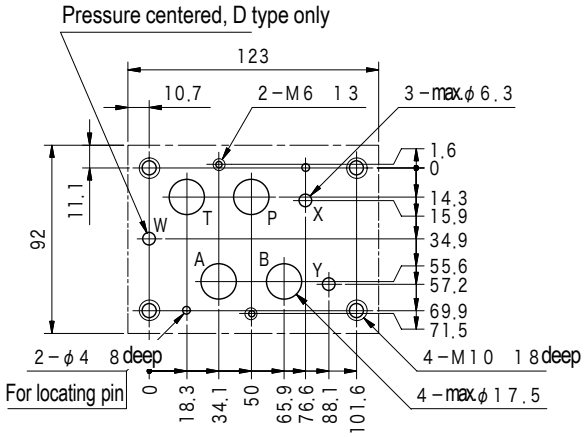
DG5V−7−∗C
DG5V−7−∗D
DG5V−7−∗N



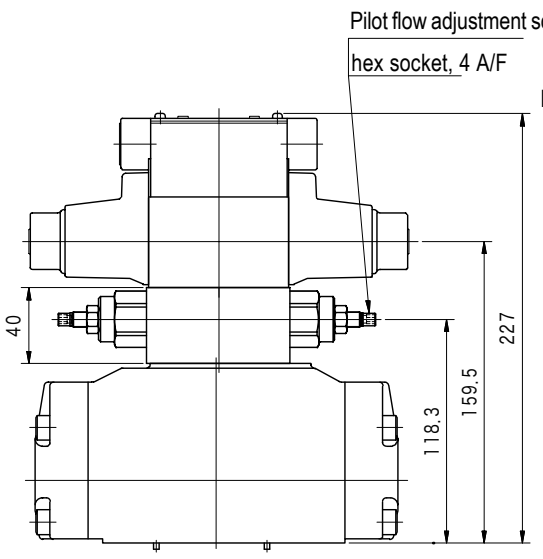
Notes:
- For DG5V-7-*A, DG5V-7-*8, solenoid valve for pilot will be only for one side (side b).
- For DG5V-7-*AL, DG5V-7-*BL, solenoid valve for pilot will be only for one side (side a).
- Dimensions in ( ) indicate DC solenoids.



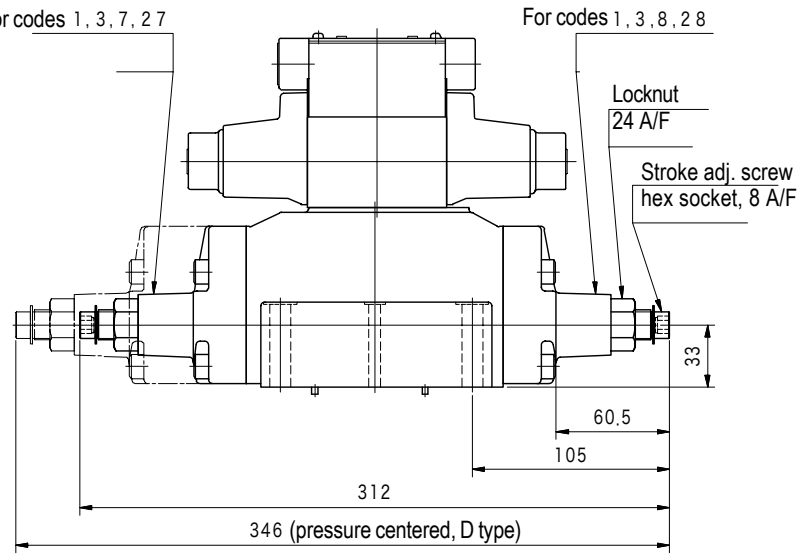
Mounting Dimensions
(ISO 4401−AD−07−4−A)



With Pilot Restrictor Valve

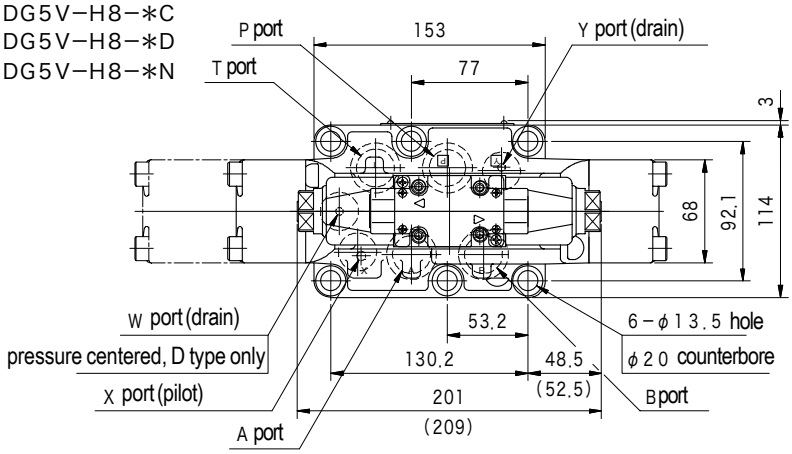


With Stroke Adjuster

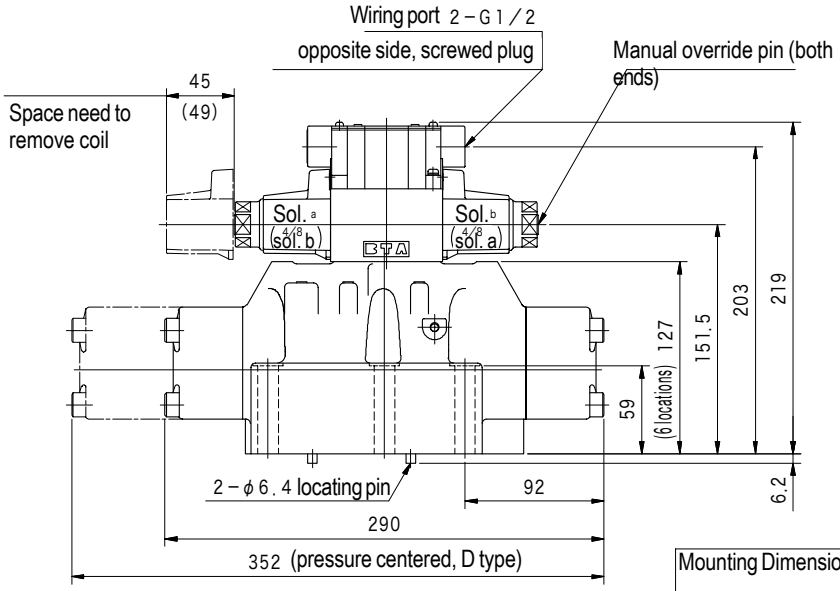


Dimensions

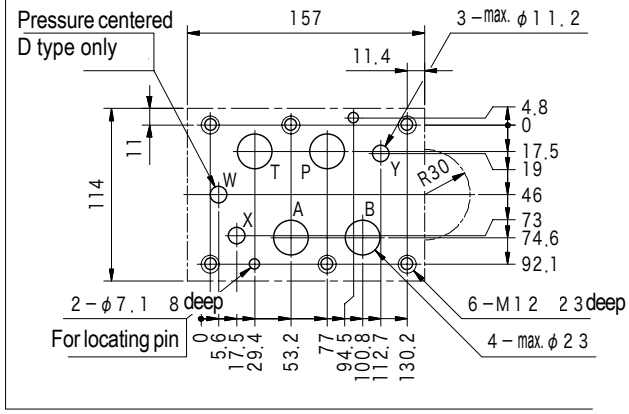
DG5V−H8−∗C
DG5V−H8−∗D
DG5V−H8−∗N



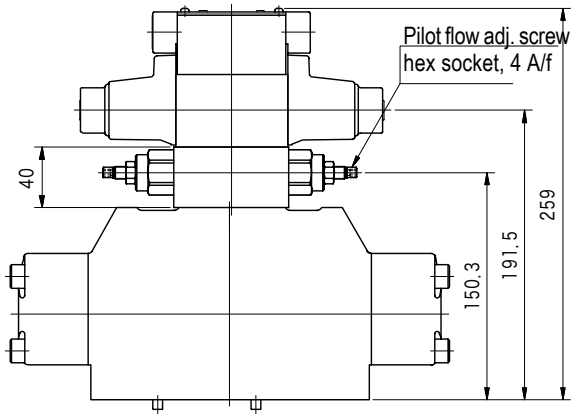
Notes:
- For DG5V-H8-*A, DG5V-H8-*8, solenoid valve for pilot will be only for one side (side b).
- For DG5V-H8-*AL, DG5V-H8-*BL, solenoid valve for pilot will be only for one side (side a).
- Dimensions in ( ) indicate DC solenoids.



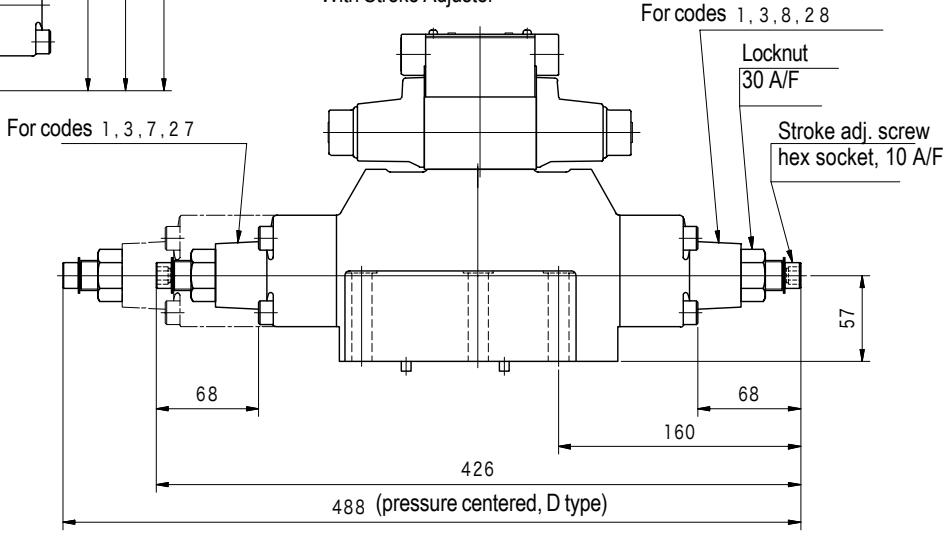
Mounting Dimensions (ISO 4401−AE−08−4−A)



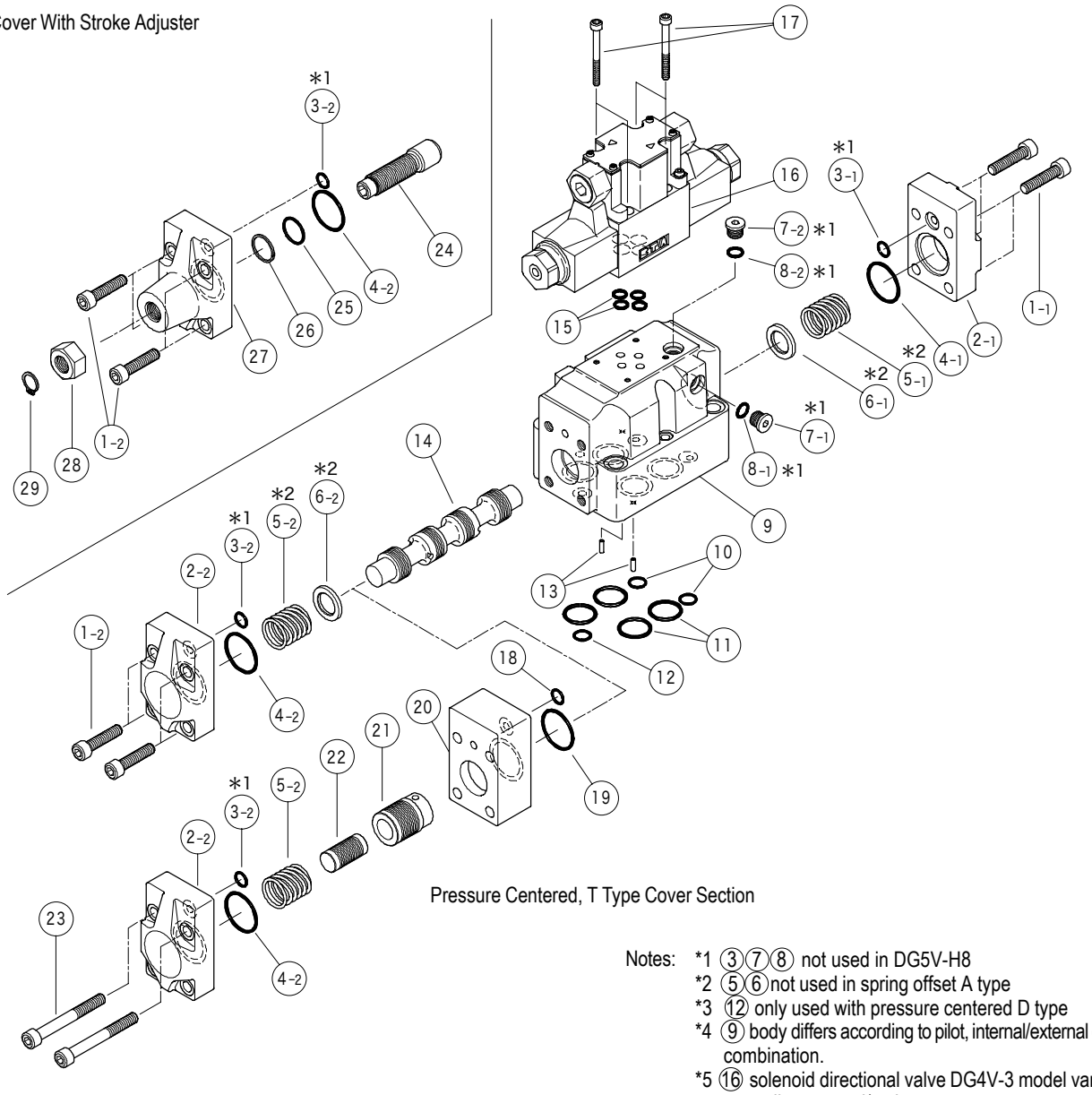
With Pilot Restrictor Valve



With Stroke Adjuster



Construction



Pressure Centered, T Type Cover Section

Notes: *1 ③⑦⑧ not used in DG5V-H8
*2 ⑤⑥ not used in spring offset A type
*3 ⑫ only used with pressure centered D type
*4 ⑨ body differs according to pilot, internal/external drain combination.
*5 ⑯ solenoid directional valve DG4V-3 model varies according to spool/spring arrangement.
See page E79.

DG5V−7

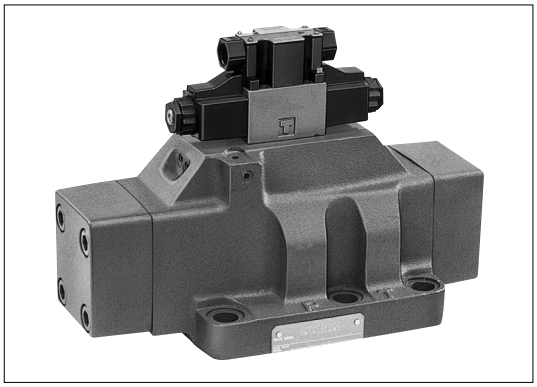
No.	Description	Part No.	Standard	Qty
3	O-ring	007911019	AS568−110 (NBR, Hs90)	2
4	O-ring	007912319	AS568−123 (NBR, Hs90)	2
8	O-ring	007990419	AS568−904 (NBR, Hs90)	2
10	O-ring	007901319	AS568−013 (NBR, Hs90)	2
11	O-ring	007911819	AS568−118 (NBR, Hs90)	4
12	O-ring	007901319	AS568−013 (NBR, Hs90)	1
15	O-ring	007901219	AS568−012 (NBR, Hs90)	4
18	O-ring	007911019	AS568−110 (NBR, Hs90)	1
19	O-ring	007912319	AS568−123 (NBR, Hs90)	1
25	O-ring	007901819	AS568−018 (NBR, Hs90)	1 or 2
26	Backup ring	48197576	MS28774−018	1 or 2

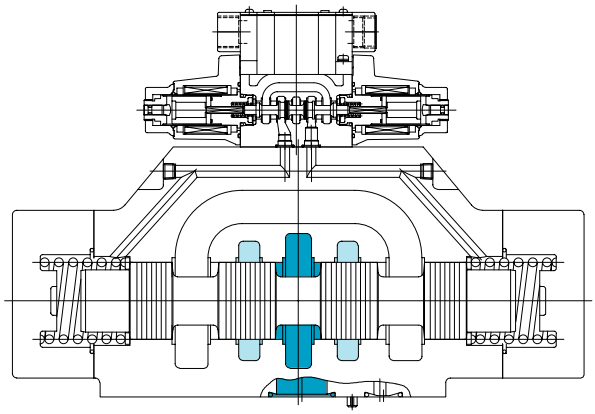
Note: For external pilot, external drain, O-ring 8 quantity is 1 pc.

DG5V−H8

No.	Description	Part No.	Standard	Qty
4	O-ring	007922419	AS568−224 (NBR, Hs90)	2
10	O-ring	007921019	AS568−210 (NBR, Hs90)	2
11	O-ring	007921519	AS568−215 (NBR, Hs90)	4
12	O-ring	007921019	AS568−210 (NBR, Hs90)	1
15	O-ring	007901219	AS568−012 (NBR, Hs90)	4
18	O-ring	007901119	AS568−011 (NBR, Hs90)	1
19	O-ring	007913119	AS568−131 (NBR, Hs90)	1
25	O-ring	007902319	AS568−023 (NBR, Hs90)	1 or 2
26	Backup ring	48197581	MS28774−023	1 or 2

Solenoid controlled pilot operated directional control valves DG5S-10





Model Code

(F3) - DG5S - 10 - 2 A (L) - (2) (E) - (T) -P 7-T- 8 4 -JA-M

1 | 2 | 3 | 4 5 | 6 | 7 | 8 | 9 | 10 11 | 12 | 13

1 Fluid
Omitted for mineral oil, water glycol
F3: phosphate ester

2 Solenoid pilot operated directional valve (gasket mounting)

3 Mounting
10: ISO 4401-AF-10-4-A

4 Spoo
See page E91

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 (3 position, double solenoid)
D: Pressure centered (3 position, double solenoid)
N: No spring detented (2 positionk, double solenoid)

6 Solenoid assembly orientation (for spring arrangements A, B)
Omitted for standard (energized P to B, A to T)
L: Left hand build
(energized P to A, B to T)

7 Pilot restrictor valve (option)
Omitted for no pilot restrictor valve (standard)
2: With pilot restrictor valve

8 Pilot
Omitted for internal pilot
E: External pilot

9 Drain
Omitted for external drain
T: Internal drain

10 Wiring connection
P:Plug-in conduit box, G 1/2
U:connector, pg. 11

11 Electrical accessories
Omitted for no accessories (coil connections P, KU)
1: Connectors without accessories
(coil connection U)
2: With indicator lamp (AC standard)
4: With surge suppressor (coil connection KU,
slow solenoid deenergize)
7: With indicator lamp and surge suppressor
(DC standard)
9: ADC solenoid rectifier (fast solenoid de-energization)
and indicator lamp (ADC standard)
12: ADC solenoid rectifier (delayed solenoid de-energization)
and indicator lamp
Note: Electrical accessories - 9, 12
ADC solenoids (AC-DC rectifier) only
Wiring connection, P only
With surge suppressor

12 Solenoid coil voltage
T:100V 50/60Hz,110V 60Hz
V:200V 50/60Hz,220V 60Hz
G:DC12V
H:DC24V
TR:100V 50/60Hz(ADC AC/DC rectifier)
VR:200V 50/60Hz(ADC AC/DC rectifier)

13 Design no.

Specifications

Model	Size	Max.Operating Pressure MPa	Max. Flow L/min	Allowable Tank Port Back Pressure MPa	Max. Pilot Pressure MPa	Min. Pilot Pressure MPa	Weight kg	
							Single Solenoid	Double Solenoid
DG5S-10	10	21	See Pressure-Flow Characteristics	20. 6	21	See Min. Pilot Press. Curves	42	43

Pilot Solenoid Switching Valve

DG4V-3 solenoid valve used as pilot. See page E10 for solenoid specifications.
Following spring set solenoid valves are used.

Spring offset, type A: DG4V-3-2AL-M-**-*-7-54
Spring offset, type B: DG4V-3-6BL-M-**-*-7-54
Spring centered, type C: DG4V-3-6C-M-**-*-7-54
Spring centerdc, type D: DG4V-3-7C-M-**-*-7-54

Spring offset, type AL: DG4V-3-2A-M-**-*-7-54
Spring offset, type BL: DG4V-3-6B-M-**-*-7-54
No spring detented, type N: DG4V-3-2N-M-**-*-7-54

Spool Types and Pressure-Flow Characteristics

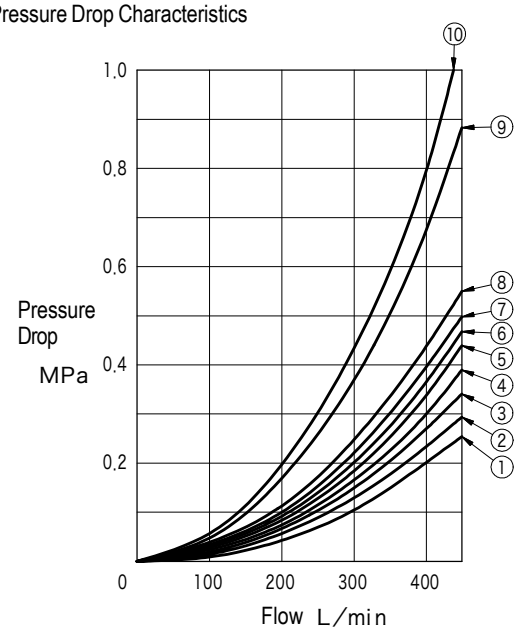
Spool Neutral Position	Valve Function Schematics 3 Position		Max. Flow L/min		Pressure Drop Curve No.				
	Spring Centered – C –	Pressure Centered – D –	C , B , BL	D	Switched Condition P→A	B→T	P→B	A→T	Neutral P→T
0	DG5S-10-0C	DG5S-10-0D	600	800	①	⑤	①	③	③
2	DG5S-10-2C	DG5S-10-2D			②	⑥	②	④	—
3	DG5S-10-3C	DG5S-10-3D			②	⑧	②	③	—
4	DG5S-10-4C	DG5S-10-4D			⑥	⑨	⑦	⑩	⑥
6	DG5S-10-6C	DG5S-10-6D			②	④	②	③	—
8	DG5S-10-8C	DG5S-10-8D			④	⑨	⑤	⑩	⑥
9	DG5S-10-9C	DG5S-10-9D	※570		②	④	②	③	—
33	DG5S-10-33C	DG5S-10-33D	600		②	⑥	②	⑥	—

Spool Transient Condition	Valve Function Schematics 2 Position			Max. Flow L/min	Pressure Drop Curve No.			
	Spring Offset – A –	Spring Offset – AL –	No Spring Detented – N –		Switched Condition P→A	B→T	P→B	A→T
0	DG5S-10-0A	DG5S-10-0AL	DG5S-10-0N	800	①	⑤	①	③
2	DG5S-10-2A	DG5S-10-2AL	DG5S-10-2N		②	⑥	②	④
6	DG5S-10-6A	DG5S-10-6AL	DG5S-10-6N		②	④	②	③
9	DG5S-10-9A	DG5S-10-9AL	DG5S-10-9N		②	④	②	③

Notes • Max. flow without malfunction.
• Max flow value for * at 7 MPa. At 21 MPa, it is 320 L/min.

Performance Curve (viscosity 20 mm²/s , specific gravity 0.87)

Pressure Drop Characteristics

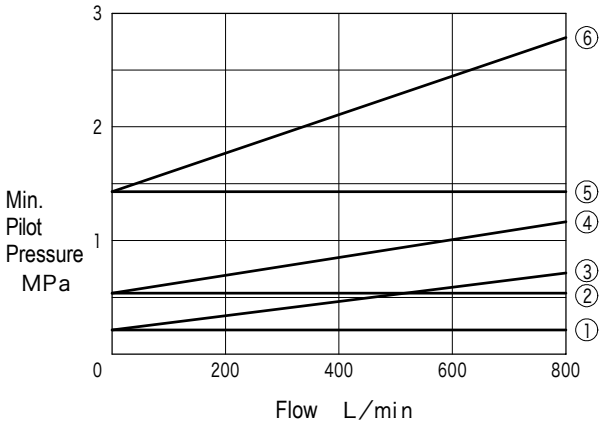


1. For pressure drops($\triangle P_1$)of viscosities other than 20mm²/s, calculate using multiplier coefficients shown in below table.
2. The formula to calculate pressure drops($\triangle P_1$)for specific gravities other 0.87 is as follows.

$\triangle P_1 = \triangle P \times G_1 / G$

$\triangle P$····· characteristics curve value
G·····0. 87
G_1····· desired specific gravity

Minimum Pilot Pressure



Min. Pilot Pressure Curve No.

Spool/Spring Arrangement	Spool Type	No.
A, AL, N	0, 9	①
	2, 6	③
B, BL, C	0, 4, 8, 9	②
	2, 3, 6, 33	④
D	0, 4, 8, 9	⑤
	2, 3, 6, 33	⑥

Viscosity mm²/s	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Coefficient	0. 85	1. 00	1. 09	1. 17	1. 24	1. 29	1. 34	1. 38	1. 42	1. 46	1. 49	1. 52	1. 56	1. 59	1. 62

Options

Pilot restrictor valve

A restrictor modular valve incorporated with the pilot solenoid valve enables meter out control of oil from the pilot chamber during shifting of the main valve spool. This reduces transient shock. Modular restrictor valve model, TGMFN-3-Y-A2W-B2W-50.

Operating Considerations

- 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
  Always insure that one side solenoid is deenergized before energizing the opposite side solenoid. 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.
- 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.
- Drain and pilot
  1. For internal drain type valves, pilot pressure (P port pressure of internal pilot valves) must be higher than min. pilot pressure + tank line back pressure. Therefore the pressure difference must be maintained even when surge pressures occur in the tank line.
  2. External drain type valve is recommended when surge pressures may occur in tank line. Drain line should also be piped directly to tank.
  3. In case of internal drain valve with spring sets B, C, and D and spool types 0, 4, 8,and 9, internal pilot type valve cannot be used if P to T port pressure drop during solenoid deenergization falls below minimum pilot pressure. Use external pilot type valve in this case.
- Manual operation
  For manual switching, push the manual override pin. Be aware that actuation force increases with higher back pressure. (See page E16)
- Solenoid indicator lamp
  For valves with indicator lamps, the lamps will light when current flows to the solenoid.

Mounting Bolts (JIS B1176, Strength Class 12.9)

Hex Socket Bolts	Quantity
M20 × 65	6

- Order mounting bolts separately.
- Mounting bolt tightening torque: 230~290 Nm

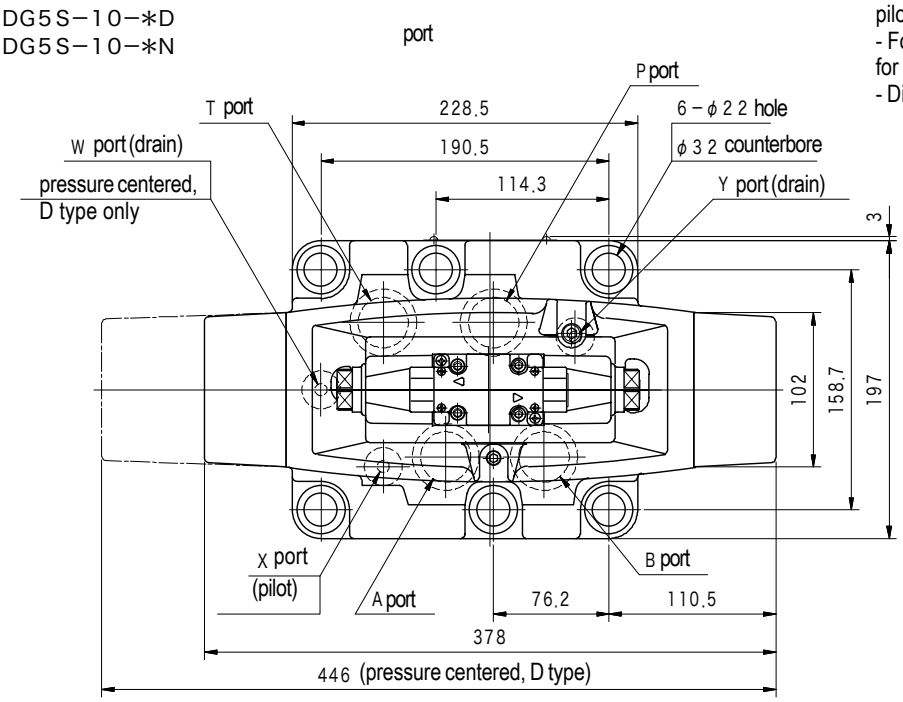
Subplate

Subplate Model	Port Dia Rc	
	P, T, A, B	X, Y, W
DGSM-10-(D)-11-JA-M	1-1/4	3/8
DGSM-10X-(D)-11-JA-M	1-1/2	
DGSM-10Y-(D)-11-JA-M	2	

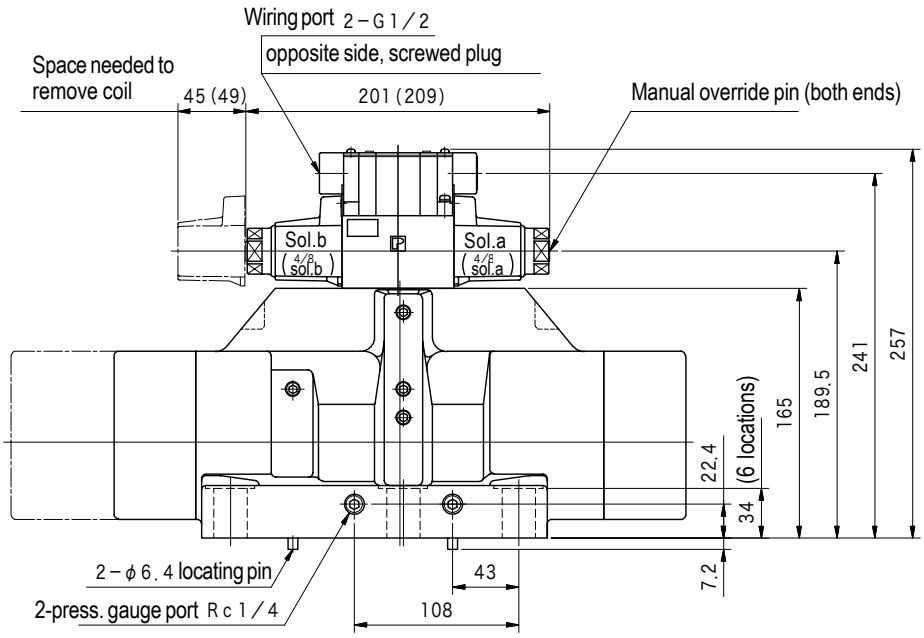
- Subplate must be ordered separately.
- See page Q6 for dimensions.
- DGSMV-**-D-10 used is pressure center type.
- Hex socket bolts for subplate mounting are included.

Dimensions

DG5S-10-*C
DG5S-10-*D
DG5S-10-*N



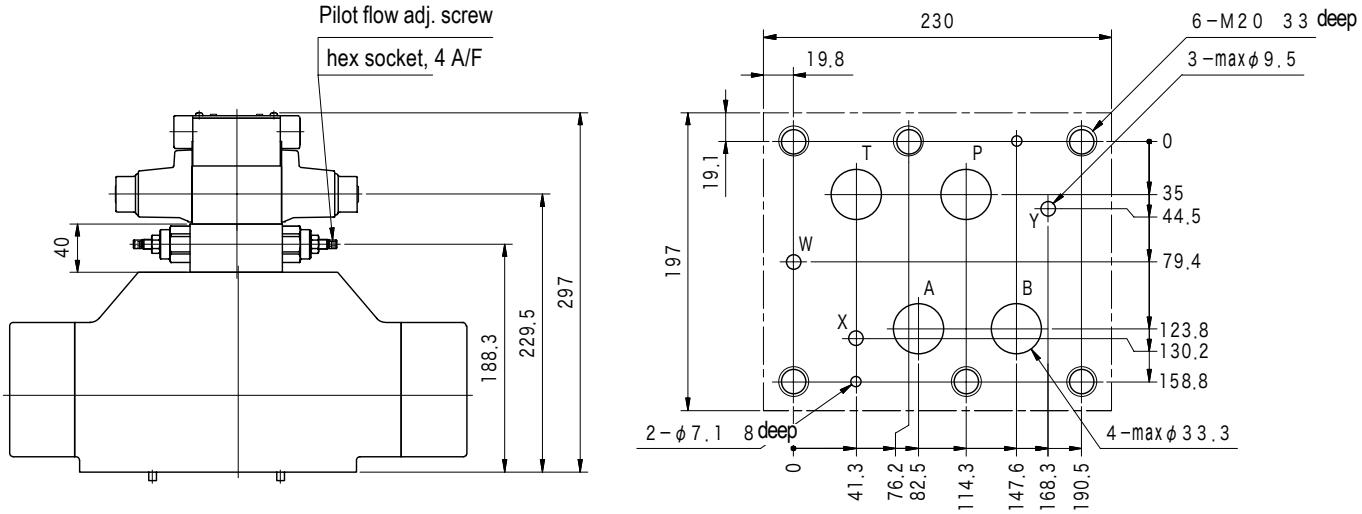
Notes: - For DG5S-10-*A, DG55S-10-*B, solenoid valve for pilot will be only for one side (side b).
- For DG5S-10-*AL, DG5S-10-*BL, solenoid valve for pilot will be only for one side (side a).
- Dimensions in ( ) indicate DC solenoids.



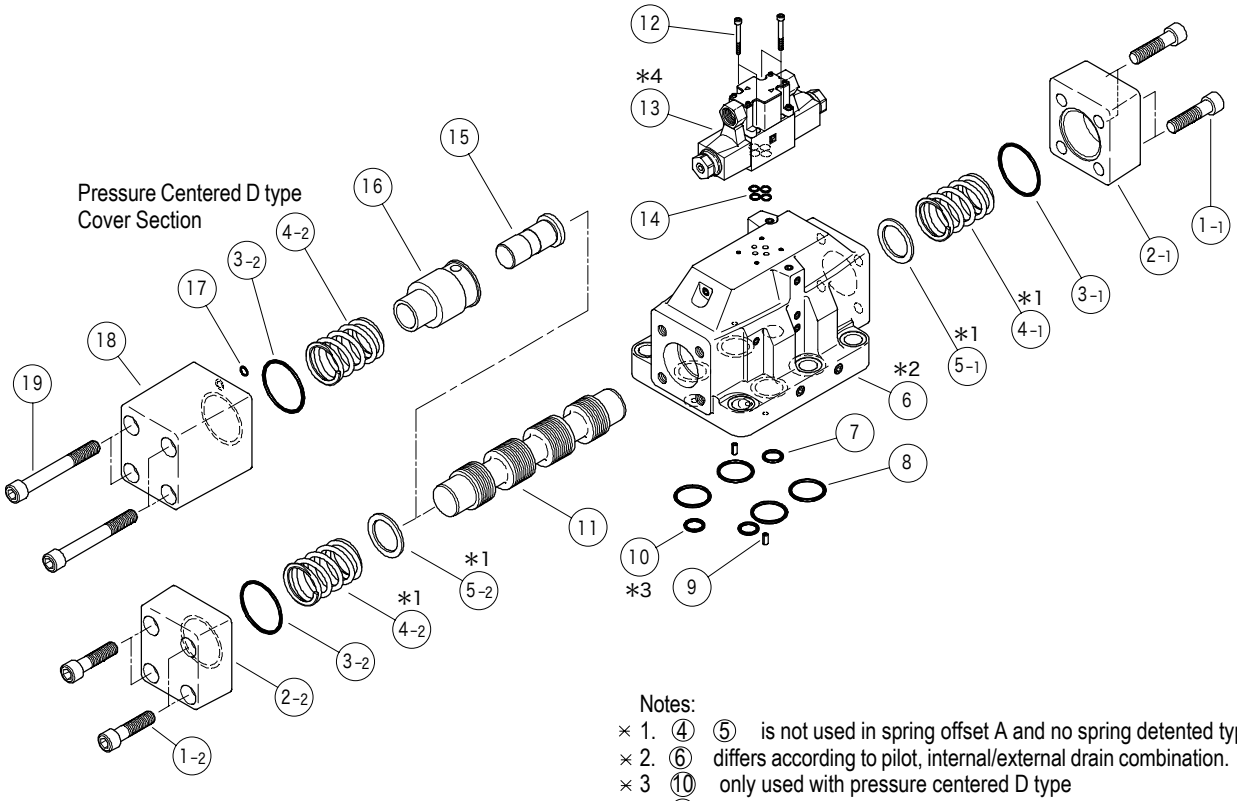
Dimensions

DG5S−10−∗∗−2

Mounting Dimensions （ISO 4401−AF−10−4−A ）



Construction



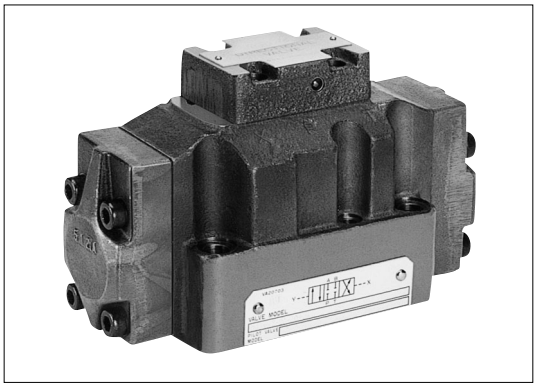
Notes:

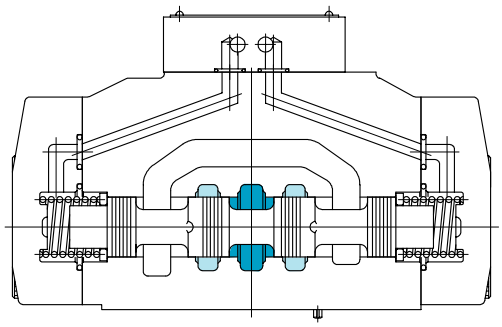
× 1. ④ ⑤ is not used in spring offset A and no spring detented types.
× 2. ⑥ differs according to pilot, internal/external drain combination.
× 3 ⑩ only used with pressure centered D type
× 4 ⑯ type varies with spool/spring arrangement of DG4V-3 solenoid valve. See page E91.

O-Rings

No.	Part No.	Standard	Qty
3	007923019	AS568−230 (NBR, Hs90)	2
7	007921019	AS568−210 (NBR, Hs90)	2
8	007922219	AS568−222 (NBR, Hs90)	4
10	007921019	AS568−210 (NBR, Hs90)	1
14	007901219	AS568−012 (NBR, Hs90)	4
17	007901317	AS568−013 (NBR, Hs70)	1

Pilot operated directional control valves DG3V-7/DG3V-H8





Model Code

(F3)-DG3V-7-2A-(1)-10-(LH)-JA *Note

1 2 3 4 5 6 7 8 9

1 Fluid
Omitted for mineral oil, water glycol
F3: phosphate ester

2 Pilot operated directional valve (gasket mounting)

3 Mounting
7:ISO 4401-AD-07-4-A
H8:ISO 4401-AE-08-4-A

4 Spool
See page E90-97

5 Spool/spring arrangement
A: Spring offset
C: Spring centered
D: Pressure centered
Omitted for no spring

6 Spool stroke adjustment (option)
Omitted for no option (standard)
1: With stroke adjuster (A, B port both sides)
7: With stroke adjuster (A port side)
8: With stroke adjuster (B port side)

7 Design no.
10:All models except 12 design below
12:DG3V-7-**-1/7/8
(model with spool stroke adjuster)

8 Cover build orientation (only for spring offset type)
Omitted for standard (when offset, P to A, B to T)
LH: left hand build (when offset, P to B, A to T)

* Note: Model code with "Z" suffix.
(F3)-DG3V-7/H8-**-(*)-(E)-(T)-10/12-(LH)-JA-(S***)-Z
"-Z":no top cover
"E"in code refers to external pilot(omitted for internal pilot)
"T"in code refers to internal drain(omitted for external drain)

Specifications

Model	Size	Max. Operating Pressure MPa	Max. Flow L/min	Allowable T (Tank) Port Back Pressure MPa	Minimum Pilot Pressure MPa	Maximum Pilot Pressure MPa	Weight kg
DG3V-7	04	31.5	See Pressure-Flow Charac.	21	See Min. Pilot Pressure Curves	31.5	7.5
DG3V-H8	06						15.5

Spool Types and Pressure-Flow Characteristics (DG3V-7)

Spool Neutral Position		Valve Function Schematics 3 Position		Max. Flow L/min					Pressure Drop Curve No.				
		Spring Centered – C –	Pressure Centered – D –	7 MPa	14 MPa	21 MPa	28 MPa	31.5 MPa	Switched Condition P→A	B→T	P→B	A→T	Neutral P→T
0	Open Center	DG3V-7-0C	DG3V-7-0D	300	300	300	300	300	②	①	②	③	③
1	P–A–T Connection	DG3V-7-1C	DG3V-7-1D	260	220	120	100	90	①	②	②	③	④
2	Closed Center	DG3V-7-2C	DG3V-7-2D	300	300	300	300	300	①	②	①	②	—
3	A–T Connection	DG3V-7-3C	DG3V-7-3D	300	300	300	300	300	①	②	①	③	—
4	Tandem	DG3V-7-4C	DG3V-7-4D	260	220	120	100	90	②	②	②	①	⑥
6	A–B–T Connection	DG3V-7-6C	DG3V-7-6D	300	300	300	300	300	①	①	①	③	—
8	Tandem	DG3V-7-8C	DG3V-7-8D	300	300	250	165	140	②	②	②	①	⑤
9	Open Center w/ A,B Restrictors	DG3V-7-9C	DG3V-7-9D	260	220	120	100	90	①	②	①	③	⑦
11	P–B–T Connection	DG3V-7-11C	DG3V-7-11D	260	220	120	100	90	②	③	①	②	④
31	B–T Connection	DG3V-7-31C	DG3V-7-31D	300	300	300	300	300	①	③	①	②	—
33	A–B–T Connection w/ Restrictors	DG3V-7-33C	DG3V-7-33D	300	300	300	300	300	①	②	①	②	—
52	Closed Center	DG3V-7-52C	DG3V-7-52D	300	300	300	300	300	②	—	③	③	—
X2	Closed Center	DG3V-7-X2C	DG3V-7-X2D	120	120	120	120	120	—	②	—	②	—
Y2	Closed Center	DG3V-7-Y2C	DG3V-7-Y2D	120	120	120	120	120	①	—	①	—	—
X33	A–B–T Connection w/ Restrictors	DG3V-7-X33C	DG3V-7-X33D	120	120	120	120	120	—	②	—	②	—
Y33	A–B–T Connection w/ Restrictors	DG3V-7-Y33C	DG3V-7-Y33D	120	120	120	120	120	①	—	①	—	—

Spool Transient Condition		Valve Function Schematics 2 Position			Max. Flow L/min					Press. Drop Curve No. Switched Condition			
		Spring Offset – A –	Spring Offset – A – LH –	No Spring	7 MPa	14 MPa	21 MPa	28 MPa	31.5 MPa	P→A	B→T	P→B	A→T
0	Open Center	DG3V-7-0A	DG3V-7-0A-LH	DG3V-7-0	300	300	300	300	300	②	①	②	③
					300	300	300	300	300				
2	Closed Center	DG3V-7-2A	DG3V-7-2A-LH	DG3V-7-2	300	300	70	50	40	①	②	①	③
					300	300	300	300	300				
6	A–B–T Connection	DG3V-7-6A	DG3V-7-6A-LH	DG3V-7-6	300	300	100	70	60	①	①	①	③
					300	300	300	300	300				

Note • Upper max. flow values for spring offset, A type; lower values for no spring type.
• Max. flow without valve malfunction.

Spool Types and Pressure-Flow Characteristics (DG3V-H8)

Spool Neutral Position			Valve Function Schematics 3 Position Spring Centered – C –	Valve Function Schematics 3 Position Pressure Centered – D –	Max.Flow L/min 21 MPa	Max.Flow L/min 31.5 MPa	Pressure Drop Curve No. Switched Condiiton P→A	B→T	P→B	A→T	Neutral P→T
0		Open Center	DG3V-H8-0C	DG3V-H8-0D	700	650	②	⑤	②	③	④
1		P–A–T Connection	DG3V-H8-1C	DG3V-H8-1D	650	500	①	②	②	②	⑤
2		Closed Center	DG3V-H8-2C	DG3V-H8-2D	700	700	①	②	①	②	—
3		A–T Connection	DG3V-H8-3C	DG3V-H8-3D	700	700	①	②	①	④	—
4		Tandem	DG3V-H8-4C	DG3V-H8-4D	350	220	①	④	①	③	⑥
6		A–B–T Connection	DG3V-H8-6C	DG3V-H8-6D	650	600	①	④	①	④	—
8		Tandem	DG3V-H8-8C	DG3V-H8-8D	700	450	①	④	①	③	⑥
9		Open Center w/ A,B Restrictors	DG3V-H8-9C	DG3V-H8-9D	350	220	②	④	②	③	—
11		P–B–T Connection	DG3V-H8-11C	DG3V-H8-11D	650	500	②	②	①	②	⑤
31		B–T Connection	DG3V-H8-31C	DG3V-H8-31D	700	700	①	④	①	②	—
33		A–B–T Connection w/ Restrictors	DG3V-H8-33C	DG3V-H8-33D	700	700	①	②	①	①	—
52		Closed Center	DG3V-H8-52C	DG3V-H8-52D	500	500	②	—	⑤	②	—
X2		Closed Center	DG3V-H8-X2C	DG3V-H8-X2D	300	300	—	②	—	②	—
Y2		Closed Center	DG3V-H8-Y2C	DG3V-H8-Y2D	300	300	①	—	①	—	—
X33		A–B–T Connection w/ Restrictors	DG3V-H8-X33C	DG3V-H8-X33D	300	300	—	②	—	②	—
Y33		A–B–T Connection w/ Restrictors	DG3V-H8-Y33C	DG3V-H8-Y33D	300	300	①	—	①	—	—

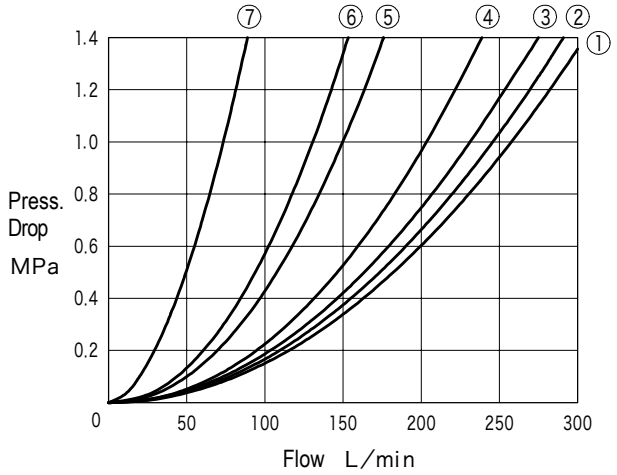
Spool Transient Condition			Valve Function Schematics 2 Position Spring Offset – A –	Spring Offset – A – LH –	No Spring	Max.Flow L/min 21 MPa	31.5 MPa	Press. Drop Curve No. Switched Condition P→A	B→T	P→B	A→T
0		Open Center	DG3V-H8-0A	DG3V-H8-0A-LH	DG3V-H8-0	500	500	②	⑤	②	③
						700	700				
2		Closed Center	DG3V-H8-2A	DG3V-H8-2A-LH	DG3V-H8-2	350	250	①	②	①	②
						700	700				
6		A–B–T Connection	DG3V-H8-6A	DG3V-H8-6A-LH	DG3V-H8-6	350	250	①	④	①	④
						700	700				

Note • Upper max. flow values for spring offset, A type; lower values for no spring type.
• Max. flow without valve malfunction.

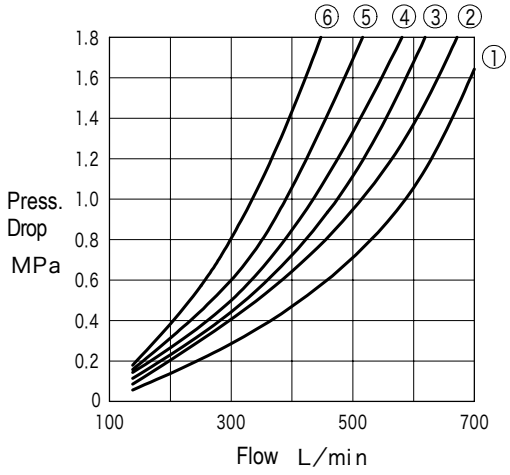
Performance Curve (viscosity 20 mm²/s , specific gravity 0.87)

Pressure Drop Characteristics

DG3V−7



DG3V−H8



1. For pressure drops ($\triangle P_1$) of viscosities other than 20mm²/s, calculate using multiplier coefficients shown in below table.
2. The formula to calculate pressure drops($\triangle P_1$)for specific gravities other than 0.87 is as follows.

$\triangle P_1 = \triangle P \times G_1 / G$

$\triangle P$ ····· characteristics curve value

G ·····0. 87

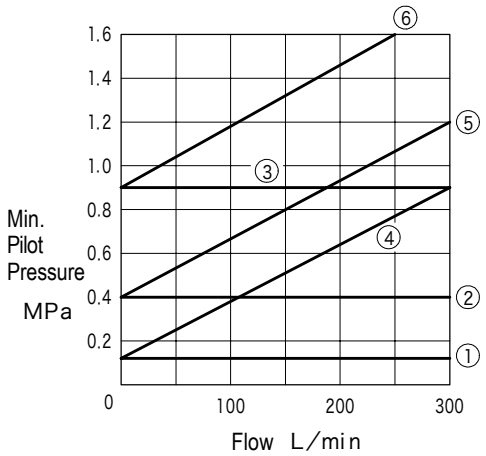
G_1 ·····desired specific gravity

Viscosity mm²/s	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Coefficient	0. 85	1. 00	1. 09	1. 17	1. 24	1. 29	1. 34	1. 38	1. 42	1. 46	1. 49	1. 52	1. 56	1. 59	1. 62

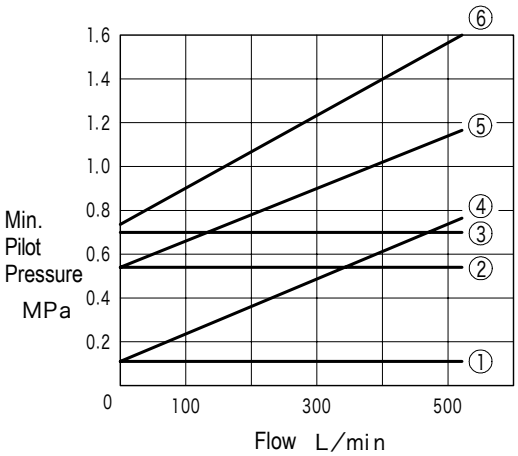
Pilot

Minimum Pilot Pressure

DG3V−7



DG3V−H8



Min. Pilot Pressure Curve No.

Spool/Spring Arrangement	Spool Type	Min.Pilot Press.Curve No.
No Spring	0	①
	2, 6	④
A, A−LH, C	0, 1, 4, 8, 9, 11	②
	2, 3, 6, 31, 33, 52, X2, Y2, X33, Y33	⑤
D	0, 1, 4, 8, 9, 11	③
	2, 3, 6, 31, 33, 52, X2, Y2, X33, Y33	⑥

Pilot Fluid Volume

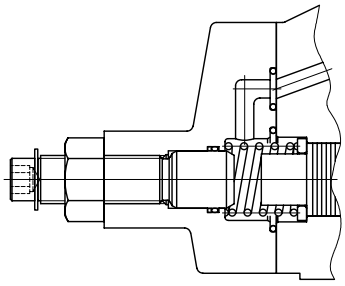
Unit : cm³

Model	Spool/Spring Arrangement	Neutral to Stroke End	Stroke End to Stroke End
DG3V−7	A, A−LH	———	8. 1
	No Spring	———	8. 1
	C, D	4. 1	8. 1
DG3V−H8	A, A−LH	———	23
	No Spring	———	23
	C, D	12	23

Options

Spool stroke adjustment

Spool stroke adjusters can be installed on one or both sides and provides flow control by adjustment of the spool maximum opening. Flow control can be enhanced by use X2, X33, Y2, Y33 type spools.



Operating Considerations

• Pilot

Supply of pilot pressure to pilot ports X, Y may differ according to the spool/spring arrangement. Pilot circuit should be designed reference below table (for spool types 4 and 8, pilot port X and Y relationship will be reversed).

Valve Switched Condition	P→A, B→T		Neutral		P→B, A→T	
Pilot Port	X	Y	X	Y	X	Y
Spring Offset, A Type	D	D	—	—	P	D
Spring Offset, A-LH Type	D	P	—	—	D	D
Spring Centered, C Type	D	P	D	D	P	D
Pressure Centered, D Type	D	P	P	P	P	D
No Spring	D	P	—	—	P	D

P: Pilot pressure supplied
D: Drained to tank

• Minimum pilot pressure

For valve switching, differential pressure between X port and Y port must be higher than the minimum pilot pressure. Therefore when there is back pressure in the drain side port, pilot pressure supplied must be higher than the minimum pilot pressure + drain port back pressure. For spring centered, spring offset, and pressure centered types, when pressure falls below minimum pilot pressure, spool will be returned to the prescribed position by spring force. With no spring types, spool positioning is unstable. Always maintain minimum pilot pressure during valve switching.

• Drain

Y port of spring offset type, X port of spring offset left hand (LH) build type, and W port of pressure centered type are the drain ports. Do not merge with other tank lines but pipe directly to tank.

• Mounting

As long as minimum pilot pressure maintained, there is no restriction in mounting orientation

Mounting Bolts (JIS B1176, Strength Class 12.9)

Model	Hex Socket Bolts	Qty
DG3V–7	M10×60	4
	M 6×55	2
DG3V–H8	M12×80	6

• Order mounting bolts separately.
• Mounting bolt tightening torque:
M6: 9~14Nm
M10: 50~60 Nm
M12: 75~81Nm

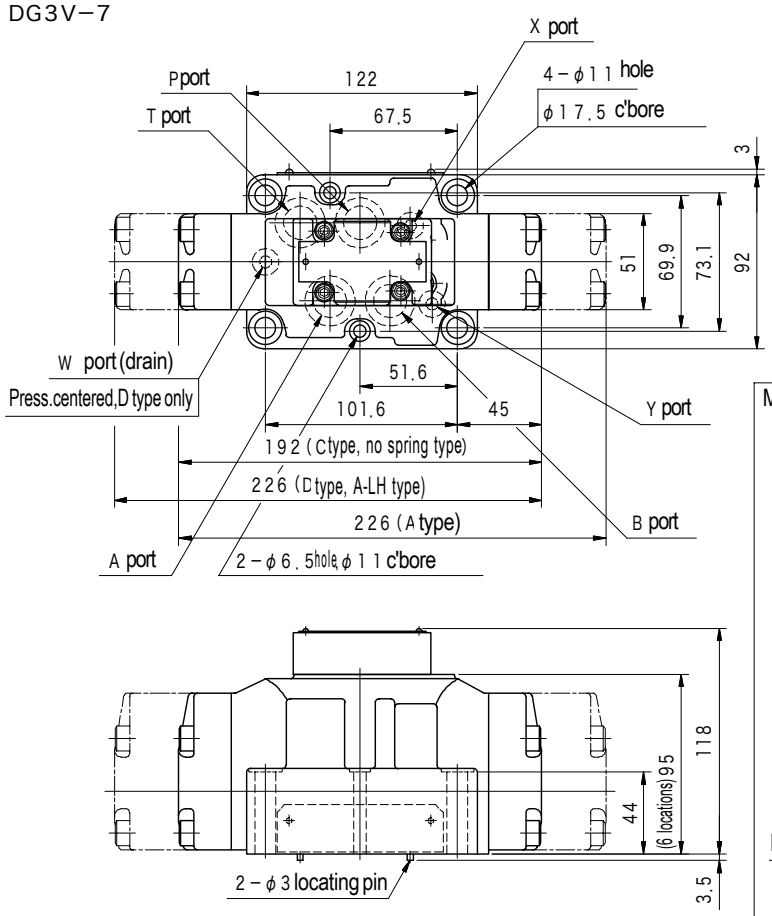
Subplate

Model	Subplate Model	Port Dia.	
		P, T, A, B	X, Y, W
DG3V–7	DGSMV–04–10	Rc1/2	Rc1/4
	DGSMV–04–D–10		
	DGSMV–04X–10	Rc3/4	
	DGSMV–04X–D–10		
DG3V–H8	DGSMV–06–10	Rc3/4	Rc1/4
	DGSMV–06–D–10		
	DGSMV–06X–10	Rc1	
	DGSMV–06X–D–10		

• Subplate must be ordered separately.
• Hex socket bolts for subplate mounting are included.
• See page Q6 for dimensions.
• DGSMV-**-D-10 used is pressure centered type.
• Maximum working pressure is 21 MPa. If using pressures above this, it is convenient to mount on manifold blocks, etc.

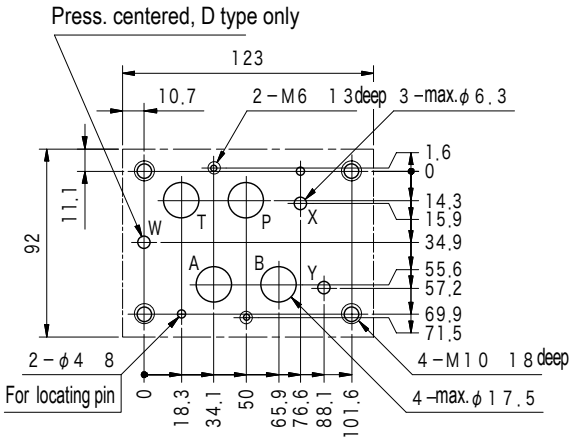
Dimensions

DG3V−7

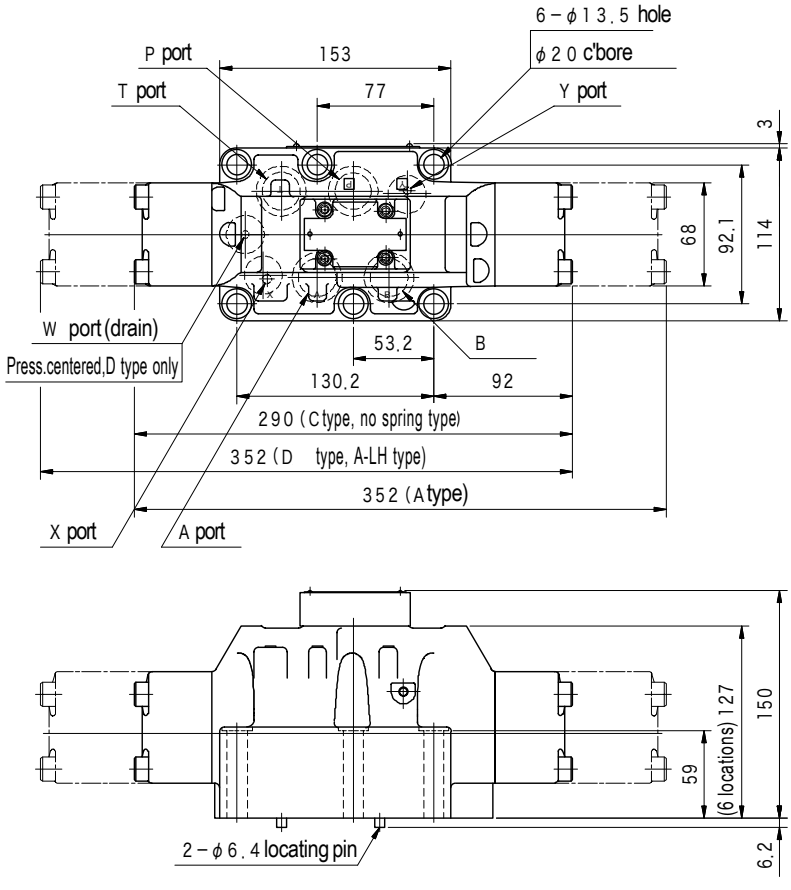


WIth Stroke Adjuster
See page E87 under DG5V-7 for stroke adjuster dimensions.

Mounting Dimensions
(ISO 4401−AD−07−4−A)

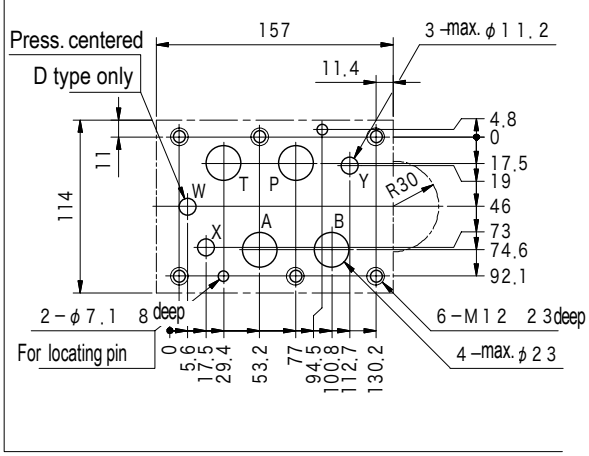


DG3V−H8

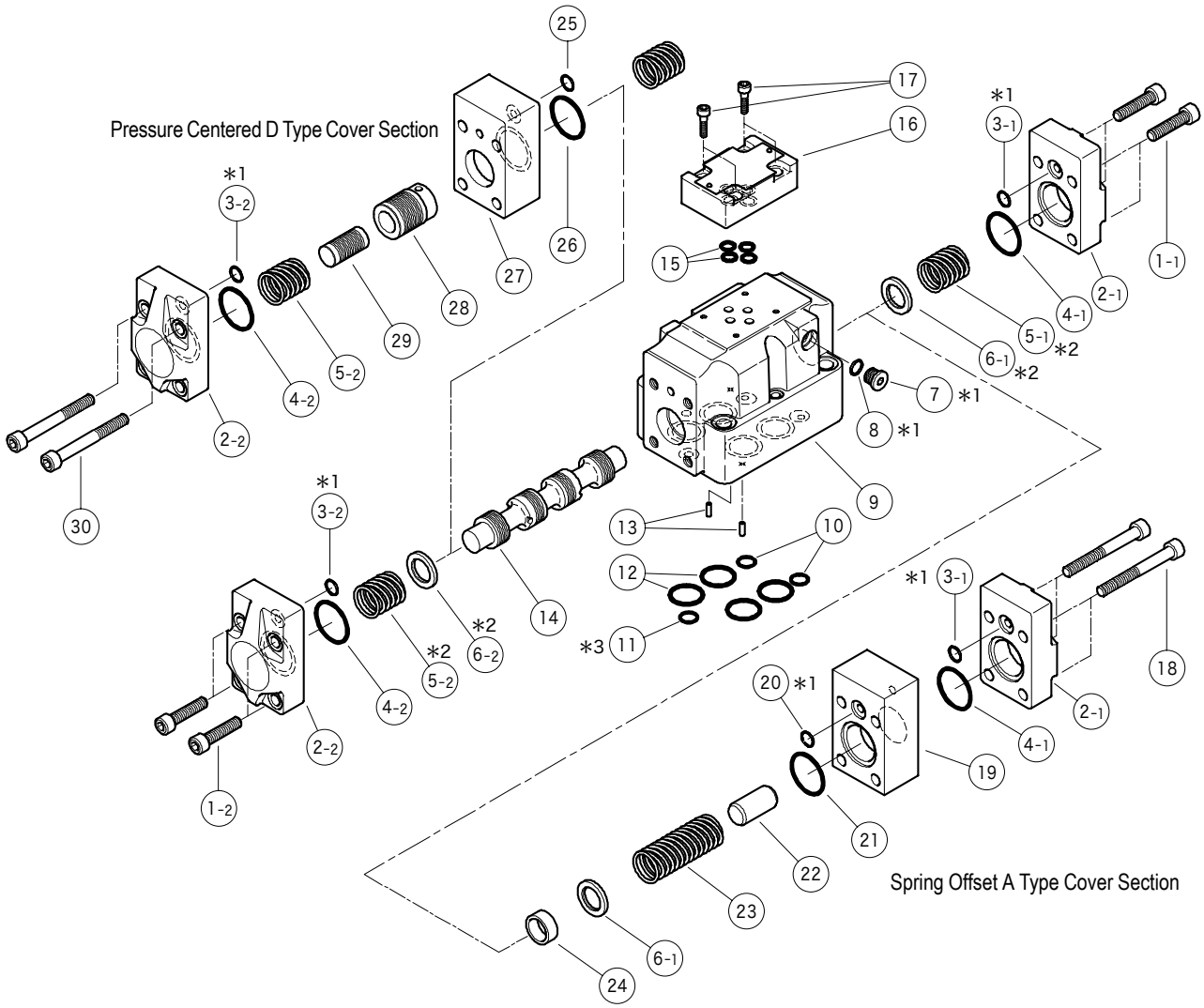


WIth Stroke Adjuster
See page E88 under DG5V-H8 for stroke adjuster dimensions.

Mounting Dimensions
(ISO 4401−AE−08−4−A)



Construction



Notes:・＊1 ③, ⑦, ⑧, ⑳ are not used in DG3V-H8.
・＊2 ⑤, ⑥ are not used with no spring types. Also for spring offset,A type,⑤-2, ⑥-2are not used.
・＊3 ⑪only used with pressure centered, D type

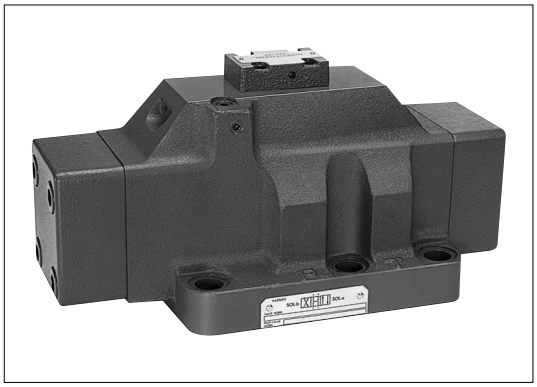
O-Rings(DG3V-7)

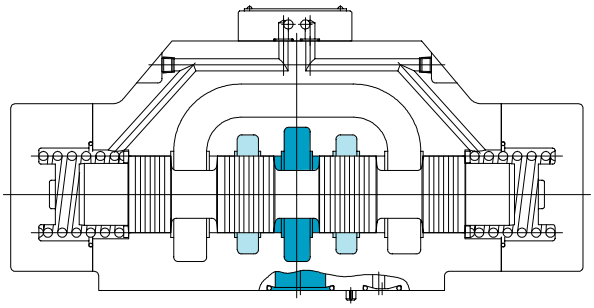
No.	Part No.	Standard	Qty
3	007911019	AS568-110 (NBR, Hs90)	2
4	007912319	AS568-123 (NBR, Hs90)	2
8	007990419	AS568-904 (NBR, Hs90)	1
10	007901319	AS568-013 (NBR, Hs90)	2
11	007901319	AS568-013 (NBR, Hs90)	1
12	007911819	AS568-118 (NBR, Hs90)	4
15	007901219	AS568-012 (NBR, Hs90)	4
20	007911019	AS568-110 (NBR, Hs90)	1
21	007912319	AS568-123 (NBR, Hs90)	1
25	007911019	AS568-110 (NBR, Hs90)	1
26	007912319	AS568-123 (NBR, Hs90)	1

O-Rings(DG3V-H8)

No.	Part No.	Standard	Qty
4	007922419	AS568-224 (NBR, Hs90)	2
10	007921019	AS568-210 (NBR, Hs90)	2
11	007921019	AS568-210 (NBR, Hs90)	1
12	007921519	AS568-215 (NBR, Hs90)	4
15	007901219	AS568-012 (NBR, Hs90)	4
21	007922419	AS568-224 (NBR, Hs90)	1
25	007901119	AS568-011 (NBR, Hs90)	1
26	007913119	AS568-131 (NBR, Hs90)	1

Pilot operated directional control valves DG3S-10





Model Code

(F3) - DG3S- 10 - 2 A - JA -10 (- LH) -M

1 2 3 4 5 6 7

1 Fluid
Omitted for mineral oil, water glycol
F3: phosphate ester
2 Pilot operated directional valve (gasket mounting)
3 Mounting
4 Spool
See page E103

5 Spool/spring arrangment
A: Spring offset
C: Spring centered
D: Pressure centered
Omitted for no spring
6 Design no.
7 Cover build orientation (applicable for spring offset type only)
Omitted for standard (offset condition, P to A, B to T)
LH: Left hand build (offset condition, P to B, A to T)

Specifications

Model	Size	Max. Operating Pressure MPa	Max. Flow L/min	Allowable T (Tank) Port Back Pressure MPa	Minimum Pilot Pressure MPa	Maximum Pilot Pressure MPa	Weight kg
DG3S-10	10	21	See Pressure-Flow Charac.	21	See Min. Pilot Pressure Curves	21	40

Spool Types and Pressure-Flow Characteristics

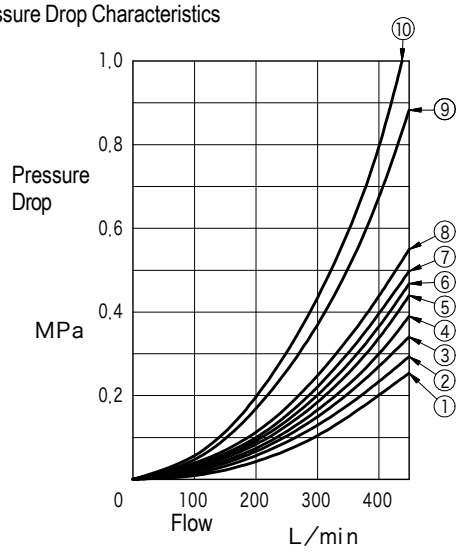
Spool Neutral Position	Valve Function Schematics		Max. Flow L/min		Pressure Drop Curve No.				
	Spring Centered – C –	Pressure Centered – D –			Switched Condition				Neutral
			C	D	P→A	B→T	P→B	A→T	P→T
0	DG3S-10-0C	DG3S-10-0D	600	800	①	⑤	①	③	③
2	DG3S-10-2C	DG3S-10-2D	600	800	②	⑥	②	④	—
3	DG3S-10-3C	DG3S-10-3D	600	800	②	⑧	③	③	—
4	DG3S-10-4C	DG3S-10-4D	600	800	⑥	⑨	⑦	⑩	⑥
6	DG3S-10-6C	DG3S-10-6D	600	800	②	④	②	③	—
8	DG3S-10-8C	DG3S-10-8D	600	800	④	⑨	⑤	⑩	⑥
9	DG3S-10-9C	DG3S-10-9D	※570	800	②	④	②	③	—
33	DG3S-10-33C	DG3S-10-33D	600	800	②	⑥	②	⑥	—

Spool Transient Condition	Valve Function Schematics			Max. Flow L/min		Pressure Drop Curve No.			
	Spring Offset		No Spring			Switched Condition			
	– A –	– A – LH –		A , A-LH	No Spring	P→A	B→T	P→B	A→T
0	DG3S-10-0A	DG3S-10-0A-LH	DG3S-10-0	600	800	①	⑤	①	③
2	DG3S-10-2A	DG3S-10-2A-LH	DG3S-10-2	600	800	②	⑥	②	④
6	DG3S-10-6A	DG3S-10-6A-LH	DG3S-10-6	600	800	②	④	②	③

Note • Max. flow without malfunction.
• ※mark indicates max. flow at 7 MPa operating pressure. Max. flow is 320 L/min at 21 MPa.

Performance Curve (viscosity 20 mm²/s , specific gravity 0.87)

Pressure Drop Characteristics



1. For pressure drops ($\triangle P_1$) of viscosities other than 20mm²/s, calculate using multiplier coefficients shown in below table.
2. The formula to calculate pressure drops ($\triangle P_1$) for specific gravities other than 0.87 is as follows.

$\triangle P$ ····· characteristics curve value

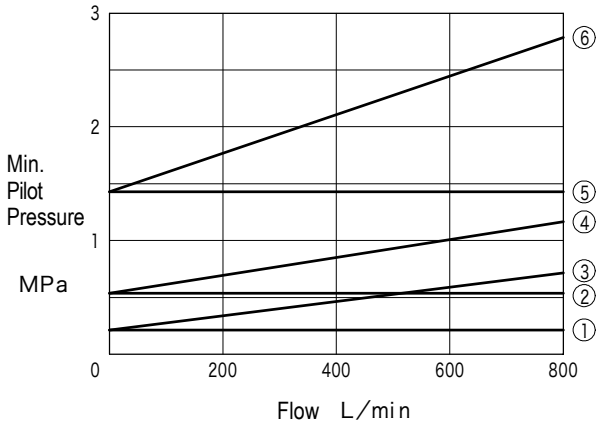
$\triangle P_1 = \triangle P \times G_1 / G$ G ····· 0. 87

G_1 ····· desired specific gravity

Viscosity mm²/s	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Coefficient	0. 85	1. 00	1. 09	1. 17	1. 24	1. 29	1. 34	1. 38	1. 42	1. 46	1. 49	1. 52	1. 56	1. 59	1. 62

Performance Curves

Minimum Pilot Pressure



Min. Pilot Pressure Curve No.

Spool/Spring Arrangement	Spool Type	No.
No Spring	0, 9	①
	2, 6	③
A, A–LH, C	0, 4, 8, 9	②
	2, 3, 6, 33	④
D	0, 4, 8, 9	⑤
	2, 3, 6, 33	⑥

Operating Considerations

• Pilot
Supply of pilot pressure to pilot ports X, Y may differ according to the spool/spring arrangement. Pilot circuit should be designed reference below table (for spool types 4 and 8, pilot port X and Y relationship will be reversed).

Switched Condition	P→A, B→T		Neutral		P→B, A→T	
Pilot Port	X	Y	X	Y	X	Y
Spring Offset, A Type	D	D	—	—	P	D
Spring Offset, A-LH Type	D	P	—	—	D	D
Spring Centered, C Type	D	P	D	D	P	D
Pressure Centered, D Type	D	P	P	P	P	D
No Spring	D	P	—	—	P	D

P: Pilot pressure supplied
D: Drained to tank

• Minimum pilot pressure
For valve switching, differential pressure between X port and Y port must be higher than the minimum pilot pressure. Therefore when there is back pressure in the drain side port, pilot pressure supplied must be higher than the minimum pilot pressure + drain port back pressure. For spring centered, spring offset, and pressure centered types, when pressure falls below minimum pilot pressure, spool will be returned to the prescribed position by spring force. With no spring types, spool positioning is unstable. Always maintain minimum pilot pressure during valve switching.

• Drain
Y port of spring offset type, X port of spring offset left hand (LH) build type, and W port of pressure centered type are the drain ports. Do not merge with other tank lines but pipe directly to tank.

• Mounting
As long as minimum pilot pressure maintained, there is no restriction in mounting orientation

Mounting Bolts (JIS B1176, Strength Class 12.9)

Hex Socket Bolts	Quantity
M20 × 65	6

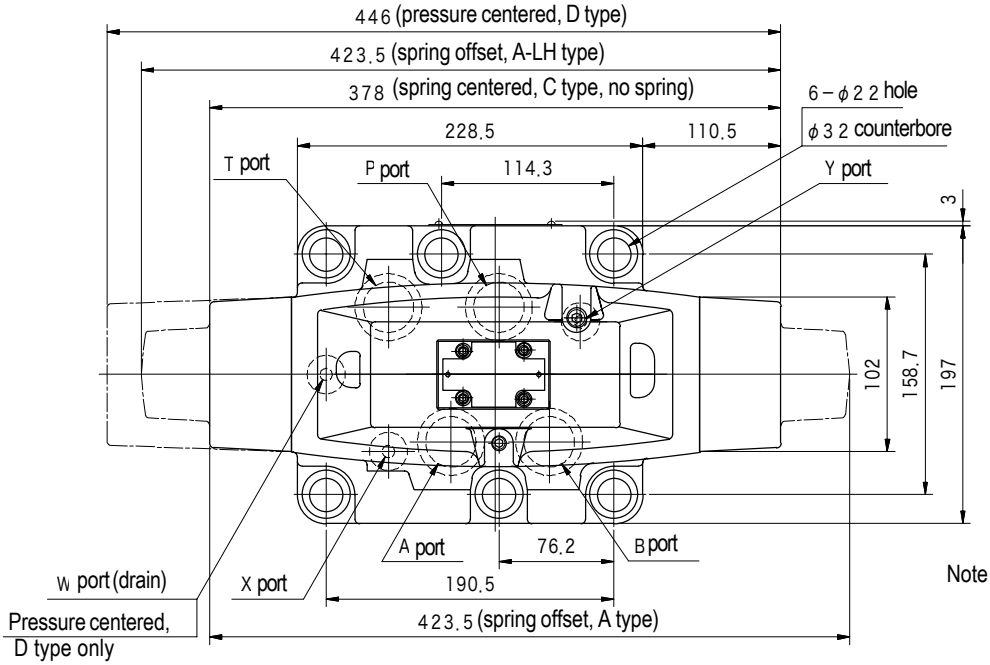
• Order mounting bolts separately.
• Mounting bolt tightening torque: 230~290Nm

Subplate

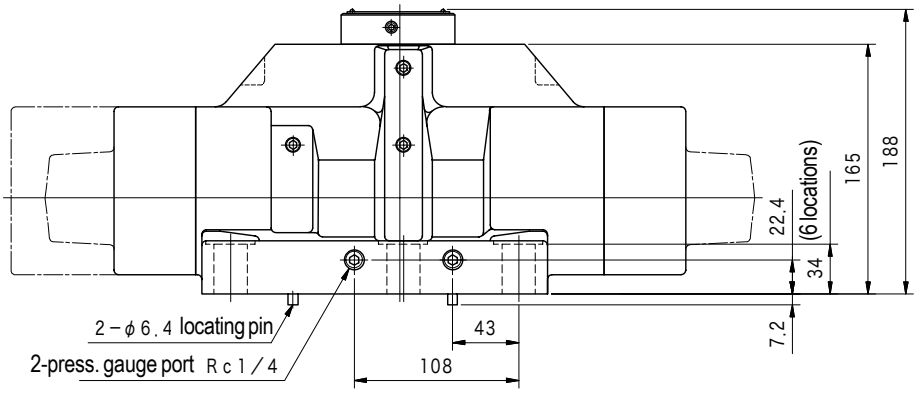
Subplate Model	Connec. Port Dia. Rc	
	P, T, A, B	X, Y, W
DGSM–10– (D) –11–JA–M	1–1/4	3/8
DGSM–10X– (D) –11–JA–M	1–1/2	
DGSM–10Y– (D) –11–JA–M	2	

• DGSMV-**-D-10 used is pressure center type.
• Subplate must be ordered separately.
• Hex socket bolts for subplate mounting are included.
• See page Q6 for dimensions.

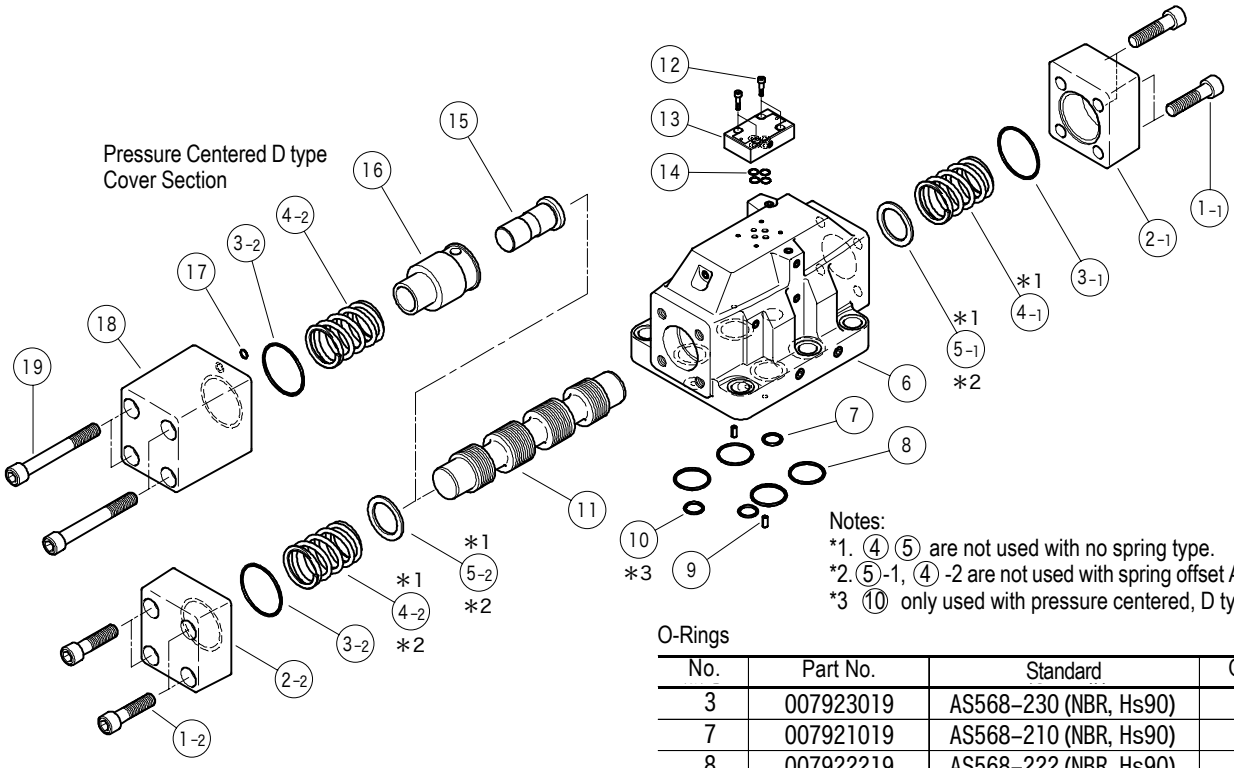
Dimensions



Note : See DG5S-10 (page E94) for mounting dimensions



Construction

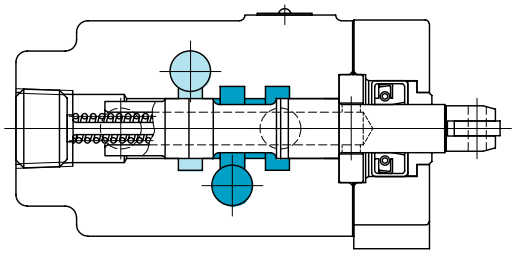


Notes:
*1. ④ ⑤ are not used with no spring type.
*2. ⑤-1, ④-2 are not used with spring offset A type.
*3 ⑩ only used with pressure centered, D type

O-Rings

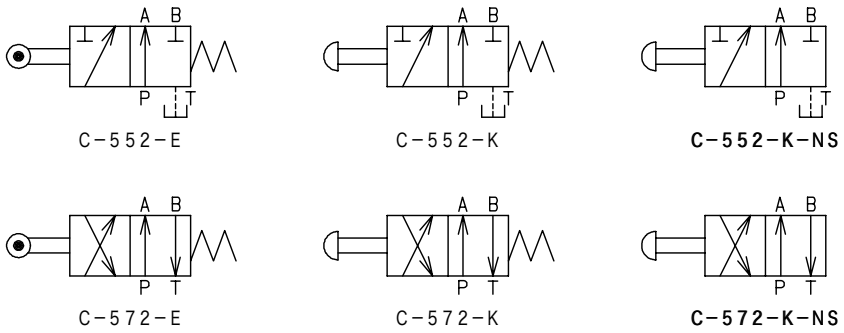
No.	Part No.	Standard	Qty
3	007923019	AS568–230 (NBR, Hs90)	2
7	007921019	AS568–210 (NBR, Hs90)	2
8	007922219	AS568–222 (NBR, Hs90)	4
10	007921019	AS568–210 (NBR, Hs90)	1
14	007901217	AS568–012 (NBR, Hs70)	4
17	007901317	AS568–013 (NBR, Hs70)	1

Mechanically or manually operated directional control valves C - 552 / C - 572



• Two position directional valve for manual or cam operation. Used mainy in pilot circuits.

Functional Symbols



Model Code

(F3) - C - 552 - K- (NS) - JA - J

1	2	3	4

1 Fluid
Omitted for mineral oil, water glycol
F3: phosphate ester

2 Mechanically or manually operated directional valve (threaded type)
C-552: 2 way valve
C-572: 4 way valve

3 Switching method
E: Mechanically operated
K: Manually operated (push button)

4 Spring (applicable for K type manual operation only)
Omitted for spring offset
NS: no spring

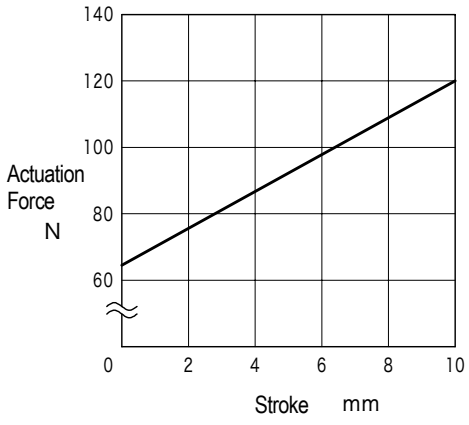
Operating Considerations

- Cam slope angle should be less than 35°.
- Design system so cam cannot be pushed beyond max. position.
- Connect piping directly to tank port (allowable back pressure less than 0.035 MPa)
- Mounting bolt holes, piping port positions and roller direction can each be rotated in 90° increments.

Specifications

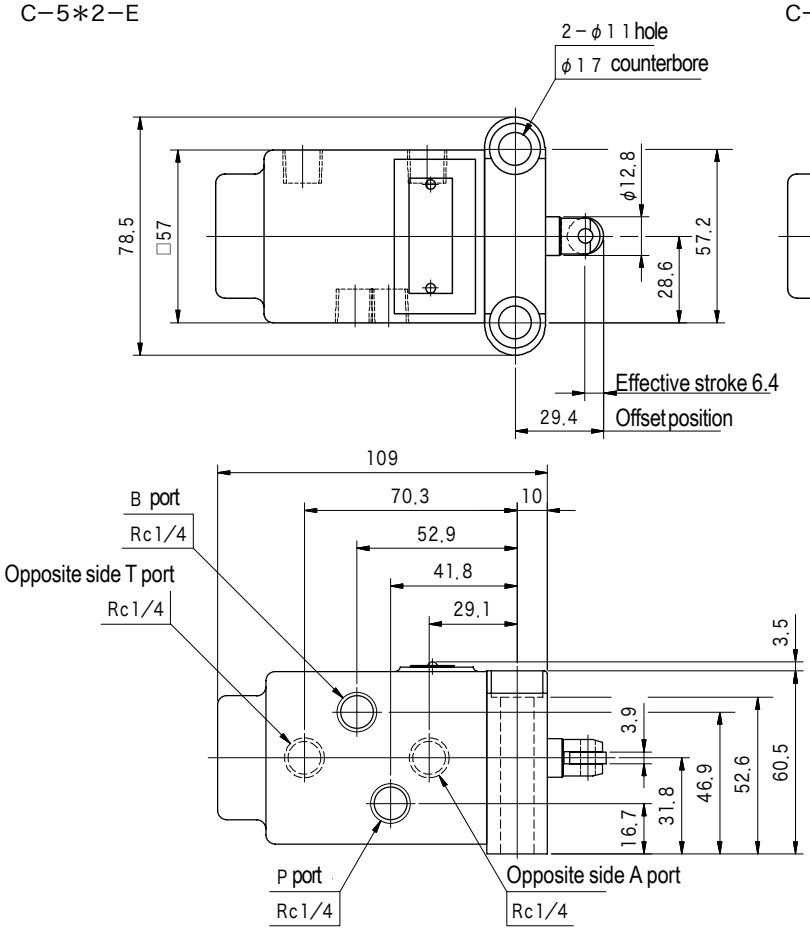
Model	Size	Max. Oper. Pressure MPa	Max.Flow L/min	Actuation Force N	Weight kg
C-552 C-572	02	14	11. 5	See graph	2. 3

Actuation Force

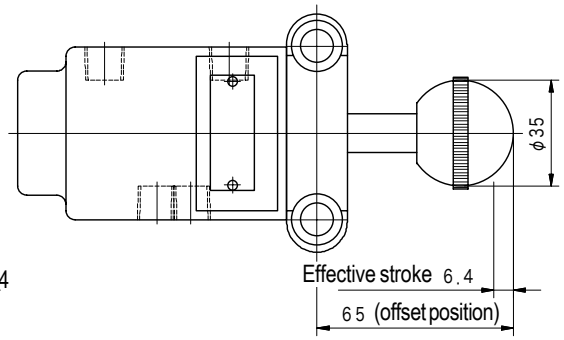


Dimensions

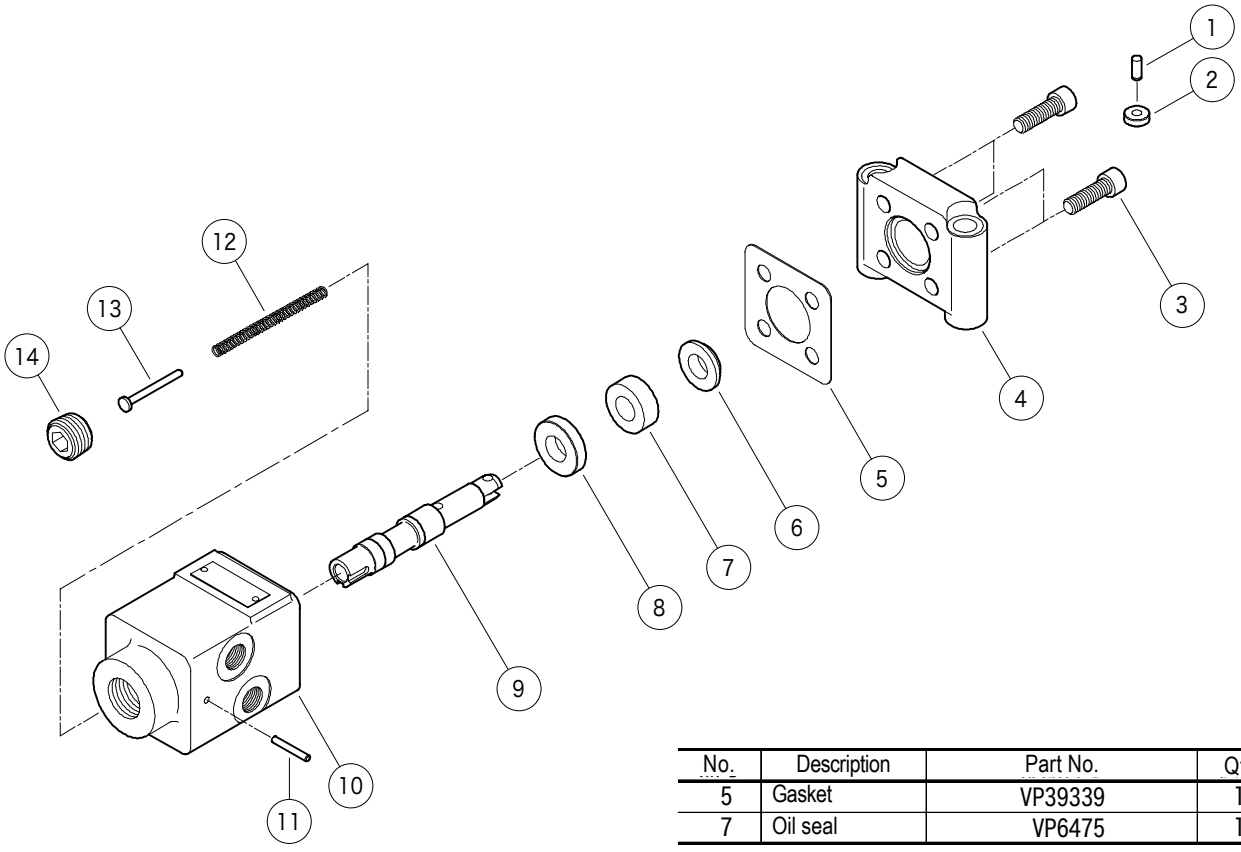
C−5∗2−E



C−5∗2−K

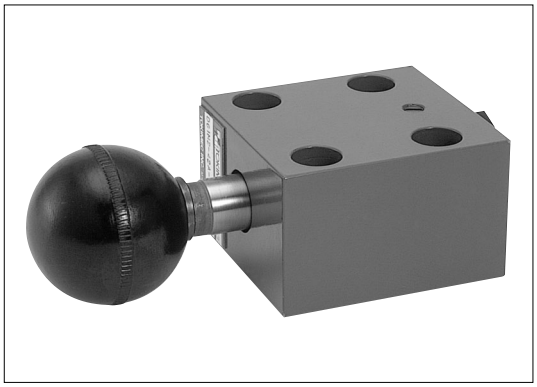


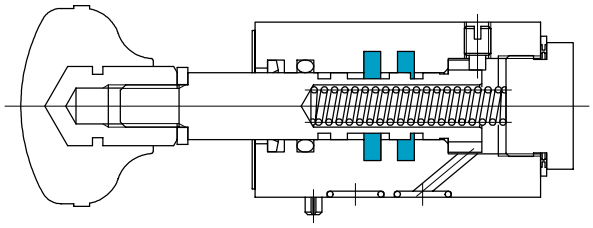
Construction



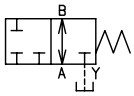
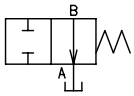
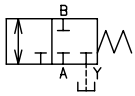
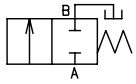
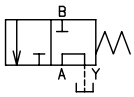
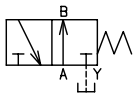
No.	Description	Part No.	Qty
5	Gasket	VP39339	1
7	Oil seal	VP6475	1

Mechanically or manually operated directional control valves DG/T*M2





Functional Symbols

Basic Symbol		Spool Type	External Drain	Internal Drain	Spool Type	External Drain	Internal Drain
Manually Operated	D*1M2	0			2		
Mechanically Operated	D*2M2	1			7		

Model Code

(F3) - DG2M2 - 4 0A - (T) 30 - J A - (J)

1 | 2 | 3 | 4 5 | 6 | 7 | 8

1 Fluid
Omitted for mineral oil, water glycol
F3: phosphate ester

2 Mechanical or manual actuation
DG1M: Manual (push button) switching (gasket mounting)
DT1M: Manual (push button) switching (thread connection)
DG2M: Mechanical switching (gasket mounting)
DT2M: Mechnical switching (thread connection)

3 Flow direction
2: 2 way

4 Spool
See 'Functional Symbols'

5 Spool/spring arrangement
A: Spring offset

6 Drain
Omitted for external drain
T: internal drain

7 Design no.
10:DT*M2
30:DG*M2

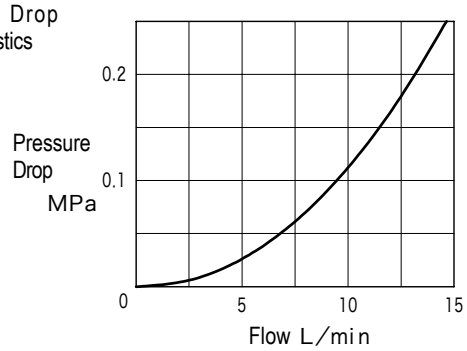
8 JIS pipe taper thread connection
Use for DT*M2

Specifications

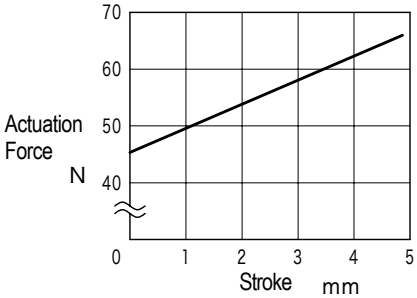
Model	Max. Oper. Pressure MPa	Rated Flow L/min	Allow.Y Port Back Press. MPa	Actuation Force N	Weight kg
DG1M2	14	13. 5	0. 35	See graph	0. 7
DT1M2					
DG2M2					
DT2M2					

Performance Curve (viscosity 20 mm²/s, specific gravity 0.87)

Pressure Drop Characteristics



Actuation Force



Operating Considerations

- Spool will lock if manual type DG1M2,DT1M2 knob is depressed and rotated to right 90° and this switched condition will be maintained even if the hand is removed.Returning knob 90° andreleasing knob will cause spring force to return valve to offset position.
- For mechanical actuation,design system so cam cannot be pushed beyond max. position.
- Roller orientation can be rotated 90° .
- For external drain type, connect Y port directly to tank.

Mounting Bolts (JIS B1176, Strength Class 12.9)

Hex Socket Bolts		Qty
Metric	Unified	
M6×35	1/4–20UNC×38. 1	4

- Order mounting bolts separately.
- Mounting bolt tightening torque: 8~10Nm

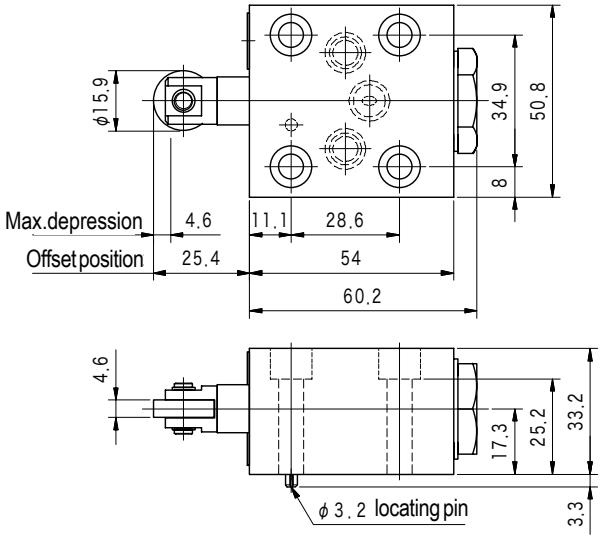
Subplate

Model		Subplate Model	Port Dia. Rc	Mounting Bolts
DG*M2	Side Ported	DGME–02–JA–20–B–J	1/4	1/4–20UNC
		DGME–03–JA–20–B–J	3/8	
		DGME–02–JA–20–R–J	1/4	M6
		DGME–03–JA–20–R–J	3/8	
	Rear Ported	DGM–02–JA–20–B–J	1/4	1/4–20UNC
		DGM–03–JA–20–B–J	3/8	
		DGM–02–JA–20–R–J	1/4	M6
		DGM–03–JA–20–R–J	3/8	

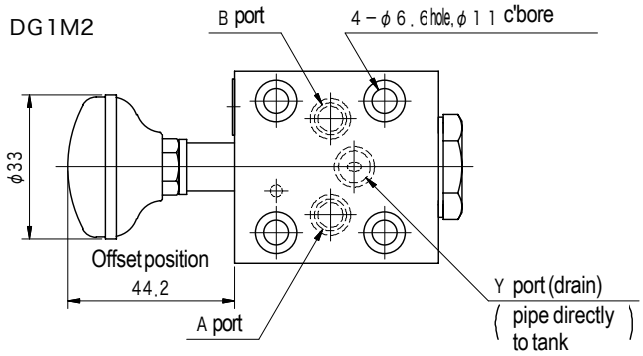
- Subplate must be ordered separately.
- Hex socket bolts for subplate mounting are not includedand mustbe ordered separately.
- See page Q7 for dimensions.

Dimensions

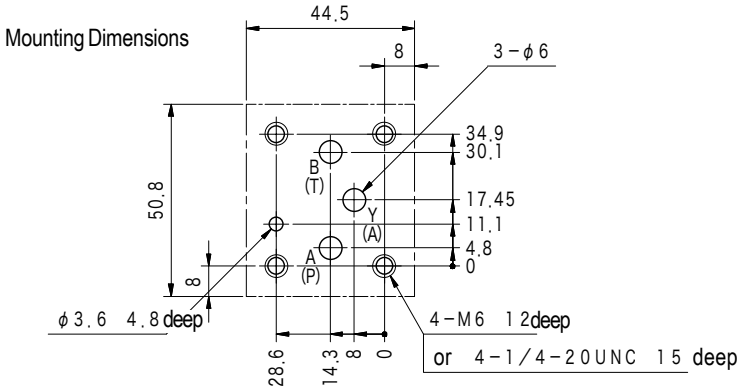
DG2M2



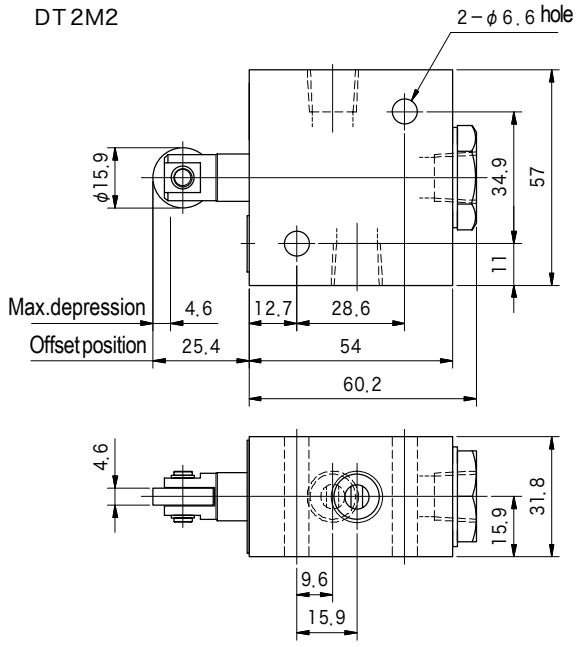
DG1M2



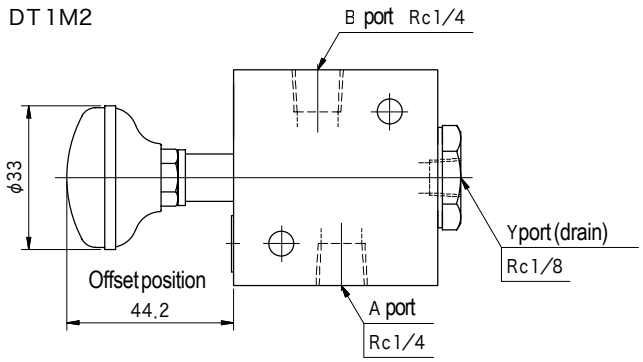
Mounting Dimensions



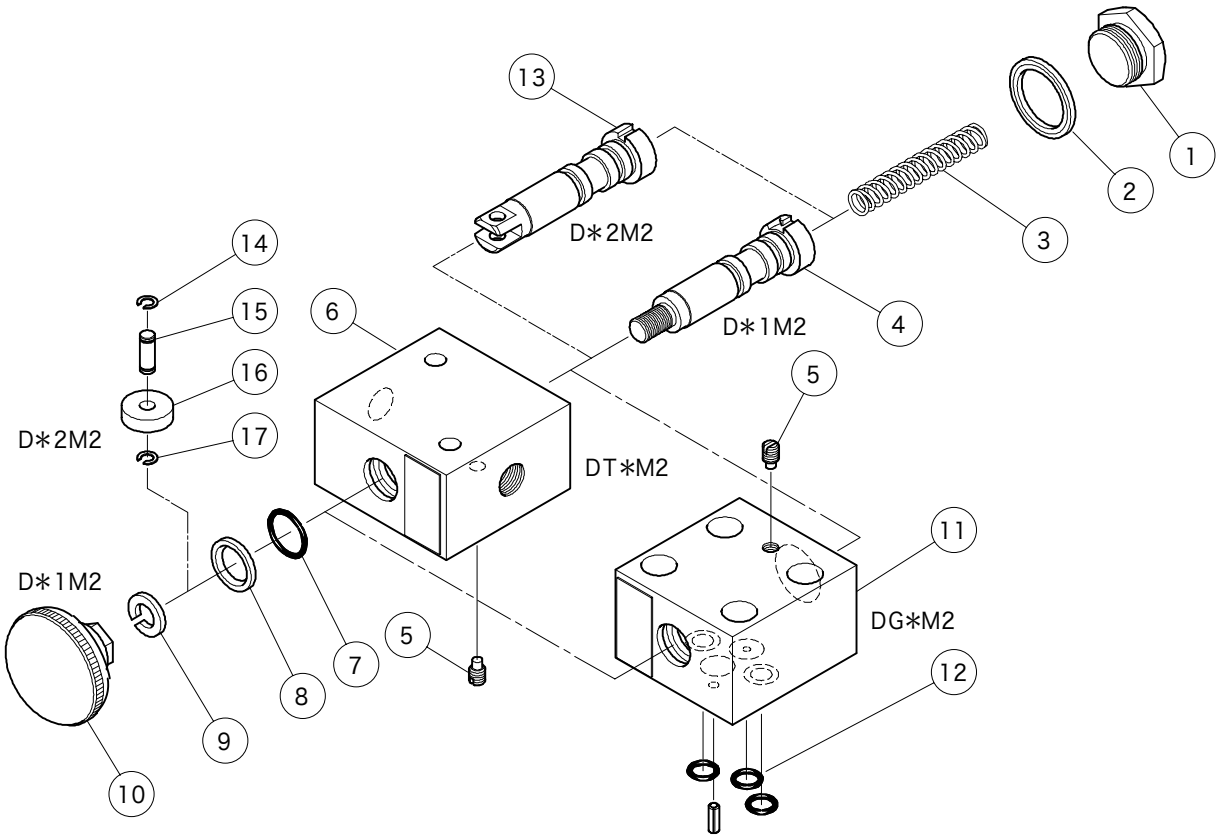
DT2M2



DT1M2



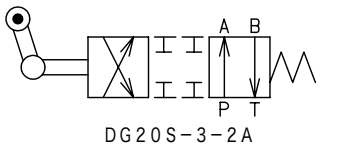
Construction



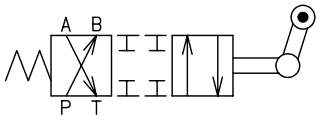
No.	Description	Part No.	Standard	Qty
2	Seal washer	40017160	————	1
7	O-ring	007911217	AS568–112 (NBR, Hs70)	1
8	Seal wiper	VP530527	————	1
12	O-ring	007901117	AS568–011 (NBR, Hs70)	3

Mechanically operated directional control valves

Functional Symbols



DG20S-3-2A



DG20S-3-2AL

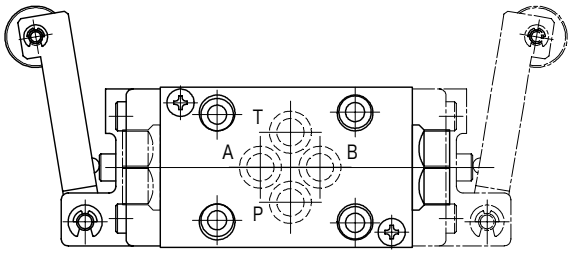
Model Code

(F3) - DG20S - 3 - 2 A(L) - P- 20

1	2	3	4	5	6	7	8

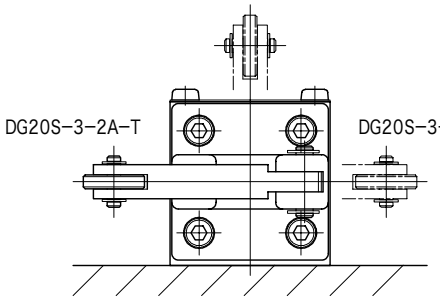
1 Fluid
Omitted for mineral oil, water glycol
F3: phosphate ester
2 Mechanicallyoperated(rollerlever)directionalvalve(gasketmounting)
3 Mounting
3: ISO 4401-03
4 Spool
2: All ports blocked in neutral (transient switching condition) position
5 Spool/spring arrangement
A: Spring offset
6 Lever assembly position
Omitted: offset condition, P to A, B to T
L: offset condition, P to B, A to T
7 Roller, lever mounting orientation
P: Roller on P port side
T: Roller on T port side
S: Roller opposite gasket surface
8 Design no.

DG20S-3-2A-T



DG20S-3-2AL-T

DG20S-3-2A-S



DG20S-3-2A-T

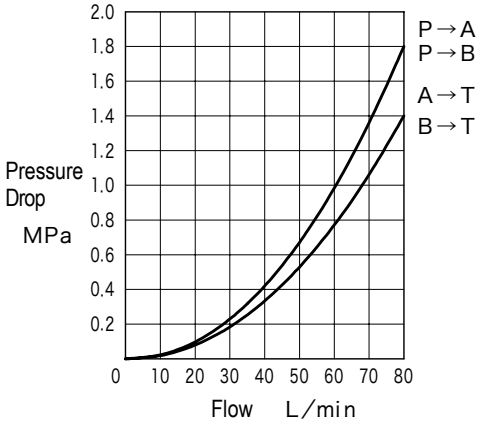
DG20S-3-2A-P

Specifications

Model	Max. Oper. Pressure MPa	Max. Flow L/min	Allow. Tank Port Back Press. MPa	Weight kg
DG20S-3	21	40	7	1.7

Performance Curve (viscosity 20 mm²/s, specific gravity 0.87)

Pressure Drop Characteristics



1. For pressure drops ($\triangle P_1$) of viscosities other than 20mm²/s, calculate using multiplier coefficients shown in below table.
2. The formula to calculate pressure drops ($\triangle P_1$) for specific gravities other than 0.87 is as follows.

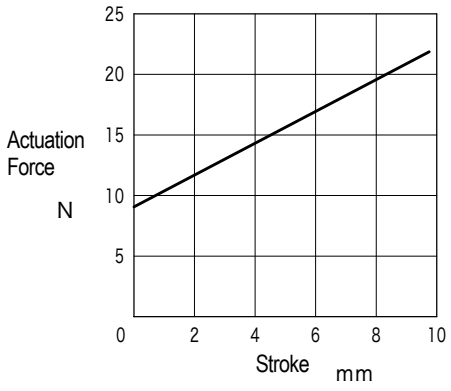
$$\triangle P_1 = \triangle P \times G_1 / G$$

$\triangle P$ ····· characteristics curve value
G ····· 0.87
G_1 ····· desired specific gravity

Viscosity mm²/s	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Coefficient	0.85	1.00	1.09	1.17	1.24	1.29	1.34	1.38	1.42	1.46	1.49	1.52	1.56	1.59	1.62

Specifications

Actuation Force (roller tip)



Operating Considerations

- Cam slope angle should be less than 35°.
- Design system so cam cannot be pushed beyond max. position.

Mounting Bolts (JIS B1176, Strength Class 12.9)

Hex Socket Bolts	Quantity
M5 × 50	4

- Order mounting bolts separately.
- Mounting bolt tightening torque: 7~8Nm

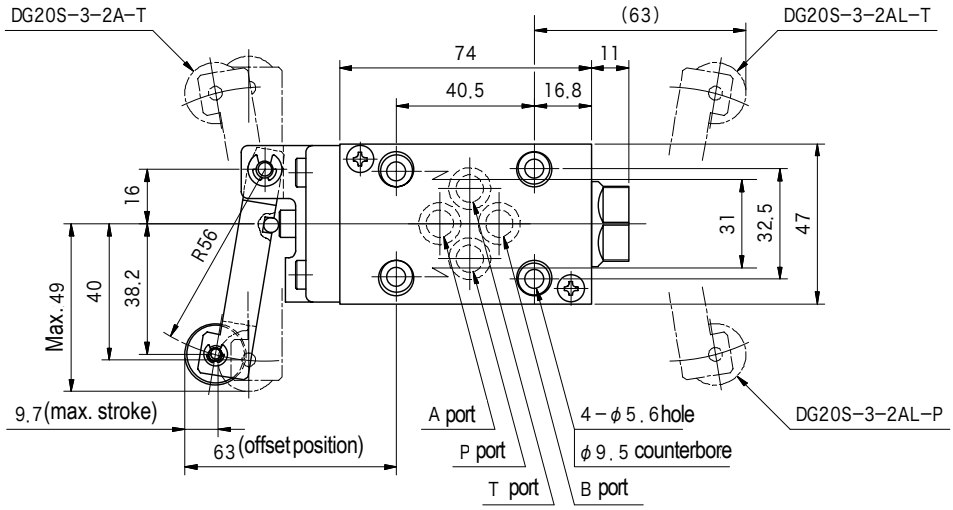
Subplate

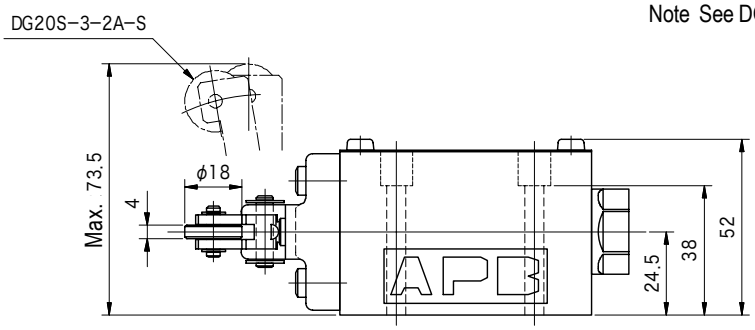
Subplate Model		Port Dia. Rc
Side Ported	DGMS-3-1E-10-T-JA-J	3/8
Rear Ported	DGVM-3-10-T-JA-J	

- Subplate must be ordered separately.
- Hex socket bolts for subplate mounting are not included and must be ordered separately.
- See page Q7 for dimensions.

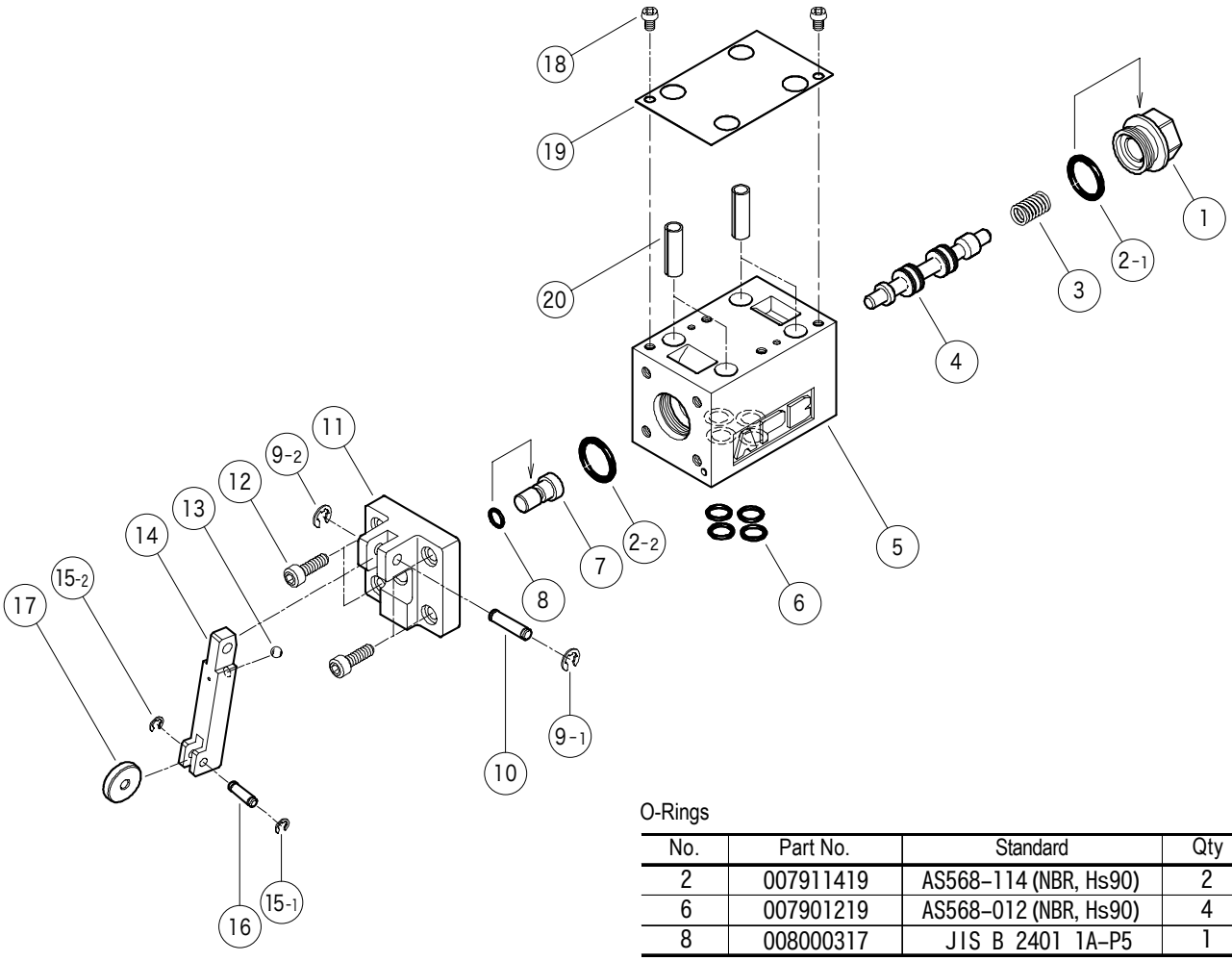
Dimensions

DG20S-3-2A-P





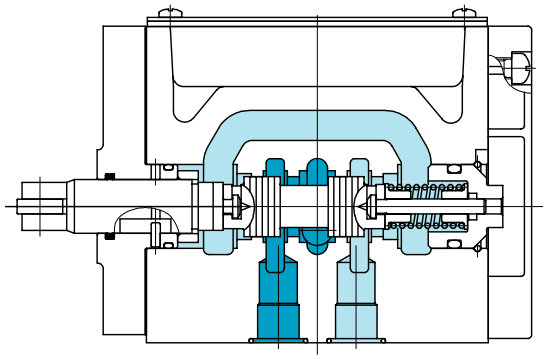
Note See DG4V-3 (page E17) for mounting dimensions.



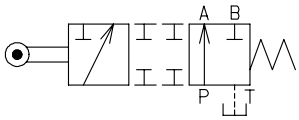
O-Rings

No.	Part No.	Standard	Qty
2	007911419	AS568-114 (NBR, Hs90)	2
6	007901219	AS568-012 (NBR, Hs90)	4
8	008000317	JIS B 2401 1A-P5	1

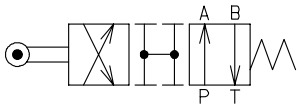
Mechanically operated directional control valves DG2S2-01 DG2S4-01



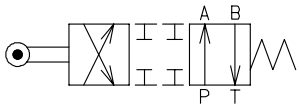
Functional Symbols



DG2S2−012A



DG2S4−010A



DG2S4−012A

Model Code

(F3) - DG2S 4 - 01 2 A - 51 - (LH) - JA - (S15)

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8

1 Fluid
Omitted for mineral oil, water glycol
F3: phosphate ester

2 Mechanically operated directional valve (gasket mounting)
Mounting: ISO 4401-AC-05-4-A

3 Direction of flow
2: 2 way
4: 4 way

4 Spool
See 'Functional Symbols'

5 Spring offset

6 Design no.
51: Standard
50: S15, S16

7 Roller, lever assembly orientation
Omitted for standard (offset condition, P to A, B to T)
LH: Left hand build (offset condition, P to B, A to T)

8 Special feature
Omitted for direct operated roller
S15: Roller lever (roller position, P port side)
S16: Roller lever (roller position, T port side)

Dimensions

Model	Size	Max. Oper. Pressure MPa	Max. Flow L/min		Allow. Tank Back Press. MPa	Wt. kg
			7 MPa	21 MPa		
DG2S2-012A	03	21	45	30	0.035	3.5
DG2S4-010A			45	30	7	
DG2S4-012A			76	76		

Spool Type	Pressure Drop Curve No.			
	P→A	B→T	P→B	A→T
0	②	①	②	③
2	③	④	③	⑤

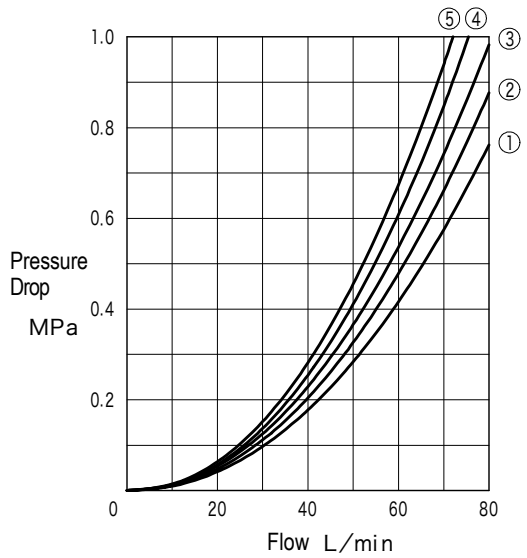
Viscosity mm²/s	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Coefficient	0.85	1.00	1.09	1.17	1.24	1.29	1.34	1.38	1.42	1.46	1.49	1.52	1.56	1.59	1.62

1. For pressure drops ($\triangle P_1$) of viscosities other than 20mm²/s, calculate using multiplier coefficients shown in below table.
2. The formula to calculate pressure drops ($\triangle P_1$) for specific gravities other than 0.87 is as follows.

$$\triangle P_1 = \triangle P \cdot G_1 / 0.87$$

Performance Curve (viscosity 20 mm²/s, specific gravity 0.87)

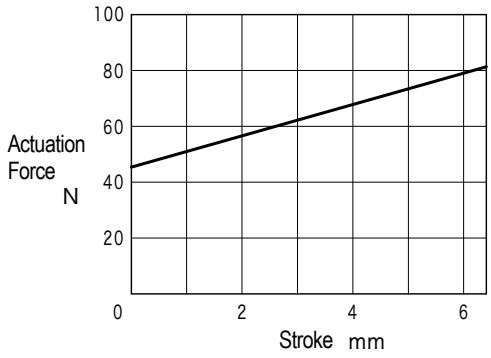
Pressure Drop Characteristics



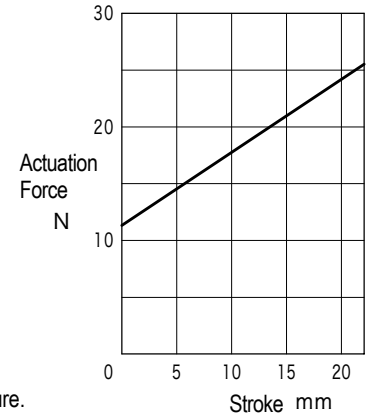
Specifications

Actuation Force

Standard (DG2S∗-01∗A)



Type S15, S16 (DG2S∗-01∗A-S15/S16)



Notes: Switching force of standard type will increase according to tank line back pressure. Above graph is with back pressure 0 MPa. If back pressure exists, switching force (N) will be value shown in above graph +180 × tank line back pressure (MPa).

Operating Considerations

- Cam slope angle should be less than 35°.
- Design system so cam is not pushed beyond max. position.
- Tank port of two way DG2S2 valve is drain and should be connected directly to tank.

Mounting Bolts (JIS B1176, Strength Class 12.9)

Hex Socket Bolts		Qty
Metric	Unified	
M6 × 40	1/4-20UNC × 38. 1	4

- Order mounting bolts separately.
- Mounting bolt tightening torque: 12~15Nm

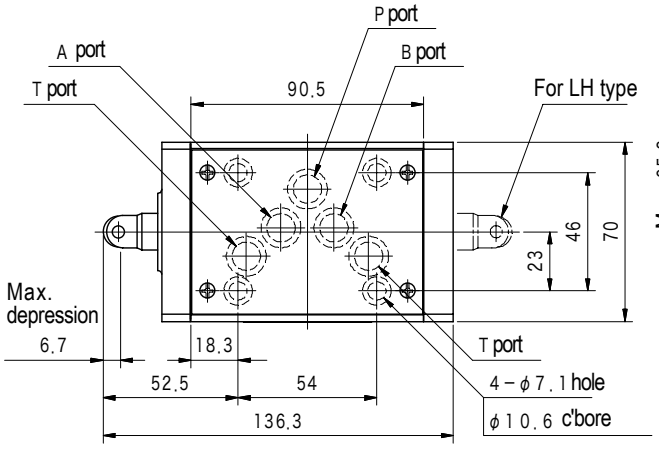
Subplate

Subplate Model	Mounting Thread	Port Dia. Rc
DGSM-01X-10-JA-M	M6	3/8
DGSM-01X-10-JA-J	1/4-20UNC	
DGSM-01Y-10-JA-M	M6	1/2
DGSM-01Y-10-JA-J	1/4-20UNC	

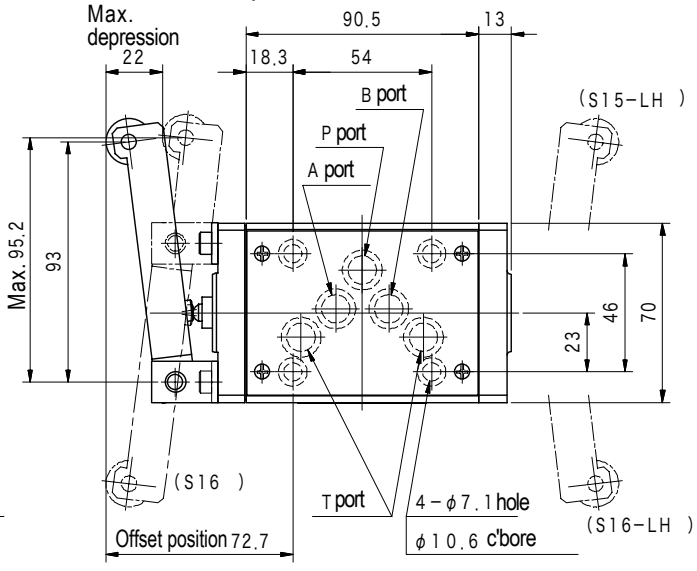
- Subplate must be ordered separately.
- Hex socket bolts for subplate mounting are included.
- See page Q8 for dimensions.

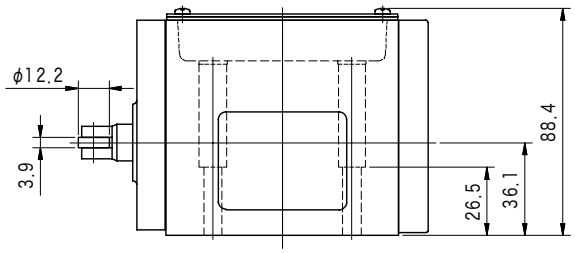
Dimensions

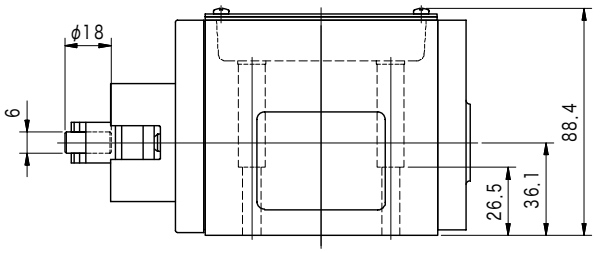
DG2S∗-01∗A



DG2S∗-01∗A-S15/S16



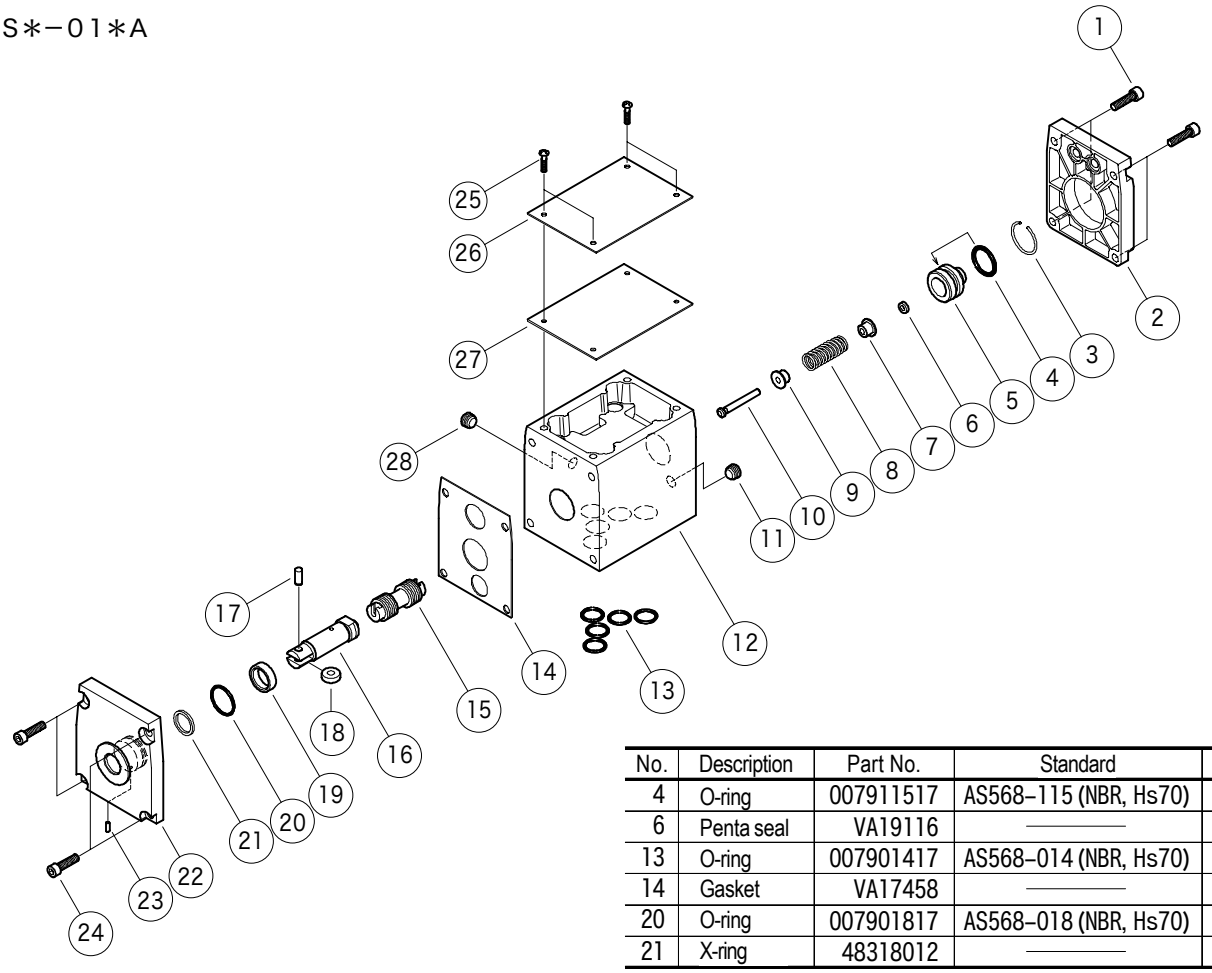




Note Mounting dimensions confirms to standard ISO 4401-05. See page E62 (DG4V-5 series).

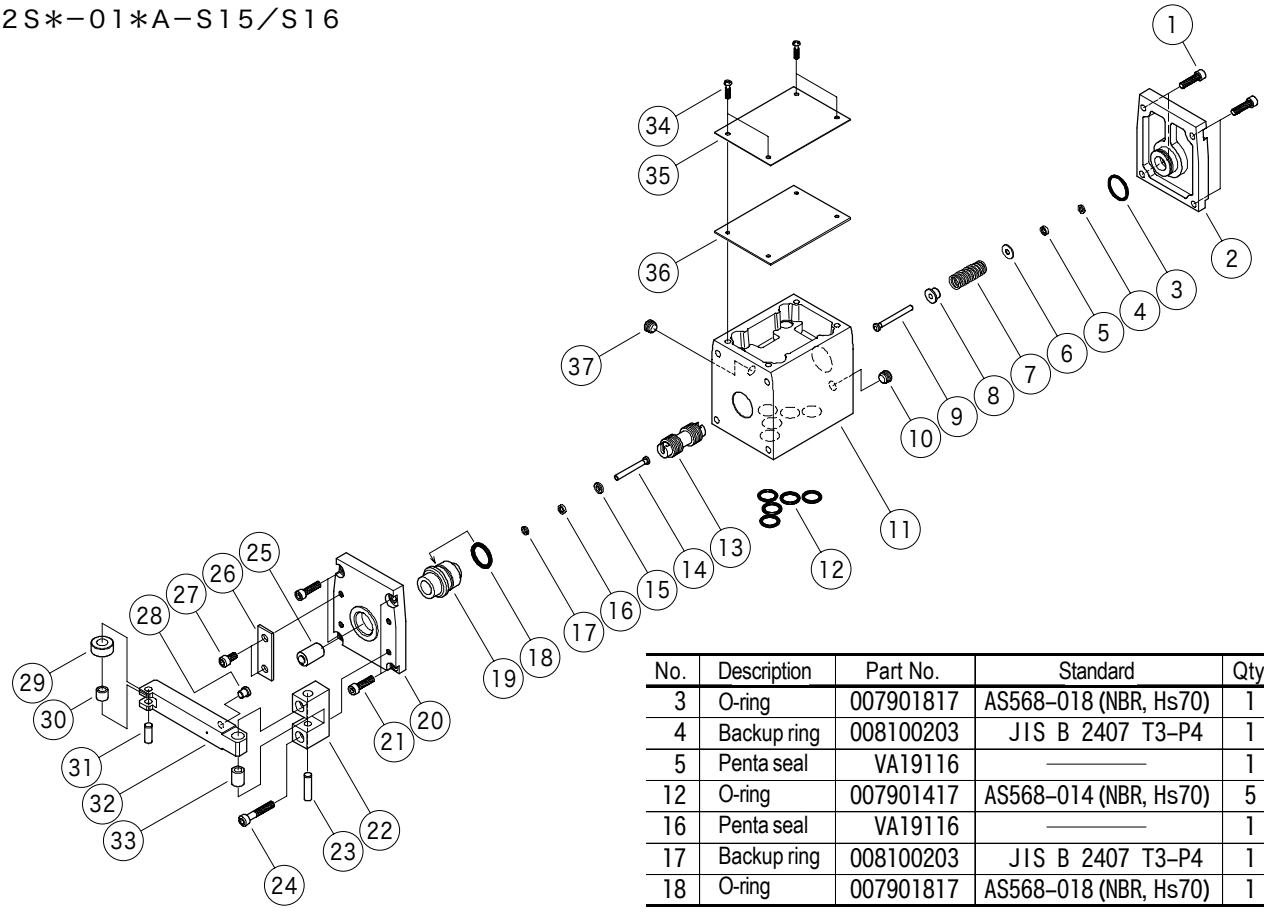
Construction

DG2S∗−01∗A



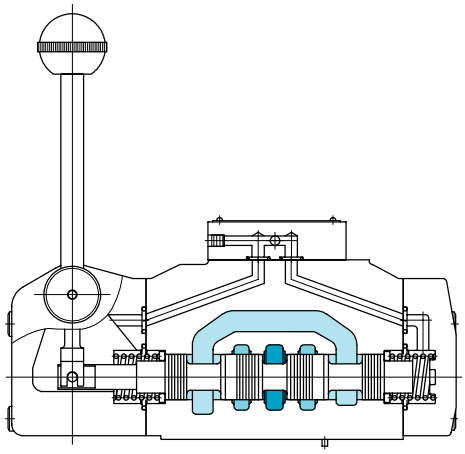
No.	Description	Part No.	Standard	Qty
4	O-ring	007911517	AS568−115 (NBR, Hs70)	1
6	Penta seal	VA19116	———	1
13	O-ring	007901417	AS568−014 (NBR, Hs70)	5
14	Gasket	VA17458	———	1
20	O-ring	007901817	AS568−018 (NBR, Hs70)	1
21	X-ring	48318012	———	1

DG2S∗−01∗A−S15／S16



No.	Description	Part No.	Standard	Qty
3	O-ring	007901817	AS568−018 (NBR, Hs70)	1
4	Backup ring	008100203	JIS B 2407 T3−P4	1
5	Penta seal	VA19116	———	1
12	O-ring	007901417	AS568−014 (NBR, Hs70)	5
16	Penta seal	VA19116	———	1
17	Backup ring	008100203	JIS B 2407 T3−P4	1
18	O-ring	007901817	AS568−018 (NBR, Hs70)	1

Manually operated directional control valves DG17V



Model Code

(F3) - DG17V - 7- 6 C -(1)- 10 - JA-S90

1 | 2 | 3 | 4 | 5 | 6 | 7

1 Fluid
Omitted for mineral oil, water glycol
F3: phosphate ester
2 Manually operated (lever) directional valve (gasket mounting)
3 Mounting
7: ISO 4401-AD-07-4-A
4 Spool
See below
5 Spool/spring arrangement
C: Spring centered
6 Spool stroke adjustment
Ommtied for no spool stroke adjuster (standard)
1: A & B line control
7: A line control
8: B line control
7 Design no.

Specifications

Model	Size	Max. Operating Press. MPa	Allow. Tank Port Back Press. MPa	Weight kg
DG17V-7	04	31.5	21	9.5

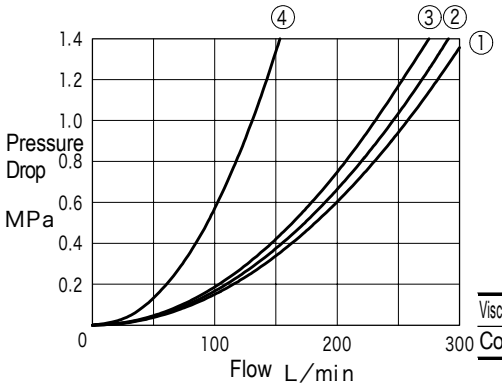
Spool Types and Pressure-Flow Characteristics

Spool Neutral Position		※ Functional Symbols	Max. Flow L/min					Pressure Drop Curve No.				
								Switched Condition				Neutral
			7 MPa	14 MPa	21 MPa	25 MPa	31.5MPa	P→A	B→T	P→B	A→T	P→T
2	Closed center	DG17V-7-2C	300	300	300	300	300	①	②	①	②	—
4	Tandem	DG17V-7-4C	260	220	120	100	90	②	②	②	①	④
6	A-B-T Connection	DG17V-7-6C	300	300	300	300	300	①	①	①	③	—
33	A-B-T Connection w/ Restrictor	DG17V-7-33C	300	300	300	300	300	①	②	①	②	—

※ See pg. E118 for function symbol (spool position) and lever position relationship.

Performance Curve (viscosity 20 mm²/s , specific gravity 0.87)

Pressure Drop Characteristics



1. For pressure drops ($\triangle P_1$) of viscosities other than 20mm²/s, calculate using multiplier coefficients shown in below table.
2. The formula to calculate pressure drops ($\triangle P_1$) for specific gravities other than 0.87 is as follows.

$$\triangle P_1 = \triangle P \times G_1 / G$$

$\triangle P$ ····· characteristics curve value
G ····· 0. 87
G_1 ····· desired specific gravity

Viscosity mm²/s	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Coefficient	0. 85	1. 00	1. 09	1. 17	1. 24	1. 29	1. 34	1. 38	1. 42	1. 46	1. 49	1. 52	1. 56	1. 59	1. 62

Operating Considerations

- Drain (X,Y) ports should be connected directly to tank.
- When hand is released from lever in switched position, spool will be returned to neutral position by spring force. Do not release hand during switching.

Mounting Bolts (JIS B1176, Strength Class 12.9)

Model	Hex Socket Bolts	Quantity
DG17V–7	M10 × 60	4
	M6 × 55	2

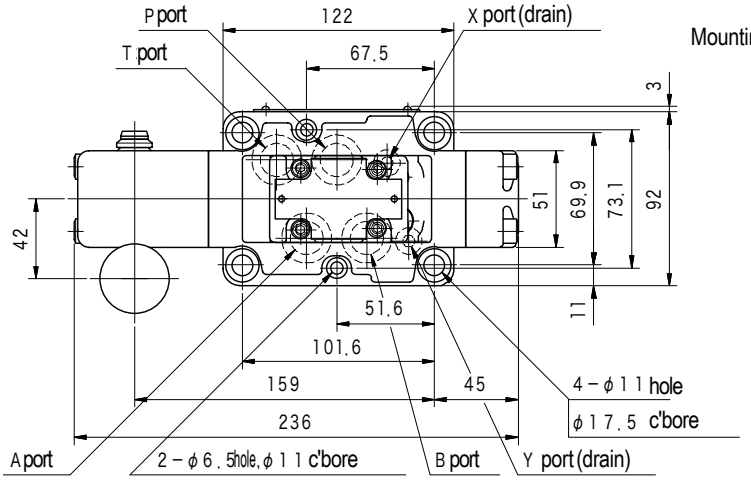
- Order mounting bolts separately.
- Mounting bolt tightening torque:
  M6: 9~14Nm
  M10: 50~60 Nm

Subplate

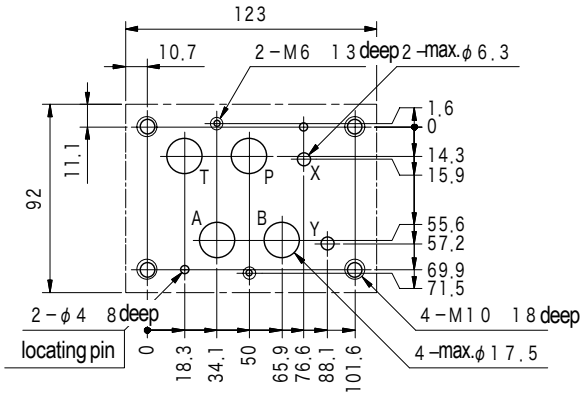
Model	Subplate Model	Port Dia. Rc	
		P, T, A, B	X, Y
DG17V–7	DGSMV–04–10	1/2	1/4
	DGSMV–04X–10	3/4	

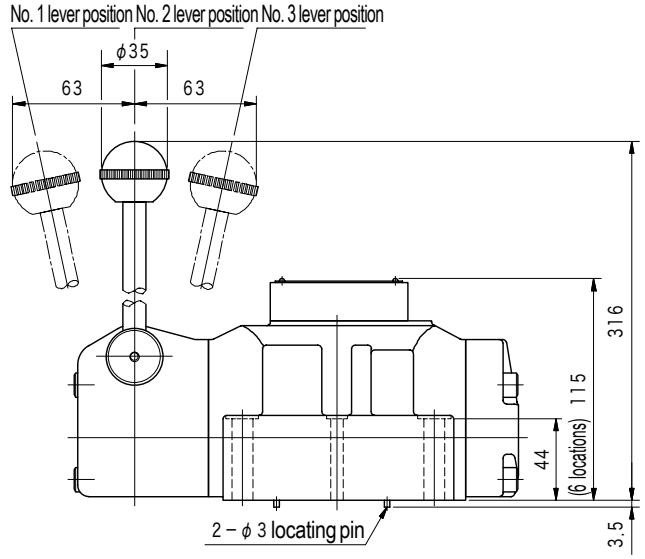
- Maximum working pressure is 21 MPa. If using pressures above this, it is convenient to mount on manifold blocks, etc.
- Subplate must be ordered separately.
- Hex socket bolts for subplate mounting are included.
- See page Q6 for dimensions.

Dimensions

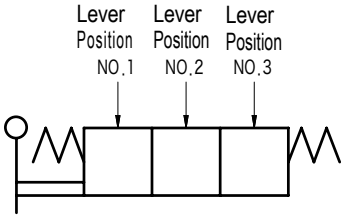


Mounting Dimensions
(ISO 4401–AD–07–4–A)

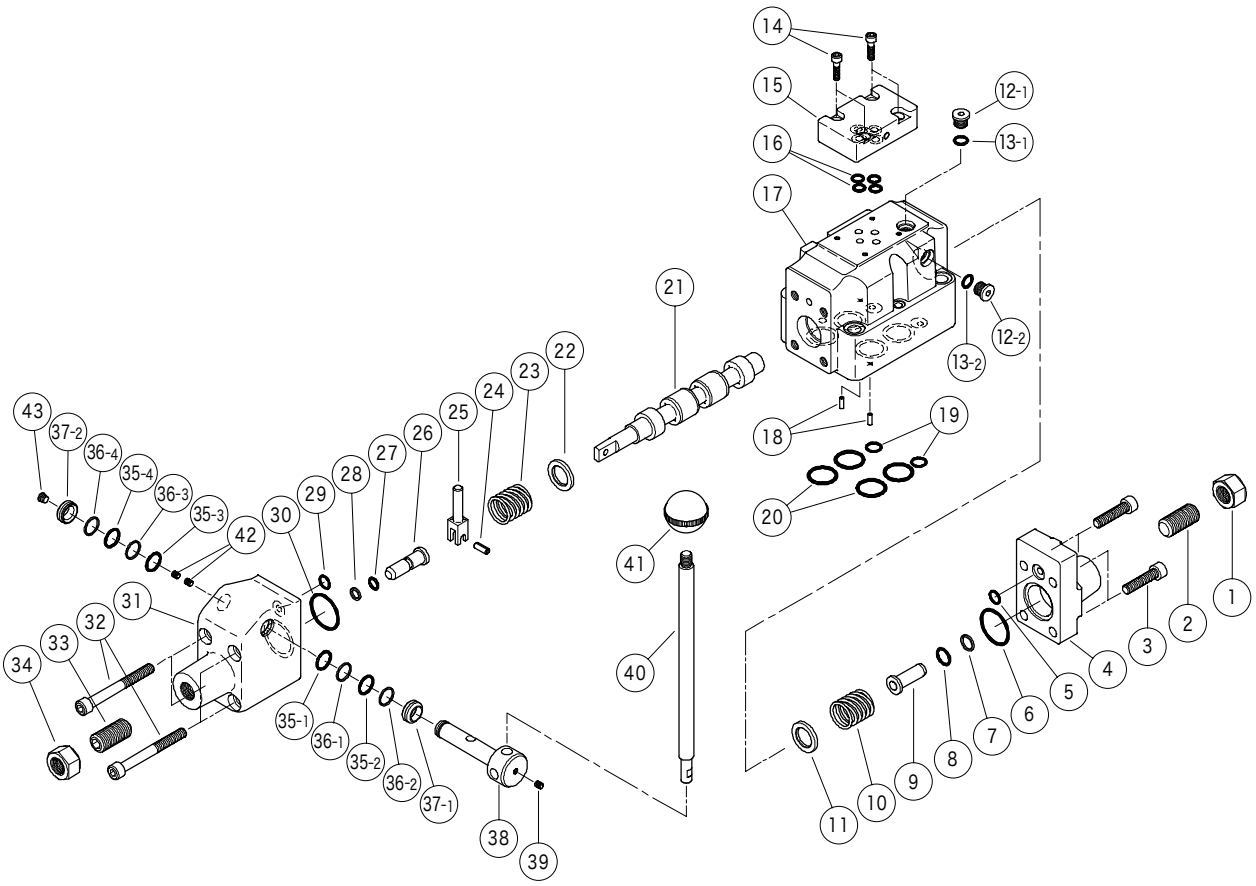




Note: Relationship of lever position and functional symbol is described in left figure and diagram below.



Construction



No.	Description	Part No.	Standard	Qty
5	O-ring	007911019	AS568-110 (NBR, Hs90)	1
6	O-ring	007912319	AS568-123 (NBR, Hs90)	1
7	Backup ring	VP197571	MS28774-013	1
8	O-ring	007901319	AS568-013 (NBR, Hs90)	1
13	O-ring	007990419	AS568-904 (NBR, Hs90)	2
16	O-ring	007901219	AS568-012 (NBR, Hs90)	4
19	O-ring	007901319	AS568-013 (NBR, Hs90)	2
20	O-ring	007911819	AS568-118 (NBR, Hs90)	4
27	O-ring	008000619	JIS B 2401 1B-P8	1

No.	Description	Part No.	Standard	Qty
28	Backup ring	008100602	JIS B 2407 T2-P8	1
29	O-ring	007911019	AS568-110 (NBR, Hs90)	1
30	O-ring	007912319	AS568-123 (NBR, Hs90)	1
35	O-ring	007901517	AS568-015 (NBR, Hs70)	4
36	Backup ring	VA25270	————	4
37	V-ring	VA16620	————	2

Note Schematic shows valve with stroke adjuster.
Parts ①. ②. ⑦~⑨. ㉖~㉘. ㉝. ㉞ not used for valve without stroke adjuster.