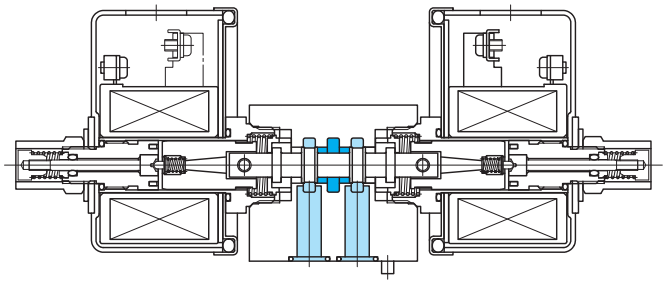
Miniature solenoid directional valves DG4M4



- 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)-DG4M4-30C-100AC-20-(LH)-(M12)-JA-(PG)-(S7/S46/S47)

1	2	3 4	5	6	7	8	9	10

1 Hydraulic fluid
Omit: mineral oil based fluid, water-glycol based fluid
F3: Phosphate ester

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

3 Spool type
See page E1-2

4 Spool/spring arrangement
A: Spring offset, A type (2 position, single solenoid)
B: Spring offset, B type (2 position, single solenoid)
C: Spring centered type (3 position, double solenoid)
Omit: no spring type (2 position, double solenoid)

5 Solenoid voltage
See “Solenoid Specifications”

6 Design no.

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

8 Indicator lamp (option)
Omit: no indicator lamp (standard)
M12: With indicator lamp (for AC solenoids)
DIN43650 connectors
M14: With indicator lamp and surge suppressor (for DC solenoids)
DIN43650 connectors
* Only ‘Omitted’ applies for the lead wire type (S46/S47).

9 Cable ground
(Option in cases where there are no indicator lamps)
Omit: no cable ground provided (standard)
PG: Cable ground provided
* Only ‘Omitted’ applies for the lead wire type (S46/S47).
* The indicator lamp (provided with M12/M14) is provided as a standard feature.

10 Special feature
S7: 1.0 mm orifice in P port
S46: Lead wire type electrical connection (length 300 mm)
S47: Lead wire type electrical connection
(with surge suppressor, length 300 mm)

Table of electrical options

Indicator Lamp	Cable Ground	Special Feature	Electrical Wiring System
Omitted (not provided)	Omitted (not provided)	Not provided/S7	2 connectors
		S46/S47	Lead wires
	PG (provided)	Not provided/S7	2 connectors
M12/M14 (provided)	Omitted (provided)	Not provided/S7	DIN 43650 connector

Specifications

Model Code	Max. Working Pressure MPa	Max. Flow L/min	Allowable Tank Port Back Pressure MPa	Max. Switching Frequency (cycles/min)		Weight kg	
				AC Solenoids	DC Solenoids	Single Solenoids	Double Solenoids
DG4M4	21	See “Pressure-Flow Characteristics”	7	500	400	0.9	1.2

Solenoid Specifications

Power Supply	Voltage Code	Voltage V	Frequency Hz	Initial Current A	Holding Current A	Power Consumption W	Allowable Voltage Fluctuation %	Insulation Class [Allowable Temperature]
AC	100AC	100	50	0. 42	0. 3	18	±10	F (155°C)
			60	0. 36	0. 25	15. 3		
	200AC	200	50	0. 21	0. 14	18. 8		
			60	0. 18	0. 12	16. 5		
DC	12DC	12	–	–	1. 23	14. 8	±10	F (155°C)
	24DC	24			0. 56	13. 4		
DC (Lead Wire)	12DC	12	–	–	1. 2	14. 5	±10	F (155°C)
	24DC	24			0. 6	14. 5		

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

Spool Types and Pressure-Flow Characteristics

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

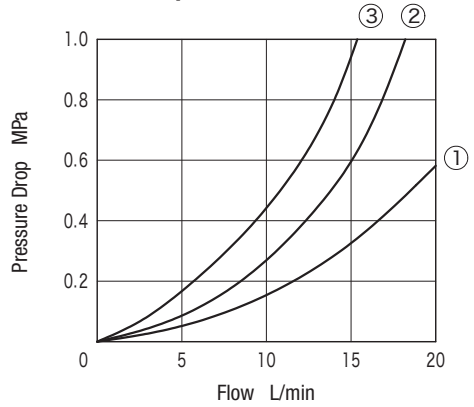
Spool Center Position	Model Code, Functional Symbol			Max. Flow L/min						Pressure Drop Curve No.				
	3 Position	2 Position								Switched Condition				
	Spring Centered	Spring Offset												
			Left Hand Build	3.5MPa	7MPa	10.5MPa	14MPa	17.5MPa	21MPa	P→A	B→T	P→B	A→T	P→T
	– C –	– B –	– B – LH –											
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						Pressure Drop Curve No.				
	No Spring	Spring Offset								Switched Condition				
	Omitted	– A –	Left Hand Build – 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 refers to limit flow without valve malfunction for valve switching.
• In the case of the S47, some of the characteristics may differ from the ones presented in this table.

Characteristics Curve (viscosity 20 mm²/s, specific gravity 0.87) (typical examples)

● Pressure Drop Characteristics



1. For pressure drops ($\triangle P_1$) of viscosities other than 20 mm²/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.
$\triangle P_1 = \triangle P \times G_1 / G$
$\triangle P$.....Values according to characteristics 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

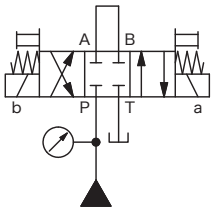
Unit: ms

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	———

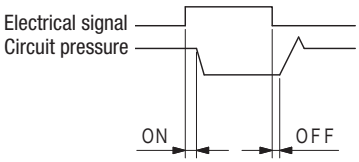
Note: Values shown may vary according to spool type and circuit conditions.

● Conditions: No. 2 spool, open loop circuit, flow 10 L/min., supply pressure 10.5 MPa, fluid viscosity 20 mm²/s

[Circuit Example]



[Switching Time Definition]



Notes on Operation

● Mounting orientation
Mount No Spring detented type valves so spool axis is horizontal. There are no mounting attitude restrictions for other spool/spring arrangements.

● Solenoid energization
Always ensure that one side of solenoid is deenergized before energizing the opposite side. For No Spring detented type valves, one side 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 ensure 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 max. flow is limited when used as two or three-way valves. Consult Tokyo Keiki for details.

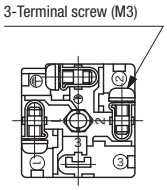
● Long periods of solenoid energization
Care should be paid as long periods of solenoid energization at high pressure may cause spool sticking and switching malfunction.

● 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 tank line back pressure.

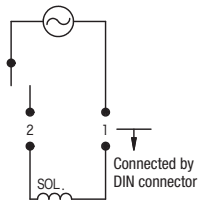
● Solenoid indicator lamp
For valves with indicator lamps, the lamps will light when current flows to the solenoid.

● Electrical wiring

In cases of direct wiring

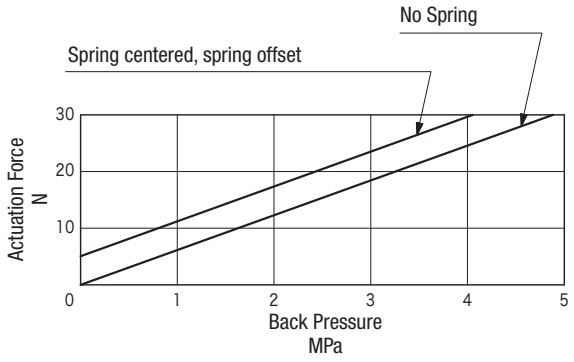


In cases where the DIN connector is used



Coil and DIN connector

* Terminals 1 and 2 have no polarities.



Subplate

Valve Model		Subplate	Connection Port Dia. Rc	Mounting Bolts
DG4M4	Side Piping	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	
	Bottom Piping	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 R6-6 for dimensions.
● See page R6-6 for plural mount subplates.
● Mounting bolts are not included.

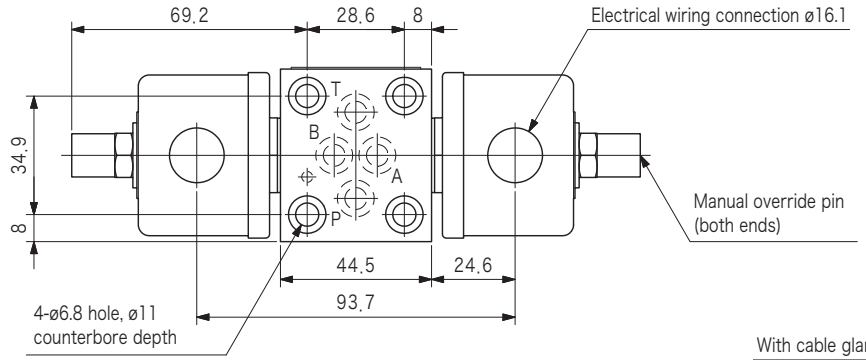
Mounting Bolts (JIS B 1176, Strength Class 12.9)

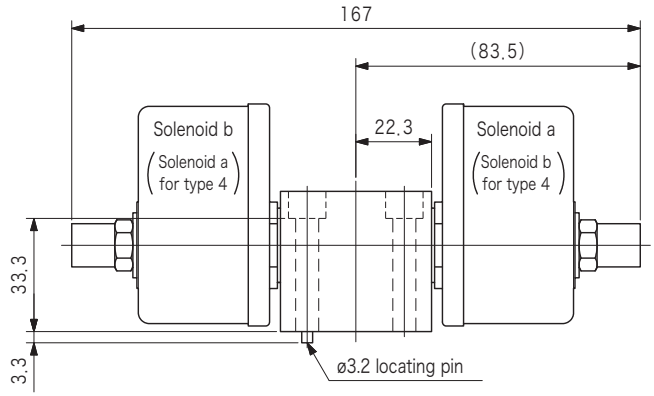
Hex Socket Bolts		Qty
Metric Thread	Unified Thread	
M6 × 45	1/4–20UNC × 44. 5	4

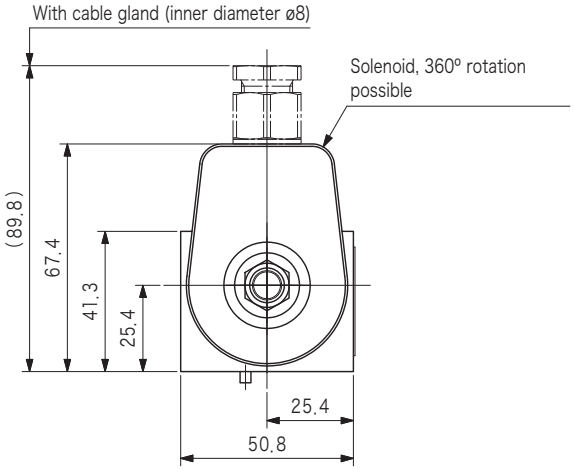
● Mounting bolts must be ordered separately.
● Tightening torque of mounting bolts: 8 to 10 N•m

Dimensions

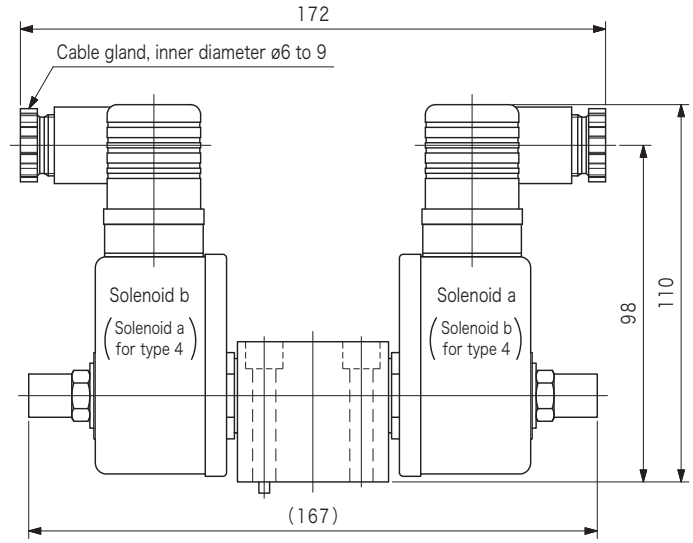
Spring Centered DG4M4−3∗C
No Spring DG4M4−32

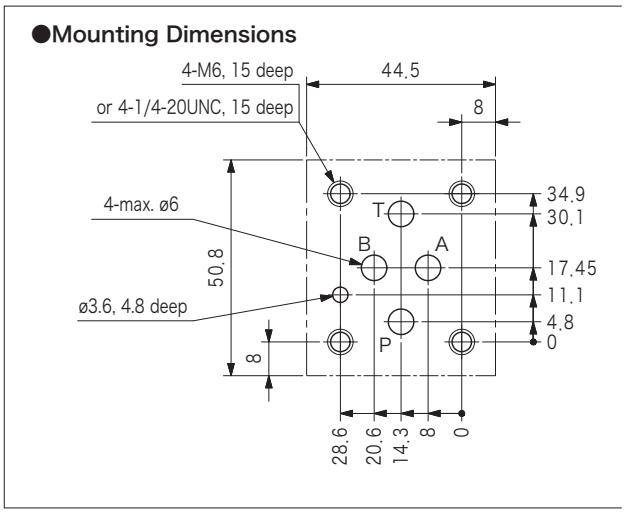




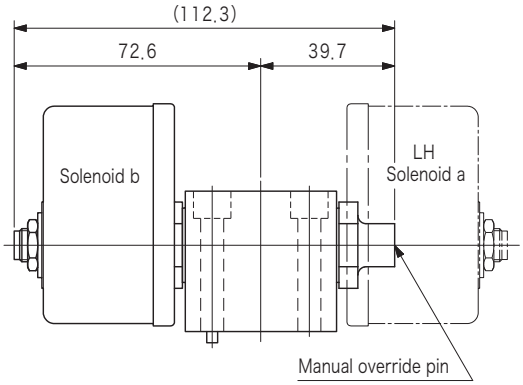


With Indicator Lamp (Option)

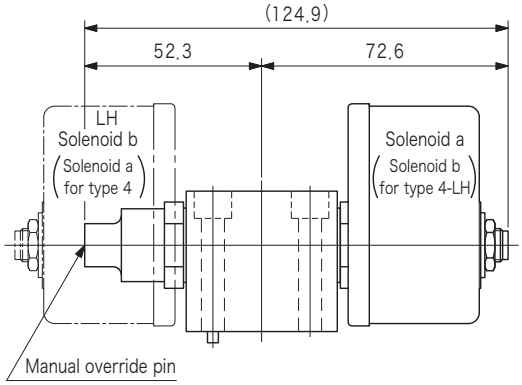




Spring Offset, A Type DG4M4−32A

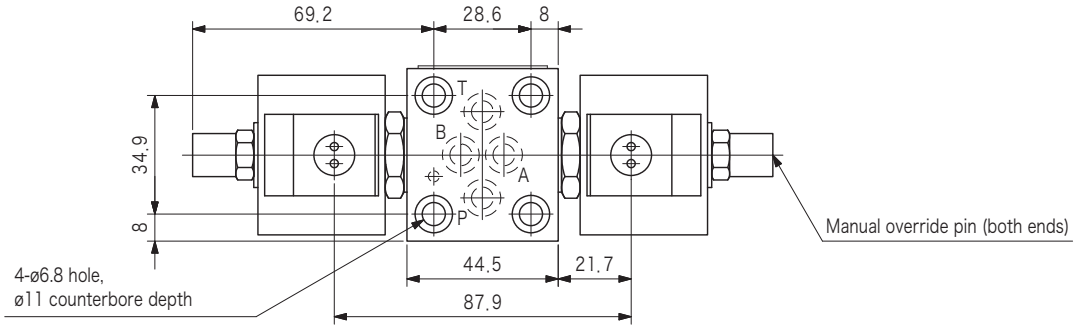


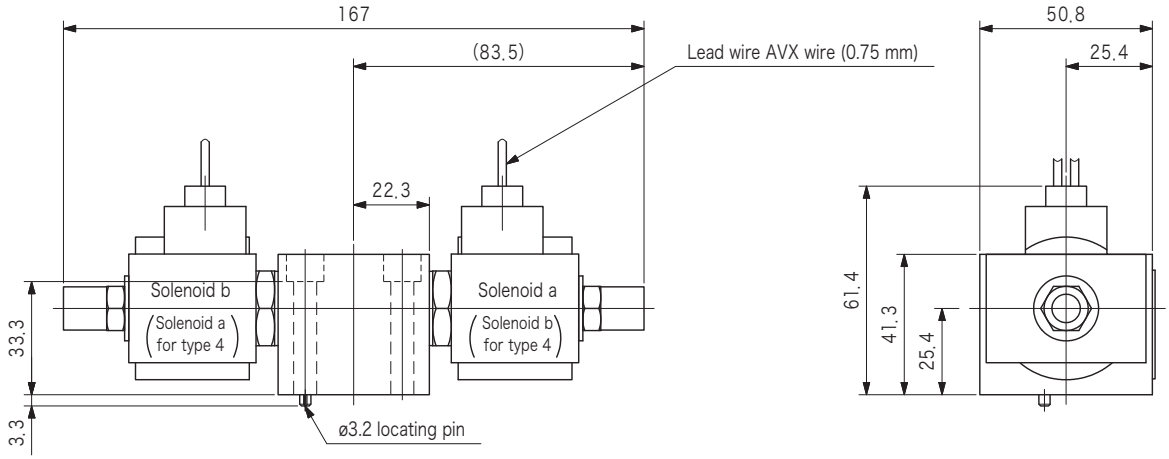
Spring Offset, B Type DG4M4−3∗B



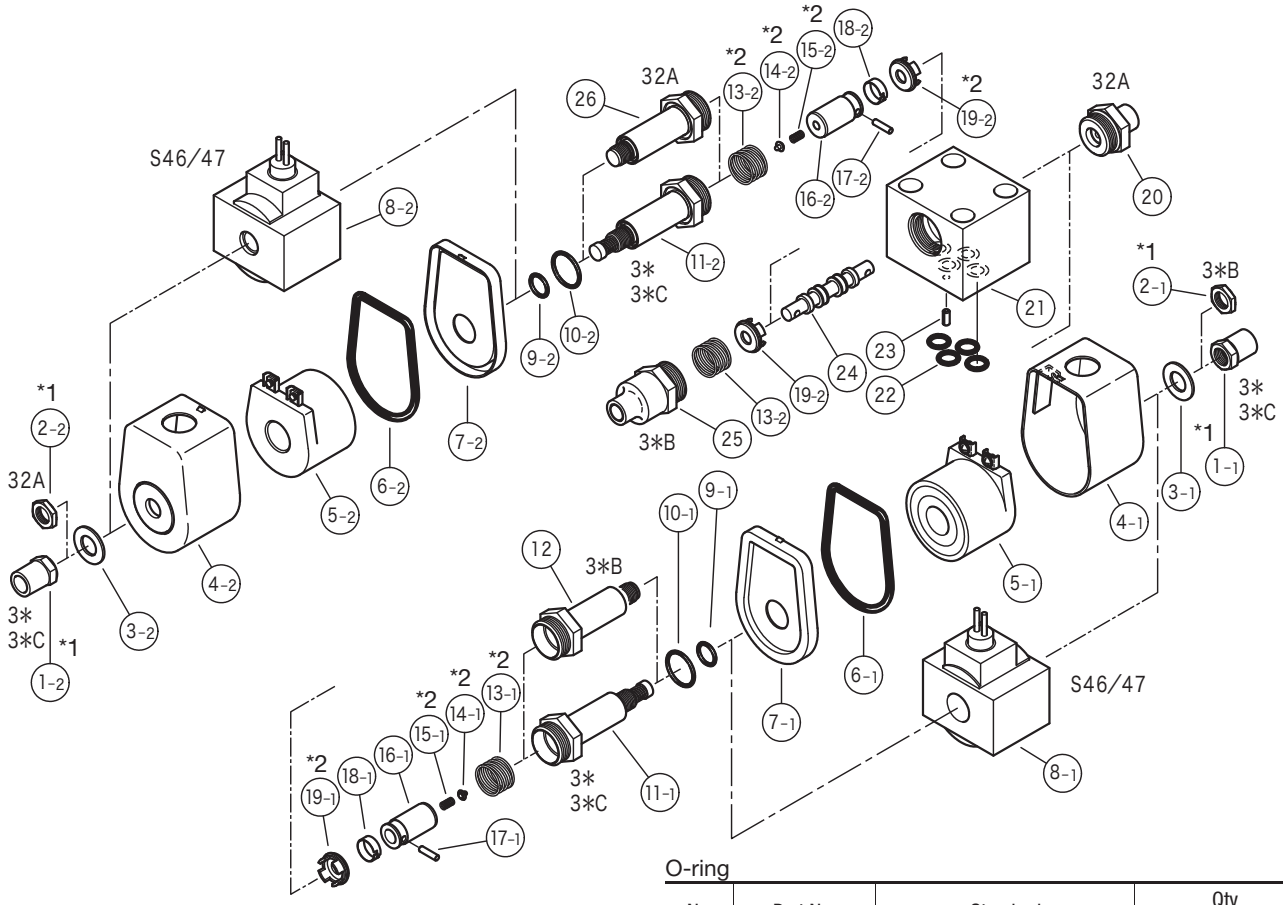
Dimensions

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





Construction



O-ring

No.	Part No.	Standard	Qty	
			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

Note:
*1 Tightening torque of <1> and <2> nuts: 4 to 6 N•m
*2 <13>, <14>, <15> and <19> are not used with no spring types.