Product Data Sheet
February 2017
SD 4500-2E08

Damcos Solenoid Valves

Solenoid Operated Directional Control Valve

DAMCOS™

EMERSON™

Description

Basically, these solenoid operated directional control valves are for directing and stopping flow at any point in a hydraulic system.

- Efficient control of greater hydraulic powers without increasing solenoid power consumption.
- Installed cost and space savings from higher power/ weight-and-size ratio.
- Reduced internal leakage reduces power losses, increases system efficiency: the result of improved manufacture of spools and bores.
- Installation flexibility resulting from choice of numerous combinations of solenoid connectors and locations.
- Multi-fluid capability without need to change seals.
- Higher sustained machine productivity and higher up-time because of proven fatigue life and endurance, tested over 20 million cycles.

Features

Very long life
The movable iron core of the wet type solenoid is immersed in oil, which keeps it lubricated and cushions it from impact and vibration, ensuring very long life.

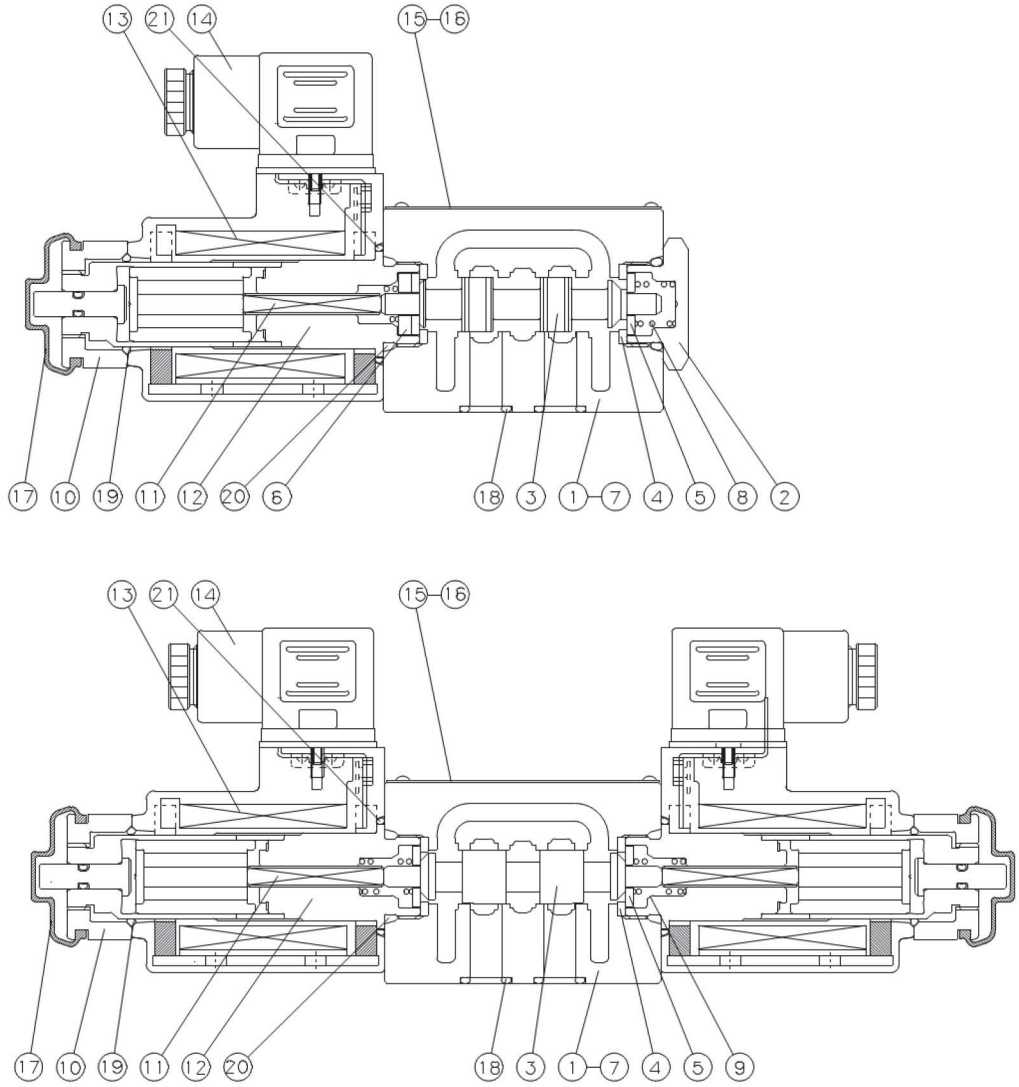
Low switching noise
The wet-type solenoid valve provides very low core switching noise, for quiet operation.

No surge voltage
Sparking and surge voltage during solenoid switching is canceled for stable switching (Option G).

Easy coil replacement
A DIN connector type coil enables one-touch coil replacement.

Wide-ranging backward compatibility makes it simple to replace previous valve models with this one
Combining this valve with a modular valve contributes to the compact configuration of the overall device.

Cross-sectional drawing



Part no.	Part name	Part no.	Part name
1	Body	12	Solenoid guide
2	Plug	13	Solenoid coil
3	Spool	14	Connector(OPTION)
4	Retainer A	15	Nameplate
5	Retainer B	16	Screw
6	Retainer C	17	Cap
7	Spacer	18	O-ring
8	Spring A	19	O-ring
9	Spring C	20	O-ring
10	Nut	21	O-ring
11	Rod		

Specifications

SA-G01					
Solenoid type			AC-Solenoid	DC-Solenoid	
				Built-in rectifier	
			C*	E*	D*
Max. working pressure, P, A, B ports			350 bar		
Max. allowable backpressure, T-port			210 bar		
Maximum flow rate			80 LPM		
Maximum internal leakage			10 cc/min (at 135 bar, 30 cSt)		
Switches/min.			300	120	300
Option	Indicator light		R		
	Surgeless		G	-	G
	with manual push-button		N		
Weight (kg)	Double solenoid		1.8	2.0	
	Single solenoid		1.4	1.5	
Operating environ-ment	Dust resistance / Water resistance rank		JIS C 0920 IP 65 (Dust-tight, waterjet-proof) (Note 1)		
	Ambient temperature		-20 to +60°C		
	Operating fluid	Temperature range	-20 to +70°C		
		Viscosity range	15 to 300 cSt		
		Filtration	25 microns or less		
Mounting bolt	Size x Length		M5 x 45 (Four)		
	Tightening torque		5 to 7 Nm (51 to 71 kgf.cm)		

Note 1: The power supply type for E* is IP 64 (dust-tight, splash-proof)

Note 2: For mounting bolts use 12T or equivalent.

Notes

1. Pipe system so that tank line is always filled with oil.
2. Surge pressure should be kept below maximum tank line back pressure rating.
3. When using a 4-way valve as a 2-way or 3-way and blocking unused ports lowers the maximum flow.
4. Keep hydraulic oil clean. (Degree of contamination: NAS grade 12 or better). See Damcos flushing recommendation for the system.
5. When petroleum hydraulic oil is used, it should conform to ISO VG32, 46. See Damcos oil recommendation for the system.
6. Do not exceed permissible voltage range of the coil used.
7. Do not supply electric power to the AC solenoid unless the coil is mounted to the valve.
8. Provide drain piping from the T port, when valve spool types are A2X, H2X, E2X.
9. If the changeover position is kept under high pressure for an extend-ed period, malfunctions may occur due to hydraulic lock. Please consult us when you have such application.
10. When the detent-type (E2X, E3X, E3Z) is used, we recom-mend that the electric power supply be continuous in order that the changeover position may be firmly maintained.
11. Resistance force against the manual override pin changes, depending on the back pressure of the tank line.
12. Solenoid coil could be hot by continuous operation. Do not touch the coil directly by hand.
13. Gasket dimension : ISO 4401-03-02-0-94

Solenoid Assembly Specification

Solenoid type	Power supply type	Voltage (V)	Frequency (Hz)	For SA-G01				
				Solenoid coil type	Drive current (A)	Holding current (A)	Holding power (W)	Allowable votage range (V)
AC	C1	AC 100	50	EAC64-C1	2.2	0.52	25	80 to 110
			60		2.0	0.38	22	90 to 120
		AC 110	60		2.2	0.46	28	
	C115	AC 110	50	EAC64-C115	2.0	0.47	25	90 to 120
			60		1.8	0.35	22	100 to 130
		AC 115	60		2.0	0.42	28	
	C2	AC 200	50	EAC64-C2	1.1	0.26	25	160 to 220
			60		1.0	0.19	22	180 to 240
		AC 220	60		1.1	0.23	28	
	C230	AC 220	50	EAC64-C230	1.0	0.24	28	180 to 240
			60		0.91	0.17	25	200 to 260
		AC 230	60		1.0	0.21	22	
DC with built-in rectifier	E1	AC 100	50/60	EAC64-E1-1A	0.31		27	90 to 110
	E115	AC 110	50/60	EAC64-E115-1A	0.26		25	100 to 125
		AC 115			0.27		27	
	E2	AC 200	50/60	EAC64-E2-1A	0.15		26	180 to 220
	E230	AC 220	50/60	EAC64-E230-1A	0.12		24	200 to 250
		AC 230			0.13		27	
DC	D1	DC 12	-	EAC64-D1-1A	2.2		26	10.8 to 13.2
	D2	DC 24	-	EAC64-D2-1A	1.1		26	21.6 to 26.4

Understanding Model Numbers

SA – G 01 – A 3 X - ** - C2 – 31 ES

- **ES** — Low internal leakage (customer name : EMERSON)
- **31** — Design number
- **C2** — Power supply
  - C : AC (50/60Hz) C1=AC100V C115=AC110V/115V C2=AC200V C230=AC220V/230V
  - D : DC D1=DC12V D2=DC24V
  - E : AC (Built-in rectifier; 50/60Hz) E1=AC100V E115=AC110V/115V E2=AC200V E230=AC220V/230V
- ****** — Auxiliary symbol (Can be combined alphabetic sequence.)
  - GR : Surgeless type with indicator (Available with power supply C*, D*)
  - N : With manual push-button
  - R : With indicator light
- **X** — Transition Flow Path (Specify for A2X, H2X, E2X, *3*, C7Y only)

X	Y	Z
Closed	Semi-open	Open

- **3** — Center position

0	1	2	3	4	5
6	7	8	9	1S	6S

Note 1: P=Pressure port; A and B=Connection port to cylinder, etc; T(R)=Connection port to tank

- **A** — Operation Method

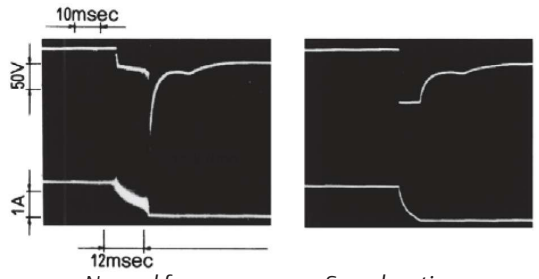
A	H	C	E
Spring Offset		Spring Center	Detent

- **01** — Nominal diameter (01 size)
- **G** — Mounting method: G: Cascade mounting
- **SA** — Wet type solenoid operated directional control valve with DIN connector

Options

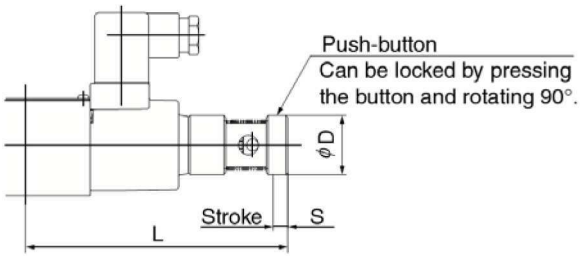
Surgeless type (Auxiliary symbol: G)

The surge pressure waveforms when the DC solenoid valve power supply is opened and closed by a relay are shown at the bottom of this block. A built-in surge absorber element eliminates sparking and surge pressure.



Normal form *Surgeless time*

With manual push-button (Auxiliary symbol: N)



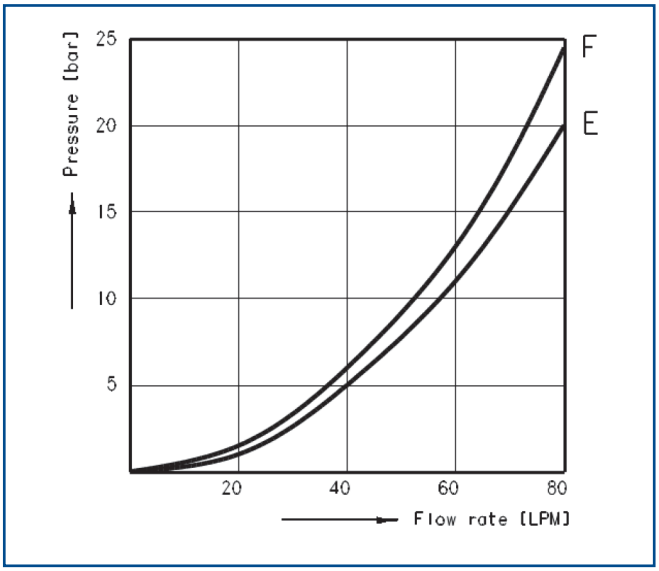
Model no.		L	S	D
SA-G01	AC Solenoid	133.5	7.5	30
	DC solenoid	140.5	9.5	35

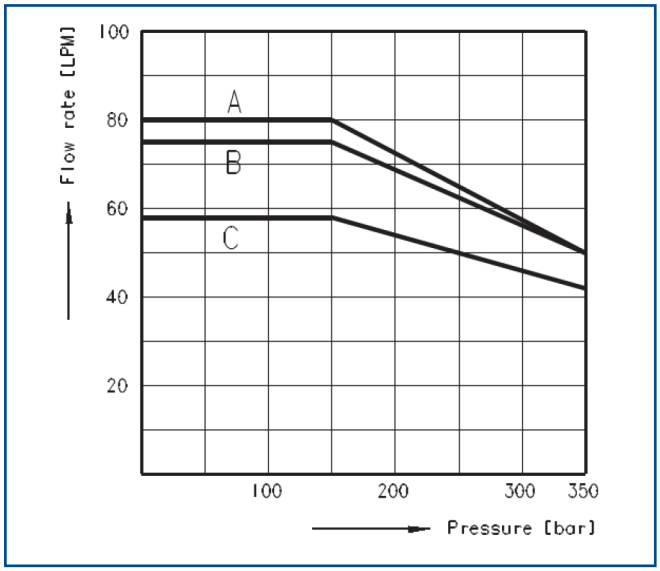
Performance Curves

Hydraulic Operating Fluid Viscosity 32cSt.

Pressure Loss Characteristics					
Type	Spool type	Connections			
		P→A	P→B	A→T	B→T
		Curves on the graph			
SA-G01	A3X, H3X	E	E	E	E
	E3X	F	F	F	F
	C6S	F	F	F	F

Pressure-Flow Volume Allowable value		
Type	Spool type	Curve
SA-G01	A3X, H3X	A
	E3X	B
	C6S	C





Switching Response Time			
Model no.	Response time (sec)		Measurement Conditions
	Solenoid ON	Spring return	
SA-G01-**-(GR)-30ES	0.02 to 0.03	0.02 to 0.03	140 bar 30 LPM
SA-G01-**-(GR)-D*-30ES	0.03 to 0.04	0.02 to 0.04	
SA-G01-**- (R)-E*-30ES	0.03 to 0.04	0.07 to 0.10	

Dimensions

AC Solenoid

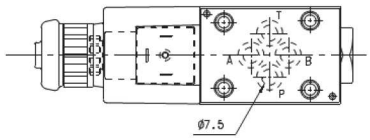
SA-G01-A**-*-C*-30ES

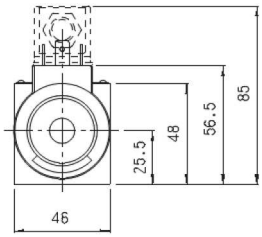
SA-G01-H**-*-C*-30ES

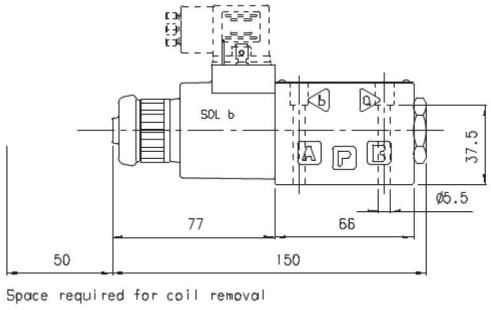
Note!

SA-G01- H**-R-**-30ES

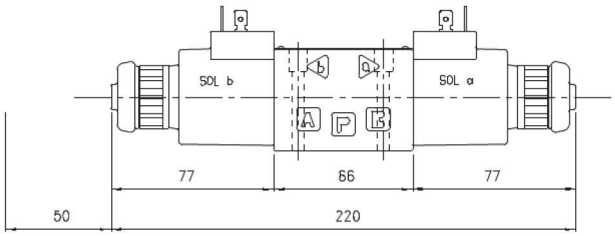
The solenoid is on the opposite side of that shown for Sol a in the illustrations shown here.







Space required for coil removal



Space required for coil removal

SA-G01-C**-R-C*-30ES

SA-G01-3**-R-C*-30ES

DC Solenoid

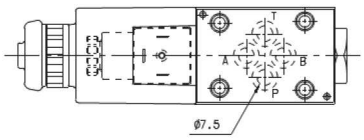
SA-G01-A**-*-D*/E*-30ES

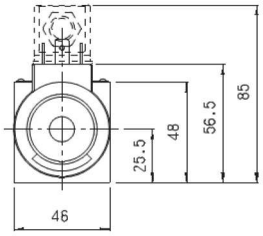
SA-G01-H**-*-D*/E*-30ES

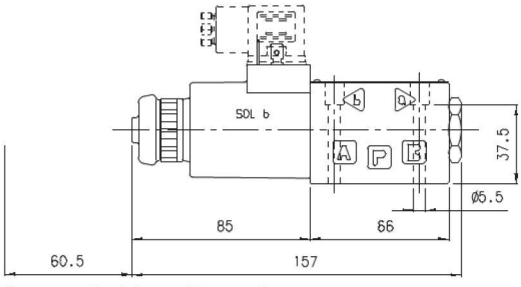
Note!

SA-G01- H**-*-D*/E*-30ES

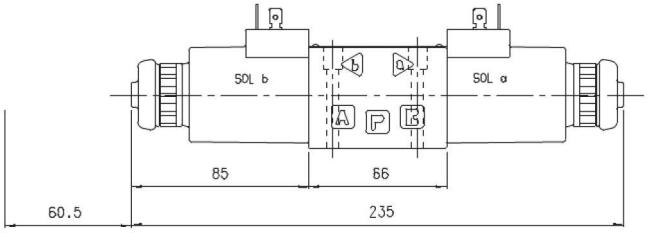
The solenoid is on the opposite side of that shown for Sol a in the illustrations shown here.







Space required for coil removal

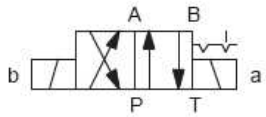
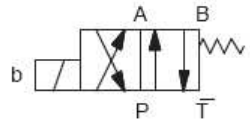
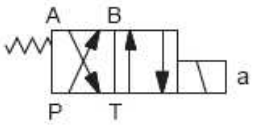
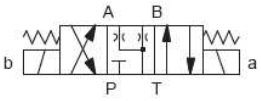


Space required for coil removal

SA-G01-A**-*-D*/E*-30ES

SA-G01-H**-*-D*/E*-30ES

Ordering

Part no.	Description	Type	Symbol
160L8050	Solenoid Valve 4/2-1-0 24 V DC	SA-G01-E3X-G-D2-31ES	
160L8051	Solenoid Valve 4/2-1-0 110/115 V AC 50/60	SA-G01-E3X-C115-31ES	
160L8053	Solenoid Valve 4/2-1-0-S 220/240 V AC 50/60	SA-G01-E3X-C230-31ES PPS	
160L8054	Solenoid Valve 4/2-2-0 24 V DC	SA-G01-A3X-G-D2-31ES	
160L8055	Solenoid Valve 4/2-2-0 110/115 V AC 50/60	SA-G01-A3X-C115-31ES	
160L8057	Solenoid Valve 4/2-2-0-S 220/240 V AC 50/60R	SA-G01-A3X-C230-31ES PPS	
160L8058	Solenoid Valve 4/2-3-0 24 V DC	SA-G01-H3X-G-D2-31ES	
160L8059	Solenoid Valve 4/2-3-0 110/115 V AC 50/60	SA-G01-H3X-C115-31ES	
160L8061	Solenoid Valve 4/2-3-0-S 220/240 V AC 50/60	SA-G01-H3X-C230-31ES PPS	
160L8062	Solenoid Valve 4/3-4-0 24 V DC	SA-G01-C6S-G-D2-31ES	
160L8063	Solenoid Valve 4/3-4-0 110/115 V AC 50/60	SA-G01-C6S-C115-31ES	
160L8068	Solenoid Valve 4/3-4-0-S 220/240 V AC 50/60	SA-G01-C6S-C230-31ES PPS	
160L8070	Lock for manual override	EDB14-D-ES (for AC voltage)	See “With manual push-button (Auxiliary symbol: N)” on page 6.
160L8071	Lock for manual override	EDB14-A-ES (for DC voltage)	