

Powering Business Worldwide

Solenoid Operated Directional Valve

DG4V-3M-65 Design

General Description

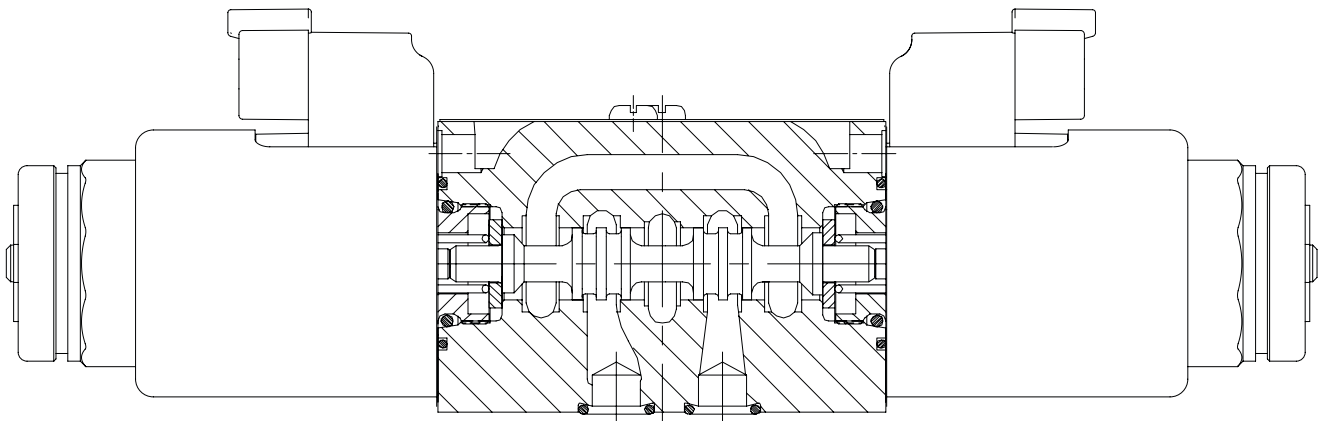
Solenoid operated directional control valves are for directing and stopping flow at any point in a hydraulic system.

- Efficient control of greater hydraulic powers without increasing solenoid power consumption.
- Installed cost and space savings from higher power/weight-and-size ratios.
- Installation flexibility resulting from choice of numerous combinations of solenoid connectors and locations.

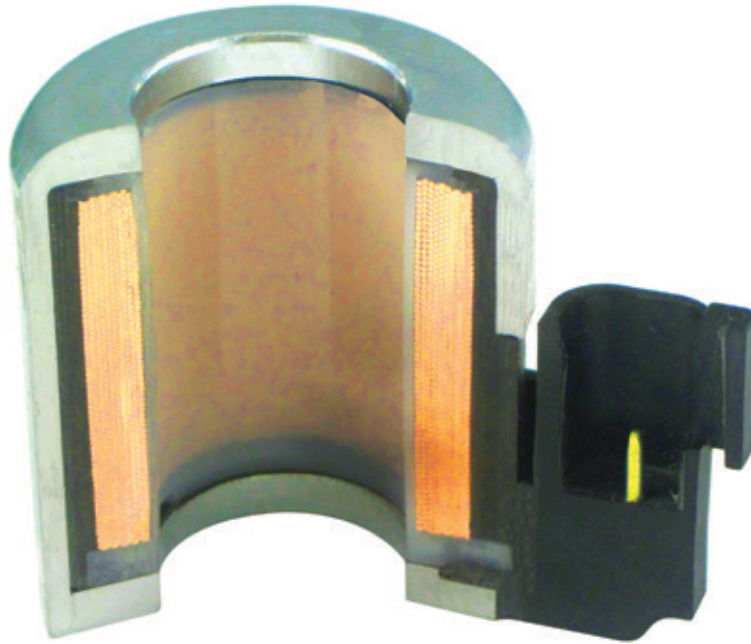
- Viton seals as standard for multi-fluid capability. Nitrile seals available as a model code option.
- Higher sustained Machine productivity and higher uptime because of proven fatigue life and endurance, tested over 20 million cycles.
- Solenoid coils can be changed quickly and easily without leakage from hydraulic system.
- Compact, cost effective system design when used with Eaton® SystemStak™ valves and subplates.

DG4V-3M High Performance Valves

- Minimum pressure drop 2.5 bar at 30 l/min.
 - Range of coil connectors including DIN and Deutsch.
 - Range of coil voltages and power options.
 - Up to 80 l/min (21 USgpm) and up to 40 l/min (10.5 USgpm) respectively at 350 bar (5000 psi).
 - Offers designers the opportunity to select the optimum value package for each application.
- International standard interface. The valve mounting face conforms to ISO 4401, size 03 and is compatible with related international standards.
 - Rigorous coil tests for added protection against physical and environmental damage. Details on page R-3.
 - Rated to IP69 best in the class



Eaton Tough Coils



You can rely on Eaton ToughCoils™

OEM's strive to build dependable machines that get the job done without interruption – no matter the conditions. Our solenoid operated directional control valves matched with our new ToughCoils™ provides industry leading environmental protection and performance in a compact and rugged package.

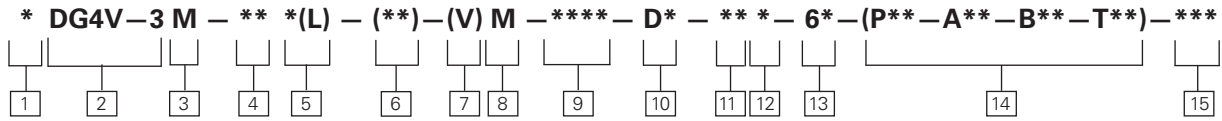
Electro-hydraulic components are being utilized in an array of off-highway and industrial applications. Electrical winding integrity is critical. ToughCoils™ are encapsulated in a plastic surrounding by a one-piece deep drawn metal frame. With an IP69K rating (Deutsch type only), it has the highest ingress protection from dust and water. Most valve coils in the market only meet an ingress protection (IP) rating of 65.

ToughCoils™ have also passed Eaton's own rigorous tests for added protection against physical and environmental damage:

- Extreme heat
- Thermal shock dunk
- Extended vibration test
- Salt fog
- Ice
- Bench handling
- Combined environment test
- Particle impact

Flexible Mounting - ToughCoils™ can be reversed mounted and rotated to any degree allowing more wiring flexibility in difficult locations

Model Code



1 Seal Type

Blank – Viton
F6 – Buna Nitrile/High CAN

2 Model series

4 – Solenoid operated
V – Pressure rating 350 bar (5000 psi) on P, A & B ports
3 – ISO4401 Size 03

3 Performance

M – Mobile high performance

4 Spool Type

Please refer functional symbols on Page 5 for spool types.

5 Spool Spring Arrangement

A – Spring offset, end-to-end
AL – Same as “A” but left hand build
B – Spring offset, end to center
BL – Same as “B” but left hand build
C – Spring centered
N – No-spring detented

6 Manual Override Option

Blank – Plain override(s) in solenoid end(s) only ▲
H – Water-resistant override(s) on solenoid end(s) ▲
Z – No overrides at either end

▲ No override in non-solenoid end of single solenoid valves

7 Solenoid Energization Identity

Blank – None
V – Solenoid “A” is at port “A” end and/ or solenoid “B” is at port “B” end, independent of spool type

NOTE: Used to select the identification of the solenoid. Refer to table on page 4.

8 Flag Symbol

M – Electrical options and features

9 Coil Type

U – ISO4400, DIN43650 connector
U1 – ISO4400 fitted with PG11 plug
KUP5 – Integral Deutsch connector

10 Surge Suppressor/Damper

D – Zener Diode

See Page12 for circuit details

11 Coil Rating

G – 12V DC
GL – 12V DC
H – 24V DC
HL – 24V DC

12 Tank Pressure Rating

Refer to “Operating Data” for port T pressure ratings.
7 – 207 bar (3000 psi)

13 Design Number

65 – Basic design

14 Orifice Plug

00 – No orifice required
03 – 0.3 mm dia.
06 – 0.6 mm dia.
08 – 0.8 mm dia.
09 – 0.9 mm dia.
10 – 1.0 mm dia.
13 – 1.3 mm dia.
15 – 1.5 mm dia.
20 – 2.0 mm dia.
23 – 2.3 mm dia.

15 Reverse Coil Option

RC – Both Coils reversed
RCA – A Coil Reversed
RCB – B coil reversed

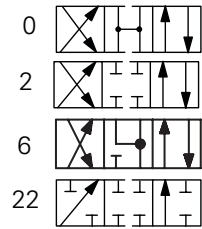
NOTE: See page 10.

Functional Symbols

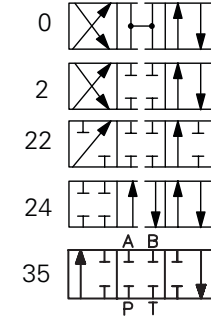
Spool Options

The valve function schematics apply to both U.S. and European valves.

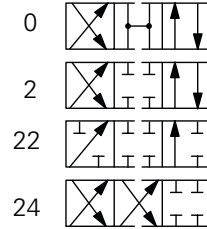
DG4V-3(S)-*NV



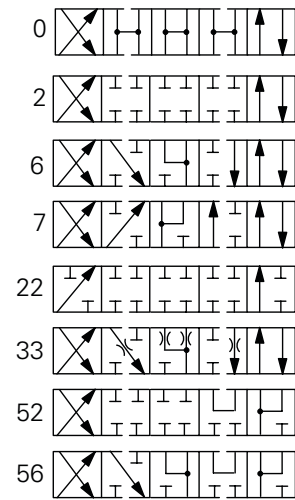
DG4V-3(S)-*AV



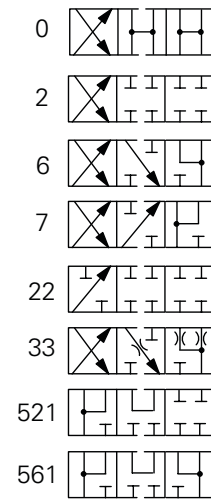
DG4V-3(S)-*ALV



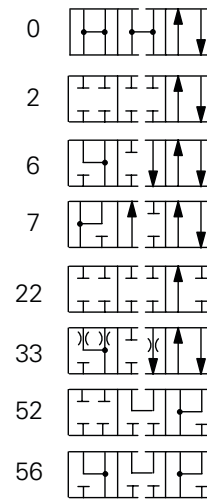
DG4V-3(S)-*CV



DG4V-3(S)-*BV



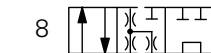
DG4V-3(S)-*BLV



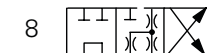
DG4V-3(S)-8CV



DG4V-3(S)-8BLV



DG4V-3(S)-8BV

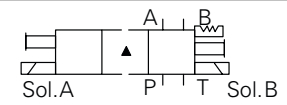
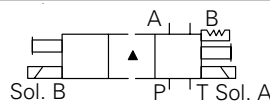


Solenoid Identified to US and European Standards

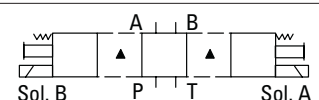
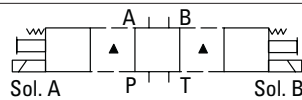
U.S. Solenoid Standard

European Solenoid Standard (specify "V" in the model code at position 7 on page 3)

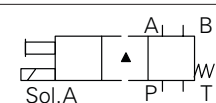
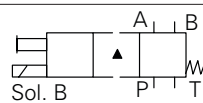
Double solenoid valves, two position, detented



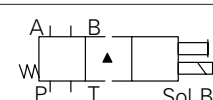
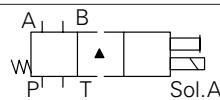
Double solenoid valves, spring centered



Single solenoid valves, solenoid at port A end



Single solenoid valves, solenoid at port B end



▲ Transient condition only

Operating Data

Feature	DG4V-3M
Pressure Limits P, A and B ports	350 bar (5075 psi)
T port:	210 bar (3045 psi)
Flow rating	See performance data
Relative duty factor	Continuous; ED = 100%
Type of protection: ISO 4400 coils with plug fitted correctly	IP69K for Deutsch type IP65 for DIN type
Coil winding	Class H
Coil encapsulation	Class F
Permissible voltage fluctuation:	
Maximum	Refer to temperature limits.
Minimum	90% rated
Typical response times at 100% rated volts measured from application/removal of voltage to full spool displacement of "2C" spool at:	
Flow rate P-A, B-T	20 l/min (5.3 USgpm)
Pressure	175 bar (2537 psi)
AC (~) energizing	18 ms
AC (~) de-energizing	32 ms
DC (=) energizing	60 ms
DC (=) de-energizing	40 ms

Power consumption, DC solenoids at rated voltage and 20 C (68 F).

Full power coils:

12V, model type "G"	30W
24V, model type "H"	30W

Low power coils:

12V, model type "GL"	18W
24V, model type "HL"	18W

▲ 1st half cycle; armature fully retracted.

Performance Data

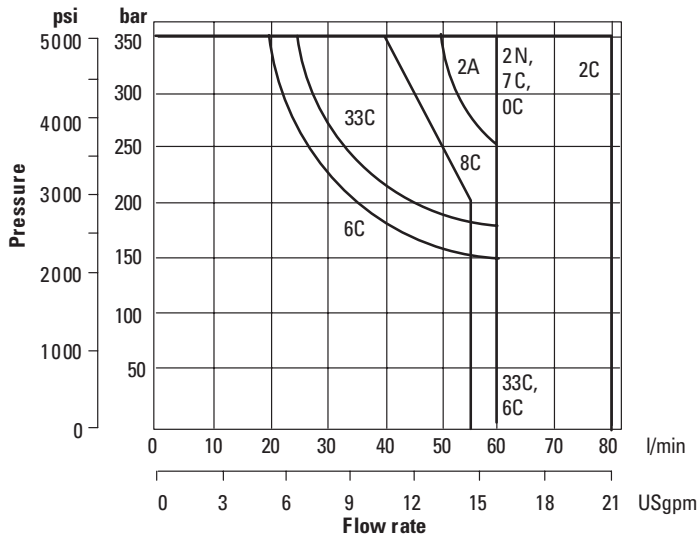
Typical with mineral oil at 36 cSt (168.6 SUS) and a specific gravity of 0.87.

Maximum flow rates

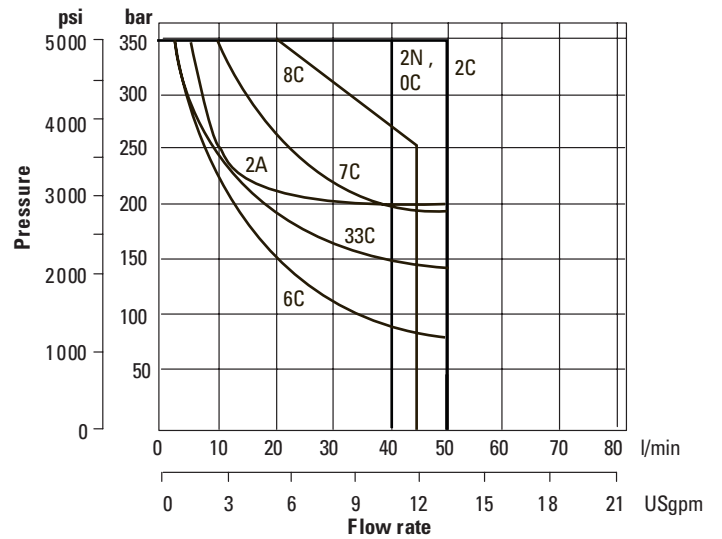
Performance based on full power solenoid coils warm and operating at 90% rated voltage.

R

HType Solenoid- 30W

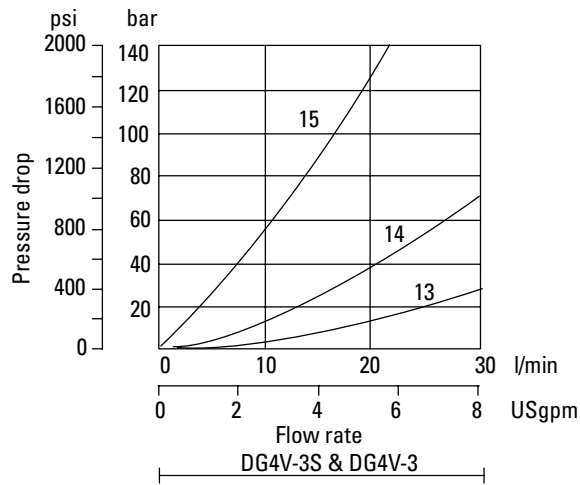
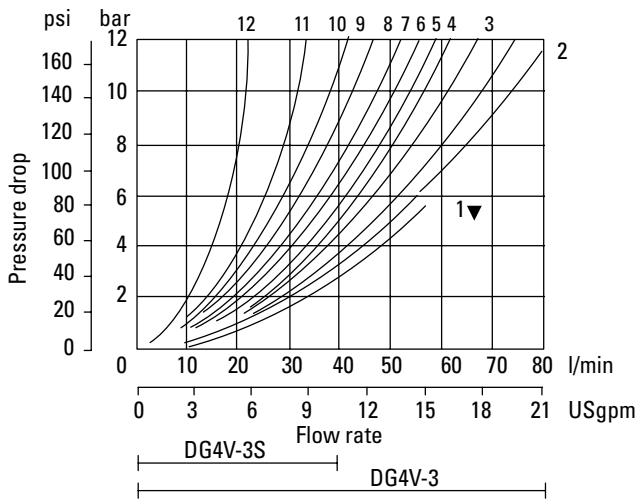


HLType Solenoid- 18W- (Optional)



Performance Data

Pressure drops



▼ Curve for spool type 6: not recommended for flows in excess of 60 l/min (15.8 USgpm).

Pressure drops in offset positions except where otherwise indicated

Spool/spring code	Spool positions covered	P to A	P to B	A to T	B to T	P to T	B to A or A to B
0A(L)	Both	5	5	2	2	—	—
0B(L) & 0C	De-energized	—	—	—	—	4▲▲	—
	Energized	4	4	2	2	—	—
2A(L)	Both	6	6	5	5	—	—
2B(L) & 2C	Energized	5	5	2	2	—	—
2N	Both	6	6	3	3	—	—
6B(L) & 6C	De-energized	—	—	3▲	3Δ	—	—
	Energized	6	6	1	1	—	—
7B(L) & 7C	De-energized	6▲	6Δ	—	—	—	7○
	Energized	4	4	3	3	—	—
8B(L) & 8C	All	9	9	5	5	3	—
22A(L), 22B(L) & 22C	All	6	6	—	—	—	—
24A(L)	De-energized	6	6	2	2	—	—
33B(L) & 33C	De-energized	—	—	15▲	15Δ	—	—
	Energized	5	5	2	2	—	—
52BL & 52C	Energized	6▲	6Δ	2	—	—	10○
56BL	Both	6▲	6Δ	11▲	10Δ	—	10○
56C	De-energized	—	—	11▲	10Δ	—	10○
	Energized	6▲	6Δ	2	—	—	10○
521B	All	6▲	6Δ	—	—	—	10○
561B	De-energized	—	—	10▲	11Δ	—	10○
	Energized	6	6Δ	—	—	—	10○

▲ "B" plugged Δ "A" plugged ○ "P" plugged

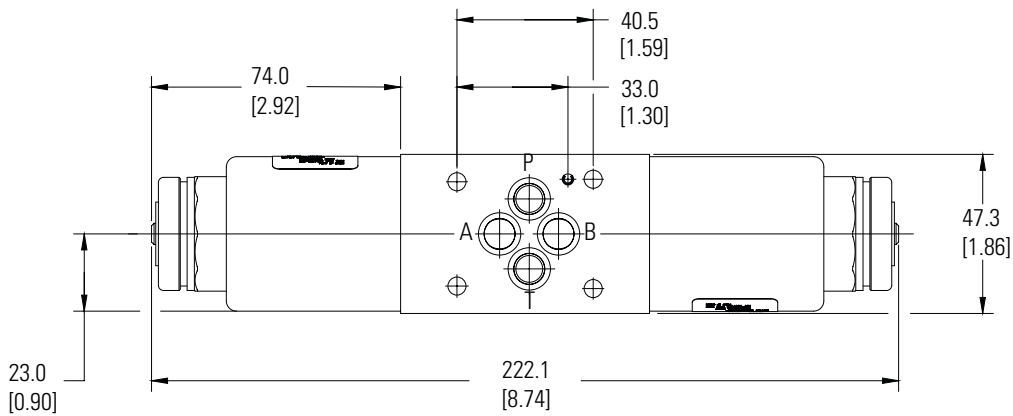
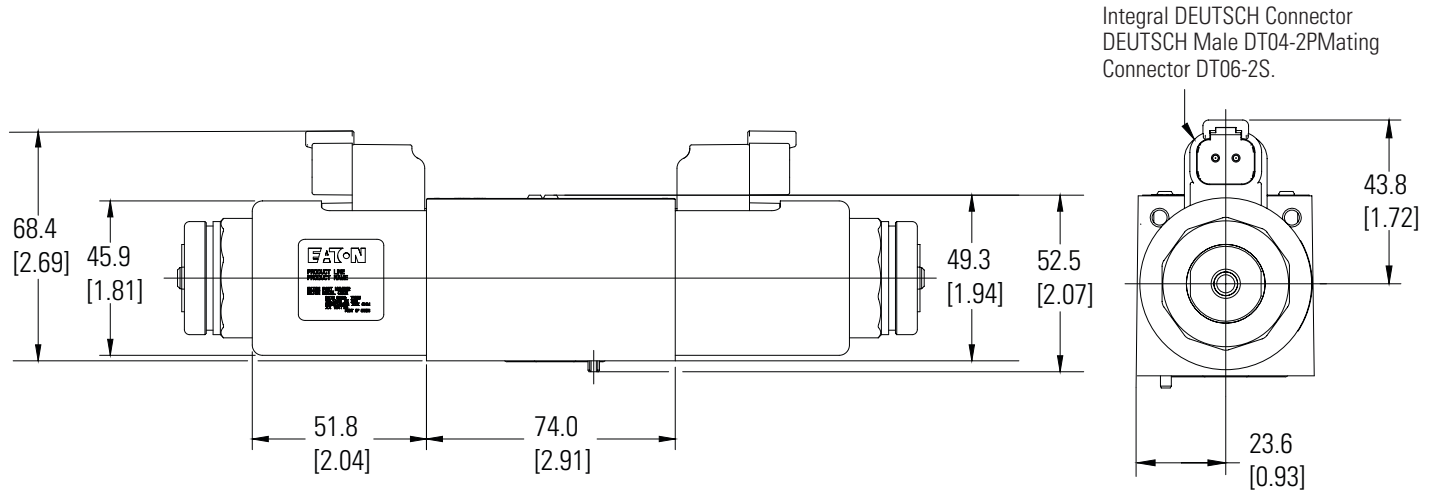
For other viscosities, pressure drops approximate to:

Viscosity cSt (SUS)						
14	20	43	54	65	76	85
(17.5)	(97.8)	(200)	(251)	(302)	(352)	(399)
% of Δp						
81	88	104	111	116	120	124

A change to another specific gravity will yield an approximately proportional change in pressure drop.

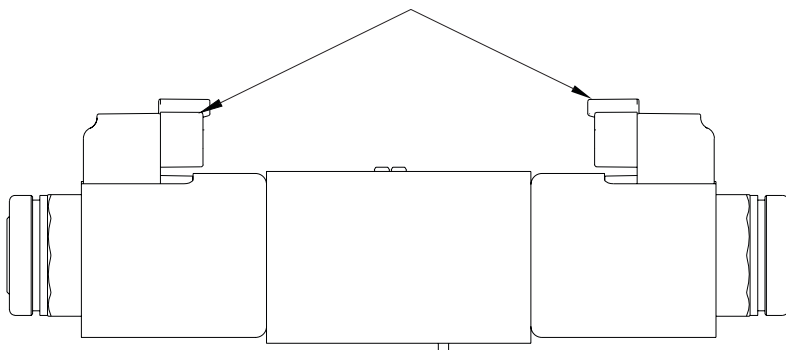
The specific gravity of a fluid may be obtained from its producer. Fire resistant fluids usually have higher specific gravities than oil.

Installation Dimension



DG4V-3M-0C-M- KUP5-G7-65

Reversed Coil at both sides



DG4V-3M-0C-M-KUP5-G7-65-RC

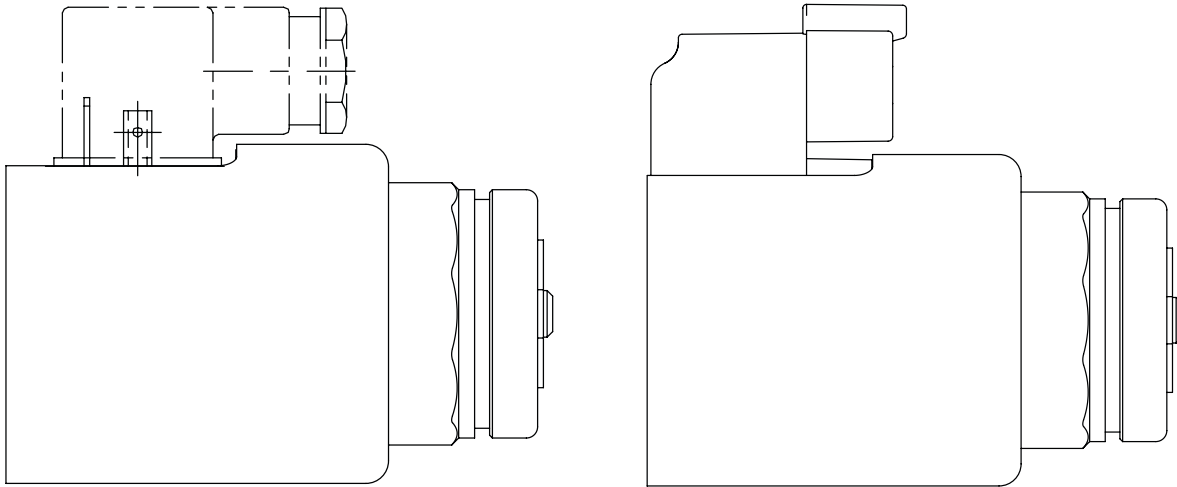
Note: Option RCA will have Coil at A port reversed and Option RCB will have coil at B port reversed.

Coils and Connectors

U/U1

KUP5

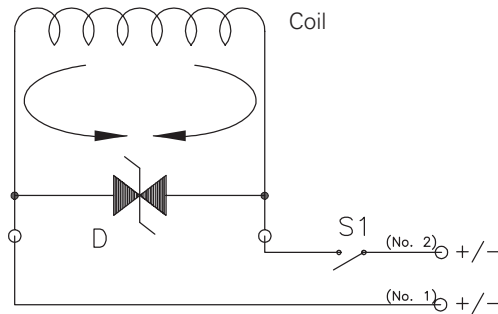
R



Surge Suppression Device Bi-directional Zener Diode (D)

Zener diode in parallel with coil. When switch (S1) is opened, the energy stored in the coil is trapped and dissipated by the diode (D) and the coil resistance.

- The Zener makes exact limitation of inductive spikes.
- Polarity insensitive.



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