

# Solenoid operated valve



## Features

- Realized high pressure and large flow rate such as 35MPa {350kgf/cm<sup>2</sup>}, 100L/min. (G02), 160L/min. (G03).
- Mostly suits for the structure not only with dust-proof and water-proof complying with IEC Pub529 IP65, but also coping with Europe safety standards (CE).

## Nomenclature

\* - **KSO** - **G** \*\* - \*\* \* \* - \*\* - \*\*\* - \*\*\*

1 2 3 4 5 6 7 8 9 10

### (1) Nomenclature of applied fluid

No mark : Working oil with petroleum contents  
H : Working oil with water / glycol contents  
F : Working oil with phosphoric acid ester

### (2) Model No.

KSO : K series solenoid operated valve

### (3) Connections

G : Gasket attached type

### (4) Nominal diameter

02 : 1/4

03 : 3/8

### (5) Spool method (refer to model list)

### (6) Spool operating systems

C : Spring center type  
A : Spring off-set type (with SOLa)  
B : Spring off-set type (with SOLb)  
N : No spring type (without detente)  
D : No spring type (with detente)

### (7) Voltage mark (refer to solenoid specifications table)

### (8) Design number (design number is subject to change)

20 : Nominal diameter 03 (3/8)

30 : Nominal diameter 02 (1/4)

### (9) Option mark (refer to the option mark list)

### (10) Auxiliary spool symbol (refer to the model list)

## Specifications

| Model No. | Nom. Dia. | Max. operating pressure<br>MPa {kgf/cm <sup>2</sup> } | Max. flow rate<br>L/min | Permissible back pressure<br>MPa {kgf/cm <sup>2</sup> } | Max. switching frequency |                |                                               | Insulation skin |
|-----------|-----------|-------------------------------------------------------|-------------------------|---------------------------------------------------------|--------------------------|----------------|-----------------------------------------------|-----------------|
|           |           |                                                       |                         |                                                         | AC, DC                   | With rectifier | Surge killer built-in DIN connector with lump |                 |
| KSO-G02   | 1/4       | 35 {350}                                              | 100                     | 17.5 {175}                                              | 240                      | 120            | 100                                           | IEC Pub529 IP65 |
| KSO-G03   | 3/8       | (25 {250}) ★1                                         | 160 (DC), 130 (AC)      | 16 {160}                                                |                          |                | 60                                            |                 |

Note) ★1 Max. operating pressure: Spool symbol/operating method 5C, 66C or 51C is 25MPa {250kgf/cm<sup>2</sup>}.

## (7) : Solenoid specifications

### ● KSO-G02

| Voltage mark | Supply voltage | Starting amperes<br>A | Holding current<br>A | Holding power<br>W | Permissible volts variation<br>% | Voltage mark | Supply voltage        | Starting amperes<br>A | Holding current<br>A | Holding power<br>W | Permissible volts variation<br>% |
|--------------|----------------|-----------------------|----------------------|--------------------|----------------------------------|--------------|-----------------------|-----------------------|----------------------|--------------------|----------------------------------|
| A            | AC100V (50Hz)  | 2.42                  | 0.51                 | 21.5               | 80~110                           | M            | AC230V (50Hz)         | 1.05                  | 0.22                 | 21.5               | 80~110                           |
|              | AC100V (60Hz)  | 2.14                  | 0.37                 | 18                 | 90~121                           |              | AC230V (60Hz)         | 0.93                  | 0.16                 | 18                 | 90~120                           |
|              | AC110V (60Hz)  | 2.35                  | 0.44                 | 22.5               | 82~110                           |              |                       |                       |                      |                    |                                  |
| B            | AC200V (50Hz)  | 1.21                  | 0.26                 | 21.5               | 80~110                           | N            | DC12V                 | —                     | 2.35                 | 28.2               | 90~110                           |
|              | AC200V (60Hz)  | 1.07                  | 0.19                 | 18                 | 90~121                           | P            | DC24V                 | —                     | 1.22                 | 29.2               | 90~110                           |
|              | AC220V (60Hz)  | 1.18                  | 0.22                 | 22.5               | 82~110                           | Q            | DC48V                 | —                     | 0.61                 | 29.3               | 90~110                           |
| C            | AC110V (50Hz)  | 2.2                   | 0.46                 | 21.5               | 80~110                           | R            | DC100V                | —                     | 0.35                 | 34.8               | 90~110                           |
| D            | AC220V (50Hz)  | 1.1                   | 0.23                 | 21.5               | 80~110                           | S            | DC110V                | —                     | 0.32                 | 35                 | 90~110                           |
| J            | AC240V (50Hz)  | 1.01                  | 0.21                 | 21.5               | 80~110                           | T            | DC200V                | —                     | 0.18                 | 35.4               | 90~110                           |
|              | AC240V (60Hz)  | 0.89                  | 0.15                 | 18                 | 90~120                           | U            | DC220V                | —                     | 0.15                 | 33.6               | 90~110                           |
| K            | AC120V (50Hz)  | 2.02                  | 0.43                 | 21.5               | 80~110                           | E            | AC100V with rectifier | —                     | 0.38                 | 33.5               | 90~110                           |
|              | AC120V (60Hz)  | 1.78                  | 0.31                 | 18                 | 90~120                           | F            | AC110V with rectifier | —                     | 0.34                 | 32.8               | 90~110                           |
| L            | AC115V (50Hz)  | 2.1                   | 0.44                 | 21.5               | 80~110                           | G            | AC200V with rectifier | —                     | 0.2                  | 36.8               | 90~110                           |
|              | AC115V (60Hz)  | 1.86                  | 0.32                 | 18                 | 90~120                           | H            | AC220V with rectifier | —                     | 0.17                 | 34                 | 90~110                           |

## (7) : Solenoid specification table

### ● KSO-G03

| Voltage mark | Supply voltage | Starting amperes A | Holding current A | Holding power W | Permissible volts variation % | Voltage mark | Supply voltage        | Starting amperes A | Holding current A | Holding power W | Permissible volts variation % |
|--------------|----------------|--------------------|-------------------|-----------------|-------------------------------|--------------|-----------------------|--------------------|-------------------|-----------------|-------------------------------|
| A            | AC100V (50Hz)  | 5.7                | 0.88              | 37              | 80~110                        | M            | AC230V (50Hz)         | 2.5                | 0.35              | 37              | 80~110                        |
|              | AC100V (60Hz)  | 4.9                | 0.64              | 33              | 90~121                        |              | AC230V (60Hz)         | 2.1                | 0.26              | 33              | 90~120                        |
|              | AC110V (60Hz)  | 5.4                | 0.77              | 41              | 82~110                        |              |                       |                    |                   |                 |                               |
| B            | AC200V (50Hz)  | 2.9                | 0.44              | 37              | 80~110                        | N            | DC 12V                | —                  | 3.08              | 37              | 90~110                        |
|              | AC200V (60Hz)  | 2.4                | 0.32              | 33              | 90~121                        | P            | DC 24V                | —                  | 1.6               | 38              | 90~110                        |
|              | AC220V (60Hz)  | 2.7                | 0.39              | 41              | 82~110                        | Q            | DC 48V                | —                  | 0.77              | 37              | 90~110                        |
| C            | AC110V (50Hz)  | 5.2                | 0.74              | 37              | 80~110                        | R            | DC 100V               | —                  | 0.37              | 37              | 90~110                        |
| D            | AC220V (50Hz)  | 2.6                | 0.37              | 37              | 80~110                        | S            | DC 110V               | —                  | 0.34              | 37              | 90~110                        |
| J            | AC240V (50Hz)  | 2.4                | 0.34              | 37              | 80~110                        | T            | DC 200V               | —                  | 0.19              | 38              | 90~110                        |
|              | AC240V (60Hz)  | 2                  | 0.25              | 33              | 90~120                        | U            | DC 220V               | —                  | 0.17              | 38              | 90~110                        |
| K            | AC120V (50Hz)  | 4.8                | 0.68              | 37              | 80~110                        | E            | AC100V with rectifier | —                  | 0.42              | 37              | 90~110                        |
|              | AC120V (60Hz)  | 4.1                | 0.5               | 33              | 90~120                        | F            | AC110V with rectifier | —                  | 0.39              | 38              | 90~110                        |
| L            | AC115V (50Hz)  | 5                  | 0.7               | 37              | 80~110                        | G            | AC200V with rectifier | —                  | 0.2               | 36              | 90~110                        |
|              | AC115V (60Hz)  | 4.3                | 0.52              | 33              | 90~120                        | H            | AC220V with rectifier | —                  | 0.19              | 37              | 90~110                        |

Note) ○Current and power are at 20°C.

○The starting current is the value when the moving iron core is at farthest place.

| Time rating | Dielectric resistance | Dielectric characteristics | Insulation class                          |                          |
|-------------|-----------------------|----------------------------|-------------------------------------------|--------------------------|
|             |                       |                            | KSO-G02                                   | KSO-G03                  |
| Continuous  | 50 MΩ                 | AC1500V one min            | B class (Coils: AC: H class, DC: F class) | B class (Coils: H class) |

## (9) : Option mark table

| Option mark | Option' contents   |                                              |                                              |                          |                              | KSO-G02 | KSO-G03 | Note  |
|-------------|--------------------|----------------------------------------------|----------------------------------------------|--------------------------|------------------------------|---------|---------|-------|
| No mark     | Terminal box type  | With lump                                    | Without earth terminal                       | Coping with CE standards | Without surge killer         | ○       | ○       |       |
| N           |                    |                                              |                                              |                          | With surge killer            | ○       | ○       |       |
| NR          |                    |                                              |                                              |                          | Surge killer with resistance | ○       | ○       | ★2    |
| E           |                    |                                              | With earth terminal                          |                          | Without surge killer         | ○       | ○       | ★3    |
| EN          |                    |                                              |                                              |                          | With surge killer            | ○       | ○       | ★3    |
| ENR         |                    |                                              |                                              |                          | Surge killer with resistance | ○       | ○       | ★2, 3 |
| QR          |                    |                                              | With quick return circuit built-in rectifier |                          |                              |         | —       | ○     |
| C           | DIN connector type | Without lump                                 | With earth terminal                          |                          | Without surge killer         | ○       | ○       |       |
| CE          |                    |                                              |                                              | Coping with CE standards |                              | ○       | ○       | ★3    |
| CL          |                    |                                              |                                              |                          |                              | ○       | ○       |       |
| CLE         |                    | Coping with CE standards                     |                                              | ○                        | ○                            | ★3      |         |       |
| N-CL        |                    | With lump                                    |                                              |                          | With surge killer            | ○       | —       |       |
| N-CLE       |                    |                                              |                                              | Coping with CE standards |                              | ○       | —       | ★3    |
| CI          | DIN connector type | With quick return circuit built-in rectifier |                                              |                          |                              | ○       | ○       |       |
| L           | Lead wire type     | Without lump                                 | Without earth terminal                       |                          | Without surge killer         | ○       | ○       |       |
| 8           |                    | Set bolts: M8                                |                                              |                          |                              | —       | ○       |       |

Note) ★2 Applies only when the voltage mark is P.

★3 Products coping with CE standards are applied only when the voltage mark is A or P.

★4 Applies when the voltage mark is E, F, G, or H. Exclusive use driver is attached for this option. (One driver is attached to one solenoid).

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Model : SSQ-201 (Voltage mark : G, H)

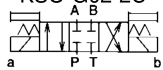
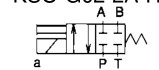
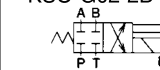
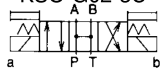
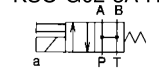
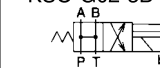
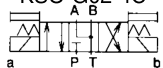
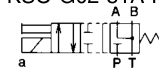
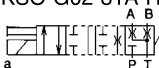
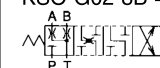
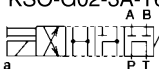
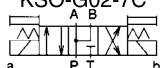
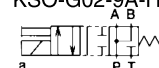
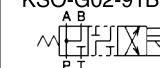
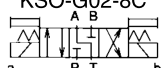
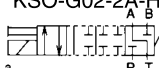
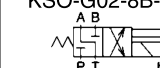
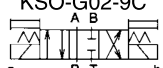
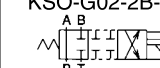
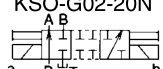
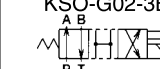
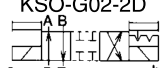
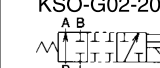
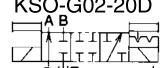
○If the options are doubled more than two, line up them in the alphabetical order.

## Weight (kg)

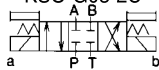
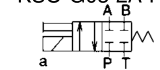
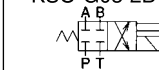
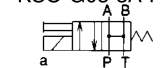
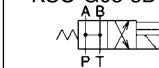
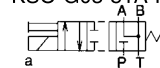
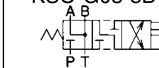
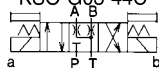
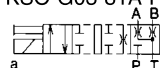
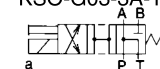
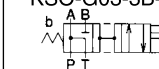
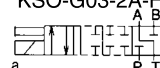
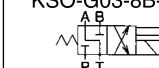
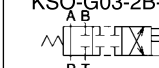
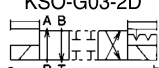
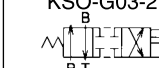
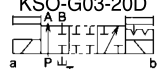
| Application        |                 | KSO-G02 |                    | KSO-G03 |                    |
|--------------------|-----------------|---------|--------------------|---------|--------------------|
|                    |                 | AC      | DC, with rectifier | AC      | DC, with rectifier |
| Terminal box type  | Double solenoid | 1.8     | 2.2                | 4.4     | 5.8                |
|                    | Single solenoid | 1.5     | 1.7                | 3.7     | 4.4                |
| DIN connector type | Double solenoid | 1.8     | 2.1                | 4.3     | 5.7                |
|                    | Single solenoid | 1.4     | 1.6                | 3.6     | 4.3                |
| Lead wire type     | Double solenoid | 1.7     | 2                  | 4.3     | 5.7                |
|                    | Single solenoid | 1.4     | 1.5                | 3.6     | 4.3                |

# (5)(10) : Model list

## ● KSO-G02

| Model code                                                                                         |                                                                                                      |                                                                                                      |
|----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| JIS hydraulic symbols                                                                              |                                                                                                      |                                                                                                      |
| Spool operating method                                                                             |                                                                                                      |                                                                                                      |
| C, N, D type                                                                                       | A type                                                                                               | B type                                                                                               |
| KSO-G02-2C<br>    | KSO-G02-2A-H2<br>   | KSO-G02-2B-2T<br>   |
| KSO-G02-3C<br>    | KSO-G02-3A-H3<br>   | KSO-G02-3B-3T<br>   |
| KSO-G02-4C<br>    | KSO-G02-81A-H4<br>  | KSO-G02-8B-4T<br>   |
| KSO-G02-44C<br>   | KSO-G02-81A-H44<br> | KSO-G02-8B-44T<br>  |
| KSO-G02-5C<br>    | KSO-G02-3A-T5<br>   | KSO-G02-3B-5H<br>   |
| KSO-G02-66C<br>   | KSO-G02-3A-T66<br>  | KSO-G02-3B-66H<br>  |
| KSO-G02-7C<br>    | KSO-G02-9A-H7<br>   | KSO-G02-91B-7T<br>  |
| KSO-G02-8C<br>   | KSO-G02-2A-H8<br>  | KSO-G02-8B-8T<br>  |
| KSO-G02-9C<br>  | KSO-G02-9A-H9<br> | KSO-G02-2B-9T<br> |
| KSO-G02-2N<br>  | —                                                                                                    | KSO-G02-2B<br>    |
| KSO-G02-20N<br> | —                                                                                                    | KSO-G02-3B<br>    |
| KSO-G02-2D<br>  | —                                                                                                    | KSO-G02-20B<br>   |
| KSO-G02-20D<br> | —                                                                                                    | —                                                                                                    |

## ● KSO-G03

| Model code                                                                                          |                                                                                                        |                                                                                                        |
|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| JIS hydraulic symbols                                                                               |                                                                                                        |                                                                                                        |
| Spool operating method                                                                              |                                                                                                        |                                                                                                        |
| C, D type                                                                                           | A type                                                                                                 | B type                                                                                                 |
| KSO-G03-2C<br>    | KSO-G03-2A-H2<br>   | KSO-G03-2B-2T<br>   |
| KSO-G03-3C<br>    | KSO-G03-3A-H3<br>   | KSO-G03-3B-3T<br>   |
| KSO-G03-4C<br>    | KSO-G03-81A-H4<br>  | KSO-G03-8B-4T<br>   |
| KSO-G03-44C<br>   | KSO-G03-81A-H44<br> | KSO-G03-8B-44T<br>  |
| KSO-G03-5C<br>    | KSO-G03-3A-T5<br>   | KSO-G03-3B-5H<br>   |
| KSO-G03-66C<br>   | KSO-G03-3A-T66<br>  | KSO-G03-3B-66H<br>  |
| KSO-G03-7C<br>    | KSO-G03-9A-H7<br>   | KSO-G03-91B-7T<br>  |
| KSO-G03-8C<br>   | KSO-G03-2A-H8<br>  | KSO-G03-8B-8T<br>  |
| KSO-G03-9C<br>  | KSO-G03-9A-H9<br> | KSO-G03-2B-9T<br> |
| KSO-G03-2D<br>  | —                                                                                                      | KSO-G03-2B<br>    |
| KSO-G03-20D<br> | —                                                                                                      | KSO-G03-3B<br>    |
| —                                                                                                   | —                                                                                                      | KSO-G03-20B<br>   |