# WS-15, 15C, WF-15, 15C Type Solenoid Valve (for Liquids or Gases)

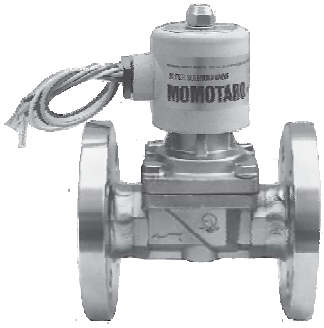
Diaphragm type

These series valves are basically the same as WS series,except that they are made of stainless steel.

Although the electromagnet of the part contacting with liquid is made of stainless steel with special steel, cares should be paid in applications requiring high corrosion resistance.

WS-15 Type

WS-15C Type



WF-15 Type

WF-15C Type

## FEATURES

- Suitable for stainless steel piping and equipment.
- Wide range of working pressure: 0~1.0MPa
- Water hammer relaxation mechanism.
- Free installation in vertical or horizontal direction.
- Energized open or energized close operation.

## SPECIFICATIONS

| Model name | WS-15 | WF-15 | WS-15C | WF-15C |
|---|---|---|---|---|
| Code name | **WS15-D** | **WF15-D** | **WS15C-D** | **WF15C-D** |
| Size | 10~50(⅜″~2″) | 15~50(½″~2″) | 10~50(⅜″~2″) | 15~50(½″~2″) |
| End connection | Screwed JIS Rc | Flanged JIS 10KFF | Screwed JIS Rc | Flanged JIS 10KFF |
| Operation | Energized open | | Energized close | |
| Applicable fluid | Water, air, inert gas & oil(Kerosene, light oil level) | | | |
| Applicable pressure | 0~1.0MPa | | | |
| Min. pressure differential across the disc | 0MPa (0.03MPa for coil installed horizontally.) | | | |
| Fluid temperature | 5~60℃ | | | |
| Fluid viscosity | 20cSt or less | | | |
| Leakage allowance | Nil (Confirm at pressure gauge. For gas, when 0.02~1.0MPa) | | | |
| Rated voltage | Common use:AC100/200V 50/60Hz or AC110/220V 60Hz*2. | | | |
| Insulation | Class B (Silicone mold) | | | |
| Ambient temperature | 5~60℃ | | | |
| Protection | Dust & drip proof (When used outdoors, also use TB-03 Type terminal box, as rain proof type) | | | |
| Materials | Body(Stainless steel), Diaphragm(Synthetic rubber) | | | |
| Installation | Can be installed on both horizontal and vertical piping at any angle between the vertical (when the coil part is placed above) and horizontal. | | | |
| Valve body pressure | Hydraulic 2.0MPa | | | |

＊1. Refer to page 231 for Method of Wiring.
＊2. Special voltage items other than the above specified are available upon your request.
＊3. Please contact our local agant if the fluid is pure water.
＊4. Select WS,WF-15Y,15CY types if humidity is higher than 85%.

## DIMENSIONS AND CURRENT VALUES

(mm)

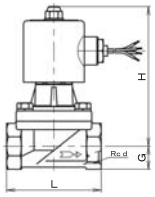
| Size | | | | 10(⅜″) | 15(½″) | 20(¾″) | 25(1″) | 32(1¼″) | 40(1½″) | 50(2″) |
|---|---|---|---|---|---|---|---|---|---|---|
| Screwed | WS-15 WS-15C Type | d | | ⅜″ | ½″ | ¾″ | 1″ | 1¼″ | 1½″ | 2″ |
| | | L | | 63 | 63 | 80 | 90 | 106 | 118 | 140 |
| | | G | | 15 | 15 | 18 | 22 | 27 | 30 | 37 |
| | | H | | 120(181) | 120(181) | 131(190) | 135(194) | 151(208) | 154(211) | 166(223) |
| | | Port size | | 18 | 18 | 23 | 28 | 32 | 40 | 48 |
| | | Cv value | | 3 | 4 | 7 | 10 | 17 | 20 | 30 |
| | | Mass(kg) | | 1.3(1.9) | 1.3(1.9) | 1.8(2.2) | 2.2(2.6) | 2.9(3.3) | 3.7(4.1) | 5.6(5.8) |
| Flanged | WF-15 WF-15C Type | L | | — | 112 | 118 | 140 | 150 | 160 | 190 |
| | | G | | — | 15 | 18 | 22 | 27 | 30 | 37 |
| | | H | | — | 120(181) | 131(190) | 135(194) | 151(208) | 154(211) | 166(223) |
| | | Port size | | — | 18 | 23 | 28 | 32 | 40 | 48 |
| | | Cv value | | — | 4 | 7 | 10 | 17 | 20 | 30 |
| | | Mass(kg) | | — | 2.6(3.2) | 3.6(4) | 4.9(5.3) | 6.2(6.6) | 7.3(7) | 9.8(10) |
| Current (A) | | AC100V | Rated | 0.25(0.35) | 0.25(0.35) | 0.30(0.35) | 0.30(0.35) | 0.40(0.45) | 0.40(0.45) | 0.40(0.45) |
| | | | Starting | 0.60(1.30) | 0.60(1.30) | 0.90(1.30) | 0.90(1.30) | 1.30(1.70) | 1.30(1.70) | 1.30(1.70) |
| | | AC200V | Rated | 0.13(0.18) | 0.13(0.18) | 0.15(0.18) | 0.15(0.18) | 0.20(0.23) | 0.20(0.23) | 0.20(0.23) |
| | | | Starting | 0.30(0.70) | 0.30(0.70) | 0.45(0.70) | 0.45(0.70) | 0.65(0.85) | 0.65(0.85) | 0.65(0.85) |

Figures in ( ) are for WS-15C or WF-15C.

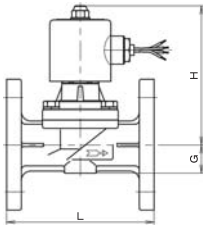
Flange code JIS 10KFF

## FIGURATION DRAWING

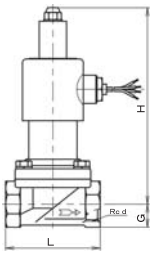
WS-15 Type



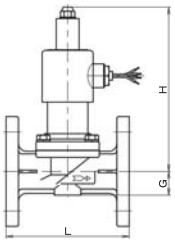

WF-15 Type




WS-15C Type



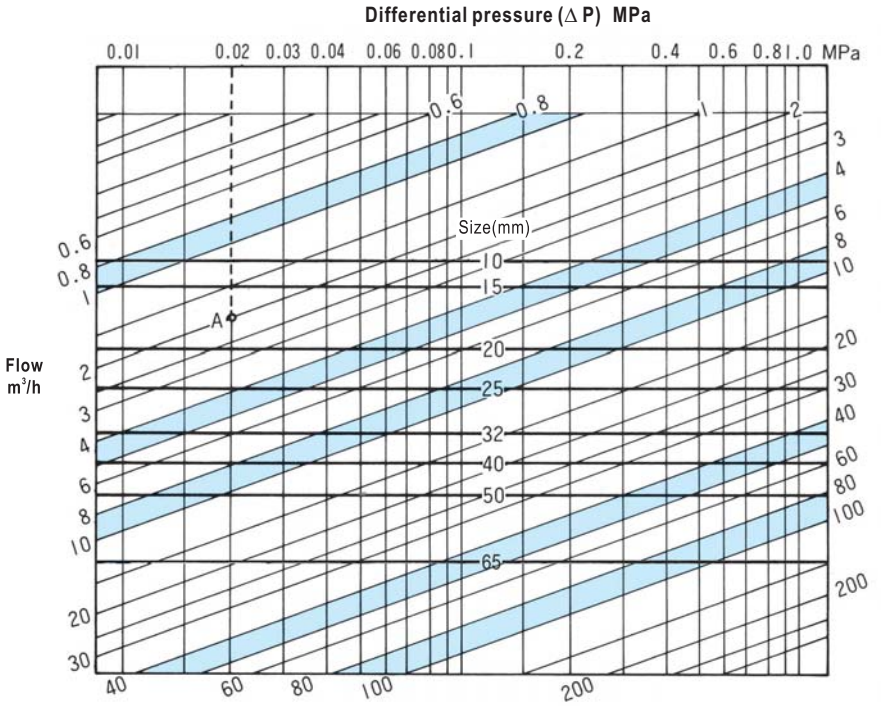

WF-15C Type



# DATA/WS, WF Type Solenoid Valve (for Liquids or Gases)

## SIZE SELECTION CHART (for Water)

Applicable models: WS-12, 12C, 12K, 12CK
WF-12, 12C, 12K, 12CK
WS-15, 15C
WF-15, 15C




### HOW TO USE THE CHART

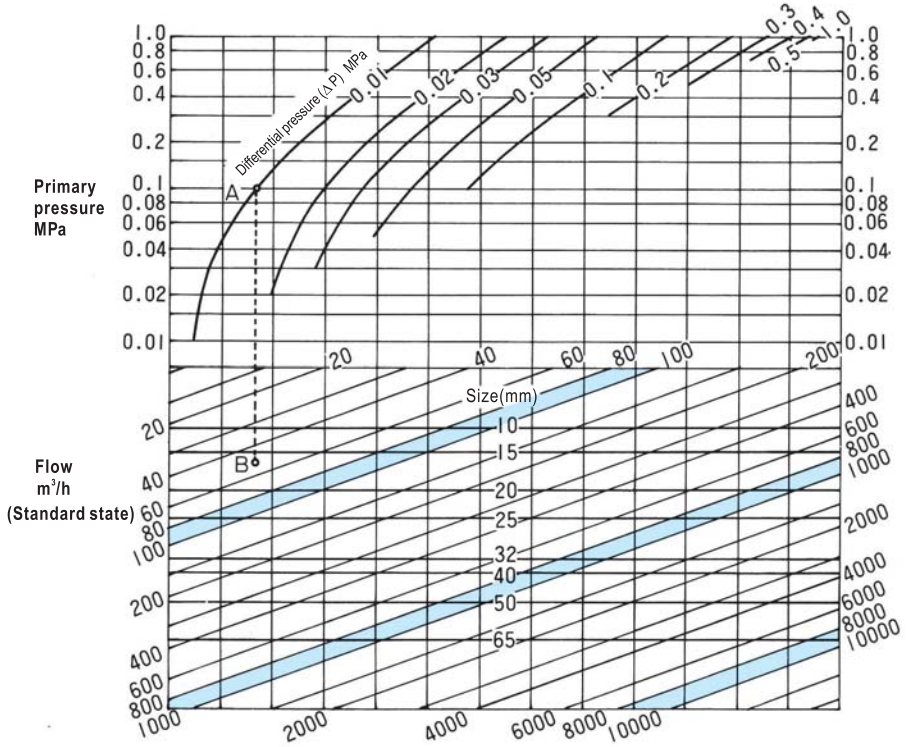
Example: Determine the size of valve meeting the following conditions:

Primary pressure: 0.3MPa
Secondary pressure: 0.28MPa
Flow of water: 2m³/h

Differential pressure (Δ P) : 0.3−0.28=0.02MPa. Find out the intersection point A between the 0.02MPa differential pressure (ΔP) line and the 2m³/h flow line. Since point A is between the lines representing nominal diameter 15mm and 20mm, the nominal diameter should be the larger one, i.e. 20mm.

## SIZE SELECTION CHART (for Air)

Applicable models: WS-12, 12C, 12K, 12CK
WF-12, 12C, 12K, 12CK
WS-15, 15C
WF-15, 15C




### HOW TO USE THE CHART

Example: Determine the size of valve meeting the following conditions:

Primary pressure: 0.1MPa
Secondary pressure: 0.09MPa
Flow of air (at 20℃): 50m³/h (standard state)

Differential pressure (ΔP) is: 0.1−0.09=0.01MPa. Identify intersection point (A) of the 0.1MPa primary pressure line and the 0.01MPa Differential pressure curve. Draw a vertical line from point A until it intersects with the 50m³/h flow line. The intersection point is named B. Since point B is between the 15mm and 20mm size lines, the larger size, which is 20mm, is selected.

# DATA/Solenoid Valve

## METHOD FOR CONNECTION OF COIL

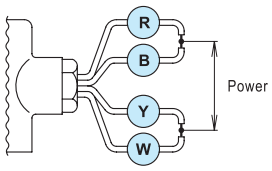
As shown in relevant specification table, different models of solenoid valve have different rated voltage.
When connecting to power, make sure the voltage does not exceed the rated voltage of solenoid valve.

**<Common voltage coil>**
- Connect the 4 lead wires (in different color) to power source.

**<Exclusive/Special voltage coil>**
- Connect 2 lead wires to power source.

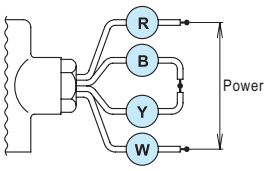
**<Frequency selecting coil>**
- There are 3 lead wires on coil. Read the connection method shown on product before connecting to power source.
  The lead wire that left unused should be insulated using insulating tape.

AC100/110V



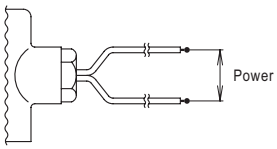

Connect R and B wires, then Y and W wires, before connecting them to power source.

AC200/220V



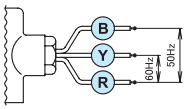

Connect and then insulate Y and B wires. Connect the R and W wires to power source.

W : White
Y : Yellow
B : Black
R : Red

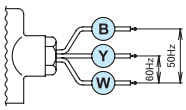



DS-10, 10H, 12 Type

AC 100V

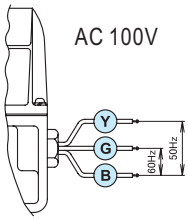



AC200V

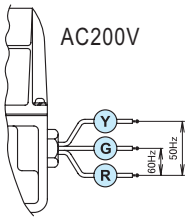



ED-S, F Type

AC 100V




AC200V




W : White
Y : Yellow
B : Black
R : Red
G:Grey

## REFERENCE: ABOUT EXPLOSION PREVENTION

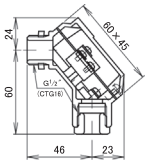
Terminal box specially designed for solenoid valve. Can be screwed in with lead wire of solenoid valve and protect power cable and lead wire from being exposed to rain or dust.
TB-03 series are for outdoor cable and conduit.


An example of TB-03 installation

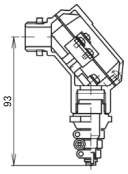
### TB-03 TYPE SERIES (for indoor/outdoor, metal body, rainproof)

**(Without indication lamp) Rated power: 250V 15A**

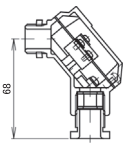
- TB-03 Type(standard model)
  With gland nut




- TB-03C Type
  With cap cone

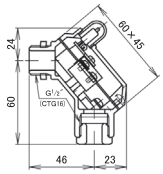



- TB-03F Type
  With ship-class gland

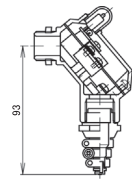



**(With indication lamp) Rate power: AC100V or AC200V**
**Please specify voltage when ordering.**

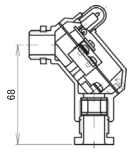
- TB-03L Type
  With indication lamp



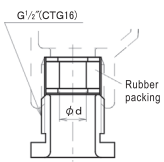

- TB-03LC Type
  Lamp + cap cone




- TB-03LF Type
  Lamp + ship-class gland

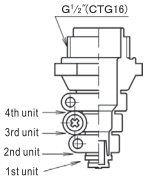



### SPECIFICATIONS OF GLAND (TB-03F, 03LF Type)



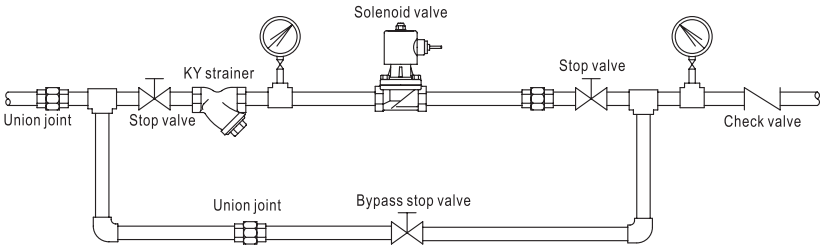

| Gland size | d (mm) | Size of applicable conduit | | |
|---|---|---|---|---|
| | | Hard steel conduit | Flexible metal conduit | |
| 15a | 9 | 16 | Class 1 | Class 2 |
| 15b | 10 | | 13 | 10 12 |
| 15c | 11 | | 15 | 15 17 |

### SPECIFICATIONS OF CAPCONE PLUG (TB-03C, 03LC Type)




| Cut position | Applicable cable diameter(mm) |
|---|---|
| 4th unit | 10~12 |
| 3rd unit | 8~10 |
| 2nd unit | 6~8 |
| 1st unit | 4~6 |

## ■ Fig.1 Piping example

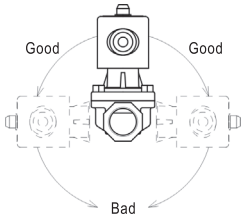



## ■ SELECTION AND INSTALLATION

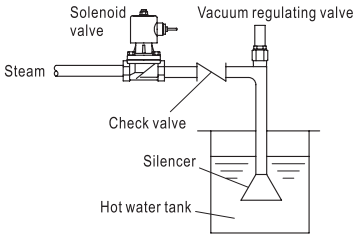
1. Install strainer on the primary side of solenoid valve (see Fig.1).
2. Install a bypass pipe (with stop valve) between the primary and secondary sides of solenoid valve if the operation of equipment cannot be stopped (see Fig.1).
   If you do not intend to install bypass pipe, install blowing stop valve, which is branched from the main pipe, right before the stop valve on the primary side of solenoid valve, to allow flushing.
3. The coil should stand upright above horizontal pipe (see Fig.1, 2).
   For size 50mm (and below) valve of WS, PS series, the coil can be upright above or at the same level of (and perpendicular to) horizontal pipe. In this case, make sure the pressure differential before and after the valve is larger than 0.03MPa (see Fig.2).
4. Back flow may occur when the secondary pressure is larger than the primary pressure. To prevent back flow, install check valve on the secondary side (see Fig. 1).
5. If the valve is used for steam and the secondary pressure is negative pressure when the valve is closed, install vacuum regulating valve (vacuum breaker) on the secondary side of solenoid valve (see Fig.3).
6. Install steam trap on piping if the valve is used for steam.
7. When used for liquid, the pressure inside the piping may increase due to water hammer occurred when valve is closed or ambient temperature. In this case, it is recommended to install relief valve to protect machine (see Fig.4).
8. Connect coil properly using 0.75mm$^2$ above wire. Install fuse to protect electric circuit.
9. Repeated power-on and power-off for a long period may make the surface temperature rises up to about 70℃. Cares should be paid to avoid burning. (Depending on conditions and model, the temperature rise varies.)
10. Make sure the arrow mark on solenoid valve match with the direction of flow of fluid.
11. Leave some space for dissembling and maintenance.
12. Fix and support piping properly to prevent solenoid valve from being damaged due to weight of piping, excessively large stress, bending force, or vibration.
13. Discharge drain or apply thermal insulation if there is risk of freezing.
    However, the coil should not be applied with any thermal insulation.

### Fig.2 Installation position

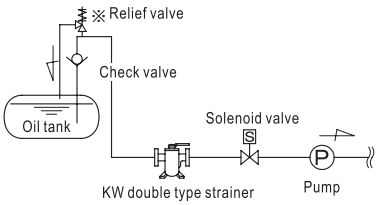
**Upright to horizontal pipe**




### Fig.3 Steam line application




### Fig.4 Relief valve installation




※ Install relief valve if pressure rise due to thermal expansion or other factors is anticipated.