# SOLENOID DIRECTIONAL CONTROL VALVES

## D4(AC) SERIES

## D5(AC) SERIES



## D4(DC/RF) SERIES
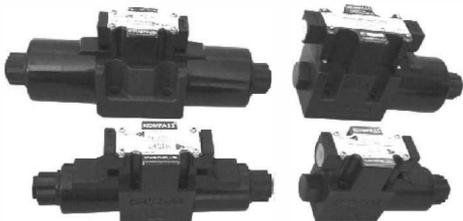
## D5(DC/RF) SERIES
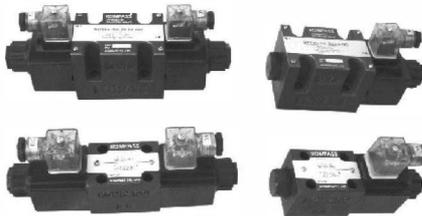


## Feature:

1. Mounting surfaces meet with IS0 4401 .CETOP.DIN 24340 NEPA standared with communion.

2. Submersed dasign.with cushioned.reduce noise,install easy, reduce the rub of spool and seal cause the leakage problem to add the using life.

3. Same specification spools.coils.tubes can change to use.install easy.reduce cost.

4. High pressure test can reacri 1 500 V/min.coil insulation H class insulation resistanceover 100mΦ and 180 degree C temperature，with CE certification..

5. Tube with three sections welded by special equipment.with high hardness can with stand high pressure.

## How To Order:

| D5 | -02 | -2 | B | 2 | -L | -A1 | 5 | - |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| MODEL NO | PORT SIZE | POSITIONS | SPRING ARRANGEMENT | SPOOL TYPE | COIL REVERSE POSITION | COIL TYPE | FREQUENCY | LAMP |
| D4: Terminal Box Type (JIS) D5:Plug-in connector Type(DIN) | 02(6valve size) NG6 | 2 | B:Single head 2 Positions (Spring offset) D:Two heads 2 positions (position mechanic) | 2,3,4,5, 6,7,8,9 10,11,12 For details refer to " Spool Type " table | None: standard L:Reverse assembly | AC A1:AC 110V A2:AC 220V A3:AC 380V DC D1:DC 12V D2:DC 24V RF R1:RF 110V R2:RF 220V | 5 : 50HZ 6 : 60HZ | None: standard lamp with B:Lamp without |
| | | 3 | C:two heads 3 positions (Spring centered) | | | | | |
| D4: Terminal Box Type (JIS) D5:Plug-in connector Type(DIN) | 03(10valve size) Ng10 | 2 | B:single head 2 positions (Spring offset) D:two heads 2 positions (position mechanic) | | | | | |
| | | 3 | C:two heads 3 positions (Spring centered) | | | | | |

The MODEL NO header spans POSITIONS, SPRING ARRANGEMENT, SPOOL TYPE columns.

o Remarks:

1. Unlisted spool types,please refer to " spool type " ,specially design please contact us.

2. Specially Coils Voltage please contact with us.

3. Plug-in connector type and Terminal box type,the connector all with indicating light.

## ■ Solenoid Directional Control Specification Table:

| Spool Type | | | Flow range $l$/min | | | |
|---|---|---|---|---|---|---|
| | | | D4(D5)-02 | | D4(05)-03 | |
| | | | Rated | MAX | Rated | MAX |
| C2 | a  b | | 40 | 60 | 60 | 100 |
| C4 | a  b | | | | | |
| C10 | a  b | | | | | |
| C3 | a  b | | 30 | 40 | 50 | 80 |
| C5 | a  b | | | | | |
| C60 | a  b | | | | | |
| B2 | a  b | | 40 | 60 | 60 | 100 |
| B3 | a  b | | | | | |
| B8 | a  b | | | | | |
| D2 | a  b | | 40 | 60 | 60 | 100 |
| D3 | a  b | | | | | |
| Max.pressure(P、A、B port) | | | 31.5MPa | | | |
| Max.pressure 3C5、3C60 | | | 25MPa | | | |
| Max.Back pressure | | | 16MPa | | | |
| Weight KGS | Single head | | 1.5(AC) | 1.6(DC、RF) | 3.3(AC) | 3.6(DC) |
| | Two heads | | 1.90(AC) | 2（DC、RF） | 4.0(AC) | 4.8(DC) |
| Max.Operating frequencies | | | AC、DC: 240C.P.M   Therefore: 120C.P.M | | | |
| Ambient temperature range | | | 5℃-60℃ | | | |
| Viscosity | | | 20-300cSt | | | |
| Filtration | | | 25μ | | | |
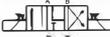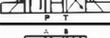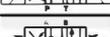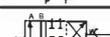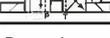
## ■ Coil Specification Table:

| Current A/DC | | AC | | | | DC | |
|---|---|---|---|---|---|---|---|
| Frequency(Hz) | | 50 | 60 | 50 | 60 | - | - |
| Rated Voltage(V) | | 110 | 110 | 220 | 220 | 12 | 24 |
| 02 | Inrush(A) | 2.0 | 2.2 | 1.0 | 1.1 | 1.9 | 0.95 |
| | Holding(A) | 0.38 | 0.4 | 0.16 | 0.18 | | |
| 03 | Inrush(A) | 4.0 | 4.8 | 2.1 | 2.5 | 3 | 1.5 |
| | Holding(A) | 0.72 | 0.8 | 0.34 | 0.38 | | |
| 02(RF) | Inrush(A) | 0.34 | 0.34 | 0.17 | 0.17 | - | - |
| | Holding(A) | 0.22 | 0.22 | 0.11 | 0.11 | - | - |
| 03(RF) | Inrush(A) | 0.66 | 0.66 | 0.33 | 0.33 | - | - |
| | Holding(A) | 0.48 | 0.48 | 0.24 | 0.24 | - | - |
| VOLTAGE Range(v) | | Rated Voltage + 10% or-15% | | | | | |
| Insulation Resistance(MΩ) | | Over 100MΩ(DC 500V insulation tested) | | | | | |

© Remarks: Tested under conditions of insulation high 1500V/sec, and momentary shift 0.1 sec/cycle.

## ■ Typical Preformance Curves:

Pressure Drod-Flow Characterstics:



D4(D5)-02 TYPE



D4(D5)-03 TYPE
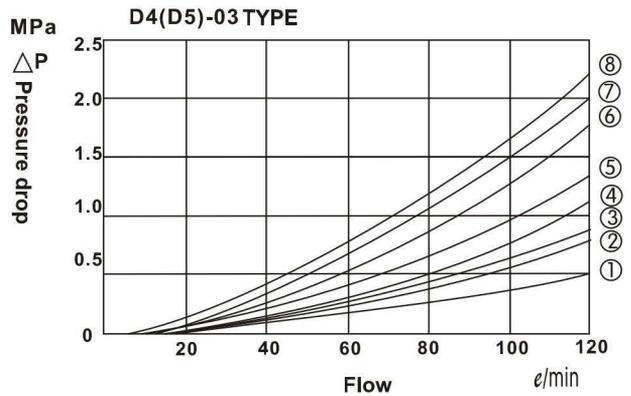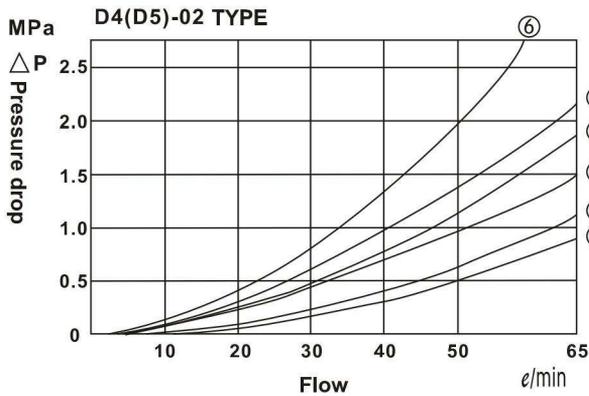
| SPOOL TYPE | CURVE NO.FOR PORT INTERCONNECTIONS | | | | |
|---|---|---|---|---|---|
| | P-A | P-B | A-T | B-T | P-T |
| 3C2 | ② | ② | ② | ② | - |
| 3C3 | ① | ① | ① | ① | ③ |
| 3C4 | ② | ② | ① | ① | - |
| 3C5 | ⑤ | ⑤ | ⑤ | ⑤ | ③ |
| 3C60 | ⑥ | ⑥ | ⑥ | ⑥ | ③ |
| 3C10 | ② | ② | ② | ① | - |
| 2D2 | ② | ② | ② | ② | - |
| 2D3 | ② | ② | ④ | ④ | - |
| 2B2 | ③ | ③ | ② | ② | - |
| 2B3 | ④ | ② | ② | ④ | - |

| SPOOL TYPE | CURVE NO.FOR PORT INTERCONNECTIONS | | | | |
|---|---|---|---|---|---|
| | P-A | P-B | A-T | B-T | P-T |
| 3C2 | ③ | ③ | ③ | ③ | - |
| 3C3 | ② | ② | ② | ② | ④ |
| 3C4 | ③ | ③ | ② | ② | - |
| 3C5 | ④ | ⑦ | ④ | ⑦ | ① |
| 3C60 | ⑦ | ⑦ | ⑦ | ⑦ | ④ |
| 3C10 | ③ | ③ | ③ | ② | - |
| 2D2 | ⑦ | ③ | ③ | ⑦ | - |
| 2D3 | ② | ② | ② | ② | - |
| 2B2 | ⑦ | ③ | ③ | ⑦ | - |
| 2B3 | ⑥ | ③ | ③ | ⑥ | - |

PRESSURE DROP CALCULATION：

The pressure drop($\triangle P_1$) can be obtained from the formula for other specific viscosity:

$\triangle P_2 = (V_2/V_1)^{1/4} \cdot P \triangle_1$

$\triangle P_1$ = viscosity $V_1$ kgf/cm$^2$ → ?Kgf/cm$^2$ pressure drop when it reach $V_1$ viscosity

$\triangle P_2$ = viscosity $V_2$ kgf/cm$^2$ → ?Kgf/cm$^2$ pressure drop when it reach $V_2$ viscosity

$V_1$ = viscosity mm$^2$/s

$V_2$ = viscosity mm$^2$/s

($\triangle P_1$, $V_1$ refer to pressure drop characterstics bable

$(V_2/V_1)^{1/4}$ refer to the following table.

Test conditions:
pressine: 7Mpa
Viscosity: 20 cSt
Temperature:50℃
Fluid: ISO-VG32

| Viscosity | CSt (mm²/s) | 15 | 20 | 30 | 32 | 35 | 40 | 50 | 60 | 70 | 80 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | (SSU) | 77 | 98 | 141 | 150 | 164 | 186 | 232 | 278 | 324 | 371 |
| $(V^2/v^1)^{1/4}$ | | 0.83 | 0.89 | 0.98 | 1.00 | 1.02 | 1.06 | 1.12 | 1.17 | 1.22 | 1.25 |

| Viscosity | CSt (mm²/s) | 100 | 120 | 160 | 200 | 240 | 280 | 320 | 360 | 400 |
|---|---|---|---|---|---|---|---|---|---|---|
| | (SSU) | 464 | 556 | 742 | 927 | 1112 | 1298 | 1483 | 1669 | 1854 |
| $(V^2/v^1)^{1/4}$ | | 1.33 | 1.39 | 1.50 | 1.58 | 1.65 | 1.72 | 1.78 | 1.83 | 1.88 |

## ■ Spool type table:

| Two heads 3 positions spring centered | Graphic Symbols (standard) | | | Two heads 3 positions mechanic | Graphic Symbols (standard) | | |
|---|---|---|---|---|---|---|---|
| 3C2 | a | | b | 2D2 | a | | b |
| 3C3 | a | | b | 2D3 | a | | b |
| 3C4 | a | | b | | | | |
| 3C40 | a | | b | | | | |
| 3C5 | a | | b | | **One head 2 positions spring centered** | **Graphic Symbols (standard)** | |
| 3C6 3C60 | a | | b | 2B2 | | | b |
| 3C7 | a | | b | 2B3 | | | b |
| 3C8 | a | | b | 2B8 | | | b |
| 3C9 | a | | b | | **One head 2 positions spring centered** | **Graphic Symbols (Reverse Assembly)** | |
| 3C10 | a | | b | 2B2L | a | | |
| 3C11 | a | | b | 2B3L | a | | |
| 3C12 | a | | b | 2B8L | a | | |

| One head 2 positions spring centered | Graphic Symbols (standard) | One head 2 positions spring centered | Graphic Symbols (Reverse Assembly) | One head 2 positions spring centered | Graphic Symbols (standard) | One head 2 positions spring centered | Graphic Symbols (Reverse Assembly) |
|---|---|---|---|---|---|---|---|
| 2B2A | b | 2B2AL | a | 2B2B | b | 2B2BL | a |
| 2B3A | b | 2B3AL | a | 2B3B | b | 2B3BL | a |
| 2B4A | b | 2B4AL | a | 2B4B | b | 2B4BL | a |
| 2B40A | b | 2B40AL | a | 2B40B | b | 2B40BL | a |
| 2B5A | b | 2B5AL | a | 2B5B | b | 2B5BL | a |
| 2B60A | b | 2B60AL | a | 2B60B | b | 2B60BL | a |
| 2B8A | b | 2B8AL | a | 2B8B | b | 2B8BL | a |
| 2B9A | b | 2B9AL | a | 2B9B | b | 2B9BL | a |
| 2B10A | b | 2B10AL | a | 2B10B | b | 2B10BL | a |
| 2B11A | b | 2B11AL | a | 2B11B | b | 2B11BL | a |
| 2B12A | b | 2B12AL | a | 2B12B | b | 2B12BL | a |

◎ Remarks: 1. type of port connections ● when coil " a " energized;P→A  B→T ● When coil " b " energized:P→B  A→T

● spool types of 3C5 & 3C6 are reverse directions.

2. For special specifications please cotact us.

# ■ Spool functions and application:(spool type is distinguished by the fluid moving when in middle)

| Spool Type | Graphic Symbols | Drawing (normal) | Spool functions and applications |
|---|---|---|---|
| **3C2** <br> All ports not connected at normal position | | TBPA | At normal position the pressure of pump and cylinder position keep the same,please note to use 2 position valve. As all ports will be closed when change so will create impact |
| **3C3** <br> All ports not connected at normal position | | TBPA | At normal position pump no loading,execute componet is in floating situation,If using 2 position valve when change direction all port connect oil tank so impact be reduced. |
| **3C4** <br> A.B.T ports interconnected at normal position | | TBPA | At normal position pump loading,execute component is in floating situation when change direction and also ask to keep system pressure can use 2 position and 3C2 spool compare change direction the impact is smaller. |
| **3C40** <br> A.B.T ports interconnected at normal position | | TBPA | 3C4 is one of transfiguration spool,between AT and BT port with a check control can more quickly to stop the move of execute component. |
| **3C50** <br> P.A.T ports interconnected at normal position | | TBPA | At normal position pump loading execute component one way locked. |
| **3C6** <br> P.T ports interconnected at normal position | | TBPA | At normal position no loading execute component position locked,suitable valve connection together situation,instant 4 ports plug. |
| **3C60** <br> P.T ports interconnected at normal position | | TBPA | 3C6 0ne of transfiguration spool,as change direction a ports connection so impact reduced instant 4 ports connection. |
| **3C7** <br> All ports interconnected at normal position | | TBPA | Main to be 2 position valve,change direction the impact reduced. |
| **3C8** <br> Two connect valves | | TBPA | Same as 3C2 spool,at normal situation position pump loading,cylinder position locked to be two connect valve |
| **3C9** <br> P. A. B ports interconnected at normal position | | TBPA | At normal situation position to make a difference move circle |
| **3C10** <br> B.T ports interconnected at normal position | | TBPA | At normal position can prevent P port leakage to cause execute components moves. |
| **3C11** <br> P.A ports interconnected at normal position | | TBPA | At normal position B.T. Port close,P.T.port connection execute components move stop. |
| **3C12** <br> A.T ports interconnected at normal position | | TBPA | At normal position can prevent the leakage of P port cause execute components one way move. |
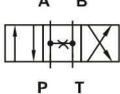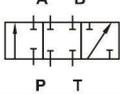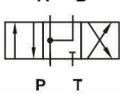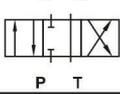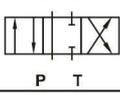
# ■ Spool outward structure (02、03)

| Spool Type | Graphic Symbols | 02 | 03 |
|---|---|---|---|
| **2B2**<br>2 positions instant center close |  |  |  |
| **2B3**<br>2 positions instant center connection |  |  |  |
| **2B8**<br>2 positions one connection instant center close |  |  |  |
| **2D2**<br>2 positions instant center close,take poition |  |  |  |
| **2D3**<br>2 positions instant center connection, take poition |  |  |  |
| **2C2**<br>3 positions center close |  |  |  |
| **3C3**<br>3 positions center connection |  |  |  |
| **3C4**<br>3 positions center A.B.T connection |  |  |  |
| **3C5**<br>3 positions center A.P.T connection |  |  |  |
| **3C60**<br>3 positions center P.T connection |  |  |  |
| **3C8**<br>3 positions , one connect, center close |  |  |  |
| **3C9**<br>3 positions center A.B.P connection |  |  |  |
| **3C10**<br>3 positions center B.T connection |  |  |  |
| **3C12**<br>3 positions center A.T connection |  |  |  |
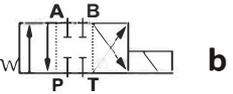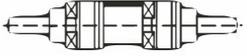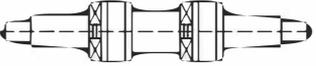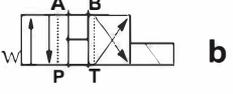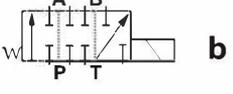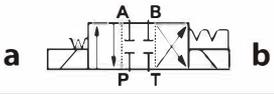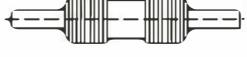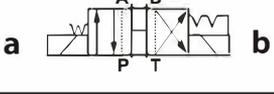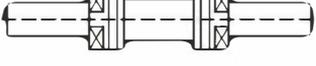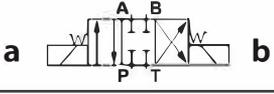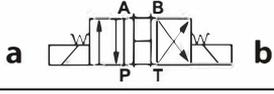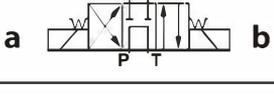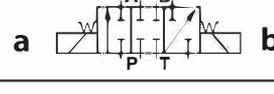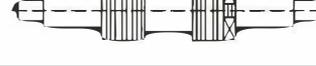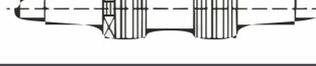
# ■ Connetion Type

## ● D4(JIS)Terminal Box(with Indicating lights)

**Dual Coils**



Coil a

Coil b

**Single Coil**
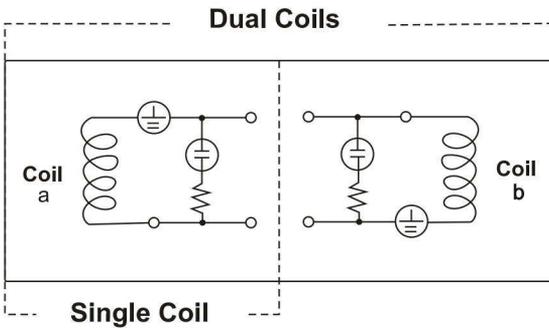
## ● D5(DIN)Plug-in connector(with LED lights)

**Dual Coils**



Coil a

Coil b

**Single Coil**

## ● D4(JIS)Terminal Box



Landline    A.Terminal(coil a)    b.Terminal (coil b)

C.Terminal (common terminal)

Landline
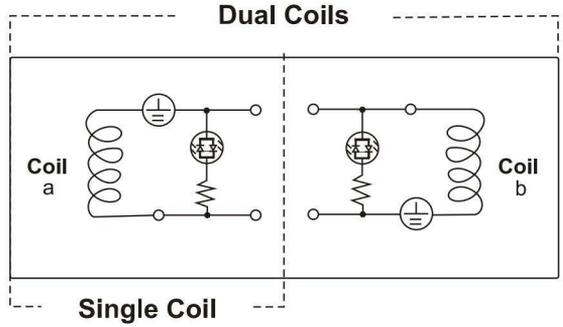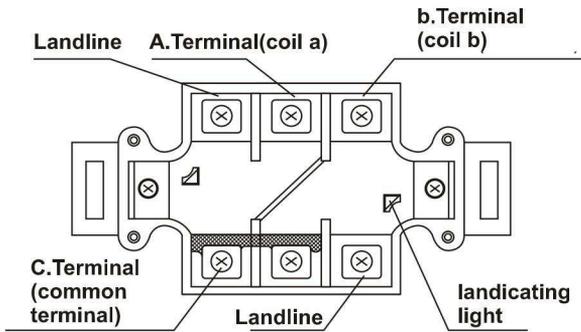
landicating light

## ● D5(DIN)Plug-in connector

**Mounting Surface : ISO 4401 standard**



b.Terminal    a.Terminal    c.Terminal com.
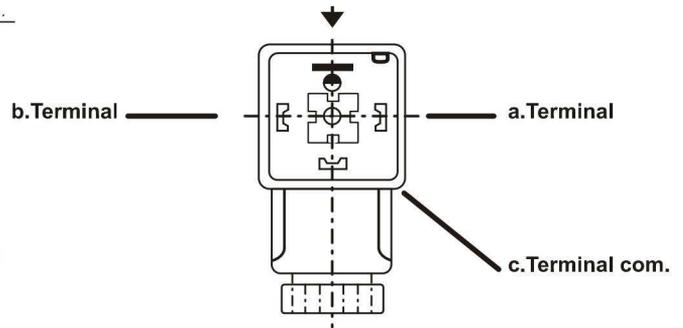
◎ Remarks: 1.The indicating light of terminal Box Type is made of filement lamp,and DIN plug-in connectors is made of bipolar LED lamp.

2.DC solenoid has no pole limitation.

## ● Subplates(DSGM)

Please see the spcifications and dimensions,please contact us for special port and dimensions.

# ■ Accessories

## ● Mounting Bolts

| MODEL | DESCRIPTION SIZE | Q'TY | TIGHT TORQUE(N-m) |
|---|---|---|---|
| D4(D5)-02 | Soc.Hex cap bolt(4mm) M5 x 45 | 4 | 6-7 |
| D4(D5)-03 | Soc.Hex cap bolt(5mm) M6 x 35 | 4 | 12-15 |

**D4-02-3C*-D*(R*)**
**2D***

Indicatiing(sol a)

P

A

B

T

Hole Thru 4-ø5.5
C'bore ø9.5

Indicatiing(sol b)

216

90

63

Electrical
conduit
2—PF1/2"connection

Sol a

Sol b

36

48

90

72

25

48

ø6  Manual Actuator

65

40.5

11

30.2

21.5

12.7

T

B

A

P

25.8

15.5

5.2

31

32.5

48

0.75

7.75

4 -ø7

4-ø5.5 Hole Thru

**D4-02-2B*-D*(R*)**

152.5

Sol b

146.7