



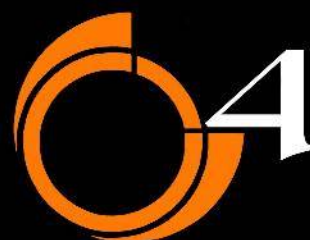
DIRECTIONAL CONTROLS

E10

**DIRECTIONAL
VALVES
MECHANICAL
OPERATION**



油研工業株式會社

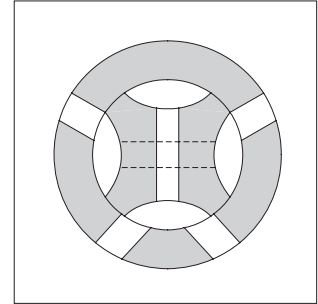


Mechanically Operated Directional Valves

These valves are chiefly used to shift the pilot circuit. Rotary Type Directional Valves and Cam Operated Type Directional Valves are available.

Rotary Type Directional Valves

These valves are used to rotate the spool either manually or by way of cam and shift the direction of oil flow. The detented mechanism incorporated in these valves prevents the valve from being changed over by itself due to vibrations or any other shocks.



Specifications

Model Numbers		Rated Flow L/min (U.S.GPM)	Max. Operating Pressure MPa (PSI)	Max. T-Line Pressure MPa (PSI)	Approx. Mass kg (lbs.)	
Threaded Connection	Sub-plate Mounting				DRT Type	DRG Type
DRT-02-*D*-20*	DRG-02-*D*-20*	16 (4.2)	7 (1020)	7 (1020) *	4.7 (10.4)	3.4 (7.5)

★ When a back pressure of more than 3 MPa (435 PSI) is generated in the tank port, be sure to use External Drain Type.

Model Number Designation

F-	DR	G	-02	-2	D	2	-A	-R	-20	*
Special Seals	Series Connection	Type of Mounting	Valve Size	No. of Valve Position	Spool-Spring Arrangement	Spool Type	Operation Type	Drain Connection	Design Number	Design Standards
F: Special seals for phosphate ester type fluids (Omit if not required)	DR: Rotary Type Directional Valve	T: Threaded Connection	02	2	D: No-spring Detented	2	A: Reversing Dog B: Reversing Dog & Manual C: Manual	None: Internal Drain R: External Drain	20	None: Japanese Std. "JIS" 80: European Design Std. 90: N. American Design Std.
		G: Sub-plate Mounting	02	3		4			20	

Note: When selecting the Model type, be sure to give the model number from the following Graphic Symbols.
No combinations other than those in the table below are allowed.

Graphic Symbols

No. of Position	2-Position Type			3-Position Type
Operation Type	Reversing Dog Operation	Reversing Dog & Manual Operation	Manual Operation	Manual Operation
Graphic Symbols				
Model No.	DR*-02-2D2-A	DR*-02-2D2-B	DR*-02-2D2-C	DR*-02-3D4-C

Instructions

Changeover Torque

When the pressure of pressure port "P" and cylinder port "A" (or "B") is set to 7 MPa (1020 PSI), the valve changeover torque will be as right side table:

2-Way directional valves

Be sure to use the External Drain Type Valve of spool type "2" and plug the tank port.

Changeover Torque

Tank Port Back Pres. MPa (PSI)	Torque Nm (in. lbs.)
0	1.0 (8.9)
3 (435)	4.8 (42.5)

Sub-plates

Drain Connection	Japanese Standard "JIS"		European Design Standard		N.American Design Standard		Approx. Mass kg (lbs.)
	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	
For Internal Drain	DRGM-02-20 DRGM-02X-20	Rc 1/4 Rc 3/8	DRGM-02-2080 DRGM-02X-2080	1/4 BSPF 3/8 BSPF	DRGM-02-2090 DRGM-02X-2090	1/4 NPT 3/8 NPT	1.9 (4.2)
For External Drain	DRGM-02-R-20 DRGM-02X-R-20	Rc 1/4 Rc 3/8	DRGM-02-R-2080 DRGM-02X-R-2080	1/4 BSPF 3/8 BSPF	DRGM-02-R-2090 DRGM-02X-R-2090	1/4 NPT 3/8 NPT	

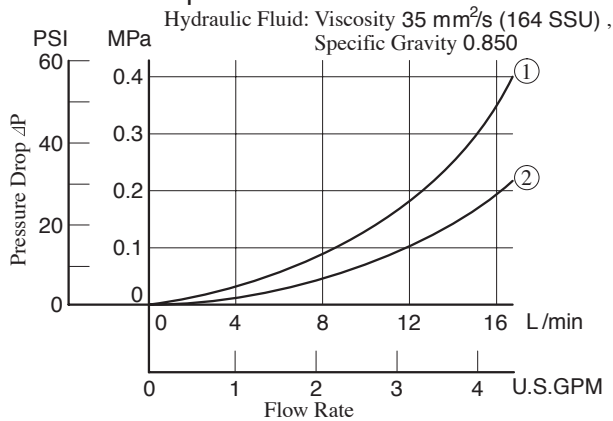
- Sub-plates are available. Specify the sub-plate model number from the table above.
- When sub-plates are not used, the mounting surface should have a good machined finish.

Mounting Bolts

The Sub-plate Mounting Type Valves (DRG-02) only are furnished with the following mounting bolts.

Model Numbers	Socket Head Cap Screw (5 Pcs.)	
	Japanese Standard "JIS" European Design Standard	N. American Design Standard
DRG-02	M8 × 45 Lg.	5/16-18 UNC × 1-3/4 Lg.

Pressure Drop



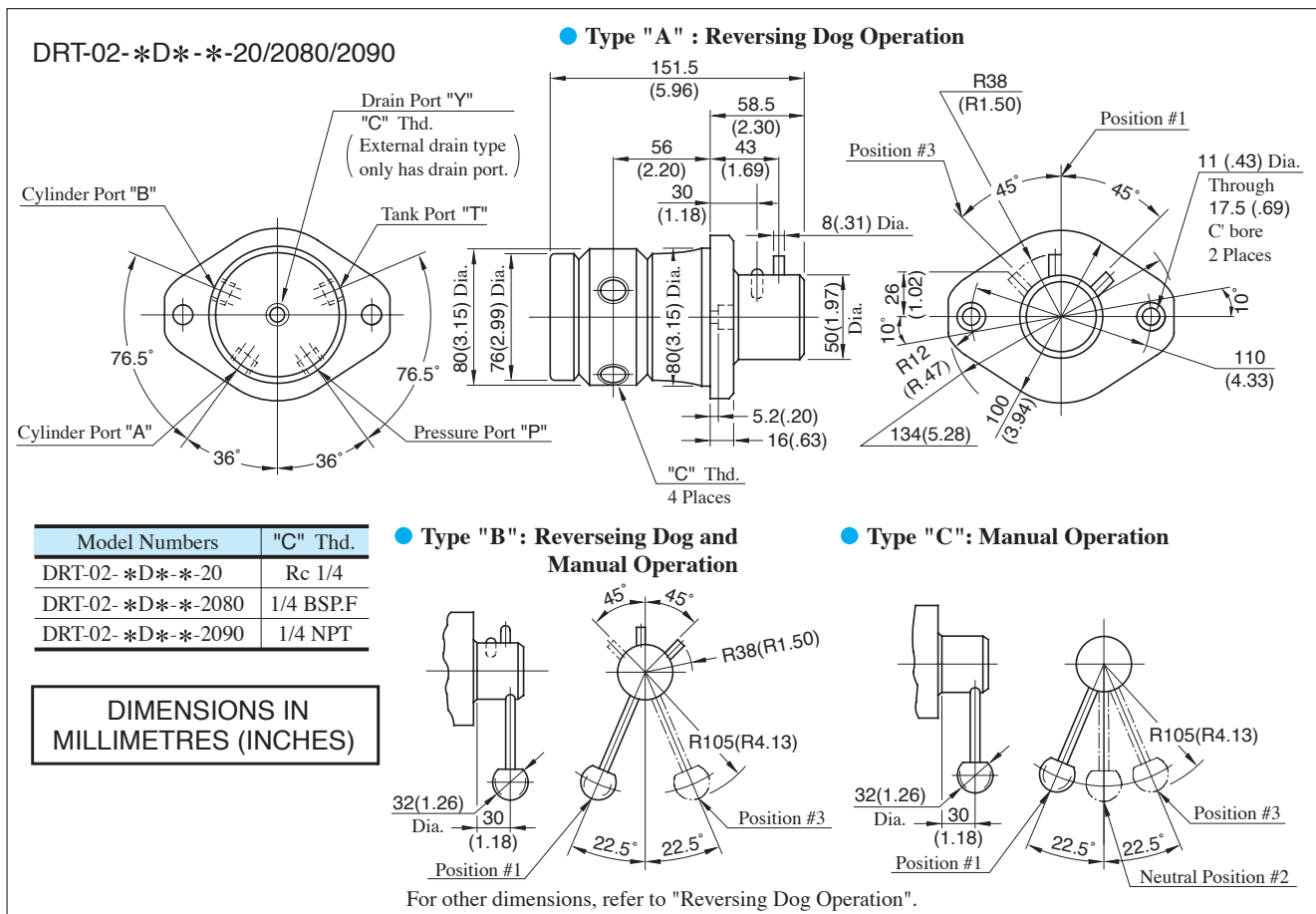
Valve Type	Pressure Drop Curve No.			
	P→A	B→T	P→B	A→T
2D2	②	②	②	②
3D4	②	②	①	②

1. For any other viscosity, multiply by the factors in the table below.

Viscosity	mm ² /s	15	20	30	40	50	60	70	80	90	100
	SSU	77	98	141	186	232	278	324	371	417	464
Factor		0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

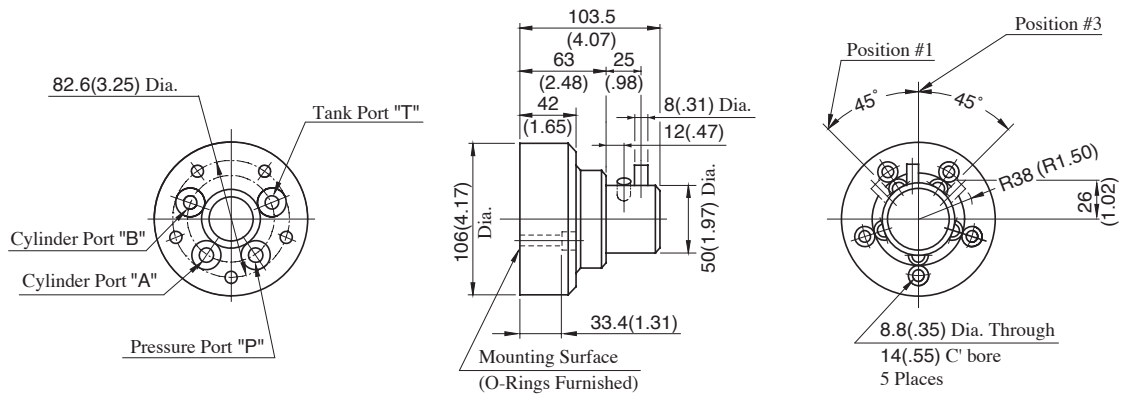
2. For any other specific gravity (G'), the pressure drop ($\Delta P'$) may be obtained from the formula below.

$$\Delta P' = \Delta P (G'/0.850)$$



DRG-02-*D*-*20/2090

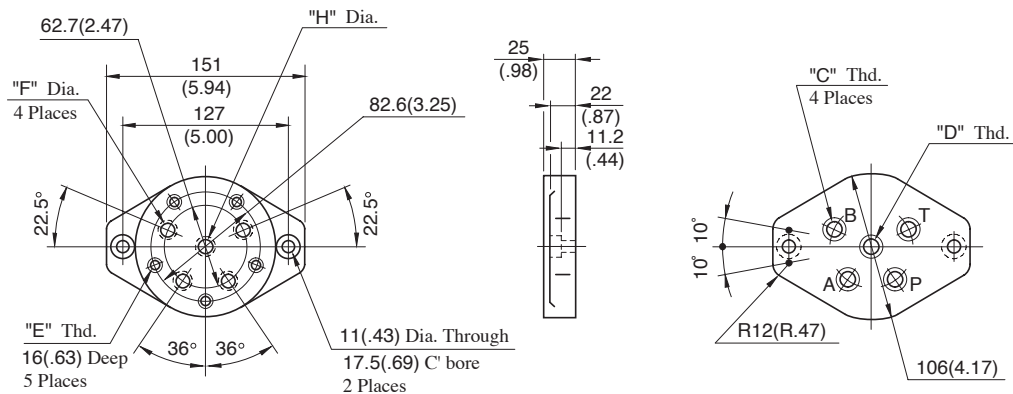
● Type "A": Reversing Dog Operation



For information on Type "B": reversing Dog and Manual Operation and Type "C": Manual Operation, see DRT-02 on the [previous page](#).

**DIMENSIONS IN
MILLIMETRES (INCHES)**

Sub-plates : DRGM-⁰²_{02X}-*20/2080/2090



Sub-plate Model Numbers	"C" Thd.	"D" Thd.	"E" Thd.	mm (Inches)		Remarks
				F	H	
DRGM-02-20 DRGM-02X-20	Rc 1/4 Rc 3/8	—	M8	11 (.43)	—	For Internal Drain
DRGM-02-2080 DRGM-02X-2080	1/4 BSP.F 3/8 BSP.F	—	M8	11.7 (.46)		
DRGM-02-2090 DRGM-02X-2090	1/4 NPT 3/8 NPT	—	5/16-18 UNC	11 (.43)		
DRGM-02-R-20 DRGM-02X-R-20	Rc 1/4 Rc 3/8	Rc 1/4	M8	11 (.43)	11 (.43)	For External Drain
DRGM-02-R-2080 DRGM-02X-R-2080	1/4 BSP.F 3/8 BSP.F	1/4 BSP.F	M8	11.7 (.46)	11.7 (.46)	
DRGM-02-R-2090 DRGM-02X-R-2090	1/4 NPT 3/8 NPT	1/4 NPT	5/16-18 UNC	11 (.43)	11 (.43)	

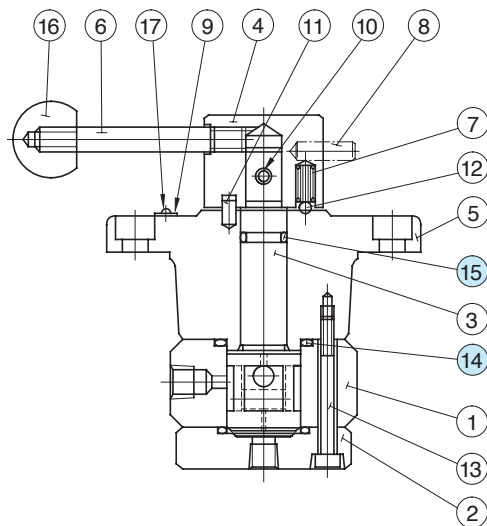
E



Mechanically Operated Directional Valves

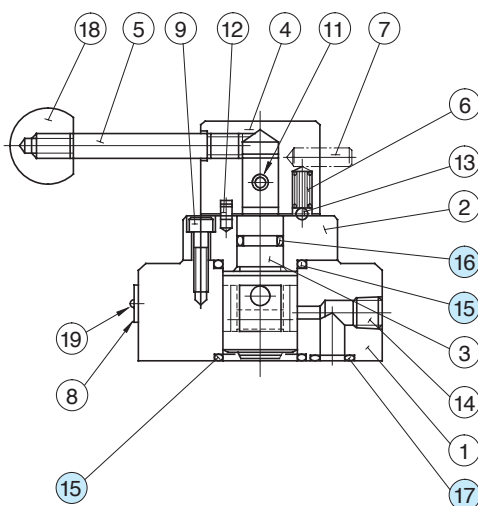
■ List of Seals

DRT-02- *D* - *-20/2080/2090



Item	Name of Parts	Part Numbers	Qty.	Remarks
14	O-Ring	SO-NB-G35	2	Included in Seal Kit (Kit No.: KS-DRT-02-20)
15	O-Ring	SO-NA-P16	1	

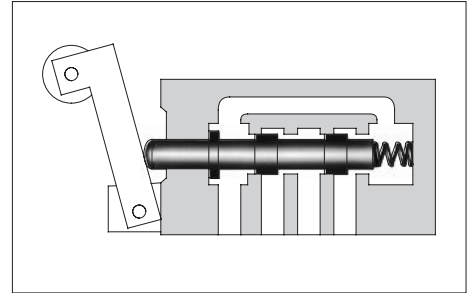
DRG-02- *D* - *-20/2090



Item	Name of Parts	Part Numbers	Qty.	Remarks
15	O-Ring	SO-NB-G35	2	Included in Seal Kit (Kit No.: KS-DRG-02-20)
16	O-Ring	SO-NA-P16	1	
17	O-Ring	SO-NB-P16	4	

Cam Operated Directional Valves

These valves may be used to shift the direction of oil flow by depressing the spool by way of a cam.



Specifications

Model Numbers		Max. Flow ★ L/min (U.S.GPM)	Max. Operating Pressure MPa (PSI)	Max. T-Line Pressure MPa (PSI)	Approx. Mass kg (lbs.)	
Threaded Connection	Sub-plate Mounting				DCT Type	DCG Type
DCT-01-2B*-40*	DCG-01-2B*-40*	30 (7.9)	21 (3050)	7 (1020)	1.1 (2.4)	1.1 (2.4)
DCT-03-2B*-50*	DCG-03-2B*-50*	100 (26.4)	25 (3630)	10 (1450)	4.5 (9.9)	3.8 (8.4)

★ Max. flow indicates the ceiling flow which does not affect the normal function (changeover) of valves.

Model Number Designation

F-	DC	T	-01	-2	B	2	-R	-40	*
Special Seals	Series Number	Type of Connection	Valve Size	No. of Valve Position	Spool-Spring Arrangement	Spool Type	Roller Position	Design Number	Design Standards
F: Special seals for phosphate ester type fluids (Omit if not required)	DC: Cam Operated Directional Valve	T: Threaded Connection	01	2	B: Spring Offset	2 3 8	None (Normal Position) R Y (DC*-01 only)	40	None: Japanese Standard "JIS" 80: European Design Standard 90: N. American Design Standard
			03					50	
		G: Sub-plate Mounting	01					40	None: Japanese Standard "JIS" & European Design Standard 90: N. American Design Standard
			03					50	

Sub-plates

Valve Model Numbers	Japanese Standard "JIS"		European Design Standard		N. American Design Standard		Approx. Mass kg (lbs.)
	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	Sub-plate Model Numbers	Thread Size	
DCG-01	DSGM-01-31	Rc 1/8	DSGM-01-3180	1/8 BSP.F	DSGM-01-3190	1/8 NPT	0.8 (1.8)
	DSGM-01X-31	Rc 1/4	DSGM-01X-3180	1/4 BSP.F	DSGM-01X-3190	1/4 NPT	0.8 (1.8)
	DSGM-01Y-31	Rc 3/8	—	—	DSGM-01Y-3190	3/8 NPT	0.8 (1.8)
DCG-03	DSGM-03-41	Rc 3/8	DSGM-03-2180	3/8 BSP.F	DSGM-03-2190	3/8 NPT	3.0 (6.6)
	DSGM-03X-41	Rc 1/2	DSGM-03X-2180	1/2 BSP.F	DSGM-03X-2190	1/2 NPT	3.0 (6.6)
	DSGM-03Y-41	Rc 3/4	DSGM-03Y-2180	3/4 BSP.F	DSGM-03Y-2190	3/4 NPT	4.7 (10.4)

● Sub-plates are available. Specify the sub-plate model number from the table above.
When sub-plates are not used, the mounting surface should have a good machined finish.



■ Mounting Bolts

Socket head cap screws in the table below are included.

Model Numbers	Socket Head Cap Screw			
	Japanese Standard "JIS" European Design Standard	N. American Design Standard	Qty.	Tightening Torque Nm (in. lbs)
DCT-01	M5 × 45 Lg.	No. 10-24 UNC × 1-3/4 Lg.	2	5-7 (43-60)
DCG-01	M5 × 45 Lg.	No. 10-24 UNC × 1-3/4 Lg.	4	5-7 (43-60)
DCG-03	M6 × 35 Lg.	1/4-20 UNC × 1-1/2 Lg.	4	12-15 (105-130)

■ Direction of Oil Flow for Roller Position

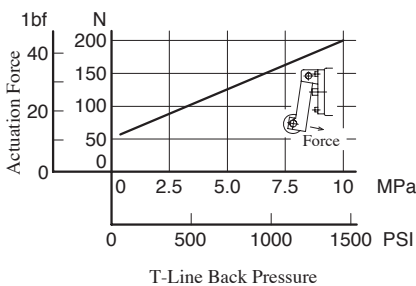
Model Numbers	Graphic Symbols	Roller Position and Direction of Oil Flow	
		Roller Stroke from Offset Position mm(Inches)	
		Extended(Offset)	Depressed
DCT-01-2B2 DCG-01-2B2		P → B A → T All ports blocked 0 3.8 (0.150) 4.6 (0.181) 9.5 (0.374)	P → A B → T
DCT-01-2B3 DCG-01-2B3		P → B A → T All ports open 0 3.8 (0.150) 4.6 (0.181) 9.5 (0.374)	P → A B → T
DCT-01-2B8 DCG-01-2B8		P → B A&T ports blocked 0 3.8 (0.150) 9.5 (0.374)	P → A B&T ports blocked
DCT-03-2B2 DCG-03-2B2		P → A B → T All ports blocked 0 3.4 (0.134) 3.8 (0.150) 7 (0.276)	P → B A → T
DCT-03-2B3 DCG-03-2B3		P → A B → T All ports open 0 3.0 (0.118) 4.0 (0.157) 7 (0.276)	P → B A → T
DCT-03-2B8 DCG-03-2B8		P → A B&T ports blocked All ports blocked 0 3.6 (0.142) 4.7 (0.185) 7 (0.276)	P → B A&T ports blocked

■ Instructions

● Valve Type "2B8"

Tank port "T" functions as a drain port. Directly connect it to the reservoir.
[Max. allowable back pressure 0.35 MPa (50 PSI)].

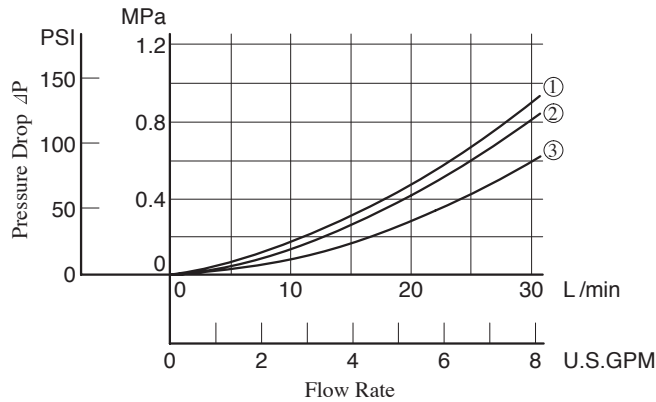
● Actuation Force



Pressure Drop

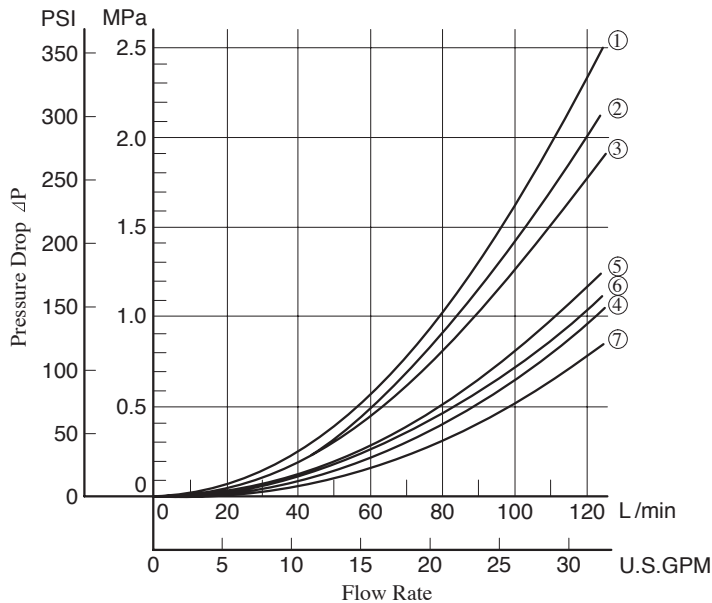
Pressure drop curves based on viscosity of 35 mm²/s (164 SSU) and specific gravity of 0.850.

DCT DCG -01



Model Numbers	Pressure Drop Curve No.			
	P→A	B→T	P→B	A→T
DCT-01-2B2	①	①	②	①
DCT-01-2B3	②	—	②	—
DCT-01-2B8	③	—	③	—

DCT DCG -03



Model Numbers	Pressure Drop Curve No.			
	P→A	B→T	P→B	A→T
DCG-03-2B2	②	①	④	④
DCG-03-2B3	③	②	⑦	⑦
DCG-03-2B8	⑥	—	⑤	—

● For any other viscosity, multiply the factors in the table below.

Viscosity	mm ² /s	15	20	30	40	50	60	70	80	90	100
SSU		77	98	141	186	232	278	324	371	417	464
Factor		0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

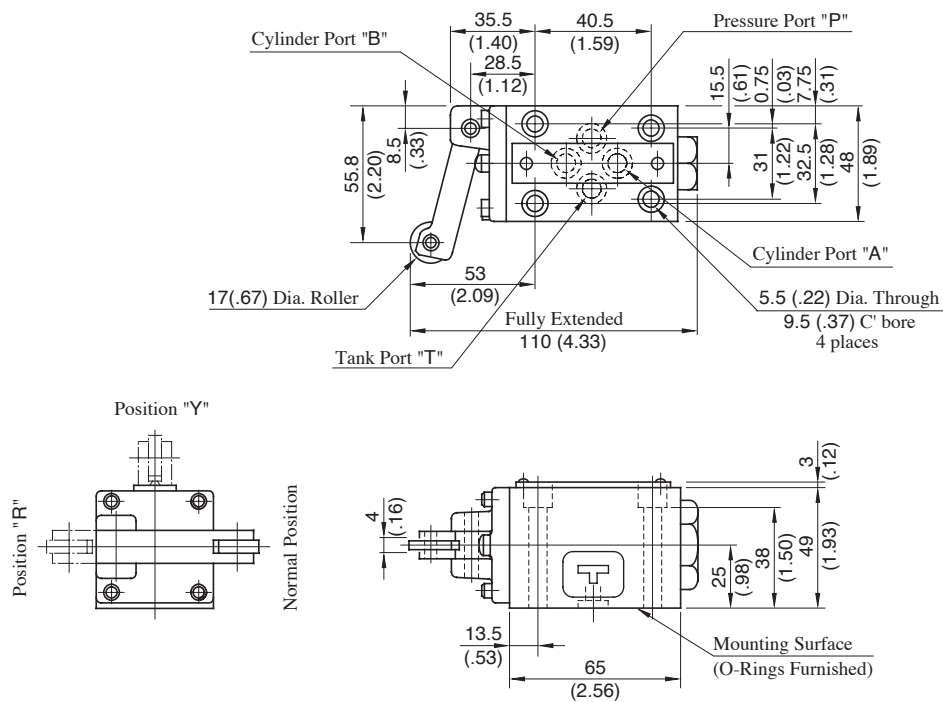
● For any other specific gravity (G'), the pressure drop (ΔP') may be obtained from the formula below.

$$\Delta P' = \Delta P (G'/G) \text{ where, } \Delta P \text{ is a value on the above chart and } G \text{ is } 0.850.$$



DCG-01-2B*-*-40/4090

Mounting Surface: ISO 4401-AB-03-4-A



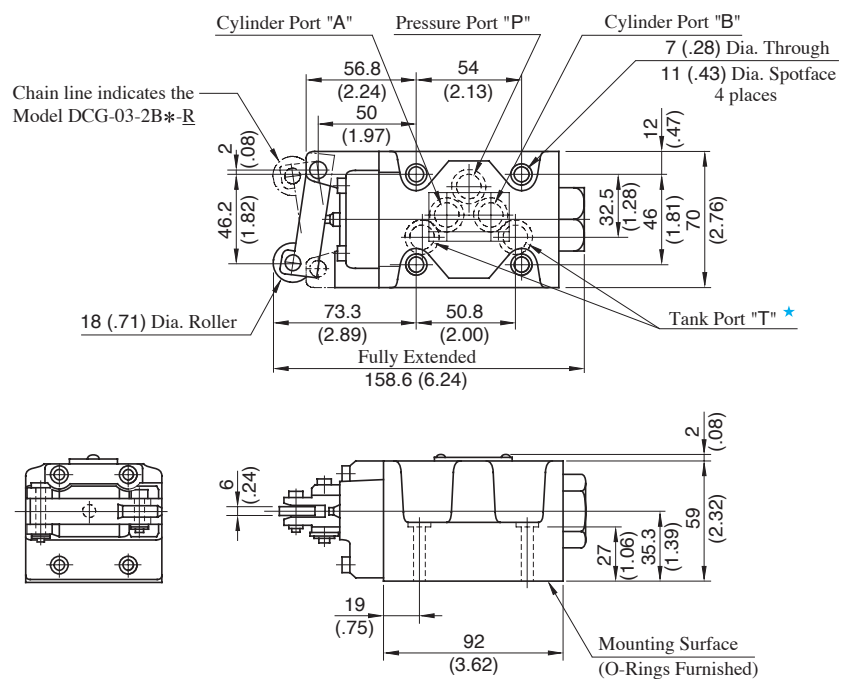
Note1: For the cam and roller travel, see DCT-01 in the [previous page](#).

Note2: For the valve mounting surface dimensions, see the dimensional drawing of the sharable sub-plate in [page 356](#).

DIMENSIONS IN
MILLIMETRES (INCHES)

Mounting Surface: ISO 4401-AC-05-4-A

DCG-03-2B*-*-50/5090



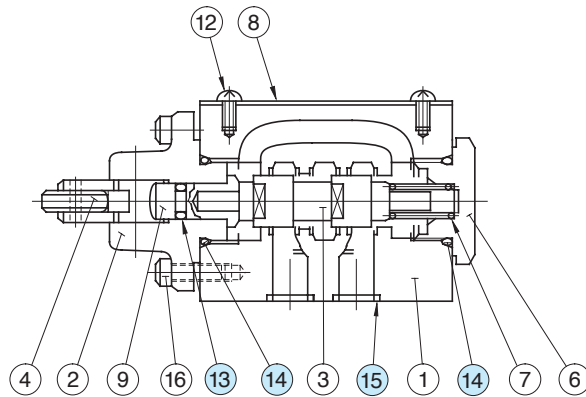
★. Although the tank port is shown on the left in our sub-plate, either may be used.

Note1: For the cam and roller travel, see DCT-03 in the [previous page](#).

Note2: For the valve mounting surface dimensions, see the dimensional drawing of the sharable sub-plate in [page 373](#).

■ List of Seals

DCT-01-2B*-*-40/4080/4090
DCG-01-2B*-*-40/4090



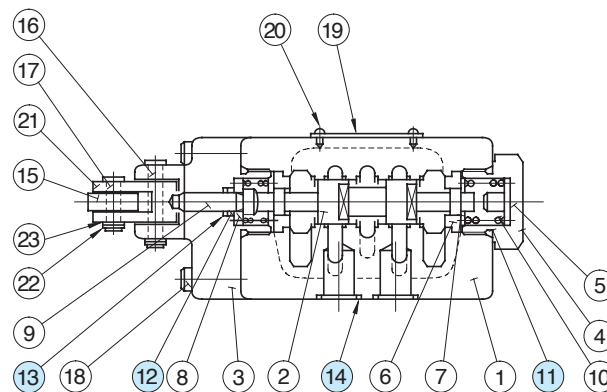
● List of Seal Kit No.

Item	Name of Parts	Part Numbers	Quantity	
			DCT-01	DCG-01
13	O-Ring	SO-NA-P5	1	1
14	O-Ring	SO-NB-P18	2	2
15	O-Ring	SO-NB-P9	0	4

Valve Model Numbers	Seal Kit Numbers
DCT-01-2B*-*-40/4080/4090	KS-DCT-01-40
DCG-01-2B*-*-40/4090	KS-DCG-01-40

Note: When ordering the o-rings, please specify the seal kit number from the table right.

DCT-03-2B*-*-50/5080/5090
DCG-03-2B*-*-50/5090



● List of Seal Kit No.

Item	Name of Parts	Part Numbers	Quantity	
			DCT-03	DCG-03
11	O-Ring	SO-NB-P21	2	2
12	O-Ring	SO-NA-P6	1	1
13	Back Up Ring	SO-BE-P6	1	1
14	O-Ring	SO-NB-A014	0	5

Valve Model Numbers	Seal Kit Numbers
DCT-03-2B*-*-50/5080/5090	KS-DCT-03-50
DCG-03-2B*-*-50/5090	KS-DCG-03-50

Note: When ordering the seals, please specify the seal kit number from the table right.



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