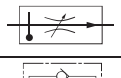
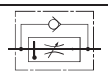
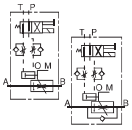
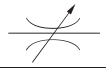
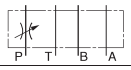
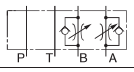
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FLOW CONTROLS

Valve Type	Graphic Symbols	Maximum Operating Pressure MPa	Maximum Flow L/min (1 2 3 5 10 20 30 50 100 200 300 500 1000 2000 3000 5000)	Page
Flow Control Valves		21	FG 01 02 03 06 10	D-3
Flow Control and Check Valves		21	FCG 01 02 03 06 10	D-3
Pilot Operated Flow Control Valves		21	FHG 02 03 06 10	D-12
Pilot Operated Flow Control and Check Valves		21	FHCG 02 03 06 10	D-12
Restrictors		25	SRT/SRG 03 06 10 (Rated Flow)★	D-13
One Way Restrictors		25	SRCT/SRCG 03 06 10 (Rated Flow)★	D-13
Throttle Modules		25	TC1G 01 03	D-18
Throttle & Check Modules		25	TC2G 01 03	D-18
Deceleration Valves		21	ZT/ZG 03 06 10	D-22
Deceleration & Check Valves		21	ZCT/ZCG 03 06 10	D-22
Feed Control Valves		14	UCF1G/UCF2G 01 03 04	D-23
Needle Valves		35	GCT/GCTR 02	D-24

★Rated flow stands for approximate flow rate when the pressure drop between inlet and outlet ports of the valve in fully opened condition becomes 0.3 MPa maximum at fluid's specific gravity of 0.85 and viscosity of 20 mm^2/s.

Hydraulic Fluids

Fluid Types

Any type of hydraulic fluids listed in the table below can be used.
Regardless of which hydraulic fluid is used, the specifications, etc., remain the same.

Hydraulic Fluids	Special Remarks
Petroleum Based Oils	Use fluids equivalent to ISO VG 32 or VG 46.
Synthetic Fluids	Use phosphate ester or polyol ester fluid. When phosphate ester type fluid is used, prefix "F-" to the model number because the special seals (fluororubber) are required to be used.
Water Containing Fluids	Use water-glycol fluid.

Note: Please consult us separately when using hydraulic fluids other than those listed above.
Standard products of restrictors and one-way restrictors valves respectively can be used for W/O type emulsion hydraulic oil.

Recommended Viscosity and Oil Temperatures

Use hydraulic fluids which satisfy the recommended viscosity and oil temperatures given below.

Name	Viscosity	Temperature
Flow Control Valves Flow Control and Check Valves Pilot Operated Flow Control Valves Pilot Operated Flow Control and Check Valves Feed Control Valves	20 - 200 mm^2/s	−15 - +70°C
Restrictors One Way Restrictors Throttle Modules Throttle and Check Modules Deceleration Valves Deceleration and Check Valves Needle Valves	15 - 400 mm^2/s	

Control of Contamination

Due caution must be paid to maintaining control over contamination of the hydraulic fluids which may otherwise lead to breakdowns and shorten the life of the valves. Please maintain the degree of contamination within NAS 1638-Grade 12. Use 25 μm or finer line filter.

Interchangeability in Installation between Current and New Design

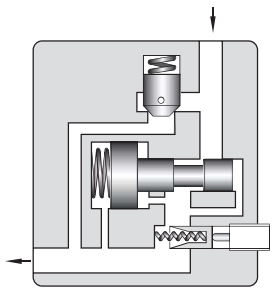
The model change is as follows.

Name	Model Numbers	Design Number		Interchangeability in Installation	Major Changes
		Current	New		
Needle Valves	GCT–02 GCTR–02	33	34	Yes	Improved assembly workability

Flow Control Valves / Flow Control and Check Valves

These valves are pressure and temperature compensating type valves and maintain a constant flow rate independent of change in system pressure (load) and temperature (viscosity of the fluid). They control flow rate of the hydraulic circuit and eventually control speed of the actuator precisely.
Valves with an integral check valve allow a controlled flow and reverse free flow. Repeated resetting can be made easily with a digital readout.(Valve size "01" is excluded)





Specifications

Model Numbers	Max. Metered Flow Capacity L/min	Min. Metered Flow Capacity L/min	Max.Operating Pressure MPa	Approx. Mass kg
FG / FCG -01- 4 / 8 -*-11	4 / 8	0.02 (0.04)★	14	1.3
FG / FCG -02-30-*-30	30	0.05	21	3.8
FG / FCG -03-125-*-30	125	0.2		7.9
FG / FCG -06-250-*-30	250	2		23
FG / FCG -10-500-*-30	500	4		52

★The figures in parentheses are for pressures above 7 MPa.

Model Number Designation

FC	G	−01	−8	−N	−11
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Pres. Compensator★ Stroke Adjustment	Design Number
F : Flow Control Valves FC : Flow Control and Check Valves	G : Sub-Plate Mounting	01	4·8	N : Applicable only for Pres. Compensator Stroke Adjustment (Option)	11
		02	30		30
		03	125		30
		06	250		30
		10	500		30

★Pres. Compensator Stroke Adjustment : This is used to reduce the jumping phenomenon at actuator startup.

Accessories

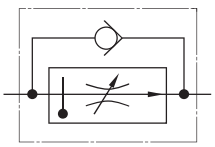
● Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw
FG / FCG -01	M 5 × 55L.....4pcs.
FG / FCG -02	M 8 × 50L.....4pcs.
FG / FCG -03	M10× 75L.....4pcs.
FG / FCG -06	M16×130L.....4pcs.
FG / FCG -10	M20×160L.....4pcs.

Graphic Symbols



FG



FCG

Sub-Plates

Valve Model Numbers	Sub-Plate Model No.	Thread Size Rc	Mass kg
FG FCG -01	FGM-01X-10	1/4	0.8
FG FCG -02	FGM-02-20	1/4	2.3
	FGM-02X-20	3/8	2.3
	FGM-02Y-20	1/2	3.1
FG FCG -03	FGM-03-20	3/8	3.9
	FGM-03X-20	1/2	3.9
	FGM-03Y-20	3/4	5.7
	FGM-03Z-20	1	5.7
FG FCG -06	FGM-06X-20	1	12.5
	FGM-06Y-20	1 1/4	16
	FGM-06Z-20	1 1/2	16
FG FCG -10	FGM-10Y-20	1 1/2, 2, (used with pipe flange)	37

- 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 ($\sqrt{6}$).
- When ordering FGM-10Y, please order F3 pipe flange kit separately also. Please consult your Yuken representatives in advance separately for details on F3 pipe flange kit.

Instructions

Min. Required Pressure Difference

The minimum differential pressure between inlet and outlet port is required to obtain the optimum pressure compensation. It varies according to the flow rate to be set. For details, please refer to the performance curves.

Flow Adjustment

[F*G-01]

Loosen the locking screw and turn the flow adjustment dial clockwise for increase, and anti-clockwise for decrease. The dial makes about 4 revolutions from zero to full flow and the valve opening is indicated on the revolution indicator.

(Refer to characteristics of "Dial Position vs. Flow").

After flow adjustments, be sure to tighten the locking screw to the specified torque.

[F*G-02, 03, 06, 10]

Loosen the locking screw and turn the flow adjustment handle clockwise for increase, and anti-clockwise for decrease.

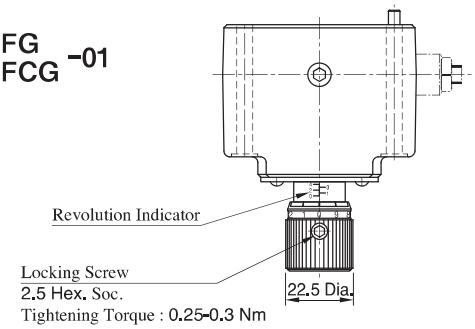
Open condition is indicated in digital-scale in built-in revolution indicator and each rotation of handle increase or decrease the number by 100 (Refer to the characteristics of "Dial Position vs. Flow").

After flow adjustments, be sure to tighten the locking screw.

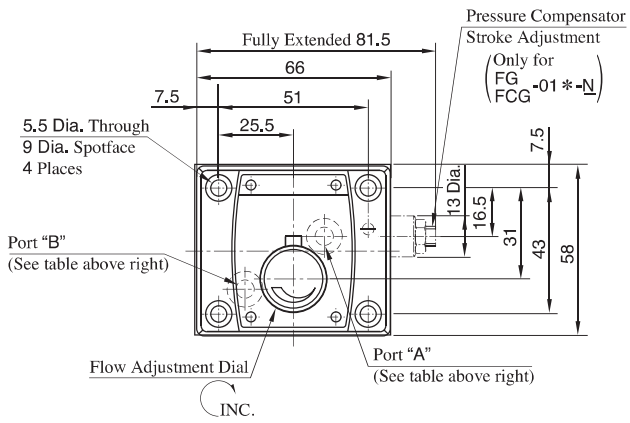
Line Filter

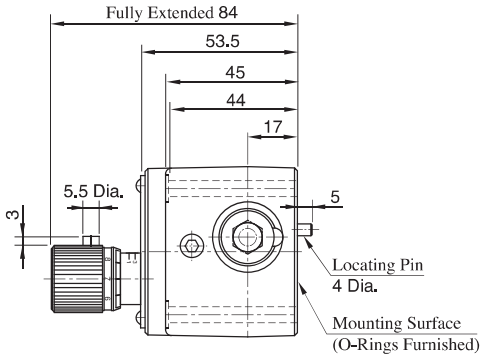
To carry out flow adjustments by as small degree as 2 L/min or less, be sure to use a line filter of 10 μm or finer and install it near the valve inlet.

FG FCG -01



Model No.	Port "A"	Port "B"
FG-01	Controlled Flow Inlet	Controlled Flow Outlet
FCG-01	Controlled Flow Inlet or Free Flow Outlet	Controlled Flow Outlet or Free Flow Inlet

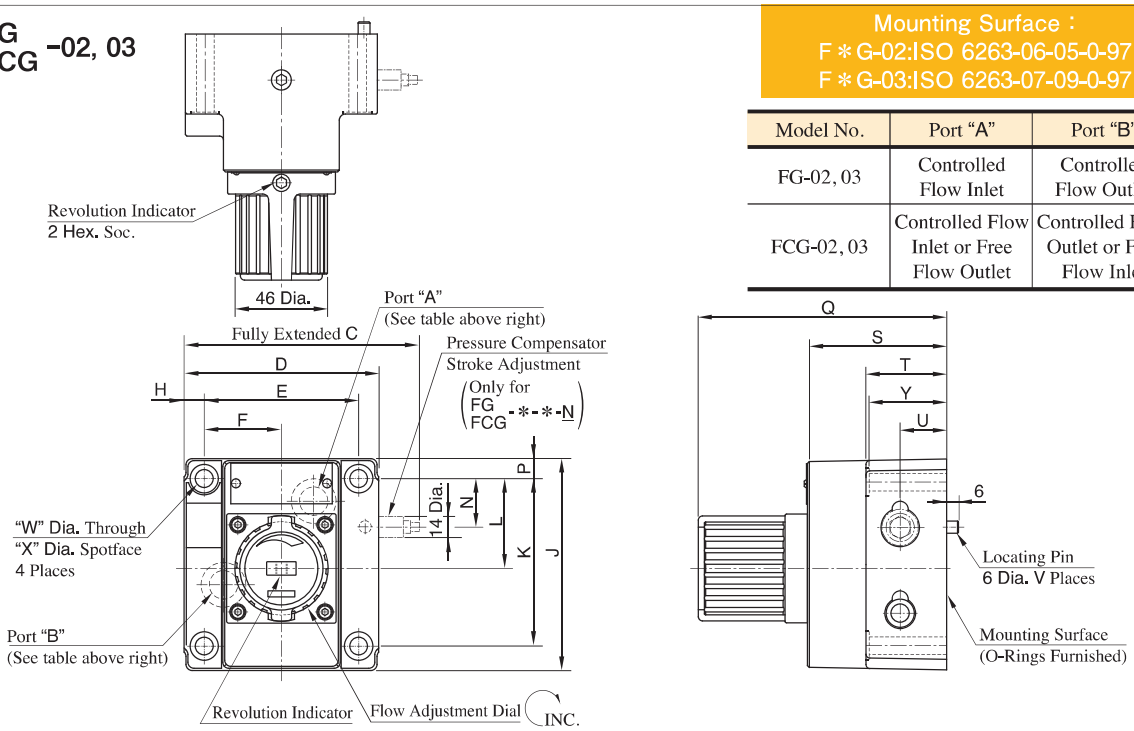




FG FCG -02, 03

Mounting Surface :
F＊G-02:ISO 6263-06-05-0-97
F＊G-03:ISO 6263-07-09-0-97

Model No.	Port "A"	Port "B"
FG-02, 03	Controlled Flow Inlet	Controlled Flow Outlet
FCG-02, 03	Controlled Flow Inlet or Free Flow Outlet	Controlled Flow Outlet or Free Flow Inlet

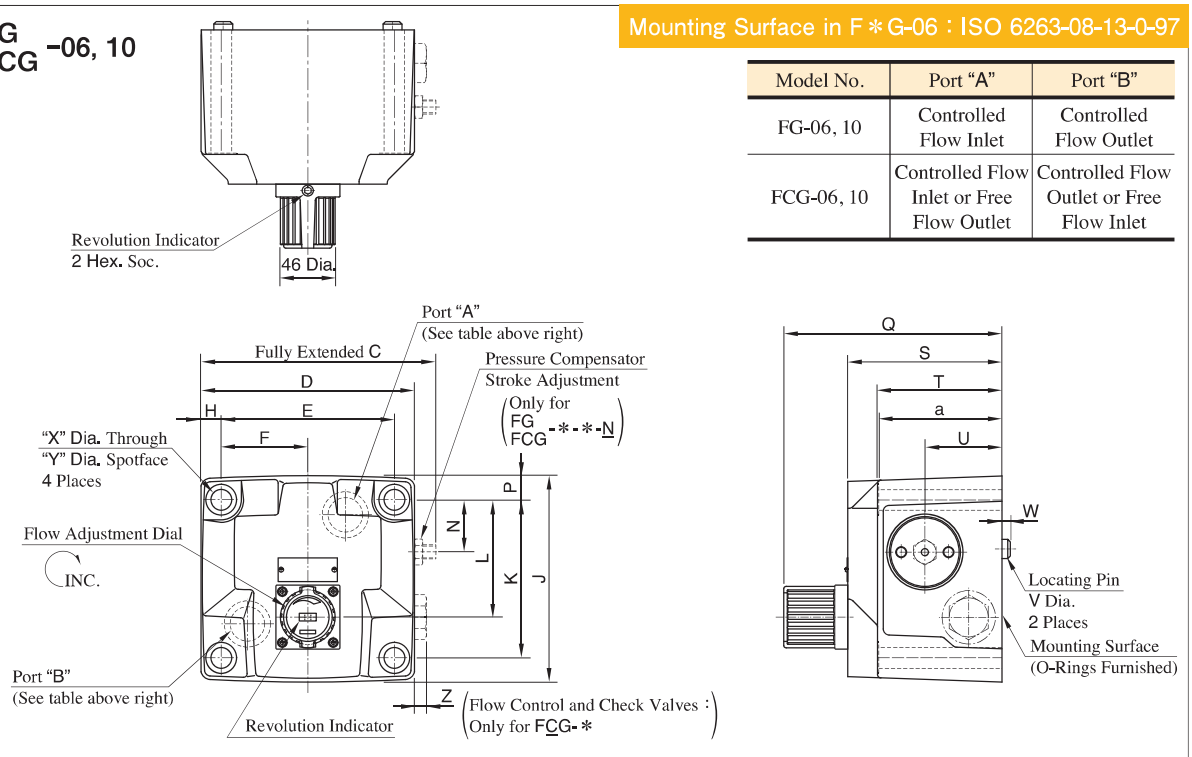


Model No.	C	D	E	F	H	J	K	L	N	P	Q	S	T	U	V	W	X	Y
FG FCG -02	116	96	76.2	38.1	9.9	104.5	82.6	44.3	24	9.9	123	69	40	23	1	8.8	14	39
FG FCG -03	145	125	101.6	50.8	11.7	125	101.6	61.8	29.8	11.7	152	98	64	41	2	11	17.5	63

FG FCG -06, 10

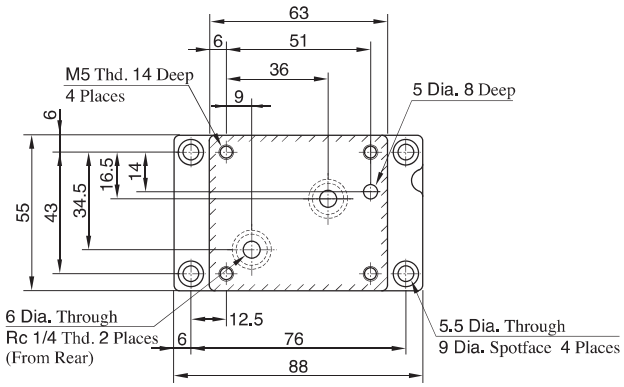
Mounting Surface in F＊G-06 : ISO 6263-08-13-0-97

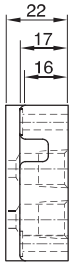
Model No.	Port "A"	Port "B"
FG-06, 10	Controlled Flow Inlet	Controlled Flow Outlet
FCG-06, 10	Controlled Flow Inlet or Free Flow Outlet	Controlled Flow Outlet or Free Flow Inlet



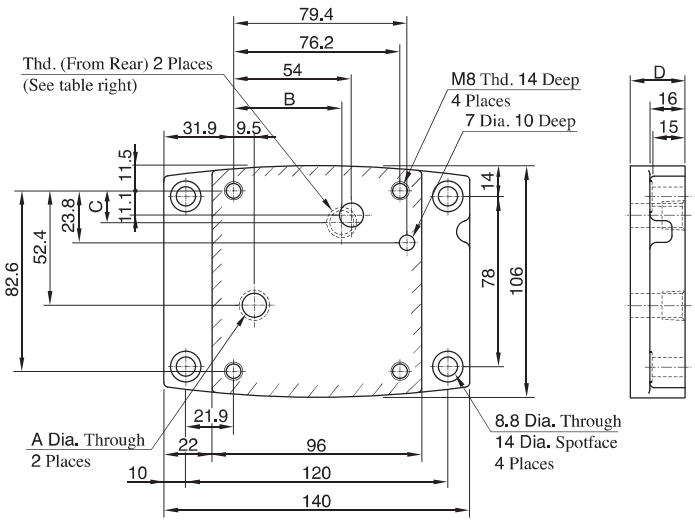
Model No.	C	D	E	F	H	J	K	L	N	P	Q	S	T	U	V	W	X	Y	Z	a
FG FCG -06	198	180	146.1	73	17	174	133.4	99	44	20.3	184	130	105	65	16	7	17.5	26	10	103
FG FCG -10	267	244	196.9	98.5	23.5	228	177.8	144.5	61	25	214	160	137	85	18	10	21.5	32	7.5	135

Sub-Plate:FGM-01X





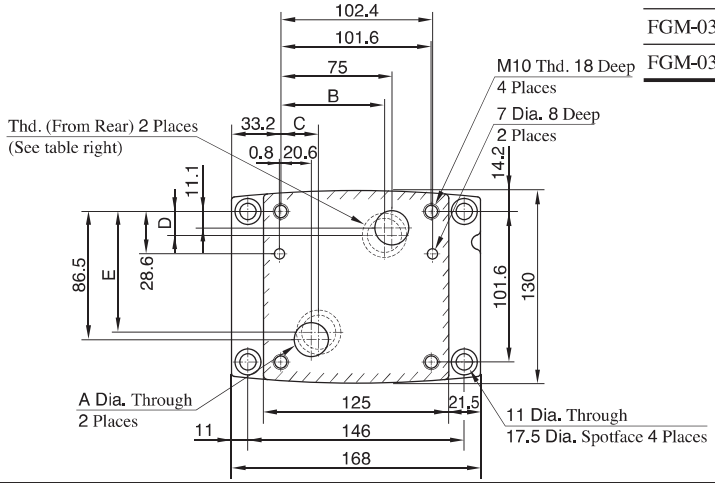
Sub-Plate:FGM-02, 02X, 02Y

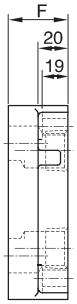


Sub-Plate Model Numbers	Thread Size Rc	A	B	C	D
FGM-02-20	1/4	11	54	11.1	25
FGM-02X-20	3/8	14	54	11.1	25
FGM-02Y-20	1/2	14	51	14	35

Sub-Plate:FGM-03, 03X, 03Y, 03Z

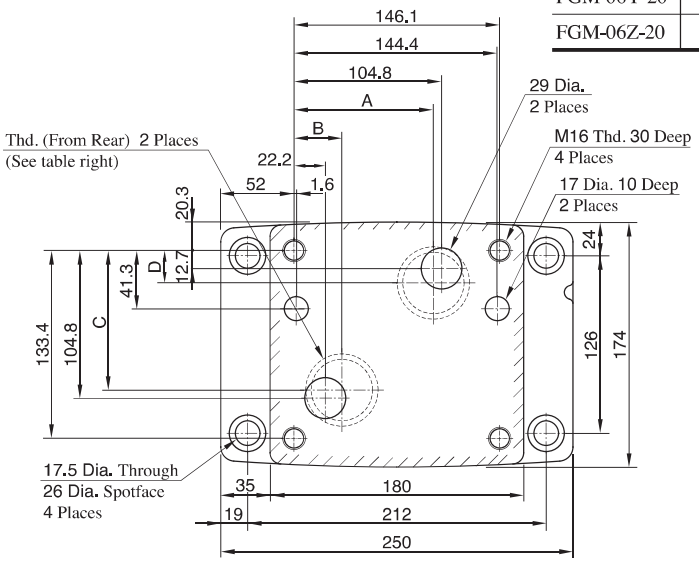
Sub-Plate Model Numbers	Thread Size Rc	A	B	C	D	D	F
FGM-03-20	3/8	14	75	20.6	11.1	86.5	25
FGM-03X-20	1/2	17.5	75	20.6	11.1	86.5	25
FGM-03Y-20	3/4	23	70	25.6	16.1	81.5	40
FGM-03Z-20	1	23	70	25.6	16.1	81.5	40

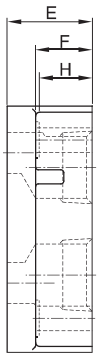




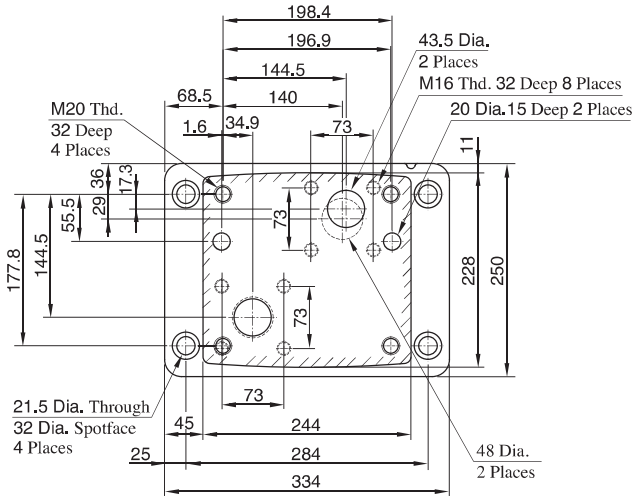
Sub-Plate:FGM-06X, 06Y, 06Z

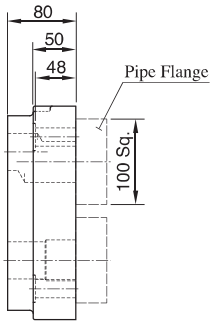
Sub-Plate Model Numbers	Thread Size Rc	A	B	C	D	E	F	H
FGM-06X-20	1	104.8	22.2	104.8	18	45	35	34
FGM-06Y-20	1 1/4	99	34	99	23	60	40	39
FGM-06Z-20	1 1/2	99	34	99	23	60	40	39





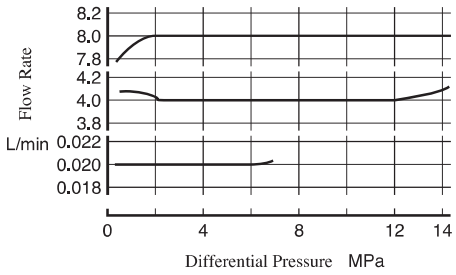
Sub-Plate:FGM-10Y



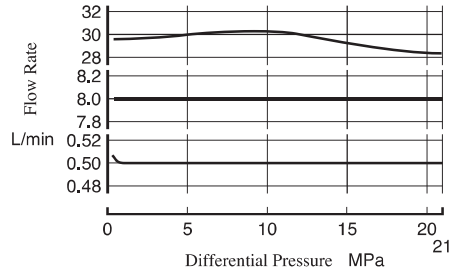


Differential Pressure vs. Flow

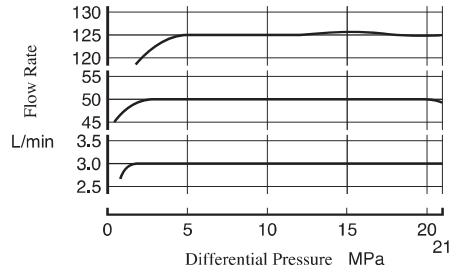
FG/FCG-01



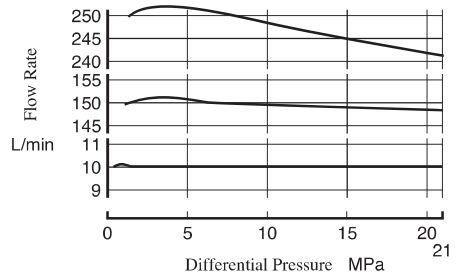
FG/FCG-02



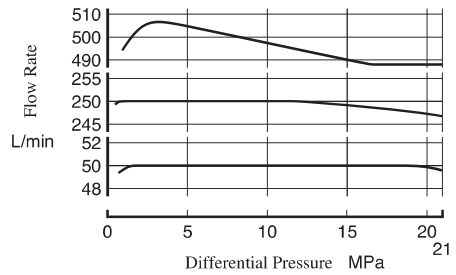
FG/FCG-03



FG/FCG-06

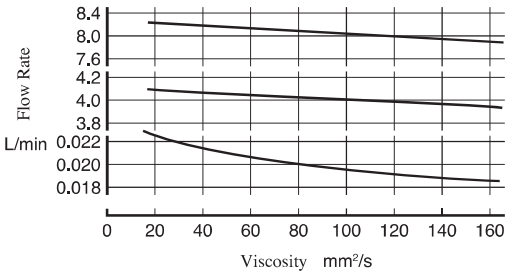


FG/FCG-10

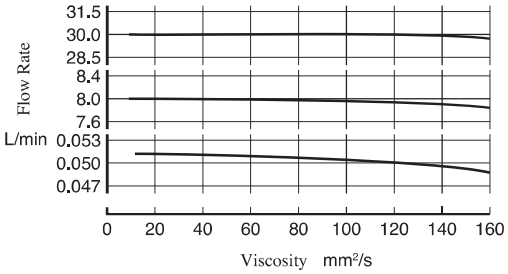


Viscosity vs.Flow

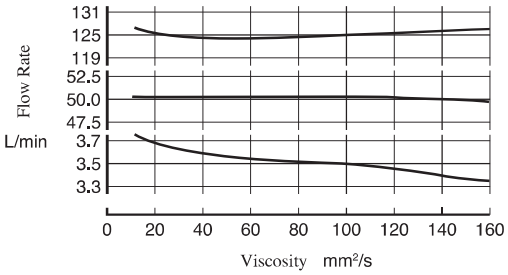
FG/FCG-01



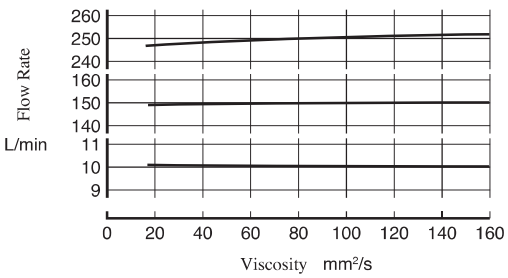
FG/FCG-02



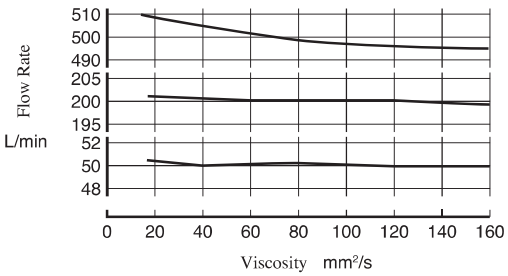
FG/FCG-03



FG/FCG-06

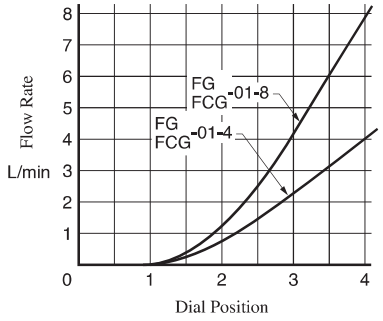


FG/FCG-10

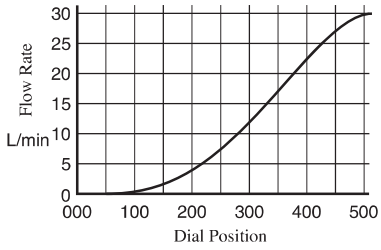


Dial Position vs. Flow

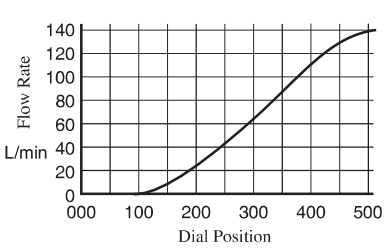
FG FCG-01



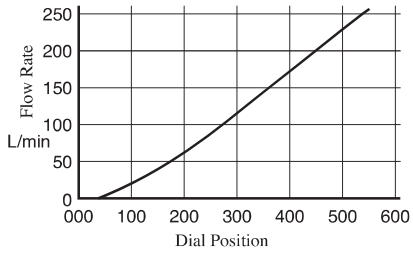
FG FCG-02



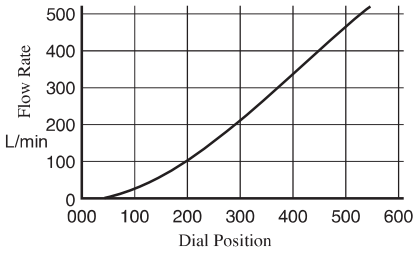
FG FCG-03



FG FCG-06

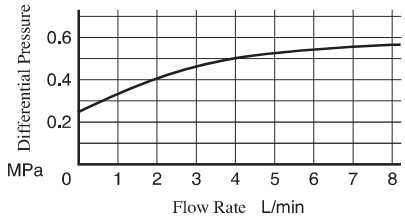


FG FCG-10

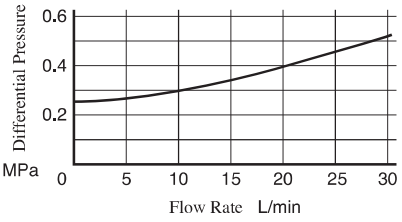


Min. Required Pressure Difference

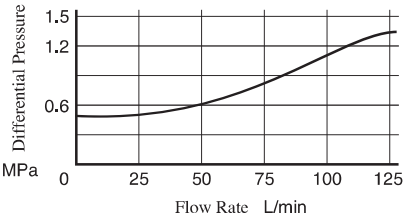
FG FCG-01



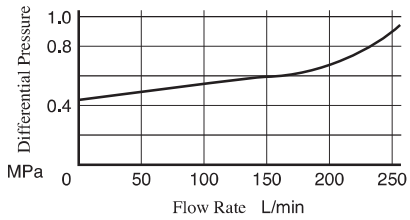
FG FCG-02



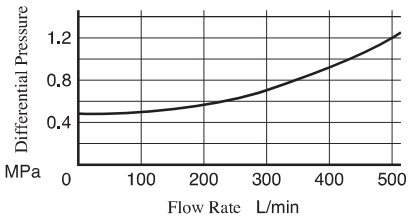
FG FCG-03



FG FCG-06



FG FCG-10

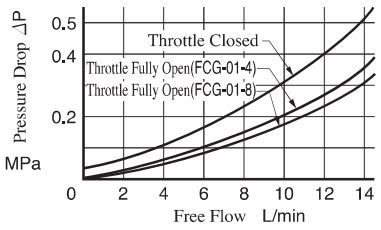


D Flow Control and Check Valves

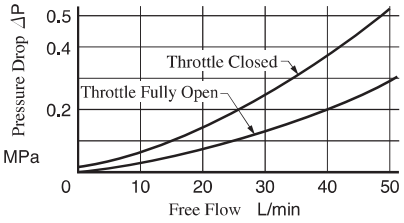
Pressure Drop for Free Flow (Only for with check valve)

Hydraulic Fluid : Viscosity 35 mm²/s, Specific Gravity 0.850

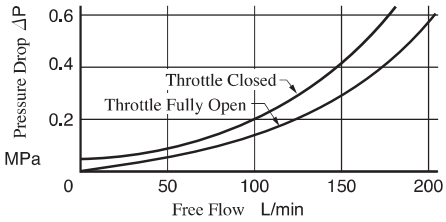
FCG-01



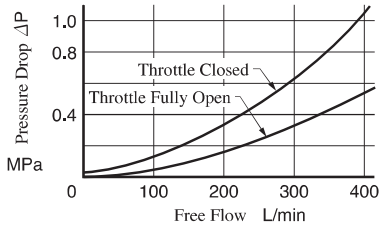
FCG-02



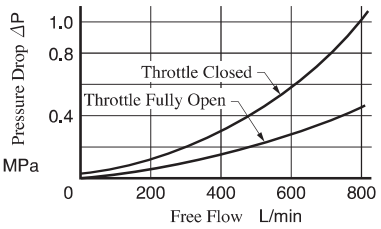
FCG-03



FCG-06



FCG-10



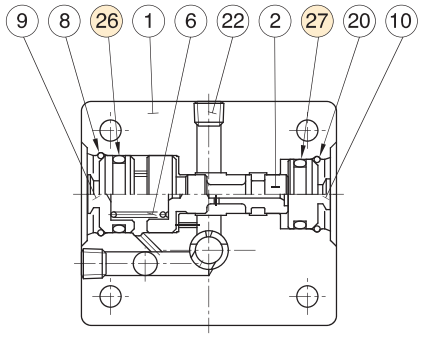
●For any other viscosity, multiply the factors in the table below.

Viscosity mm²/s	20	40	60	80	100
Factor	0.87	1.03	1.14	1.23	1.30

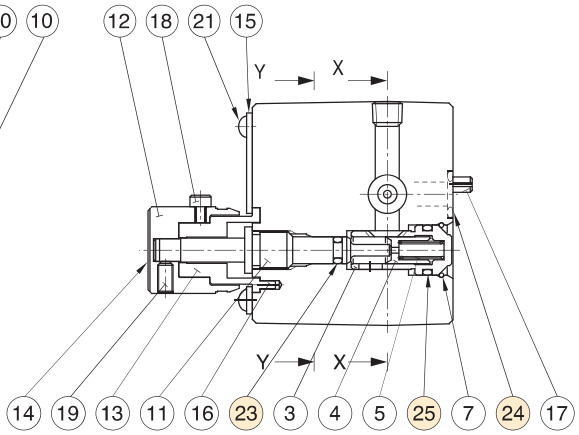
●Please use $\Delta P' = \Delta P \frac{G'}{G}$ for specific gravity change. However, ΔP is the value in the diagram and G is 0.850.

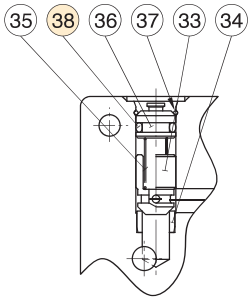
List of Seals

FG FCG -01

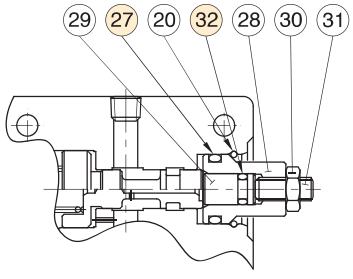


Section X-X
(FG-01)





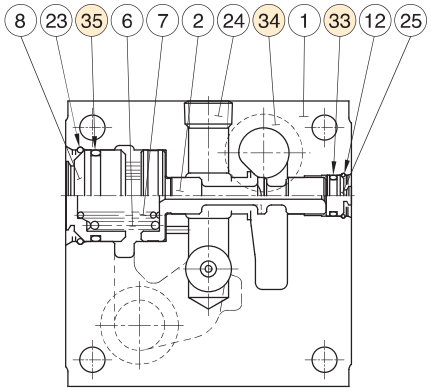
Section Y-Y
(FCG-01)



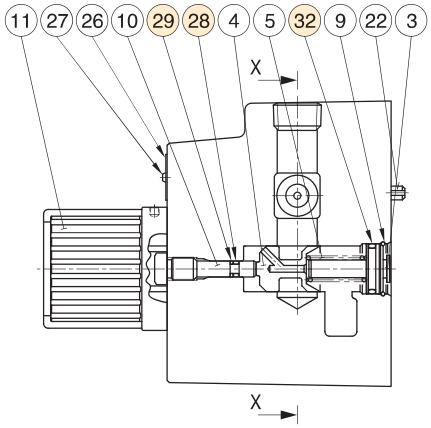
Section X-X
(FG FCG-01-*-N)

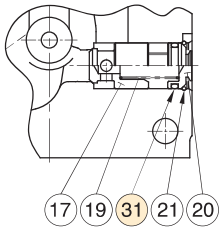
Item	Name of Parts	Part Numbers	Qty.
23	O-Ring	OR NBR-70-1 P4-N	1
24	O-Ring	OR NBR-90 P9-N	2
25	O-Ring	OR NBR-90 P10-N	1
26	O-Ring	OR NBR-90 P16-N	1
27	O-Ring	OR NBR-90 P14-N	1
32	O-Ring	OR NBR-70-1 P5-N	1
38	O-Ring	OR NBR-90 P7-N	1

FG / FCG -02, 03

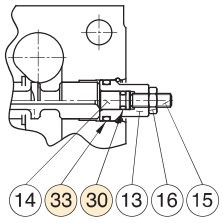


Section X-X
(FG-＊)





(FCG-＊)

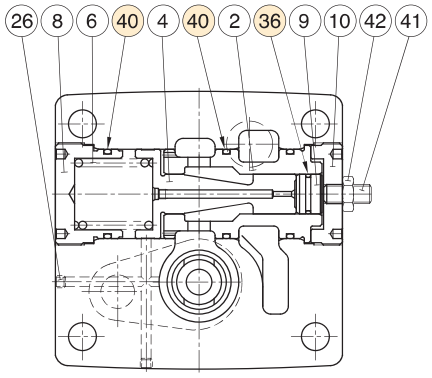


(FG / FCG -＊-＊-N)

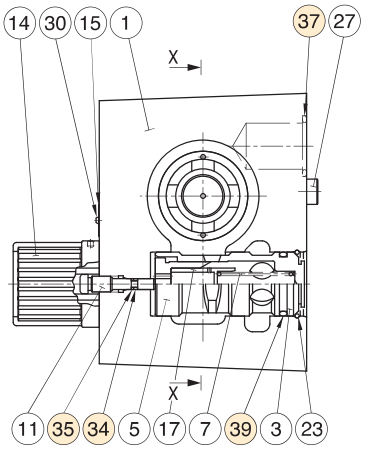
Section X-X

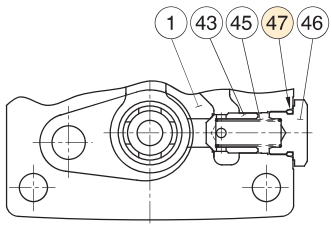
Item	Name of Parts	Part Numbers		Qty.
		FG / FCG -02	FG / FCG -03	
28	O-Ring	OR NBR-70-1 P4-N	OR NBR-70-1 P4-N	1
29	Back Up Ring	BR JIS B 2401-4-T2-P4	BR JIS B 2401-4-T2-P4	1
30	O-Ring	OR NBR-90 P5-N	OR NBR-90 P5-N	1
31	O-Ring	OR NBR-90 P10A-N	OR NBR-90 P16-N	1
32	O-Ring	OR NBR-90 P12-N	OR NBR-90 P18-N	1
33	O-Ring	OR NBR-90 P14-N	OR NBR-90 P14-N	1
34	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	2
35	O-Ring	OR NBR-90 G25-N	OR NBR-90 G35-N	1

FG / FCG -06, 10

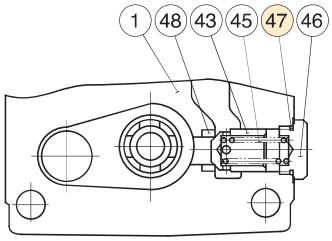


Section X-X
(FG-＊)





Section X-X
(FCG-06)

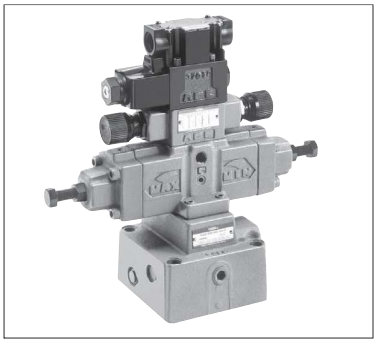


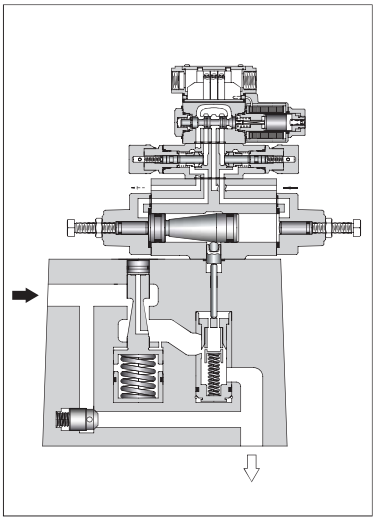
Section X-X
(FCG-10)

Item	Name of Parts	Part Numbers		Qty.
		FG / FCG -06	FG / FCG -10	
34	O-Ring	OR NBR-70-1 P4-N	OR NBR-70-1 P4-N	1
35	Back Up Ring	BR JIS B 2401-4-T2-P4	BR JIS B 2401-4-T2-P4	1
36	O-Ring	OR NBR-90 P21-N	OR NBR-90 P34-N	1
37	O-Ring	OR NBR-90 P32-N	OR NBR-90 P48-N	2
39	O-Ring	OR NBR-90 P34-N	OR NBR-90 P50-N	1
40	O-Ring	OR NBR-90 P50-N	OR NBR-90 P75-N	3
47	O-Ring	AS568-020 (NBR-90)	OR NBR-90 P32-N	1

Pilot Operated Flow Control Valves / Pilot Operated Flow Control and Check Valves

The function of the flow control handle of the flow control valve is performed by a hydraulic cylinder. With these valves, smooth flow characteristics allow control without shocks during acceleration and deceleration. With the compensator for the pressure and temperature, stable flow control can be obtained regardless of the changes in the pressure (load) and temperature (oil viscosity).





Specifications

Model Numbers	Max. Metered Flow L/min	Min. Metered Flow L/min	Max. Operating Pressure MPa	Min. Pilot Pressure MPa	Mass kg
FH＊G-02-30-＊-13	30	0.05	21	1.5	13
FH＊G-03-125-＊-13	125	0.2			17
FH＊G-06-250-＊-13	250	2			32
FH＊G-10-500-＊-13	500	4			61

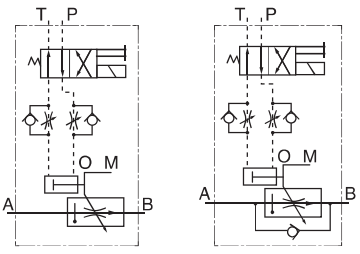
Model Number Designation

FHC	G	−02	−30	−N	−O	−A100	−N	−13
Series Number	Type of Mounting	Valve Size	Max. Metered Flow L/min	Pressure Compensator Stroke Adj. ★3	With No Pilot Valve ★1	Coil Type ★2	Type of Electrical Connections	Design Number
FH：Pilot Operated Flow Control Valves FHC：Pilot Operated Flow Cont. & Check Valves	G：Sub-Plate Mounting	02	30	N：Applicable only for Pres. Compensator Stroke Adjustment (Option)	O：Applicable only for Without Pilot Valve	AC：A100, A120, A200, A240 DC：D12, D24, D48 AC→DC Rectified：R100, R200	None：Terminal Box Type N：With Plug-in Connector Type (Option)	13
		03	125					13
		06	250					13
		10	500					13

★1. Both solenoid operated directional valve (DSG-01) and throttle check modular valve (MSW-01) can be used as a pilot valve.
If no pilot valve is required, there is no needs to specify the coil type and the electrical connection type of solenoid operated directional valve.
★2. The coil types are same as those for DSG-01 Series solenoid operated directional valves. See page D-27.
★3. Pres. Compensator Stroke Adjustment：This is used to reduce the jumping phenomenon at actuator startup.

In the table above, the symbols or numbers highlighted with shade represent the optional extras. The valves with model number having such optional extras are handled as options, therefore, please confirm the time of delivery with us before ordering.

Graphic Symbols

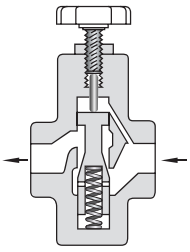


●Please contact us separately for the details of Pilot Operated Flow Control Valves／Pilot Operated Flow Control and Check Valves.

Restrictors / One Way Restrictors

This valve is used to regulate an actuator speed in a circuit where line pressure is almost steady and small fluctuation of oil flow due to pressure changes is permitted. Integrated check valve allows reversed free flow from outlet to inlet port. Pressure balanced construction provides less effort in adjustment at high pressure.





Specifications

Model Numbers			Rated Flow★ L/min	Max. Operating Pres. MPa	Mass kg
	Restrictor	One Way Restrictor			
Threaded Connection	SRT-03-50	SRCT-03-50	30	25	1.5
	SRT-06-50	SRCT-06-50	85		3.8
	SRT-10-50	SRCT-10-50	230		9.1
Sub-Plate Mounting	SRG-03-50	SRCG-03-50	30	25	2.5
	SRG-06-50	SRCG-06-50	85		3.9
	SRG-10-50	SRCG-10-50	230		7.5

★Rated flow stands for approximate flow rate when the pressure drop between inlet and outlet ports of the valve in fully opened condition becomes 0.3 MPa maximum at fluid's specific gravity of 0.85 and viscosity of 20 mm²/s.

Yuken can offer flanged connection valves described below.

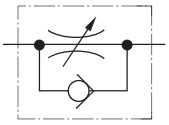
For details, contact us.

Model Numbers	Rated Flow L/min	Max. Operating Pressure MPa
SRF SRCF -10-50	230	25
SRF SRCF -16-50	500	

Graphic Symbols



SR＊



SRC＊

Model Number Designation

SR	T	−03	−50
Series Number	Type of Mounting	Valve Size	Design Number
SR : Restrictor	T : Threaded Connection	03	50
		06	50
		10	50
SRC : One Way Restrictor	G : Sub-Plate Mounting	03	50
		06	50
		10	50

Sub-Plates

Valve Model Numbers	Sub-Plate Model Numbers	Thread Size Rc	Mass kg
SRG SRCG -03	CRGM-03-50	3/8	1.6
	CRGM-03X-50	1/2	1.6
SRG SRCG -06	CRGM-06-50	3/4	2.4
	CRGM-06X-50	1	3.0
SRG SRCG -10	CRGM-10-50	1 1/4	4.8
	CRGM-10X-50	1 1/2	5.7

- Sub-plates are available. Specify the sub-plate model number from the left table. When sub-plates are not used, the mounting surface should have a good machined finish ($\overset{1.6}{\nabla}$).
- Sub-plates are common with right angle check valves. For dimensions, see page D-26.

Accessories

Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw	Qty.
SRG SRCG -03	M10×45L	4
SRG SRCG -06	M10×50L	4
SRG SRCG -10	M10×55L	6

Instructions

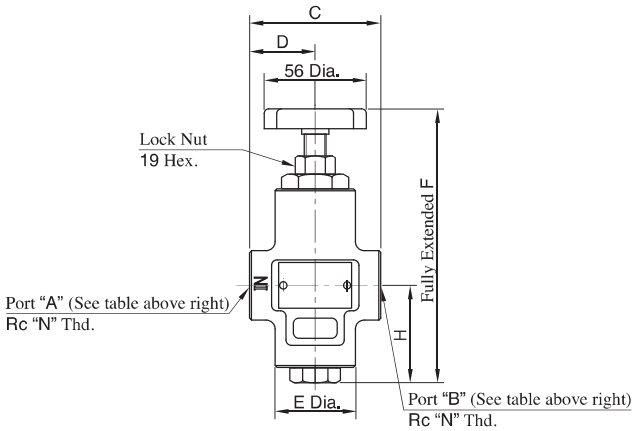
Flow Adjustment

Loosen the lock nut and turn the flow adjustment handle clockwise to increase. After adjustment, be sure to tighten the lock nut.

SRT SRCT -03, 06, 10

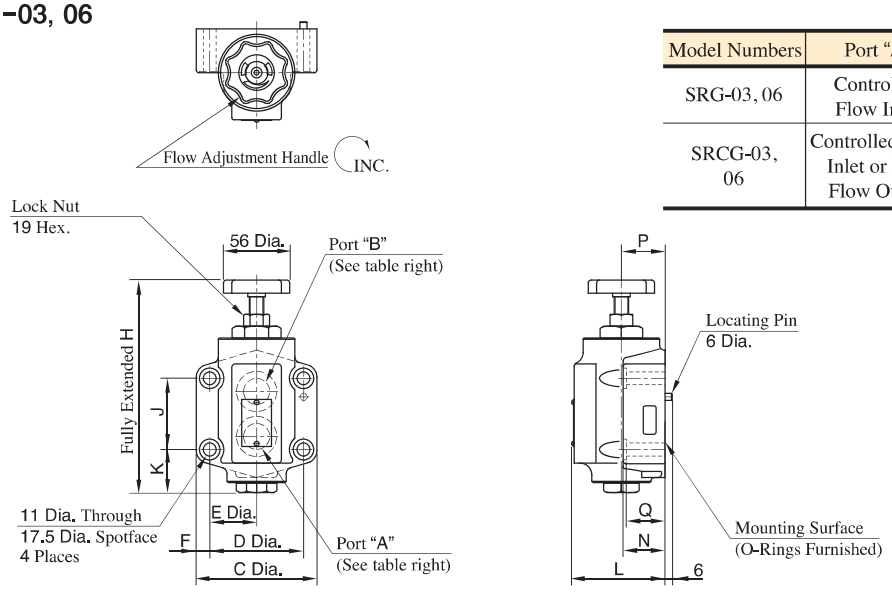


Model Numbers	Port "A"	Port "B"
SRT-*	Controlled Flow Inlet	Controlled Flow Outlet
SRCT-*	Controlled Flow Inlet or Free Flow Outlet	Controlled Flow Outlet or Free Flow Inlet



Model Numbers	C	D	E	F	H	J	K	L	N
SRT SRCT -03	72	36	44	150.5	53.5	38 Dia.	46	22	3/8
SRT SRCT -06	100	50	58	180	66.5	62 Sq.	64	31	3/4
SRT SRCT -10	138	69	80	227	86	80 Sq.	82	40	1 1/4

SRG SRCG -03, 06



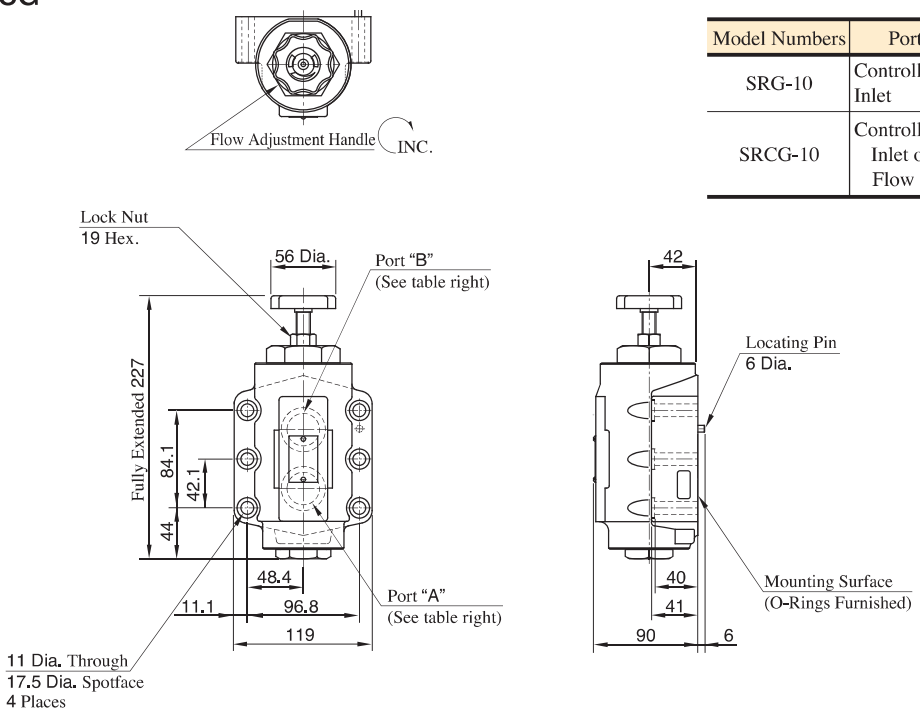
Model Numbers	Port "A"	Port "B"
SRG-03, 06	Controlled Flow Inlet	Controlled Flow Outlet
SRCG-03, 06	Controlled Flow Inlet or Free Flow Outlet	Controlled Flow Outlet or Free Flow Inlet

Model Numbers	C	D	E	F	H	J	K	L	N	P	Q	Mounting Surface
SRG SRCG -03	90	66.7	33.3	11.7	150.5	42.9	32	64	31	31	30	ISO 5781-06-07-0-00
SRG SRCG -06	102	79.4	39.7	11.3	180	60.3	36.5	79	36	37	35	ISO 5781-08-10-0-00

Note: For dimensions of the valve mounting surface, see the page D-26.

SRG SRCG -10

Mounting Surface : ISO 5781-10-13-0-00



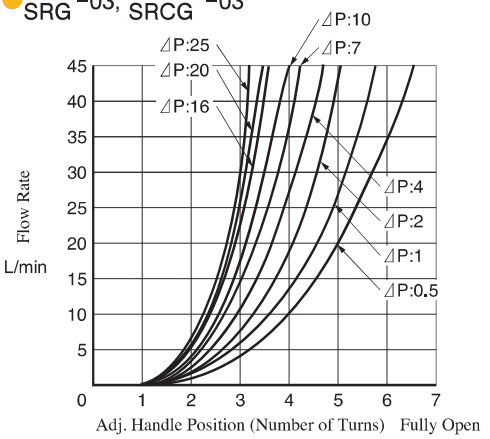
Model Numbers	Port "A"	Port "B"
SRG-10	Controlled Flow Inlet	Controlled Flow Outlet
SRCG-10	Controlled Flow Inlet or Free Flow Outlet	Controlled Flow Outlet or Free Flow Inlet

Note: For dimensions of the valve mounting surface, see the page D-26.

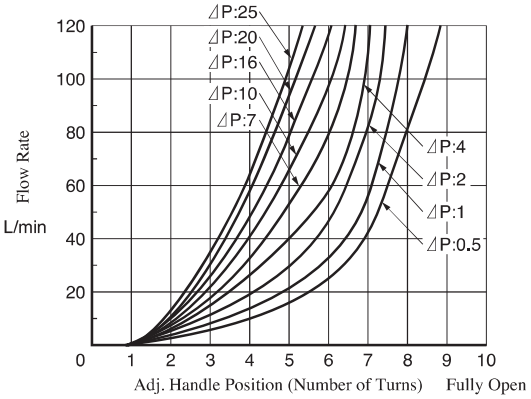
Adjustment Handle Position vs. Flow

Viscosity : 30 mm²/s [ΔP : Differential Pressure (MPa)]

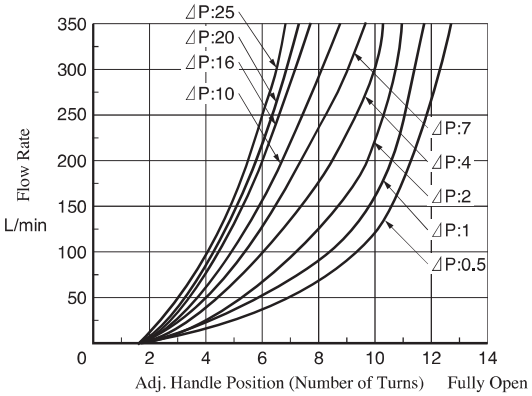
SRT SRG -03, SRCT SRCG -03



SRT SRG -06, SRCT SRCG -06



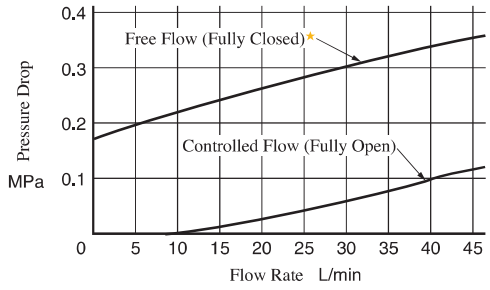
SRT SRG -10, SRCT SRCG -10



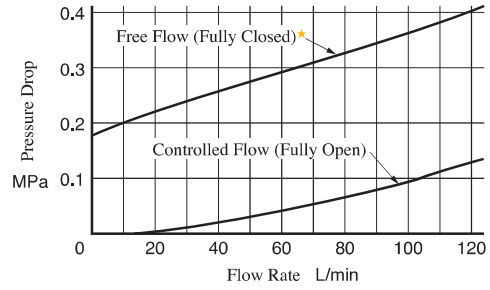
Pressure Drop

Viscosity : 30 mm²/s

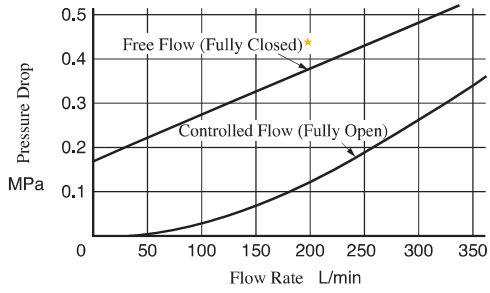
SRT SRG -03, SRCT SRCG -03



SRT SRG -06, SRCT SRCG -06



SRT SRG -10, SRCT SRCG -10

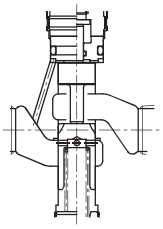


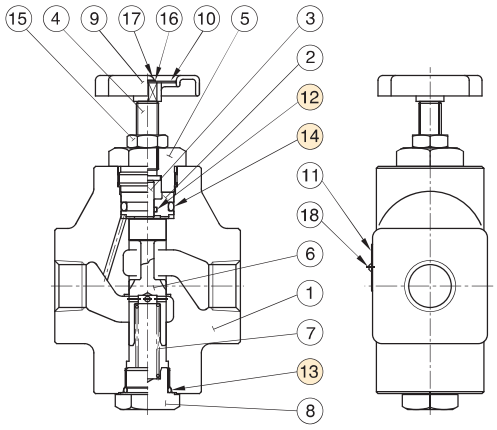
★Applicable only for one way restrictor (Model No. SRC*)

List of Seals

SRT SRCT -03, 06, 10

For SRCT

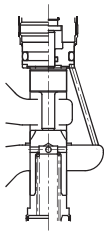


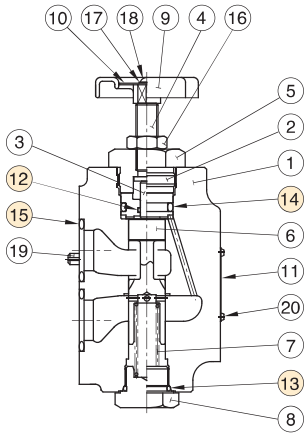


Item	Name of Parts	Part Numbers			Qty.
		SRT SRCT -03	SRT SRCT -06	SRT SRCT -10	
12	O-Ring	OR NBR-90 P7-N	OR NBR-90 P7-N	OR NBR-90 P7-N	1
13	O-Ring	OR NBR-90 P15-N	OR NBR-90 P21-N	OR NBR-90 P29-N	1
14	O-Ring	OR NBR-90 P20-N	OR NBR-90 P22.4-N	OR NBR-90 P36-N	1

SRG SRCG -03, 06, 10

For SRCG

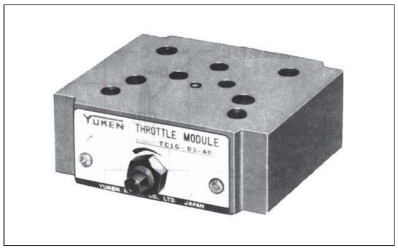




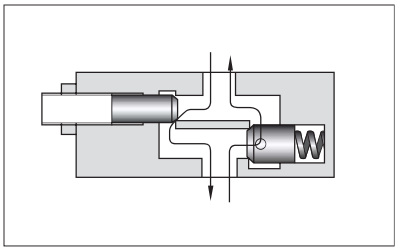
Item	Name of Parts	Part Numbers			Qty.
		SRG SRCG -03	SRG SRCG -06	SRG SRCG -10	
12	O-Ring	OR NBR-90 P7-N	OR NBR-90 P7-N	OR NBR-90 P7-N	1
13	O-Ring	OR NBR-90 P15-N	OR NBR-90 P21-N	OR NBR-90 P29-N	1
14	O-Ring	OR NBR-90 P20-N	OR NBR-90 P22.4-N	OR NBR-90 P36-N	1
15	O-Ring	OR NBR-90 P18-N	OR NBR-90 P28-N	OR NBR-90 P32-N	2

Throttle Module / Throttle and Check Module

Used as pilot choke valves for solenoid controlled pilot operated directional valves and pilot operated directional valves.







Specifications

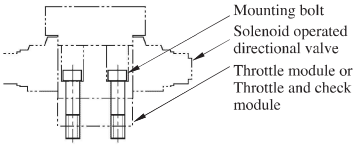
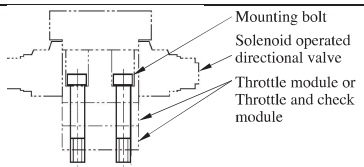
Model Numbers	Nominal Flow L/min	Max. Operating Pressure MPa	Mass kg
TC1G-01-40	30	25	0.6
TC2G-01-40			0.65
TC1G-03-＊-40	80		1.6
TC2G-03-＊-40			1.8

Model Number Designation

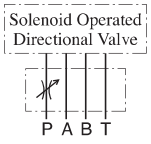
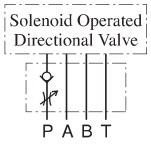
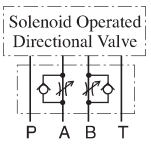
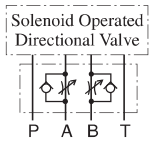
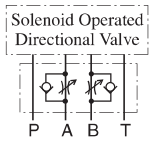
TC1	G	−03	−C	−40
Series Number	Type of Mounting	Valve Size	Valve Type	Design Number
TC1 : Throttle Module TC2 : Throttle and Check Module	G : Gasket Mounting	01	—	40
TC1 : Throttle Module		03	None : Std. C : With Check Valve	40
TC1 : Throttle and Check Module			None : Std. (Meter-Out) A : Meter-In	

Mounting Bolts

If mounting bolts are necessary, order suitable ones selected from the table below. If mounting bolts from other companies are used, their strength must be 8.8 or up JIS B1176 standards.

Solenoid Operated Directional Valve	Socket Head Cap Screw	
	TC＊G−01	TC＊G−03
 Mounting bolt, Solenoid operated directional valve, Throttle module or Throttle and check module	M5×70L (4pcs.)	M6×70L (4pcs.)
 Mounting bolt, Solenoid operated directional valve, Throttle module or Throttle and check module	M5×95L (4pcs.)	M6×100L (4pcs.)

Graphic Symbols

Valve Size 01	Valve Size 03
 Solenoid Operated Directional Valve, P A B T TC1G-01-40	 Solenoid Operated Directional Valve, P A B T TC1G-03-40
—	 Solenoid Operated Directional Valve, P A B T TC1G-03-C-40
 Solenoid Operated Directional Valve, P A B T TC2G-01-40	 Solenoid Operated Directional Valve, P A B T TC2G-03-40
—	 Solenoid Operated Directional Valve, P A B T TC2G-03-A-40

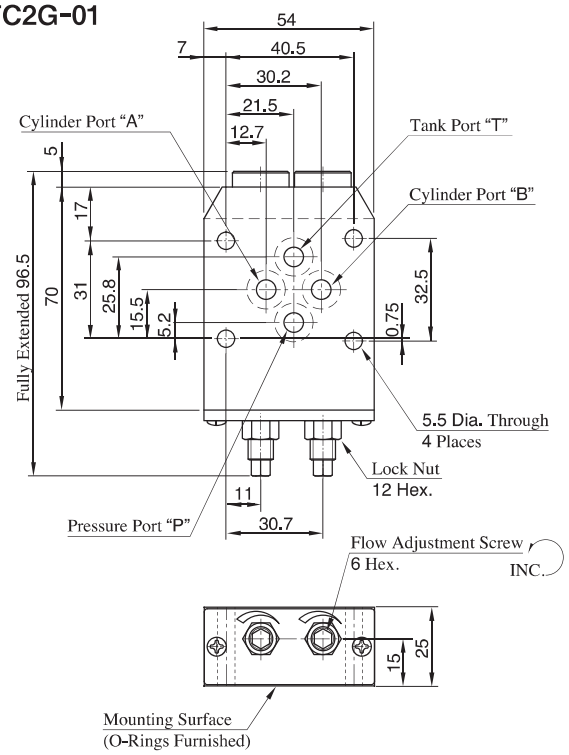
Instructions

Flow Adjustment

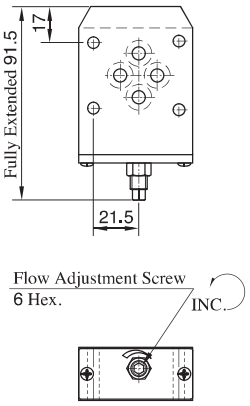
Loosen the lock nut and turn the flow adjustment handle clockwise to increase. After adjustment, be sure to tighten the lock nut.

Mounting Surface : ISO 4401-03-02-0-05

TC2G-01



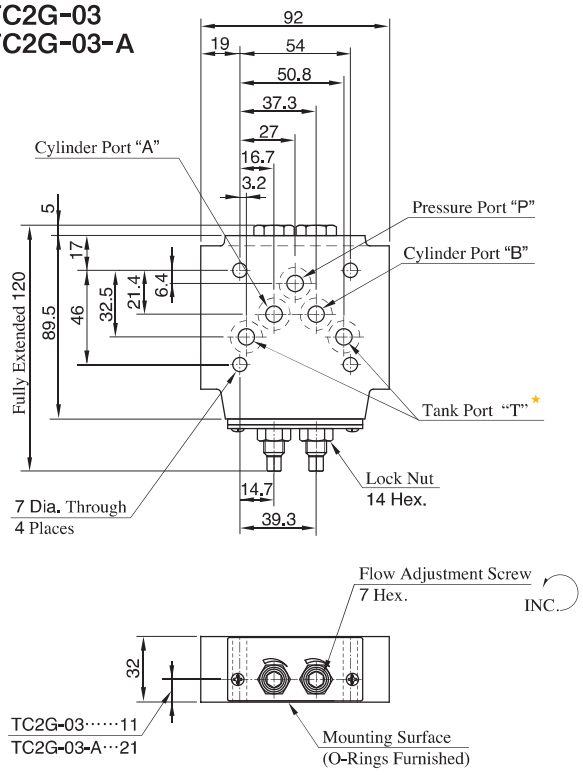
TC1G-01



For other dimensions, see the figures shown TC2G-01.

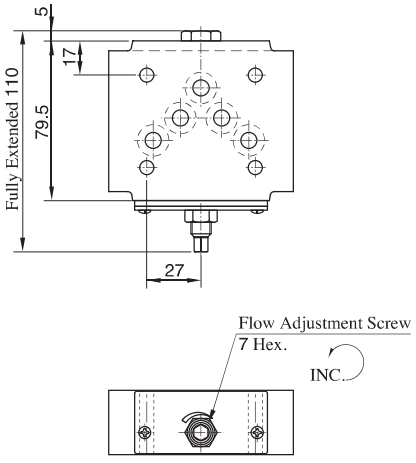
Mounting Surface : ISO 4401-05-04-0-05

TC2G-03
TC2G-03-A



★With standard sub-plate, the left one of the two tank ports "T" is used but either one may be used.

TC1G-03
TC1G-03-C

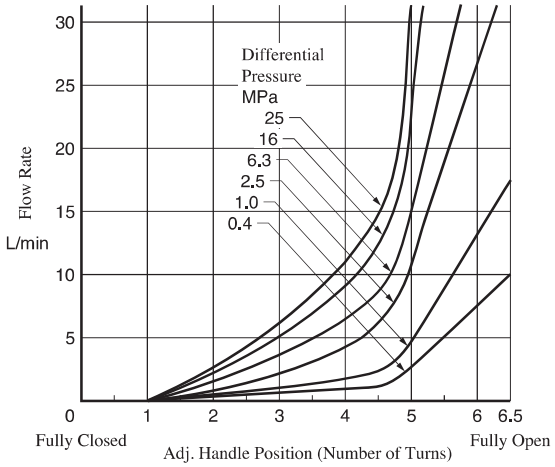


For other dimensions, see the figures shown TC2G-03.

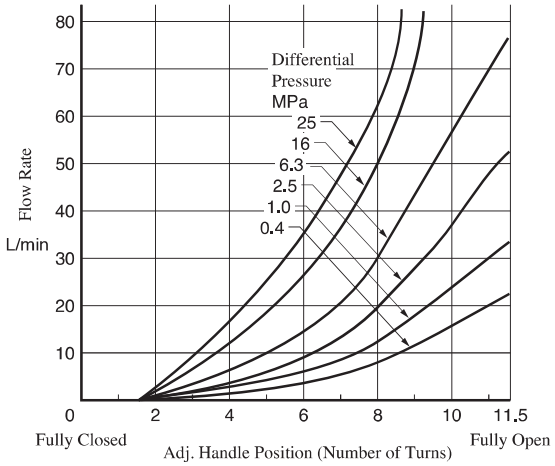
Adjustment Handle Position vs. Flow

Viscosity : 35 mm²/s

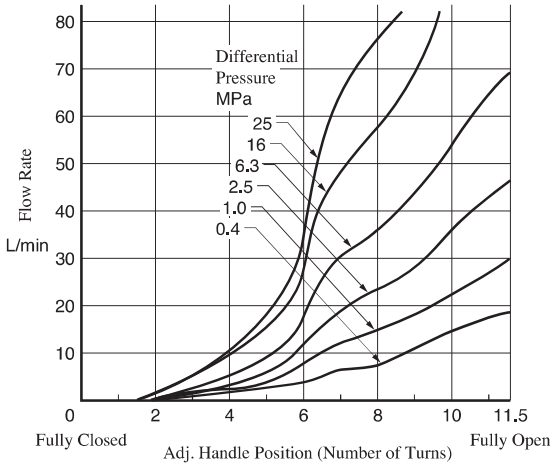
TC1G-01
TC2G-01



TC1G-03
TC2G-03



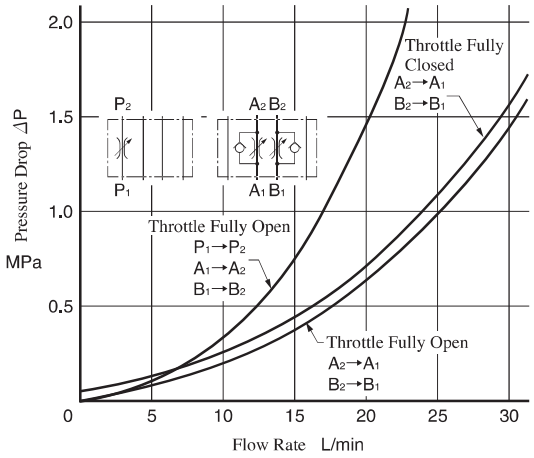
TC1G-03-C



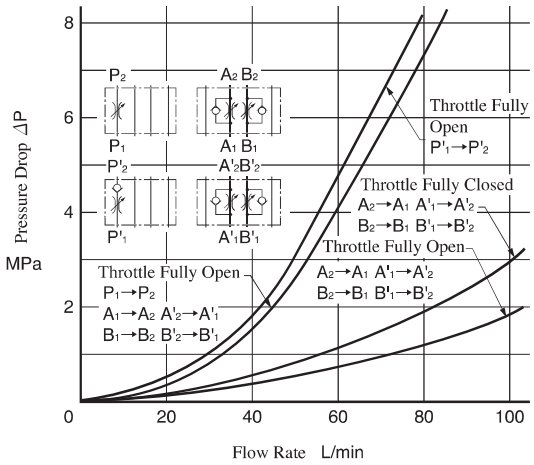
Pressure Drop

Viscosity : 35 mm²/s

TC1G-01
TC2G-01



TC1G-03-*
TC2G-03-*



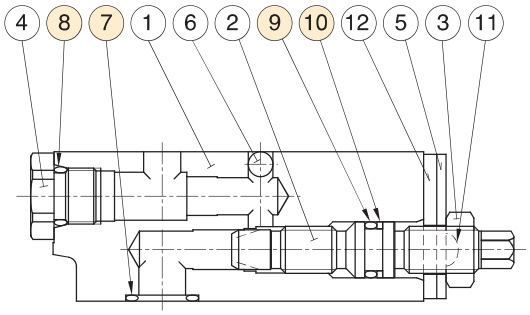
●For any other viscosity, multiply the factors in the table below.

Viscosity mm²/s	15	20	30	40	50	60	70	80	90	100
Factor	0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27	1.30

●Please use $\Delta P' = \Delta P \frac{G'}{G}$ for specific gravity change. However, ΔP is the value in the diagram and G is 0.850.

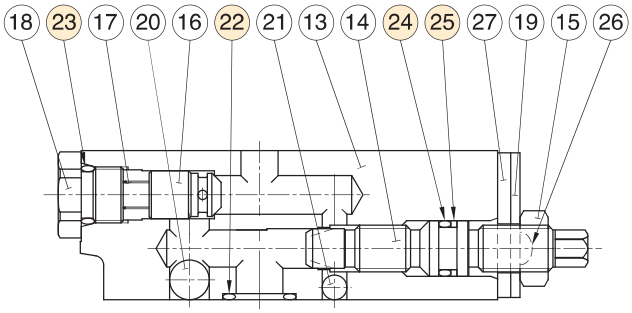
List of Seals

TC1G-01, 03



Item	Name of Parts	Part Numbers		Qty.	
		TC1G-01	TC1G-03	TC1G-01	TC1G-03
7	O-Ring	OR NBR-90 P9-N	AS 568-014 (NBR-90)	4	5
8	O-Ring	——	OR NBR-90 P10-N	—	1
9	O-Ring	OR NBR-70-1 P7-N	OR NBR-70-1 P9-N	1	1
10	Back Up Ring	BR JIS B 2401-4-T2-P7	BR JIS B 2401-4-T2-P9	1	1

TC2G-01, 03



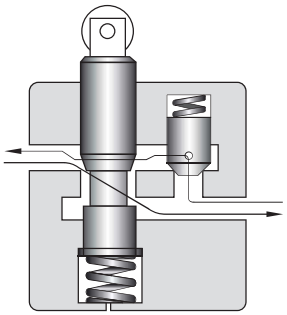
Item	Name of Parts	Part Numbers		Qty.	
		TC2G-01	TC2G-03	TC2G-01	TC2G-03
22	O-Ring	OR NBR-90 P9-N	AS 568-014 (NBR-90)	4	5
23	O-Ring	OR NBR-90 P10-N	OR NBR-90 P10-N	2	2
24	O-Ring	OR NBR-70-1 P7-N	OR NBR-70-1 P9-N	2	2
25	Back Up Ring	BR JIS B 2401-4-T2-P7	BR JIS B 2401-4-T2-P9	2	2

Deceleration Valves / Deceleration and Check Valves

Cam operation easily increases or decreases the flow rate and opens or closes the valve's internal passageway.
This valve is used when you want the actuator to perform acceleration/deceleration and stop necessary for machine tool table feed, etc.
The check valve allows free flow in the opposite direction of the controlled flow regardless of the cam position.

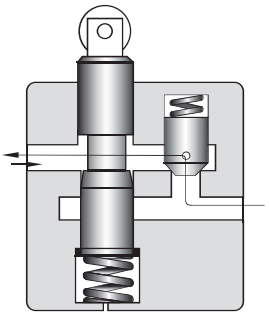


Normally Open Type



Pushing down on the spool throttles the flow rate.

Normally Closed Type



Pushing down on the spool increases the flow rate.

Specifications

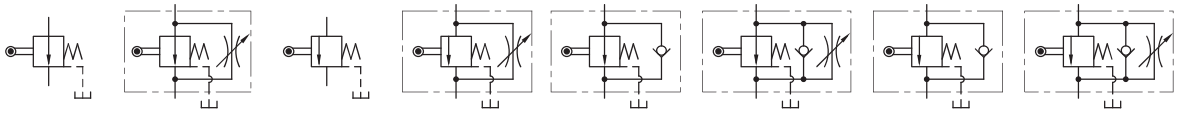
Model Numbers		Max. Flow L/min	Max. Operating Pressure MPa	Mass kg	
Threaded Connection	Sub-Plate Mounting			Z∗T	Z∗G
Z∗T-03-∗-∗-22	Z∗G-03-∗-∗-22	30	21	4.3	4.3
Z∗T-06-∗-∗-22	Z∗G-06-∗-∗-22	80		8.7	8.7
Z∗T-10-∗-∗-22	Z∗G-10-∗-∗-22	200		17	17

Model Number Designation

ZC	T	−03	−T	−C	−22
Series Number	Type of Mounting	Valve Size	With Adjustable Needle Valve for By-Pass Line★	Spool Type	Design Number
Z : Deceleration Valve ZC : Deceleration and Check Valve	T : Threaded Connection	03	T : Applicable only with Adjustable Needle Valve for By-Pass Line (Option)	None : Normally Open Type C : Normally Closed Type	22
		06			22
		10			22
	G : Sub-Plate Mounting	03			22
		06			22
		10			22

★The throttle valve for By-Pass Line allows the actuator to be fed at a low speed by allowing regulated flow between the ports even when the passage is blocked by a spool.

Graphic Symbols



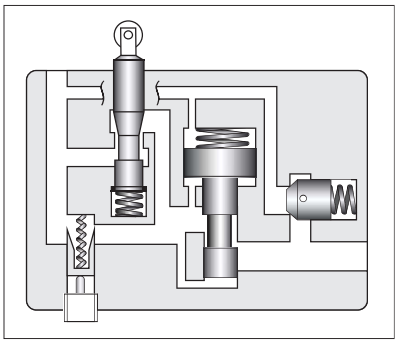
●Please contact us separately for the details of Deceleration Valves / Deceleration and Check Valves.

Feed Control Valves

This valve is a compact combination of a flow control valve with check valve and a deceleration valve, and is mainly used for machine tools. The switching from rapid feed to cutting feed is done by a cam, and the cutting feed speed can be adjusted as desired. Since this is a pressure/temperature compensated type, the set flow rate is constant regardless of changes in pressure (load) and temperature (hydraulic oil viscosity). Therefore, precise speed control is possible. The valve size "04" is digitally graduated for easy flow reproduction. The return can be quickened regardless of the position of the cam.







Specifications

Model Numbers	Max. Flow L/min ★1	Metered Flow Range L/min		Max. Reversed Free Flow L/min	Max. Operating Pressure MPa	Mass kg
		Feed	Fine Feed			
UCF1G-01-4-A-∗-11	16 (12)	0.03 - 4 ★2 (0.05 - 4)	—	20	14	1.6
UCF1G-01-4-B-∗-11	12 (8)					
UCF1G-01-4-C-∗-11	8 (4)					
UCF1G-01-8-A-∗-11	20 (12)	0.03 - 8 ★2 (0.05 - 8)	—			
UCF1G-01-8-B-∗-11	16 (8)					
UCF1G-01-8-C-∗-11	12 (4)					
UCF1G-03-4-∗-10	40 (40)	0.05 - 4	—	40		2.6
UCF1G-03-8-∗-10		0.05 - 8	—			
UCF2G-03-4-∗-10	40 (40)	0.1 - 4	0.05 - 4	40		2.7
UCF2G-03-8-∗-10		0.1 - 8	0.05 - 4			
UCF1G-04-30-30	80 (40)	0.1 - 22	—	80		6.5
UCF2G-04-30-30		0.1 - 22	0.1 - 17			9.2

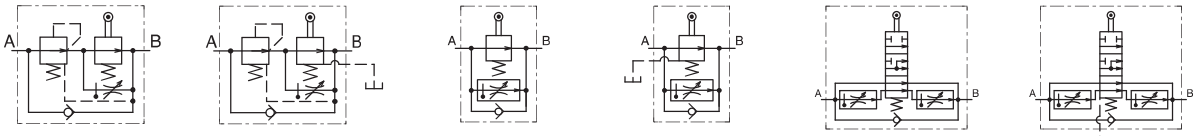
★1. The maximum flow rates are values with the deceleration valve and the flow control valve fully open. The values in parentheses are maximum flow rates with the deceleration valve fully open and the flow control valve fully closed.

★2. The values in parentheses are for pressures above 7 MPa .

Model Number Designation

UCF1	G	−01	−4	−A	−E	−11
Series Number	Type of Mounting	Valve Size	Nominal Metered Flow L/min	Deceleration Valve Max. Flow L/min	Drain Connection	Design Number
UCF1 : Single Feed Control	G : Gasket Mounting	01	4·8	A : 12, B : 8, C : 4	None : Internal Drain, E : External Drain	11
		03	4·8	—		10
		04	30	—	None : External Drain	30
UCF2 : Double Feed Control		03	4·8	—	None : Internal Drain, E : External Drain	10
		04	30	—	None : External Drain	30

Graphic Symbols



UCF1G-01-∗-∗-11 | UCF1G-01-∗-∗-E-11 | UCF1G-03-∗-10 | UCF1G-03-∗-E-10 UCF1G-04-30-30 | UCF2G-03-∗-10 | UCF2G-03-∗-E-10 UCF2G-04-30-30

●Please contact us separately for the details of Feed Control Valves.

Needle Valves



Used as stop valves for pressure gauge lines and small-capacity line. Also can be used as restrictors for regulating flow rates in pilot lines.

Specifications

Model Numbers		Max. Flow L/min	Max. Operating Pressure MPa	Mass kg
In-Line Type	Angle Type			
GCT–02–34	GCTR–02–34	★	35	0.34

★Depends on allowable pressure drops. See Adjustment Handle Position vs. Flow characteristics and Pressure Drop at Fully Open characteristics.

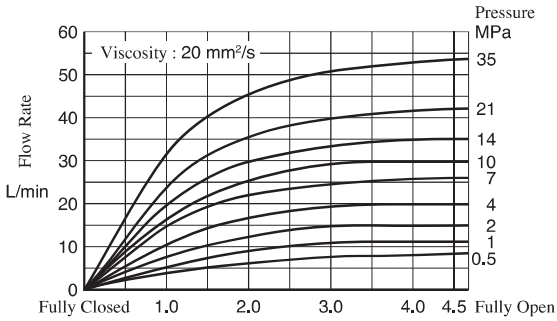
Model Number Designation

GCT	–02	–34
Series Number	Valve Size	Design Number
GCT : In-line Type Needle Valve, Threaded Connection GCTR : Angle Type Needle Valve, Threaded Connection	02	34

Graphic Symbol

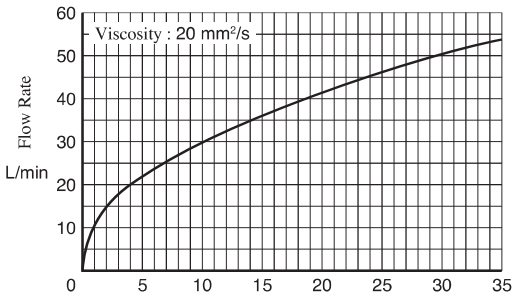


Adjustment Handle Position vs. Flow



Adj. Handle Position (Number of Turns from Fully Closed)

Pressure Drop at Fully Open



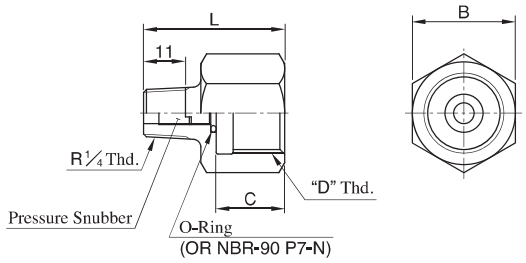
Pressure Drop MPa

Adapter

Used where pressure gauges are attached directly to needle valves. Equipped with pressure snubber for reducing harmful surges to protect pressure gauges. Adapters are not accessories to needle valves. Order them referring to the table below.

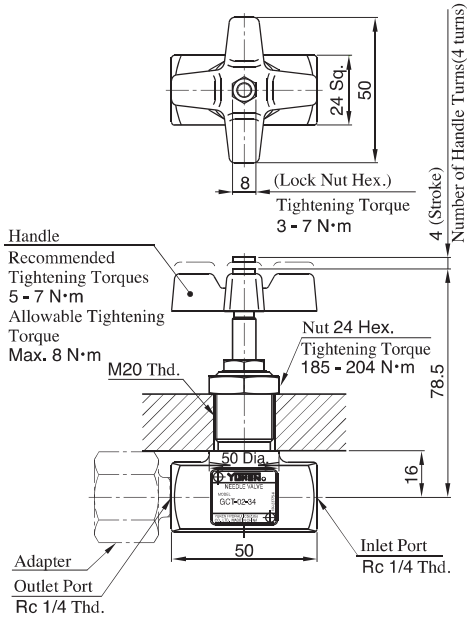
Adapter Type	Thread Size "D" Thd.	B	C	L	Mass kg
AG-02S	G1/4	24	14	32	0.075
AG-03S	G3/8	24	16	35	0.075
AG-04S	G1/2	27	18	37	0.08

AG–02S, 03S, 04S

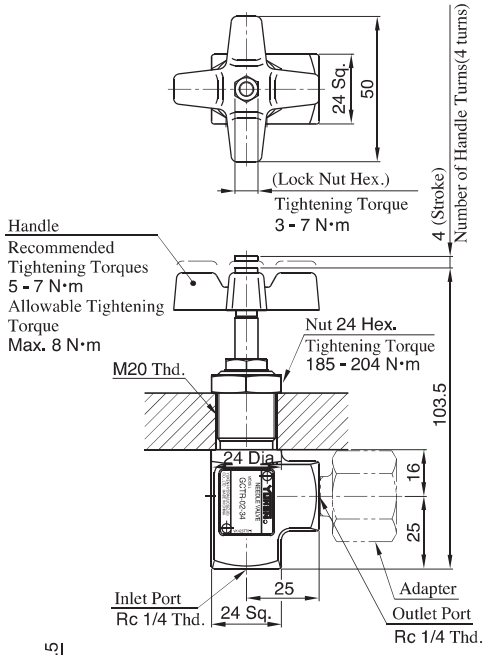


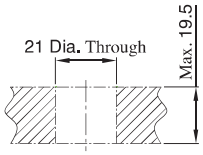
Note: See table above for dimensions.

GCT-02



GCTR-02

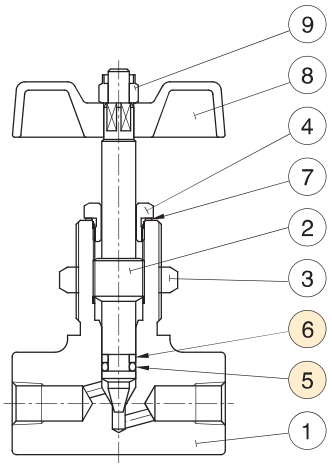




Panel Mounting Dimensions

List of Seals

GCT GCTR -02



Item	Name of Parts	Part Numbers	Qty.
5	O-Ring	OR NBR-70-1 P5-N	1
6	Back Up Ring	BR JIS B 2401-4-T2-P5	1

Installation

Refer to the following procedures to fit the valve with a panel. Figure in a circle below is shown on the left drawing.

1. Remove the nut ⑨ then take off the handle ⑧.
2. Take off the nut ③.
3. Insert the needle valve to a panel hole.
4. Screw the nut ③ on to the valve and fix the valve with the panel.
5. Fit the handle ⑧ and fix it with the nut ⑨.

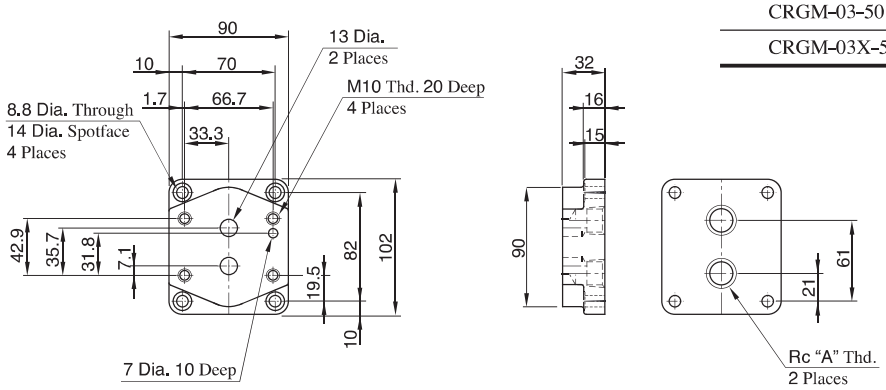
Interchangeability in Installation between Current and New Design

The needle valve has changed model from a 33 to a 34 design to improve assembly workability. There are no changes in specifications, external dimensions, or installation. The nameplate mounting position is on the opposite face of the current design.

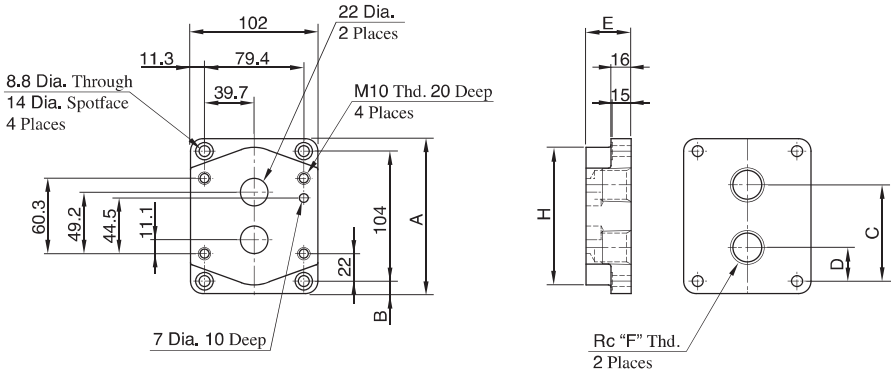
Sub-Plate

CRGM – 03, 03X

Sub-Plate Model Numbers	A
CRGM-03-50	3/8
CRGM-03X-50	1/2

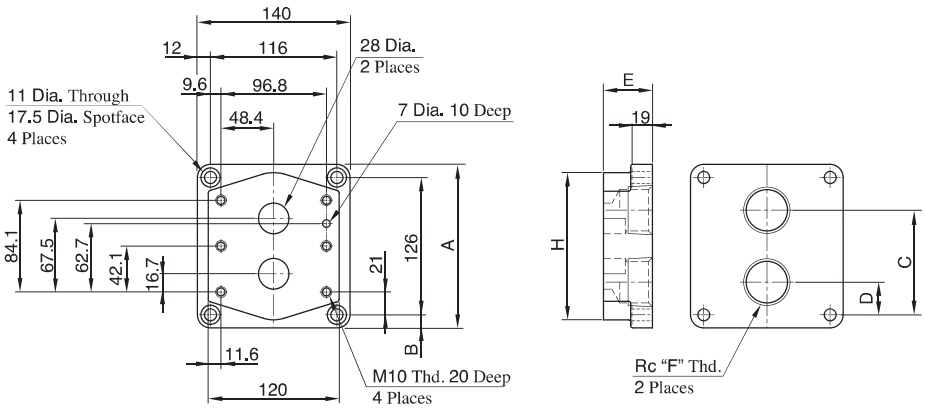


CRGM – 06, 06X



Sub-Plate Model Numbers	A	B	C	D	E	F	H
CRGM-06-50	124	10	77	27	36	3/4	110
CRGM-06X-50	136	16	82.3	22	45	1	130

CRGM – 10, 10X



Sub-Plate Model Numbers	A	B	C	D	E	F	H
CRGM-10-50	150	12	96	30	45	1 1/4	135
CRGM-10X-50	177	25.5	104	22	50	1 1/2	167

Solenoid Ratings

Valve Type	Electric Source	Coil Type ★3	Frequency (Hz)	Voltage (V)		Current & Power at Rated Voltage		
				Source Rating	Serviceable Range	Inrush ★2 (A)	Holding (A)	Power (W)
Standard Type	AC ★1	A 100	50	100	80 - 110	2.42	0.51	—
			60	100	90 - 120	2.14	0.37	
				110		2.35	0.44	
		A 120	50	120	96 - 132	2.02	0.42	
			60		108 - 144	1.78	0.31	
		A 200	50	200	160 - 220	1.21	0.25	
			60	200	180 - 240	1.07	0.19	
				220		1.18	0.22	
		A 240	50	240	192 - 264	1.01	0.21	
			60		216 - 288	0.89	0.15	
Shockless Type	DC (K Series)	D 12	—	12	10.8 - 13.2	—	2.45	29
		D 24		24	21.6 - 26.4		1.23	
		D 48		48	43.2 - 52.8		0.61	
	AC→ DC Rectified (R)	R 100	50/60	100	90 - 110	—	0.33	29
		R 200		200	180 - 220		0.16	

★1. AC solenoid is not available in shockless type.
R type models with built-in current rectifier is recommended for shockless operation with AC power.
★2. Inrush current in the above table show rms values at maximum stroke.
★3. There are more coil types other than the above. For details, please make inquiries.

The coil type numbers in the shaded column are handled as opotinal extras.
In case these coils are required to be chosen, please confirm the time of delivery with us before ordering.