

Hydraulic Fluids

1. Fluid Types

Any type of hydraulic fluid, listed in the table below can be used.

Petroleum based oil	Use fluids equivalent to ISO VG32 or VG46
Synthetic fluids	Use phosphate ester or polyol ester fluid. When phosphate ester fluid is to be used. Prefix -"F"- to the model number because a special seal (Flurorubber) will be used.

2. Recommended Fluid Viscosity and Temperature

Use under conditions where the viscosity and temperature of the hydraulic fluid remain in the ranges indicated in the following table.

Name	Viscosity	Temperature
Remote Control Relief Valves Direct Type Relief Valves Pilot Operated Relief Valves Solenoid Controlled Relief Valves HC Type Pressure Control Valves Pressure Reducing and Check Valves Unloading Relief Valves Pressure Switches	15-400 cSt (80-1800 SSU)	-15+70 ^o C (5-158 ^o F)

* If the valve is provided with a vent restrictor (ex:A-BSG-03) the viscosity range should be 15-200 cSt (80-900 SSU)

3. Control of Contamination

Due caution must be paid to maintain control over contamination of the hydraulic fluids which may otherwise, lead to breakdowns and shorten the life of the valve. Please maintain the degree of contamination within NAS 1638-Grade 11. Use 25µm or finer line filter.

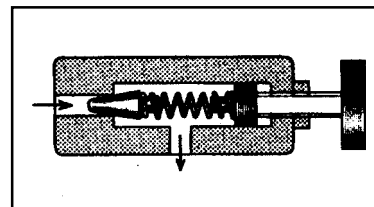
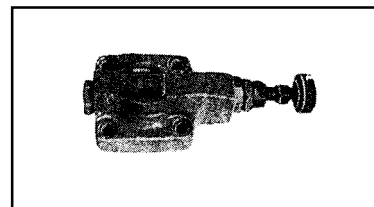
PRESSURE CONTROLS

■ Remote Control Relief Valves

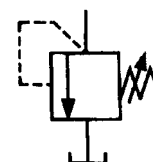
This valve is used as a remote control valve for pilot operated type pressure control valves.

■ Ratings

Model Numbers		Max. Operating Pres. kgf/cm ²	Max. flow l/min	Mass kg	
Threaded Connection	Sub Plate Mounting			YBT type	YBG type
YBT-01-※-250-1080	YBG-01-※-250-1080	250	4	1.6	1.4



Graphic Symbol



■ Model Number Designation

F-	YB	T	-01	- F	- 250	-10	80
Special Seals	Series Number	Type of Mounting	Valve Size	Panel Mounting	Max. Operating Pressure kgf/cm ²	Design Number	Design Standards
F: Special Seals for Phosphate Ester Type Fluids (Omit if not required)	YB: Remote Control Relief Valves	T: Threaded Connections	01	F: Panel Mounting (Omit if not required)	250	10	80
		G: Sub-Plate Mounting		—			

■ Instructions

- To adjust the pressure, loosen the lock nut and turn the handle slowly clockwise for higher pressure or anti-clockwise for lower pressures. After adjustments, do not forget to tighten the lock nut.
- Piping of the tank line should not be connected to any tank line of the other valves, but connected directly to the tank.

■ Attachment

● Mounting bolt

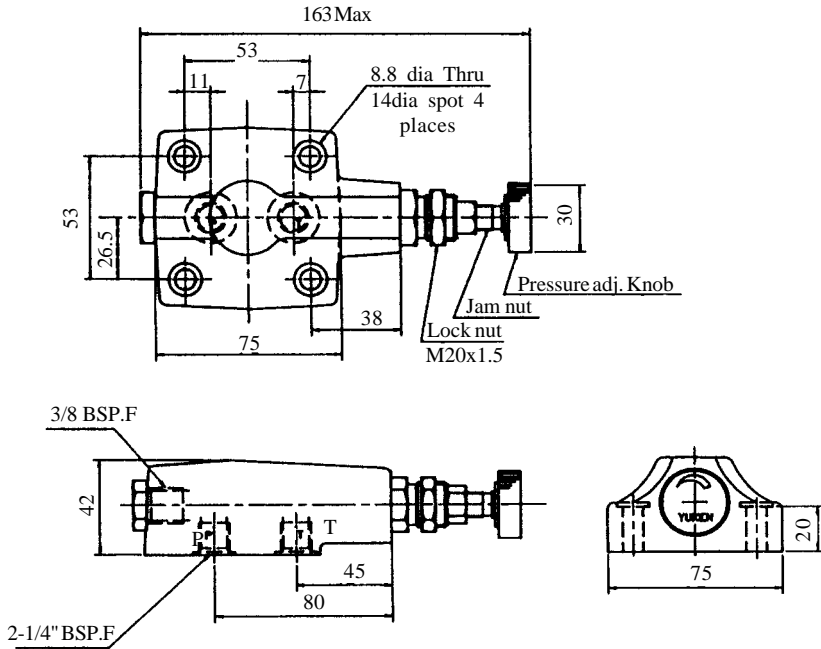
Valve Model	Socket Head Cap Screw	Qty.	Bolt Kit Model Code
YBG-01	M8 x 30Lg.	4	BKYBG-01-10

■ Sub-Plate

Valve Model Numbers	Sub - Plate Model Numbers	Piping Size	Mass kg.
YBG-01	YBGM-01-1080	1/4 BSP.F	0.7

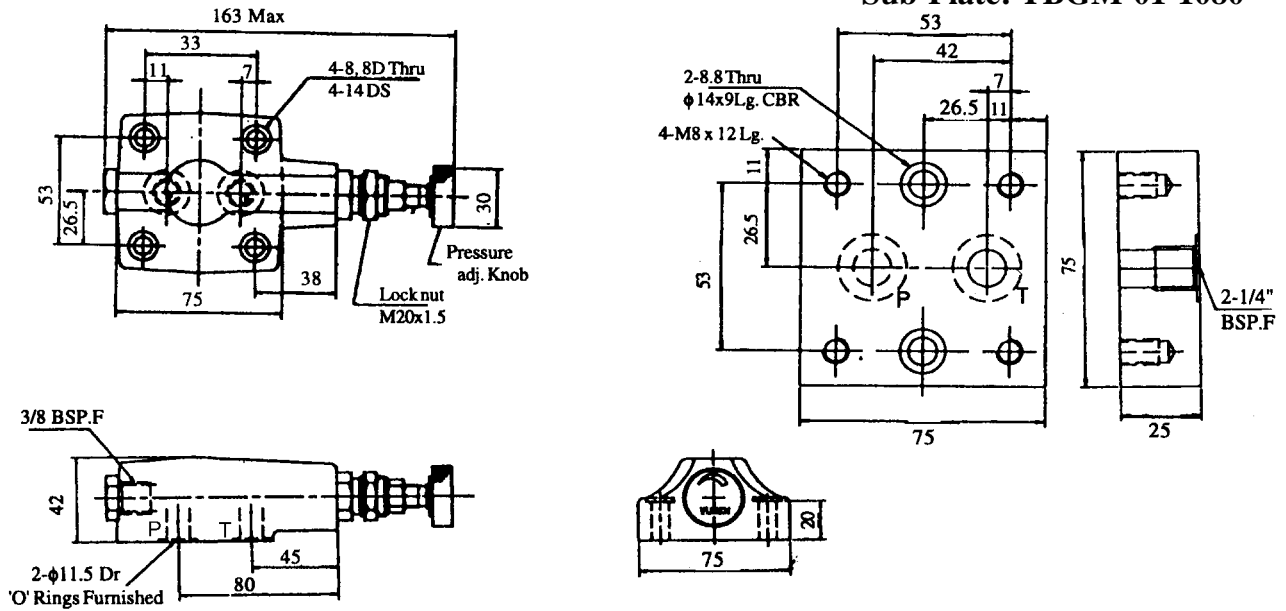
YBT-01-250-1080

DIMENSION IN MILLIMETRES

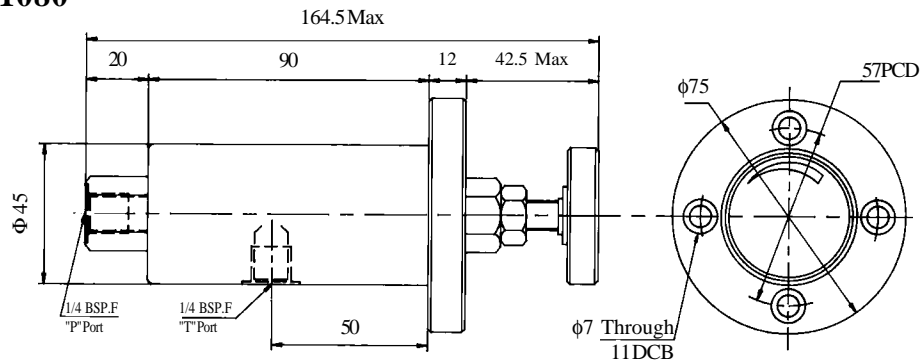


YBG-01-250-1080

Sub-Plate: YBGM-01-1080



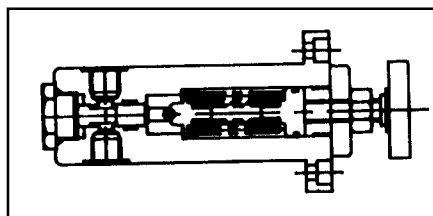
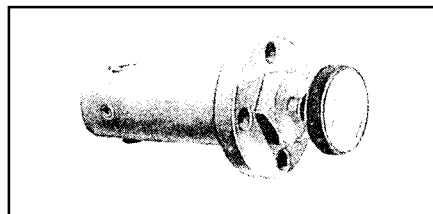
YBT-01-F-250-1080



PRESSURE CONTROLS

■ Direct Type Relief Valves

This valve is used in a hydraulic system to prevent damage due to over pressure and to adjust the maximum system pressure of small capacity.

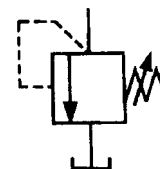


■ Ratings

Model Numbers Threaded Connections	Max. Operat- ing Pressure kgf/cm ²	Pres. Adj. Range kgf/cm ²	Max. Flow l/min	Mass
				kg. YBT type
YBT-02-**-*-1080	140	(Note)	20	1.5
YBT-02-F-**-*-1080				1.5
YBG-02-**-*-10				1.6

Note : Refer to the Model Number Designation.

Graphic Symbol



■ Model Number Designation

F	YB	T	-02	-F	-X	-B	-10	*
Special Seals	Series Number	Type of Mounting	Valve Size	Flange Mounting	Port Size	Pres. Adj. Range kgf/cm ²	Design number	Design Standards
F: Special Seals for Phosphate Ester Type Fluids (Omit if not required)	YB: Direct Type Relief Valves	T: Threaded Connections G: Sub-Plate Mounting	02	F: Flange Mounting (Omit if not reqd.) -	None: Std. - 1/4" X: -3/8	B: *-70 C: 35-140	10 10	80 -

*1. Refer to the Minimum Adjustment Pressure Characteristics.

■ Instructions

- To adjust the pressure, loosen the lock nut and turn the handle slowly clockwise for higher pressure or anti-clockwise for lower pressures. After adjustments, do not forget to tighten the lock nut.
- Piping of the tank line should not be connected to any tank line of the other valves, but connected directly to the tank

■ Attachment

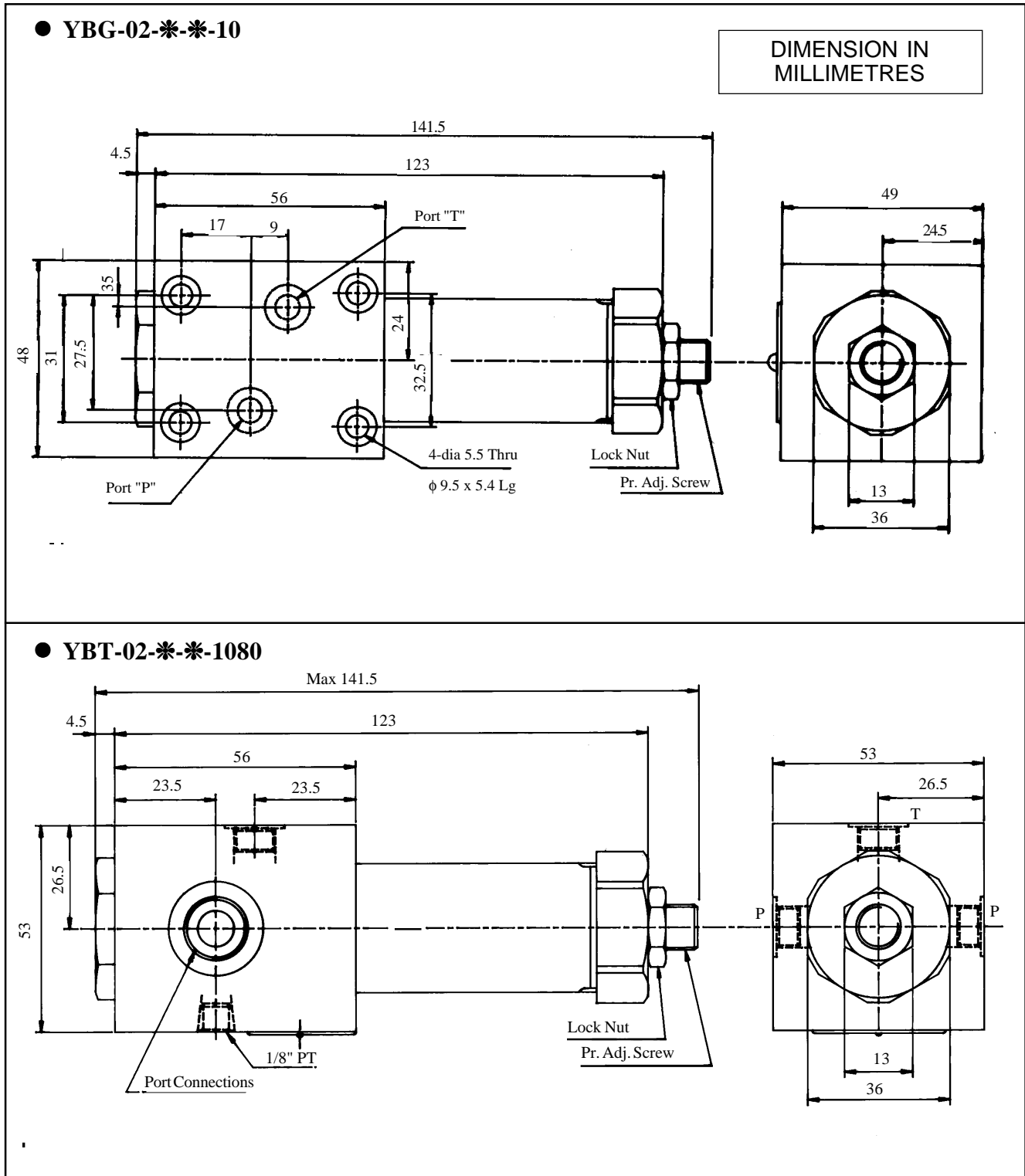
● Mounting bolt

Valve Model	Socket Head Cap Screw	Qty.	Bolt Kit Model Number
YBG-02	M5 x 55 Lg.	4	BKYBG-02-10

■ Sub-Plate

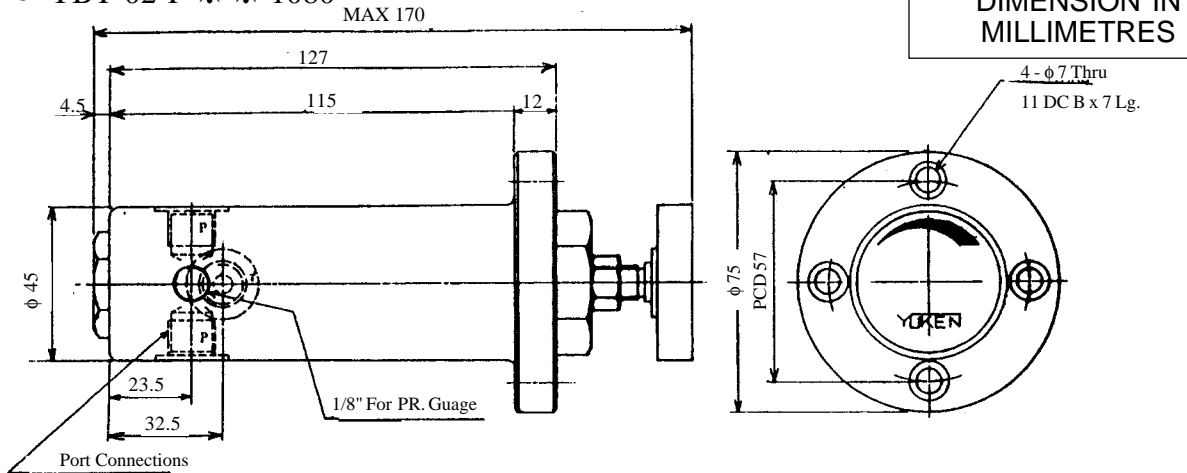
Valve Model	Sub-Plate Model Numbers	Piping Size	Mass kg.
YBG-02	YBGM-02-1080	1/4 BSP.F	0.7

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

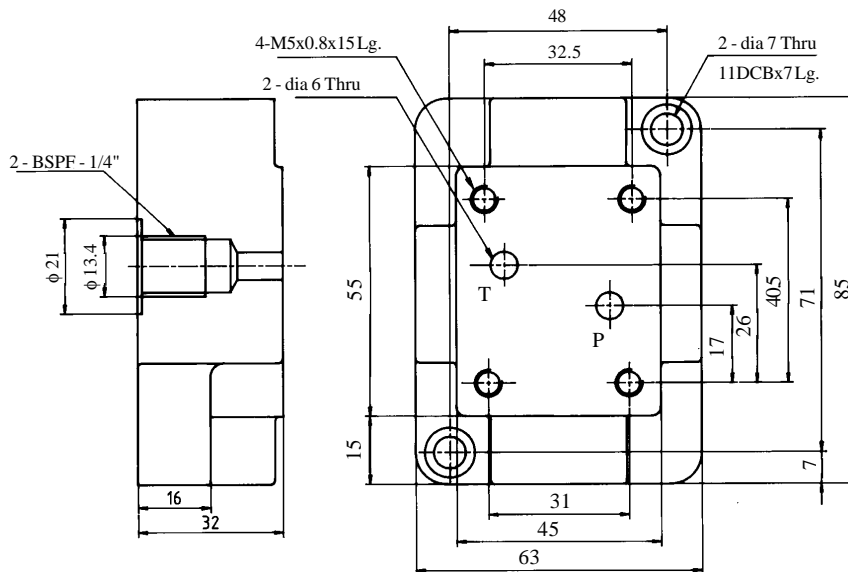


PRESSURE CONTROLS

● YBT-02-F-**-**-1080



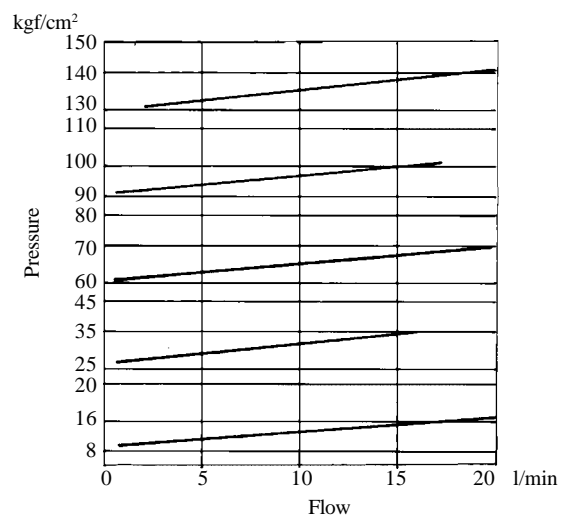
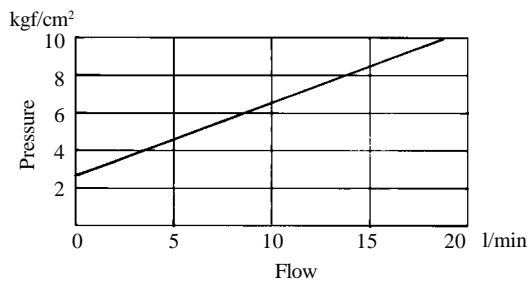
● Sub-plate: YBGM-02-1080



● YB-**-02

■ Nominal Override Characteristics

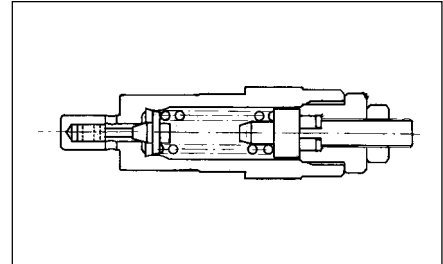
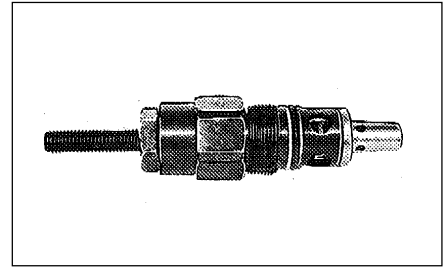
■ Min. Adjustment Pressure



■ Cartridge type Remote Relief Valve

This valve is used in a hydraulic system to prevent damage due to over pressure and to adjust the maximum system pressure of small capacity

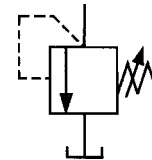
These valves can be screwed inside manifold. These valves can also be used as a backpressure valve.



■ Ratings

Model Number	Max. Operating Pres. kgf/cm ²	Pr. adj. range kgf/cm ²	Max. Flow l/min	Mass kg.
CB-5-**-*-1080	350	See Model No. Designation	15	1.35

Graphic Symbol



■ Model Number Designation

C	B-	5-	AO-	1-	10	80
Cartridge Type	Relief Valve	Valve Size	Pr. adj. range kgf/cm ²	Type of Operation	Design Number	Design Standard
C	B	5	AO - 0 ~ 25 A - 0 ~ 50 B - 50 ~ 100 C - 100 ~ 200 D - 200 ~ 350	1. Hand Knob 2. Adjust Screw	10	80

■ Instructions

● Pressure adjustment

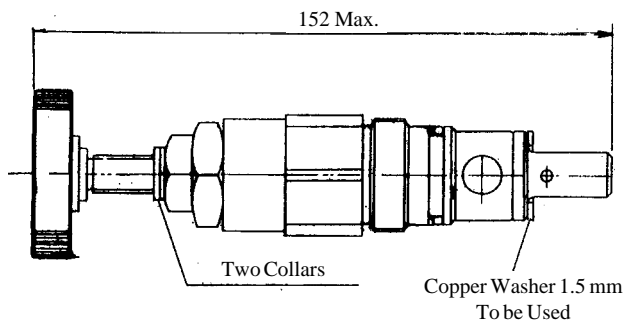
- Loosen Lock nut and turn adjustment screw clockwise for increase and anticlockwise for Decrease in pressure. After adjustment set screw with lock nut.

● Care in Application

- Before the valve is assembled into the manifold care should be taken to see that inside the manifold dust or chips should not be present.

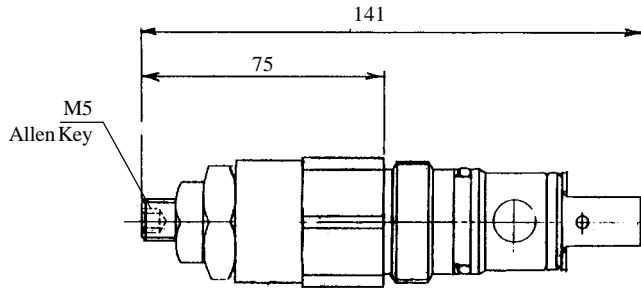
● CB-5-**-*-1-1080

DIMENSION IN MILLIMETRES

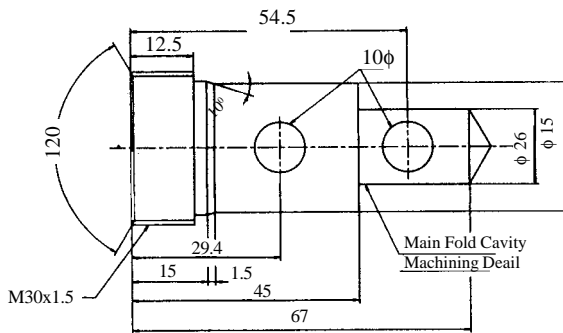


● **CB-5-✱-2-1080**

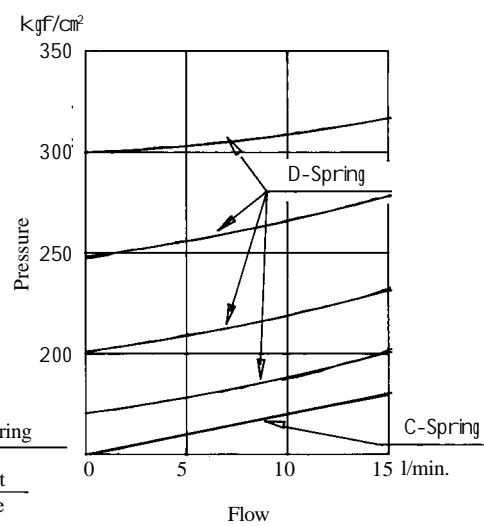
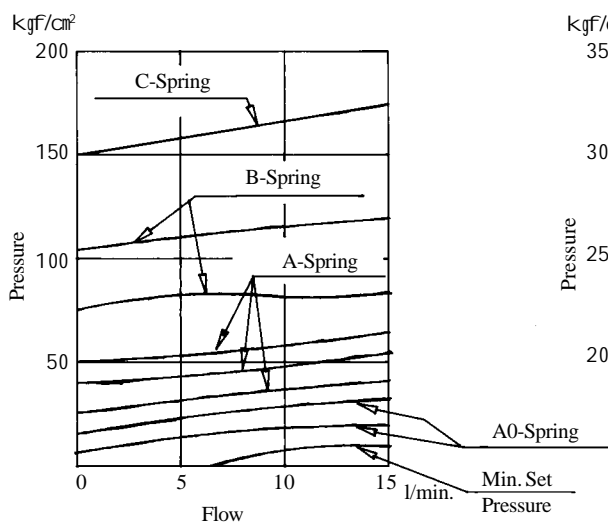
DIMENSION IN
MILLIMETRES



● Mounting Socket details



Nominal Override Characteristics



■ Direct Type Relief Valve

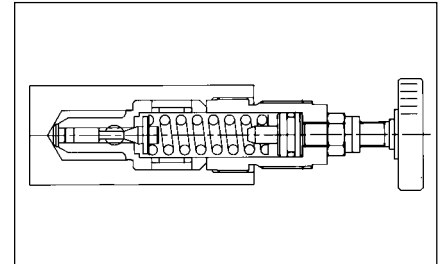
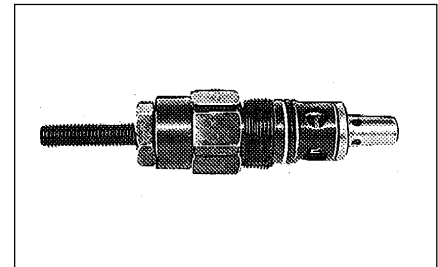
These valves are used in a hydraulic circuit to prevent damage due to excess pressure and to adjust the max pressure of small capacity.

● Ratings

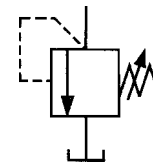
Model Numbers		Max. Operating Pressure kgf/cm ²	Pres. Adj. Range kgf/cm ²	Max. Flow l/min	Mass kg.	
Threaded Connections	Sub-Plate Mounting				B-5-*T	B-5-*G
B-5-*T-*1080	B-5-*G-*1080	315	See Model Designation	30	1.9	1.9

● Model Number Designation

F	-B	-5-	A-	T-	*	-10	80
Special Seals	Relief Valve	Valve Size	Spring Type kgf/cm ²	Mounting Type	Size of Pipe	Design Number	Design Standard
F: Special Seals for Phosphate Ester Type Fluids (Omit if not required)	B	5	A-0-50 B-50-100 C-100-200 D-200-315	T: Threaded Type G: Subplate mounting	1: 1/2 BSP.F 2: 3/4BSP.F	10	80



Graphic Symbol



■ Instructions

● Pressure Adjustment

Loosen Jamnut and turn knob clockwise for increase in pressure and anticlockwise for decrease in pressure.

● Care in Application

Tank Line of this valve to be directly connected to tank.

■ Attachment

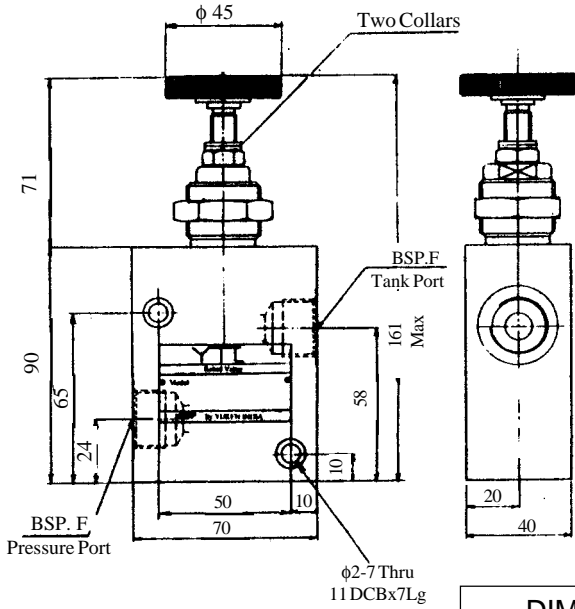
Valve Model	Socket Head Cap Screw	Qty.	Bolt Kit Model Number
B-5-*G-*10	M6 x 50 Lg.	4	BKB5-10

■ Sub-plate

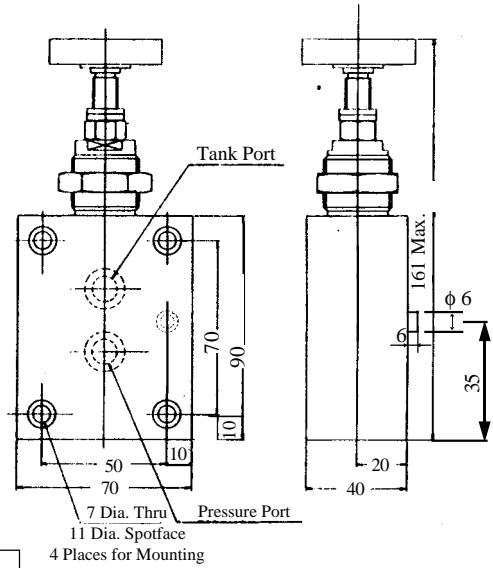
Valve Model	Subplate Model	Piping Size	Mass kg.
B-5-*G-*10	BM-5-1-1080	1/2 BSP.F	2.8
	BM-5-2-1080	3/4 BSP.F	3.8

PRESSURE CONTROLS

● B-5-*****-T-*****-1080

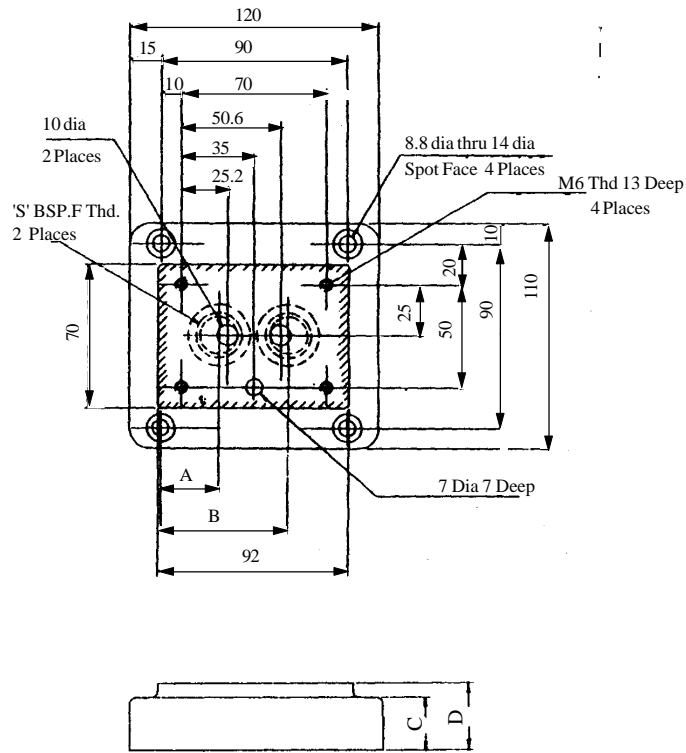


● B-5-*****-G-1080

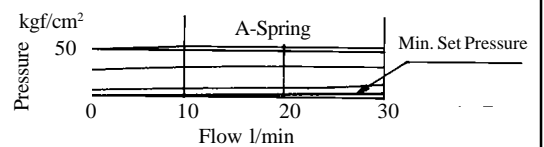
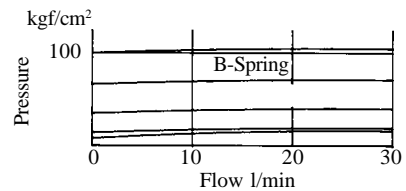
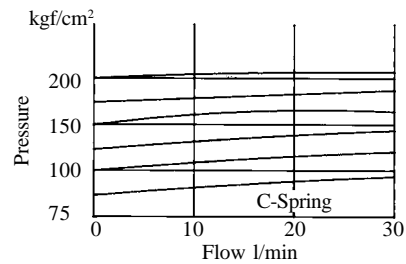
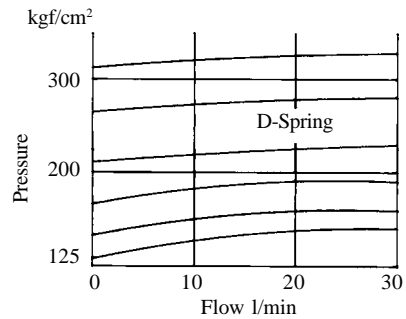


DIMENSION IN MILLIMETRES

● Sub-plate : BM-5-*****-1080



Nominal Override Characteristics

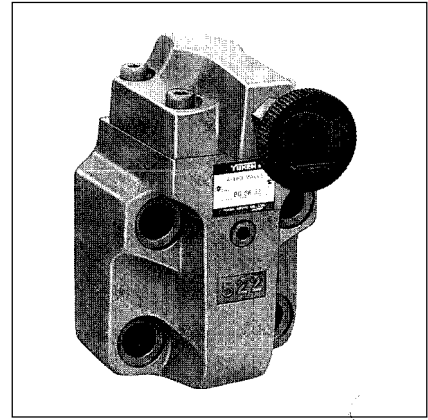


Sub-Plate Model No.	Piping Size 'S' BSP.F	A	B	C	D
BM-5-1-1080	1/2	31	65	25	32
BM-5-2-1080	3/4	28	67.6	35	42

■ Pilot Operated Relief Valves

These valves protect the hydraulic system from excessive pressure, and can be used to maintain constant pressure in a hydraulic system.

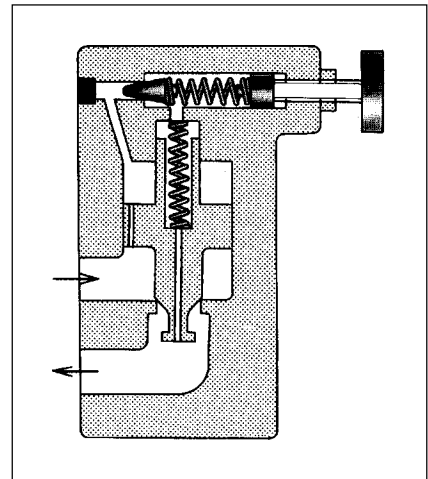
Remote Control and unloading are premitted by vent circuit.



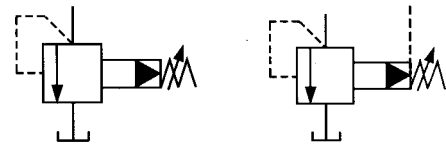
■ Ratings

Model Numbers		Max. Operating Pressure kgf/cm ²	Pres. Adj. Range kgf/cm ²	Max. Flow l/min	Mass kg.	
Threaded Connection	SubPlate Mounting				BT type	BG type
BT-06-※-3280	BG-03-※-32	250	(Note) ※-250	100		4.7
	BG-06-※-32			200	5	5.6
	BG-10-※-32			400		8.7

Note: Refer to the Minimum adjustment Pressure characteristics on page 98.



Graphic Symbols



Vent Connection

■ Model Number Designation

F	B	T	-03	P	-V	-32	※
Special Seal	Series Number	Type of Mounting	Valve Size	Plunger Type	High Venting Pres. Feature	Design Number	Design Standards
F: Special Seals for Phosphate Ester Type Fluids (Omit if not required)	B: Pilot Operated Relief Valves	T: Threaded Connections	06	P: Pull Type	V: For High Venting Pressure Feature (Omit if not required)	32	80
		G: Sub-Plate Mounting	03			32	—
			06			32	
			10			32	

Use high venting pressure type to reduce the response time from unload to onload.

■ Attachment

● Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw	Qty Nos.	Bolt Kit Ordering Code
BG-03	M12 x 70Lg., M12 x 95Lg	2 each	BK BG - 03 - 10
BG-06	M16 x 60Lg., M16 x 80Lg	2 each	BK BG - 06 - 10
BG-10	M20 x 70Lg., M20 x 90Lg	2 each	BK BG - 10 - 10

■ Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Piping Size	Mass kg.
BG-03	BGM-03-3080	3/8 BSP.F	2.4
	BGM-03X-3080	1/2 BSP.F	3.1
BG-06	BGM-06-3080	3/4 BSP.F	4.7
	BGM-06X-3080	1 BSP.F	5.7
BG-10	BGM-10-3080	1-1/4 BSP.F	8.4
	BGM-10X-3080	1-1/2 BSP.F	10.3

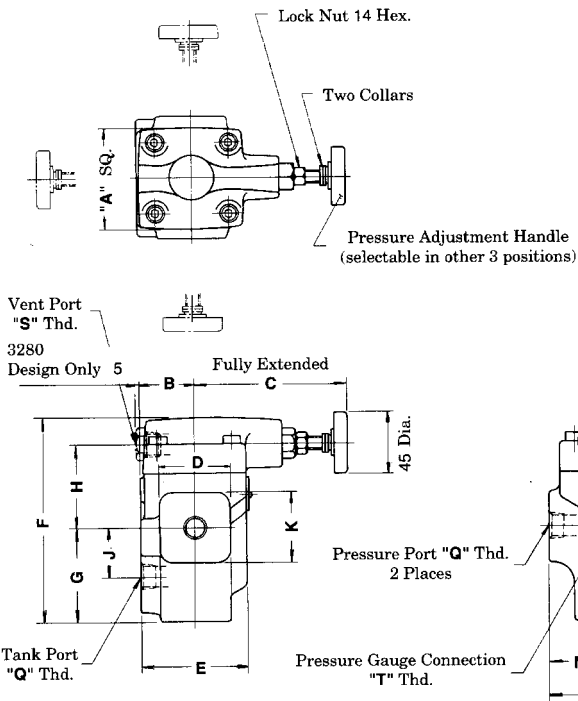
- Sub-plates are available. Specify sub-plate model from the table above. When sub-plates are not used, the mounting surface should have a good machined finish.

■ Instructions

- If a remote control relief valve is used in the vent circuit, see page 85. In addition, if the internal volume of the vent line is too large, chattering is likely to occur. Thus, as far as possible reduce the inside Dia. and the length of the pipe.
- To adjust the pressure, loosen the lock nut and turn the handle slowly clockwise for higher pressures or anti-clockwise for lower pressures. One revolution of the handle makes about a 50 kgf/cm² pressure change. After adjustments, do not forget to tighten the lock nut.
- Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 100 kgf/cm².
- Piping of the tank line should not be connected to any tank line of the other valves, but connected directly to the tank.
- With a small flow, the setting pressure may be unstable. Use models numbered 03 and 06 with a flow rate 8 l/min and model 10 with 15 l/min.
- There are two threaded connection pressure ports. They can be connected each other in-line one as inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.

BT-06P-※-3280

DIMENSION IN
MILLIMETRES



Model Numbers	"Q" Thd.	"S" Thd	"T" Thd
BT-06P-※-3280	3/4 BSP. F	3/8 BSP. F	1/4 BSP. Tr

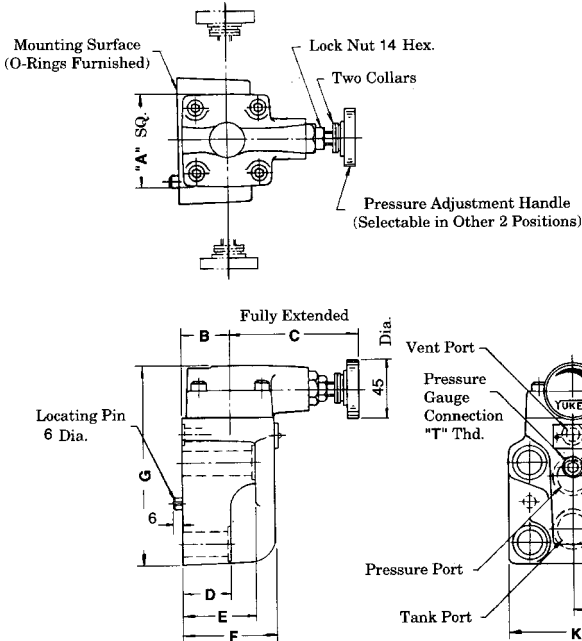
Model Numbers	A	B	C	D	E	F
BT-06	75	40	105	52	78	150.5

Model Numbers	G	H	J	K	L	N
BT-06	68.5	62	36	52	90	45

03 BG-06 P-※-32 10

Model Number	"T" Thd
BG-03P-※-32	1/4 BSP. Tr
BG-06P-※-32	1/4 BSP. Tr
BG-10P-※-32	1/4 BSP. Tr

Mounting Surface
BG-03: ISO 6264 AR-06-2-A
BG-06: ISO 6264 AS-08-2-A
BG-10: ISO 6264 AT-10-2-A



Model Number	A	B	C	D	E	F	G
BG-03	75	40	105	57	78	78	137
BG-06	17	40	105	40	60	78	161
BG-10	20.7	45	101	47	67	87.5	195

Model Number	H	J	K	L
BG-03	14.1	41	82	117
BG-06	17	52	104	141
BG-10	20.7	62	124	175

Model Number	N	P	Q	S
BG-03	77	22	13.5	21
BG-06	83.5	4.5	17.5	26
BG-10	110	6	21.5	32

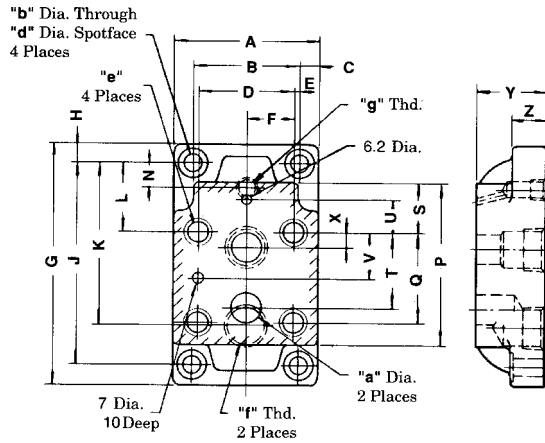
PRESSURE CONTROLS

03, 03X

Sub-Plate: BGM -06, 06X-3080

10, 10X

DIMENSION IN
MILLIMETRES

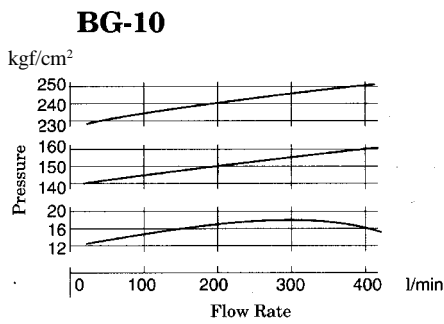
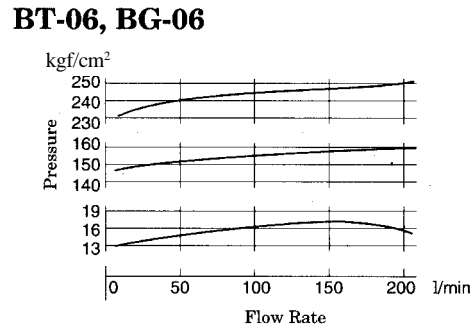
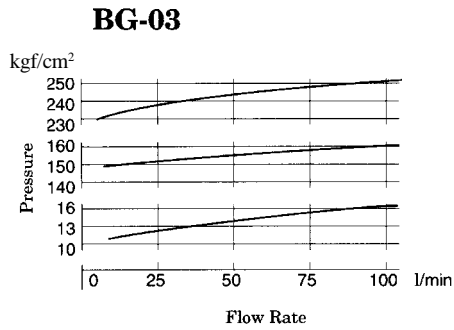


Model Numbers	A	B	C	D	E	F	G	H	J	K	L	N	P	Q
BGM-03	86	60	13	53.8	3.1	26.9	149	13	123	86	32	26	97	53.8
BGM-03X										95		21		
BGM-06	108	78	15	70	4	35	180	15	150	106.5	51	27.2	121	66.7
BGM-06X										119		18		
BGM-10	126	94	16	82.6	5.7	41.3	227	16	195	138.2	62	30.2	154	88.9
BGM-10X										158		17		

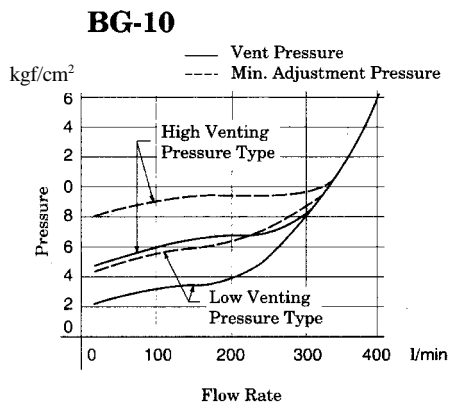
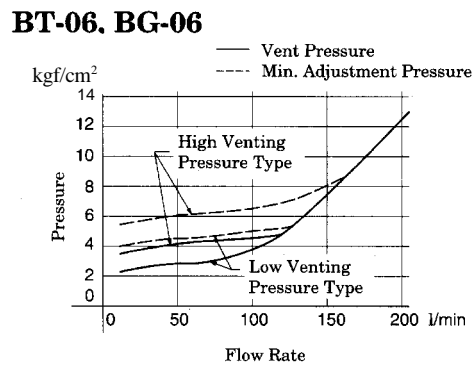
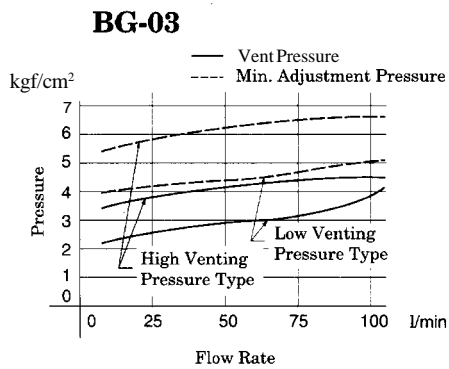
Model Numbers	S	T	U	V	X	Y	Z	a	b	d
BGM-03	19	47.4	0	22	22	32	20	14.5	11	17.5
BGM-03X						40				
BGM-06	37	55.5	23.8	33.4	11	40	25	23	13.5	21
BGM-06X						50				
BGM-10	42	76.2	31.8	44.5	12.7	50	32	28	17.5	26
BGM-10X						63				

Model Numbers	Design "3080"		
	"e" Thd.	"f" Thd.	"g" Thd.
BGM-03	M 12 Thd. 20 Deep	3/8 BSP.F	1/4 BSP.F
BGM-03X		1/2 BSP.F	
BGM-06	M 16 Thd. 25 Deep	3/4 BSP.F	
BGM-06X		1 BSP.F	
BGM-10	M 20 Thd. 28 Deep	1 - 1/4 BSP.F	
BGM-10X		1 - 1/2 BSP.F	

■ Nominal Override Characteristics

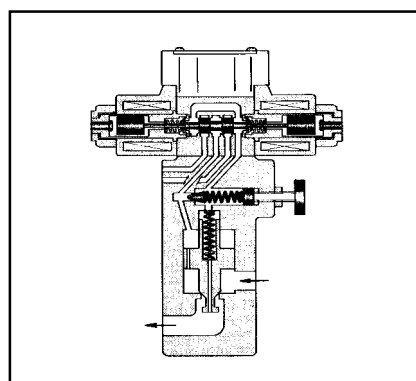
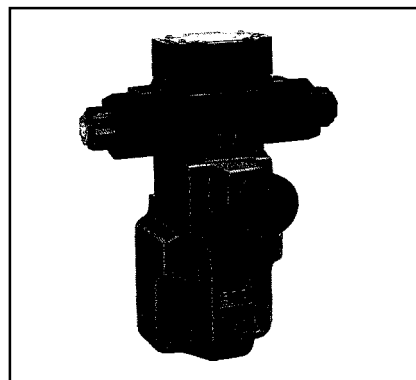


■ Min. Adj Pressure & Vent Pressure Vs Flow



■ Solenoid Controlled Relief Valves

These valves are a combination of relief valve and solenoid valve. Piping between the two is eliminated as the solenoid valve is directly mounted on the relief valve and connected with the relief valve vent. Pump pressure may be unloaded remotely by an electrical signal to the solenoid, or by connecting pilot relief valves to the solenoid valve ports.



■ Ratings

Model Numbers		Max. Operating pressure kgf/cm ²	Pres. Adj. Range kgf/cm ²	Max. Flow l/min	Mass kg.	
Threaded Connections	Sub-Plate Mounting				BT type	BG type
BST-06-**-**-**-4680	BSG-03-**-**-**-46	250	(Note) *-250	100	-	7.1
	BSG-06-**-**-**-46			200	7.4	8.0
	BSG-10-**-**-**-46			400	-	11.3

Note: For relief Valves, standard pilot operated relief valves are used. For minimum adjustment pressures and other characteristics, see page 98. The mass is those for the double-solenoid types (vent types 3C2, 3C3). For single-solenoid types (vent types 2B3A, 2B3B, 2B2B, 2B2), reduce 0.6 Kg. For models with vent restrictors, add 1 Kg.

■ Model Number Designation

F-	A-	BS	T	-03	-V	-2B3A	-A100	-N	-46	80
Special Seals	With Vent Restrictor	Series Number	Type of Mounting	Valve Size	High Valve Pres. Feature	Vent Type	Coil Type	Type of Electrical Con.	Design Number	Design Standard
F: Special Seals for Phosphate Ester Type Fluids (Omit if not required.)	A: *1 With Vent Restrictor (Option)	BS: Solenoid Controlled Relief Valves	T: Threaded Connection G: Sub-Plate Mounting	06 03 06 10	V: For High *2 Venting Pressure Feature (Omit if not required)	2B3A ^{*3} 2B3B 2B2B 2B2 3C2 3C3	AC: A120 ^{*4} A240 DC: D12, D24	N: With Plug-in Connector (DIN) N1: With Plug-in Connector with indicator light (option)	46	80

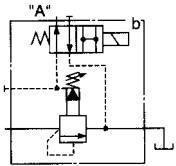
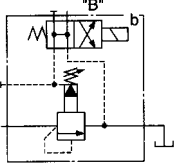
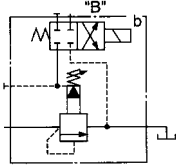
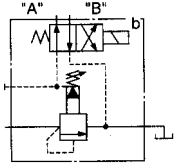
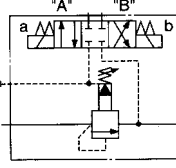
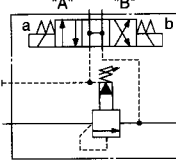
*1. Models with vent restrictor are applicable only for the vent type 2B3A and 2B3B For details see page 101.

*2. Use high venting pressure types to reduce response time from unloading to onloading.

*3. For the details of the vent types, see the following page.

*4. The coil codes are the same as for solenoid directional valve DSG-01. See Solenoid Rating on page 144.

■ Vent Types

Vent Type	Graphic Symbols	Solenoid Operated Directional Valve Model Number	Operation		
			SOL "a"	SOL "b"	Vent Connecting
2B3A		DSG-01-2B3A	---	OFF	Connected to port "A"
			---	ON	Connected to tank (no-load)
2B3B		DSG-01-2B3B	---	OFF	Connected to tank (no-load)
			---	ON	Connected to port "B"
2B2B		DSG-01-2B2B	---	OFF	Closed State (relief valve setting pressure)
			---	ON	Connected to port "B"
2B2		DSG-01-2B2	---	OFF	Connected to port "A"
			---	ON	Connected to port "B"
3C2		DSG-01-3C2	OFF	OFF	Closed state (relief valve setting pressure)
			ON	OFF	Connected to port "A"
			OFF	ON	Connected to port "B"
3C3		DSG-01-3C3	OFF	OFF	Closed to tank (no-load)
			ON	OFF	Connected to port "A"
			OFF	ON	Connected to port "B"

■ Attachment

● Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw	Qty. Nos.	Bolt Kit Ordering Code
BSG-03	M12 x 70 Lg., M12 x 95 Lg.	2 each	BKBG - 03 - 30
BSG-06	M16 x 60 Lg., M16 x 80 Lg.	2 each	BKBG - 06 - 30
BSG-10	M20 x 70 Lg., M20 x 90 Lg.	2 each	BKBG - 10 - 30

■ Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Piping Size	Mass kg.
BSG-03	BGM-03-3080	3/8 BSP.F	2.4
	BGM-03X-3080	1/2 BSP.F	3.1
BSG-06	BGM-06-3080	3/4 BSP.F	4.7
	BGM-06X-3080	1 BSP.F	5.7
BSG-10	BGM-10-3080	1-1/4 BSP.F	8.4
	BGM-10X-3080	1-1/2 BSP.F	10.3

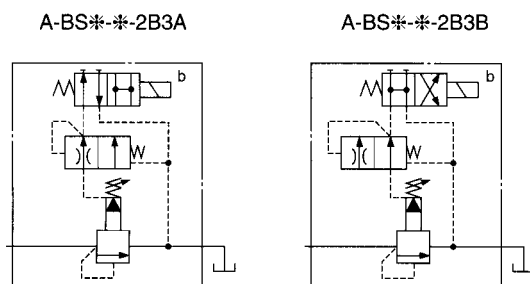
- Sub-plates are available. Specify sub-plate model from the table above. When sub-plates are not used, the mounting surface should have a good machined finish.
- The sub-plates are those for pilot operated relief valves. For dimensions, refer BGM-06.

■ Option

● With vent restrictor

This type has a vent restrictor valve, in types 2B3A and 2B3B added between relief valve and a solenoid operated directional valve. It prevents shock to the main circuit by gradually lowering the venting pressure in the shift from the set pressure to unloading.

Unloading pressure are the same as without a vent restrictor.



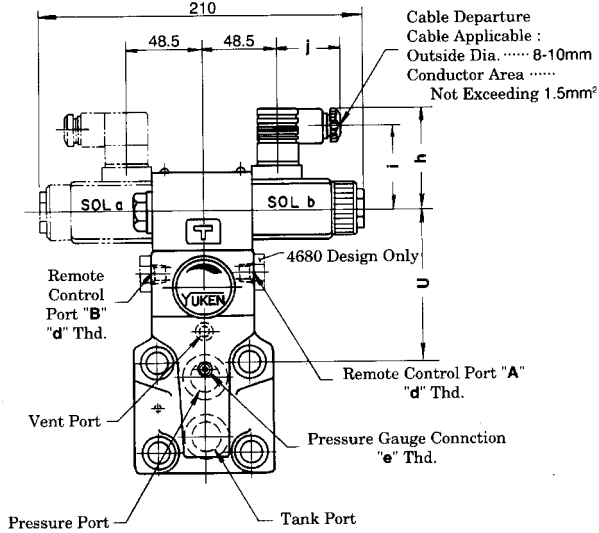
■ Instructions

- The remote control relief valve is used in the vent circuit, see page 85. In addition, if the internal volume of the vent line is too large, chattering is likely to occur. Thus, as far as possible reduce the inside Dia. and the length of the pipe.
- To adjust the pressure, loosen the lock nut and turn the handle slowly clockwise for higher pressures or anti-clockwise for lower pressures. One revolution of the handle makes about a 50 kgf/cm² pressure change. After adjustments, do not forget to tighten the lock nut.
- Pressure is limited by collars fitted. If a working pressure cannot be attained, remove some collars. One collar is equivalent to 100 kgf/cm².
- Piping of the tank line should not be connected to any tank line of the other valves, but connected directly to the tank.
- With a small flow, the setting pressure may be unstable. Use models numbered 03 and 06 with a flow rate above 8 l/min and model 10 with 15 l/min.
- There are two threaded connection pressure ports in BST type. They can be connected each other in-line; one as inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.

■ Models with Plug-in Connector

03
BSG-06-***-N-4680
10

DIMENSION IN
MILLIMETRES



Model Numbers	U
BSG-03,-N-	85
BSG-06,-N-	102.5
BSG-10,-N-	110

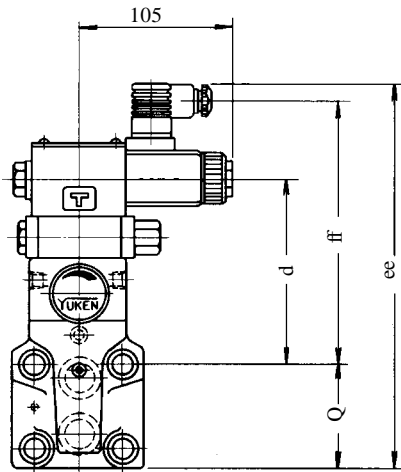
Model Numbers	i	h	j
BSG-***-A-N-4680 (with AC solenoid)	53	65	39
BSG-***-D*-N- (with DC solenoid)	64	76	39

Model Numbers	"d" Thd.	"e" Thd
BSG-03-***-N-4680	1/8BSP.F	1/4BSP.Tr
BSG-06-***-N-4680		
BSG-10-***-N-4680		

■ Options-Models with Vent Restrictor

● Plug-in Connector Type

03 2B3A
A-BSG-06-***-N-4680
10 2B3B

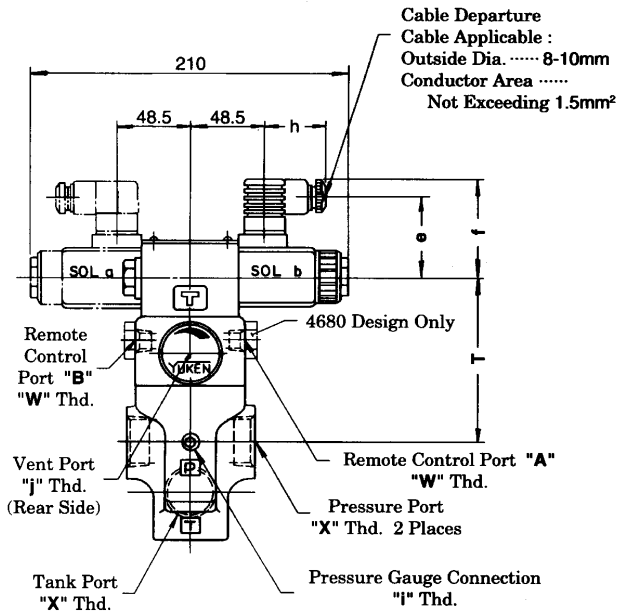


Item Model Number	d	Q	Plug-in Connector Type			
			AC Soleniod		DC Soleniod	
			ee	ff	ee	ff
A-BSG-03	115	77	245	180	256	191
A-BSG-06	132.5	83.5	269	197.5	280	208.5
A-BSG-10	140	110	303	205	314	216

■ Models with Plug-in Connector

BST-06-**-**-N-4680

DIMENSION IN
MILLIMETRES



Model Numbers	T
BST-06-**-**-N-	107

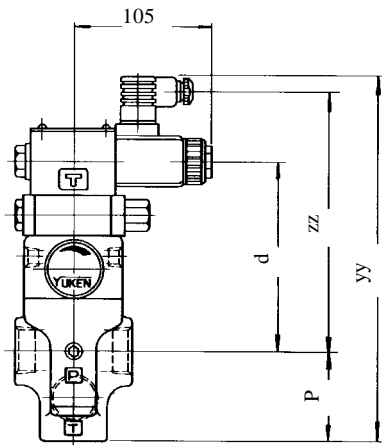
Model Numbers	e	f	g
BST-**- (with AC solenoid)	53	65	39
BST-**-D-**-N- (with DC solenoid)	64	76	39

Model Number	"W" Thd.	"I" Thd	"J" Thd
BST-06-**-**-N-4680	1/8 BSP.F	1/4 BSP.Tr	1/4 BSP.Tr

■ Options-Models with Vent Restrictor

● Plug-in Connector Type

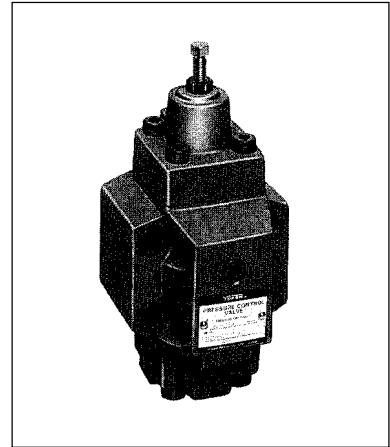
A-BST-06-^{2B3A}
^{2B3B}-**-4680



Item	d	P	Plug-in Connector Type			
			AC Soleniod		DC Soleniod	
			YY	ZZ	YY	ZZ
Model Number						
A-BST-06	137	68.5	270.5	190	281.5	201

■ HC Type Pressure Control Valves

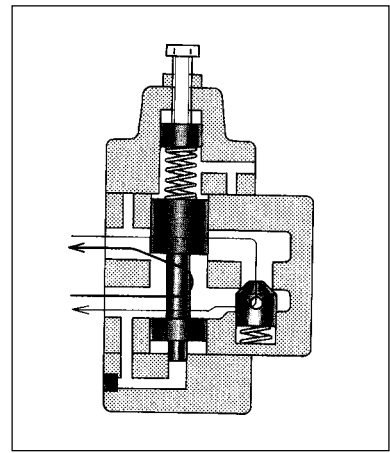
These valves are hydraulically damped, direct operated, pressure control valves which can be actuated by internal or external pilot pressure. They are available with integral check valves for use when reverse free flow from the secondary port to the primary port is desired. There are various types of valve including sequence and counterbalance valves, all of which are operated by a pressure rise in the circuit, sensed either internally or remotely.



■ Ratings

Model Numbers		Max. Operating Pres kgf/cm ²	Max. Flow l/min	Mass kg.	
Threaded Connection	Sub-Plate Mounting			HT Type	HG Type
HCT-06***2180	HCG-06***21	210	125	7.1	7.4

For check valve pressure drops, see free flow pressure drop characteristics



■ Model Number Designation

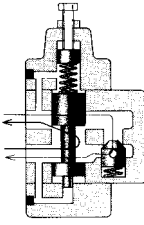
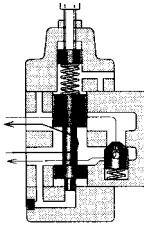
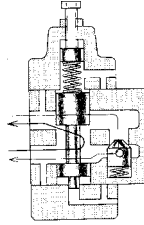
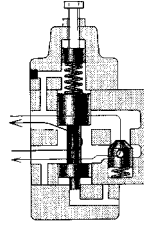
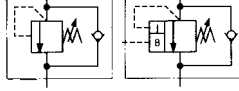
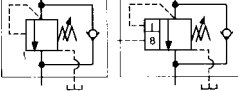
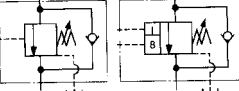
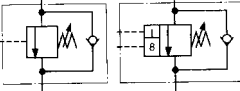
F -	HC	T	-06	-C	3	-P	-21	*
Special Seals	Series Number	Type of Mounting	Valve Size	Pres. Adj Range kgf/cm ²	Vent Type	With Auxiliary Pilot Pressure	Design Number	Design Standards
F: Special Seals for Phosphate Ester Type Fluids (Omit if not reqd.)	HC: HC Type Pressure Control Valves	T: Threaded Connection	06	L: 2.5-4.5 M: 4.5-9	1*1 2 3 4		21	80
		G: Sub-Plate Mounting	06	N: 9-18 A: 18-35 B: 35-70 C: 70-140		P: *2 With Auxiliary Pilot Pressure	21	None

*1. For details of valves types, see the following page.

*2. Model with auxiliary pilots are used where valves must be operated under a lower external pilot pressure than the adjusted pressure (types N, A and B about 1/8 of adjusted pressure; type C: about 1/16). This does not apply to pressure adjustment ranges L and M.

PRESSURE CONTROLS

■ Valve Types

Valve Type	Type 1: Counterbalance Valve	Type 2: Sequence and Check Valve	Type 3: Sequence and Check Valve	Type 4: Counterbalance Valve
Pilot-Drain Type	Internal Pilot-Internal Drain	Internal Pilot-External Drain	External Pilot-External Drain	External Pilot-Internal Drain
Operations				
Graphic symbols	 With Auxiliary pilot port	 With Auxiliary pilot port	 With Auxiliary pilot port	 With Auxiliary pilot port
Descriptions	Used to prevent gravitational falls by generating a pressure on the actuator return side. If Primary pressure exceeds the pressure setting, fluid is released to keep the pressure constant.	Used to control the operating Sequence of two or more actuators. If primary pressure exceeds the pressure setting effective fluid is delivered to the secondary side. Reversed flow is free by check valve.	Used for same purposes as for type 2. Operated by external pilot pressure irrespective of primary pressure. Reversed flow is free by check valve.	Used for the same purposes as for type 1. Operated by external pilot pressure irrespective of primary pressure. Reversed flow is free by check Valve.

■ Instructions

- To adjust the pressure, loosen the lock nut and turn the pressure adjustment screw slowly clockwise for higher pressure or anticlockwise for lower pressures. After adjustments, do not forget to tighten the lock nut.
- Connect the secondary side pressure ports of types 1 and 4 (internal drain) and the drain ports of types 2 and 3 (external drain) directly to the tanks with a back pressure close to the atmospheric pressure.
- There are two threaded connection pressure ports with HCT type. They can be connected each other in-line: one as an inlet and the other as an outlet or the valve can be used by plugging one of the pressure ports.

■ Attachment

● Mounting Bolts

Valve Model	Socket Head Cap Screw	Qty	Bolt Kit ordering Code
HCG-06	M10x80 Lg.	4	BKHG-06-20

■ Sub-Plate

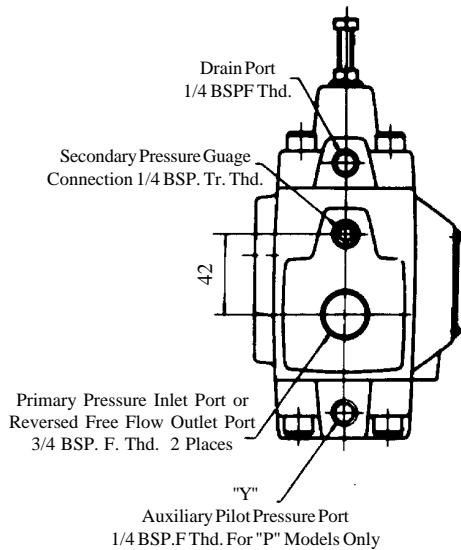
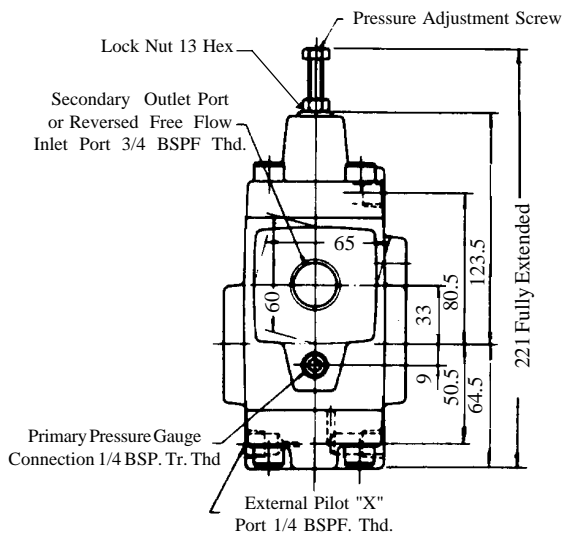
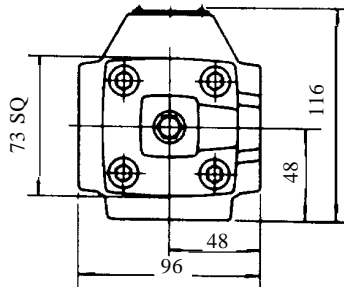
Valve Model Numbers	Sub-Plate Model Numbers	Piping Size	Mass Kg.
HCG-06-**-*	HGM-06-2080	3/4 BSP. F	2.4
	HGM-06X-2080	1 BSP. F	3.0
HCG-06-**-*P	HGM-06-P-2080	3/4 BSP. F	2.4
	HGM-06X-P-2080	1 BSP. F	3.0

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

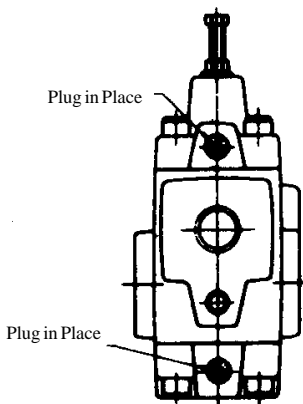
● HCT-06-***-2180

DIMENSION IN MILLIMETRES

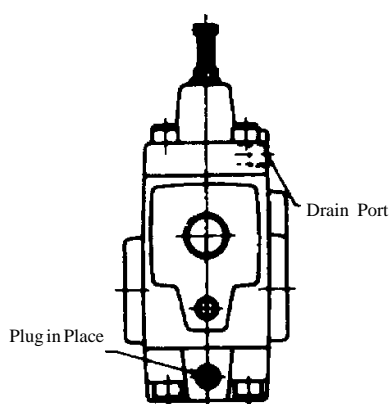
Type 3: Sequence and Check Valves
(External Pilot, External drain)



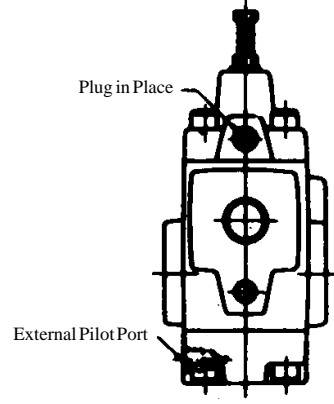
Type 1: Counterbalance Valve
(Internal Pilot, Internal Drain)



Type 2: Sequence and check Valve
(Internal Pilot, External Drain)



Type 4: Counterbalance Valve
(External Pilot, Internal Drain)



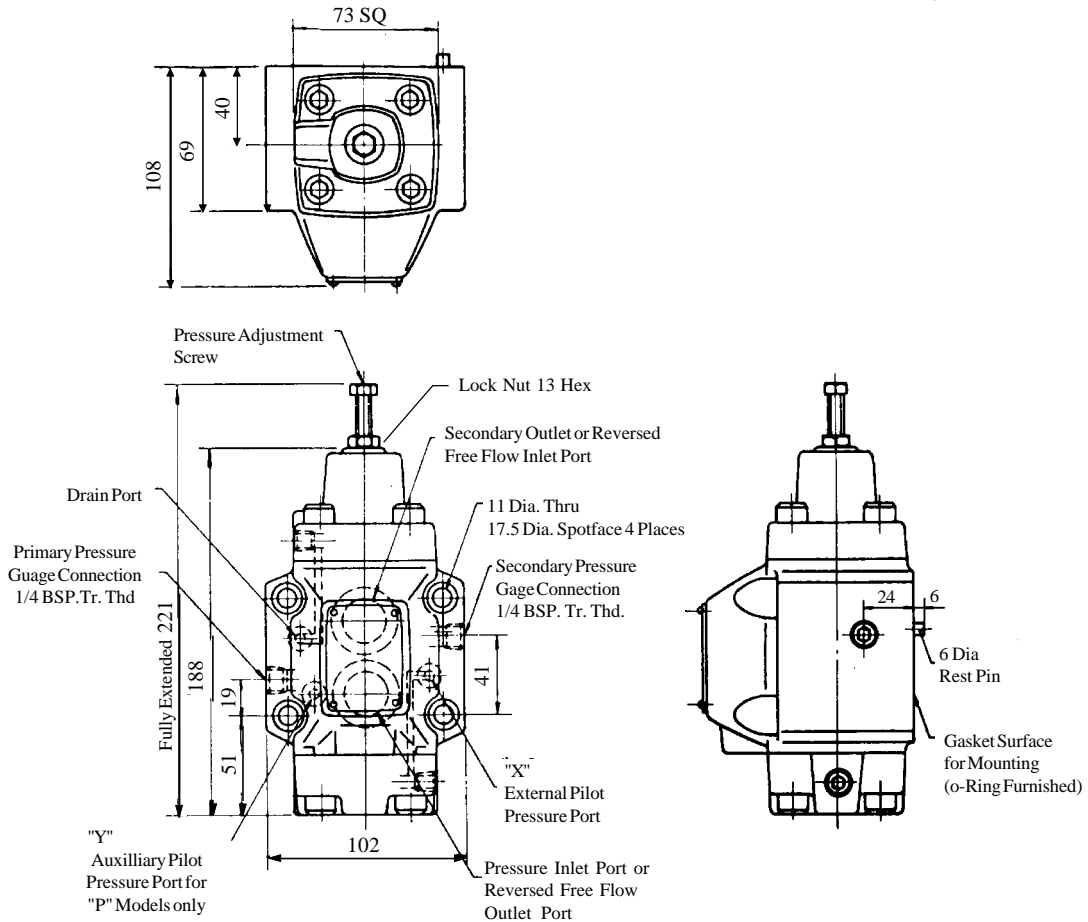
PRESSURE CONTROLS

● HCG-06-***-21

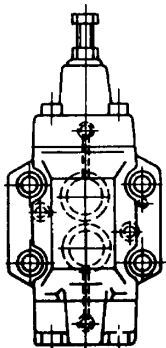
Type 3: Sequence and Check Valve

(External Pilot, External Drain)

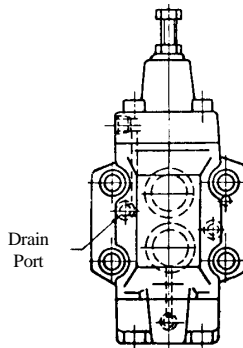
DIMENSION IN
MILLIMETRES



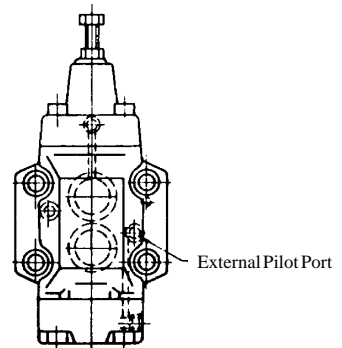
Type 1: Counterbalance Valve
(Internal Pilot, Internal Drain)



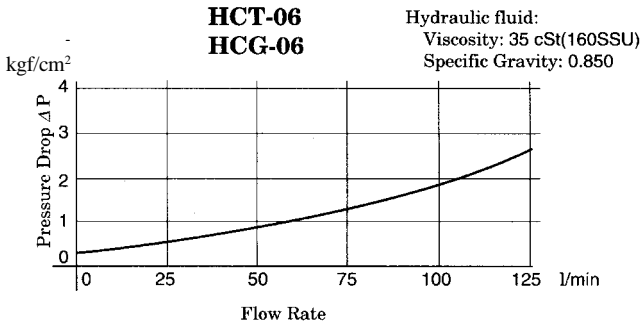
Type 2: Sequence and check Valve
(Internal Pilot, External Drain)



Type 4: Counterbalance Valve
(External Pilot, Internal Drain)



■ Pressure Drop for Reversed Free Flow



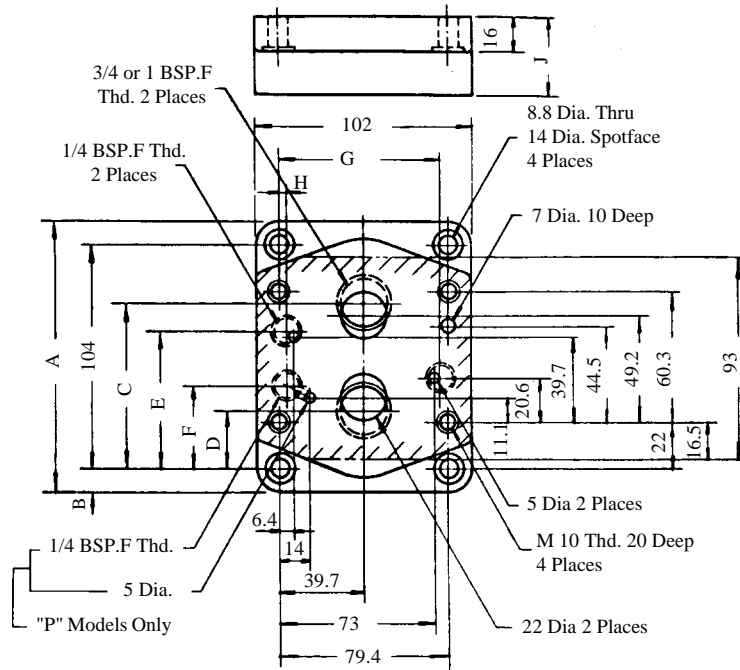
- For any other viscosity, multiply the factors in the table below.

Viscosity	cSt	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 ($\Delta P'$) may be obtained from the formula below.
 $\Delta P' = \Delta P (G/0.850)$

DIMENSION IN
MILLIMETRES

- Sub-Plate : HGM - ⁰⁶06X - 2080



Sub Plate Model Numbers	Piping Size BSP.F	A	B	C	D	E	F	G	H	J	Mass (Approx.) Kg.	Recommended Max. Flow Capacity l/min
HGM-06-2080	3/4	124	10	77	27	61.7	-	73	6.4	36	2.4	80
HGM-06X-2080	1	136	16	82.3	22	61.7	-	75	6.4	45	3	125
HGM-06-P-2080	3/4	124	10	77	27	64	39	73	3	36	2.4	80
HGM-06X-P-2080	1	136	16	82.3	22	64	39	75	3	45	3	125

■ Pressure Reducing and Check Valves

Pressure reducing and check valves are used to set the pressure of a hydraulic circuit below that of the main circuit. They have check valves, which allow a free flow from the secondary side to the primary. Operation under remote control is also possible by using the remote control port.

■ Ratings

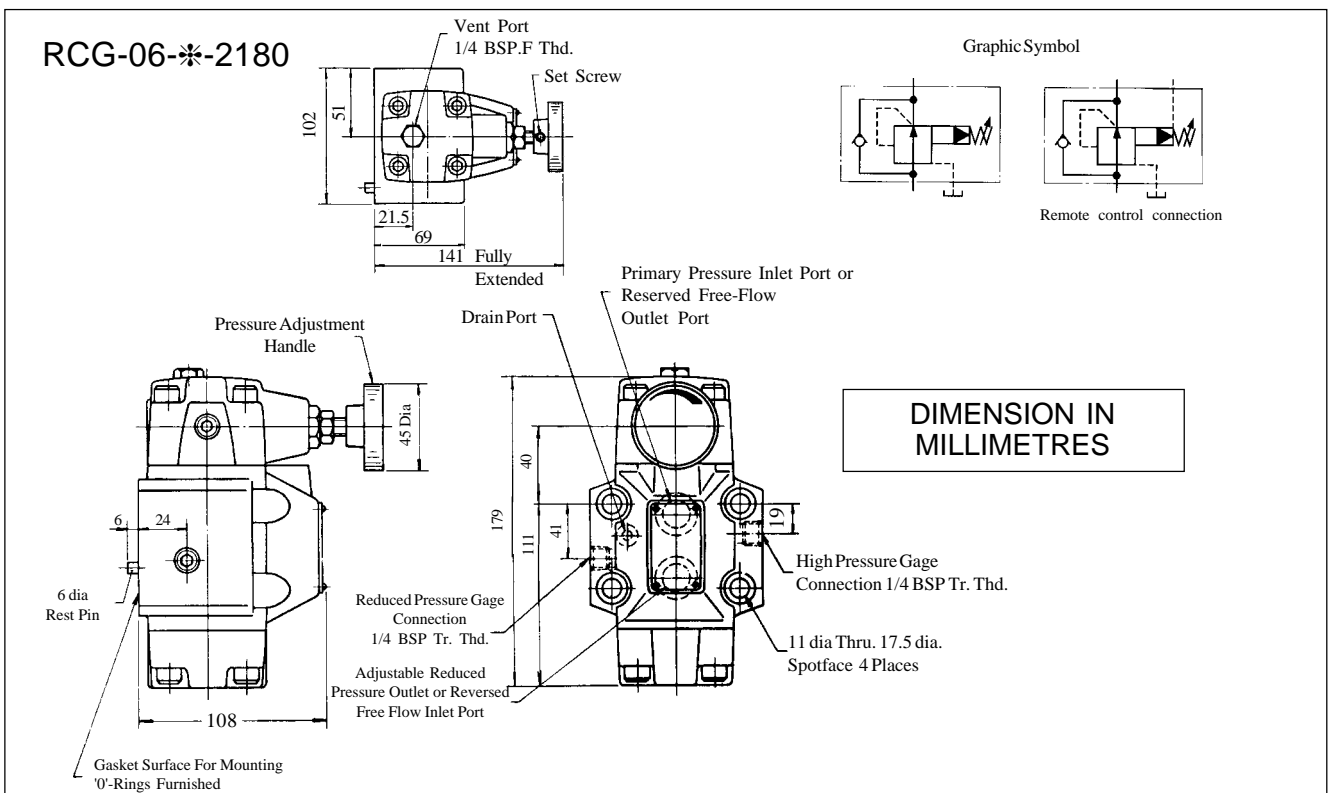
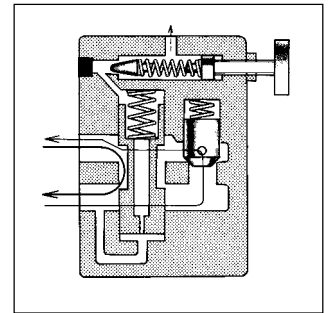
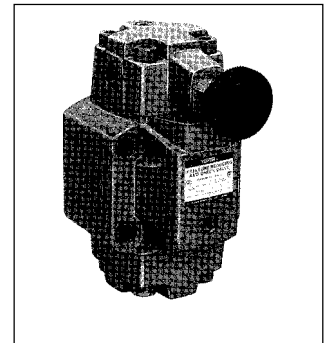
Model Numbers	Max. Operating Pres. kgf/cm ²	Max Flow *1		Drain Flow *2 l / min	Mass kg.
		Set Pressure kgf/cm ²	Max. Flow l / min		
RCG-06-2180	210	7-10	50	0.8-1.1	8.1
		10-15	100		
		15-205	125		

*1 The max. flow rates are those shown at the primary pressure at 210 kgf/cm²

*2 The drain flow rates are equal to pilot flow rates when differential pressure between primary and secondary pressure is at 205 kgf/cm²

■ Model Number Designation

F-	RC	G	-06	-B	-21	80
Special seals	Series Number	Type of mounting	Valve Size	Pres. Adj Range kgf/cm ²	Design Number	Design Standard
F: Special Seals for Phosphate Ester Type Fluids (Omit if not required)	RC: Pressure Reducing and Check Valves	G: Sub-Plate Mounting	06	B: 7-70 C: 35-140 H: 70-205	21	80



■ Attachment

● Mounting Bolts

Valve Model Numbers	Socket Head Cap Screw	Qty.	Bolt Kit Model Number
RCG-06	M10 x 80Lg.	4	BKHG-06-20

■ Sub-Plate

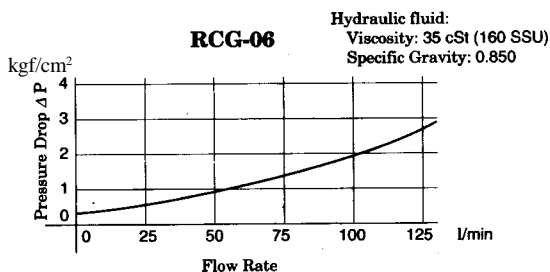
Value Model Numbers	Sub-Plate Model Numbers	Piping Size	Mass kg.
RCG-06	HGM-06-2080	3/4 BSP.F	2.4
	HGM-06X-2080	1 BSP.F	3.0

- Sub-plates are available. Specify sub-plates model from the table above. When sub-plates are not used, the mounting surface should have a good machined finish.
- The sub-plates are the same as those for HC type pressure control valves. With the reducing and check valve, the sub-plate is used in position 180° turned (upside down) from the normal position. When mounting the sub-plate, be sure to bring the valve locating pin to the sub-plate pin hole. For dimensions, see page 108.

■ Instructions

- To adjust the pressure, loosen the lock nut and turn the pressure adjustment handle slowly clockwise for higher pressures and anti-clockwise for lower pressures. After adjustments, do not forget to tighten the lock nut.
- Connect the drain port directly to the tank in which case the pressure at the drain port should be kept at a low back pressure close to the atmospheric pressure.

■ Pressure Drop for Reversed Free Flow



- For any other viscosity, multiply the factors in the table below

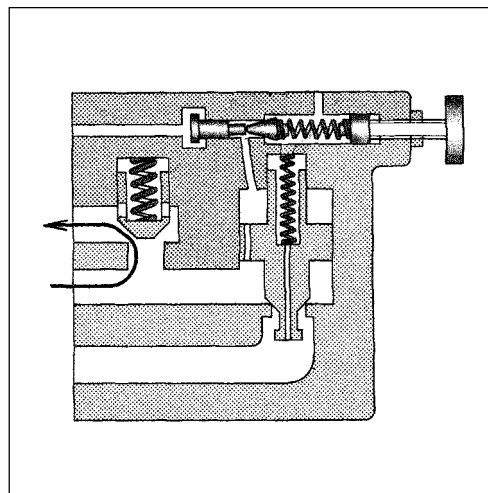
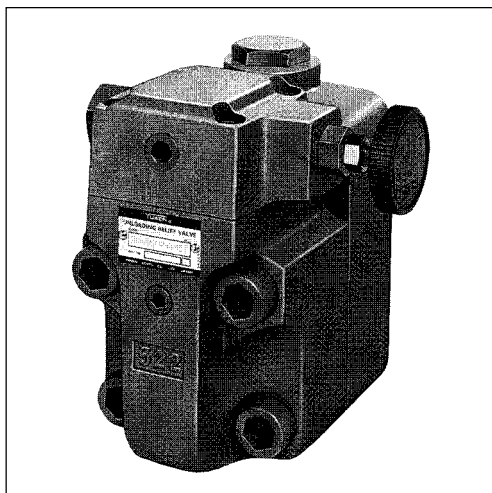
Viscosity	cSt	15	20	30	40	50	60	70	80	19
	SSU	77	98	141	186	232	278	324	371	417
Factor		0.81	0.87	0.96	1.03	1.09	1.14	1.19	1.23	1.27

- For any other specific gravity (G), the pressure drop ($\Delta P'$) is obtained from the formula below

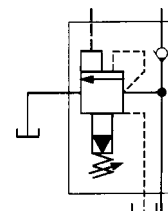
$$\Delta P' = \Delta P (G / 0.850)$$

■ Unloading Relief Valves

Unloading relief valves are used to operate pumps under a minimum load in accumulator or 2-pressure pump circuits etc.



Graphic Symbol



■ Ratings

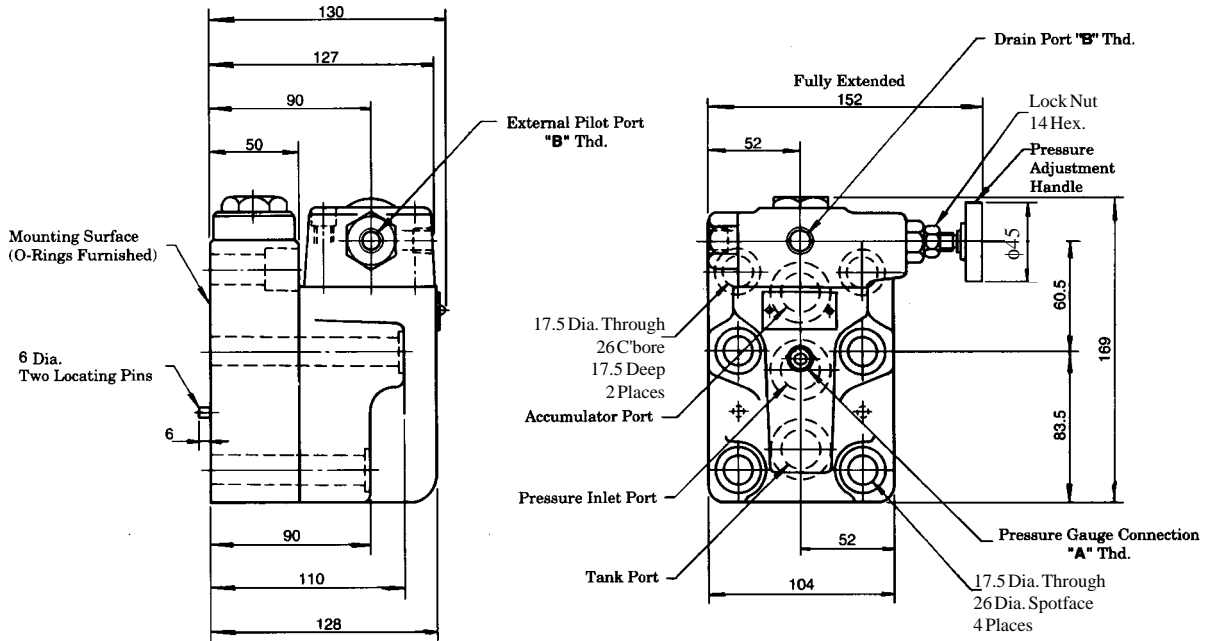
Model Numbers	Max. Operating Pres. kgf/cm ²	Max. Flow l/min	Mass kg.
BUCG-06-**-*-3080	210	125	12

■ Model Number Designation

F-	BUC	G	-06	-B	V	-30	80
Special Seals	Series Number	Type of Mounting	Valve Size	Cut-out Pres. Adj. Range kgf/cm ²	High Venting Pres. Feature	Design Number	Design Standard
F: Special Seals for Phosphate Ester Type Fluids (Omit if not required)	BUC: Unloading Relief Valve	G: Sub-plate Mounting	06	B: 25-70 C: 35-140 H: 70-210	V: For High Venting Pressure Feature (Omit if not required)	30	80

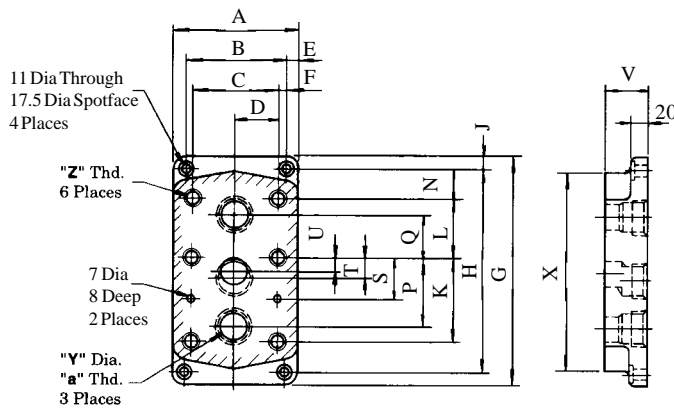
● BUCG-06-***-3080

Model Numbers	"A" Thd.	"B" Thd
BUCG-06-***-3080	1/4 BSP.F	1/4 BSP.F



DIMENSION IN MILLIMETRES

Sub-plate: BUCGM-06-2080



Model No.	A	B	C	D	E	F	G	H	J	K	L	N	P	Q	S	T	U	V	X	Y
BUCGM-06	102	78	70	35	12	4	192	168	12	66.7	46	27.5	55.5	33.5	33.3	11	11	40	145	23

Mounting Sub-plate is available by separate order, and must be specified in addition to the valve model number if required

When Sub-plate is not used, mounting surface as shown by shaded Area must be finished flat and smooth

■ Unloading Relief Valves

● Mounting Bolts

Valve Model Number	Socket Head Cap Screw	Qty.	Bolt Kit Ordering Code
BUCG-06	M16 x 55 Lg.	2 Nos.	BKBUCG-06-20
	M16 x 110 Lg.	2 Nos.	
	M16 x 130 Lg.	2 Nos.	

■ Instructions

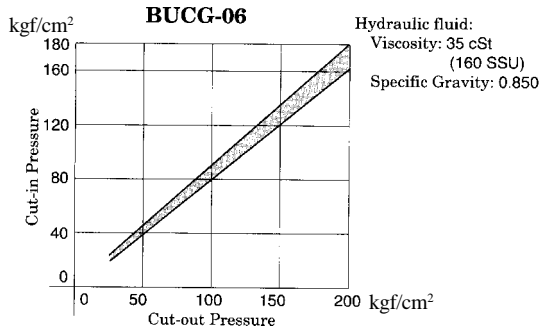
- To adjust the pressure, loosen the lock nut and turn the pressure adjustment handle slowly clockwise for higher pressures or anti-clockwise for lower pressures. After adjustments, do not forget to tighten the lock nut.
- Take care not to neglect connecting the drain pipe to the tank; otherwise not only will the valve fail to operate properly but also the line pressure will rise infinitely. Extend the end of the drain pipe into fluid.
- Limit the pressure drop between the valve and the accumulator in an accumulator circuit below 10% of the cut-out pressure.
- Limit the drain port back pressure below 2% of the cut-out pressure.

■ Sub-plate

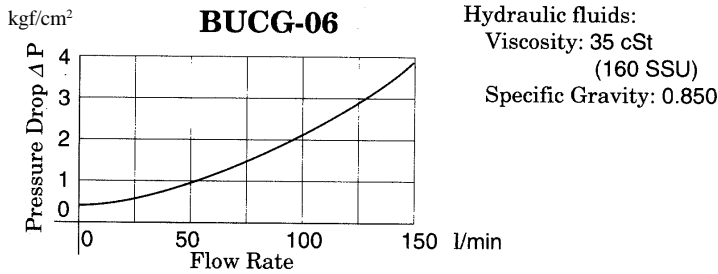
Valve Model Numbers	*Sub-plate Model Numbers	Piping Size	Mass kg.
BUCG-06	BUCGM-06-2080	3/4 BSP.F	4.4

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

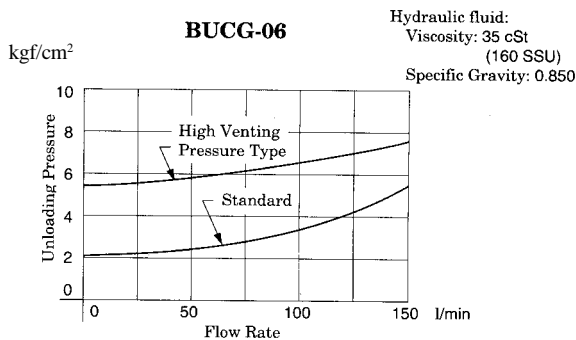
■ Cut-in Pressure vs. Cut-out Pressure



■ Pressure Drop for Check Valve



■ Unloading Pressure vs. Flow



- For any other viscosity, multiply the factors in the table below

Viscosity	cSt	15	20	30	40	50	60	70	80	19	100
	SSU	77	98	141	186	232	278	324	371	417	461
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^1) is obtained from the formula below.

$$\Delta P^1 = \Delta P (G^1 / 0.850)$$

PRESSURE CONTROLS

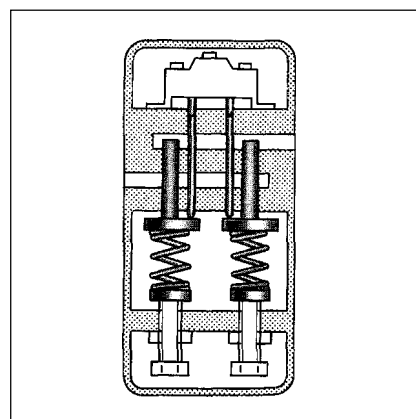
■ Pressure Switches

- Pressure switches are used to switch electric circuits in accordance with the pressures of hydraulic circuits.
- A Pressure switch has two microswitches each capable of electrically detecting pressure setting on high or low pressure side. The microswitch structure is dust and drip proof.

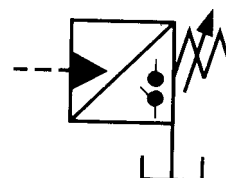


■ Ratings

Model Numbers	Max. Operating Pressure kgf/cm ²	Mass kg.
Sub-plate Mounting		
SG-02- * -2080	350	4.5



Graphic Symbol



■ Micro Switch Ratings

Loads	AC open closed		DC
	Normally closed Contact	Normally Open Contact	
Resistance Load	15A - 125V 15A - 250V		0.50A - 125V 0.25A - 250V
Inductive Load	4.5A - 125V 3.0A - 250V	2.5A - 125V 1.5A - 250V	0.05A - 125V 0.03A - 250V
Electric Motor Incandescent Lamp Electromagnetic Coil Load			—

■ Model Number Designation

F-	S	G	-02	-B	-20	80
Special Seals	Series Number	Type of Mounting	Valve Size	Pres. Adj. Range kgf/cm ²	Design Number	Design Standard
F: Special Seals for Phosphate Ester Type Fluids (Omit if not required)	S: Pressure Switches	G: Sub-plate Mounting	02	B: 7-70 C: 35-140 H: 70-210 K: 105-350	20	80

■ Instructions

● Pressure adjustments

Remove the front cover and loosen the lock nut. Turn the pressure adjustment screw slowly clockwise for higher pressures or anti-clockwise for lower pressures. After adjustment, be sure to tighten the lock nut and replace the front cover in position.

● Drain piping

Connect the drain pipe not to any other line but directly to the tank.

■ Attachment

● Mounting Bolts

Valve Model Number	Socket Head Cap Screw	Qty.	Bolt Kit Ordering Code
SG-02-2080	M6 x 60 Lg.	2	BKSG-02-20

■ Sub-Plate

Valve Model Numbers	Sub-Plate Model Numbers	Piping Size	Mass kg.
SG-02	SGM-02-2080	1/4 BSP.F	1.1

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

● Pressures and microswitch contacts

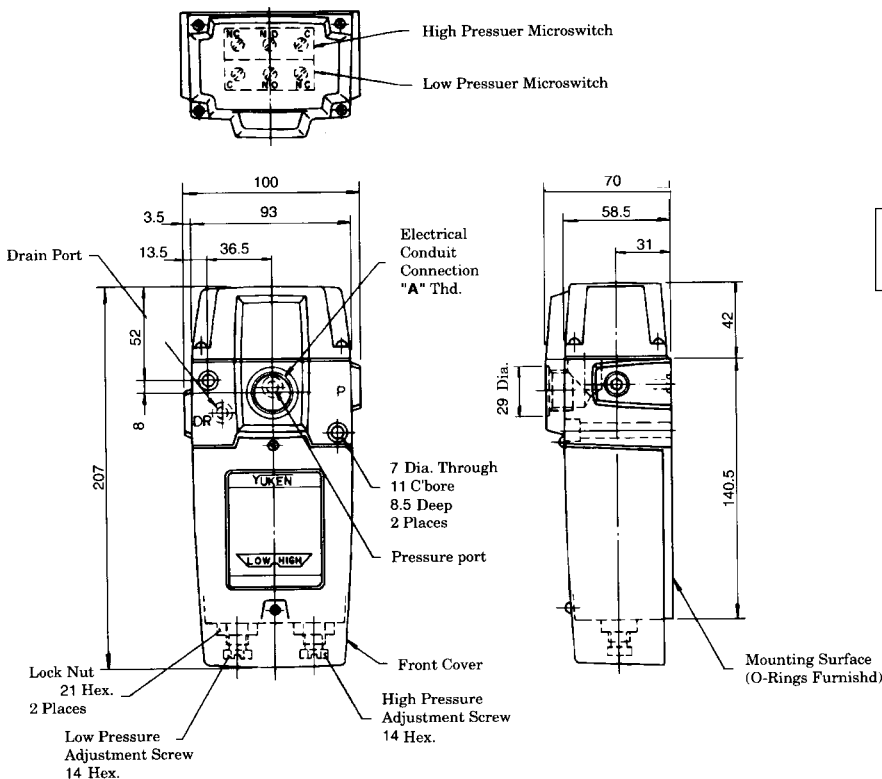
Pressure	Contact point	
	High Pressure Microswitch	Low Pressure Microswitch
Under the Setting Pressure		
Above the Setting Pressure		

● Microswitch terminals

	Mounting surface		
High-pressure side	NC O	NO O	C O
Low-pressure side	O C	O NO	O NC

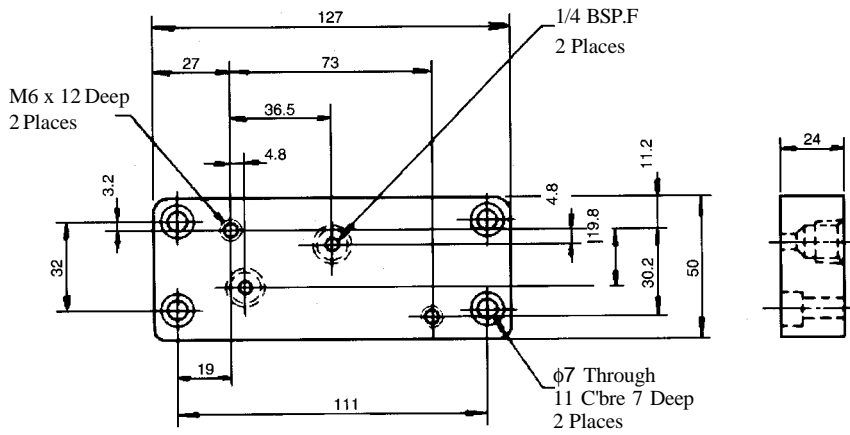
Front cover

SG-02--2080



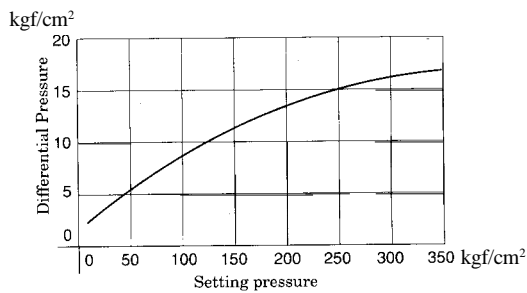
PRESSURE CONTROLS

● Sub-plate: SGM-02-2080

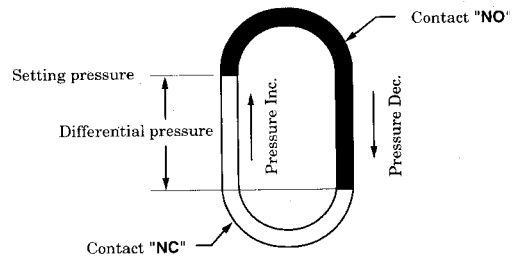


DIMENSION IN MILLIMETRES

■ Differential Pressure Characteristic



* The differential pressure means the pressure difference caused between at NC and at NO when one of the pressure on the high-and low-pressure side is raised and then lowered.



■ Electrical Circuit Examples

Example 1 Solenoid is required to be energised at low pressure and De-Energised at high pressure		Example 2 Solenoid is required to be De-Energised at low pressure and energised at high pressure		Example 3 Electric motor is required to be started at low pressure and stopped at high pressure	
Schematic Diagram	Wiring Diagram	Schematic Diagram	Wiring Diagram	Schematic Diagram	Wiring Diagram
<p>Schematic diagram for Example 1: A power source is connected to a pressure switch with two sides: High-pressure side and Low-pressure side. The High-pressure side has a normally closed (NC) contact. The Low-pressure side has a normally open (NO) contact. A relay (RY) is connected to the NO contact of the Low-pressure side. The relay's normally open (NO) contact is connected to the solenoid. The NC contact of the High-pressure side is connected to the relay's normally closed (NC) contact, which is also connected to the solenoid. This configuration ensures the solenoid is energized at low pressure and de-energized at high pressure.</p>	<p>Wiring diagram for Example 1: Shows the physical wiring of the pressure switch, relay, and solenoid. The power source is connected to the pressure switch. The relay is wired to the low-pressure side, and the solenoid is connected to the relay's output.</p>	<p>Schematic diagram for Example 2: A power source is connected to a pressure switch with two sides: High-pressure side and Low-pressure side. The High-pressure side has a normally open (NO) contact. The Low-pressure side has a normally closed (NC) contact. A relay (RY) is connected to the NO contact of the High-pressure side. The relay's normally open (NO) contact is connected to the solenoid. The NC contact of the Low-pressure side is connected to the relay's normally closed (NC) contact, which is also connected to the solenoid. This configuration ensures the solenoid is de-energized at low pressure and energized at high pressure.</p>	<p>Wiring diagram for Example 2: Shows the physical wiring of the pressure switch, relay, and solenoid. The power source is connected to the pressure switch. The relay is wired to the high-pressure side, and the solenoid is connected to the relay's output.</p>	<p>Schematic diagram for Example 3: A power source is connected to a pressure switch with two sides: High-pressure side and Low-pressure side. The High-pressure side has a normally open (NO) contact. The Low-pressure side has a normally closed (NC) contact. A relay (RY) is connected to the NO contact of the Low-pressure side. The relay's normally open (NO) contact is connected to the motor (M). The NC contact of the High-pressure side is connected to the relay's normally closed (NC) contact, which is also connected to the motor. A fuse is connected to the power source. This configuration ensures the motor is started at low pressure and stopped at high pressure.</p>	<p>Wiring diagram for Example 3: Shows the physical wiring of the pressure switch, relay, motor, and fuse. The power source is connected to the pressure switch and the fuse. The relay is wired to the low-pressure side, and the motor is connected to the relay's output.</p>