



# HYDRAULIC EQUIPMENT

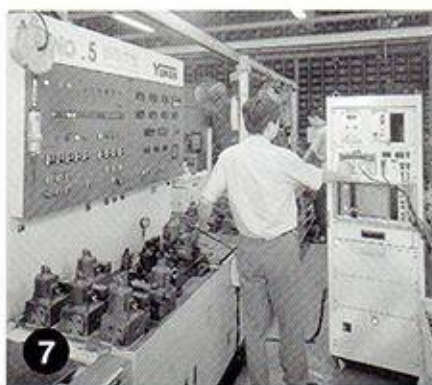
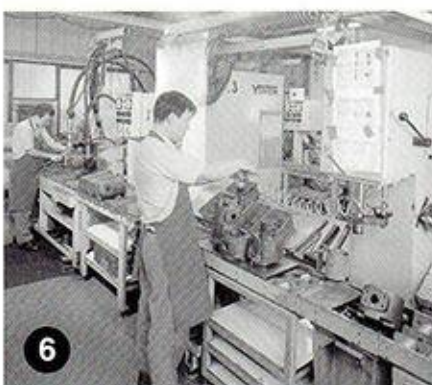
## B

## PRESSURE CONTROL VALVES









1. Front View of the Main Factory

2. Front View of 2nd Factory

3. Power Unit Assembly Line

4. Horizontal Machining Centers

5. Processing Production Line (2nd Factory)

6. Vane Pumps Test Bench

7. Proportional Electro-Hydraulic Controls Test Bench

8. Solenoid Valves Assembly Line



## Brief Introduction

The main factory of Yuken Hydraulics (T.W.) Co., Ltd., is located at No. 12 7th Rd., Taichung Industrial Park, Taichung, Taiwan. the area is 9,543 m<sup>2</sup>. 2nd factory is located at No. 6, 7th Rd, the area is 5,623 m<sup>2</sup>.

"To improve Technology, to improve Quality, to strengthen Service, and to satisfy Customers" are our consistent quality promises. In order to keep our promises, we have a strong focus on the promotion of automation and computerization covering sales, design, operations, production management and even quality control, to ensure quality of our products and services. All our employees pursue the organization's Goal - "To work hard, to ameliorate, and to grow perpetually."

As the domestic market was getting saturated gradually, we started exploring overseas market since July, 1996. The achievement has been remarkable. Our market is not only in Asia but also North America, Europe, Middle East and Africa.

- March, 1997, Yuken Hydraulics (T.W.) Co., Ltd., was awarded ISO-9002 certificate and built up international-level quality system.
- January, 1998, We open our second factory located at No.6 7th Rd., Taichung Industrial Park, Taichung, Taiwan, area is 5,623 m<sup>2</sup>.
- February, 2002, Yuken Hydraulics (T.W.) Co., Ltd., was awarded CSA-C/US certificate, to strengthen our competition in North American market.
- May, 2002, Yuken Hydraulics (T.W.) Co., Ltd., was awarded ISO-9001 certificate and scaled new heights of quality system.
- October, 2002, Organization simplified, management institutionalized.
- June, 2003, Production line readjusted, equipment reinforced, production rationalized, striding into a new milestone.
- April, 2005, Proportional Valve was awarded CE certificate.
- November, 2005, Solenoid Valve was awarded CE certificate.
- November, 2008, Solenoid Valves with monitoring switches were patented in Taiwan.
- March, 2009, Solenoid Valves with monitoring switches were patented in China.
- June, 2010, Solenoid Valves with monitoring switches were awarded CE certificate.
- December, 2011, 2nd factory's expansion is finished.

Yuken Hydraulics (T.W.) Co., Ltd. has been leading the Industry here in Taiwan. We will increase technical cooperation with our parent company, Yuken Kogyo Co., Ltd. in the future. We will build an efficient and comprehensive sales network both in domestic and overseas market. Concurrently, we will train our talented people extensively to upgrade quality continuously. All our efforts are to achieve our goal - to grow perpetually!

- Name : **Yuken Hydraulics (T.W.) Co., Ltd.**
- Main Factory : No. 12, 7th Road, Taichung Industrial Park, Taichung, Taiwan.  
Tel: 886-4-2359-3077 (Rep.)  
Fax: 886-4-2359-2500  
Website: <http://www.yuken.com.tw>
- Taichung Office: No. 12, 7th Road, Taichung Industrial Park, Taichung, Taiwan.  
(Sales Dept) Tel: 886-4-2359-3077 (Rep.)  
Fax: 886-4-2359-8813
- Taipei Office : No. 18-1, Wun Hua 5th Road, Guei Shan Township, Taoyuan County, Taiwan.  
(Sales Dept) Tel: 886-3-328-3628 (Rep.)  
Fax: 886-3-328-3242
- Established : 1, May, 1969
- Paid in Capital : NTS 90,000,000 (as of January, 2004)
- Line of Business : • Manufacture & sales of Hydraulic Pumps, Pressure Control Valves, Flow Control Valves, Directional Control Valves, Modular Valves, Proportional Electro-Hydraulic Control Valves, Electro-Hydraulic Servo Valves, Power Unit, Hydraulic Cylinders, Hydraulic Motors & Associated Products.  
• Design, manufacture & installation of Hydraulic systems.
- Licensor : **YUKEN KOGYO CO., LTD.**



# Group of Components



Hydraulic Pumps

Pressure Control Valves

Flow Control Valves

Directional Control Valves

Check Valves

Proportional Electro-Hydraulic Control

## A Hydraulic Pump

1 MPa = 10.2 kgf/cm<sup>2</sup>

| Pump Type                                                              | Max. Pressure<br>MPa | Nominal Displacement cm <sup>3</sup> /rev |   |   |       |                  |                  |                    |                       |           |    | Page |
|------------------------------------------------------------------------|----------------------|-------------------------------------------|---|---|-------|------------------|------------------|--------------------|-----------------------|-----------|----|------|
|                                                                        |                      | 1                                         | 2 | 5 | 10    | 20               | 50               | 100                | 200                   | 500       |    |      |
| ARL1 Series Variable<br>Piston Pumps                                   | 7                    |                                           |   |   | ARL1  |                  |                  |                    |                       |           | 9  |      |
| AML1 Series<br>Motor-Pumps                                             | 7                    |                                           |   |   | AML1  |                  |                  |                    |                       |           | 12 |      |
| ML1 Series<br>Electric Motors                                          | -                    | ML1 (0.75 / 1.5 / 2.2 kw)                 |   |   |       |                  |                  |                    |                       |           |    | 15   |
| AR Series Variable<br>Piston Pumps                                     | 16                   |                                           |   |   | AR16  | AR22             |                  |                    |                       |           | 16 |      |
| 50T 150T<br>Single Pumps                                               | 7                    |                                           |   |   | 50T   |                  |                  | 150T               |                       |           | 20 |      |
| PV2R S-PV2R<br>Series Single Pumps                                     | 21 (17.5/16/14)      |                                           |   |   | PV2R1 | PV2R2<br>S-PV2R2 | PV2R3<br>S-PV2R3 | PV2R4<br>S-PV2R4   |                       |           | 24 |      |
| PV2R S-PV2R<br>Series Double Pumps                                     | 21 (17.5/16/14)      |                                           |   |   | PV2R1 | PV2R2<br>S-PV2R2 | PV2R3<br>S-PV2R3 | Small Volume Pumps |                       |           | 38 |      |
|                                                                        |                      |                                           |   |   |       | PV2R2<br>S-PV2R2 | PV2R3<br>S-PV2R3 | PV2R4<br>S-PV2R4   | Large Volume<br>Pumps |           |    |      |
| A <sub>16</sub> SR3, A <sub>22</sub> SR4 Series<br>Piston & Vane Pumps | 21 (17.5/16/14)      |                                           |   |   | A16   | A22              | Piston Pump      |                    |                       |           | 48 |      |
|                                                                        |                      |                                           |   |   |       |                  |                  | PV2R3<br>S-PV2R3   | PV2R4<br>S-PV2R4      | Vane Pump |    |      |
| SVPF Series<br>Variable Vane Pump                                      | 7                    | SVPF-12                                   |   |   |       | 20               | 30               | 40                 |                       |           | 51 |      |
| SVPDF Series Double<br>Variable Vane Pump                              | 7                    | SVPDF-30 30 30 30                         |   |   |       |                  |                  |                    |                       |           |    | 52   |
| SVPDF-30 30 40 40 SVPDF-40 40 40 40                                    |                      |                                           |   |   |       |                  |                  |                    |                       |           |    |      |

## B Pressure Control Valves

| Valve Type                                       | Max. Pressure MPa | Max. Flow L/min |   |          |    |                  |    |     |     |     |      | Page |
|--------------------------------------------------|-------------------|-----------------|---|----------|----|------------------|----|-----|-----|-----|------|------|
|                                                  |                   | 1               | 2 | 5        | 10 | 20               | 50 | 100 | 200 | 500 | 1000 |      |
| Remote Control Relief Valves                     | 25                | DT-01           |   |          |    |                  |    |     |     |     |      | 53   |
| Direct Type Relief Valves                        | 21                |                 |   | DT-DG-02 |    |                  |    |     |     |     |      | 53   |
| Pilot Operated Relief Valves                     | 25                |                 |   |          |    | BT-BG-03         |    | 06  | 10  |     |      | 53   |
| Low Noise Type Pilot Operated Relief Valves      | 25                |                 |   |          |    | S-BG-03          |    | 06  |     |     |      | 53   |
| Solenoid Controlled Relief Valves                | 25                |                 |   |          |    | BST-03           |    | 06  | 10  |     |      | 57   |
| Low Noise Type Solenoid Controlled Relief Valves | 25                |                 |   |          |    | S-BSG-03         |    | 06  |     |     |      | 57   |
| H & HC Type Pressure Control Valves              | 21                |                 |   |          |    | HT/HCT-HG/HCG-03 |    | 06  | 10  |     |      | 61   |
| Pressure Reducing (and Check) Valves             | 21                |                 |   |          |    | RT/RCT-RG/RCG-03 |    | 06  | 10  |     |      | 67   |
| Unloading Relief Valves                          | 21                |                 |   |          |    | BUCG-06          |    |     |     |     |      | 72   |
| Balancing Valves                                 | 14                |                 |   |          |    | RBG-03           |    |     |     |     |      | 73   |

## C Flow Control Valves

| Valve Type                      | Max. Pressure MPa | Max. Flow L/min |   |   |      |            |    |      |            |         |                      | Page |
|---------------------------------|-------------------|-----------------|---|---|------|------------|----|------|------------|---------|----------------------|------|
|                                 |                   | 1               | 2 | 5 | 10   | 20         | 50 | 100  | 200        | 500     | 1000                 |      |
| Flow Control (and Check) Valves | 21                |                 |   |   | FG   | FCG-02     |    | 03   | 06 *       | 10 *    | * Yuken Kogyo Models | 74   |
| (One Way) Restrictors           | 21                |                 |   |   | SRCT | SRG/SCG-03 |    | SRCT | SRG/SCG-06 | SRCT-10 |                      | 77   |
| Throttle (and Check) Modules    | 25                |                 |   |   | TC1G | TC2G-01    |    |      |            |         |                      | 80   |
| Needle Valves                   | 35                |                 |   |   | GCT  | GTCR-02    |    |      |            |         |                      | 81   |



## D Directional Control Valves 1 MPa = 10.2 kgf/cm<sup>2</sup>

| Valve Type                                                           | Max. Pressure<br>MPa | Max. Flow L/min                              |   |   |    |    |    |     |     |     |      |      |      |  |  |  | Page |
|----------------------------------------------------------------------|----------------------|----------------------------------------------|---|---|----|----|----|-----|-----|-----|------|------|------|--|--|--|------|
|                                                                      |                      | 1                                            | 2 | 5 | 10 | 20 | 50 | 100 | 200 | 500 | 1000 | 2000 | 8000 |  |  |  |      |
| Solenoid Operated Directional Valves                                 | 7                    | DSGL-01                                      |   |   |    |    |    |     |     |     |      |      |      |  |  |  | 84   |
| Solenoid Operated Directional Valves                                 | 31.5                 | DSG-01 03                                    |   |   |    |    |    |     |     |     |      |      |      |  |  |  | 86   |
| Solenoid Valves with Monitoring Switch-DSGS                          | 31.5                 | DSGS-01 03                                   |   |   |    |    |    |     |     |     |      |      |      |  |  |  | 92   |
| Solenoid Controlled Pilot Operated Directional Valves                | 31.5                 | DSHG-04 06 10                                |   |   |    |    |    |     |     |     |      |      |      |  |  |  | 94   |
| Solenoid Valves with Monitoring Switch-DSHGN                         | 25                   | DSHGN-03 04 06                               |   |   |    |    |    |     |     |     |      |      |      |  |  |  | 99   |
| Pilot Operated Directional Valves                                    | 31.5                 | DHG-04 06 10                                 |   |   |    |    |    |     |     |     |      |      |      |  |  |  | 104  |
| Manually Operated Directional Valves                                 | 25 ( 21 )            | DMT-03<br>DMG-03                             |   |   |    |    |    |     |     |     |      |      |      |  |  |  | 107  |
| Mechanically Operated Directional Valves                             | 21 ( 25 )            | DCT-01<br>DCG-01 03                          |   |   |    |    |    |     |     |     |      |      |      |  |  |  | 109  |
| Mechanically Operated Directional Valves with Monitoring Switch-DCGS | 21 ( 25 )            | DCTS-01<br>DCGS-01 03                        |   |   |    |    |    |     |     |     |      |      |      |  |  |  | 112  |
| Logic Valves with Monitoring Switch-LDLS                             | 30                   | LDLS-16 25 32 40 50                          |   |   |    |    |    |     |     |     |      |      |      |  |  |  | 115  |
| Check Valves                                                         | 21                   | CIT-03 06 10                                 |   |   |    |    |    |     |     |     |      |      |      |  |  |  | 119  |
|                                                                      |                      | CRT-03<br>CRG-03 06 10                       |   |   |    |    |    |     |     |     |      |      |      |  |  |  |      |
| Pilot Controlled Check Valves                                        | 25                   | CPT/CPG<br>CPDT/CPDG-03 06 10                |   |   |    |    |    |     |     |     |      |      |      |  |  |  | 121  |
| Poppet Type Directional Valves                                       | 21                   | LVT-03<br>LVG-03                             |   |   |    |    |    |     |     |     |      |      |      |  |  |  | 123  |
| Prefill Valves                                                       | 25                   | PF-80<br>PDF-80 90 100 125 150 PF-20(PF-300) |   |   |    |    |    |     |     |     |      |      |      |  |  |  | 124  |

## E Proportional Electro-Hydraulic Controls

| Valve Type                                                            | Max. Pressure<br>MPa | Max. Flow L/min              |   |        |           |             |          |              |     |           |                      |     |     | Page |
|-----------------------------------------------------------------------|----------------------|------------------------------|---|--------|-----------|-------------|----------|--------------|-----|-----------|----------------------|-----|-----|------|
|                                                                       |                      | 1                            | 2 | 5      | 10        | 20          | 50       | 100          | 200 | 500       | 1000                 |     |     |      |
| Proportional Electro-Hydraulic Pilot Relief Valves                    | 25                   | EDG-01                       |   |        |           |             |          |              |     |           |                      |     | 131 |      |
| Proportional Relief Valves                                            | 25                   |                              |   | EBG-03 |           |             |          |              | 06  | 10 *      | * Yuken Kogyo Models |     | 133 |      |
| Power Saving Valves                                                   | 25                   | EFBG-03                      |   |        |           |             |          |              |     | 06        | 10                   |     | 135 |      |
| Power Saving Valves<br>10Ω~10Ω                                        | 25                   | EFBG-03                      |   |        |           |             |          |              |     |           |                      |     | 141 |      |
| Power Saving Valves<br>High Performance                               | 25                   | ELFBG<br>ELFBCG-03           |   |        |           |             |          |              |     | 06        |                      |     | 143 |      |
| Proportional Electro-Hydraulic<br>Directional and Flow Control Valves | 25                   | EDFG-01                      |   |        |           |             | EDFHG-03 |              | 04  | 06        |                      |     | 149 |      |
| Power Amplifiers                                                      | -                    | AME-D2-H1 (Kogyo )<br>Models |   |        | AMN-D-20T | AMN-D-L-20T |          | SK1115-※-30T |     | AMN-W-10T |                      | 156 |     |      |

## F Other Valves

| Valve Type                | Max. Pressure<br>MPa | Max. Flow L/min     |   |   |    |    |    |     |     |     |  |  |  |  |  |  | Page |
|---------------------------|----------------------|---------------------|---|---|----|----|----|-----|-----|-----|--|--|--|--|--|--|------|
|                           |                      | 1                   | 2 | 5 | 10 | 20 | 50 | 100 | 200 | 500 |  |  |  |  |  |  |      |
| Lift Valves               | 21                   | LVST-03             |   |   |    |    |    |     |     |     |  |  |  |  |  |  | 165  |
| Air Bleed Valves          | 21                   | AVT-03-05 AVT-03-20 |   |   |    |    |    |     |     |     |  |  |  |  |  |  | 166  |
| Automatic Shut Off Valves | 21                   | DAS-03-20           |   |   |    |    |    |     |     |     |  |  |  |  |  |  | 166  |

## G Modular Base Plates

| Series Number | Max. Pressure<br>MPa | Max. Flow L/min  |    |    |    | Page |
|---------------|----------------------|------------------|----|----|----|------|
|               |                      | 0                | 20 | 40 | 60 |      |
| Base Plates   | 31.5                 | MMC-01<br>MMC-03 |    |    |    | 167  |

\* As for the products other than those listed in this catalogue, please consult with our engineers for your requirement.



# General Information

## Design Standard

The distinctive features of Yuken Standard products is as shown below.

| Feature                           | Domestic Standard         | Remarks                                           |
|-----------------------------------|---------------------------|---------------------------------------------------|
| Port Tapping                      | Rc(=PT)                   | Taper Pipe Thread (ISO 7/1)                       |
| Port Tapping (Partial)            | G(=PF)                    | Straight Pipe Thread (ISO 228/1)                  |
| Pressure Gauge Tapping            | Rc(=PT)                   | Taper Pipe Thread (ISO 7/1)                       |
| Mounting Bolts                    | Metric                    | General Purpose Thread (ISO 261)                  |
| Mounting Dimensions               | Metric                    |                                                   |
| Conduit Entry                     | G(=PF)                    | Straight Pipe Thread (ISO 228/1)                  |
| Solenoid Voltages AC/DC           | Domestic voltage          | Voltage and frequency change according to country |
| Frequency                         | 50/60 Hz                  |                                                   |
| Electronic Amplifier Input Supply | Domestic voltage 50/60 Hz |                                                   |
| Graphic Symbol                    | ISO Standard              | ISO 1219                                          |
| Valve Port Size                   | Inch                      |                                                   |

## Design Number

Yuken products have factory applied Design numbers, the key to which is as follows.

Example: 4222T68

42 22 T68

Major Design No. \_\_\_\_\_ Design No. for modified products in Taiwan  
Minor Design No. \_\_\_\_\_ Omitted: Domestic standard

Design numbers are subject to change. But installation dimensions and specifications remain unchanged for variation in second digit of design numbers (Minor Design No.).

## Hydraulic Fluids

### Type of hydraulic fluids

- Petroleum base oil-Please use anti-wear type hydraulic oil or R & O (Rust and Oxidation inhibitor) type hydraulic oil equivalent to ISO VG 32 or 46. Do not use VG 68 hydraulic oils in winter; it will cause suction failure or cavitation.
- Fire resistant or other special fluids-Please consult with our sales engineers for your requirement.

### Fluid viscosity and temperature range

Please use hydraulic fluids in a range which satisfies the conditions of both viscosity and temperature (specified in table.)

| Type of Components                            | Viscosity Range                                                              | Temperature Range |
|-----------------------------------------------|------------------------------------------------------------------------------|-------------------|
| Hydraulic Pumps                               | 20 ~ 400 mm <sup>2</sup> /s ★ 1                                              | 0 ~ 70°           |
| Pressure Control Valves                       | 15 ~ 400 mm <sup>2</sup> /s ★ 2                                              | -15 ~ +70°        |
| Flow Control Valves                           | FG, FCG : 20 ~ 200 mm <sup>2</sup> /s<br>Other : 15 ~ 400 mm <sup>2</sup> /s |                   |
| Directional Control Valves                    | 15 ~ 400 mm <sup>2</sup> /s                                                  |                   |
| Proportional Electro-Hydraulic Control Valves | EBG : 15 ~ 400 mm <sup>2</sup> /s<br>EFBG : 20 ~ 200 mm <sup>2</sup> /s      |                   |

- ★ 1. When starting the pumps at low speed, maximum viscosity is restricted. (see table above right).  
★ 2. If the valve is provided with a vent restrictor (ex.: A-BSG-03), the viscosity range should be 15-200 mm<sup>2</sup>/s.

### Control of contamination

Contamination of the hydraulic fluids may cause any damage to the products or shorten the life of the products, therefore, please maintain the degree of contamination level lower than NAS Class Numbers as shown on the table 1 below

① The suction port line must have a reservoir type filter of 100 μm (150 mesh) and the filter should be installed minimum 50 mm higher than the bottom of the reservoir.

② The return line must have a line filter.

### Line type filter ratings

| Type of Components  | Line Type Filter                                                                            |
|---------------------|---------------------------------------------------------------------------------------------|
| Pump's Suction Port | 100μm                                                                                       |
| Circuit System      | Piston Pumps: below 10μm<br>E series components: below 20μm<br>Other components: below 25μm |

### Limit of contamination

| Type of Components  | NAS Class No. |
|---------------------|---------------|
| Piston Pumps        | 10 or less    |
| E series components | 11 or less    |
| Other components    | 12 or less    |



# General Information

## ■ Limitation of general properties of fluids

### ● Limit of fluid purity

| Characteristics <sup>1</sup> | Value changed |
|------------------------------|---------------|
| Specific gravity (15/4°C)    | 0.05          |
| Colour                       | 2             |
| Flash point (°C) COC         | 60            |
| Total acid number (mg KOH/g) | 0.2           |
| Viscosity (cSt)              | 10 ~ 15       |

## ■ High-pressure specialized hydraulic fluid

| Manufacture | Brand               |
|-------------|---------------------|
| Mobil       | Mobil DTE 25        |
| Shell       | Shell Tellus Oil 46 |
| China Oil   | Aw46, LPS 46        |

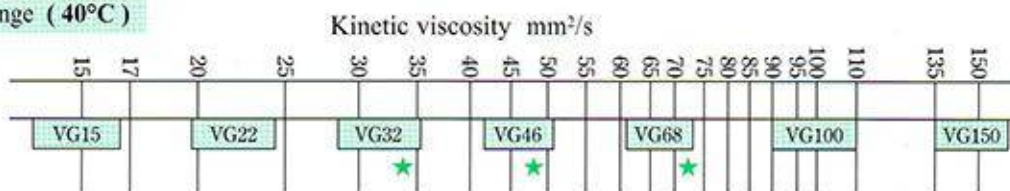
### ● Limit of water content

| Applicable conditions                                                                                                                                         | Limit                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Fluid becomes milky with water contained.                                                                                                                     | To be replaced immediately. |
| Systems in which operating fluid circulates and returns to reservoir and which are not to be stopped for a long period of time.                               | 1000ppm                     |
| System with long piping lines in which operating fluid in circuits does not completely circulate.                                                             | 500ppm                      |
| Systems to be stopped for a long period of time (Safety systems) or systems in which operating fluid in circuits moves little, and precision control systems. | 300ppm                      |

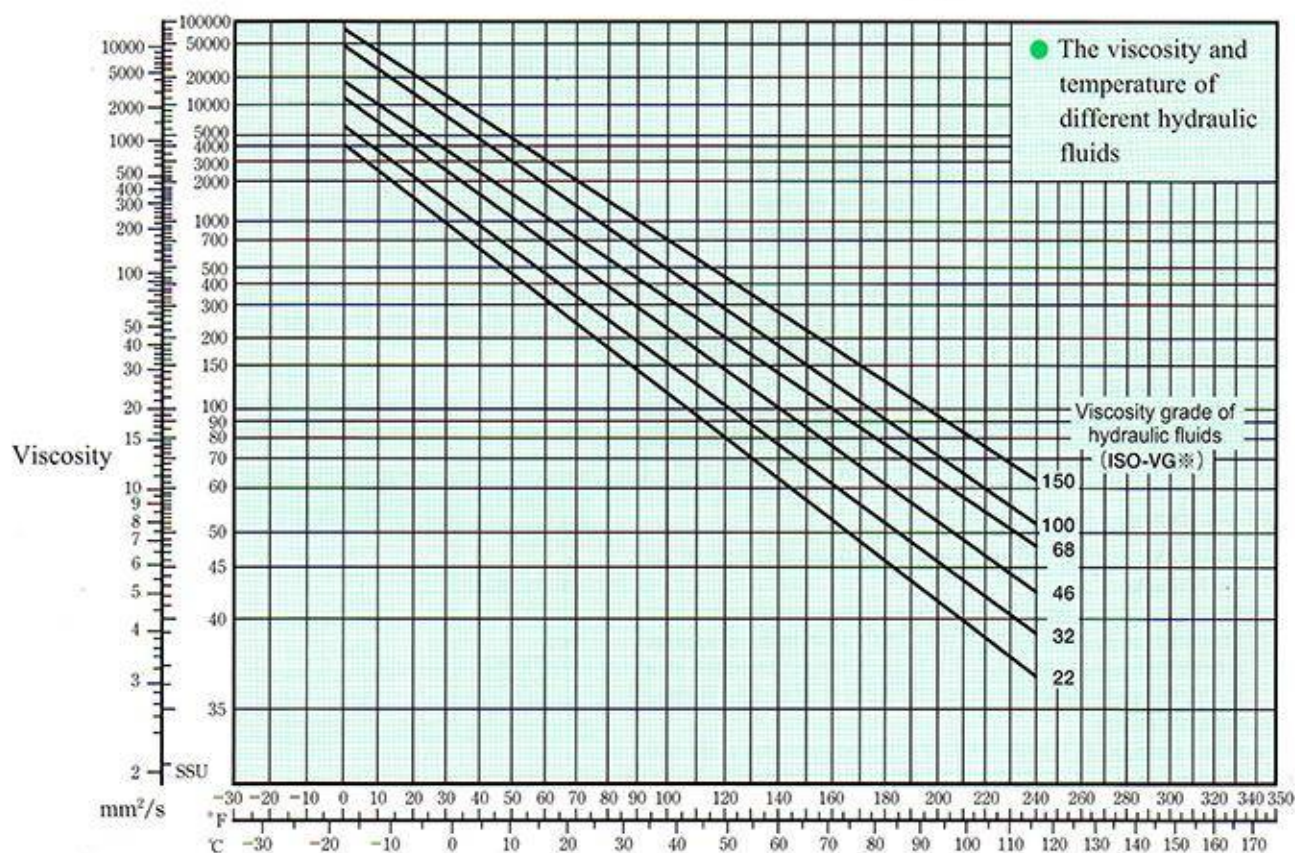
## ■ Viscosity of hydraulic fluids

Viscosity range (40°C)

● ISO  
Viscosity  
grade  
(ISO VG)



★ JIS K 2213 The Second Type ( Added Turbine oil )  
for ISO VG32, 46, 68.





# General Information

## Instructions for hydraulic pump

### 1. Mounting

When installing piston pumps the filling port should be positioned upwards. When (S)-PV2R Single and Double Vane Pumps are operated below 1200 r/min; we recommend the suction port upwards to suck oil easily.

### 2. Alignment of Shaft

Employ a flexible coupling whenever possible, and avoid any stress from bending or thrust. Maximum permissible misalignment is less than 0.1 mm. TIR (Total Indicator Reading) and maximum permissible misangular is less than 0.2°.

### 3. Suction Pressure

★ 1 kPa = 0.01 kgf/cm<sup>2</sup> = 7.5 mmHg

| Model                  |                                                        | Suction Pressure Range |                                   |          |
|------------------------|--------------------------------------------------------|------------------------|-----------------------------------|----------|
|                        |                                                        | Min                    |                                   | Max.     |
|                        |                                                        | Petroleum base oils    | Water containing phosphate esters |          |
| Piston Pumps           | ARL1 AR※                                               | -16.7 kPa              | —                                 | +50 kPa  |
| Single Pumps           | 50T 150T                                               | -20 kPa                | -16 kPa                           | +140 kPa |
| PV2R Single Vane Pumps | (S)-PV2R1 (S)-PV2R2 (S)-PV2R3 (S)-PV2R4                | -20 kPa                | -16 kPa                           | +30 kPa  |
| PV2R Double Vane Pumps | (S)-PV2R12 (S)-PV2R13 (S)-PV2R23 (S)-PV2R24 (S)-PV2R34 | -20 kPa                |                                   |          |
|                        |                                                        | -20 kPa                |                                   |          |
|                        |                                                        | -20 kPa ★              |                                   |          |

- Make sure that the height of the pump suction port is within 1m from the oil level in the reservoir.
- Please follow the instructions of catalogue to choose suitable caliber of suction port pipes; otherwise, it might lead to dangerous cavitation. We suggest the suction port flow rate under 1 m/s.

★ For some displacement of pumps, the Min. suction pressure is restricted by the rotation speed. Please refer to Table 1.

● Table 1: The limitation of Min. suction pressure for specific displacement of hydraulic pumps.

The following hydraulic pumps with rotation speed 1700 r/min are restricted by the Min. suction pressure. (Min. suction pressure of other hydraulic pumps is -150 mmHg)

| Model No.          | Min. Suction Pressure kPa |                 |
|--------------------|---------------------------|-----------------|
|                    | 1700 r/min Below          | 1700-1800 r/min |
| (S)-PV2R3-116      | -20                       | 0               |
| (S)-PV2R4-237      | -20                       | -13.3           |
| (S)-PV2R※3-※-76    | -20                       | -6.7            |
| (S)-PV2R※3-※-94    | -20                       | -6.7            |
| (S)-PV2R※3-※-116   | -20                       | 0               |
| (S)-PV2R※4-※-237   | -20                       | -13.3           |
| (S)-PV2R34-76-※    | -20                       | -6.7            |
| (S)-PV2R34-94-※    | -20                       | -6.7            |
| (S)-PV2R34-116-※   | -20                       | 0               |
| (S)-PV2R34-116-237 | -20                       | 0               |

### 4. Instructions of Piping

- ① In case the pump is installed above the oil level, the suction piping and suction line filter should be located lower than the pump position to prevent air in the suction line.
- ② When using steel pipes for the suction or discharge ports, excessive load from the piping to the pump generates excessive noise. Whenever there is fear of excessive load, please use rubber hoses.

### 5. Drain Piping

Install drain piping according to the chart and ensure that pressure within the pump housing should be maintained at a normal pressure of less than 0.1 MPa (14.5 PSI) and surge pressure of less than 0.5 MPa (72.5 PSI). Length of piping should be less than 1 m, and the pipe end should be submerged in oil.

Recommended Drain Piping Size:

| Model     | Piping Fitting Size                | Internal Dia. of Pipe |
|-----------|------------------------------------|-----------------------|
| ARL1, AR※ | 3/8 (Internal Dia. more than Ø8.5) | more than Ø10         |

### 6. Hydraulic Pumps Starting

- Before first starting, fill pump case with clean operating oil via the filling port.
- In order to avoid air blockage when starting pumps after long time shut down, to set up air bleeding valve on the discharge sides in advance or to loose discharge piping connection area for bleeding the air in the pipes. To the best of pumps' starting with no loading.
- When temperature is under 15°C in winter or viscosity is 200~400 mm<sup>2</sup>/s (1000SSU~1800SSU), please refer to the following instructions to start pumps in order to make better internal lubrication, and it will help the suction of the pump and extend the pump's life.
- Starting instructions: to start running pumps for 5 seconds, and then stop it for 10 seconds. To repeat this process 10 times, and then keep it running.

● Table 2: Max. viscosity list of starting at low rotation speed

| Model                                  | Rotation speed of starting r/min | Max. viscosity mm <sup>2</sup> /s |
|----------------------------------------|----------------------------------|-----------------------------------|
| PV2R1 (S)-PV2R12 (S)-PV2R13 (S)-PV2R14 | 750                              | 100                               |
|                                        | 950                              | 200                               |
| 50T (S)-PV2R2 (S)-PV2R23 (S)-PV2R24    | 600                              | 100                               |
|                                        | 950                              | 200                               |



## Relief Valves

Max. Pressure 25 MPa



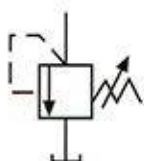
Remote Control Relief Valve



Direct Type Relief Valve

### Graphic Symbol

Remote Control / Direct Type

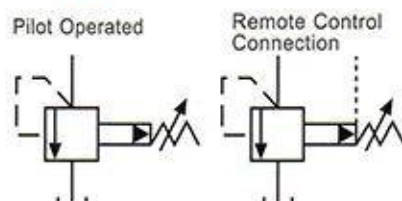


General Type Pilot Operated Relief Valve



Low Noise Type Pilot Operated Relief Valve

### Graphic Symbol



- Remote Control Relief Valves are used for hydraulic pressure control valve(Relief Valve, Pressure Reducing Valve) by remote control.
- Relief Valve is used to protect hydraulic system from excessive pressure and can also be used to maintain a constant pressure in the hydraulic system.

### Specifications

| Valve Type                  | Valve Size     | Model No.                      | Pressure Adjustment Range MPa (kgf/cm <sup>2</sup> ) | Max. Flow L/min | Mass kg    |
|-----------------------------|----------------|--------------------------------|------------------------------------------------------|-----------------|------------|
| Remote Control Relief Valve | 1/8            | DT-01-22<br>DG-01-22           | Max. 25 (250)                                        | 2               | 1.6<br>1.4 |
| Direct Type Relief Valve    | 1/4            | DT-02-※-22<br>DG-02-※-22       | Please refer to Model Number Designation             | 16              | 1.5        |
| Pilot Operated Relief Valve | General Type   | 3/8 BT-03-※-32<br>BG-03-※-32   | 0.5~25 (5~250)                                       | 100             | 5.0<br>4.7 |
|                             |                | 3/4 BT-06-※-32<br>BG-06-※-32   |                                                      | 200             | 5.0<br>5.6 |
|                             |                | 1-1/4 BT-10-※-32<br>BG-10-※-32 |                                                      | 400             | 8.5<br>8.7 |
|                             | Low Noise Type | 3/8 S-BG-03-※-L-R-40           | 0.4~25 (4~250)                                       | 100             | 4.1        |
|                             |                | 3/4 S-BG-06-※-L-R-40           |                                                      | 200             | 5.0        |

\*Low-pressure control type, please contact sales people for details.

### Model Number Designation

D T-02-B-22

Design No.  
Pressure Adjustment Range MPa (kgf/cm<sup>2</sup>)  
(Applicable only for DT-02 & DG-02)  
B : 0.5~7 (5~70)  
C : 3.5~14 (35~140)  
H : 7.0~21 (70~210)  
Valve Size  
Type of Connection  
T : Threaded Connection  
G : Sub-plate Mounting  
Series No.

S-B G-06-V-L-※

Low Noise Type  
(Omit if not required)  
Series Number  
Type of Connection  
T : Threaded Connection  
(only for general type)  
G : Sub-plate Mounting  
Valve Size  
Design No.  
Direction of Pressure adjustment handle  
(only for S-BG)  
(Viewed from pressure gauge connection side)  
L : Left (Standard) ◦ R : Right  
High Venting Pressure Feature\*(Optional)  
(Omit if not required)  
\*Use high venting pressure type to reduce the response time from unload to load.

- The Min. Flow: The setting pressure will be unstable when using small flow; therefore, the flow should be bigger than the min. flow as the below table.

| Model No. | BG/BT Series | S-BG Series |
|-----------|--------------|-------------|
| 03        | 8 L/min      | 5 L/min     |
| 06        |              |             |
| 10        | 15 L/min     | -           |

### Sub-plate

| Valve Model No. | Sub-plate Model No. | Piping Size Rc | Mass kg |
|-----------------|---------------------|----------------|---------|
| DG-01,DG-02     | DGM-02-20           | 1/4            | 0.7     |
| (S)-BG-03       | BGM-03-20           | 3/8            | 2.4     |
|                 | BGM-03X-20          | 1/2            | 3.1     |
| (S)-BG-06       | BGM-06-20           | 3/4            | 4.7     |
|                 | BGM-06X-20          | 1              | 5.7     |
| BG-10           | BGM-10-20           | 1-1/4          | 8.4     |
|                 | BGM-10X-20          | 1-1/2          | 10.3    |

- Sub-plates are available. When ordering.
- Please refer to page 54, 56 for the dimensions.

### Mounting Bolts (Attachment)

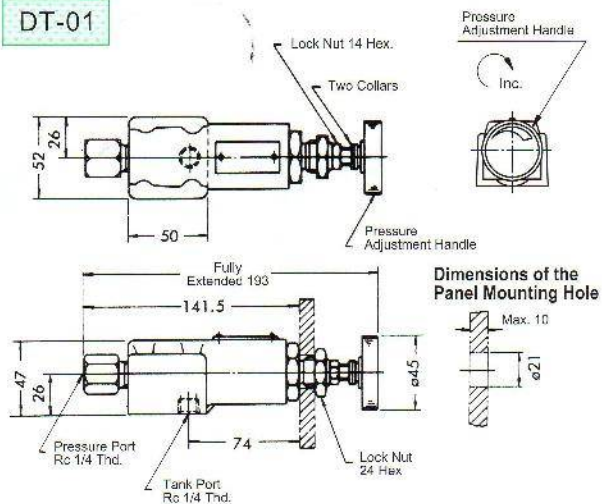
| Model No. | Socket Head Cap Screw | Qty | Tightening Torque N·m |
|-----------|-----------------------|-----|-----------------------|
| DG-01     | M5 x 45 Lg            | 4   | 8~9                   |
| DG-02     | M5 x 45 Lg            | 4   |                       |
| BG-03     | M12 x 70 Lg           | 2   | 104~127               |
|           | M12 x 95 Lg           | 2   |                       |
| BG-06     | M16 x 60 Lg           | 2   | 253~310               |
|           | M16 x 80 Lg           | 2   |                       |
| BG-10     | M20 x 70 Lg           | 2   | 493~603               |
|           | M20 x 90 Lg           | 2   |                       |
| S-BG-03   | M12 x 40 Lg           | 4   | 104~127               |
| S-BG-06   | M16 x 50 Lg           | 4   | 253~310               |



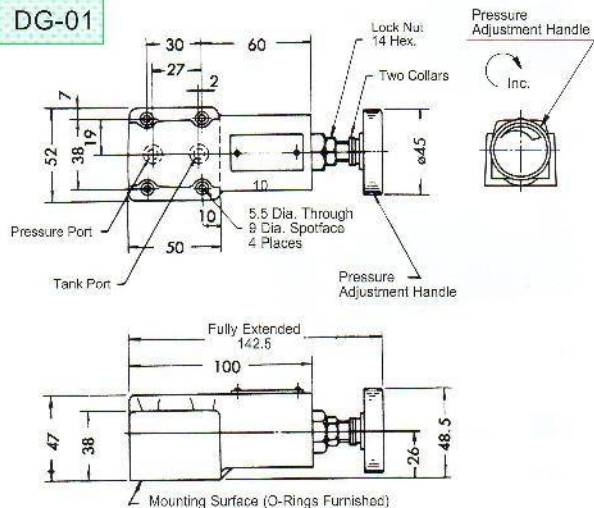
## Relief Valves

Max. Pressure 25 MPa

**DT-01**

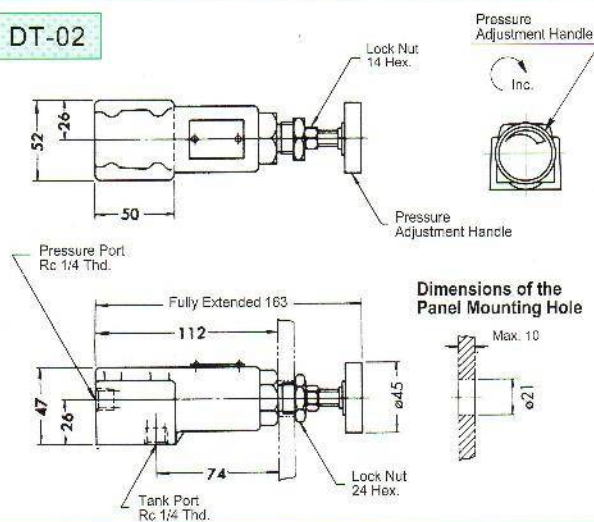


**DG-01**

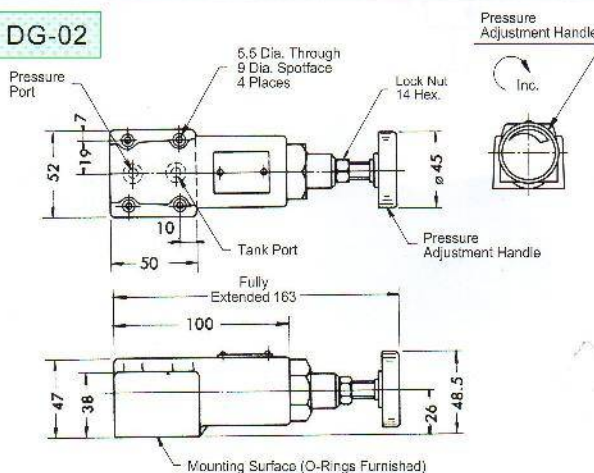


Note: For dimension of mounting surface, please refer to subplate DGM-02 below.

**DT-02**

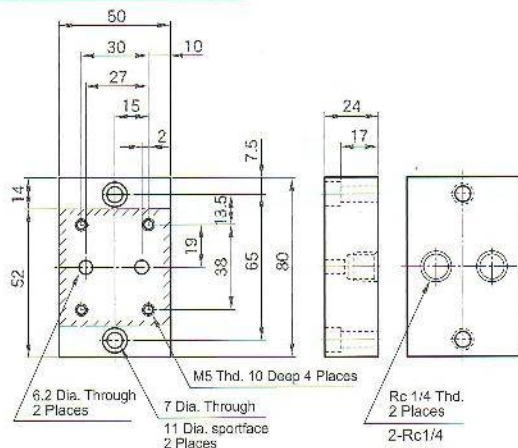


**DG-02**



Note: For dimension of mounting surface, please refer to subplate DGM-02 below.

**Subplate: DGM-02-20**



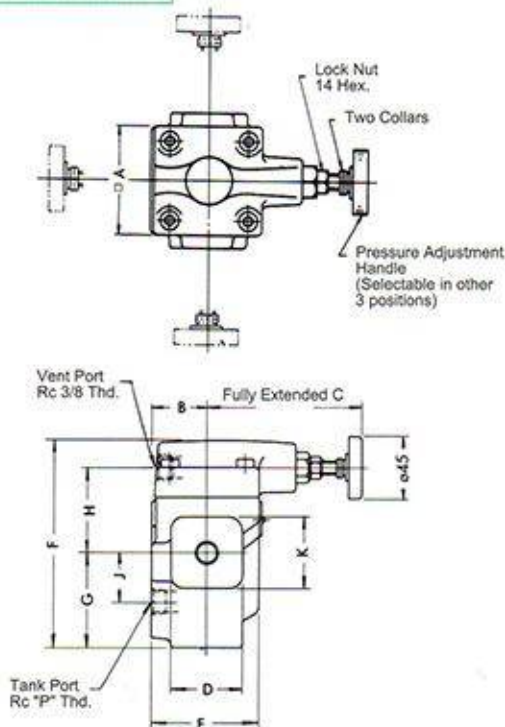


## Relief Valves

Max. Pressure 25 MPa

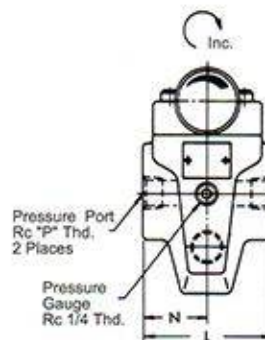
**B**

### BT-03,06,10

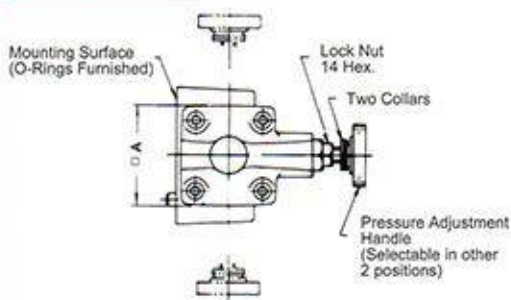


| Model No. | A  | B  | C   | D  | E  | F     |
|-----------|----|----|-----|----|----|-------|
| BT-03     | 75 | 40 | 105 | 52 | 78 | 150.5 |
| BT-06     | 85 | 50 | 101 | 80 | 96 | 183   |

| Model No. | G    | H  | J  | K  | L   | N  | P     |
|-----------|------|----|----|----|-----|----|-------|
| BT-03     | 68.5 | 62 | 36 | 52 | 90  | 45 | 3/8   |
| BT-06     | 89   | 74 | 49 | 80 | 120 | 60 | 3/4   |
| BT-10     |      |    |    |    |     |    | 1-1/4 |



### BG-03,06,10

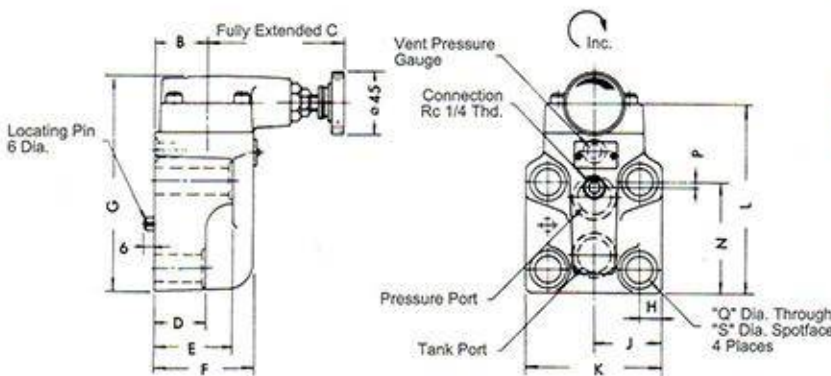


Mounting Surface  
BG-03:ISO 6264-AR-06-2-A-87  
BG-06:ISO 6264-AS-08-2-A-87  
BG-10:ISO 6264-AT-10-2-A-87

| Model No. | A  | B  | C   | D  | E  | F  | G   |
|-----------|----|----|-----|----|----|----|-----|
| BG-03     | 75 | 40 | 105 | 57 | 78 | 78 | 137 |
| BG-06     | 75 | 40 | 105 | 40 | 60 | 78 | 161 |
| BG-10     | 85 | 45 | 101 | 47 | 67 | 84 | 195 |

| Model No. | 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 No. | 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 |



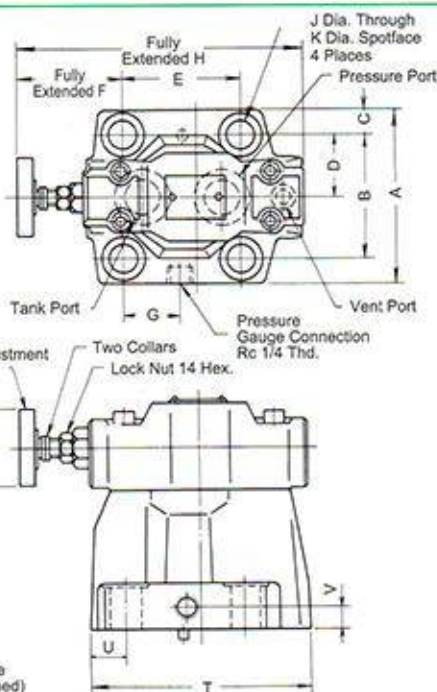
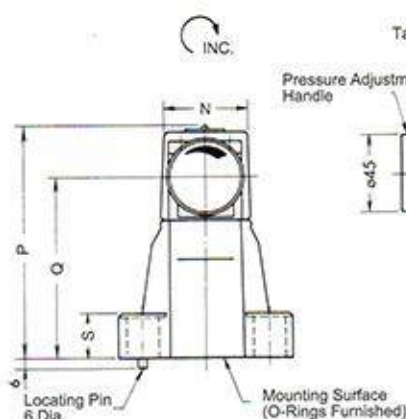
Note: For dimensions of mounting surface, please refer to BGM type sub-plate (on next page)



## Relief Valves

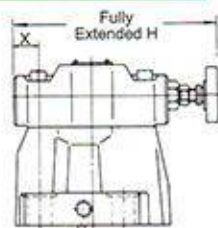
Max. Pressure 25 MPa

**S-BG-03-※-L-※-40**  
Normal Handle Position



Mounting Surface:  
S-BG-03:ISO 6264-AR-06-2-A-87  
S-BG-06:ISO 6264-AS-08-2-A-87

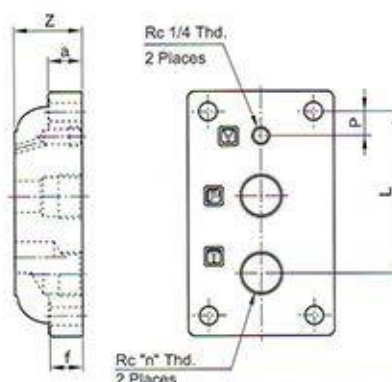
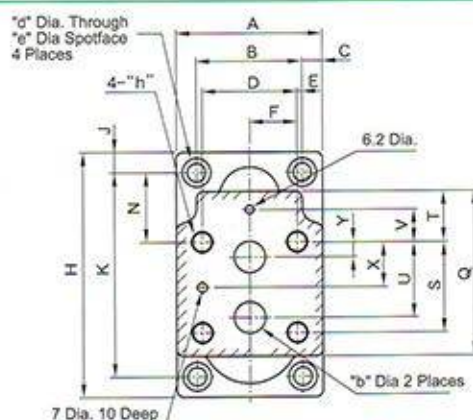
Opposite Handle Position  
S-BG-06-※-R



For other dimensions, please see the figures shown left.

| Model No. | A  | B    | C    | D    | E    | F    | G    | H     | J    | K  | N  | P   | Q   | S    | T   | U    | V  | X    |
|-----------|----|------|------|------|------|------|------|-------|------|----|----|-----|-----|------|-----|------|----|------|
| S-BG-03   | 76 | 53.8 | 11.1 | 26.9 | 53.8 | 73.6 | 26.9 | 163.5 | 13.5 | 21 | 50 | 130 | 103 | 21.5 | 106 | 26.1 | 13 | 36.1 |
| S-BG-06   | 98 | 70   | 14   | 35   | 66.7 | 58.8 | 33.7 | 163.5 | 17.5 | 26 | 50 | 130 | 103 | 26   | 122 | 19.3 | 13 | 21.3 |

Sub-plate  
BGM-03, 03X-20  
06, 06X  
10, 10X



| Model No. | A   | B    | C    | D    | E    | F    | H   | J    | K    | L     | N  | P                | Q   | S     |
|-----------|-----|------|------|------|------|------|-----|------|------|-------|----|------------------|-----|-------|
| 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 No. | T   | U    | V    | X    | Y    | Z    | a   | b    | d    | e     | f  | h                |     | n     |
| BGM-03    | 19  | 47.4 | 0    | 22   | 22   | 32   | 20  | 14.5 | 11   | 17.5  | 19 | M12 Thd. 20 Deep |     | 3/8   |
| BGM-03X   |     |      |      |      |      | 40   |     |      |      |       |    |                  |     | 1/2   |
| BGM-06    | 37  | 55.5 | 23.8 | 33.4 | 11   | 40   | 25  | 23   | 13.5 | 21    | 24 | M16 Thd. 25 Deep |     | 3/4   |
| BGM-06X   |     |      |      |      |      | 50   |     |      |      |       |    |                  |     | 1     |
| BGM-10    | 42  | 76.2 | 31.8 | 44.5 | 12.7 | 50   | 32  | 28   | 17.5 | 26    | 31 | M20 Thd. 28 Deep |     | 1-1/4 |
| BGM-10X   |     |      |      |      |      | 63   |     |      |      |       |    |                  |     | 1-1/2 |



## Solenoid Controlled Relief Valves Max. Pressure 25 MPa

B



General  
Type  
Solenoid  
Controlled  
Relief Valve



Low Noise Type  
Solenoid Controlled  
Relief Valve

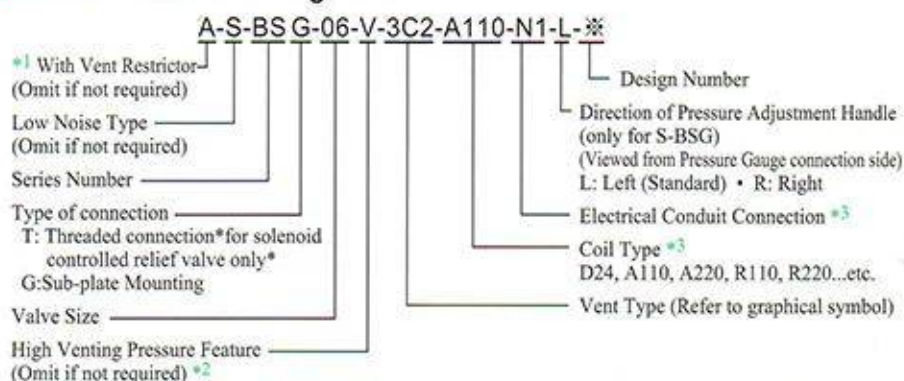
These valves are a combination of relief valve and solenoid valve. Piping between the two valves is eliminated as the solenoid valve is directly mounted on the relief valve and connected with the relief valve vent. Pump pressure may be unloaded remotely by an electrical signal to the solenoid, or by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

### Specifications

| Valve Type                                      | Valve Size | Model No.                                                 | Pressure Adjustment Range MPa (kgf/cm <sup>2</sup> ) | Max. Flow L/min | Mass kg*    |             |
|-------------------------------------------------|------------|-----------------------------------------------------------|------------------------------------------------------|-----------------|-------------|-------------|
|                                                 |            |                                                           |                                                      |                 | Single Sol. | Double Sol. |
| General Type Solenoid Controlled Relief Valve   | 3/8        | BST-03- $\star$ - $\star$ - $\star$ -46                   | 0.5~25<br>(5~250)                                    | 100             | 6.8         | 7.4         |
|                                                 |            | BSG-03- $\star$ - $\star$ - $\star$ -46                   |                                                      |                 | 6.5         | 7.1         |
|                                                 | 3/4        | BST-06- $\star$ - $\star$ - $\star$ -46                   |                                                      | 200             | 6.8         | 7.4         |
|                                                 |            | BSG-06- $\star$ - $\star$ - $\star$ -46                   |                                                      |                 | 7.4         | 8.0         |
|                                                 | 1-1/4      | BST-10- $\star$ - $\star$ - $\star$ -46                   |                                                      | 400             | 10.5        | 11.1        |
|                                                 |            | BSG-10- $\star$ - $\star$ - $\star$ -46                   |                                                      |                 | 10.7        | 11.3        |
| Low Noise Type Solenoid Controlled Relief Valve | 3/8        | S-BSG-03- $\star$ - $\star$ - $\star$ - $\frac{R}{L}$ -51 | 0.4~25                                               | 100             | 5.7         | 6.3         |
|                                                 | 3/4        | S-BSG-06- $\star$ - $\star$ - $\star$ - $\frac{R}{L}$ -51 | (4~250)                                              | 200             | 6.6         | 7.2         |

\*For models with vent restrictors, add 1 kg.

### Model Number Designation



\*1. Models with vent restrictor (ST-797-40) are applicable only for the vent type 2B3A and 2B3B. It prevents shocks to the main circuit by gradually lowering the venting pressure in the shift from the set pressure to unloading. The hydraulic fluid viscosity remains the range of 15~200cSt. The bolt kits should be 30 mm longer when mounting solenoid controlled relief valves.

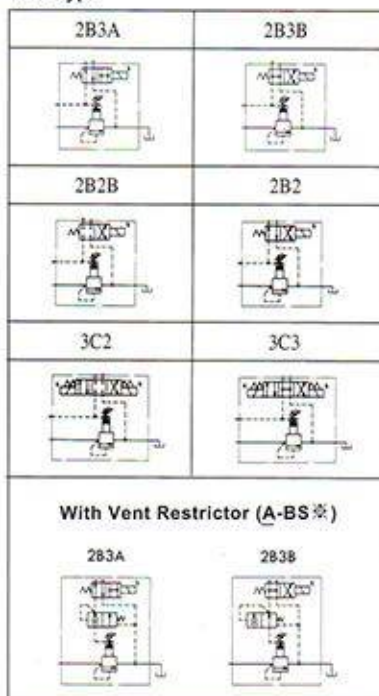
\*2. Use high-venting pressure type to reduce response time from unloading to onloading.

\*3. The coil type is the same as that of the solenoid operated directional valve DSG-01. (Page 86)

\*4. The minimum using flow is restricted. Please refer to page 53. BG/BSG series.

### Graphic Symbol

Vent type



### Sub-Plate

| Valve Model No. | Sub-plate Model No. | Piping Size Rc | Mass kg |
|-----------------|---------------------|----------------|---------|
| (S)-BSG-03      | BGM-03-20           | 3/8            | 2.4     |
|                 | BGM-03X-20          | 1/2            | 3.1     |
| (S)-BSG-06      | BGM-06-20           | 3/4            | 4.7     |
|                 | BGM-06X-20          | 1              | 5.7     |
| BSG-10          | BGM-10-20           | 1-1/4          | 8.4     |
|                 | BGM-10X-20          | 1-1/2          | 10.3    |

Please refer to page 56 for dimension details.

### Mounting Bolts (Attachment)

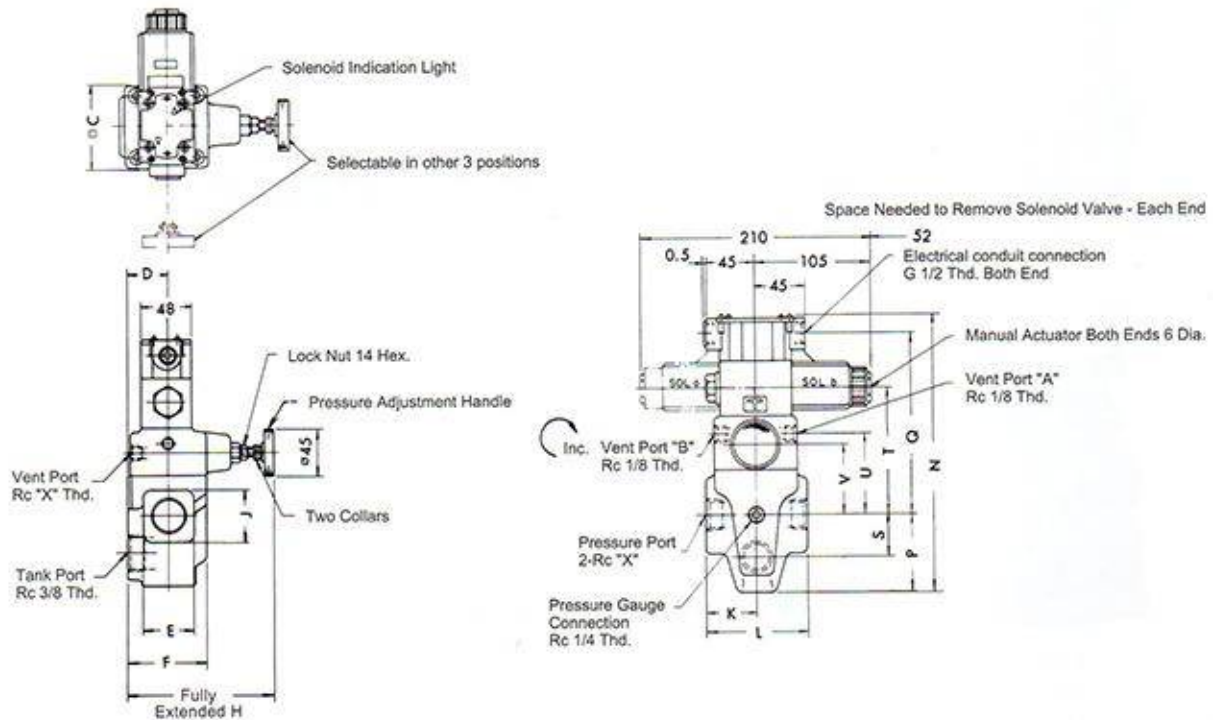
| Model No. | Socket Head Cap | Screw Q'ty | Tightening Torque N·m |
|-----------|-----------------|------------|-----------------------|
| BSG-03    | M12 x 70 Lg     | 2          | 104~127               |
|           | M12 x 95 Lg     | 2          |                       |
| BSG-06    | M16 x 60 Lg     | 2          | 253~310               |
|           | M16 x 80 Lg     | 2          |                       |
| BSG-10    | M20 x 70 Lg     | 2          | 493~603               |
|           | M20 x 90 Lg     | 2          |                       |
| S-BSG-03  | M12 x 40 Lg     | 4          | 104~127               |
| S-BSG-06  | M16 x 50 Lg     | 4          | 253~310               |



## Solenoid Controlled Relief Valves

Max. Pressure 25 MPa

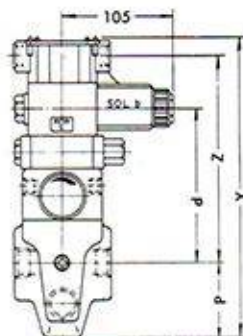
BST-03,06,10



| Model No. | C  | D  | E  | F  | H   | J  | K  | L   | N     | P    | Q   | S  | T   | U  | V  | X     |
|-----------|----|----|----|----|-----|----|----|-----|-------|------|-----|----|-----|----|----|-------|
| BST-03    | 75 | 40 | 52 | 78 | 145 | 52 | 45 | 90  | 240.8 | 68.5 | 154 | 36 | 107 | 69 | 62 | 3/8   |
| BST-06    |    |    |    |    |     |    |    |     |       |      |     |    |     |    |    | 3/4   |
| BST-10    | 85 | 50 | 80 | 96 | 151 | 80 | 60 | 120 | 273.3 | 89   | 166 | 49 | 119 | 81 | 74 | 1-1/4 |

Note: For detailed dimensions of Solenoid Operated Directional Valves (page 87,88).

### Options-Model with Vent Restrictor: A-BST-03, 06, 10



| Model No. | P    | Y     | Z   | d   |
|-----------|------|-------|-----|-----|
| A-BST-03  | 68.5 | 270.8 | 185 | 137 |
| A-BST-06  |      |       |     |     |
| A-BST-10  | 89   | 303.3 | 197 | 149 |

For other dimensions, please refer to the dimensions of each model as listed in the table in the upper drawing.

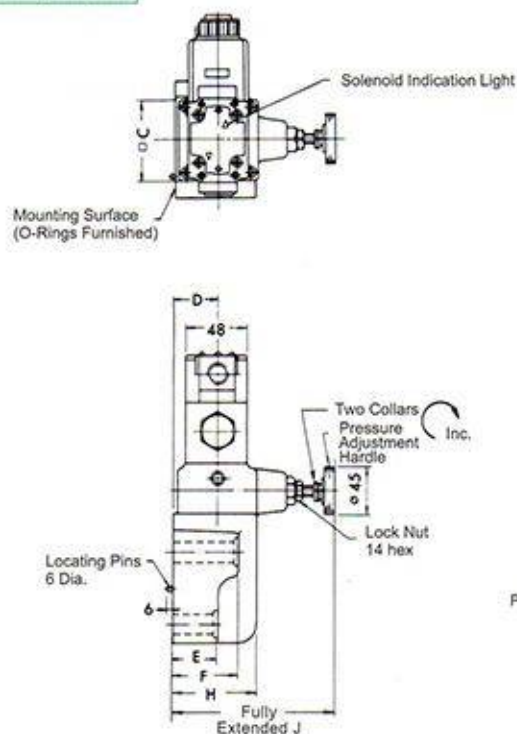


## Solenoid Controlled Relief Valves

Max. Pressure 25 MPa

**B**

BSG-03,06,10

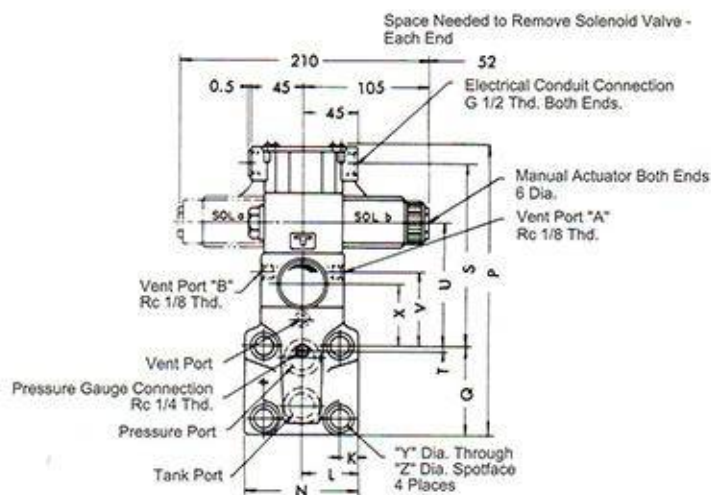


Mounting Surface

BSG-03:ISO 6264-AR-06-2-A-87

BSG-06:ISO 6264-AS-08-2-A-87

BSG-10:ISO 6264-AT-10-2-A-87

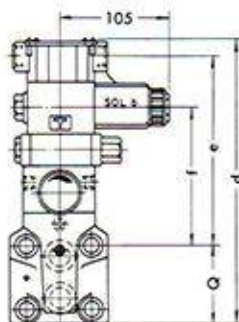


| Model No. | C  | D  | E  | F  | H  | J   | K    | L  | N   | P     | Q    | S     | T   | U     | V    | X    | Y    | Z  |
|-----------|----|----|----|----|----|-----|------|----|-----|-------|------|-------|-----|-------|------|------|------|----|
| BSG-03    | 75 | 40 | 57 | 78 | 78 | 145 | 14.1 | 41 | 82  | 227.3 | 77   | 132   | 22  | 85    | 47   | 40   | 13.5 | 21 |
| BSG-06    | 75 | 40 | 40 | 60 | 78 | 145 | 17   | 52 | 104 | 251.3 | 83.5 | 149.5 | 4.5 | 102.5 | 64.5 | 57.5 | 17.5 | 26 |
| BSG-10    | 85 | 45 | 47 | 67 | 84 | 146 | 20.7 | 62 | 124 | 285.3 | 110  | 157   | 6   | 110   | 72   | 65   | 21.5 | 32 |

Note: For dimensions of mounting surface, please refer to BGM type sub-plate (page 56).

For detailed dimensions of Solenoid Operated Directional Valve (page 87,88).

### Options-Model with Vent Restrictor: A-BSG-03, 06, 10



| Model No. | Q    | d     | e     | f     |
|-----------|------|-------|-------|-------|
| A-BSG-03  | 77   | 257.3 | 163   | 115   |
| A-BSG-06  | 83.5 | 281.3 | 180.5 | 132.5 |
| A-BSG-10  | 110  | 315.3 | 188   | 140   |

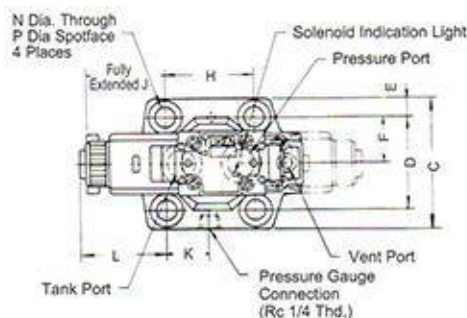
For other dimensions, please refer to the dimensions of each model as listed in the table in the upper drawing.



## Solenoid Controlled Relief Valves

Max. Pressure 25 MPa

S-BSG-03-<sup>03</sup>-<sup>06</sup>-<sup>03</sup>-<sup>06</sup>-<sup>03</sup>-<sup>06</sup>-L-51  
Normal Handle Position

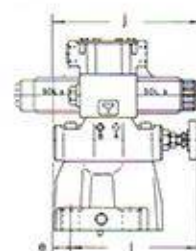


Mounting Surface:

S-BSG-03:ISO 6264-AR-06-2-A-87

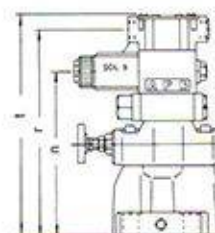
S-BSG-06:ISO 6264-AS-08-2-A-87

Opposite Handle Position  
S-BSG-03.06-<sup>03</sup>-<sup>06</sup>-<sup>03</sup>-<sup>06</sup>-R

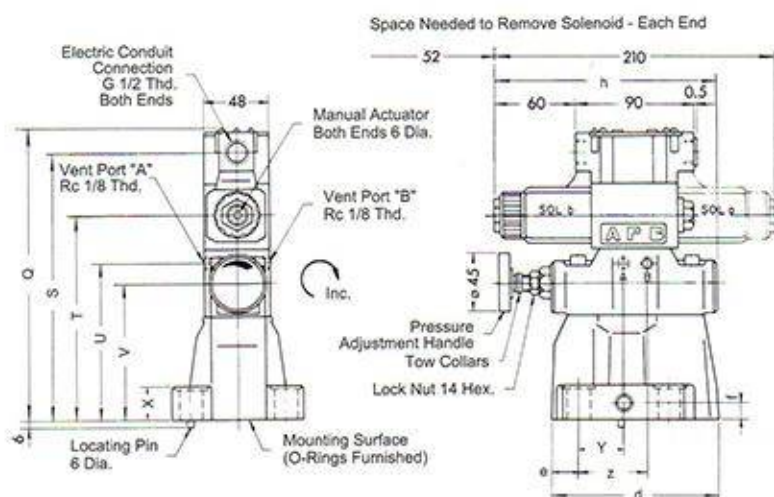


For other dimensions, please see the figures shown left.

Options-Model with Vent Restrictors  
A-S-BSG-03<sup>03</sup><sub>06</sub>



For other dimensions, please see the figures shown left.



| Model No. | C  | D    | E    | F    | H    | J    | K    | L    | N    | P  | Q     | S   | T   | U   |
|-----------|----|------|------|------|------|------|------|------|------|----|-------|-----|-----|-----|
| S-BSG-03  | 76 | 53.8 | 11.1 | 26.9 | 53.8 | 73.6 | 26.9 | 78.1 | 13.5 | 21 | 218.3 | 200 | 153 | 117 |
| S-BSG-06  | 98 | 70   | 14   | 35   | 66.7 | 58.8 | 33.7 | 63.3 | 17.5 | 26 | 218.3 | 200 | 153 | 117 |

| Model No. | V   | X    | Y    | Z    | d   | e    | f  | h   | i     | j   | n   | r   | t     |
|-----------|-----|------|------|------|-----|------|----|-----|-------|-----|-----|-----|-------|
| S-BSG-03  | 103 | 21.5 | 17.1 | 36.6 | 106 | 26.1 | 13 | 158 | 127.9 | 168 | 183 | 230 | 248.3 |
| S-BSG-06  | 103 | 26   | 31.9 | 51.4 | 122 | 19.3 | 13 | 166 | 142.2 | 166 | 183 | 230 | 248.3 |

Note: For dimensions of mounting surface, please refer to BGM-03/06 type sub-plate (page 56).  
For detailed dimensions of Solenoid Operated Directional Valve (page 87, 88).



## H Type Pressure Control Valves HC Type Pressure Control Valves

Max. Pressure 21 MPa

B



HG Type



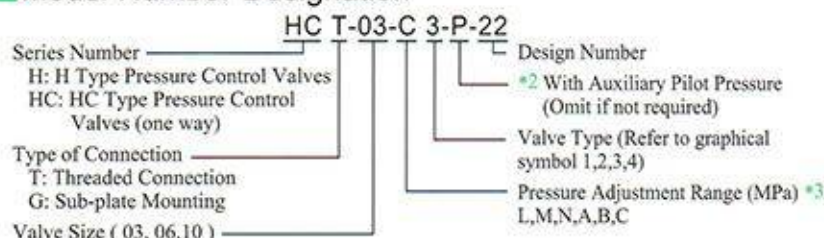
HCG Type

These valves are pressure control valves directly operated with hydraulic buffer, which can be actuated by internal or external pilot pressure. The valves with an integral check valve are also available. These valves can be used in such a case where free reverse flow from the secondary port to primary port is required. There are various type of valves available including sequence, counterbalance, unloading and low pressure relief valves, all of which are operated by a pressure rise in the circuit being sensed either internally or remotely. (Please refer to Graphic Symbol)

### Specifications

| Valve Size | Model No.        | Pressure Adjustment<br>MPa ( kgf/cm <sup>2</sup> ) | Max. Flow<br>L/min | Mass<br>kg |
|------------|------------------|----------------------------------------------------|--------------------|------------|
| 3/8        | HT-03-※※※-22     | L : 0.25 ~ 0.45<br>( 2.5 ~ 4.5 )                   | 50                 | 3.7        |
|            | HG-03-※※※-22     |                                                    |                    | 4.0        |
|            | HCT-03-※※※-22    | M : 0.45 ~ 0.9<br>( 4.5 ~ 9 )                      |                    | 4.1        |
|            | HCG-03-※※※-22    |                                                    |                    | 4.8        |
| 3/4        | HT-06-※※※-22     | N : 0.9 ~ 1.8<br>( 9 ~ 18 )                        | 125                | 6.2        |
|            | HG-06-※※※-22     |                                                    |                    | 6.1        |
|            | HCT-06-※※※-22    | A : 1.8 ~ 3.5<br>( 18 ~ 35 )                       |                    | 7.1        |
|            | HCG-06-※※※-22    |                                                    |                    | 7.4        |
| 1-1/4      | HT-10-※※※-22     | B : 3.7 ~ 7.0<br>( 35 ~ 70 )                       | 250                | 12.0       |
|            | HG-10-※※※-22     |                                                    |                    | 11.0       |
|            | HCT-10-※※※-22 *1 | C : 7.0 ~ 14<br>( 70 ~ 140 )                       |                    | 13.8       |
|            | HCG-10-※※※-22    |                                                    |                    | 13.8       |

### Model Number Designation



- \*1. Products are made by Yuken Kogyo. If you have any inquiry, please contact our sales engineers.  
\*2. Models with auxiliary pilots are used where valves must be operated under a lower external pilot pressure than the adjusted pressure. This does not apply to pressure adjustment ranges L, M and H of valve type 1.  
\*3. In addition, type 1 is only possible for pressure adjustment ranges L and M. (applicable only for H type)

### Mounting Bolts (Attachment)

| Model No. | Socket Head Cap | Screw Q'ty | Tightening Torque N·m |
|-----------|-----------------|------------|-----------------------|
| HG-03     | M10 x 50 Lg     | 4          | 60~74                 |
| HCG-03    | M10 x 70 Lg     | 4          |                       |
| HG-06     | M10 x 50 Lg     | 4          |                       |
| HCG-06    | M10 x 80 Lg     | 4          |                       |
| HG-10     | M10 x 50 Lg     | 6          |                       |
| HCG-10    | M10 x 90 Lg     | 6          |                       |

### Sub-plate

| Valve Model No.  | Sub-plate Model No. | Piping Size Re | Mass kg |
|------------------|---------------------|----------------|---------|
| HG -03-※※※-22    | HGM-03-20           | 3/8            | 1.6     |
| HCG -03-※※※-22   | HGM-03X-20          | 1/2            |         |
| HG -03-※※※-P-22  | HGM-03-P-20         | 3/8            | 2.0     |
| HCG -03-※※※-P-22 | HGM-03X-P-20        | 1/2            |         |
| HG -06-※※※-22    | HGM-06-20           | 3/4            | 2.4     |
| HCG -06-※※※-22   | HGM-06X-20          | 1              | 3.0     |
| HG -06-※※※-P-22  | HGM-06-P-20         | 3/4            | 2.4     |
| HCG -06-※※※-P-22 | HGM-06X-P-20        | 1              | 3.0     |
| HG -10-※※※-22    | HGM-10-20           | 1-1/4          | 4.8     |
| HCG -10-※※※-22   | HGM-10X-20          | 1-1/2          | 5.7     |
| HG -10-※※※-P-22  | HGM-10-P-20         | 1-1/4          | 4.8     |
| HCG -10-※※※-P-22 | HGM-10X-P-20        | 1-1/2          | 5.7     |

Sub-plates are available. When ordering, please specify sub-plate model from the table above (page 66).

### Graphic Symbol

| Series No. | Valve Type                       | Auxiliary Port |          |
|------------|----------------------------------|----------------|----------|
|            |                                  | Without        | With (P) |
| H※         | Type 1 Low Pressure Relief Valve |                | —        |
|            | Type 2 Sequence Valve            |                |          |
|            | Type 3 Sequence Valve            |                |          |
|            | Type 4 Unloading valve           |                |          |
| HC※        | Type 1 Counterbalance Valve      |                |          |
|            | Type 2 Sequence and Check Valve  |                |          |
|            | Type 3 Sequence and Check Valve  |                |          |
|            | Type 4 Counterbalance Valve      |                |          |



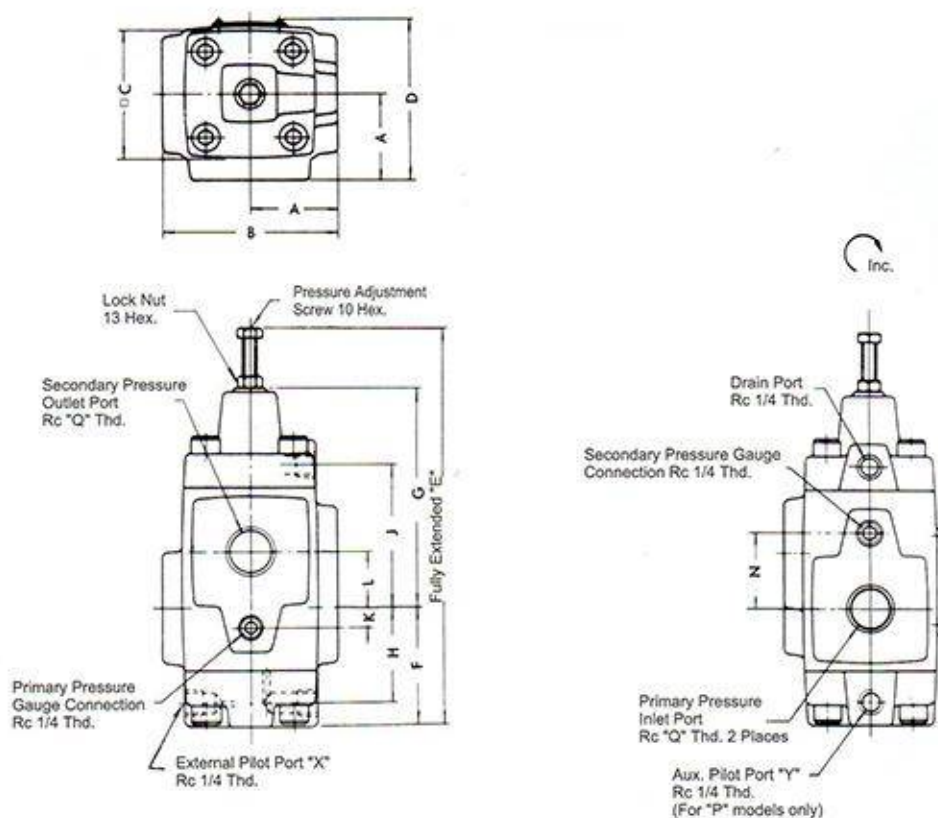
B

## H Type Pressure Control Valves

Max. Pressure 21 MPa

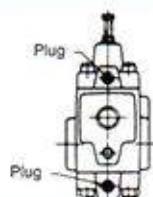
HT-03, 06, 10

Type 3: Sequence Valve  
(External Pilot, External Drain)

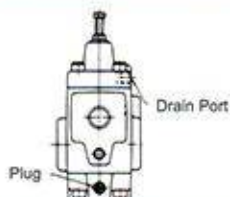


| Model No. | A  | B   | C  | D   | E   | F    | G     | H    | J    | K  | L  | N  | Q     |
|-----------|----|-----|----|-----|-----|------|-------|------|------|----|----|----|-------|
| HT-03     | 41 | 82  | 60 | 74  | 191 | 57   | 106   | 43   | 70   | 0  | 28 | 28 | 3/8   |
| HT-06     | 48 | 96  | 73 | 87  | 221 | 64.5 | 123.5 | 50.5 | 80.5 | 9  | 33 | 42 | 3/4   |
| HT-10     | 66 | 132 | 86 | 112 | 272 | 84   | 149   | 66   | 98   | 12 | 40 | 52 | 1-1/4 |

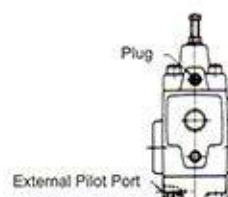
Type 1: Low Pressure Relief Valve  
(Internal Pilot, Internal Drain)



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



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





## H Type Pressure Control Valves

Max. Pressure 21 MPa

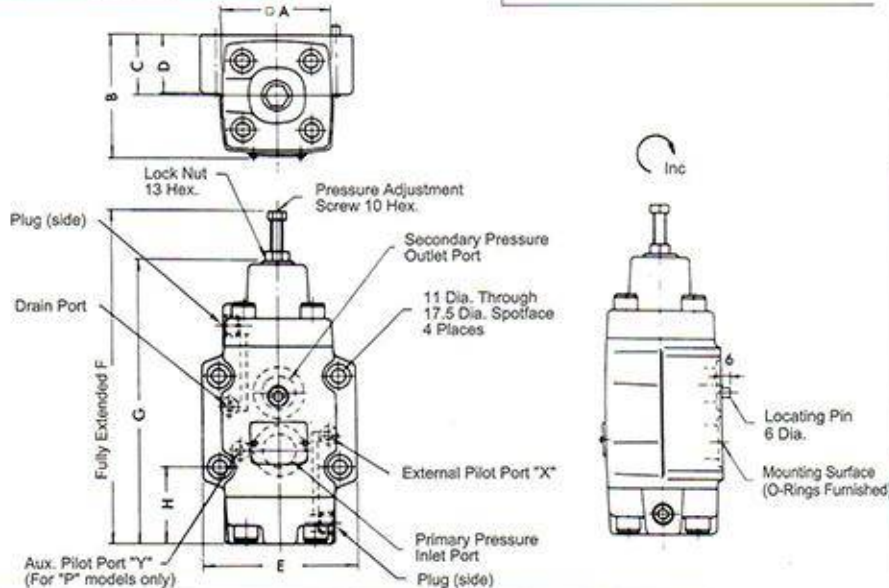
HG-03, 06

Type 3: Sequence Valve  
(External Pilot, External Drain)

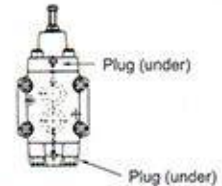
Mounting Surface:

HG-03: ISO 5781-AG-06-2-A-87

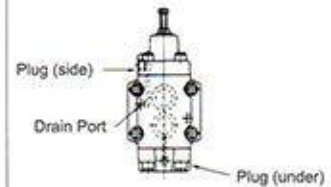
HG-06: ISO 5781-AH-08-2-A-87



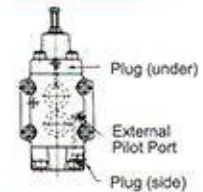
Type 1: Low Pressure Relief Valve  
(Internal Pilot, Internal Drain)



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



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



| Model No. | A  | B  | C  | D  | E   | F   | G   | H    |
|-----------|----|----|----|----|-----|-----|-----|------|
| HG-03     | 60 | 67 | 35 | 39 | 89  | 191 | 163 | 49.6 |
| HG-06     | 73 | 79 | 40 | 39 | 102 | 221 | 188 | 51   |

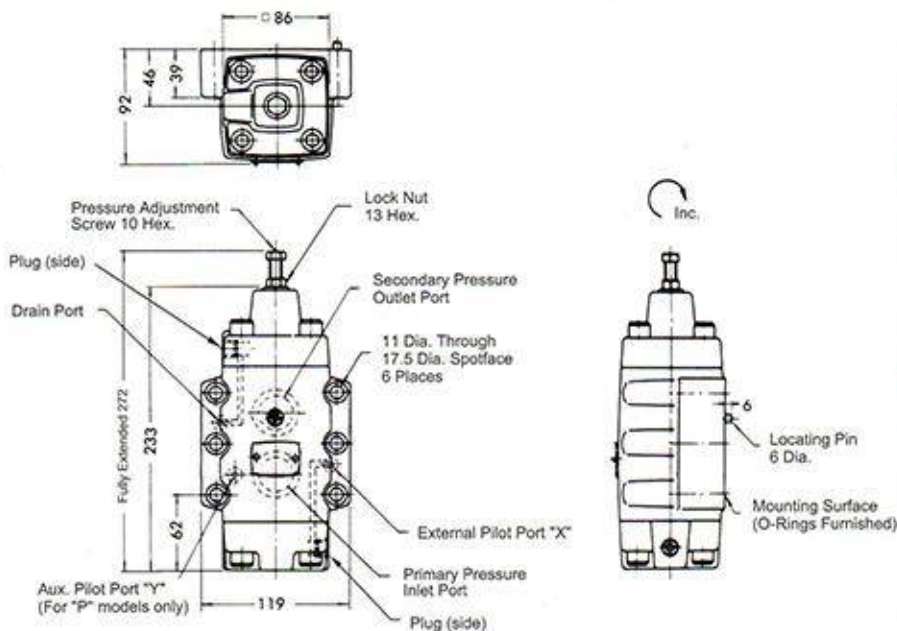
Note: For dimensions of mounting surface, please refer to HGM-03 & 06 type sub-plate. (page 66)

HG-10

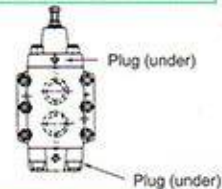
Type 3: Sequence Valve  
(External Pilot, External Drain)

Mounting Surface: ISO 5781-AJ-10-2-A-87

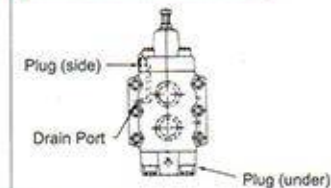
Note: For dimensions of mounting surface, please refer to HGM-10 type sub-plate. (page 66)



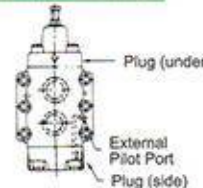
Type 1: Low Pressure Relief Valve  
(Internal Pilot, Internal Drain)



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



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

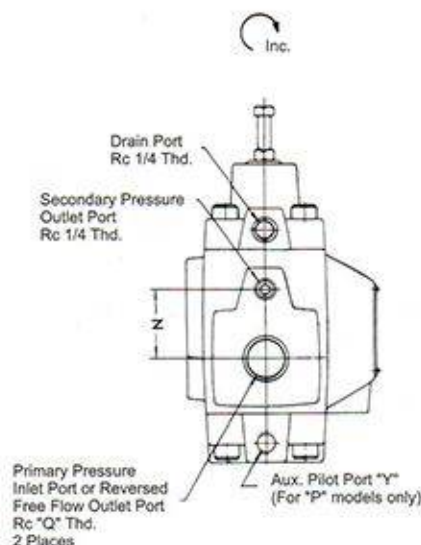
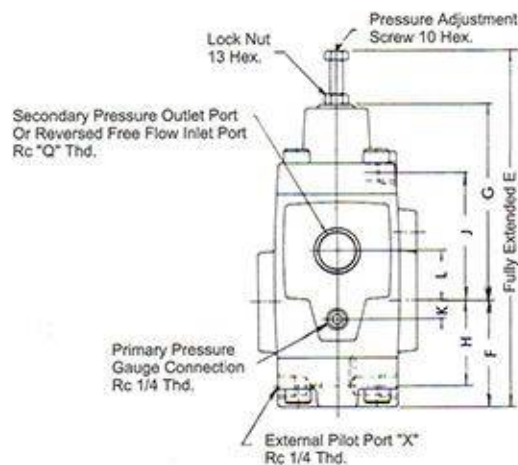
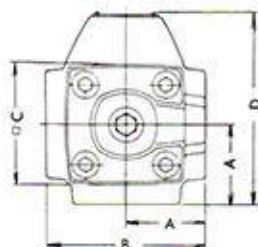




## HC Type Pressure Control Valves Max. Pressure 21 MPa

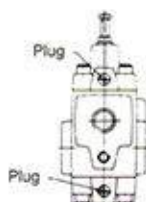
HCT-03, 06, 10

Type 3: Sequence and Check Valve  
(External Pilot, External Drain)

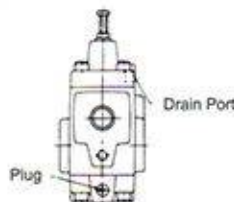


| Model No. | A  | B   | C  | D   | E   | F    | G     | H    | J    | K  | L  | N  | Q     |
|-----------|----|-----|----|-----|-----|------|-------|------|------|----|----|----|-------|
| HCT-03    | 41 | 82  | 60 | 96  | 191 | 57   | 106   | 43   | 70   | 0  | 28 | 28 | 3/8   |
| HCT-06    | 48 | 96  | 73 | 116 | 221 | 64.5 | 123.5 | 50.5 | 80.5 | 9  | 33 | 42 | 3/4   |
| HCT-10    | 66 | 132 | 86 | 152 | 272 | 84   | 149   | 66   | 98   | 12 | 40 | 52 | 1-1/4 |

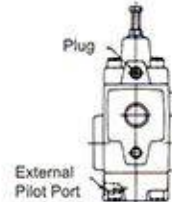
Type 1: Counterbalance Valve  
(Internal Pilot, Internal Drain)



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



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





## HC Type Pressure Control Valves Max. Pressure 21 MPa

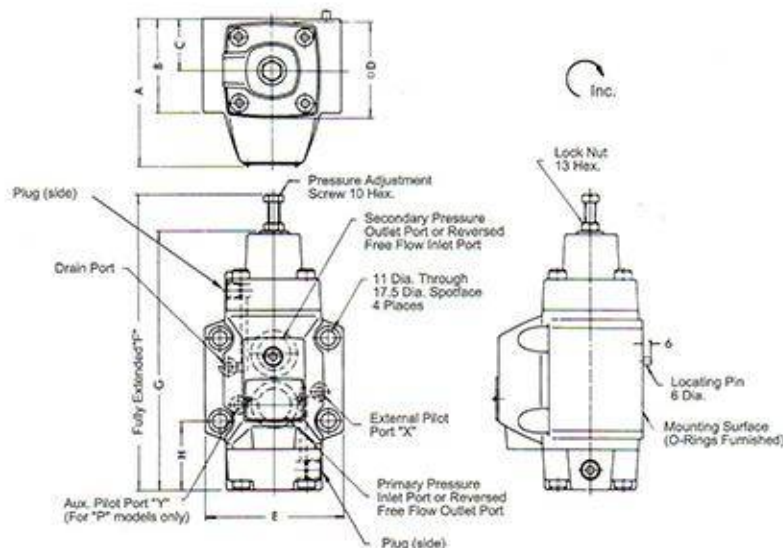
HCG-03, 06

Type 3: Sequence and Check Valve  
(External Pilot, External Drain)

Mounting Surface:

HCG-03: ISO 5781-AG-06-2-A-87

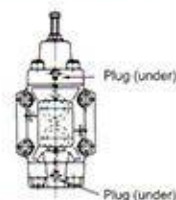
HCG-06: ISO 5781-AH-08-2-A-87



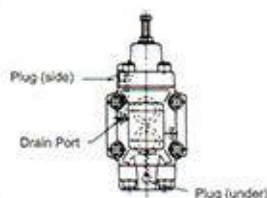
| Model No | A   | B  | C  | D  | E   | F   | G   | H    |
|----------|-----|----|----|----|-----|-----|-----|------|
| HCG-03   | 90  | 59 | 35 | 60 | 89  | 191 | 163 | 49.6 |
| HCG-06   | 108 | 69 | 40 | 73 | 102 | 221 | 188 | 51   |

Note: For dimensions of mounting surface, please refer to HGM-03 & 06 type sub-plate (page 66).

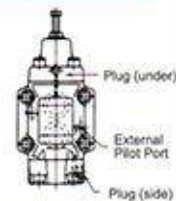
Type 1: Counterbalance Valve  
(Internal Pilot, Internal Drain)



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



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

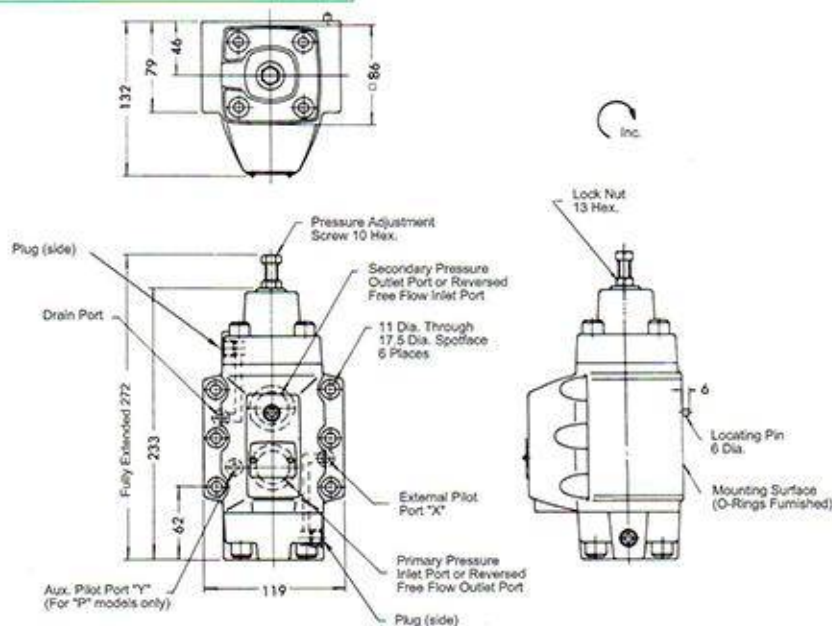


HCG-10

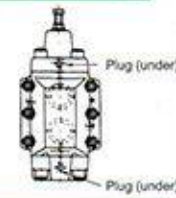
Type 3: Sequence and Check Valve  
(External Pilot, External Drain)

Mounting Surface: ISO 5781-AJ-10-2-A-87

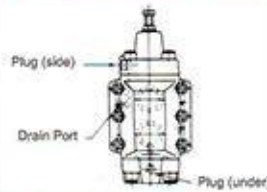
Note: For dimensions of mounting surface, please refer to HGM-10 type sub-plate (page 66).



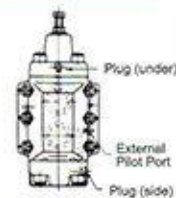
Type 1: Counterbalance Valve  
(Internal Pilot, Internal Drain)



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



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



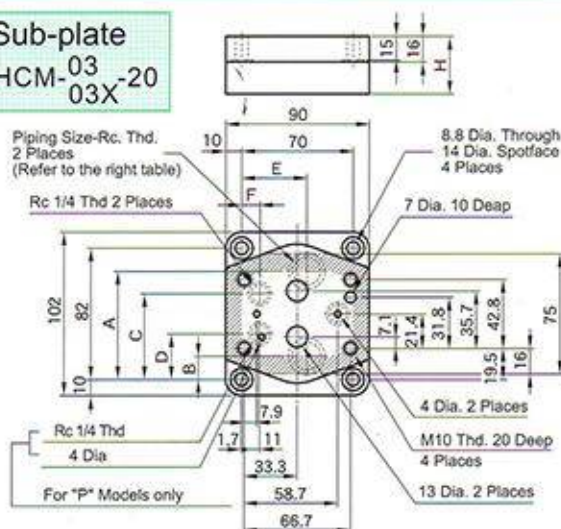


**B**

## H Type Pressure Control Valves HC Type Pressure Control Valves

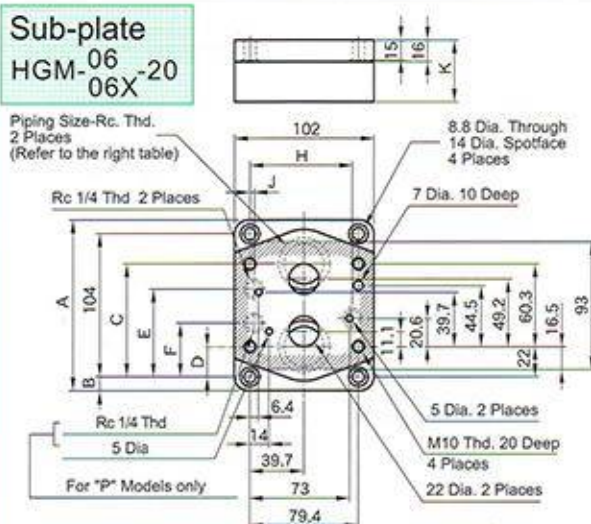
Max. Pressure 21 MPa

**Sub-plate**  
**HCM-03**  
**03X-20**



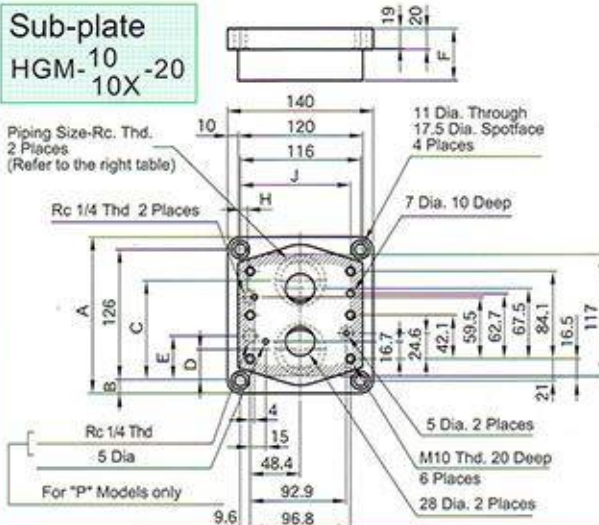
| Sub-plate Model No. | Piping Size Rc | A    | B    | C    | D    | E  | F    | G  |
|---------------------|----------------|------|------|------|------|----|------|----|
| HGM-03-20           | 3/8            | 61   | 21   | 40.9 | -    | 35 | 9.6  | 32 |
| HGM-03X-20          | 1/2            | 61   | 21   | 40.9 | -    | 35 | 9.6  | 32 |
| HGM-03-P-20         | 3/8            | 69.5 | 12.5 | 53.5 | 28.5 | 35 | 11.5 | 36 |
| HGM-03X-P-20        | 1/2            | 67.5 | 14.5 | 53.5 | 28.5 | 41 | 11.5 | 36 |

**Sub-plate**  
**HGM-06**  
**06X-20**



| Sub-plate Model No. | Piping Size Rc | A   | B  | C    | D  | E    | F  | G  | H   | J  |
|---------------------|----------------|-----|----|------|----|------|----|----|-----|----|
| HGM-06-20           | 3/4            | 124 | 10 | 77   | 27 | 61.7 | -  | 73 | 6.4 | 36 |
| HGM-06X-20          | 1              | 136 | 16 | 82.3 | 22 | 61.7 | -  | 75 | 6.4 | 45 |
| HGM-06-P-20         | 3/4            | 124 | 10 | 77   | 27 | 64   | 39 | 73 | 3   | 36 |
| HGM-06X-P-20        | 1              | 136 | 16 | 82.3 | 22 | 64   | 39 | 75 | 3   | 45 |

**Sub-plate**  
**HGM-10**  
**10X-20**



| Sub-plate Model No. | Piping Size Rc | A   | B    | C   | D  | E  | F  | H    | J     |
|---------------------|----------------|-----|------|-----|----|----|----|------|-------|
| HGM-10-20           | 1-1/4          | 150 | 12   | 96  | 30 | -  | 45 | 13.6 | 102.5 |
| HGM-10X-20          | 1-1/2          | 177 | 25.5 | 104 | 22 | -  | 50 | 13.6 | 102.5 |
| HGM-10-P-20         | 1-1/4          | 150 | 12   | 96  | 30 | 43 | 45 | 9.6  | 102.5 |
| HGM-10X-P-20        | 1-1/2          | 177 | 25.5 | 104 | 22 | 43 | 50 | 9.6  | 106   |



## Pressure Reducing Valves Pressure Reducing & Check Valves

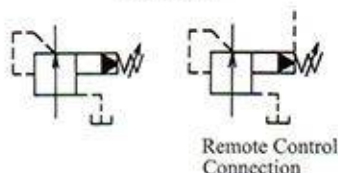
Max. Pressure 21 MPa



RG Type

### Graphic Symbol

RT, RG



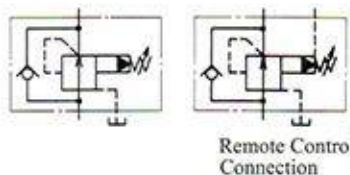
Remote Control Connection



RCG Type

### Graphic Symbol

RCT, RCG



Remote Control Connection

- These valves are used to limit the pressure in a part of the circuit to something lower than that required in the main circuit. The valves may be controlled by pilot pressure from a remote control port.
- They are available with integral check valves for use when free reverse flow from the secondary port to the primary port is required.

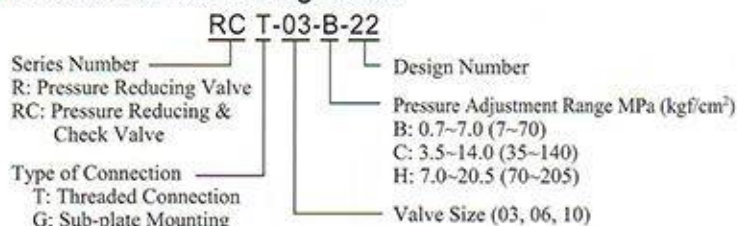
### Specifications

| Valve Size | Model No.      | Setting Pressure MPa | Max. Flow L/min *1 | Mass kg |
|------------|----------------|----------------------|--------------------|---------|
| 3/8        | RT-03-※-22     | 0.7 ~ 1.0            | 40                 | 4.3     |
|            | RG-03-※-22     |                      |                    | 4.5     |
|            | RCT-03-※-22    | 1.0 ~ 20.5           | 50                 | 4.8     |
|            | RCG-03-※-22    |                      |                    | 5.4     |
| 3/4        | RT-06-※-22     | 0.7 ~ 1.0            | 50                 | 6.9     |
|            | RG-06-※-22     |                      |                    | 6.8     |
|            | RCT-06-※-22    | 1.0 ~ 1.5            | 100                | 7.8     |
|            | RCG-06-※-22    |                      |                    | 8.1     |
| 1 1/4      | RT-10-※-22 *2  | 0.7 ~ 1.0            | 130                | 12.0    |
|            | RG-10-※-22 *2  |                      |                    | 11.0    |
|            | RCT-10-※-22 *2 | 1.5 ~ 10.5           | 220                | 13.8    |
|            | RCG-10-※-22 *2 |                      |                    | 13.8    |

\*1. The Max. flow rates are those shown at the primary pressure of 21MPa (210kgf/cm<sup>2</sup>)

\*2. Products are made by Yuken Kogyo. If you have any inquiry, please contact our sales engineers.

### Model Number Designation



### Mounting Bolts (Attachment)

| Model No. | Socket Head Cap Screw | Qty | Tightening Torque N·m |
|-----------|-----------------------|-----|-----------------------|
| RG-03     | M10 x 50 Lg           | 4   | 60~74                 |
| RCG-03    | M10 x 70 Lg           | 4   |                       |
| RG-06     | M10 x 50 Lg           | 4   |                       |
| RCG-06    | M10 x 80 Lg           | 4   |                       |
| RG-10     | M10 x 50 Lg           | 6   |                       |
| RCG-10    | M10 x 90 Lg           | 6   |                       |

### Sub-Plate

| Valve Model No. | Sub-plate Model No. | Piping Size Rc | Mass kg |
|-----------------|---------------------|----------------|---------|
| RG -03          | HGM-03-20           | 3/8            | 1.6     |
|                 | HGM-03X-20          | 1/2            |         |
| RG -06          | HGM-06-20           | 3/4            | 2.4     |
|                 | HGM-06X-20          | 1              |         |
| RG -10          | HGM-10-20           | 1-1/4          | 4.8     |
|                 | HGM-10X-20          | 1-1/2          |         |

\*1. The sub-plates are available. Please specify sub-plate model from the table above. Please refer to page 66 for dimension details.

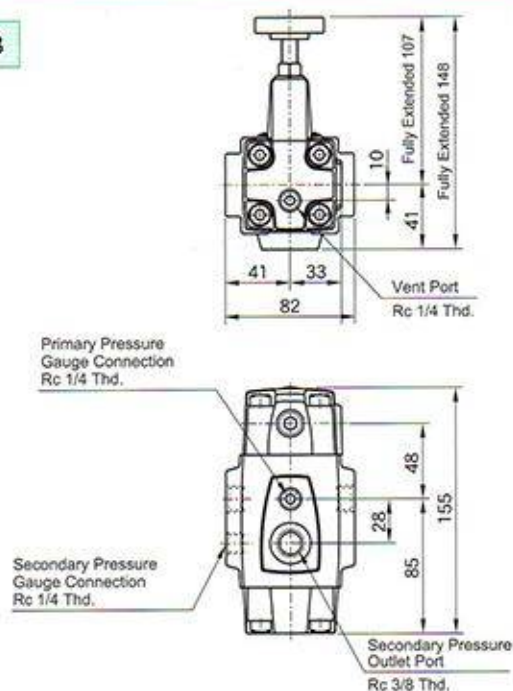
\*2. Note: The sub-plates are the same as those for H and HC type pressure controlled valve. With the pressure reducing valve, the sub-plate is used in a position 180° turned (upside down) from the normal position.



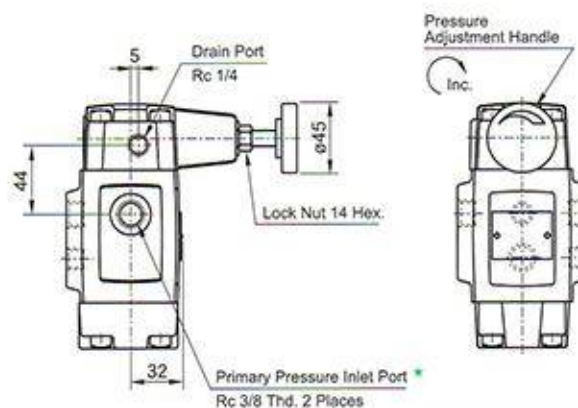
## Pressure Reducing Valves

Max. Pressure 21 MPa

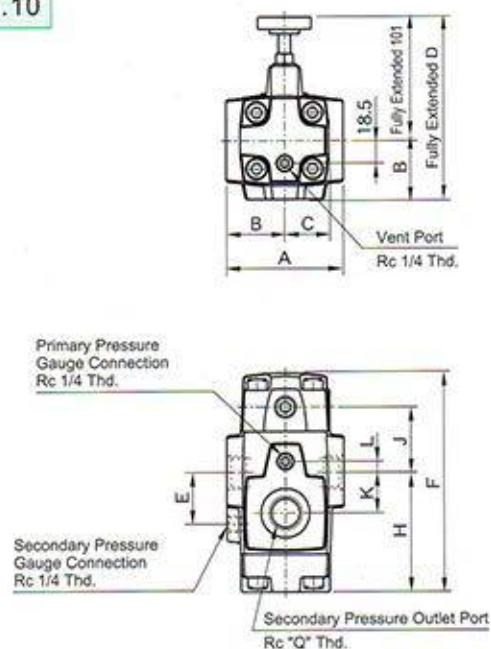
RT-03



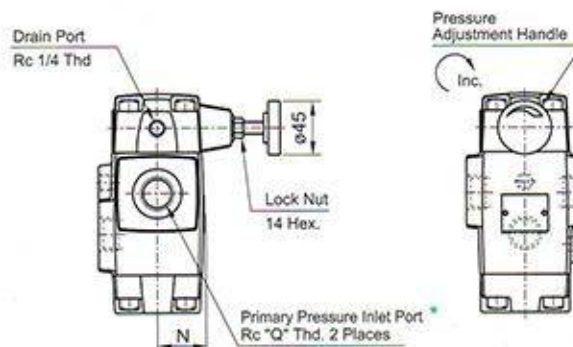
★ There are two Primary Pressure Ports. One can be used as an inlet port and the other as an outlet port with threaded connection. You can also block one port as your requirement.



RT-06.10



★ There are two Primary Pressure Ports. One can be used as an inlet port and the other as an outlet port with threaded connection. You can also block one port as your requirement.



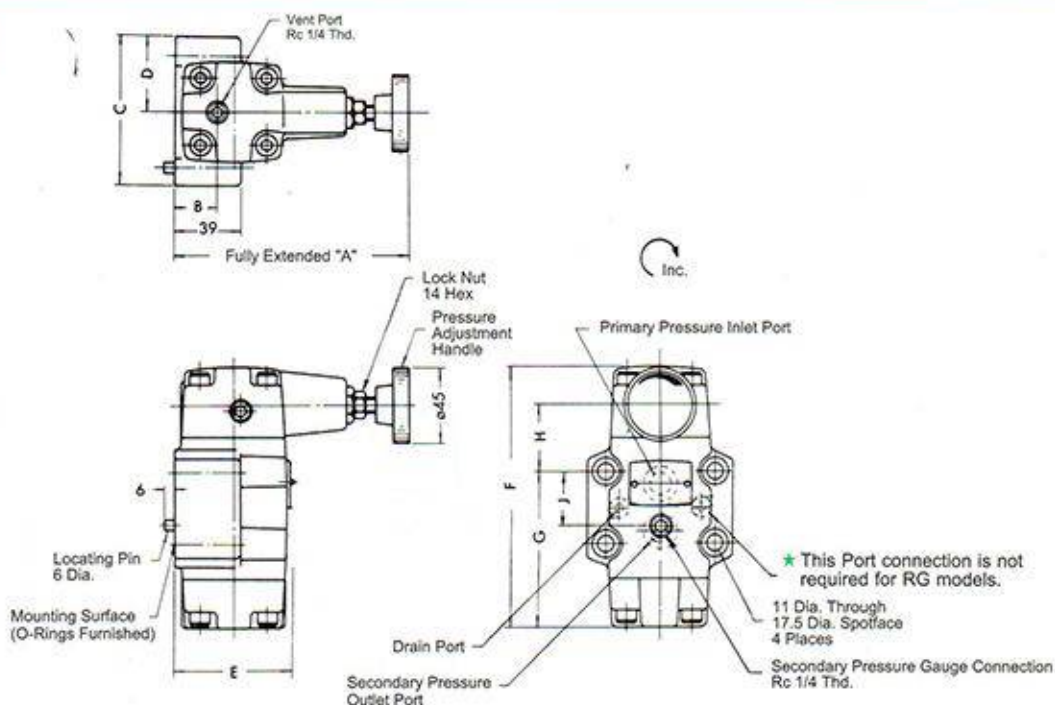
| Model No. | A   | B  | C    | D   | E  | F   | H    | J    | K  | L  | N  | Q     |
|-----------|-----|----|------|-----|----|-----|------|------|----|----|----|-------|
| RT-06     | 96  | 48 | 36.5 | 149 | 42 | 179 | 97.5 | 53.5 | 33 | 9  | 39 | 3/4   |
| RT-10     | 132 | 66 | 43   | 167 | 52 | 216 | 124  | 64   | 40 | 12 | 46 | 1-1/4 |

## Pressure Reducing Valves

Max. Pressure 21 MPa

B

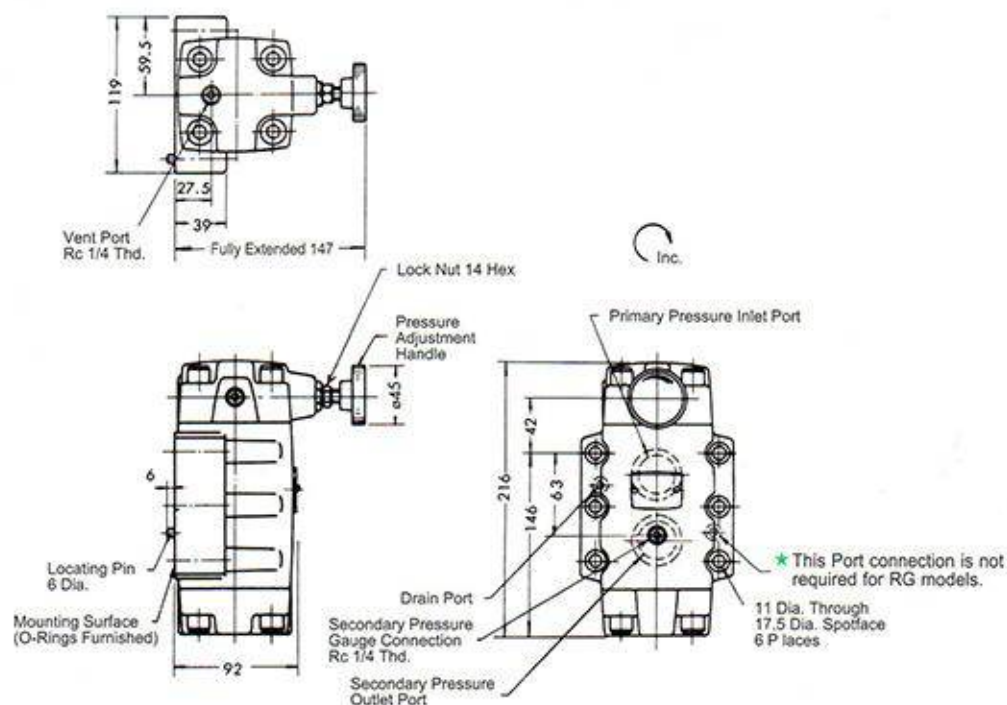
RG-03,06



| Model No. | A   | B    | C   | D    | E  | F     | G    | H    | J    |
|-----------|-----|------|-----|------|----|-------|------|------|------|
| RG-03     | 142 | 25   | 89  | 44.5 | 67 | 155.5 | 92.4 | 40.6 | 34.9 |
| RG-06     | 141 | 21.5 | 102 | 51   | 79 | 179   | 111  | 40   | 48   |

Note: For dimensions of mounting surface, please refer to HGM-03 & 06 type sub-plate (page 66).

RG-10

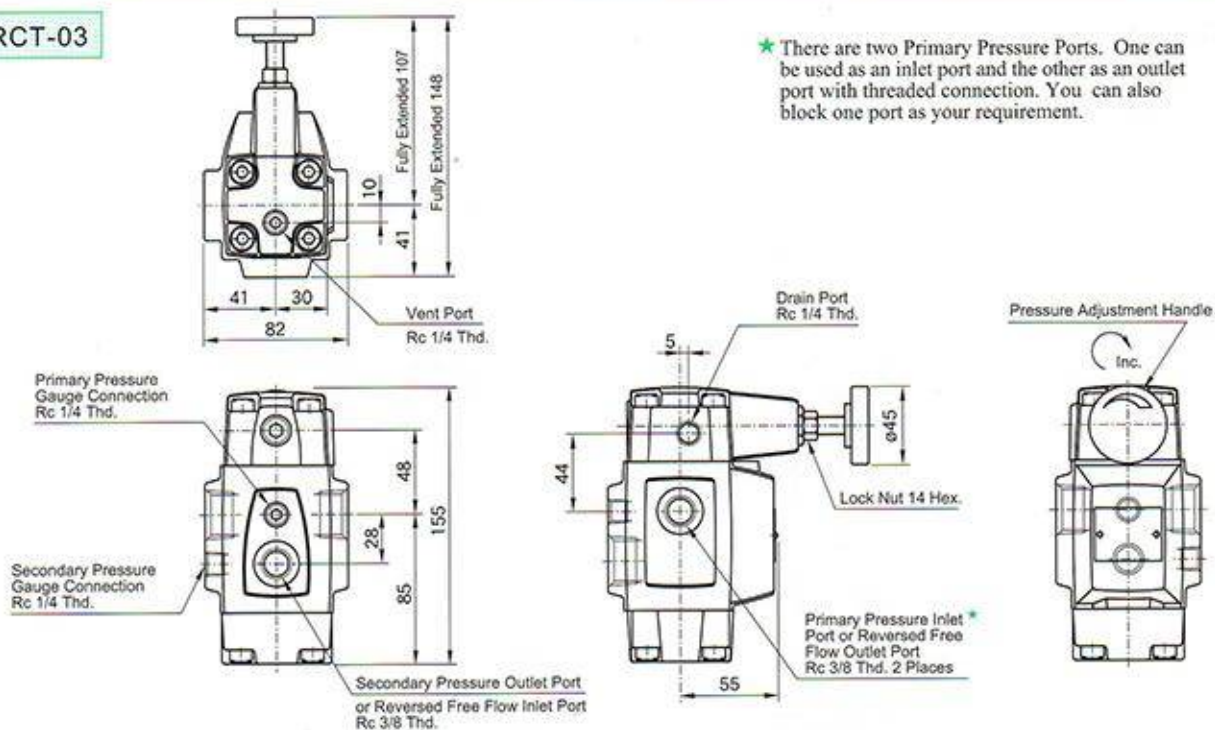


Note: For dimensions of mounting surface, please refer to HGM-10 type sub-plate (page 66).

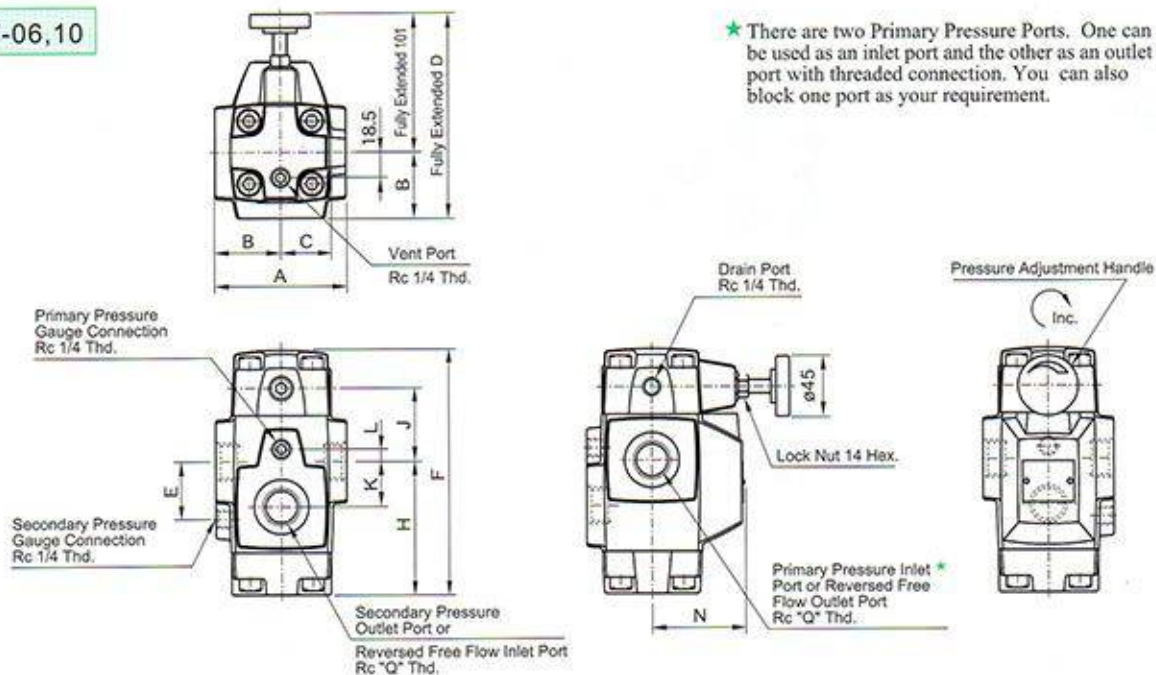


## Pressure Reducing & Check Valves Max. Pressure 21 MPa

**RCT-03**



**RCT-06,10**

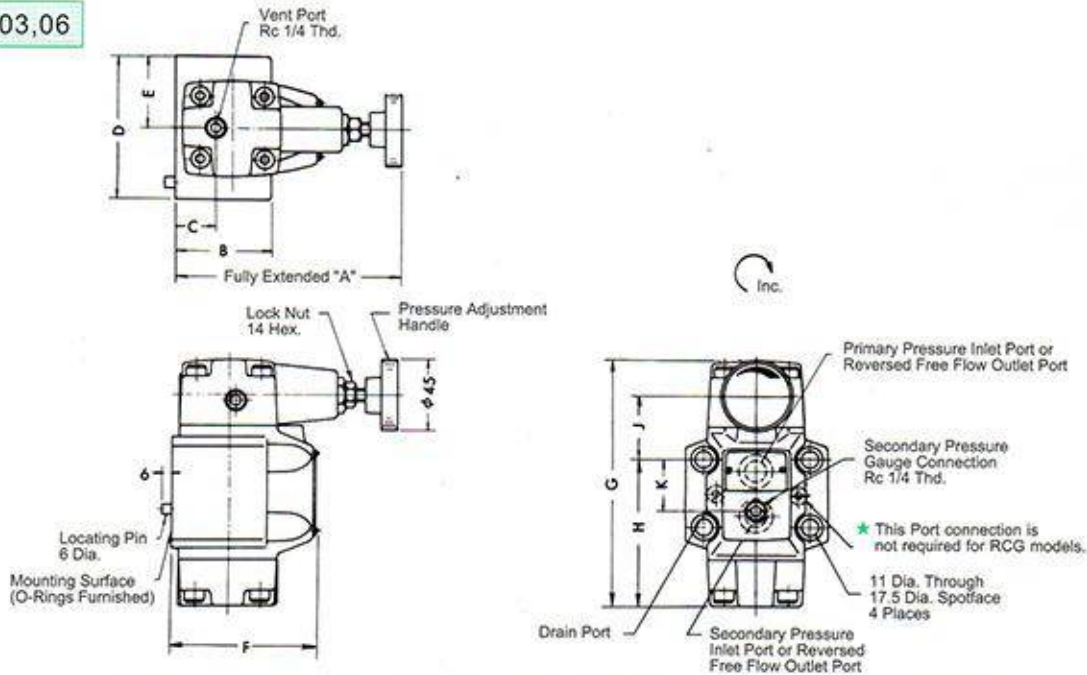


| Model No. | A   | B  | C    | D   | E  | F   | H    | J    | K  | L  | N  | Q     |
|-----------|-----|----|------|-----|----|-----|------|------|----|----|----|-------|
| RCT-06    | 96  | 48 | 36.5 | 149 | 42 | 179 | 97.5 | 53.5 | 33 | 9  | 68 | 3/4   |
| RCT-10    | 132 | 66 | 43   | 167 | 52 | 216 | 124  | 64   | 40 | 12 | 86 | 1-1/4 |

## Pressure Reducing & Check Valves Max. Pressure 21 MPa

**B**

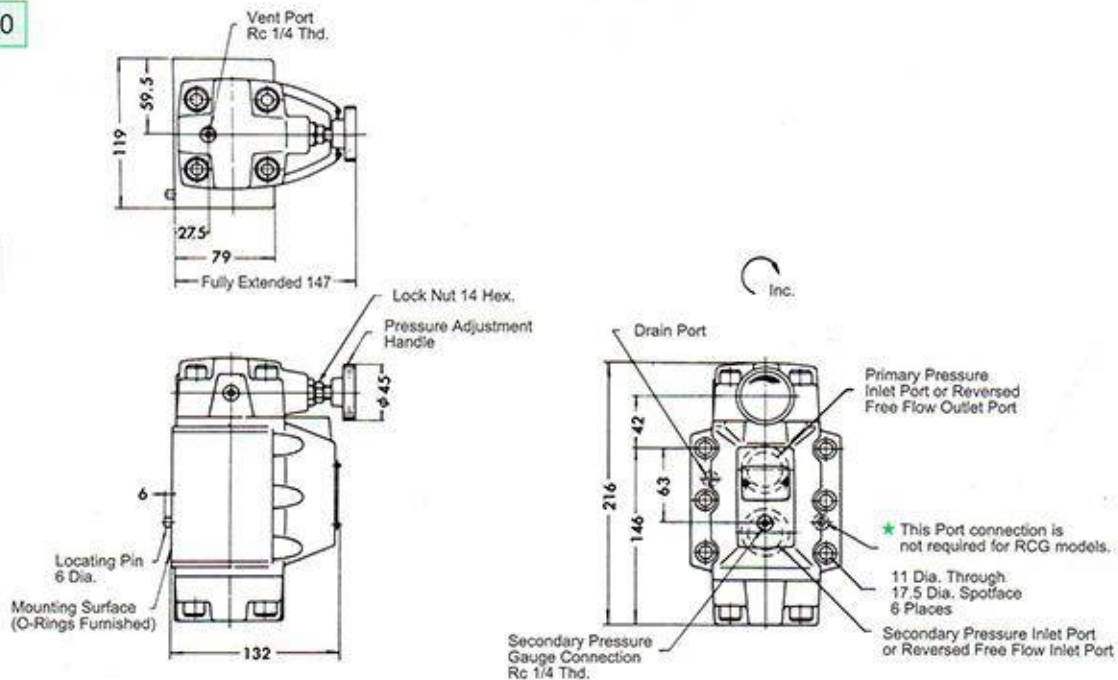
**RCG-03,06**



| Model No. | A   | B  | C    | D   | E    | F   | G   | H    | J    | K    |
|-----------|-----|----|------|-----|------|-----|-----|------|------|------|
| RCG-03    | 142 | 59 | 25   | 89  | 44.5 | 90  | 155 | 92.4 | 40.6 | 34.9 |
| RCG-06    | 141 | 69 | 21.5 | 102 | 51   | 108 | 179 | 111  | 40   | 48   |

Note: For dimensions of mounting surface, please refer to HGM-03 & 06 type sub-plate (page 66).

**RCG-10**



Note: For dimensions of mounting surface, please refer to HGM-10 type sub-plate (page 66).



## Unloading Relief Valves

Max. Pressure 21 MPa



These valves are used in an accumulator circuit or high-low pump circuit to unload the pump by diverting the pump flow into the reservoir at low pressure.

### Specifications

| Valve Size | Model No.     | Pres. Adj. Range<br>MPa (kgf/cm <sup>2</sup> )                  | Max. Flow<br>L/min | Mass<br>kg |
|------------|---------------|-----------------------------------------------------------------|--------------------|------------|
| 3/4        | BUCG-06-※-※-※ | B:2.5~7.0 (25~70)<br>C:3.5~14.0 (35~140)<br>H:7.0~21.0 (70~210) | 125                | 12         |

### Design Numbers

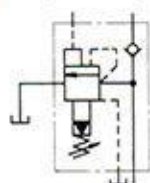
| Design No. | Pilot |      | Drain |      |
|------------|-------|------|-------|------|
|            | Int.  | Ext. | Int.  | Ext. |
| 30         |       | ○    |       | ○    |
| 3001       | ○     |      | ○     |      |
| 3002       | ○     |      |       | ○    |
| 3003       |       | ○    | ○     |      |

※ The adjustment handle of the internal control pressure is mounted vertically on the surface.

### Mounting bolt(Attachment)

|                       |                     |
|-----------------------|---------------------|
| Socket Head Cap Screw | M16 x 55 Lg (2Pcs)  |
|                       | M16 x 110 Lg (2Pcs) |
|                       | M16 x 130 Lg (2Pcs) |
| Tightening Torque N·m | 253~310 N·m         |

### Graphic Symbol

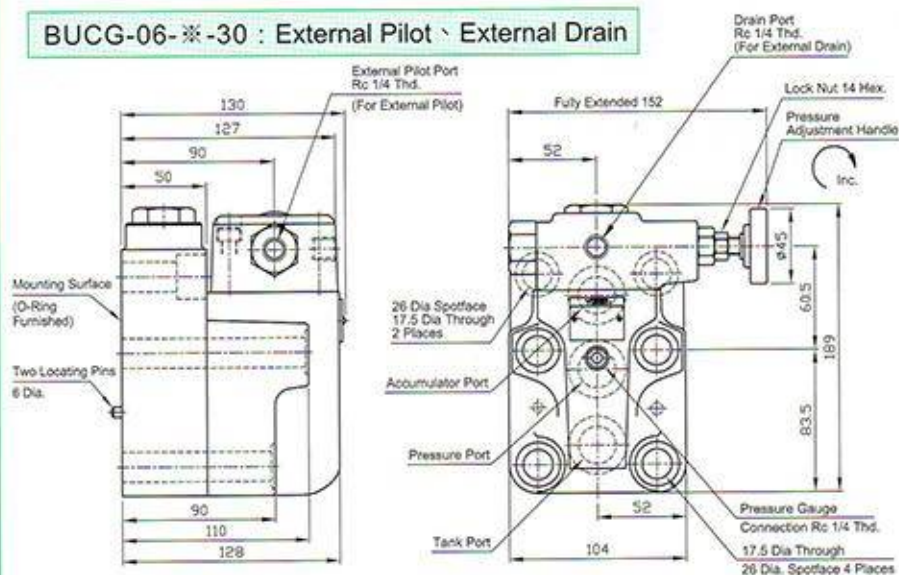


### Model Number Designation

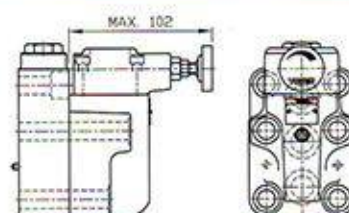
**BUCG-06-B V-※**

Series Number (Sub-plate mounting)  
Valve Size  
Pressure Adjustment Range MPa (kgf/cm<sup>2</sup>) B, C, H  
Design Number (see the table above)  
None: Normal  
V: High Venting Pressure Type (Options)※  
※ Use high-venting pressure type to reduce response time from unloading to onloading.

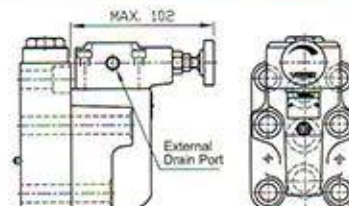
#### BUCG-06-※-30 : External Pilot, External Drain



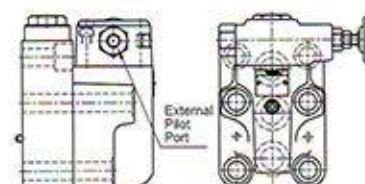
#### BUCG-06-※-3001 : Internal Pilot, Internal Drain



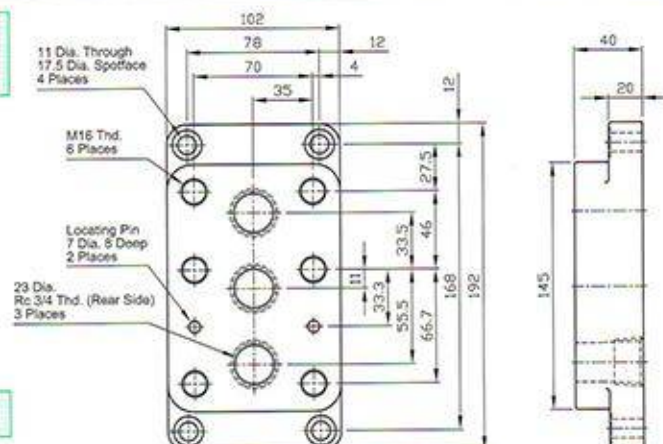
#### BUCG-06-※-3002 : Internal Pilot, External Drain



#### BUCG-06-※-3003 : External Pilot, Internal Drain



#### Sub-plate BUCGM-06



Mass 4.4kg



## Balancing Valves

Max. Pressure 14 MPa

B

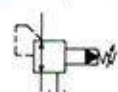


This valve is designed for hydraulic balance circuit. It is a combined pressure control valve including reducing and relief function. It is available for the weight division of the main headstock of CNC machine tool; also cut down the space and the weight of the machine.

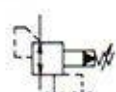
### Specifications

| Model Numbers | Max. Operating Pressure MPa (kgf/cm <sup>2</sup> ) | Pres. Adj. Range MPa (kgf/cm <sup>2</sup> ) | Max. Flow L/min | Relieving Flow L/min | Drain Flow L/min | Mass kg |
|---------------|----------------------------------------------------|---------------------------------------------|-----------------|----------------------|------------------|---------|
| RBG           | 14 (143)                                           | 0.6~13.5 (6.1~138)                          | 50              | 50                   | 0.6~1            | 4.2     |

### Graphic Symbols



Internal drain



External drain

### Attentions

- If the internal volume of the remote control piping is too big, it will result in vibration easily. Please make the internal diameter and length of the piping as small as possible.
- The drain piping should not be connected to other piping and should be connected to the tank directly.

### Model Number Designation

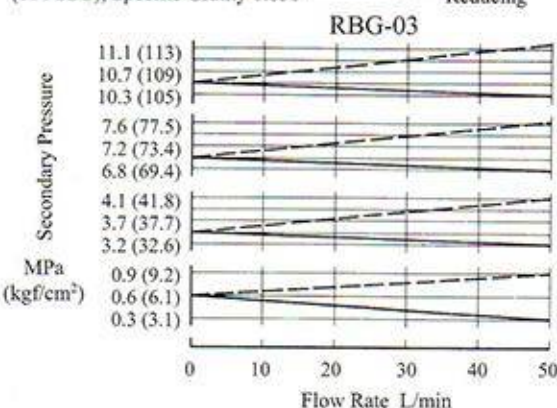
| RB                       | G                        | -03          | -R                                        | -10           |
|--------------------------|--------------------------|--------------|-------------------------------------------|---------------|
| Series Number            | Type of Mounting         | Valve Size   | Drain Type                                | Design Number |
| RB :<br>Balancing Valves | G:<br>Sub-plate Mounting | 03 : Size 10 | None: Internal Drain<br>R: External Drain | 10            |

### Mounting Bolts

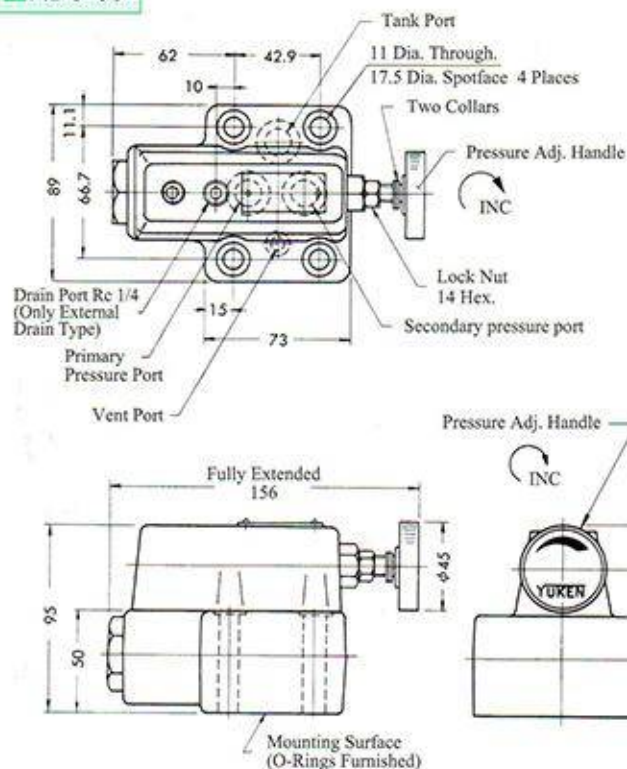
| Valve Model Numbers | Socket Head Cap Screw (4 pcs)                        |
|---------------------|------------------------------------------------------|
| RBG-03              | M10 x 65 Lg 4 pcs<br>Tightening torque:<br>60~74 N·m |

### Nominal Override Characteristics

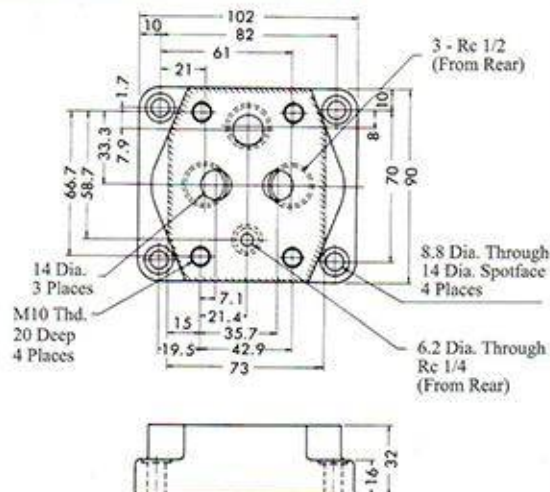
Hydraulic Fluid, Viscosity 35mm<sup>2</sup>/s (cSt) (164 SSU), Specific Gravity 0.850



### RBG-03



### Sub-plate: RBGM - 03X - 10



★ Pressure adjustment is controlled by the collar. If it can not meet the working pressure, please take one piece collar out. One piece of collar equals to 10 MPa (102 kgf/cm<sup>2</sup>).





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