

NACHI

2004

Standard hydraulic equipment

NACHI-FUJIKOSHI CORP.



TOYAMA HEAD OFFICE



ISO 9001
JQA-1383

NACHI

Standard Hydraulic Equipment

Using the NACHI Standard Hydraulic Equipment Catalog

As a comprehensive manufacturer of a full range of hydraulic equipment, Nachi-Fujikoshi manufactures, markets, and provides a wide range of other services for a full lineup of outstanding products.

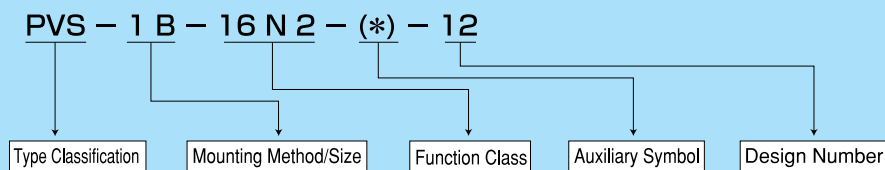
This general catalog introduces standard hydraulic equipment that has been carefully selected from the wide range of products manufactured by Nachi-Fujikoshi.

We hope that this catalog will be of assistance in planning your hydraulic system and for providing some guidelines for your inquiries about Nachi-Fujikoshi products.

■ Interpreting Model Numbers

Model numbers are assigned in accordance with Nachi-Fujikoshi standards as described below.

Example: PVS Series Variable Volume Piston Pump



(Note) Design numbers are always two digits.

A change in the right digit of the design number indicates there is no component compatibility. However, installation method compatibility still exists. This is subject to change without notice.

■ Using the Model Number Index




The Model Number Index at the back of this catalog lists the model numbers for NACHI standard hydraulic equipment. Use the index when looking up equipment details.

* × indicates a discontinued product, while — indicates a product that is scheduled for production.

Hydraulic Equipment and Device Safety Precautions

■ Before using any Nachi-Fujikoshi hydraulic equipment or device, carefully read the precautions and the "Handling" section for each of the of the standard hydraulic equipment products.

■ Precautions are classified according to the three types described below. All three indicate important information that you need to know to ensure safety. Be sure to read all precautions and carefully follow the advice that they provide.

 Danger	This type of precaution indicates a condition in which incorrect handling creates the immediate risk of death or serious personal injury.
 Warning	This type of precaution indicates a condition in which incorrect handling creates the risk of death or serious personal injury.
 Caution	This type of precaution indicates a condition in which incorrect handling creates the risk of personal injury or material damage.









*Danger, Warning, and Caution precautions are not comprehensive. Other risks may exist, even though they are not specifically mentioned. Before actually using any Nachi-Fujikoshi product, be sure to read its user documentation. You should use the product or device only after you thoroughly understand its user documentation, always keeping safety first and foremost in your mind.

*Be sure that you always comply with the following laws in order to ensure safe operation of a product.






- High Pressure Gas Safety Law
- Occupational Safety and Health Law
- Fire Codes

■ Hydraulic Operating Fluid Precautions



● Use of improper hydraulic operating fluid creates the risk of malfunction and breakdown.

 Danger	Many hydraulic operating fluids are flammable, so do not use open flame and do not perform welding in the vicinity of hydraulic devices and equipment. Failure to follow this precaution creates the risk of fire.
 Caution	Use only anti-wear type hydraulic operating fluid that is ISO3448 viscosity grade VG32 to VG68. Never use any other type of hydraulic operating fluid or fluid that is contaminated with foreign matter. Always check your user documentation for information before using non-mineral type hydraulic operating fluid (water based, synthetic, etc.)
 Caution	Use the proper type of hydraulic operating fluid, ensuring that fluid temperature, viscosity, contaminant level, and other factors are all within their prescribed ranges. Using hydraulic operating fluid outside of its prescribed ranges creates the risk of fire due to operational problems, mechanical damage, and fluid leaks.
 Caution	Configure circuits and operate the system to ensure that the contamination level of the hydraulic operating fluid being used is always within the manufacturer's recommended values. Check the contamination level and the condition of the filter at regular intervals. Also periodically check hydraulic operating fluid for oxidation, deterioration, and moisture, and replace the hydraulic operating fluid whenever these levels exceed the recommended values of the fluid manufacturer.
 Caution	Whenever changing to another type of hydraulic operating fluid, be sure to thoroughly flush out the interior of the circuit. Never mix hydraulic operating fluids of different types. Continued use creates the risk of malfunction of and damage to the equipment.
 Caution	Make sure to avoid splashing hydraulic operating fluid on you and others. Should fluid get on your skin, wash the area thoroughly with soap and water. Allowing hydraulic operating fluid to remain on the skin creates the risk of skin irritation.
 Caution	Before replacing the hydraulic operating fluid, allow the fluid in the system to cool sufficiently. Hot fluid creates the risk of burn injury.
 Caution	Allowing the hydraulic operating fluid level in the tank to become too low creates the risk of malfunction and breakdown.



■ Precautions when Preparing for a Test Run

 Warning	Always leave product installation, removal, piping, wiring, and other work up to specialists.
 Warning	Never attempt any unauthorized modification of the hydraulic system or control circuit.
 Warning	Never attempt any unauthorized modification of the setting values of the pressure and flow rate adjusting devices.
 Caution	Always check new hydraulic devices for looseness of internal components that may have occurred during shipment and check to make sure that all components are fitted securely.
 Caution	Whenever suspending a product, make sure that you use all of the attached eye plates or eye bolts. Using any other method (such as using a single eye plate) to suspend the product creates the risk of it falling.


1. Checking the Product Model Number

 Danger	In any atmosphere where there is the danger of explosion or fire, be sure to use only products that are designed for operation in such atmospheres.
 Caution	Whenever installing a valve, pump, or motor, check its plate and engravings to confirm that it is the proper type. In many cases, you cannot tell the difference between different hydraulic equipment types by their outward appearance only.



2. Product Handling

 Caution	Never climb onto, strike, tip over, or apply excessive force to a product. Doing so creates the risk of malfunction, damage, fluid leaks, etc.
 Caution	Wipe up any hydraulic operating fluid that gets on the product or floor. Failure to do so creates the risk of personal injury due to the product slipping out of your hand and falling, and due to someone slipping on the fluid left on the floor.


3. External Piping

 Caution	<ul style="list-style-type: none">• Be sure to perform sufficient flushing.• Anchor pipe supports to a secure surface.• Use pipe that has sufficient pressure rating. The rated pressure of the pipe should be double the pressure that you plan to be using.• The finish of the O-ring seal surface should be within the equivalent of 6.3S. Make sure there are no cracks, etc.
---	--





4. Electrical

 Warning	Leave all electrical work up to a qualified professional. Be sure to turn off power before performing electrical work. Failure to do so creates the risk of electric shock.
 Warning	Failure to check the condition of the gate valve and relief valve when checking the rotation direction of a hydraulic pump creates the risk of accident, malfunction, and breakdown.


5. Coupling Alignment

 Caution	Though motor and pump shaft alignment is checked at the factory prior to shipment, they may go out of alignment during shipping or due to installation conditions. Because of this, you should always check for proper alignment during the test run.
---	---



6. Valve, Pump, and Motor Installation

 Caution	Make sure installation holes and surfaces are clean. Insufficient bolt tightening torque can allow fluid to leak, creating the risk of fire.
 Caution	Whenever installing a product, always use bolts of the specified strength and specified number, and tighten them to the specified torque. Failure to observe proper specified values during installation creates the risk of fire due to malfunction, mechanical damage, and hydraulic fluid leaks.
 Caution	During installation and removal, never strike the pump shaft or motor shaft with a hammer or otherwise subject them to impact. Doing so can damage the product.
 Caution	In the case of a pump or motor that requires a drain pipe, the drain pipe that is used should not allow the pressure inside the casing to exceed the specified value. In the case of a pump or motor structure where operating fluid needs to be filled within the casing during operation, use a drain pipe that constantly replenishes operating fluid but does not allow air to collect inside of the casing. The drain pipe also should not let the level of operating fluid inside of the case to drop (does not allow fluid to return to the tank) during long periods of non-operation.


7. High-pressure Restrictions

 Warning	When using a pump that does not have a pressure compensation function (with maximum pressure adjustment), be sure to install a hydraulic circuit maximum pressure regulating relief valve near the pump discharge side.
---	---







8. Using an Accumulator

 Warning	When using an accumulator, use only nitrogen gas. Be sure to read and understand all pertinent user documentation before using an accumulator.
 Warning	Never attempt to modify an accumulator by mechanical processing or welding.




9. Fluid Supply

 Caution	Supply fluid up to the standard quantity through the prescribed oil supply port. Take care to ensure that no foreign matter or moisture contaminates the fluid. Also, check to make sure that the standard oil quantity is maintained even when the actuator is operated.
---	---




■ Precautions During a Test Run

 Warning	Authorized personnel only should be allowed in the vicinity of hydraulic devices during operation. Never touch devices during operation.
 Warning	Never remove covers of rotating parts or operate hydraulic devices with covers open.
 Warning	Before turning on the power supply, first check to make sure that all operation switches are off.
 Caution	Start up a pump while it is in the no-load state, and check to make sure that the rotation direction is correct.
 Caution	Valves, pumps, and motor casings can become very hot during operation. Do not touch them.
 Caution	Should you ever notice abnormal noise, abnormal heat, abnormal vibration, leaking oil, smoke, abnormal odor, or any other abnormal operation in a valve, pump, or motor, immediately shut down operation and take the necessary steps to correct the condition. Installation of sensors designed to detect abnormalities is recommended. Continued use under the above conditions creates the risk of damage, fire, and personal injury.


1. Hydraulic Pump Operation

 Warning	Before starting operation, check to make sure that all stop valves are correctly open or closed as required. Particular attention is required in the case of the suction line and return line.
 Caution	Though there is some vibration during normal operation, extreme vibration may indicate a defective fitting. Continued use creates the risk of accident or breakdown.
 Caution	Use a current meter to check for abnormally high loads on the motor. A large load can indicate a defective fitting, sticking, etc. Correct the abnormality before operating the pump.


2. Priming (Air Bleeding)

 Warning	Set the pressure to a value that does not operate the actuator (normally 0.5 to 1.5MPa). Perform operation carefully while monitoring the pressure with a pressure gauge.
 Warning	When bleeding air while the actuator is being operated, be careful about the movement of the machinery. Shut down the machinery immediately whenever there is the danger of accident.
 Caution	Performing work while operating fluid is below the prescribed level or using a mixture of different types of operating fluid creates the risk of malfunction or breakdown of the pump or other devices.

3. Actuator Operation





 Warning	Operate the actuator manually at low speed for initial operation. While carefully observing the operation of the machinery, perform continuous operation and automatic operation. Trying to perform continuous operation and automatic operation for the initial operation creates the risk of unexpected accident and breakdown.
--	---

4. Cleaning the Filter





 Caution	The filter can become clogged right from the first test run. Be sure to watch the filter indicator for signs of clogging. Continued use of a clogged filter creates the risk of unexpected accident and breakdown.
--	--

5. Valve Control

All Valves





 Warning	Use valves within their prescribed maximum operating pressures (including surge pressure).
 Warning	Sudden operation of the handle (screw) is dangerous. Be sure to unload the valve before gradually increasing pressure. Never keep a valve at a pressure that is greater than its design specification pressure value.
 Warning	Make sure you understand the hydraulic circuit diagram and switching valve structure, and check the electrical operation circuit and solenoid valve before performing any operation. <ul style="list-style-type: none"> • An incorrect switching direction can cause reverse operation of the actuator and create the risk of unexpected accident and breakdown.
 Warning	Make sure you understand the hydraulic circuit diagram and flow control valve structure before performing any operation. <ul style="list-style-type: none"> • Sudden operation can change the operating speed of the actuator and create the risk of unexpected accident or breakdown.

Solenoid Valves, Proportional Valves, Servo Valves


 Warning	Use valves within their prescribed maximum operating pressures (including surge pressure).
 Warning	Never charge both coils of a double solenoid valve at the same time.
 Caution	The pump casing and solenoid coil surface can become very hot. Never touch them.
 Caution	Be sure to use the appropriate model in environments that require water resistance.

■ Maintenance Precautions During Normal Daily Operation


1. Operating Fluid

 Caution	In order to ensure proper performance of hydraulic devices, check the fluid temperature, fluid level, and fluid color (for discoloration and deterioration) everyday. Any abnormalities create the risk of malfunction and breakdown.
 Caution	Whitish fluid indicates that water has contaminated the fluid, and blackish fluid indicates that the fluid has been subjected to high temperatures. Replace the operating fluid whenever these symptoms are noticed.
 Caution	Operating fluid that is below the prescribed level can cause improper pump suction. Keep fluid filled to prescribed level.
 Caution	As it is used for normal operations, operating fluid deteriorates and gradually loses its rust inhibiting, lubrication, and foam inhibiting characteristics. Deteriorated operating fluid creates the risk of malfunction and breakdown. As a general rule, replace operating fluid at least once a year.


2. Hydraulic Pumps

 Caution	A very hot hydraulic pump surface indicates the possibility of malfunction and breakdown. Immediately shut down the pump and take steps to correct the problem.
--	---


3. Fluid Leaks

 Warning	Fluid leaking from welded pipe seams, from a hydraulic pump, from hydraulic machinery, or from other sources creates the risk of serious accident. Always be on the lookout for possible leaks.
--	---


4. Filters

 Caution	Continued use of a clogged filter creates the risk of unexpected accident and breakdown. Replace a filter as soon as possible after it shows signs of clogging. Never operate devices with filter elements removed.
--	--


5. Pressure Gauges

 Caution	Always be sure to tighten the gauge cock whenever you do not need to view the pressure gauge. Deflection of the needle can damage the pressure gauge.
--	---


6. Tank Interior

 Caution	Actual tank inspection needs depend on the contamination level of the operating fluid. As a general rule, the tank should be emptied of fluid and its interior inspected and cleaned once a year.
--	---


7. Hydraulic Devices

 Caution	Never allow cutting oil, grinding oil, clippings, water, or other similar matter to get on hydraulic devices.
--	---










8. Coolers

 Caution	For a water cooler, adjust the temperature adjusting valve to keep the water temperature below 60°C. Orient a fan cooler to allow proper intake, outflow, and flow of cooling air.
--	---


■ Handling Precautions During Non-use

 Caution	If the system will not be operated for long periods, be sure to take proper anti-rust measures. <ul style="list-style-type: none">• Not operating the system for long periods without taking anti-rust measures creates the risk of malfunction and breakdown due to rust.• Be sure to flush the system before using it again after a long period of non-use. Failure to flush out rust inhibitors creates the risk of malfunction and breakdown.
--	--

■ Disassembly and Inspection Work Precautions

 Warning	Never attempt to modify or reconfigure valves, pumps, or motors. Doing so can cause them to operate at levels that are lower for which they are designed, and creates the risk of malfunction and breakdown.
 Warning	All disassembly and inspection work should be left up to persons who possess the required special knowledge for such work. Attempting disassembly without the required knowledge creates the risk of unexpected accident. Incorrectly performed disassembly and inspection work creates the risk of malfunction and breakdown.
 Warning	Before starting disassembly or maintenance work, make sure that all electrical breakers are cut off, and use an electroscope to check for the presence of electricity. Failure to do so creates the risk of unexpected accident to actuator free running, electric shock, etc.
 Warning	Performing work while the electrical circuitry is charged creates the risk of unexpected accident due to electric shock.
 Warning	Always make sure to release all residual pressure before starting disassembly work. Performing disassembly work without releasing residual pressure creates the risk of accident due to spurting fluid, actuator free running, or dropping, and also creates the risk of malfunction and breakdown.
 Caution	Always place valves, pumps, and motors on a secure surface, and never place them on top of hydraulic machinery. Doing so creates the risk of damage to the hydraulic machinery.
 Caution	Never strike or drop valves, pumps, or motors, and never subject hydraulic equipment to strong external force.
 Caution	During reassembly, failure to tighten to proper torques and contaminants getting into piping creates the risk of malfunction and breakdown. <ul style="list-style-type: none">• Take care to ensure that the tightening torques of hydraulic equipment are uniform and at prescribed levels.• Take care that sealing materials, welding scales, and other contaminants do not get inside of piping.
 Caution	After disassembly and reassembly, double check to make sure that you did not forget to open stopper valves, and that you have properly tightened all bolts, stopper plugs, couplings, and other required parts before performing the first operation.

■ Storage Precautions

 Caution	Seals may need to be replaced before using a product for the first time after long storage.
--	---

Standard Hydraulic Equipment Contents

[NACHI Hydraulic Pumps]

Hydraulic Pump Features or Handling	A-	1
Hydraulic Pump Selection Table	A-	2

A Piston Pumps

PVS — PVS Series Variable Volume Piston Pumps	A-	3
PZS — PZS Series Variable Volume Piston Pump	A-	22
PZ — PZ Series Load Sensitive Variable Piston Pump	A-	35
PZH — PZH Series High-Pressure Variable Volume Piston Pump	A-	42

B Vane Pumps

VDS — VDS Series Small Variable Volume Vane Pump	B-	1
VDR · 22D — VDR22 Design Series Variable Volume Vane Pump	B-	6
VDR · 13D — VDR13 Design Series Variable Volume Vane Pump	B-	15
VDC — VDC Series High-Pressure Type Variable Volume Vane Pump	B-	25
VDC Series High-Pressure Type Variable Volume Double Vane Pump		
UVN — UVN Series Variable Volume Vane Uni-pump	B-	39

C Gear Pumps

IPH — IPH Series IP Pump	C-	1
IPH Series Double IP Pump	C-	14

[NACHI Hydraulic Valves]

Hydraulic Valve Features or Handling	D-	1
Hydraulic Valve Selection Table	D-	2

D Modular Valves

Modular Valve Series	D-	4
G01 Modular Valve Series	D-	7
G03 Modular Valve Series	D-	9
G04 Modular Valve Series	D-	12
OR — Relief Modular Valve	D-	13
ORO — Brake Modular Valve	D-	19
ORD — Direct Relief Modular Valve	D-	23
OG — Pressure Reducing Modular Valve	D-	28
OGB — Balanced Piston Type Pressure Reducing Modular Valve	D-	35
OG — Pressure Reducing Modular Valve	D-	37
OGS — Two-Pressure Reducing Modular Valve	D-	44
OQ — Sequence Modular Valve	D-	47
OCQ — Counter Balance Modular Valve	D-	50
OW — Pressure Switch Modular Valve	D-	55
OY,OCY — Flow Regulator Modular Valve	D-	58
OF,OCF — Flow Control Modular Valve (Pressure and temperature compensated)	D-	66
OC,OCV — Check Modular Valve	D-	72
OCP — Pilot Operated Check Modular Valve	D-	79
OK — Gauge Modular Block	D-	84
OB — High-low System Block	D-	86
MOB — End Plate, Free Flow Plate, 03/01 Change Plate	D-	88
MSA,MDS — Solenoid Valve/Modular Valve Subplate	D-	90
OTH,OTD — Valve Installation Bolt List	D-	93
MOB — 01, 03 Base Block	D-	96
High-pressure M35 Series	D-	98

E Solenoid Valve

SS — SS Series (Wiring System: Central Terminal Box)				
Wet Type Solenoid Valve	E-	1	Piston Pumps	
SA — SA Series (Wiring System: DIN Connector Type)				
Wet Type Solenoid Valve	E-	13		
SE — SE Series Pilot Operated Lower Power Solenoid Valve	E-	25	Vane Pumps	
SL — SL Series (Wiring System : Central Terminal Box)				
Wet Type Solenoid Valve	E-	31		
DSS — DSS (DSA) 21 Design Series Solenoid Control Valve	E-	38		
SF — Fine Solenoid Valve SF Series	E-	46	Gear Pumps	
SNH — SNH Series Non-leak Type Solenoid Valve	E-	50		

F Pressure Control Valve

R — Relief Valve	F-	1		
RI — RI Series Relief Valve (ISO Mounting, Balanced Piston Type)	F-	5		
RC,RCD — Remote Control Relief Valve	F-	8		
RSS,RSA — Solenoid Controlled Relief Valve	F-	10	Solenoid Valve	
RIS — RI Series Solenoid Controlled Relief Valve	F-	15		
(C)G — Pressure Reducing (and Check) Valve	F-	18		
GR — Balancing Valve (Pressure Reducing and Relief Valve)	F-	23	Pressure Control Valve	
(C)Q — Pressure Control (and Check) Valve	F-	25		

G Flow Control Valve

(C)FR — Throttle (and Check) Valve	G-	1	Flow Control Valve	
(C)FT — FT Type Flow Control (and Check) Valve (With Pressure and Temperature Compensation)	G-	4		
(C)F — F Type Flow Control (and Check) Valve (With Pressure Compensation)	G-	8	Direction Control Valves	
(C)TN — TN Type Flow Control (and Check) Valve (Fine Adjustment Type With Pressure and Temperature Compensation)	G-	11		
(C)TS — TS Type Flow Control (and Check) Valve (Fine Adjustment Type With Pressure and Temperature Compensation)	G-	14	Electro-hydraulic control valve	
TL,TLT — TL (TLT) Type Feed Control Valve (Fine Control Type With Pressure Compensation)	G-	16		

H Direction Control Valves

CA,CN — Right Angle Check Valve In-line Check Valve	H-	1	Hydraulic Cylinder	
CP — Pilot Check Valves	H-	4		
K2 — Gauge Cock	H-	7		
DMA — DMA Type Manual Valve	H-	8		
Flange Type Series	H-	10	Hydraulic Unit	

I Electro-hydraulic control valve

Electro-hydraulic Proportional Valve Series	I-	1	Hydraulic Accessories	
EPR — Electro-hydraulic Proportional Pilot Relief Valve	I-	2		
ER — Electro-hydraulic Proportional Relief Valve	I-	4		
EGB — Electro-hydraulic Proportional Relief and Reducing Valve	I-	6		
(C)ES — Electro-hydraulic Proportional Flow Control Valve	I-	8	Technical data	
ESR — Load Response Electro-hydraulic Proportional Relief and Flow Control Valve	I-	11		
ESD — Electro-hydraulic Proportional Flow and Direction Control Valve	I-	14		
EOG — Modular Type Electro-hydraulic Proportional Reducing Valve	I-	22	Model No. Index	
EOF — Modular Type Electro-hydraulic Proportional Flow Control Valve	I-	24		
EMA,EMC — Power Amplifier Series for Electro-hydraulic Proportional Valve Drive	I-	26		
EBA — Small Type Power Amplifier Series for Electro-hydraulic Proportional Valve Drive	I-	30		
EDA,EDC — Small Type Multi-function Power Amplifier	I-	34		

ESH — High-response proportional flow control valve ESH-G01	I-	38
ESH — High-response proportional flow control valve ESH-G03, 04, 06	I-	40
EHA — High-speed Response Proportional Control Valve Amplifier EHA Series	I-	42
EN — NACHI-MOOG Electro-hydraulic Servo Valve EN Series	I-	44
EA — Electro-hydraulic Servo Valve Driver Servo Amplifier	I-	46

J Hydro-logic Valve

Composite Valve Series Logic Valve	J-	1
--	----	---

K Hydraulic Cylinder

FJ — FJ Series General Purpose Hydraulic Cylinder	K-	1
---	----	---

L Hydraulic Unit

NCP-NACHI PACK (Standard Variable Pump Unit)	L-	1
NEP-NACHI PACK Economy Series (NEP)	L-	18
NSP-NACHICCO II (Compact Variable Pump Unit)	L-	20
NNP-NACHI NN PACK (Low-noise Standard Variable Pump Unit)	L-	24

M Hydraulic Accessories

Hydraulic Accessories	M-	1
-----------------------------	----	---

N Technical data

Operating Fluid	N-	1
Water-Glycol Type Operating Fluid Hydraulic Devices	N-	3
SI Units and Conversion Formulas	N-	7

O Model No. Index

Model No. Index	O-	1
-----------------------	----	---

NACHI Hydraulic Pumps

Features

- ①Nachi Fujikoshi hydraulic pumps are finished by high-grade, precision machining technology unique to the comprehensive manufacturer Nachi Fujikoshi using carefully selected materials and traditional heat treatment technology. High performance and quality are assured with all models of Nachi Fujikoshi hydraulic pumps.
- ②Noise has been thoroughly reduced on hydraulic pumps, a general source of noise on machinery and equipment. All models such as the low-noise type IP series can be operated quietly with little noise.
- ③Attention has been paid to surface treatment and selection of materials in NACHI hydraulic pumps so that they can be applied extensively with fire-resistant hydraulic operating fluid.

Installation and Maintenance

- ①Limit the eccentricity between the drive shaft and hydraulic pump shaft to 0.05 mm, keep the angle error within 1° and use flexible couplings for connections.
- ②When operating hydraulic pumps with belts, gears and chains, prevent a radial or thrust load exceeding the allowable value from being applied on the pump shaft. Also, if necessary, install a device that prevents a load (bending force) from being applied at right angles on the shaft. Mount hydraulic pumps so that the pump shaft is horizontal.
- ③Use a rigid pump mounting base.
- ④The direction of rotation is determined on each hydraulic pump. Operate the hydraulic pump in the correct direction of rotation after checking the indicated model No. on the nameplate or the arrow indicating the direction of rotation on the body. The direction of rotation is clockwise when viewed from the shaft end.
- ⑤Limit the suction pressure to within the range -0.03 to +0.03 MPa {-0.3 to +0.3 kgf/cm²}.
- ⑥With external drain type hydraulic pumps, directly connect the drain to the tank, insert the drain pipe under the oil level, and limit the drain back pressure to 0.03 MPa {0.3 kgf/cm²}.
- ⑦When connecting steel pipes to the suction and discharge sides, prevent force pressure from being applied on the hydraulic pump by the piping.
- ⑧Set the clamping length of couplings and hydraulic pump shafts so that it is within at least 2/3 or more of the coupling width. Also, use a size of coupling that matches the shaft diameter.

- ⑨When inserting couplings into shafts, insert them gently. When removing couplings from shafts, be sure to use a pulley extractor. Avoid hitting the shaft when attaching or removing couplings.
- ⑩Connect to the suction port above the horizontal to keep oil inside hydraulic pumps.
- ⑪Provide an air bleed valve in circuits where it is difficult to release air at startup.
- ⑫Be sure to use only specified bolts on hydraulic pumps. Use 12T or equivalent.

Uni-pumps

Uni-pumps are compact pump/motor units which have a motor directly coupled to the hydraulic pump. Variable discharge volume type vane pumps and piston pumps are available. As each of these pumps are ideally integrated with the motor, they can be easily installed, and more compact equipment configurations can be achieved economically.

- Standard motor:
 - totally-enclosed splashproof housing surface flange cooled self-actuating type (totally enclosed fan-cooled type)
 - 3.7 kW to 4P or less: Class E insulation
 - 5.5 kW to 4P or more: Class B insulation
 - Voltage 200V...50/60 Hz
 - 220V...60 Hz

Management of Hydraulic Operating Fluid

- ①Use mineral oil-based hydraulic operating fluid.
- ②Provide a suction filter of about 100 to 150 mesh on the suction port.
- ③When operating hydraulic pumps at a high pressure or when using fire-resistant hydraulic operating fluid, oil contamination greatly affect pump service life. So, use a filter of 25µm or less.
- ④Consult your agent when using fire-resistant hydraulic operating fluid. When using water- or glycol-based hydraulic operating fluid, refer to page N-3 for details on applicable models of hydraulic pumps.
- ⑤For details on the viscosity of hydraulic operating fluid, refer to the separate item "Hydraulic Operating Fluid."

Terms Used in This Catalog

The following describes the meanings of the following terms used in this catalog:

- Rated pressure:
 - The maximum pressure at which a hydraulic pump can be used continuously.
- Maximum operating pressure:
 - The maximum pressure (including surge pressure) at which a hydraulic pump can be used within six seconds at most within 1/10 of the cycle time.
- Allowable peak pressure:
 - The maximum pressure (set pressure + surge pressure) that can be momentarily allowed
- The following shows the standards in Lists of Sealing Parts:
 - JIS standard B2401 (O-ring)
 - JIS standard B2407 (backup ring)
 - SAE standard AS568 (O-ring)
- Pipe apertures mentioned in this catalog that are indicated as "G*/#" comply with JIS B2351 O-ring seal systems. Note, however, that G3/4 adopts dimensions before JIS revisions were made in 1990. Nachi Fujikoshi adopts P24 as the O-ring size whereas P22.4 is stated in current JIS standards.

Calculation Formula Required when Selecting Hydraulic Pumps and Motor

1. Pump discharge flow rate

$$Q_p = \frac{q \cdot N \cdot \eta_v}{1000} \quad (\ell/\text{min})$$
 - q=discharge volume per rotation (cm³/rev)
 - N=revolution speed (min⁻¹)
 - η_v=volume efficiency
2. Power required for pump drive

$$W_{P1} = \frac{P \cdot Q_p}{60 \eta} \quad (\text{kW})$$

$$= \frac{P \cdot Q_p}{44 \eta} \quad (\text{PS})$$
 - P=discharge pressure (MPa)
 - η=overall efficiency
3. Motor revolution speed

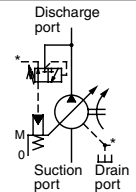
$$N = \frac{120 \cdot f}{P} \cdot (1-S) \quad (\text{min}^{-1})$$
 - f=frequency (50Hz, 60Hz)
 - P=number of motor poles
 - S=slip rate

Hydraulic Pump Selection Table

Pump Type	Name	Type Classification	Rated Pressure MPa (kgf/cm ²)	Displacement cm ³ /rev											Page			
				1	2	5	10	20	50	100	200	500	1000	2000		5000		
Variable piston pumps	PVS series variable piston pump	PVS	21 {214}	3														A-3
	Uni-pump	UPV	21 {214}	3														A-19
	PZS series variable piston pump	PZS	21 {214}						42									A-22
	PZ load-sensitive variable piston pump	PZ	21 {214}	8														A-35
	PZH series high-pressure variable piston pump	PZH	35 {357}					28										A-42
Variable discharge volume vane pumps	VDS series compact variable vane pump	VDS	7 {71.4}	3														B-1
	Uni-pump	USV	7 {71.4}	3														B-4
	VDR22 design series variable vane pump	VDR	14 {143}	5														B-6
	Uni-pump	UVD	7 {71.4}	5														B-12
	VDR13 design series variable vane pump	VDR	6 {61.2}	4														B-15
	Uni-pump	UVD	6 {61.2}	4														B-22
	VDC series high-pressure variable vane pump	VDC	14 {143}	5														B-25
	Uni-pump	UVC	7 {71.4}	5														B-37
	UVN series variable vane uni-pump	UVN	8 {81.6}	8.1														
Internal gear pump	IPH series IP pump	IPH	25 {255}	3.6														C-1
	IPH series double IP pump	IPH	21 {214}	7.2														C-14

PVS Series Variable Volume Piston Pumps

8.0 to 45.0cm³/rev
21MPa



- ❖ Design No. 30 is applied on PVS-0B to make the pump more compact and lighter, and reduce noise.
- ❖ Production of PVS-3B has been discontinued. Use PZS-3B.
- ❖ Pressure adjustment 3 type has been added to PVS-1B-22 and PVS-2B-45. (Design No. 20 is applied only on PVS-2B-45*3.)

Features

Energy-saving Type with Drastically Reduced Loss

A NACHI-proprietary semi-circular barrel swash plate that receives pressure on its surface ensures a stable discharge volume at all times. This eliminates excess

discharge volume, and enables the effective use of power corresponding to the load cycle.

This "energy-saving type" conserves energy, reduces power loss, and helps to reduce hydraulic costs.

Silent Type That Demonstrates Its Power Quietly

Proprietary low-noise mechanisms are incorporated on the shoe, swash plate, valve plate, and other locations to ensure silent operation. In particular, a semi-circular barrel swash plate stabilizes operation characteristics to ensure silent operation.

Specifications

Model No.	Volume cm ³ /rev	Discharge volume at no-load ℓ /min				Pressure adjustment range MPa {kgf/cm ² }	Permitted peak pressure MPa {kgf/cm ² }	Rotating speed min ⁻¹		Mass kg
		1000min ⁻¹	1200min ⁻¹	1500min ⁻¹	1800min ⁻¹			Min.	Max.	
PVS-0B-8*0-30 1 2 3	8.0	8.0	9.6	12.0	14.4	2 to 3.5 {20.4 to 35.7} 2 to 7 {20.4 to 71.4} 3 to 14 {30.6 to 143} 3 to 21 {30.6 to 214}	25 {255}	500	2000	7.7
PVS-1B-16*0-(*)-12 1 2 3	16.5	16.5	19.8	24.7	29.7	2 to 3.5 {20.4 to 35.7} 2 to 7 {20.4 to 71.4} 3 to 14 {30.6 to 143} 3 to 21 {30.6 to 214}	25 {255}	500	2000	10.5
PVS-1B-22*0-(*)-12 1 2 3	22.0	22.0	26.4	33.0	39.6	2 to 3.5 {20.4 to 35.7} 2 to 7 {20.4 to 71.4} 3 to 14 {30.6 to 143} 3 to 21 {30.6 to 214}	25 {255}	500	2000	10.5
PVS-2B-35*0-(*)-12 1 2 3	35.0	35.0	42.0	52.5	63.0	2 to 3.5 {20.4 to 35.7} 2 to 7 {20.4 to 71.4} 3 to 14 {30.6 to 143} 3 to 21 {30.6 to 214}	25 {255}	500	2000	21
PVS-2B-45*0-(*)-12 1 2 3(*)-20	45.0	45.0	54.0	67.5	81.0	2 to 3.5 {20.4 to 35.7} 2 to 7 {20.4 to 71.4} 3 to 14 {30.6 to 143} 3 to 21 {30.6 to 214}	25 {255}	500	2000	21

Note) 1. The standard direction of rotation is clockwise when viewed from the shaft end. Consult your agent separately for a counterclockwise direction of rotation.
2. A keyed straight shaft is standard. For details on spline shafts, consult your agent separately.

- Handling
- Cautions during Pump Installation and Piping

- 1 Use flexible couplings for connecting the pump shaft to the drive shaft, and prevent a radial or thrust load from being applied on the pump shaft.
- 2 For centering of the pump shaft, limit the eccentricity between the drive shaft and hydraulic pump shaft to 0.05 mm, and keep the angle error within 1°.
- 3 Set the clamping length of couplings and hydraulic pump shafts so that it is within at least 2/3 or more of the coupling width.
- 4 Use a sufficiently rigid pump mounting base.
- 5 Set the pressure on the pump suction side to -0.03 MPa or more (suction port flow velocity within 2 m/sec).
- 6 Raise part of the drain piping to above the topmost part of the pump body, and

insert the return section of the drain piping into the hydraulic operating fluid. Also, observe the values in the following table to limit the drain back pressure to 0.1 MPa.

Item	Model No.	PVS-0B	PVS-1B	PVS-2B
Pipe joint size		3/8" or more		1/2" or more
Pipe I.D		φ7.6 mm dia or more		φ12 mm dia or more
Pipe length		1m or less		1m or less

- Management of Hydraulic Operating Fluid

- 1 Use good-quality hydraulic operating fluid, and use within a kinematic viscosity range of 20 to 200 mm²/sec during operation. Use an R&O type and anti-wear hydraulic fluid of ISO-VG32 to 68. The optimum kinematic viscosity during operation is 20 to 50 mm²/sec.

- 2 The operating temperature range is 5 to 60°C. When the oil temperature at start-up is 5°C or less, warm up the hydraulic pump by low-pressure, low-operation speed operation until the oil temperature reaches 5°C.
- 3 Provide a suction strainer with a filtering grade of about 100μm (150 mesh). Be sure to provide a return line filter of grade 20μm or less on the return line to the tank. (When the hydraulic pump is used at a high pressure of 14 MPa or more, we recommend providing a filter of 10μm or less.)
- 4 Manage the hydraulic operating fluid so that contamination is maintained at class NAS10 or lower.
- 5 Use hydraulic operating fluid within an operating ambient temperature of 0 to 60°C.

(continued on following page)

● Cautions at Startup

- 1 Before you start pump operation, fill the pump body with clean hydraulic operating fluid via the lubrication port.
- 2 An unload is required when the motor is started under condition λ-Δ. Consult your agent regarding the circuit.
- 3 Make sure that the pump operates in the direction of rotation the same as that indicated by the arrow on the pump body.

Model No.	Injection amount cm ³
PVS-0B-8	220
PVS-1B-16, 22	300
PVS-2B-35, 45	650

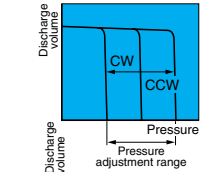
4 Air entering the pump or pipes may cause noise or vibration. At startup, set the pump discharge side to a no-load state, and operate the pump in the inching mode to release any air in the pump or pipes.

5 Provide an air bleed valve in circuits where it is difficult to release air at start-up. (See "IP Pumps" on page C-13.)

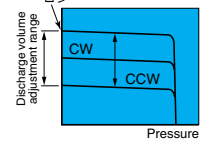
● How to Set Pressure and Discharge Volume

The default pump discharge volume is set to "maximum" and default discharge pressure is set to "minimum". Change the discharge volume and discharge pressure settings according to your particular operating conditions.

[Pressure adjustment]
Turning the pressure adjusting screw CW increases the pressure.



[Discharge volume adjustment]
Turning the flow rate adjusting screw CW decreases the discharge volume.



[Note]

- For details regarding the relationship between flow rate adjustment length l and pump capacity q , see the tables provided in the installation dimension drawings for each of the pumps.
- Firmly tighten the lock nuts after you have finished adjustments.

[Note]

● Variable control mechanism

Standard type

N* : Pressure compensation type (manual mode)

Option type

P* : Pressure compensation type (remote control mode)

N*Q* : 2-pressure, 2-flow rate control

R^AS_⊗ : Solenoid cutoff control

W^AS_⊗ : 2-pressure control

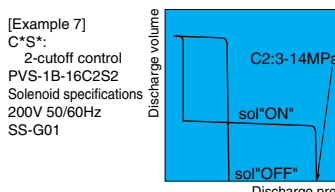
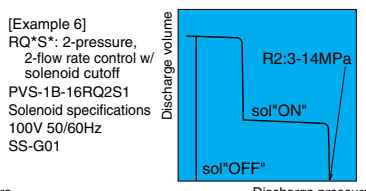
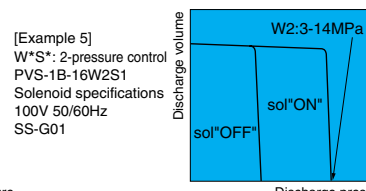
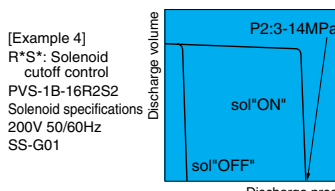
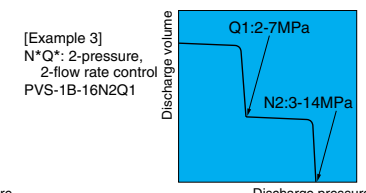
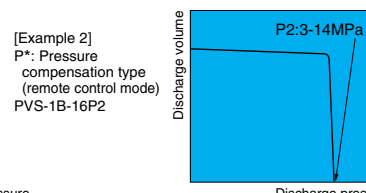
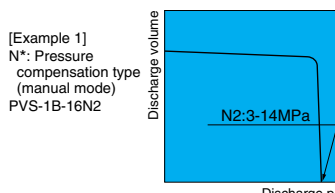
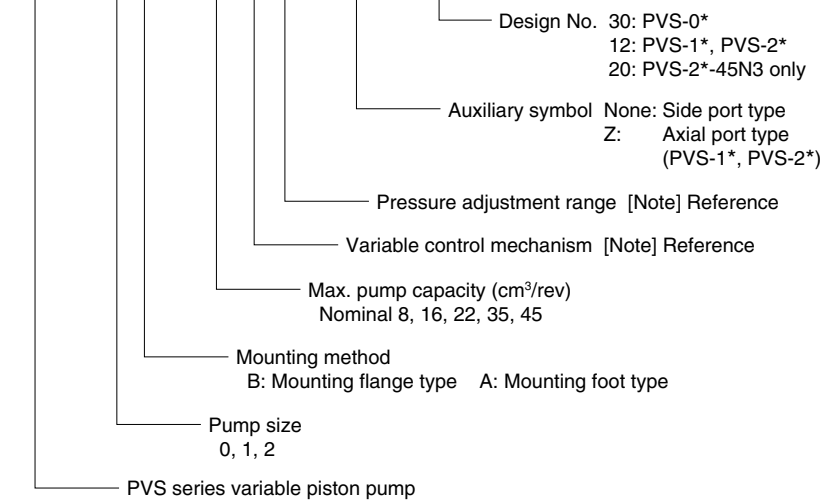
RQ^AS_⊗ : 2-pressure, 2-flow rate control w/ solenoid cutoff

C^AS_⊗ : 2-cutoff control

- * : Pressure adjustment range
 - 0 : 2 to 3.5MPa {20.4 to 35.7kgf/cm²}
 - 1 : 2 to 7MPa {20.4 to 71.4kgf/cm²}
 - 2 : 3 to 14MPa {30.6 to 143kgf/cm²}
 - 3 : 3 to 21MPa {30.6 to 214kgf/cm²}
- ⊗ : Applicable to solenoid specifications A, S
 - A⊗ : SA-G01
 - S⊗ : SS-G01
 - 1 : 100V 50/60Hz
 - 2 : 200V 50/60Hz
 - 3 : DC12V
 - 4 : DC24V

Explanation of model No

PVS - 1 B - 16 N 2 - (*) - 12



■ NQ, RS, WS, RQS and CS types are not available for the PVS-0B-8, and the NQ, RQS and CS types are not available for the PVS-1B-16-Z and PVS-2B-35-Z.

Variable Control Mechanisms

Standard type

Symbol	External View	Characteristics	Hydraulic Circuit	Explanation
N				<p>Pressure compensation type (manual system)</p> <p>When the discharge pressure reaches the preset volume set by the pressure compensator, the discharge volume is automatically reduced to hold the pressure at the set pressure.</p>

Option type

P				<p>Pressure compensation type (remote control mode)</p> <p>This mode demonstrates the same characteristics as the manual mode. The discharge pressure can be adjusted by external pilot pressure. The discharge volume can be adjusted manually. Note 2)</p>
NQ				<p>2-pressure, 2-flow rate control type</p> <p>The discharge volume changes in two stages by the pump's built-in sequence valve. This allows conventional high/ low pressure control to be performed on a single pump unit, and save energy in the hydraulic circuit.</p>
RS (RA)				<p>Solenoid cutoff control type</p> <p>A solenoid valve for unload is integrated into the pressure compensation type to minimize energy loss when pump output is not required. Only a slight amount of heat is generated.</p>
WS (WA)				<p>2-pressure control type</p> <p>Two pressure compensation types can be obtained by switching the solenoid valve ON/OFF. Two types of output control are possible with the actuator set to a constant speed.</p>
RQS (RQA)				<p>2-pressure, 2-flow rate control type w/ solenoid cutoff</p> <p>The discharge volume can be changed in two stages by the sequencer valve and solenoid valve for unload mounted on the pump, and unloading is possible when pressure oil is not required.</p>
CS (CA)				<p>2-cutoff control type</p> <p>Two types of pressure - flow rate characteristics can be obtained by the solenoid valve and cylinder mounted on the pump.</p>

Note 1) Many other variable control mechanism are also available in addition to those in the above table. Please consult your agent for details.

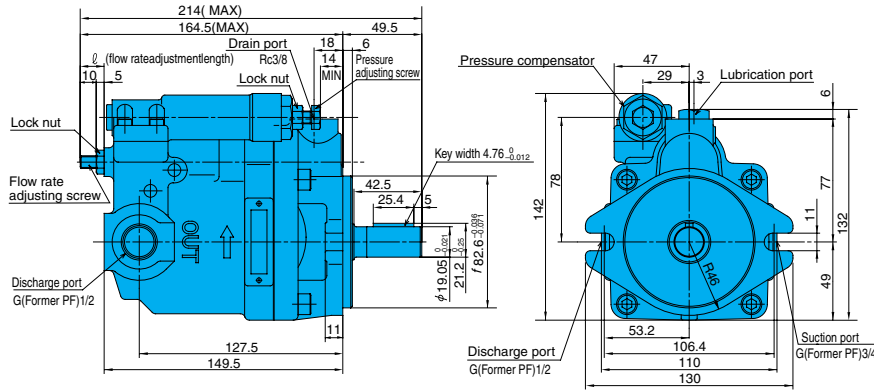
Note 2) We recommend ZR-T02-*5895* as the remote control valve. For details, consult your agent. Prevent the pipe volume up to the remote control valve from falling below 150cm³.

Pressure Compensation Type

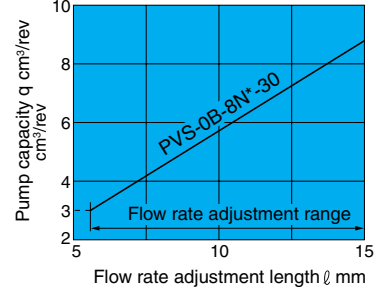
Manual mode: standard type

PVS-0B-8N*-30

Installation Dimension Drawing

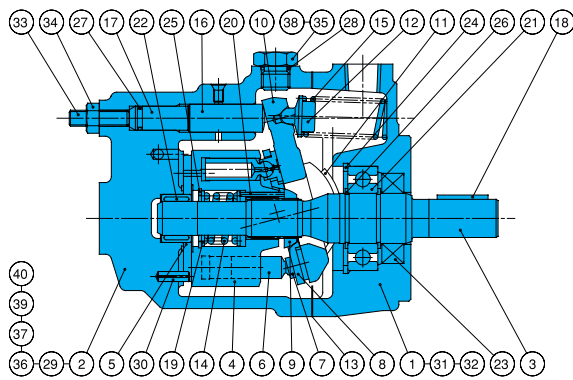


Relationship between flow rate adjustment length (l) and pump capacity (q)



Set a flow rate adjustment length within the above range. Oil will leak if the pump is operated below the adjustment range lower limit.

Cross-sectional Drawing



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	15	Spring S	29	Parallel pin
2	Case	16	Control piston	30	Spring pin
3	Shaft	17	Guide pin	31	Hexagon socket head bolt
4	Cylinder barrel	18	Parallel key	32	Cross-recessed countersunk head screw
5	Valve plate	19	Retainer	33	Hexagon socket set screw
6	Piston	20	Needle	34	Hexagon nut
7	Shoe	21	Ball bearing	35	Hexagon plug
8	Shoe holder	22	Needle bearing	36	Metal plug
9	Barrel holder	23	Oil seal	37	Nameplate
10	Swash plate	24	Snap ring	38	Lubrication port plate
11	Thrust bush	25	Snap ring	39	CAUTION plate
12	Spring holder	26	Snap ring	40	Rivet
13	Gasket	27	O-ring		
14	Spring C	28	O-ring		

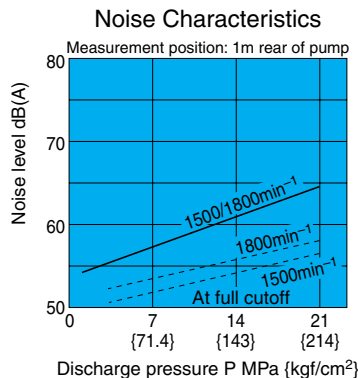
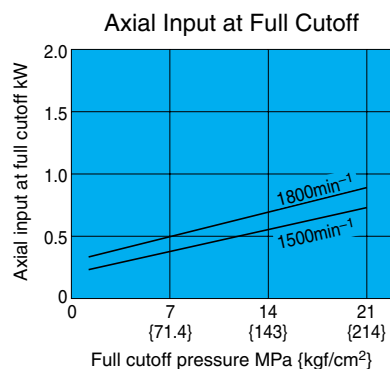
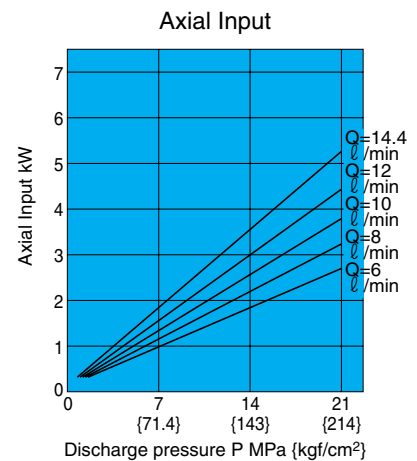
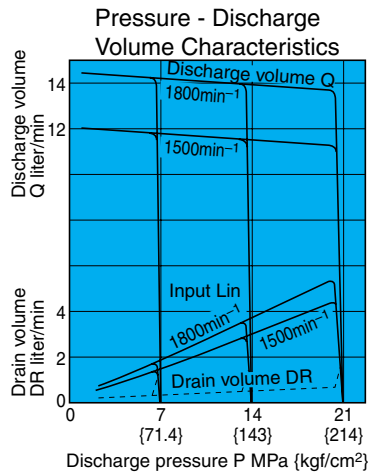
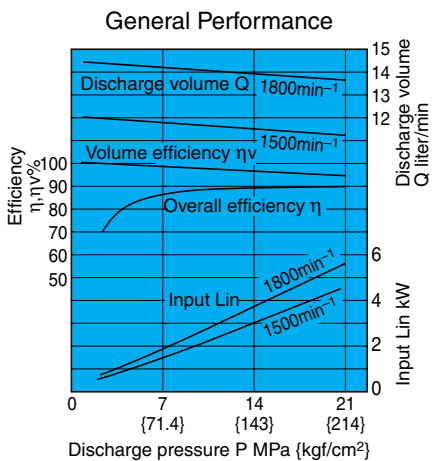
List of Sealing Parts

Part No.	Part Name	Qty	PVS-0B-8	
			Size	Remarks
13	Packing	1	PS46-100000	3 Bond
23	Oil seal	1	TCV-254511	N.O.K
27	O-ring	1	1B-P9	JIS B 2401
28	O-ring	1	1B-P11	JIS B 2401

Parts marked by an asterisk "*" are not available on the market. Consult your agent.

Performance Curves

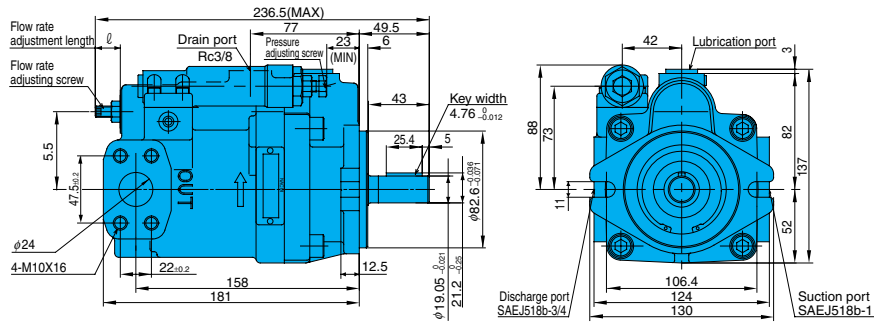
Typical characteristics at hydraulic operating fluid kinematic viscosity of 32 mm²/s



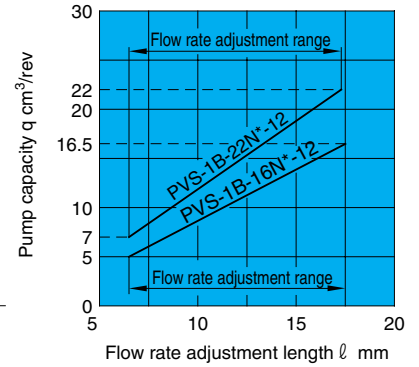
Installation Dimension Drawing

PVS-1B-16¹⁶N*(Z)-12

(side port type)

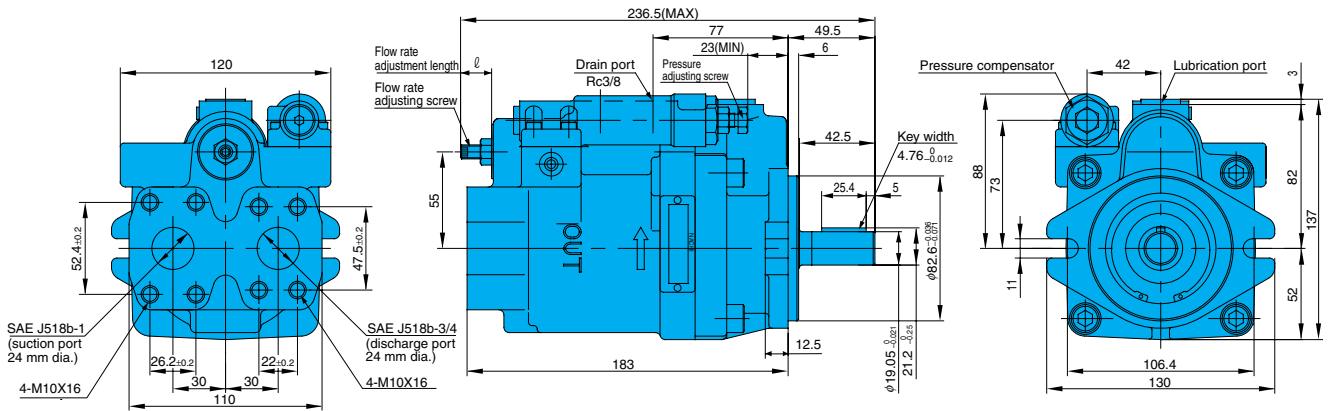


Relationship between flow rate adjustment length (ℓ) and pump capacity (q)

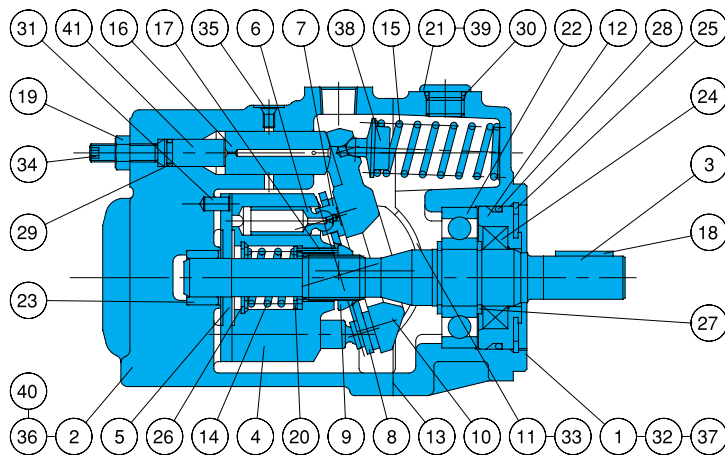


Set a flow rate adjustment length within the above range. Oil will leak if the pump is operated below the adjustment range lower limit.

(axial port type)



Cross-sectional Drawing



Part No.	Part Name	Part No.	Part Name
1	Body	22	Ball bearing
2	Case	23	Needle bearing
3	Shaft	24	Oil seal
4	Cylinder barrel	25	Snap ring
5	Valve plate	26	Snap ring
6	Piston	27	Snap ring
7	Shoe	28	O-ring
8	Shoe holder	29	O-ring
9	Barrel holder	30	O-ring
10	Swash plate	31	Pin
11	Thrust bush	32	Hexagon socket head bolt
12	Seal holder	33	Cross-recessed countersunk head screw
13	Gasket	34	Hexagon socket set screw
14	Spring C	35	Metal plug
15	Spring S	36	Nameplate
16	Control piston	37	CAUTION plate
17	Needle	38	Spring holder
18	Key	39	Lubrication port plate
19	Nut	40	Rivet
20	Retainer	41	Guide pin
21	Plug		

List of Sealing Parts

Part No.	Name	Q'ty	Size	Remarks
13	Gasket	1	*	Nihon Gasket
24	Oil seal	1	TCN-254511	N.O.K
28	O-ring	1	1B-G55	JIS B 2401
29	O-ring	1	1B-P9	JIS B 2401
30	O-ring	1	1B-P14	JIS B 2401

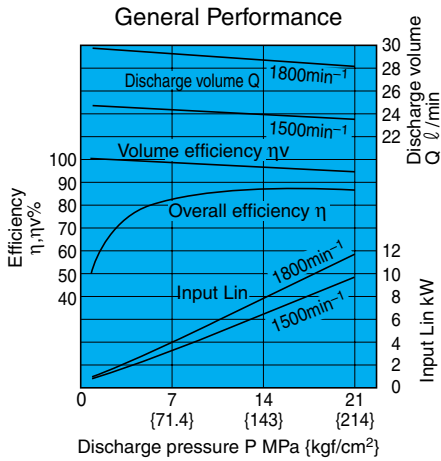
Parts marked by an asterisk "*" are not available on the market. Consult your agent.

Performance Curves

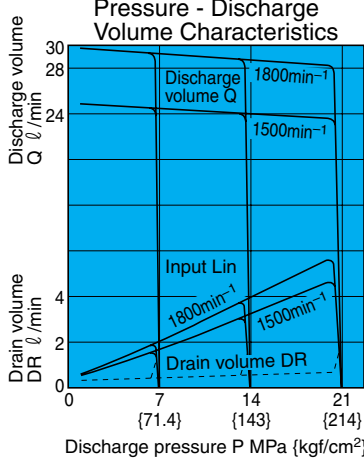
Typical characteristics at hydraulic operating fluid kinematic viscosity of 32 mm²/s

PVS-1B-16N*(Z)-12

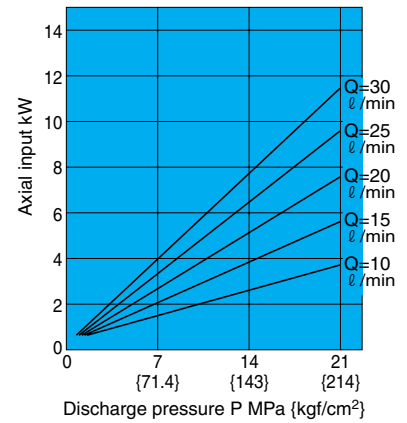
General Performance



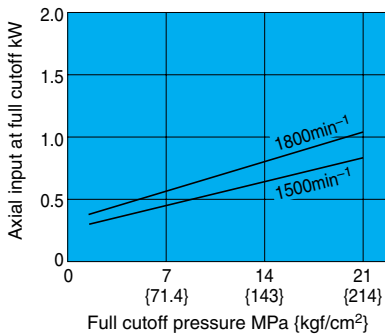
Pressure - Discharge Volume Characteristics



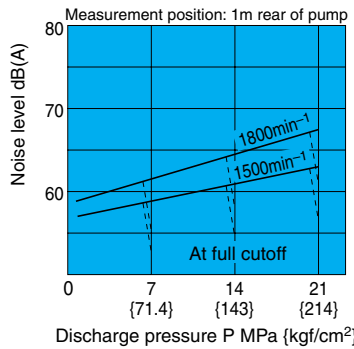
Axial Input



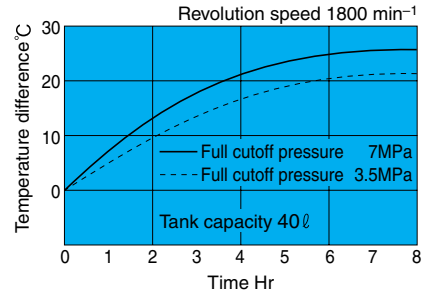
Axial Input at Full Cutoff



Noise Characteristics



Oil Temperature Rise Characteristics PVS-1B-16N1-12

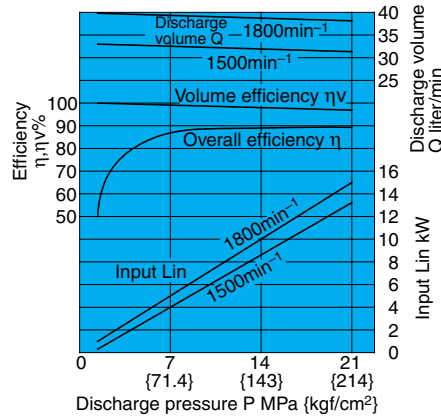


Performance Curves

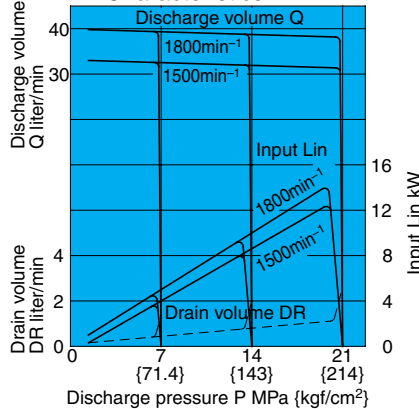
Typical characteristics at hydraulic operating fluid kinematic viscosity of 32 mm²/s

PVS-1B-22N*(Z)-12

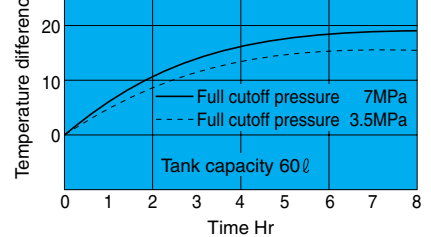
General Performance



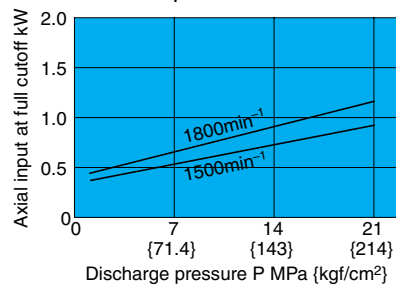
Pressure - Flow Rate Characteristics



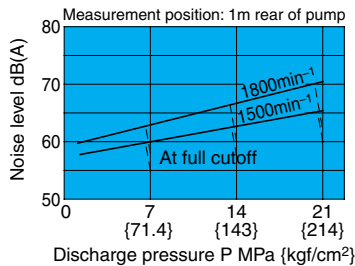
Oil Temperature Rise Characteristics PVS-1B-22N1-12



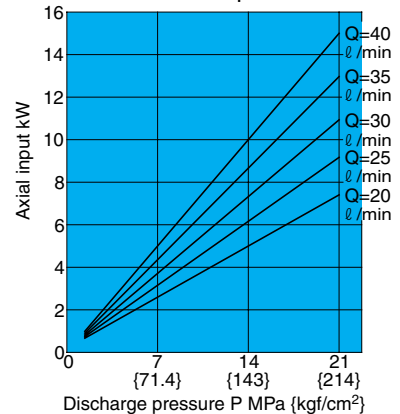
Axial input at full cutoff kW



Noise Characteristics



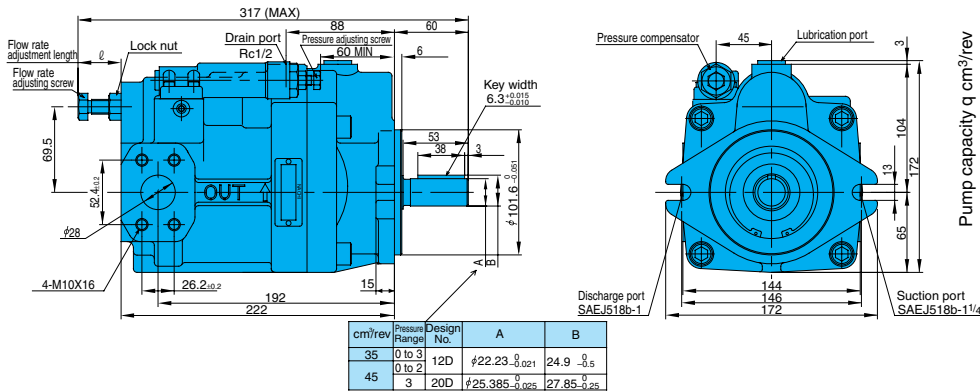
Axial Input



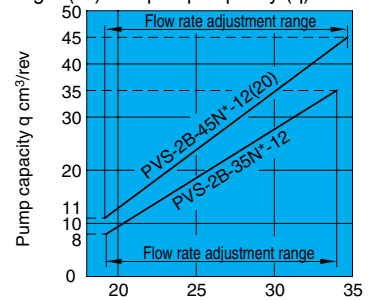
Installation Dimension Drawing

PVS-2B-³⁵/₄₅N*(Z)-12(20)

(side port type)



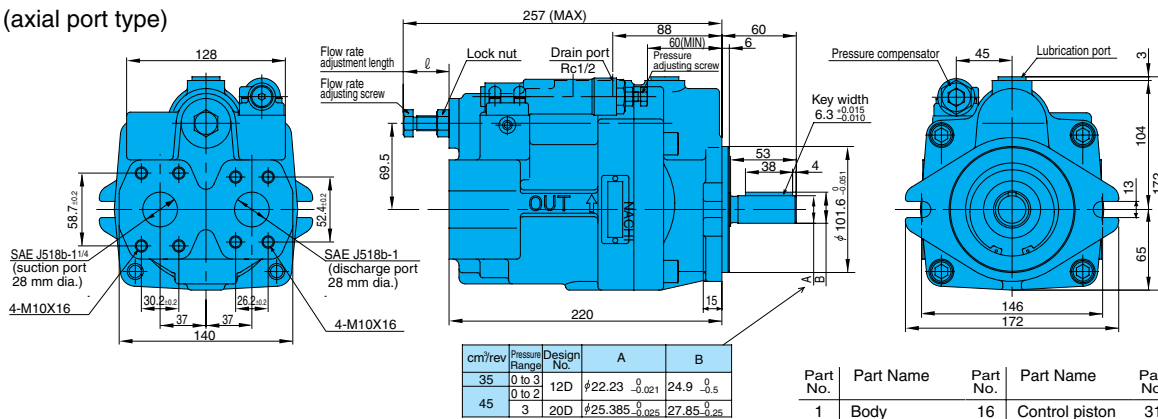
Relationship between flow rate adjustment length (ℓ) and pump capacity (q)



Flow rate adjustment length ℓ mm

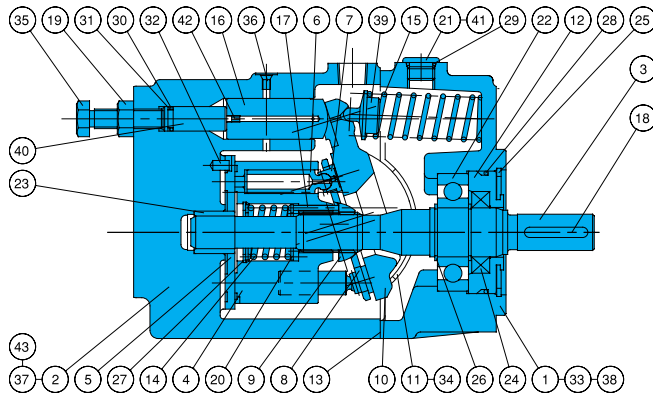
Set a flow rate adjustment length within the above range. Oil will leak if the pump is operated below the adjustment range lower limit.

(axial port type)

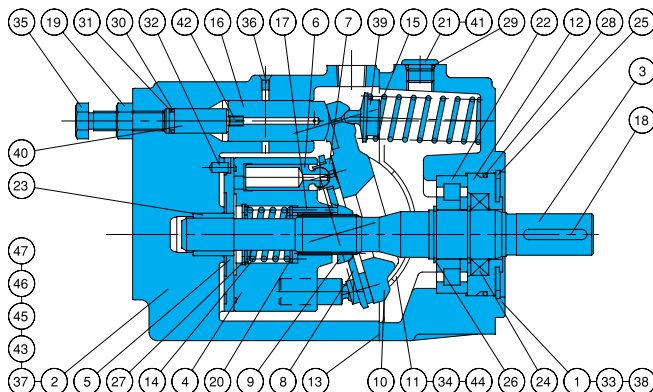


Cross-sectional Drawing

PVS-2B-³⁵/₄₅N*(Z)-12



PVS-2B-45N3(Z)-20



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	16	Control piston	31	Backup ring
2	Case	17	Needle	32	Pin
3	Shaft	18	Key	33	Hexagon socket head bolt
4	Cylinder barrel	19	Nut	34	Cross-recessed countersunk head screw
5	Valve plate	20	Retainer	35	Flow rate adjusting screw
6	Piston	21	Plug	36	Metal plug
7	Shoe	22	Ball bearing	37	Nameplate
8	Shoe holder	23	Needle bearing	38	CAUTION plate
9	Barrel holder	24	Oil seal	39	Spring holder
10	Swash plate	25	Snap ring	40	Guide
11	Thrust bush	26	Snap ring	41	Lubrication port plate
12	Seal holder	27	Snap ring	42	Orifice
13	Gasket	28	O-ring	43	Rivet
14	Spring C	29	O-ring		
15	Spring S	30	O-ring		

List of Sealing Parts

Part No.	Part Name	Qty	PVS-2B-35/45	
			Size	Remarks
13	Gasket	1	*	Nihon Gasket
24	Oil seal	1	TCN-305011Z	N.O.K
28	O-ring	1	1B-G70	JIS B 2401
29	O-ring	1	1B-P14	JIS B 2401
30	O-ring	1	1B-P11	JIS B 2401
31	Backup ring	1	T2-P11	JIS B 2407

Parts marked by an asterisk "*" are not available on the market. Consult your agent.

Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
2	Case	18	Key	34	Cross-recessed countersunk head screw
3	Shaft	19	Nut	35	Flow rate adjusting screw
4	Cylinder barrel	20	Retainer	36	Metal plug
5	Valve plate	21	Plug	37	Nameplate
6	Piston	22	Roller bearing	38	CAUTION plate
7	Shoe	23	Needle bearing	39	Spring holder
8	Shoe holder	24	Oil seal	40	Guide
9	Barrel holder	25	Snap ring	41	Lubrication port plate
10	Swash plate	26	Snap ring	42	Orifice
11	Thrust bush	27	Snap ring	43	Rivet
12	Seal holder	28	O-ring	44	Orifice
13	Gasket	29	O-ring	45	Pin
14	Spring C	30	O-ring	46	O-ring
15	Spring S	31	Backup ring	47	Plug
16	Control piston	32	Pin		

List of Sealing Parts

Part No.	Part Name	Qty	PVS-2B-45N3	
			Size	Remarks
13	Gasket	1	*	Nihon Gasket
24	Oil seal	1	TCN-305011Z	N.O.K
28	O-ring	1	1B-G70	JIS B 2401
29	O-ring	1	1B-P14	JIS B 2401
30	O-ring	1	1B-P11	JIS B 2401
46	O-ring	2	1B-P5	JIS B 2401
31	Backup ring	1	T2-P11	JIS B 2407

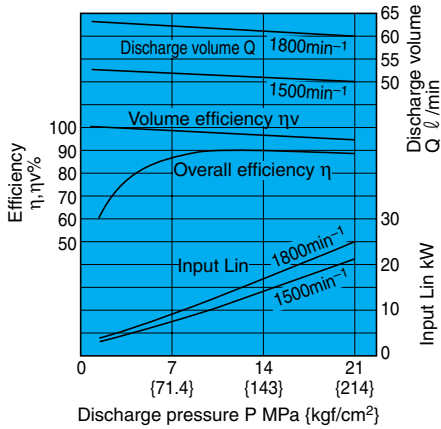
Parts marked by an asterisk "*" are not available on the market. Consult your agent.

Performance Curves

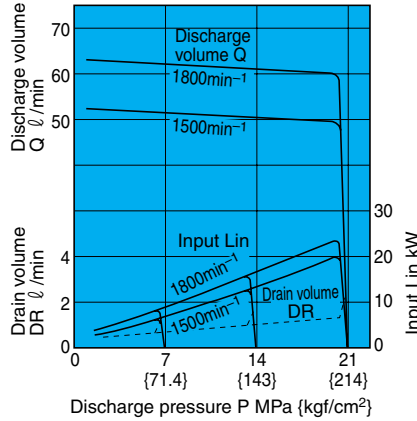
Typical characteristics at hydraulic operating fluid kinematic viscosity of 32 mm²/s

PVS-2B-35N^{*}-(Z)-12

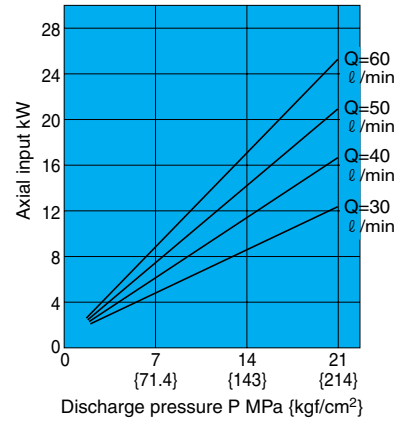
General Performance



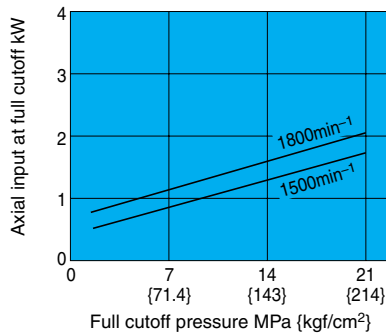
Pressure - Discharge Volume Characteristics



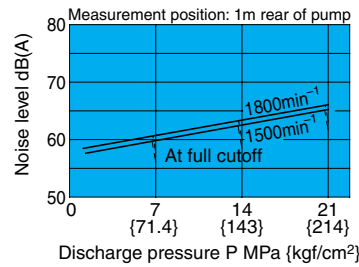
Axial Input



Axial Input at Full Cutoff



Noise Characteristics

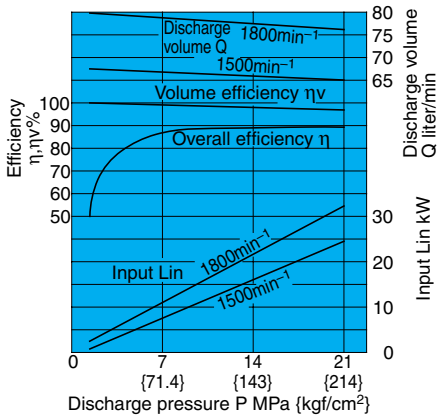


Performance Curves

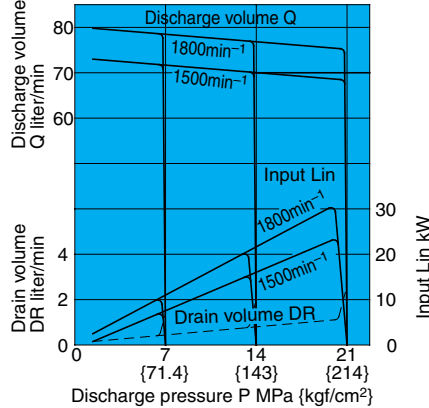
Typical characteristics at hydraulic operating fluid kinematic viscosity of 32 mm²/s

PVS-2B-45N^{*}-(Z)-12(20)

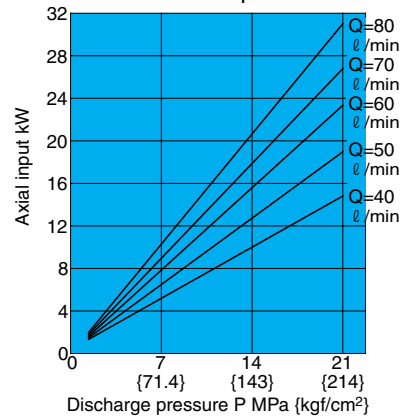
General Performance



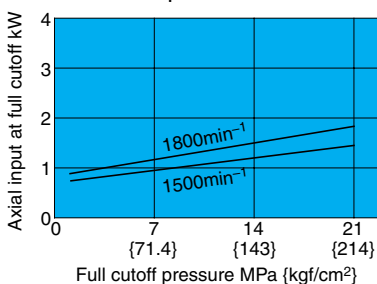
Pressure - Discharge Volume Characteristics



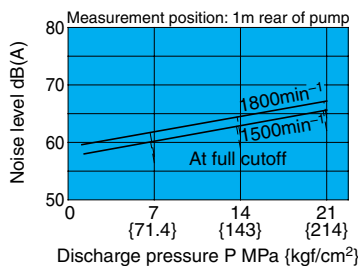
Axial Input



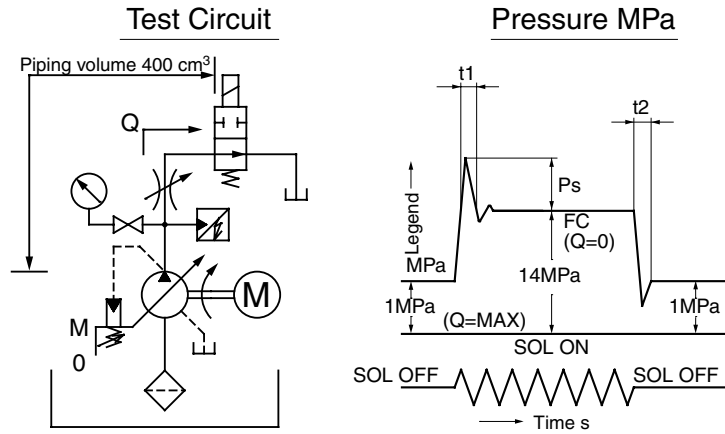
Axial Input at Full Cutoff



Noise Characteristics



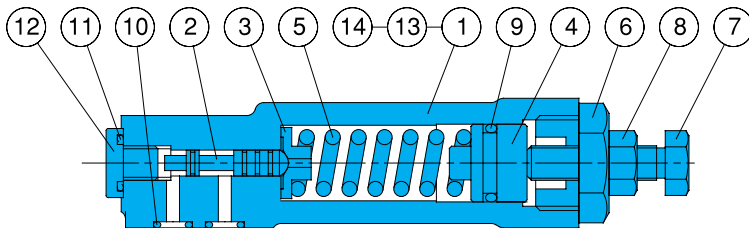
Response Performance



Model No.	Response Time (s)		Surge Pressure MPa{kgf/cm ² }
	t ₁	t ₂	P _s
PVS-0B-8	0.03 to 0.04	0.04 to 0.06	2 to 4{20.4 to 40.8}
PVS-1B-16	0.05 to 0.06	0.07 to 0.08	4 to 7{40.8 to 71.4}
PVS-1B-22	0.05 to 0.06	0.07 to 0.08	5 to 8{51 to 81.6}
PVS-2B-35	0.05 to 0.06	0.05 to 0.07	6 to 9{61.2 to 91.8}
PVS-2B-45	0.05 to 0.06	0.05 to 0.07	6 to 9{61.2 to 91.8}

Response performance changes according to pipe volume and size.
Use an anti-surfing valve to prevent surge voltage.

Pressure Compensator



Part No.	Part Name	Part No.	Part Name
1	Body	8	Nut
2	Spool	9	O-ring
3	Holder	10	O-ring
4	Plunger	11	O-ring
5	Spring	12	Plug
6	Retainer	13	Plug
7	Pressure adjusting bolt	14	Mounting bolt

List of Sealing Parts

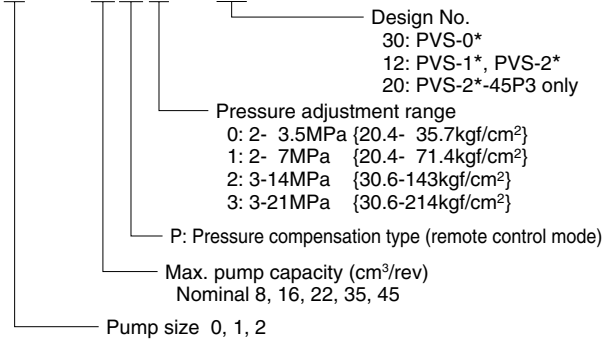
Part No.	Name	Q'ty	Size
			For 0B, 1B, 2B
9	O-ring	1	1A-P14
10	O-ring	3	1B-P6
11	O-ring	1	1B-P10

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.

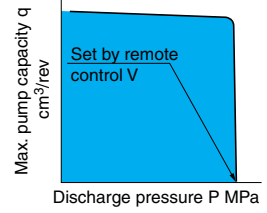
Pressure Compensation Type

(remote control mode)

Explanation of model No.: **PVS - 0 B - 8 P * - 30**

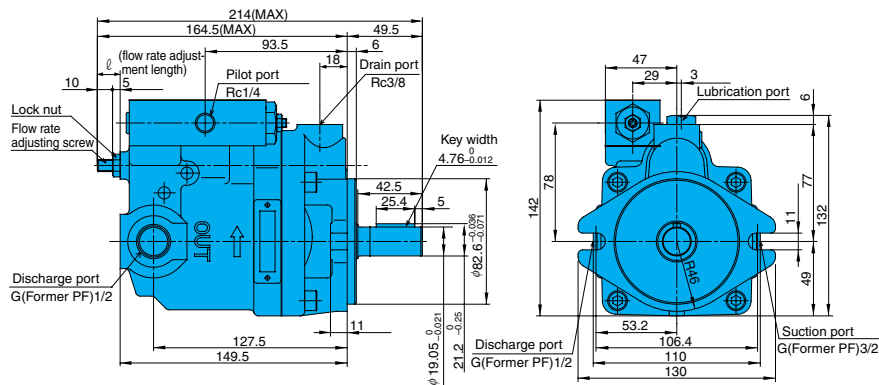


P-Q Characteristics

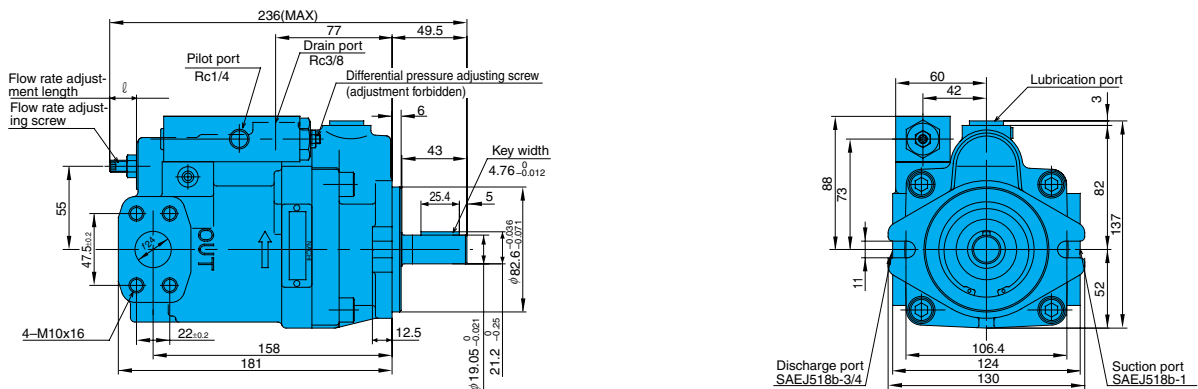


Installation Dimension Drawing

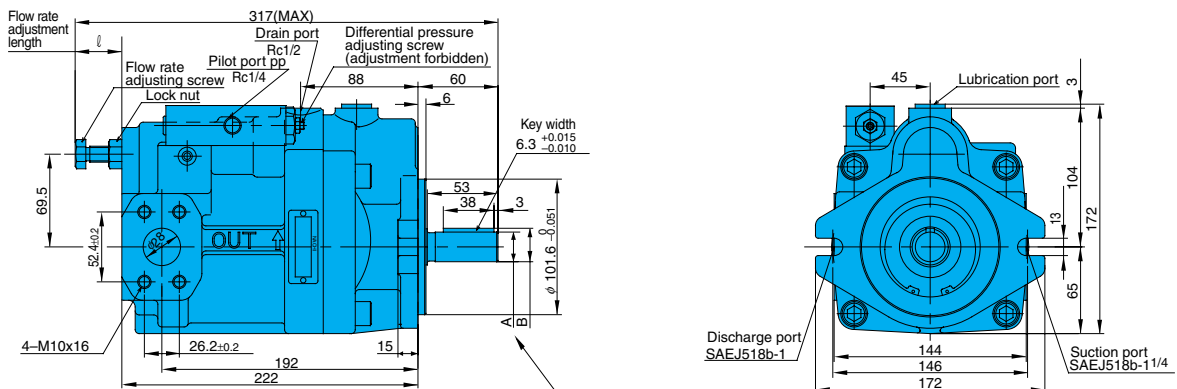
PVS-0B-8P*-30



PVS-1B-¹⁶/₂₂P*-12



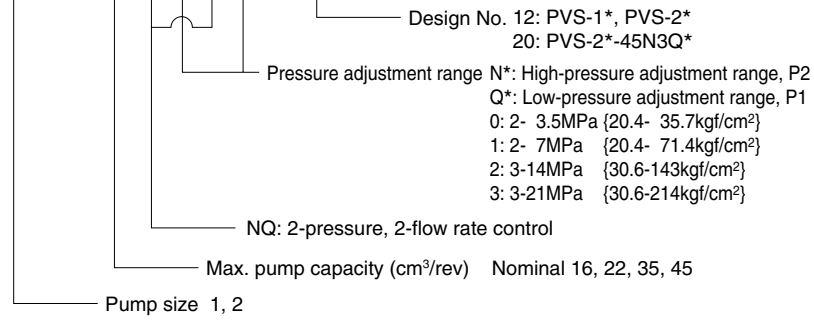
PVS-2B-³⁵/₄₅P*-12(20)



cm ³ /rev	Pressure Range	Design No.	A	B
35	0 to 3	12D	φ22.23 ⁰ _{-0.021}	24.9 ⁰ _{-0.5}
45	0 to 2	3	φ25.385 ⁰ _{-0.025}	27.85 ⁰ _{-0.25}

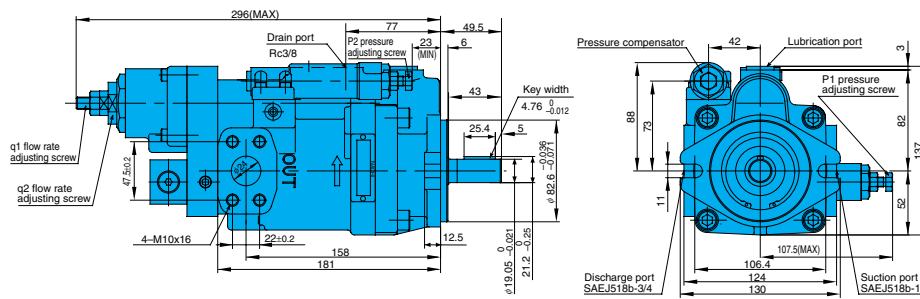
2-pressure, 2-flow Rate Control Type

Explanation of model No.: **PVS - 1 B - 16 N 3 Q 1 - 12**

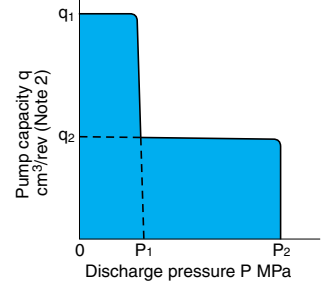


Installation Dimension Drawing

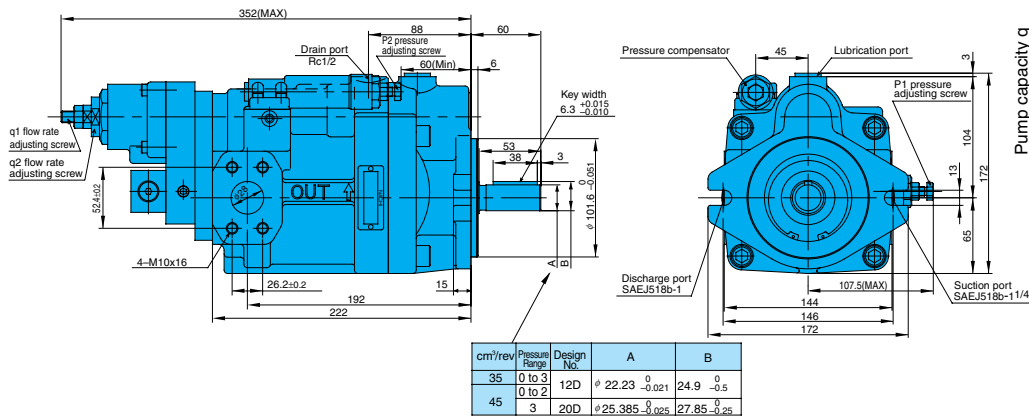
PVS-1B-¹⁶/₂₂N*Q*-12



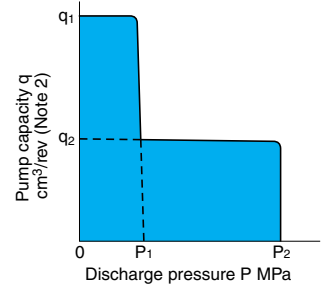
P-Q Characteristics



PVS-2B-³⁵/₄₅N*Q*-12(20)



P-Q Characteristics



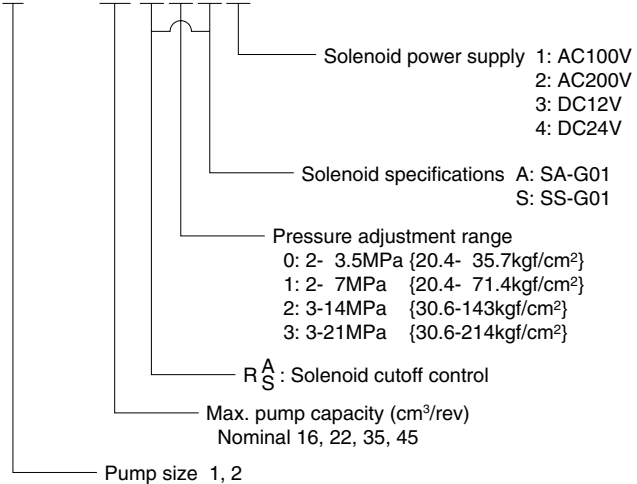
Pump Model No.	q ₂ Adjustment Range (cm ³ /rev)	Default q ₂ (Setting cm ³ /rev)
PVS-1B-16	0 to 10	3.3
PVS-1B-22	0 to 13	4.4
PVS-2B-35	0 to 19	7
PVS-2B-45	0 to 24	9

Note 1) The setting range of maximum pump capacity q₁ varies according to the setting of q₂.

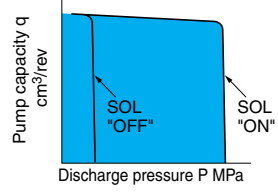
Note 2) Overall efficiency at a low flow rate is worse than at the maximum flow rate. Pay attention to this when selecting the motor capacity for the drive.

Solenoid Cutoff Control Type

Explanation of model No.: **PVS - 1 B - 16 R 2 S 1 - 12**

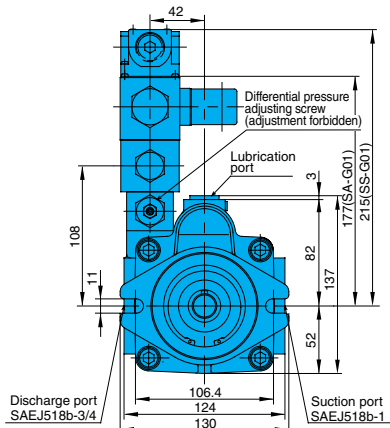
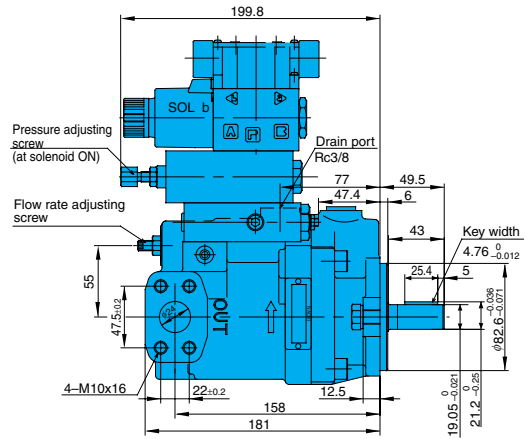


P-Q Characteristics

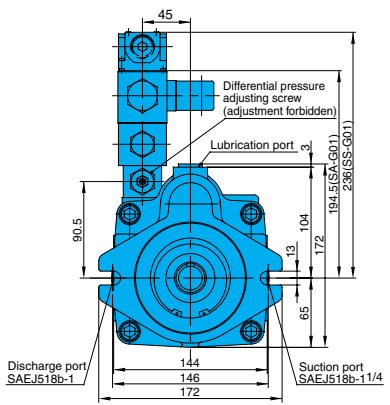
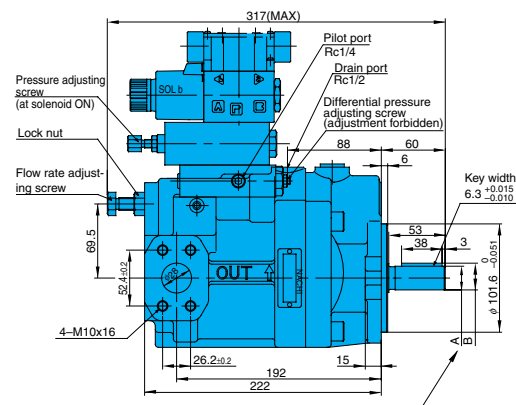


Installation Dimension Drawing

PVS-1B-16R^AS-12



PVS-2B-35R^AS-12(20)

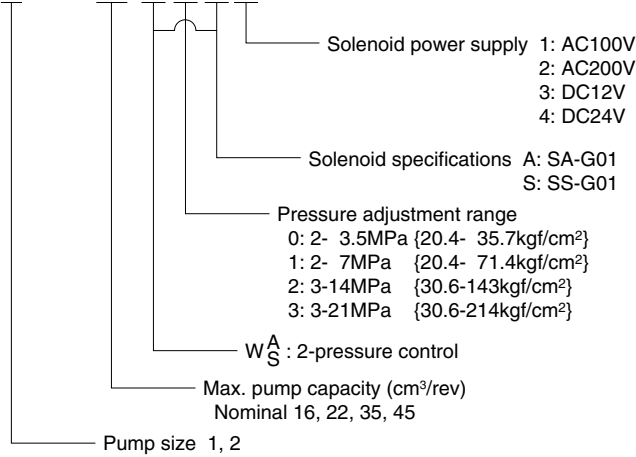


cm ³ /rev	Pressure Range	Design No.	A	B
35	0 to 3	12D	22.23 ⁰ _{-0.021}	24.9 ⁰ _{-0.5}
45	0 to 2	3	25.385 ⁰ _{-0.025}	27.85 ⁰ _{-0.25}

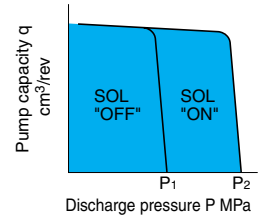
■ The coil surface temperature increases if this pump is kept continuously energized.
Do not touch the surface of the coil directly with your hands.

2-pressure Control Type

Explanation of model No.: **PVS - 1 B - 16 W 2 S 1 - 12**

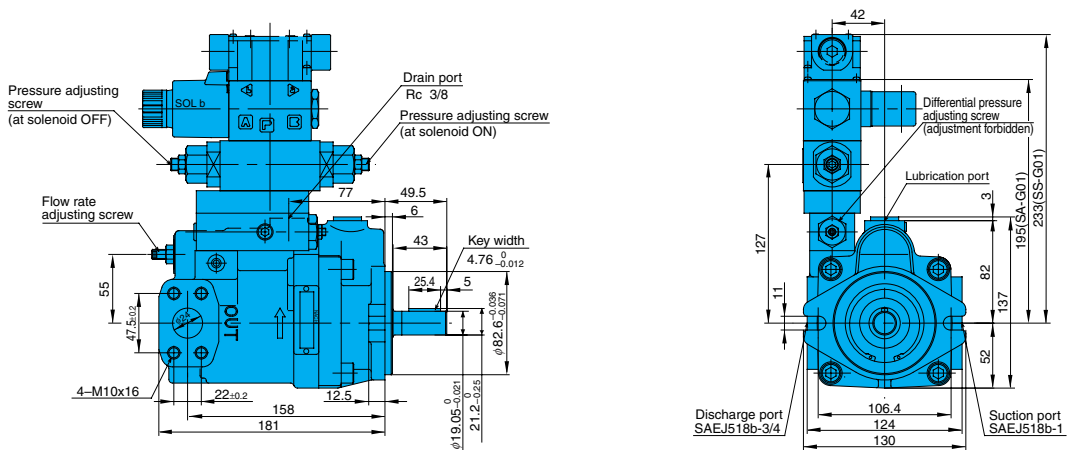


P-Q Characteristics

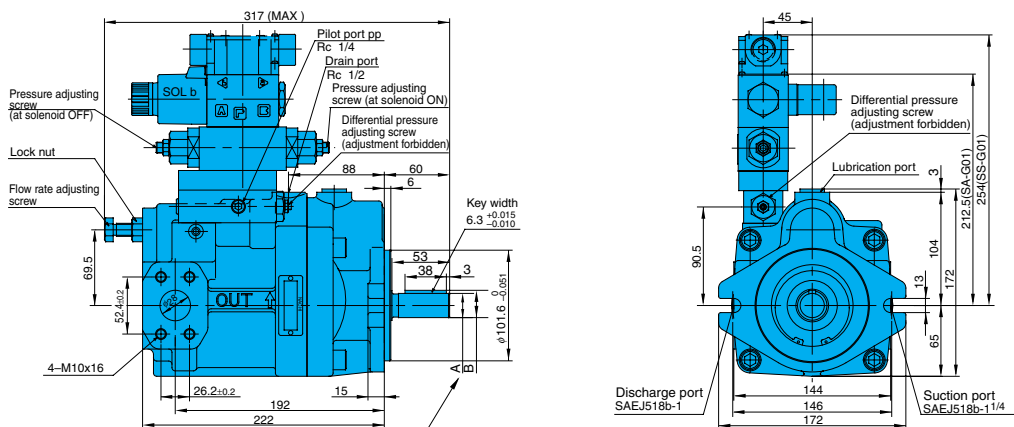


Installation Dimension Drawing

PVS-1B-¹⁶/₂₂W^A/_S-12



PVS-2B-³⁵/₄₅W^A/_S-12(20)

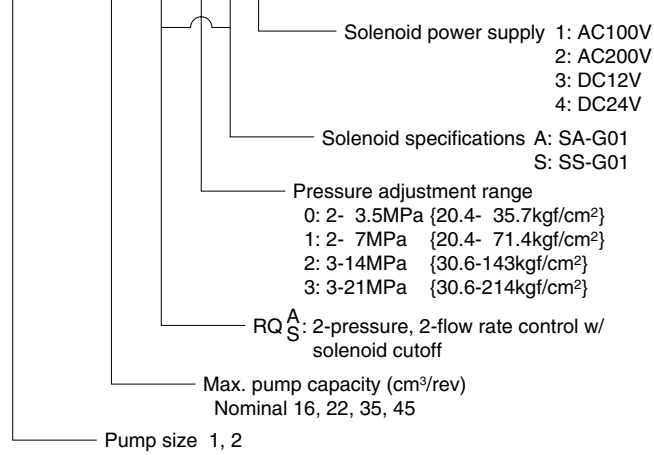


cm ³ /rev	Pressure Range	Design No.	A	B
35	0 to 3	12D	φ 22.23 ⁰ / _{-0.021}	24.9 ⁰ / _{-0.5}
45	0 to 2	20D	φ 25.385 ⁰ / _{-0.025}	27.85 ⁰ / _{-0.25}

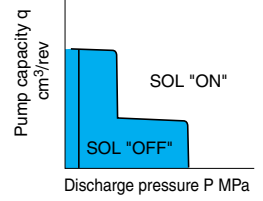
■ The coil surface temperature increases if this pump is kept continuously energized.
 Do not touch the surface of the coil directly with your hands.

2-pressure, 2-flow rate Control Type w/ Solenoid Cutoff

Explanation of model No.: **PVS - 1 B - 16 RQ 2 S 1 - 12**

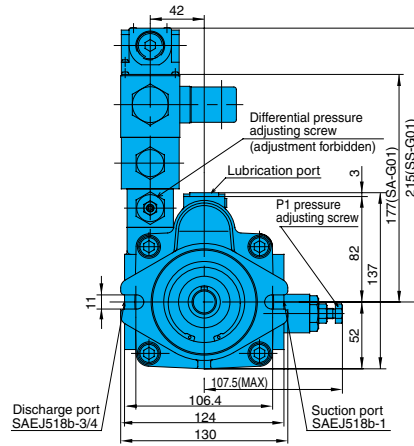
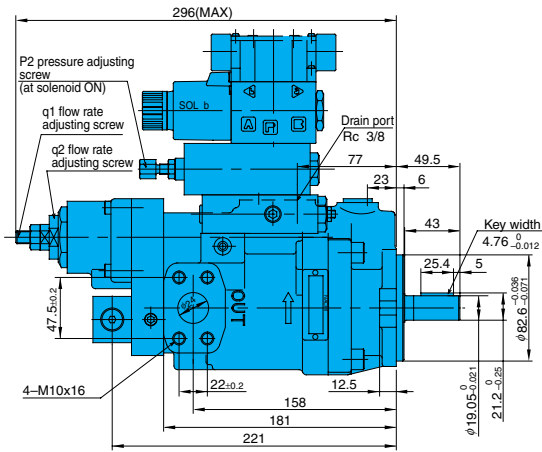


P-Q Characteristics

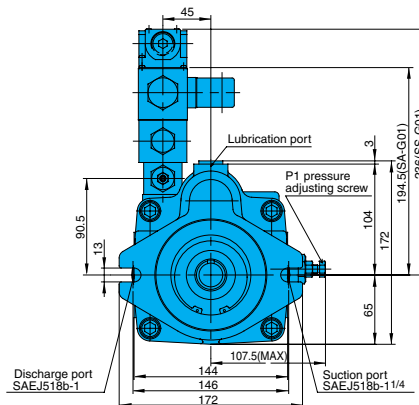
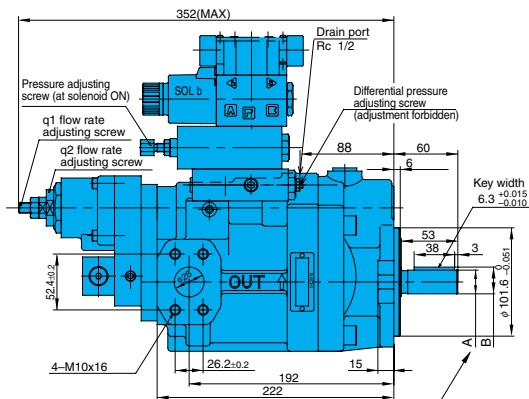


Installation Dimension Drawing

PVS-1B-16RQ^A_S-12



PVS-2B-35RQ^A_S-12(20)

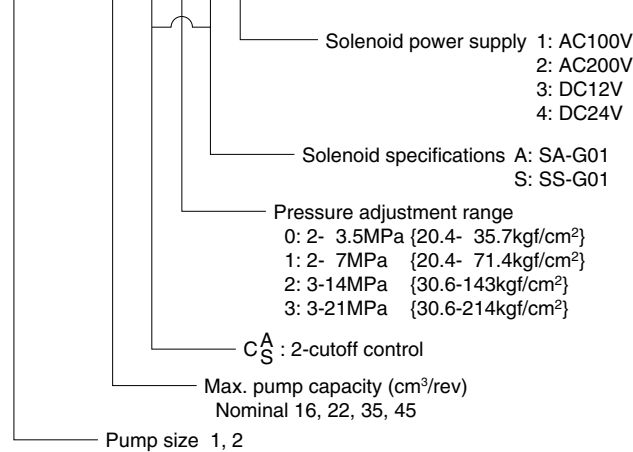


cm ³ /rev	Pressure Range	Design No.	A	B
35	0~3	12D	φ 22.23 ⁰ _{-0.021}	24.9 ⁰ _{-0.5}
45	0~2	3	φ 25.385 ⁰ _{-0.025}	27.85 ⁰ _{-0.25}

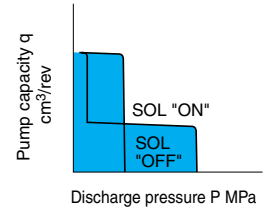
■ The coil surface temperature increases if this pump is kept continuously energized.
 Do not touch the surface of the coil directly with your hands.

2-cutoff Control Type

Explanation of model No.: **PVS - 1 B - 16 C 2 S 1 - 12**

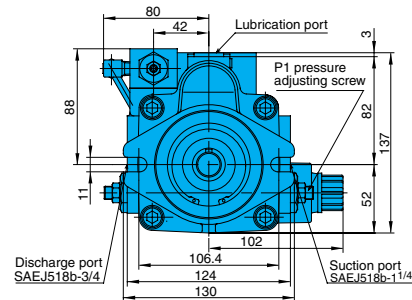
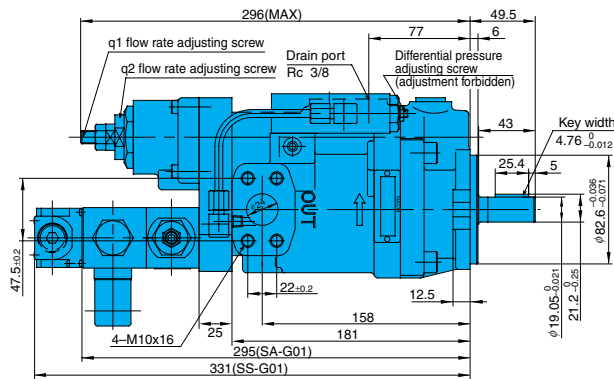


P-Q Characteristics

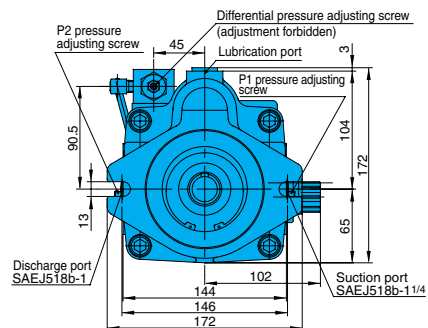
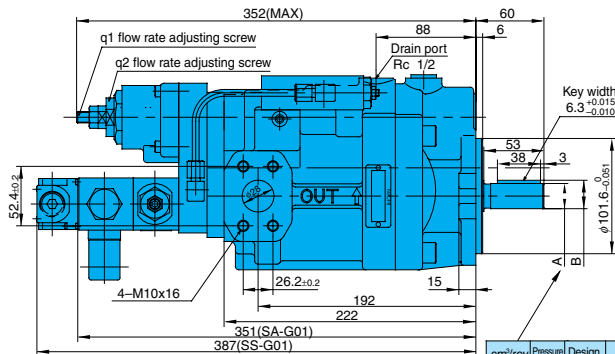


Installation Dimension Drawing

PVS-1B-¹⁶/₂₂C^A*S-12



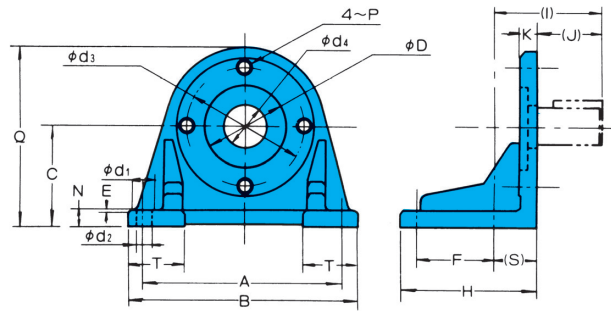
PVS-2B-³⁵/₄₅C^A*S-12(20)



cm ³ /rev	Pressure Range	Design No.	A	B
35	0~3	12D	22.23 ⁰ _{-0.021}	24.9 ⁰ _{-0.5}
45	0~2	3	25.385 ⁰ _{0.025}	27.85 ⁰ _{0.25}

- The coil surface temperature increases if this pump is kept continuously energized. Do not touch the surface of the coil directly with your hands.

Foot Mounting Kit



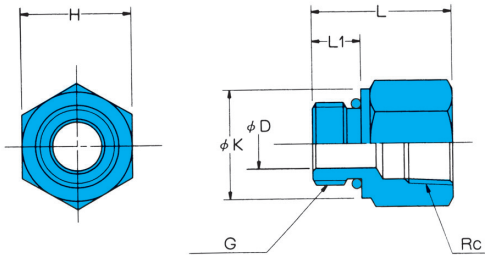
Kit Model No.	Applicable Pump Model No.	Accessories				Dimensions				
		Bolt	Q'ty	Washer	Q'ty	A	B	C	E	F
IHM-2-10	PVS-0B PVS-1B	TB-10×30	2	WP-10	2	127	152.5	69.8	1	50.8
IHM-4-10	PVS-2B	TB-12×30	2	WP-12	2	220.7	246	107.95	1	114.3

Kit Model No.	Dimensions														Weight kg
	H	(I)	(J)	K	N	P	Q	(S)	T	ϕD	ϕd_1	ϕd_2	ϕd_3	ϕd_4	
IHM-2-10	96	64.5	32	17.5	13	M10	135	32.5	36.5	82.6	22	11	106.4	50	2.0
IHM-4-10	140	56.7	44	16	16	M12	195.5	12.7	53	101.6	22	11	146	40	5.5

When only the mounting feet are required, the pump mounting bolts, washers and other parts are sold together as the Foot Mounting Kit.

Coupling kit

Kit for PVS-0B: PSCF-100000

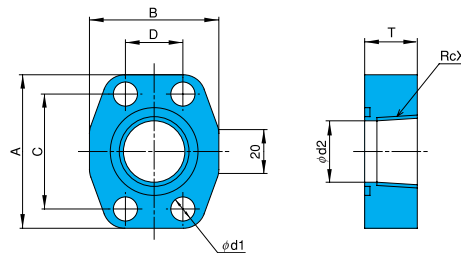


Applicable Pump Model No.	PVS-0B-8	
Plunger Kit model No.	Suction port	Discharge port
L	46	40
L ₁	16	14
ϕK	$\phi 36$	$\phi 27$
ϕD	$\phi 16$	$\phi 12$
H	36	27
G screw size	G3/4	G1/2
Rc screw size	Rc3/4	Rc1/2
O-ring size	1B-P24	1B-P18

- Notes) 1. Joints are on sale in the Joint Kit which includes O-rings.
2. The dimensions of the O-ring seal section on the connector conforms with JIS B2351.
3. O-ring 1B/B-** refers to JIS B2401-1B.

Piping Flange Kit

For PVS-1B, 2B



Applicable Pump Model No.	PVS-1B-16/22		PVS-2B-35/45	
	PSF-101000		PSF-102000	
Plunger Kit model No.	Suction port	Discharge port	Suction port	Discharge port
A	70	65	79	70
B	59	52	73	59
C	52.4	47.5	58.7	52.4
D	26.2	22.0	30.2	26.2
T	24	24	28	24
ϕd_1	$\phi 11$	$\phi 11$	$\phi 11$	$\phi 11$
ϕd_2	$\phi 28$	$\phi 22$	$\phi 37$	$\phi 28$
X	1	3/4	1-1/4	1
Mounting bolt	TH-10×40	TH-10×40	TH-10×45	TH-10×40
Washer	WS-B-10	WS-B-10	WS-B-10	WS-B-10
O-ring	1B-G35	1B-G30	1B-G45	1B-G35
Weight kga	0.6	0.5	0.75	0.6

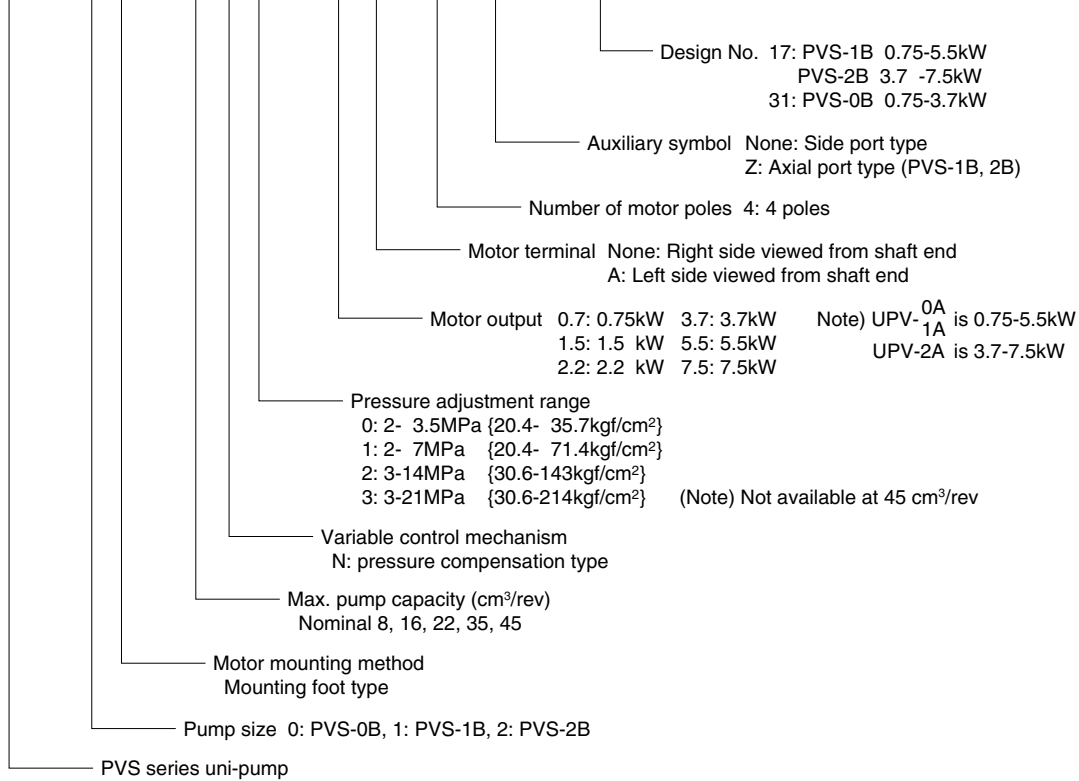
- Notes) 1. The piping flange is on sale in the Flange Kit which includes mounting bolts, washers and O-rings.
2. O-ring 1B/B-** refers to JIS B2401-1B.
3. For details on tightening torque, see page C-11.

❖ To improve reliability, design Nos. 17 and 31 were adopted due to remodeling of the grease injection system connecting section.

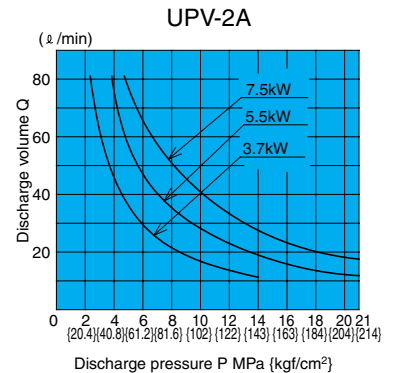
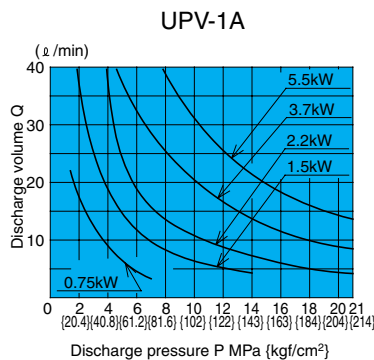
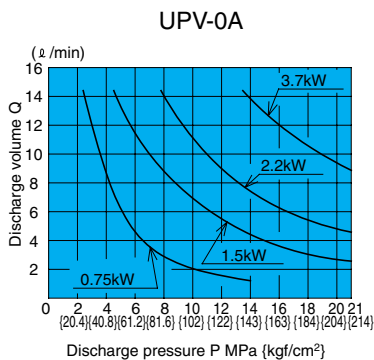
Uni-pump Specifications

Explanation of model No.

UPV - 1 A - 16 N 1 - 1.5 * - 4 - * - 17(31)



Motor selection curves

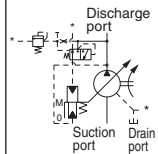


● How to select the motor

The lower side of the output curves for each of the motors shown above indicates the operating range under rated output for that motor.

Motor Specifications

Output kW	Motor Dimensions																	Frame No.	Weight
	A	IL	C	D	E	F	G	H	I	J	L	M	N	S×T	KD	KL	O		
0.75	124	107.5	80 ⁰ _{-0.5}	160	62.5	50	10	160	–	34	231.5	155	135	10×25	φ22	126	21	80M	12
1.5	142.5	118.5	90 ⁰ _{-0.5}	178	70	62.5	10	179	–	35	261	170	155	10×16	φ22	136	36.5	90L	16
2.2	160.5	136	100 ⁰ _{-0.5}	195	80	70	13	197.5	–	45	296.5	195	175	12×25	φ22	150	45.5	100L	20
3.7	171	143.5	112 ⁰ _{-0.5}	219	95	70	14	221.5	–	45	314.5	224	175	12×25	φ22	161	53	112M	29
5.5	217	163.5	132 ⁰ _{-0.5}	276	108	70	16	270	311.5	50	380.5	250	175	12×25	φ34	217	33.5	132S	48
7.5	217	163.5	132 ⁰ _{-0.5}	276	108	70	16	270	311.5	50	380.5	250	175	12×25	φ34	217	33.5	132S	54



PZS Series Variable Volume Piston Pump

70 to 220cm³/rev
70 to 100cm³/rev 28MPa
130 to 220cm³/rev 25MPa

Features

- ① High pressure, high reliability
These pumps deliver the perfect combination of high pressure (28MPa {286kgf/cm²} maximum) and high reliability. Hydraulic device energy efficiency is ensured because variable volume capabilities provide the means to keep the discharge rate to the desired level.
- ② Low noise, low vibration operation
The semi-cylindrical swash plate of

the PVS series provides high support and rigidity, making it possible to increase the number of pistons (from nine to 11) and equip optimal valve plates, all of which make low-noise operation possible.

- ③ High reliability, long life
O-ring seals used for mating surfaces eliminate worries about oil leaks. A spherical valve plate maintains optimal hydraulic pressure balance, for

stable operation across a wide range and better contamination resistance characteristics.

- ③ A wide range of possible applications
In addition to use as a stand-alone pump, a PVS Series pump can be combined with another IP pump in a wide range of possible applications.

Specifications

Model No.	Pump Capacity cm ³ /rev (Adjustment Range)	Rated Voltage MPa {kgf/cm ² }	Maximum Working Pressure MPa {kgf/cm ² }	Pressure Adjustment Range MPa {kgf/cm ² }	Revolution Speed min ⁻¹		Weight kg	Fixed Discharge Pump (Note 1)	
					Min.	Max.		Capacity cm ³ /rev	Pressure MPa {kgf/cm ² }
PZS-3B-* 70* 1-10 3 4	70 (45 to 70)	21 {214}	28 {286}	2 to 7 {20.4 to 71.4} 2 to 21 {20.4 to 214 } 2 to 28 {20.4 to 286 }	500	1800	37	3.6 to 8.18	21 {214}
PZS-4B-* 100* 1-10 3 4	100 (40 to 100)	21 {214}	28 {286}	2 to 7 {20.4 to 71.4} 2 to 21 {20.4 to 214 } 2 to 28 {20.4 to 286 }	500	1800	58	3.6 to 15.8	21 {214}
PZS-5B-* 130* 1-10 3 4	130 (51 to 130)	21 {214}	25 {255}	2 to 7 {20.4 to 71.4} 2 to 21 {20.4 to 214 } 2 to 25 {20.4 to 255 }	500	1800	86	3.6 to 32.3	21 {214}
PZS-6B-* 180* 1-10 3 4	180 (101 to 180)	21 {214}	25 {255}	2 to 7 {20.4 to 71.4} 2 to 21 {20.4 to 214 } 2 to 25 {20.4 to 255 }	500	1800	123	3.6 to 63.9	21 {214}
PZS-6B-* 220* 1-10 3 4	220 (124 to 220)	21 {214}	25 {255}	2 to 7 {20.4 to 71.4} 2 to 21 {20.4 to 214 } 2 to 25 {20.4 to 255 }	500	1500	126	3.6 to 63.9	21 {214}

- Note
1. Fixed discharge pump can be configured by combining with an IP pump.
 2. Pump capacity adjustment ranges are for control codes N, RS, and WS. For information about control code NQ, see page A-27.
 3. The standard direction of rotation is clockwise when viewed from the shaft end. Contact your agent for information about counterclockwise rotation.
 4. A keyed straight shaft is standard. Contact your agent for information about spline shafts.

- Handling
- Pump Installation and Piping Precautions

- ① Use flexible couplings for connecting the pump shaft to the drive shaft, and prevent radial or thrust load from being applied to the pump shaft.
- ② Eccentricity between the drive shaft and pump shaft should be no greater than 0.05mm, with an eccentric angle error of 1° or less.
- ③ Keep the clamping length of couplings and pump shafts at least 2/3 the length of the coupling width.
- ④ Use a sufficiently rigid pump mounting base.
- ⑤ Set pump suction side pressure to -0.03 MPa or more (suction port flow velocity less than 2 m/sec).

- ⑥ Raise part of the drain piping so it is above the topmost part of the pump body, and insert the return section of the drain piping into the hydraulic operating fluid. Also, observe the values in the following table in order to limit the drain back pressure to 0.1 MPa.

Model No.	3B, 4B, 5B	6B
Item		
Pipe joint size	At least 3/4"	At least 1"
Pipe I.D.	At least φ17	At least φ22
Pipe length	1 m or less	1 m or less

- ⑦ Mount the pump so the pump shaft is oriented horizontally.
- ⑧ Use of rubber hose is recommended in order to minimize noise and vibration.

- Management of Hydraulic Operating Fluid

- ① Use only good-quality hydraulic operating fluid with a kinematic viscosity during operation within the range of 20 to 200 mm²/sec. Normally, you should use an R&O type and wear-resistant type of IS-OGV32 to 68 or equivalent. The optimum kinematic viscosity during operation is 20 to 50 mm²/sec.
- ② The operating temperature range is 5 to 60°C. When the oil temperature at startup is 5°C or less, run the pump at low pressure and low speed until the oil temperature reaches 5°C.
- ③ Provide a suction strainer with a filtering grade of about 100μ (150 mesh).

(Continued on following page)

- 4] Manage hydraulic operating fluid so contamination is maintained at class NAS10 or lower.
- 5] Use hydraulic operating fluid when the operating ambient temperature is in the range of 0 to 60°C.

● Startup Precautions

- 1] Before starting up the pump, fill the pump body with clean hydraulic operating fluid through the lubrication port.

Model No.	Oil Amount cm ³
PZS-3B	1000
PZS-4B	1800
PZS-5B	2200
PZS-6B	3000

- 2] An unload circuit is required when the motor is started under

condition $\lambda-\Delta$. Contact your agent about the unload circuit.

- 3] Check to make sure that the rotation direction of the pump is the same as the rotation direction indicated by the arrow on the pump body.

- 4] Air entering the pump or pipes can cause noise or vibration. At startup, set the pump discharge side to a no-load state, and operate the pump in the inching mode to remove any air that might be in the pump or pipes.

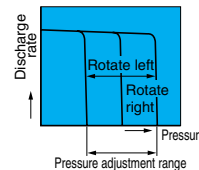
- 5] Equip an air bleed valve in circuits where it is difficult to release air before startup. (See "IP Pumps" on page C-13.)

● Configuring Pressure and Discharge Rate Settings

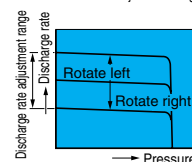
The factory default pump discharge rate setting is the setting's maxi-

imum value, while the default discharge pressure is the settings minimum value. Change the discharge rate and discharge pressure settings in accordance with your particular operating conditions.

[Pressure Adjustment]
Rotating the pressure adjusting screw clockwise increases pressure.



[Discharge Volume Adjustment]
Rotating the flow rate adjusting screw clockwise decreases the discharge rate.

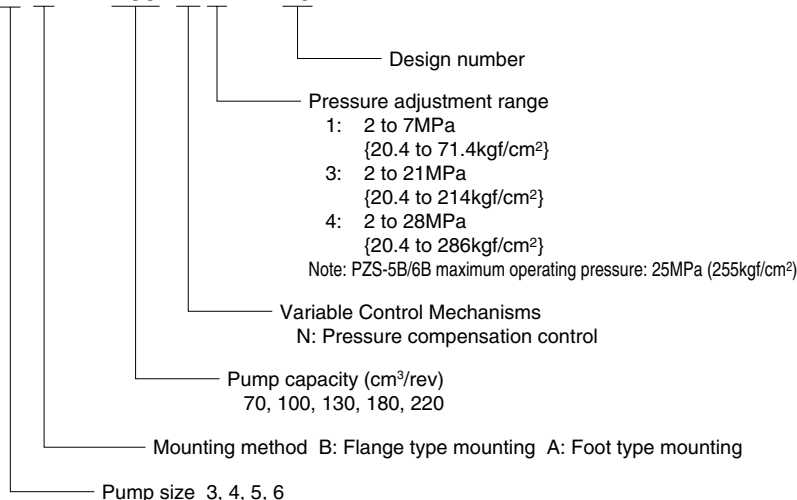


Note: Securely tighten the lock nut after making adjustments.

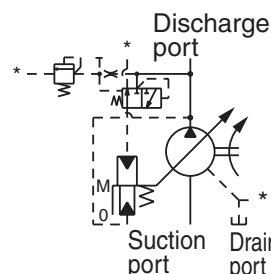
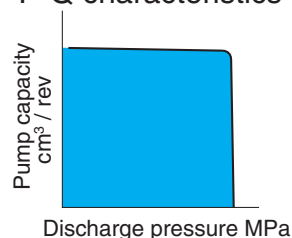
Understanding Model Numbers

Standard type
Pressure compensation(N)

PZS - 4 B - 100 N * - 10

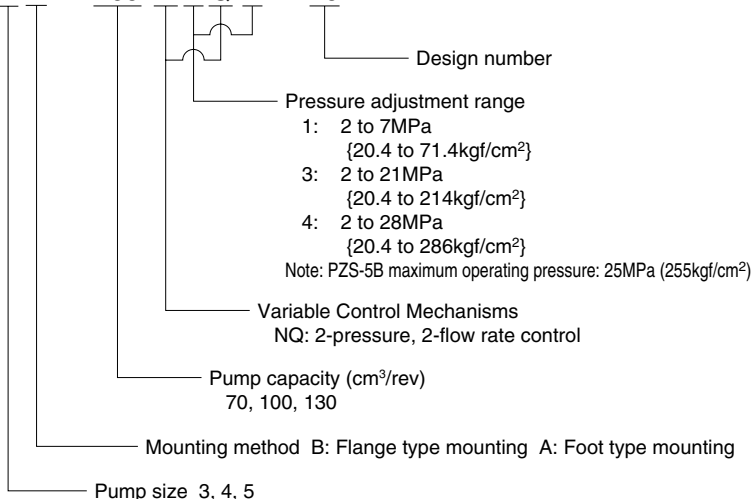


P-Q characteristics

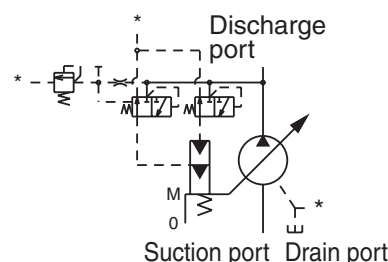
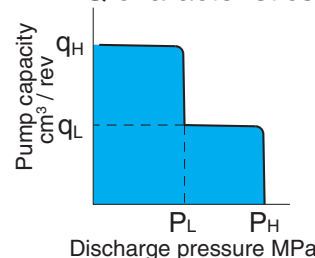


Option type
2-Pressure, 2-Flow Rate Control Type (NQ)

PZS - 4 B - 100 N * Q * - 10

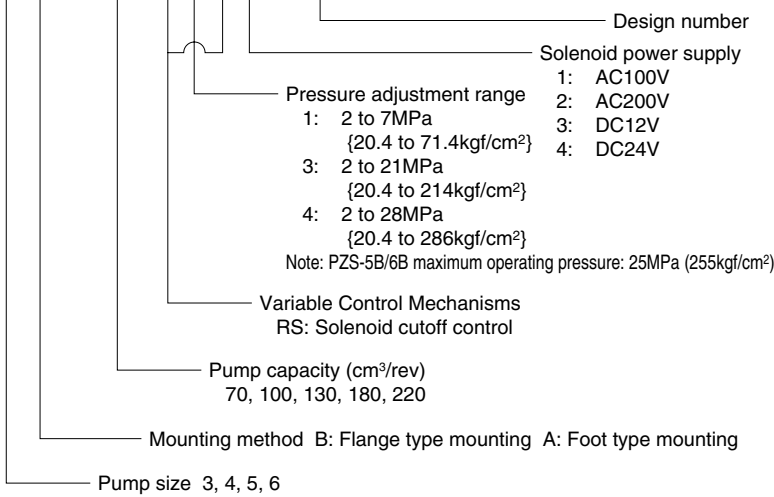


P-Q characteristics

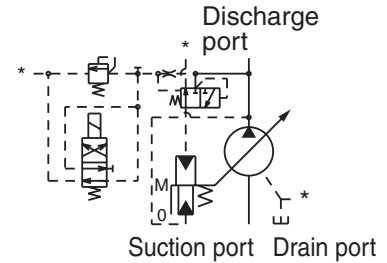
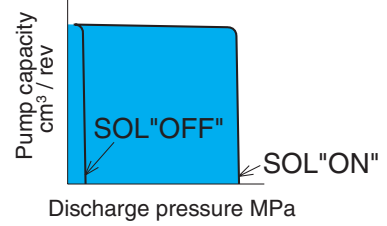


Solenoid Cutoff Control Type (RS)

PZS - 4 B - 100 R * S * - 10

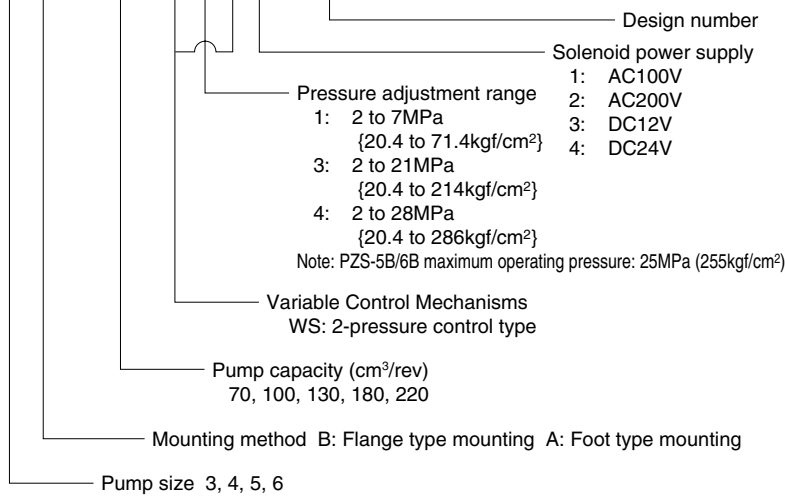


P-Q characteristics

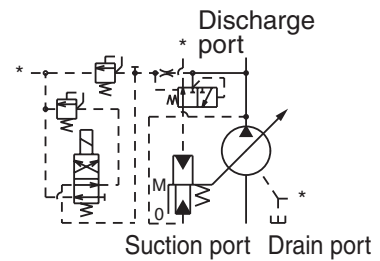
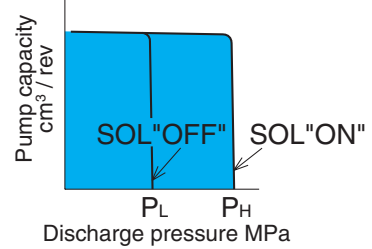


2-Pressure Control System (WS)

PZS - 4 B - 100 W * S * - 10



P-Q characteristics

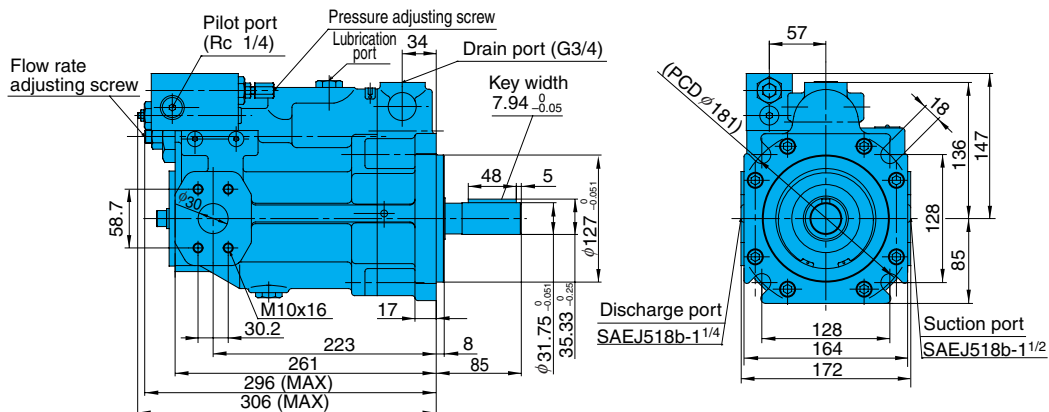


Installation Dimension Drawings

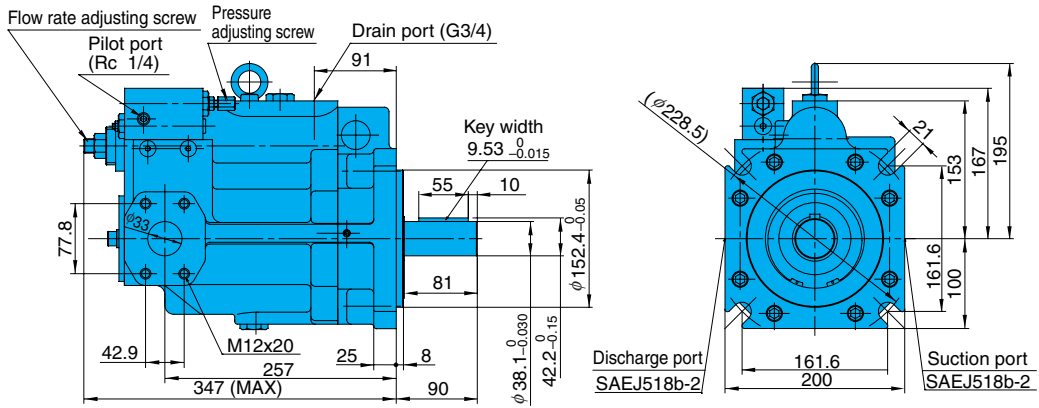
Pressure Compensation Type

Installing a remote control relieve valve to the pilot port provides remote control of pressure compensation.

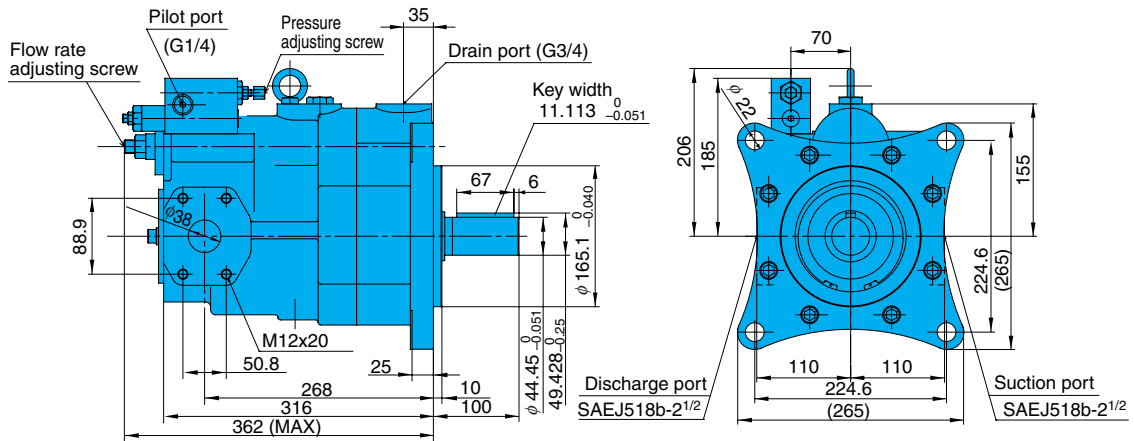
PZS-3B-70N*-10



PZS-4B-100N*-10

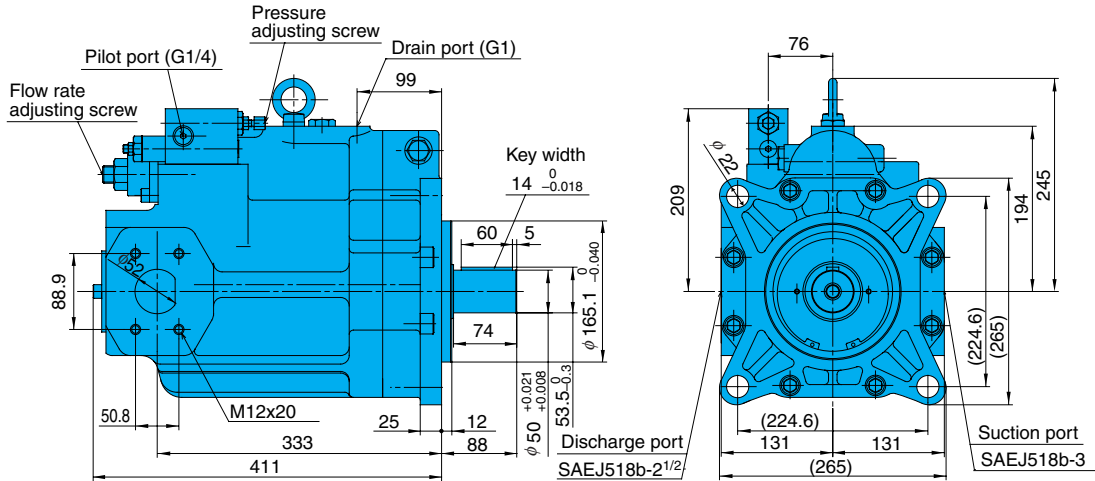


PZS-5B-130N*-10

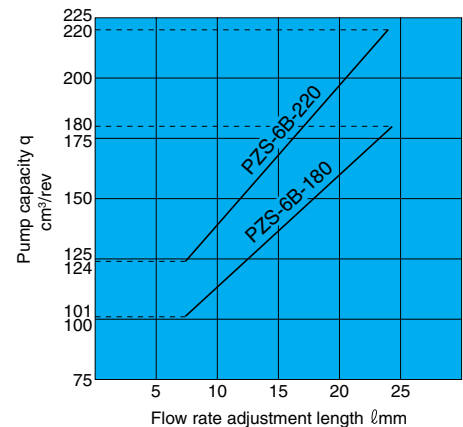
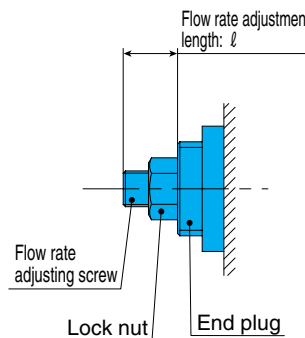
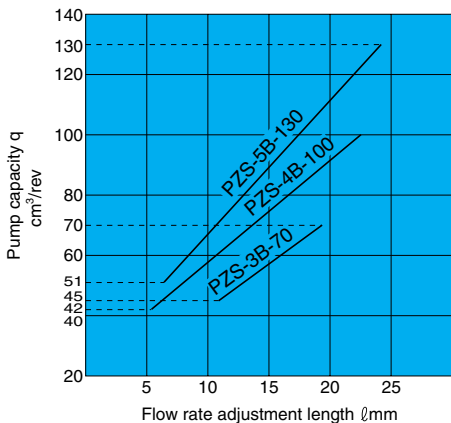


PZS-6B-180N*-10

PZS-6B-220N*-10



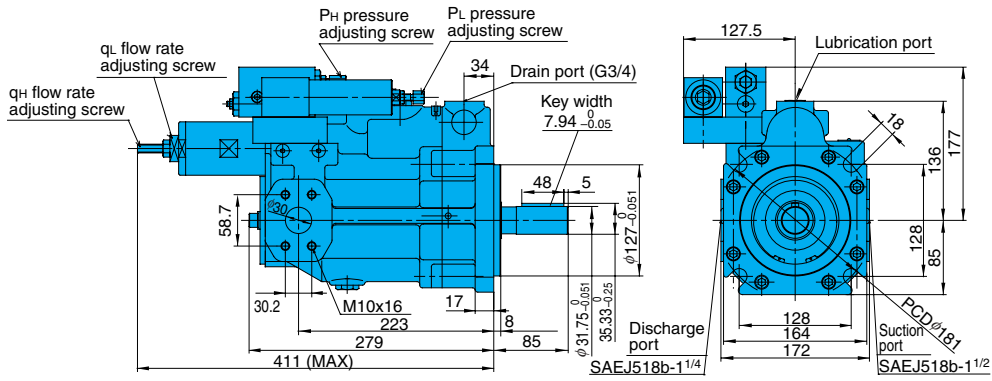
Flow Adjustment Rotation Angle (ℓ) and Pump Capacity (q)



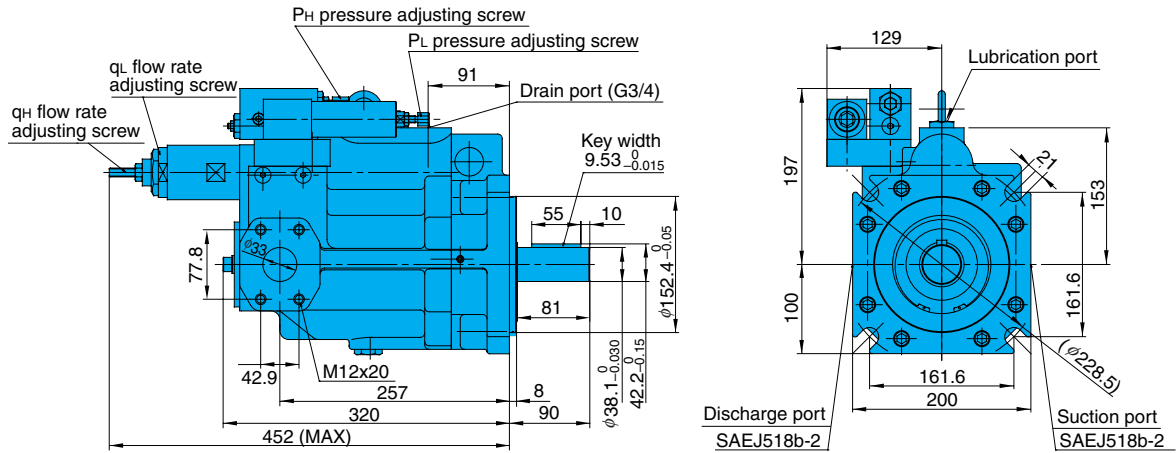
Use a flow adjustment length that is within the range noted in the above chart. Using a length that is outside the lower limit adjustment range can lead to oil leaks.

Use a flow adjustment length that is within the range noted in the above chart. Using a length that is outside the lower limit adjustment range can lead to oil leaks.

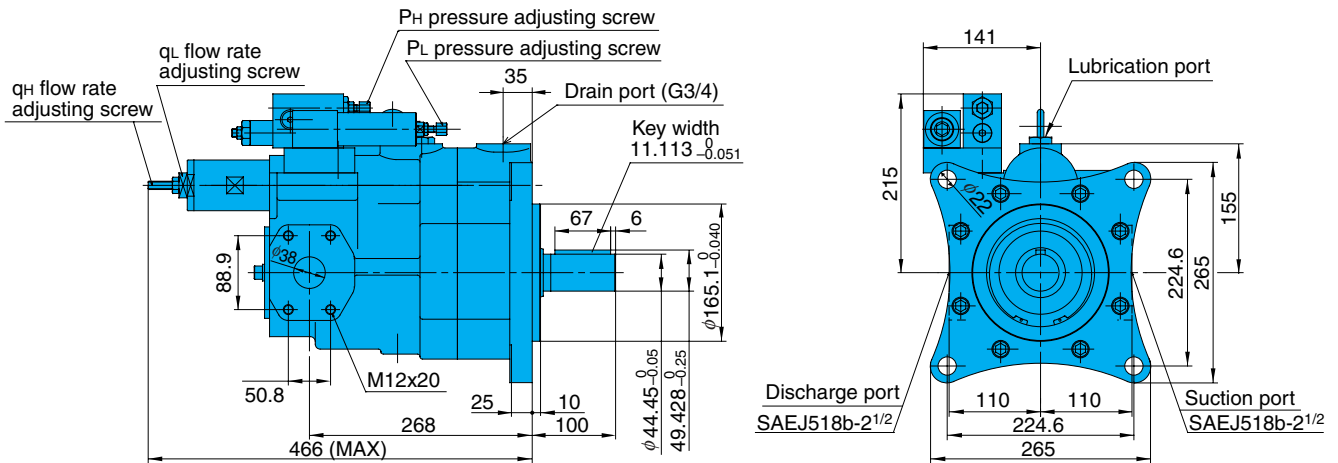
2-Pressure, 2-Flow Rate Control Type
PZS-3B-70N*Q*-10



PZS-4B-100N*Q*-10



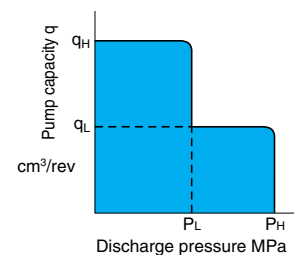
PZS-5B-130N*Q*-10



Pump Volume Adjustable Range

Pump Model No.	Volume Adjustment Range cm ³ /rev		Factory Default q _i Setting (cm ³ /rev)
	q _H Note 1	q _L Note 2	
PZS-3B-70N*Q*-10	5 to 70	5 to 40	14
PZS-4B-100N*Q*-10	16 to 100	7 to 60	20
PZS-5B-130N*Q*-10	17 to 130	8 to 70	26

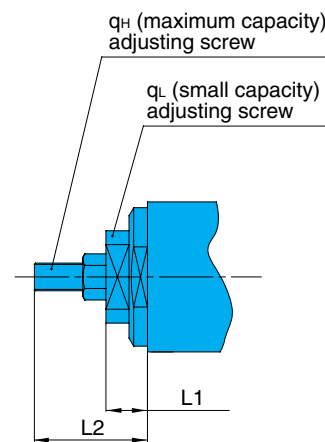
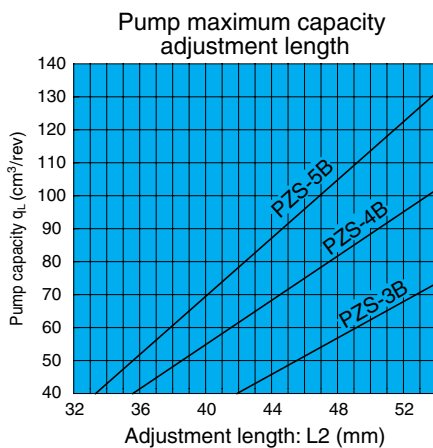
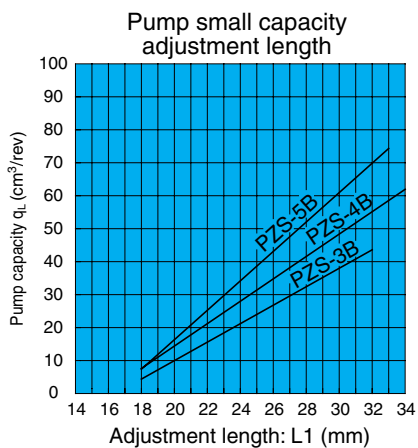
P-Q characteristics



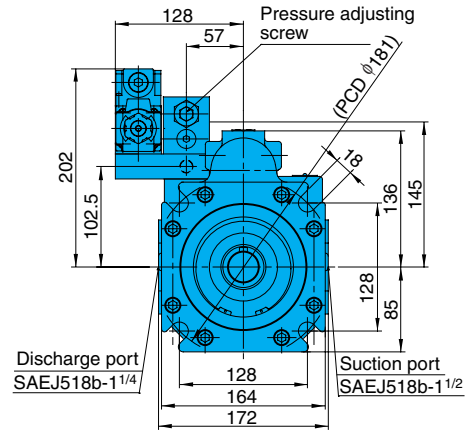
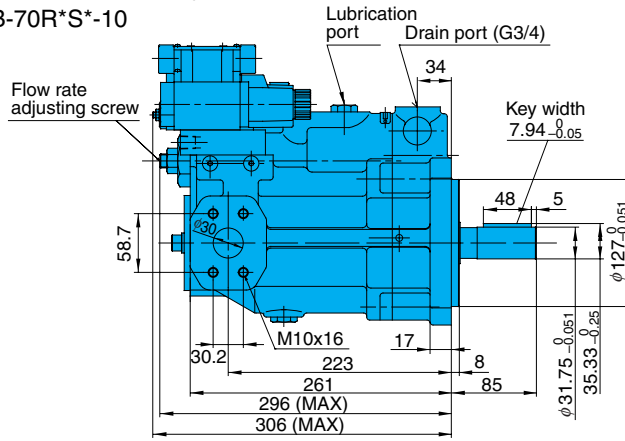
Note1: The setting range for pump maximum capacity q_H depends on the q_L setting.
 Note2: Overall efficiency at a low flow rate is worse than at the maximum flow rate. Keep this in mind when deciding on the drive motor capacity.

PZS Pump 2-Pressure 2-Flow Rate Control Flow Rate Adjustment Graph

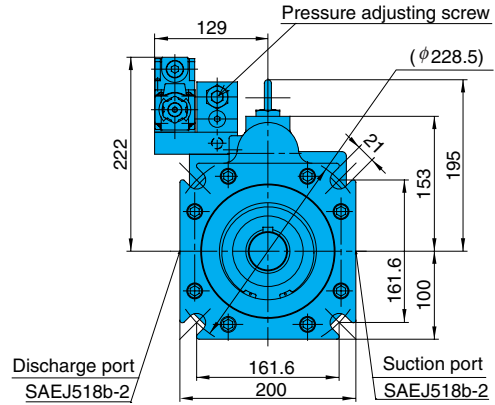
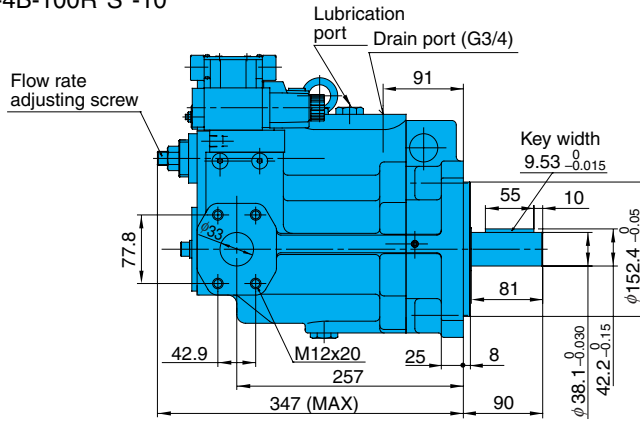
- Be sure to adjust the low flow rate first, and then adjust the maximum flow rate.
- Remember that the maximum flow rate adjustment range (lower limit) changes in accordance with the low flow rate adjustment. The maximum flow rate adjustment lower limit is equivalent to the low flow rate adjustment length (L1) plus 11mm.
- Pump efficiency at a low flow rate is worse than at the maximum flow rate. Keep this in mind when deciding on the drive motor capacity.



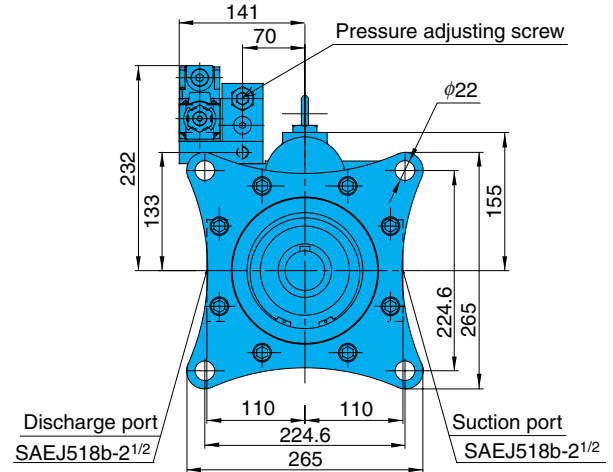
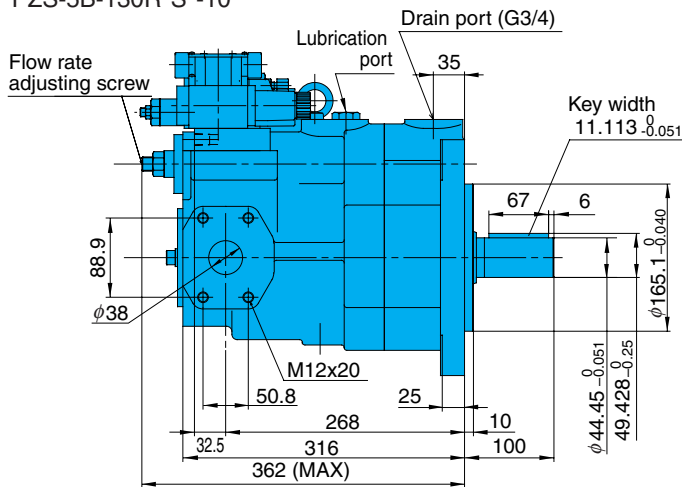
Solenoid Cutoff Control Type
PZS-3B-70R*S*-10



PZS-4B-100R*S*-10

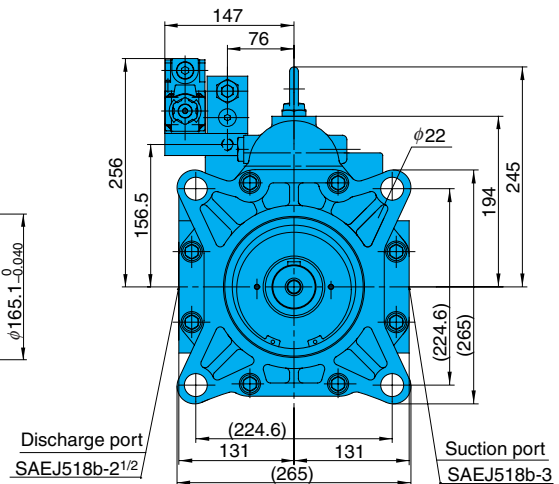
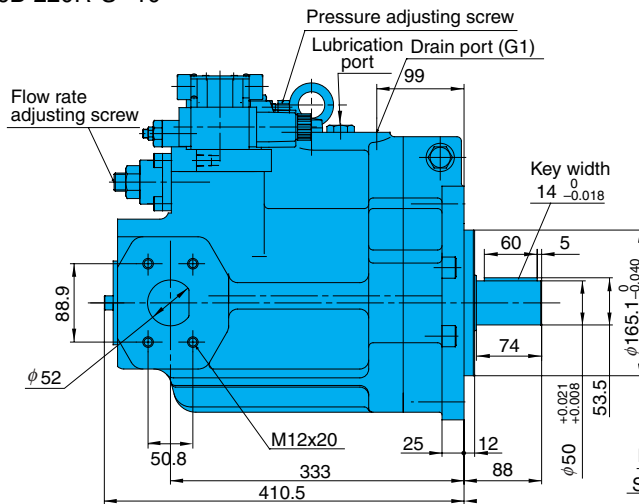


PZS-5B-130R*S*-10



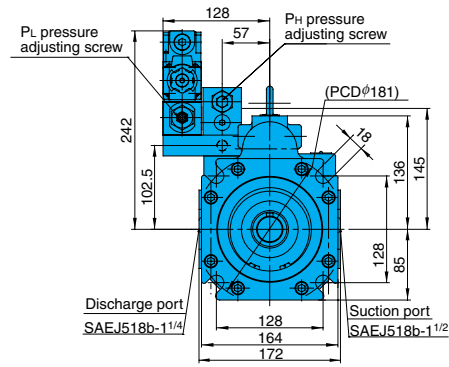
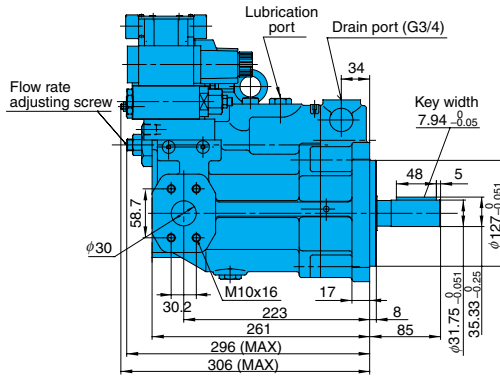
PZS-6B-180R*S*-10

PZS-6B-220R*S*-10

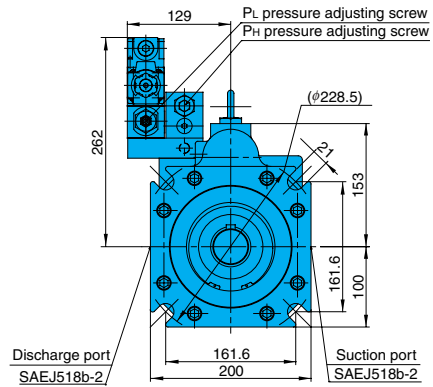
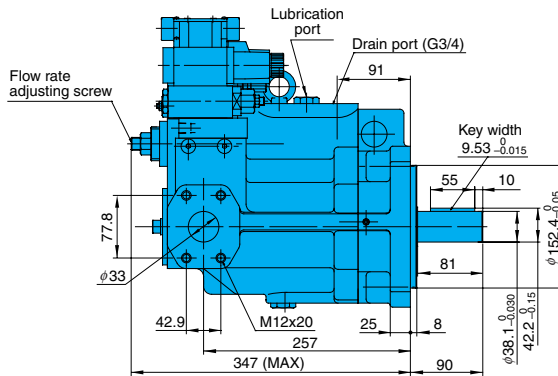


■ Using the installed solenoid valve so it is continuously conducting current can cause the coil surface to become hot.
Do not touch the surface of the coil directly with your hands.

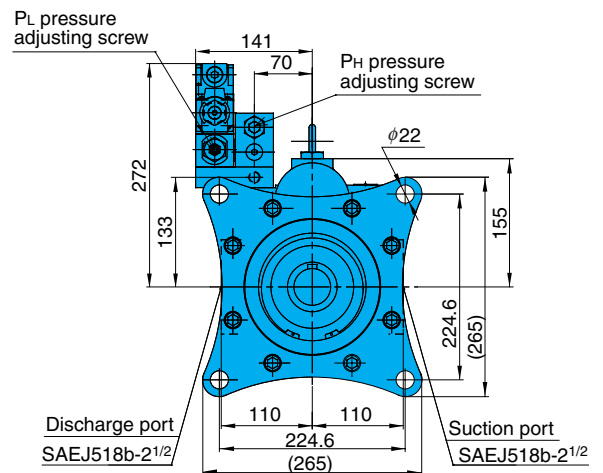
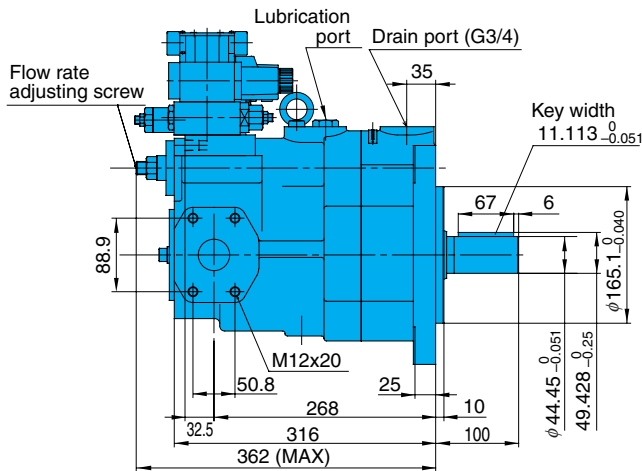
2-Pressure Control Type
PZS-3B-70W*S



PZS-4B-100W*S*-10

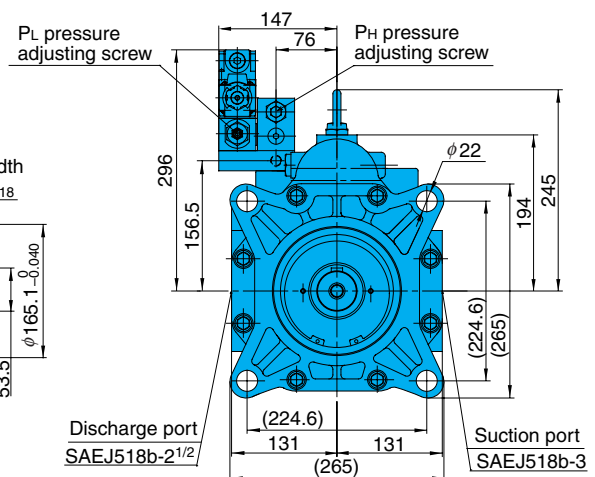
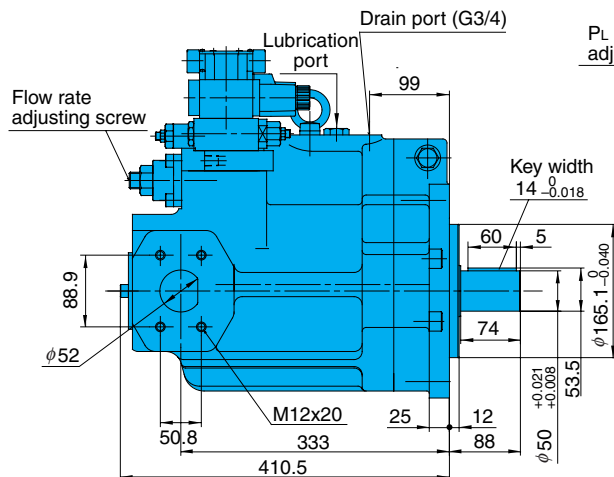


PZS-5B-130W*S*-10



PZS-6B-180W*S*-10

PZS-6B-220W*S*-10

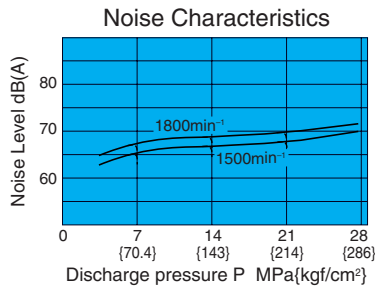
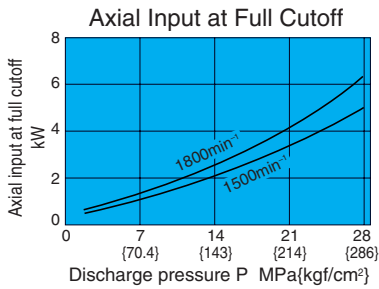
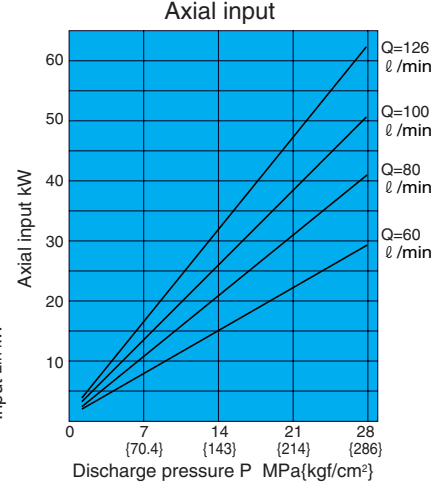
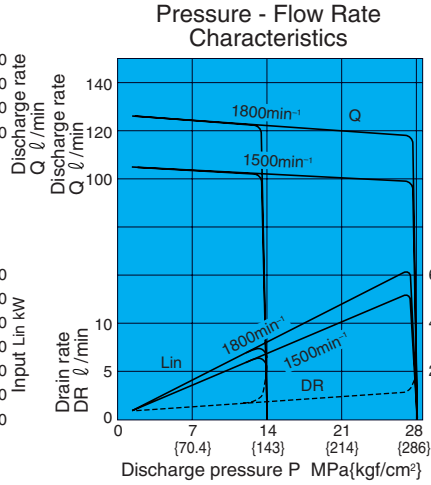
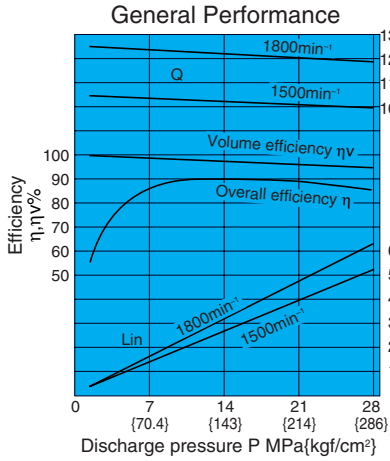


■ Using the installed solenoid valve so it is continuously conducting current can cause the coil surface to become hot.
Do not touch the surface of the coil directly with your hands.

Performance Curves

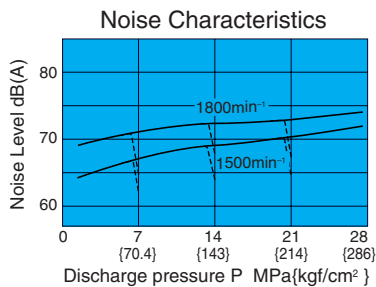
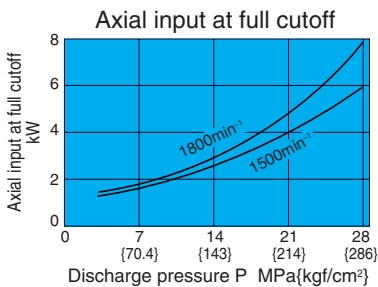
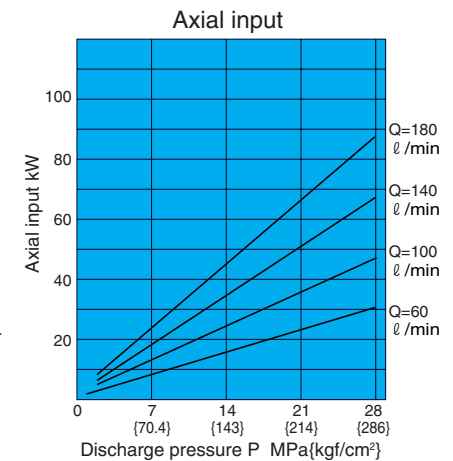
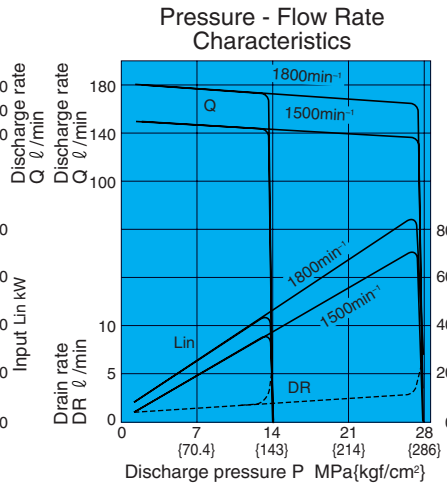
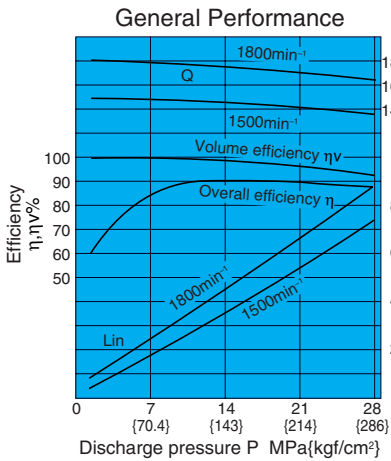
Typical Characteristics at a Hydraulic Operating Fluid Kinematic Viscosity of 46 mm²/s

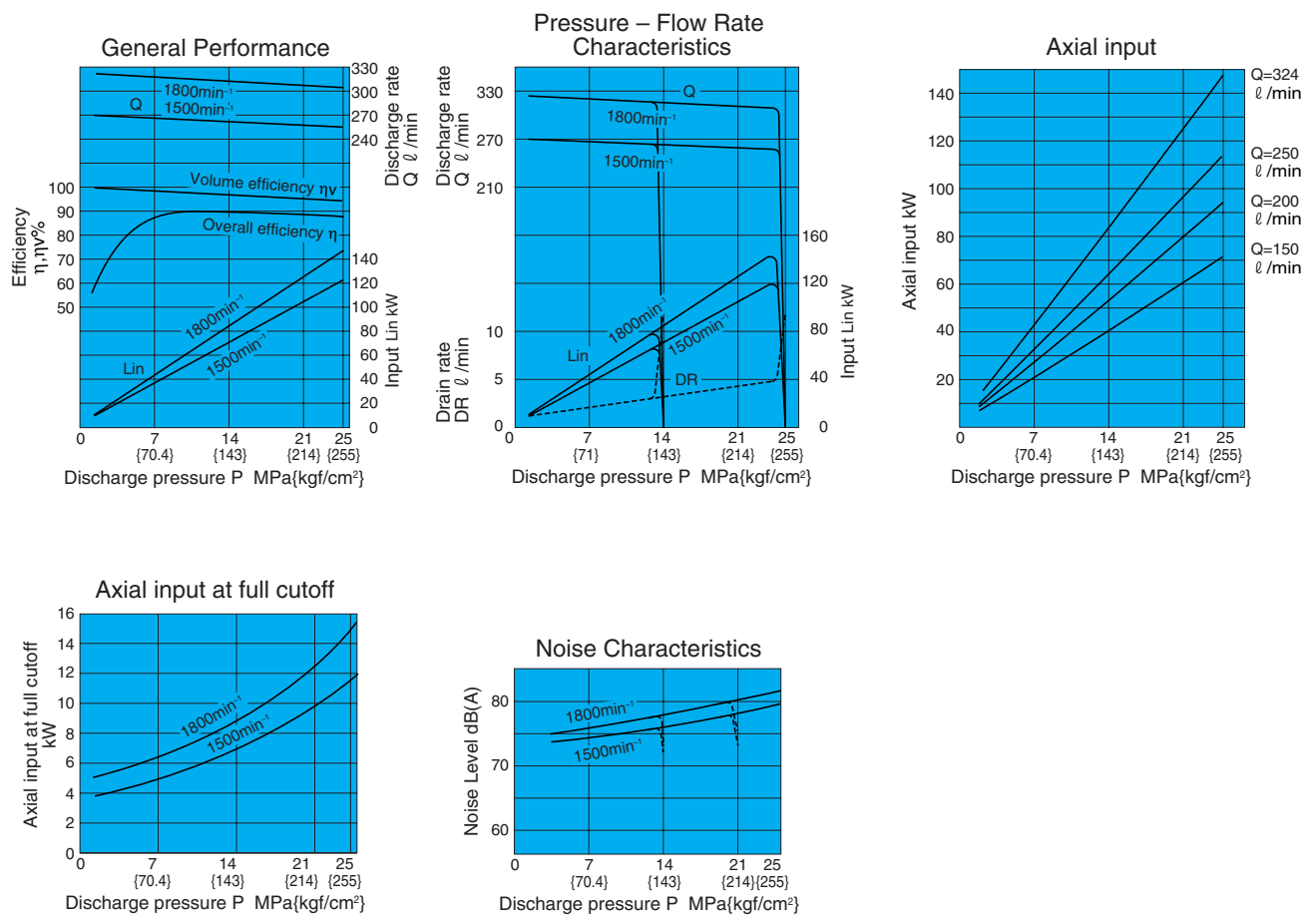
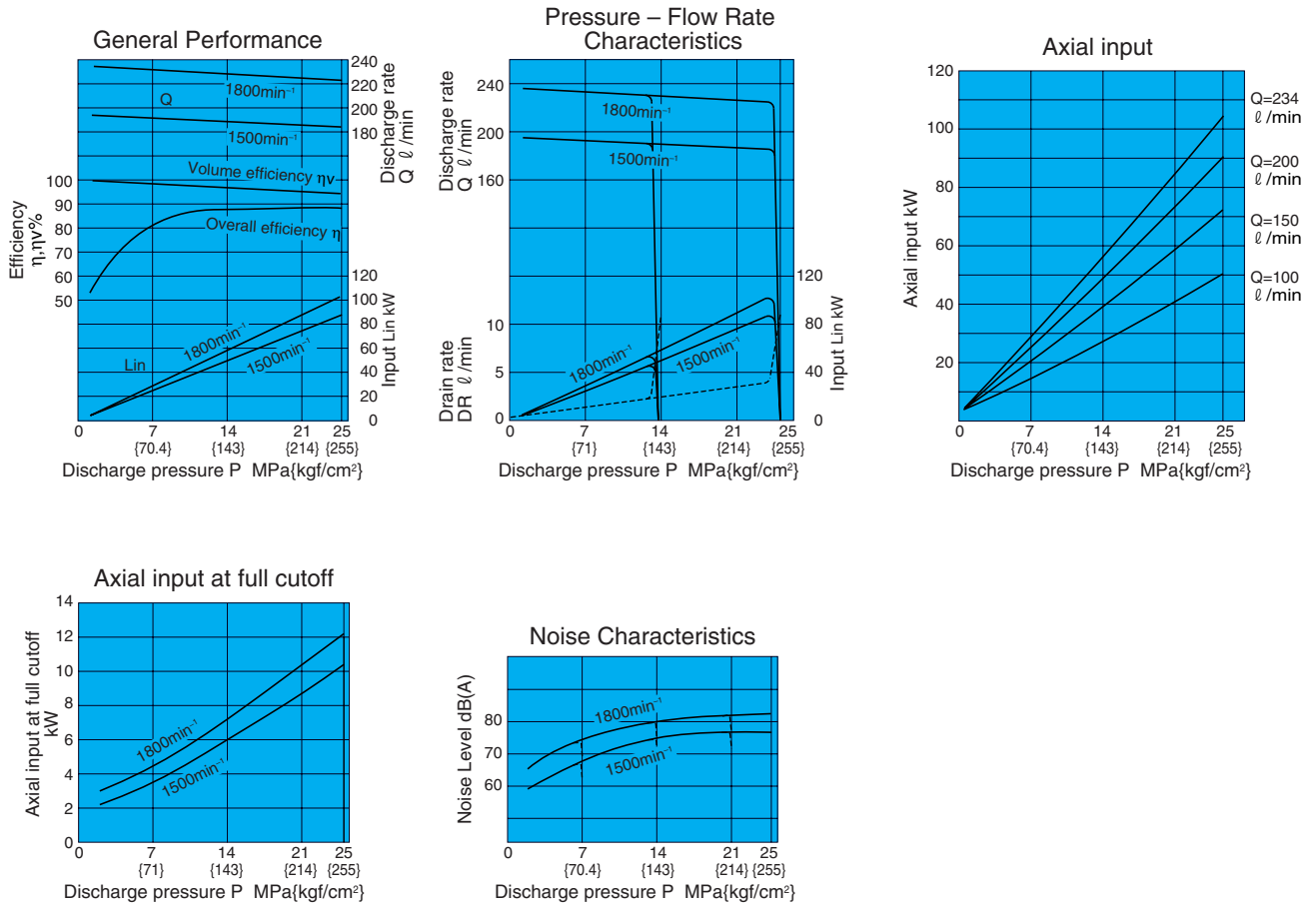
PZS-3B-70N*-10



PZS-4B-100N*-10

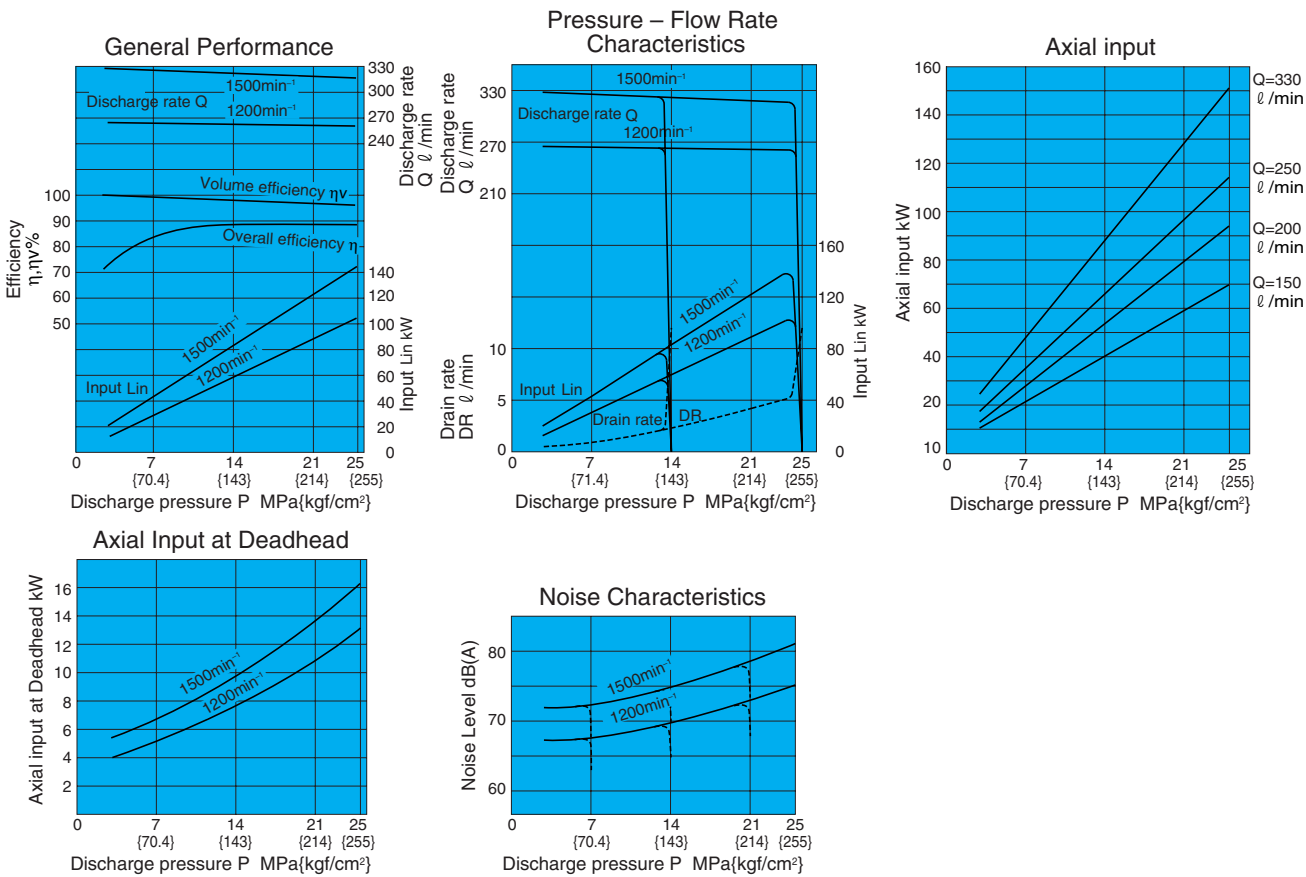
Typical Characteristics at a Hydraulic Operating Fluid Kinematic Viscosity of 46 mm²/s





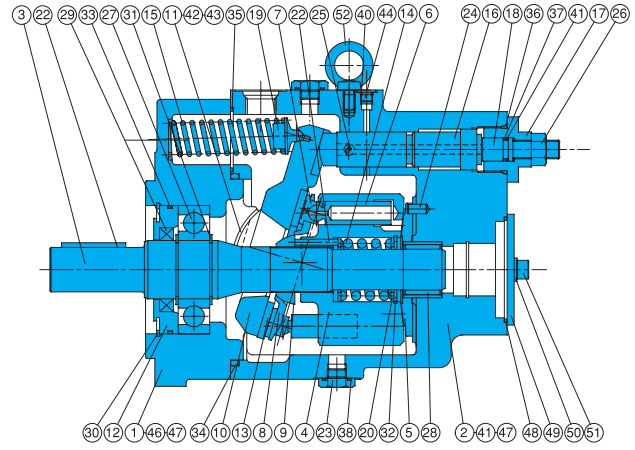
PZS-6B-220N*-10

Typical Characteristics at a Hydraulic Operating Fluid Kinematic Viscosity of 46 mm²/s



Cross-sectional Drawing

PZS-3B-70N*-10
PZS-4B-100N*-10
PZS-6B-**N*-10



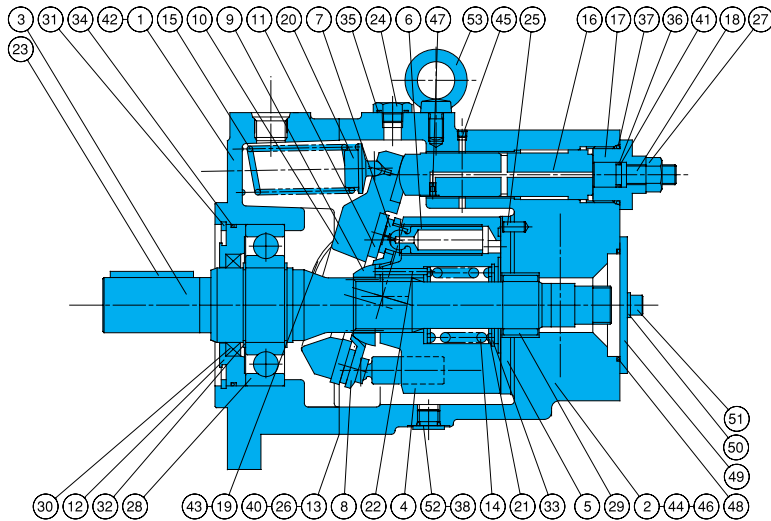
Part No.	Part Name	Part No.	Part Name
1	Body	28	Needle bearing
2	Case	29	Oil seal
3	Shaft	30	Snap ring
4	Cylinder barrel	31	Snap ring
5	Valve plate	32	Snap ring
6	Piston	33	O-ring
7	Shoe	34	O-ring
8	Shoe holder	35	O-ring
9	Barrel holder	36	O-ring
10	Swash plate	37	O-ring
11	Thrust bush	38	O-ring
12	Seal holder	39	O-ring
13	Thrust plate	40	O-ring
14	Spring C	41	Backup ring
15	Spring S	42	Orifice
16	Control piston	43	Flat phillips head screw
17	End plug	44	Plug
18	Guide screw	45	Pin
19	Spring holder	46	Bolt
20	Retainer	47	Plug
21	Needle	48	O-ring
22	Key	49	Plate
23	Plug	50	Washer
24	Pin	51	Bolt
25	Orifice	52	Eye bolt
26	Nut		
27	Ball bearing		

List of Sealing Parts

Part No.	Name	Product Number				Remarks		
		PZS-3B	Q'ty	PZS-4B	Q'ty		PZS-6B	Q'ty
29	Oil seal	TCN-456812	1	TCN-507212	1	TCN-659013	1	NOK
33	O-ring	1B-G95	1	1B-G105	1	1B-G135	1	JIS B 2401
34	O-ring	1B-G130	1	1B-G155	1	1B-G200	1	"
35	O-ring	1B-G50	1	1B-G50	1	1B-G65	1	"
36	O-ring	1B-P34	1	1B-P36	1	1B-P41	1	"
37	O-ring	1B-P12	1	1B-P16	1	1B-P16	1	"
38	O-ring	1B-P21	2	1B-P21	3	1B-P21	3	"
39	O-ring	Note 1	1	1B-P9	1	1B-P10	1	"
40	O-ring	1B-P8	5	1B-P8	5	1B-P8	8	"
41	Backup ring	T2-P12	1	T2-P16	1	T2-P16	1	JIS B 2407
48	O-ring	Note 1	1	1B-G85	1	1B-G85	1	JIS B 2401

Note 1: Contact your agent about this type of O-ring.

PZS-5B-130N*-10



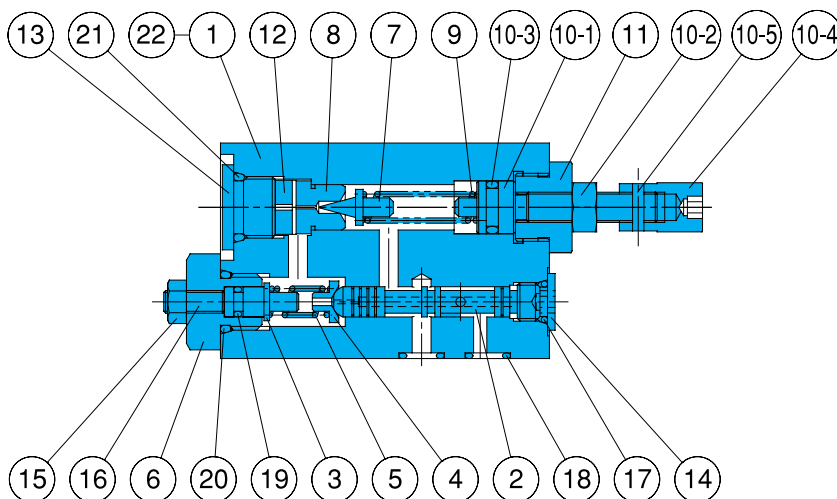
Part No.	Part Name	Part No.	Part Name
1	Body	28	Ball bearing
2	Case	29	Needle bearing
3	Shaft	30	Oil seal
4	Cylinder barrel	31	Snap ring
5	Valve plate	32	Snap ring
6	Piston	33	Snap ring
7	Shoe	34	O-ring
8	Shoe holder	35	O-ring
9	Barrel holder	36	O-ring
10	Swash plate	37	O-ring
11	Thrust plate	38	O-ring
12	Seal holder	39	O-ring
13	Gasket	40	O-ring
14	Spring C	41	Backup ring
15	Spring S	42	Bolt
16	Control piston	43	Flat philips head screw
17	End plug	44	Plug
18	Guide screw	45	Plug
19	Thrust bush	46	Plug
20	Spring holder	47	Orifice
21	Retainer	48	O-ring
22	Needle	49	Plate
23	Key	50	Washer
24	Plug	51	Bolt
25	Pin	52	Plug
26	Connector	53	Eye bolt
27	Nut		

PZS-5B

Part No.	Name	Q'ty	Size	Remarks
13	Gasket	1	*	3 Bond
30	Oil seal	1	TCN-608212	N. O. K
34	O-ring	1	1B-G125	JIS B 2401
35	O-ring	2	1B-P21	JIS B 2401
36	O-ring	1	1B-P16	JIS B 2401
37	O-ring	1	1B-P42	JIS B 2401
38	O-ring	1	1B-P14	JIS B 2401
39	O-ring	5	1B-P8	JIS B 2401
40	O-ring	2	1B-P7	JIS B 2401
41	Backup ring	1	T2-P16	JIS B 2407
48	O-ring	1	1B-G85	JIS B 2401

Parts marked by an asterisk "*" are not available on the market. Consult your agent.

Pressure Compensator



Part No.	Part Name	Part No.	Part Name
1	Valve body	12	Collar
2	Spool	13	Plug
3	Spring guide	14	Plug
4	Sprint bearing	15	Nut
5	Spring	16	Socket head screw
6	Retainer	17	O-ring
7	Needle valve	18	O-ring
8	Valve seat	19	O-ring
9	Spring	20	O-ring
10	Adjustment screw kit	21	O-ring
10-1	Adjustment screw	22	Plug
10-2	Nut		
10-3	O-ring		
10-4	Nut		
10-5	Spring pin		
11	Retainer		

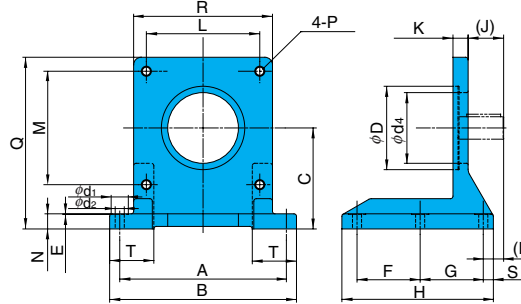
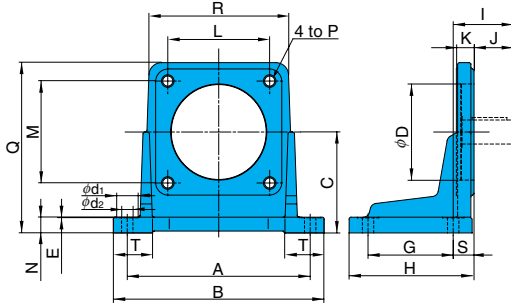
List of Sealing Parts

Part No.	Name	Part Number				Remarks
		PZS-3B, 4B	Q'ty	PZS-5B, 6B	Q'ty	
10-3	O-ring	1B-P10A	1	1B-P10A	1	JIS B 2401
17	O-ring	1B-P8	1	1B-P11	2	"
18	O-ring	1B-P9	4	1B-P9	5	"
19	O-ring	1B-P5	1	1B-P14	1	"
20	O-ring	1B-P12	1	1B-P22	1	"
21	O-ring	1B-P14	1	1B-P14	1	"

Foot Mounting Kit

Foot Mounting Installation Measurement Chart
IHM-55-10

PZM-*-10



Foot Mounting Kit Model No.	Applicable Pump Model No.	Accessories				Measurements (mm)							
		Bolt	Q'ty	Washer	Q'ty	A	B	C	E	F	G	H	(I)
PZM-3-10	PZS-3B	TH-16x40	4	WP-16	4	295.3	334	152.4	1	-	139.7	203	104.5
PZM-4-10	PZS-4B	TB-20x45	4	WP-20	4	290	334	160	1	-	135	198	95
IHM-55-10	PZS-5B, 6B	TH-20x50	4	WS-B-20	4	330	370	200	1	125	125	300	40

Foot Mounting Kit Model No.	Measurements (mm)														Weight kg
	(J)	K	L	M	N	P	Q	R	(S)	T	phi D	phi d1	phi d2	phi d4	
PZM-3-10	60	25	128	128	25	M16	259	-	44.5	61	127	35	18	86	13.5
PZM-4-10	62	28	161.6	161.6	25	M20	270	220	33	62	152.4	34	18	phi 152.4	18.0
IHM-55-10	70 (Note)	30	224.6	224.6	30	M20	340	275	20	90	165.1	34	18	140	32.0

Note The IHM-55-10 (J) dimension (70) is the value for the PZS-5B. This dimension becomes 58 in the case of the PZS-6B.
The IHM-55-10 (I) dimension (40) is the value for the PZS-5B. This dimension becomes 28 in the case of the PZS-6B.
See the IHM-45-10 on pages B-36 and C-12 to see what the PZM-3-10 looks like.

Piping Flange Kit

Screw In Type

Screw In Type Flange Kit model No.	Applicable Pump Model No.	IN Flange							
		Flange Part No.	Bolt	Washer	O-ring				
PJF-10300T	PZS-3B	IH03J-100120	1	TH-12x55	4	WS-B-12	4	1B-G50	1
PJF-10400T	PZS-4B	IH03J-100160	1	TH-12x60	4	WS-B-12	4	1B-G60	1
PJF-10500T	PZS-5B	IH03J-100200	1	TH-12x65	4	WS-B-12	4	1B-G75	1
PJF-10600T	PZS-6B	IH03J-100240	1	TH-16x75	4	WS-B-16	4	1B-G85	1

OUT Flange								Plug	
Flange Part No.	Bolt	Washer	O-ring						
IH03J-100100	1	TH-10x55	4	WS-B-10	4	1B-G40	1	TPHA-1/4	1
IH03J-100160	1	TH-12x60	4	WS-B-12	4	1B-G60	1	-	
IH03J-100200	1	TH-12x65	4	WS-B-12	4	1B-G75	1	-	
IH03J-100200	1	TH-12x65	4	WS-B-12	4	1B-G75	1	-	

Welded Type

Welded Type Flange Kit model No.	Applicable Pump Model No.	IN Flange							
		Flange Part No.	Bolt	Washer	O-ring				
PJF-10300E	PZS-3B	IH03J-200120	1	TH-12x55	4	WS-B-12	4	1B-G50	1
PJF-10400E	PZS-4B	IH03J-200160	1	TH-12x60	4	WS-B-12	4	1B-G60	1
PJF-10500E	PZS-5B	IH03J-200200	1	TH-12x75	4	WS-B-12	4	1B-G75	1
PJF-10600E	PZS-6B	IH03J-200240	1	TH-16x75	4	WS-B-16	4	1B-G85	1

OUT Flange								Plug	
Flange Part No.	Bolt	Washer	O-ring						
IH03J-200100	1	TH-10x55	4	WS-B-10	4	1B-G40	1	TPHA-1/4	1
IH03J-200160	1	TH-12x60	4	WS-B-12	4	1B-G60	1	-	
IH03J-200200	1	TH-12x65	4	WS-B-12	4	1B-G75	1	-	
IH03J-200200	1	TH-12x65	4	WS-B-12	4	1B-G75	1	-	

- See page C-11 for dimensions.
- O-ring 1B-** refers to JIS B2401-1B-**.
- See page C-11 for details on tightening torque.



PZ Series Load Sensitive Variable Piston Pump

35 to 220cm³/rev
21MPa

Features

- ① The PZ Series load sensitive variable piston pump employs the semi-cylindrical swash plate that is part of the basic technology used by the PVS series variable piston pump. To this it adds a hydrostatic bearing mechanism, valve plate, and other noise reducing mechanisms for operation that is even quieter than that of PVS Series pumps.
- ② The pump body houses an electro-hydraulic proportional control valve, compensator, and surge cutoff valve, which eliminates the need for superfluous piping.
- ③ The electro-hydraulic proportional control valve uses the proven force feedback system for improved hysteresis, repeatability, and response.
- ④ The ability to create a double pump configuration with an IP pump further expands the range of possible applications.

Specifications

Pump System Specifications

Model No.	Pump Capacity cm ³ /rev	Maximum Working Pressure MPa {kgf/cm ² }	Pressure Adjustment Range MPa {kgf/cm ² }	Flow Control Limit Range ℓ/min Note 3	Revolution Speed min ⁻¹		Weight kg	Fixed Discharge Pump Note 1	
					Min.	Max.		Capacity cm ³ /rev	Pressure MPa {kgf/cm ² }
PZ-2B-* 35E1A-11 2 3	35	21 {214}	2 to 7{20.4 to 71.4} 2 to 14{20.4 to 143 } 2 to 21{20.4 to 214 }	1 to 63	600	2000	36	3.6 to 8.18	21 {214}
PZ-2B-* 45E1A-11 2	45	14 {143}	2 to 7{20.4 to 71.4} 2 to 14{20.4 to 143 }	1 to 80	600	2000	36	3.6 to 8.18	21 {214}
PZ-3B-* 70E1A-10 2 3	70	21 {214}	2 to 7{20.4 to 71.4} 2 to 14{20.4 to 143.4} 2 to 21{20.4 to 214.4}	1 to 126	600	1800	60	3.6 to 15.8	21 {214}
PZ-4B-* 100E1A-10 2 3	100	21 {214}	2 to 7{20.4 to 71.4} 2 to 14{20.4 to 143.4} 2 to 21{20.4 to 214.4}	1 to 180	600	1800	76	3.6 to 15.8	21 {214}
PZ-5B-* 130E1A-10 (Note 2) 3	130	21 {214}	2 to 7{20.4 to 71.4} 2 to 14{20.4 to 143.4} 2 to 21{20.4 to 214.4}	3 to 234	600	1800	100	3.6 to 32.3	21 {214}
PZ-6B-* 180E1A-20 2 3	180	21 {214}	2 to 7{20.4 to 71.4} 2 to 14{20.4 to 143.4} 2 to 21{20.4 to 214.4}	3 to 324	600	1800	160	3.6 to 63.9	21 {214}
PZ-6B-* 220E1A-20 2 3	220	21 {214}	2 to 7{20.4 to 71.4} 2 to 14{20.4 to 143.4} 2 to 21{20.4 to 214.4}	3 to 330	600	1500	162	3.6 to 63.9	21 {214}

Note1. Can be used in combination with an IP pump to configure a fixed discharge pump.

Note2. The PZ-4B-130 model number was changed to PZ-5B-130.

Note3. Maximum flow rate depends on the revolution speed. Values in the above table are for a speed of 1800min⁻¹ for the PZ-2B to PZ-6B-180, and 1500min⁻¹ for the PZ-6B-220.

Pressure/Flow Rate Control System Specifications Pressure Control System

Pressure Control Range MPa {kgf/cm ² }	1 : 2 to 7{20.4 to 71.4} 2 : 2 to 14{20.4 to 143.4} 3 : 2 to 21{20.4 to 214.4}
Rated Current mA	800
Coil Resistance Ω	20(20°C)
Hysteresis %	3% max. Note 1

Flow Rate Control System

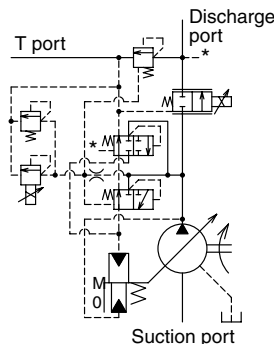
Valve Differential Pressure MPa {kgf/cm ² }	1{10} Note 2
Rated Current mA	800
Coil Resistance Ω	20(20°C)
Hysteresis %	3% max. Note 1

Note 1. Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

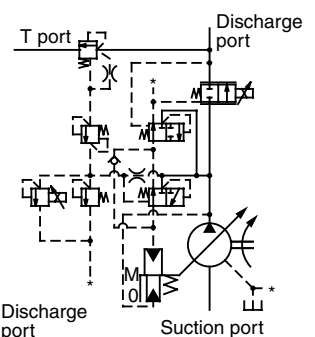
Note 2. Pressure differential of pump discharge pressure (valve IN side) and load pressure (valve OUT side).

Note 3. For information about power amplifiers, see pages I-26 through I-37.

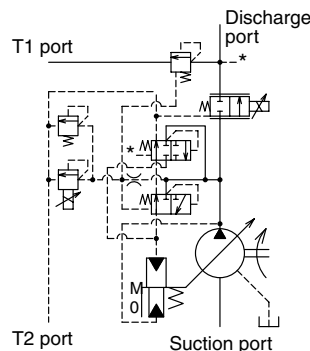
PZ-2B/3B/5B



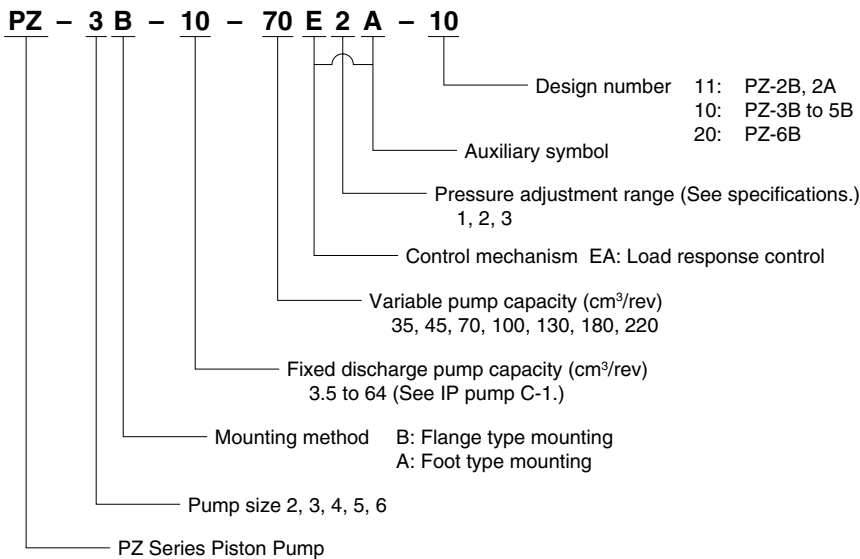
PZ-4B-100



PZ-6B



Understanding Model Numbers



- Handling
- Pump Installation and Piping Precautions

- 1 Use flexible couplings for connecting the pump shaft to the drive shaft, and prevent radial or thrust load from being applied to the pump shaft.
- 2 Eccentricity between the drive shaft and pump shaft should be no greater than 0.05mm, with an eccentric angle error of 1° or less.
- 3 Keep the clamping length of couplings and pump shafts at least 2/3 the length of the coupling width.
- 4 Use a sufficiently rigid pump mounting base.
- 5 Set pump suction side pressure to -0.03 MPa or more (suction port flow velocity less than 2 m/sec).
- 6 Raise part of the drain piping so it is above the topmost part of the pump body, and insert the return section of the drain piping into the hydraulic operating fluid. Also, observe the values in the following table in order to limit the drain back pressure to 0.1 MPa

Item Model No.	PZ-2B	3B PZ-4B 5B	PZ-6B
Pipe Joint Size	At least 1/2"	At least 3/4"	At least 1"
Pipe I.D.	At least φ12	At least φ17	At least φ22
Pipe Length	1 m or less	1 m or less	1 m or less

- 7 Mount the pump so the pump shaft is oriented horizontally.
- 8 Use of rubber hose is recommended in order to minimize noise and vibration.

- Management of Hydraulic Operating Fluid

- 1 Use only good-quality hydraulic operating fluid with a kinematic viscosity during operation within the range of 20 to 200 mm²/sec. Normally, you should use an R&O type and wear-resistant type of IS-OGV32 to 68 or equivalent. The optimum kinematic viscosity during operation is 20 to 50 mm²/sec.
- 2 The operating temperature range is 5 to 60°C. When the oil temperature at startup is 5°C or less, run the pump at low pressure until the oil temperature reaches 5°C.
- 3 Provide a suction strainer with a filtering grade of about 100μ (150 mesh). Provide a return line filter of grade 20μm or less on the return line to the tank. (When the pump is used at a high pressure of 14 MPa or greater, a filter of 10μm or less is recommended.)
- 4 Manage hydraulic operating fluid so contamination is maintained at class NAS10 or lower.
- 5 Use hydraulic operating fluid when the operating ambient temperature is in the range of 0 to 60°C.

- Startup Precautions

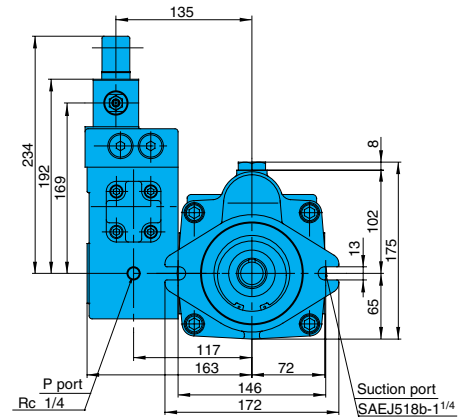
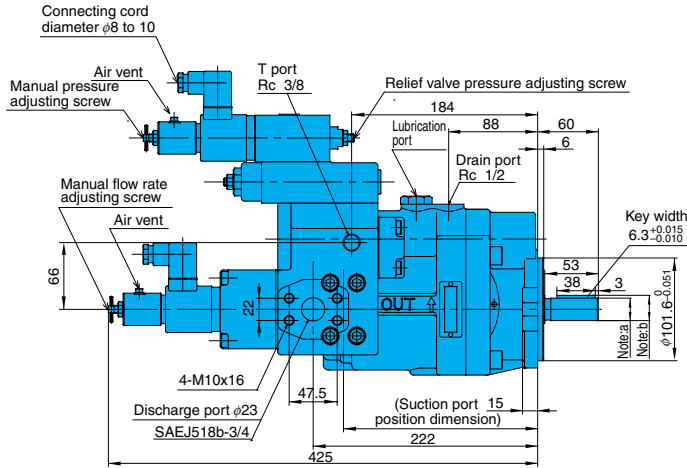
- 1 Before starting up the pump, fill the pump body with clean hydraulic operating fluid through the lubrication port.

Model No.	Oil Amount cm ³
PZ-2B	650
PZ-3B	1000
PZ-4B	1800
PZ-5B	2200
PZ-6B	3000

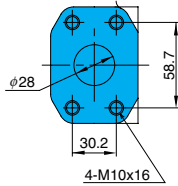
- 2 Check to make sure that the rotation direction of the pump is the same as the rotation direction indicated by the arrow on the pump body.
- 3 Air entering the pump or pipes can cause noise or vibration. At startup, set the pump discharge side to a no-load state, and operate the pump in the inching mode to remove any air that might be in the pump or pipes.
- 4 Equip an air bleed valve in circuits where it is difficult to release air before startup. (See "IP Pumps" on page C-13.)
- 5 To enable superior pressure and flow control, loosen the air vent when starting up the pump in order to release any air, and fill the inside of the solenoid with hydraulic operating fluid. You can change the position of the air vent by rotating its cover.
- 6 Before adjusting the manual adjusting screw from the first time or when there is no input current to the valve due to electrical malfunction or some other reason, you can control pump pressure and flow rate by rotating the manual adjusting screw. Normally, the manual adjusting screw should be returned completely to its original position and secured with the lock nut.

Installation Diagram

PZ-2B-35
45



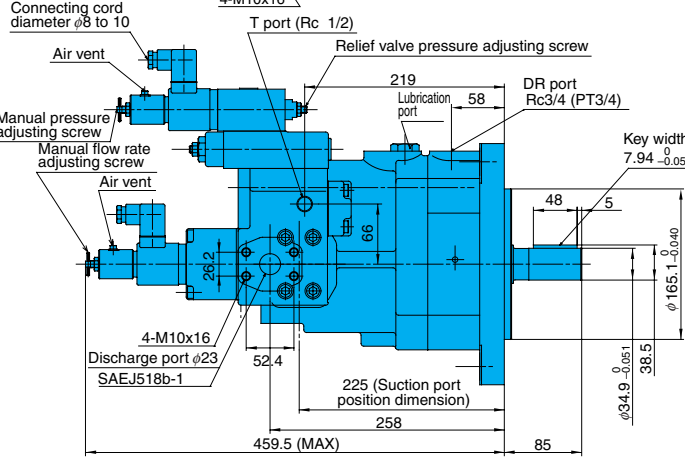
Suction port



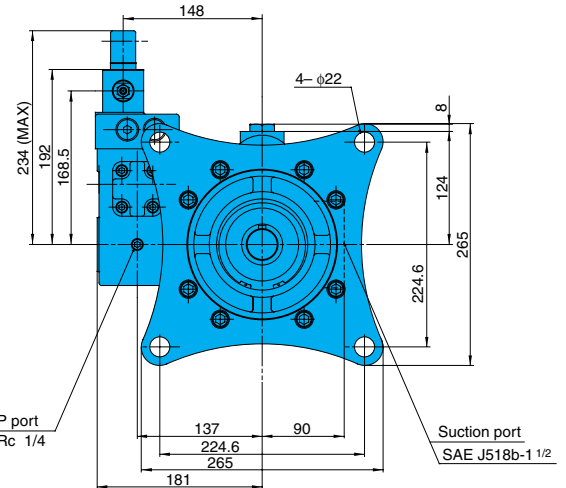
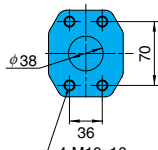
Note

	a	b
Single Pump	$\phi 22.23^{0}_{-0.021}$	$24.9^{0}_{-0.5}$
Double Pump with Fixed Flow IP	$\phi 25.385^{0}_{-0.025}$	$27.85^{0}_{-0.25}$

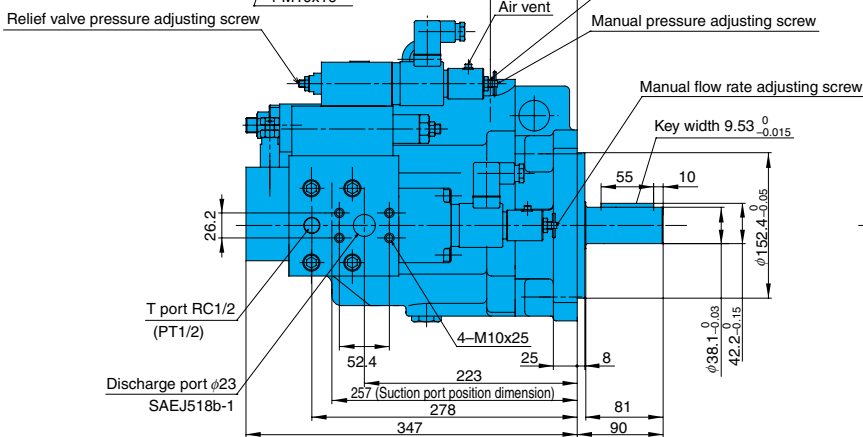
PZ-3B-70



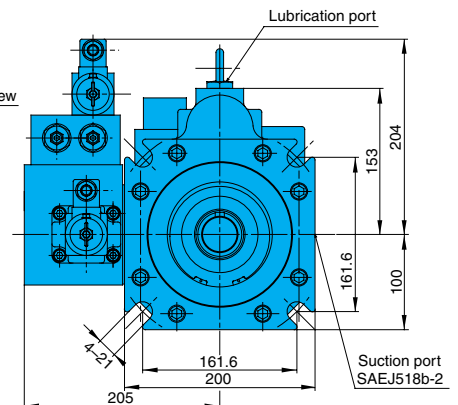
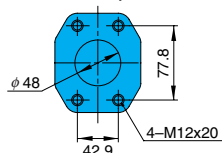
Suction port configuration



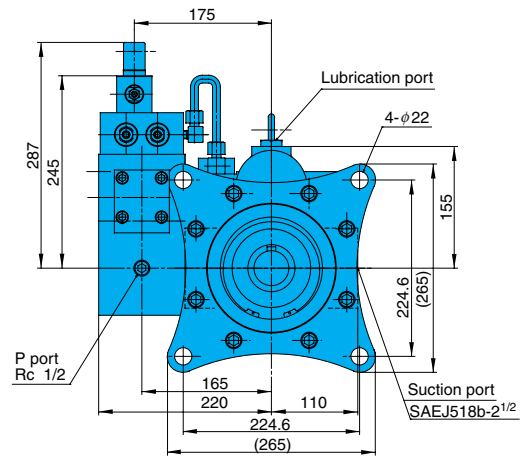
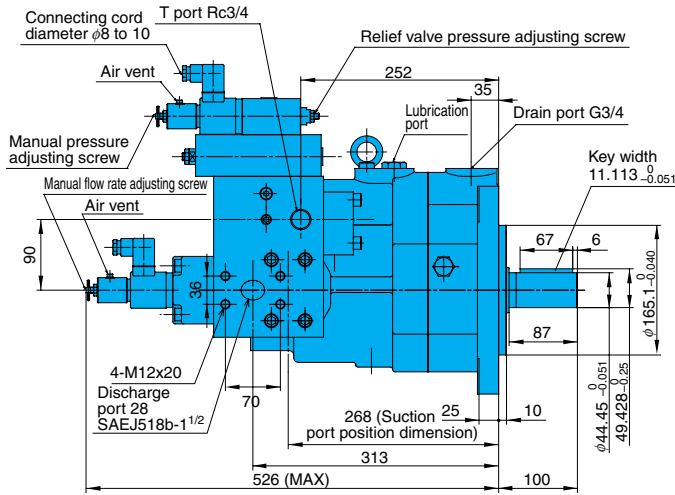
PZ-4B-100



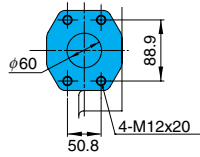
Suction port



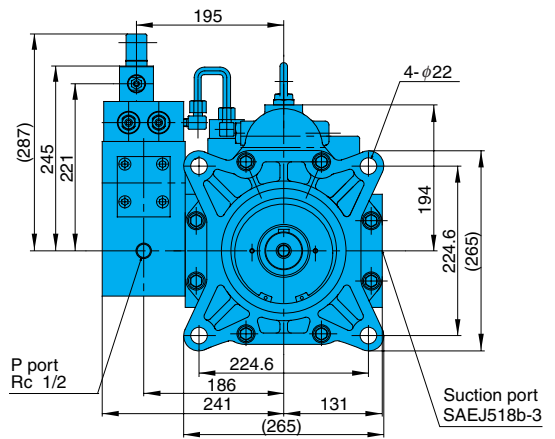
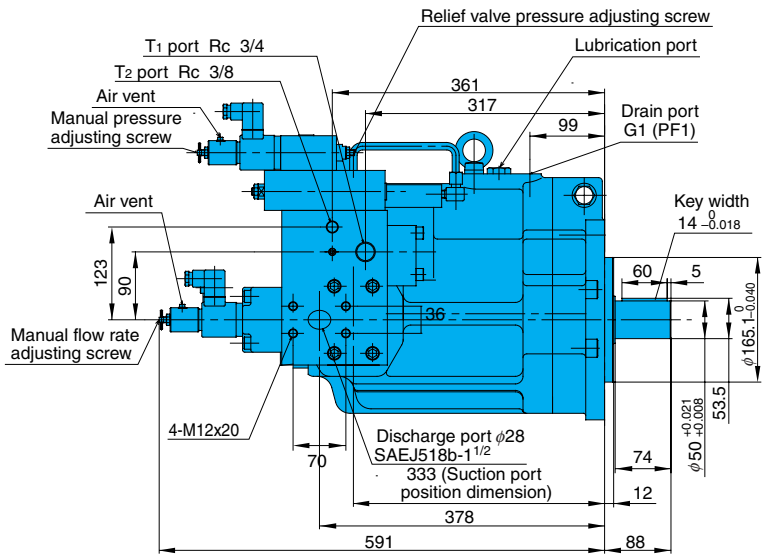
PZ-5B-130



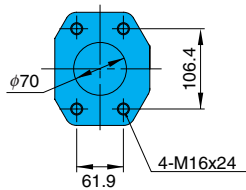
Suction port



PZ-6B-180
220



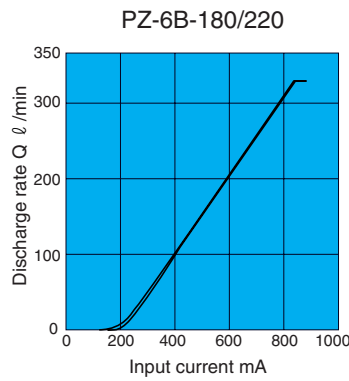
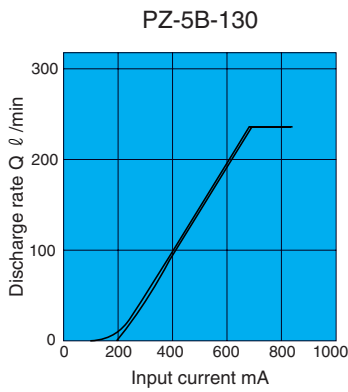
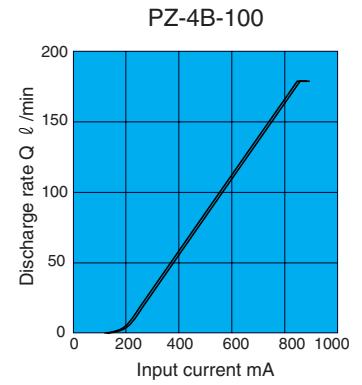
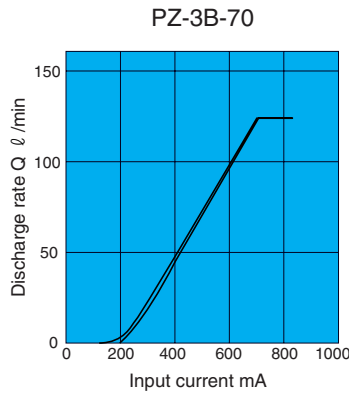
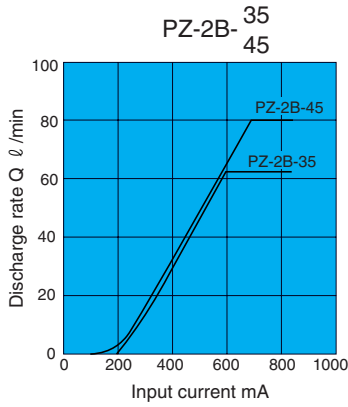
Suction port



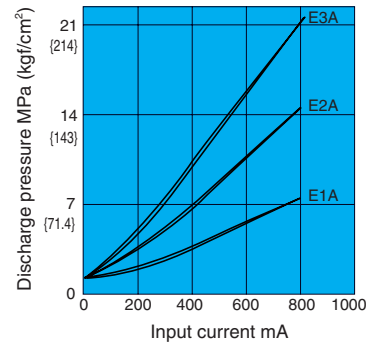
Performance Curves

Typical characteristics at hydraulic operating fluid kinematic viscosity of 32 mm²/s

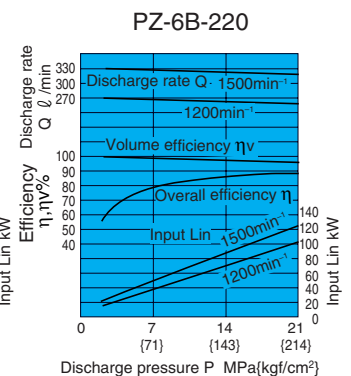
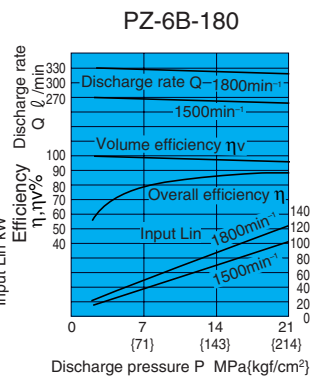
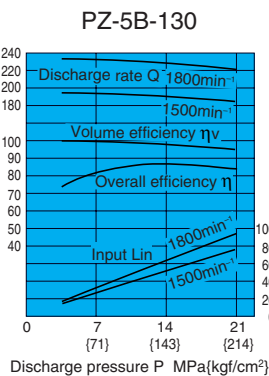
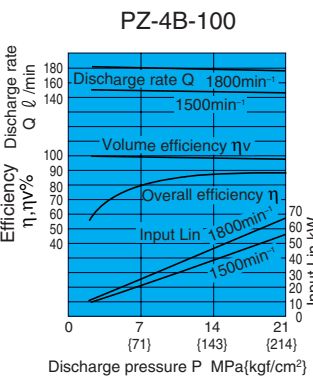
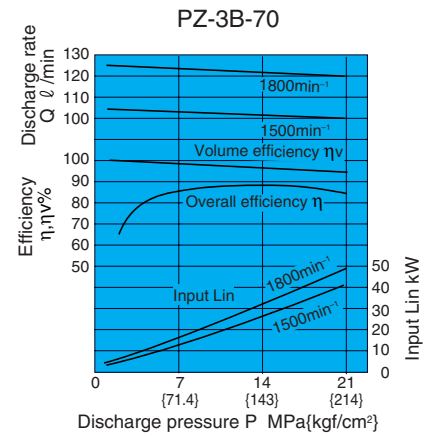
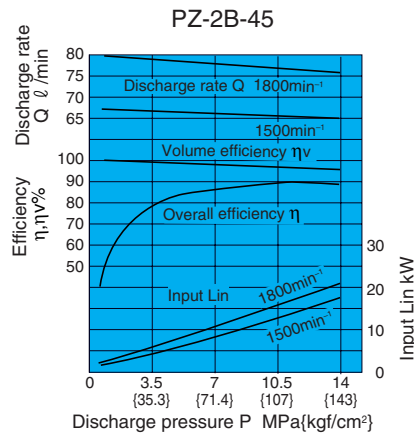
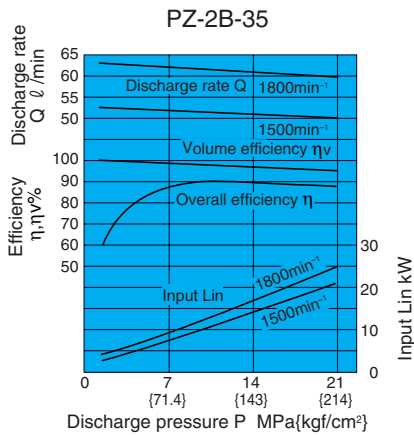
Input Current–Discharge Rate Characteristics



Input Current–Discharge Pressure Characteristics

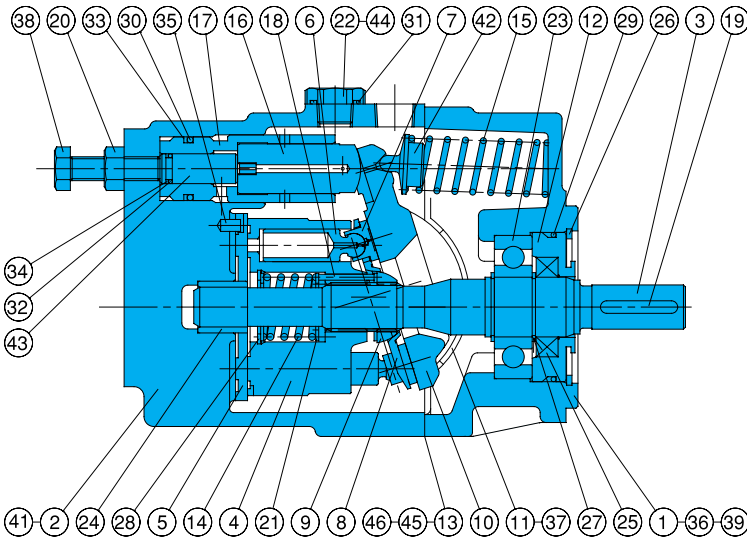


General Performance



Cross-sectional Drawing

PZ-2B-³⁵E*A-10
45



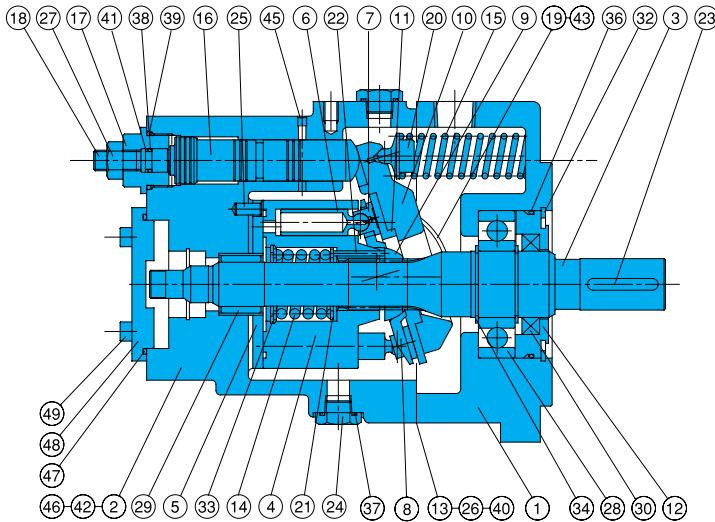
Part No.	Part Name	Part No.	Part Name
1	Body	24	Needle bearing
2	Case	25	Oil seal
3	Shaft	26	Snap ring
4	Cylinder barrel	27	Snap ring
5	Valve plate	28	Snap ring
6	Piston	29	O-ring
7	Shoe	30	O-ring
8	Shoe holder	31	O-ring
9	Barrel holder	32	O-ring
10	Swash plate	33	Backup ring
11	Thrust bush	34	Backup ring
12	Seal holder	35	Pin
13	Gasket	36	Screw
14	Spring C	37	Screw
15	Spring S	38	Screw
16	Control piston	39	Expander plug
17	Sleeve	40	Nameplate
18	Needle	41	CAUTION plate
19	Key	42	Spring holder
20	Nut	43	Guide
21	Retainer	44	Lubrication port plate
22	Plug	45	Connector
23	Ball bearing	46	O-ring

List of Sealing Parts

Part No.	Name	Q'ty	Size	Remarks
13	Gasket	1	*	3 Bond
25	Oil seal	1	TCN-305011	N. O. K
29	O-ring	1	1B-G70	JIS B 2401
30	O-ring	1	1B-P26	JIS B 2401
31	O-ring	1	1B-P21	JIS B 2401
32	O-ring	1	1B-P11	JIS B 2401
33	Backup ring	1	T2-P26	JIS B 2407
34	Backup ring	1	T2-P11	JIS B 2407
46	O-ring	2	1B-P5	JIS B 2401

*Not available through retail sources. Consult your agent for more information.

PZ-3/5B-*E*A-10

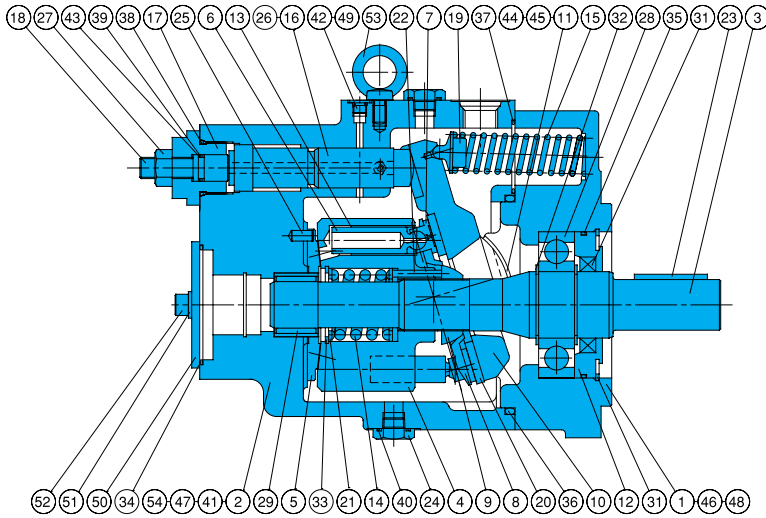


Part No.	Part Name	Part No.	Part Name
1	Body	24	Plug
2	Case	25	Pin
3	Shaft	26	Connector
4	Cylinder barrel	27	Nut
5	Valve plate	28	Ball bearing
6	Piston	29	Needle bearing
7	Shoe	30	Oil seal
8	Shoe holder	32	Snap ring
9	Barrel holder	33	Snap ring
10	Swash plate	34	Snap ring
11	Thrust plate	36	O-ring
12	Seal holder	37	O-ring
13	Gasket	38	O-ring
14	Spring C	39	O-ring
15	Spring S	40	O-ring
16	Control piston	41	Backup ring
17	End plug	42	Bolt
18	Guide screw	43	Screw
19	Thrust bush	44	Expander plug
20	Spring holder	45	Expander plug
21	Retainer	46	Pin
22	Needle	47	O-ring
23	Key	48	Plate
		49	Screw

List of Sealing Parts

Part No.	Part Name	PZ-3B		PZ-5B		Remarks
		Size	Q'ty	Size	Q'ty	
13	Gasket	*	1	*	1	3 Bond
30	Oil seal	TCN-456812	1	TCN-608212	1	N. O. K
36	O-ring	1B-G95	1	1B-G125	1	JIS B 2401
37	O-ring	1B-P21	2	1B-P21	2	JIS B 2401
38	O-ring	1B-P12	1	1B-P16	1	JIS B 2401
39	O-ring	1B-P34	1	1B-P42	1	JIS B 2401
40	O-ring	1B-P7	2	1B-P7	2	JIS B 2401
41	Backup ring	T2-P12	1	T2-P16	1	JIS B 2407
47	O-ring	1B-G90	1	1B-G85	1	JIS B 2401

*Not available through retail sources. Consult your agent for more information.



Part No.	Part Name	Part No.	Part Name
1	Body	31	Snap ring
2	Case	32	Snap ring
3	Shaft	33	Snap ring
4	Cylinder barrel	34	O-ring
5	Valve plate	35	O-ring
6	Piston	36	O-ring
7	Shoe	37	O-ring
8	Shoe holder	38	O-ring
9	Barrel holder	39	O-ring
10	Swash plate	40	O-ring
11	Thrust bush	41	O-ring
12	Seal holder	42	O-ring
13	Sleeve	43	Backup ring
14	Spring C	44	Orifice
15	Spring S	45	Screw
16	Control piston	46	Plug
17	End plug	47	Pin
18	Guide screw	48	Bolt
19	Spring holder	49	Plug
20	Thrust plate	50	Plate
21	Retainer	51	Washer
22	Needle	52	Bolt
23	Key	53	Eye bolt
24	Plug	54	Electro-hydraulic proportional valve
25	Pin		
26	Orifice		
27	Nut		
28	Ball bearing		
29	Needle bearing		
30	Oil seal		

List of Sealing Parts

Part No.	Part Name	PZ-4B		PZ-6B		Remarks
		Size	Q'ty	Size	Q'ty	
30	Oil seal	TCN-507212	1	TCN-659013	1	N. O. K
34	O-ring	1B-G85	1	1B-G85	1	JIS B 2401
35	O-ring	1B-G105	1	1B-G135	1	JIS B 2401
36	O-ring	1B-G155	1	1B-G200	1	JIS B 2401
37	O-ring	1B-G50	1	1B-G60	1	JIS B 2401
38	O-ring	1B-P36	1	1B-P41	1	JIS B 2401
39	O-ring	1B-P16	1	1B-P16	1	JIS B 2401
40	O-ring	1B-P21	3	1B-P21	3	JIS B 2401
41	O-ring	1B-P9	1	1B-P10	1	JIS B 2401
42	O-ring	1B-P8	5	1B-P8	8	JIS B 2401
43	Backup ring	T2-P16	1	T2-P16	1	JIS B 2407

Foot Mounting Kit

Pump Model No.	Mounting Model No.
PZ-2B	IHM-44-10
PZ-3B PZ-5B PZ-6B	IHM-55-10
PZ-4B	PZM-4-10

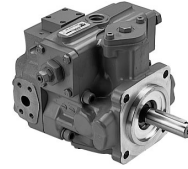
Note: See pages C-12 and A-34 for information about mounting methods.

Piping Flange Kit

Flange Kit model No.	Applicable Pump Model No.	IN Flange							
		Flange Part No.		Bolt		Washer		O-ring	
IHF -4-T-20	PZ-2B-35/45	IH03J-100100	1	TH-10 × 55	4	WS-B-10	4	1B-G40	1
IHF -5-T-20	PZ-3B-70	IH03J-100120	1	TH-12 × 55	4	WS-B-12	4	1B-G50	1
PZF -4-T-10	PZ-4B-100	IH03J-100160	1	TH-12 × 60	4	WS-B-12	4	1B-G60	1
IHF -7-T-10	PZ-5B-130	IH03J-100200	1	TH-12 × 60	4	WS-B-12	4	1B-G75	1
PZF -6-T-10	PZ-6B-180/220	IH03J-100240	1	TH-16 × 75	4	WS-B-16	4	1B-G85	1

OUT Flange								Plug	
Flange Part No.		Bolt		Washer		O-ring			
IH03J-100060	1	TH-10 × 50	4	WS-B-10	4	1B-G30	1	TPHA-1/4	1
IH03J-100080	1	TH-10 × 50	4	WS-B-10	4	1B-G35	1	TPHA-1/4	2
IH03J-100080	1	TH-10 × 50	4	WS-B-10	4	1B-G35	1	TPHA-1/4	1
IH03J-100120	1	TH-12 × 60	4	WS-B-12	4	1B-G50	1	TPHA-1/4	1
IH03J-100120	1	TH-12 × 60	4	WS-B-12	4	1B-G50	1	TPHA-1/4	1

Note 1. See page C-11 for dimensions.
 2. O-ring 1B/B-** refers to JIS B2401-1B.
 3. See page C-11 for details on tightening torque.



PZH Series High-Pressure Variable Volume Piston Pump

28,40cm³/rev
41MPa

Features

① Long, trouble-free service life

Swash plate design ensures long, trouble-free bearing life.

② Low-noise, even in the high pressure range

High-rigidity semi-cylindrical swash plate provides low-noise operation,

even in the high-pressure range.

③ Female piston

Female piston increases sealing between the shoe and piston for enhanced resistance to contamination.

④ High-precision proportional flow control

This load sensitive type pump provides precision low flow rate control from zero load.

Specifications

Model No.	Pump Capacity cm ³ /rev	Rated Voltage MPa {kgf/cm ² }	Maximum Working Pressure MPa {kgf/cm ² }	Revolution Speed min ⁻¹		Weight kg
				Min.	Max.	
PZH-2B-28**5***-10	28	34.3 {350}	41.0 {418}	500	1900	28
PZH-2B-40**5***-10	40	34.3 {350}	41.0 {418}	500	1900	29

● Handling

● Pump Installation and Piping Precautions

- ① Use flexible couplings for connecting the pump shaft to the drive shaft, and minimize radial or thrust load from being applied to the pump shaft.
- ② Eccentricity between the drive shaft and pump shaft should be no greater than 0.05mm, with surface vibration n0.09 or less.
- ③ Make sure the clamping length of couplings and the hydraulic pump shaft is long enough to allow the entire length of key fits in the coupling width.
- ④ Use a sufficiently rigid pump mounting base.
- ⑤ Make the pump suction side pressure is at least -0.03MPa at peak times, and at least -0.01MPa normally.
- ⑥ Raise part of the drain piping so it is above the topmost part of the pump body, and insert the return section of the drain piping into the hydraulic operating fluid tank. In order to obtain a drain back pressure of 0.2Mpa or less, the drain pipe should have an inside diameter of at least φ17 and should be less than one meter long.

● Management of Hydraulic Operating Fluid

- ① Use only good-quality hydraulic operating fluid with a kinematic viscosity during operation within the range of 20 to 200 mm²/sec. Normally, you should use an R&O type and wear-resistant type of ISO VG46 or equivalent. The optimum kinematic viscosity during operation is 20 to 50 mm²/sec.
- ② The operating temperature range is 10 to 80°C. When the oil temperature at startup is 10°C or less, run the pump at low pressure until the oil temperature reaches 10°C.
- ③ Provide a suction strainer with a filtering grade of about 100μm (150 mesh). Provide a return line filter of grade 20μm or less on the return line to the tank. (When the pump is used at a high pressure of 14 MPa or greater, a filter of 10μm or less is recommended.)
- ④ Manage the hydraulic operating fluid so that contamination is maintained at class NAS9 or lower.
- ⑤ Use the hydraulic operating fluid when the operating ambient temperature is in the range of -20 to 20°C.

● Startup Precautions

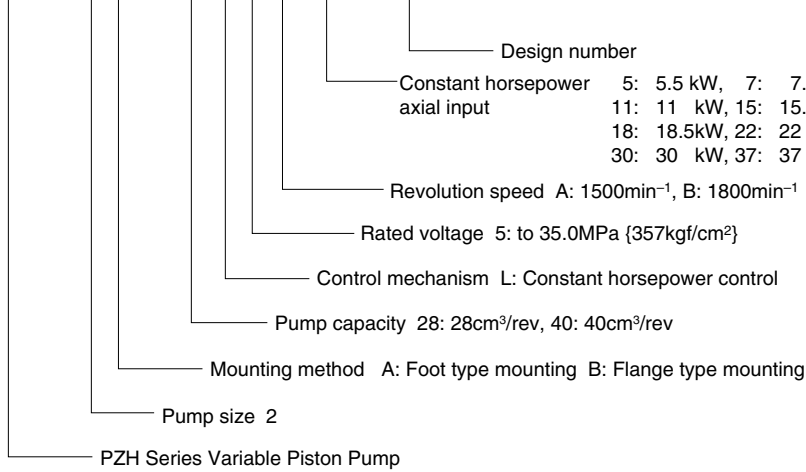
- ① Before starting the pump, fill the pump body with clean hydraulic operating oil through the drain port or the air bleeder port. Be sure to perform the air bleed operation from the air bleeder port before and immediately after running the pump.
- ② This pump does not have a pressure compensation mechanism (no full cut-off). Be sure to install a relief valve in the circuit.
- ③ Check to make sure that the pump rotation direction is clockwise when viewed from the end of the shaft.
- ④ Air entering the pump or pipes can cause noise or vibration. At startup, set the pump discharge side to a no-load state, and operate the pump in the inching mode to remove any air that might be in the pump or pipes.
- ⑤ To enable proper flow control when using a proportional flow control model, loosen the air vent of the electro-hydraulic proportional control valve to bleed air from the valve immediately after operation. You can change the position of the air vent by loosening the coil cover. When there is no input current to the valve, you can manually control the flow rate with the manual flow rate adjusting screw. Normally, the manual adjusting screw should be returned completely to its original position and secured with the lock nut.

Understanding Model Numbers

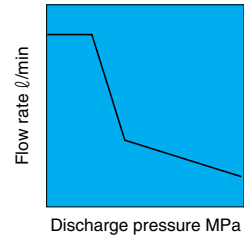
Standard type

Constant horsepower control type (L)

PZH - 2 B - 28 L 5 A ** - 10



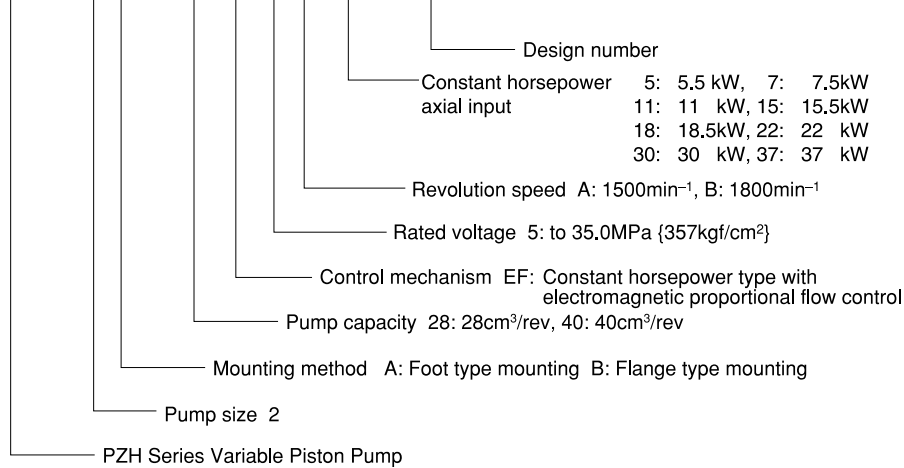
P-Q characteristics



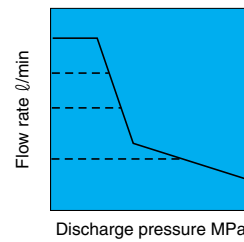
Option type

Electro-hydraulic proportional control type (EF)

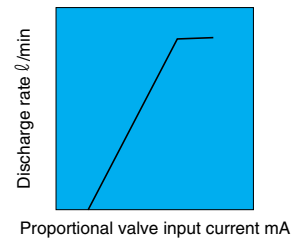
PZH - 2 B - 28 EF 5 A ** - 10



P-Q characteristics

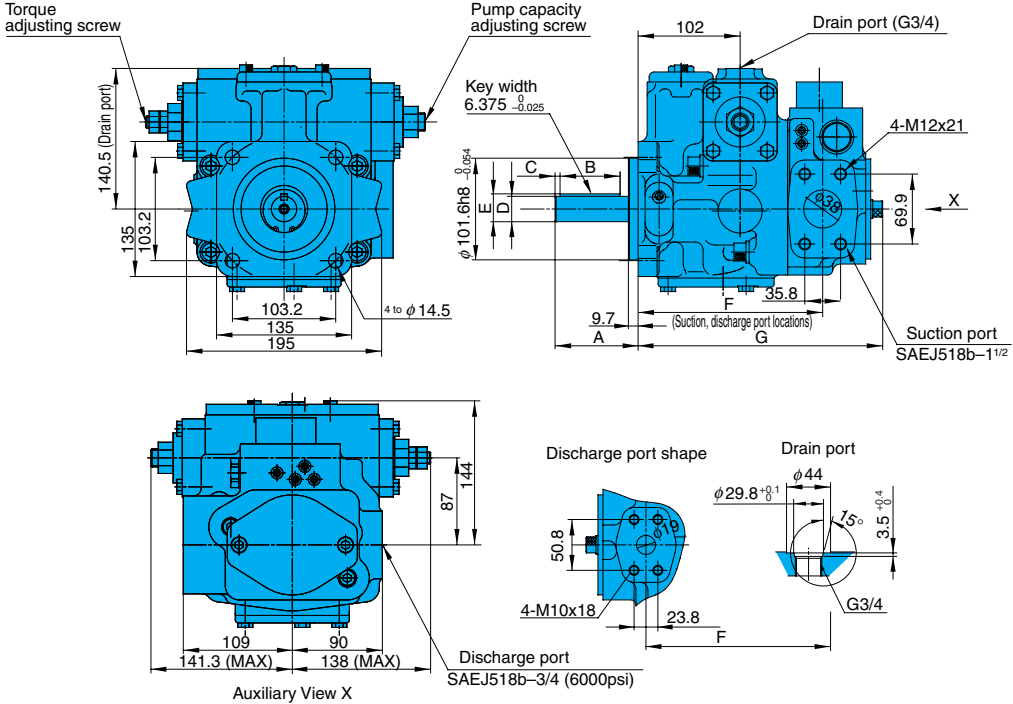


Input Current – Discharge Rate Characteristics



Installation Dimension Drawings

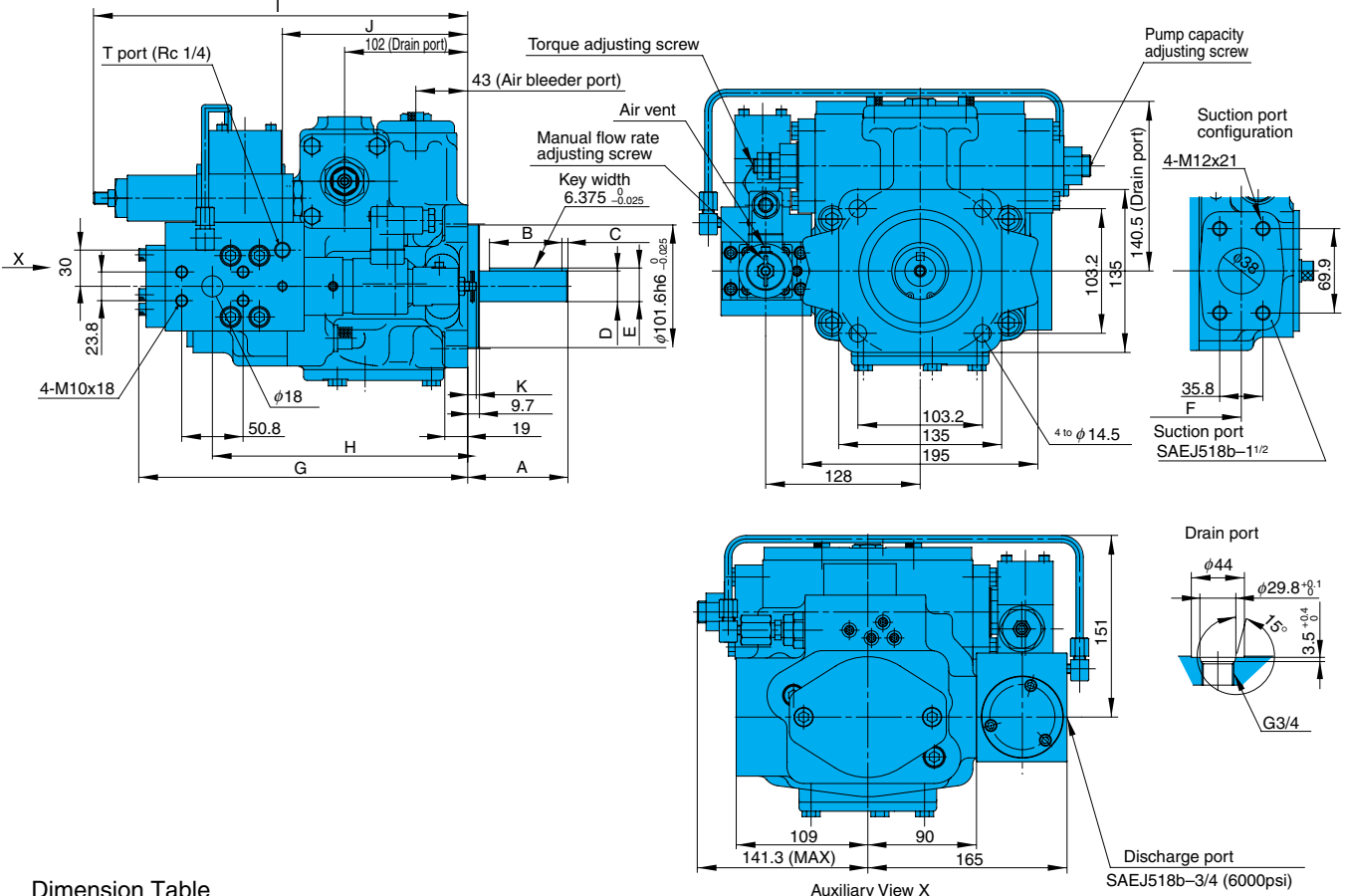
PZH-2B-28²⁸L5**⁴⁰-10



Dimension Table

Pump Model No.	A	B	C	D	E	F	G
PZH-2B-28L5** ⁴⁰ -10	67	45	4	φ22.23 ⁰ _{-0.025}	25.08 ⁰ _{-0.25}	175	233
PZH-2B-40L5** ⁴⁰ -10	83	60	5	φ25.385 ⁰ _{-0.025}	27.85 ⁰ _{-0.25}	184.5	242.5

PZH-2B-28²⁸EF5**⁴⁰-10



Dimension Table

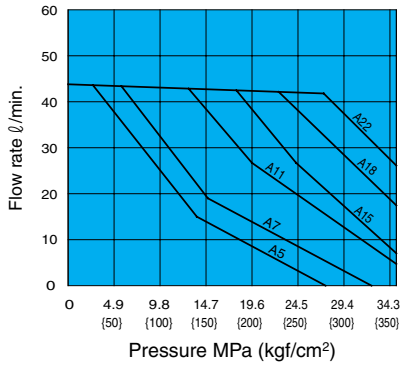
Pump Model No.	A	B	C	D	E	F	G	H	I	J	K
PZH-2B-28EF5** ⁴⁰ -10	67	45	4	φ22.23 ⁰ _{-0.025}	25.08 ⁰ _{-0.25}	175	263	202	300.5	144	16.5
PZH-2B-40EF5** ⁴⁰ -10	83	60	5	φ25.385 ⁰ _{-0.025}	27.85 ⁰ _{-0.25}	184.5	272.5	211.5	310	153.5	7

Performance Curves

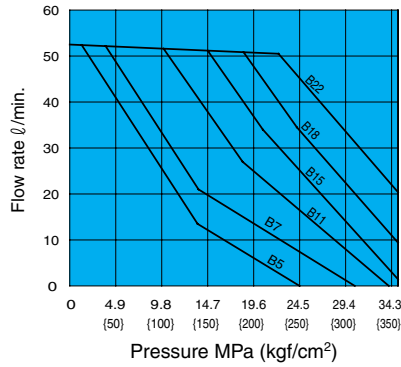
Typical Characteristics at a Hydraulic Operating Fluid Kinematic Viscosity of 46 mm²/s

Load Pressure - Flow Rate Characteristics

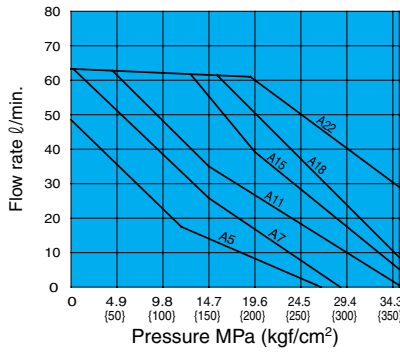
PZH-2B-28*5A**-10
 Revolution Speed :1500min⁻¹
 Symbol : A**



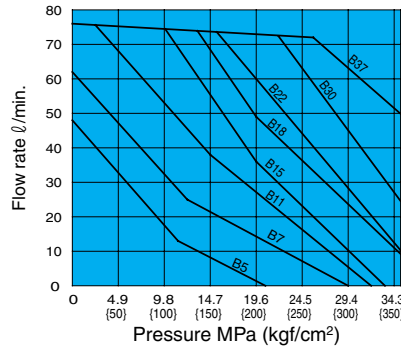
PZH-2B-28*5B**-10
 Revolution Speed :1800min⁻¹
 Symbol : B**



PZH-2B-40*5A**-10
 Revolution Speed :1500min⁻¹
 Symbol : A**



PZH-2B-40*5B**-10
 Revolution Speed :1800min⁻¹
 Symbol : B**

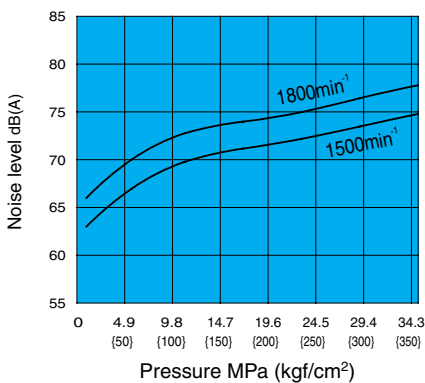


Constant Horsepower Input and Symbols

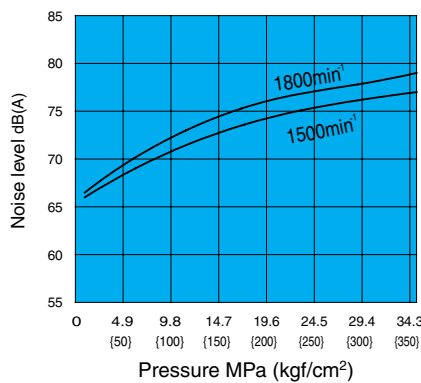
Input (kW)	PZH-2B-28		PZH-2B-40	
	4P-50Hz	4P-60Hz	4P-50Hz	4P-60Hz
5.5	A5	B5	A5	B5
7.5	A7	B7	A7	B7
11	A11	B11	A11	B11
15	A15	B15	A15	B15
18.5	A18	B18	A18	B18
22	A22	B22	A22	B22
30	-	-	-	B30
37	-	-	-	B37

Noise Characteristics

PZH-2B-28

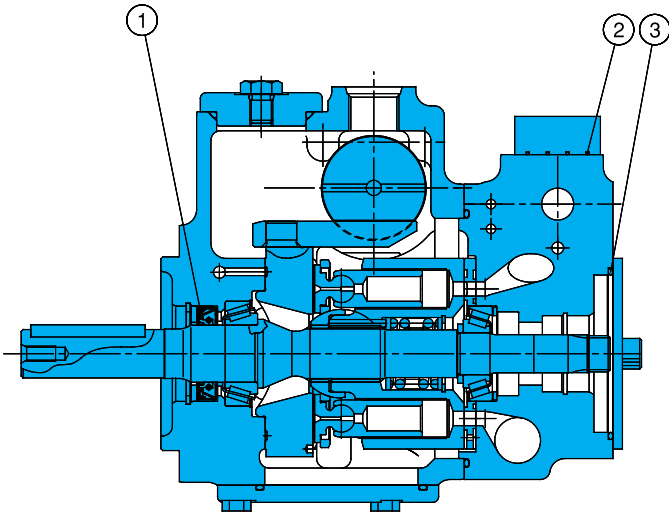


PZH-2B-40



Cross-sectional Drawing

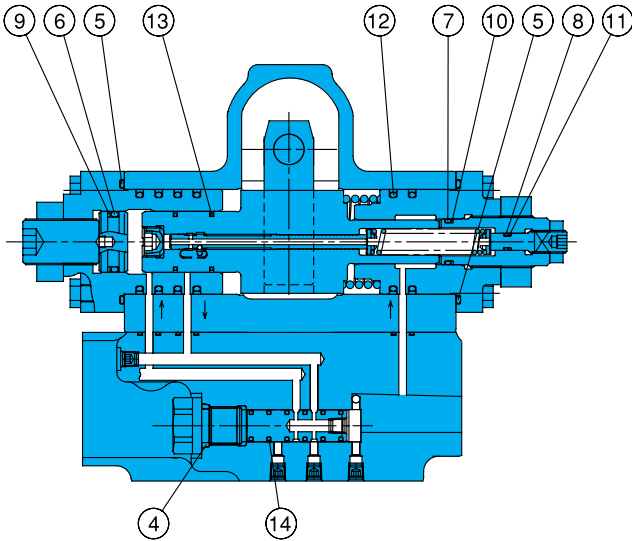
PZH-2B-***-10



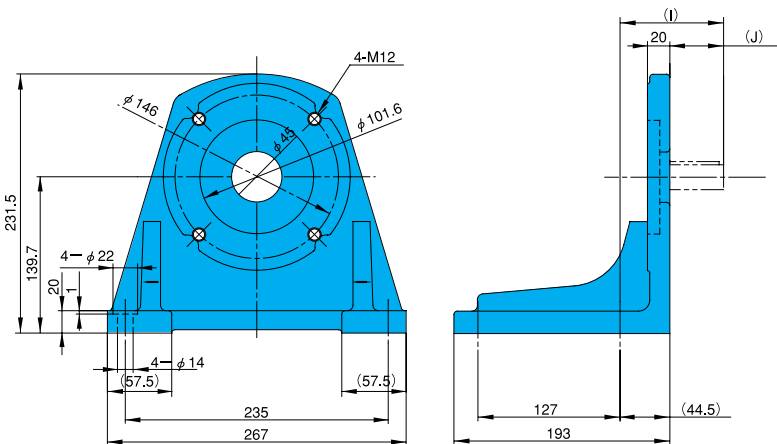
List of Sealing Parts

Part No.	Name	Q'ty	Part Number	
			PZH-2B-28	PZH-2B-40
1	Oil seal	1	*	*
2	O-ring	4	*	
3	O-ring	1	*	
4	O-ring	1	*	
5	O-ring	2	*	
6	O-ring	1	*	
7	O-ring	1	*	
8	O-ring	1	*	
9	Backup ring	1	*	
10	Backup ring	1	*	
11	Backup ring	1	*	
12	Packing	6	*	
13	Packing	6	*	
14	Packing	2	*	

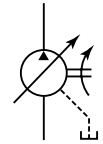
*These seal products are not available through retail channels. For details, consult your agent.



Foot Mounting Kit



Kit Model No.	Applicable Pump Model No.	Accessories				Dimensions (mm)		Weight kg
		Bolt	Q'ty	Washer	Q'ty	I	J	
PZH-2-H-10	PZH-2B-28	TB-12×35	4	WP-10	4	92.5	48	12.0
	PZH-2B-40					107.5	63	



VDS Series Small Variable Volume Vane Pump

8cm³/rev
15 ℓ
7MPa

Features

① High efficiency operation with minimal power loss

All the performance of the original new VDR series mechanisms combines with precision machining for a pump that minimizes power loss, especially at full cut-off.

② Quiet operation

Journal bearings with a proven record on IP pumps plus new suction and discharge port configurations reduce operating noise and

deliver quiet operation with minimal vibration, even in the high-pressure range.

③ Compact and simple design, easy operation

Compact and quiet, VDS Series variable vane pumps are economical and easy to handle. A simple design allows use in a wide range of hydraulic systems.

④ Precise characteristics, prompt response

Prompt response at both ON-OFF and OFF-ON ensures instantaneous, stable, high-precision operation.

⑤ Solidly built for high efficiency and long life

VDS Series pumps are built to last, with a design that incorporates years of NACHI experience and know-how. Specially selected materials and skilled workmanship provide outstanding durability along with stable, high-efficiency operation.

Specifications

Model No.	Capacity cm ³ /rev	No-load Discharge Rate ℓ/min				Pressure Adjustment Range MPa {kgf/cm ² }	Allowable Peak Pressure MPa {kgf/cm ² }	Revolution Speed min min ⁻¹		Weight kg
		1000min ⁻¹	1200min ⁻¹	1500min ⁻¹	1800min ⁻¹			Min.	Max.	
VDS-0A(B)-1A1-10						1 to 2 {10.2 to 20.4}				
“ -1A2 “	8.3	8	10	12.5	15	1.5 to 3.5 {15.3 to 35.7}	14 {143}	800	1800	A : 6.5 B : 4.5
“ -1A3 “						3 to 7 {30.6 to 71.4}				

● Handling

- The direction of rotation for this pump is clockwise (rightward) when viewed from the shaft side.
- Drain piping must be direct piping up to a point that is below the tank fluid level, and back pressure due to pipe resistance should not exceed 0.03MPa.
- When adjusting pressure, pressure is increased by clockwise (rightward) rotation of the adjusting screw and decreased by counterclockwise (leftward) rotation.
- When adjusting the flow rate, the flow rate is decreased by clockwise (rightward) rotation of the adjusting screw and increased by counterclockwise (leftward) rotation. The graph on the right provides general guidelines for the relationship between the rotation angle of the flow rate adjusting screw and the no-load discharge rate.
- Factory Default P-Q Settings (Standard Model)
 - Flow Rate Setting = Maximum flow rate for model as indicated in the catalog
 - Pressure Setting = Pressure shown in table below

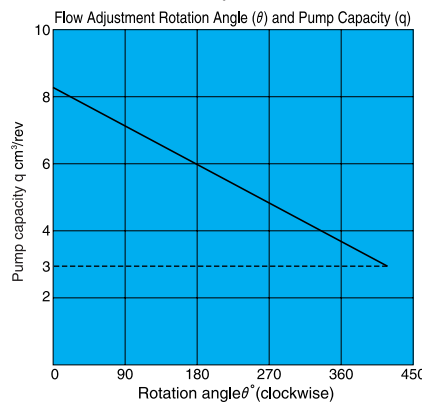
Factory Default Pressure Settings MPa{kgf/cm ² }
1 : 2.0 {20.4}
2 : 3.5 {35.7}
3 : 7.0 {71.4}

However: $Q=q \times n \times 10^{-3}$

Q : No-load Discharge Rate (ℓ/min)

q : Capacity (cm³/rev)

N : Revolution Speed min⁻¹



The values indicated above are at maximum pump discharge volume with the flow volume adjusting screw at the 0° position.

The broken line shows the flow volume adjustment range lower limit value.

⑥ Thrust Screw

The thrust screw is precision adjusted at the factory during assembly. Never touch the thrust screw. See callout 9 in the cross-section diagram on page B-4.

⑦ Initial Operation

Before operating the pump for the first time, put the pump discharge side into the no-load state and then repeatedly start and stop the motor to bleed all air from inside the pump and the suction piping. After confirming that the pump is discharging oil, continue the no-load operation for at least 10 minutes to discharge all the air from the circuit.

⑧ For the hydraulic operating fluid, use an R&O type and wear-resistant type of ISO VG32 to 68 or equivalent (viscosity index of at least 90). Use hydraulic operating fluid that provides kinematic viscosity during operation in the range of 20 to 150mm²/s.

⑨ The operating temperature range is 15 to 60°C. When the oil temperature at startup is 15°C or less, perform a warm-up operation at low pressure until the oil temperature reaches 15°C. Use the pump in an area where the temperature is within the range of 0 to 60°C.

(Continued on following page)

- 10 Suction pressure is -0.03 to +0.03MPa (-0.3 to +0.3kgf/cm²), and the suction port flow rate should be greater than 2m/sec.
- 11 Avoid pulley, gear, and other drive systems that impart a radial or thrust load on the end of the pump shaft. Mount the pump so its pump shaft is oriented horizontally.
- 12 Provide a suction strainer with a filtering grade of about 100 μm (150 mesh). For the return line to the tank, use a 25 μm line filter.
- 13 Manage hydraulic operating

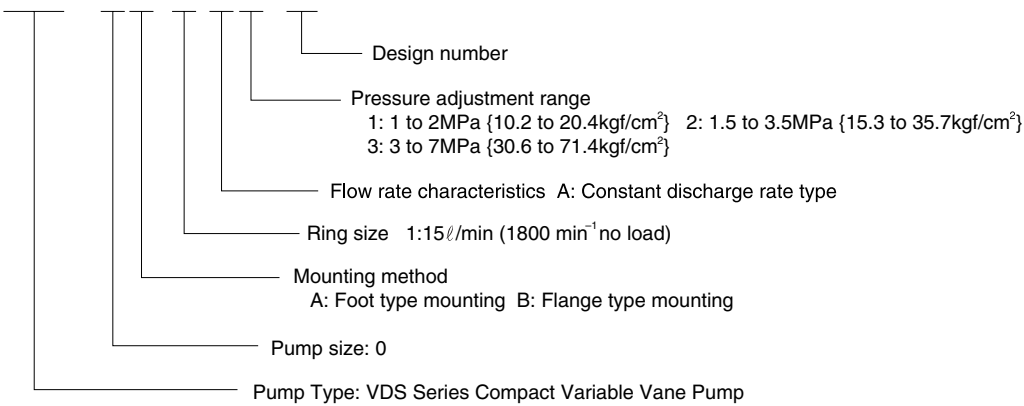
fluid so contamination is maintained at class NAS10 or lower. Take care to avoid contamination with water or other foreign matter, and watch for discoloration. Whitish fluid indicates that air has contaminated the fluid, and brownish fluid indicates the fluid is dirty.

- 14 Contact your agent about using water- and glycol-based hydraulic operating fluids.
- 15 At startup, repeat the inching operation (start-stop) to bleed air from the pump and pipes.

- 16 Equip an air bleed valve in circuits where it is difficult to bleed air before startup. See page C-13 for more information.
- 17 To ensure proper lubrication of the pump's rubbing surfaces, supply oil to the interior of the pump before starting operation.
- 18 When centering the pump shaft, eccentricity with the motor shaft should be no greater than 0.05mm. The angle error should be no greater than 1°.

Understanding Model Numbers

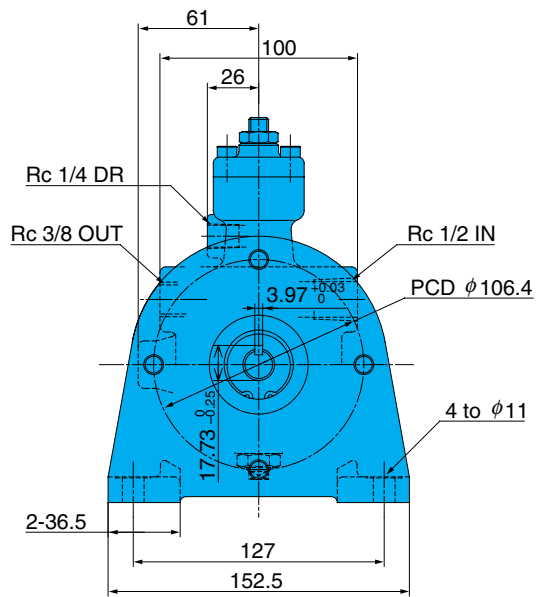
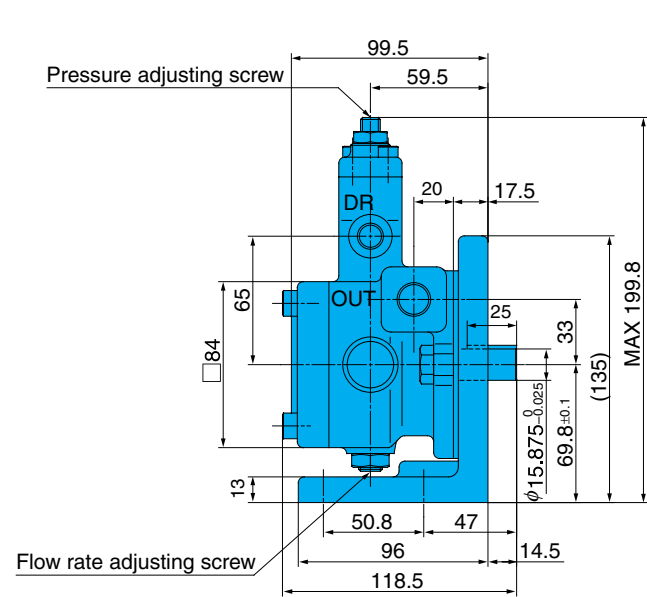
VDS - O * - 1 A * - 10



Installation Dimension Drawings

VDS-0A-1A*-10

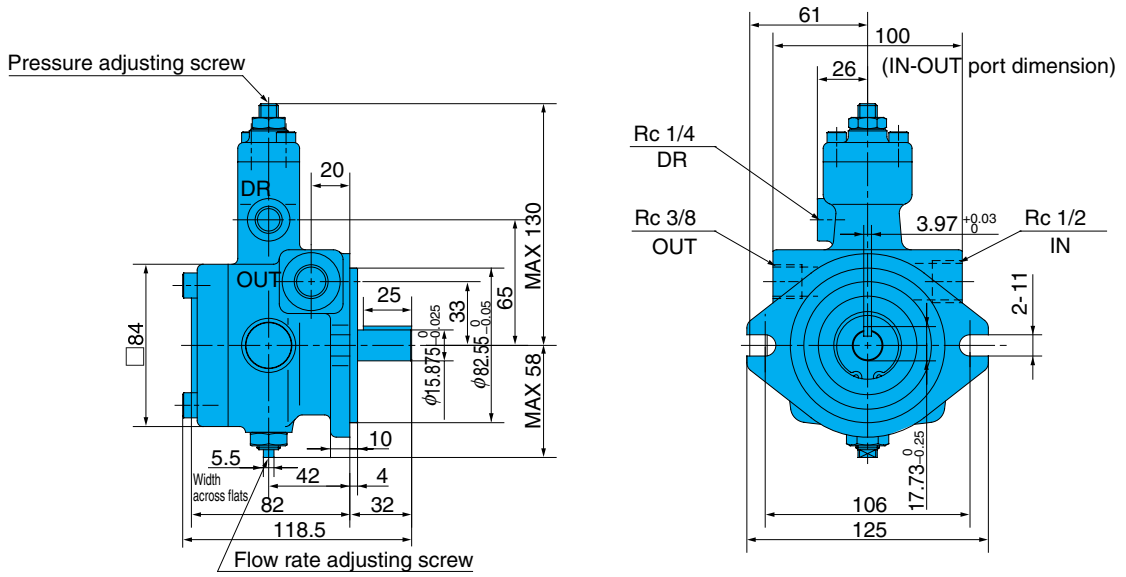
Foot Mounting Type



Note) Foot Mounting Kit: IHM-2-10

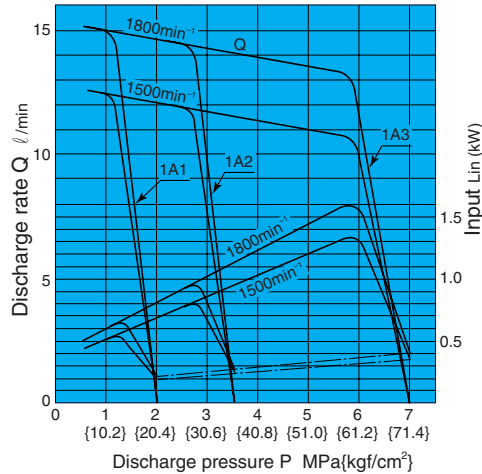
VDS-0B-1A-*-10

Flange Mounting

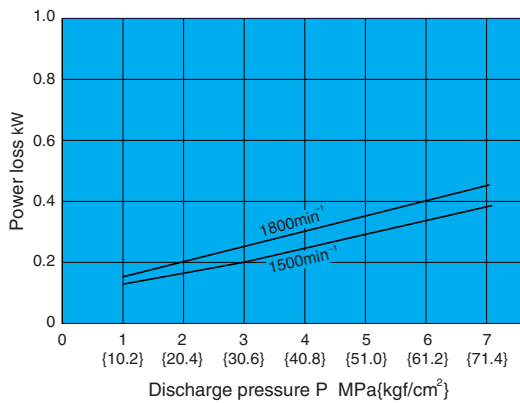


Performance Curves

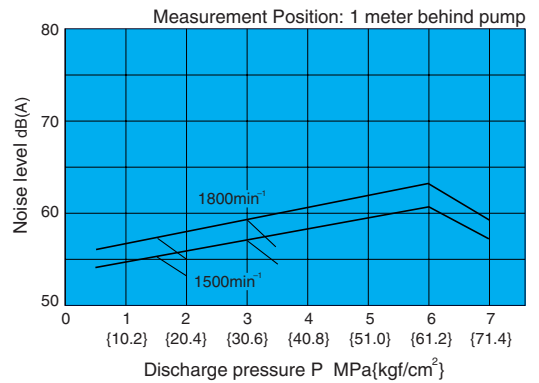
Typical characteristics at hydraulic operating fluid kinematic viscosity of 32 mm²/s



Power Loss Curve – At Full Cutoff

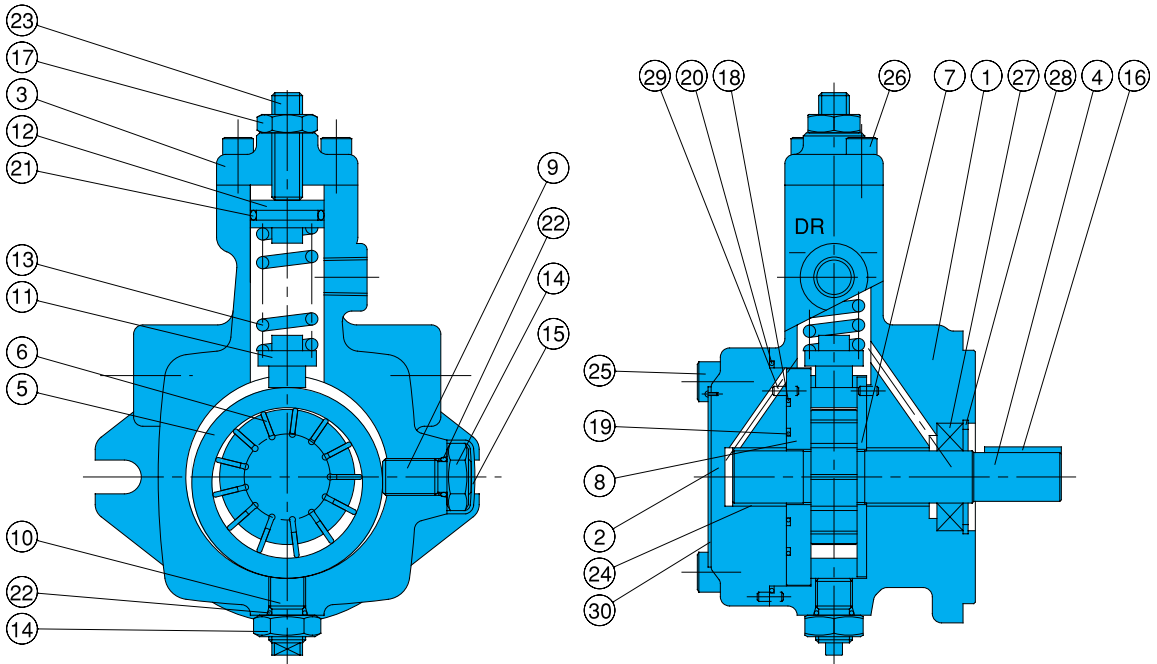


Noise Characteristics



Cross-sectional Drawing

VDS-0B-1A*-10



List of Sealing Parts

Seal Kit: VBAS-100B00

Applicable Pump Model: VDS-0A/B-1A*-10

Part No.	Part Name	Part Number	Q'ty
18	O-ring	AS568-032	1
19	O-ring	AS568-023	1
20	O-ring	S71 (NOK)	1
21	O-ring	1A-P20	1
22	O-ring	1A-P10	2
27	Oil seal	TC-17358	1

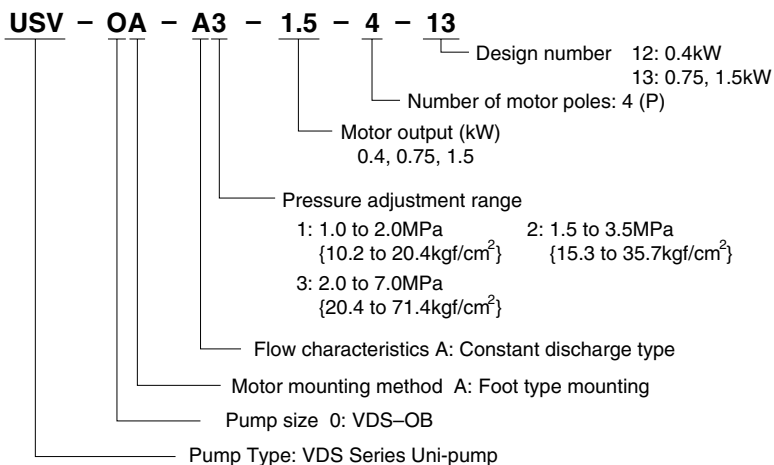
Note)

1.Oil seals are manufactured by Nippon Oil Seal Industry Co. Ltd. (NOK).
2.O-ring 1A/B-** refers to JIS B2401-1A.

Part No.	Part Name	Part No.	Part Name
1	Body	16	Key
2	Cover (A)	17	Nut
3	Cover (B)	18	O-ring
4	Shaft	19	O-ring
5	Cam ring	20	O-ring
6	Vane	21	O-ring
7	Plate (S)	22	O-ring
8	Plate (H)	23	Screw
9	Thrust screw	24	Bearing
10	Screw	25	Screw
11	Piston	26	Screw
12	Holder	27	Oil seal
13	Spring	28	Snap ring
14	Nut	29	Pin
15	Cap	30	Nameplate

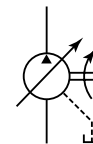
Uni-pump Specifications

Understanding Model Numbers



Specifications

Maximum Working Pressure MPa (kgf/cm ²)	Maximum Flow Rate ℓ/min	
	50Hz	60Hz
7{71.4}	12.5	15



VDR22 Design Series Variable Volume Vane Pump

30 ℓ /min 14MPa
40 ℓ /min 7MPa

Features

① Stable, highly efficient operation up to 14MPa

A biased piston that minimizes ring vibration and leak-free pressure balance construction enables highly efficient high-pressure operation, and very stable performance up to 14MPa.

② High-precision instantaneous response

Response has been improved by a special bias piston mechanism. Prompt response at both ON-OFF and

OFF-ON ensures instantaneous, stable, high-precision operation.

③ Silent operation, even in the high pressure range

Quiet journal bearings, a bias piston that allows a 3-point support system, and new suction and discharge port shapes all contribute to minimize operation noise. Silent, vibration-free operation is ensured, even in the high pressure range.

④ Reduced power loss

A combination of NACHI-original mechanical innovations and precision machining create a pump that minimizes power loss, especially at full cutoff.

⑤ Solid construction stands up to harsh operating conditions

The tough and rugged construction of this pump is made possible by a long history of quality pump designs. This, in combination with specially selected materials and skilled workmanship, provides outstanding durability.

Specifications

Single Pump

Model No.	Capacity cm ³ /rev	No-load Discharge Rate (ℓ/min)				Pressure Adjustment Range MPa(kgf/cm ²)	Allowable Peak Pressure MPa(kgf/cm ²)	Revolution Speedmin ⁻¹		Weight kg
		1000min ⁻¹	1200min ⁻¹	1500min ⁻¹	1800min ⁻¹			Min.	Max.	
VDR-1A(B)-1A2-22 1A3 1A4 1A5	16.7	16.7	20	25	30	1.5 to 3.5 {15.3 to 35.7}	14 {143}	800	1800	9
3 to 7 {30.6 to 71.4}										
6.5 to 10.5 {66.3 to 107}										
9 to 14 {91.8 to 143}										
VDR-1A(B)-2A2-22 2A3	22	22	27	33	40	1.5 to 3.5 {15.3 to 35.7}	14 {143}	800	1800	9
3 to 7 {30.6 to 71.4}										

Double Pump

Model No.	Vent Side		Shaft Side		Vent Side	Shaft Side	Revolution Speedmin ⁻¹		Weight kg
	Discharge Rate ℓ/min	Pressure Adjustment Range MPa(kgf/cm ²)	Discharge Rate ℓ/min	Pressure Adjustment Range MPa(kgf/cm ²)			Allowable Peak Pressure MPa(kgf/cm ²)	Min.	
VDR-11A(B)-1A2-1A2-22 VDR-11A(B)-1A2-1A3-22	30	1.5 to 3.5 {15.3 to 35.7}	30	1.5 to 3.5 {15.3 to 35.7}	14 {143}	800	1800	17	
VDR-11A(B)-1A3-1A3-22		3 to 7 {30.6 to 71.4}		3 to 7 {30.6 to 71.4}					
VDR-11A(B)-2A2-2A2-22 VDR-11A(B)-2A2-2A3-22	40	1.5 to 3.5 {15.3 to 35.7}	40	1.5 to 3.5 {15.3 to 35.7}	14 {143}	800	1800	17	
VDR-11A(B)-2A3-2A3-22		3 to 7 {30.6 to 71.4}		3 to 7 {30.6 to 71.4}					

Note) 1. The discharge rate is the value at 1800min⁻¹ no-load.

2. The change from design number 21 to design number 22 represents a change in the shaft key width from 3.2mm to 4.76mm. This means that when using a 3.2mm key coupling, you need to use a stepped key (VD31J-302000) or add a new key groove at 4.76.

● Handling

① Rotation Direction

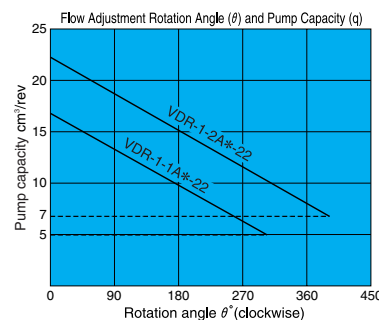
The direction of rotation is always clockwise (rightward) when viewed from the shaft side.

② Drain

Drain piping must be direct piping up to a point that is below the tank fluid level, and back pressure due to pipe resistance should not exceed 0.03MPa. When using a pump that has drain ports at two locations, use the drain port that is higher after the pump is installed.

③ Discharge Volume Adjustment

The discharge flow rate is decreased by clockwise (rightward) rotation of the discharge rate adjusting screw, and increased by counterclockwise (leftward) rotation. Loosen the lock nut before making adjustments. After adjustment is complete, re-tighten the lock nut. The graph on the right provides general guidelines for the relationship between the rotation angle of the flow rate adjusting screw and the no-load discharge rate.



(Continued on following page)

However: $Q=q \times n \times 10^{-3}$

Q :No-load Discharge Rate Q ℓ/min

q :Volume cm³/rev

N :Revolution Speed min⁻¹

The broken line shows the flow volume adjustment range lower limit value.

Note)

The values indicated above are at maximum discharge volume with the flow volume adjusting screw at the 0° position.

4 Pressure Adjustment

Pressure is decreased by clockwise (rightward) rotation of the

discharge rate adjusting screw, and increased by counterclockwise (leftward) rotation.

5 Factory Default P-Q Settings (Standard Model)

- Flow Rate Setting = Maximum flow rate for model as indicated in the catalog
- Pressure Setting = Pressure shown in table to the right

6 Thrust Screw

The thrust screw is precision adjusted at the factory during assembly. Never touch the thrust screw. See callout ⑪ in

Factory Default Pressure Settings MPa{kgf/cm ² }	
2	: 3.5 {35.7}
3	: 3 {30.6}
4	: 6.5 {66.3}
5	: 9 {91.8}

the cross-section diagram on page B-11.

7 Initial Operation

Before operating the pump for the first time, put the pump discharge side into the no-load state and then repeatedly start and stop the motor to bleed all air from inside the pump and the suction piping. After confirming that the pump is discharging oil, continue the no-load operation for at least 10 minutes to discharge all the air from the circuit.

Provide an air bleed valve in circuits where it is difficult to bleed air before startup.

8 Sub Plate

Use the following table for specification when a sub plate is required.

Pump Model No.	Sub Plate Number	Motor(kW)
VDR-1A-1A*22	MVD-1-115-10	0.75 to 1.5
	MVD-1-135-10	2.2 to 3.7
VDR-1A-2A*22	MVD-1-115Y-10	0.75 to 1.5
	MVD-1-135Y-10	2.2 to 3.7
VDR-11A-*A* -*A*22	MVD-11-135-10	1.5 to 3.7
	MVD-11-135X-10	

For detailed dimensions, see pages B-17 through B-19.

9For the hydraulic operating fluid, use type ISO VG32 or equivalent (viscosity index of at least 90) for pressures of 7MPa or lower, and type ISO VG68 or equivalent (viscosity index of at least 90) for pressures greater than 7MPa.

10The operating temperature range is 15 to 60°C. When the oil temperature at startup is 15°C or less, perform a warm-up operation at low pressure until the oil temperature reaches 15°C. Use the pump in an area where the temperature is within the range of 0 to 60°C.

11Suction pressure is -0.03 to +0.03MPa (-0.3 to +0.3kgf/cm²), and the suction port flow rate should be to greater than 2m/sec.

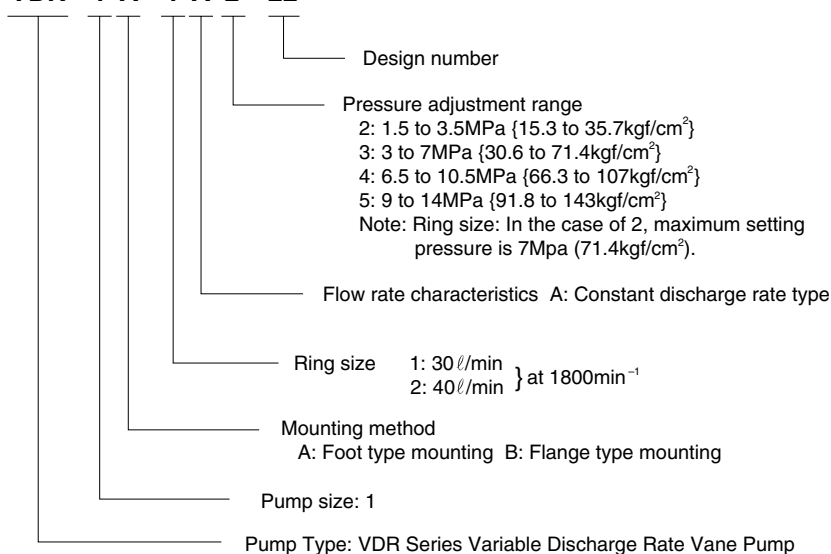
12Avoid pulley, gear, and other drive systems that impart a radial or thrust load on the end of the pump shaft. Mount the pump so its pump shaft is oriented horizontally.

(Continued on following page)

Understanding Model Numbers

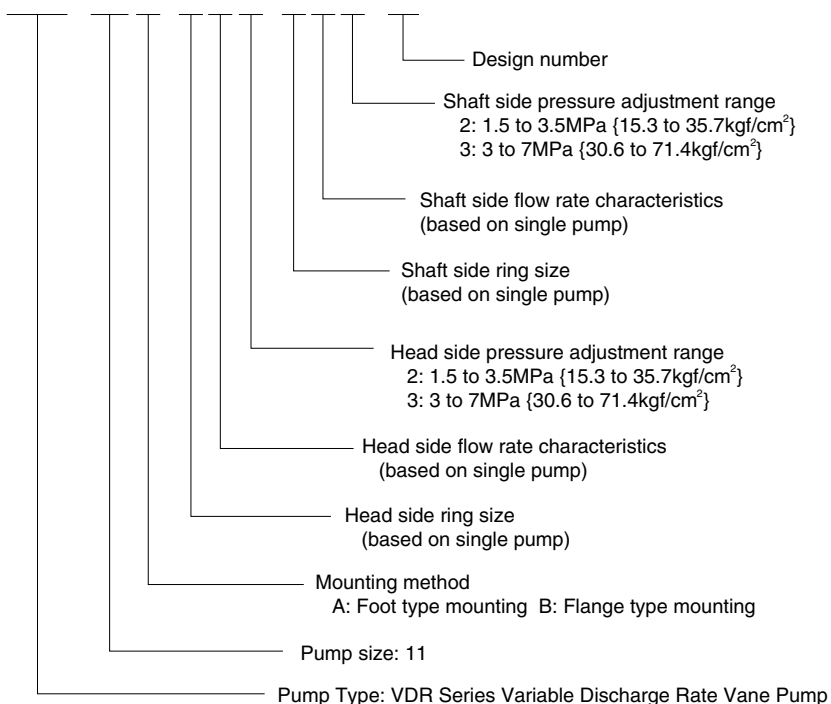
Single pump

VDR-1 A-1 A 2-22



Double pump

VDR-11 A-1 A 2-1 A 3-22



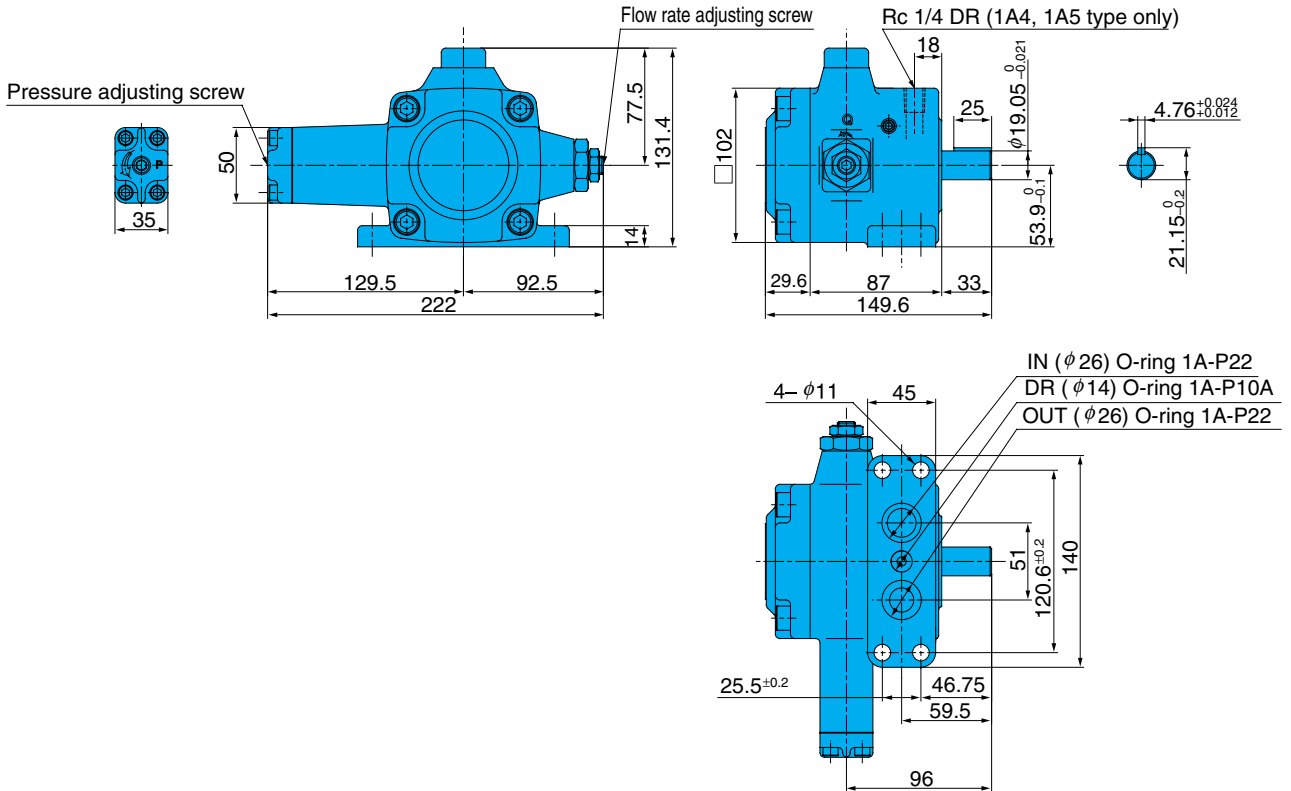
- 13 Provide a suction strainer with a filtering grade of about 100 μm (150 mesh). For the return line to the tank, use a 25μm line filter.
- 14 Manage hydraulic operating fluid so contamination is maintained at class NAS10 or lower. Take care to avoid contamination with water or other foreign matter, and watch out for discoloration. Whitish fluid indicates that air has contaminated the

- fluid, and brownish fluid indicates the fluid is dirty.
- 15 Contact your agent about using water- and glycol-based hydraulic operating fluids.
- 16 At startup, repeat the inching operation (start-stop) to bleed air from the pump and pipes.
- 17 Equip an air bleed valve in circuits where it is difficult to bleed air before startup. See page C-13 for

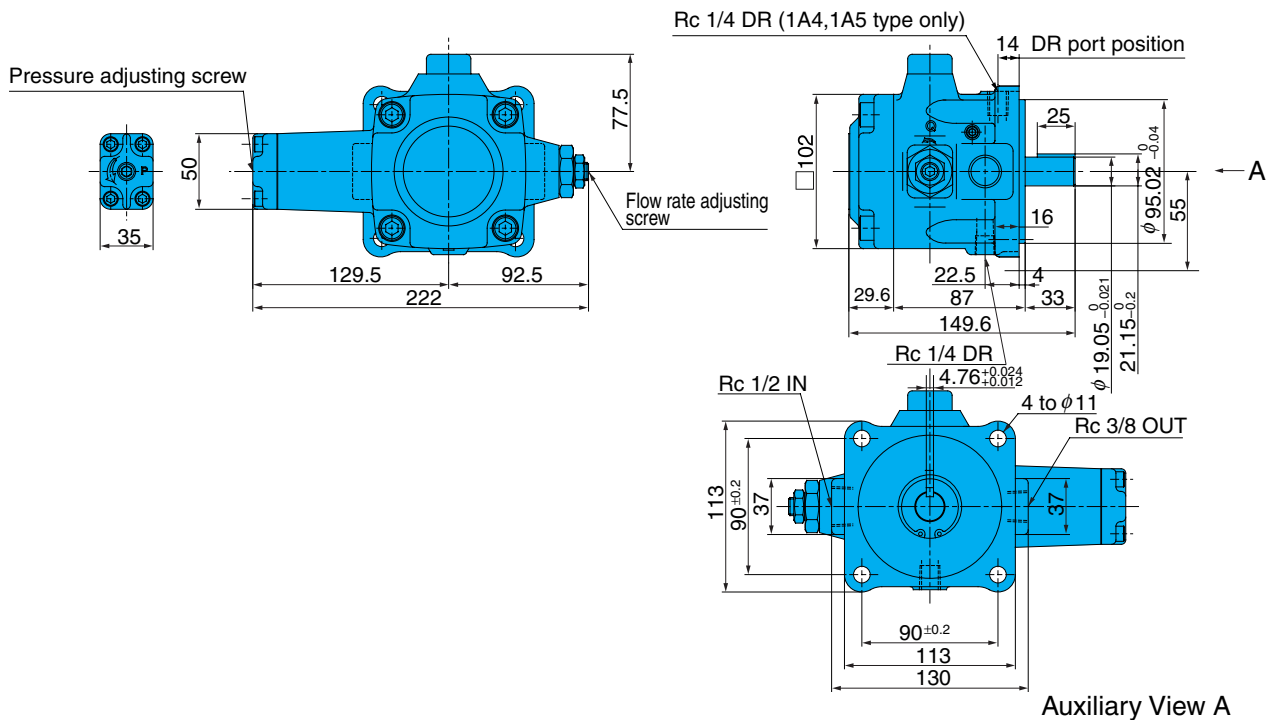
- more information.
- 18 To ensure proper lubrication of the pump's rubbing surfaces, supply oil to the interior of the pump before starting operation.
- 19 When centering the pump shaft, eccentricity with the motor shaft should be no greater than 0.05mm. Use a pump mounting base of sufficient rigidity. The angle error should be no greater than 1°.

Installation Dimension Drawings

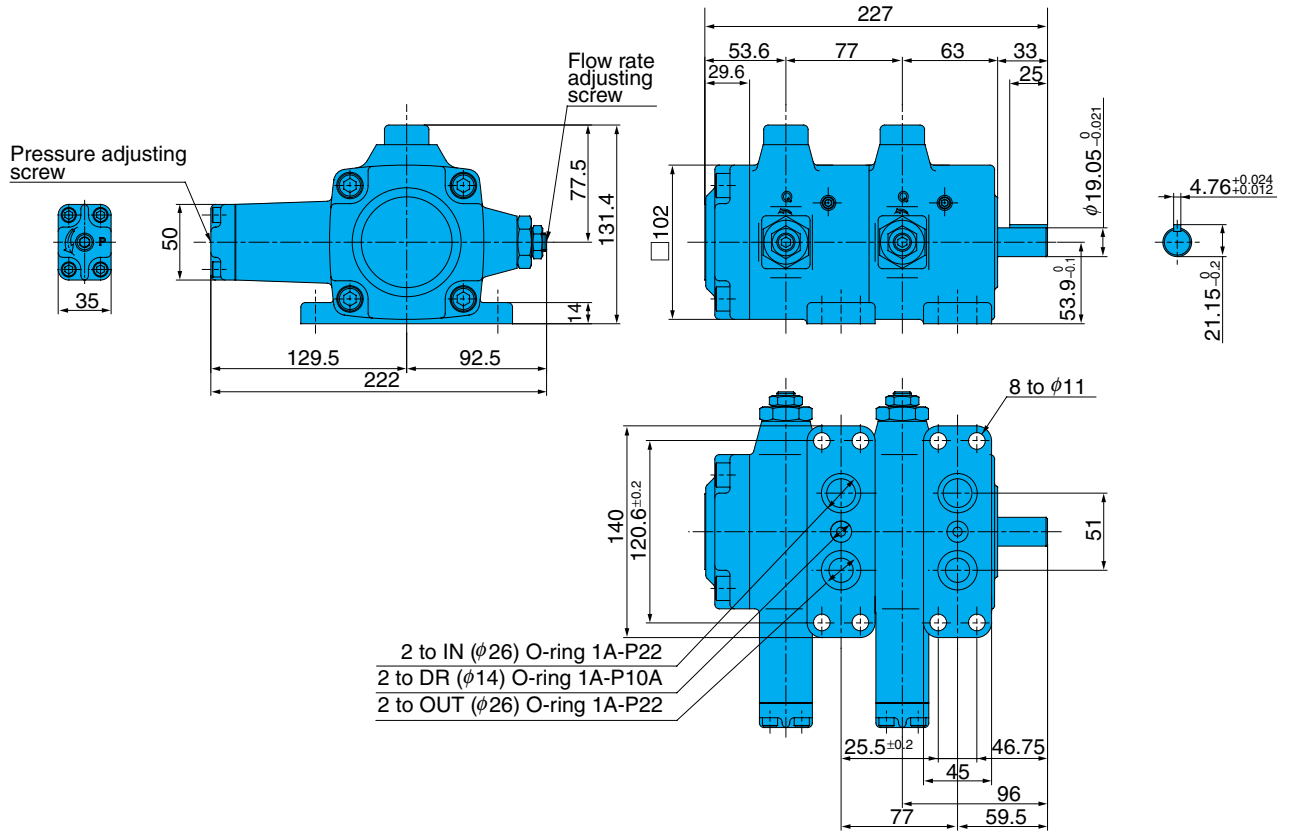
VDR-1A-*A*-22



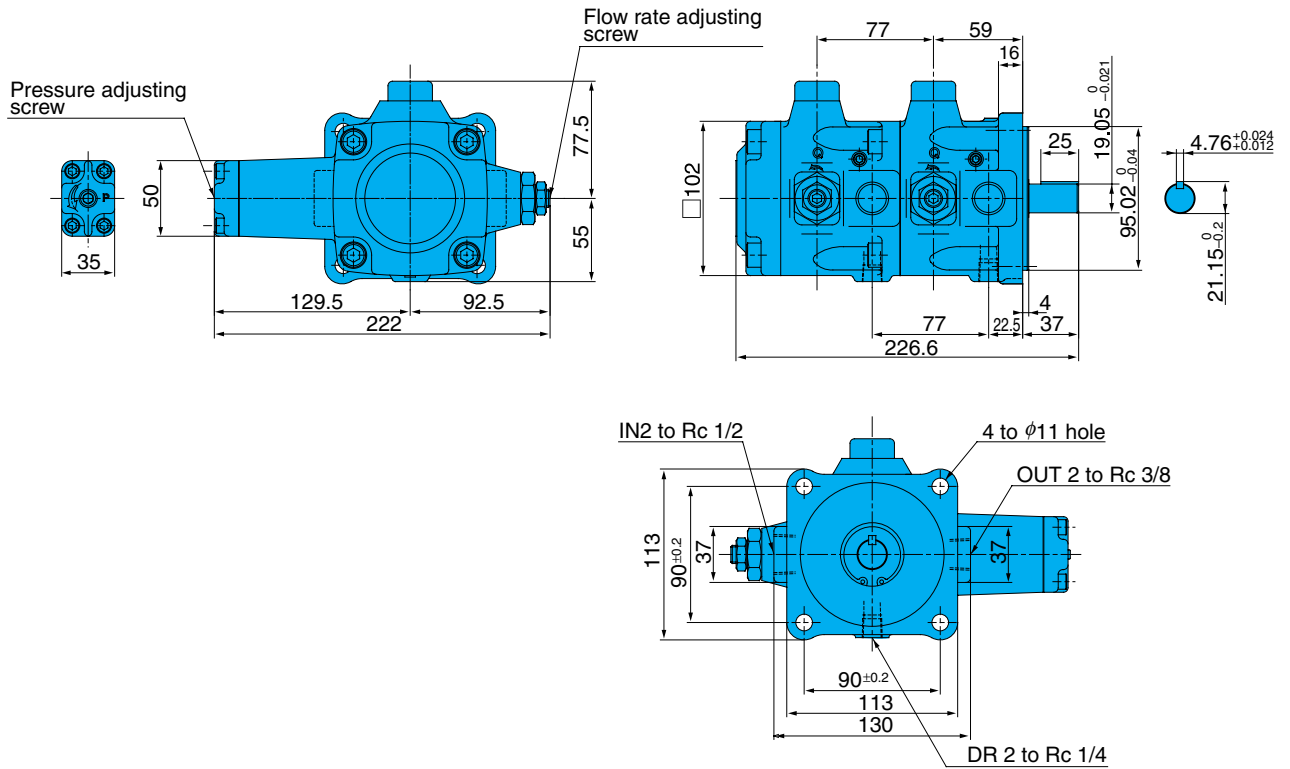
VDR-1B-*A*-22



VDR-11A-**-*-22



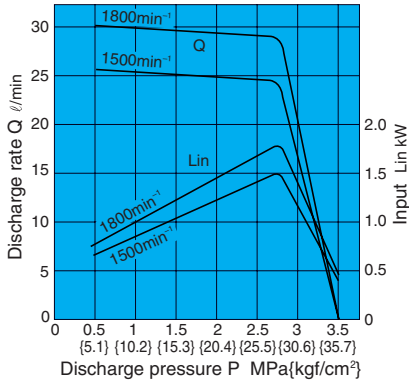
VDR-11B-**-*-22



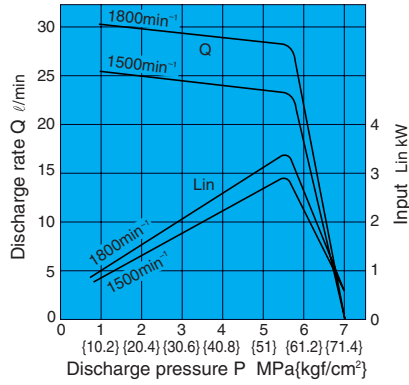
Performance Curves

Typical characteristics at hydraulic operating fluid kinematic viscosity of 32 mm²/s

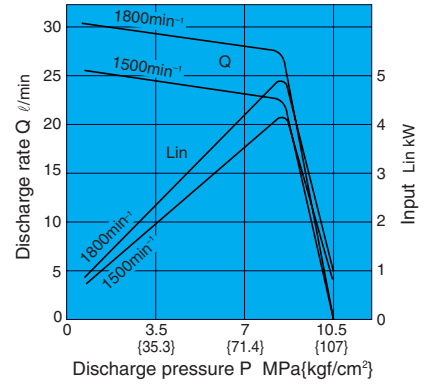
VDR-1*-1A2-22



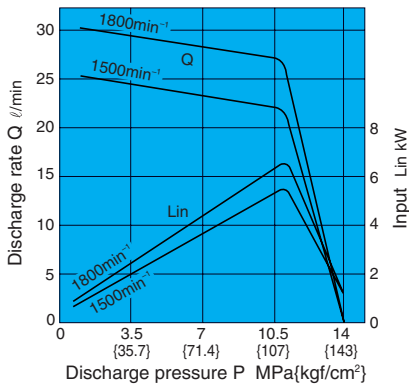
VDR-1*-1A3-22



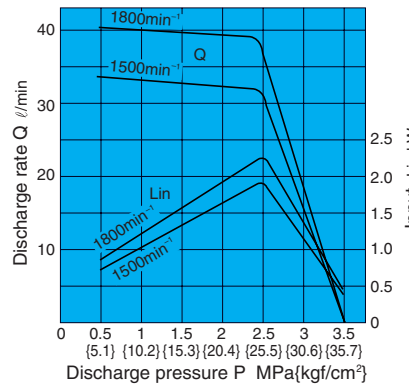
VDR-1*-1A4-22



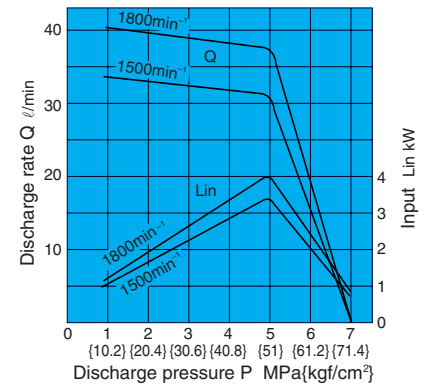
VDR-1*-1A5-22



VDR-1*-2A2-22



VDR-1*-2A3-22

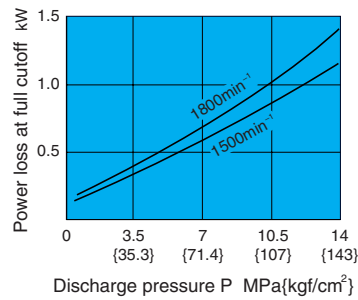


Use the formula below to calculate a pump's required drive force.

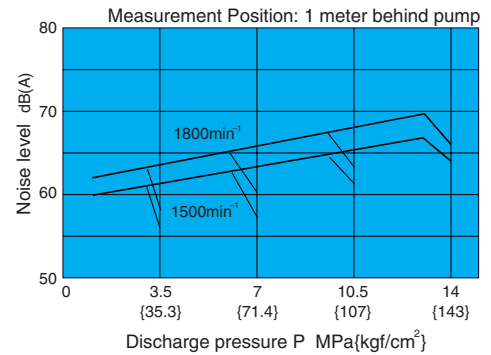
$$H = \frac{PQ}{60} + L$$

H : Input (kW)
P : Pressure MPa
Q : Flow rate l/min
L : Power loss kW

Power Loss Curve

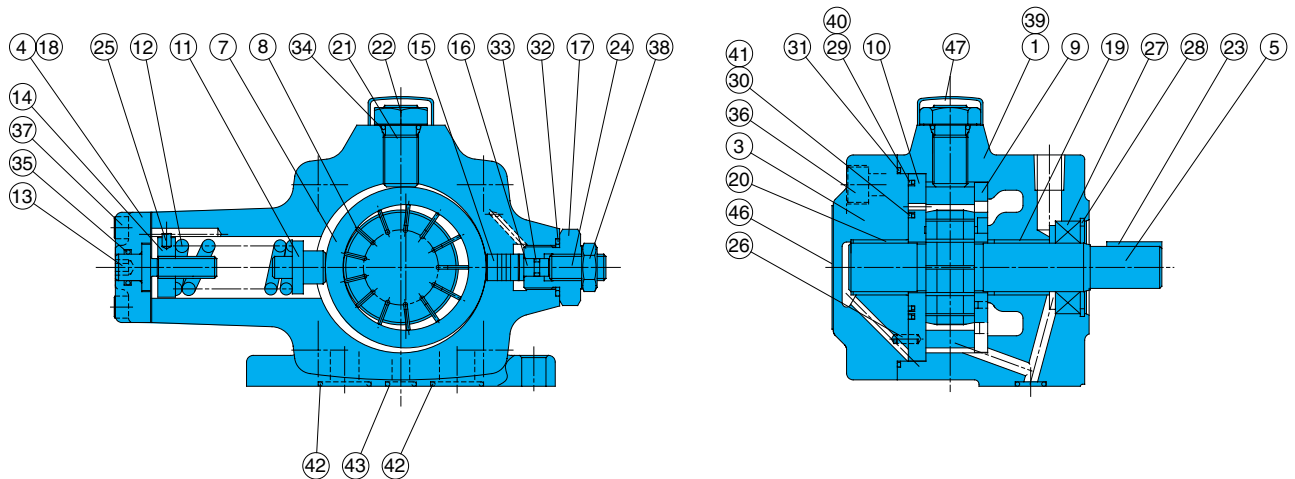


Noise Characteristics



Cross-sectional Drawing

VDR-1A-*A*-22



List of Sealing Parts

Single Pump

Part No.	Applicable Pump Model No.	VDR-1A-*A*-22	
	Seal Kit Number	VDBS-101A00	
	Part Name	Part Number	Q'ty
18	Packing	VDB32-101000	1
27	Oil seal	ISRD-224211	1
29	Backup ring	VDB34-101000	1
30	Backup ring	VDB34-201000	1
31	O-ring	S85(NOK)	1
32	O-ring	1A-P22	1
33	O-ring	1A-P5	1
34	O-ring	1A-P14	1
35	O-ring	1A-P12	1
40	O-ring	AS568-036	1
41	O-ring	AS568-029	1
42	O-ring	1A-P22	2
43	O-ring	1A-P10A	1

Note)

- Oil seals are manufactured by Nippon Oil Seal Industry Co. Ltd. (NOK).
- O-ring 1A-** refers to JIS B2401-1A-**.
- For VDR-1B-*A*-22, the seal kit number becomes VDBS-101B00, without the 42 and 43 O-rings.

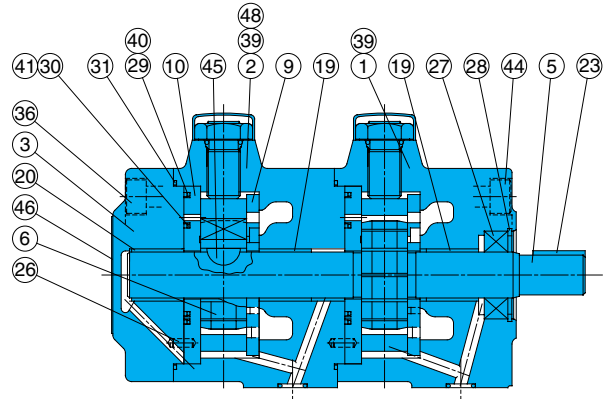
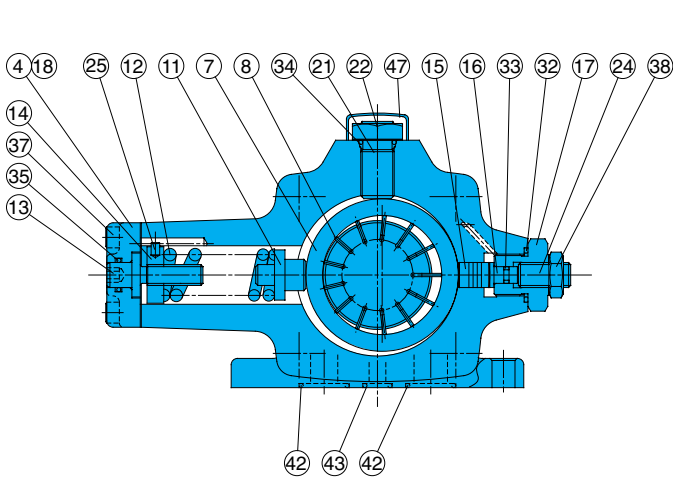
Double Pump

Part Name	Applicable Pump Model No.	VDR-11A-*A*-22	
	Seal Kit Number	VDBS-111A00	
	Part Name	Part Number	Q'ty
18	Packing	VDB32-101000	2
27	Oil seal	ISRD-224211	1
29	Backup ring	VDB34-101000	2
30	Backup ring	VDB34-201000	2
31	O-ring	S85(NOK)	2
32	O-ring	1A-P22	2
33	O-ring	1A-P5	2
34	O-ring	1A-P14	2
35	O-ring	1A-P12	2
40	O-ring	AS568-036	2
41	O-ring	AS568-029	2
42	O-ring	1A-P22	4
43	O-ring	1A-P10A	2

Note)

- Oil seals are manufactured by Nippon Oil Seal Industry Co. Ltd. (NOK).
- O-ring 1A-** refers to JIS B2401-1A-**.
- For VDR-11B-*A*-22, the seal kit number becomes VDBS-111B00, without the 42 and 43 O-rings.

Part No.	Part Name	Part No.	Part Name
1	Body (A)	25	Pin
2	Body (B)	26	Spring pin
3	Cover	27	Oil seal
4	Cover	28	Snap ring
5	Shaft	29	Backup ring
6	Rotor	30	Backup ring
7	Ring	31	O-ring
8	Vane	32	O-ring
9	Plate (S)	33	O-ring
10	Plate (H)	34	O-ring
11	Piston	35	O-ring
12	Spring	36	Screw
13	Screw	37	Screw
14	Nut	38	Nut
15	Piston	39	Plug
16	Holder	40	O-ring
17	Adapter	41	O-ring
18	Packing	42	O-ring
19	Bearing (S)	43	O-ring
20	Bearing (H)	44	Screw
21	Thrust screw	45	Key
22	Nut	46	Nameplate
23	Key	47	Cap
24	Screw	48	Pin



Uni-pump Specifications

Understanding Model Numbers

Single Pump

UVD - 1 A - A 2 - 1.5 - 4 - 26

- Design number
- Number of motor poles: 4 (P)
- Motor output (kW)
0.75, 1.5, 2.2, 3.7
- Pressure adjustment range
2: 1.5 to 3.5MPa
{15.3 to 35.7kgf/cm²}
3: 3.0 to 7.0MPa
{30.6 to 71.4kgf/cm²}
- Flow characteristics A: Constant discharge type
- A: Foot type mounting
- Pump size 1: VDR-1B (22D)
- Pump Type: VDR (220) Series Uni-pump

Double Pump

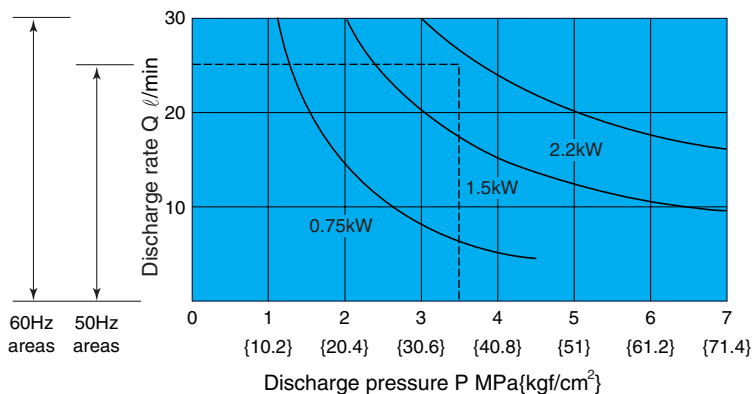
UVD - 11 A - A 2 - A 2 - 1.5 - 4 - 26

- Design number
- Number of motor poles: 4 (P)
- Motor output (kW)
1.5, 2.2, 3.7
- Shaft side pump pressure adjustment range
2: 1.5 to 3.5MPa
{15.3 to 35.7kgf/cm²}
3: 3.0 to 7.0MPa
{30.6 to 71.4kgf/cm²}
- Shaft side pump flow rate characteristics
A: Constant discharge type
- Head side pump pressure adjustment range:
Same as the shaft side pump
- Head side pump flow rate characteristics
A: Constant discharge type
- A: Foot type mounting
- Pump size 11: VDR-11B (22D)
- Pump Type: VDR (220) Series Uni-pump

Specifications

Model No.	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Flow Rate ℓ/min	
		50Hz	60Hz
UVD-1A	7{71.4}	25	30
UVD-11A	7{71.4}	25-25	30-30

Motor selection curves



● Selecting a motor

The area under a motor output curve in the graph to the left is the operating range for that motor under the rated output for that motor.

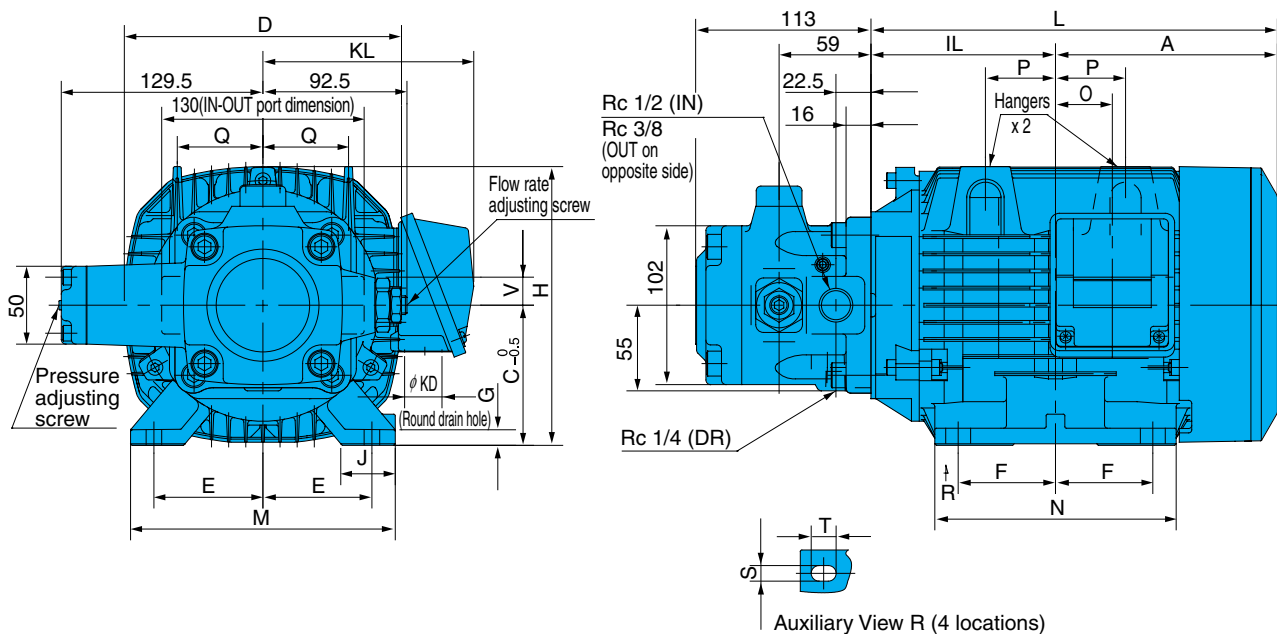
Example:

To find the motor that can produce pressure of 3.5MPa and a discharge rate of 25 l/min.

Selection Process

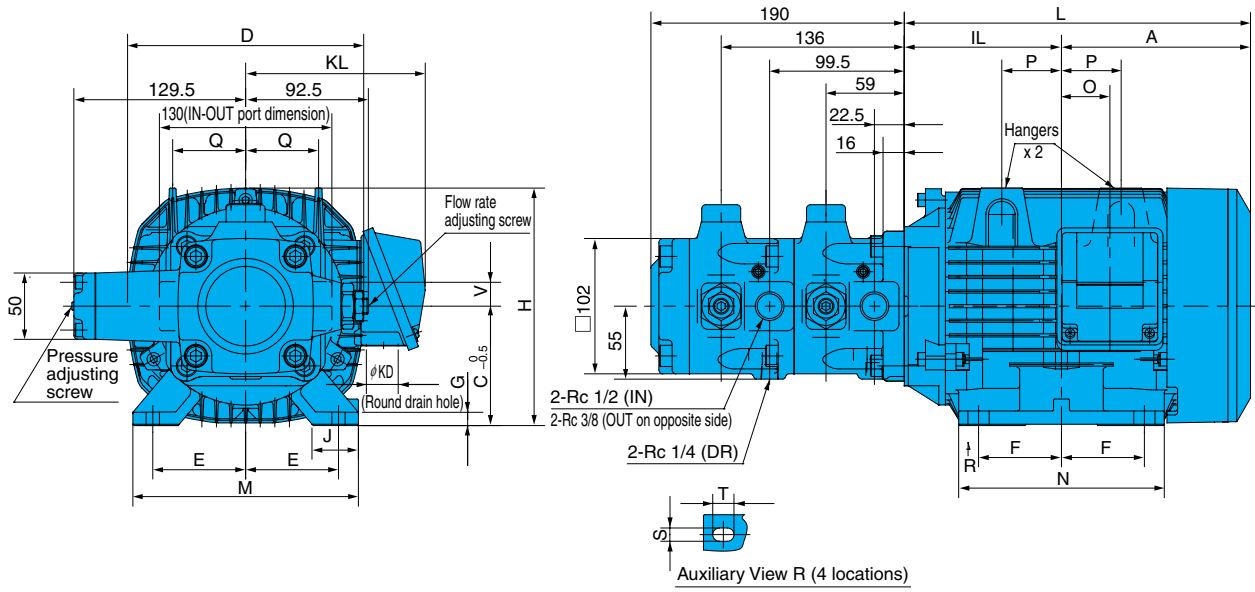
Since the intersection of the two broken lines from a pressure of 3.5MPa and discharge rate of 25 l/min intersect in the area under the 2.2kW curve, it means that a 2.2kW motor should be used. In the case of a double pump configuration, select a motor that is larger than the total power required by both pumps.

Installation Dimension Drawings
UVD-1A

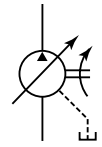


Uni-pump	Motor Dimensions mm																			Frame No.	Output kW (4 poles)	Weight kg
	A	IL	C	D	E	F	G	H	J	L	M	N	S × T	KD	KL	O	P	Q	V			
UVD-1A-A2-0.75-4-26	124	105	80	160	62.5	50	10	160	34	229	155	135	10 × 25	φ22	126	21	-	-	16.5	80M	0.75	21
UVD-1A-A2-1.5-4-26	142.5	118.5	90	178	70	62.5	10	179	35	261	170	155	10 × 16	φ22	136	36.5	45	55	18	90L	1.5	25
UVD-1A-A3-1.5-4-26																						
UVD-1A-2A2-1.5-4-26	160.5	133	100	195	80	70	13	197.5	45	293.5	195	175	12 × 25	φ22	150	45.5	50	55	22	100L	2.2	29
UVD-1A-A2-2.2-4-26																						
UVD-1A-A3-2.2-4-26																						
UVD-1A-2A2-2.2-4-26	171	140	112	219	95	70	14	221.5	45	311	224	175	12 × 25	φ22	161	53	55	66	22	112M	3.7	38
UVD-1A-A3-3.7-4-26																						
UVD-1A-2A2-3.7-4-26																						
UVD-1A-2A3-3.7-4-26																						

0.75kW model does not have hangers.



Uni-pump	Motor Dimensions mm																			Frame No.	Output kW (4 poles)	Weight kg	
	A	IL	C	D	E	F	G	H	J	L	M	N	S × T	KD	KL	O	P	Q	V				
UVD-11A-A2-A2-1.5-4-26																							
UVD-11A-A2-A3-1.5-4-26	142.5	118.5	90	178	70	62.5	10	179	35	261	170	155	10×16	ϕ22	136	36.5	45	55	18	90L	1.5	33	
UVD-11A-A3-A3-1.5-4-26																							
UVD-11A-A2-A2-2.2-4-26																							
UVD-11A-A2-A3-2.2-4-26	160.5	133	100	195	80	70	13	197.5	45	293.5	195	175	12×25	ϕ22	150	45.5	50	55	22	100L	2.2	37	
UVD-11A-A3-A3-2.2-4-26																							
UVD-11A-2A2-2A2-2.2-4-26																							
UVD-11A-A2-A2-3.7-4-26																							
UVD-11A-A2-A3-3.7-4-26																							
UVD-11A-A3-A3-3.7-4-26	171	140	112	219	95	70	14	221.5	45	311	224	175	12×25	ϕ22	161	53	55	66	22	112M	3.7	46	
UVD-11A-2A2-2A2-3.7-4-26																							
UVD-11A-2A2-2A3-3.7-4-26																							



VDR13 Design Series Variable Volume Vane Pump

20 to 45 ℓ /min
6MPa

❖ The new design number 13 was created by modifying some of the components of old design numbers 11 and 12, and the new design installation compatible with the old design.

Features

- ① Energy efficient, economical operation
- ② Built-in high-precision temperature compensation mechanism
- ③ The ring is displaced by a spring, and a rise in pressure automatically moves it to the center to make the discharge rate zero.
- ④ Relief valve and unloading valve can be eliminated from the circuit.
- ⑤ It was possible to reduce the size of the unit because there was no increase of proportional input to pressure which prevented increases in the temperature of the fluid.
- ⑥ New design for lower noise and improved durability

Specifications

Single Pump

Model No.	Capacity cm ³ /rev	No-load Discharge Rate (ℓ/min)				Pressure Adjustment Range MPa{kgf/cm ² }	Allowable Peak Pressure MPa {kgf/cm ² }	Revolution Speed min ⁻¹		Weight kg
		1000min ⁻¹	1200min ⁻¹	1500min ⁻¹	1800min ⁻¹			Min.	Max.	
VDR-1A(B)-1A1-13	13.9	14	16.5	21	25	1 to 2 {10.2 to 20.6}	14 {143}	800	1800	8
-1A2-	13.9	14	16.5	21	25	1.5 to 3.5 {15.3 to 35.7}				
-1A3-	11.1	11	13	17	20	3 to 6 {30.6 to 61.2}				
VDR-2A(B)-1A1-13	25	25	30	38	45	1 to 2 {10.2 to 20.4}	14 {143}	800	1800	21
-1A2-	25	25	30	38	45	1.5 to 3.5 {15.3 to 35.7}				
-1A3-	22.2	22	26.5	34	40	3 to 6 {30.6 to 61.2}				

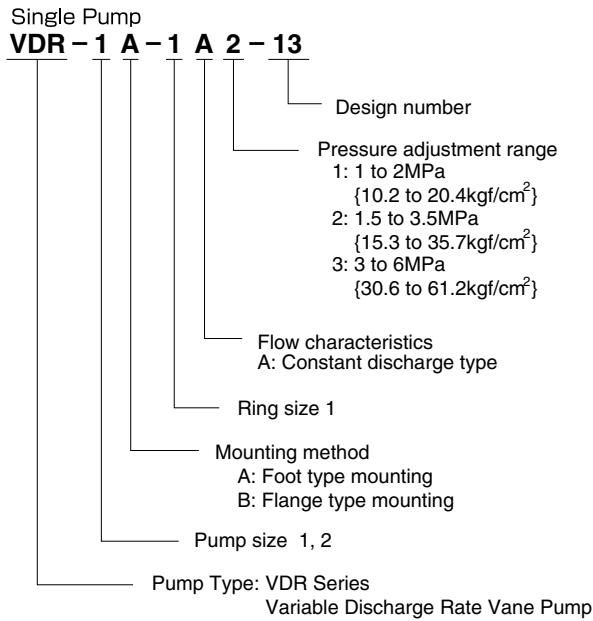
Double Pump

Model No.	Vent Side		Shaft Side		Vent Side	Shaft Side	Revolution Speed min ⁻¹		Weight kg
	Discharge Rate ℓ/min	Pressure Adjustment Range MPa{kgf/cm ² }	Discharge Rate ℓ/min	Pressure Adjustment Range MPa{kgf/cm ² }	Allowable Peak Pressure MPa{kgf/cm ² }	Min.	Max.		
VDR-11A(B)-1A1-1A1-13	25	1 to 2 {10.2 to 20.4}	25	1 to 2 {10.2 to 20.4}	14 {143}	800	1800	A : 13.6 B : 13.9	
VDR-11A(B)-1A1-1A2-13			1.5 to 3.5 {15.3 to 35.7}	1.5 to 3.5 {15.3 to 35.7}					
VDR-11A(B)-1A1-1A3-13		3 to 5 {30.6 to 51}	3 to 5 {30.6 to 51}						
VDR-11A(B)-1A2-1A2-13	20	1.5 to 3.5 {15.3 to 35.7}	25	1.5 to 3.5 {15.3 to 35.7}	14 {143}				
VDR-11A(B)-1A2-1A3-13			20	3 to 5 {30.6 to 51}		14{143}			
VDR-11A(B)-1A3-1A3-13	20	3 to 5 {30.6 to 51}	20	3 to 5 {30.6 to 51}	14{143}				

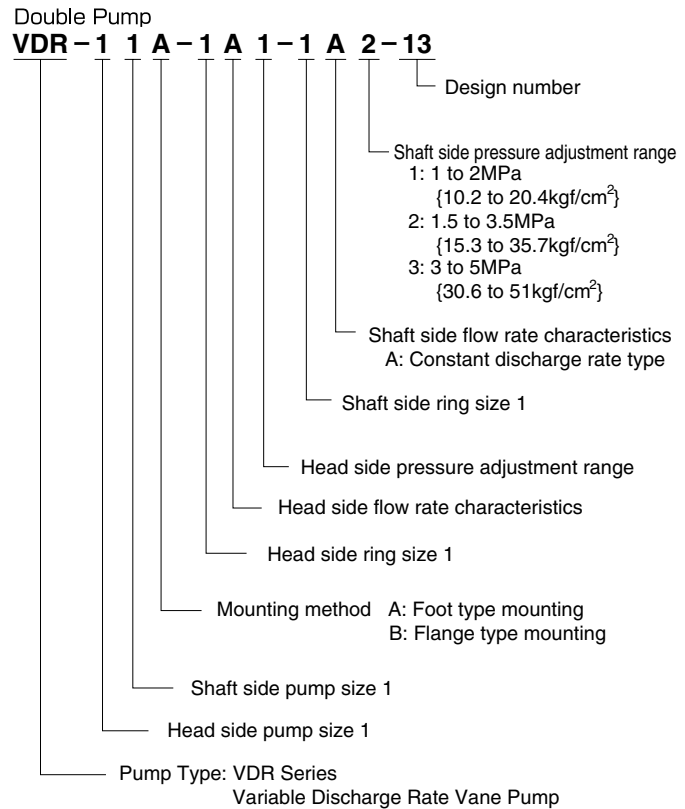
- Note) 1. The discharge rate is the value at 1800min⁻¹ no-load.
 2. In addition to this model, the VDC Series (maximum working pressure: 14MPa) high-pressure variable vane pump is also available. See page B-25 for more information.
 3. The change from VDR-1 Series design number 11 to design number 12 represents a change in the shaft key width from 3.2mm to 4.76mm. This means that when using a 3.2mm key coupling, you need to use a stepped key (VD31J-302000) or add a new key groove at 4.76.
 4. There is no change in the mounting method with the change from the VDR-1 size design number 12 and VDR-2 design number 11 to design number 13.

Understanding Model Numbers

Single Pump

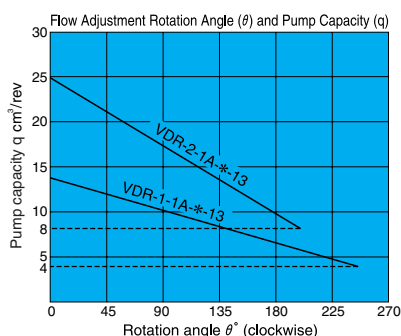


Double Pump



● Handling

- Rotation Direction** The direction of rotation is always clockwise (rightward) when viewed from the shaft side.
- Drain** Drain piping must be direct piping up to a point that is below the tank fluid level, and back pressure due to pipe resistance should not exceed 0.03MPa.
- Discharge Volume Adjustment** The discharge flow rate is decreased by clockwise (rightward) rotation of the discharge rate adjusting screw, and increased by counterclockwise (leftward) rotation. Loosen the lock nut before making adjustments. After adjustment is complete, re-tighten the lock nut. The graph below provides general guidelines for the relationship between the rotation angle of the flow rate adjusting screw and the no-load discharge rate.



- However:
- Q: No-load Discharge Rate $Q \ell / \text{min}$
 - q: Volume cm^3 / rev
 - N: Revolution Speed min^{-1}
- Pressure Adjustment** Pressure is decreased by clockwise (rightward) rotation of the discharge rate adjusting screw, and increased by counterclockwise (leftward) rotation.
 - Factory Default P-Q Settings (Standard Model)**
 - Flow Rate Setting = Maximum flow rate for model as indicated in the catalog
 - Pressure Setting = Pressure shown in table to the right
 - Initial Operation** Before operating the pump for the first time, put the pump discharge side into the no-load state and then repeatedly start and stop the motor to bleed all air from inside the pump and the suction piping. After confirming that the pump is discharging oil, continue the no-load operation for at least 10 minutes to discharge all the air from the circuit.

Factory Default Pressure Settings MPa {kgf/cm ² }	
1 : 2	{20.4}
2 : 3.5	{35.7}
3 : 3	{30.6}

Provide an air bleed valve in circuits where it is difficult to bleed air before startup.

- Sub Plate** When a sub plate is required, specify a sub-plate type from the table in the installation dimension diagram.
- For the hydraulic operating fluid, use an R&O type and wear-resistant type of ISO VG32 to 68 or equivalent (viscosity index of at least 90). Use hydraulic operating fluid that provides kinematic viscosity during operation in the range of 20 to 150mm²/s.
- The operating temperature range is 15 to 60°C. When the oil temperature at startup is 15°C or less, perform a warm-up operation at low pressure and low speed until the oil temperature reaches 15°C. Use the pump in an area where the temperature is within the range of 0 to 60°C.
- Suction pressure is -0.03 to +0.03MPa (-0.3 to +0.3kgf/cm²), and the suction port flow rate should be to greater than 2m/sec.

Note) The values indicated above are at maximum pump discharge volume with the flow volume adjusting screw at the 0° position. The broken line shows the flow volume adjustment range lower limit value.

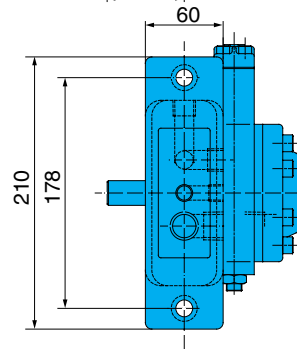
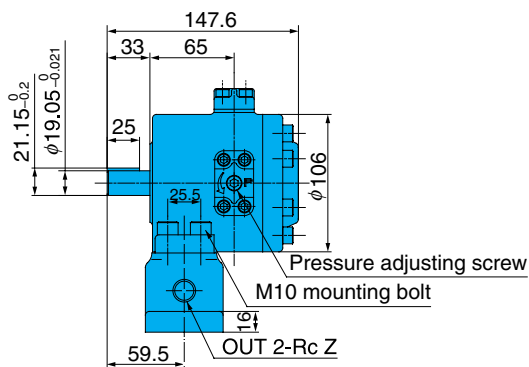
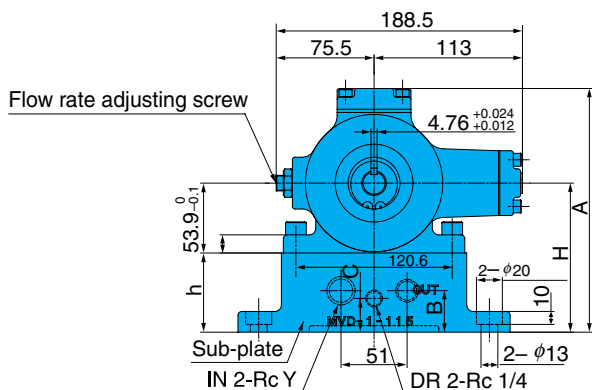
- 11 Avoid pulley, gear, and other drive systems that impart a radial or thrust load on the end of the pump shaft. Mount the pump so its pump shaft is oriented horizontally.
- 12 Provide a suction strainer with a filtering grade of about 100µm (150 mesh). For the return line to the tank, use a 25µm line filter.
- 13 Manage hydraulic operating fluid so contamination is maintained at class NAS10 or lower. Take care to avoid contamination with water and other foreign

- matter, and watch out for discoloration. Whitish fluid indicates that air has contaminated the fluid, and brownish fluid indicates the fluid is dirty.
- 14 Contact your agent about using water- and glycol-based hydraulic operating fluids.
- 15 At startup, repeat the inching operation (start-stop) to bleed air from the pump and pipes.
- 16 Equip an air bleed valve in circuits where it is difficult to bleed air before startup. See page C-13 for more information.

- 17 To ensure proper lubrication of the pump's rubbing surfaces, supply oil to the interior of the pump before starting operation.
- 18 When centering the pump shaft, eccentricity with the motor shaft should be no greater than 0.05mm. Use a pump mounting base of sufficient rigidity. The angle error should be no greater than 1°.

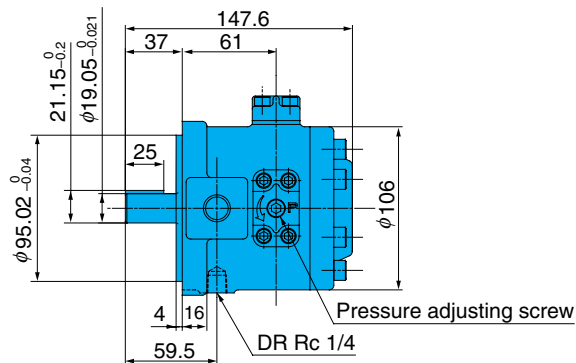
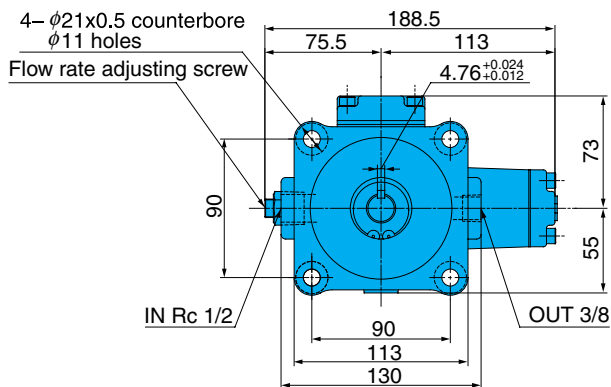
Installation Dimension Drawings

VDR-1A-*-13 (Foot Mounting)

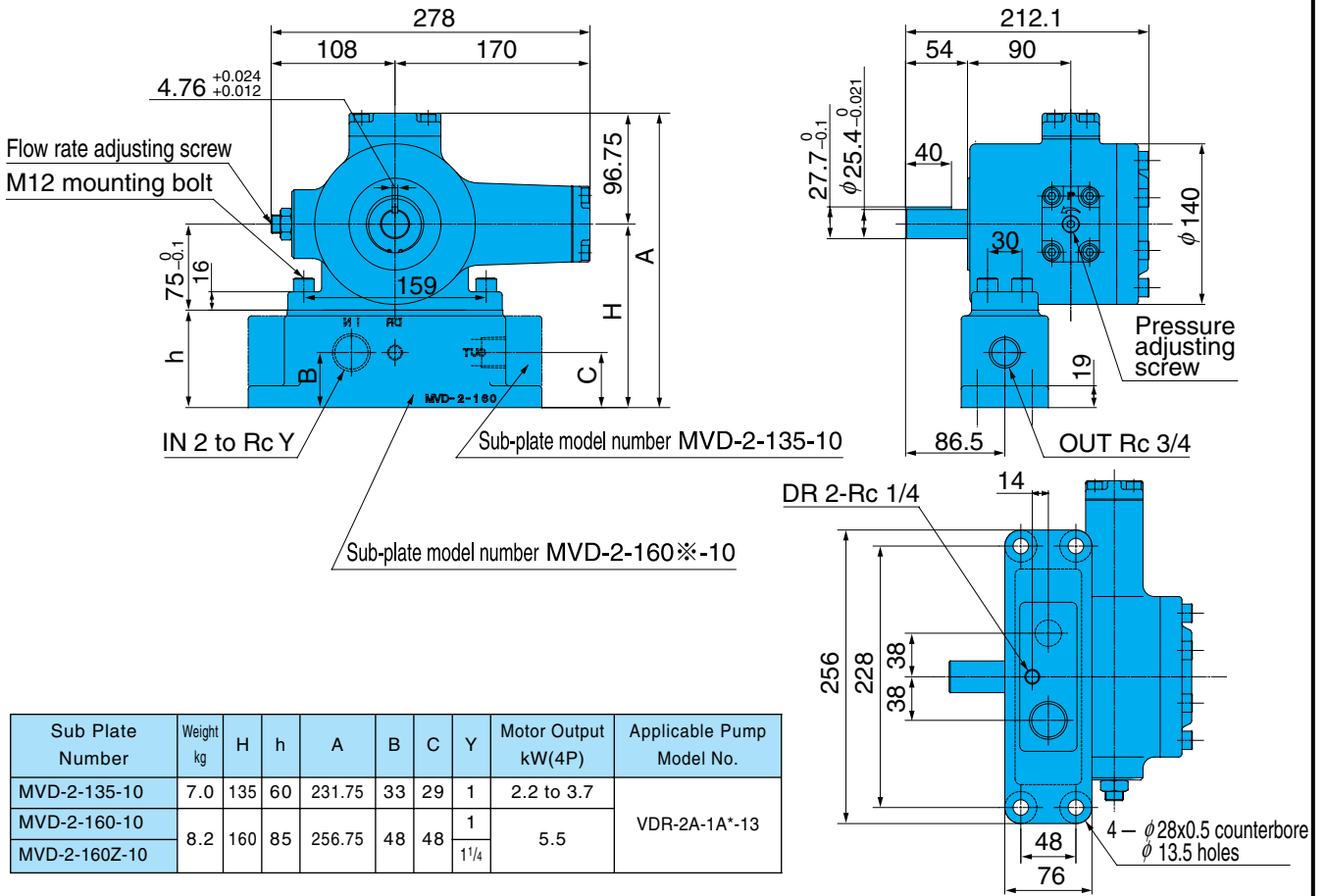


Sub Plate Number	Weight kg	H	h	A	B	C	Y	Z	Motor Output kW(4P)
MVD-1-115-10	3.7	115	61.1	188	32	26	1/2	3/8	0.75 to 1.5
MVD-1-115Y-10							3/4	1/2	
MVD-1-135-10	4.9	135	81.1	208	40	40	1/2	3/8	2.2 to 3.7
MVD-1-135Y-10							3/4	1/2	

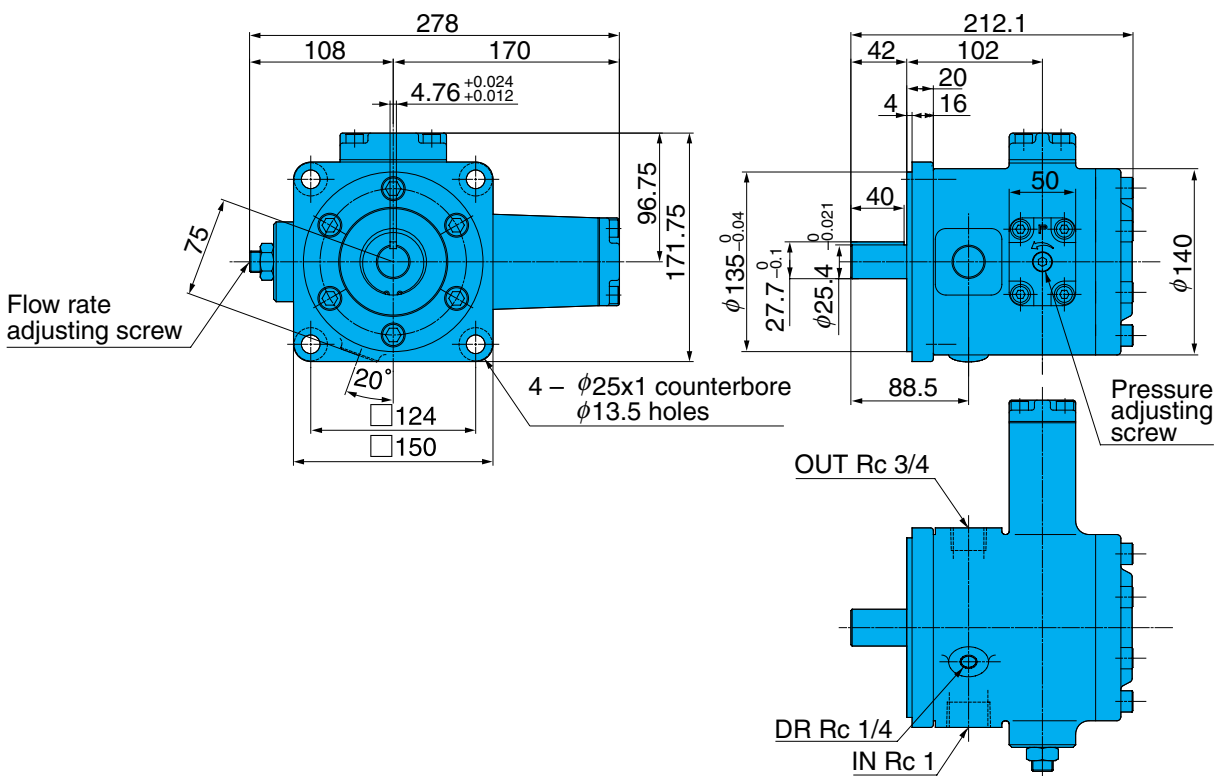
VDR-1B-*-13 (Flange Mounting)



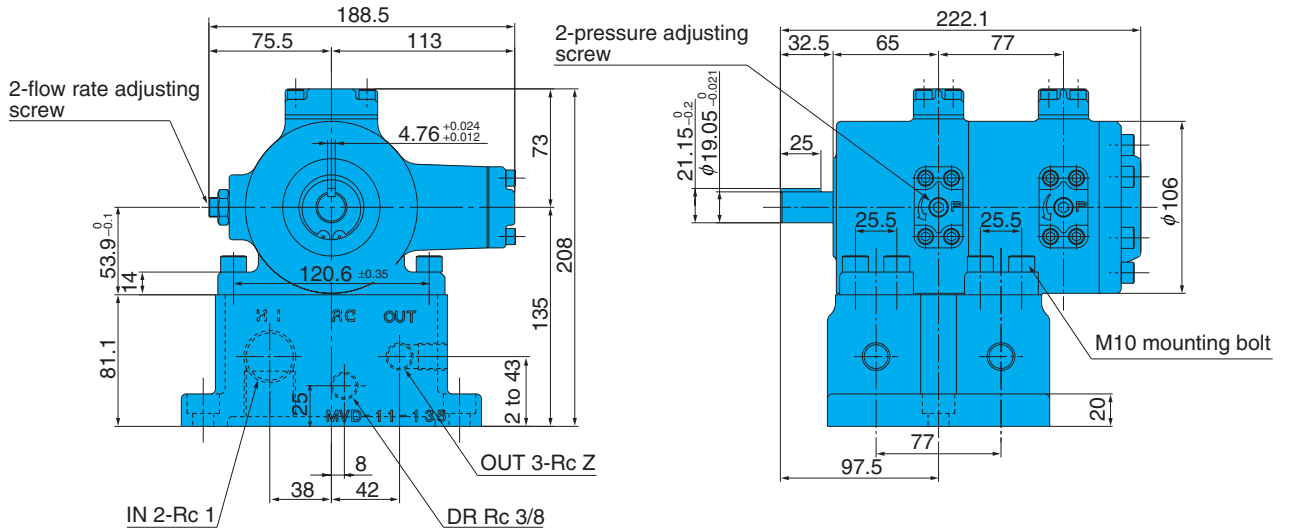
VDR-2A*-13 (Foot Mounting)



VDR-2B*-13 (Flange Mounting)

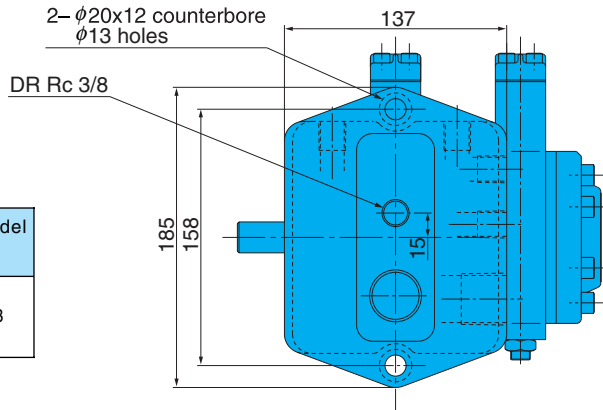


VDR-11A-*-13 (Foot Mounting)

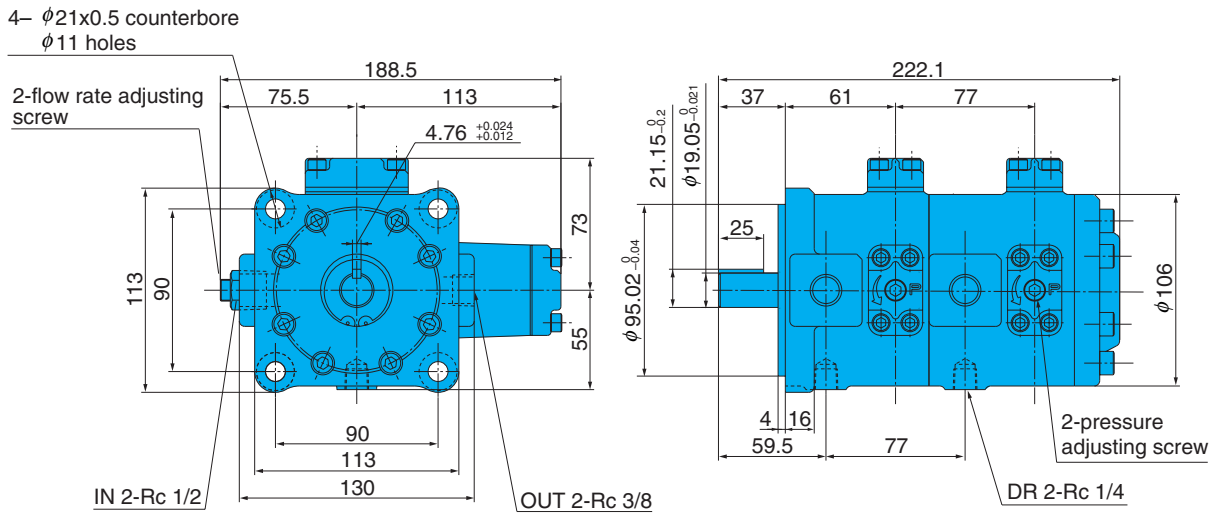


Note) Sub plate is not include.
Contact your agent for more information.

Sub Plate Number	Z	Weight kg	Applicable Pump Model No.
MVD-11-135-10	3/8	10.3	VDR-11A-1A*-1A*-13
MVD-11-135X-10	1/2		



VDR-11B-*-13 (Flange Mounting)

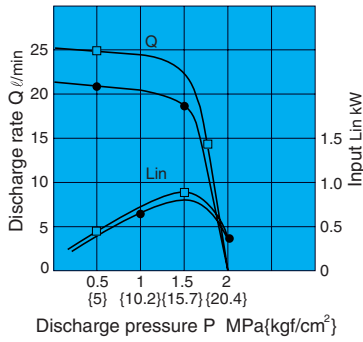


Performance Curves

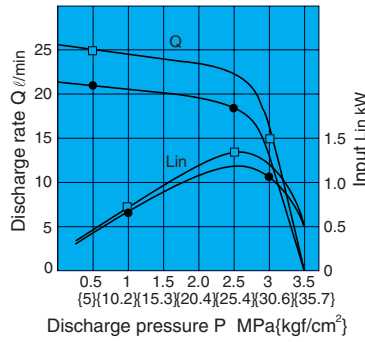
Typical characteristics at hydraulic operating fluid kinematic viscosity of 32 mm²/s

Revolution Speed 1500min⁻¹ —●—
1800min⁻¹ —□—

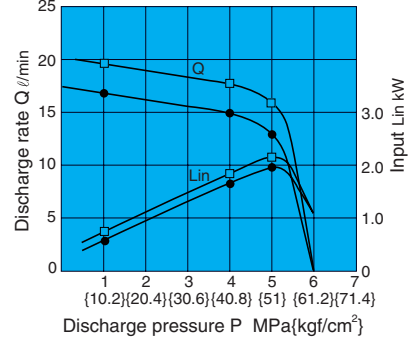
VDR-1A-1A1-13



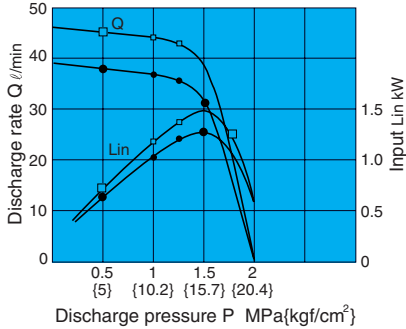
VDR-1A-1A2-13



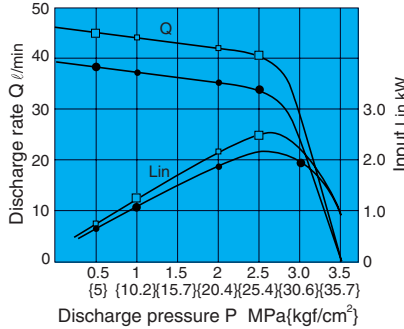
VDR-1A-1A3-13



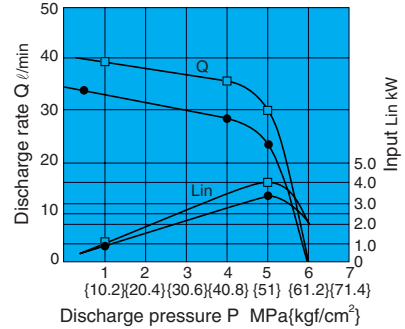
VDR-2A-1A1-13



VDR-2A-1A2-13



VDR-2A-1A3-13



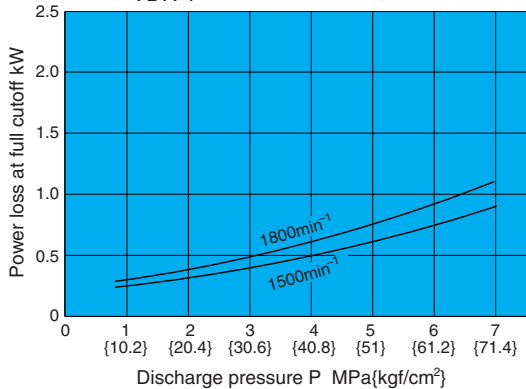
Use the formula below to calculate a pump's required drive force.

$$H = \frac{PQ}{60} + L$$

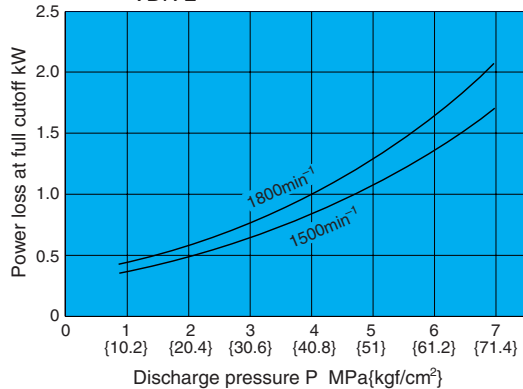
H : Input kW
P : Pressure MPa
Q : Flow rate l/min
L : Power loss kW

Power Loss Curve

VDR-1



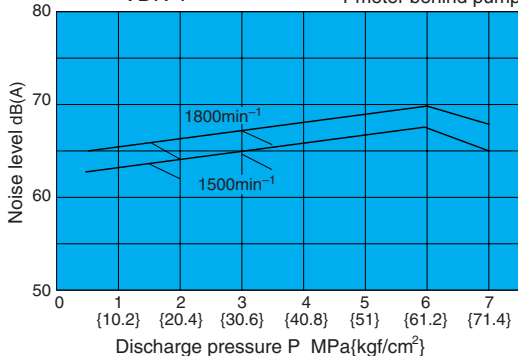
VDR-2



Noise Characteristics

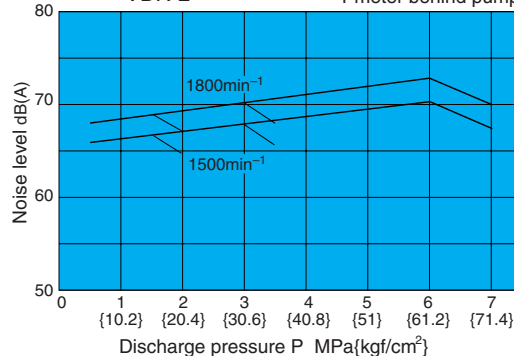
VDR-1

Measurement Position:
1 meter behind pump



VDR-2

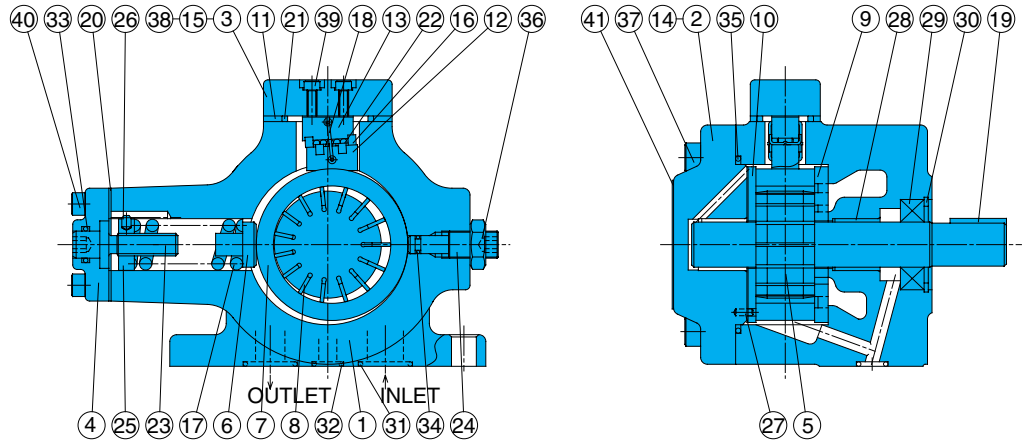
Measurement Position:
1 meter behind pump



Cross-sectional Drawing

VDR-1A-*-13

VDR-2A-*-13



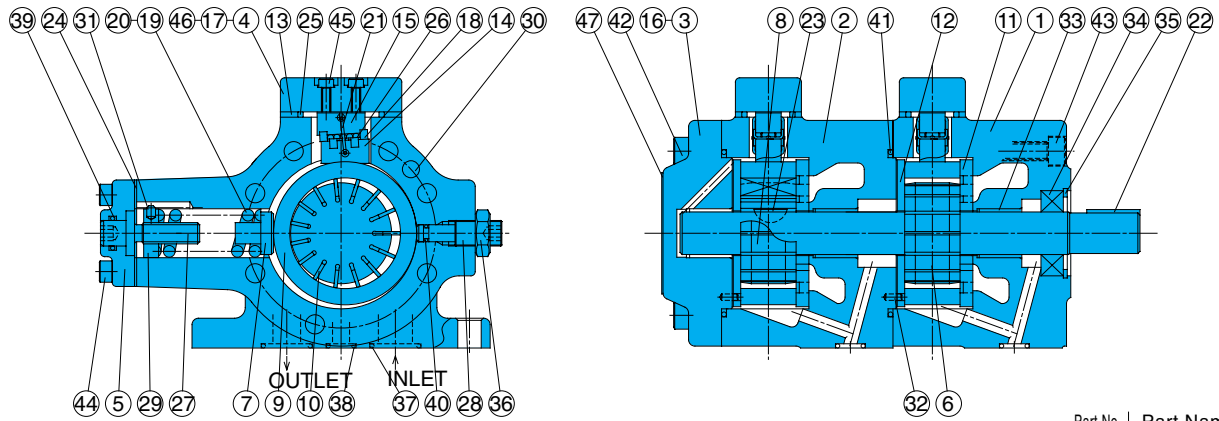
List of Sealing Parts

Part No.	Applicable Pump Model No.	VDR-1A-*-13		VDR-2A-*-13	
	Seal Kit Number	VDAS-101A00		VDAS-102A00	
	Part Name	Part Number	Q'ty	Part Number	Q'ty
20	Packing	VD32J-101000	1	VD32J-102000	1
21	Square ring	VD33J-101000	1	1A-G45	1
29	Oil seal	ISRD-204010	1	ISP-284811	1
31	O-ring	1A-P20	2	1A-G30	2
32	O-ring	1A-P10A	1	1A-P12	1
33	O-ring	1A-P12	1	1A-P14	1
34	O-ring	1A-P5	1	1A-P9	1
35	O-ring	1A-G70	1	1A-G100	1

Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	15	Shim	29	Oil seal
2	Cover	16	Retainer	30	Snap ring
3	Cover	17	Spring	31	O-ring
4	Cover	18	Spring	32	O-ring
5	Shaft	19	Key	33	O-ring
6	Piston	20	Packing	34	O-ring
7	Ring	21	Square ring (O-ring)	35	O-ring
8	Vane	22	Needle	36	Nut
9	Plate (S)	23	Screw	37	Screw
10	Plate (H)	24	Screw	38	Screw
11	Plate	25	Nut	39	Screw
12	Holder	26	Pin	40	Screw
13	Holder	27	Pin	41	Nameplate
14	Shim	28	Bearing		

Note) 1. Oil seals are manufactured by Nippon Oil Seal Industry Co. Ltd. (NOK).
 2. O-ring 1A-** refers to JIS B2401-1A-**.
 3. For VDR-*B-*-13, the seal kit number becomes VDBS-10*B00, without the 31 and 32 O-rings.

VDR-11A-*-13



List of Sealing Parts

Part No.	Applicable Pump Model No.	VDR-11A-*-13	
	Seal Kit Number	VDAS-111A00	
	Part Name	Part Number	Q'ty
24	Packing	VD32J-101000	2
25	Square ring	VD33J-101000	2
34	Oil seal	ISRD-204010	1
37	O-ring	1A-P20	4
38	O-ring	1A-P10A	2
39	O-ring	1A-P12	2
40	O-ring	1A-P5	2
41	O-ring	1A-G70	2

Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	11	Plate (S)	21	Spring
2	Body	12	Plate (H)	22	Key
3	Cover	13	Plate	23	Key
4	Cover	14	Holder	24	Packing
5	Cover	15	Holder	25	Square ring
6	Shaft	16	Shim	26	Needle
7	Piston	17	Shim	27	Screw
8	Rotor	18	Retainer	28	Screw
9	Ring	19	Spring	29	Nut
10	Vane	20	Spring	30	Pin

Part No.	Part Name
31	Pin
32	Pin
33	Bearing
34	Oil seal
35	Snap ring
36	Nut
37	O-ring
38	O-ring
39	O-ring
40	O-ring
41	O-ring
42	Screw
43	Screw
44	Screw
45	Screw
46	Screw
47	Nameplate

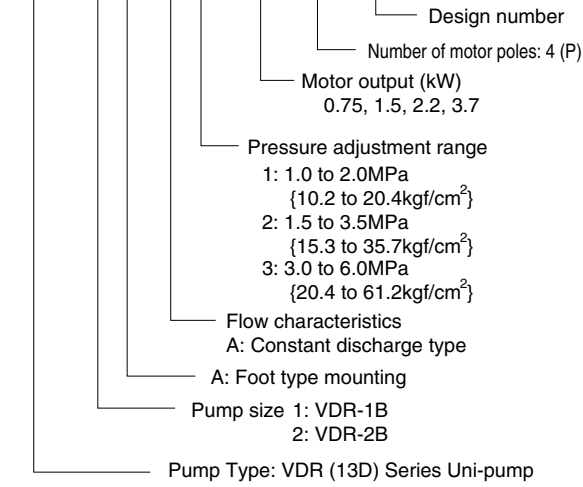
Note) 1. Oil seals are manufactured by Nippon Oil Seal Industry Co. Ltd. (NOK).
 2. O-ring 1A-** refers to JIS B2401-1A-**.
 3. For VDR-11B-*-13, the seal kit number becomes VDBS-111B00, without the 37 and 38 O-rings.

Uni-pump Specifications

Understanding Model Numbers

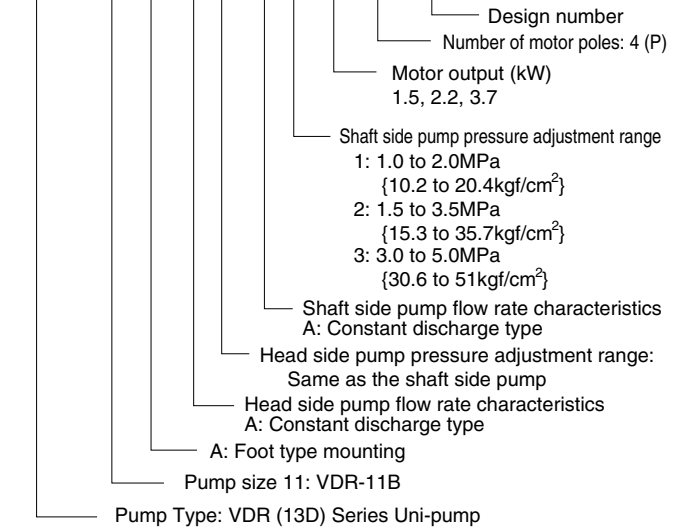
Single Pump

UVD - 1 A - A 2 - 1.5 - 4 - 16



Double Pump

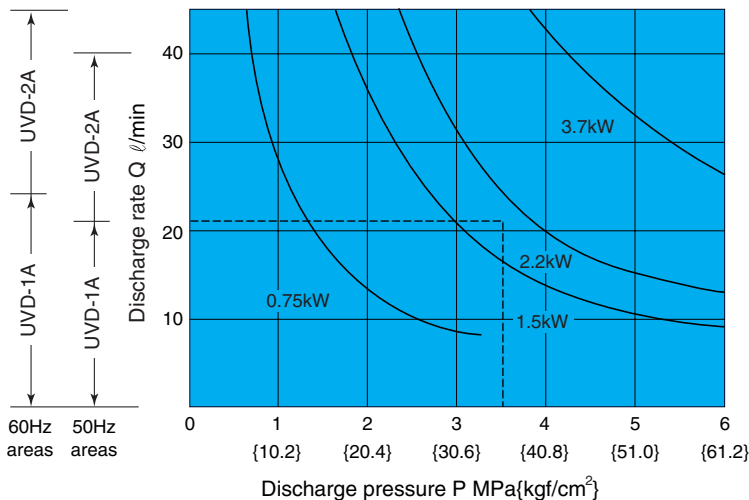
UVD - 11 A - A * - A * - * - 4 - 16



Specifications

Model No.	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Flow Rate ℓ/min	
		50Hz	60Hz
UVD- 1A	6{61.2}	21	25
UVD- 2A	5{51.0}	38	45
UVD-11A	5{51.0}	21-21	25-25

Motor Selection Curves



• Selecting a motor

The area under a motor output curve in the graph to the left is the operating range for that motor under the rated output for that motor.

Example:

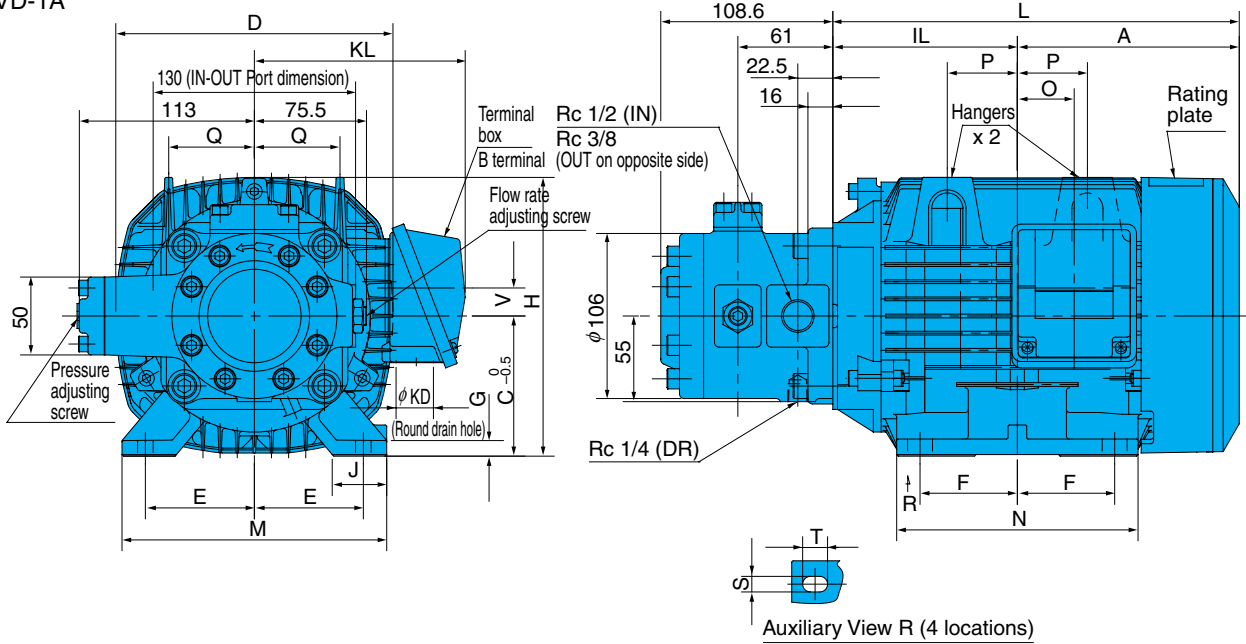
To find the motor that can produce pressure of 3.5MPa and a discharge rate of 21 ℓ/min.

Selection Process

Since the intersection of the two broken lines from a pressure of 3.5MPa and discharge rate of 21 ℓ/min intersect in the area under the 2.2kW motor curve, it means that a 2.2kW motor should be used. In the case of a double pump configuration, select a motor that is larger than the total power required by both pumps.

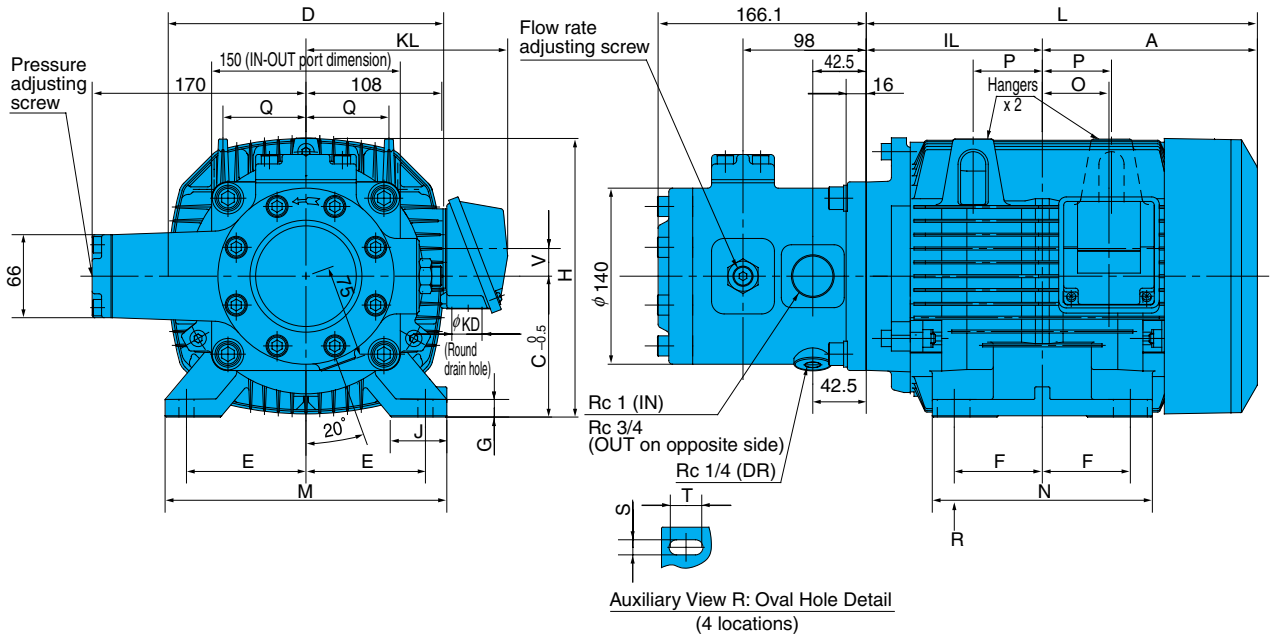
Installation Dimension Drawings

UVD-1A



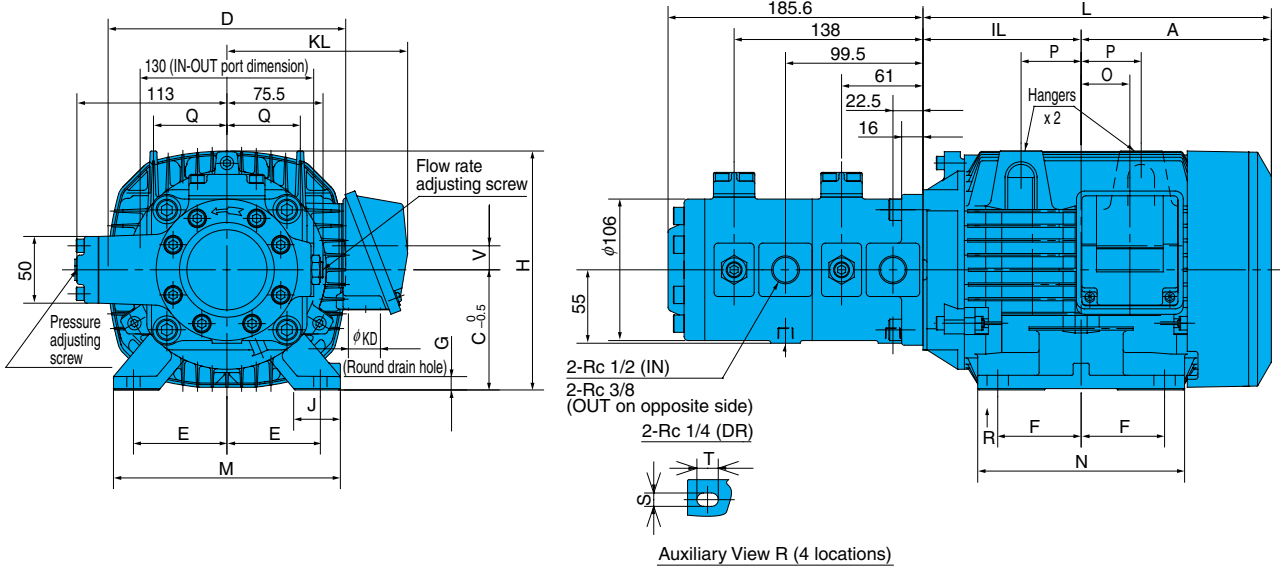
Uni-pump	Motor Dimensions mm																		Frame No.	Output kW (4poles)	Weight kg		
	A	IL	C	D	E	F	G	H	J	L	M	N	S×T	KD	KL	O	P	Q				V	
UVD-1A-A1-0.75-4-16	124	105	80	160	62.5	50	10	160	34	229	155	135	10×25	φ22	126	21	-	-	16.5	80M	0.75	20	
UVD-1A-A2-0.75-4-16																							
UVD-1A-A2-1.5-4-16	142.5	118.5	90	178	70	62.5	10	179	35	261	170	155	10×16	φ22	136	36.5	45	55	18	90L	1.5	24	
UVD-1A-A3-1.5-4-16																							
UVD-1A-A3-2.2-4-16	160.5	133	100	195	80	70	13	197.5	45	293.5	195	175	12×25	φ22	150	45.5	50	55	22	100L	2.2	28	

UVD-2A

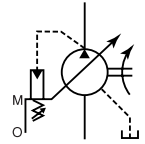


Uni-pump	Motor Dimensions mm																		Frame No.	Output kW (4poles)	Weight kg		
	A	IL	C	D	E	F	G	H	J	L	M	N	S×T	KD	KL	O	P	Q				V	
UVD-2A-A1-1.5-4-16	142.5	118.5	90	178	70	62.5	10	179.0	35	261	170	155	10×16	φ22	136	36.5	45	55	18	90L	1.5	37	
UVD-2A-A2-1.5-4-16																							
UVD-2A-A2-2.2-4-16	160.5	133	100	195	80	70	13	197.5	45	293.5	195	175	12×25	φ22	150	45.5	50	55	22	100L	2.2	41	
UVD-2A-A3-2.2-4-16																							
UVD-2A-A2-3.7-4-16	171	140	112	219	95	70	14	221.5	45	311	224	175	12×25	φ22	161	53	55	66	22	112M	3.7	50	
UVD-2A-A3-3.7-4-16																							

UVD-11A



Uni-pump	Motor Dimensions mm																			Frame No.	Output kW (4poles)	Weight kg
	A	IL	C	D	E	F	G	H	J	L	M	N	S×T	KD	KL	O	P	Q	V			
UVD-11A-A1-A1-1.5-4-16	142.5	118.5	90	178	70	62.5	10	179	35	261	170	155	10×16	φ22	136	36.5	45	55	18	90L	1.5	30
UVD-11A-A1-A2-1.5-4-16																						
UVD-11A-A1-A3-1.5-4-16																						
UVD-11A-A2-A2-1.5-4-16																						
UVD-11A-A2-A3-1.5-4-16																						
UVD-11A-A1-A2-2.2-4-16	160.5	133	100	195	80	70	13	197.5	45	293.5	195	175	12×25	φ22	150	45.5	50	55	22	100L	2.2	34
UVD-11A-A1-A3-2.2-4-16																						
UVD-11A-A2-A2-2.2-4-16																						
UVD-11A-A2-A3-2.2-4-16																						
UVD-11A-A3-A3-2.2-4-16																						
UVD-11A-A1-A3-3.7-4-16	171	140	112	219	95	70	14	221.5	45	311	224	175	12×25	φ22	161	53	55	66	22	112M	3.7	43
UVD-11A-A2-A2-3.7-4-16																						
UVD-11A-A2-A3-3.7-4-16																						
UVD-11A-A3-A3-3.7-4-16																						



VDC Series
High-Pressure Type Variable Volume Vane Pump

30 to 120 ℓ /min
14MPa

Features

① Highly efficient and stable high-pressure operation

Innovative pressure control and pressure balance mechanisms combine with an original 3-point ring support system dramatically improves high-pressure operation. The result is outstanding performance at high pressures up to 14MPa.

② Low vibration and noise

A number of innovative new mechanisms are adopted to minimize vibration and noise. In particular, a 3-point support system is used for the control piston and bias pis-

ton to increase ring stability. This minimizes ring vibration and delivers quiet operation.

③ Outstanding response, high-precision operation

An innovative new ring stopper eliminates excessive ring displacement and improves response. The result is high precision operation at all times, including during starts, stops, and load changes.

④ Precise characteristics for a stable discharge rate

A revolutionary new pressure compensator type pressure con-

trol mechanism ensures a highly stable fixed discharge rate, even in the high pressure range.

⑤ High efficiency operation with minimal power loss

New mechanical innovations minimize power loss, especially at full cutoff.

⑥ Simplified maintenance and handling

Pressure adjusting and discharge rate adjusting mechanisms are located on the same side of the pump for simplified maintenance and handling.

Specifications

Model No.	Capacity cm ³ /rev	No-load Discharge Rate (ℓ/min)				Pressure Adjustment Range MPa {kgf/cm ² }	Allowable Peak Pressure MPa {kgf/cm ² }	Revolution Speed min ⁻¹		Weight kg
		1000min ⁻¹	1200min ⁻¹	1500min ⁻¹	1800min ⁻¹			Min.	Max.	
VDC-1A(B)-1A2-20 1A3 1A4 1A5	16.7	16.7	20	25	30	1.5 to 3.5 {15.3 to 35.7} 2 to 7 {20.4 to 71.4} 5 to 10.5 {51 to 107} 7 to 14 {71.4 to 143}	14{143}	800	1800	9.5
						21{214}				
VDC-1A(B)-2A2-20 2A3	22	22	27	33	40	1.5 to 3.5 {15.3 to 35.7} 2 to 7 {20.4 to 71.4}	14{143}	800	1800	9.5
VDC-2A(B)-1A2-20 1A3 1A4 1A5	30	30	36	45	54	1.5 to 3.5 {15.3 to 35.7} 2 to 7 {20.4 to 71.4} 5 to 10.5 {51 to 107} 7 to 14 {71.4 to 143}	14{143}	800	1800	25
						21{214}				
VDC-2A(B)-2A2-20 2A3	39	39	47	58	70	1.5 to 3.5 {15.3 to 35.7} 2 to 7 {20.4 to 71.4}	14{143}	800	1800	25
VDC-3A(B)-1A2-20 1A3 1A4 1A5	67	67	80	100	120	1.5 to 3.5 {15.3 to 35.7} 2 to 7 {20.4 to 71.4} 5 to 10.5 {51 to 107} 7 to 14 {71.4 to 143}	14{143}	800	1800	47 (33)
						21{214}				

Double Pump

Model No.	Vent Side			Shaft Side			Revolution Speed min ⁻¹		Weight kg
	Discharge Rate ℓ/min		Pressure Adjustment Range MPa {kgf/cm ² }	Discharge Rate ℓ/min		Pressure Adjustment Range MPa {kgf/cm ² }	Min.	Max.	
	1800min ⁻¹	1500min ⁻¹		1800min ⁻¹	1500min ⁻¹				
VDC-11A(B)-2A3-2A3-20 VDC-11A(B)-2A3-1A5-20	40	33	2 to 7 {20.4 to 71.4}	40	33	2 to 7 {20.4 to 71.4} 7 to 14 {71.4 to 143}	800	1800	Type A 27 Type B 20
VDC-12A(B)-2A3-2A3-20 VDC-12A(B)-2A3-1A5-20 VDC-12A(B)-1A5-2A3-20 VDC-12A(B)-1A5-1A5-20	40	33	2 to 7 {20.4 to 71.4}	70	58	2 to 7 {20.4 to 71.4} 7 to 14 {71.4 to 143}	800	1800	Type A 42 Type B 35
	30	25	7 to 14 {71.4 to 143}	70	58	2 to 7 {20.4 to 71.4} 7 to 14 {71.4 to 143}			
VDC-22A(B)-2A3-2A3-20 VDC-22A(B)-2A3-1A5-20	70	58	2 to 7 {20.4 to 71.4}	70	58	2 to 7 {20.4 to 71.4} 7 to 14 {71.4 to 143}	800	1800	Type A 62 Type B 50
VDC-13A(B)-2A3-1A3-20 VDC-13A(B)-2A3-1A5-20 VDC-13A(B)-1A5-1A3-20 VDC-13A(B)-1A5-1A5-20	40	33	2 to 7 {20.4 to 71.4}	120	100	2 to 7 {20.4 to 71.4} 7 to 14 {71.4 to 143}	800	1800	Type A 62 Type B 48
	30	25	7 to 14 {71.4 to 143}			2 to 7 {20.4 to 71.4} 7 to 14 {71.4 to 143}			

Note) 1. VDC-3A, VDC-11A, VDC-12A and VDC-13A are foot mounting types, and come with foot mountings.
2. VDC-1A and VDC-2A are sub plate types. Sub plates are not included.

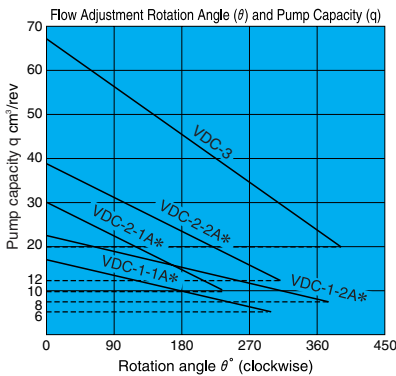
● Handling

- 1 Rotation Direction The direction of rotation is always clockwise (rightward) when viewed from the shaft side.
- 2 Drain Drain piping must be direct piping up to a point that is below the tank fluid level, and piping should comply with the conditions shown in the table below to ensure that back pressure due to pipe resistance does not exceed 0.1MPa. When using a pump that has drain ports at two locations, use the drain port that is higher after the pump is installed. In the case of a double pump, run separate pipes from both the shaft side and the head side drains directly connect to the tank, so the drain pipe is below the surface of the oil.

Model No. Item	VDC-1	VDC-2	VDC-3
Pipe Joint Size	At least 1/4"	At least 1/4"	At least 3/8"
Pipe I.D.	At least φ7.6	At least φ7.6	At least φ9.6
Pipe Length	1m or less	1m or less	1m or less

- 3 Discharge Volume Adjustment The discharge flow rate is decreased by clockwise (rightward) rotation of the discharge rate adjusting screw, and increased by counterclockwise (leftward) rotation. Loosen the lock nut before making adjustments. After adjustment is complete, re-tighten the lock nut. The graph below provides general guidelines for the relationship between the rotation angle of the flow rate adjusting screw and the no-load discharge rate.

However: $Q = q \times N \times 10^{-3}$
 Q : No-load Discharge Rate ℓ / min
 q : Volume cm^3 / rev
 N : Revolution Speed min^{-1}



Note)
 The values indicated above are at maximum pump discharge volume with the flow volume adjusting screw at the 0° position. The broken line shows the flow volume adjustment range lower limit value.

- 4 Pressure Adjustment Pressure is increased by clockwise (rightward) rotation of the discharge rate adjusting screw, and decreased by counterclockwise (leftward) rotation. Loosen the lock nut before making adjustments. After adjustment is complete, re-tighten the lock nut.
- 5 Factory Default P-Q Settings (Standard Model)
 - Flow Rate Setting = Maximum flow rate for model as indicated in the catalog
 - Pressure Setting = Pressure shown in table below
- 6 Thrust Screw and Stopper The thrust screw and stopper are precision adjusted at the factory during assembly. Never touch them. See callouts 15/43 and 15/38 in the VDC-1A and 2A/3A cross-section diagrams on pages B-33 and B-34.

- 7 An unload circuit is required when the motor is started under condition $\lambda - \Delta$. Contact your agent about the unload circuit.
- 8 Initial Operation Before operating the pump for the first time, put the pump discharge side into the no-load state and then repeatedly start and stop the motor to bleed all air from inside the pump and the suction piping. After confirming that the pump is discharging oil, continue the no-load operation for at least 10 minutes to discharge all the air from the circuit. Provide an air bleed valve in circuits where it is difficult to bleed air before startup.
- 9 Sub Plate Use the table below for to specify a sub plate type when one is required.

Factory Default Pressure Settings MPa(kgf/cm²)
2 : 3.5 {35.7}
3 : 3 {30.6}
4 : 5 {51}
5 : 7 {71.4}

Sub Plate Number

Pump Model No.	Sub Plate Number	Motor (kW)
VDC-1A-1A*-20	MVD-1-115-10	0.75 to 1.5
	MVD-1-135-10	2.2 to 3.7
VDC-1A-2A*-20	MVD-1-115Y-10	0.75 to 1.5
	MVD-1-135Y-10	2.2 to 3.7
VDC-2A-*A*-20	MVD-2-135-10	2.2 to 3.7
	MVD-2-160-10	5.5
VDC-2A-2A*-20	MVD-2-160Z-10	5.5

Note) See pages B-17 and B-18 for detailed dimensions.

10 Foot Mounting

For a double pump with VDC-3 foot mounting, the foot mounting kit and pump are sold as a set. When only the mounting feet are required, pump mounting bolts, washers and other parts are sold together as the Foot Mounting Kit. See page B-36 for detailed dimensions.

- 11 For the hydraulic operating fluid, use type ISO VG32 or equivalent (viscosity index of at least 90) for pressures of 7MPa or lower, and type ISO VG68 or equivalent (viscosity index of at least 90) for pressures greater than 7MP.
- 12 The operating temperature range is 15 to 60°C. When the oil temperature at startup is 15°C or less, perform a warm-up operation at low pressure until the oil temperature reaches 15°C. Use the pump in an area where the temperature is within the range of 0 to 60°C.
- 13 Suction pressure is -0.03 to +0.03MPa (-0.3 to +0.3kgf/cm²), and the suction port flow rate should be no greater than 2m/sec.
- 14 Avoid pulley, gear, and other drive systems that impart a radial or thrust load on the end of the pump shaft. Mount the pump so its pump shaft is oriented horizontally.
- 15 Provide a suction strainer with a filtering grade of about 100μm (150 mesh). For the return line to the tank, use a 25μm line filter.
- 16 Manage hydraulic operating fluid so contamination is maintained at class NAS10 or lower. Take care to avoid contamination with water and other foreign matter, and watch out for discoloration. Whitish fluid indicates that air has contaminated the fluid, and brownish fluid indicates the fluid is dirty.
- 17 Contact your agent about using water- and glycol-based hydraulic operating fluids.
- 18 At startup, repeat the inching operation (start-stop) to bleed air from the pump and pipes.

(Continued on following page)

19 Equip an air bleed valve in circuits where it is difficult to bleed air before startup. See page C-13 for more information.

20 To ensure proper lubrication of the pump's rubbing surfaces, supply oil to the interior of the pump before starting operation.

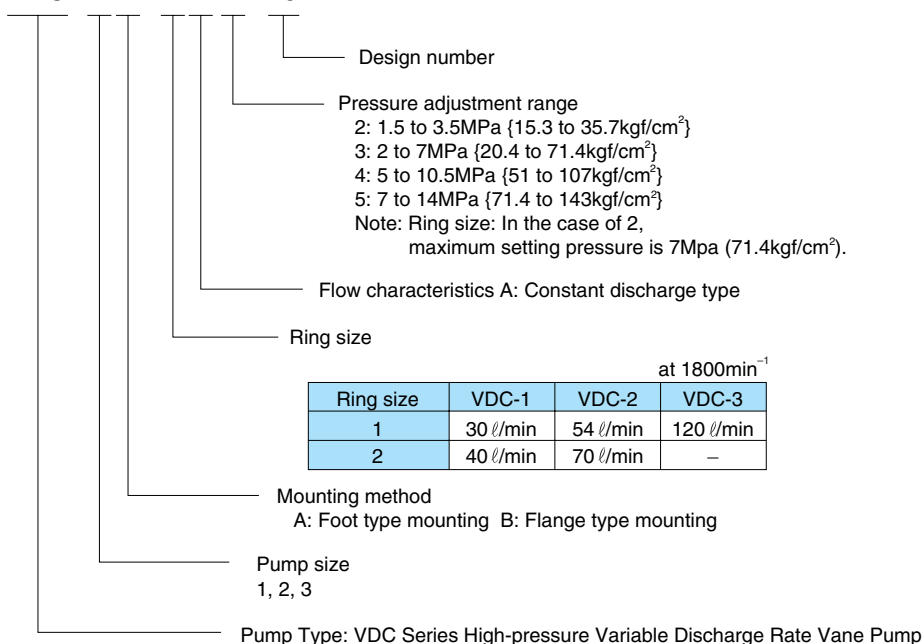
21 When centering the pump shaft, eccentricity with the motor shaft should be no greater than 0.05mm. Use a pump mounting base of sufficient rigidity.

The angle error should be no greater than 1°.

Understanding Model Numbers

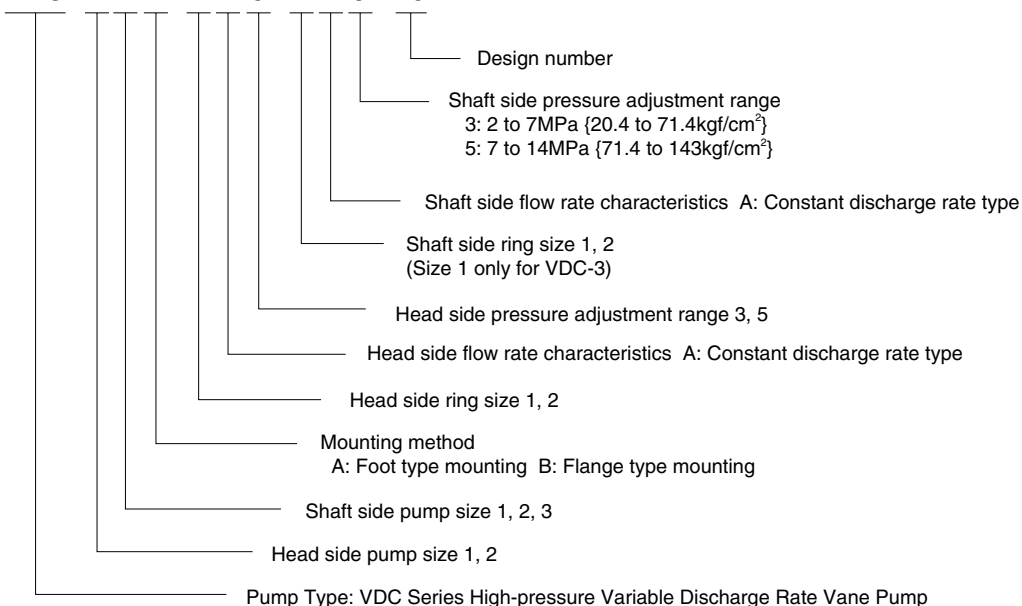
Single Pump

VDC-2 A-1 A 2-20



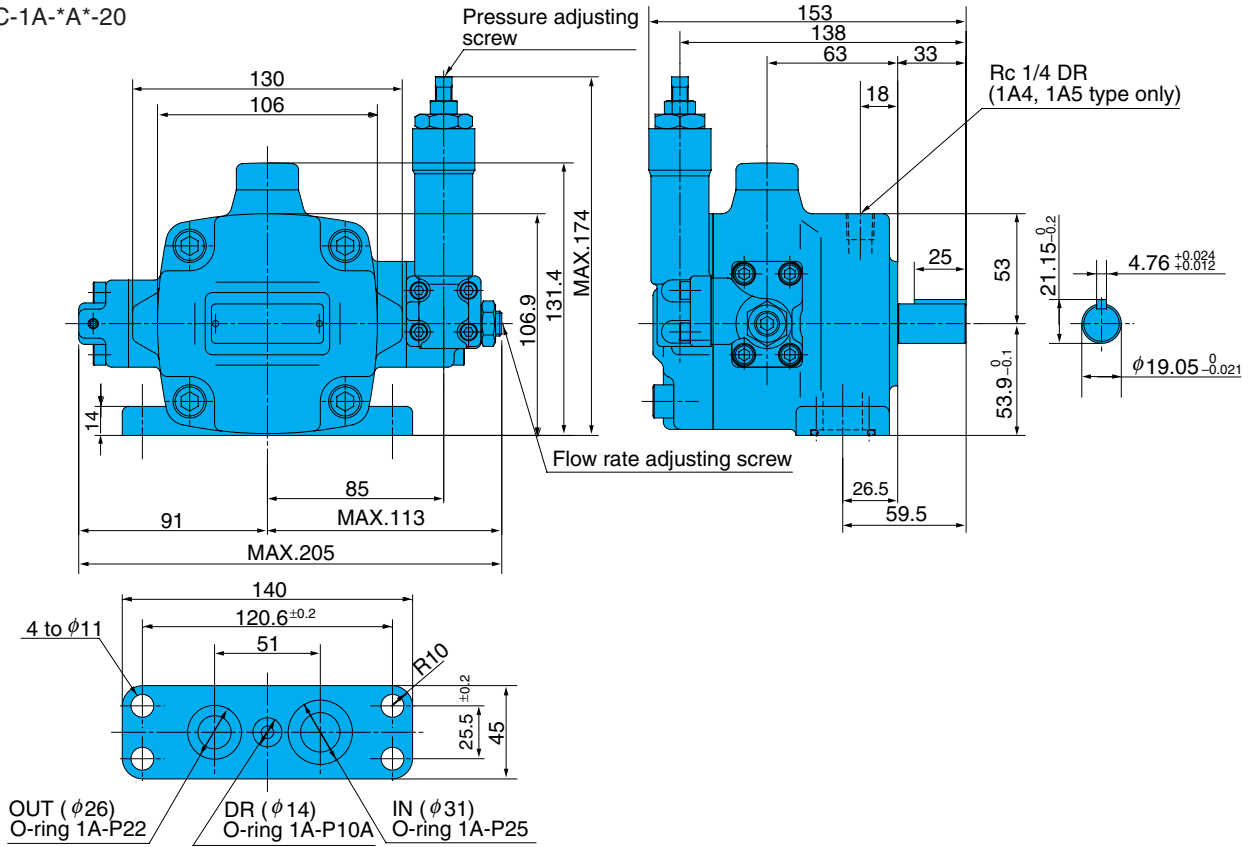
Double Pump

VDC-1 2 A-1 A 5-2 A 3-20

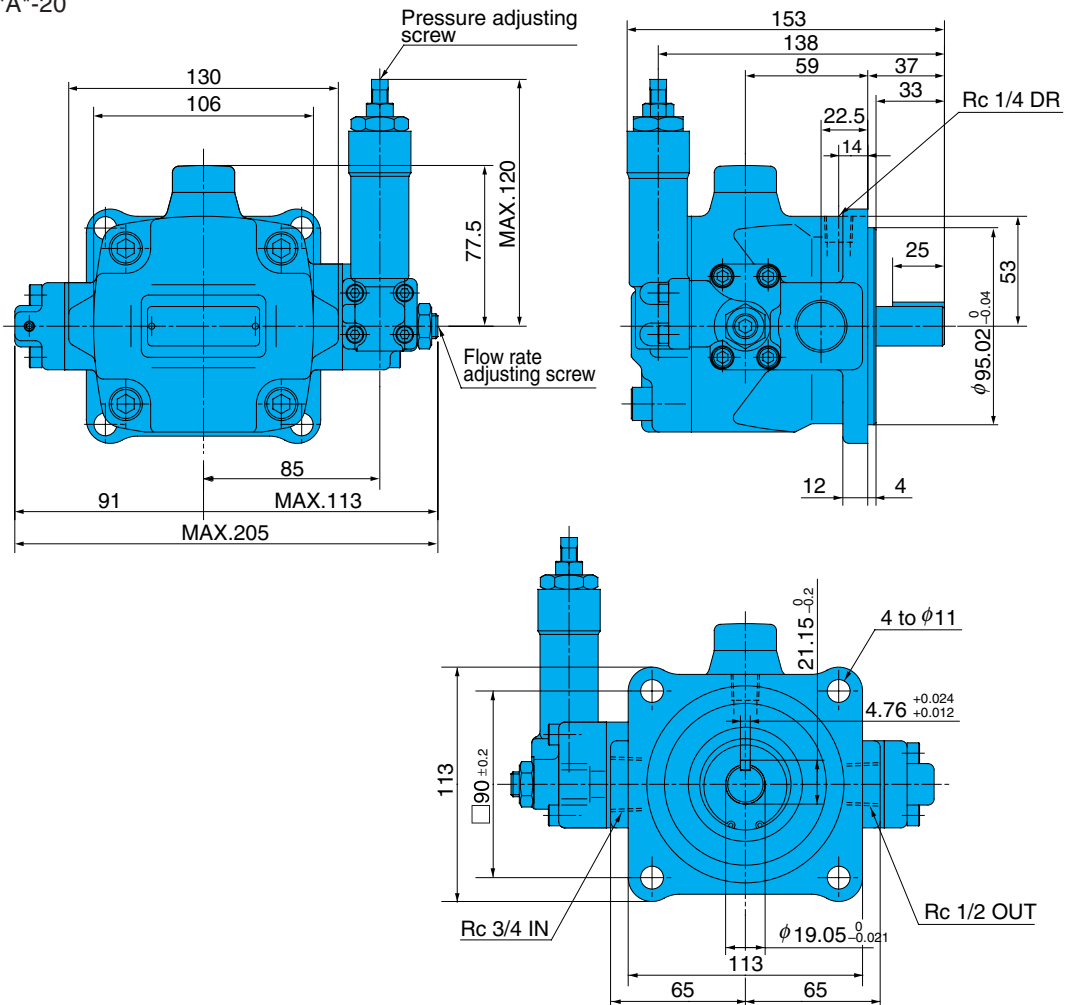


Installation Dimension Drawings

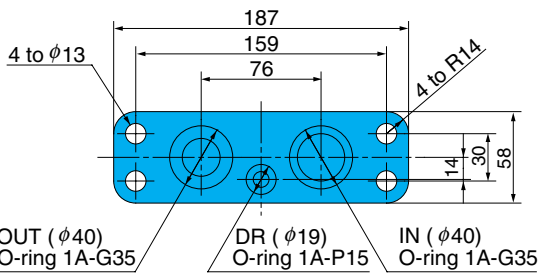
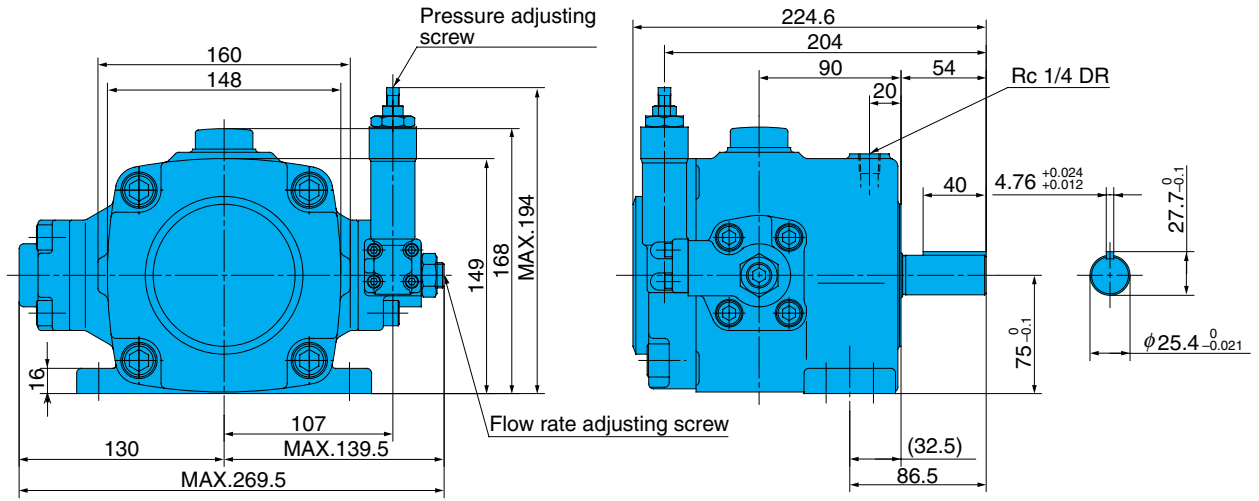
Single Pump
VDC-1A-*A*-20



VDC-1B-*A*-20

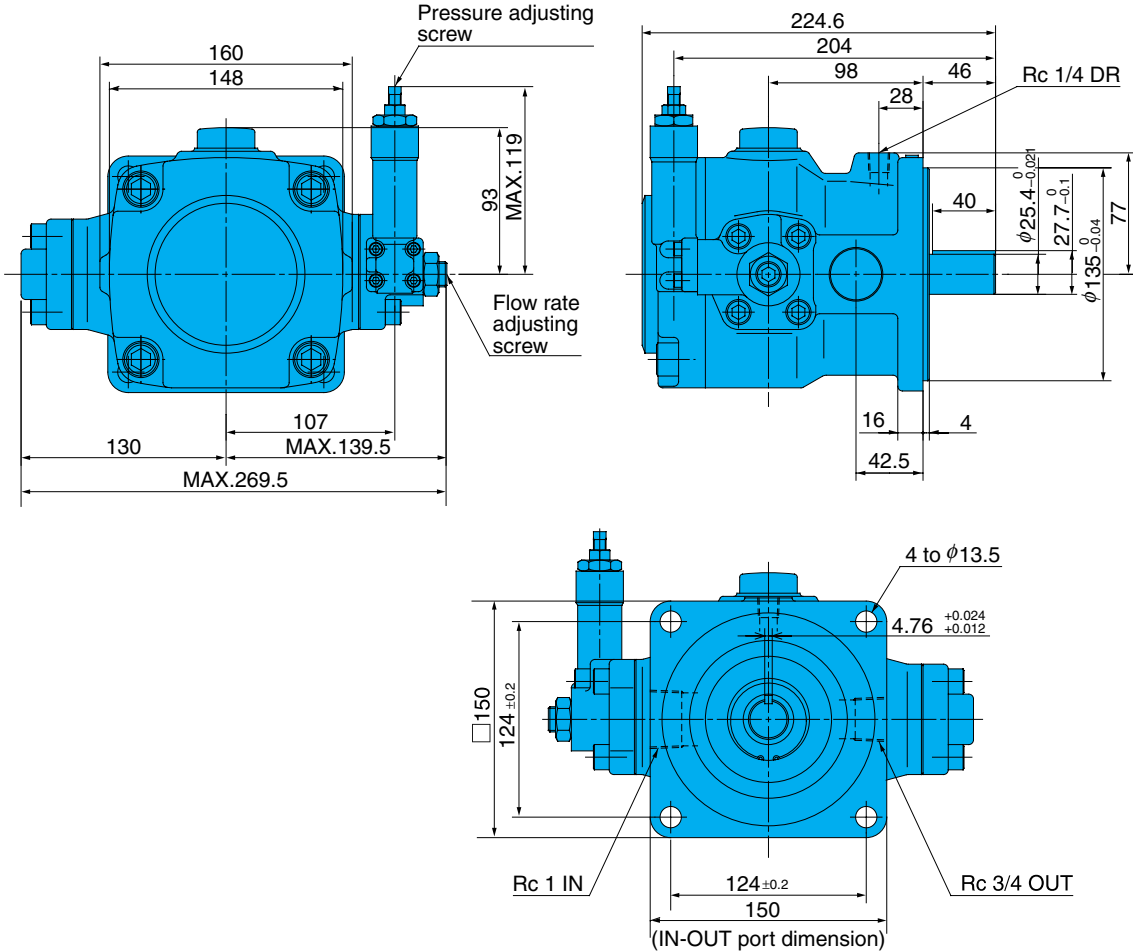


VDC-2A-*A*-20

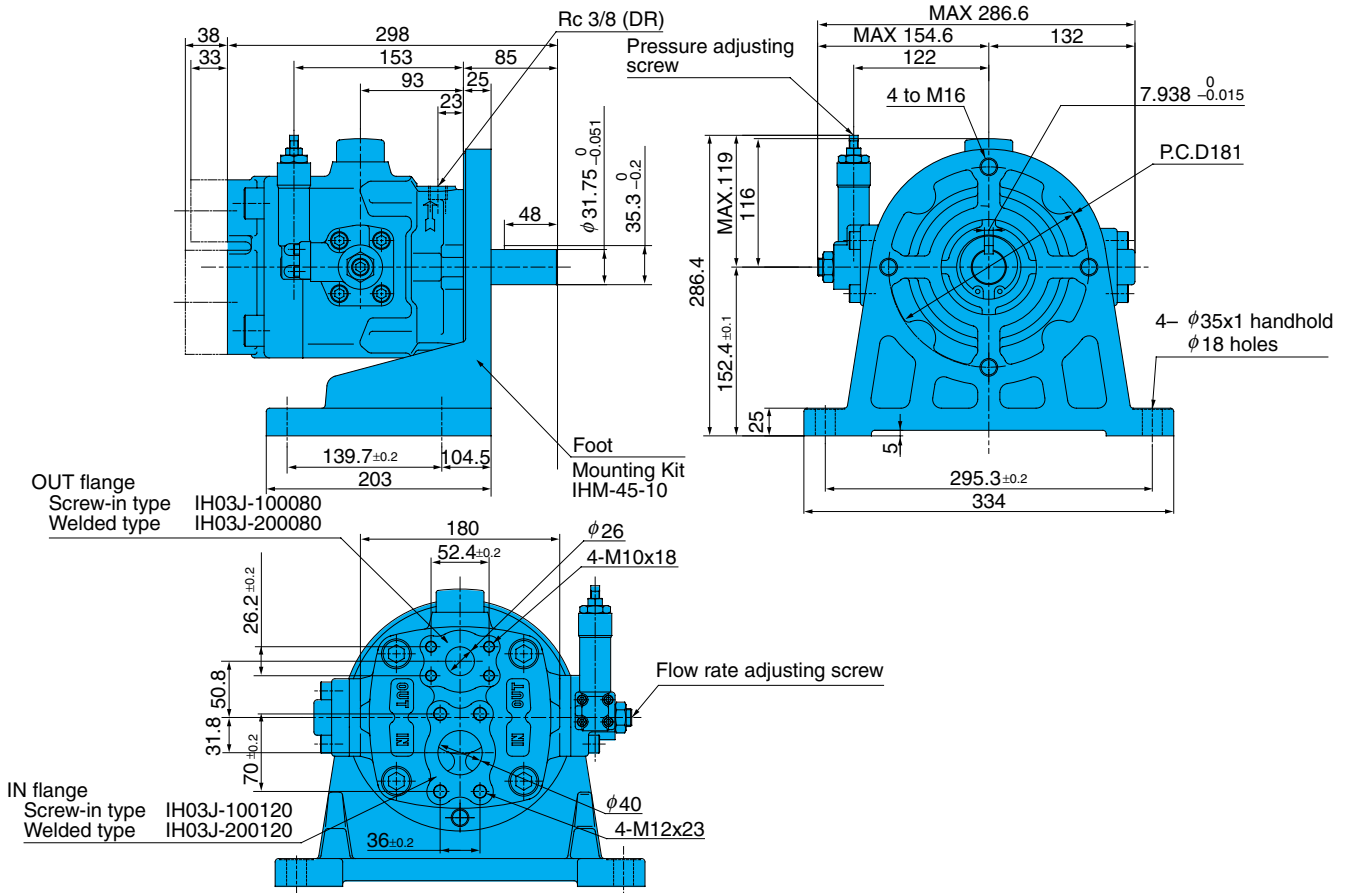


Note)
O-ring 1A-** refers to JIS B2401-1A-**.

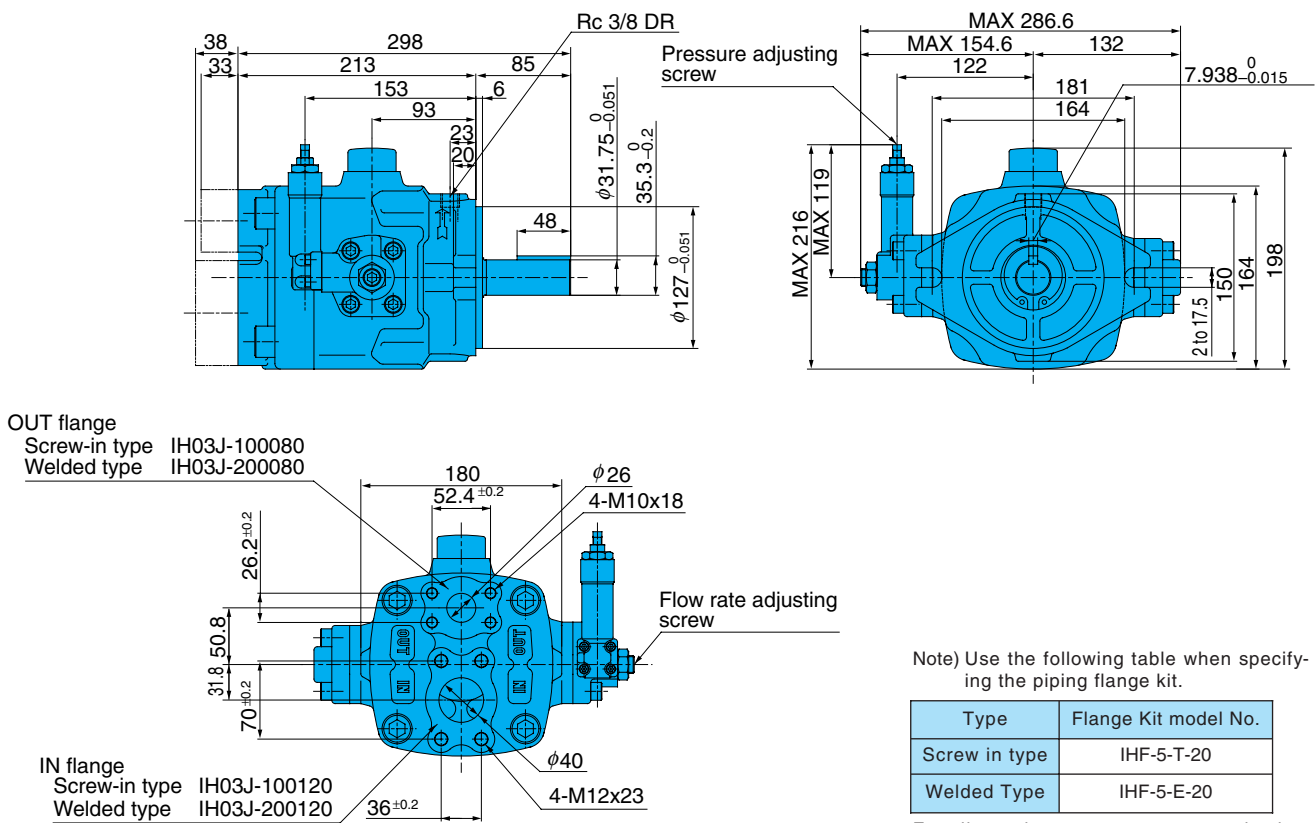
VDC-2B-*A*-20



VDC-3A-1A*-20



VDC-3B-1A*-20

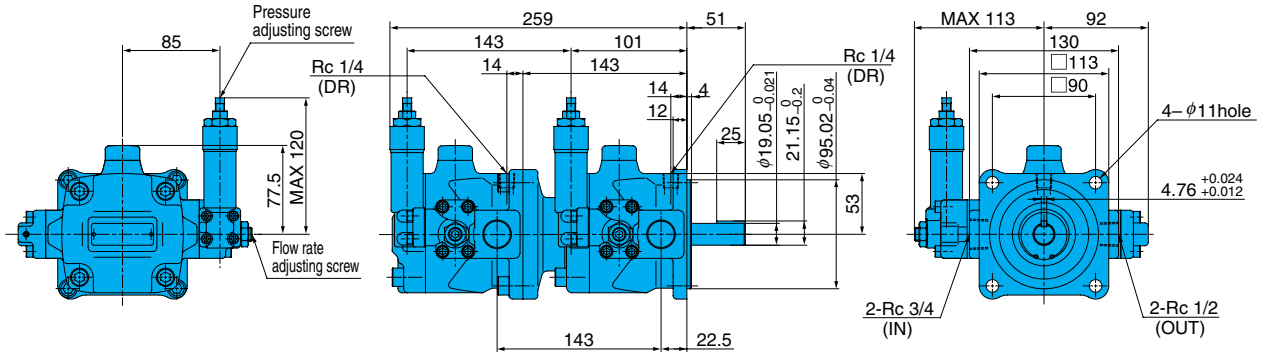


Note) Use the following table when specifying the piping flange kit.

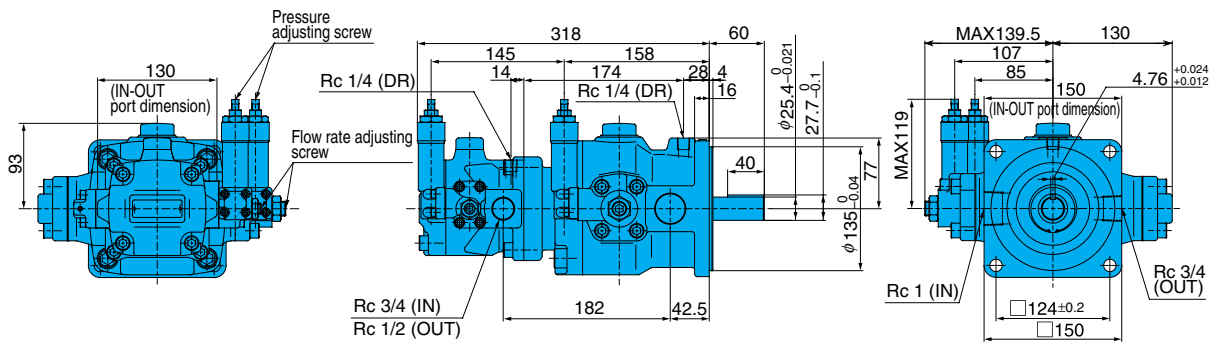
Type	Flange Kit model No.
Screw in type	IHF-5-T-20
Welded Type	IHF-5-E-20

For dimensions, components, and other details, see the IP pump piping flange kits on pages C-10 and C-11.

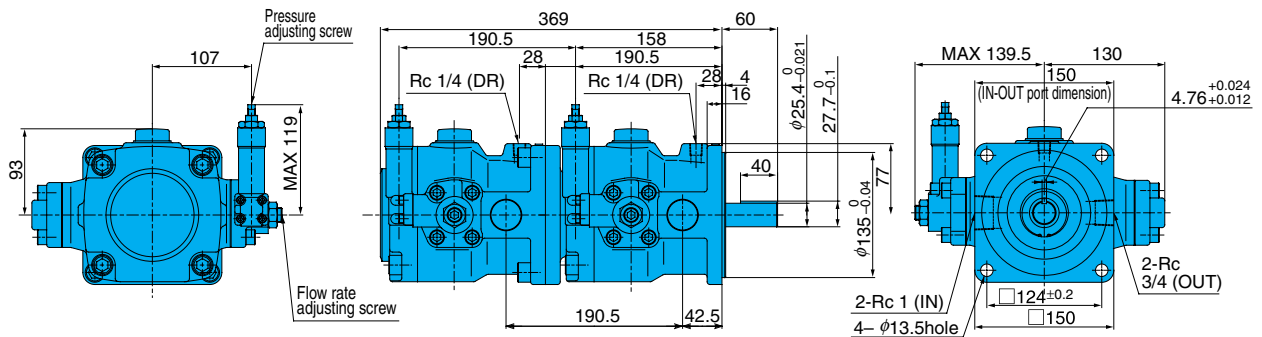
Double Pump
VDC-11B-*A*-*A*-20



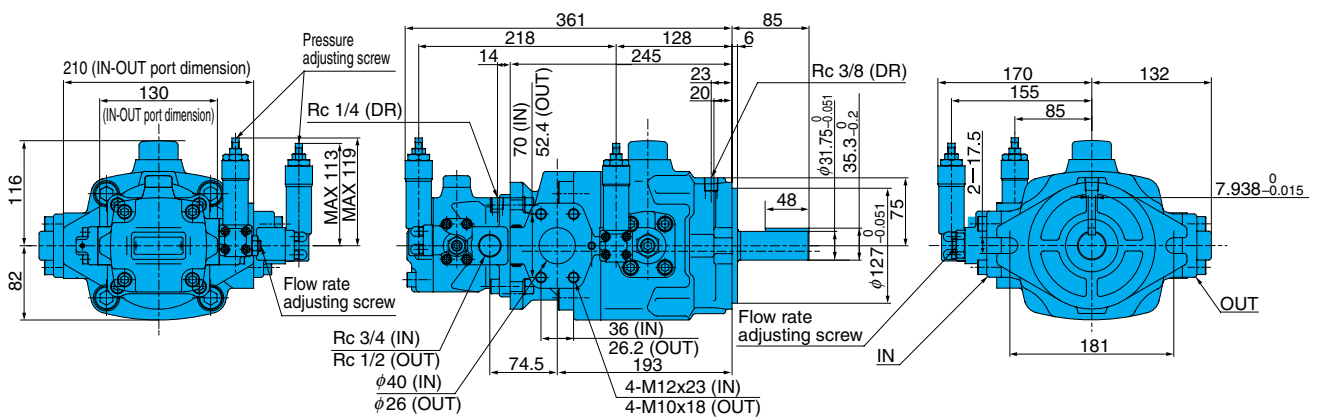
VDC-12B-*A*-*A*-20



VDC-22B-*A*-*A*-20



VDC-13B-*A*-*A*-20

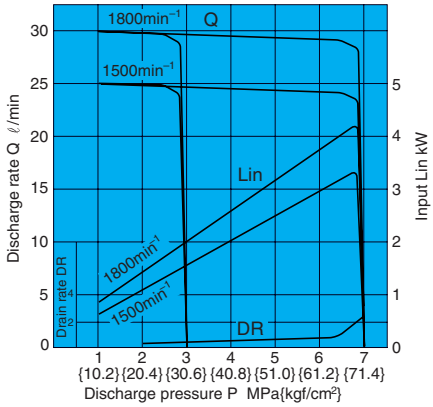


Note) 1. VDC-**A has the foot mounting kit shown on page B-36 installed.
2. Rc-* previously was PT*.

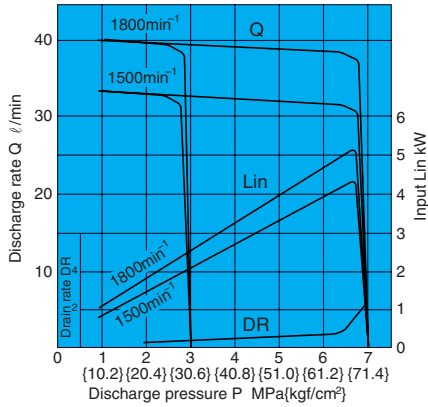
Performance Curves

Typical characteristics at hydraulic operating fluid kinematic viscosity of 32 mm²/s

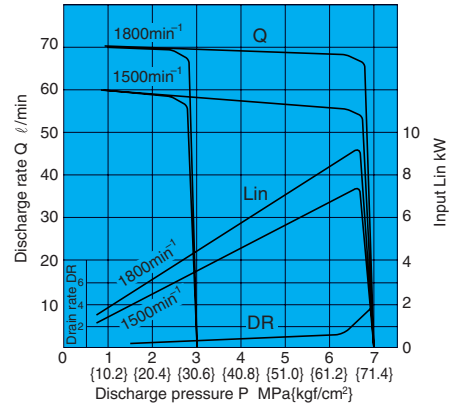
VDC-1A(B)-1A3-20



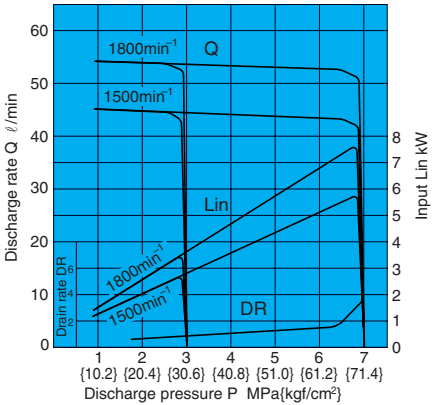
VDC-1A(B)-2A3-20



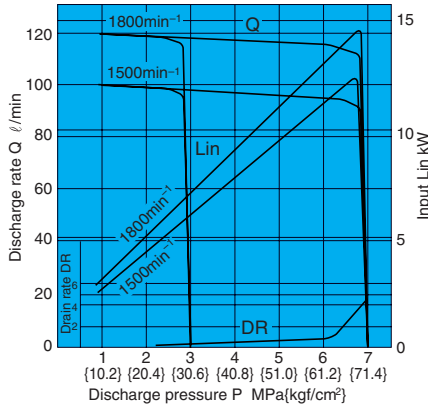
VDC-2A(B)-2A3-20



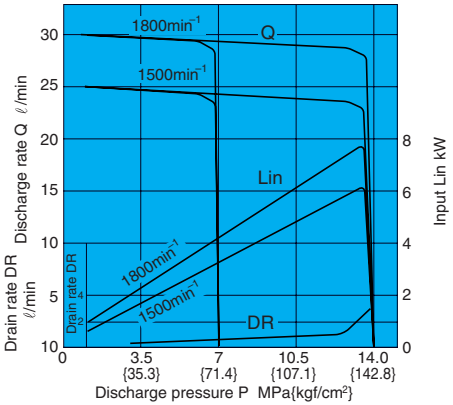
VDC-2A(B)-1A3-20



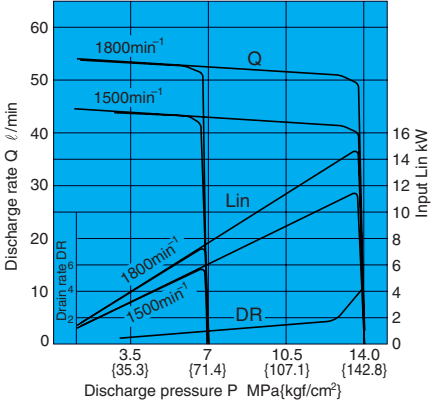
VDC-3A(B)-1A3-20



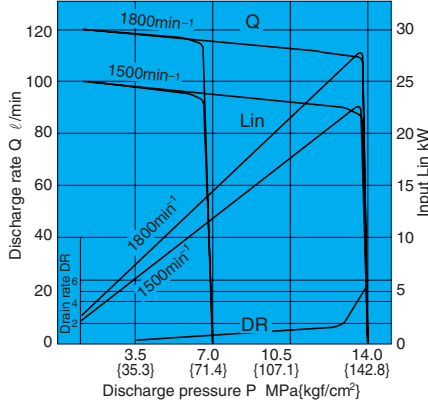
VDC-1A(B)-1A5-20



VDC-2A(B)-1A5-20



VDC-3A(B)-1A5-20

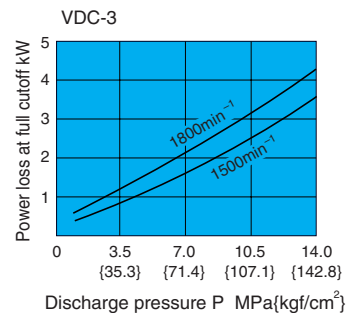
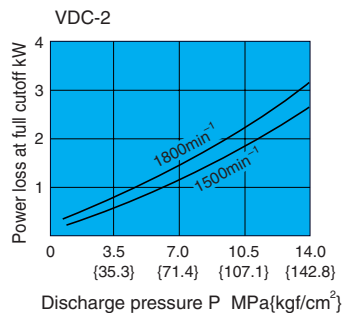
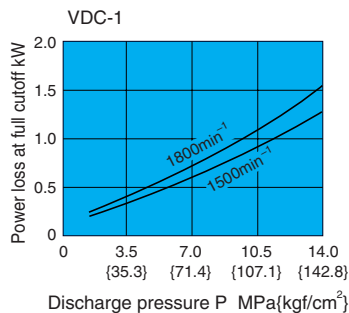


Use the formula below to calculate a pump's required drive force.

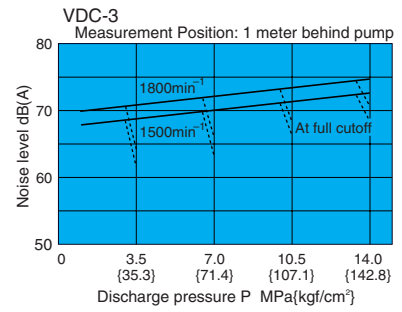
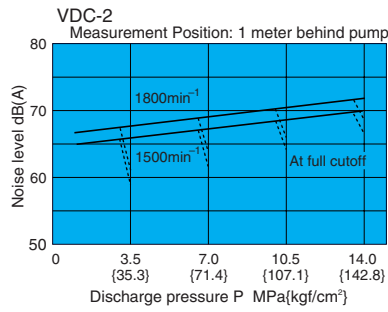
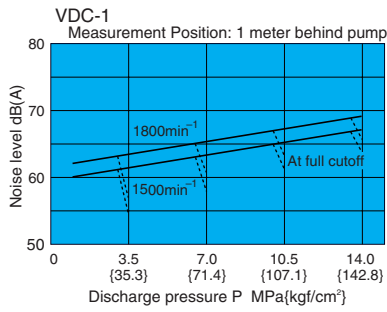
$$H = \frac{PQ}{60} + L$$

H : Input (kW)
P : Pressure MPa
Q : Flow rate ℓ/min
L : Power loss kW

Power loss



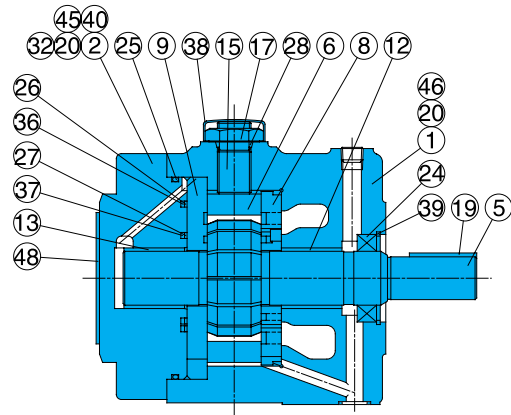
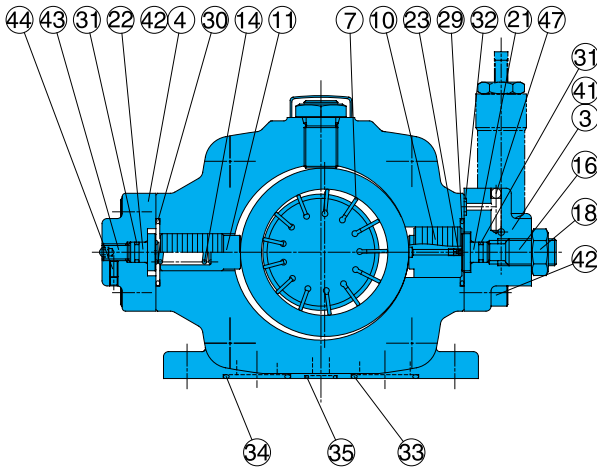
Noise Characteristics



Cross-sectional Drawing

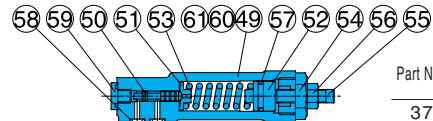
VDC-1A-*A*-20

VDC-2A-*A*-20



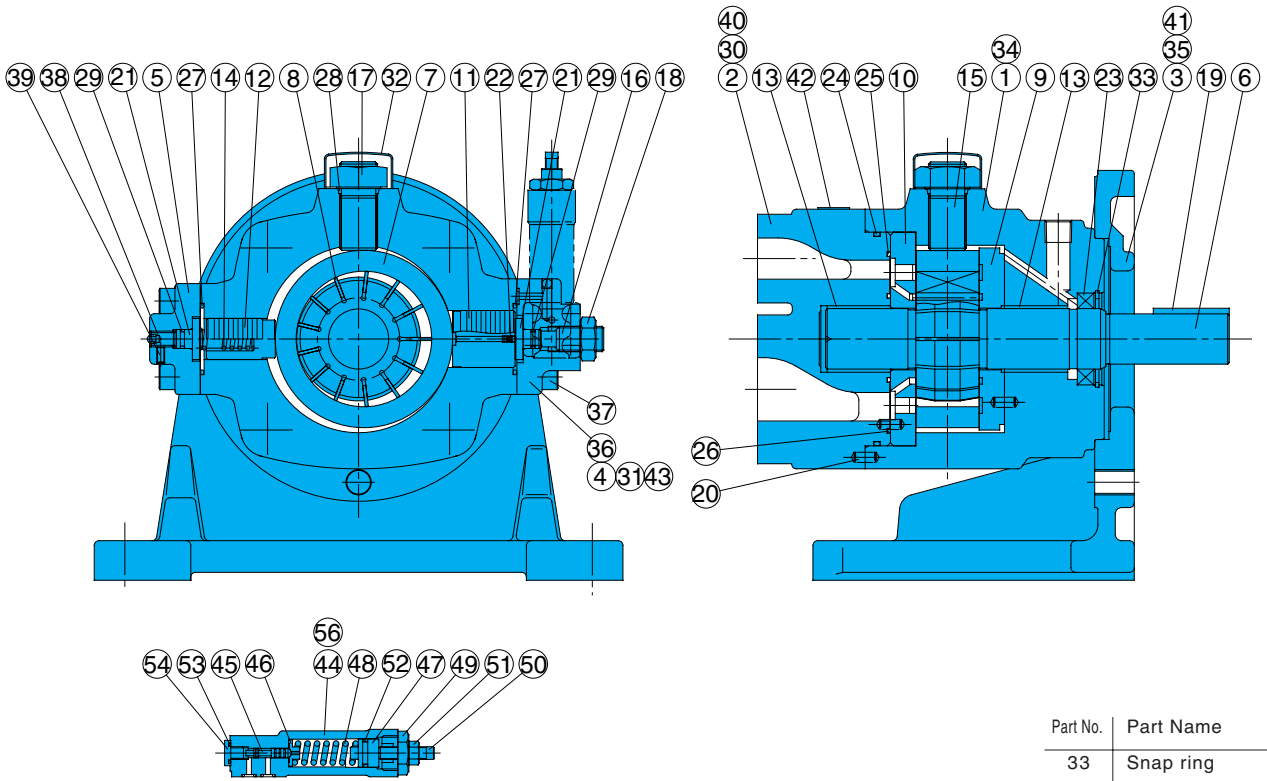
Seal Component Table (VDC-1*, VDC-2*)

Part No.	Applicable Pump Model No.		VDC-1A-*A*-20		VDC-2A-*A*-20	
	Seal Kit Number		VCBS-101A00		VCBS-102A00	
	Part Name	Part Number	Q'ty	Part Number	Q'ty	
24	Oil seal	TCV-224211	1	TCN-325211	1	
25	O-ring	S85(NOK)	1	1A-G115	1	
26	O-ring	AS568-034	1	AS568-150	1	
27	O-ring	AS568-026	1	AS568-134	1	
28	O-ring	1A-P14	1	1A-P18	1	
29	O-ring	1A-P22	1	1A-G35	1	
30	O-ring	1A-P20	1	1A-G35	1	
31	O-ring	1A-P5	2	1A-P9	2	
32	O-ring	1A-P6	4	1A-P7	4	
33	O-ring	1A-P25	1	1A-G35	1	
34	O-ring	1A-P22	1	1A-G35	1	
35	O-ring	1A-P10A	1	1A-P15	1	
36	Backup ring	VCB34-101000	1	VCB34-102000	1	
37	Backup ring	VCB34-201000	1	VCB34-202000	1	
57	O-ring	1A-P14	1	1A-P14	1	
58	O-ring	1B-P6(Hs90)	3	1B-P6(Hs90)	3	



Part No.	Part Name	Part No.	Part Name
1	Body (1)	19	Key
2	Body (2)	20	Pin
3	Cover (1)	21	Holder
4	Cover (2)	22	Holder
5	Shaft	23	Orifice
6	Ring	24	Oil seal
7	Vane	25	O-ring
8	Plate (S)	26	O-ring
9	Plate (H)	27	O-ring
10	Piston (1)	28	O-ring
11	Piston (2)	29	O-ring
12	Bearing	30	O-ring
13	Bearing	31	O-ring
14	Spring	32	O-ring
15	Thrust screw	33	O-ring
16	Screw	34	O-ring
17	Nut	35	O-ring
18	Nut	36	Backup ring
		37	Backup ring
		38	Cap
		39	Snap ring
		40	Screw
		41	Screw
		42	Screw
		43	Screw (stopper)
		44	Screw
		45	Plug
		46	Plug
		47	Pole
		48	Nameplate
		49	Valve body
		50	Spool
		51	Holder
		52	Plunger
		53	Spring
		54	Retainer
		55	Screw
		56	Nut
		57	O-ring
		58	O-ring
		59	Plug
		60	Plug
		61	Screw

Note) 1. Oil seals are manufactured by Nippon Oil Seal Industry Co. Ltd. (NOK).
 2. O-ring 1A-** refers to JIS B2401-1A-**.
 3. For VDR-*B*-20, the seal kit number becomes VDBS-10*B00, without the 33, 24, and 35 O-rings.



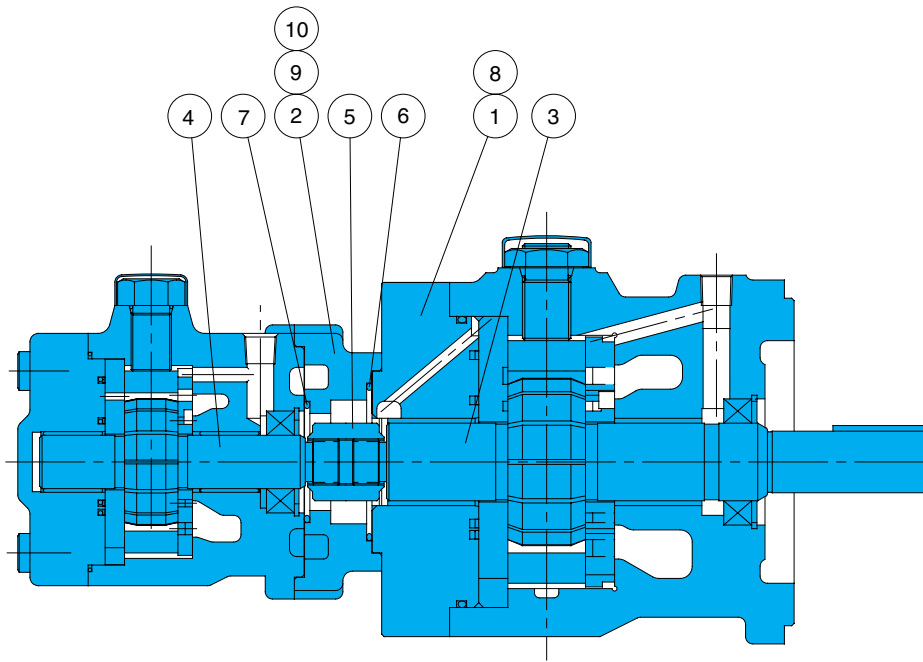
Seal Component Table (VDC-3*)

Part No.	Applicable Pump Model No.	VDC-3A(B)*-20	
	Seal Kit Number	VCBS-103B00	
	Part Name	Part Number	Q'ty
23	Oil seal	TCN-385811	1
24	O-ring	1A-G130	1
25	O-ring	AS568-154(Hs90)	1
26	O-ring	AS568-151(Hs90)	1
27	O-ring	1A-G40	2
28	O-ring	1A-P22	1
29	O-ring	1A-P9	2
30	O-ring	1A-P7	2
31	O-ring	1A-P7	2
52	O-ring	1A-P14	1
53	O-ring	1B-P6(Hs90)	3

Note) 1. Oil seals are manufactured by Nippon Oil Seal Industry Co. Ltd. (NOK).
2. O-ring 1A-** refers to JIS B2401-1A-**.

Part No.	Part Name	Part No.	Part Name
1	Body (1)	17	Nut
2	Body (2)	18	Nut
3	Mounting	19	Key
4	Cover (1)	20	Pin
5	Cover (2)	21	Holder
6	Shaft	22	Orifice
7	Ring	23	Oil seal
8	Vane	24	O-ring
9	Plate (S)	25	O-ring
10	Plate (H)	26	O-ring
11	Piston (1)	27	O-ring
12	Piston (2)	28	O-ring
13	Bearing	29	O-ring
14	Spring	30	O-ring
15	Thrust screw	31	O-ring
16	Screw	32	Cap
		33	Snap ring
		34	Screw
		35	Screw
		36	Screw
		37	Screw
		38	Screw (stopper)
		39	Screw
		40	Plug
		41	Washer
		42	Nameplate
		43	Pole
		44	Valve body
		45	Spool
		46	Holder
		47	Plunger
		48	Spring
		49	Retainer
		50	Screw
		51	Nut
		52	O-ring
		53	O-ring
		54	Plug
		55	Plug
		56	Screw

VDC Series
Double Pump



Part No.	Part Name
1	Body (2)
2	Body (3)
3	Shaft (S)
4	Shaft (H)
5	Joint
6	O-ring
7	O-ring
8	Screw
9	Screw
10	Screw

Note)
In the case of a double pump, use single pump parts in addition to the 10 parts listed above.

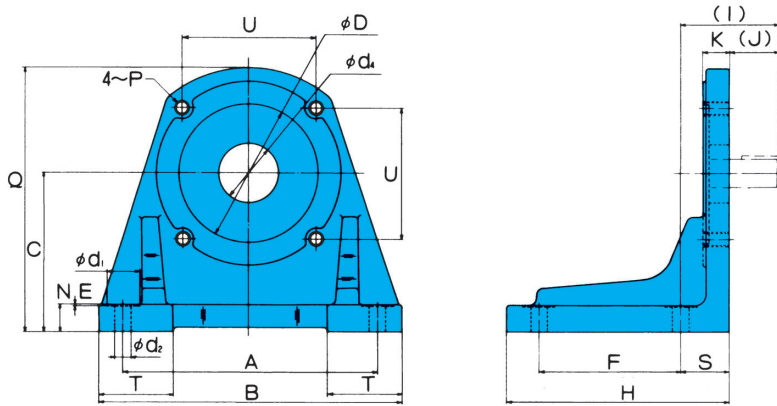
List of Sealing Parts

Part No.	Part Name	VDC-11A-*-*-20		VDC-12A-*-*-20		VDC-22A-*-*-20		VDC-13A-*-*-20	
		Part Number	Q'ty	Part Number	Q'ty	Part Number	Q'ty	Part Number	Q'ty
6	O-ring	—		1A-G60	1	1A-G60	1	—	
7	O-ring	1A-G85	1	1A-G45	1	1A-G60	1	1A-G85	1

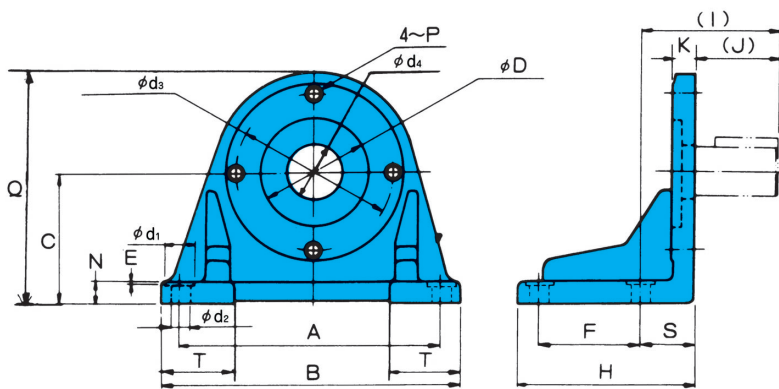
Note)
1. See the description of the single pump for seal parts that are not included in the list.
2. O-ring 1A-** refers to JIS B2401-1A-**.

Foot Mounting Installation Measurement Chart

For VDC-11A and VDC-*2A



For VDC-3A and VDC-13A

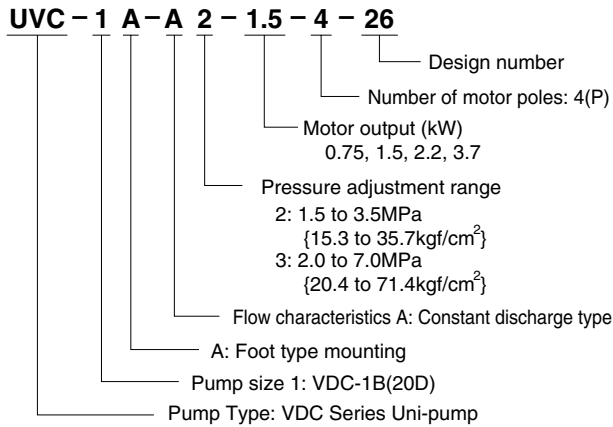


Foot Mounting Kit Model No.	Applicable Pump Model No.	Accessories				Dimensions (mm)					
		Bolt	Q'ty	Washer	Q'ty	A	B	C	E	F	H
VCM-11-20	VDC-11	TH-10 × 30	4	WS-B-10	4	171.45	204	107.95	1	95.25	150
VCM-22-20	VDC-12 VDC-22	TH-12 × 35	4	WS-B-12	4	235	267	139.7	1	127	193
IHM-45-10	VDC-3 VDC-13	TB-16 × 40	2	WP-16	2	295.3	334	152.4	1	139.7	203

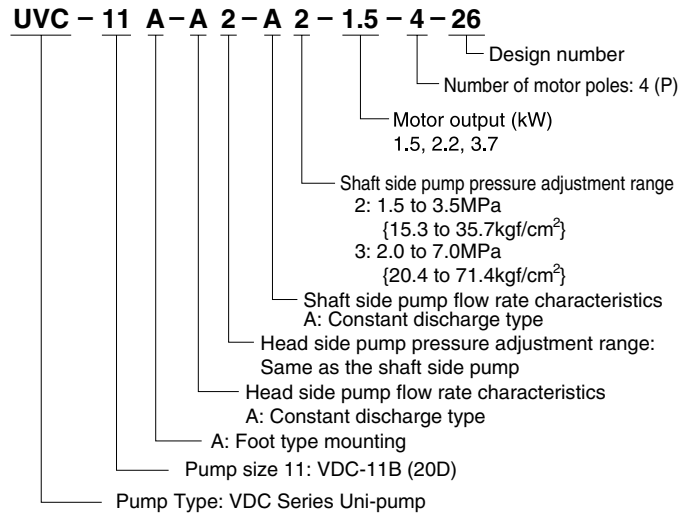
Foot Mounting Kit Model No.	Dimensions (mm)														Weight kg
	I	(J)	K	N	P	Q	S	T	U	φ D	φ d ₁	φ d ₂	φ d ₃	φ d ₄	
VCM-11-20	66.5	33	18	18	M10	180	32.5	50	90	95.02	22	11	—	40	6.5
VCM-22-20	84.5	40	20	20	M12	232	44.5	57.5	124	135	22	14	—	40	12.0
IHM-45-10	104.5	60	25	25	M16	259	44.5	61	—	127	35	18	181	86	13.5

Uni-pump Specifications

Single Pump



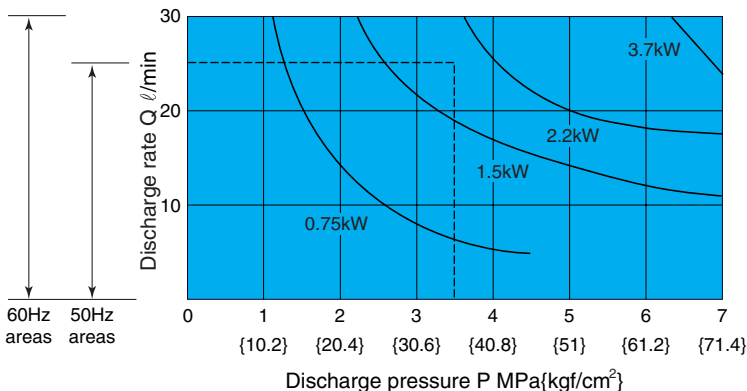
Double Pump



Specifications

Model No.	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Flow Rate ℓ/min	
		50Hz	60Hz
UVC- 1A	7{71.4}	25	30
UVC-11A	7{71.4}	25-25	30-30

Motor selection curves



● Selecting a motor

The area under a motor output curve in the graph to the left is the operating range for that motor under the rated output for that motor.

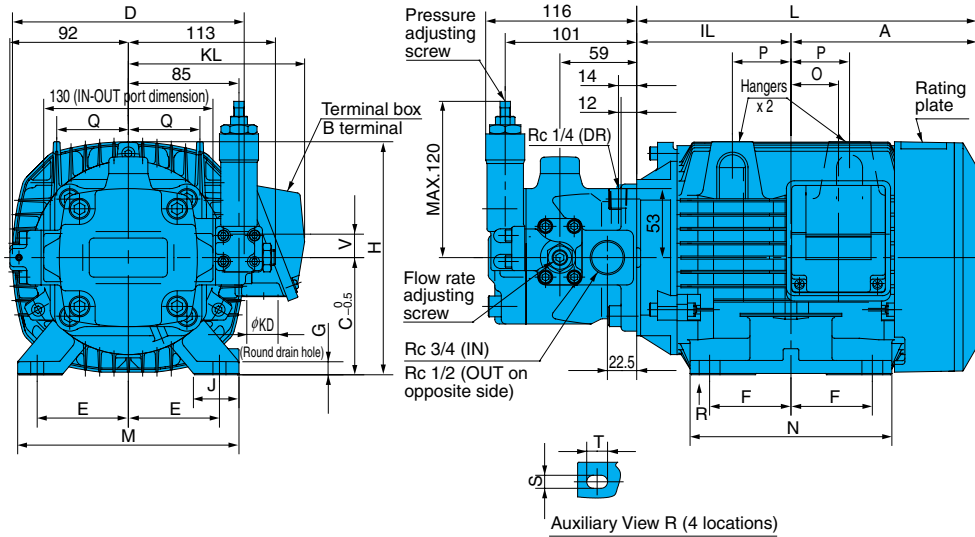
Example:

To find the motor that can produce pressure of 3.5MPa and a discharge rate of 25.0 ℓ/min.

Selection Process

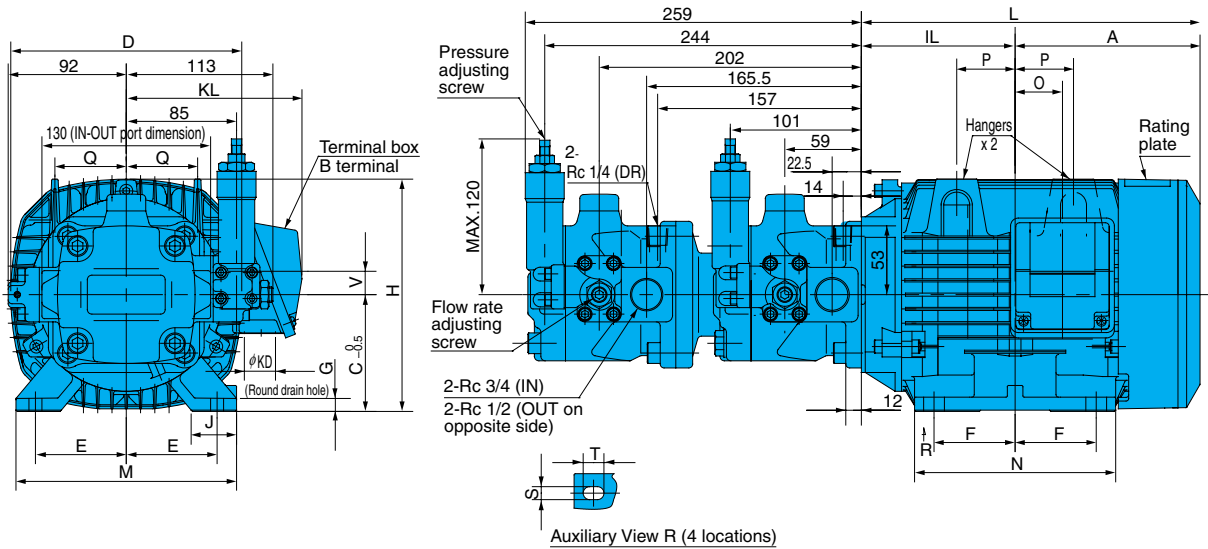
Since the intersection of the two broken lines from a pressure of 3.5MPa and discharge rate of 25.0 ℓ/min intersect in the area under the 2.2kW curve, it means that a 2.2kW motor should be used. In the case of a double pump configuration, select a motor that is larger than the total power required by both pumps.

Installation Dimension Drawings
UVC-1A

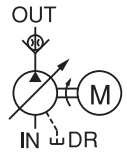


Uni-pump	Motor Dimensions mm																		Frame No.	Output kW (4 poles)	Weight kg	
	A	IL	C	D	E	F	G	H	J	L	M	N	S × T	KD	KL	O	P	Q				V
UVC-1A-A2-0.75-4-26	124	105	80	160	62.5	50	10	160	34	229	155	135	10×25	φ22	126	21	—	—	16.5	80M	0.75	21.5
UVC-1A-A2-1.5-4-26	142.5	118.5	90	178	70	62.5	10	179	35	261	170	155	10×16	φ22	136	36.5	45	55	18	90L	1.5	25.5
UVC-1A-A3-1.5-4-26																						
UVC-1A-2A2-1.5-4-26	160.5	133	100	195	80	70	13	197.5	45	293.5	195	175	12×25	φ22	150	45.5	50	55	22	100L	2.2	29.5
UVC-1A-A2-2.2-4-26																						
UVC-1A-A3-2.2-4-26	171	140	112	219	95	70	14	221.5	45	311	224	175	12×25	φ22	161	53	55	66	22	112M	3.7	38.5
UVC-1A-2A2-2.2-4-26																						
UVC-1A-A3-3.7-4-26	171	140	112	219	95	70	14	221.5	45	311	224	175	12×25	φ22	161	53	55	66	22	112M	3.7	38.5
UVC-1A-A4-3.7-4-26																						
UVC-1A-2A2-3.7-4-26																						
UVC-1A-2A3-3.7-4-26																						

UVC-11A



Uni-pump	Motor Dimensions mm																		Frame No.	Output kW (4 poles)	Weight kg	
	A	IL	C	D	E	F	G	H	J	L	M	N	S × T	KD	KL	O	P	Q				V
UVC-11A-A2-A2-1.5-4-26	142.5	118.5	90	178	70	62.5	10	179	35	261	170	155	10×16	φ22	136	36.5	45	55	18	90L	1.5	36
UVC-11A-A3-A3-1.5-4-26																						
UVC-11A-A2-A2-2.2-4-26	160.5	133	100	195	80	70	13	197.5	45	293.5	195	175	12×25	φ22	150	45.5	50	55	22	100L	2.2	40
UVC-11A-A3-A3-2.2-4-26																						
UVC-11A-2A2-2A2-2.2-4-26	171	140	112	219	95	70	14	221.5	45	311	224	175	12×25	φ22	161	53	55	66	22	112M	3.7	49
UVC-11A-A2-A2-3.7-4-26																						
UVC-11A-A2-A3-3.7-4-26	171	140	112	219	95	70	14	221.5	45	311	224	175	12×25	φ22	161	53	55	66	22	112M	3.7	49
UVC-11A-A3-A3-3.7-4-26																						
UVC-11A-2A2-2A2-3.7-4-26																						
UVC-11A-2A2-2A3-3.7-4-26																						



UVN Series Variable Volume Vane Uni-pump

3 to 16cm³/rev
8MPa{81.6kgf/cm²}

Features

1. Energy efficient high performance

All the performance of a vane pump, right from the low pressure range, is enhanced even further by eliminating the external drain and optimizing the pressure balance, creating a design that generates little heat.

The result is a pump that contributes to the energy efficiency of the mother machine, as

well as to process precision.

2.Lightweight, compact design

The pump and motor are designed for exclusive uni-pump use, making them lightweight, compact, easy to handle, and suitable for a wide range of applications.

3.Low noise, long life

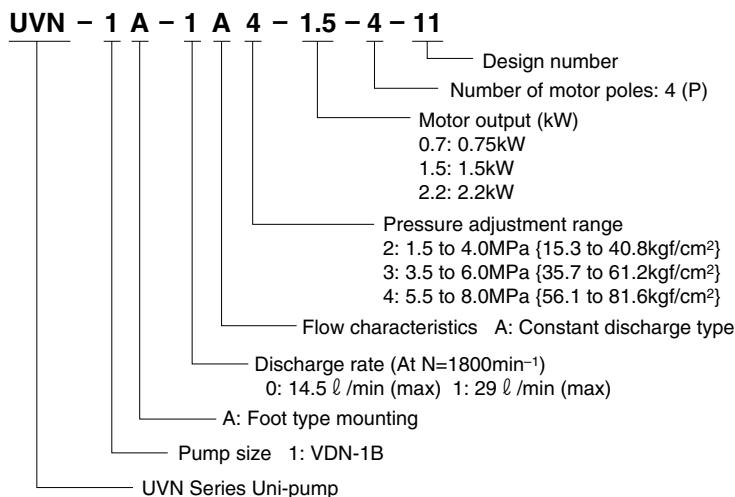
The pump and motor shaft are linked by a joint, which minimizes noise by eliminating the effects of shaft vibration and an off-center shaft. The coupling is constructed to allow constant lubrication, for friction-free long life.

Specifications

Model No.	Pump Capacity cm ³ /rev	Pressure Adjustment Range MPa{kgf/cm ² }	No-load Discharge Rate ℓ/min	
			50Hz	60Hz
UVN-1A-0A2 ^{0.7} _{1.5} -4-11	8.1	1.5 to 4.0 {15.3 to 40.8}	12	14.5
UVN-1A-0A3 ^{0.7} _{1.5} -4-11		3.5 to 6.0 {35.7 to 61.2}		
UVN-1A-0A4 ^{0.7} _{1.5} -4-11		5.5 to 8.0 {56.1 to 81.6}		
UVN-1A-1A2 ^{1.5} _{2.2} -4-11	16.1	1.5 to 4.0 {15.3 to 40.8}	24	29
UVN-1A-1A3 ^{1.5} _{2.2} -4-11		3.5 to 6.0 {35.7 to 61.2}		
UVN-1A-1A4 ^{1.5} _{2.2} -4-11		5.5 to 8.0 {56.1 to 81.6}		

Note)
Contact your agent for combinations other than those noted above.

Understanding Model Numbers



● Handling

1.Installation and Piping Precautions

- ① Provide a mounting base of sufficient rigidity, and install so that the pump shaft is oriented horizontally.
- ② Make sure the flow rate of the suction piping is no more than 2m/s, and that the suction pressure at the pump suction port is in the range of -0.03 to +0.03MPa.
- ③ Drain piping must be direct piping up to

a point that is below the tank fluid level, and back pressure due to pipe resistance should not exceed 0.01MPa.

Provide a suction strainer with a filtering grade of about 100 μm (150 mesh).

2.Running Precautions

- ① The direction of rotation is clockwise (rightward) when viewed from the motor fan side.
- ② At startup, repeat the inching opera-

tion (start-stop) with the pump discharge side at no-load to bleed air from the pump and suction piping.

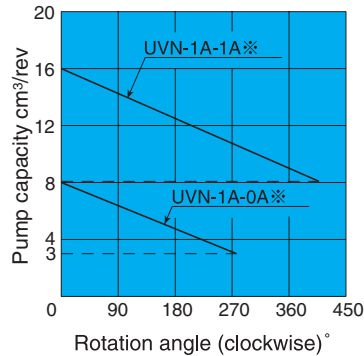
- ③ Equip an air bleed valve in circuits where it is difficult to bleed air before startup.
- ④ Make sure the maximum peak pressure (setting pressure + surge pressure) during operation does not exceed 14MPa.

3. Management of Hydraulic Operating Fluid

- ① Use only good-quality hydraulic operating fluid with a kinematic viscosity at a fluid temperature of 40°C within the range of 30 to 50mm²/sec (30 to 50cSt). Normally, you should use an R&O type and wear-resistant type of ISO VG32 or 46, or equivalent.
- ② The operating temperature range is 15 to 60°C. When the oil temperature at startup is 15°C or less, perform a warm-up operation at low pressure until the oil temperature reaches 15°C. Use the pump in an area where the temperature is within the range of 10 to 35°C.
- ③ For the return line to the tank, use a 25μm line filter.
- ④ Manage hydraulic operating fluid so contamination is maintained at class NAS10 or lower. Take care to avoid contamination with water, foreign matter, and other oil, and watch out for discoloration.

4. Setting the Pressure and Discharge Rate

- ① When adjusting pressure, pressure is increased by clockwise (rightward) rotation of the adjusting screw and decreased by counterclockwise (leftward) rotation. After adjustment is complete, securely tighten the lock nut.
- ② When adjusting the discharge rate, the rate is decreased by clockwise (rightward) rotation of the adjusting screw and increased by counterclockwise (leftward) rotation. The graph below provides general guidelines for the relationship between



the rotation angle of the flow rate adjusting screw and the no-load discharge rate. After adjustment is complete, securely tighten the lock nut.

③ Factory Default P-Q Settings (Standard Model)

- Flow Rate Setting = Maximum flow rate for model as indicated in the catalog
- Pressure Setting = Pressure shown in table below

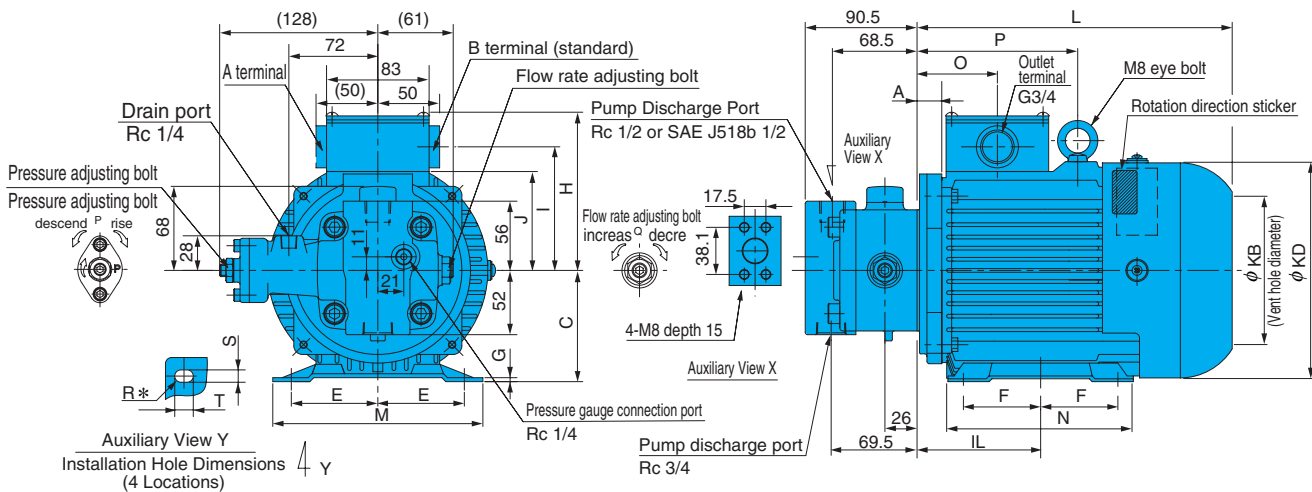
Factory Default Pressure Settings MPa(kgf/cm ²)
2 : 3.5 (35.7)
3 : 5.0 (51.0)
4 : 7.0 (71.4)

- ④ The thrust screw is precision adjusted at the factory during assembly. Never touch the thrust screw.

Note)
The values indicated above are at maximum pump discharge volume with the flow volume adjusting screw at the 0° position. The broken lines show the flow volume adjustment range lower limit value.

Installation Dimensions

Installation method is the same as design number 10D (old design).



Model No.	Output - Poles (kW-4P)	Motor Dimensions mm (mm)																	Weight kg	
		A	IL	C	φKD	E	F	G	H	J	L	M	N	T×S	R*	φKB	O	P		I
UVN-1A-A*0.7-4-11	0.75-4	20	90	80	157	62.5	50	2.3	120	72	230	155	120	15×10	R5	110	65	130	92	17
UVN-1A-A*1.5-4-11	1.5-4	20	100	90	175	70	62.5	3.2	128	80	255	170	150	15×10	R5	120	65	130	100	21
UVN-1A-A*2.2-4-11	2.2-4	20	110	100	195	80	70	3.2	138	90	285	200	165	17×12	R6	134	65	135	110	26

Performance Curves

UVN-1A-*A*-4-11
 Operating Fluid : ISO VG 32
 Oil temperature : 40°C

Motor selection curves

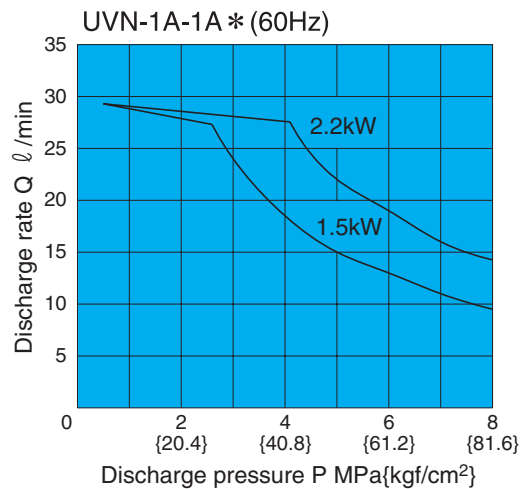
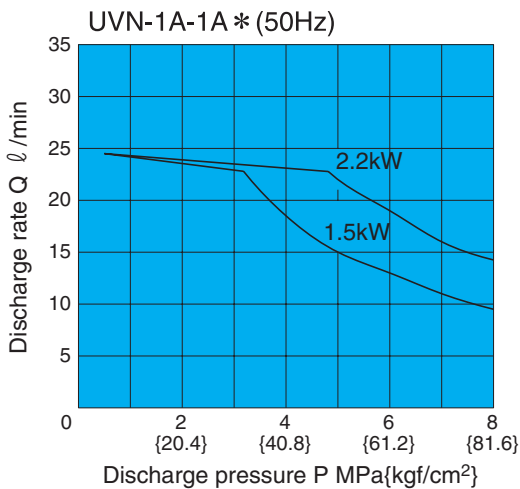
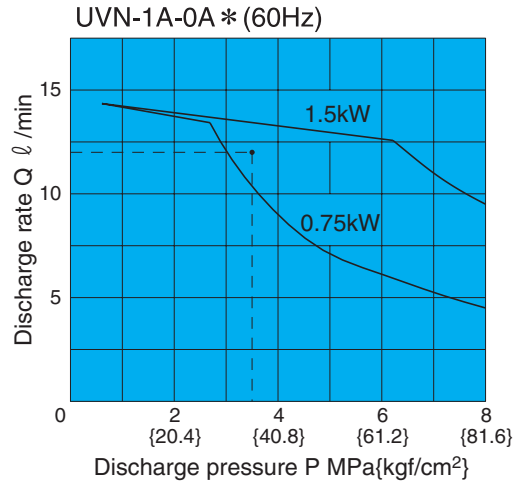
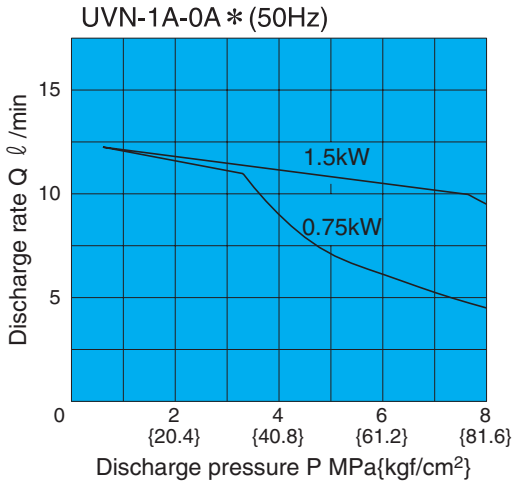
The area under a motor output curve in the graph below is the operating range for that motor under the rated output for that motor.

Example:

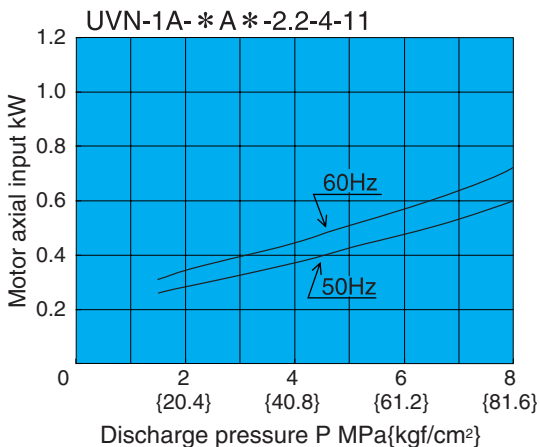
To find the motor that can produce pressure of 3.5MPa and a discharge rate of 12 ℓ/min.

Selection Process

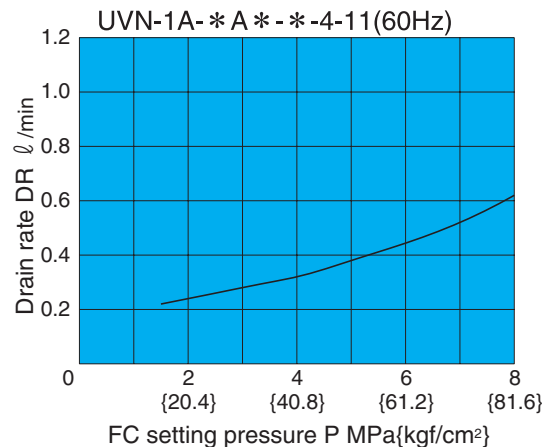
Since the intersection of the two broken lines from a pressure of 3.5MPa and discharge rate of 12 ℓ/min intersect in the area under the 1.5kW curve, it means that a 1.5kW motor should be used.

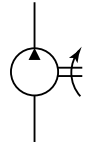


Motor Power Loss at Full Cutoff



DR Volume a Full Cutoff





IPH Series IP Pump

3.6 to 125.9cm³/rev
30MPa

❖ This is a new design series in which all pump types are installation compatible with previous designs. Note, however, that there is no longer compatibility for some of the seal components between the IPH-3 and IPH-4 sizes and design numbers 10 and 12.

Features

- ① A patented axial and radial pressure loading system provides high efficiency and generates pressures up to 30MPa {306kgf/cm²}.
- ② Outstanding durability and very long life.
- ③ A modified involute short-tooth gear enables internal gearing for greatly reduced pulsation and noise, and exceptionally quiet operation.
- ④ A simple structure makes maintenance and inspection easier.

Specifications

Model No.	Capacity cm ³ /rev	Rated Voltage MPa	Maximum Operating Pressure MPa{kgf/cm ² }	Minimum Revolution Speed min ⁻¹	Maximum Revolution Speed min ⁻¹	Weight kg	
						Type A	Type B
IPH-2A(B)- 3.5-11	3.60	25 {255}	30 {306}	600	2000	4.4	2.4
	5					4.5	2.5
	6.5					4.6	2.6
	8					4.8	2.8
IPH-3A(B)- 10-20	10.2	25 {255}	30 {306}	600	2000	10.5	4.8
	13					10.7	5.0
	16					11.0	5.3
IPH-4A(B)- 20-20	20.7	25 {255}	30 {306}	500	2000	15.2	9.5
	25					15.7	10.0
	32					16.2	10.5
IPH-5A(B)- 40-21(11)	40.8	25 {255}	30 {306}	400	2000	32.0	19.0
	50					33.0	20.0
	64					34.0	21.0
IPH-6A(B)- 80-21(11)	81.3	25 {255}	30 {306}	300	2000	62.0	39.0
	100					64.0	41.0
	125					66.0	43.0

- Note)
- 1.Capacity: Logical discharge rate per rotation.
 - 2.Suction Pressure: +0.03 to +0.3MPa {−0.3 to +0.3kgf/cm²}
 - 3.Maximum working pressure shown here is the pressure limit when there are frequent pressure changes.
 - 4.Avoid installation with the suction port towards the bottom of the pump.
 - 5.Specify using the model number format shown below when pipe flanging is required.

● Handling

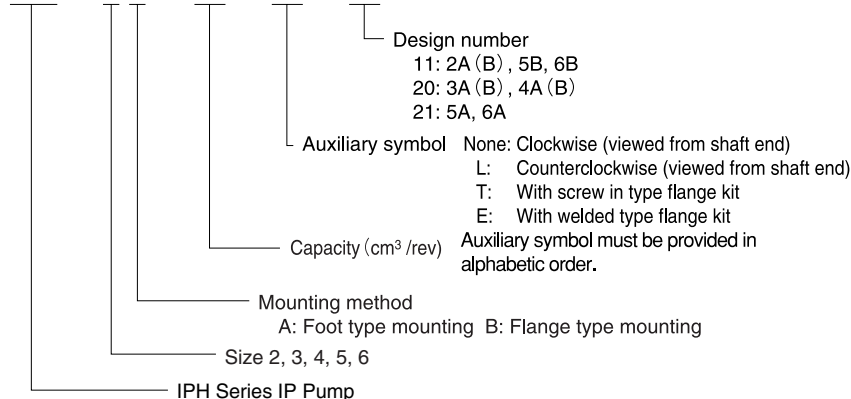
- ① For the hydraulic operating fluid, use an R&O type and wear-resistant type of ISO VG32 to 68 or equivalent (viscosity index of at least 90). Use hydraulic operating fluid that provides kinematic viscosity during operation in the range of 20 to 150mm²/s.
- ② The operating temperature range is 5 to 65°C. When the oil temperature at

startup is 5°C or less, perform a warm-up operation at low pressure until the oil temperature reaches 5°C. Use the pump in an area where the temperature is within the range of 0 to 60°C.

- ③ Suction pressure is -0.03 to +0.03MPa (-0.3 to +0.3kgf/cm²), and the suction port flow rate should be to greater than 2m/sec.
- ④ Avoid pulley, gear, and other drive systems that impart a radial or thrust load on the end of the pump shaft.
- ⑤ Mount the hydraulic pump so its pump shaft is oriented horizontally. Provide a suction strainer with a filtering grade of about 100μm (150 mesh). For the return line to the tank, use a 25μm line filter.
- ⑥ Manage hydraulic operating fluid so contamination is maintained at class NAS10 or lower. Take care to avoid contamination with water and other foreign matter, and watch out for discoloration. Whitish fluid indicates that air has contaminated the fluid, and brownish fluid indicates the fluid is dirty.

Understanding Model Numbers

IPH - 4 B - 25 - LT - 20



(Continued on following page)

- 7 When using water- or glycol-based hydraulic operating fluid, refer to page O-3 for details on applicable models of hydraulic pumps.
- 8 At startup, repeat the inching operation (start-stop) to bleed air from the pump and pipes.
- 9 Equip an air bleed valve in circuits

- where it is difficult to bleed air before startup. See page C-13 for more information.
- 10 To ensure proper lubrication of the pump's rubbing surfaces, supply oil to the interior of the pump before starting operation.
- 11 When centering the pump shaft,

- eccentricity with the motor shaft should be no greater than 0.05mm. Use a pump mounting base of sufficient rigidity. The angle error should be no greater than 1°.
- 12 Contact your agent for information about engines.

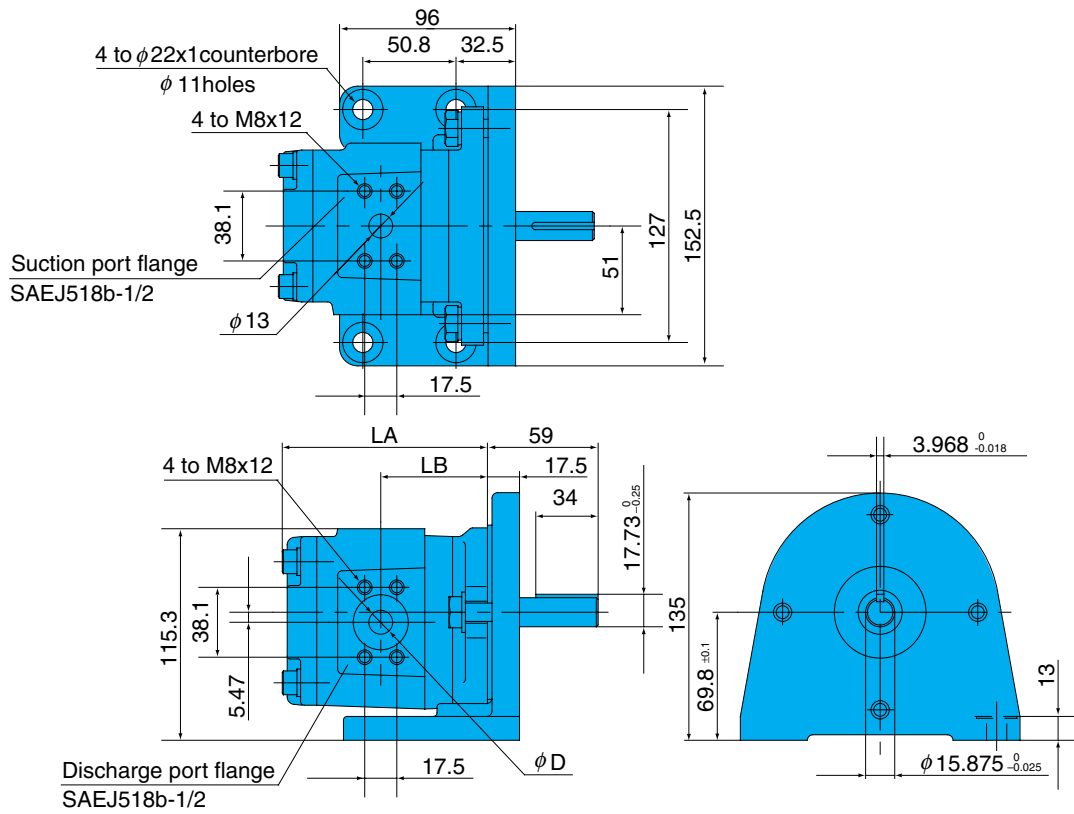
Discharge Rate and Required Input for Each Pump Speed

Speed	Pressure MPa Model No.	Discharge Rate l/min						Required Input kW					
		0.7	7	14	21	25	30	0.7	7	14	21	25	30
1000 min^{-1}	IPH-2A(B)- 3.5-11 5 6.5 8	3.60 5.24 6.55 8.18	3.49 5.09 6.37 7.95	3.39 4.93 6.19 7.74	3.28 4.78 6.03 7.54	3.23 4.70 5.93 7.40	3.15 4.60 5.82 7.26	0.09 0.12 0.16 0.19	0.62 0.79 0.97 1.19	1.12 1.47 1.82 2.24	1.63 2.26 2.79 3.45	1.93 2.63 3.25 4.01	2.30 3.19 3.95 4.86
	IPH-3A(B)- 10-20 13 16	10.2 13.3 15.8	9.95 13.0 15.4	9.71 12.7 15.1	9.47 12.4 14.8	9.23 12.3 14.6	9.17 12.1 14.3	0.25 0.32 0.37	1.59 2.02 2.37	2.73 3.57 4.23	4.25 5.35 6.35	5.06 6.29 7.47	6.14 7.73 9.19
	IPH-4A(B)- 20-20 25 32	20.7 25.7 32.3	20.2 25.2 31.6	19.8 24.7 31.0	19.3 24.2 30.4	19.1 23.9 30.1	18.8 23.6 29.6	0.50 0.61 0.75	3.13 3.79 4.71	5.56 6.89 8.67	8.24 10.3 12.8	9.80 12.1 15.3	11.7 14.6 18.4
	IPH-5A(B)- 40-21(11) 50 64	40.8 50.3 63.9	39.9 49.3 62.6	39.0 48.4 61.4	38.1 47.3 60.2	37.6 46.8 59.5	37.0 46.2 58.6	0.99 1.20 1.49	6.18 7.42 9.32	10.9 13.6 17.2	16.3 20.1 25.5	19.3 23.8 30.6	23.8 28.6 36.3
	IPH-6A(B)- 80-21(11) 100 125	81.3 101.6 125.9	79.5 99.6 123.4	77.7 97.7 121.1	76.0 95.8 118.7	75.1 94.6 117.2	73.8 93.2 115.6	1.98 2.42 2.94	11.8 14.6 17.8	21.8 27.3 33.9	32.3 40.5 50.1	38.4 48.1 59.6	46.7 57.7 71.5
1200 min^{-1}	IPH-2A(B)- 3.5-11 5 6.5 8	4.32 6.28 7.86 9.81	4.20 6.12 7.67 9.58	4.08 5.95 7.48 9.34	3.97 5.79 7.29 9.11	3.91 5.70 7.18 8.97	3.83 5.58 7.05 8.81	0.11 0.15 0.19 0.23	0.66 0.95 1.16 1.44	1.23 1.77 2.19 2.70	1.83 2.62 3.24 4.00	2.15 3.09 3.81 4.70	2.61 3.74 4.63 5.71
	IPH-3A(B)- 10-20 13 16	12.2 15.9 18.9	11.9 15.9 18.5	11.7 15.3 18.2	11.4 15.0 17.8	11.3 14.8 17.6	11.1 14.6 17.4	0.30 0.39 0.45	1.86 2.37 2.77	3.28 4.28 5.09	4.93 6.42 7.63	5.93 7.56 8.98	7.20 9.28 11.1
	IPH-4A(B)- 20-20 25 32	24.8 30.8 38.7	24.3 30.3 38.1	23.8 29.8 37.4	23.4 29.3 36.8	23.1 29.0 36.3	22.8 28.6 35.9	0.62 0.75 0.92	3.76 4.56 5.66	6.67 8.27 10.4	9.88 12.3 15.5	11.8 14.7 18.4	14.2 17.5 22.0
	IPH-5A(B)- 40-21(11) 50 64	48.9 60.3 76.6	48.0 59.3 75.3	47.1 58.3 74.0	46.1 57.3 72.8	45.5 56.6 72.0	44.9 56.0 71.2	1.22 1.47 1.83	7.42 8.91 11.2	13.2 16.2 20.6	19.5 24.0 30.5	23.1 28.6 36.3	28.4 34.3 43.5
	IPH-6A(B)- 80-21(11) 100 125	97.5 121.9 151.0	95.7 119.7 148.4	93.8 117.7 145.9	91.9 115.8 143.4	90.9 114.5 141.9	89.5 113.1 140.3	2.42 2.96 3.60	14.3 17.5 21.5	26.2 32.3 40.1	38.7 48.4 60.1	46.2 57.7 71.6	56.1 69.2 85.9
1500 min^{-1}	IPH-2A(B)- 3.5-11 5 6.5 8	5.40 7.86 9.82 12.3	5.25 7.65 9.59 11.9	5.10 7.44 9.35 11.6	4.97 7.24 9.12 11.4	4.89 7.11 8.97 11.2	4.79 6.97 8.82 11.0	0.14 0.20 0.25 0.30	0.96 1.17 1.49 1.78	1.68 2.21 2.73 3.37	2.46 3.31 4.09 5.05	2.89 3.85 4.76 5.87	3.46 4.69 5.78 7.14
	IPH-3A(B)- 10-20 13 16	15.3 19.9 23.7	14.9 19.5 23.2	14.6 19.1 22.7	14.3 18.8 22.3	14.1 18.6 22.1	13.9 18.3 21.8	0.40 0.51 0.59	2.31 2.95 3.46	4.15 5.41 6.42	6.22 8.03 9.53	7.40 9.44 11.2	8.99 11.6 13.8
	IPH-4A(B)- 20-20 25 32	31.0 38.5 48.4	30.4 37.8 47.6	29.8 37.2 46.8	29.3 36.6 45.9	28.9 36.1 45.4	28.4 35.7 44.9	0.81 0.98 1.20	4.70 5.69 7.07	8.33 10.4 13.1	12.4 15.4 19.3	14.7 18.3 22.9	17.6 21.9 27.5
	IPH-5A(B)- 40-21(11) 50 64	61.2 75.4 95.8	60.0 74.1 94.2	58.8 72.8 92.5	57.6 71.6 91.0	56.9 70.8 90.0	56.2 70.0 89.0	1.59 1.91 2.38	9.51 11.4 14.4	16.6 20.5 26.0	24.7 30.4 38.6	29.3 36.1 45.9	36.0 43.3 55.1
	IPH-6A(B)- 80-21(11) 100 125	121.9 152.4 188.8	119.5 149.7 185.5	117.3 147.3 182.5	115.0 144.7 179.3	113.5 143.2 177.5	111.9 141.5 175.3	3.16 3.86 4.69	18.3 22.5 27.5	33.1 41.4 51.3	49.0 61.4 76.0	58.4 73.0 90.4	70.9 87.6 108.1
1800 min^{-1}	IPH-2A(B)- 3.5-11 5 6.5 8	6.48 9.43 11.7 14.7	6.33 9.21 11.5 14.4	6.16 8.99 11.2 14.1	6.01 8.76 11.0 13.7	5.92 8.61 10.9 13.6	5.82 8.46 10.7 13.3	0.17 0.24 0.30 0.37	1.16 1.45 1.78 2.20	2.02 2.65 3.27 4.04	2.95 3.47 4.92 6.06	3.46 4.62 5.71 7.05	4.15 5.61 6.93 8.56
	IPH-3A(B)- 10-20 13 16	18.3 23.9 28.4	18.0 23.5 27.9	17.6 23.1 27.5	17.3 22.7 27.0	17.1 22.5 26.7	16.8 22.2 26.4	0.49 0.62 0.72	2.90 3.67 4.30	5.04 6.57 7.80	7.47 9.63 11.4	8.89 11.3 13.5	10.8 13.9 16.5
	IPH-4A(B)- 20-20 25 32	37.2 46.2 58.1	36.6 45.6 57.3	36.0 44.9 56.5	35.4 44.3 55.5	35.0 43.8 55.1	34.5 43.3 54.5	0.99 1.20 1.48	5.64 6.83 8.47	10.0 12.4 15.6	14.9 18.5 23.1	17.6 21.9 27.5	21.2 26.3 33.0
	IPH-5A(B)- 40-21(11) 50 64	73.4 90.5 115.0	72.1 89.2 113.4	70.9 87.9 111.6	69.7 86.6 110.0	69.0 85.9 109.1	68.1 85.0 108.0	1.95 2.34 2.92	11.7 14.1 17.6	20.2 24.9 31.6	30.0 36.9 46.8	35.6 43.8 55.7	43.7 52.6 66.9
	IPH-6A(B)- 80-21(11) 100 125	146.3 182.8 226.6	143.7 180.2 223.3	141.4 177.6 220.1	139.0 174.9 216.9	137.5 173.5 215.0	135.8 171.7 212.7	3.88 4.74 5.75	22.4 27.7 33.8	40.2 50.3 62.2	59.6 74.4 92.3	70.9 88.6 110.0	86.1 106.0 131.5

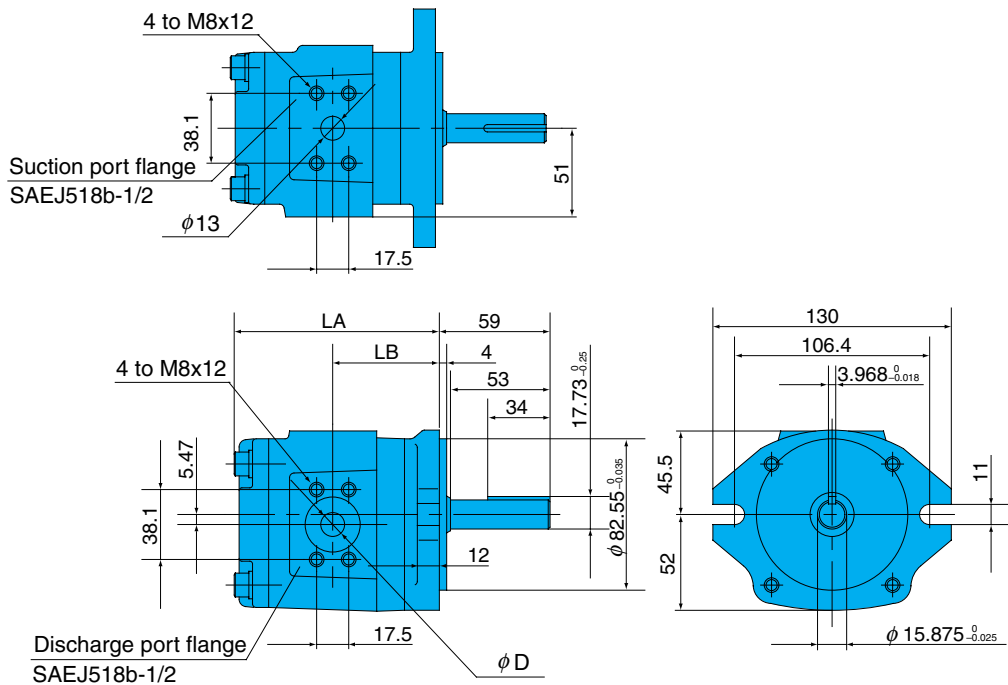
Note) Values in the table are general values at an operating fluid viscosity of 46mm²/s. Use the values when selecting the model for your needs.

Installation Dimension Drawings

IPH-2A-*-11 (Foot Mounting, Clockwise Rotation)



IPH-2B-*-11 (Flange Mounting, Clockwise Rotation)

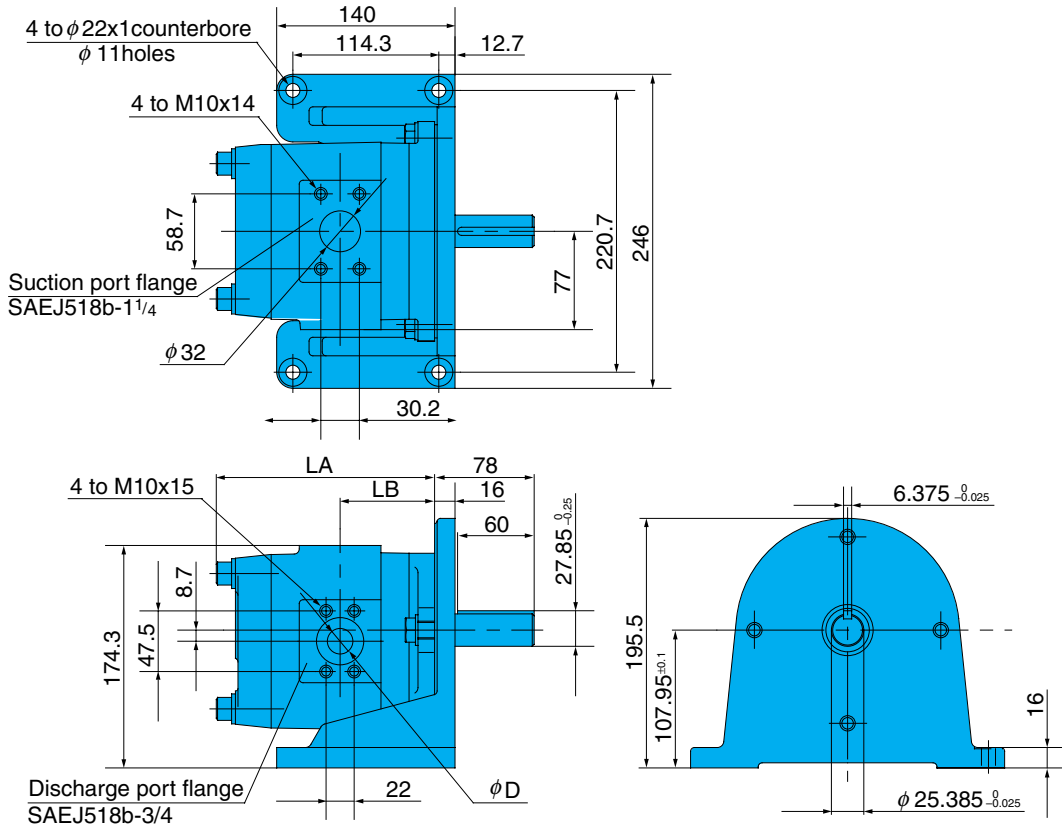


Model No.	Dimensions (mm)		
	LA	LB	φD
IPH-2*-3.5-*-11	107	51.0	8.9
IPH-2*-5-*-11	112	53.5	11
IPH-2*-6.5-*-11	116	55.5	12
IPH-2*-8-*-11	121	58.0	13

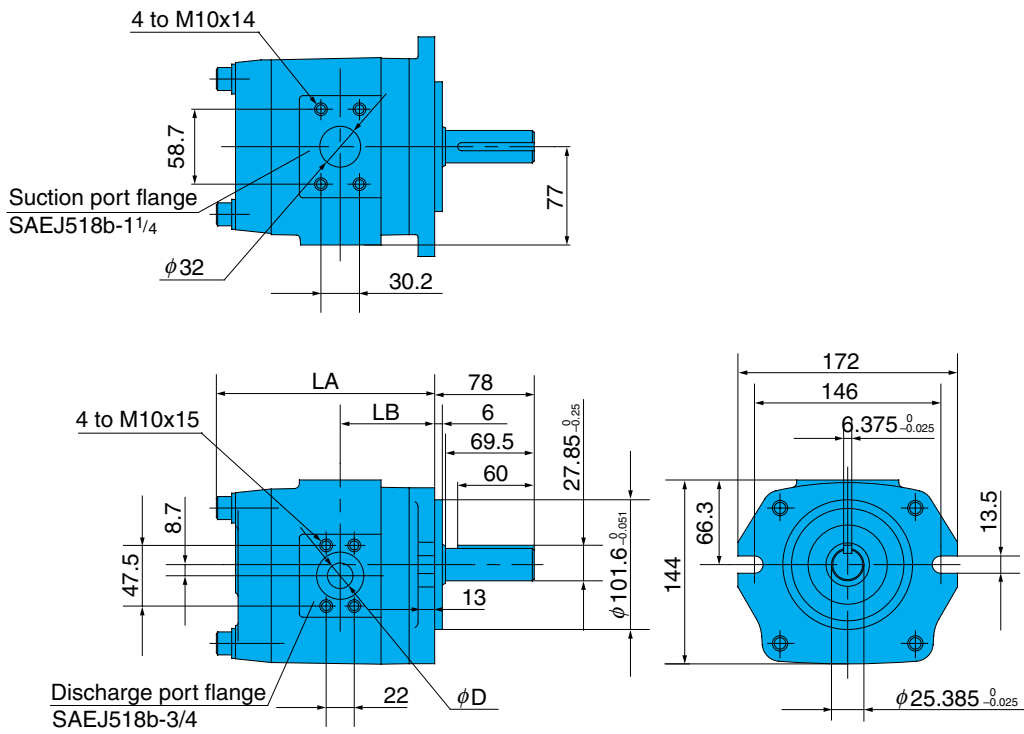
Note) IPH-2A (B)-*-L-11 (foot mounting/flange mounting, counterclockwise rotation) are the mirror image of the drawings shown above. In the case the suction port flange is facing upwards, the discharge port flange is positioned to the right when viewed from the shaft side.



IPH-4A-*-20 (Foot Mounting, Clockwise Rotation)



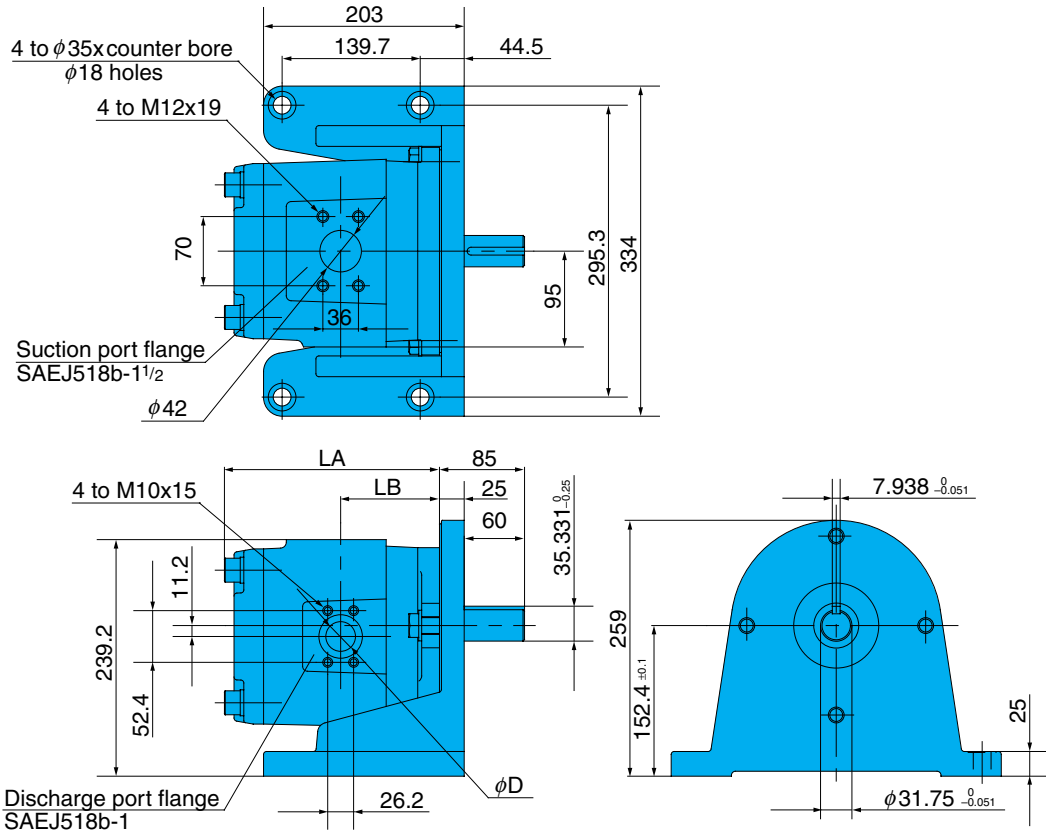
IPH-4B-*-20 (Flange Mounting, Clockwise Rotation)



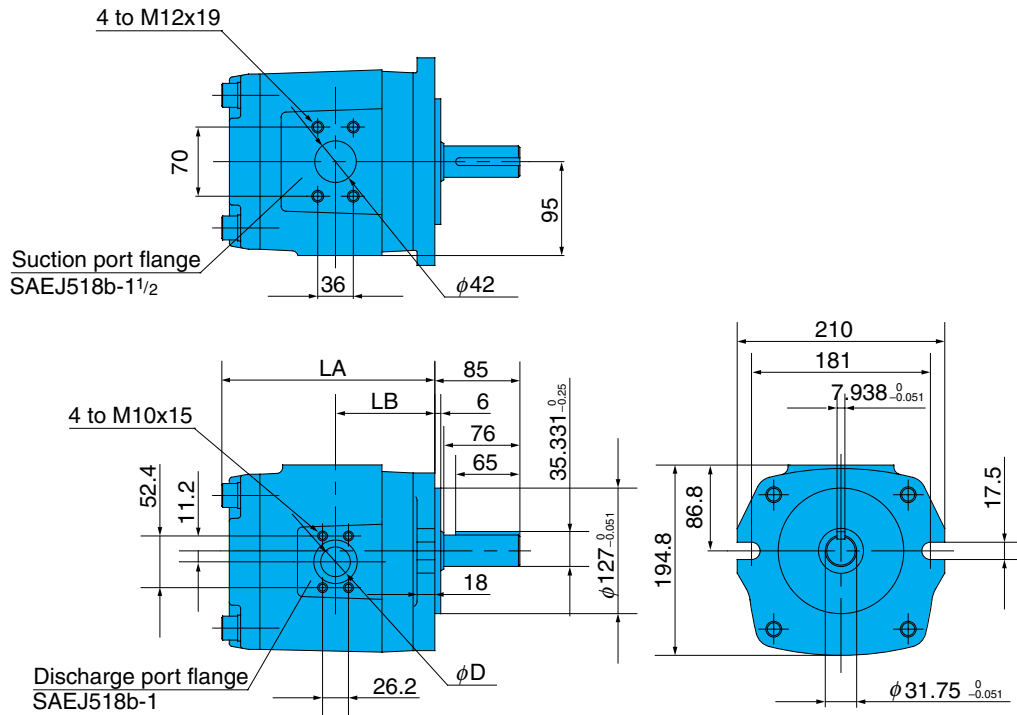
Model No.	Dimensions (mm)		
	LA	LB	φD
IPH-4*-20-*-20	164.5	71	18
IPH-4*-25-*-20	170.5	74	20
IPH-4*-32-*-20	178.5	78	24

Note) IPH-4A (B)-*-L-20 (foot mounting/flange mounting, counterclockwise rotation) are the mirror image of the drawings shown above. In the case the suction port flange is facing upwards, the discharge port flange is positioned to the right when viewed from the shaft side.

IPH-5A-*-21 (Foot Mounting, Clockwise Rotation)



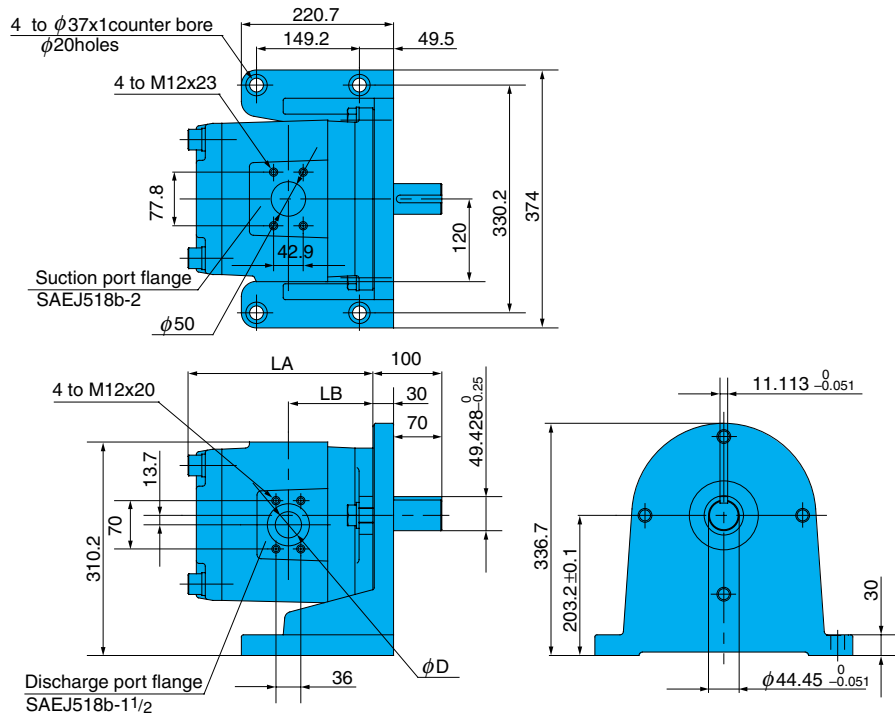
IPH-5B-*-11 (Flange Mounting, Clockwise Rotation)



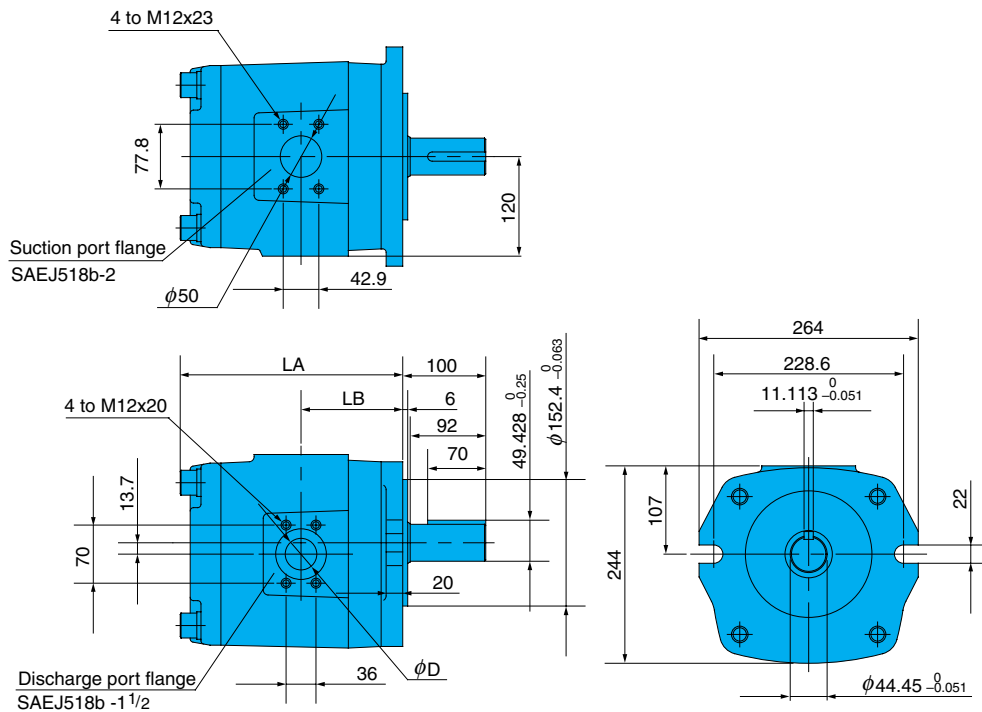
Model No.	Dimensions (mm)		
	LA	LB	ϕD
IPH-5*-40-*-21 (11)	201.5	91.0	24
IPH-5*-50-*-21 (11)	208.5	94.5	26
IPH-5*-64-*-21 (11)	218.5	99.5	28

Note) IPH-5A (B)-*-L-21 (11) (foot mounting/flange mounting, counterclockwise rotation) are the mirror image of the drawings shown above. In the case the suction port flange is facing upwards, the discharge port flange is positioned to the right when viewed from the shaft side.

IPH-6A-*-21 (Foot Mounting, Clockwise Rotation)



IPH-6B-*-11 (Flange Mounting, Clockwise Rotation)

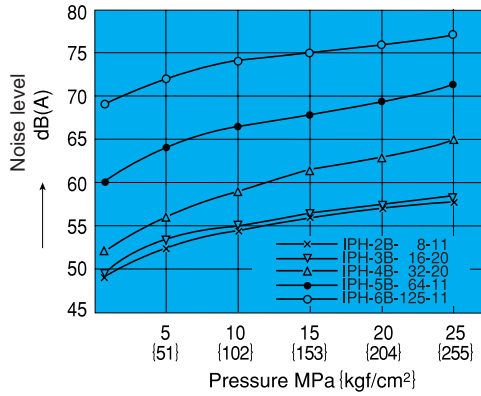
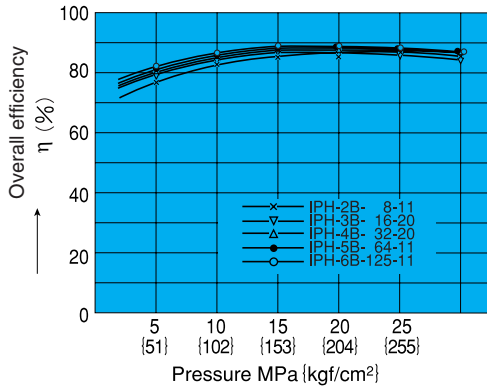
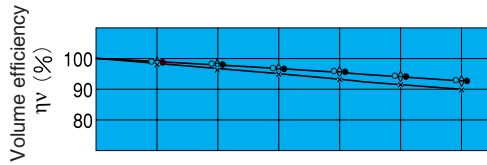


Model No.	Dimensions (mm)		
	LA	LB	ϕD
IPH-6*- 80-*-21 (11)	241.5	111.5	32
IPH-6*-100-*-21 (11)	251.5	116.5	36
IPH-6*-125-*-21 (11)	263.5	122.5	38

Note) IPH-6A (B)-*-L-21 (11) (foot mounting/flange mounting, counterclockwise rotation) are the mirror image of the drawings shown above. In the case the suction port flange is facing upwards, the discharge port flange is positioned to the right when viewed from the shaft side.

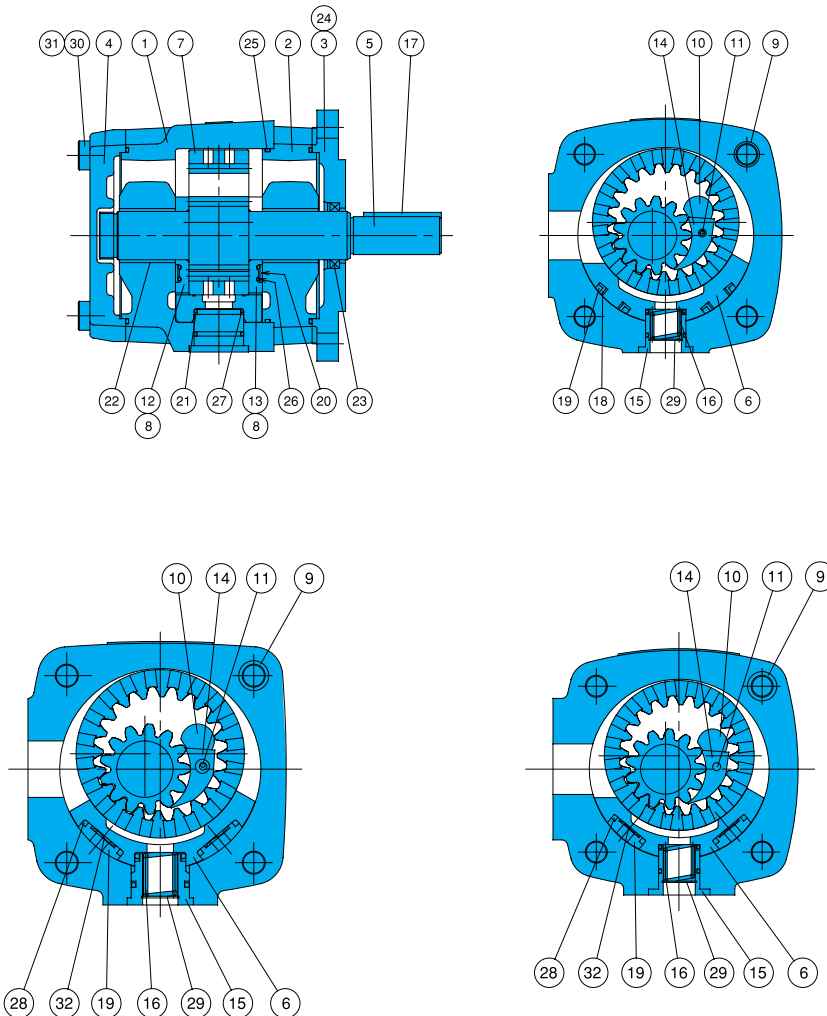
Performance Curves

Revolution Speed 1200min⁻¹
 Operating Hydraulic Fluid Viscosity 46mm²/s
 Representative Characteristics Under Above Conditions



Cross-sectional Drawing

IPH-*B-*

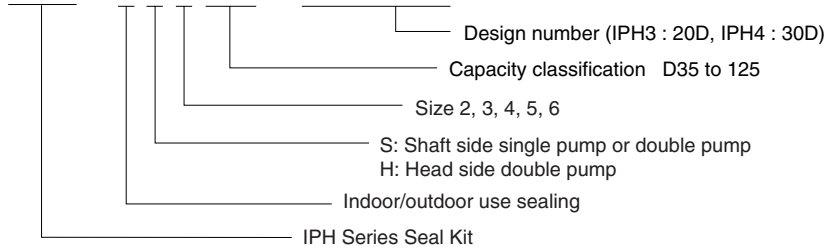


Part No.	Part Name
1	Body -1
2	Body -2
3	Mounting
4	Rear cover
5	Pinion shaft
6	Radial piston
7	Internal gear
8	Bushing
9	Knock pin
10	Stopper pin
11	Spring pin (guide pin)
12	Axial plate -1
13	Axial plate -2
14	Feeler piece
15	Spring holder
16	Spring
17	Key
18	Radial seal
19	Radial backup ring
20	Axial backup ring
21	Backup ring
22	Bearing
23	Oil seal
24	Pin
25	O-ring
26	O-ring
27	O-ring
28	O-ring
29	Snap ring
30	Screw
31	Washer
32	Wave washer

IPH Series Seal Kit

Understanding Seal Kit **IHAS - 2 S * ** - 10(20, 30)**

Model Numbers :



Seal Kit Number	Applicable Pump Model No.	Component Part Numbers							
		18	Qty	19	Qty	20	Qty	21	Qty
		Radial Seal		Radial Backup Ring		Axial Backup Ring		Backup ring	
IHAS-2S2D35-10	IPH-2A(B)-3.5-11			IH34J-102D35-1A	2	IH34J-202000	2	IH34J-402D35	1
2S2005-10	5			102005-1A	2	"	2	402005	1
2S2D65-10	6.5			102D65-1A	2	"	2	402D65	1
2S2008-10	8			102008-1A	2	"	2	402008	1
IHAS-2S3010-20	IPH-3A(B)-10-20			IH34J-103010-1A	2	IH34J-203000	2	IH34J-403010	1
2S3013-20	13			103013-1A	2	"	2	403013	1
2S3016-20	16			103016-1A	2	"	2	403016	1
IHAS-2S4020-30	IPH-4A(B)-20-20			IH34J-104020-2A	2	IH34J-204000-1A	2	IH34J-404020	1
2S4025-30	25			104025-2A	2	"	2	404025	1
2S4032-30	32			104032-2A	2	"	2	404032	1
IHAS-2S5040-10	IPH-5A(B)-40-21(11)	IH33J-105040-1A	2	IH34J-105040-1A	2	IH34J-205000	2	IH34J-405040	1
2S5050-10	50	105050-1A	2	105050-1A	2	"	2	405050	1
2S5064-10	64	105064-1A	2	105064-1A	2	"	2	405064	1
IHAS-2S6080-10	IPH-6A(B)-80-21(11)	IH33J-106080-1A	2	IH34J-106080-1A	2	IH34J-206000	2	IH34J-406080	1
2S6100-10	100	106100-1A	2	106100-1A	2	"	2	406100	1
2S6125-10	125	106125-1A	2	106125-1A	2	"	2	406125	1

Seal Kit Number	Component Part Numbers									
	23	Qty	25	Qty	26	Qty	27	Qty	28	Qty
	Oil seal		O-ring		O-ring		O-ring		O-ring	
IHAS-2S2D35-10	ISD-20328	1	R68 × 2	3	R23 × 2	2	R10 × 2	1	R10 × 2	2
2S2005-10	"	1	"	3	"	2	R12 × 2	1	R12 × 2	2
2S2D65-10	"	1	"	3	"	2	R14 × 2	1	R14 × 2	2
2S2008-10	"	1	"	3	"	2	R16 × 2	1	R16 × 2	2
IHAS-2S3010-20	ISD-25388	1	R86 × 2	3	R30 × 2	2	R15 × 2.5	1	R15 × 2.5	2
2S3013-20	"	1	"	3	"	2	R18 × 2.5	1	R18 × 2.5	2
2S3016-20	"	1	"	3	"	2	R20 × 2.5	1	R20 × 2.5	2
IHAS-2S4020-30	ISD-32458	1	R108 × 3	3	R38 × 2.5	2	R21 × 2.5	1	R21 × 2.5	2
2S4025-30	"	1	"	3	"	2	R23 × 3	1	R23 × 3	2
2S4032-30	"	1	"	3	"	2	R26 × 3	1	R26 × 3	2
IHAS-2S5040-10	ISD-40558	1	R140 × 3	3	R49 × 3	2	R26 × 3	1		
2S5050-10	"	1	"	3	"	2	R29 × 3.5	1		
2S5064-10	"	1	"	3	"	2	R33 × 3.5	1		
IHAS-2S6080-10	ISD-50659	1	R172 × 4	3	R60 × 3.5	2	R34 × 3.5	1		
2S6100-10	"	1	"	3	"	2	R38 × 4	1		
2S6125-10	"	1	"	3	"	2	R43 × 4	1		

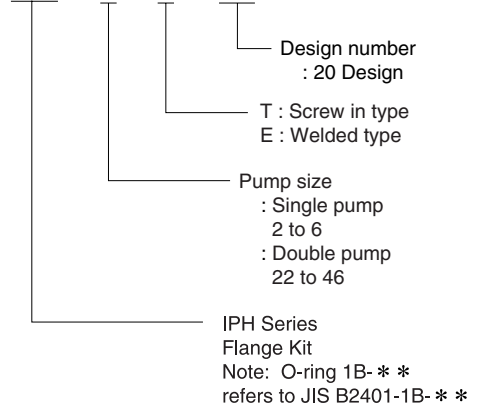
Note) 1.Oil seals are manufactured by Nippon Oil Seal Industry Co. Ltd. (NOK).
2.O-rings are not available through retail sources. Consult your agent for more information.

IPH Series Pipe Flange Kit

Understanding Flange Kit Model Numbers :

The pipe flange kit combines the flanges, bolts, washers, and O-rings required for each type of pump into a single kit. The component parts table shows the screw in type flange kit. In the case of the welded type flange, the flange part number is IH03J-200040 (1 of IH03J-100040 changes to 2). All other included parts are the same.

IHF - 3 - T - 20



Screw in type Flange Kit model No.	Applicable Pump Model No.	IN Flange							
		Flange Part No.		Bolt		Washer		O-ring	
IHF-2-T-20	IPH-2A(B)-*-11	IH03J-100040	1	TH- 8 × 45	4	WS-B- 8	4	IB-P22	1
IHF-3-T-20	IPH-3A(B)-*-20	IH03J-100080	1	TH-10 × 50	4	WS-B-10	4	IB-G35	1
IHF-4-T-20	IPH-4A(B)-*-20	IH03J-100100	1	TH-10 × 55	4	"	4	IB-G40	1
IHF-5-T-20	IPH-5A(B)-*-21(11)	IH03J-100120	1	TH-12 × 55	4	WS-B-12	4	IB-G50	1
IHF-6-T-20	IPH-6A(B)-*-21(11)	IH03J-100160	1	TH-12 × 60	4	"	4	IB-G60	1

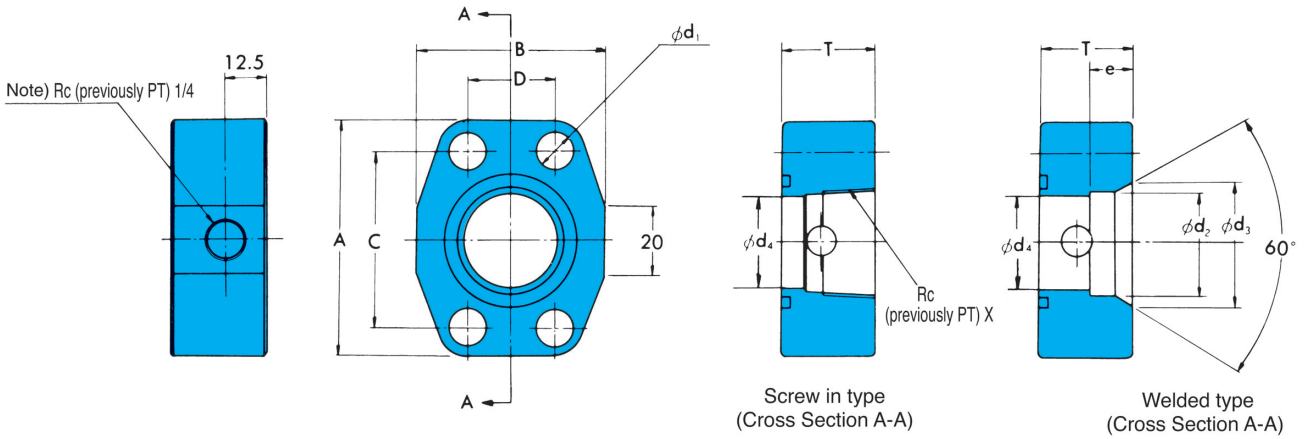
OUT Flange								Plug	
Flange Part No.		Bolt		Washer		O-ring			
IH03J-100040	1	TH- 8 × 45	4	WS-B- 8	4	IB-P22	1	TPHA-1/4	2
IH03J-100040	1	TH- 8 × 45	4	"	4	IB-P22	1	"	2
IH03J-100060	1	TH-10 × 50	4	WS-B-10	4	IB-G30	1	"	1
IH03J-100080	1	TH-10 × 50	4	"	4	IB-G35	1	"	2
IH03J-100120	1	TH-12 × 60	4	WS-B-12	4	IB-G50	1	"	1

Note)1. In the case of a double pump, the flange kit includes three flanges: one for the common IN port and two OUT port flanges. When using separate IN ports, use separate single pump flange kits, one each for the head side and the shaft side.
 Note)2. There is no common IN port in the case of the double pump models IPH-55, IPH-56, and IPH-66, or a single IN port is used.

Screw in type Flange Kit model No.	Applicable Pump Model No.	IN Flange							
		Flange Part No.		Bolt		Washer		O-ring	
IHF-22-T-20	IPH-22B-*-*-11	IH03J-100060	1	TH-10 × 50	4	WS-B-10	4	IB-G30	1
IHF-23-T-20	23	IH03J-100080	1	"	4	"	4	IB-G35	1
IHF-24-T-20	24	IH03J-100120	1	TH-12 × 55	4	WS-B-12	4	IB-G50	1
IHF-25-T-20	25	IH03J-100160	1	TH-12 × 60	4	"	4	IB-G60	1
IHF-26-T-20	26	IH03J-100200	1	TH-12 × 65	4	"	4	IB-G75	1
IHF-33-T-20	IPH-33B-*-*-11	IH03J-100100	1	TH-10 × 55	4	WS-B-10	4	IB-G40	1
IHF-34-T-20	34	IH03J-100120	1	TH-12 × 55	4	WS-B-12	4	IB-G50	1
IHF-35-T-20	35	IH03J-100160	1	TH-12 × 60	4	"	4	IB-G60	1
IHF-36-T-20	36	IH03J-100200	1	TH-12 × 60	4	"	4	IB-G75	1
IHF-44-T-20	IPH-44B-*-*-11	IH03J-100120	1	TH-12 × 55	4	"	4	IB-G50	1
IHF-45-T-20	45	IH03J-100200	1	TH-12 × 65	4	"	4	IB-G75	1
IHF-46-T-20	46	IH03J-100240	1	TH-16 × 75	4	WS-B-16	4	IB-G85	1

OUT Flange (Shaft Side)							OUT Flange (Head Side)							Plug			
Flange Part No.		Bolt		Washer		O-ring	Flange Part No.		Bolt		Washer		O-ring				
IH03J-100040	1	TH- 8 × 45	4	WS-B- 8	4	IB-P22	1	IH03J-100040	1	TH- 8 × 45	4	WS-B- 8	4	IB-P22	1	TPHA-1/4	3
IH03J-100040	1	"	4	"	4	IB-P22	1	"	1	"	4	"	4	"	1	"	3
IH03J-100060	1	TH-10 × 50	4	WS-B-10	4	IB-G30	1	"	1	"	4	"	4	"	1	"	3
IH03J-100080	1	"	4	"	4	IB-G35	1	"	1	"	4	"	4	"	1	"	2
IH03J-100120	1	TH-12 × 60	4	WS-B-12	4	IB-G50	1	"	1	"	4	"	4	"	1	"	2
IH03J-100040	1	TH- 8 × 45	4	WS-B- 8	4	IB-P22	1	IH03J-100040	1	TH- 8 × 45	4	WS-B- 8	4	IB-P22	1	"	2
IH03J-100060	1	TH-10 × 50	4	WS-B-10	4	IB-G30	1	"	1	"	4	"	4	"	1	"	3
IH03J-100080	1	"	4	"	4	IB-G35	1	"	1	"	4	"	4	"	1	"	2
IH03J-100120	1	TH-12 × 60	4	WS-B-12	4	IB-G50	1	"	1	"	4	"	4	"	1	"	2
IH03J-100060	1	TH-10 × 50	4	WS-B-10	4	IB-G30	1	IH03J-100060	1	TH-10 × 50	4	WS-B-10	4	IB-G30	1	"	3
IH03J-100080	1	"	4	"	4	IB-G35	1	"	1	"	4	"	4	"	1	"	2
IH03J-100120	1	TH-12 × 60	4	WS-B-12	4	IB-G50	1	"	1	"	4	"	4	"	1	"	2
IH03J-100060	1	TH-10 × 50	4	WS-B-10	4	IB-G30	1	IH03J-100060	1	TH-10 × 50	4	WS-B-10	4	IB-G30	1	"	3
IH03J-100080	1	"	4	"	4	IB-G35	1	"	1	"	4	"	4	"	1	"	2
IH03J-100120	1	TH-12 × 60	4	WS-B-12	4	IB-G50	1	"	1	"	4	"	4	"	1	"	2

Pipe Flange Installation Dimension Diagram



Screw in type

Pipe Flange Kit Part Number	SAE Standard	Nominal Diameter	Dimensions (mm)							Weight kg
			A	B	C	D	T	ϕd_1	ϕd_4	
IH03J -100040	SAE J518b 1/2	1/2	54	46	38.1	17.5	33	9	12.7	0.4
-100060	SAE J518b 3/4	3/4	65	52	47.5	22.0	33	11	20	0.6
-100080	SAE J518b 1	1	70	59	52.4	26.2	33	11	27	0.6
☆ -100100	SAE J518b 1 1/4	1 1/4	79	73	58.7	30.2	38	11	33	1.0
-100120	SAE J518b 1 1/2	1 1/2	94	83	70.0	36.0	38	13	37.5	1.4
☆ -100160	SAE J518b 2	2	102	97	77.8	42.9	38	13	50	1.7
☆ -100200	SAE J518b 2 1/2	2 1/2	114	109	88.9	50.8	43	13	60	2.1
☆ -100240	SAE J518b 3	3	135	131	106.4	61.9	48	17.5	71	3.3

Welded Type

Pipe Flange Kit Part Number	SAE Standard	Pipe Diameter	Dimensions (mm)										Weight kg
			A	B	C	D	T	e	ϕd_1	ϕd_2	ϕd_3	ϕd_4	
IH03J -200040	SAE J518b 1/2	1/2	54	46	38.1	17.5	33	11	9	22.2	27	12.7	0.4
-200060	SAE J518b 3/4	3/4	65	52	47.5	22.0	33	12	11	27.7	35	20	0.6
-200080	SAE J518b 1	1	70	59	52.4	26.2	33	14	11	34.5	42	27	0.6
☆ -200100	SAE J518b 1 1/4	1 1/4	79	73	58.7	30.2	38	16	11	43.2	48	33	1.0
-200120	SAE J518b 1 1/2	1 1/2	94	83	70.0	36.0	38	18	13	49.1	58	37.5	1.4
☆ -200160	SAE J518b 2	2	102	97	77.8	42.9	38	19	13	61.1	68	50	1.7
☆ -200200	SAE J518b 2 1/2	2 1/2	114	109	88.9	50.8	43	22	13	77.1	82	60	2.1
☆ -200240	SAE J518b 3	3	135	131	106.4	61.9	48	25	17.5	90.0	97	71	3.3

Recommended Tightening Torque for Flange Installation Bolts

Mounting bolt	Tightening Torque N · m {kgf · cm}
M8	25.5 to 32.3 {260 to 329}
M10	50.9 to 64.7 {520 to 660}
M12	88.2 to 112.7 {900 to 1150}
M14	142.1 to 176.4 {1450 to 1800}
M16	215.6 to 274.4 {2200 to 2800}
M18	294 to 382.2 {3000 to 3900}

Note) There is no RC (previously PT) 1/4 tap for the above flange numbers (exclusively for suction port use) marked with a star (☆).

IPH Series Foot Mounting Kit

Understanding Foot Mounting Kit Numbers:

When only the mounting feet are required for a single pump or double pump, pump mounting bolts, washers and other parts are sold together as the Foot Mounting Kit.

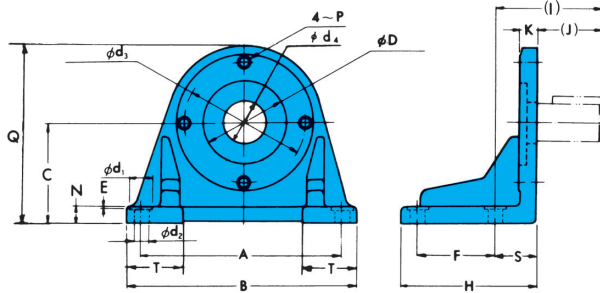
IHM - 2 - 10

Design number

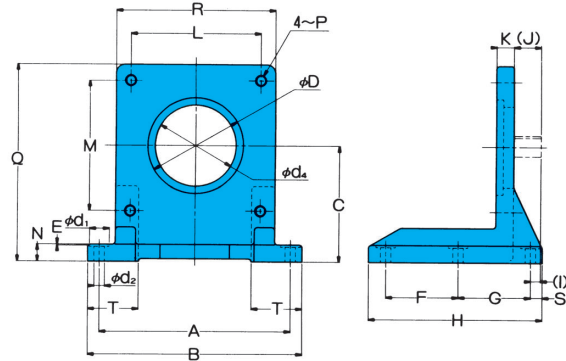
Pump size : Single pump 2 to 6
: Double pump 22 to 66

IPH Series
Foot Mounting Kit

Foot Mounting Installation Measurement Chart
SAE-2BOLT-MOUNTING



SAE-4BOLT-MOUNTING



SAE-2BOLT-MOUNTING

Foot Mounting Kit Model No.	Applicable Pump Model No.		Accessories				Dimensions (mm)					
	SINGLE PUMP	DOUBLE PUMP	Bolt	Q'ty	Washer	Q'ty	A	B	C	E	F	H
IHM-2-10	IPH-2	-	TB-10 × 30	2	WP-10	2	127	152.5	69.8	1	50.8	96
IHM-4-10	IPH-3	-	TB-12 × 30	2	WP-12	2	220.7	246	107.95	1	114.3	140
IHM-4-10	IPH-4	-	TB-12 × 30	2	WP-12	2	220.7	246	107.95	1	114.3	140
IHM-22-10		IPH-22	TB-10 × 30	2	WP-10	2	171.45	204	107.95	1	95.25	150
IHM-44-10		IPH23, IPH-33	TB-12 × 30	2	WP-12	2	235	267	139.7	1	127	193
IHM-44-10		IPH-24, IPH-34, IPH-44	TB-12 × 30	2	WP-12	2	235	267	139.7	1	127	193
IHM-45-10	IPH-5	IPH-25, IPH-35, IPH-45	TB-16 × 40	2	WP-16	2	295.3	334	152.4	1	139.7	203
IHM-46-10	IPH-6	IPH-26, IPH-36, IPH-46	TB-20 × 50	2	WP-20	2	330.2	374	203.2	1	149.2	220.7

Foot Mounting Kit Model No.	Dimensions (mm)													Weight kg
	I	(J)	K	N	P	Q	(S)	T	φD	φd ₁	φd ₂	φd ₃	φd ₄	
IHM-2-10	74	41.5	17.5	13	M10	135	32.5	36.5	82.55	22	11	106.4	50	2.0
IHM-4-10	61.7	49	16	16	M12	195.5	12.7	53	101.6	22	11	146	40	5.5
IHM-4-10	74.7	62	16	16	M12	195.5	12.7	53	101.6	22	11	146	40	5.5
IHM-22-10	73.5	41	18	18	M10	180	32.5	50	82.55	22	11	106.4	40	6.5
IHM-44-10	89.5	45	20	20	M12	232	44.5	57.5	101.6	22	14	146	40	12.0
IHM-44-10	102.5	58	20	20	M12	232	44.5	57.5	101.6	22	14	146	40	12.0
IHM-45-10	104.5	60	25	25	M16	259	44.5	61	127	35	18	181	86	13.5
IHM-46-10	119.5	70	30	30	M20	337	49.5	64	152.4	37	20	228.6	100	22.0

*IHM-2-10, IHM-4-10, and IHM-45-10 are the same as PVS pump foot mounting PSM-101000, PSM102000, and PSM103000 respectively.

SAE-4BOLT-MOUNTING

Foot Mounting Kit Model No.	Applicable Pump Model No.	Accessories				Dimensions (mm)								
	DOUBLE PUMP	Bolt	Q'ty	Washer	Q'ty	A	B	C	E	F	G	H	(I)	
IHM-55-10	IPH-55	TH-20 × 50	4	WS-B-20	4	330	370	200	1	125	125	300	17	
IHM-66-10	IPH56, IPH-66	TH-24 × 60	4	WS-B-24	4	380	430	260	1	140	140	340	17	

Foot Mounting Kit Model No.	Dimensions (mm)														Weight kg
	(J)	K	L	M	N	P	Q	R	S	T	φD	φd ₁	φd ₂	φd ₄	
IHM-55-10	47	30	224.6	224.6	30	M20	340	275	20	90	165.1	34	18	140	32.0
IHM-66-10	52	40	247.5	247.5	40	M24	415	310	25	105	177.8	34	18	150	48.0

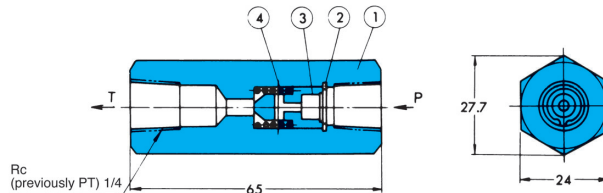
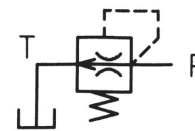
Air Bleed-off Valve

Equipping an air bleed-off valve on the pump's discharge side helps to simplify air bleeding during test operation.

Specifications

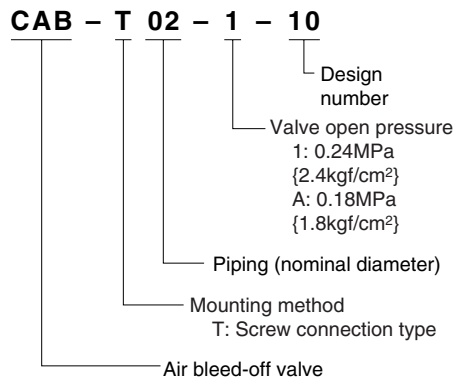
- ① Air inside the pump and the suction pipe is exhausted rapidly when the pump is started up. When discharge pressure reaches 0.2MPa {2.0kgf/cm²} or greater after the pump intakes oil, a valve closes to prevent oil from leaking.
- ② Maximum operating pressure: 30MPa {306kgf/cm²}
- ③ Provide piping to ensure that the tank port is under the oil level surface.

JIS symbol



Understanding Model Numbers

CAB - T 02 - 1 - 10



Part No.	Part Name	Q'ty
1	Valve body	1
2	Snap ring	1
3	Valve	1
4	Spring	1

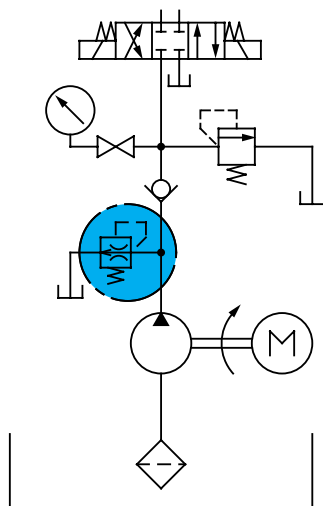
Note 1) If chattering occurs in a circuit when CAB-T02-1-10 is used, use CAB-T02-A-10 instead.

2) If chattering occurs in a circuit when CAB-T02-A-10 is used, use of a CAB air bleed-off valve is not required.

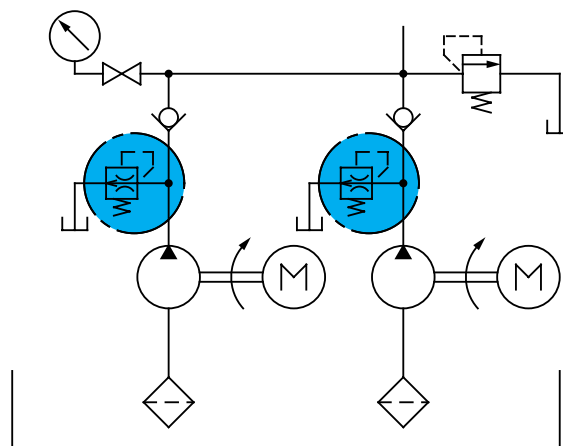
Application Examples

Example of Circuits that Require an Air Bleed-off Valve

- ① When using a Type 2 or Type 3 check valve (Sample Circuit A)
- ② When unload circuit function cannot be achieved (Sample Circuit A)
- ③ When the discharge sides of multiple pumps run together (Sample Circuit B)



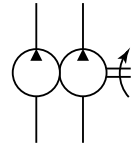
Circuit Diagram A



Circuit Diagram B

IPH Series Double IP Pump

3.6 to 125.9cm³/rev
30MPa



❖All the types in this new design (11D) series are installation compatible with the previous design (10D). Note, however, that there is no longer compatibility for some of the seal components between the IPH-3 and IPH-4 sizes and the 3 and 4 sizes.

Features

- ① Configured with the high-pressure, low-noise IPH Series and IP pumps, these double pumps greatly expand the range of application for the IP pump.
- ② A wide selection of pump combinations provides options that are perfect for just about any type of application imaginable.

Specifications

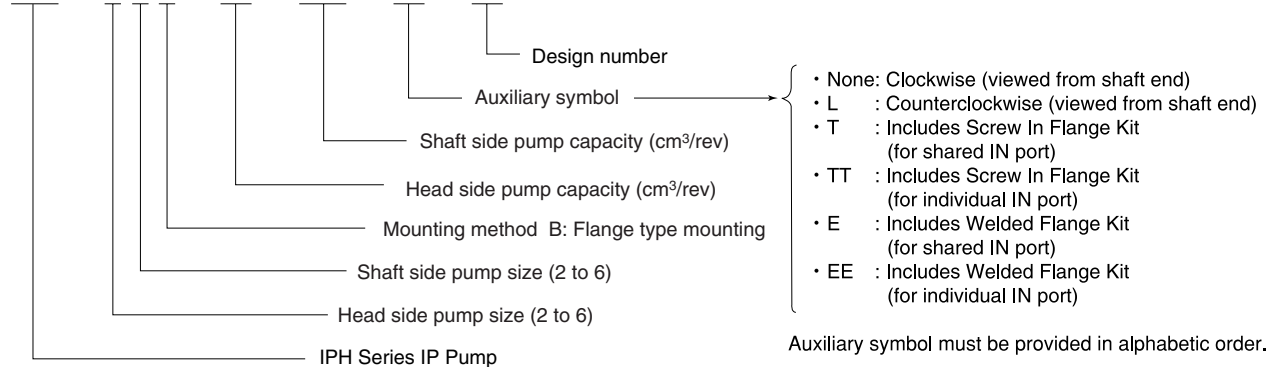
Model No.	Discharge Rate (1200min ⁻¹ No-load)		Revolution Speed		Operating Pressure MPa{kgf/cm ² }	Required Power at 1200min ⁻¹ , 21MPa kW
	Vent Side ℓ/min	Shaft Side ℓ/min	Min. min ⁻¹	Max. min ⁻¹		
IPH-22B-*,*-(*)-11 IPH-23B IPH-24B IPH-25B IPH-26B	4.3 to 9.8	4.3 to 9.8	600	2000	Rated: 21 {214} Max: 30 {306}	7.99
		12.2 to 18.9				11.6
IPH-33B IPH-34B IPH-35B IPH-36B	12.2 to 18.9	12.2 to 18.9				19.5
		24.8 to 38.7				34.5
IPH-44B IPH-45B IPH-46B	24.8 to 38.7	24.8 to 38.7				64.0
		48.9 to 76.6				15.3
IPH-55B IPH-56B	48.9 to 76.6	48.9 to 76.6	23.1			
		97.5 to 151.0	38.1			
IPH-66B	97.5 to 151.0	97.5 to 151.0	67.7			
			31.0			
			46.0			
			75.6			
			61.0			
			90.6			
			119.3			

- Note)
1. Maximum Pressure: Maximum pressure limit when there are frequent pressure changes. However, maximum pressure is the same as rated pressure when load is applied to the head side and shaft side simultaneously.
 2. Suction Pressure: +0.03 to +0.3 MPa {-0.3 to +0.3 kgf/cm²}
 3. Avoid installation with the suction port towards the bottom of the pump. If the revolution speed will exceed 1800mm⁻¹, provide separate piping for shaft side and head size IN ports.
 4. Specify using the model number format shown below when pipe flange is required.
 5. Working pressure is continuous operating pressure when the same pressure exists on the head side and shaft side.
 6. Individual pump performance on the head side and shaft side is the same as that of the single pumps. Required power is the sum of the power required by each of the two pumps.
 7. The "Required Power at 1200min⁻¹, 21MPa (kW)" column in the above table are based on combinations that provide the maximum capacity for each model number, when pressure at both the head side and shaft side is 21MPa. Examples of combinations that provide "the maximum capacity for each model number" are IPH-22B-8-8-11 for IPH-22b, and IPH-46B-32-125-11 for IPH-46B. A capacity of 125 for all *6B Type 6 pumps is used for calculations.

- Handling
Handling is in accordance with procedures for the IPH pump. See page C-1 for more information.

Understanding Model Numbers

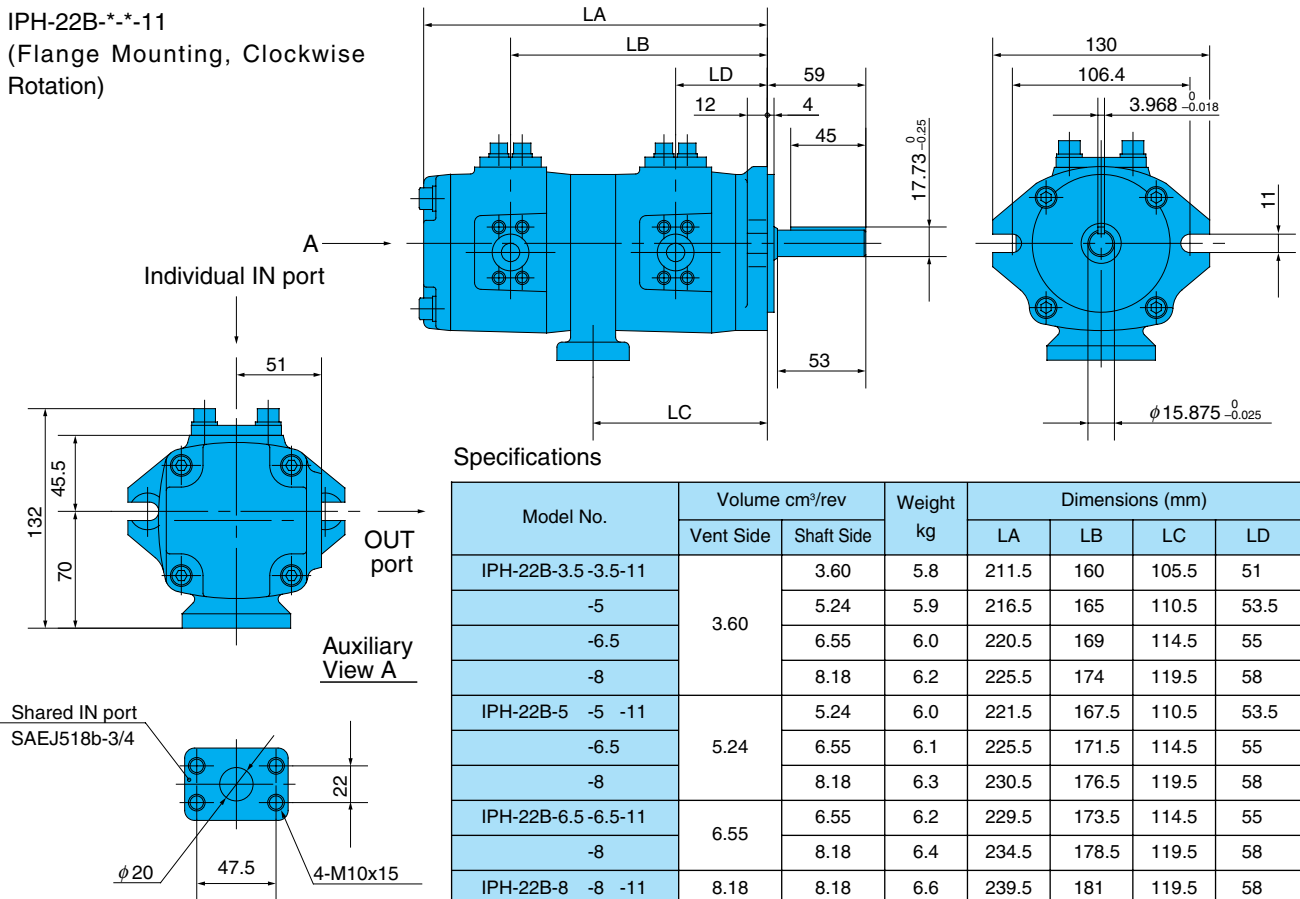
IPH - 4 6 B - 20 - 125 - LT - 11



- IPH Series Double IP Pump Foot Mounting Kit
See the IPH Series (single) IP pump section in page C-12.
- IPH Series Double IP Pump Pipe Flange
See the IPH Series (single) IP pump section in page C-10.

Installation Dimension Drawings

IPH-22B-*-11
(Flange Mounting, Clockwise Rotation)

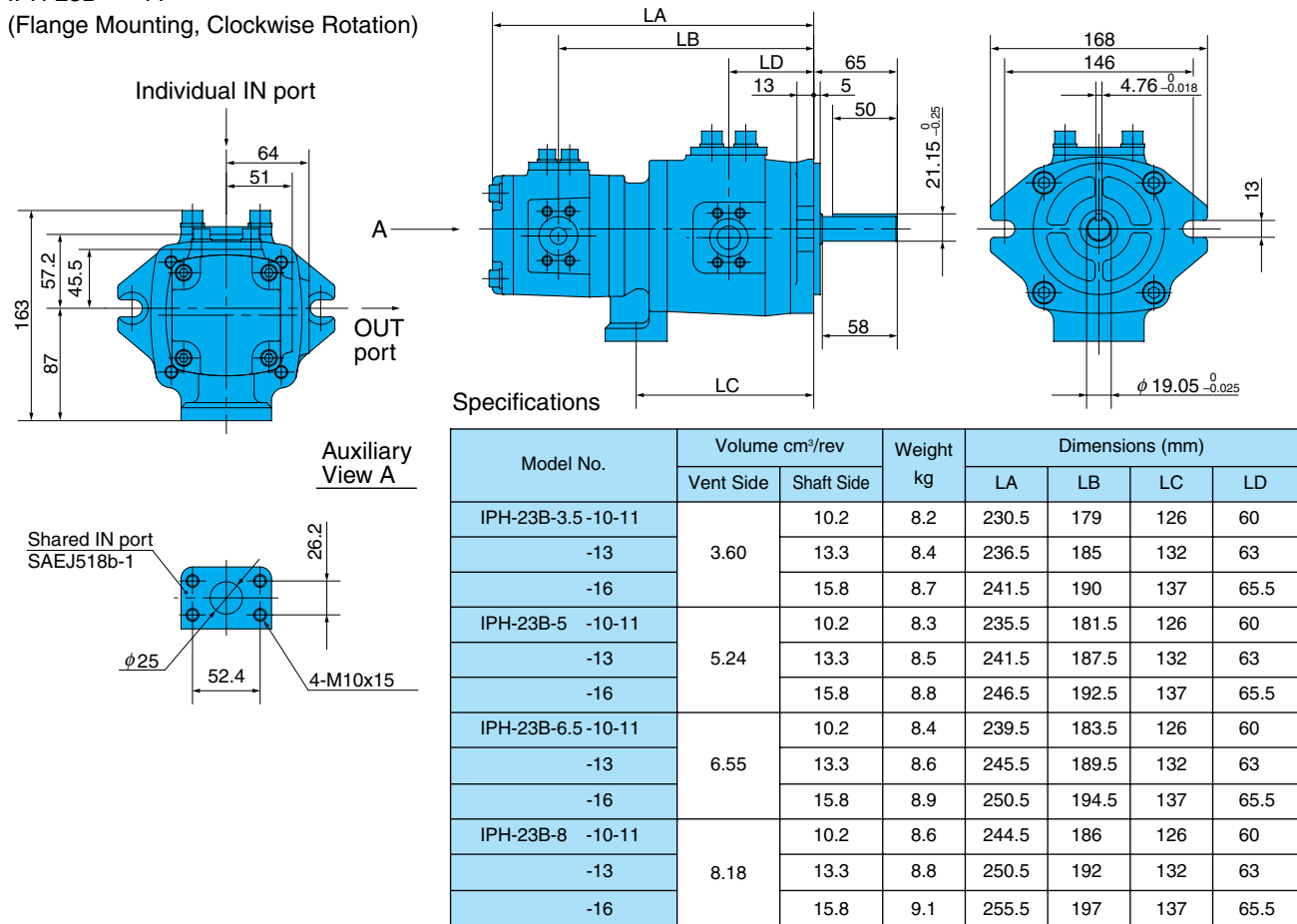


Specifications

Model No.	Volume cm ³ /rev		Weight kg	Dimensions (mm)			
	Vent Side	Shaft Side		LA	LB	LC	LD
IPH-22B-3.5-3.5-11	3.60	3.60	5.8	211.5	160	105.5	51
-5		5.24	5.9	216.5	165	110.5	53.5
-6.5		6.55	6.0	220.5	169	114.5	55
-8		8.18	6.2	225.5	174	119.5	58
IPH-22B-5-5-11	5.24	5.24	6.0	221.5	167.5	110.5	53.5
-6.5		6.55	6.1	225.5	171.5	114.5	55
-8		8.18	6.3	230.5	176.5	119.5	58
IPH-22B-6.5-6.5-11	6.55	6.55	6.2	229.5	173.5	114.5	55
-8		8.18	6.4	234.5	178.5	119.5	58
IPH-22B-8-8-11	8.18	8.18	6.6	239.5	181	119.5	58

Note) Dimensions shown in this diagram are for a single pump.

IPH-23B-*-11
(Flange Mounting, Clockwise Rotation)

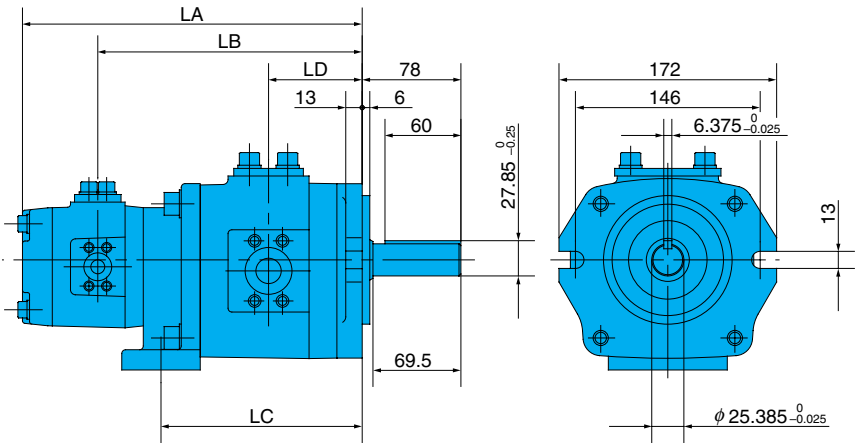
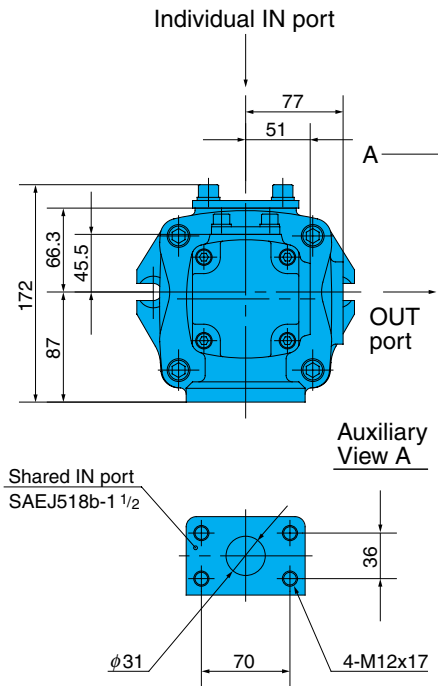


Specifications

Model No.	Volume cm ³ /rev		Weight kg	Dimensions (mm)			
	Vent Side	Shaft Side		LA	LB	LC	LD
IPH-23B-3.5-10-11	3.60	10.2	8.2	230.5	179	126	60
-13		13.3	8.4	236.5	185	132	63
-16		15.8	8.7	241.5	190	137	65.5
IPH-23B-5-10-11	5.24	10.2	8.3	235.5	181.5	126	60
-13		13.3	8.5	241.5	187.5	132	63
-16	15.8	8.8	246.5	192.5	137	65.5	
IPH-23B-6.5-10-11	6.55	10.2	8.4	239.5	183.5	126	60
-13		13.3	8.6	245.5	189.5	132	63
-16		15.8	8.9	250.5	194.5	137	65.5
IPH-23B-8-10-11	8.18	10.2	8.6	244.5	186	126	60
-13		13.3	8.8	250.5	192	132	63
-16		15.8	9.1	255.5	197	137	65.5

Note) IPH-22B (23B)-*-*-L-11 (foot mounting/flange mounting, counterclockwise rotation) are the mirror image of the drawings shown above. In the case the individual port is facing upwards, the discharge port flange is positioned to the right when viewed from the shaft side.

IPH-24B--11**
(Flange Mounting, Clockwise Rotation)

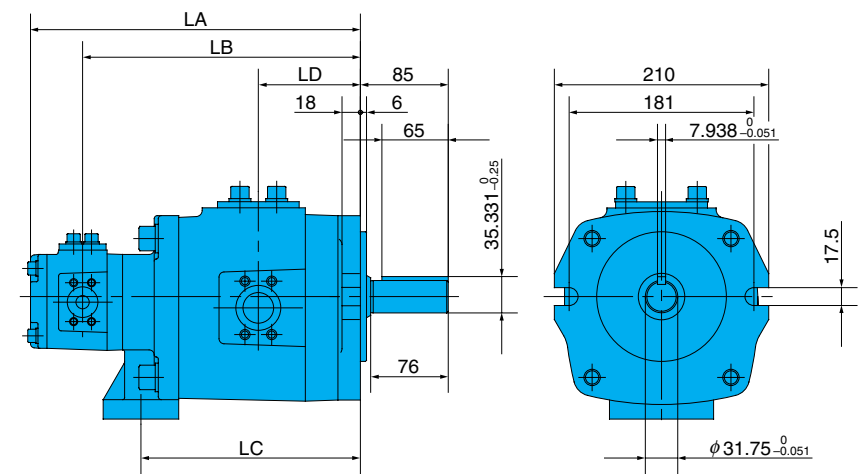
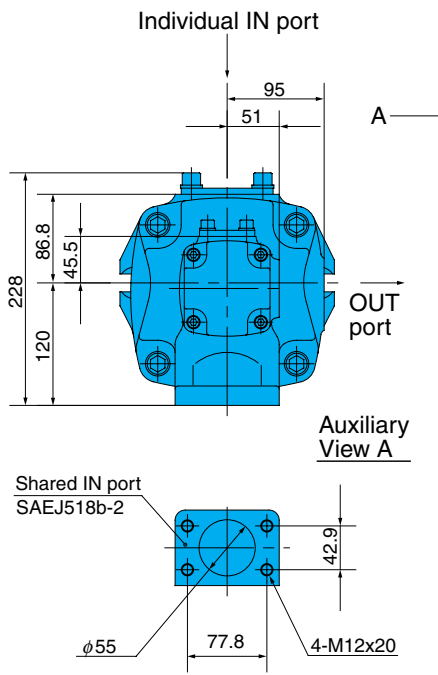


Specifications

Model No.	Volume cm ³ /rev		Weight kg	Dimensions (mm)			
	Vent Side	Shaft Side		LA	LB	LC	LD
IPH-24B-3.5 -20-11	3.60	20.7	12.8	250.5	199	153	71
-25		25.7	13.3	256.5	205	159	74
-32		32.3	13.8	264.5	213	167	78
IPH-24B-5 -40-11	5.24	20.7	12.9	255.5	201.5	153	71
-25		25.7	13.4	261.5	207.5	159	74
-32		32.3	13.9	269.5	215.5	167	78
IPH-24B-6.5 -20-11	6.55	20.7	13.0	259.5	203.5	153	71
-25		25.7	13.5	265.5	209.5	159	74
-32		32.3	14.0	273.5	217.5	167	78
IPH-24B-8 -20-11	8.18	20.7	13.2	264.5	206	153	71
-25		25.7	13.7	270.5	212	159	74
-32		32.3	14.2	278.5	220	167	78

Note) Dimensions shown in this diagram are for a single pump.

IPH-25B--11**
(Flange Mounting, Clockwise Rotation)

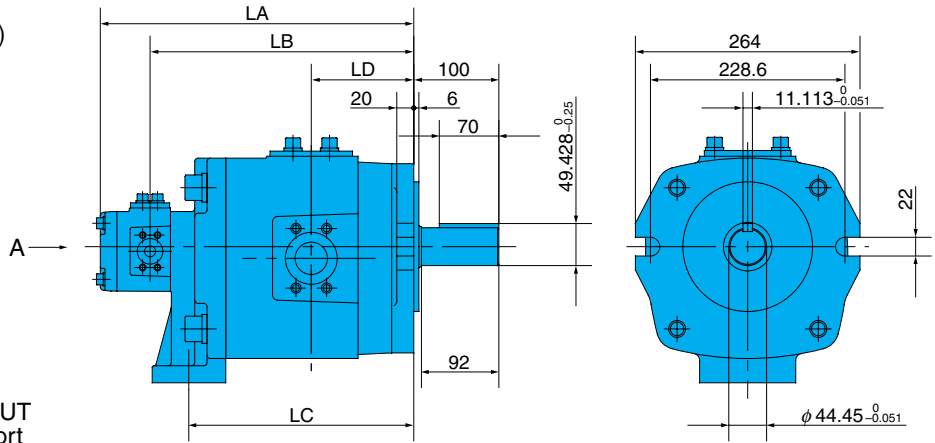
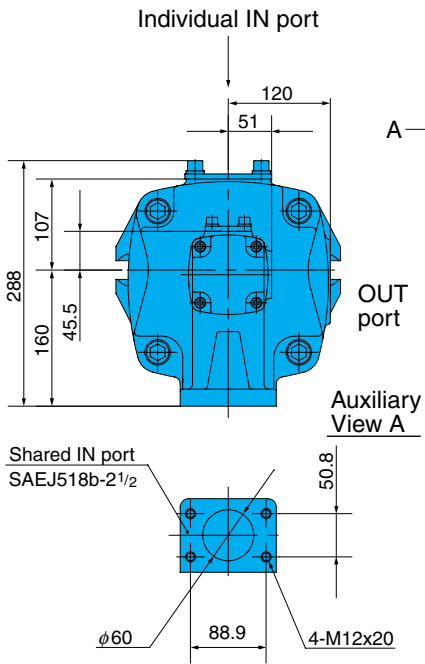


Specifications

Model No.	Volume cm ³ /rev		Weight kg	Dimensions (mm)			
	Vent Side	Shaft Side		LA	LB	LC	LD
IPH-25B-3.5 -40-11	3.60	40.8	24.1	298.5	247	197	91
-50		50.3	25.1	305.5	254	204	94.5
-64		63.9	26.1	315.5	264	214	99.5
IPH-25B-5 -40-11	5.24	40.8	24.2	303.5	249.5	197	91
-50		50.3	25.2	310.5	256.5	204	94.5
-64		63.9	26.2	320.5	266.5	214	99.5
IPH-25B-6.5 -40-11	6.55	40.8	24.3	307.5	251.5	197	91
-50		50.3	25.3	314.5	258.5	204	94.5
-64		63.9	26.3	324.5	268.5	214	99.5
IPH-25B-8 -40-11	8.18	40.8	24.5	312.5	254	197	91
-50		50.3	25.5	319.5	261	204	94.5
-64		63.9	26.5	329.5	271	214	99.5

Note) IPH-24B (25B)-**-L-11 (foot mounting/flange mounting, counterclockwise rotation) are the mirror image of the drawings shown above. In the case the individual IN port is facing upwards, the discharge port flange is positioned to the right when viewed from the shaft side.

IPH-26B-*-*-11
(Flange Mounting, Clockwise Rotation)

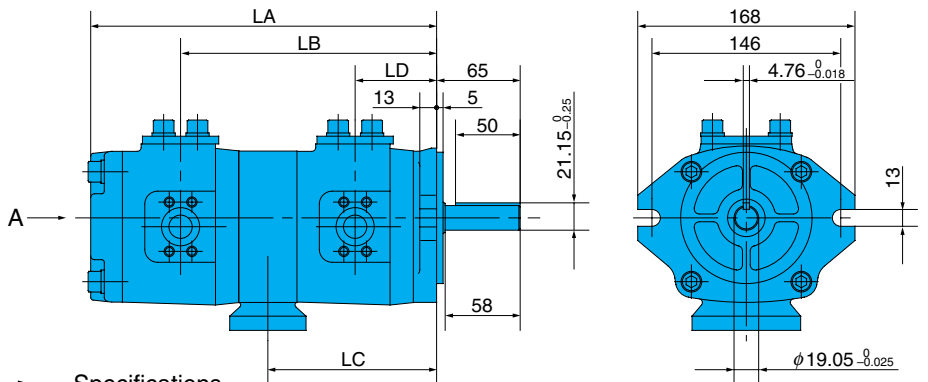
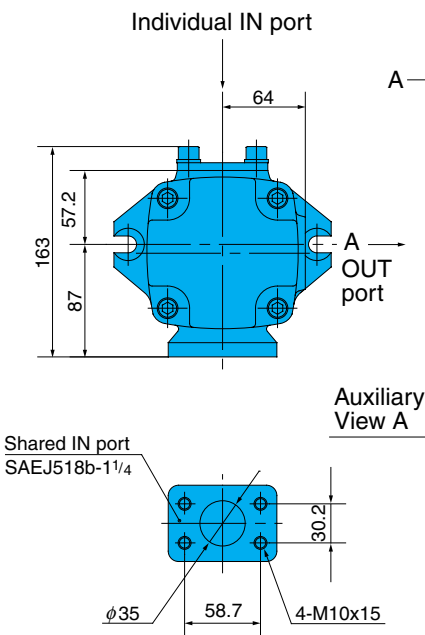


Specifications

Model No.	Volume cm ³ /rev		Weight kg	Dimensions (mm)			
	Vent Side	Shaft Side		LA	LB	LC	LD
IPH-26B-3.5 - 80-11	3.60	81.3	45.8	345.5	294	240	111.5
		101.6	47.8	355.5	304	250	116.5
		125.9	49.8	367.5	316	262	122.5
IPH-26B-5 - 80-11	5.24	81.3	45.9	350.5	296.5	240	111.5
		101.6	47.9	360.5	306.5	250	116.5
		125.9	49.9	372.5	318.5	262	122.5
IPH-26B-6.5 - 80-11	6.55	81.3	46.0	354.5	298.5	240	111.5
		101.6	48.0	364.5	308.5	250	116.5
		125.9	50.0	376.5	320.5	262	122.5
IPH-26B-8 - 80-11	8.18	81.3	46.2	357	301	240	111.5
		101.6	48.2	367	311	250	116.5
		125.9	50.2	379	323	262	122.5

Note) Dimensions shown in this diagram are for a single pump.

IPH-33B-*-*-11
(Flange Mounting, Clockwise Rotation)

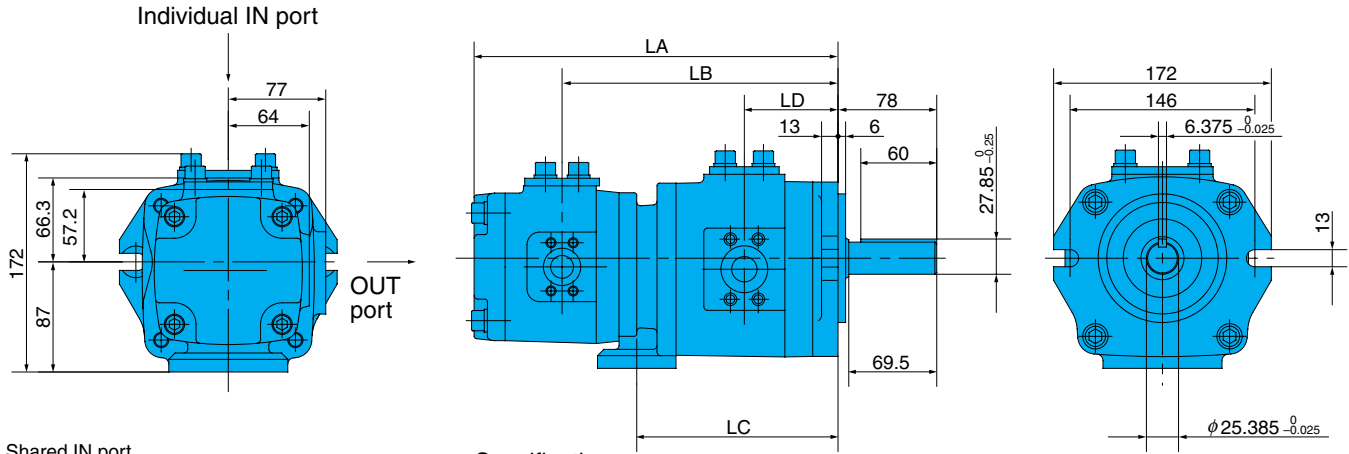


Specifications

Model No.	Volume cm ³ /rev		Weight kg	Dimensions (mm)			
	Vent Side	Shaft Side		LA	LB	LC	LD
IPH-33B-10 -10-11	10.2	10.2	10.3	255.5	189	124.5	60
		13.3	10.5	261.5	195	130.5	63
		15.8	10.8	266.5	200	135.5	65.5
IPH-33B-13 -13-11	13.3	13.3	10.5	267.5	198	130.5	63
		15.8	11.0	272.5	203	135.5	65.5
IPH-33B-16 -16-11	15.8	15.8	11.3	277.5	205.5	135.5	65.5

Note) IPH-26B (33B)-*-*-L-11 (foot mounting/flange mounting, counterclockwise rotation) are the mirror image of the drawings shown above. In the case the individual IN port is facing upwards, the discharge port flange is positioned to the right when viewed from the shaft side.

IPH-34B-*-11
(Flange Mounting, Clockwise Rotation)

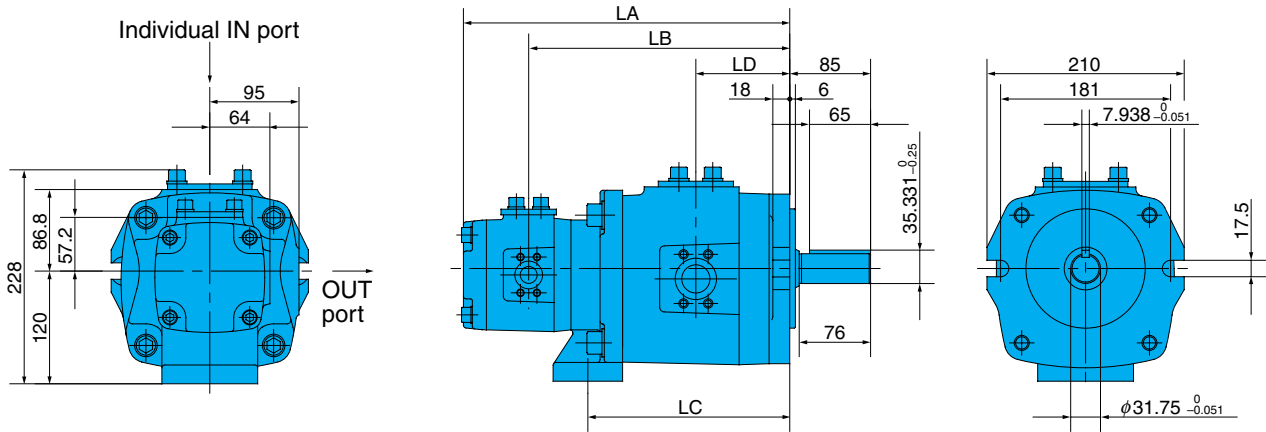


Specifications

Model No.	Volume cm ³ /rev		Weight kg	Dimensions (mm)			
	Vent Side	Shaft Side		LA	LB	LC	LD
IPH-34B-10 -20-11	10.2	20.7	14.9	272	209	153	71
		25.7	15.4	278	215	159	74
		32.3	15.9	286	223	167	78
IPH-34B-13 -20-11	13.3	20.7	15.1	278	212	153	71
		25.7	15.6	284	218	159	74
		32.3	16.1	292	226	167	78
IPH-34B-16 -20-11	15.8	20.7	15.4	283	214.5	153	71
		25.7	15.9	289	220.5	159	74
		32.3	16.4	297	228.5	167	78

Note) Dimensions shown in this diagram are for a single pump.

IPH-35B-*-11
(Flange Mounting, Clockwise Rotation)

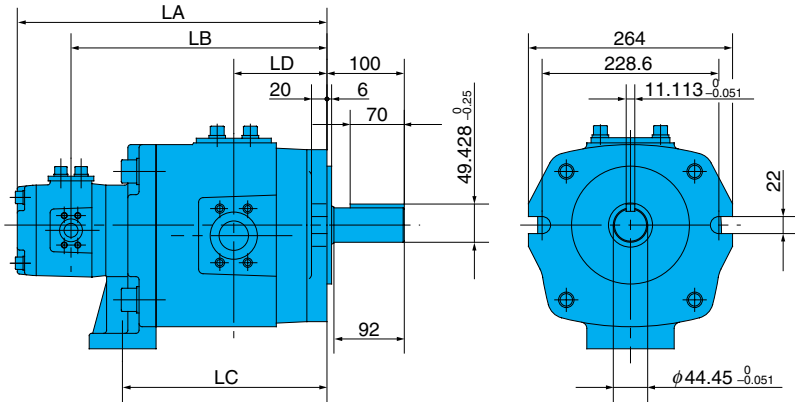
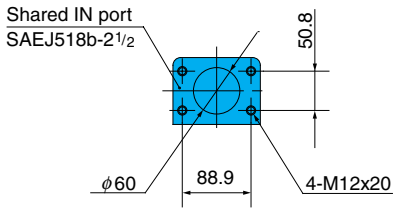
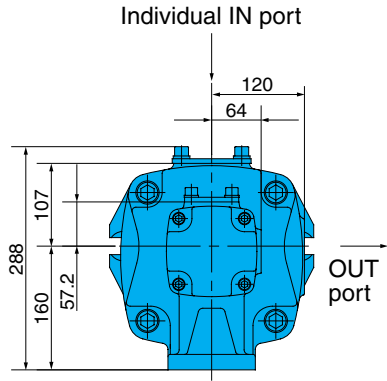


Specifications

Model No.	Volume cm ³ /rev		Weight kg	Dimensions (mm)			
	Vent Side	Shaft Side		LA	LB	LC	LD
IPH-35B-10 -40-11	10.2	40.8	26.4	323.5	257	197	91
		50.3	27.4	330.5	264	204	94.5
		63.9	28.4	340.5	274	214	99.5
IPH-35B-13 -40-11	13.3	40.8	26.6	329.5	260	197	91
		50.3	27.6	336.5	267	204	94.5
		63.9	28.6	346.5	277	214	99.5
IPH-35B-16 -40-11	15.8	40.8	26.9	334.5	262.5	197	91
		50.3	27.9	341.5	269.5	204	94.5
		63.9	28.9	351.5	279.5	214	99.5

Note) IPH-34B (35B)-*-L-11 (foot mounting/flange mounting, counterclockwise rotation) are the mirror image of the drawings shown above. In the case the individual IN port is facing upwards, the discharge port flange is positioned to the right when viewed from the shaft side.

IPH-36B-*-11
(Flange Mounting, Clockwise Rotation)

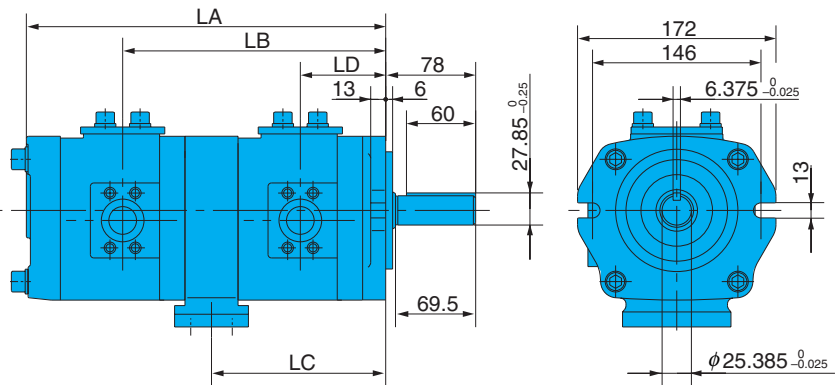
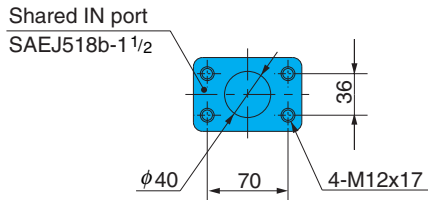
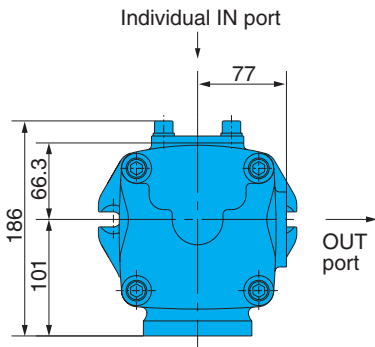


Specifications

Model No.	Volume cm ³ /rev		Weight kg	Dimensions (mm)			
	Vent Side	Shaft Side		LA	LB	LC	LD
IPH-36B-10 - 80-11	10.2	81.3	47.8	370.5	304	240	111.5
-100		101.6	49.8	380.5	314	250	116.5
-125		125.9	51.8	392.5	326	262	122.5
IPH-36B-13 - 80-11	13.3	81.3	48.0	376.5	307	240	111.5
-100		101.6	50.0	386.5	317	250	116.5
-125		125.9	52.0	398.5	329	262	122.5
IPH-36B-16 - 80-11	15.8	81.3	48.3	381.5	309.5	240	111.5
-100		101.6	50.3	391.5	319.5	250	116.5
-125		125.9	52.3	403.5	331.5	262	122.5

Note) Dimensions shown in this diagram are for a single pump.

IPH-44B-*-11
(Flange Mounting, Clockwise Rotation)



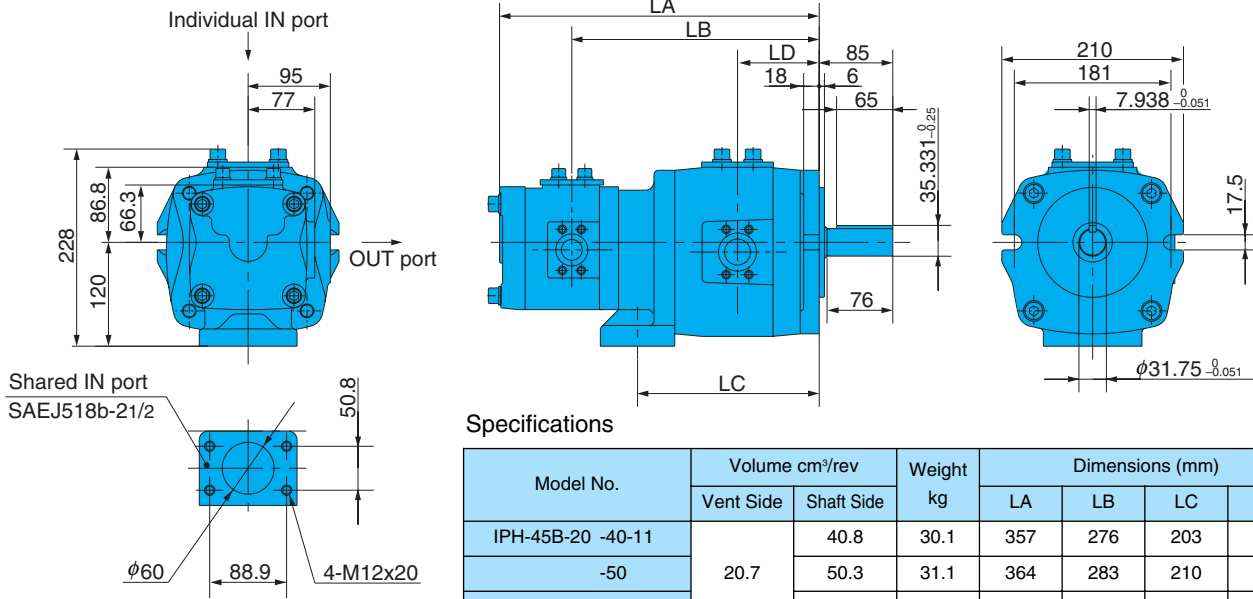
Specifications

Model No.	Volume cm ³ /rev		Weight kg	Dimensions (mm)			
	Vent Side	Shaft Side		LA	LB	LC	LD
IPH-44B-20 -20-11	20.7	20.7	19.5	307	219	145	71
-25		25.7	20.0	313	225	151	74
-32		32.3	20.5	321	233	159	78
IPH-44B-25 -25-11	25.7	25.7	20.5	319	228	151	74
-32		32.3	21.0	327	236	159	78
IPH-44B-32 -32-11	32.3	32.3	21.5	335	240	159	78

Note) IPH-36B (44B)-*-*-L-11 (foot mounting/flange mounting, counterclockwise rotation) are the mirror image of the drawings shown above. In the case the individual IN port is facing upwards, the discharge port flange is positioned to the right when viewed from the shaft side.

IPH-45B-**-11

(Flange Mounting, Clockwise Rotation)



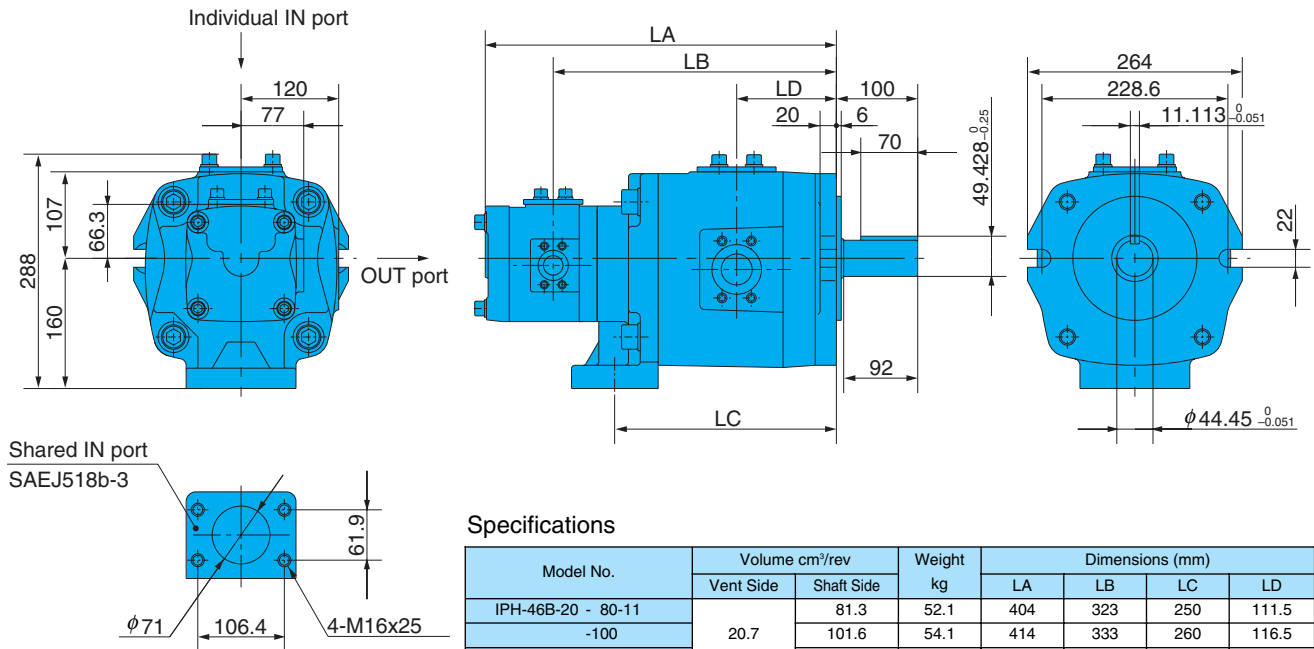
Specifications

Model No.	Volume cm ³ /rev		Weight kg	Dimensions (mm)			
	Vent Side	Shaft Side		LA	LB	LC	LD
IPH-45B-20 -40-11	20.7	40.8	30.1	357	276	203	91
		50.3	31.1	364	283	210	94.5
		63.9	32.1	374	293	220	99.5
IPH-45B-25 -40-11	25.7	40.8	30.6	363	279	203	91
		50.3	31.6	370	286	210	94.5
		63.9	32.6	380	296	220	99.5
IPH-45B-32 -40-11	32.3	40.8	31.1	371	283	203	91
		50.3	32.1	378	290	210	94.5
		63.9	33.1	388	300	220	99.5

Note) Dimensions shown in this diagram are for a single pump.

IPH-46B-**-11

(Flange Mounting, Clockwise Rotation)



Specifications

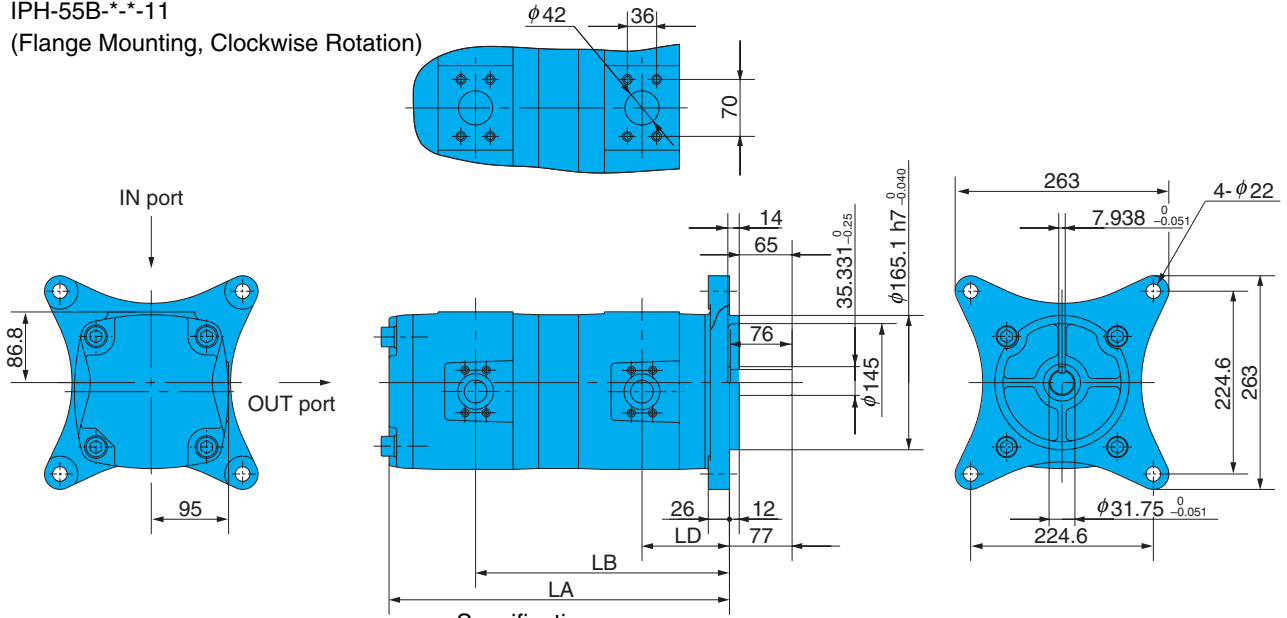
Model No.	Volume cm ³ /rev		Weight kg	Dimensions (mm)			
	Vent Side	Shaft Side		LA	LB	LC	LD
IPH-46B-20 - 80-11	20.7	81.3	52.1	404	323	250	111.5
		101.6	54.1	414	333	260	116.5
		125.9	56.1	426	345	272	122.5
IPH-46B-25 - 80-11	25.7	81.3	52.6	410	326	250	111.5
		101.6	54.6	420	336	260	116.5
		125.9	56.6	432	348	272	122.5
IPH-46B-32 - 80-11	32.3	81.3	53.1	418	330	250	111.5
		101.6	55.1	428	340	260	116.5
		125.9	57.1	440	352	272	122.5

Note) Dimensions shown in this diagram are for a single pump.

Note) IPH-45B (46B)-**-L-11 (foot mounting/flange mounting, counterclockwise rotation) are the mirror image of the drawings shown above. In the case the individual IN port is facing upwards, the discharge port flange is positioned to the right when viewed from the shaft side.

IPH-55B-*-11

(Flange Mounting, Clockwise Rotation)



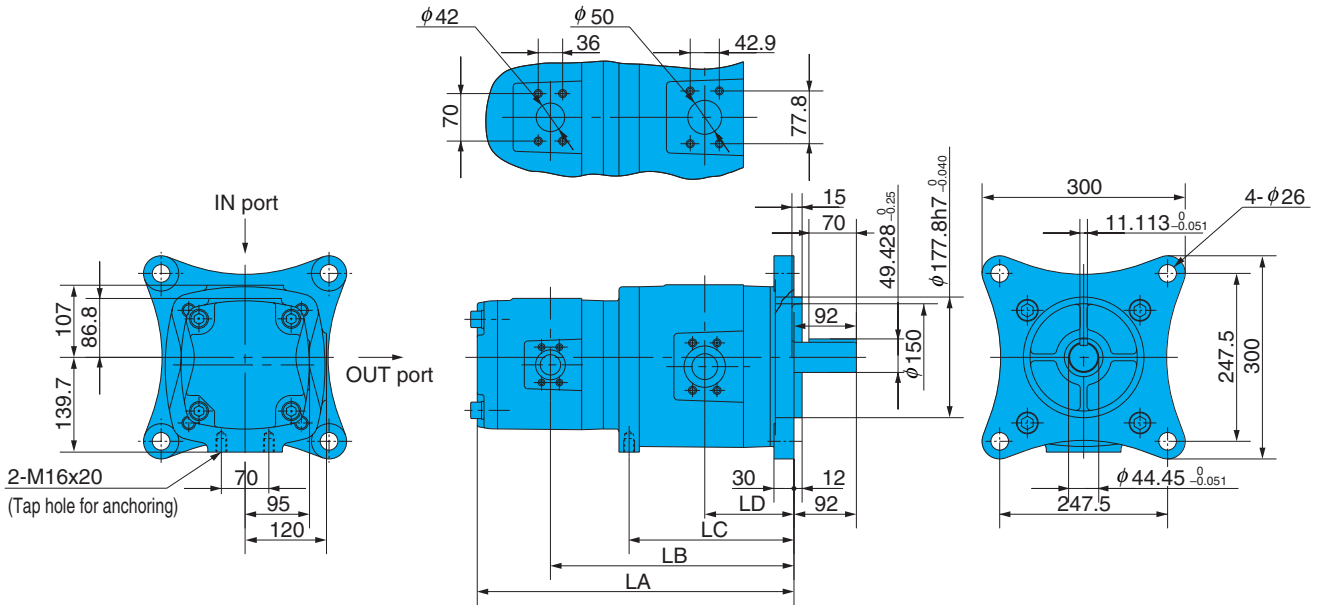
Specifications

Model No.	Volume cm ³ /rev		Weight kg	Dimensions (mm)		
	Vent Side	Shaft Side		LA	LB	LD
IPH-55B-40 -40-11	40.8	40.8	45.5	385	286	99
-50		50.3	46.5	392	293	102.5
-64		63.9	47.5	402	303	107.5
IPH-55B-50 -50-11	50.3	50.3	47.5	399	296.5	102.5
-64		63.9	48.5	409	306.5	107.5
IPH-55B-64 -64-11	63.9	63.9	49.5	419	311.5	107.5

Note) Dimensions shown in this diagram are for a single pump.

IPH-56B-*-11

(Flange Mounting, Clockwise Rotation)



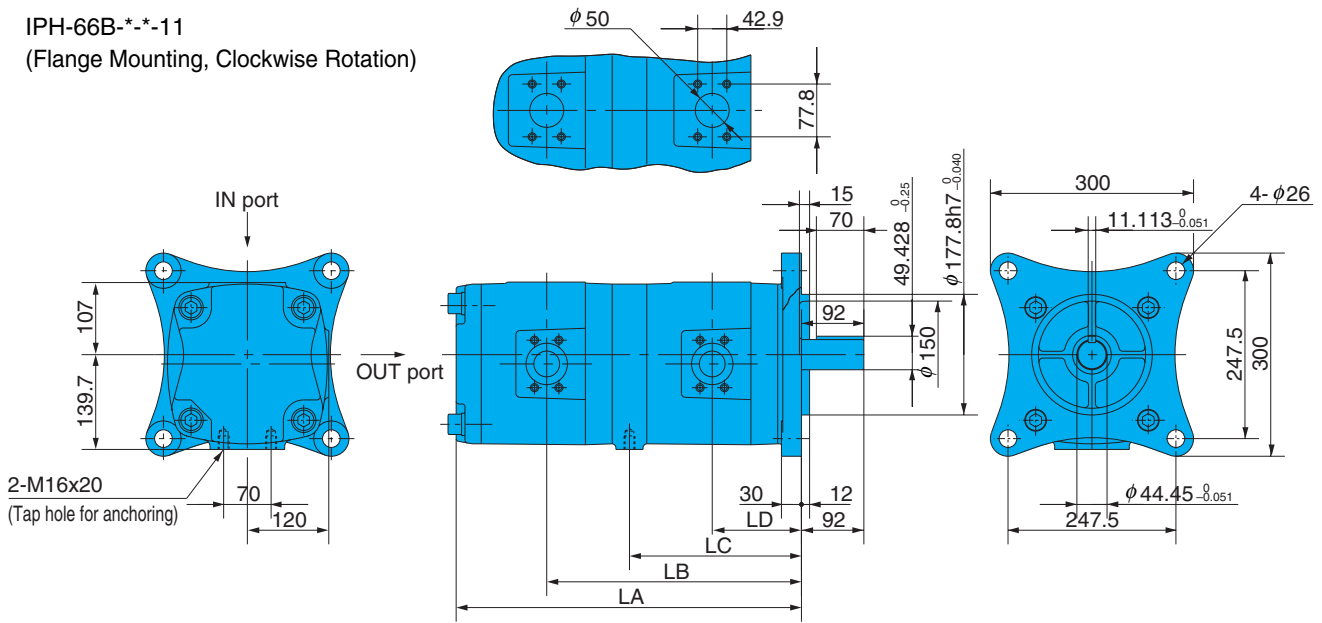
Specifications

Model No.	Volume cm ³ /rev		Weight kg	Dimensions (mm)			
	Vent Side	Shaft Side		LA	LB	LC	LD
IPH-56B-40 - 80-11	40.8	81.3	70.6	427	328	221	120.5
-100		101.6	72.6	437	338	231	125.5
-125		125.9	74.6	449	350	243	131.5
IPH-56B-50 - 80-11	50.3	81.3	71.6	434	331.5	221	120.5
-100		101.6	73.6	444	341.5	231	125.5
-125		125.9	75.6	456	353.5	243	131.5
IPH-56B-64 - 80-11	63.9	81.3	72.6	444	336.5	221	120.5
-100		101.6	74.6	454	346.5	231	125.5
-125		125.9	76.6	466	358.5	243	131.5

Note) Dimensions shown in this diagram are for a single pump.

Note) IPH-55B (56B)-*-L-11 (foot mounting/flange mounting, counterclockwise rotation) are the mirror image of the drawings shown above. In the case the individual IN port is facing upwards, the discharge port flange is positioned to the right when viewed from the shaft side.

IPH-66B-**-*-11
(Flange Mounting, Clockwise Rotation)



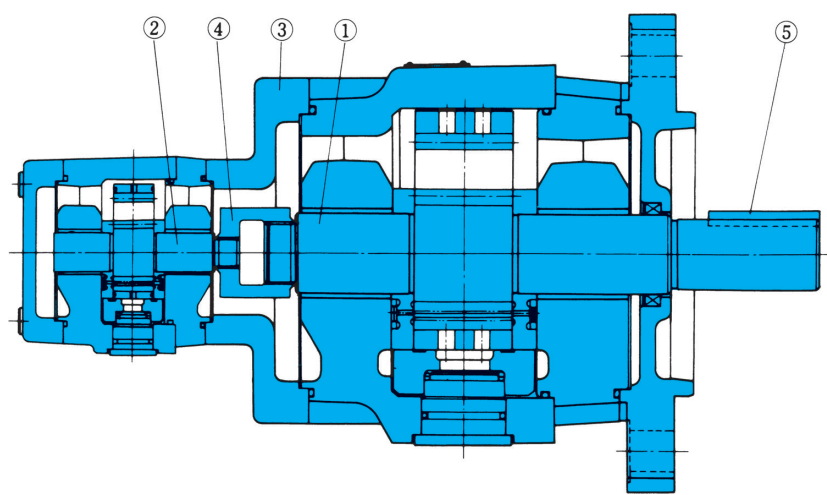
Specifications

Model No.	Volume cm ³ /rev		Weight kg	Dimensions (mm)			
	Vent Side	Shaft Side		LA	LB	LC	LD
IPH-66B- 80- 80-11	81.3	81.3	89.1	470	347.5	234	120.5
-100		101.6	91.1	480	357.5	244	125.5
-120		125.9	93.1	492	369.5	256	131.5
IPH-66B-100-100-11	101.6	101.6	93.1	490	362.5	244	125.5
-125		125.9	95.1	502	374.5	256	131.5
IPH-66B-125-125-11	125.9	125.9	97.1	514	380.5	256	131.5

Note) Dimensions shown in this diagram are for a single pump.

Note) IPH-66B-*-L-11 (foot mounting/flange mounting, counterclockwise rotation) are the mirror image of the drawings shown above. In the case the suction port flange is facing upwards, the discharge port flange position is to the right when viewed from the shaft side.

Cross-sectional Drawing IPH Series Double IP Pump



Part No.	Part Name
1	Pinion shaft -1
2	Pinion shaft -2
3	Body -3
4	Joint
5	Key

Note) In the case of a double pump, use single pump parts in addition to the 5 parts listed above.

● **IPS Series Double IP Pump Seal Kit**
The double pump seal kit combines a shaft side pump seal kit with a head side pump seal kit. The shaft side pump seal kit (IHAS-2S****-**) is the same as the single pump seal kit. The head side pump seal kit (IHAS-2H****-**) includes the same

component parts as the single pump seal kit, except that it does not have a #23 oil seal. See the IPH Series (single) IP pump section in page C-9 for more information.

● **Air bleed-off valve**
See the IPH Series (single) IP pump section in page C-13.

NACHI Hydraulic Valves

Features

- ① Maximum operating pressure of 21 to 35MPa {214 to 357kgf/cm²} provides smooth operation at high pressures. Low leakage for high efficiency.
- ② Extremely stable performance across all pressure ranges.
- ③ Conformance with ISO recommended dimensions for most gasket installations enables a high degree of international compatibility.
- ④ A highly reliable and quiet wet type solenoid valve series is available when the noise and reliability issues of solenoid valves are a problem.
- ⑤ A comprehensive pipe-less series provides the ultimate in compact design and reliability.
- ③ Make sure that the return piping from the hydraulic valve to the tank is below the fluid level surface.
- ④ Be sure to use only specified bolts on hydraulic valves. Use 12T bolts or equivalent.
- ⑤ Installation bolts are not included with any modular valves, the SS, SA, SF, and SNG G01 size solenoid valves, the DMA-G01 manual valve, or with sub plates. Bolts are included with gasket type valves other than those mentioned above.
- ⑥ Use O-rings with a hardness of Hs-90 for valve gasket O-rings.

6 for details on applicable models. Contact your agent for information about other fire-resistant hydraulic fluids and special fluids.

- ④ Foreign matter in the hydraulic operating fluid can lead to frequent valve operation problems. Use a 25μm line filter to protect against contamination.

Terms Used in This Catalog

The following describes the meanings of the following terms used in this catalog:

- **Rated Flow Rate :**
Specific guaranteed flow rate under certain fixed conditions
- **Maximum Flow Rate :**
Maximum flow rate that satisfies valve function
- The following are the ratings that apply to the seal part list.
JIS standard B2401 (O-ring)
JIS standard B2407 (backup ring)
SAE standard AS568 (O-ring)
- Pipe apertures mentioned in this catalog that are indicated as "G*/*" comply with JIS B2351 O-ring seal systems.

Installation and Maintenance

- ① Installation is possible in horizontal, vertical, and diagonal configurations. However, the spool must be oriented horizontally in the case of a solenoid valve or hydraulic switching solenoid valve no-spring type.
- ② Precision finish the mounting surface to a surface roughness of 1.6a and degree of flatness of 0.01mm.

Management of Hydraulic Operating Fluid

- ① Use mineral oil-based hydraulic operating fluid.
- ② See pages N-1 and N-2 for information about the viscosity of the operating fluid you need to use.
- ③ When using phosphate ester base operating fluid, include "P-" at the beginning of the model number.
When using water- or glycol-based hydraulic operating fluid, refer to pages N-4 through N-

Calculation of Hydraulic Valve Pressure Loss

Use the following formula to convert pressure loss values for each hydraulic valve in accordance with changes in operating fluid viscosity.

$$\Delta P_2 = \left(\frac{v_2}{v_1}\right)^{1/4} \cdot \Delta P_1$$

ΔP_1 : Pressure loss MPa {kgf/cm²} at for viscosity v_1

ΔP_2 : Pressure loss MPa {kgf/cm²} at for viscosity v_2

v_1 : Viscosity mm²/s

v_2 : Viscosity mm²/s

The graph on the right shows coefficient values $(v_2/v_1)^{1/4}$ viscosity ratios (v_1/v_2) .

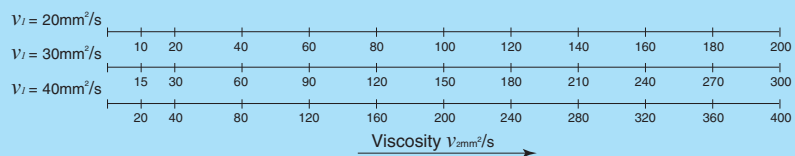
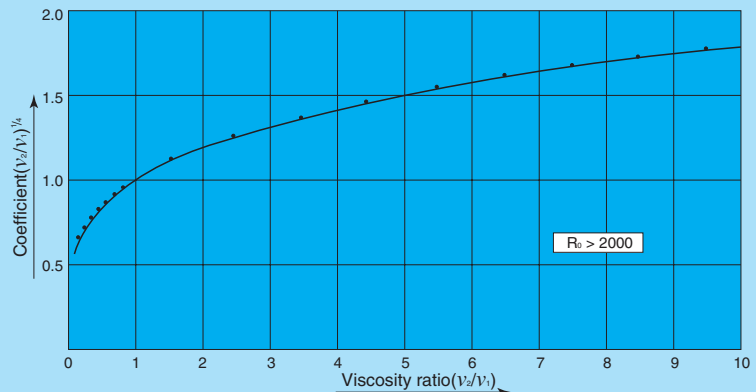
<Example>

For a value whose pressure loss at the rated flow rate when $v_1 = 30\text{mm}^2/\text{s}$ is $\Delta P_1 = 0.3\text{MPa}\{3.1\text{kgf/cm}^2\}$, a change in viscosity to $v_2 = 90\text{mm}^2/\text{s}$ produces a pressure loss of $(v_2/v_1)^{1/4} = 3$. According to the graph on the right, coefficient $(v_1/v_2)^{1/4} = 1.3$.

Accordingly :

$$\Delta P_2 = 1.3\Delta P_1 = 1.3 \times 0.3$$

$$\text{MPa}\{3.1\text{kgf/cm}^2\} = 0.39\text{MPa}\{4.03\text{kgf/cm}^2\}$$



Factory Default Handle Setting

The following are the factory default pressure and flow rate settings for handles (screws) on adjustable valves.

- ① Pressure Control Valve: Near the minimum control pressure
- ② Flow Control Valve: Near the minimum control flow rate

Note, however, that ER and ESR relief valves are set to rated pressures. For

details, see the applicable pages for each type of valve.

Hydraulic Valve Selection Table

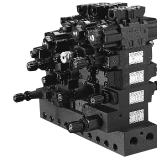
Pump Type	Name	Type Classification	Maximum Working Pressure MPa (kgf/cm ²)	Maximum Flow Rate ℓ /min											Page		
				1	2	5	10	20	50	100	200	500	1000	2000		5000	
Modular Valves	Relief modular valve	OR	25 {255}					01			03	04					D-13
	Brake modular valve	ORO	25 {255}		01					03							D-19
	Direct relief modular valve	ORD	25 {255}		01					03	04						D-23
	Pressure reducing modular valve	OG	25 {255}		01						03	04					D-28
	01 Size balance type Pressure reducing modular valve	OGB	25 {255}		01												D-35
	Reducing valve & modular valve	OG	25 {255}		01						03	04					D-37
	2-pressure reducing modular valve	OGS	25 {255}		01												D-44
	Sequence modular valve	OQ	25 {255}		01						03						D-47
	Counter balance modular valve	OCQ	25 {255}		01						03	04					D-50
	Pressure switching modular valve	OW	25 {255}		01												D-55
	Flow regulator modular valve	O(C)Y	25 {255}		01						03	04					D-58
	Flow control modular valve	O(C)F	25 {255}		01						03	04					D-66
	Check modular valve	OC(V)	25 {255}		01						03	04					D-72
	Pilot operated check modular valve	OCP	25 {255}		01						03	04					D-79
Solenoid Valves	SS wet type solenoid valve	SS	35 {357}					01				03				E- 1	
	SA wet type solenoid valve	SA	35 {357}					01				03				E-13	
	SE low power type solenoid valve	SE	21 {214}					01				03				E-25	
	SL wet type solenoid valve	SL	7 {71}					01								E-31	
	DSS(A) solenoid control valve	DSS DSA	35 {357}							04					06	E-38	
	Fine Solenoid Valve	SF	21 {214}					01								E-46	
	Non-leak Type Solenoid Valve	SNH	35 {357}		01						03	04	06			E-50	
Pressure Control Valves	Relief valve	R	21 {214}							03		06	10			F- 1	
	RI series relief valve	RI	35 {357}							03		06				F- 5	
	Remote control valve	RC(D)	21 {214}	RC-02	RCD-02											F- 8	
	Solenoid control relief valve	RSS(A)	21 {214}							03		06	10			F-10	
	RIS Series Solenoid control relief valve	RIS	35 {357}							03		06				F-15	
	Reducing (& check) valve	(C)G	21 {214}					03				06	10			F-18	
	Balancing valve	GR	21 {214}		01					03						F-23	
	Pressure control (& check) valve	(C)Q	21 {214}					03				06	10			F-25	

Note) Maximum operating pressure for the modular valve series is 35MPa {357kgf/cm²}.

Pump Type	Name	Type Classification	Maximum Working Pressure MPa (kgf/cm ²)	Maximum Flow Rate ℓ /min											Page			
				1	2	5	10	20	50	100	200	500	1000	2000		5000		
Flow Control Valves	Throttle (& check) valve	(C)FR	21 {214}				03			06	10						G- 1	
	FT type low control valve	(C)FT	21 {214}				02			03							G- 4	
	F type control valve	(C)F	21 {214}				06					10					G- 8	
	TN type flow control valve	(C)TN	10.5 {107}				02										G-11	
	TS type flow control valve	(C)TS	10.5 {107}				01										G-14	
	TL type flow control valve	TL(T)	7 {71}				03, 04										G-16	
Direction Control Valves	Right angle check valve	CA	21 {214}				03			06	10						H- 1	
	In-line check valve	CN	21 {214}				03			06	10						H- 1	
	Pilot check valve	CP	21 {214}				03			06	10						H- 4	
	Gauge cock	K ₂	42 {427}														H- 7	
	DMA type manual valve	DMA	35 {357}				01			03							H- 8	
Electro-hydraulic Proportional Control Valves	Pilot relief valve	EPR	35 {357}				01										I- 2	
	Relief valve	ER	35 {357}				03			06							I- 4	
	Relief and reducing valve	EGB	25 {255}				03			06							I- 6	
	Flow control valve	(C)ES	21 {214}				02			03	06	10					I- 8	
	Load response control valve	ESR	25 {255}				03			06	10						I-11	
	Flow direction control valve	ESD	25 {255}				01			03	04	06	10				I-14	
	Modular type reducing valve	EOG	25 {255}				01										I-22	
	Modular type flow control valve	EOF	21 {214}				01										I-24	
	Driver power amplifier	EMA EMC	-															I-26
	Driver power compact amplifier	EBA EBC	-															I-30
	Compact multi-function power amplifier	EDA EDC	-															I-34
High-response Proportional Flow Control Valve	High-response proportional flow control valve	ESH	32 {327}				01			03	04	06					I-38	
	High-speed response proportional control valve amplifier	EHA	-														I-42	
Electro-hydraulic Servo Valves	NACHI-MOOG servo valve	EN	35 {357}														I-44	
Other	Hydro-logic valve	HT, HF	28 {286}				06			10	16	24					J- 1	

Modular Valve Series

20 to 300 ℓ /min
21,25,35MPa



Overview

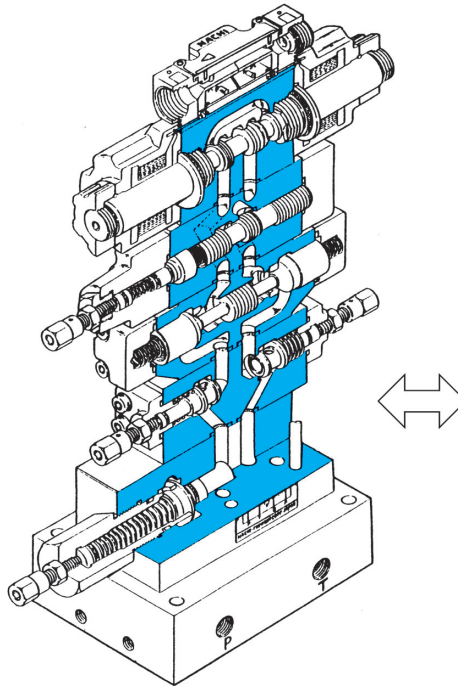
The modular valve is designed and engineered to integrate multiple hydraulic valve operations into a single unit, which eliminates the need for piping between valves and

enables configuration of a circuit using a single modular valve. The result is an innovative valve system whose energy and materials efficiency pro-

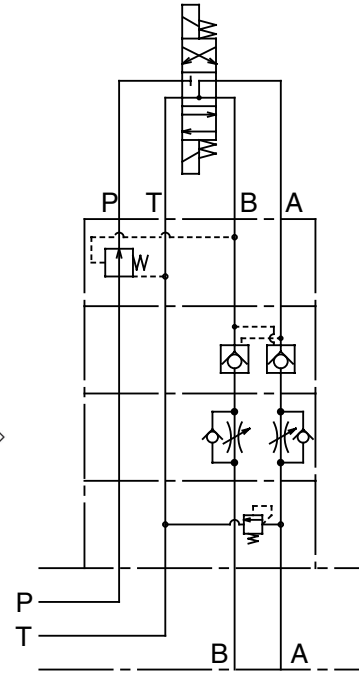
vide advantages in terms of compact configuration, reliability, and more. The illustrations below show one example of a circuit configuration using this system.

Features

- ① High pressure and high volume. Available maximum operating pressure operations are 21, 25, and 35MPa {214, 255, 357kgf/cm²}, while maximum control flow rates are G01 50 ℓ /min, G03 100 ℓ /min, G04 300 ℓ /min.
- ② Ganging and bolting format allows for quick and easy circuit configuration as well as circuit changes and additions.
- ③ Compact module configurations greatly reduce space requirements.
- ④ Maintenance costs are also reduced because less piping and fewer couplings mean less need for acid rinsing and flushing of pipes.
- ⑤ Fewer fluid leak problems due to pipe resonance, noise, and loose couplings.
- ⑥ Circuit configuration is simple yet exact. Nameplates on the side of the valve show JIS codes that make it quick and easy to determine its performance.
- ⑦ A full lineup of models is available to meet a wide range of needs and circuit configurations: Model G01 58 Type 131, G03 52 Type 96, G04 30 Type 68.



Integrated Structural Diagram



Integrated Circuit Diagram

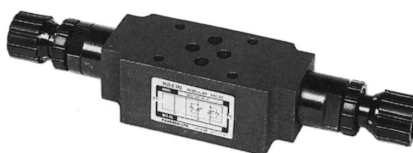
Specifications

Name	Nominal Diameter (Size)	Maximum Working Pressure MPa {kgf/cm ² }	Maximum Flow Rate ℓ /min	Gasket Surface Dimensions	Possible Number of Ganged Valves (Note 2)
01 Series	1/8	25{255}(Note 1)	50	ISO 4401-03-02-0-94	1 to 4
03 Series	3/8	25{255}(Note 1)	100	ISO 4401-05-04-0-94	1 to 4
04 Series	1/2	35{357}	300	ISO 4401-07-06-0-94	1 to 3(Note 3)

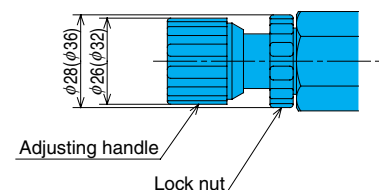
- Note) 1. The M35 Series is available as a 35MPa {357kgf/cm²} maximum operating pressure version of the 01 and 03 Series. For details, see pages D-98 and D-99.
 2. The number of ganged valves does not include solenoid valves.
 3. Depending on maximum operating pressure, up to four valves can be ganged together. For details, consult your agent.

K Series Modular Valve

The valve shown in the photograph is available with nominal diameter 01 and 03 size adjusting bolts. Use the following format for specification.



Auxiliary symbol
K: With handle

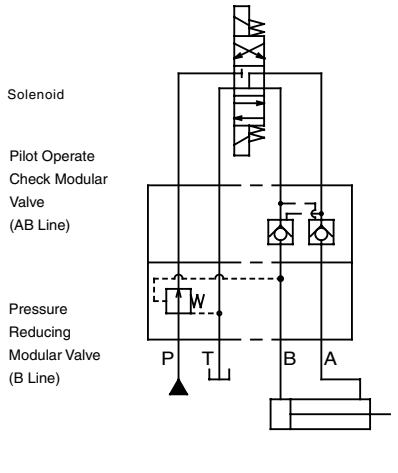
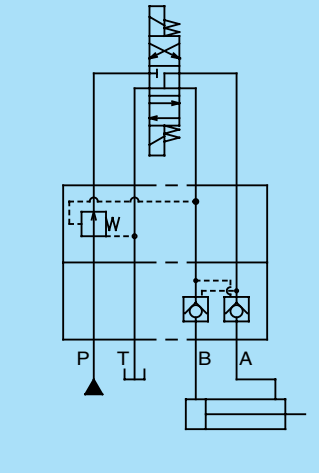
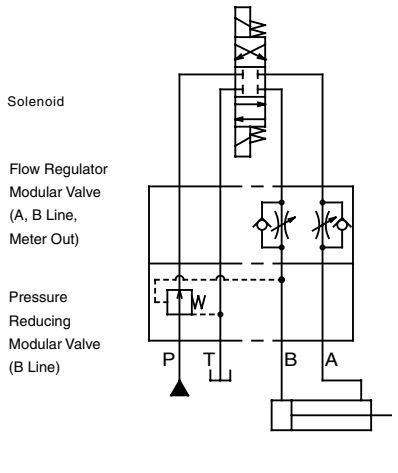
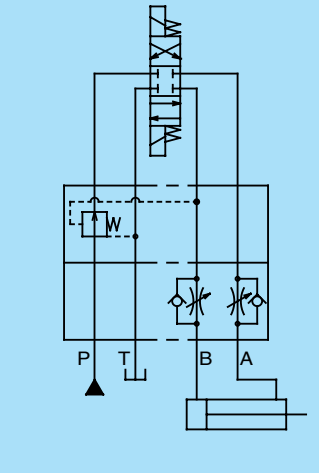
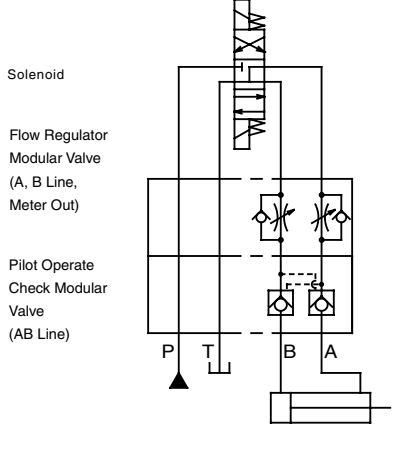
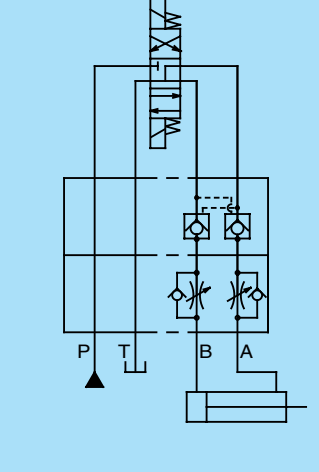


Dimensions in parentheses indicate nominal diameter 03.

Example: OCY-G01-W-Y-K-20

Precautions when Ganging Modular Valves

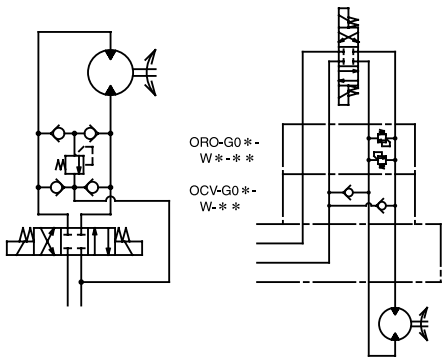
Note the following precautions when ganging modular valves together in the applicable example circuits.

Circuit Diagram	Description	Incorrect	Correct
<p>Locking Circuit and Pressure Reducing Circuit</p>	<ul style="list-style-type: none"> ● Cylinder position not maintained ○ Leaks occur because, during the pilot check, the line being maintained flows into the pilot line of the reducing valve. 	<p>Solenoid</p> <p>Pilot Operate Check Modular Valve (AB Line)</p> <p>Pressure Reducing Modular Valve (B Line)</p> 	
<p>Pressure Reduction Circuit with Speed Control</p>	<ul style="list-style-type: none"> ● Insufficient cylinder output and drop in speed ○ Pressure increases due to the restrictor effect of the flow regulator. Since the pilot runs from that line, pressure reduction makes smooth operation impossible. 	<p>Solenoid</p> <p>Flow Regulator Modular Valve (A, B Line, Meter Out)</p> <p>Pressure Reducing Modular Valve (B Line)</p> 	
<p>Locking Circuit and Speed Control Circuit</p>	<ul style="list-style-type: none"> ● Cylinder knocking ○ Pressure is increased by the restrictor effect of the flow regulator. That pressure moves the pilot check in the closed direction, which causes the valve to repeatedly open and close. 	<p>Solenoid</p> <p>Flow Regulator Modular Valve (A, B Line, Meter Out)</p> <p>Pilot Operate Check Modular Valve (AB Line)</p> 	

Valve Ganging Circuit Configuration Examples

Anti-cavitation Circuit

G 01
03

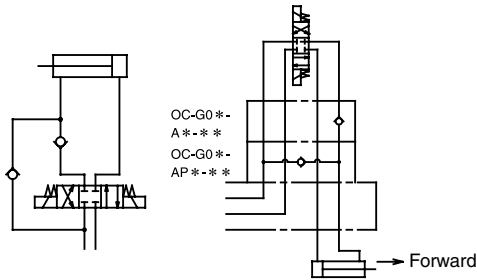


OR0-G0*-
W*-**
OCV-G0*-
W*-**

- Surge pressure is prevented by the inertia of the actuator, and cavitation by fluid being sucked in through the opposite port, which is in negative pressure, is prevented.
- Example Valve Model Numbers (G03)
Relief Valve ————— OR0-G03-W*-J50
Vacuum Check Valve ——— OCV-G03-W-J50

Differential Circuit

G 01
03



OC-G0*-
A*-**
OC-G0*-
AP*-**

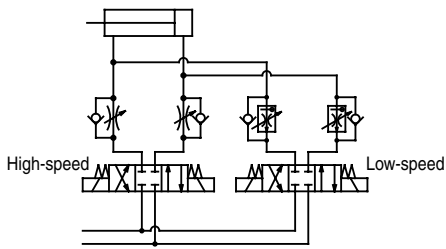
- When the cylinder advances, the rod side return fluid returns to the P port and the pump discharge rate and confluence are advanced at high speed (differential).
- Example Valve Model Numbers (G03)
Check valve ————— OC-G03-A*-J50
Differential check valve ——— OC-G03-AP*-J50

Important:

Cylinder effective output is the rod surface area portion only.

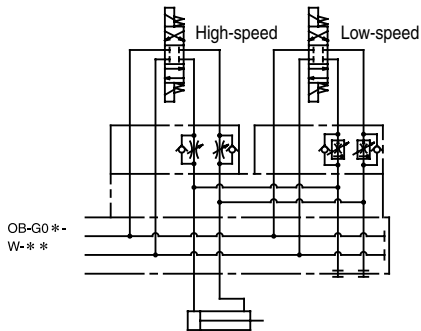
2-speed Circuit

G 01
03



OB-G0*-
W*-**

- This type of circuit allows variation between two actuator speeds. It prevents low-speed shock when the actuator starts up or stops, and it used when the intermediate stroke is operated at high speed.
- Example Valve Model Numbers (G03)
2-speed Plate ————— OB-G03-W-(H)-J30
High-speed Flow Regulator Valve ——— 0CY-G-03-W-Y-J51
Low-speed Flow Control Valve ——— 0CF-G03-W60-Y-J50



G01 Modular Valve Series

Type	Name	Valve Model Number	Pressure Adjustment Range (Check Valve Cracking Pressure) MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	JIS Symbol	Height mm	Weight kg	Catalog Page	
Solenoid Valves	Solenoid Valve	SS-G01-**-R**-31 SA-G01-**-**'-31		100				E-1 E-13	
Pressure Control Valves	Relief Valves (Balance Type)	OR-G01-P ₃ ¹ -20		50		40	1.5	D-13	
		-W ₃ ¹ -20	1:* to 7 (* to 71.4) 3:3.5 to 25 {35.7 to 255}				2.3		
		-A ₃ ¹ -21	*See page D-17 for these items.				1.6		
		-B ₃ ¹ -21							
	Brake Valves (Direct Type)	ORO-G01-W ₃ ¹ -20		20		40	1.5	D-19	
		-A ₃ ¹ -20	1:0.8 to 7 {8.2 to 71.4}				1.4		
		-B ₃ ¹ -20	3:3.5 to 21 {35.7 to 214}						
	Direct Relief Valves (Direct Type)	ORD-G01-W ₃ ¹ -20		20		40	1.5	D-23	
		-A ₃ ¹ -20	1:0.8 to 7 {8.2 to 71.4}				1.4		
		-B ₃ ¹ -20	3:3.5 to 21 {35.7 to 214}						
	Reducing Valves (Direct Type)	OG-G01-P1 ₂ ^C -21		50		40	1.3	D-28	
		-A1 ₂ ^C -21	C:0.15 to 3.5 {1.5 to 35.7}				D-37		
		-B1 ₂ ^C -21	1:0.8 to 7 {8.2 to 71.4}						
	Balance Type Reducing Valves	OGB-G01-P1 ₃ ^C -20		40		40	1.9	D-35	
		-A1 ₃ ^C -20	C:0.15 to 3.5 {1.5 to 35.7}						
-B1 ₃ ^C -20		1:0.8 to 7 {8.2 to 71.4}							
Pressure Control Valves (Sequence Valves)	OQ-G01-P2 ₃ ¹ -20		1:0.8 to 7{8.2 to 71.4}	40		40	1.1	D-47	
Pressure Control Valves (Counter Balance Valves)	OCQ-G01-A1 ₂ ¹ -20	3:3.5 to 21{35.7 to 214}	D-50						
Pressure Switches		OW-G01-P1-R ^C -30	C:0.5 to 3.5 {5.1 to 35.7}	50		40	1.8	D-55	
		-W1-R ^C -30	1:0.8 to 7{8.2 to 71.4}				2.6		
		-A1-R ^C -30	3:3.5 to 21 {35.7 to 214}				1.8		
		-B1-R ^C -30	Contact Capacitance AC125V:5A DC 14V:5A DC 30V:4A						
Flow Control Valve	Flow Regulator Valve	OY-G01-T-20		50		40	1.0	D-58	
	Flow Regulator Valves with Check	OCY-G01-P-20	(0.04{0.4})						
	Meter-Out Flow Regulator Valves		OCY-G01-W-Y-20		50		40	1.3	D-58
			-A-Y-20	(0.08{0.8})				1.2	
			-B-Y-20						

G01 Modular Valve Series

Type	Name	Valve Model Number	Pressure Adjustment Range (Check Valve Cracking Pressure) MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	JIS Symbol	Height mm	Weight kg	Catalog Page	
Flow Control Valves	Meter-in Flow Regulator Valve	OCY-G01-W-X-20	(0.08{0.8})	50		40	1.3	D-58	
		-A-X-20							
		-B-X-20							
	Flow Control Valve	OF-G01-P20-20	(Control Flow Rate) Differential Pressure 7{71.4}:0.1 to 20 Differential Pressure 21{214}:0.3 to 20				1.2	D-66	
	Meter-out Flow Control Valves	OCF-G01-W40-Y-30	(Control Flow Rate) Differential Pressure 7{71.4}:0.1 to 40 Differential Pressure 25{255}:0.5 to 40	40		40	1.7		
		-A40-Y-30					1.5		
		-B40-Y-30					1.7		
	Meter-in Flow Control Valves	OCF-G01-W40-X-30	(Control Flow Rate) Differential Pressure 7{71.4}:0.1 to 40 Differential Pressure 25{255}:0.5 to 40	40		40	1.5		
		-A40-X-30					1.5		
		-B40-X-30					1.5		
Direction Control Valve	Check Valves	OC-G01-P2-20 1 3	Cracking pressure $\left[\begin{array}{l} 1:0.04\{0.4\} \\ 2:0.35\{3.6\} \\ 3:0.50\{5.1\} \end{array} \right]$ *For differential circuit	50		40	1.0	D-72	
		T2-20 1 3							
		-A2-21 * 1 3							
		-AP2-20 * 1 3							
	Vacuum Check Valves	OCV-G01-W-20	(0.015{0.15})	20			1.0		
	Pilot Check Valves	OCP-G01-W ₂ ¹ -(F)-21	Cracking pressure $\left[\begin{array}{l} 1:0.2\{2.0\} \\ 2:0.5\{5.1\} \end{array} \right]$ (Auxiliary Symbol) Open Valve Ratio Standard: Parent Valve 37% F: Child Valve 6% : Parent Valve 51%	50		40	1.2		
		-A ₂ ¹ -(F)-21							
-B ₂ ¹ -(F)-21									
Composite Valves	2-pressure Reducing Valves	OGS-G01-P ₁ ^C -K(R)-**22 High pressure side Low pressure side Power supply : C1, C2, D1, D2	C:0.2 to 3.5 {2.0 to 35.7} 1:0.8 to 7 {8.2 to 71.4} 2:3.5 to 14 {35.7 to 143}	40		90	4.8	D-44	
Other	Gauge Modular Blocks	OK-G01-P-(H)-20		50		25 (H:40)	0.6 (H:1.0)	D-84	
		-T-(H)-20							
		-W-(H)-20							
	2-speed Plates	OB-G01-W-(H)-20		50					D-86
	End Plates	MOB-G01-(H)-10		-			20 (H:36)	0.3 (H:0.6)	D-88
	Free-flow plate	MOB-G01-A-10		50			36	0.6	D-96
		-B-10							
	Base Blocks (Multi-block)	MOB -01X-B*-10	B: A, B ports *: Sequential number from 2 to 6 Single side outlet						D-90
-01Y-W*-10		W: A, B ports Sequential number from 1 to 6 Dual side outlet							
Sub Plate	MSA-01Y-10 MSA-01Y-T-10	None: Back side outlet T: Side outlet						D-90	

G03 Modular Valve Series

Type	Name	Valve Model Number	Pressure Adjustment Range (Check Valve Cracking Pressure) MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	JIS Symbol	Height mm	Weight kg	Catalog Page
Solenoid Valves	Solenoid Valves	For M6 For M8 SS-G03-**-R**-J21-21 SA-G03-**-** -J21-21		160				E-1 E-13
		Pressure Control Valve	Relief Valves (Balance Type)	OR-G03-P ₃ ¹ -J50	1: * to 7 {* to 71.4} 3: 3.5 to 25 {35.7 to 255}	80		3.1
-W ₃ ¹ -J50	3.9							
-A ₃ ¹ -J50	3.1							
-B ₃ ¹ -J50	3.1							
OR-G03-P ₃ ¹ -V-J50	3.1							
Brake Valves (Direct Type)	ORO-G03-W ₃ ¹ -J50		1: 0.8 to 7 {8.2 to 71.4} 3: 3.5 to 25 {35.7 to 255}	30	55		4.8	D-19
	-A ₃ ¹ -J50						4.0	
	-B ₃ ¹ -J50							
Direct Relief Valves (Direct Type)	ORD-G03-W ₃ ¹ -J50		1: 0.8 to 7 {8.2 to 71.4} 3: 3.5 to 25 {35.7 to 255}	30	55		3.9	D-23
	-A ₃ ¹ -J50						3.1	
	-B ₃ ¹ -J50							
Reducing valve	OG-G03-P ₃ ^C -(B)-J51		C: 0.25 to 3.5 {2.5 to 35.7} 1: 0.8 to 7 {8.2 to 71.4} 3: 3.5 to 21 {35.7 to 214}	80 However, C: 50	55			D-28
	-A ₃ ^C -(B)-J51						3.6	D-37
	-B ₃ ^C -(B)-J51							
	OG-G03-P ₃ ^C -(B)V-J51							D-28
Pressure Control Valves (Sequence Valves)	OQ-G03-P2C-J50	A: 0.25 to 0.85 {2.5 to 8.7}	80	55			D-47	
	OCQ-G03-A1C-J50	C: 0.85 to 3.5 {8.7 to 35.7}				55	3.5	D-50
		E: 3.5 to 14 {35.7 to 143}						
Flow Control Valve	Flow Regulator Valve	OCY-G03-P _{P-H} -J50	(Function) H: High differential pressure regula-tor (0.1{1})	100		2.9	D-58	
	Meter-Out Flow Regulator Valves	-W-Y -W-HY ⁻ J51				3.1		
		-A-Y -A-HY ⁻ J51						
		-B-Y -B-HY ⁻ J51				3.0		

*There is no problem with seals and other parts when mixing these valves with NACHI G03 modular valve design number (J) 30 valves.

*G03 module valve installation bolts
For M6: Design number J50
For M8: Design number 50
Unit has commonality. Also, two J-pins have been inserted diagonally for M6 applications.

Note) G03 series modular valves have two T port locations: one on the A port side T_(A) and one on the B port side T_(B). The port that is used depends on the model number. See page D-11 for details about JIS symbols.

G03 Modular Valve Series

Type	Name	Valve Model Number	Pressure Adjustment Range (Check Valve Cracking Pressure) MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	JIS Symbol	Height mm	Weight kg	Catalog Page
Flow Control Valve	Meter-in Flow Regulator Valve	OCY-G03-W-X -W-HX-J51	(Function) H: High differential pressure regulator (0.1{1})	100		55	3.1	D-58
		-A-X -A-HX-J51					3.0	
		-B-X -B-HX-J51						
	Flow Control Valve	OF-G03-P60-J50	(Control Flow Rate) Differential Pressure 7{71.4};0.3 to 60 Differential Pressure 25{255};0.5 to 60				3.1	D-66
	Meter-out Flow Control Valves	OCF-G03-W60-Y-J50	(Volume control flow rate) Differential Pressure 7{71.4};0.5 to 60 Differential Pressure 25{255};1 to 60 (0.1{1})	60		55	5.0	
		-A60-Y-J50					4.6	
		-B60-Y-J50						
	Meter-in Flow Control Valves	OCF-G03-W60-X-J50					5.0	
		-A60-X-J50						
		-B60-X-J50						
Direction Control Valve	Check Valves	1 OC-G03-P2-J50 3	Cracking pressure 1:0.04{0.4} 2:0.35{3.6} 3:0.50{5.1} *For differential circuit 	100		55	2.7	D-72
		1 T2-J50 3						
		1 -A2-J50 * 3						
		1 -AP2-J50 * 3						
	Vacuum Check Valves	OCV-G03-W-J50	(0.015{0.15})	80		55	3.5	D-72
Pilot Check Valves	Pilot Check Valves	1 OCP-G03-W ₂ ¹ -(D)-J50	Cracking pressure 1:0.2{2.0} 2:0.5{5.1} (Auxiliary Symbol) Open Valve Ratio Standard : Child Valve 7% : Parent Valve 49% D : Parent Valve 49%	100		55	3.6	D-79
		-A ₂ ¹ -(D)-J50						
		-B ₂ ¹ -(D)-J50						
Other	Gauge Block	OK-G03-J50		100		55	2.3	D-84
	2-speed Plates	OB-G03-W-(H)-J30		100		35 (H:55) 45 (H:7.1)		D-86
	End Plates	MOB-G03-J50: For M6 MOB-G03-(H)-50: For M8		-		32 (H:58)	1.4 (H:2.5)	D-88
	Free Flow	MOB-G03-A-J50: For M6 MOB-G03-A-(H)-50: For M8		100		32 (H:58)	1.3 (H:2.3)	
		MOB-G03-B-J50: For M6 MOB-G03-B-(H)-50: For M8						
	Conversion plate (For 03/01 conversion)	MOB-G03-AA-50 MOB-G03-AA-J50		50		45	2.3	D-96
	Base Blocks	MOB-03-B*-J30	*:Sequential number from 2 to 5 A, B port dual side outlet					
	Sub Plate	MSA-03(X)-10 MS-03(X)-30 MSA-03(X)-T-10 MS-03(X)-T-10	MSA : For M6 MS : For M8 None : Back side outlet T : Side outlet					



G03 Modular Valve Series Detailed JIS Symbols

Type	Valve Model Number	Detailed JIS Symbols	Type	Valve Model Number	Detailed JIS Symbols	
Solenoid Valves	For M6, M8 SS-G03-**-R**-J21 -21 SA-G03-**-***-J21 -21		Flow Control Valve	OF-G03-P60-J50		
	OCF-G03-W60-Y-J50					
	OCF-G03-A60-Y-J50					
OCF-G03-B60-Y-J50						
OCF-G03-W60-X-J50						
OCF-G03-A60-X-J50						
OCF-G03-B60-X-J50						
Pressure Control Valve	OR-G03-P ₃ ¹ -J50			Direction Control Valve	OC-G03-P ₂ ¹ -J50	
	OR-G03-W ₃ ¹ -J50				OC-G03-T ₂ ¹ -J50	
	OR-G03-A ₃ ¹ -J50				OC-G03-A ₂ ¹ -J50	
	OR-G03-B ₃ ¹ -J50		OC-G03-AP ₂ ¹ -J50			
	OR-G03-P ₃ ¹ -V-J50		OCV-G03-W-J50			
	ORO-G03-W ₃ ¹ -J50		OCP-G03-W ₂ ¹ -J50			
	ORO-G03-A ₃ ¹ -J50		OCP-G03-A ₂ ¹ -J50			
	ORO-G03-B ₃ ¹ -J50		OCP-G03-B ₂ ¹ -J50			
	ORD-G03-W ₃ ¹ -J50		OK-G03-J50			
	ORD-G03-A ₃ ¹ -J50		Other		OB-G03-W-J30	
	ORD-G03-B ₃ ¹ -J50			MOB-G03-(H)-50 MOB-G03-J50		
	OG-G03-P ₁ ^C -(B)-J51			MOB-G03-A-(H)-50 MOB-G03-A-J50		
	OG-G03-A ₁ ^C -(B)-J51			MOB-G03-B-(H)-50 MOB-G03-B-J50		
	OG-G03-B ₁ ^C -(B)-J51			MOB-G03-AA-50 MOB-G03-AA-J50		
	OG-G03-P ₁ ^C -(B)V-J51			MOB-G03-B*-50 MOB-G03-B*-J50		
	OO-G03-P ₂ ^A C-J50		MS-03(X)-30 MSA-03(X)-10 MS-03(X)-T-10 MSA-03(X)-T-10			
	OCQ-G03-A ₁ ^A C-J50					
	OCQ-G03-B ₁ ^A C-J50					
Flow Control Valve	OCY-G03-P-J50					
	OCY-G03-W-Y-J51					
	OCY-G03-A-Y-J51					
	OCY-G03-B-Y-J51					
	OCY-G03-W-X-J51					
	OCY-G03-A-X-J51					
	OCY-G03-B-X-J51					

G04 Modular Valve Series

Type	Name	Valve Model Number	Maximum Working Pressure	Maximum Flow Rate ℓ /min	Pressure Adjustment Range (Check Valve Cracking Pressure) MPa(kgf/cm ²)	JIS Symbol	Weight kg	Catalog Page
Solenoid Valves	Solenoid Control Valves	DSS-G04-****-R-**21	35MPa {357 kgf/cm ² }	300			15.0	E-31
Pressure Control Valve	Relief valve	ORH-G04-P3-10 5	35MPa {357 kgf/cm ² }	300	1:0.8 to 7{8.2 to 71.4} 3:3.5 to 25{35.7 to 255} 5:7 to 35{71.4 to 357}		7.0	D-13
	Direct Relief Valves	ORH-G04-DW3-10 5		50	1:0.8 to 7 {8.2 to 71.4} 3:3.5 to 25 {35.7 to 255} 5:7 to 35 {71.4 to 357}		6.5	D-23
		ORH-G04-DA3-10 5						
		ORH-G04-DB3-10 5						
	Reducing valve	OGH-G04-P ₃ ¹ (B)-10		300	1:0.8 to 7 {8.2 to 71.4} 3:3.5 to 25 {35.7 to 255} (Auxiliary Symbol) B: External drain		8.0	D-28
		OGH-G04-A ₃ ¹ (B)-10						
		OGH-G04-B ₃ ¹ (B)-10						
	Counter Balance Valves	OQH-G04-A1C-10 E		300	A:0.25 to 0.85{2.5 to 8.7} C:0.50 to 3.5{5.1 to 35.7} E:2 to 14{20.4 to 143}		8.0	D-50
		OQH-G04-B1C-10 E						
	Flow Control Valve	Flow Regulator Valves		OYH-G04-P-10	300		Check Valve Cracking Pressure 0.04{0.4}	
Meter-in Flow Regulator Valve		OYH-G04-W-X-10	300	Check Valve Cracking Pressure 0.1{1.0}	6.5	D-58		
		OYH-G04-A-X-10						
		OYH-G04-B-X-10						
Meter-Out Flow Regulator Valves		OYH-G04-W-Y-10	300	Check Valve Cracking Pressure 0.1{1.0}	6.5	D-58		
		OYH-G04-A-Y-10						
		OYH-G04-B-Y-10						
Meter-in Flow Control Valves		OFH-G04-W200-X-10	200	Check Valve Cracking Pressure 0.1{1.0}	11.1	D-66		
		OFH-G04-A200-X-10						
		OFH-G04-B200-X-10						
	OFH-G04-W200-Y-10							
	OFH-G04-A200-Y-10							
	OFH-G04-B200-Y-10							
Meter-out Flow Control Valves	OFH-G04-W200-Y-10	200	Check Valve Cracking Pressure 0.1{1.0}	11.1	D-66			
	OFH-G04-A200-Y-10							
	OFH-G04-B200-Y-10							
	OFH-G04-W200-X-10							
	OFH-G04-A200-X-10							
	OFH-G04-B200-X-10							
Direction Control Valve	Check Valves	OCH-G04-P2-10 3	300	1:0.04{0.4} 2:0.35{3.6} 3:0.50{5.1}		4.5	D-72	
		OCH-G04-T2-10 3						
		OCH-G04-A2-10 3						
		OCH-G04-AP2-10 3						
	Vacuum Check Valves	OVH-G04-W-10	300	0.01{0.1}	6.5	D-72		
	Pilot Check Valves	OPH-G04-W ₂ ¹ (-D)-10	300	1:0.20{2.0} 2:0.50{5.1} (Auxiliary Symbol) Open Valve Ratio Standard : Child Valve 7% : Parent Valve 50% D : Parent Valve 50%	6.8	D-79		
		OPH-G04-A ₂ ¹ (-D)-10						
		OPH-G04-B ₂ ¹ (-D)-10						

The G04 series modular valves do not have an L (DR₂) drain port, so they cannot be used in combination with pressure center type solenoid valves (D).



Relief Modular Valve

50 to 300 ℓ /min
25,35MPa

Features

- ① This modular relief valve provides maximum pressure control for a hydraulic circuit.
- ② Wide ranging applicability Maximum Operating Pressure: 25, 35MPa {255, 357kgf/cm²} Pressure Adjustment Range: 0.8 to 25, 35MPa {8.2 to 255, 357kgf/cm²}
- ③ Shockless unload, 2-pressure control, and other configurations are possible by switching the solenoid valve. Contact your agent for details.

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Flow Rate ℓ /min	Pressure Adjustment Range MPa{kgf/cm ² }	Weight kg	Gasket Surface Dimensions
OR-G01-P1-20 P3	1/8	25 {255}	50	* to 7{ * to 71.4} 3.5 to 25{35.7 to 255}	1.5	ISO 4401-03-02-0-94
OR-G01-W1-20 W3				* to 7{ * to 71.4} 3.5 to 25{35.7 to 255}	2.3	
OR-G01-A1-21 A3				* to 7{ * to 71.4} 3.5 to 25{35.7 to 255}	1.6	
OR-G01-B1-21 B3				* to 7{ * to 71.4} 3.5 to 25{35.7 to 255}	1.6	
OR-G03-P1-(V)-J50 P3	3/8	25 {255}	80	* to 7{ * to 71.4} 3.5 to 25{35.7 to 255}	3.1	ISO 4401-05-04-0-94
OR-G03-W1-J50 W3				* to 7{ * to 71.4} 3.5 to 25{35.7 to 255}	3.9	
OR-G03-A1-J50 A3				* to 7{ * to 71.4} 3.5 to 25{35.7 to 255}	3.1	
OR-G03-B1-J50 B3				* to 7{ * to 71.4} 3.5 to 25{35.7 to 255}	3.1	
ORH-G04-P1-10 P3 P5	1/2	35 {357}	300	* to 7{ * to 71.4} 3.5 to 25{35.7 to 255} 7 to 35{71.4 to 357}	7.0	ISO 4401-07-06-0-94

Note) *See the Flow Rate - Low Pressure characteristics on page D-17 for information about items marked with an asterisk.

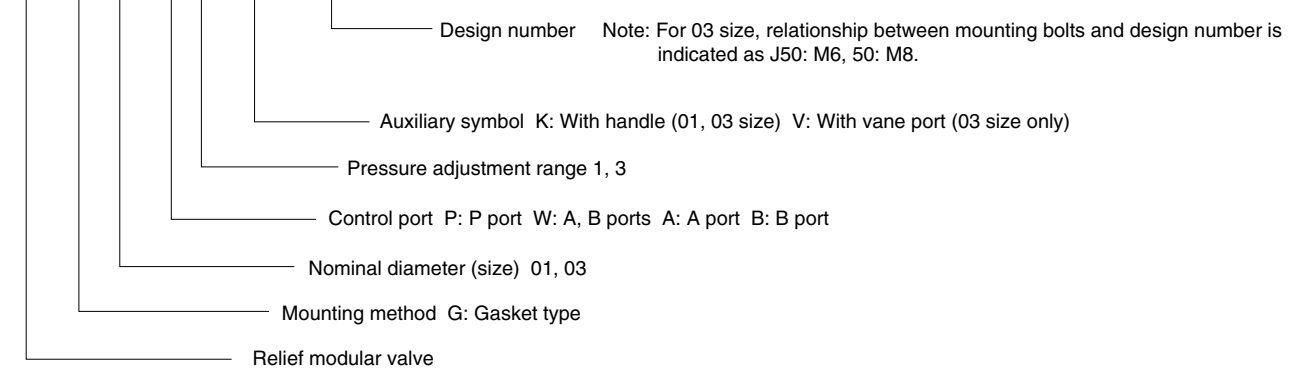
● Handling

- ① When using a remote control valve in a vent circuit, certain vent circuit pipe capacities can cause vibration. Because of this, thick steel pipe with an inside diameter of $\phi 4$ mm that is no longer than three meters is recommended. Vent piping cannot be used with the 01 size. If a vent port is required for the 03 size, add the auxiliary code "V".
- ② For use as a safety valve, use a pressure override that is higher than the required circuit pressure.
- ③ Make sure that tank port back pressure is no greater than 0.2MPa {2.0kgf/cm²}.
- ④ A small control flow rate can cause pressure instability. Use a control flow rate that is in accordance with the values shown below.
01 size: At least 5 ℓ /min
03 size: At least 8 ℓ /min
04 size: At least 8 ℓ /min
For applications that require a flow rate that is less than the minimum flow rate, use an ORD-G** direct type relieve modular valve.
- ⑤ Note that a sub plate and installation bolts are not included. See pages D-90 through D-95 if these items are required.
- ⑥ 04 series modular valves do not have an L (DR₂) drain port, so they cannot be used in combination with pressure center type solenoid valves (D).
- ⑦ Connect OR-603-W*-(J) 50 to the two T-ports on the tanks.

Understanding Model Numbers

01: 03 size

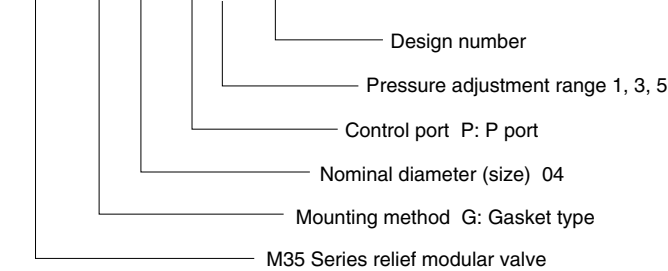
OR-G 03 - P 1 - (K) - J50



Understanding Model Numbers

04 size

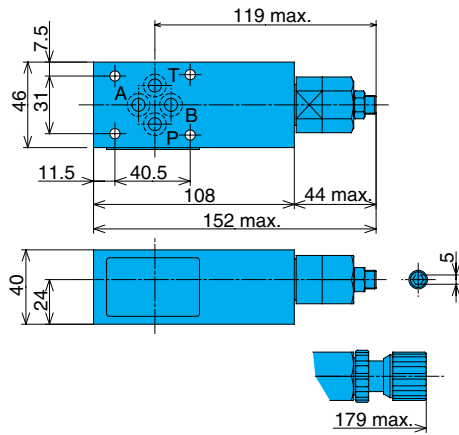
ORH-G 04 - P 5 - 10



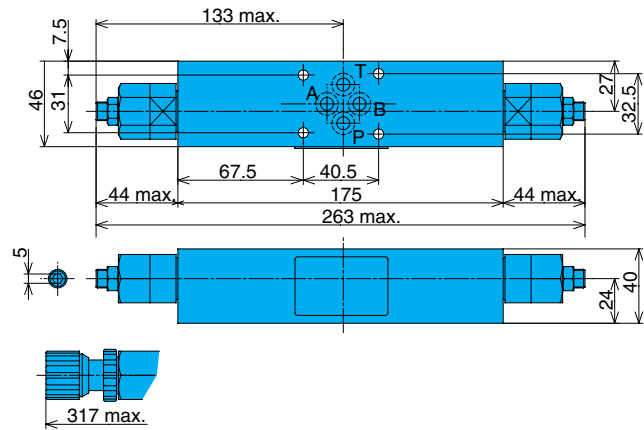
Installation Dimension Drawings

Note) Pressure is increased by clockwise (rightward) rotation of the adjusting screw (bolt), and decreased by counterclockwise (leftward) rotation.

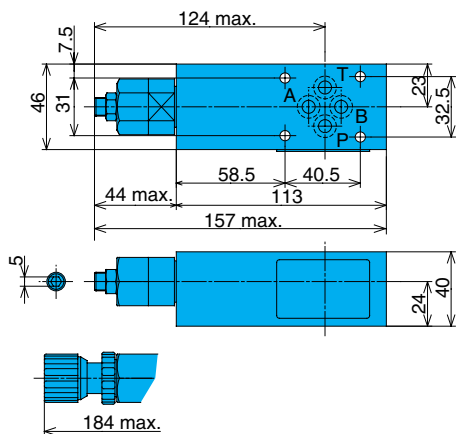
OR-G01-P*-20



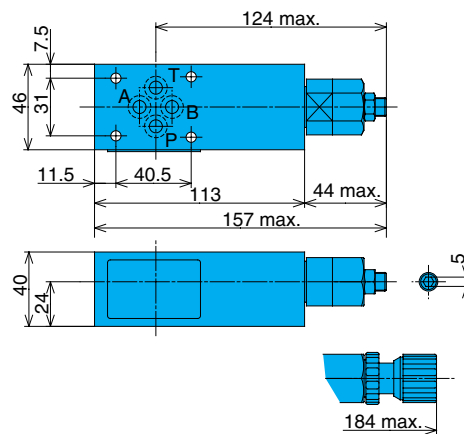
OR-G01-W*-20



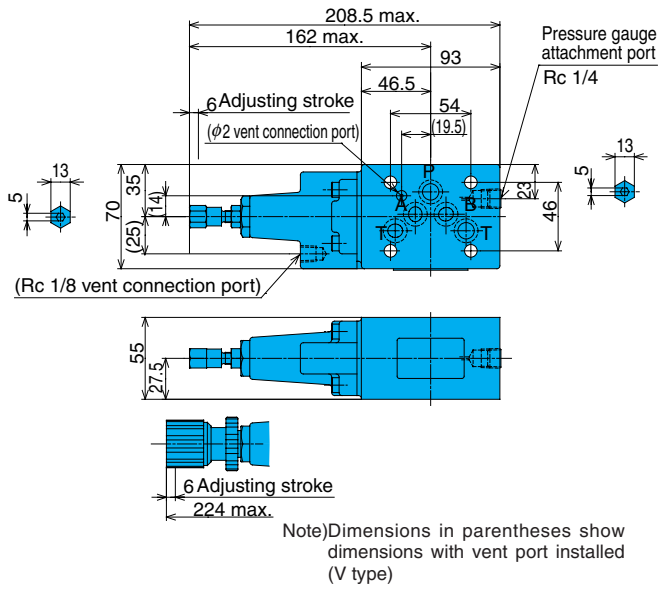
OR-G01-A*-21



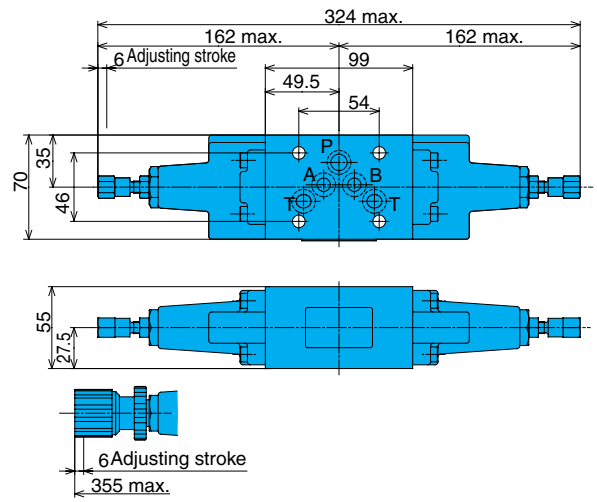
OR-G01-B*-21



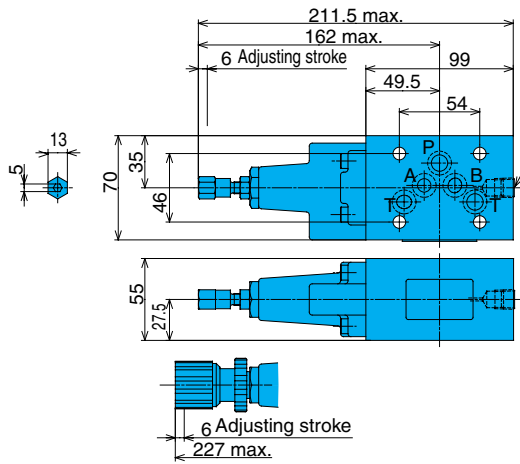
OR-G03-P*-(V)-J50



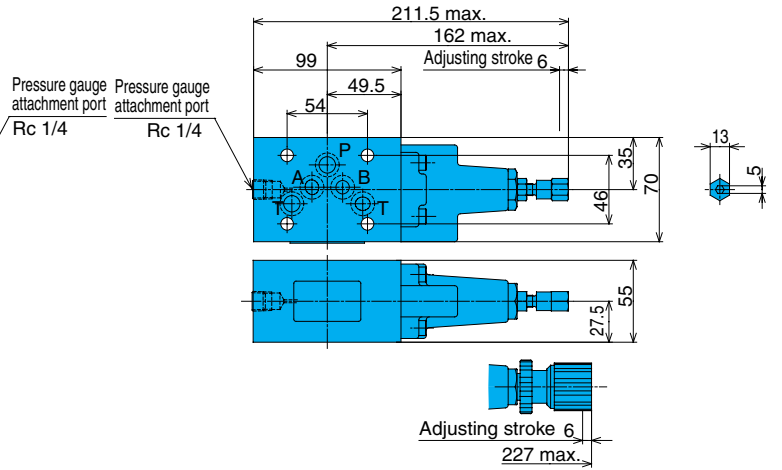
OR-G03-W*-J50



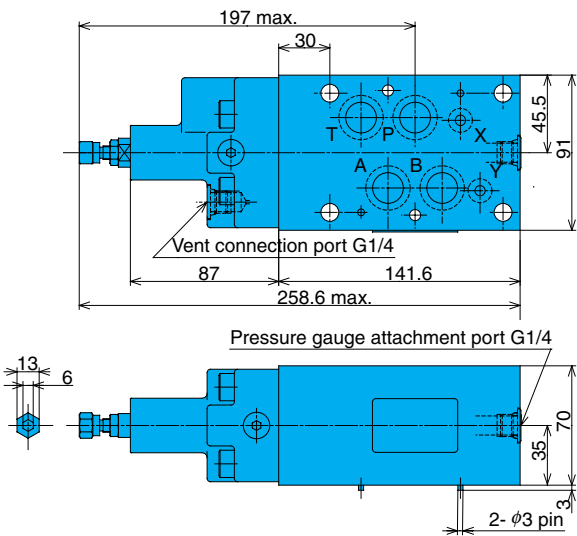
OR-G03-A*-J50



OR-G03-B*-J50



ORH-G04-P*-10

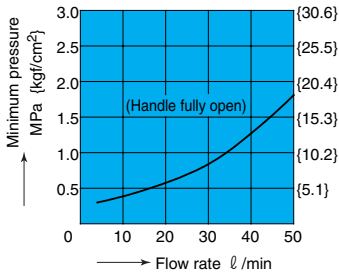


Performance Curves

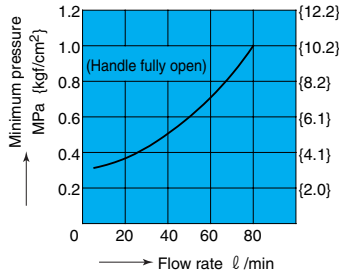
Differential Hydraulic Fluid Viscosity 32mm²/s

Flow Rate – Minimum Pressure Characteristics

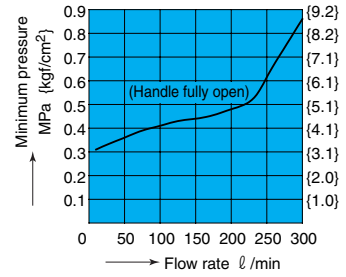
OR-G01-*1-20(21)



OR-G03-P1-J50

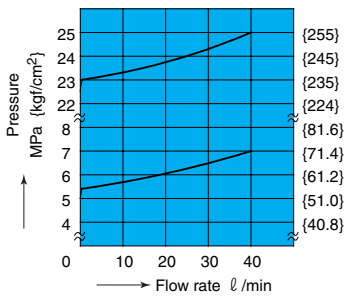


ORH-G04-P*-10

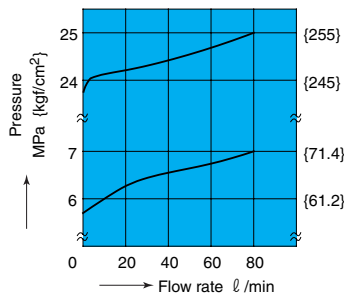


Pressure – Flow Rate Characteristics

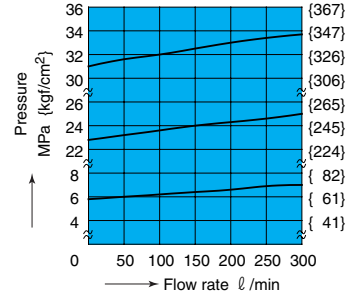
OR-G01-**-20(21)



OR-G03-P*-J50

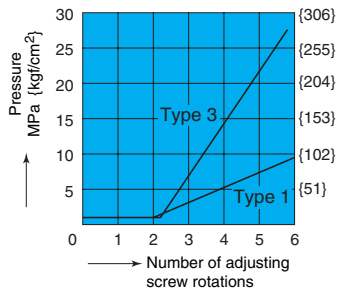


ORH-G04-P*-10

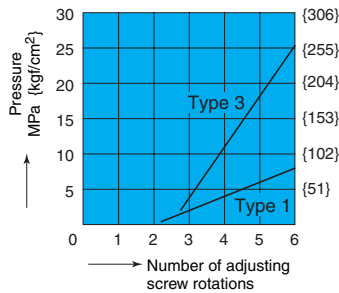


Number of Adjusting Screw Rotations – Pressure Characteristics

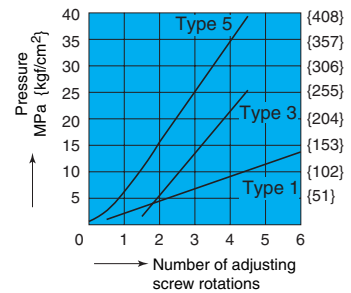
OR-G01-P*-20



OR-G03-P*-(J)50

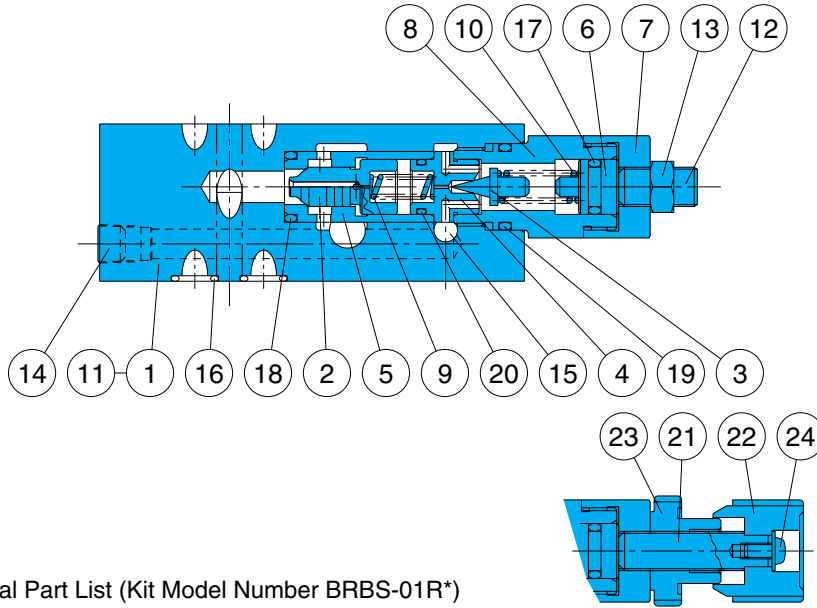


ORH-G04-P*-10



Cross-sectional Drawing

OR-G01-P*-20



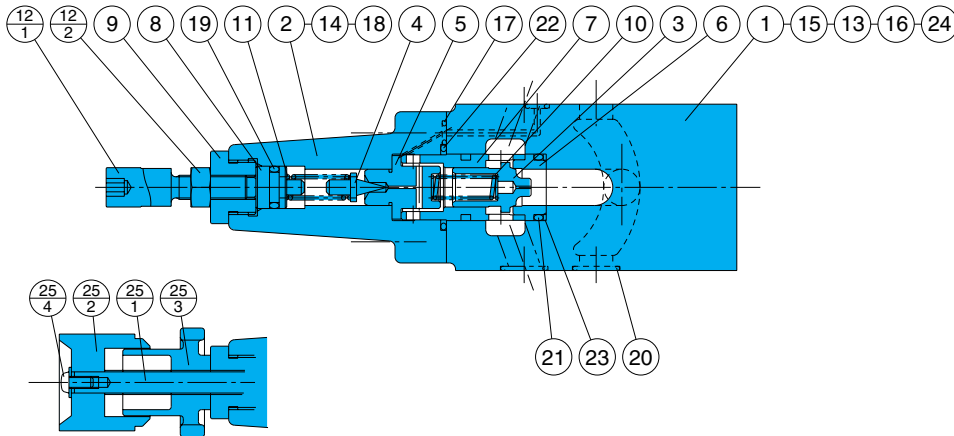
Part No.	Part Name
1	Body
2	Spool
3	Poppet
4	Seat
5	Sleeve
6	Plunger
7	Bushing
8	Retainer
9	Spring
10	Spring
11	Plate
12	Screw
13	Nut
14	Plug
15	Plug
16	O-ring
17	O-ring
18	O-ring
19	O-ring
20	O-ring
21	Screw
22	Knob
23	Nut
24	Screw

Seal Part List (Kit Model Number BRBS-01R*)

Part No.	Part Name	Part Number	Q'ty			
			P	W	A	B
16	O-ring	1B-P9	4	4	4	4
17	O-ring	1A-P10A	1	2	1	1
18	O-ring	1B-P14	1	2	1	1
19	O-ring	1B-P18	1	2	1	1
20	O-ring	AS568-013(Hs90)	1	1	1	1

Note) 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
 2. Specify P, W, A, or B for the asterisk (*) in the kit model number.

OR-G03-P*-V-J50



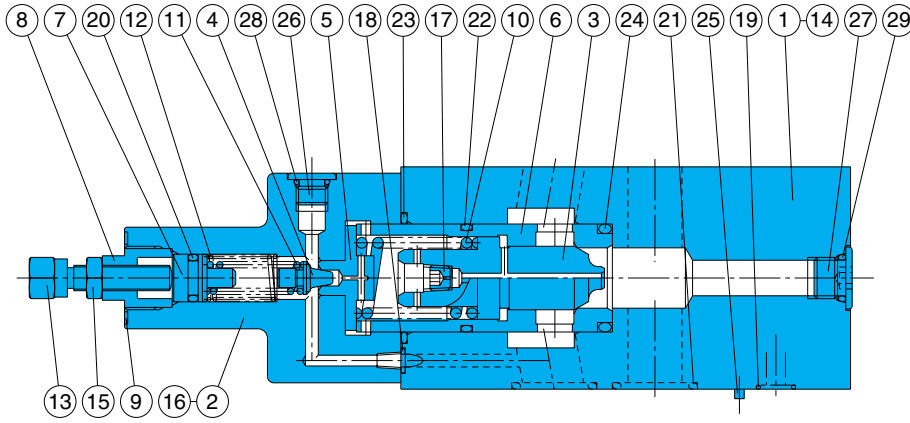
Part No.	Part Name
1	Body
2	Cover
3	Spool
4	Poppet
5	Seat
6	Seat
7	Sleeve
8	Plunger
9	Retainer
10	Spring
11	Spring
12	Screw kit
12 ₁	Screw
12 ₂	Nut
13	Plate
14	Screw
15	Plug
16	Plug
17	O-ring
18	O-ring
19	O-ring
20	O-ring
21	O-ring
22	O-ring
23	Backup ring
24	Pin
25	Handle kit
25 ₁	Screw
25 ₂	Knob
25 ₃	Nut
25 ₄	Screw

Seal Part List (Kit Model Number BRES-03R*)

Part No.	Part Name	Part Number	Q'ty		
			P/A/B	W	PV
17	O-ring	1B-P5	—	—	2
18	O-ring	1B-P7	1	2	1
19	O-ring	1A-P10A	1	2	1
20	O-ring	AS568-014(Hs90)	5	5	5
21	O-ring	1B-P18	2	4	2
22	O-ring	AS568-119(Hs90)	1	2	1
23	Backup ring	T2-P18	1	2	1

Note) 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
 2. Backup ring indicates JIS B2407-T2-**.
 3. Specify P, W, or PV for the asterisk (*) in the kit model number.

ORH-G04-P*-10



Part No.	Part Name
1	Body
2	Cover
3	Spool
4	Poppet
5	Seat
6	Sleeve
7	Plunger
8	Retainer
9	Plate
10	Spring
11	Spring
12	Spring
13	Screw
14	Plate
15	Nut
16	Screw
17	Choke
18	O-ring
19	O-ring
20	O-ring
21	O-ring
22	O-ring
23	O-ring
24	O-ring
25	Pin
26	Plug
27	Plug
28	O-ring
29	O-ring

Seal Part List (Kit Model Number BRKS-04RP)

Part No.	Part Name	Part Number	Q'ty
18	O-ring	1B-P5	1
19	O-ring	AS568-012(Hs90)	2
20	O-ring	1A-P11	1
21	O-ring	AS568-118(Hs90)	4
22	O-ring	AS568-122(Hs90)	1
23	O-ring	AS568-127(Hs90)	1
24	O-ring	1B-P28	1
28	O-ring	1B-P8	3
29	O-ring	1B-P11	3

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.



Brake Modular Valve

20 to 30 ℓ /min
0.8 to 21,25MPa

Features

① This modular pressure control valve prevents abnormal pressure when the actuator stops, enabling smooth stops.

② Wide ranging applicability
Maximum operating pressure:
25MPa{255kgf/cm²}

Pressure Adjustment Range:
0.8 to 21, 25MPa
{8.2 to 214, 255kgf/cm²}

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Flow Rate ℓ /min	Pressure Adjustment Range MPa{kgf/cm ² }	Weight kg	Gasket Surface Dimensions
ORO-G01-W1-20 W3	1/8	25 {255}	20	0.8 to 7{ 8.2 to 71.4} 3.5 to 21{35.7 to 214}	1.5	ISO 4401-03-02-0-94
ORO-G01-A1-20 A3				0.8 to 7{ 8.2 to 71.4} 3.5 to 21{35.7 to 214}	1.4	
ORO-G01-B1-20 B3				0.8 to 7{ 8.2 to 71.4} 3.5 to 21{35.7 to 214}	1.4	
ORO-G03-W1-J50 W3	3/8	25 {255}	30	0.8 to 7{ 8.2 to 71.4} 3.5 to 25{35.7 to 255}	4.8	ISO 4401-05-04-0-94
ORO-G03-A1-J50 A3				0.8 to 7{ 8.2 to 71.4} 3.5 to 25{35.7 to 255}	4.0	
ORO-G03-B1-J50 B3				0.8 to 7{ 8.2 to 71.4} 3.5 to 25{35.7 to 255}	4.0	

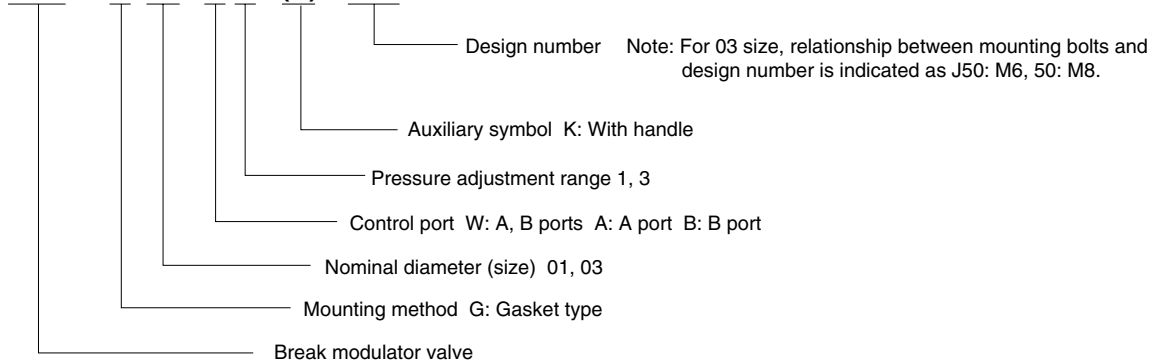
● Handling

- ① The pressure adjustment range is expressed using cracking pressure.
- ② For use as a safety valve, use a pressure override that is higher than the required circuit pressure.

③ Note that a sub plate and installation bolts are not included. See pages D-90 through D-95 if these items are required.

Understanding Model Numbers

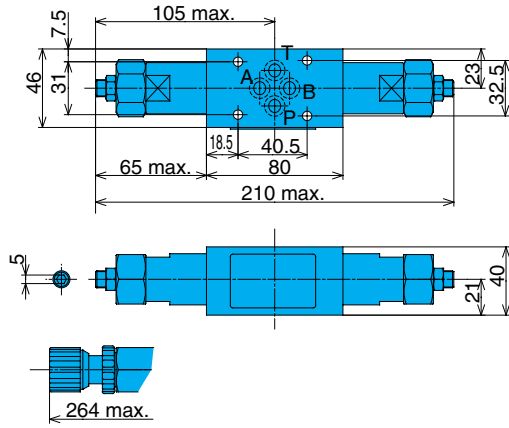
ORO - G 03 - A 3 - (K) - J50



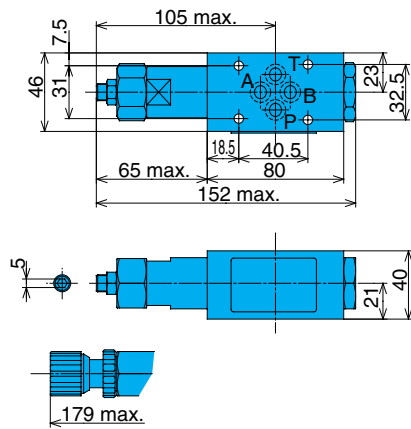
Installation Dimension Drawings

Note) Pressure is increased by clockwise (rightward) rotation of the adjusting screw (bolt), and decreased by counterclockwise (leftward) rotation.

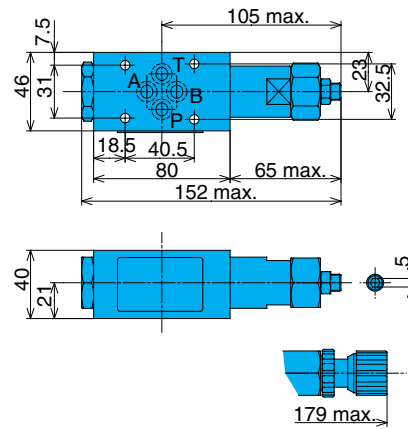
ORO-G01-W*-20



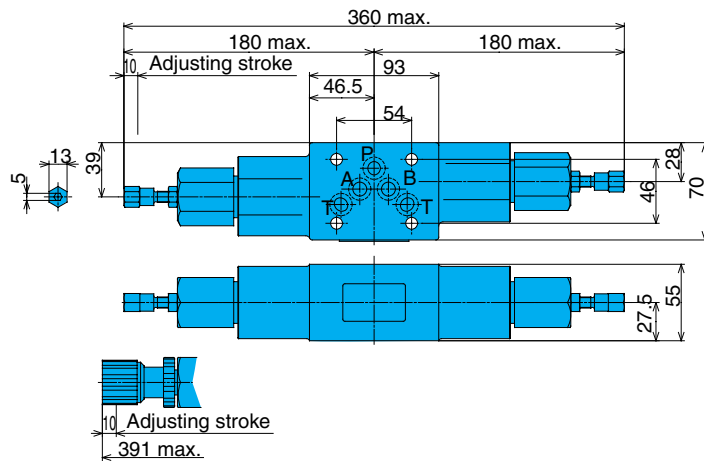
ORO-G01-A*-20



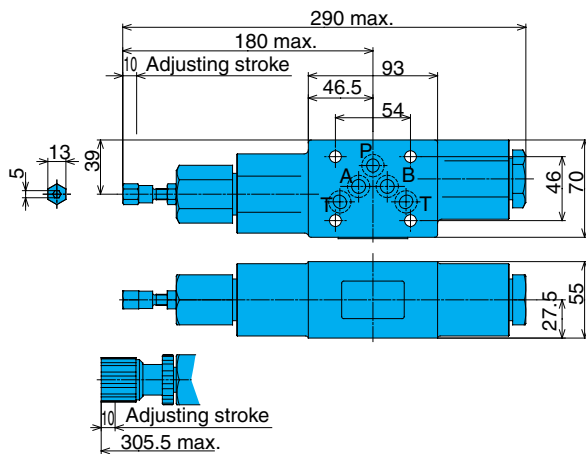
ORO-G01-B*-20



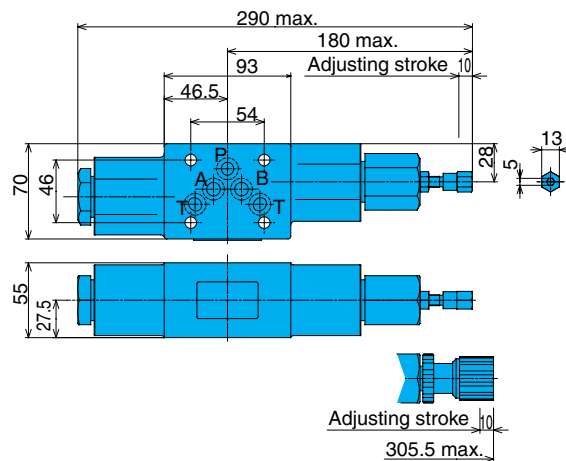
ORO-G03-W*-J50



ORO-G03-A*-J50



ORO-G03-B*-J50



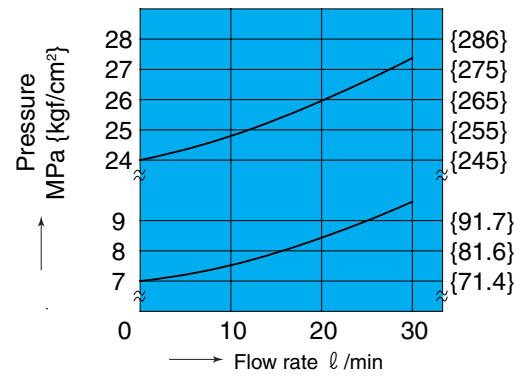
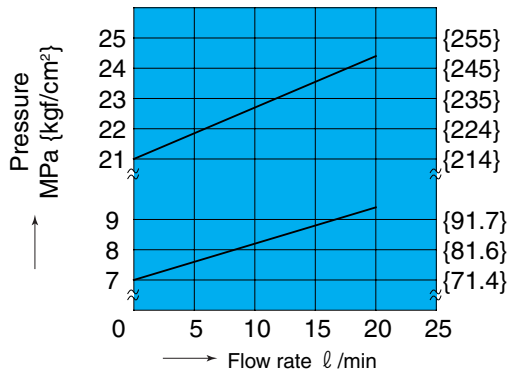
Performance Curves

Differential Hydraulic Fluid Viscosity 32mm²/s

Pressure – Flow Rate Characteristics

ORO-G01-**-20

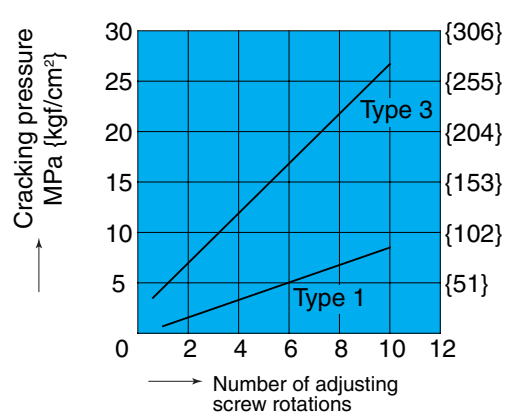
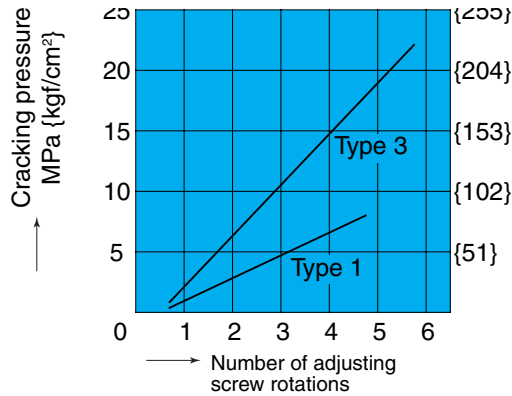
ORO-G03-**-J50



Number of Adjusting Screw Rotations – Pressure Characteristics

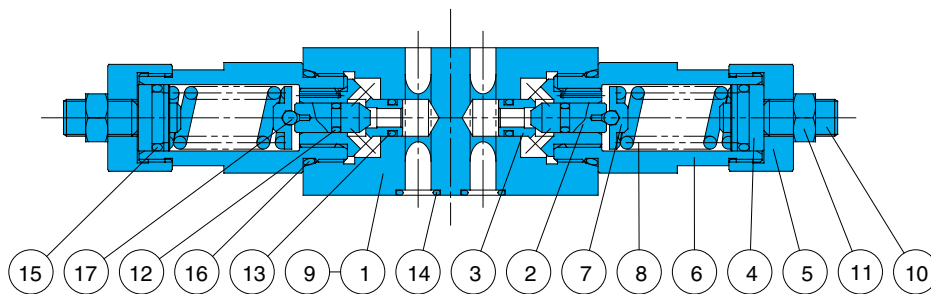
ORO-G01-**-20

ORO-G03-**-J50



Cross-sectional Drawing

ORO-G01-W*-20



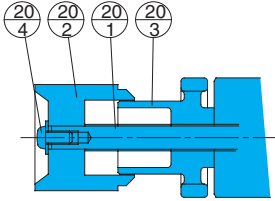
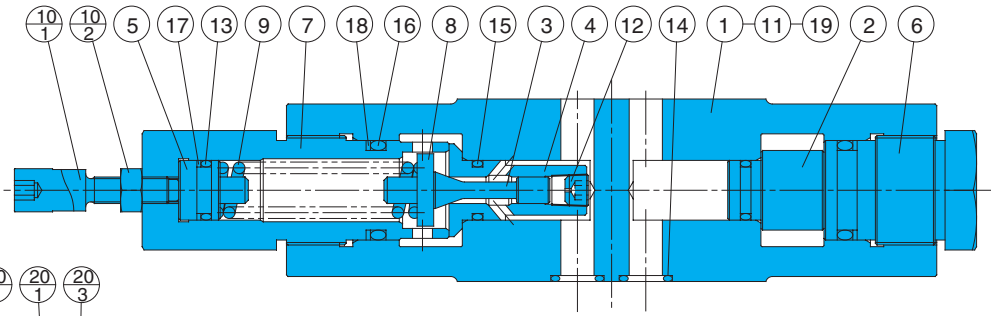
Part No.	Part Name
1	Body
2	Poppet
3	Seat
4	Plunger
5	Bushing
6	Retainer
7	Guide
8	Spring
9	Plate
10	Screw
11	Nut
12	O-ring
13	O-ring
14	O-ring
15	O-ring
16	O-ring
17	Ball
18	Screw
19	Knob
20	Nut
21	Screw

Seal Part List (Kit Model Number BRBS-01R0*)

Part No.	Part Name	Part Number	Qty		
			W	A	B
12	O-ring	1A-P5	2	1	1
13	O-ring	1B-P7	2	2	2
14	O-ring	1B-P9	4	4	4
15	O-ring	1B-P14	2	1	1
16	O-ring	1B-P22	2	2	2

Note) 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify W, A, or B for the asterisk (*) in the kit model number.

ORO-G03-A*-J50



Part No.	Part Name
1	Body
2	Plug
3	Poppet
4	Seat
5	Plunger
6	Bushing
7	Retainer
8	Guide
9	Spring
10	Screw kit
10-1	Screw
10-2	Nut
11	Plate
12	Orifice
13	O-ring
14	O-ring
15	O-ring
16	O-ring
17	Backup ring
18	Backup ring
19	Pin
20	Handle kit
20-1	Screw
20-2	Knob
20-3	Nut
20-4	Screw

Seal Part List (Kit Model Number BRES-03R0*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
13	O-ring	1A-P14	2	1	1
14	O-ring	AS568-014(Hs90)	5	5	5
15	O-ring	1B-P14	2	2	2
16	O-ring	1B-P24	2	2	2
17	Backup ring	T2-P14	2	1	1
18	Backup ring	T2-P24	2	2	2

- Note) 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
 2. Backup ring indicates JIS B2407-T2-**.
 3. Specify W, A, or B for the asterisk (*) in the kit model number.

Direct Relief Modular Valve

20 to 50 ℓ /min
0.8 to 21,25,35MPa



Features

- ① This modular relief valve provides maximum pressure control for a hydraulic circuit.
- ② Wide ranging applicability
Maximum Working Pressure: 25, 35MPa {255, 357kgf/cm²}
- Pressure Adjustment Range:
0.8 to 21, 25, 35MPa
{8.2 to 255, 357kgf/cm²}

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Flow Rate ℓ /min	Pressure Adjustment Range MPa{kgf/cm ² }	Weight kg	Gasket Surface Dimensions
ORD-G01-W1-20 W3	1/8	25{255}	20	0.8 to 7{ 8.2 to 71.4} 3.5 to 21{35.7 to 214}	1.5	ISO 4401-03-02-0-94
ORD-G01-A1-20 A3				0.8 to 7{ 8.2 to 71.4} 3.5 to 21{35.7 to 214}	1.4	
ORD-G01-B1-20 B3				0.8 to 7{ 8.2 to 71.4} 3.5 to 21{35.7 to 214}	1.4	
ORD-G03-W1-J50 W3	3/8	25{255}	30	0.8 to 7{ 8.2 to 71.4} 3.5 to 25{35.7 to 255}	4.8	ISO 4401-05-04-0-94
ORD-G03-A1-J50 A3				0.8 to 7{ 8.2 to 71.4} 3.5 to 25{35.7 to 255}	4.0	
ORD-G03-B1-J50 B3				0.8 to 7{ 8.2 to 71.4} 3.5 to 25{35.7 to 255}	4.0	
ORH-G04-DW1-10 DW3 DW5	1/2	35{357}	50	0.8 to 7{ 8.2 to 71.4} 3.5 to 25{35.7 to 255} 7 to 35{71.4 to 357}	6.5	ISO 4401-07-06-0-94
ORH-G04-DA1-10 DA3 DA5				0.8 to 7{ 8.2 to 71.4} 3.5 to 25{35.7 to 255} 7 to 35{71.4 to 357}	6.5	
ORH-G04-DB1-10 DB3 DB5				0.8 to 7{ 8.2 to 71.4} 3.5 to 25{35.7 to 255} 7 to 35{71.4 to 357}	6.5	

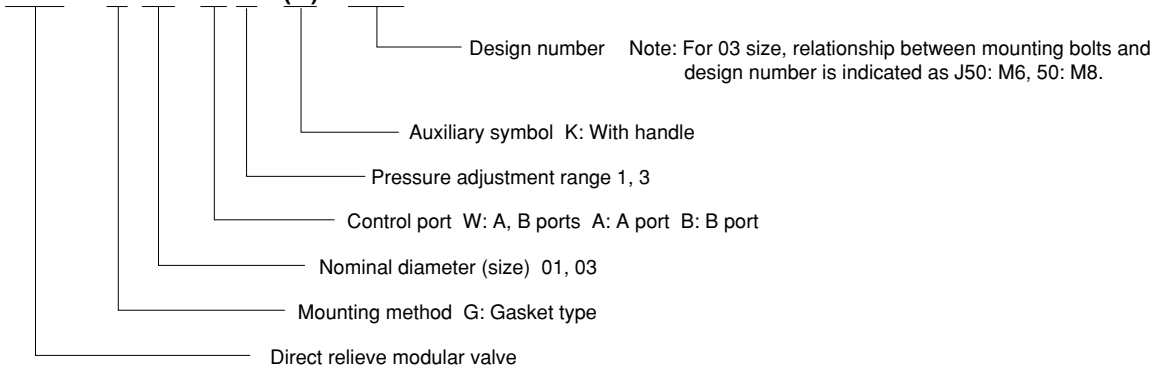
● Handling

- ① The pressure adjustment range is expressed in terms of cracking pressure.
- ② For use as a safety valve, use a pressure override that is higher than the required circuit pressure.
- ③ Tank port back pressure changes cracking pressure by the corresponding amount.
- ④ Note that a sub plate and installation bolts are not included. See pages D-90 through D-95 if these items are required.
- ⑤ 04 series modular valves do not have an L (DR₂) drain port, so they cannot be used in combination with pressure center type solenoid valves (D).

Understanding Model Numbers

01, 03 size

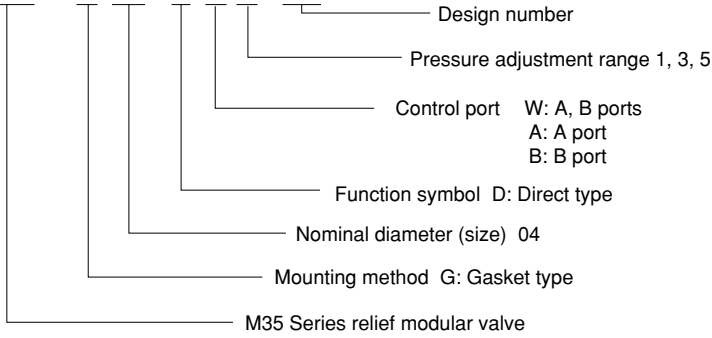
ORD - G 03 - W 3 - (K) - J50



Understanding Model Numbers

04 size

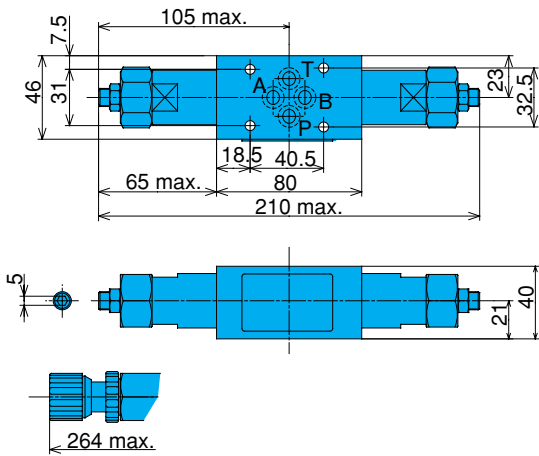
ORH - G 04 - D W 5 - 10



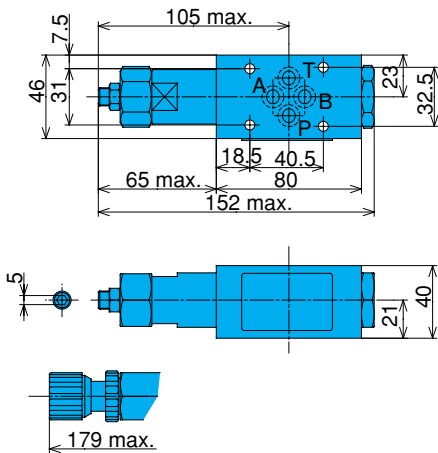
Installation Dimension Drawings

Note)
Pressure is increased by clockwise (rightward) rotation of the adjusting screw (bolt), and decreased by counterclockwise (leftward) rotation.

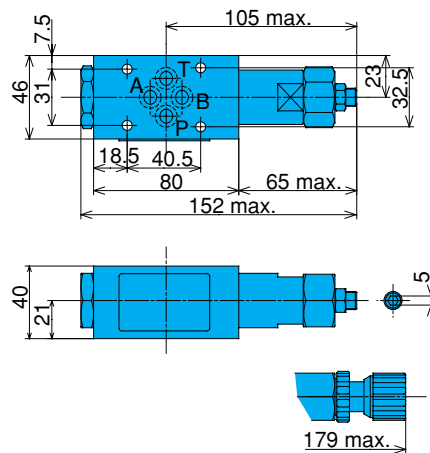
ORD-G01-W*-20



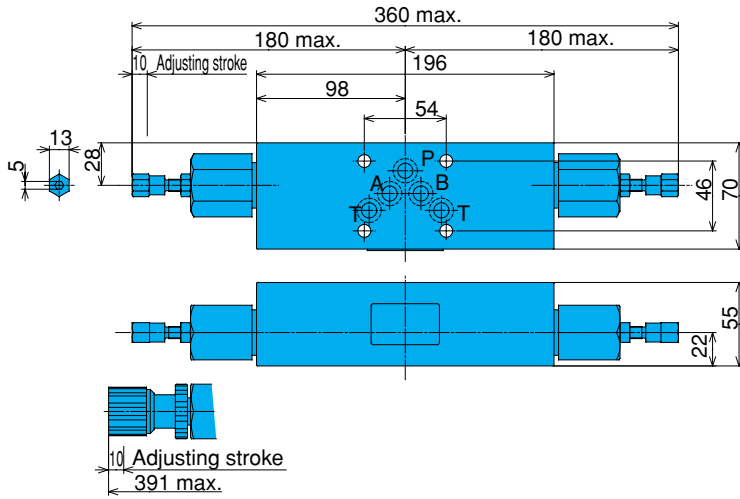
ORD-G01-A*-20



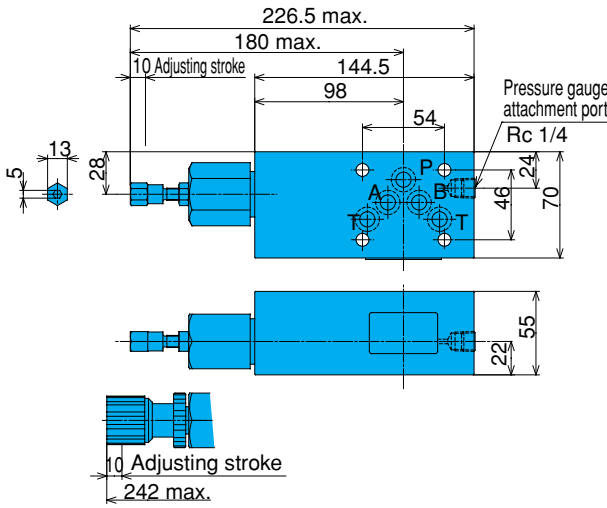
ORD-G01-B*-20



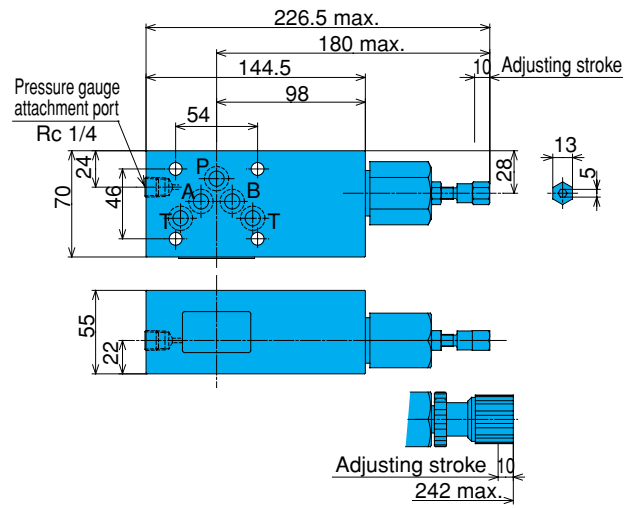
ORD-G03-W*-J50



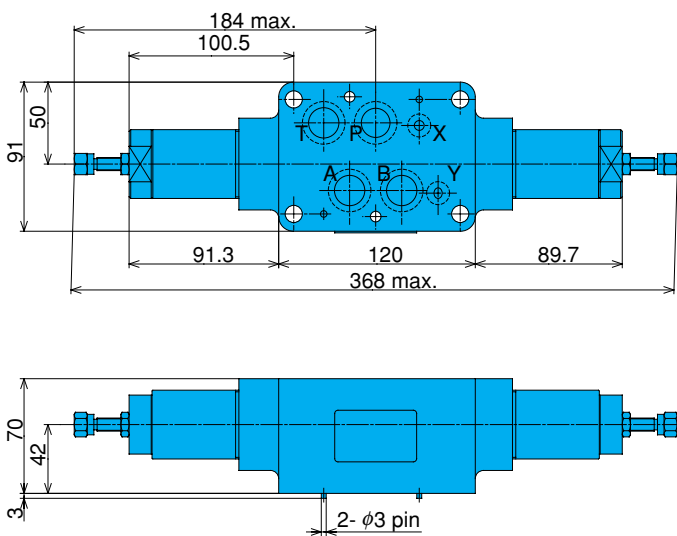
ORD-G03-A*-J50



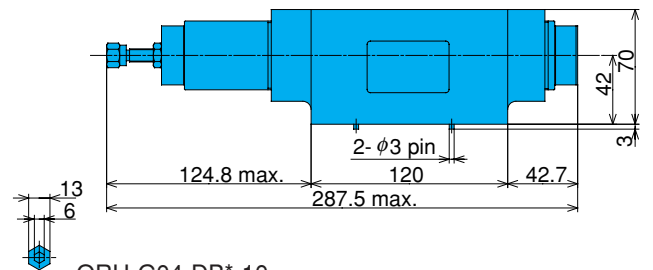
ORD-G03-B*-J50



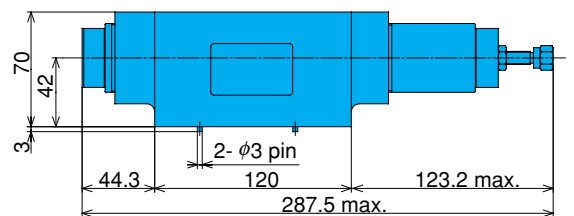
ORH-G04-DW*-10



ORH-G04-DA*-10



ORH-G04-DB*-10

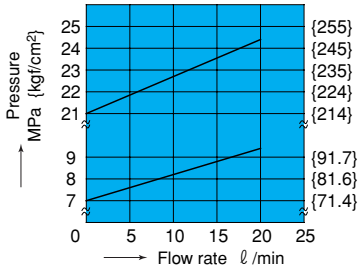


Performance Curves

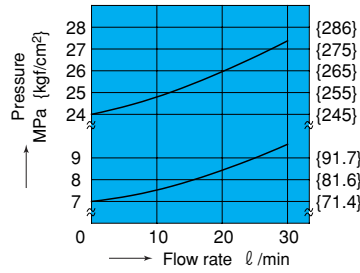
Differential Hydraulic Fluid Viscosity 32mm²/s

Pressure – Flow Rate Characteristics

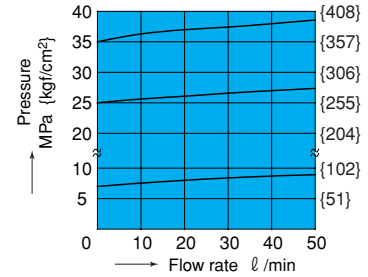
ORD-G01-**-20



ORD-G03-**-J50

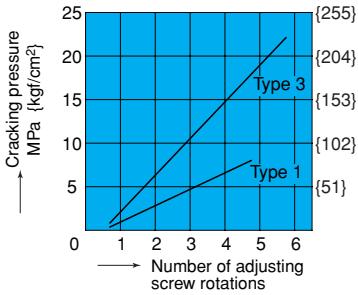


ORH-G04-DW*-10

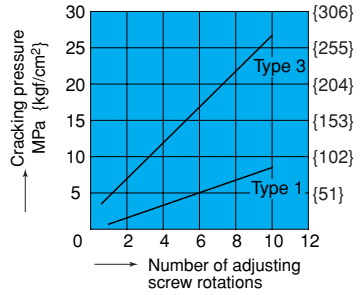


Number of Adjusting Screw Rotations – Pressure Characteristics

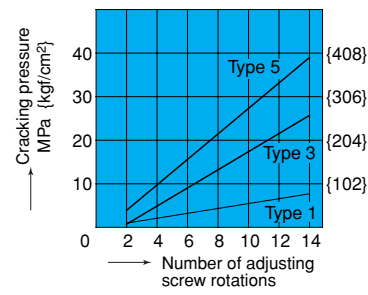
ORD-G01-**-20



ORD-G03-**-J50

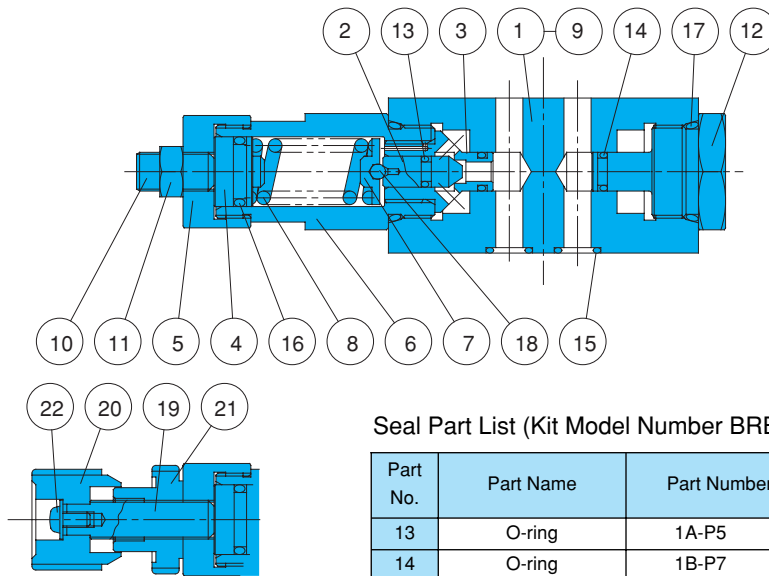


ORH-G04-DW*-10



Cross-sectional Drawing

ORD-G01-A*-20



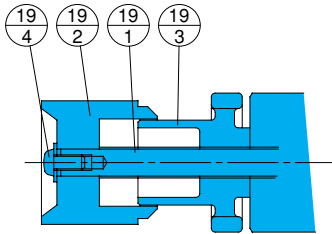
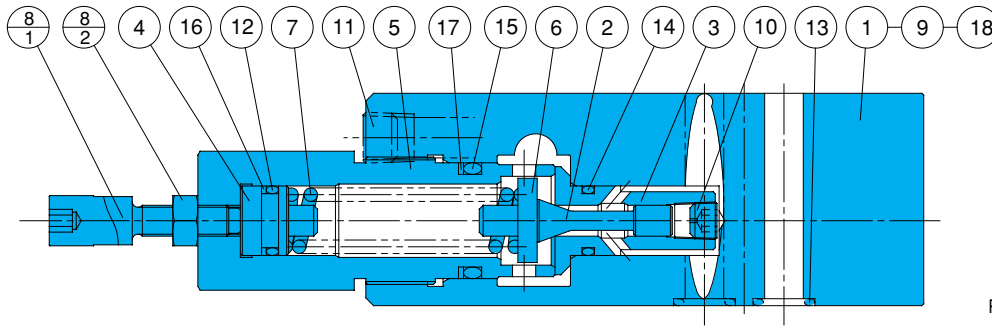
Seal Part List (Kit Model Number BRBS-01RD*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
13	O-ring	1A-P5	2	1	1
14	O-ring	1B-P7	2	2	2
15	O-ring	1B-P9	4	4	4
16	O-ring	1B-P14	2	1	1
17	O-ring	1B-P22	2	2	2

Note) 1.O-ring 1A/B-** refers to JIS B2401-1A/B.
2.Specify W, A, or B for the asterisk (*) in the kit model number.

Part No.	Part Name
1	Body
2	Poppet
3	Seat
4	Plunger
5	Bushing
6	Retainer
7	Guide
8	Spring
9	Plate
10	Screw
11	Nut
12	Bushing
13	O-ring
14	O-ring
15	O-ring
16	O-ring
17	O-ring
18	Ball
19	Screw
20	Knob
21	Nut
22	Screw

ORD-G03-A*-J50



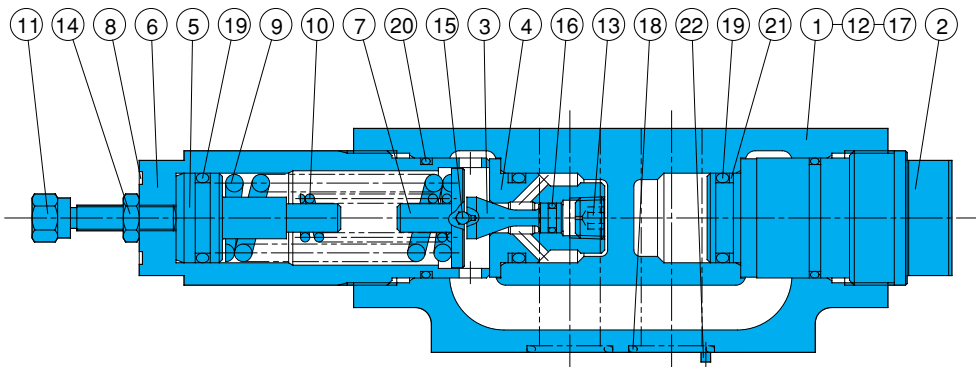
Seal Part List (Kit Model Number BRES-03RD*)

Part No.	Part Name	Part Number	Q'ty		
			A	B	W
12	O-ring	1A-P14	1	1	2
13	O-ring	AS568-014(Hs90)	5	5	5
14	O-ring	1B-P14	1	1	2
15	O-ring	1B-P24	1	1	2
16	Backup ring	T2-P14	1	1	2
17	Backup ring	T2-P24	1	1	2

Note) 1.O-ring 1A/B-** refers to JIS B2401-1A/B.
 2.Backup ring indicates JIS B2407-T2-**.
 3.Specify W, A, or B for the asterisk (*) in the kit model number.

Part No.	Part Name
1	Body
2	Poppet
3	Seat
4	Plunger
5	Retainer
6	Guide
7	Spring
8	Screw kit
8 ₁	Screw
8 ₂	Nut
9	Plate
10	Orifice
11	Plug
12	O-ring
13	O-ring
14	O-ring
15	O-ring
16	Backup ring
17	Backup ring
18	Pin
19	Handle kit
19 ₁	Screw
19 ₂	Knob
19 ₃	Nut
19 ₄	Screw

ORH-G04-DA*-10



Seal Part List (Kit Model Number BRKS-04RD*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
16	O-ring	1A-P6	2	1	1
17	O-ring	AS568-012(Hs90)	2	2	2
18	O-ring	AS568-118(Hs90)	4	4	4
19	O-ring	1B-P22A	4	3	3
20	O-ring	AS568-125(Hs70)	2	2	2
21	Backup ring	T2-P22A	2	2	2

Note) 1.O-ring 1A/B-** refers to JIS B2401-1A/B.
 2.Backup ring indicates JIS B2407-T2-**.
 3.Specify W, A, or B for the asterisk (*) in the kit model number.

Part No.	Part Name
1	Body
2	Plug
3	Poppet
4	Seat
5	Plunger
6	Retainer
7	Guide
8	Plate
9	Spring
10	Spring
11	Screw
12	Plate
13	Choke
14	Nut
15	Ball
16	O-ring
17	O-ring
18	O-ring
19	O-ring
20	O-ring
21	Backup ring
22	Pin



Pressure Reducing Modular Valve

40 to 300 ℓ /min
25,35MPa

Features

- ① This modular valve makes the pressure in part of the circuit lower than that of the main circuit.
- ② Even when pressure changes in the primary main circuit, the reduced secondary pressure is maintained at a constant level.
- ③ Maximum Operating Pressure: 25, 35MPa {255, 357kgf/cm²}

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Flow Rate ℓ /min	Pressure Adjustment Range MPa{kgf/cm ² }	Weight kg	Gasket Surface Dimensions
OG-G01-PC-21 P1 P2	1/8	25 {255}	50	0.15 to 3.5{ 1.5 to 35.7} 0.8 to 7{ 8.2 to 71.4} 3.5 to 16{35.7 to 163}	1.3	ISO 4401-03-02-0-94
OG-G03-PC-(V)-J51 P1 P3	3/8	25 {255}	80 but C : 50	0.25 to 3.5{ 2.5 to 35.7} 0.8 to 7{ 8.2 to 71.4} 3.5 to 21{35.7 to 214}	3.8	ISO 4401-05-04-0-94
OGH-G04-P1-10 P3	1/2	35 {357}	300	0.8 to 7{ 8.2 to 71.4} 3.5 to 25{35.7 to 255}	8.0	ISO 4401-07-06-0-94

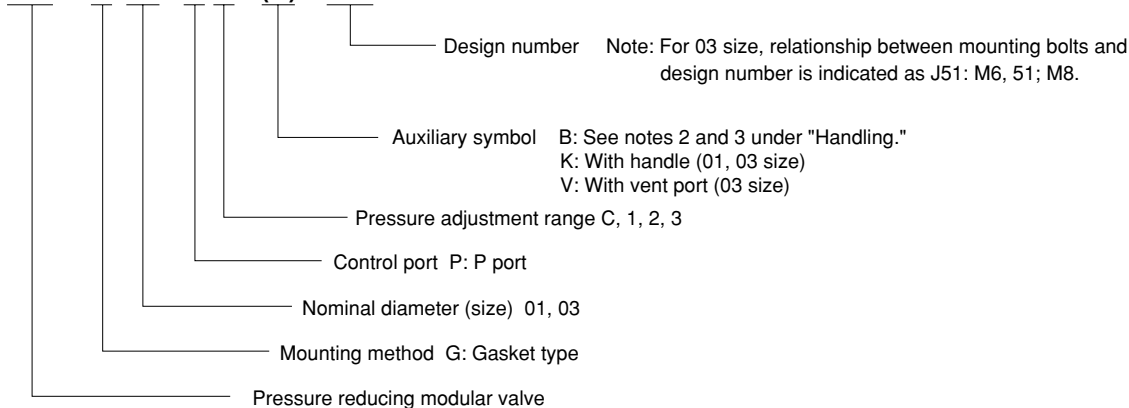
● Handling

- ① When using a remote control valve in a vent circuit, certain vent circuit pipe capacities can cause vibration. Because of this, thick steel pipe with an inside diameter of ϕ 4mm that is no longer than three meters is recommended. Vent piping cannot be used with the 01 size. If a vent port is required for the 03 size, add the auxiliary code "V".
- ② For the 03 size, the drainage can be allowed to escape through the T port. In the case of a valve with the auxiliary symbol B, however, run a return pipe from the drain discharge port directly to the tank.
- ③ With the 04 sizes, piping is not required because drainage can be allowed to escape from the gasket side drain port. In the case of a valve with the auxiliary symbol B, however, run a return pipe from the drain discharge port directly to the tank.
- ④ Note that a change in drain back pressure causes a change in setting pressure.
- ⑤ With the 01, 03 sizes, the flow rate is limited at low pressures. See the Pressure-Flow Rate Characteristics on pages D-30 for more information.
- ⑥ Note that a sub plate and installation bolts are not included. See pages D-90 through D-95 if these items are required.
- ⑦ 04 series modular valves do not have an L (DR₂) drain port, so they cannot be used in combination with pressure center type solenoid valves (D).
- ⑧ With the 03, 04 sizes, the control port can be changed by altering the attachment orientation of the back cover. See the installation diagram for more information. After making this change, be sure also to make the other changes in accordance with the model number indicated on the nameplate.

Understanding Model Numbers

01, 03, size

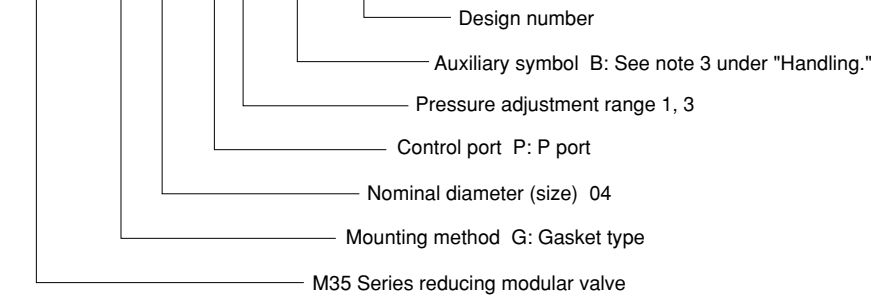
OG - G 03 - P 1 - (B) - J51



Understanding Model Numbers

04 size

OGH – G 04 – P 1 – (B) – 10

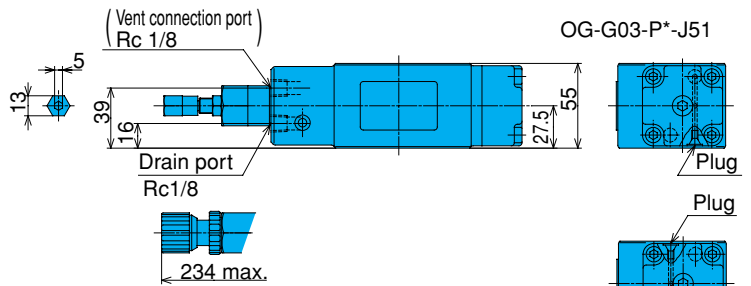
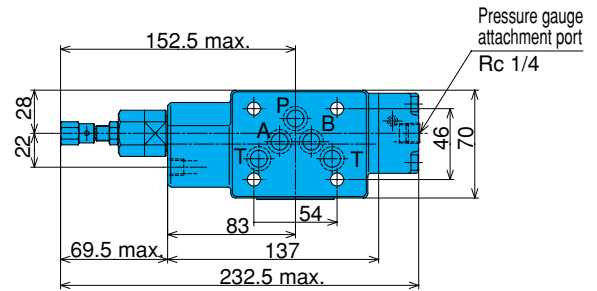
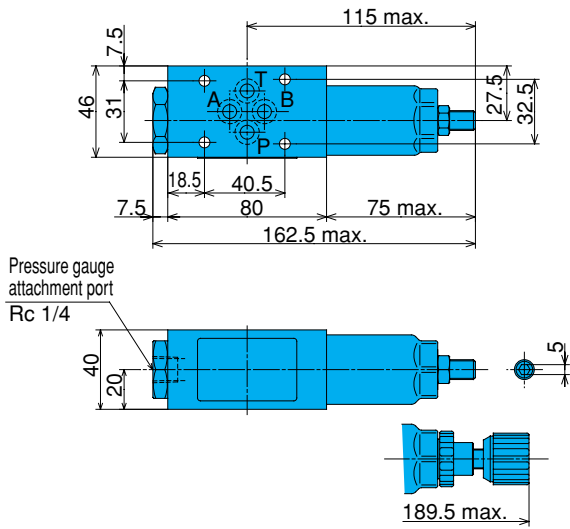


Installation Dimension Drawings

Note)
Pressure is increased by clockwise (rightward) rotation of the adjusting screw (bolt), and decreased by counterclockwise (leftward) rotation.

OG-G01-P*-21

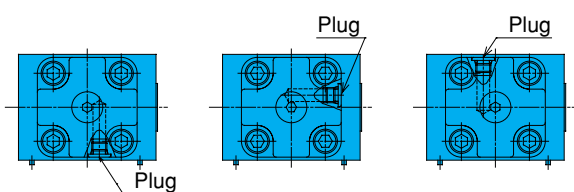
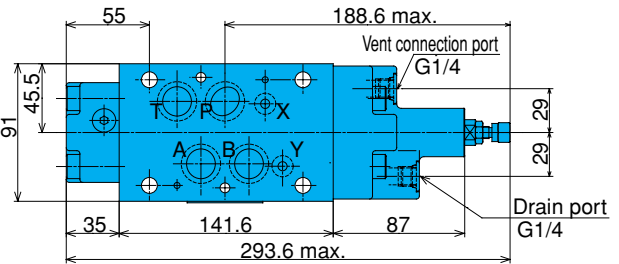
OG-G03-P*-(V)-J51



Note) 1. Conversion to B port control is possible by changing the back cover. Port control is determined by plug orientation.
2. When replacing the back cover, be sure also to change the nameplate to the applicable model type.
3. The tightening torque of the back cover bolts is: (M6) 10 to 13Nm (102 to 133 kgf-cm).

OGH-G04-P*-10

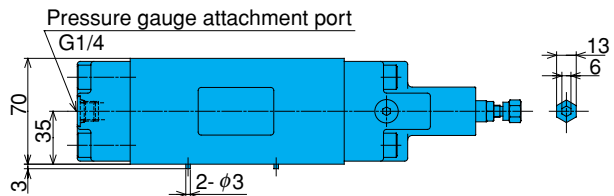
Note) 1. Conversion to A, B port control is possible by changing the back cover. Port control is determined by plug orientation.
2. When replacing the back cover, be sure also to change the nameplate to the applicable model type.
3. The tightening torque of the back cover bolts is: (M10) 45 to 55Nm (460 to 560 kgf-cm).



OGH-G04-B*-10

OGH-G04-A*-10

OGH-G04-P*-10

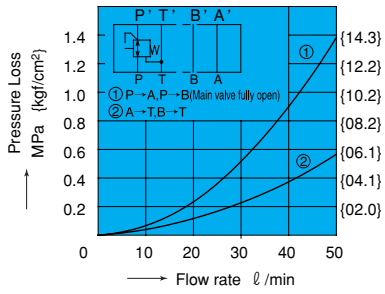


Performance Curves

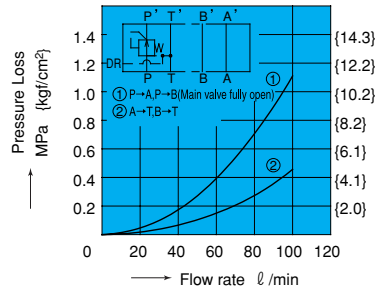
Differential Hydraulic Fluid Viscosity 32mm²/s

Pressure Loss Characteristics

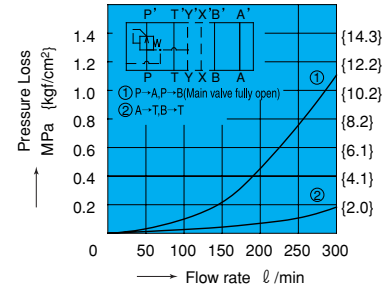
OG-G01-P*-21



OG-G03-P*-J51

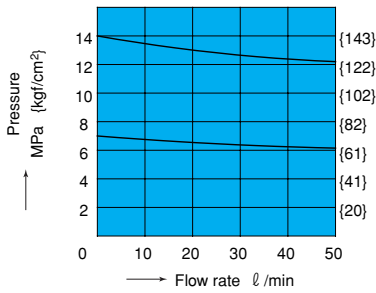


OGH-G04-**-10

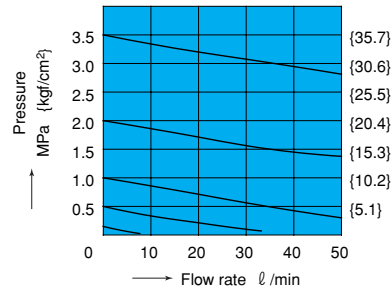


Pressure – Flow Rate Characteristics

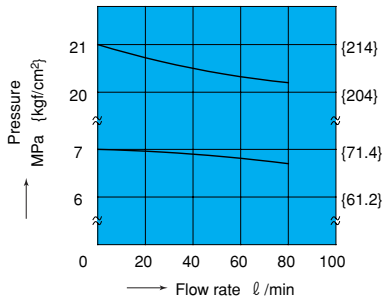
OG-G01-P₂¹-21



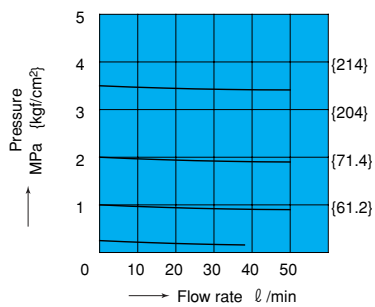
OG-G01-PC-21



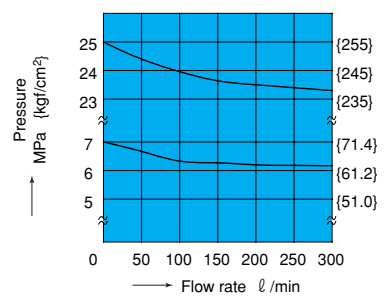
OG-G03-P₃¹-J51



OG-G03-PC-J51

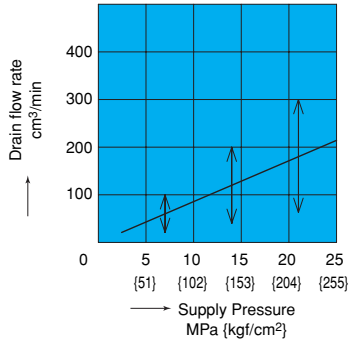


OGH-G04-**-10

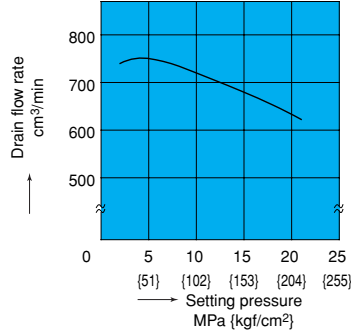


Pressure – Drain Rate Characteristics

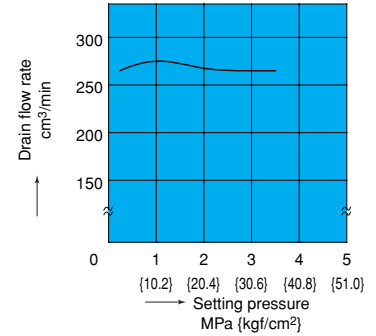
OG-G01-P*-21



OG-G03-P*-J51

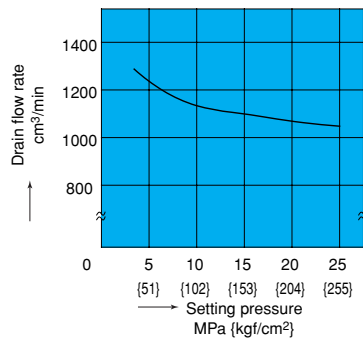


OG-G03-PC-J51



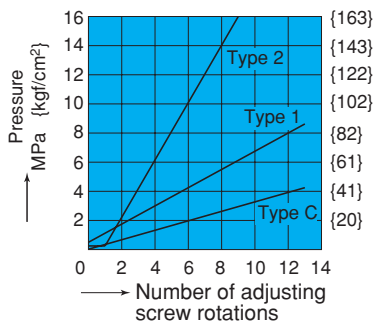
Determine it through the maximum value when designing the circuit.

OGH-G04-P3-10

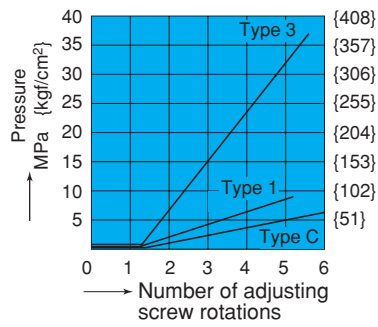


Number of Adjusting Screw Rotations – Pressure Characteristics

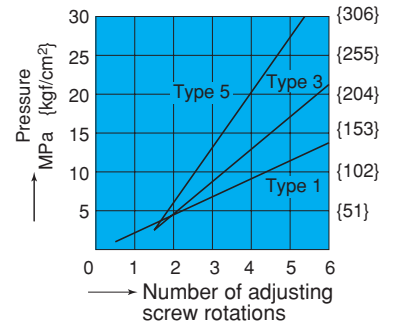
OG-G01-P*-21



OG-G03-P*-51

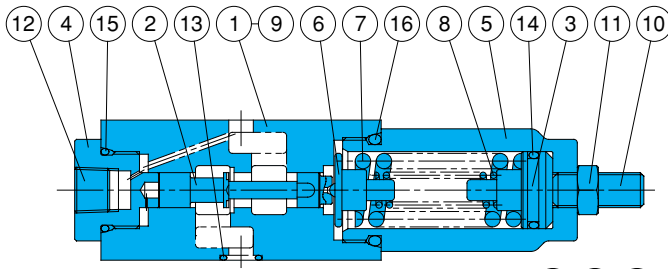


OGH-G04-P*-10



Cross-sectional Drawing

OG-G01-P2-21

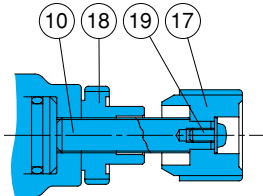


Part No.	Part Name
1	Body
2	Spool
3	Push rod
4	Bushing
5	Retainer
6	Guide
7	Spring
8	Spring
9	Plate
10	Screw
11	Nut
12	Plug
13	O-ring
14	O-ring
15	O-ring
16	O-ring
17	Knob
18	Nut
19	Screw

Seal Part List (Kit Model Number BRBS-01GP*)

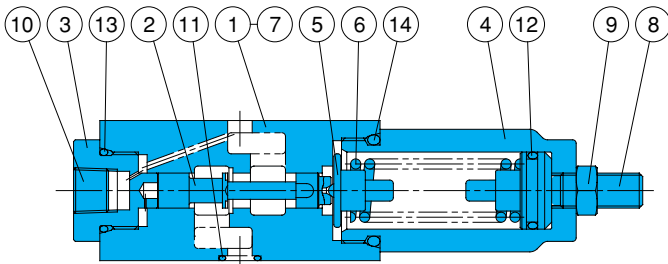
Part No.	Part Name	Part Number	Q'ty
			P
13	O-ring	1B-P9	4
14	O-ring	1A-P18	1
15	O-ring	1B-P20	1
16	O-ring	1B-P26	1

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.



Note)
Part number 8 is used in the case of pressure adjustment range type 2 only.

OG-G01-PC-21

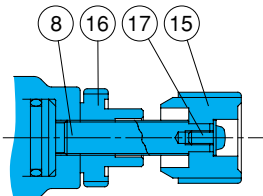


Part No.	Part Name
1	Body
2	Spool
3	Bushing
4	Retainer
5	Guide
6	Spring
7	Plate
8	Screw
9	Nut
10	Plug
11	O-ring
12	O-ring
13	O-ring
14	O-ring
15	Knob
16	Nut
17	Screw

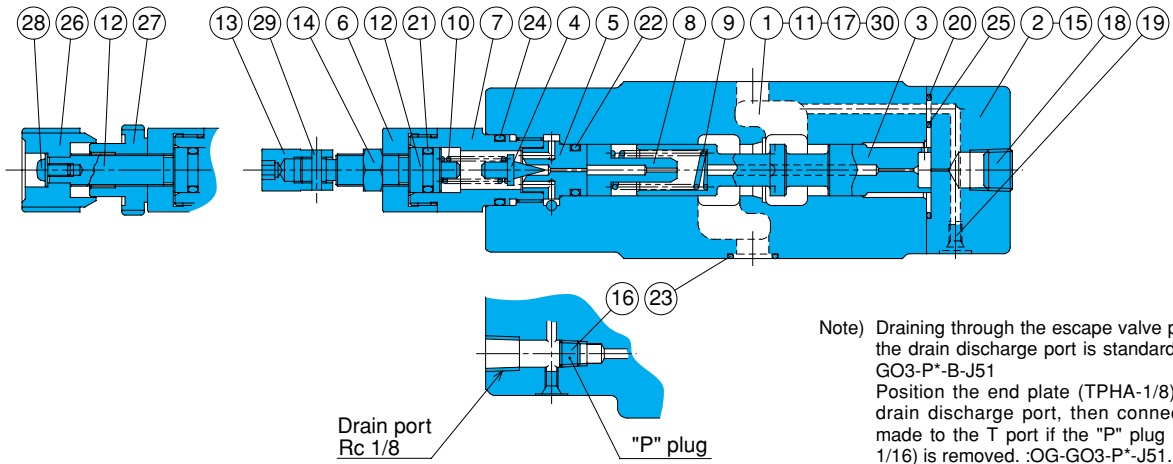
Seal Part List (Kit Model Number BRBS-01GP*)

Part No.	Part Name	Part Number	Q'ty
			P
11	O-ring	1B-P9	4
12	O-ring	1A-P18	1
13	O-ring	1B-P20	1
14	O-ring	1B-P26	1

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.



OG-G03-P*-J51



Note) Draining through the escape valve piped to the drain discharge port is standard. : OG-G03-P*-B-J51
 Position the end plate (TPHA-1/8) to the drain discharge port, then connection is made to the T port if the "P" plug (TPUA-1/16) is removed. :OG-G03-P*-J51.

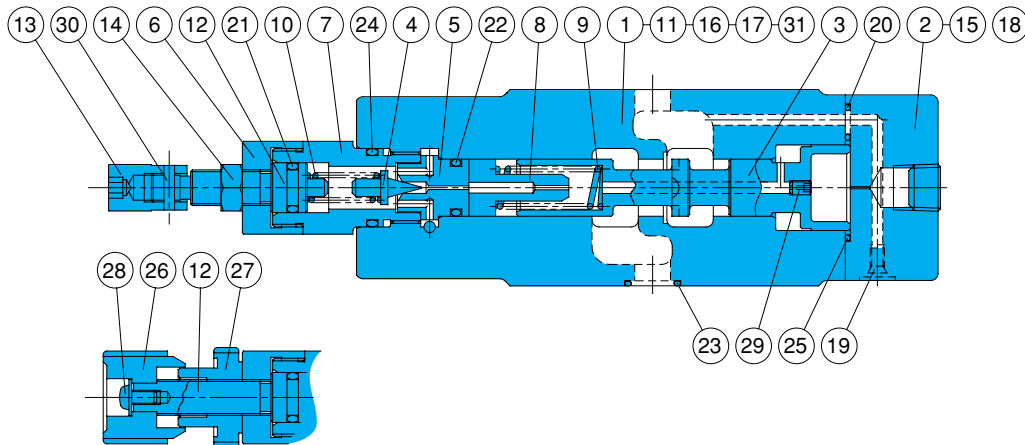
Seal Part List (Kit Model Number BRES-03GP-1A)

Part No.	Part Name	Part Number	Q'ty
			P
20	O-ring	1B-P6	2
21	O-ring	1A-P10A	1
22	O-ring	1B-P12	1
23	O-ring	AS568-014(Hs90)	5
24	O-ring	1B-P18	1
25	O-ring	AS568-023(Hs90)	1

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.

Part No.	Part Name	Part No.	Part Name
1	Body	14	Nut
2	Cover	15	Screw
3	Spool	16	Plug
4	Poppet	17	Plug
5	Seat	18	Plug
6	Bushing	19	Plug
7	Retainer	20	O-ring
8	Choke	21	O-ring
9	Spring	22	O-ring
10	Spring	23	O-ring
11	Plate	24	O-ring
12	Screw	25	O-ring
13	Nut	26	Knob
		27	Nut
		28	Screw
		29	Pin
		30	Pin

OG-G03-PC-J51



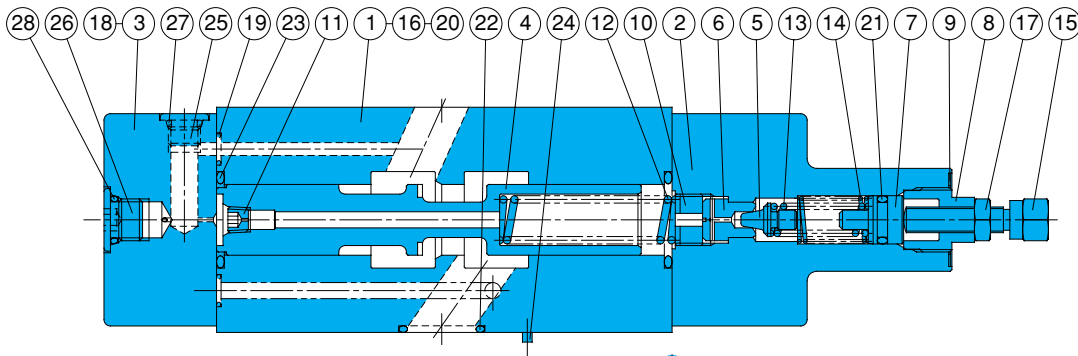
Seal Part List (Kit Model Number BRES-03GP*-1A)

Part No.	Part Name	Part Number	Q'ty
			P
20	O-ring	1B-P6	2
21	O-ring	1A-P10A	1
22	O-ring	1B-P12	1
23	O-ring	AS568-014(Hs90)	5
24	O-ring	1B-P18	1
25	O-ring	AS568-023(Hs90)	1

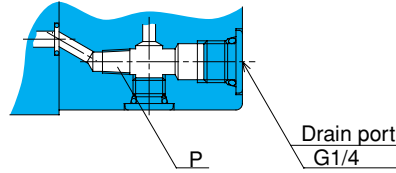
Note) O-ring 1A/B-** refers to JIS B2401-1A/B.

Part No.	Part Name	Part No.	Part Name
1	Body	16	Plug
2	Cover	17	Plug
3	Spool	18	Plug
4	Poppet	19	Plug
5	Seat	20	O-ring
6	Bushing	21	O-ring
7	Retainer	22	O-ring
8	Choke	23	O-ring
9	Spring	24	O-ring
10	Spring	25	O-ring
11	Plate	26	Knob
12	Screw	27	Nut
13	Nut	28	Screw
14	Nut	29	Choke
15	Screw	30	Pin
		31	Pin

OGH-G04-P*-10



Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Spool
5	Poppet
6	Seat
7	Plunger
8	Retainer
9	Plate
10	Collar
11	Choke
12	Spring
13	Spring
14	Spring
15	Screw
16	Plate
17	Nut
18	Screw
19	O-ring
20	O-ring
21	O-ring
22	O-ring
23	O-ring
24	Pin
25	Plug
26	Plug
27	O-ring
28	O-ring



Seal Part List (Kit Model Number BRKS-04**)

Part No.	Part Name	Part Number	Q'ty	
			G	GB
19	O-ring	1B-P7	4	4
20	O-ring	AS568-012(Hs90)	2	2
21	O-ring	1A-P11	1	1
22	O-ring	AS568-118(Hs90)	4	4
23	O-ring	1B-G25	2	2
27	O-ring	1B-P8	4	4
28	O-ring	1B-P11	3	2

Note)
In the standard configuration, OGH-G04-P*-10 does not require a P plug, while OGH-G04-P*-B-10 requires a P plug (TPUA-1/16) and drain pipe from the cover.

Note) 1.O-ring 1A/B-** refers to JIS B2401-1A/B.
2.Specify G (internal drain) or GB (external drain) for the asterisk (*) in the kit model number.



Balanced Piston Type Pressure Reducing Modular Valve

40 ℓ /min
0.15 to 25MPa

Features

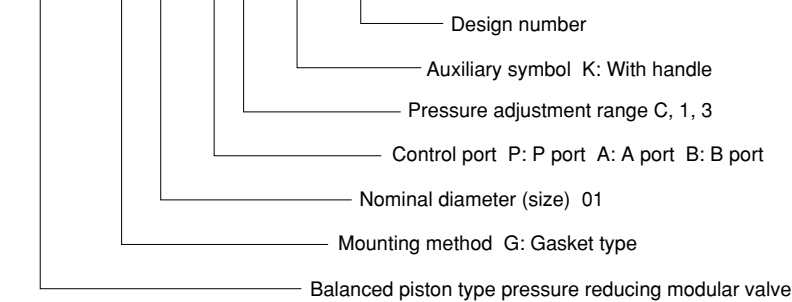
- ① This modular valve makes the pressure in part of the circuit lower than the main circuit.
- ② Even when pressure changes in the primary main circuit, the reduced secondary pressure is maintained at a constant level.
- ③ Compared with the direct type, this type of valve has outstanding Pressure-Flow Rate Characteristics, and a superior flow rate in the low pressure control range.
- ④ Maximum operating pressure: 25MPa {255kgf/cm²}

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Flow Rate ℓ /min	Pressure Adjustment Range MPa{kgf/cm ² }	Weight kg	Gasket Surface Dimensions
OGB-G01-PC-20 P1 P3	1/8	25 {255}	40	0.15 to 3.5{ 1.5 to 35.7}	1.9	ISO 4401-03-02-0-94
OGB-G01-AC-20 A1 A3				0.8 to 7{ 8.2 to 71.4}		
OGB-G01-BC-20 B1 B3				3.5 to 21{35.7 to 214}		

Understanding Model Numbers

OGB - G 01 - P 1 - (K) - 20



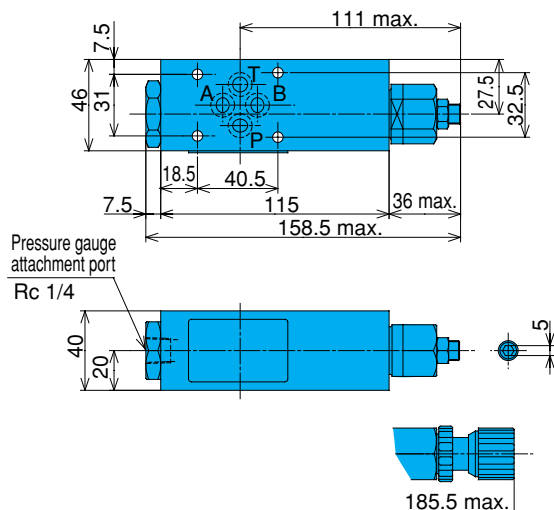
• Handling

- ① See the Pressure-Flow Rate Characteristics for information about how the flow rate is controlled at low pressures.
- ② Note that a change in tank port back pressure causes a change in setting pressure.
- ③ Vent piping is not possible.
- ④ Note that a sub plate and installation bolts are not included. See pages D-90 through D-95 if these items are required.

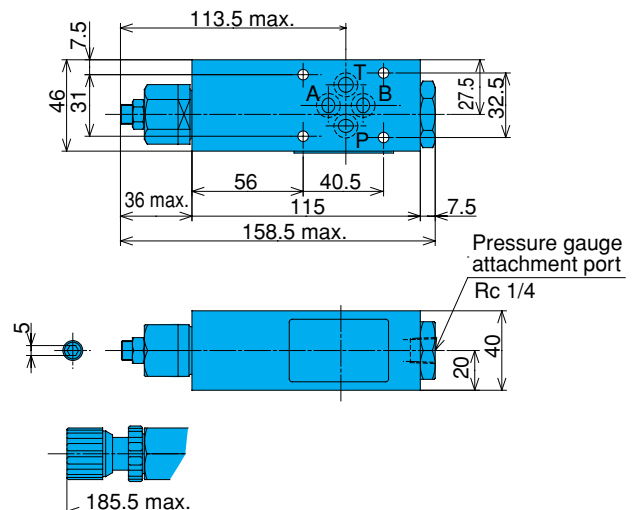
Installation Dimension Drawings

Note)
Pressure is increased by clockwise (rightward) rotation of the adjusting screw (bolt), and decreased by counterclockwise (leftward) rotation.

OGB-G01-P^{*}-20



OGB-G01-B*-20

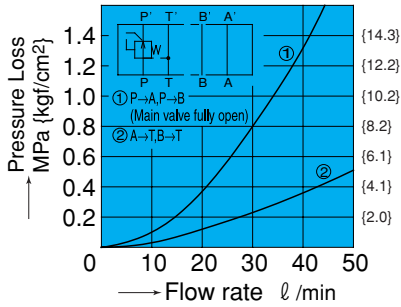


Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

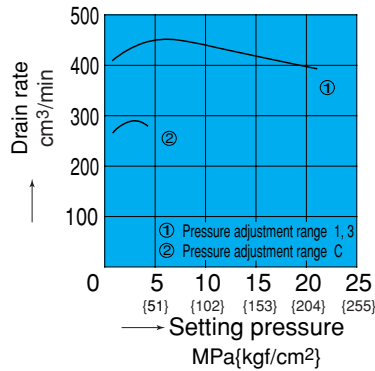
Pressure Loss Characteristics

OGB-G01-P*-20



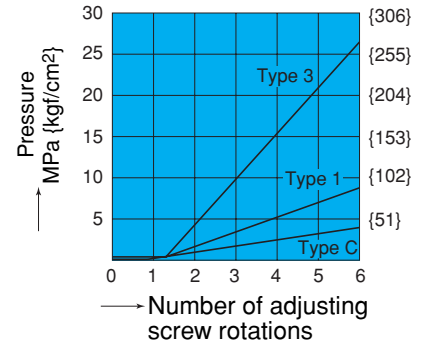
Pressure – Drain Rate Characteristics

OGB-G01-**-20



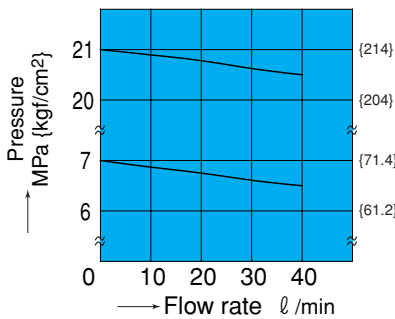
Number of Adjusting Screw Rotations – Pressure Characteristics

OGB-G01-P*-20

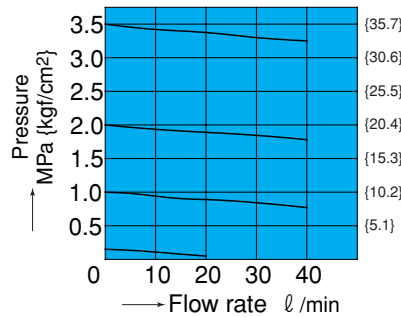


Pressure – Flow Rate Characteristics

OGB-G01-¹/₃-20

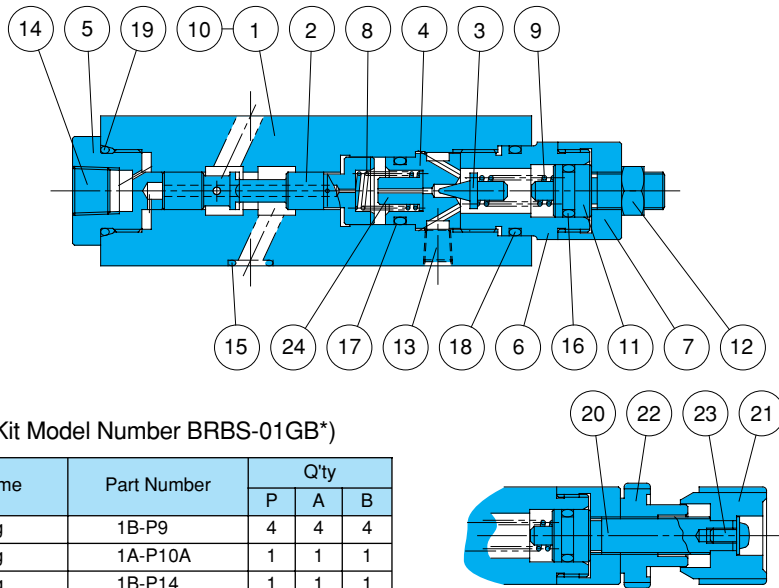


OGB-G01-*C-20



Cross-sectional Drawing

OGB-G01-P*-20



Seal Part List (Kit Model Number BRBS-01GB*)

Part No.	Part Name	Part Number	Q'ty		
			P	A	B
15	O-ring	1B-P9	4	4	4
16	O-ring	1A-P10A	1	1	1
17	O-ring	1B-P14	1	1	1
18	O-ring	1B-P20	1	1	1
19	O-ring	1B-P20	1	1	1

Part No.	Part Name
1	Body
2	Spool
3	Poppet
4	Seat
5	Bushing
6	Retainer
7	Bushing
8	Spring
9	Spring
10	Plate
11	Screw
12	Nut
13	Plug
14	Plug
15	O-ring
16	O-ring
17	O-ring
18	O-ring
19	O-ring
20	Knob
21	Nut
22	Screw
23	Choke

Note) 1.O-ring 1A/B-** refers to JIS B2401-1A/B.
2.Specify P, A, or B for the asterisk (*) in the kit model number.



Pressure Reducing Modular Valve

40 to 300 ℓ / min
25,35MPa

Features

- ① This modular valve makes the pressure in part of the circuit lower than the main circuit.
- ② Even when pressure changes in the primary main circuit, the reduced secondary pressure is maintained at a constant level.
- ③ Maximum Operating Pressure: 25, 35MPa {255, 357kgf/cm²}

Specifications

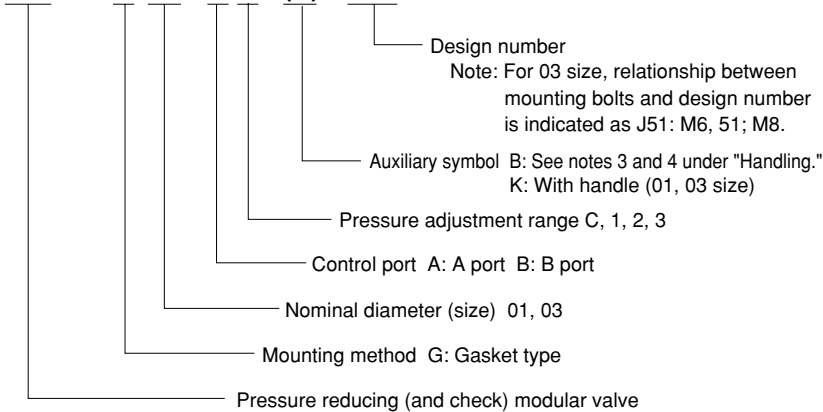
Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Flow Rate ℓ /min	Pressure Adjustment Range MPa{kgf/cm ² }	Weight kg	Gasket Surface Dimensions
OG-G01-AC-21 A1 A2	1/8	25{255}	40	0.15 to 3.5{ 1.5 to 35.7}	1.3	ISO 4401-03-02-0-94
OG-G01-BC-21 B1 B2				0.8 to 7{ 8.2 to 71.4}		
OG-G03-AC-J51 A1 A3	3/8	25{255}	80 but C : 50	0.15 to 3.5{ 1.5 to 35.7}	3.8	
OG-G03-BC-J51 B1 B3				0.8 to 7{ 8.2 to 71.4}		
OGH-G04-A1-10 A3	1/2	35{357}	300	0.8 to 7{ 8.2 to 71.4}	8.0	ISO 4401-07-06-0-94
OGH-G04-B1-10 B3				3.5 to 25{35.7 to 255}		

● Handling

- ① When using a remote control valve in a vent circuit, certain vent circuit pipe capacities can cause vibration. Because of this, thick steel pipe with an inside diameter of ϕ 4mm that is no longer than three meters is recommended. Vent piping cannot be used with the 01, 03 sizes.
- ② With the 01, 03 sizes, the flow rate is limited at low pressures. See the Pressure-Flow Rate Characteristics on page D-40 and D-41 for more information.
- ③ For the 03 size, the drainage can be allowed to escape through the T port. In the case of a valve with the auxiliary symbol B, however, run a return pipe from the drain discharge port directly to the tank.
- ④ With the 04 sizes, piping is not required because drainage can be allowed to escape from the gasket side drain port. In the case of a valve with the auxiliary symbol B, however, run a return pipe from the drain discharge port directly to the tank.
- ⑤ Note that a change in drain back pressure causes a change in setting pressure.
- ⑥ Note that a sub plate and installation bolts are not included. See pages D-90 through D-95 if these items are required.
- ⑦ 04 series modular valves do not have an L (DR₂) drain port, so they cannot be used in combination with pressure center type solenoid valves (D).
- ⑧ With the 03, 04 sizes, the control port can be changed by altering the attachment orientation of the back cover. See the installation diagram for more information. After making this change, be sure also to make the other changes as in accordance with the model number indicated on the nameplate.

Understanding Model Numbers

OG - G 03 - B 1 - (B) - J51

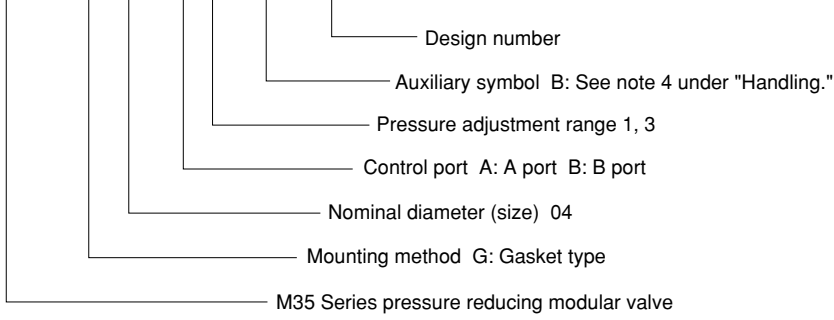


01, 03 size

Understanding Model Numbers

04 size

OGH - G 04 - A 1 - (B) - 10

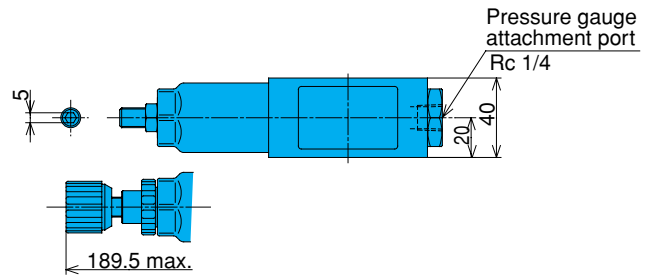
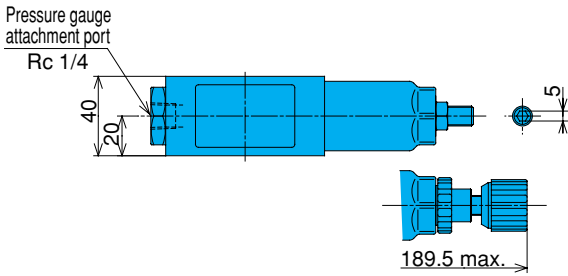
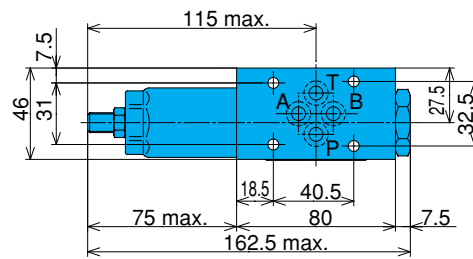
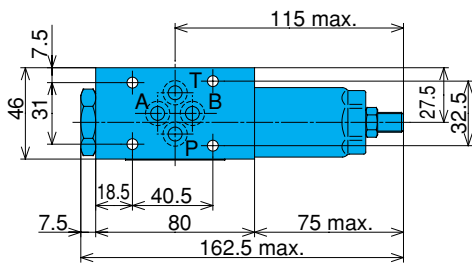


Installation Dimension Drawings

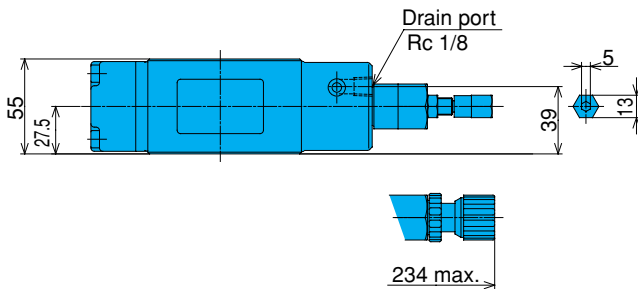
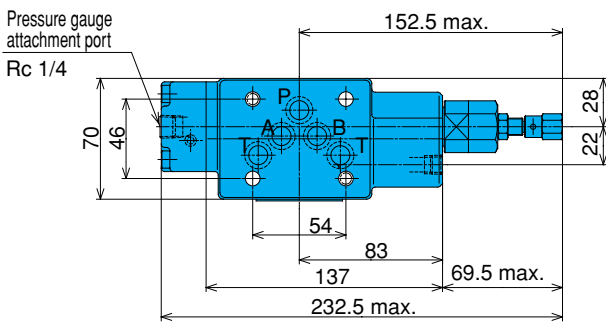
Note)
Pressure is increased by clockwise (rightward) rotation of the adjusting screw (bolt), and decreased by counterclockwise (leftward) rotation.

OG-G01-A*-21

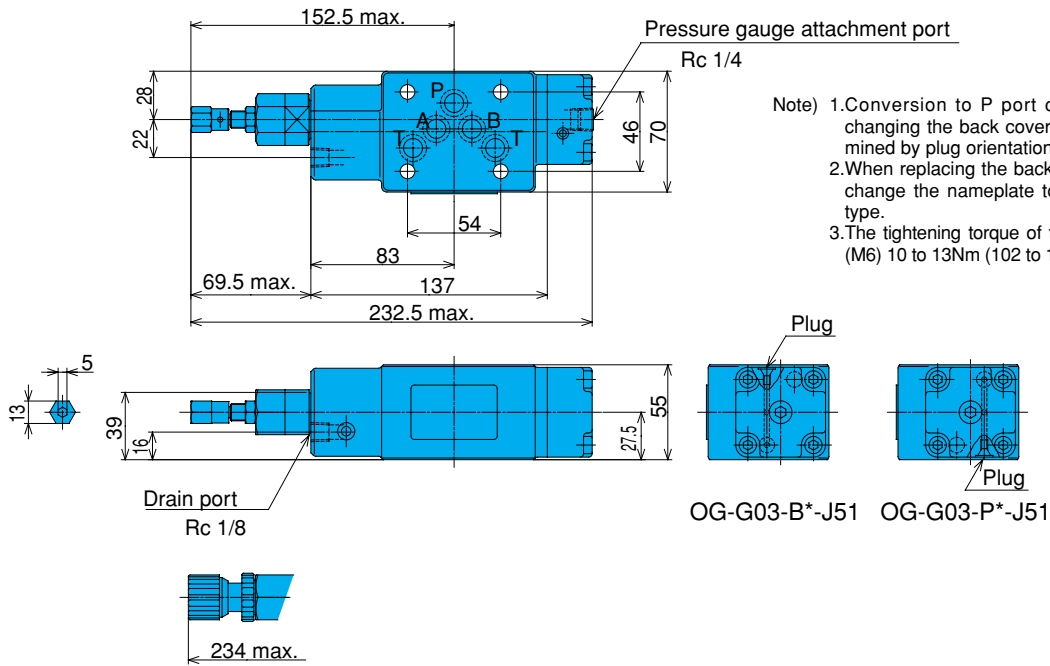
OG-G01-B*-21



OG-G03-A*-J51



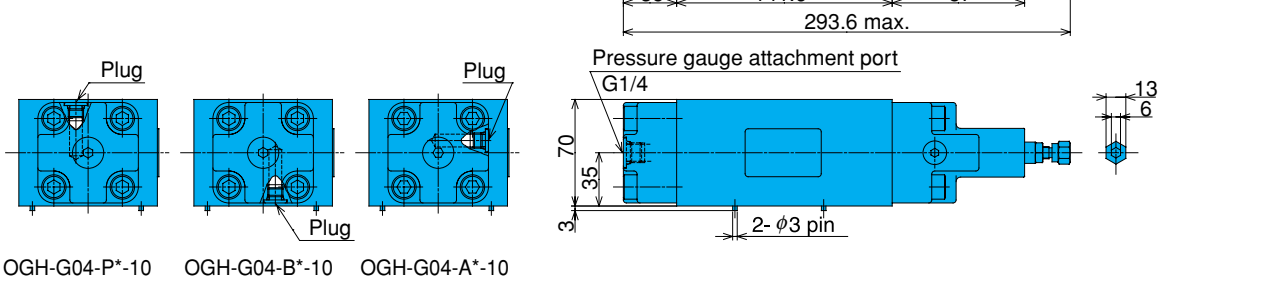
OG-G03-B*-J51



- Note) 1. Conversion to P port control is possible by changing the back cover. Port control is determined by plug orientation.
 2. When replacing the back cover, be sure also to change the nameplate to the applicable model type.
 3. The tightening torque of the back cover bolts is: (M6) 10 to 13Nm (102 to 133 kgf-cm).

OGH-G04-A*-10

- Note) 1. Conversion to P, B port control is possible by changing the back cover. Port control is determined by plug orientation.
 2. When replacing the back cover, be sure also to change the nameplate to the applicable model type.
 3. The tightening torque of the back cover bolts is: (M10) 45 to 55Nm (460 to 560 kgf-cm).

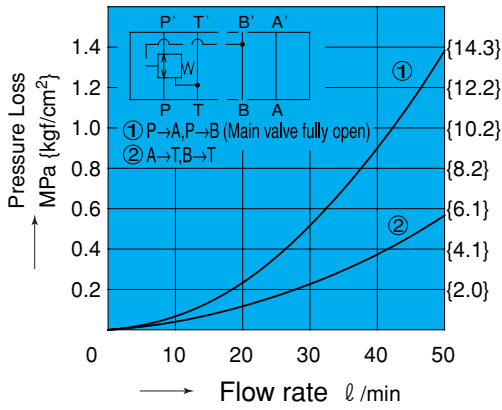


Performance Curves

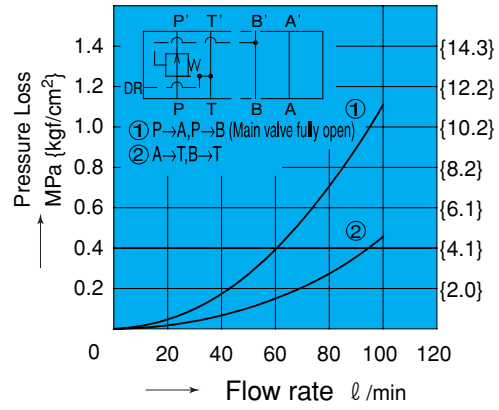
Hydraulic Operating Fluid Viscosity 32mm²/s

Pressure Loss Curve

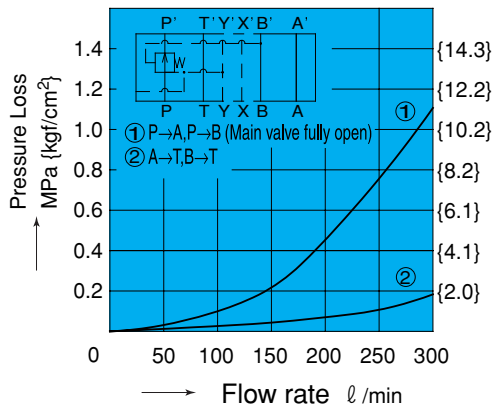
OG-G01-B*-21



OG-G03-B*-J51

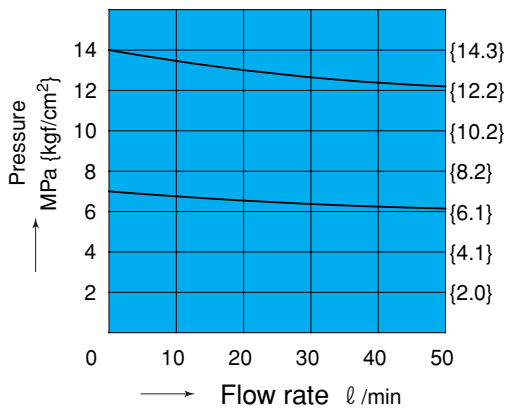


OGH-G04-**-10

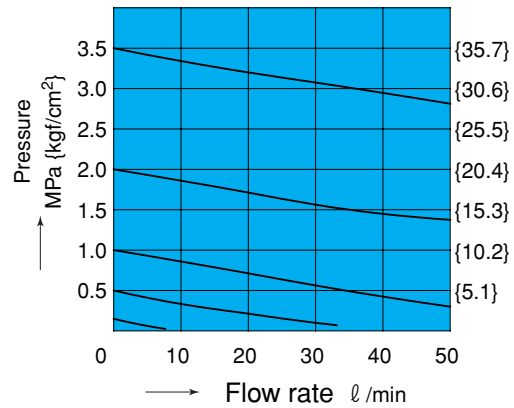


Pressure – Flow Rate Characteristics

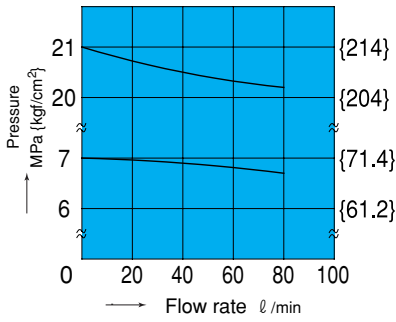
OG-G01-B₂¹-21



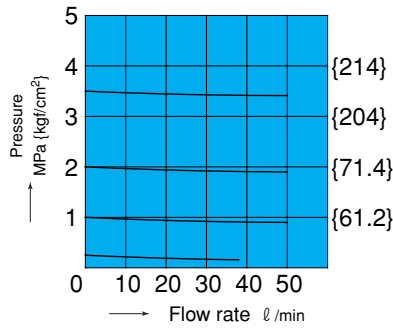
OG-G01-BC-21



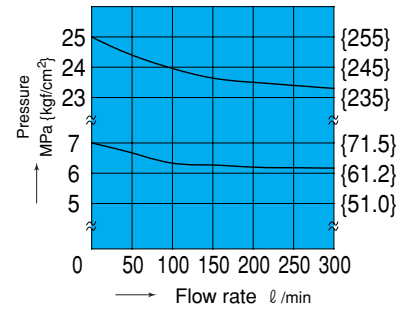
OG-G03-B₃¹-J51



OG-G03-BC-J51

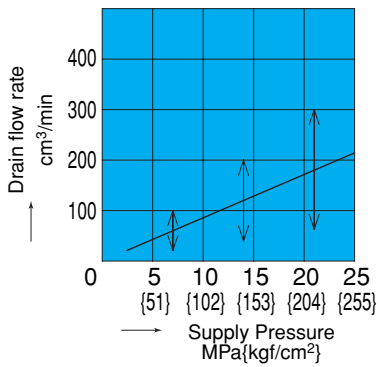


OGH-G04-**-10

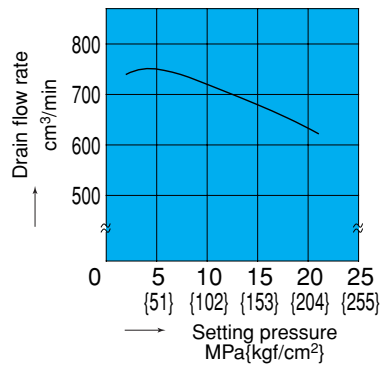


Pressure – Drain Rate Characteristics

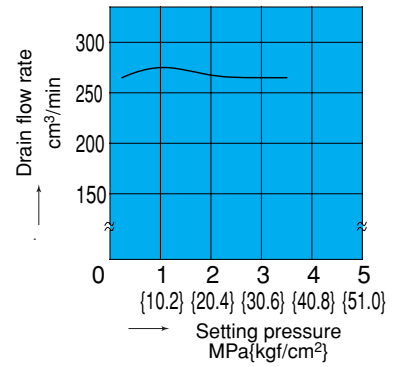
OG-G01-B*-21



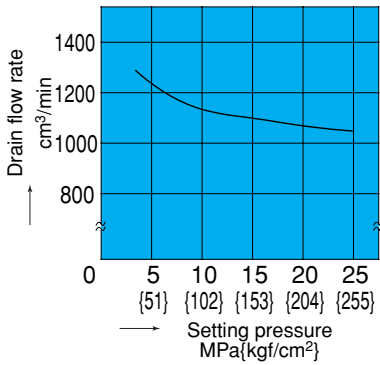
OG-G03-B*-J51



OG-G03-BC-J51

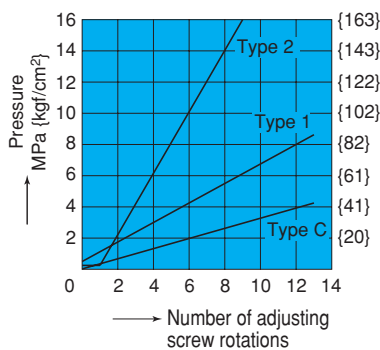


OGH-G04-*3-10

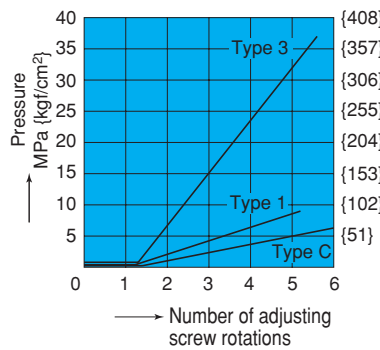


Number of Adjusting Screw Rotations – Pressure Characteristics

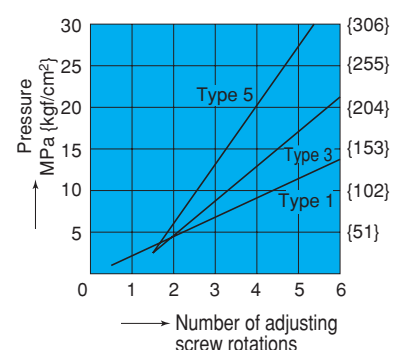
OG-G01-**-21



OG-G03-**-51

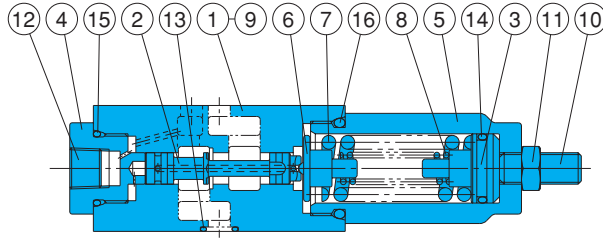


OGH-G04-**-10



Cross-section

OG-G01-A2-21

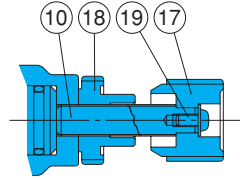


Part No.	Part Name
1	Body
2	Spool
3	Push rod
4	Bushing
5	Retainer
6	Guide
7	Spring
8	Spring
9	Plate
10	Screw
11	Nut
12	Plug
13	O-ring
14	O-ring
15	O-ring
16	O-ring
17	Knob
18	Nut
19	Screw

Seal Part List (Kit Model Number BRBS-01GP*)

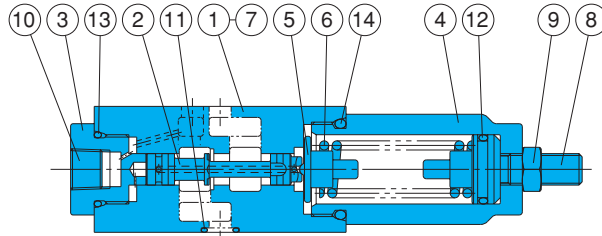
Part No.	Part Name	Part Number	Q'ty
13	O-ring	1B-P9	4
14	O-ring	1A-P18	1
15	O-ring	1B-P20	1
16	O-ring	1B-P26	1

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.



Note)
Part number 8 is used in the case of pressure adjustment range type 2 only.

OG-G01-AC-21

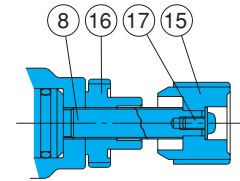


Part No.	Part Name
1	Body
2	Spool
3	Bushing
4	Retainer
5	Guide
6	Spring
7	Plate
8	Screw
9	Nut
10	Plug
11	O-ring
12	O-ring
13	O-ring
14	O-ring
15	Knob
16	Nut
17	Screw

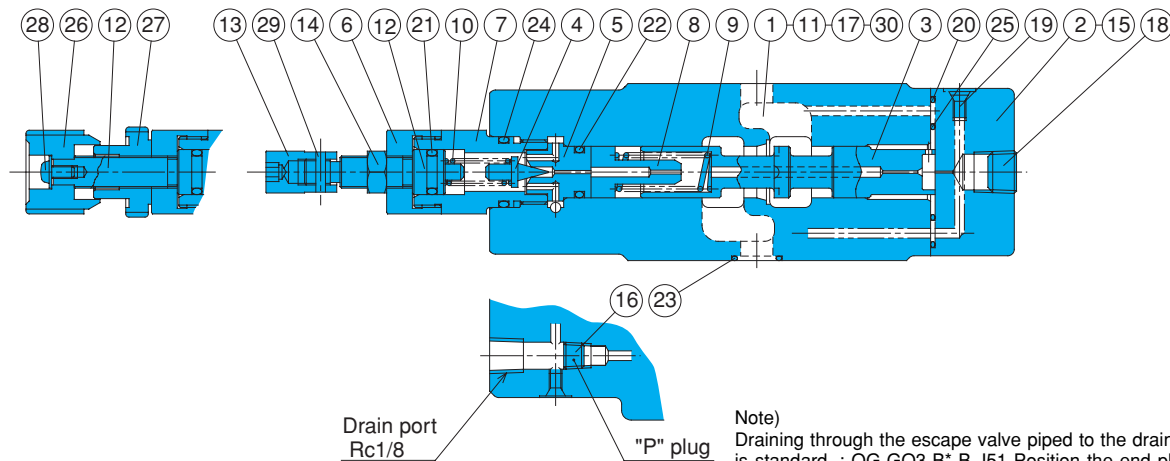
Seal Part List (Kit Model Number BRBS-01GP*)

Part No.	Part Name	Part Number	Q'ty
11	O-ring	1B-P9	4
12	O-ring	1A-P18	1
13	O-ring	1B-P20	1
14	O-ring	1B-P26	1

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.



OG-G03-B*-J51



Note)
Draining through the escape valve piped to the drain discharge port is standard. : OG-GO3-B*-B-J51 Position the end plate (TPHA-1/8) to the drain discharge port, then connection is made to the T port if the "P" plug (TPUA-1/16) is removed. :OG-GO3-B*-J51.

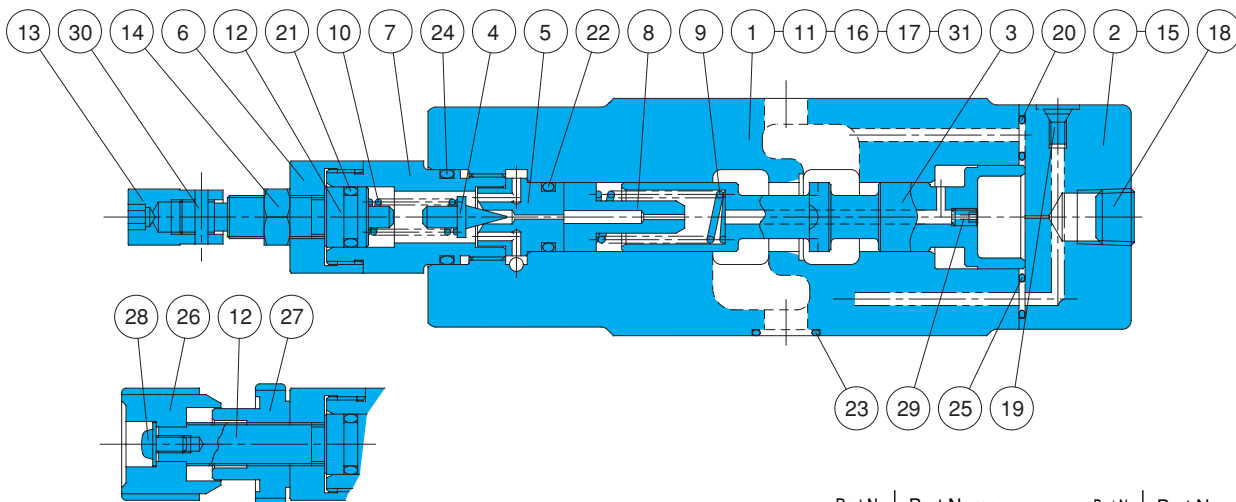
Seal Part List (Kit Model Number BRES-03G*-1A)

Part No.	Part Name	Part Number	Q'ty	
			A	B
20	O-ring	1B-P6	2	2
21	O-ring	1A-P10A	1	1
22	O-ring	1B-P12	1	1
23	O-ring	AS568-014(Hs90)	5	5
24	O-ring	1B-P18	1	1
25	O-ring	AS568-023(Hs90)	1	1

Note) 1.O-ring 1A/B-** refers to JIS B2401-1A/B.
2.Specify A or B for the asterisk (*) in the kit model number.

Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	11	Plate	21	O-ring
2	Cover	12	Screw	22	O-ring
3	Spool	13	Nut	23	O-ring
4	Poppet	14	Nut	24	O-ring
5	Seat	15	Screw	25	O-ring
6	Bushing	16	Plug	26	Knob
7	Retainer	17	Plug	27	Nut
8	Choke	18	Plug	28	Screw
9	Spring	19	Plug	29	Pin
10	Spring	20	O-ring	30	Pin

OG-G03-BC-J51



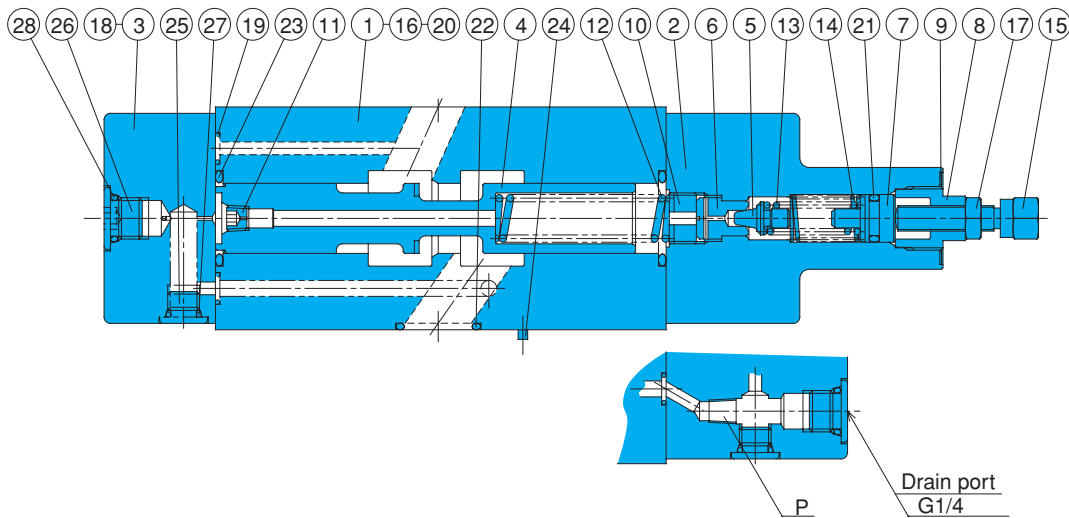
Seal Part List (Kit Model Number BRES-03GC*-1A)

Part No.	Part Name	Part Number	Q'ty	
			A	B
20	O-ring	1B-P6	2	2
21	O-ring	1A-P10A	1	1
22	O-ring	1B-P12	1	1
23	O-ring	AS568-014(Hs90)	5	5
24	O-ring	1B-P18	1	1
25	O-ring	AS568-023(Hs90)	1	1

Note) 1.O-ring 1A/B-** refers to JIS B2401-1A/B.
2.Specify A or B for the asterisk (*) in the kit model number.

Part No.	Part Name	Part No.	Part Name
1	Body	16	Plug
2	Cover	17	Plug
3	Spool	18	Plug
4	Poppet	19	Plug
5	Seat	20	O-ring
6	Bushing	21	O-ring
7	Retainer	22	O-ring
8	Choke	23	O-ring
9	Spring	24	O-ring
10	Spring	25	O-ring
11	Plate	26	Knob
12	Screw	27	Nut
13	Nut	28	Screw
14	Nut	29	Choke
15	Screw	30	Pin
		31	Pin

OGH-G04**-10



Seal Part List (Kit Model Number BRKS-04**)

Part No.	Part Name	Part Number	Q'ty	
			G	GB
19	O-ring	1B-P7	4	4
20	O-ring	AS568-012(Hs90)	2	2
21	O-ring	1A-P11	1	1
22	O-ring	AS568-118(Hs90)	4	4
23	O-ring	1B-G25	2	2
27	O-ring	1B-P8	4	4
28	O-ring	1B-P11	3	2

Note) 1.O-ring 1A/B-** refers to JIS B2401-1A/B.
2.Specify G (internal drain) or GB (external drain) for the asterisk (*) in the kit model number.

Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Spool
5	Poppet
6	Seat
7	Plunger
8	Retainer
9	Plate
10	Collar
11	Choke
12	Spring
13	Spring
14	Spring
15	Screw
16	Plate
17	Nut
18	Screw
19	O-ring
20	O-ring
21	O-ring
22	O-ring
23	O-ring
24	Pin
25	Plug
26	Plug
27	O-ring
28	O-ring

Note)
In the standard configuration, OGH-G04**-10 does not require a P plug, while OGH-G04**-B-10 requires a P plug (TPUA-1/16) and drain pipe from the cover.



Two-Pressure Reducing Modular Valve

40 ℓ /min
0.2 to 14MPa

Features

- ① When the pressure in part of the circuit is lower than the main circuit, this modular valve controls pressure by switching the low pressure to secondary pressure (high pressure, low pressure).
- ② Even when pressure changes in the primary main circuit, the reduced secondary pressure is maintained at a constant level.
- ③ Maximum Operating Pressure: 7, 25MPa {71.4, 255kgf/cm²}

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Flow Rate ℓ /min	Pressure Adjustment Range MPa{kgf/cm ² }		Weight kg	Gasket Surface Dimensions
				Low pressure side	High pressure side		
OGS-G01-PCC-K-22 P1C	1/8	7{71.4}	40	0.2 to 3.5 {2.0 to 35.7}	0.2 to 3.5{ 2.0 to 35.7}	4.8	ISO 4401-03-02-0-94
P21				0.8 to 7 {8.2 to 71.4}	0.8 to 7{ 8.2 to 71.4}		

Solenoid Specifications

Model No.	Rated Voltage	Starting Current	Holding Current	Holding Power
OGS-G01-P**K- C1-22	AC100V 50/60HZ	2.2/2.0A	0.52/0.38A	25/22W
C2	AC200V 50/60HZ	1.1/1.0A	0.26/0.19A	25/22W
D1	DC12V	2.2A		26W
D2	DC24V	1.1A		26W

● Handling

- ① See the Pressure-Flow Rate Characteristics for information about how the flow rate is controlled at low pressures.
- ② Note that a change in tank port back pressure causes a change in setting pressure.
- ③ Instability occurs when there is a small setting pressure differential between the high pressure and low pressure, so be sure to maintain at least the minimum pressure differentials described below.

C Type:

At least 0.3MPa {3.1 kgf/cm²}

1, 2 Type:

At least 0.5MPa {5.1 kgf/cm²}

- ④ Vent piping is not possible.

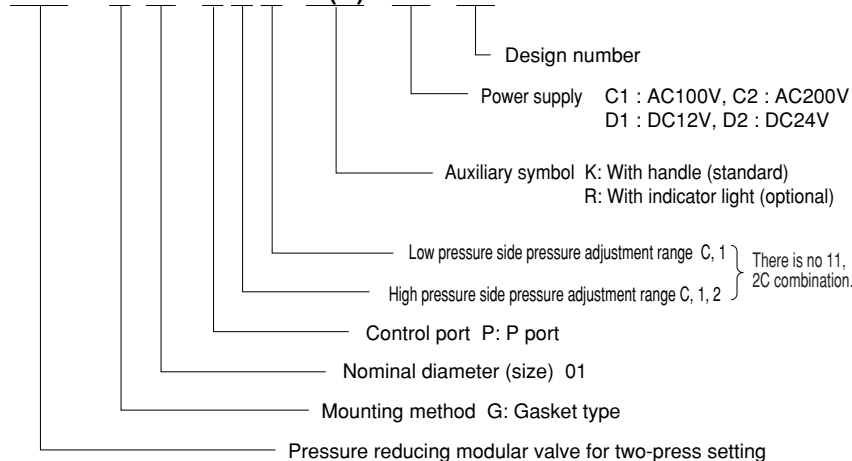
- ⑤ Note that a sub plate and installation bolts are not included. See pages D-90 through D-95 if these items are required.

- ⑥ Low pressure is attained when the solenoid is on.

- ⑦ The coil surface temperature increases if this pump is kept continuously energized. Install the valve so there is no chance of it being touched directly by hand.

Understanding Model Numbers

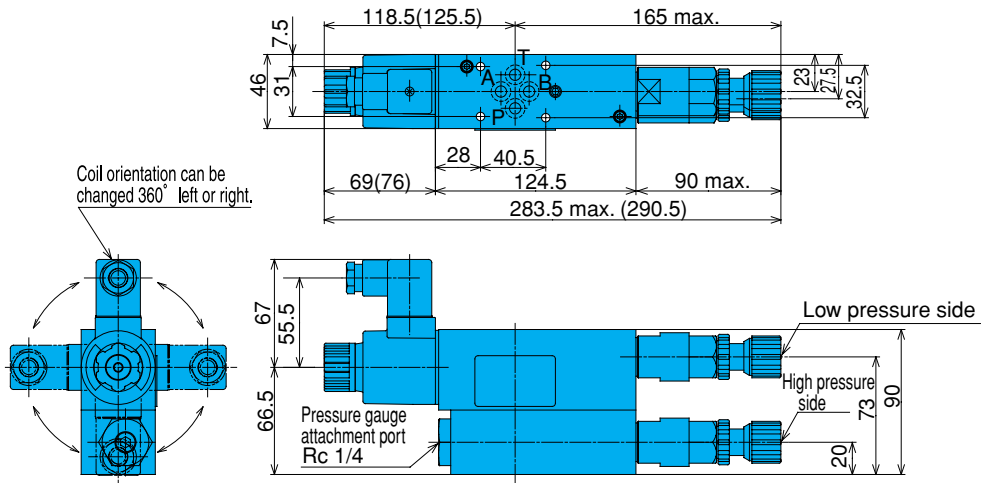
OGS - G 01 - P 1 C - K(R) - C1 - 22



Installation Dimension Drawings

Note) 1. Dimensions in parentheses apply in the case of a DC solenoid.
 2. Pressure is increased by clockwise (rightward) rotation of the adjusting handle, and decreased by counterclockwise (leftward) rotation

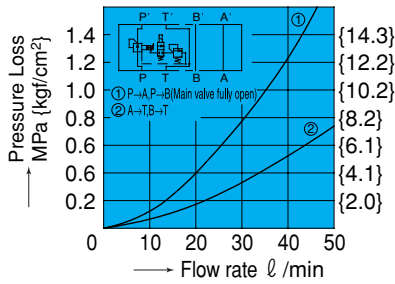
OGS-G01-P*C-K(R)-**-22



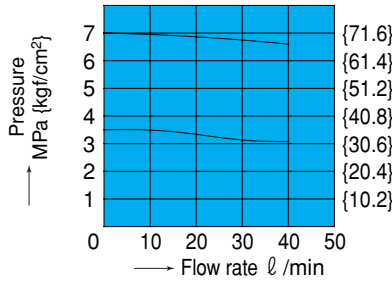
Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

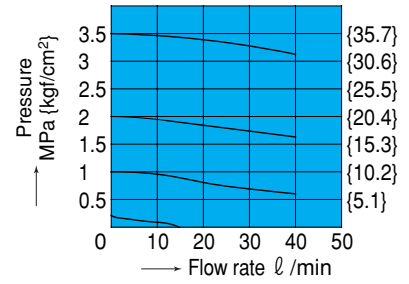
Pressure Loss Characteristics
OGS-G01-PIC-K-**-22



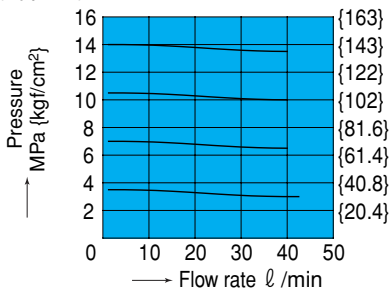
Pressure – Flow Rate Characteristics
OGS-G01-PIC-K-**-22
(Type 1)



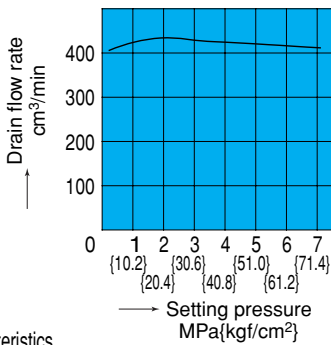
OGS-G01-P*C-K-**-22
(Type C)



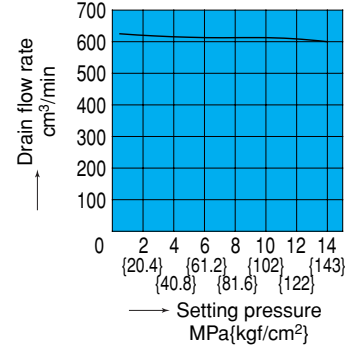
Pressure – Flow Rate Characteristics
OGS-G01-P21-K-**-22
(Type 2)



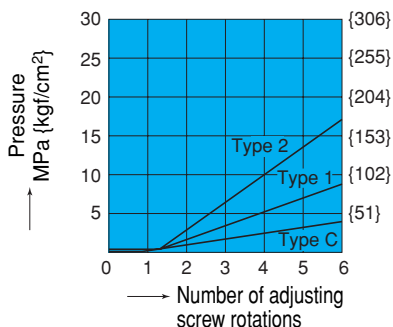
Pressure – Drain Rate Characteristics
OGS-G01-PIC-K-**-22



Pressure – Drain Rate Characteristics
OGS-G01-P21-K-**-22

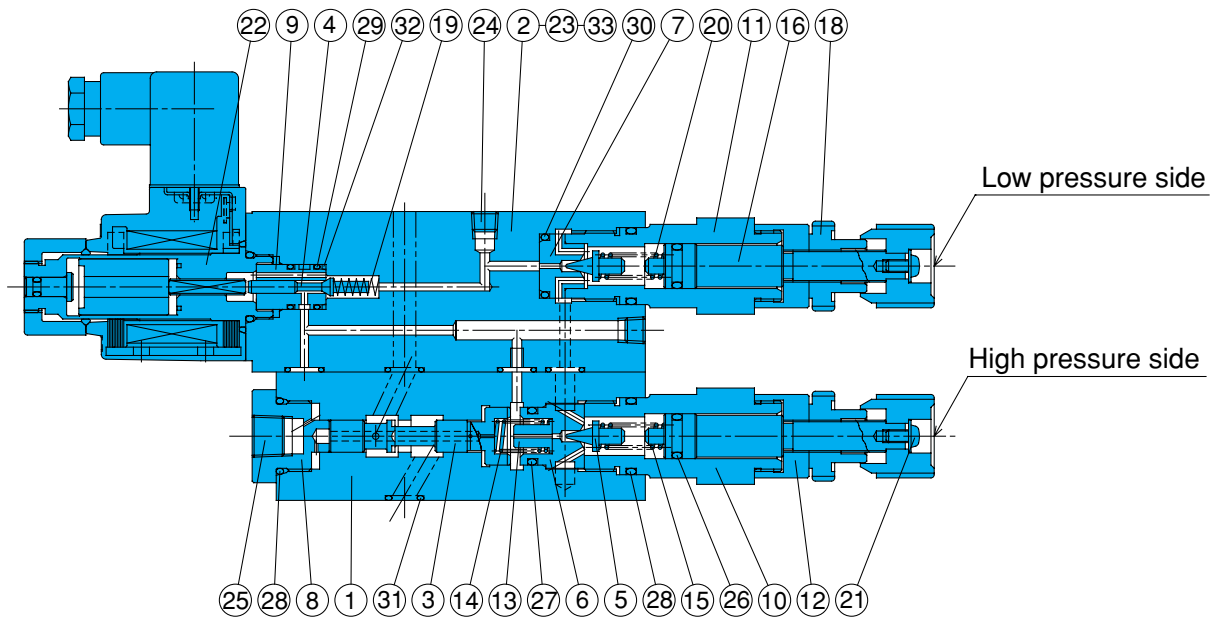


Number of Adjusting Screw Rotations – Pressure Characteristics
OGS-G01-P**-22



Cross-sectional Drawing

OGS-G01-P*C-K(R)-**1-22



Seal Part List (Kit Model Number BRBS-01GSP-1A)

Part No.	Part Name	Part Number	Q'ty
26	O-ring	1A-P10A	2
27	O-ring	1B-P14	1
28	O-ring	1B-P20	3
29	O-ring	AS568-013(Hs90)	2
30	O-ring	1B-P16	1
31	O-ring	1B-P9	11
32	Backup ring	For AS568-013	1

Note) 1.O-ring 1A/B-** refers to JIS B2401-1A/B.

Part No.	Part Name	Part No.	Part Name
1	Body	18	Nut
2	Body	19	Spring
3	Spool	20	Spring
4	Spool	21	Screw
5	Poppet	22	Solenoid assy
6	Seat	23	Screw
7	Seat	24	Plug
8	Bushing	25	Plug
9	Sleeve	26	O-ring
10	Retainer	27	O-ring
11	Retainer	28	O-ring
12	Bushing	29	O-ring
13	Choke	30	O-ring
14	Spring	31	O-ring
15	Spring	32	Backup ring
16	Screw	33	Plate
17	Knob		

Sequence Modular Valve

40 to 80 ℓ /min
25MPa



Features

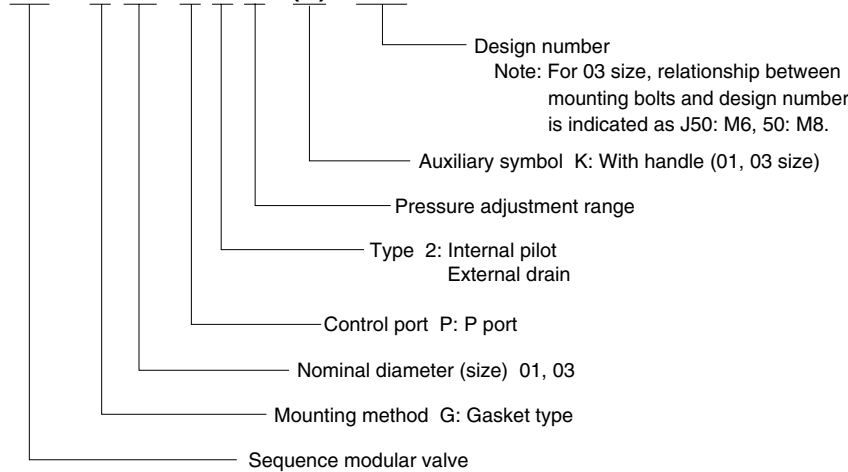
- ① This modular valve is a pressure control valve used for sequential actuator operations and for maintaining main circuit pressure.
- ② Pressure adjustment is possible across a wide range, from 0.25 to 21MPa {1.5 to 214 kgf/cm²}.
- ③ Maximum Operating Pressure: , 25MPa {255kgf/cm²}

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Flow Rate ℓ /min	Pressure Adjustment Range MPa{kgf/cm ² }	Weight kg	Gasket Surface Dimensions
OQ-G01-P21-20 P23	1/8	25{255}	40	0.8 to 7 { 8.2 to 71.4} 3.5 to 21{35.7 to 214}	1.1	ISO 4401-03-02-0-94
OQ-G03-P2A-J50 P2C P2E	3/8	25{255}	80	0.25 to 0.85{ 2.5 to 8.7} 0.85 to 3.5 { 8.7 to 35.7} 3.5 to 14{35.7 to 143}	3.5	ISO 4401-05-04-0-94

Understanding Model Numbers

OQ - G 03 - P 2 A - (K) - J50



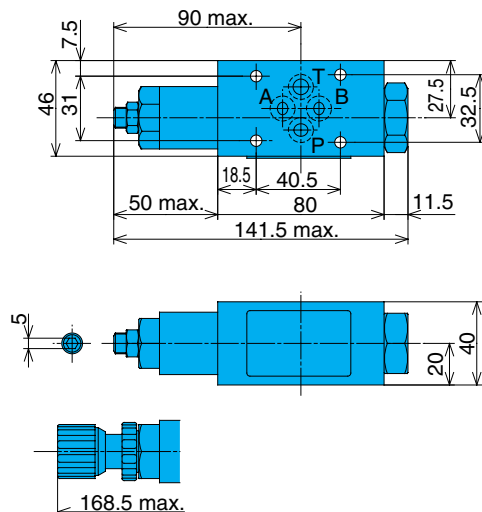
● Handling

- ① The pressure adjustment range is expressed in terms of cracking pressure.
- ② Install this valve directly above the sub plate or manifold.
- ③ When two or more of these valves are ganged in sequence, make sure the setting pressure differential between them is at least 1MPa {10.2kgf/cm²}.
- ④ Note that a sub plate and installation bolts are not included. See pages D-90 through D-95 if these items are required.

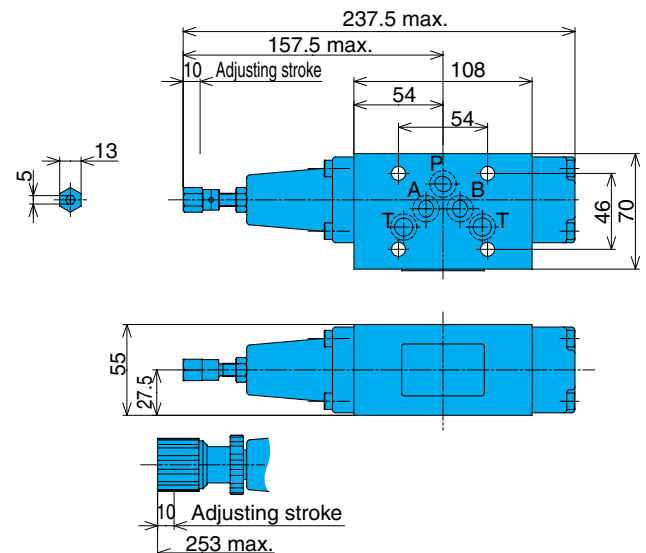
Installation Dimension Drawings

Note) Pressure is increased by clockwise (rightward) rotation of the adjusting screw (bolt), and decreased by counterclockwise (leftward) rotation.

OQ-G01-P2*-20



OQ-G03-P2*-J50

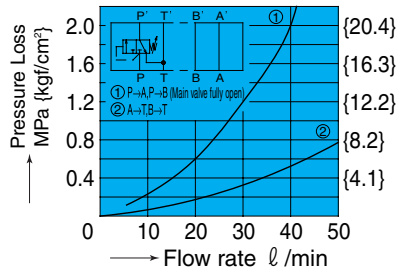


Performance Curves

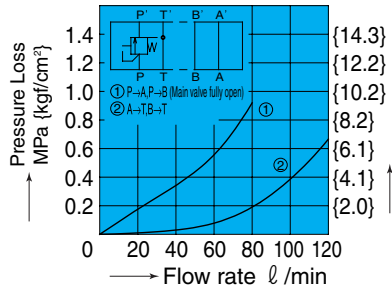
Hydraulic Operating Fluid Viscosity 32mm²/s

Pressure Loss Characteristics

OQ-G01-P2*-20



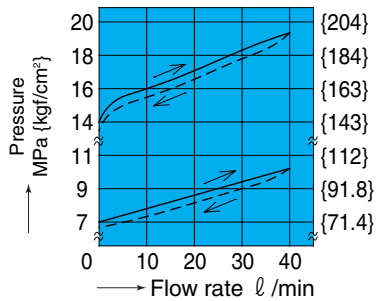
OQ-G03-P2A-J50



Pressure — Flow Rate Characteristics

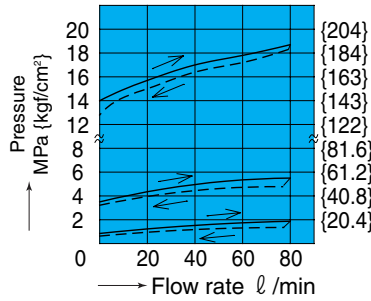
OQ-G01-P2*-20

— Pressure Rise
--- Pressure Drop



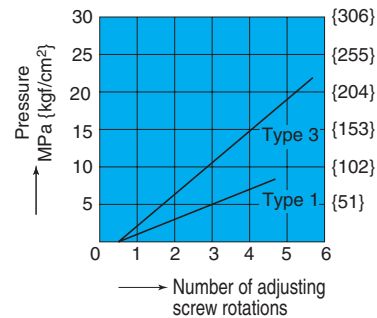
OQ-G03-P2*-J50

— Pressure Rise
--- Pressure Drop

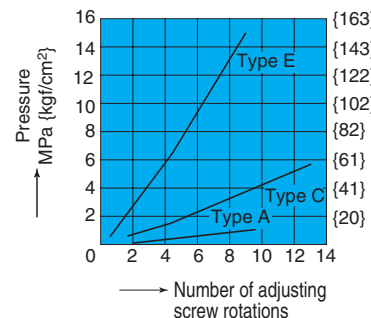


Number of Adjusting Screw Rotations — Pressure Characteristics

OQ-G01-P2*-20

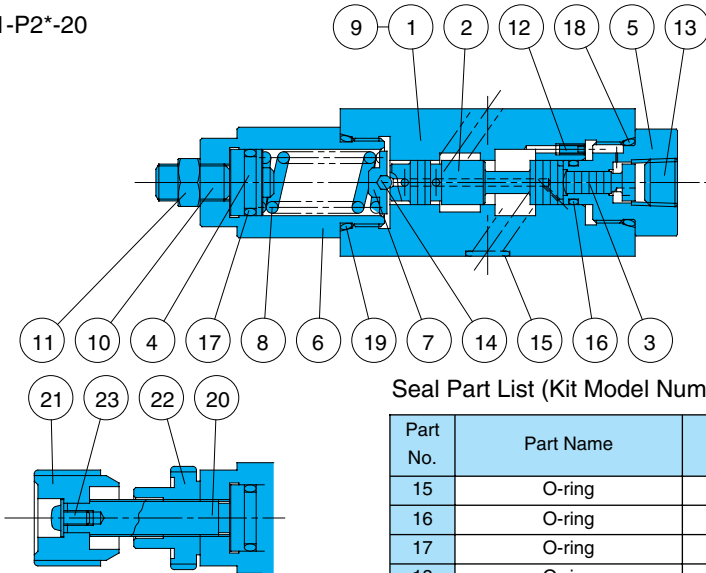


OQ-G03-P2*-J50



Cross-sectional Drawing

OQ-G01-P2*-20



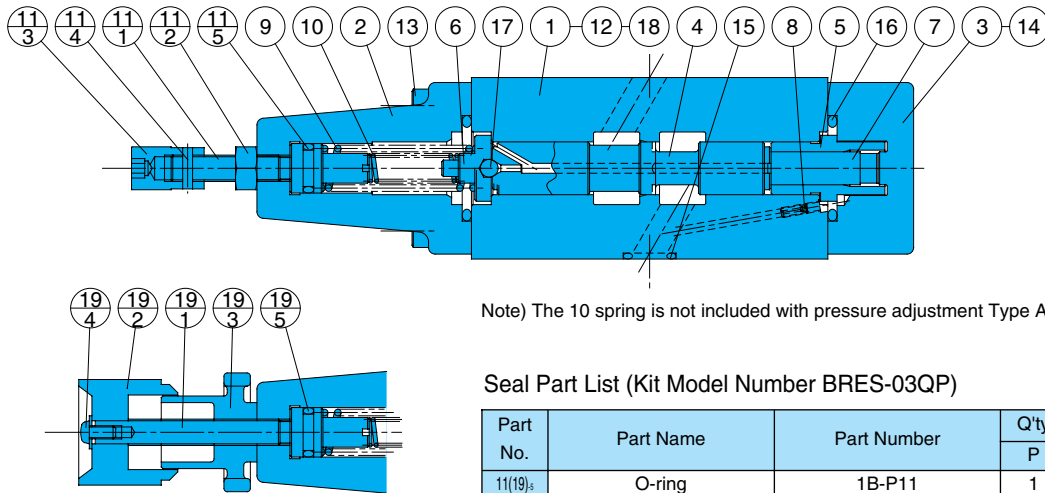
Seal Part List (Kit Model Number BRBS-01QP)

Part No.	Part Name	Part Number	Q'ty	
			P	
15	O-ring	1B-P9	4	
16	O-ring	1B-P9	1	
17	O-ring	1A-P14	1	
18	O-ring	1B-P20	1	
19	O-ring	1B-P22	1	

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.

Part No.	Part Name
1	Body
2	Spool
3	Piston
4	Plunger
5	Bushing
6	Retainer
7	Guide
8	Spring
9	Plate
10	Screw
11	Nut
12	Choke
13	Plug
14	Ball
15	O-ring
16	O-ring
17	O-ring
18	O-ring
19	O-ring
20	Screw
21	Knob
22	Nut
23	Screw

OQ-G03-P2*-J50



Note) The 10 spring is not included with pressure adjustment Type A.

Seal Part List (Kit Model Number BRES-03QP)

Part No.	Part Name	Part Number	Q'ty	
			P	
11(19) ₅	O-ring	1B-P11	1	
15	O-ring	AS568-014(Hs90)	5	
16	O-ring	1B-P26	2	

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.

Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Spool
5	Sleeve
6	Guide
7	Plunger
8	Choke
9	Spring
10	Spring
11	Screw kit
11-1	Screw
11-2	Nut
11-3	Nut
11-4	Pin
11-5	O-ring
12	Plate
13	Screw
14	Screw
15	O-ring
16	O-ring
17	Ball
18	Pin
19	Handle kit
19-1	Screw
19-2	Knob
19-3	Nut
19-4	Screw
19-5	O-ring



Counter Balance Modular Valve

40 to 300 ℓ /min
14MPa

Features

- ① This modular valve is used to control actuator back pressure and for other pressure control valve applications.
- ② Pressure adjustment is possible across a wide range, from 0.25 to 14MPa {2.5 to 143kgf/cm²}.
- ③ Maximum Operating Pressure: 25, 35MPa {255, 357kgf/cm²}

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Flow Rate ℓ /min	Pressure Adjustment Range MPa{kgf/cm ² }	Weight kg	Gasket Surface Dimensions
OCQ-G01-A11-20 A12	1/8	25{255}	40	0.8 to 7{ 8.2 to 71.4}	1.1	ISO 4401-03-02-0-94
OCQ-G01-B11-20 B12				3.5 to 14{35.7 to 143}		
OCQ-G03-A1A-J50 A1C A1E	3/8	25{255}	80	0.25 to 0.85{ 2.5 to 8.7}	3.5	ISO 4401-05-04-0-94
OCQ-G03-B1A-J50 B1C B1E				0.85 to 3.5{ 8.7 to 35.7}		
OCQ-G03-B1A-J50 B1C B1E	1/2	35{357}	300	0.25 to 0.85{ 2.5 to 8.7}	8.0	ISO 4401-07-06-0-94
OQH-G04-A1A-10 A1C A1E				0.5 to 3.5{ 5.1 to 35.7}		
OQH-G04-B1A-10 B1C B1E				2.0 to 14{20.4 to 143}		

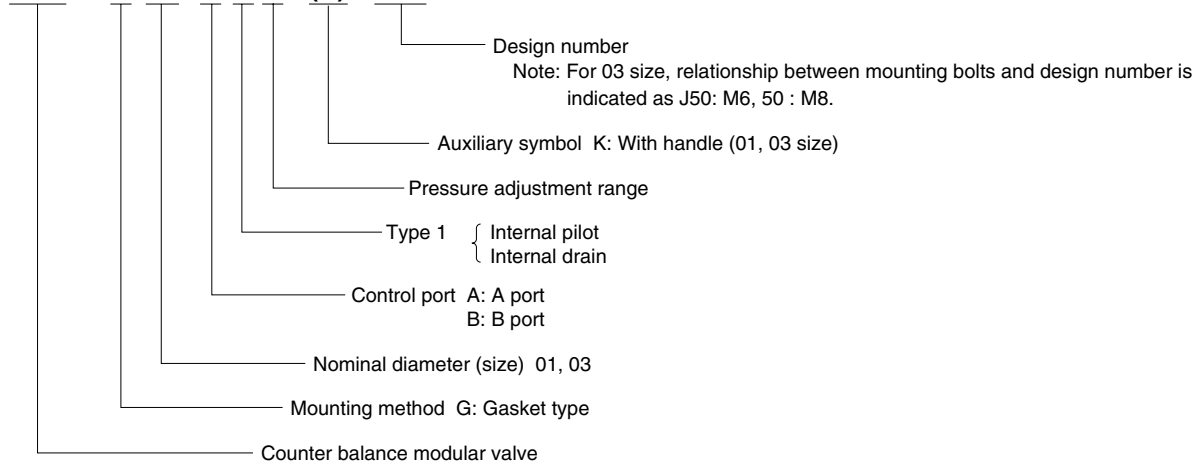
● Handling

- ① The pressure adjustment range is expressed in terms of cracking pressure.
- ② Run tank port piping directly to the tank, and ensure that back pressure is as small as possible.
- ③ Note that a sub plate and installation bolts are not included. See pages D-90 through D-95 if these items are required.
- ④ 04 series modular valves do not have an L (DR₂) drain port, so they cannot be used in combination with pressure center type solenoid valves (D).

Understanding Model Numbers

01, 03 size

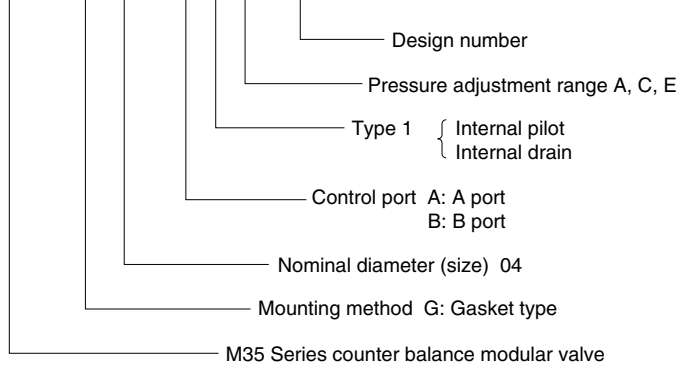
OCQ - G 03 - B 1 A - (K) - J50



Understanding Model Numbers

04 size

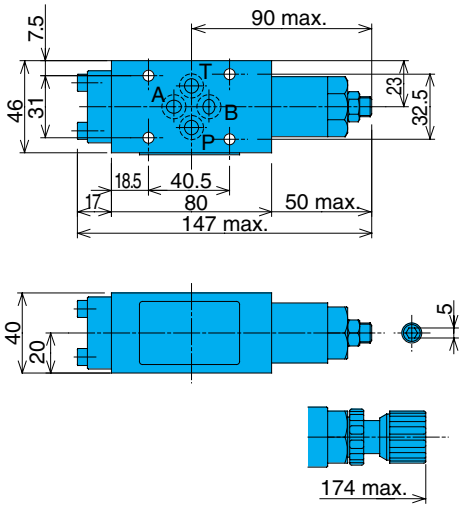
OQH - G 04 - B 1 A - 10



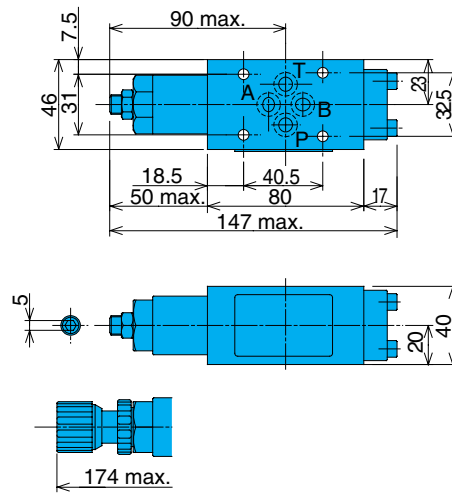
Installation Dimension Drawings

Note) Pressure is increased by clockwise (rightward) rotation of the adjusting screw (bolt), and decreased by counterclockwise (leftward) rotation.

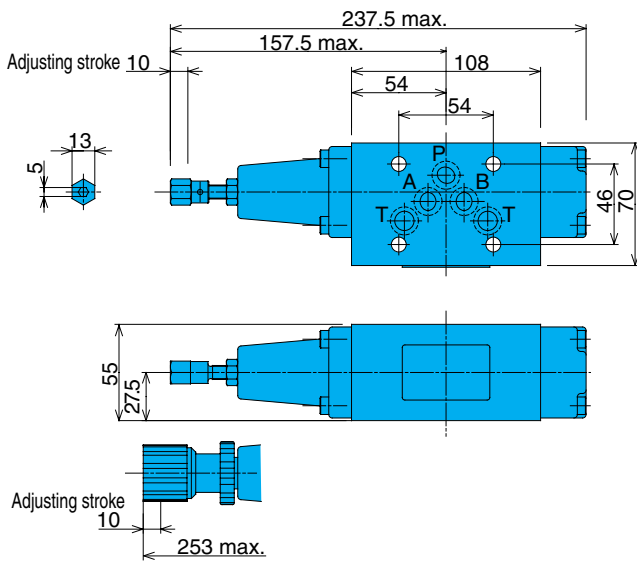
OCQ-G01-A1*-20



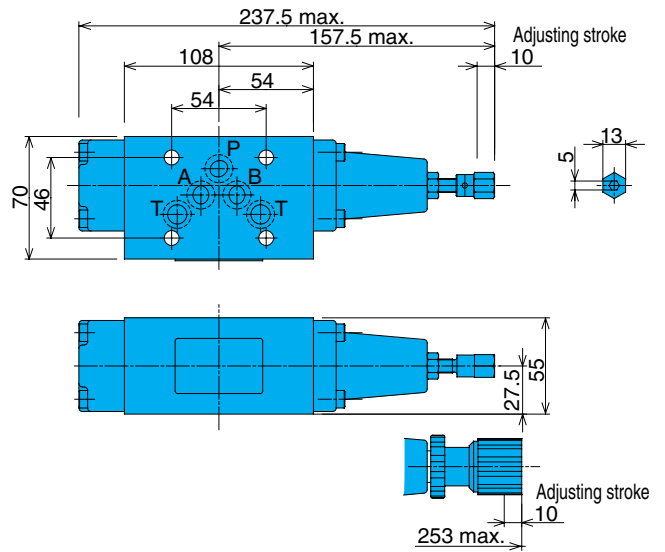
OCQ-G01-B1*-20



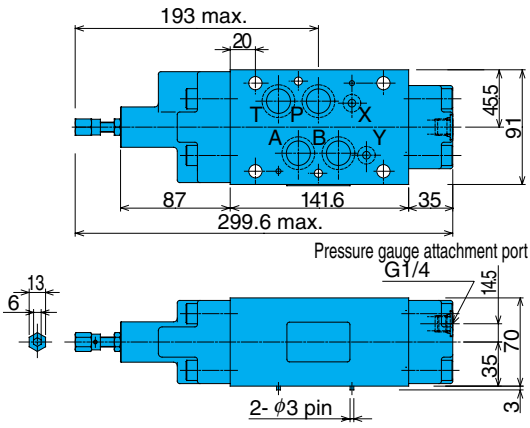
OCQ-G03-A1*-J50



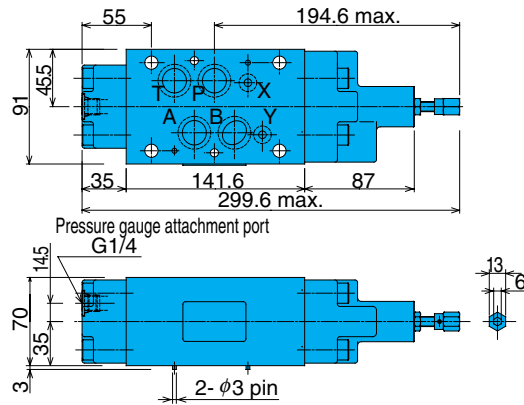
OCQ-G03-B1*-J50



OQH-G04-A1*-10



OQH-G04-B1*-10

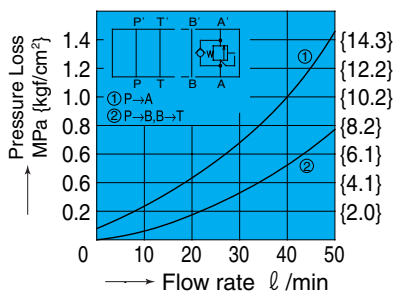


Performance Curves

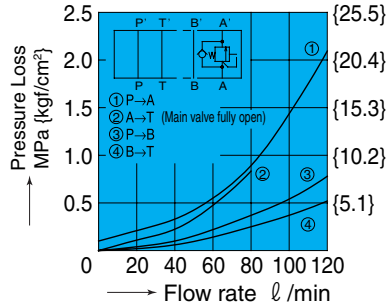
Hydraulic Operating Fluid
Viscosity 32mm²/s

Pressure Loss Characteristics

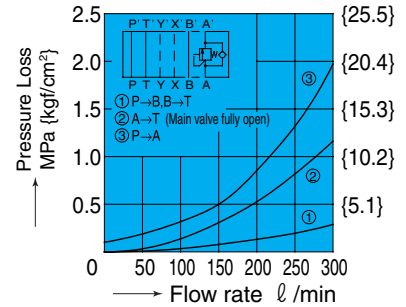
OCQ-G01-A1*-20



OCQ-G03-A1A-J50

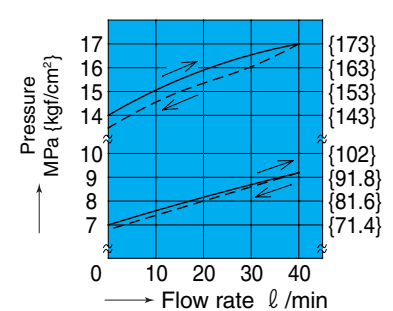


OQH-G04-B1A-10

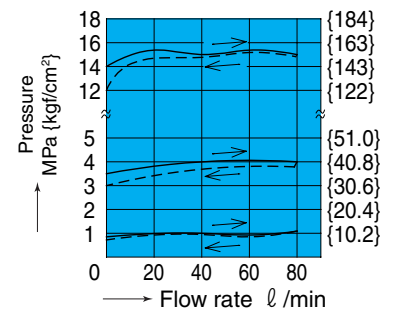


Pressure — Flow Rate Characteristics

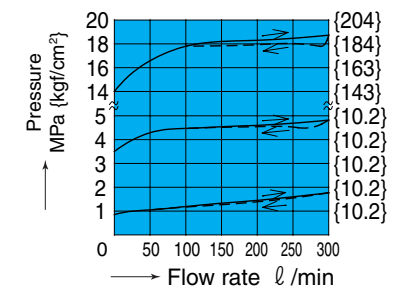
OCQ-G01-A1*-20



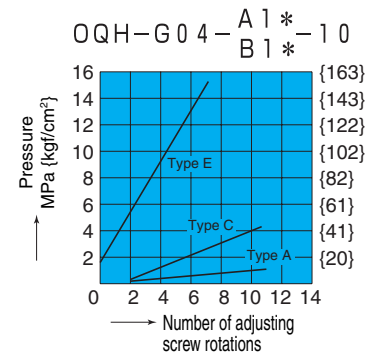
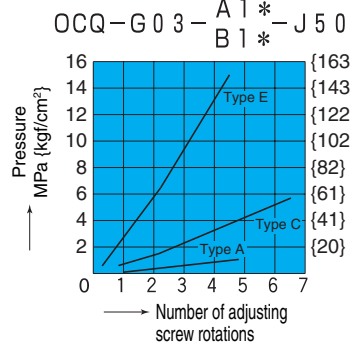
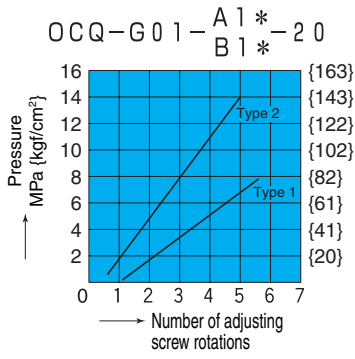
OCQ-G03-A1*-J50



OQH-G04-A1*-10



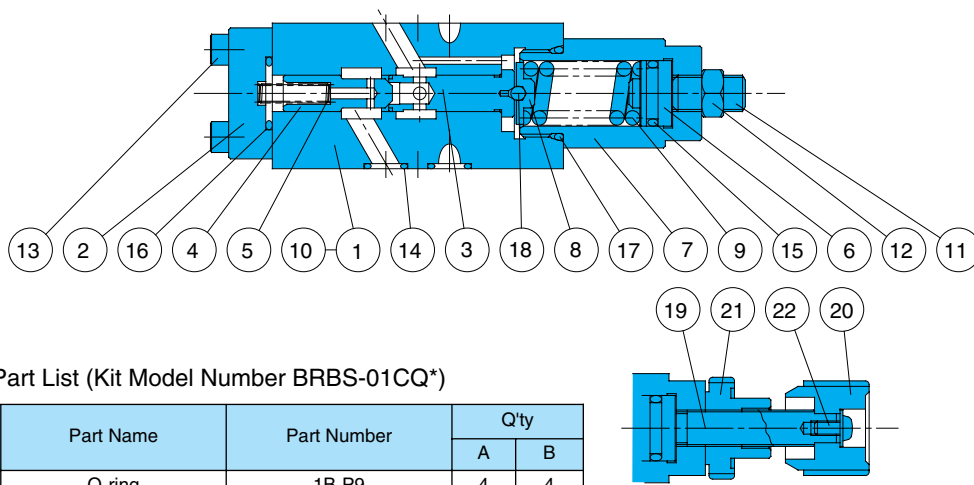
Number of Adjusting Screw Rotations — Pressure Characteristics



Note)
See the OQ-G-6 characteristics on page D-48 for details about Number of Adjusting Screw Rotations — Pressure Characteristics for OCQ-G06.

Cross-sectional Drawing

OCQ-G01-A1*-20



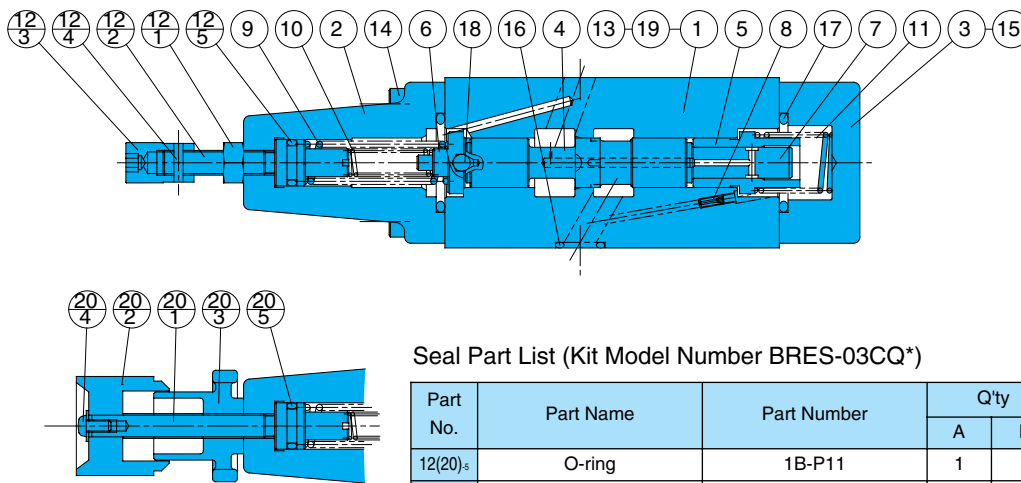
Seal Part List (Kit Model Number BRBS-01CQ*)

Part No.	Part Name	Part Number	Q'ty	
			A	B
14	O-ring	1B-P9	4	4
15	O-ring	1B-P14	1	1
16	O-ring	1B-P16	1	1
17	O-ring	1B-P22	1	1

Part No.	Part Name
1	Body
2	Cover
3	Spool
4	Poppet
5	Spring
6	Plunger
7	Retainer
8	Guide
9	Spring
10	Plate
11	Screw
12	Nut
13	Screw
14	O-ring
15	O-ring
16	O-ring
17	O-ring
18	Ball
19	Screw
20	Knob
21	Nut
22	Screw

Note) 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify A or B for the asterisk (*) in the kit model number.

OCQ-G03-A1*-J50



Seal Part List (Kit Model Number BRES-03CQ*)

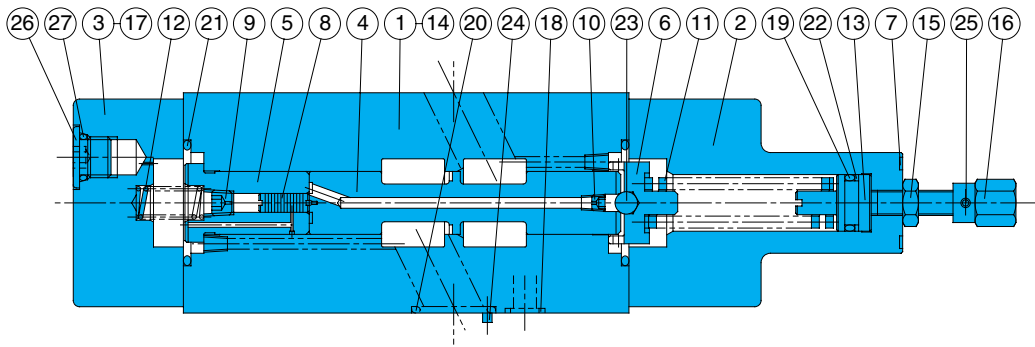
Part No.	Part Name	Part Number	Q'ty	
			A	B
12(20)s	O-ring	1B-P11	1	1
16	O-ring	AS568-014(Hs90)	5	5
17	O-ring	1B-P26	2	2

Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Spool
5	Sleeve
6	Guide
7	Plunger
8	Choke
9	Spring
10	Spring
11	Spring
12	Screw kit
12.1	Screw
12.2	Nut
12.3	Nut
12.4	Pin
12.5	O-ring
13	Plate
14	Screw
15	Screw
16	O-ring
17	O-ring
18	Ball
19	Pin
20	Handle kit
20.1	Screw
20.2	Knob
20.3	Nut
20.4	Screw
20.5	O-ring

Note)
The 10 spring is not included with pressure adjustment Type A.

Note) 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify A or B for the asterisk (*) in the kit model number.

OCQ-G04-B1*-10



Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Spool
5	Sleeve
6	Guide
7	Plate
8	Plunger
9	Choke
10	Choke
11	Spring
12	Spring
13	Screw
14	Plate
15	Nut
16	Nut
17	Screw
18	O-ring
19	O-ring
20	O-ring
21	O-ring
22	Backup ring
23	Ball
24	Pin
25	Pin
26	Plug
27	O-ring

Seal Part List (Kit Model Number BRKS-04CQ*)

Part No.	Part Name	Part Number	Q'ty	
			A	B
18	O-ring	AS568-012(Hs90)	2	2
19	O-ring	1B-P14	1	1
20	O-ring	AS568-118(Hs90)	4	4
21	O-ring	1B-G35	2	2
22	Backup ring	T2-P14	1	1
27	O-ring	1B-P11	1	1

Note) The illustration shows the configuration for pressure adjustment ranges Type C and Type E. For Type A, there is no #8 piston or #10 choke.

- Note) 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
 2. Backup ring indicates JIS 2407-T2-**.
 3. Specify A or B for the asterisk (*) in the kit model number.



Pressure Switch Modular Valve

50 ℓ /min
25MPa

Features

- ① This modular valve detects pressure changes inside the hydraulic circuit and opens and closes an electrical circuit accordingly.
- ② High precision detection, high precision circuit control, outstanding reliability.
- ③ Maximum operating pressure: 25MPa {255kgf/cm²}
- ④ Indicator light built into the DIN connector shows operational status at a glance.
- ⑤ A double type is also available for control of both port A and port B in a compact configuration.

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	Pressure Adjustment Range MPa(kgf/cm ²)	Weight kg	Gasket Surface Dimensions
OW-G01-PC-R-**-30 P1 P3	1/8	25{255}	50	0.5 to 3.5{ 5.1 to 35.7}	1.8	ISO 4401-03-02-0-94
0.8 to 7{ 8.2 to 71.4}						
3.5 to 21{35.7 to 214}						
0.5 to 3.5{ 5.1 to 35.7}						
OW-G01-AC-R-**-30 A1 A3				0.8 to 7{ 8.2 to 71.4}		
OW-G01-BC-R-**-30 B1 B3				3.5 to 21{35.7 to 214}		
OW-G01-WC-R-**-30 W1 W3				0.5 to 3.5{ 5.1 to 35.7}	2.6	
				0.8 to 7{ 8.2 to 71.4}		
				3.5 to 21{35.7 to 214}		

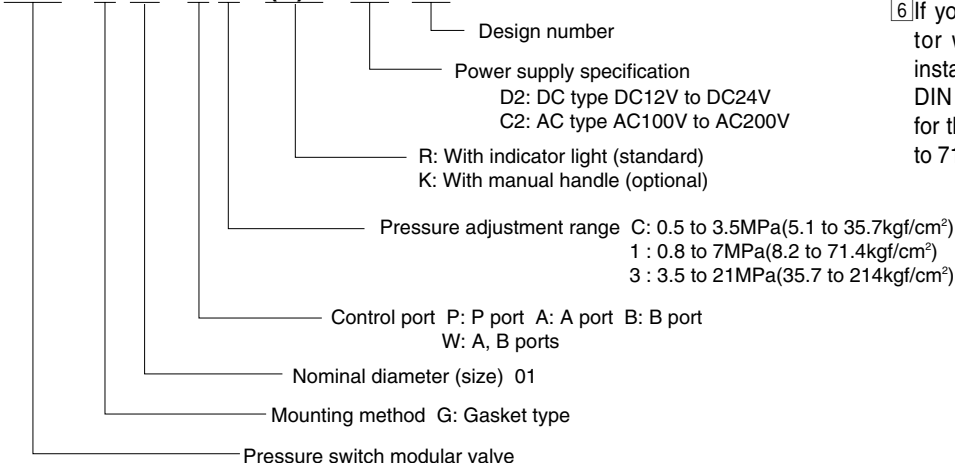
Electrical Specifications Micro Switch Manufacturer: Omron Model No. SS-5	Contact Capacitance (Resistive Load)	AC	125V	5A
			250V	3A
		DC	14V	5A
			30V	4A
	Mechanical Life	At least 1 × 10 ⁷		
	Electrical Life	At least 3 × 10 ⁶ (AC,0.1A,cosφ=1)		
	Contact Resistance	30MΩ maximum (initial value)		
Insulation Resistance	At least 100MΩ			
Allowable Operating Frequency	60 times/minute (electrical)			
Operating Environment	Dust Resistance/Water Resistance Rank	JIS C0920 IP64		
	Ambient Temperature	-20°C to 70°C (non-condensation)		
	Operating Fluid	Fluid Temperature	-20°C to 70°C	Use a fluid that is within both ranges.
		Allowable Viscosity Range	15 to 300mm ² /s{cSt}	
Filtration	25μm maximum			

● Handling

- ① See the detailed explanation on the next page for information about wiring inside connectors.
- ② Contacts are normally open type only, not normally closed type.
- ③ In addition to load wiring, power supply wiring is also required to illuminate the indicator light. See the wiring diagram for more information.
- ④ If the DIN connector interferes with other valves, remove the two switch installation bolts and change the installation orientation. If interference is caused in all orientations, install an interference blanker plate on top of the connector. Contact your agent if an interference blanker plate is required.
- ⑤ Note that a special type of DIN connector is required. The DIN connector is not interchangeable with the one for the SA type solenoid valve.
- ⑥ If you cannot remove the DIN connector when wiring, remove the switch installation bolts and then remove the DIN connector. The tightening torque for the installation bolts is 5 to 7Nm {51 to 71kgf/cm²}.

Understanding Model Numbers

OW - G 01 - P 1 - (K)R - D2 - 30



● Connectors

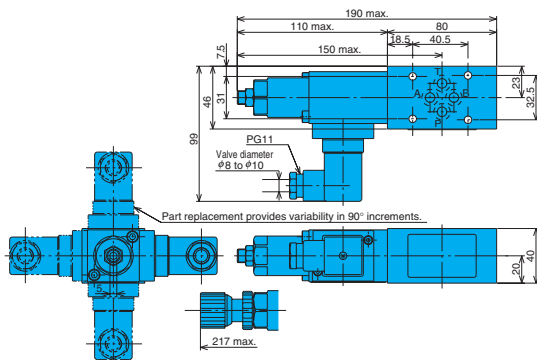
Model No.	Power supply specification	Wiring	Electrical Circuit Diagram
BRC41-01WD2	D2	<p>○ When signal input device (load) remote common is plus</p> <p>OW Terminal 1 is connected to load, while Terminals 2 and 3 are connected to power (Terminal 2 to +).</p>	<p>Normal open type with indicator</p> <p>Pressure increase causes indicator to light. Circuit closed (ON)</p> <p>Pressure decrease causes indicator to go out. Circuit open (OFF)</p>
		<p>○ When signal input device (load) common is minus</p> <p>OW Terminal 1 is connected to load, while Terminals 2 and 3 are connected to power (Terminal 2 to -).</p>	
BRC41-01WC2	C2	<p>○ When signal input device (load) is AC</p> <p>OW Terminal 1 is connected to load, while Terminals 2 and 3 are connected to power (Terminal 2 is nonpolar).</p>	<p>Normal open type with indicator</p> <p>Pressure increase causes indicator to light. Circuit closed (ON)</p> <p>Pressure decrease causes indicator to go out. Circuit open (OFF)</p>

- Note) 1. The DIN connector wiring connector port size is PG11.
 2. The compatible cable diameter for the DIN connector is $\phi 8$ to $\phi 10$. Dust resistance and water resistance is lost for any cable outside this range.
 3. The connector can be installed in different orientations are 90-degree increments by changing the orientation of the terminal block.
 4. The connector is designed so the cover cannot be removed unless the installation screws are removed.
 5. Use M3 for round type and Y type solderless terminals.
 6. The tightening torque of M3 screws used for securing connectors and for terminals is 0.3 to 0.5Nm.

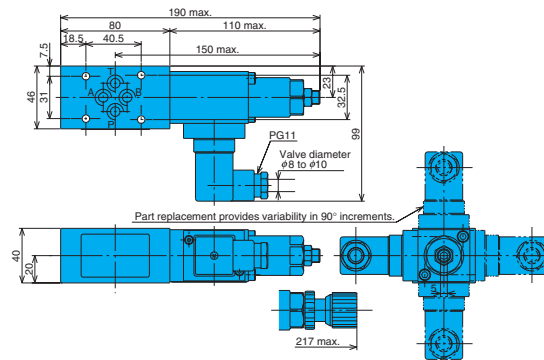
Installation Dimension Drawings

Note) Pressure is increased by clockwise (rightward) rotation of the adjusting screw, and decreased by counterclockwise (leftward) rotation.

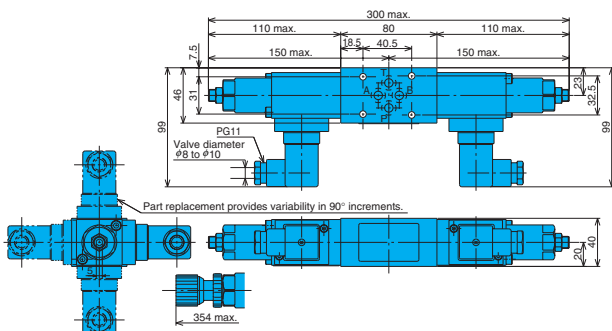
OW-G01-P^{*}-R^{*}-2-30



OW-G01-B^{*}-R^{*}-2-30



OW-G01-W^{*}-R^{*}-2-30

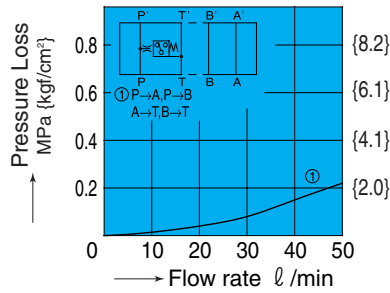


Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

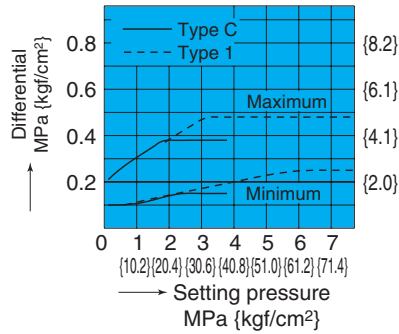
Pressure Loss Characteristics

OW-G01-**-R**-30

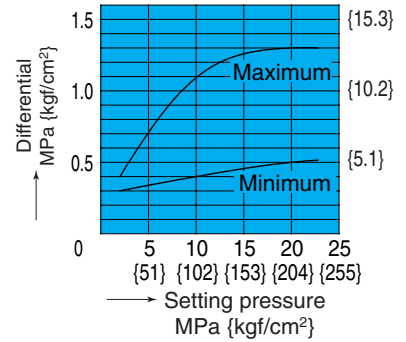


Setting Pressure — Differential Characteristics

OW-G01-^C₁-R**-30

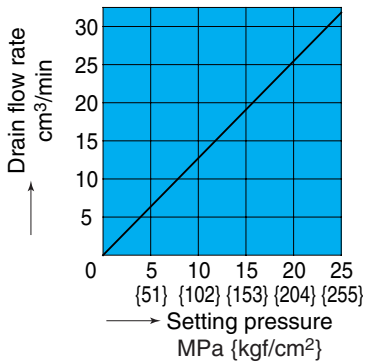


OW-G01-*3-R**-30



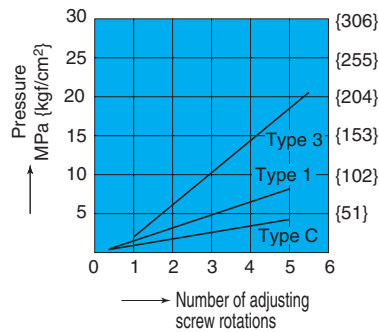
Drain Rate Characteristics

OW-G01-**-R**-30



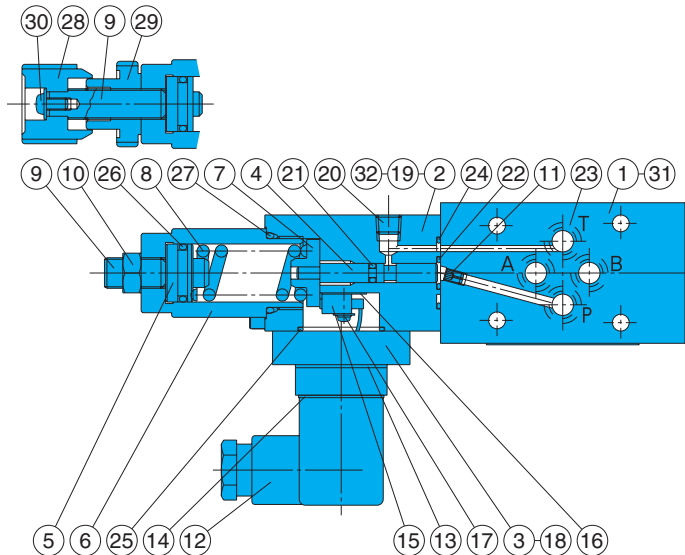
Number of Adjusting Screw Rotations — Pressure Characteristics

OW-G01-**-R**-30



Cross-sectional Drawing

OW-G01-P*-R-*2-30



Part No.	Part Name	Part No.	Part Name
1	Body	17	Screw
2	Cover	18	Screw
3	Cover	19	Screw
4	Piston	20	Plug
5	Push rod	21	O-ring
6	Retainer	22	O-ring
7	Guide	23	O-ring
8	Spring	24	O-ring
9	Screw	25	O-ring
10	Nut	26	O-ring
11	Choke	27	O-ring
12	Connector	28	Knob
13	Gasket	29	Nut
14	Gasket	30	Screw
15	Micro switch assy	31	Plate
16	Separator	32	Plate

Seal Part List (Kit Model Number BRCS-01W*)

Part No.	Part Name	Part Number	Q'ty			
			P	W	A	B
21	O-ring	1A-P3	1	2	1	1
22	O-ring	AS568-011(Hs90)	1	2	1	1
23	O-ring	1B-P9	4	4	4	4
24	O-ring	AS568-019(Hs70)	1	2	1	1
25	O-ring	AS568-022(Hs70)	1	2	1	1
26	O-ring	1A-P15	1	2	1	1
27	O-ring	1B-P22	1	2	1	1

Note) Specify P, W, A, or B for the asterisk (*) in the kit model number.



Flow Regulator Modular Valve

50 to 300 ℓ /min
25,35MPa

Features

- ① This modular valve is used to control actuator speed and for other flow control valve applications.
- ② A wide range of models are available for A and B port control, A or B port control, and P or T port control.
- ③ Maximum Operating Pressure: 25, 35MPa {255, 357kgf/cm²}

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	Pressure Adjustment Range MPa(kgf/cm ²)	Weight kg	Gasket Surface Dimensions
OY-G01-T-20	1/8	25{255}	50	-	1.0	ISO 4401-03-02-0-94
OCY-G01-P-20				0.04{0.4}	1.0	
OCY-G01-W-X-20 A B				0.08{0.8}	1.3	
					1.2	
OCY-G01-W-Y-20 A B				0.08{0.8}	1.3	
		1.2				
OCY-G03-P-J50	3/8	25{255}	100	0.04{0.4}	2.9	ISO 4401-05-04-0-94
OCY-G03-W-X-J51 A B				0.1{1.0}	3.1	
					3.0	
OCY-G03-W-Y-J51 A B				0.1{1.0}	3.1	
		3.0				
OYH-G04-P-10	1/2	35{357}	300	0.04{0.4}	4.7	ISO 4401-07-06-0-94
OYH-G04-W-X-10 A B				0.1{1.0}	6.5	
					6.3	
OYH-G04-W-Y-10 A B				0.1{1.0}	6.5	
		6.3				

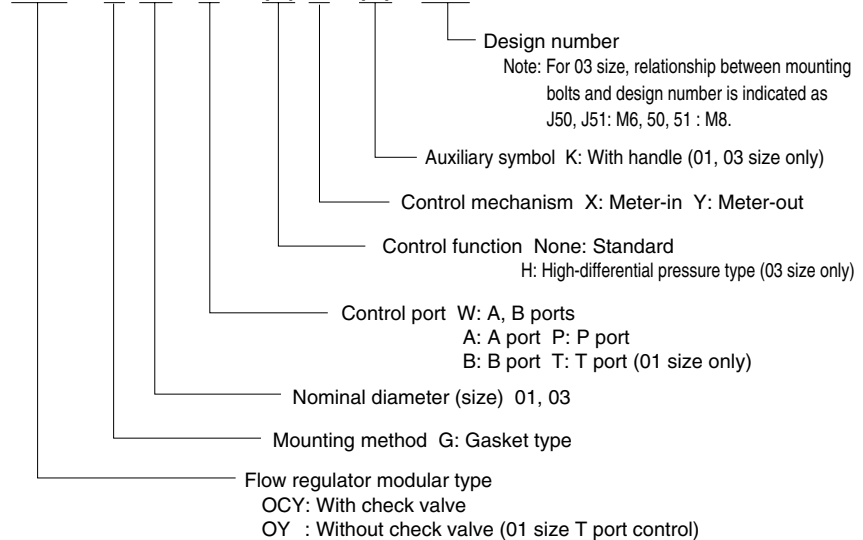
• Handling

- ① In a 03 size application where control differential pressure is large, use of an H type makes adjustment easier.
- ② Note that a sub plate and installation bolts are not included. See pages D-90 through D-95 if these items are required.
- ③ 04 series modular valves do not have an L (DR₂) drain port, so they cannot be used in combination with pressure center type solenoid valves (D).

Understanding Model Numbers

01, 03 size

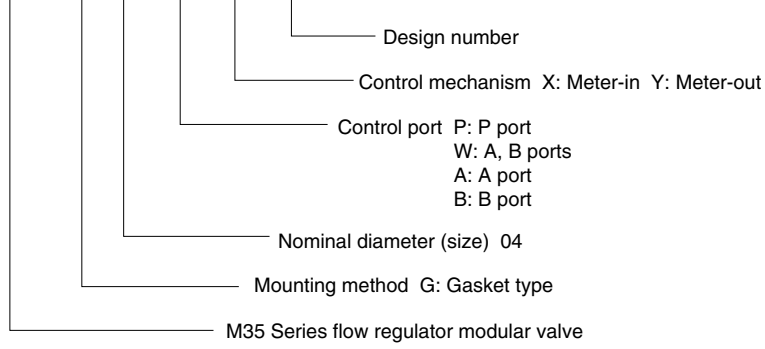
OCY - G 03 - W - (H) Y - (K) - J51



Understanding Model Numbers

04 size

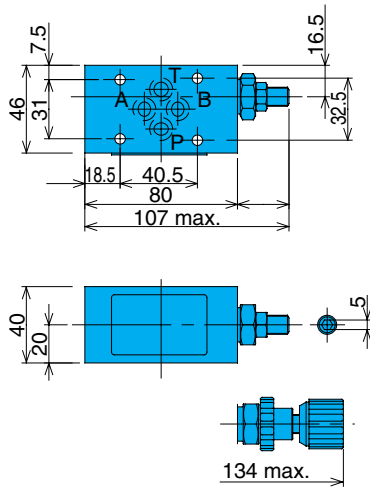
OYH - G 04 - W - Y - 10



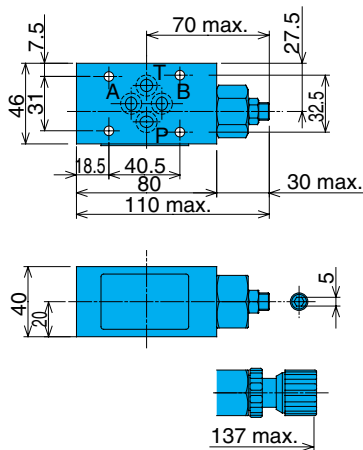
Installation Dimension Drawings

Note) The control flow rate is increased by counter clockwise (leftward) rotation of the adjusting screw.

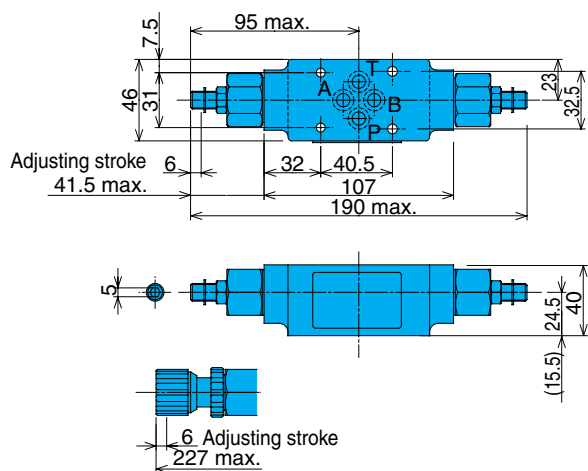
OY-G01-T-20



OCY-G01-P-20

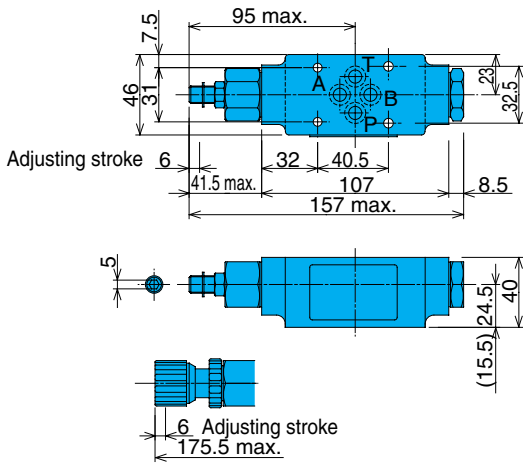


OCY-G01-W-X-20



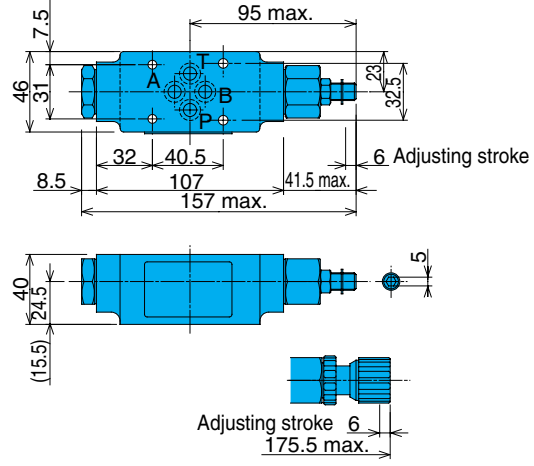
Note) Dimensions in the parentheses are for the OCY-G01-W-X-20.

OCY-G01-A-X_Y-20



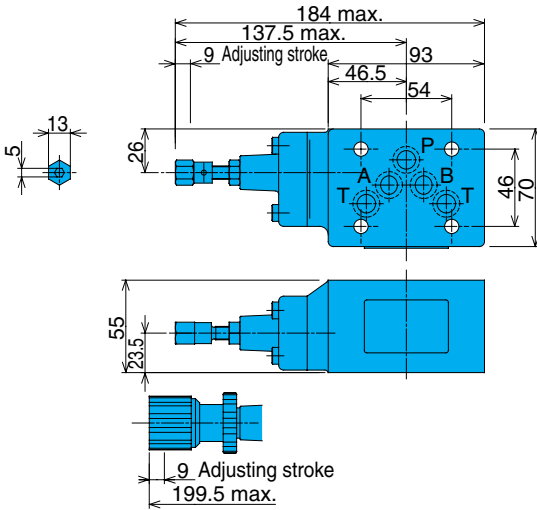
Note)
Dimensions in the parentheses are for the OCY-G01-A-X-20.

OCY-G01-B-X_Y-20

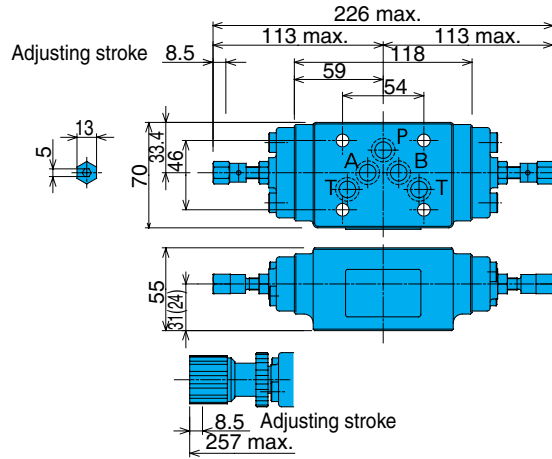


Note)
Dimensions in the parentheses are for the OCY-G01-B-X-20.

OCY-G03-P-J50

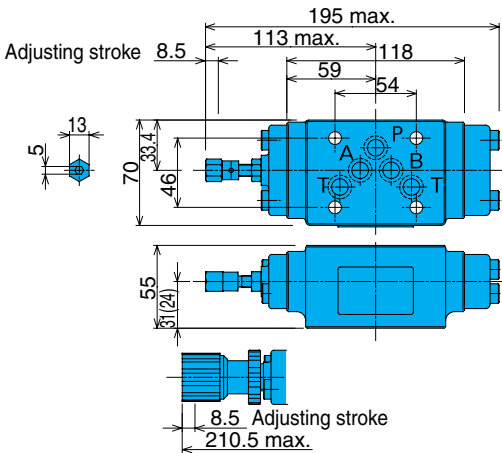


OCY-G03-W-X_Y-J51

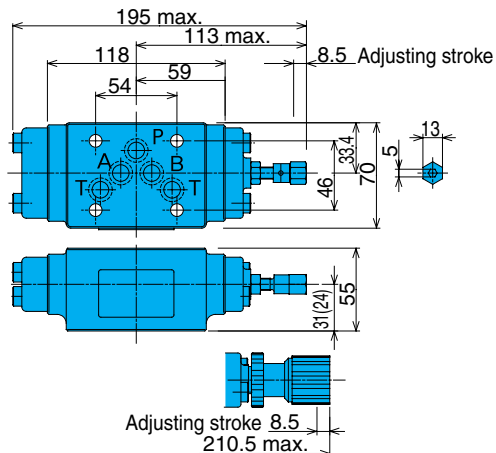


Note)
Dimensions in the parentheses are for the OCY-G03-W-X-J51.

OCY-G03-A-X_Y-J51



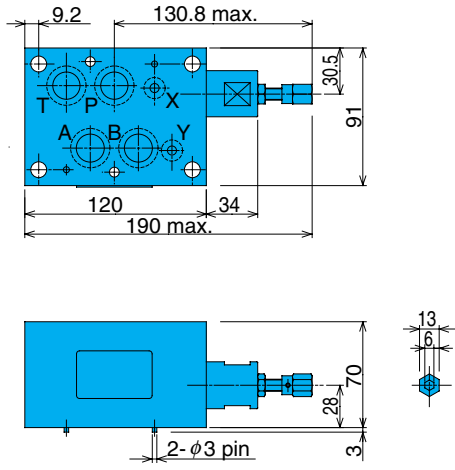
OCY-G03-B-X_Y-J51



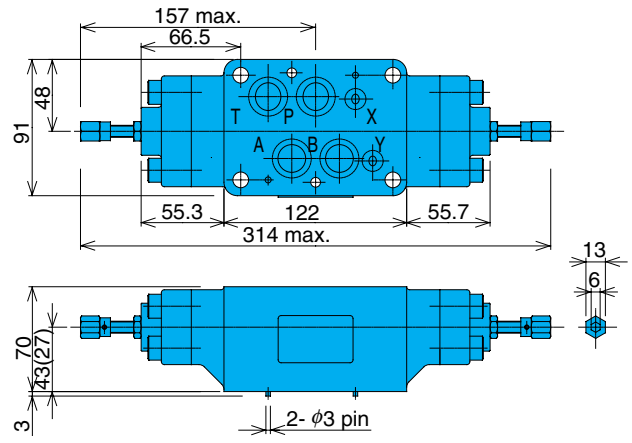
Note)
Dimensions in the parentheses are for the OCY-G03-A-X-J51.

Note)
Dimensions in the parentheses are for the OCY-G03-B-X-J51.

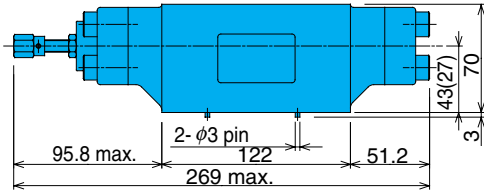
OYH-G04-P-10



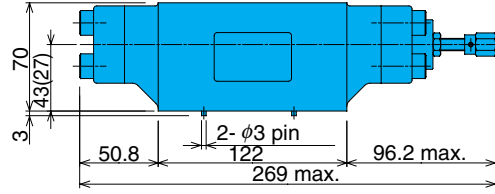
OYH-G04-W-X_Y-10



OYH-G04-A-X_Y-10



OYH-G04-B-X_Y-10



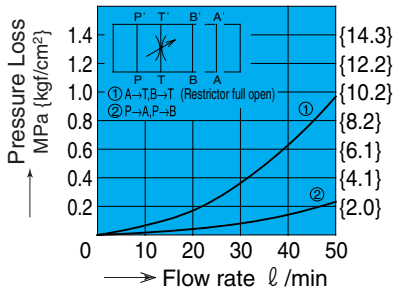
Note) Dimensions in the parentheses are for the OYH-G04-*_X-10.

Performance Curves

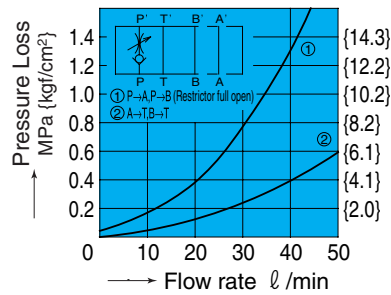
Hydraulic Operating Fluid Viscosity 32mm²/s

Pressure Loss Characteristics

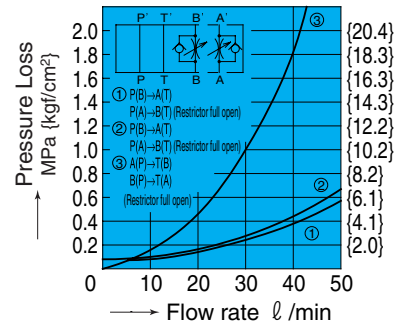
OY-G01-T-20



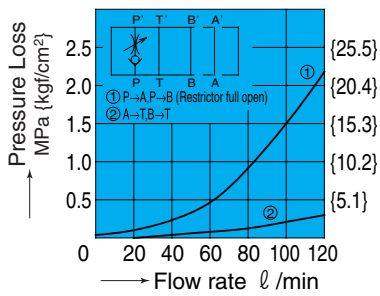
OCY-G01-P-20



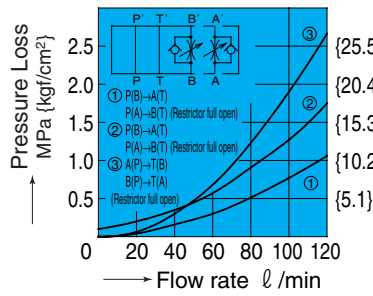
OCY-G01-W-Y-20
(OCY-G01-W-X-20)



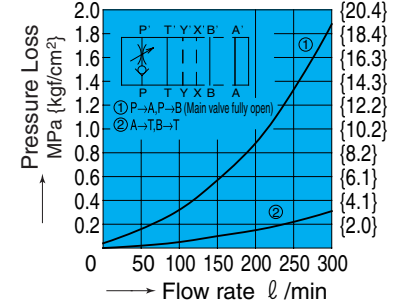
OCY-G03-P-J50



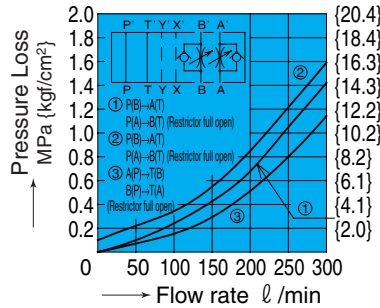
OCY-G03-W-Y-J51
(OCY-G03-W-X-J51)



OYH-G04-P-10

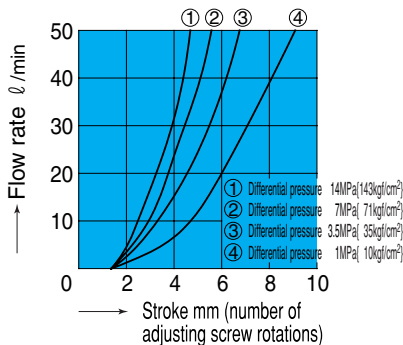


OYH-G04-W-Y-10
(OYH-G04-W-X-10)

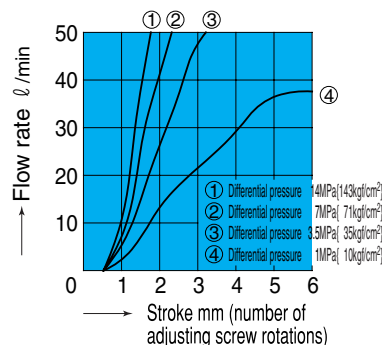


Stroke — Flow Rate Characteristics

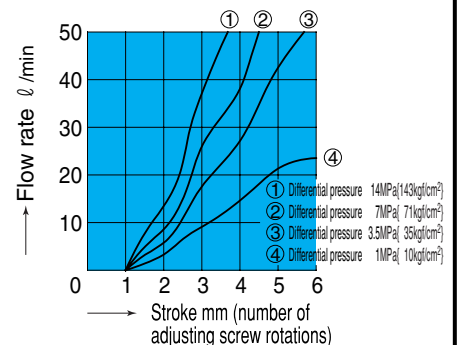
OY-G01-T-20



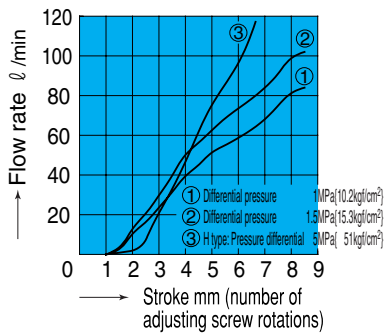
OCY-G01-P-20



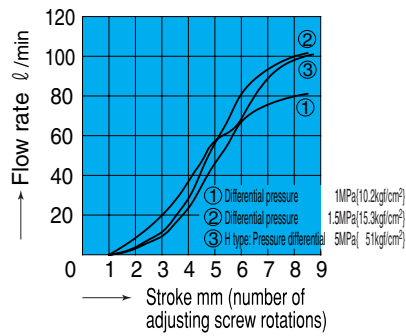
OCY-G01-*-*-20



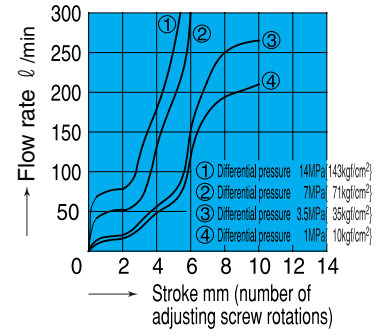
OCY-G03-P-(H)-J50



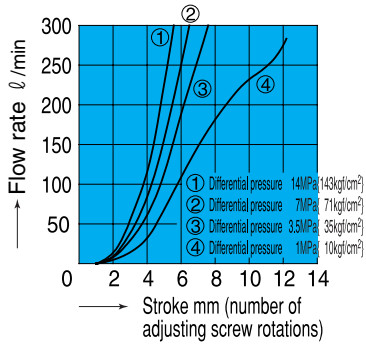
OCY-G03-W-(H)Y-J51



OYH-G04-P-10

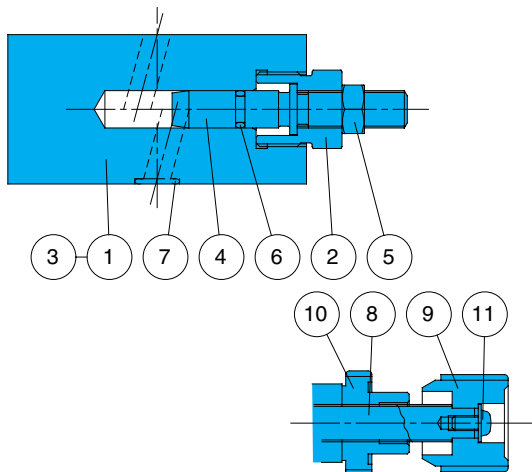


OYH-G04-W-Y-10



Cross-sectional Drawing

OY-G01-T-20



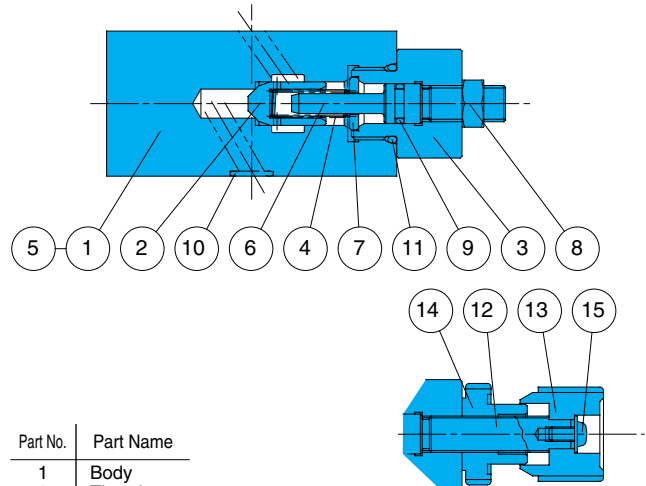
Part No.	Part Name
1	Body
2	Retainer
3	Plate
4	Screw
5	Nut
6	O-ring
7	O-ring
8	Screw
9	Knob
10	Nut
11	Screw

Seal Part List (Kit Model Number BFBS-01YT)

Part No.	Part Name	Part Number	Q'ty
6	O-ring	1B-P7	1
7	O-ring	1B-P9	4

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.

OCY-G01-P-20



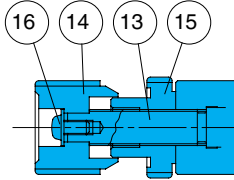
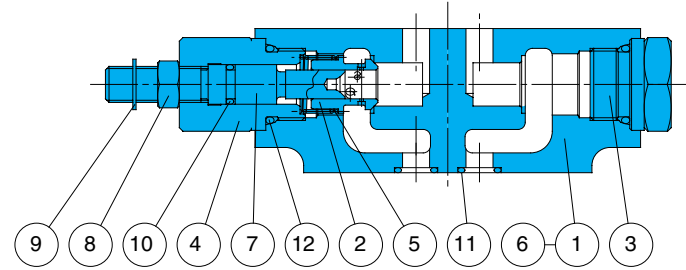
Part No.	Part Name
1	Body
2	Throttle
3	Retainer
4	Spring
5	Plate
6	Screw
7	Ring
8	Nut
9	O-ring
10	O-ring
11	O-ring
12	Screw
13	Knob
14	Nut
15	Screw

Seal Part List (Kit Model Number BFBS-01CYP)

Part No.	Part Name	Part Number	Q'ty
9	O-ring	1B-P8	1
10	O-ring	1B-P9	4
11	O-ring	1B-P18	1

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.

OCY-G01-A-Y-20



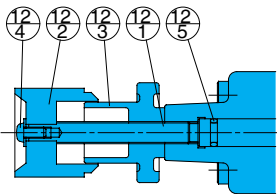
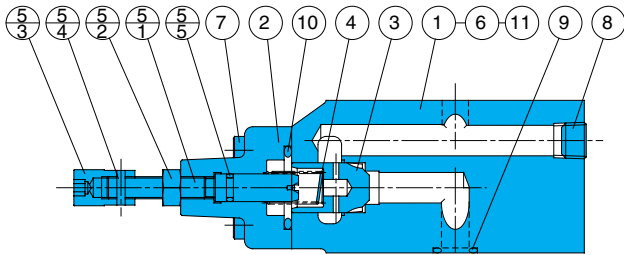
Seal Part List (Kit Model Number BFBS-01CY*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
10	O-ring	1B-P8	2	1	1
11	O-ring	1B-P9	4	4	4
12	O-ring	1B-P18	2	2	2

Note) 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify W, A, or B for the asterisk (*) in the kit model number.

Part No.	Part Name
1	Body
2	Throttle
3	Bushing
4	Retainer
5	Spring
6	Plate
7	Screw
8	Nut
9	E-ring
10	O-ring
11	O-ring
12	O-ring
13	Screw
14	Knob
15	Nut
16	Screw

OCY-G03-P-J50



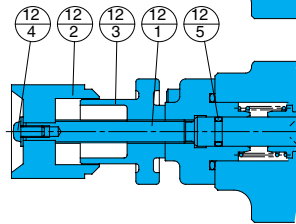
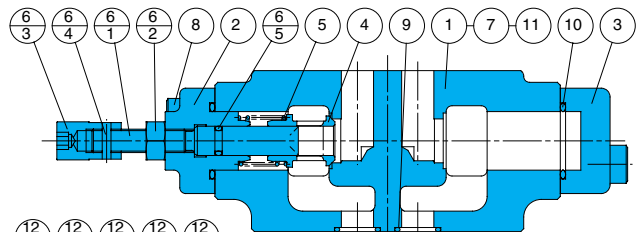
Seal Part List (Kit Model Number BFES-03CYP)

Part No.	Part Name	Part Number	Q'ty
			P
5(12) ^{-s}	O-ring	1B-P7	1
9	O-ring	AS568-014(Hs90)	5
10	O-ring	1B-P24	1

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.

Part No.	Part Name
1	Body
2	Cover
3	Throttle
4	Spring
5	Screw kit
5 ₋₁	Screw
5 ₋₂	Nut
5 ₋₃	Nut
5 ₋₄	Pin
5 ₋₅	O-ring
6	Plate
7	Screw
8	Plug
9	O-ring
10	O-ring
11	Pin
12	Handle kit
12 ₋₁	Screw
12 ₋₂	Knob
12 ₋₃	Nut
12 ₋₄	Screw
12 ₋₅	O-ring

OCY-G03-A-Y-J51



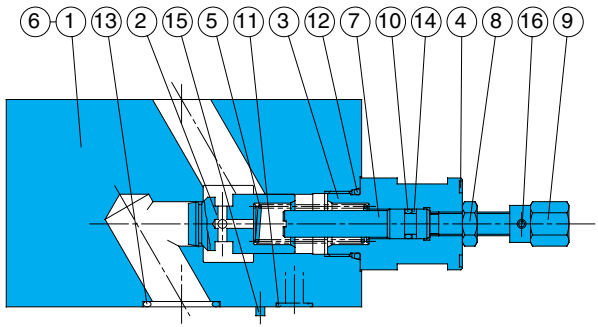
Seal Part List (Kit Model Number BFES-03CY*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
6(12) ^{-s}	O-ring	1B-P7	2	1	1
9	O-ring	AS568-014(Hs90)	5	5	5
10	O-ring	1B-P22	2	2	2

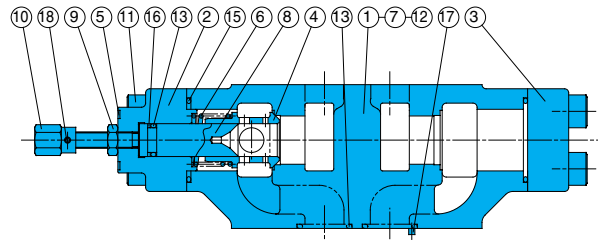
Note) 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify W, A, or B for the asterisk (*) in the kit model number.

Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Throttle
5	Spring
6	Screw kit
6 ₋₁	Screw
6 ₋₂	Nut
6 ₋₃	Nut
6 ₋₄	Pin
6 ₋₅	O-ring
7	Plate
8	Screw
9	O-ring
10	O-ring
11	Pin
12	Handle kit
12 ₋₁	Screw
12 ₋₂	Knob
12 ₋₃	Nut
12 ₋₄	Screw
12 ₋₅	O-ring

OYH-G04-P-10



OYH-G04-A-Y-10



Seal Part List
(Kit Model Number BFKS-04CYP)

Part No.	Part Name	Part Number	Q'ty	
			P	
10	O-ring	1B-P7	1	
11	O-ring	AS568-012(Hs90)	2	
12	O-ring	1B-P20	1	
13	O-ring	AS568-118(Hs90)	4	
14	Backup ring	T2-P7	1	

Note) 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Backup ring indicates JIS B 2407-T2-**.

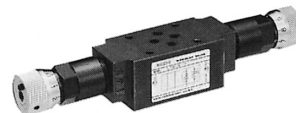
Part No.	Part Name
1	Body
2	Throttle
3	Retainer
4	Plate
5	Spring
6	Plate
7	Screw
8	Nut
9	Nut
10	O-ring
11	O-ring
12	O-ring
13	O-ring
14	Backup ring
15	Pin
16	Pin

Seal Part List
(Kit Model Number BFKS-04CY*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
12	O-ring	AS568-012 (Hs90)	2	2	2
13	O-ring	1A-P12	2	1	1
14	O-ring	AS568-118 (Hs90)	4	4	4
15	O-ring	AS568-127 (Hs90)	2	2	2
16	Backup ring	T2-P12	2	1	1

Note) 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Backup ring indicates JIS B 2407-T2-**.
3. Specify W, A, or B for the asterisk (*) in the kit model number.

Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Throttle
5	Plate
6	Spring
7	Plate
8	Screw
9	Nut
10	Nut
11	Screw
12	O-ring
13	O-ring
14	O-ring
15	O-ring
16	Backup ring
17	Pin
18	Pin



Flow Control Modular Valve (Pressure and temperature compensated)

20 to 200 ℓ /min
21,25,35MPa

Features

- ① This modular valve is used to control actuator speed and for other flow control valve applications.
- ② A wide range of models are available for A and B port control, A or B port control, and P port control.
- ③ A pressure compensation mechanism ensures that the control flow rate does not change, even when there is pressure fluctuation.
- ④ The control flow rate remains stable, even when fluid temperature changes.
- ⑤ Maximum Operating Pressure : 21, 25, 35MPa {214, 255, 357kgf/cm²}

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa{kgf/cm ² }	Control Flow Rate ℓ /min	Check Valve Cracking pressure MPa{kgf/cm ² }	Weight kg	Gasket Surface Dimensions
OF-G01-P20-20	1/8	21{214}	0.1 to 20(differential pressure: 7MPa{71.4kgf/cm ² }) 0.3 to 20(differential pressure:21MPa{214kgf/cm ² })	—	1.2	ISO 4401-03-02-0-94
OCF-G01-W40-X-30 A40 B40		25{255}	0.1 to 40(differential pressure: 7MPa{71.4kgf/cm ² }) 0.5 to 40(differential pressure:25MPa{255kgf/cm ² })	0.08{0.8}	1.7	
OCF-G01-W40-Y-30 A40 B40				0.08{0.8}	1.5	
OF-G03-P60-J50	3/8	25{255}	0.3 to 60(differential pressure: 7MPa{71.4kgf/cm ² }) 0.5 to 60(differential pressure:25MPa{255kgf/cm ² })	—	3.1	ISO 4401-05-04-0-94
OCF-G03-W60-X-J50 A60 B60			0.5 to 60(differential pressure: 7MPa{71.4kgf/cm ² }) 1 to 60(differential pressure:25MPa{255kgf/cm ² })	0.1{1.0}	5.0	
OCF-G03-W60-Y-J50 A60 B60				0.1{1.0}	4.6	
OFH-G04-W200-X-10 A200 B200	1/2	35{357}	10 to 200(differential pressure:21MPa{214kgf/cm ² }) 15 to 200(differential pressure:25MPa{255kgf/cm ² }) 20 to 200(differential pressure:35MPa{357kgf/cm ² })	0.1{1.0}	11.1	ISO 4401-07-06-0-94
OFH-G04-W200-Y-10 A200 B200					10.2	
					11.1	
					10.2	

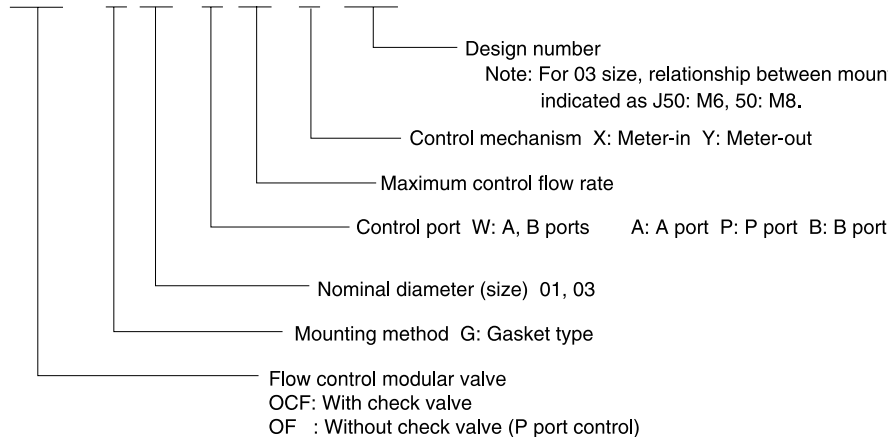
● Handling

- ① For flow rate control, make sure that the pressure differential between the input port and output port is at least 1MPa {10.2kgf/cm²}. See the Flow Rate - Minimum Differential Pressure Characteristics for information about the OCF-G01 and OFF-G04 maximum control flow rate.
- ② The control flow rate is increased by counter clockwise (leftward) rotation of the flow rate control knob.
- ③ Pressure rate control knob rotation resistance will increase as the pressure increases. However, do not use a spanner or other tool that fits around the knob to turn it. Instead, insert a 5mm hex spanner into the hex hole in the center of the knob and rotate it that way.
- ④ Note that a sub plate and installation bolts are not included. See pages D-90 through D-95 if these items are required.
- ⑤ 04 series modular valves do not have an L (DR_e) drain port, so they cannot be used in combination with pressure center type solenoid valves (D).
- ⑥ Flow rate fluctuation is ±5% within the temperature range of 20°C to 60°C.

Understanding Model Numbers

01, 03 size

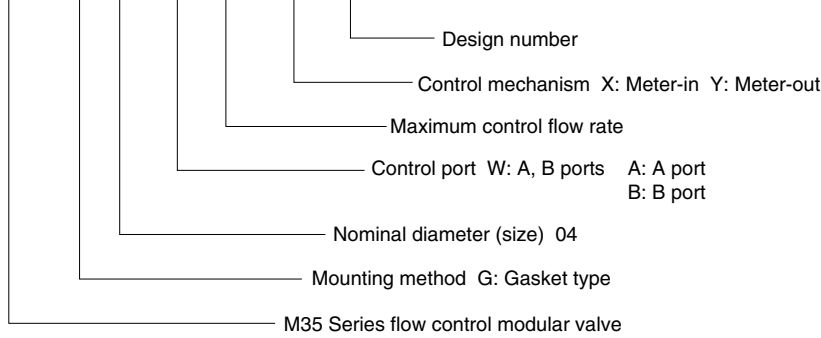
OCF - G 03 - W 60 - Y - J50



Understanding Model Numbers

04 size

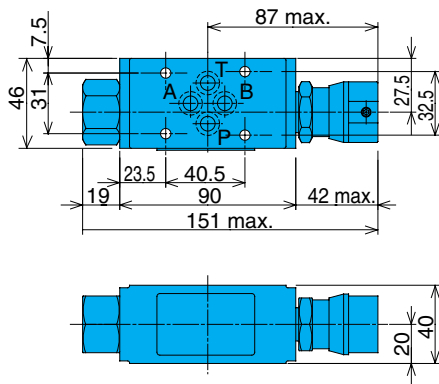
OFH - G 04 - W 200 - Y - 10



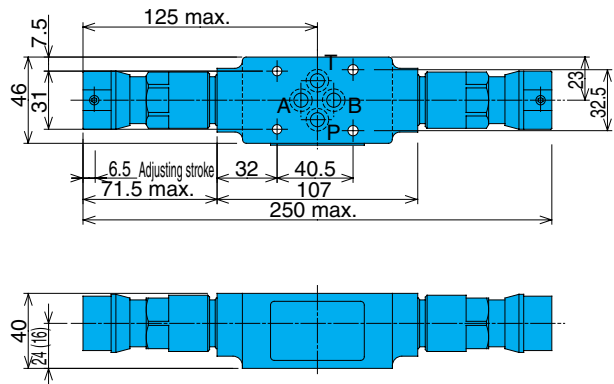
Installation Dimension Drawings

Note) The control flow rate is increased by counter clockwise (leftward) rotation of the flow rate control knob.

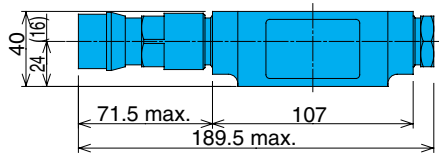
OF-G01-P20-20



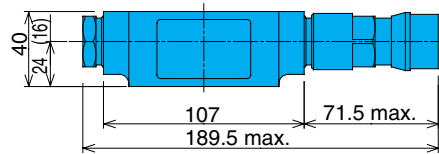
OCF-G01-W40-X/Y-30



OCF-G01-A40-X/Y-30



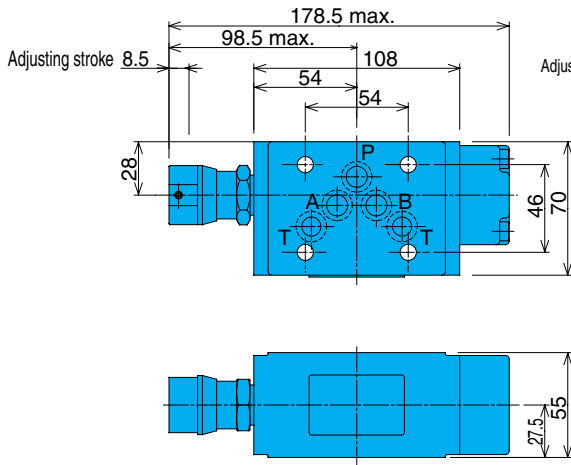
OCF-G01-B40-X/Y-30



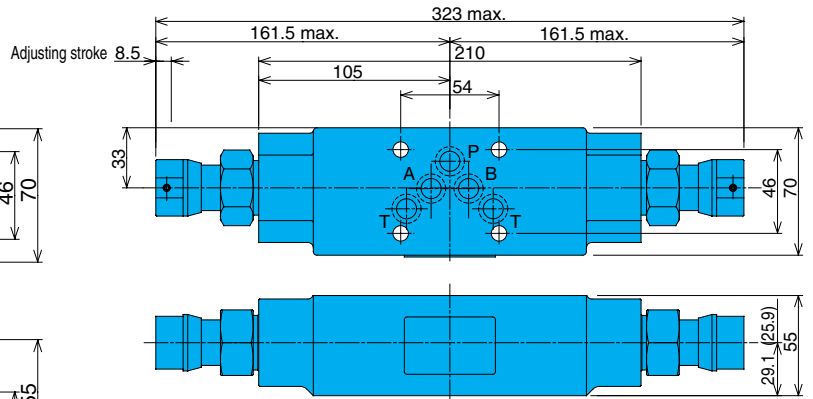
Note) Dimensions in the parentheses are for the OCF-G01-A40-X-30.

Note) Dimensions in the parentheses are for the OCF-G01-B40-X-30.

OF-G03-P60-J50

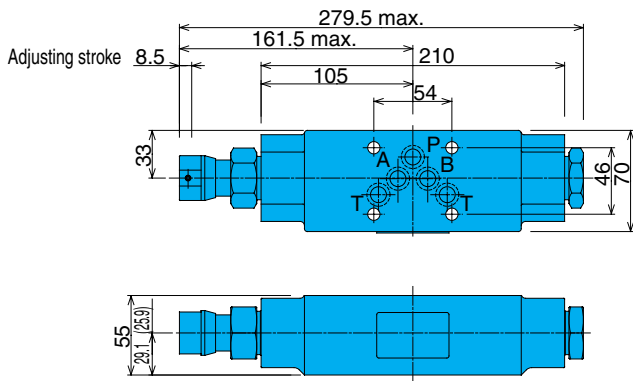


OCF-G03-W60-X/Y-J50



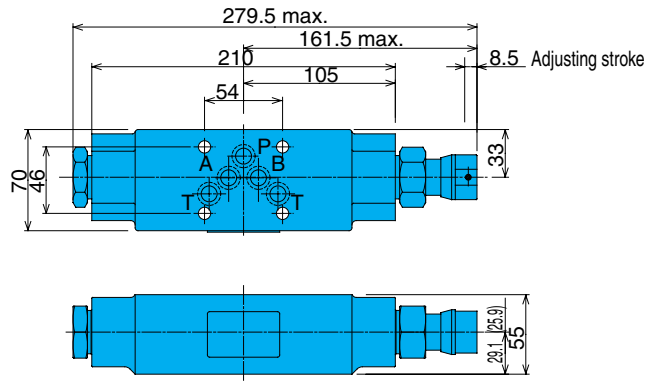
Note) Dimensions in the parentheses are for the OCF-G03-W60-X-J50.

OCF-G03-A60-X/Y-J50



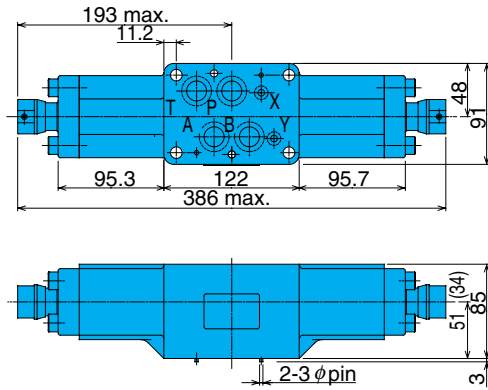
Note)
Dimensions in the parentheses are for the OCF-G03-A60-X-J50.

OCF-G03-B60-X/Y-J50



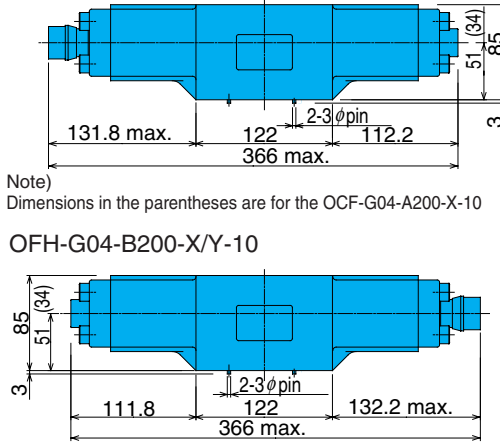
Note)
Dimensions in the parentheses are for the OCF-G03-B60-X-J50.

OFH-G04-W200-X/Y-10



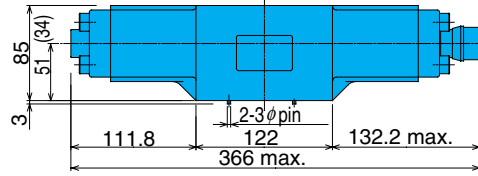
Note
Dimensions in the parentheses are for the OFH-G04-W200-X-10.

OFH-G04-A200-X/Y-10



Note)
Dimensions in the parentheses are for the OFH-G04-A200-X-10

OFH-G04-B200-X/Y-10



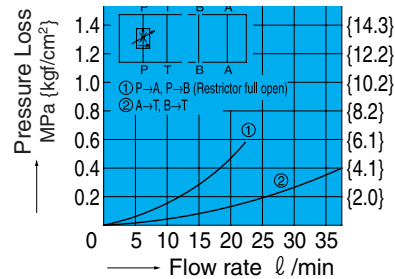
Note
Dimensions in the parentheses are for the OFH-G04-B200-X-10.

Performance Curves

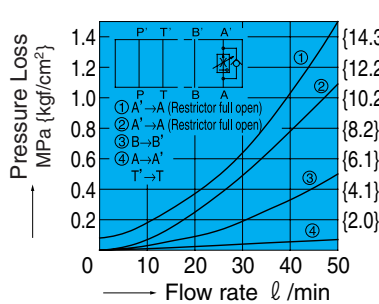
Hydraulic Operating Fluid Viscosity 32mm²/s

Pressure Loss Characteristics

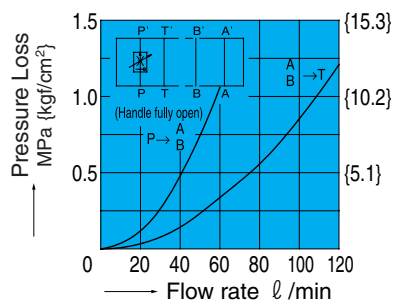
OF-G01-P20-20



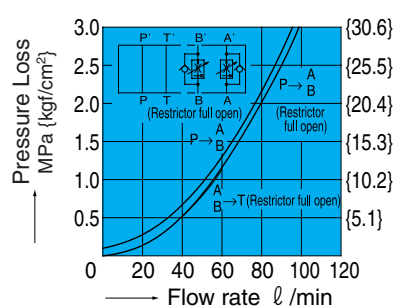
OCF-G01-A40-Y-30



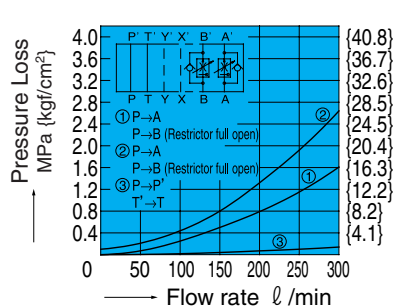
OF-G03-P60-J50



OCF-G03-W60-Y-J50

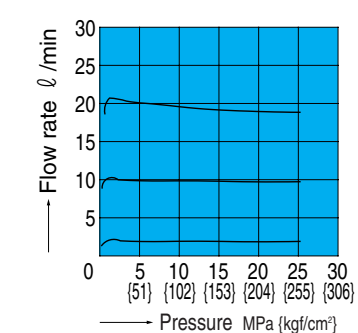


OFH-G04-W200-Y-10

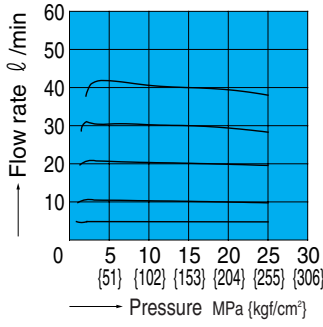


Pressure - Control Flow Rate Characteristics

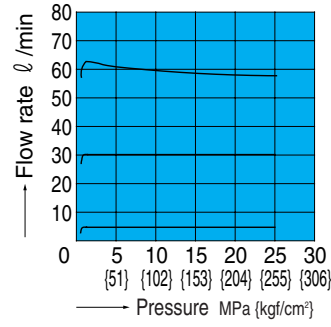
OF-G01-P20-20



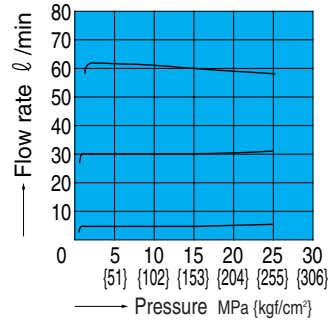
OCF-G01-*40-*-30



OF-G03-P60-J50

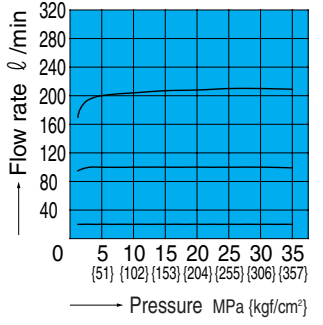


OCF-G03-W60-*-J50

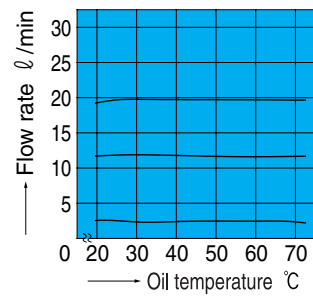


Fluid Temperature — Control Flow Rate Characteristics

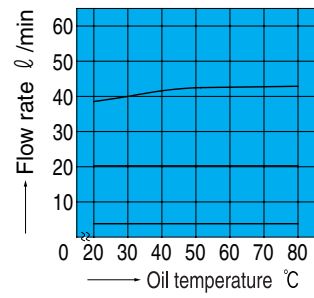
OFH-G04-W200-*-10



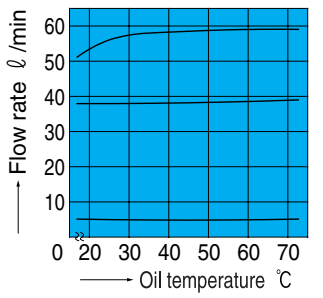
OF-G01-P20-20



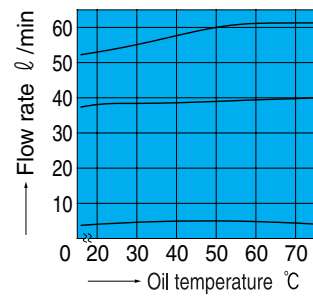
OCF-G01-*40-*-30



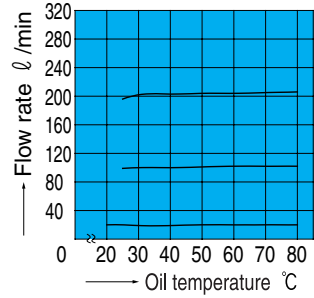
OF-G03-P60-J50



OCF-G03-W60-*-J50

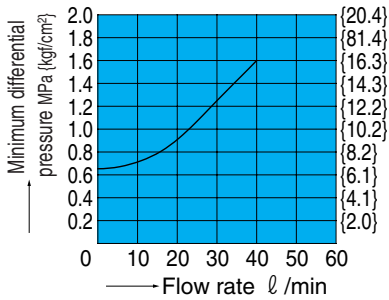


OFH-G04-W200-*-10

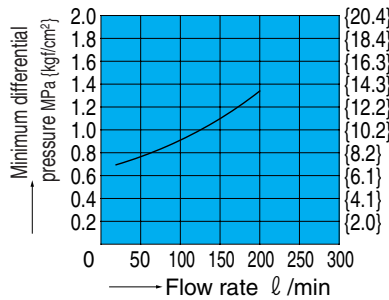


Flow Rate — Minimum Differential Pressure Characteristics

OCF-G01-*40-*-30

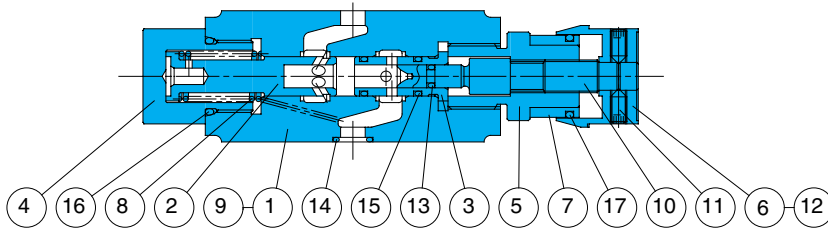


OFH-G04-W200-Y-10



Cross-sectional Drawing

OF-G01-P20-20



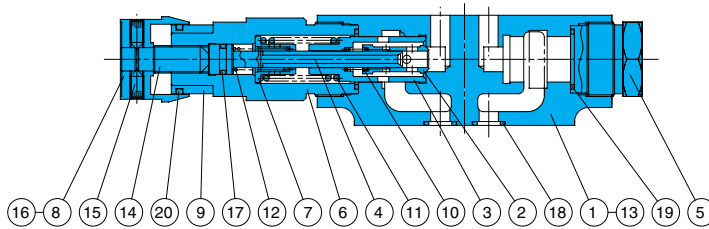
Part No.	Part Name
1	Body
2	Piston
3	Sleeve
4	Bushing
5	Retainer
6	Knob
7	Dial
8	Spring
9	Plate
10	Screw
11	Screw
12	Screw
13	O-ring
14	O-ring
15	O-ring
16	O-ring
17	O-ring

Seal Part List (Kit Model Number BFBS-01FP)

Part No.	Part Name	Part Number	Q'ty	
				P
13	O-ring	1B-P4	1	
14	O-ring	1B-P9	4	
15	O-ring	1B-P9	2	
16	O-ring	1B-P20	1	
17	O-ring	1A-P22	1	

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.

OCF-G01-A40-Y-30



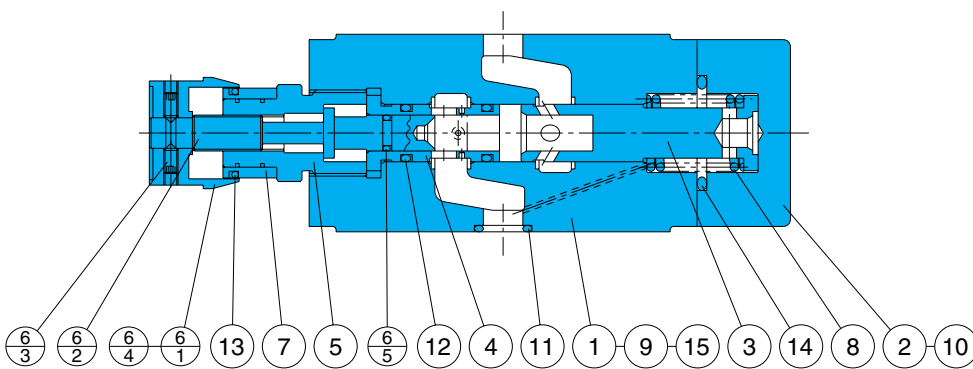
Part No.	Part Name
1	Body
2	Throttle
3	Piston
4	Rod
5	Bushing
6	Retainer
7	Guide
8	Knob
9	Dial
10	Spring
11	Spring
12	Spring
13	Plate
14	Screw
15	Screw
16	Screw
17	O-ring
18	O-ring
19	O-ring
20	O-ring

Seal Part List (Kit Model Number BFCS-01CF*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
17	O-ring	1A-P8	2	1	1
18	O-ring	1B-P9	4	4	4
19	O-ring	AS568-018(Hs90)	2	2	2
20	O-ring	1A-P21	1	1	1

Note)
 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
 2. Specify W, A, or B for the asterisk (*) in the kit model number.

OF-G03-P60-J50



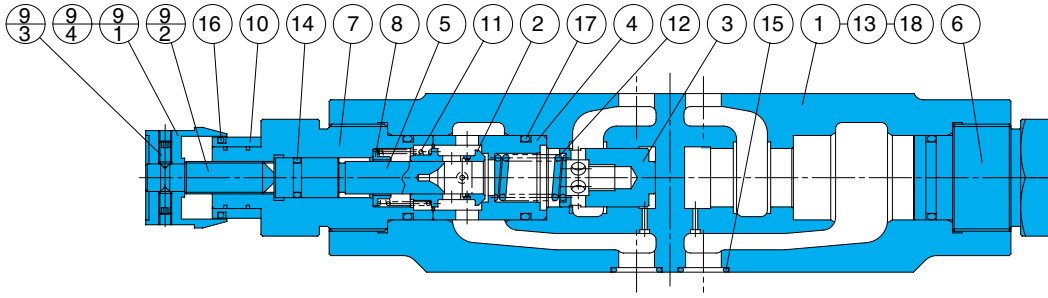
Part No.	Part Name
1	Body
2	Cover
3	Piston
4	Sleeve
5	Retainer
6	Screw kit
6-1	Knob
6-2	Screw
6-3	Screw
6-4	Screw
6-5	O-ring
7	Dial
8	Spring
9	Plate
10	Screw
11	O-ring
12	O-ring
13	O-ring
14	O-ring
15	Pin

Seal Part List (Kit Model Number BFES-03FP)

Part No.	Part Name	Part Number	Q'ty	
				PC
6-5	O-ring	1A-P7	1	
11	O-ring	AS568-014(Hs90)	5	
12	O-ring	1B-P12	2	
13	O-ring	1A-P21	1	
14	O-ring	1B-P26	1	

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.

OCF-G03-A60-Y-J50



Part No.	Part Name
1	Body
2	Throttle
3	Piston
4	Sleeve
5	Rod
6	Bushing
7	Retainer
8	Guide
9	Screw kit
9-1	Knob
9-2	Screw
9-3	Screw
9-4	Screw
10	Dial
11	Spring
12	Spring
13	Plate
14	O-ring
15	O-ring
16	O-ring
17	O-ring
18	Pin

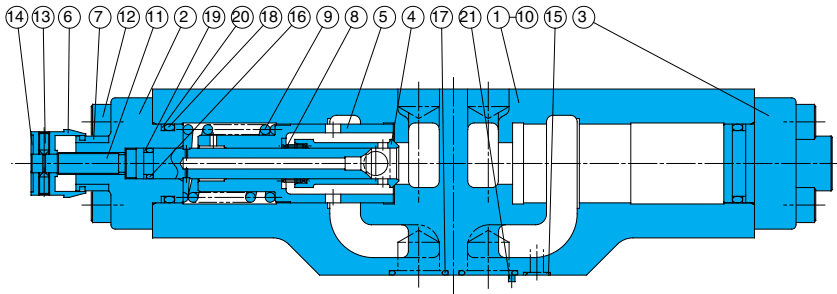
Seal Part List (Kit Model Number BFES-03CF*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
14	O-ring	1A-P10	2	1	1
15	O-ring	AS568-014(Hs90)	5	5	5
16	O-ring	1A-P21	2	1	1
17	O-ring	1B-P22	4	3	3

Note)

- O-ring 1A/B-** refers to JIS B2401-1A/B.
- Specify W, A, or B for the asterisk (*) in the kit model number.

OFH-G04-A200-Y-10



Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Throttle
5	Piston
6	Knob
7	Dial
8	Spring
9	Spring
10	Plate
11	Screw
12	Screw
13	Screw
14	Screw
15	O-ring
16	O-ring
17	O-ring
18	O-ring
19	Backup ring
20	Backup ring
21	Pin

Seal Part List (Kit Model Number BFKS-04CF*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
15	O-ring	AS568-012(Hs90)	2	2	2
16	O-ring	1B-P10A	2	1	1
17	O-ring	AS568-118(Hs90)	4	4	4
18	O-ring	1B-P30	2	2	2
19	Backup ring	T2-P10A	2	1	1
20	Backup ring	T2-P30	2	2	2

Note)

- O-ring 1A/B-** refers to JIS B2401-1A/B.
- Backup ring indicates JIS B 2407-T2-**.
- Specify W, A, or B for the asterisk (*) in the kit model number.



Check Modular Valve

50 to 300 ℓ /min
25,35MPa

Features

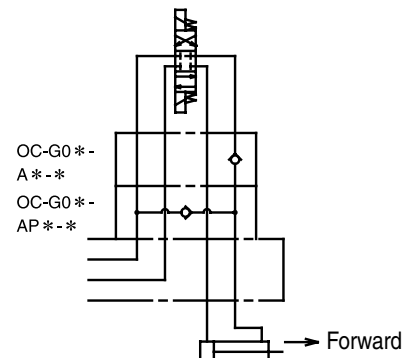
- ① This modular valve is a check valve that prevents reverse-flow.
- ② The 01, 03, 04 sizes include types that can also be used as suction and differential circuits.
- ③ Maximum Operating Pressure: 25, 35MPa {255, 357kgf/cm²}

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Flow Rate ℓ /min	Cracking pressure MPa{kgf/cm ² }	Weight kg	Gasket Surface Dimensions
OC-G01-P1-20 P2 P3	1/8	25{255}	50	0.04{0.4}	1.0	ISO 4401-03-02-0-94
OC-G01-T1-20 T2 T3				0.35{3.6}		
OC-G01-A1-21 A2 A3				0.50{5.1}		
OC-G01-AP1-20 AP2 AP3				0.04{0.4}		
OCV-G01-W-20				0.35{3.6}		
OC-G03-P1-J50 P2 P3	3/8	25{255}	100	0.04{0.4}	2.7	ISO 4401-05-04-0-94
OC-G03-T1-J50 T2 T3				0.35{3.6}		
OC-G03-A1-J50 A2 A3				0.50{5.1}		
OC-G03-AP1-J50 AP2 AP3				0.04{0.4}		
OCV-G03-W-J50				0.35{3.6}		
OCH-G04-P1-10 P2 P3	1/2	35{357}	300	0.04{0.4}	4.5	ISO 4401-07-06-0-94
OCH-G04-T1-10 T2 T3				0.35{3.6}		
OCH-G04-A1-10 A2 A3				0.50{5.1}		
OCH-G04-AP1-10 AP2 AP3				0.04{0.4}		
OVH-G04-W-10				0.35{3.6}		
				0.01{0.1}	6.5	

● Handling

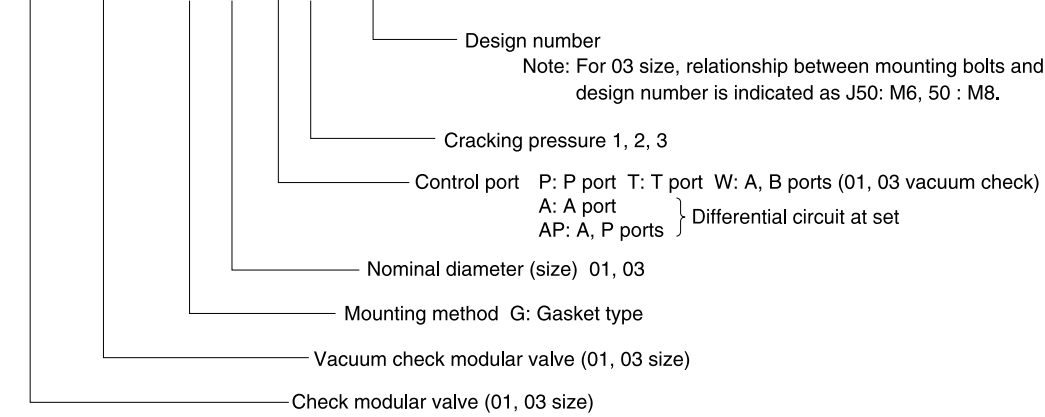
- ① Differential circuit can be easily configured at P → B by attaching OC-G**-A* above the OC-G**-AP* on the sub-plate. (See the figure to the right.)
- ② Note that a sub plate and installation bolts are not included. See pages D-90 through D-95 if these items are required.
- ③ 04 series modular valves do not have an L (DR₂) drain port, so they cannot be used in combination with pressure center type solenoid valves (D).



Understanding Model Numbers

01, 03 size

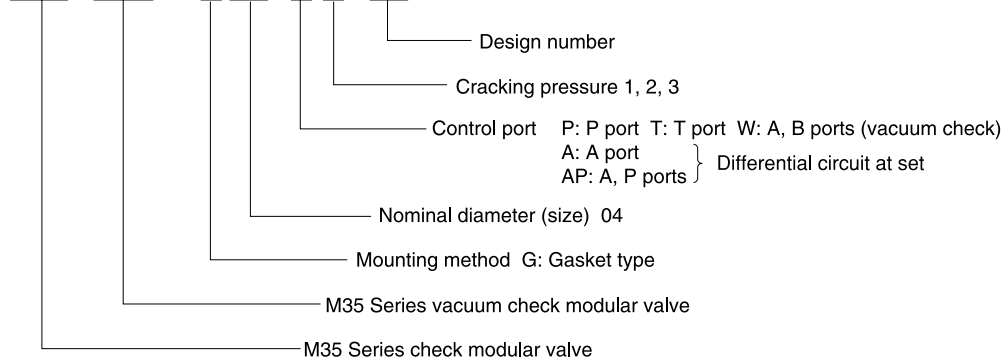
OC (OCV) - G 03 - P 1 - J50



Understanding Model Numbers

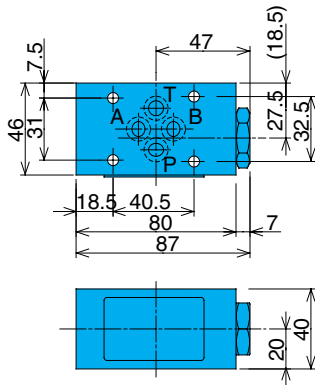
04 size

OCH (OVH) - G 04 - P 1 - 10

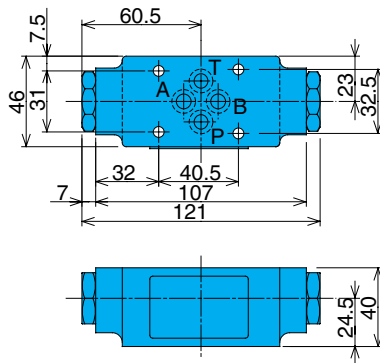


Installation Dimension Drawings

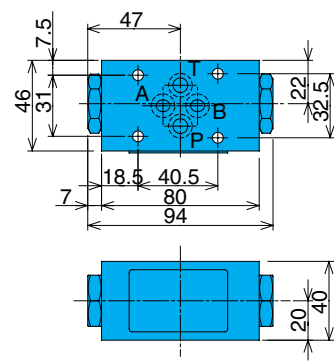
OC-G01-T*-20
P
AP



OC-G01-A*-21

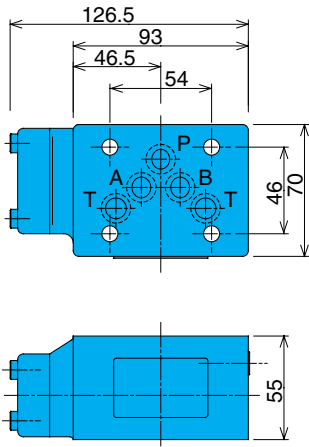


OCV-G01-W-20

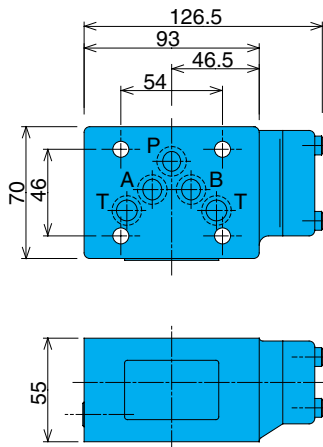


Note) Dimensions in the parentheses are for the OC-G01-T*-20.

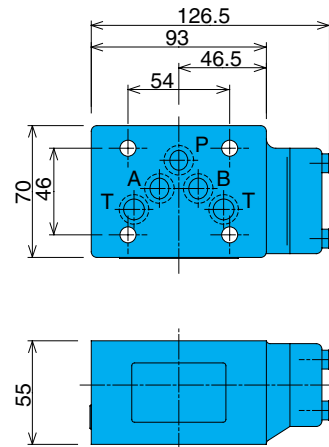
OC-G03-^P_{AP}*-J50



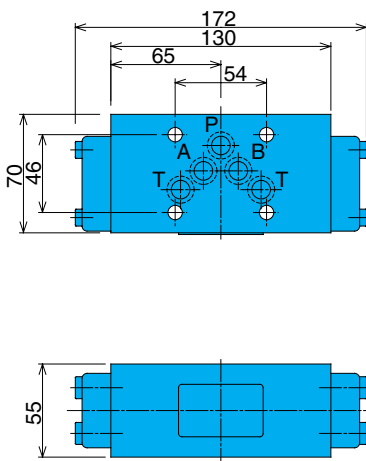
OC-G03-A*-J50



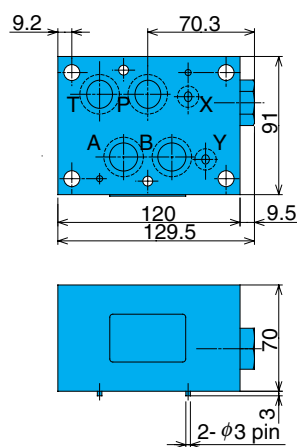
OC-G03-T*-J50



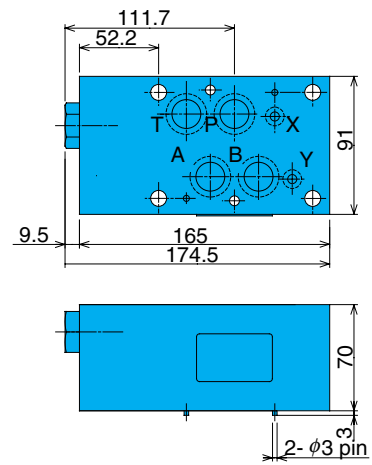
OCV-G03-W-J50



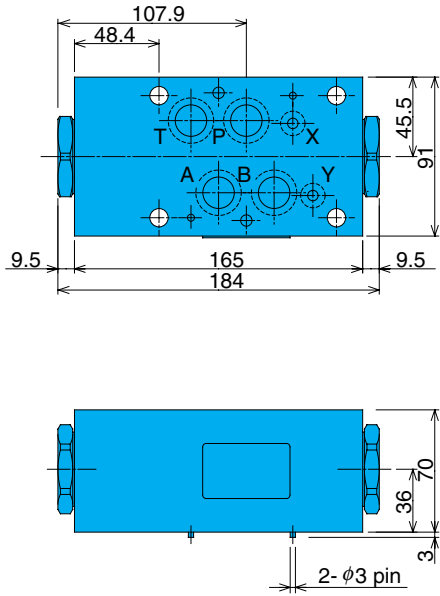
OCH-G04-A*-10
P
AP



OCH-G04-T*-10



OVH-G04-W-10

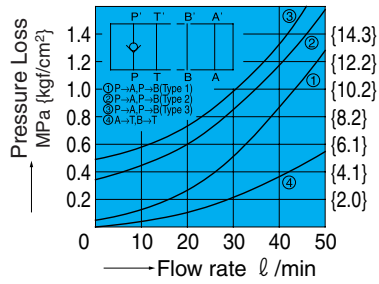


Performance Curves

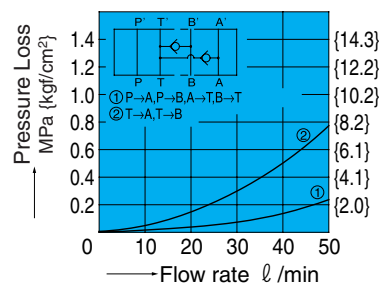
Hydraulic Operating Fluid Viscosity 32mm²/s

Pressure Loss Characteristics

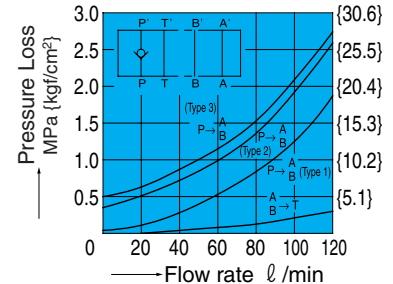
OC-G01-P*-20



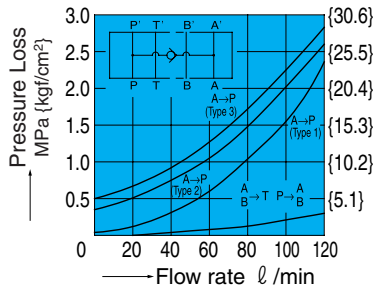
OCV-G01-W-20



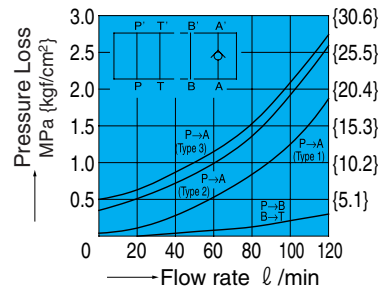
OC-G03-P*-J50



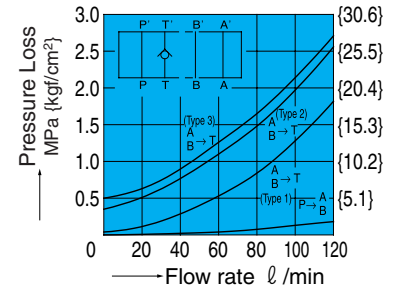
OC-G03-AP*-J50



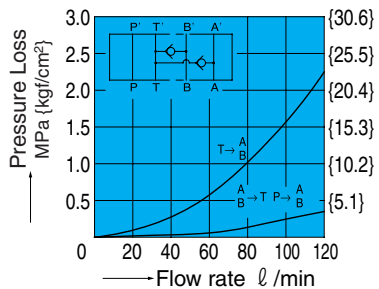
OC-G03-A*-J50



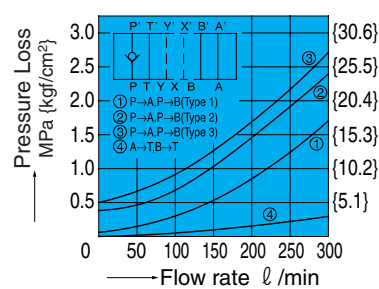
OC-G03-T*-J50



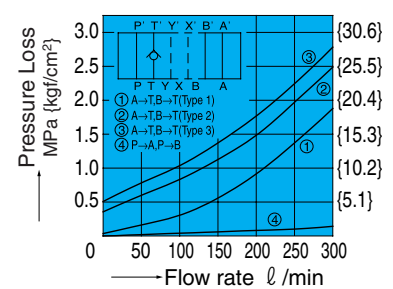
OCV-G03-W-J50



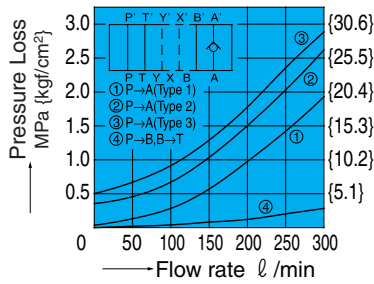
OCH-G04-P*-10



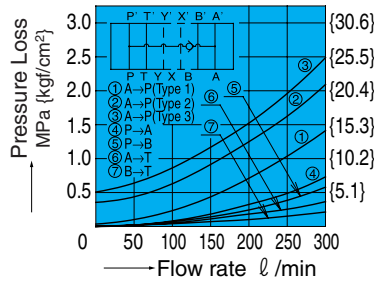
OCH-G04-T*-10



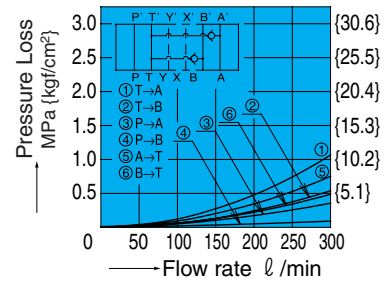
OCH-G04-A*-10



OCH-G04-AP*-10

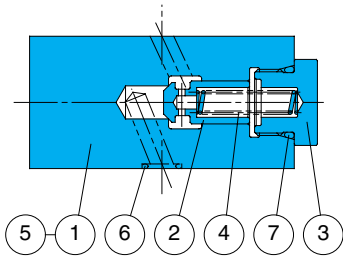


OVH-G04-W-10



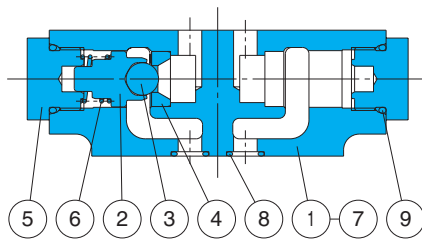
Cross-sectional Drawing

OC-G01-T*-20
AP



Part No.	Part Name
1	Body
2	Poppet
3	Guide Spring
4	Spring Plate
5	Plate
6	O-ring
7	O-ring

OC-G01-A*-21



Part No.	Part Name
1	Body
2	Poppet
3	Ball
4	Seat
5	Guide Spring
6	Spring Plate
7	Plate
8	O-ring
9	O-ring

Seal Part List (Kit Model Number BRBS-01C*)

Part No.	Part Name	Part Number	Q'ty		
			P	T	AP
6	O-ring	1B-P9	4	4	4
7	O-ring	1B-P18	1	1	1

Note)

- 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
- 2. Specify P, T, or AP for the asterisk (*) in the kit model number.

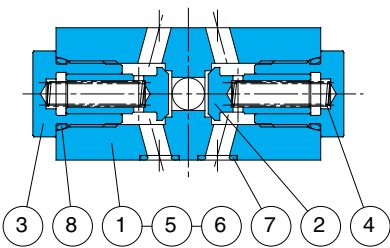
Seal Part List (Kit Model Number BDBS-01CA)

Part No.	Part Name	Part Number	Q'ty
			A
8	O-ring	1B-P9	4
9	O-ring	1B-P18	2

Note)

- O-ring 1A/B-** refers to JIS B2401-1A/B.

OCV-G01-W-20



Part No.	Part Name
1	Body
2	Poppet
3	Guide Spring
4	Spring Plate
5	Plate
6	Plug
7	O-ring
8	O-ring

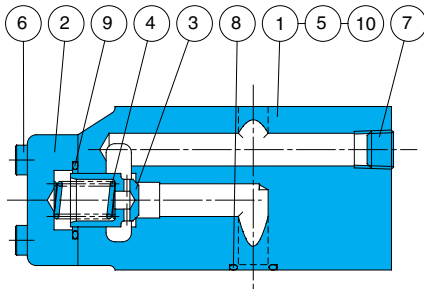
Seal Part List (Kit Model Number BDBS-01CVW)

Part No.	Part Name	Part Number	Q'ty
			W
7	O-ring	1B-P9	4
8	O-ring	1B-P18	2

Note)

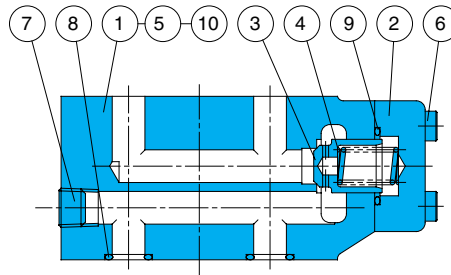
- 1. O-ring 1A/B-** refers to JIS B2401-1A/B.

OC-G03-P*-J50



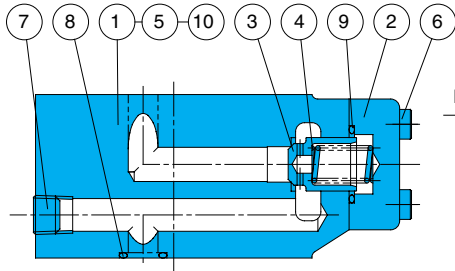
Part No.	Part Name
1	Body
2	Cover
3	Poppet
4	Spring
5	Plate
6	Screw
7	Plug
8	O-ring
9	O-ring
10	Pin

OC-G03-T*-J50



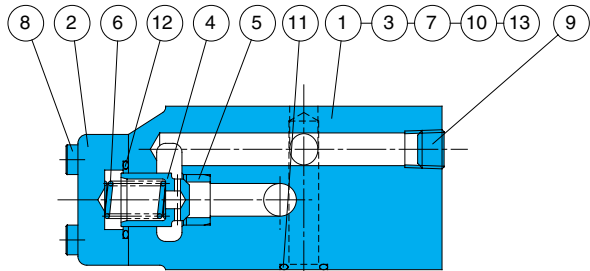
Part No.	Part Name
1	Body
2	Cover
3	Poppet
4	Spring
5	Plate
6	Screw
7	Plug
8	O-ring
9	O-ring
10	Pin

OC-G03-A*-J50



Part No.	Part Name
1	Body
2	Cover
3	Poppet
4	Spring
5	Plate
6	Screw
7	Plug
8	O-ring
9	O-ring
10	Pin

OC-G03-AP*-J50



Part No.	Part Name
1	Body
2	Cover
3	Plug
4	Poppet
5	Seat
6	Spring
7	Plate
8	Screw
9	Plug
10	O-ring
11	O-ring
12	O-ring
13	Pin

Seal Part List (Kit Model Number BDES-03C*)

Part No.	Part Name	Part Number	Q'ty		
			P	T	A
8	O-ring	AS568-014(Hs90)	5	5	5
9	O-ring	1B-P22	1	1	1

Note)

- O-ring 1A/B-** refers to JIS B2401-1A/B.
- Specify P, T, or A for the asterisk (*) in the kit model number.

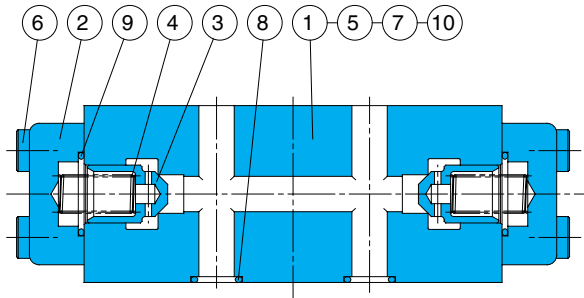
Seal Part List (Kit Model Number BDES-03CAP)

Part No.	Part Name	Part Number	Q'ty
			AP
10	O-ring	1B-P11	1
11	O-ring	AS568-014(Hs90)	5
12	O-ring	1B-P22	1

Note)

O-ring 1A/B-** refers to JIS B2401-1A/B.

OCV-G03-W-J50

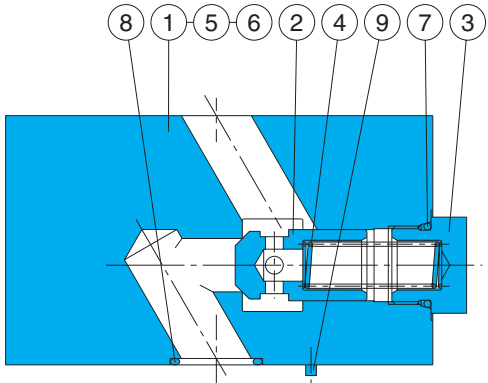


Seal Part List (Kit Model Number BDES-03CVW)

Part No.	Part Name	Part Number	Q'ty
			W
7	O-ring	1B-P10A	2
8	O-ring	AS568-014(Hs90)	5
9	O-ring	1B-P22	2

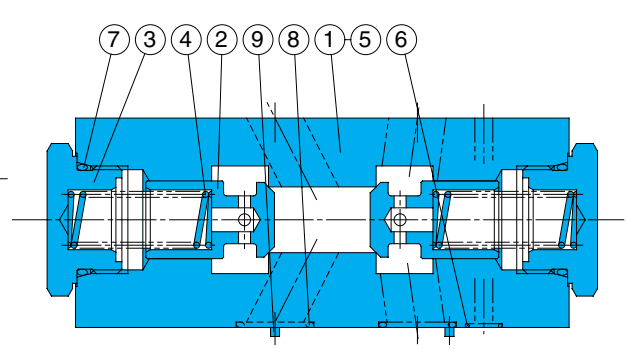
Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	5	Plate	9	O-ring
2	Cover	6	Screw	10	Pin
3	Poppet	7	O-ring		
4	Spring	8	O-ring		

OCH-G04-P*-10



Part No.	Part Name
1	Body
2	Poppet
3	Guide
4	Spring
5	Plate
6	O-ring
7	O-ring
8	O-ring
9	Pin

OVH-G04-W-10



Part No.	Part Name
1	Body
2	Poppet
3	Guide
4	Spring
5	Plate
6	O-ring
7	O-ring
8	O-ring
9	Pin

Seal Part List (Kit Model Number BDKS-04C*)

Part No.	Part Name	Body	Q'ty			
			P	T	A	AP
6	O-ring	AS568-012(Hs90)	2	2	2	2
7	O-ring	1B-P20	1	1	1	1
8	O-ring	AS568-118(Hs90)	4	4	4	4

Seal Part List (Kit Model Number BDKS-04CVW)

Part No.	Part Name	Part Number	Q'ty
6	O-ring	AS568-012(Hs90)	2
7	O-ring	1B-P32	2
8	O-ring	AS568-118(Hs90)	4

Note) 1.O-ring 1A/B-** refers to JIS B2401-1A/B.
 2.Specify P, T, A, or AP for the asterisk (*) in the kit model number.

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.



Pilot Operated Check Modular Valve

50 to 300 ℓ /min
25,35MPa

Features

- ① This modular valve is used to prevent actuator self-running and to maintain actuator position.
- ② Maximum Operating Pressure: 25, 35MPa {255, 357kgf/cm²}

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Flow Rate ℓ /min	Cracking pressure MPa{kgf/cm ² }	Area Ratio			Weight kg	Gasket Surface Dimensions	
					Pilot Piston	Check Valve Seat	Needle Valve Seat			
OCP-G01-W1-21 W2	1/8	25{255}	50	0.2{2.0} 0.5{5.1}	1	0.37	—	1.2	ISO 4401-03-02-0-94	
OCP-G01-A1-21 A2				0.2{2.0} 0.5{5.1}						
OCP-G01-B1-21 B2				0.2{2.0} 0.5{5.1}						
OCP-G01-W1-F-21 W2				0.2{2.0} 0.5{5.1}	1	0.51	0.06			1.2
OCP-G01-A1-F-21 A2				0.2{2.0} 0.5{5.1}						
OCP-G01-B1-F-21 B2				0.2{2.0} 0.5{5.1}						
OCP-G03-W1-J50 W2	3/8	25{255}	100	0.2{2.0} 0.5{5.1}	1	0.49	0.07	3.6	ISO 4401-05-04-0-94	
OCP-G03-A1-J50 A2				0.2{2.0} 0.5{5.1}						
OCP-G03-B1-J50 B2				0.2{2.0} 0.5{5.1}						
OCP-G03-W1-D-J50 W2				0.2{2.0} 0.5{5.1}	1	0.49	—			6.8
OCP-G03-A1-D-J50 A2				0.2{2.0} 0.5{5.1}						
OCP-G03-B1-D-J50 B2				0.2{2.0} 0.5{5.1}						
OPH-G04-W1-10 W2	1/2	35{357}	300	0.2{2.0} 0.5{5.1}	1	0.50	0.07	6.8	ISO 4401-07-06-0-94	
OPH-G04-A1-10 A2				0.2{2.0} 0.5{5.1}						
OPH-G04-B1-10 B2				0.2{2.0} 0.5{5.1}						
OPH-G04-W1-D-10 W2				0.2{2.0} 0.5{5.1}	1	0.50	—			
OPH-G04-A1-D-10 A2				0.2{2.0} 0.5{5.1}						
OPH-G04-B1-D-10 B2				0.2{2.0} 0.5{5.1}						

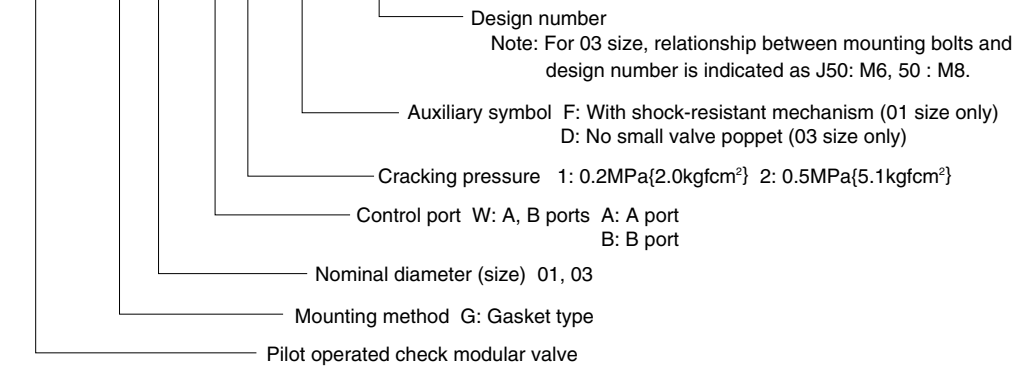
● Handling

- ① Note that when the 01 size has the auxiliary symbol "F," tank port back pressure can cause the small valve to open, making it impossible to maintain pressure.
- ② If tank port back pressure causes the small valve to open and make it impossible to maintain pressure with the 03, 04 size, use a direct type with auxiliary symbol "D."
- ③ Minimum pilot pressure fluctuates with the input side pressure during reverse flow. Operate the valve so pressure is at least twice as high as the required pressure obtained using the minimum pilot pressure characteristics graph.
- ④ Note that a sub plate and installation bolts are not included. See pages D-90 through D-95 if these items are required.
- ⑤ 04 series modular valves do not have an L (DR₂) drain port, so they cannot be used in combination with pressure center type solenoid valves (D).

Understanding Model Numbers

01, 03 size

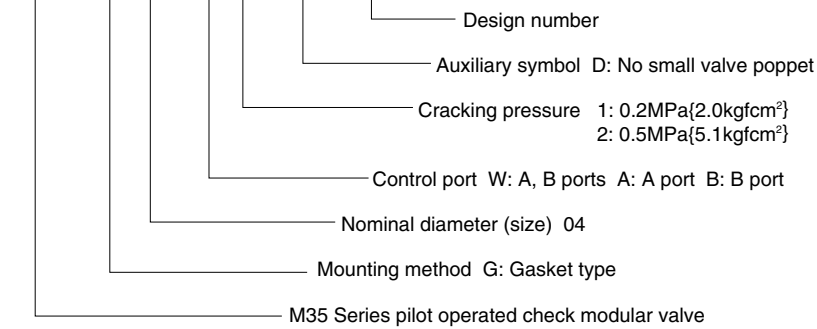
OCP - G 03 - W 1 - (D) - J50



Understanding Model Numbers

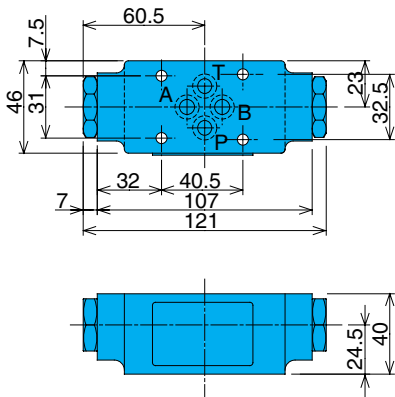
04 size

OPH - G 04 - W 1 - (D) - 10

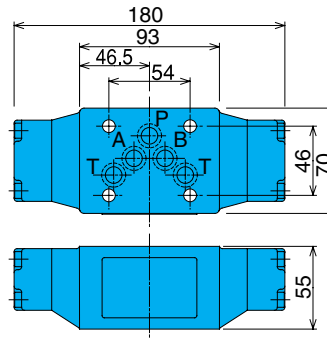


Installation Dimension Drawings

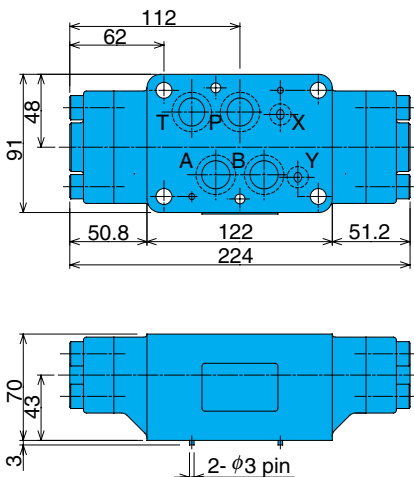
OCP-G01-**-F)-21



OCP-G03-**-D)-J50



OPH-G04-**-D)-10

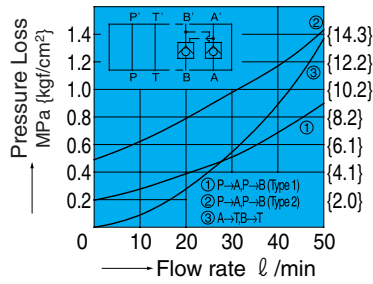


Performance Curves

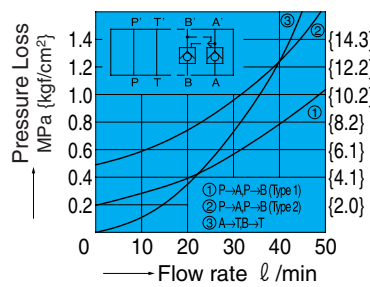
Hydraulic Operating Fluid Viscosity 32mm²/s

Pressure Loss Characteristics

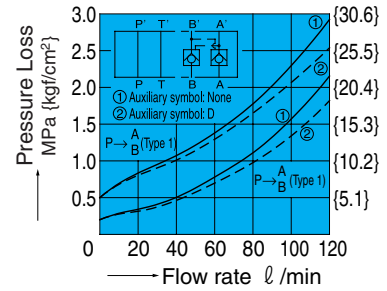
OCP-G01-W*-21



OCP-G01-W*-F-21

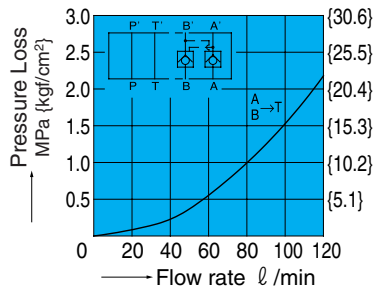


OCP-G03-W*-(D)-J50

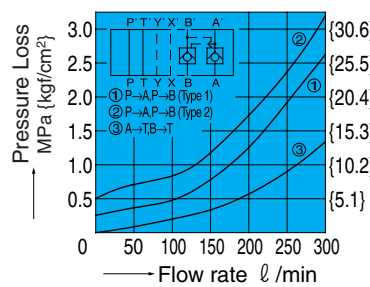


Pressure Loss Characteristics (Reverse Free Flow)

OCP-G03-W*-J50

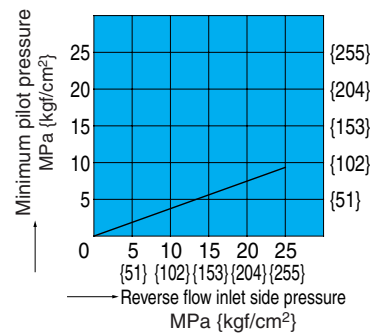


OPH-G04-W*-10

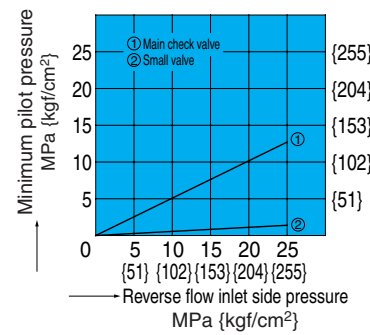


Minimum Pilot Pressure Characteristics

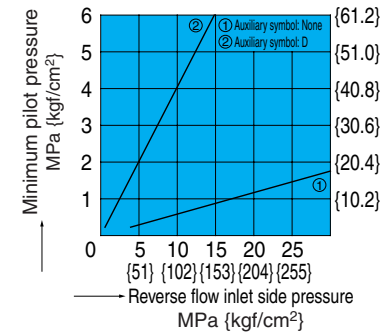
OCP-G01-**-21



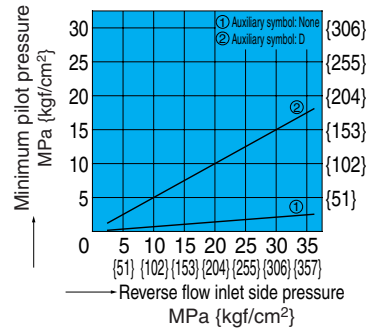
OCP-G01-**-F-21



OCP-G03-W*-(D)-J50

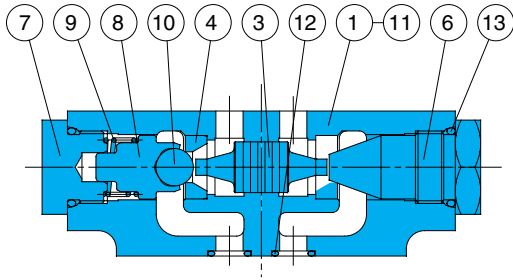


OPH-G04-W*-(D)-10

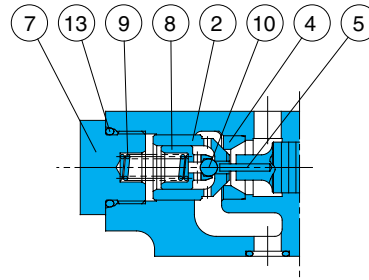


Cross-sectional Drawing

OCP-G01-A*-21



OCP-G01-A*-F-21



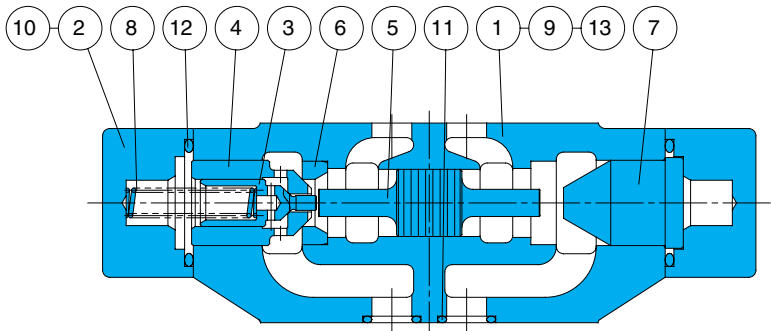
Part No.	Part Name
1	Body
2	Poppet
3	Piston
4	Seat
5	Rod
6	Bushing
7	Guide
8	Guide
9	Spring
10	Ball
11	Plate
12	O-ring
13	O-ring

Seal Part List (Kit Model Number BDBS-01CP)

Part No.	Part Name	Part Number	Qty		
			W	A	B
12	O-ring	1B-P9	4	4	4
13	O-ring	1B-P18	2	2	2

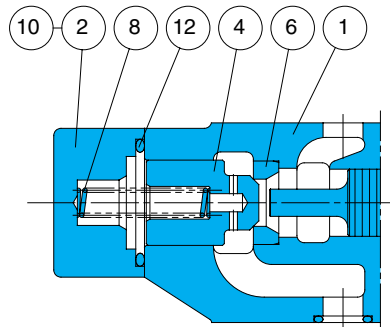
Note) 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify W, A, or B for the asterisk (*) in the kit model number.

OCP-G03-A*-J50



Part No.	Part Name
1	Body
2	Cover
3	Poppet
4	Poppet
5	Piston
6	Seat
7	Bushing
8	Spring
9	Plate
10	Screw
11	O-ring
12	O-ring
13	Pin

OCP-G03-**-D-J50

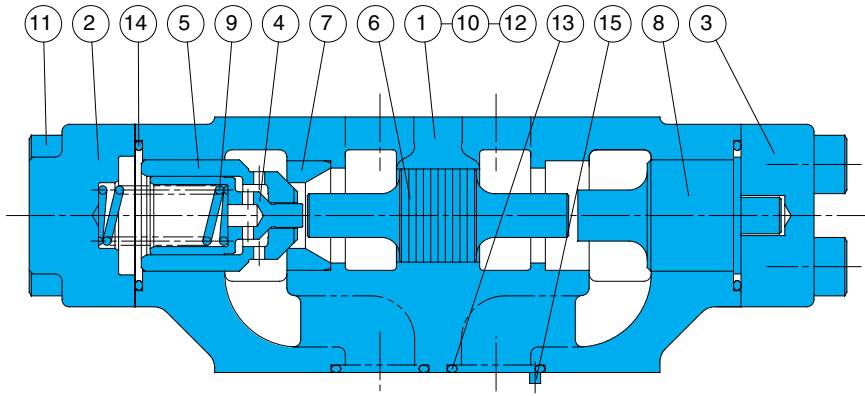


Seal Part List (Kit Model Number BDES-03CP*)

Part No.	Part Name	Part Number	Qty		
			W	A	B
11	O-ring	AS568-014(Hs90)	5	5	5
12	O-ring	1B-P29	2	2	2

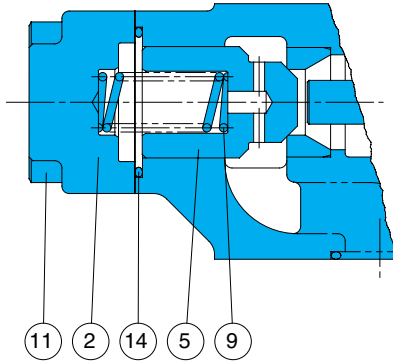
Note) 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
2. Specify W, A, or B for the asterisk (*) in the kit model number.

OPH-G04-A*-10



Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Poppet
5	Poppet
6	Piston
7	Seat
8	Bushing
9	Spring
10	Plate
11	Screw
12	O-ring
13	O-ring
14	O-ring
15	Pin

OPH-G04-**-D-10



Seal Part List (Kit Model Number BDKS-04CP*)

Part No.	Part Name	Part Number	Q'ty		
			W	A	B
12	O-ring	AS568-012(Hs90)	2	2	2
13	O-ring	AS568-118(Hs90)	4	4	4
14	O-ring	AS568-127(Hs90)	2	2	2

Note)1.Specify W, A, or B for the asterisk (*) in the kit model number.



Gauge Modular Block

50 to 100 ℓ /min
25MPa

Features

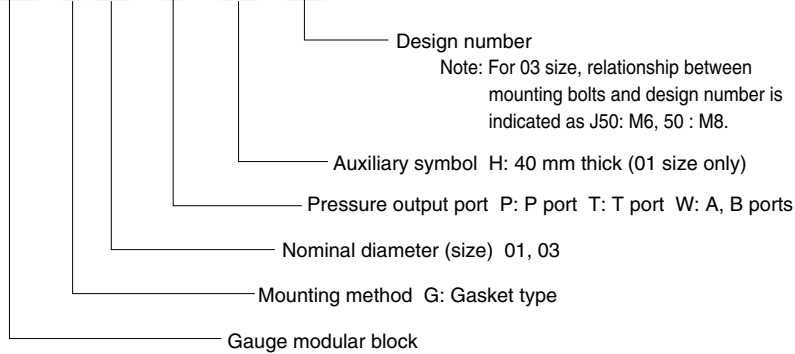
- ① This modular block makes it possible to attach a pressure gauge to the P and T ports or the A and B ports.
- ② Connection to the ports is extremely simple.

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Flow Rate ℓ /min	Weight kg	Gasket Surface Dimensions
OK-G01-P-20 OK-G01-T-20	1/8	25{255}	50	0.6	ISO 4401-03-02-0-94
OK-G01-W-20				0.6	
OK-G01-P-H-20 OK-G01-T-H-20				1.0	
OK-G01-W-H-20				1.0	
OK-G03-J50	3/8	25{255}	100	2.3	ISO 4401-05-04-0-94

Understanding Model Numbers

OK - G 01 - P - (H) - 20

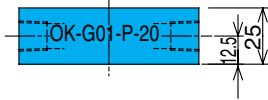
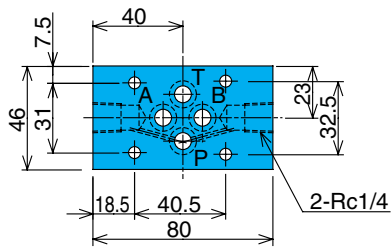


● Handling

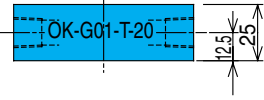
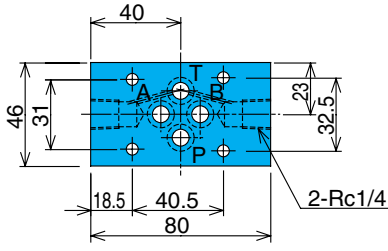
- ① When installing the OK-G01-P- (H)-20, OK-G01-T-(H)-20, or OK-G01-W-(H)-20, make sure the model number printing is oriented so it can be read correctly from the P port side.
- ② Note that a sub plate and installation bolts are not included. See pages D-90 through D-95 if these items are required.

Installation Dimension Drawings

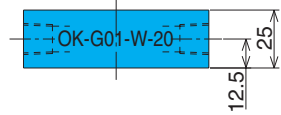
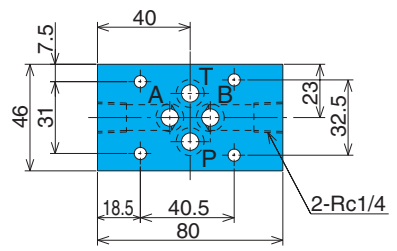
OK-G01-P-20



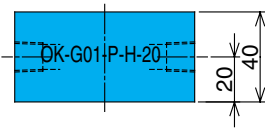
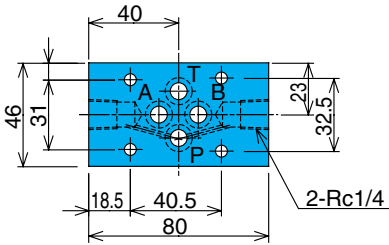
OK-G01-T-20



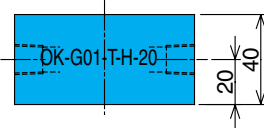
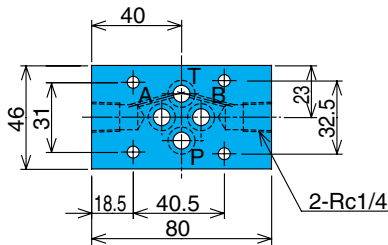
OK-G01-W-20



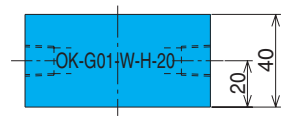
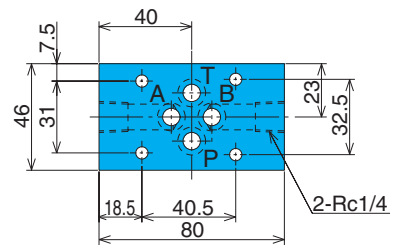
OK-G01-P-H-20



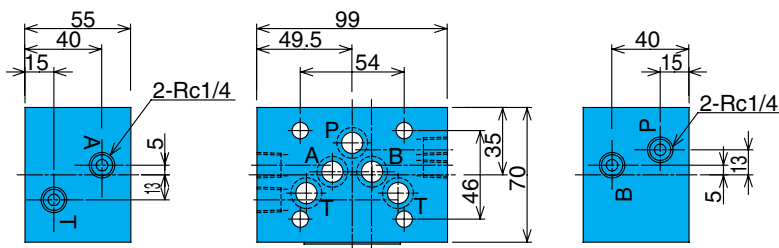
OK-G01-T-H-20



OK-G01-W-H-20



OK-G03-J50





High-low System Block

50 to 100 ℓ /min
25MPa

Features

Simple high-low 2-speed control can be attained by stacking this block on top of a high-low base block and manifold, which configures a speed control circuit.

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	Weight kg
OB-G01-W-20	1/8	25{255}	50	1.5
OB-G01-W-H-20				2.5
OB-G03-W-J30	3/8	25{255}	100	4.5
OB-G03-W-H-J30				7.1

● Handling

① If a base block is required, use MOB-01Y-W*-10 for the 01 size and MOB-03X-B*-J30 for the 03 size, because their valve pitches match. MOB-01X-B*-10 has a different valve pitch, and so cannot be used.

② When installing this block, make sure the nameplate is oriented so it can be read correctly from the A port side.

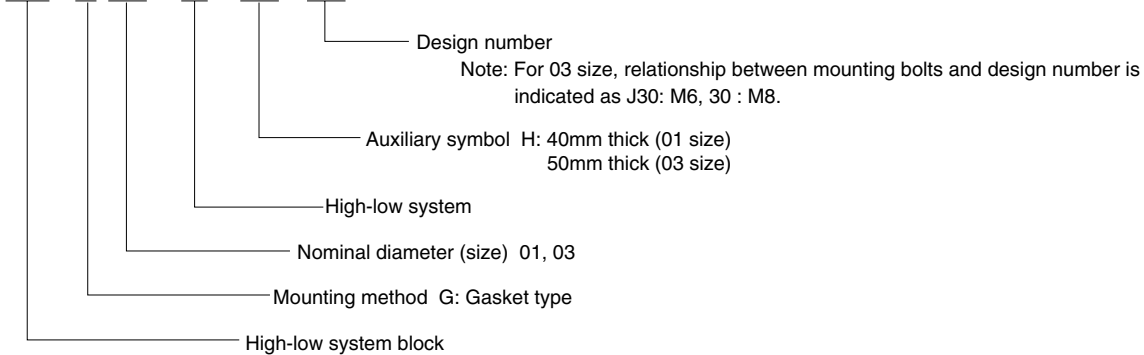
③ Both of the cylinder ports on this block's manifold side (bottom) are open. Because of this, close one of the base block cylinder ports (A1,

B1 or A2, B2 on the next page), or modify the manifold so it has a single cylinder port only.

④ Note that installation bolts are not included. See pages D-90 through D-95 if these items are required.

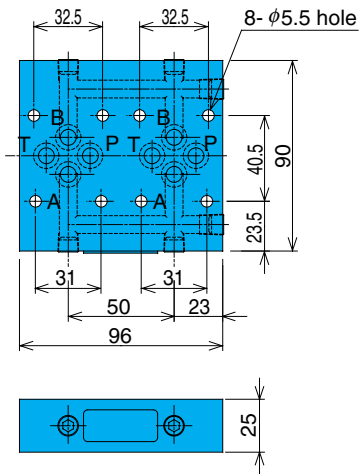
Understanding Model Numbers

OB - G 01 - W - (H) - 20

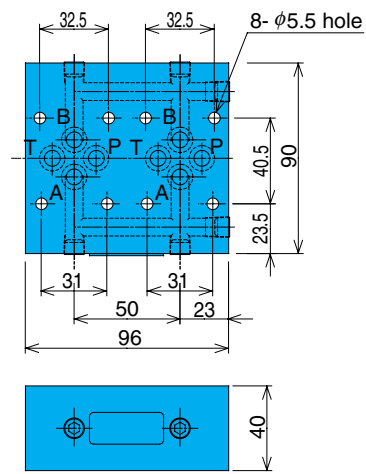


Installation Dimension Drawings

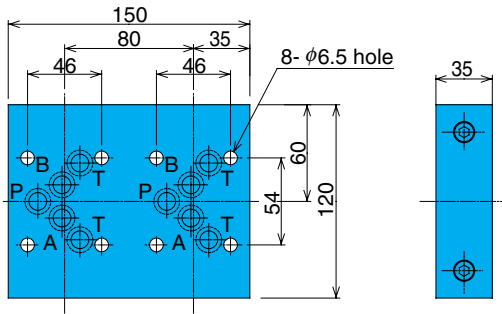
OB-G01-W-20



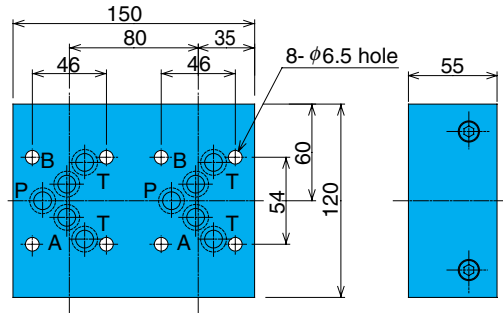
OB-G01-W-H-20



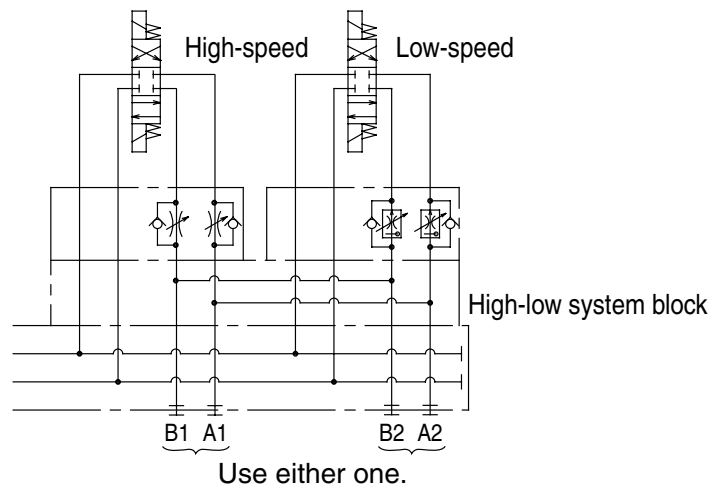
OB-G03-W-J30



OB-G03-W-H-J30



Example of Typical Circuit



End Plate, Free Flow Plate, 03/01 Change Plate

50 to 100 ℓ /min
25MPa

Features

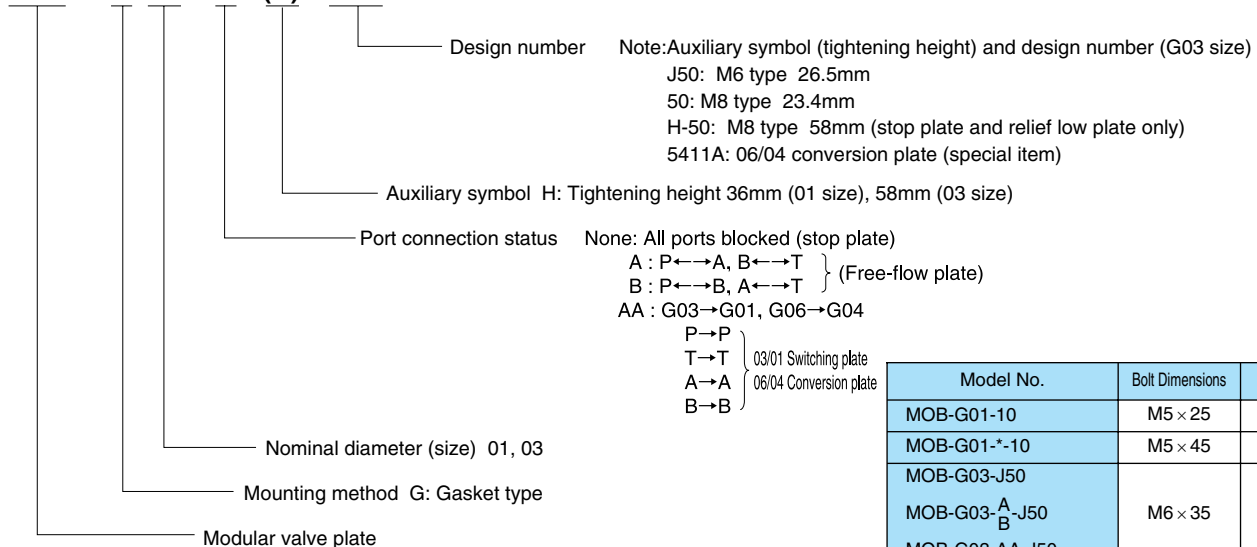
- ① The end plate is a modular valve plate used to close off a circuit that is not required, and when using a relief modular valve in a stand-alone configuration.
- ② The free flow plate is a modular valve plate is used in a one-way circuit that does not require a solenoid valve.
- ③ The 03/01 change plate makes it possible to use an 01 size modular valve with an 03 size sub-plate and base block.
- ④ The 06/04 change plate makes it possible to use an 04 size modular valve with an 06 size sub-plate and base block.

Specifications

Model No.	Nominal Diameter(Size)	Maximum Working Pressure MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	Weight kg
MOB-G01-10	1/8	25{255}	-	0.3
MOB-G01-H-10			-	0.6
MOB-G01-A-10 MOB-G01-B-10			50	0.6
MOB-G03-J50	3/8	25{255}	-	1.4
MOB-G03-H-50			-	2.5
MOB-G03-A-J50 MOB-G03-B-J50			100	1.3
MOB-G03-A-H-50 MOB-G03-B-H-50				2.3
MOB-G03-AA-J50			50	2.3
MOB-G06-AA-5411A	3/4	21{214}	200	8.0

Understanding Model Numbers

MOB - G 03 - A - (H) - J50



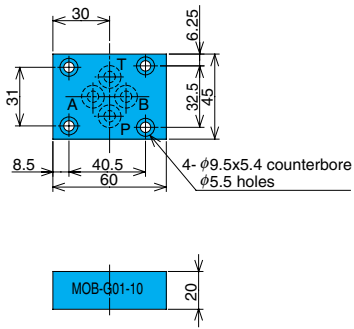
● Handling

- ① Installation bolts are not included. Use the table to the right to specify bolts for stand-alone use.

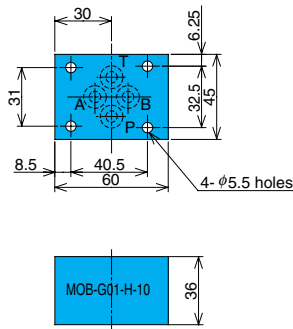
Model No.	Bolt Dimensions	Q'ty
MOB-G01-10	M5 × 25	4
MOB-G01-* -10	M5 × 45	4
MOB-G03-J50	M6 × 35	4
MOB-G03- _A -J50		
MOB-G03-AA-J50		
MOB-G03-50	M8 × 35	4
MOB-G03- _A -50		
MOB-G03-AA-50		
MOB-G03-H-50	M8 × 70	4
MOB-G03- _A -H-50		
MOB-G06-AA-5411A	M12 × 70	6

Installation Dimension Drawings

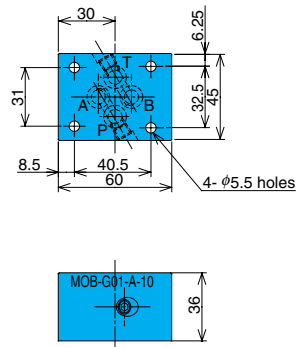
MOB-G01-10



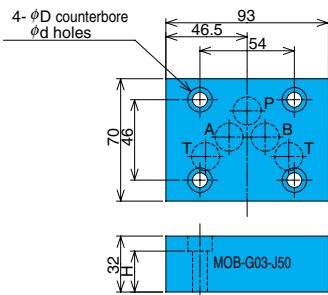
MOB-G01-H-10



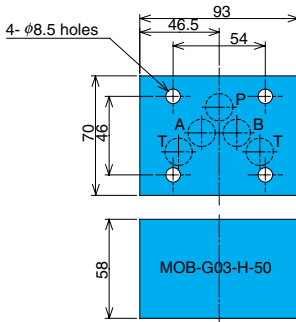
MOB-G01-^A/_B-10



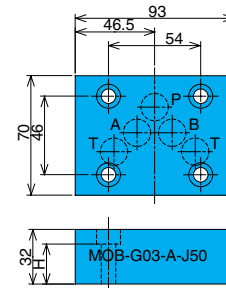
MOB-G03-J50



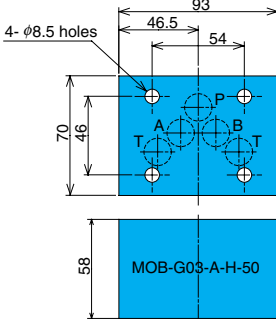
MOB-G03-H-50



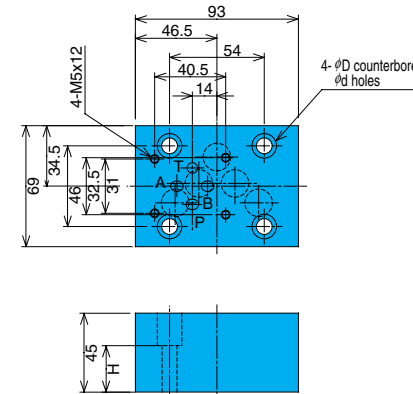
MOB-G03-^A/_B-J50



MOB-G03-^A/_B-H-50



MOB-G03-AA-J50



Model No.	D	H	d
MOB-G03-*50	14	23.4	8.5
MOB-G03-*J50	11	26.5	6.5

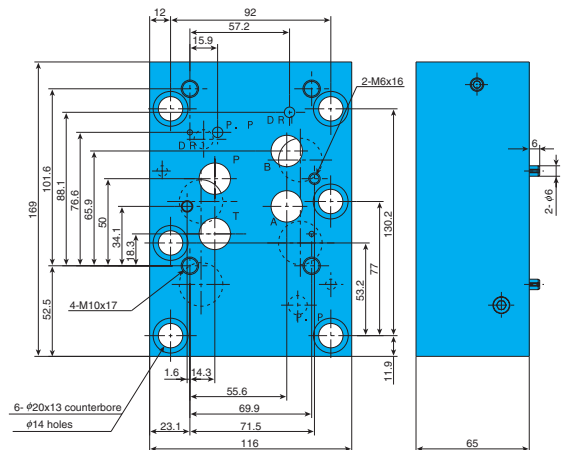
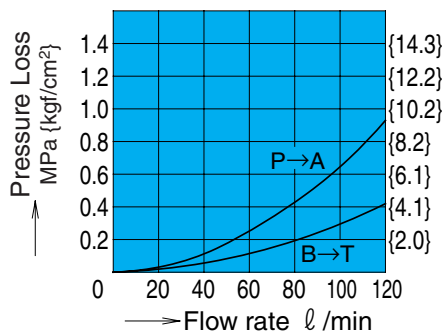
Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

Pressure Loss Characteristics

MOB-G06-AA-5411A

MOB-G03-A-J50



Solenoid Valve/Modular Valve Subplate

Features

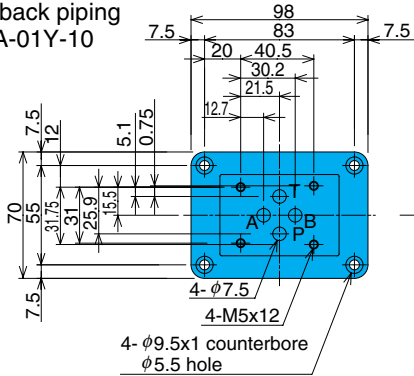
This plate is for when only a single solenoid valve and modular is used. The 01 and 03 sizes include one-side piping types.

Installation Dimension Drawings

Use the following table for specification when a sub plate is required.

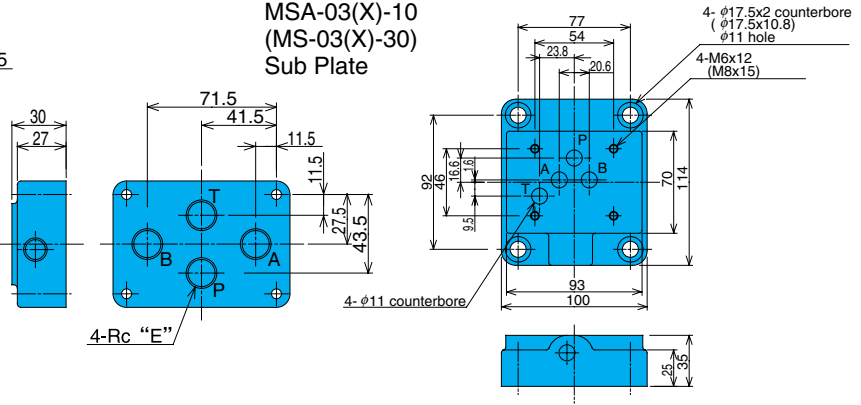
01 (nominal diameter)

For back piping
MSA-01Y-10



03 (nominal diameter)

For back piping
MSA-03(X)-10
(MS-03(X)-30)
Sub Plate



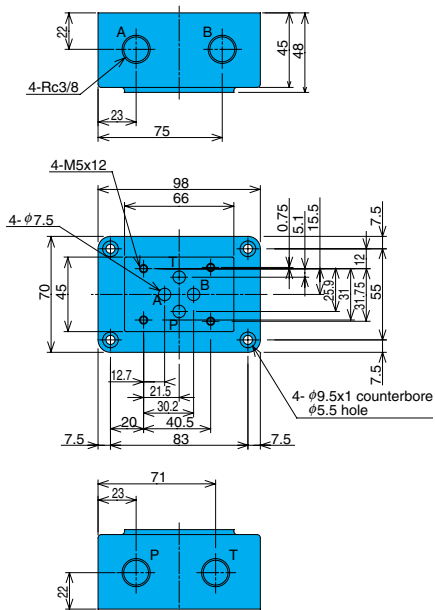
Model No.	Pipe Outlet Size E	Maximum Working Pressure MPa(kgf/cm ²)	Recommended Flow Rate ℓ/min	Weight kg
MSA-01X-10	1/4	25	20	1.2
MSA-01Y-10	3/8	{255}	40	1.2

Sub Plate Number

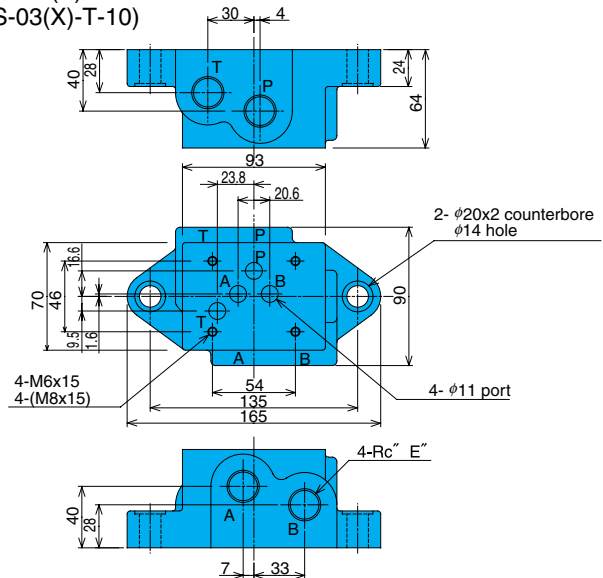
Mounting bolt	Model No.	Maximum Working Pressure MPa(kgf/cm ²)	Recommended Flow Rate ℓ/min	E
M6	MSA-03-10	25	45	3/8
	MSA-03X-10	{255}	80	1/2
M8	MS-03-30	25	45	3/8
	MS-03X-30	{255}	80	1/2

Note) Dimensions in parentheses indicate MS-03 (X) -30.

For back piping
MSA-01Y-T-10



For back piping
MSA-03(X)-T-10
(MS-03(X)-T-10)

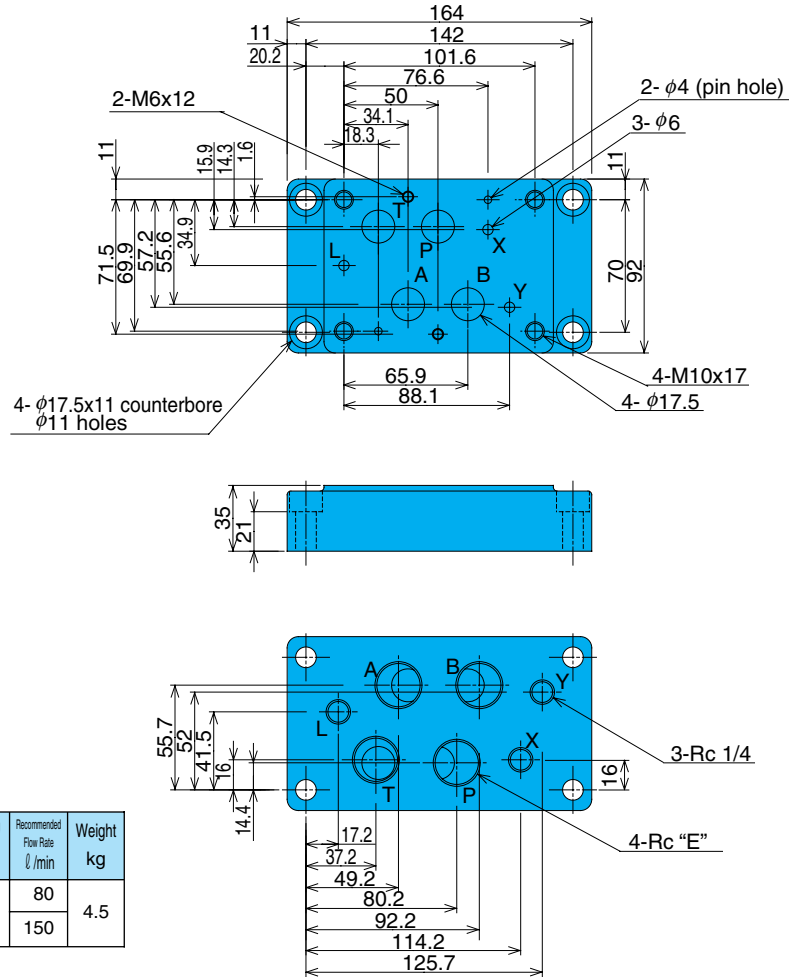


Note) Dimensions in parentheses indicate MS-03 (X) -T-10.

Model No.	Pipe Outlet Size E	Maximum Working Pressure MPa(kgf/cm ²)	Recommended Flow Rate ℓ/min	Weight kg
MSA-01Y-T-10	3/8	25{255}	40	1.9

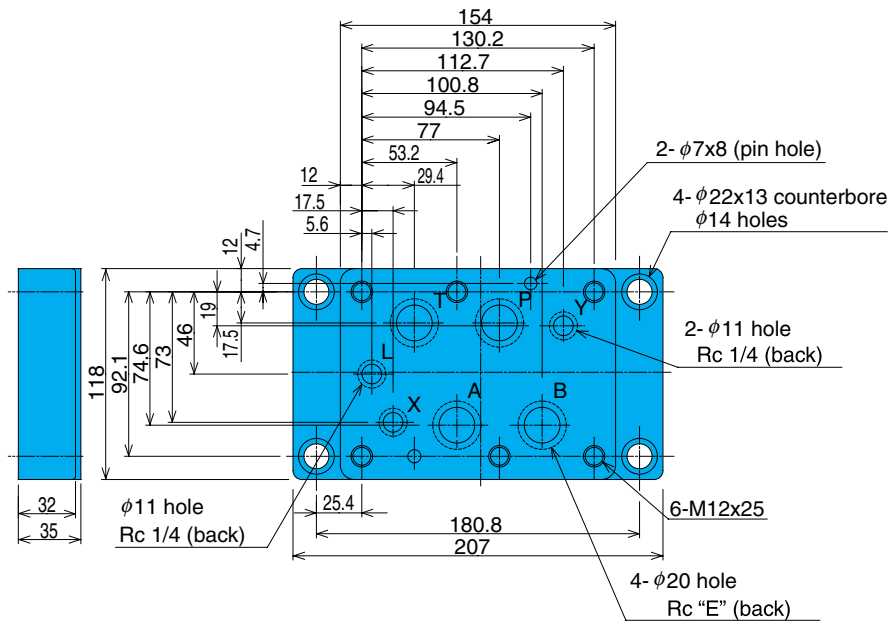
Mounting bolt	Model No.	Maximum Working Pressure MPa(kgf/cm ²)	Recommended Flow Rate ℓ/min	Pipe Outlet Size E	Weight kg
M6	MSA-03-T-10	25{255}	45	3/8	3.8
	MSA-03X-T-10		80	1/2	
M8	MS-03-T-10	25{255}	45	3/8	3.8
	MS-03X-T-10		80	1/2	

04 (nominal diameter)
MDS-04(X)-10



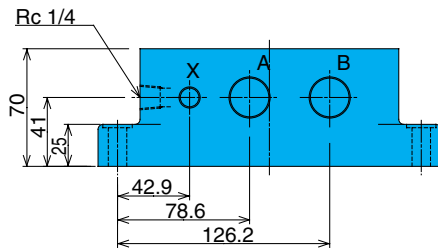
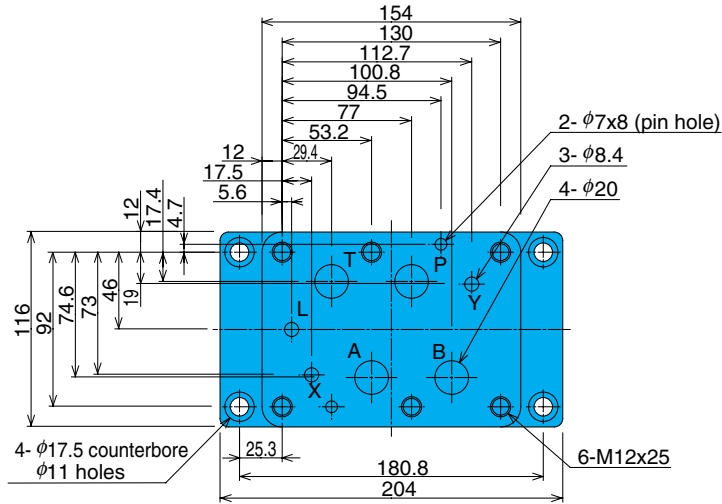
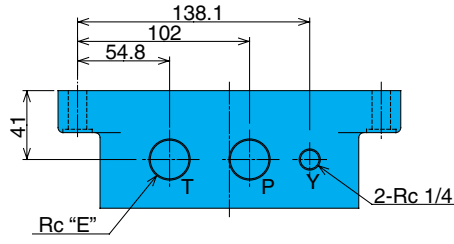
Model No.	Pipe Outlet Size E	Maximum Working Pressure MPa(kgf/cm ²)	Recommended Flow Rate ℓ/min	Weight kg
MDS-04-10	1/2	25{255}	80	4.5
MDS-04X-10	3/4		150	

06 (nominal diameter)
MDS-06(X)-30(for back piping)



Model No.	Pipe Outlet Size E	Maximum Working Pressure MPa(kgf/cm ²)	Recommended Flow Rate ℓ/min	Weight kg
MDS-06-30	3/4	25{255}	150	5.2
MDS-06X-30	1		300	

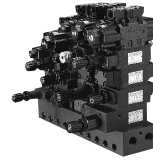
MDS-06(X)-T-10(for back piping)



Model No.	Pipe Outlet Size E	Maximum Working Pressure MPa(kgf/cm ²)	Recommended Flow Rate ℓ/min	Weight kg
MDS-06-T-10	3/4	25{255}	150	9.0
MDS-06X-T-10	1		300	

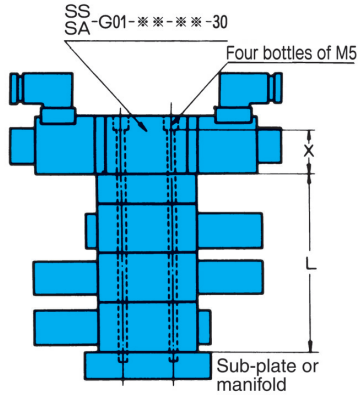


Modular Valves



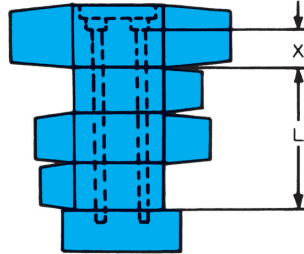
Valve Installation Bolt List

01 (nominal diameter)

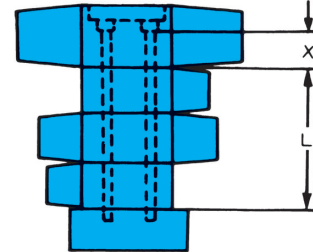


03 (nominal diameter)

SS
SA-G03-***-**-J21



SS
SA-G03-***-**-for -21



Model Number	X
SA-G01-***-**-30	37.5
SS-G01-***-R**-30	

Model Number	X
SS SA-G03-***-R**-J21	60.5

Model Number	X
SS SA-G03-***-R**-21	58

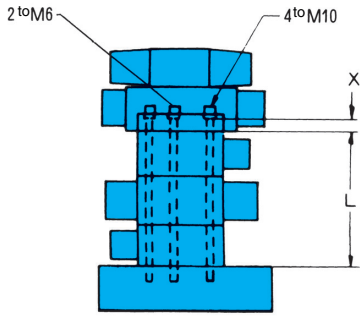
Type	Model Number	Dimension L	Bolt length
Hexagon Socket Head Bolt	OTH-01-70-10	25	70
	85	40	85
	110	65	110
	125	80	125
	150	105	150
	165	120	165
	190	145	190
	205	160	205
Stat Bolt	OTD-01-80-10	25	80
	95	40	95
	120	65	120
	135	80	135
	145	90	145
	160	105	160
	175	120	175
	185	130	185
	200	145	200
	210	155	210
	215	160	215
	225	170	225
	240	185	240
	250	195	250
	265	210	265
275	220	275	

Type	Model Number	Dimension L	Bolt length
Hexagon Socket Head Bolt	OTH-03-125-J30	55	M6 × 125
	-180-	110	M6 × 180
Stat Bolt	OTD-03-135-J30	55	M6 × 135
	-190-	110	M6 × 190
	-245-	165	M6 × 245
	-300-	220	M6 × 300

Type	Model Number	Dimension L	Bolt length
Hexagon Socket Head Bolt	OTH-03-125-30	55	M8 × 125
	-180-	110	M8 × 180
Stat Bolt	OTD-03-135-30	55	M8 × 135
	-190-	110	M8 × 190
	-245-	165	M8 × 245
	-300-	220	M8 × 300

- Note) 1. Model numbers indicate bolt kits for one solenoid valve.
 2. Up to four modular valves can be ganged together.
 3.01 Size
 Modular valves at a height of 40 + 25 = 65 mm are ganged to one level.
 4.2-pressure reducing valves at a height of 90 mm are ganged to two levels.

04 (nominal diameter)

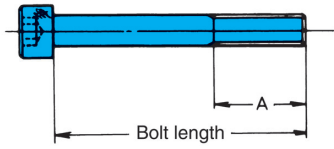


Model Number	X
DSS-G04-***-R-**-21	34
DSA-G04-***-**-21	

Type	Model Number	Dimension L	Bolt Size	Bolt length
Hexagon Socket Head Bolt	OTH-04-120-10	70	M6	115
			M10	120
	-135-	85	M6	130
			M10	135
	-190-	140	M6	185
			M10	190
	-205-	155	M6	200
			M10	205
Flat Bolt	OTD-04-135-10	70	M6	123
			M10	135
	-150-	85	M6	138
			M10	150
	-205-	140	M6	193
			M10	205
	-220-	155	M6	210
			M10	220
	-275-	210	M6	265
			M10	275
	-290-	225	M6	278
			M10	290

- Note) 1.The above model numbers indicate bolt kits for one solenoid valve.
 2.Up to three modular valves can be ganged together.
 3.Bolts for 4 level ganging are available, but the maximum working pressure is limited. For details, consult your agent.

Hexagon socket head bolt



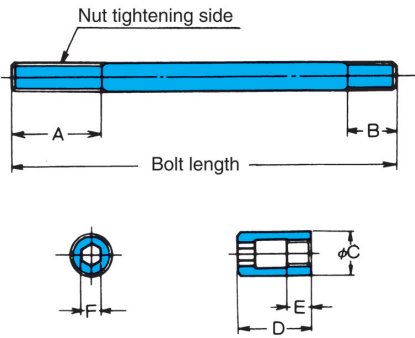
Nominal Diameter	A	Bolt Size
01	15	M5
03	18	M6
03	22	M8
04	18	M6
	26	M10

Dimensions other than bolt length are in accordance with JIS B 1176.

Tightening Torque

Nominal Diameter	Bolt Size	Tightening Torque N·m{kgf·cm}
01	M5	5 to 7{ 51 to 71}
03	M6	10 to 13{102 to 133}
03	M8	20 to 25{205 to 255}
04	M6	10 to 13{102 to 133}
	M10	45 to 55{460 to 560}

Stat Bolts and Nuts



Model No.	A	B	C	D	E	F	Bolt Size
OTD-01-***-10	12	9	8.5	16	11	4	M5
OTD-03-***-J30	20	10	10	18	11.5	5	M6
OTD-03-***-30	25	12.5	13	22	15	6	M8
OTD-04-***-10	20	10	10	18	11.5	5	M6
	25	18	16	23	15	8	M10

Stat bolts and nuts are included. The E dimension is the effective screw depth.

01, 03 Base Block

Features

This block, which allows piping from both sides, is designed for use with combinations of two or more solenoid valves and modular valves.

Understanding Model Numbers

MOB-01X-B3-10

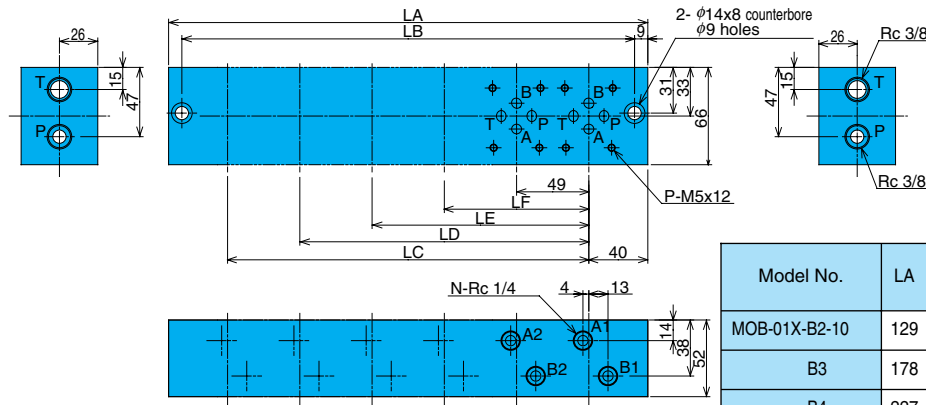
- Design number
- Sequential number
- A, B port piping diameter None: Nominal diameter X: One size larger than nominal diameter Y: Two size larger than nominal diameter
- Nominal diameter (size) 01, 03
- Base block for modular valve

Note) Another series of multi-pump blocks is available for the MBS and MBW Series NACHI PACK. For details, see page L-16.

Installation Dimension Drawings

01 (nominal diameter) bass block

MOB-01X-B*-10



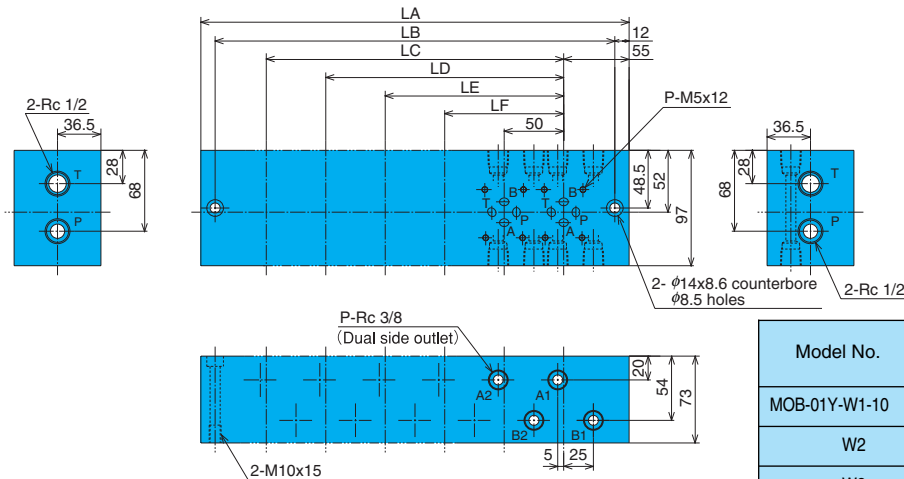
Plug Tightening Torque

Plug Configuration	Tightening Torque N·m{kgf·cm}
TPHA-1/4	25 to 30{255 to 305}
TPHA-3/8	40 to 48{410 to 490}

Model No.	LA	LB	LC	LD	LE	LF	N	P	Weight kg				
MOB-01X-B2-10	129	111	-	-	-	-	4	8	2.8				
B3	178	160					6	12	3.8				
B4	227	209					8	16	4.9				
B5	276	258					10	20	5.9				
B6	325	307					245	196	147	98	12	24	6.9

Model No	Pipe Outlet Size (A, B)	Maximum Working Pressure MPa{kgf/cm ² }	Recommended Flow Rate ℓ/min
MOB-01X-B*-10	1/4	25{255}	20

MOB-01Y-W*-10



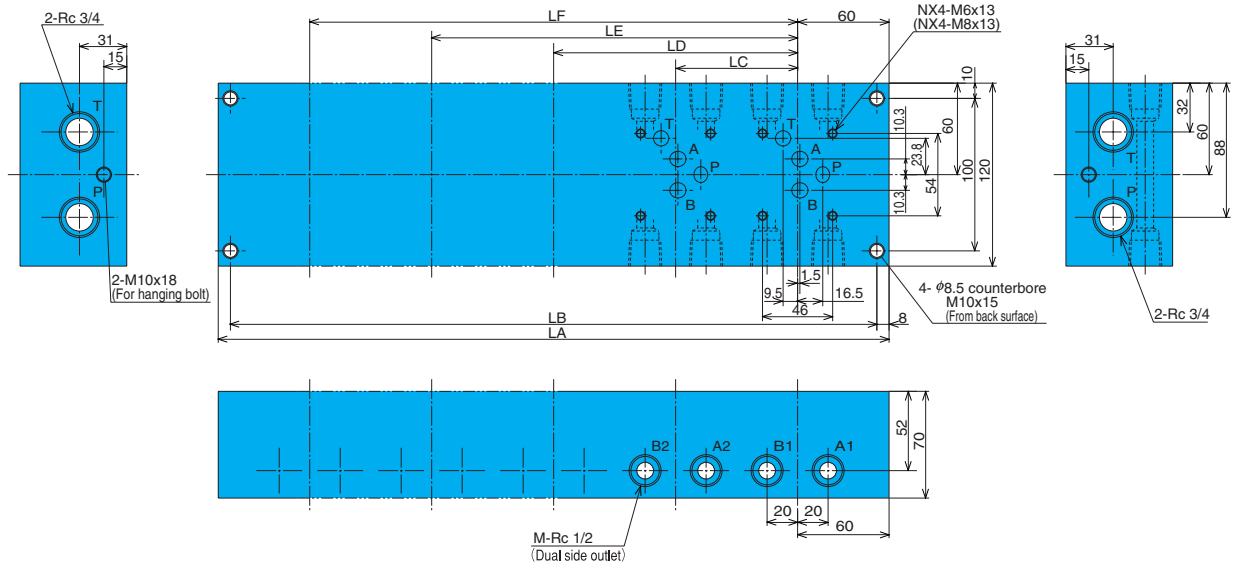
Plug Tightening Torque

Plug Configuration	Tightening Torque N·m{kgf·cm}
TPHA-3/8	40 to 48{410 to 490}
TPHA-1/2	55 to 66{560 to 675}

Model No	Pipe Outlet Size (A, B)	Maximum Working Pressure MPa{kgf/cm ² }	Recommended Flow Rate ℓ/min
MOB-01Y-W*-10	3/8	25{255}	40

Model No.	LA	LB	LC	LD	LE	LF	P	Weight kg
MOB-01Y-W1-10	110	86	-	-	-	-	4	5.1
W2	160	136					8	7.3
W3	210	186					12	9.6
W4	260	236					16	11.8
W5	310	286					20	14.0
W6	360	336	250	200	150	100		

03 (nominal diameter) bass block
 MOB-03X-B*-(J)30



Plug Tightening Torque

Plug Configuration	Tightening Torque N·m{kgf·cm}
TPHA-1/2	55 to 66{560 to 675}
TPHA-3/4	90 to 108{918 to 1100}

Model No	Pipe Outlet Size (A, B)	Maximum Working Pressure MPa{kgf/cm ² }	Recommended Flow Rate ℓ/min
MOB-03X-B*-(J) 30	1/2	25{255}	80

Model No.	Dimensions							Weight kg	
	LA	LB	LC	LD	LE	LF	M		N
MOB-03X-B2-(J) 30	200	184	80	-	-	-	8	2	10.3
B3	280	264	80	160	-	-	12	3	14.3
B4	360	344	80	160	240	-	16	4	18.4
B5	440	424	80	160	240	320	20	5	22.4

Note) Dimensions in parentheses are for model number MOB-03X-B*-(J) 30, which is the model number when using M8 valve mounting bolts.

High-pressure M35 Series

50 to 300 ℓ /min
35MPa

Overview

The High-Pressure M35 Series responds to the needs of high density in a variety of fields by enabling higher density hydraulic systems.

This valve incorporates NACHI original flow control technology and heat treatment, plus precision machining to create high-performance valves with the following features:

- High-pressure 35MPa
- High reliability and compact design

- Press Machinery
Press brakes, punching presses
- Underground Machinery
Shield tunneling machinery, removal systems, etc.
- Construction Machinery
From mini vehicles to 6 to 10-ton vehicles, shovels, etc.
- Environmental Related
Granulators, filter presses, scrap presses
- Testing Equipment
Impulse, durability, performance testers, etc.
(For details see catalog number 9265-3.)

- **M35 Series Modular Valve (O * H)**

By integrating multiple hydraulic devices, this valve can be used when configuring hydraulic circuits even in the high-pressure range. See page D-12 for information about the 04 size.

This series consists of pressure, flow rate, and flow direction control valves.

Maximum Working Pressure : 35MPa{357kgf/cm²}
Maximum Flow Rate : to 300 ℓ /min

- **M35 Series Non-leak Solenoid Valve (SNH)**

A NACHI original structure is used to configure this wet-type shutoff valve that isolates internal leaks. Installation conforms to ISO4401 standards, so it can be used in a wide range of applications in combination with modular valves. For more information, see page E-50.

Maximum Working Pressure : 35MPa{357kgf/cm²}
Maximum Flow Rate : to 100 ℓ /min

- **M35 Series Related Components**

- Pump (See page A-42.)

Rated Pressure : 35MPa{357kgf/cm²}
Capacity : 28 to 40cm³/rev

- High-response proportional flow control valve

Maximum Working Pressure : 31.4MPa{320kgf/cm²}
Maximum Flow Rate : to 350 ℓ /min

- **M35 Series Industry Specific Components**

- Jack Valve

Maximum Working Pressure : 35MPa{357kgf/cm²}
Maximum Flow Rate : to 100 ℓ /min

- Logic Cartridge Mono Block

Maximum Working Pressure : 35MPa{357kgf/cm²}
Maximum Flow Rate : to 7000 ℓ /min

- **M35 Series Industry Specific Components**

- Hydraulic accessories (stop valves, filters, accumulators, hoses, etc.); NACHI-MOOG servo level

Specifications

M35 Series Modular Valve

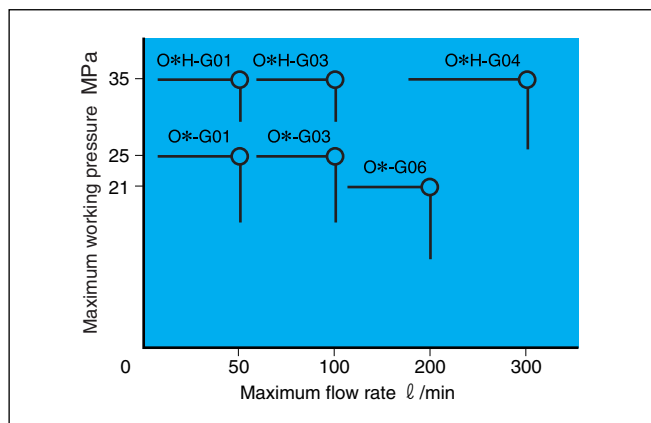
Size	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Flow Rate ℓ /min	Number of Integration Levels
01	35{357}	50	to 3
03		100	
04		300	

Dimensions

Size	Height (mm)	Width (mm)	Remarks
01	40	46	Same dimensions as the M25 Series
03	55	70	
04	70	91	

Note) M8 installation bolts only are used for the 03 size.

Modular Valve Product Series



01 03 Size Specifications

Type	Name	Valve Model Number	Maximum Operating Power	Maximum Flow Rate	Pressure Adjustment Range (Cracking Pressure) MPa{kgf/cm ² }	JIS Symbol
Solenoid Valves	Solenoid Valves	SA-G**.*-30(21)				
		SS-G**.*-30(21)				
Pressure Control Valves	Relief Valves (Balance Type)	ORH-G01-P*-10 -W*-	35MPa {357kgf/cm ² }	G01 40 l/min	3:3.5 to 25MPa(35.7 to 255kgf/cm ²) 5:7 to 35MPa(71.4 to 357kgf/cm ²)	
		ORH-G03-P*-10 -W*-		G03 80 l/min	P: P (→T) port W: AB (→T) port	
	Relief Valves (Direct Type)	ORH-G01-DW*-10 -DA*- -DB*-		G01 20 l/min	3:3.5 to 25MPa(35.7 to 255kgf/cm ²) 5:7 to 35MPa(71.4 to 357kgf/cm ²)	
ORH-G03-DW*-10 -DA*- -DB*-	G03 30 l/min	DW: AB (→T) port DA: A (→T) port DB: B (→T) port				
Reducing Valve	Reducing Valve	OGH-G01-P*-10 -B*-		G01 40 l/min	3:3.5 to 25MPa(35.7 to 255kgf/cm ²)	
		OGH-G03-P*-(B)-10 -B*-		G03 80 l/min	P: P port B: B port	
Flow Regulator Valves	Flow Regulator Valves	OYH-G01-W-Y-10 -A-Y- -B-Y- -W-X- -A-X- -B-X-	35MPa {357kgf/cm ² }	G01 50 l/min	Y: Meter out X: Meter in W: AB port A: A port B: B port	
		OYH-G03-W-Y-10 -A-Y- -B-Y- -W-X- -A-X- -B-X-		G03 100 l/min		
Check Valves	Check Valves	OCH-G01-P*-10 -T*-		G01 50 l/min	1:0.04MPa{0.4kgf/cm ² } 2:0.35MPa{3.6kgf/cm ² } 3:0.5 MPa{5.1kgf/cm ² }	
		OCH-G03-P*-10 -T*-		G03 100 l/min	P: P port T: T port	
Pilot Check Valves	Pilot Check Valves	OPH-G01-W*(F)-10 -A*- -B*-		G01 50 l/min	1:0.2MPa{2.0kgf/cm ² } 2:0.5MPa{5.1kgf/cm ² }	
		OPH-G03-W*(D)-10 -A*- -B*-		G03 100 l/min	W: AB port A: A port B: B port D: Direct type (no small valve, G03 only) F: Decomp type (with small valve, G01 only)	

ORH : Relief valve



OGH : Reducing valve

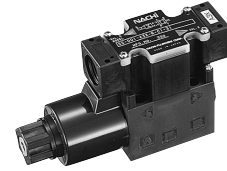


OPH : Pilot check valve



D

Modular Valves



**SS Series (Wiring System: Central Terminal Box)
Wet Type Solenoid Valve**

**100 to 160 ℓ /min
35MPa**

Features

① Very long life

The movable iron core of the wet type solenoid is immersed in oil, which keeps it lubricated and cushions it from impact and vibration, ensuring very long life.

② Low switching noise

The wet-type solenoid valve provides very low core switching noise, for quiet operation.

③ High pressure, large capacity, with minimal pressure loss

Comprehensive fluid reaction force compen-

sation and low pressure compensation construction provide large capacity and low pressure loss.

G01 : 35MPa{357kgf/cm²}100 ℓ /min

G03 : 35MPa{357kgf/cm²}160 ℓ /min

④ Easy connections

A special wiring box provides a COM port and indicator light as standard for simple wiring and maintenance.

⑤ Easy coil replacement

A plug-in type coil enables one-touch coil

replacement.

⑥ Wide-ranging backward compatibility makes it simple to replace previous valve models with this one. Combining this valve with a modular valve contributes to the compact configuration of the overall device.

⑦ Global support (G01 size)

Meets overseas safety standards (CE, UL, and CSA). It can be safely used anywhere in the world. Contact your agent for certified products.

Specifications

Model No.		SS-G01				SS-G03					
		Standard Type		Shockless Type		Standard Type				Shockless Type	
		Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kgf/cm ²)	AC Solenoid Type		DC Solenoid Type (With built-in rectifier)			
Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kgf/cm ²)					Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kgf/cm ²)		
	-A2X-	30		30		40		85		85	
	-H2X-					85					
	-E2X-	80									
	-A3X-										
	-H3X-	100									
	-E3X-										
	-A3Z-	65									
	-H3Z-										
	-E3Z-	50									
	-A4-										
	-H4-	35{357}	50	25{255}	130	35{357}	160	35{357}	130	25{255}	
	-A5-										
	-H5-	100									
	-C2-										
	-C5-	AC Solenoid 65									
	-C9-										
	-C1S-	DC Solenoid 80									
	-C6S-										
	-C1-	50									
	-C6-										
	-C4-	40									
	-C7Y-										
	-C8-	70		25{255}	100	25{255}	85				

Note) The maximum flow rate of each valve depends on the pressure. For details, see pages E-9 and E-10.

		SS-G01			SS-G03		
		AC Solenoid	DC Solenoid		AC Solenoid	DC Solenoid	
			Built-in Rectifier			Built-in Rectifier	
		C*	E*	D*	C*	E*	D*
Maximum Working Pressure	P, A, B ports	35(25)MPa{357(255)kgf/cm ² }(Note1)					
Maximum Allowable Backpressure	T port	21MPa{214kgf/cm ² }			16MPa{163kgf/cm ² }		
Switches/min.	Standard Type	300	120	300	300	120	240
	Shockless Type	—		120	—		120
Standard	Indicator light	R			R		
Option	Shockless	—	F		—	F	
	Surgeless	G	—	G	G	—	G
	With manual push-button	N			N		
	Quick Return	—	Q	—	—	Q	—
Weight (kg)	Double Solenoid	1.8	2.0		4.2	5.5	
	Single Solenoid	1.4	1.5		3.5	4.1	
Operating Environment	Dust Resistance/Water Resistance Rank	JIS C 0920 IP64 (Dust-tight, Splash-proof)					
	Ambient Temperature	- 20 to 50°C					
	Operating Fluid	Temperature Range	- 20 to 70°C				
		Viscosity Range	15 to 300mm ² /s				
	Filtration	25 microns or less					
Mounting bolt	Size × Length	M5 × 45 (Four)			M6 × 70 (Four) (M8 × 70 (Four))		
	Tightening Torque	M5 5 to 7N·m{51 to 71kgf·cm}			M6 10 to 13N·m{102 to 133kgf·cm} (M8 20 to 25N·m{204 to 255kgf·cm})		

Note) 1. Maximum operating pressure depends on the valve type. For details, see page E-1.
 2. For mounting bolts, use 12T or equivalent.
 3. Mounting bolts are not included with the 01 size. Bolts are included with the 03 size.

● Handling

- 1 In order to realize the full benefits of the wet type solenoid valve, configure piping so oil is constantly supplied to the T(R) port. Never use a stopper plug in the T(R) port.
- 2 Ensure that surge pressure in excess of the maximum allowable back pressure does not reach the T port.
- 3 Note that the maximum flow rate is limited when used as a four-way valve, or by blocking ports for use as a two-way valve or one-way valve.
- 4 Always keep the operating fluid clean. Allowable contamination is class NAS12 or less.
- 5 When using petroleum type operating fluid, use JIS K 2213 Class 1 or Class 2, or equivalent.
- 6 For details about using fire-resistant hydraulic fluid, see page D-1 for more information.
- 7 Use this valve only within the allowable voltage range.
- 8 Do not allow the AC solenoid to become charged until you install the coil into the valve.
- 9 In the case of operation symbols A2X, H2X, and E2X, run drain piping from the valve T port.
- 10 Maintaining a switching position under high pressure for a long period can cause

abnormal operation due to hydraulic lock-up. Contact your agent when you need to maintain a switching position for a long period.

- 11 When using a detent type (E2X, 3X, E3Z), use constant energization in order to securely maintain the switching position.

RSS-***-AR*(H)-** ¹⁵ / ₂₃ RIS-***-AR*(H)-** ¹⁵ / ₂₁	SS-G01-AR-R**-31
RSS-***-AQ*(H)-** ¹⁵ / ₂₃ RIS-***-AQ*(H)-** ¹⁵ / ₂₁	SS-G01-A3X-R**-31
RSS-***-F(H)-** ¹⁵ / ₂₃ RIS-***-F(H)-** ¹⁵ / ₂₁	SS-G01-A8X0-R**-31
	SS-G01-A3X-R**-31

- 14 The coil surface temperature increases if this valve is kept continuously energized. Install the valve so there is no chance of it being touched directly by hand.

12 Note that manual pin operating pressure changes in accordance with tank line back pressure.

13 The series described in the table below are available for use as RSS and RIS Series solenoid control relief valves.

- 15 Use the following table for specification when a sub plate is required.

Model No.	Pipe Diameter	Maximum Working Pressure MPa(kgf/cm ²)	Recommended Flow Rate (ℓ /min)	Weight (kg)	Applicable Valve Type
MSA-01X-10	1/4	25{255}	20	1.2	SS-G01-**-R**-31
MSA-01Y-10	3/8		40		
MSA-03-10	3/8		45	2.3	SS-G03-**-R**-J21
MSA-03X-10	1/2		80		
MS-03-30	3/8		45	2.3	SS-G03-**-R**-21
MS-03X-30	1/2		80		

● Solenoid Assembly Specifications

Solenoid Type	Power Supply Type	Voltage (V)	Frequency (Hz)	For SS-G01				For SS-G03					
				Solenoid Coil Type	Drive Current (A)	Holding Current (A)	Holding Power (W)	Allowable Voltage Range (V)	Solenoid Coil Type	Drive Current (A)	Holding Current (A)	Holding Power (W)	Allowable Voltage Range (V)
AC	C1	AC100	50	EDC64-C1	2.2	0.52	25	80 to 110	ECB64-C1	5.4	0.92	36.0	80 to 110
			60		2.0	0.38	22			90 to 120	4.6	0.62	
		AC110	60		2.2	0.46	28	5.0			0.78	42.0	90 to 120
	C115	AC110	50	EDC64-C115	2.0	0.47	25	90 to 120	ECB64-C115	5.0	0.85	36.0	90 to 120
			60		1.8	0.35	22			100 to 130	4.2	0.57	
		AC115	60		2.0	0.42	28	4.6			0.72	42.0	100 to 130
	C2	AC200	50	EDC64-C2	1.1	0.26	25	160 to 220	ECB64-C2	2.7	0.46	36.0	160 to 220
			60		1.0	0.19	22			180 to 240	2.3	0.31	
		AC220	60		1.1	0.23	28	2.5			0.39	42.0	180 to 240
	C230	AC220	50	EDC64-C230	1.0	0.24	25	180 to 240	ECB64-C230	2.5	0.42	36.0	180 to 240
			60		0.91	0.17	22			200 to 260	2.1	0.29	
		AC230	60		1.0	0.21	28	2.3			0.36	42.0	200 to 260
DC with Built-in Rectifier	E1	AC100	50/60	EDC64-E1-1A	0.37		27	90 to 110	ECB64-E1	0.40		34.0	90 to 110
			AC110		0.26					0.33			
	E115	AC115	50/60	EDC64-E115-1A	0.27		27	100 to 125	ECB64-E115	0.34		34.0	100 to 125
			AC200		50/60	EDC64-E2-1A				0.15			
	E230	AC230	50/60	EDC64-E230-1A	0.12		24	200 to 250	ECB64-E230	0.16		30.0	200 to 250
			AC230		50/60	0.13				27			
DC	D1	DC12	—	EDC64-D1-1A	2.2		26	10.8 to 13.2	ECB64-D1	2.6		31.0	10.8 to 13.2
	D2	DC24	—	EDC64-D2-1A	1.1		26	21.6 to 26.4	ECB64-D2	1.5		36.0	21.6 to 26.4

Understanding Model Numbers

SS - G 03 - A 3 X - * R - C2 - J21

Design number
 31: 01 size
 21: 03 size for mounting bolt M8
 J21: 03 size for mounting bolt M6

Power supply

C: AC (50/60Hz) C1=AC100V C115=AC110V C2=AC200V C230=AC220V
 D: DC D1=DC12V D2=DC24V
 E: AC (Built-in rectifier; 50/60Hz)
 E1=AC100V E115=AC115V E2=AC200V E230=AC230V

With indicator light

Auxiliary symbol (Can be combined in alphabetic sequence.)

F: Shockless type (Available with power supply D*, E)
 G: Surgeless type (Available with power supply C*, D*)
 N: With manual push-button
 Q: Quick return type (Available with power supply E*)

Transition Flow Path (Specify for A2X, H2X, E2X, *3*, C7Y only.)

X	Y	Z
Closed	Semi-open	Open

Center position

0	1	2	3	4	5
6	7	8	9	1S	6S

Note 1: P = Pressure port; A and B = Connection port to cylinder, etc.; T(R) = Connection port to tank

Operation Method

A	H	C	E
Spring Offset	Spring Center	Detent	

Nominal diameter
 01 size
 03 size

Mounting method
 G: Cascade mounting

Wet type solenoid operated directional control valve

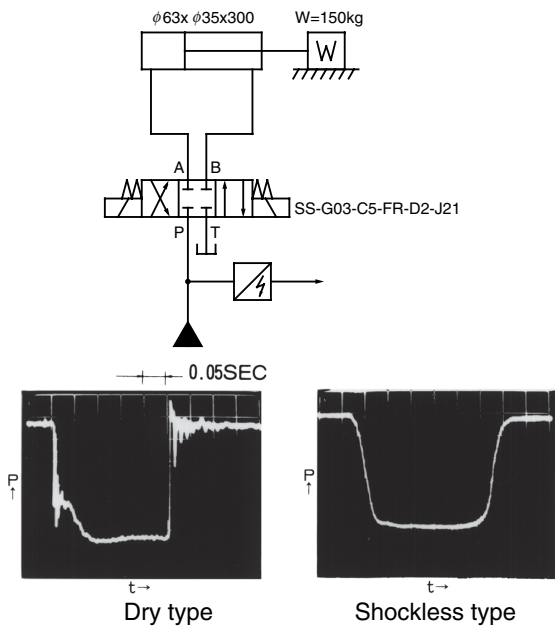


Options

(Auxiliary Symbol Explanations)

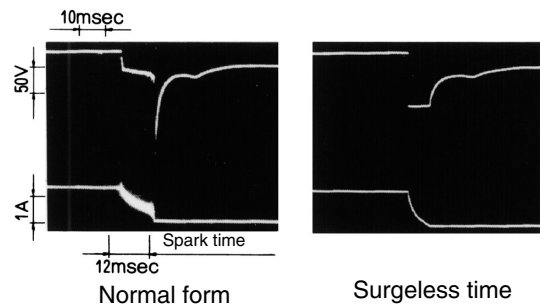
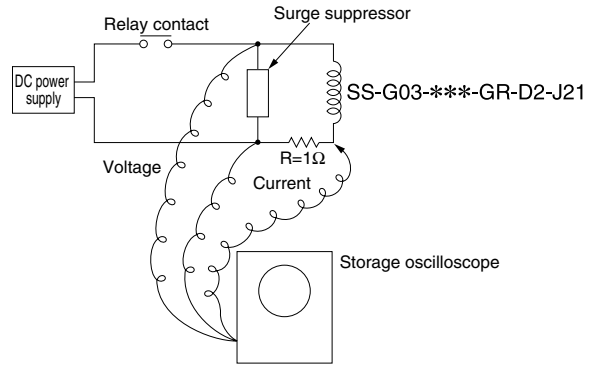
Shockless Type (Auxiliary Symbol: F)

Switching Response Characteristics
The pressure waveforms for each valve in the hydraulic circuit shown below are shown at the bottom of this block.
Opening and closing of a dry type valve generates shock (noise) and pipe vibration due to the sudden drop or rise in pressure. With a shockless solenoid valve, pressure fluctuation when the valve is opened or closed is smoothened, which eliminates shock (noise) and pipe vibration.

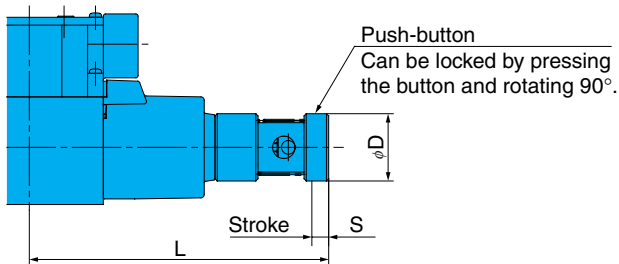


Surgeless type (Auxiliary Symbol: G)

The surge pressure waveforms when the DC solenoid valve power supply is opened and closed by a relay are shown at the bottom of this block. A built-in surge absorber element eliminates sparking and surge pressure.



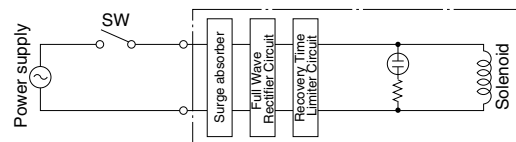
Manual Button Type (Auxiliary Symbol: N)



Model No.		L	S	D
SS-G01	AC Solenoid	133.5	7.5	30
	DC Solenoid	140.5		
SS-G03	AC Solenoid	155.5	9.5	35
	DC Solenoid	173.5		

Quick Return (Auxiliary Symbol: Q)

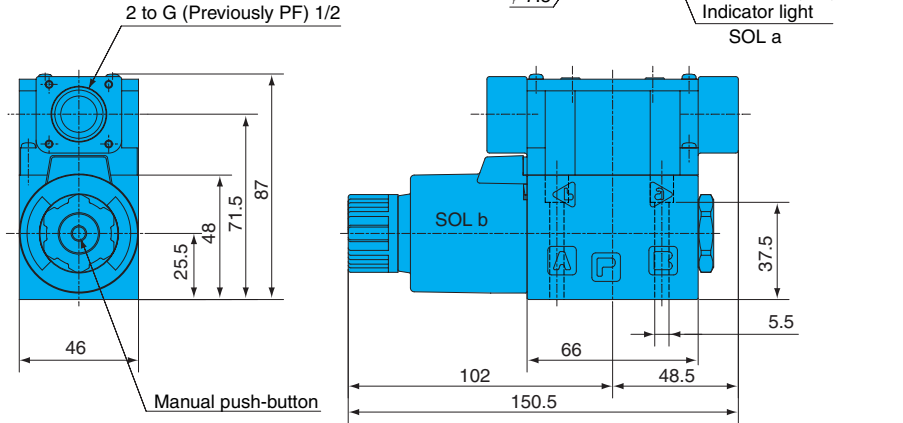
- Handling
 - 1 This type is used in the case of power supply type E* (with built-in rectifier) to shorten the spring return time. This also applies to D*.
 - 2 The quick return mechanism is built in.



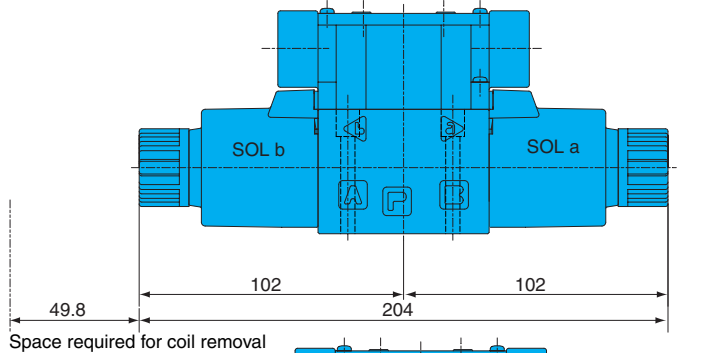
Installation Dimension Drawings

AC Solenoid
 SS-G01-A**-R-C*-31
 SS-G01-H**-R-C*-31

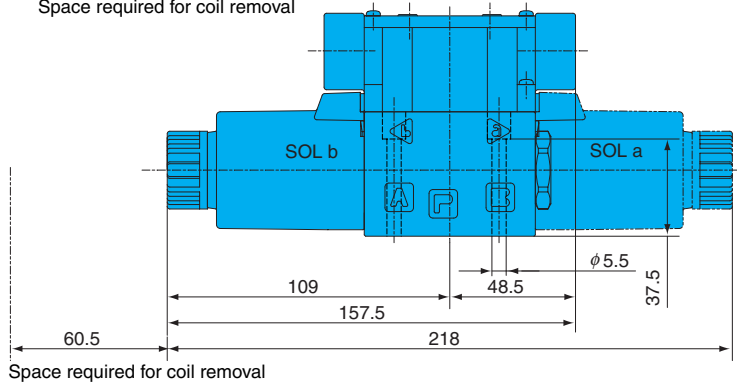
Note)
 SS-G01-H**-R**-31
 The solenoid is on the opposite side of that shown for SOLa in the illustrations shown here.



SS-G01-C **-R-C*-31
 SS-G01-E **-R-C*-31



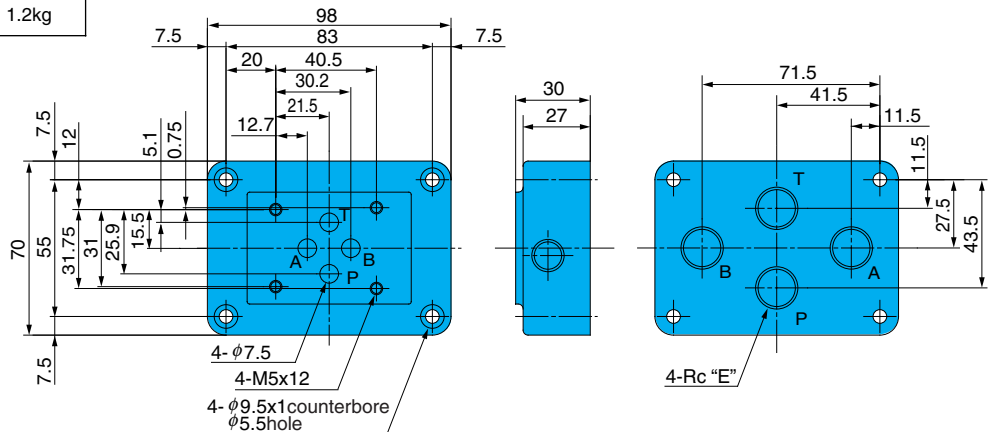
DDC Solenoid and Rectifier
 SS-G01-A **-R-D/E*-31
 SS-G01-H **-R-D/E*-31
 SS-G01-C **-R-D/E*-31
 SS-G01-E **-R-D/E*-31



For sub plate SS-G01

Model No.	E	Weight
MSA-01X-10	1/4	1.2kg
MSA-01Y-10	3/8	1.2kg

Gasket Surface Dimensions
 (ISO 4401-03-02-0-94
 (JIS B 8355 D-03-02-0-94)



Installation Dimension Drawings

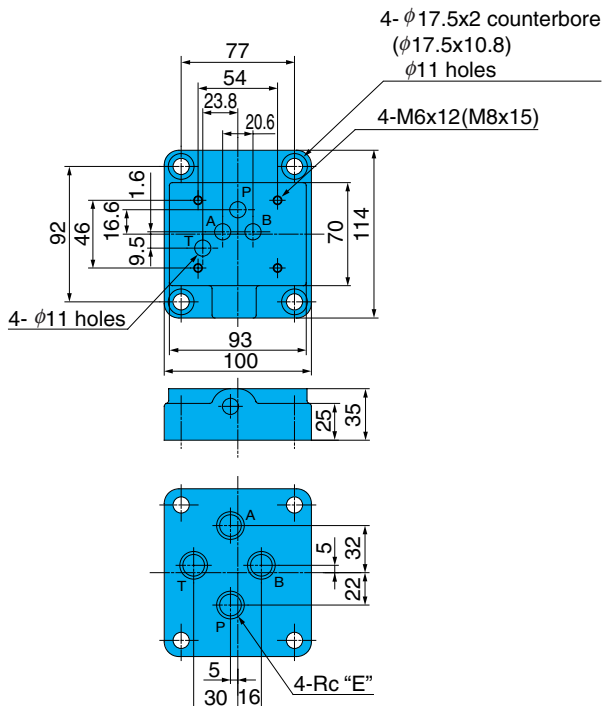
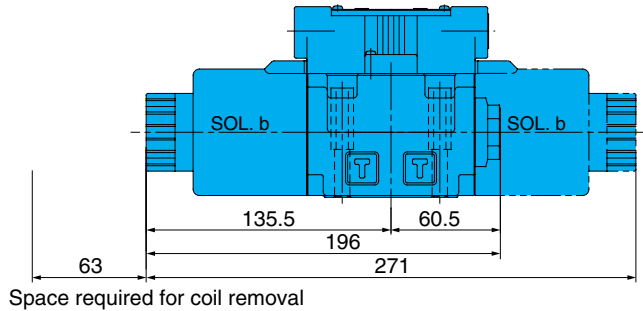
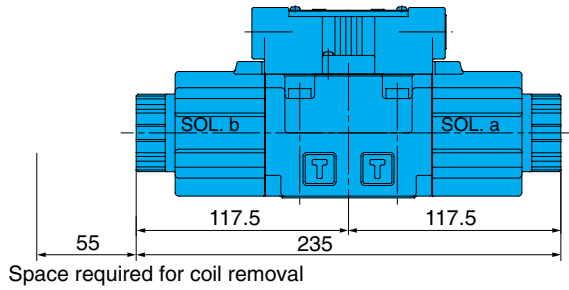
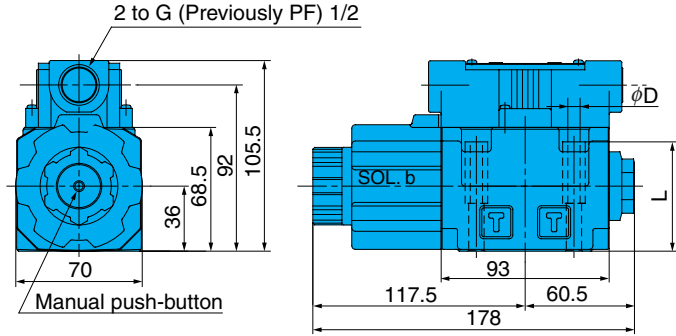
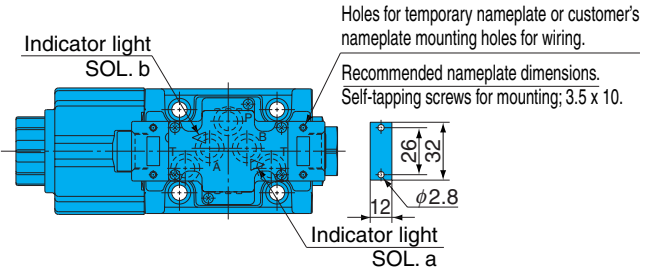
AC Solenoid
 SS-G03-A**-R-C*-J21
 SS-G03-H**-R-C*-J21

Note)
 SS-G03-H**-R**-J21
 The solenoid is on the opposite side of that shown for SOLa in the illustrations shown here.

	SS-G03**-R**-J21	SS-G03**-R**-J21
φD	φ6.8	φ8.5
L	60.5	58

SS-G03-C**-R-C*-J21
 SS-G03-E**-R-C*-J21

DC Solenoid and Rectifier
 SS-G03-A **-R-D*/E*-J21
 SS-G03-H **-R-D*/E*-J21
 SS-G03-C **-R-D*/E*-J21
 SS-G03-E **-R-D*/E*-J21

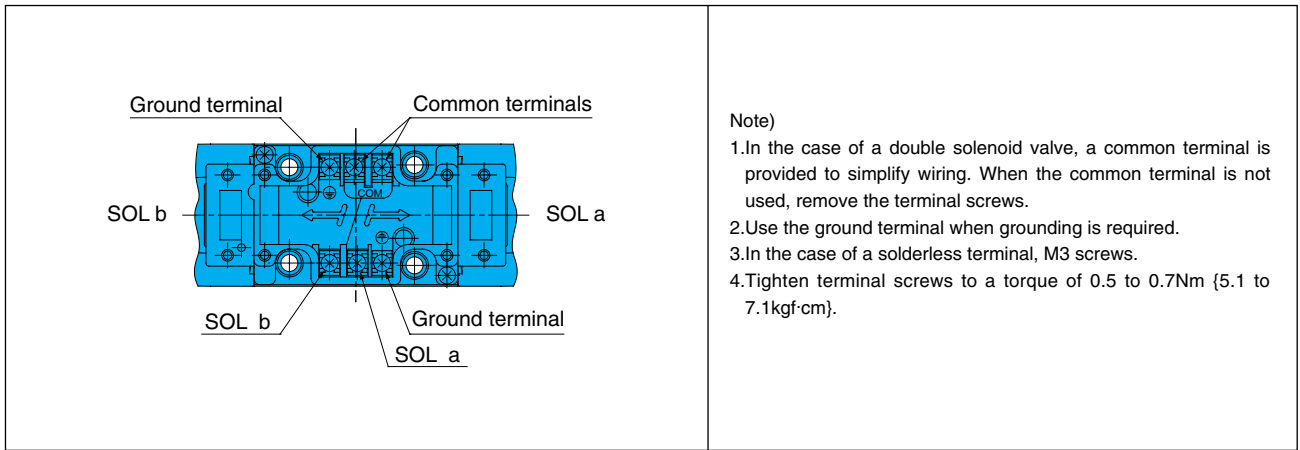


For sub plate SS-G03

Mounting bolt	Model No.	E	Weight
M6	MSA-03-10	3/8	2.3kg
	MSA-03X-10	1/2	
M8	MS-03-30	3/8	
	MS-03X-30	1/2	

M6 gasket surface dimensions
 (ISO 4401-05-04-0-94
 JIS B 8355 D-05-04-0-94)

Wiring Diagram



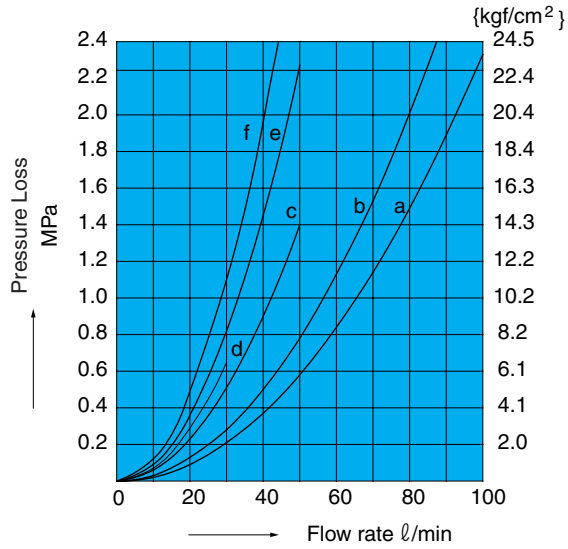
Electrical Circuit Diagram

Type	Model No.	Electrical Circuit
AC Solenoid	SS-G01-***-R-C*- 31 G03 J21	
AC Solenoid Surgeless Type	SS-G01-***-GR-C*- 31 G03 J21	
Built-in Rectifier	SS-G01-***-R-E*- 31 G03 J21	
DC Solenoid	SS-G01-***-R-D*- 31 G03 J21	
DC Solenoid Surgeless Type	SS-G01-***-GR-D*- 31 G03 J21	
Built-in Rectifier Quick Return Type	SS-G01-***-QR-E*- 31 G03 J21	See page E-4 for more information.

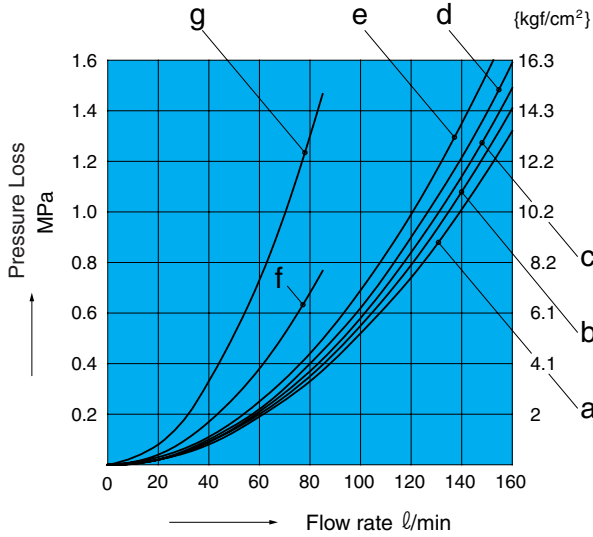
Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

Pressure Loss Characteristics



Pump Type	Flow Path	P→A	P→B	A→T	B→T	P→T
SS-G01	A2X, H2X, E2X	d	d	—	—	—
	A3X, H3X	b	b	b	b	—
	E3X	b	b	b	b	—
	A3Z, H3Z, E3Z	a	a	a	a	—
	A4, H4, C4	a	a	a	a	a
	A5, H5, C5, C6S	b	b	b	b	—
	C1, C1S	b	b	a	b	—
	C2	a	b	b	b	—
	C6	b	b	a	a	—
	C7Y	f	f	e	e	c
	C8	a	f	b	e	c
C9	a	a	b	b	—	



Pump Type	Flow Path	P→A	P→B	A→T	B→T	P→T
SS-G03	A2X, H2X, E2X	e	e	—	—	—
	A5	—	c	c	—	—
	H5	c	—	—	c	—
	A3X, H3X, E3X	c	c	d	d	—
	A3Z, H3Z	a	a	d	d	—
	E3Z	b	b	a	a	—
	C1	c	c	a	c	—
	C2	a	c	c	c	—
	A4, H4, C4	a	a	a	a	a
	C5, C1S, C6S	c	c	c	c	—
	C6	c	c	a	a	—
	C7Y	g	g	g	g	f
	C8	a	g	a	g	f
C9	a	a	c	c	—	

Switching Response Time

Model No.	Response Time (sec)		Measurement Conditions
	Solenoid ON	Spring Return	
SS-G01-**-R-C*-31	0.02 to 0.03	0.02 to 0.03	14MPa{143kgf/cm ² } 30 l /min
SS-G01-**-(G)R-D*-31	0.03 to 0.04	0.02 to 0.04	
SS-G01-**-R-E*-31	0.03 to 0.04	0.07 to 0.10	
SS-G01-**-F(G)R-D*-31	0.07 to 0.10	0.04 to 0.07	
SS-G01-**-FR-E*-31	0.07 to 0.10	0.10 to 0.15	
SS-G03-**-R-C*-J21	0.02 to 0.03	0.02 to 0.03	14MPa{143kgf/cm ² } 70 l /min
SS-G03-**-(G)R-D*-J21	0.06 to 0.09	0.03 to 0.05	
SS-G03-**-R-E*-J21	0.07 to 0.10	0.10 to 0.15	
SS-G03-**-F(G)R-D*-J21	0.13 to 0.15	0.08 to 0.15	
SS-G03-**-FR-E*-J21	0.10 to 0.15	0.15 to 0.20	

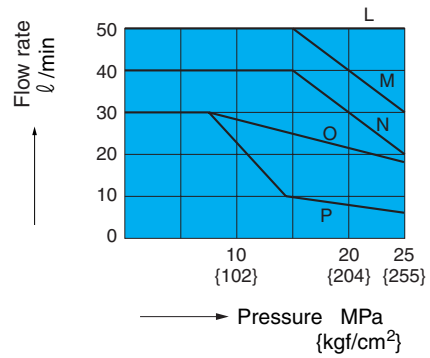
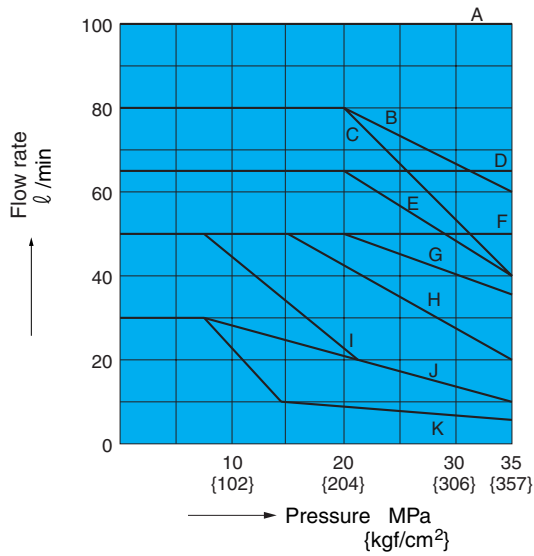
- Note) 1.The switching response time changes slightly with operating conditions (pressure, flow rate, viscosity, etc.)
 2.In the case of power supply type E* (with built-in rectifier), the spring return time using Quick Return (option symbol: Q) is the same as D*.

Pressure – Flow Volume Allowable Value

Size	Standard Form, with AC, DC solenoid		
	SS/SA-G01-**-R**-31		
Operation Example Operation Symbol			
A2X, H2X	–	K	K
E2X	–	J	J
A3X, H3X	B	K	K
E3X	A	J	J
A3Z, H3Z	D	D	D
E3Z	D	D	D
A5	A	–	I
H5	A	I	–
C1, C6	Note1) C(E)	I	I
C1S, C5, C6S	A	I	I
C2, C9	A	K	K
A4	F	F	F
H4	F	F	F
C4	F	F	F
C7Y, C8	Note2) G(H)	K	K

Size	Shockless Type, with DC solenoid		
	SS/SA-G01-**-FR**-31		
Operation Example Operation Symbol			
A2X, H2X	–	P	P
E2X	–	O	O
A3X, H3X	L	P	P
E3X	L	O	O
A3Z, H3Z	L	L	L
E3Z	L	L	L
A5	L	–	P
H5	L	P	–
C1, C6	M	P	P
C1S, C2, C5, C6S, C9	L	P	P
A4, H4	L	L	L
C4	L	L	L
C7Y, C8	N	P	P

Note) 1. Letter in parentheses is for AC solenoid.
 2. Letter in parentheses is for solenoid with built-in rectifier (E*), but without Quick Return, and for DC solenoid (D*) with surge voltage absorbing diode on the electrical circuit.





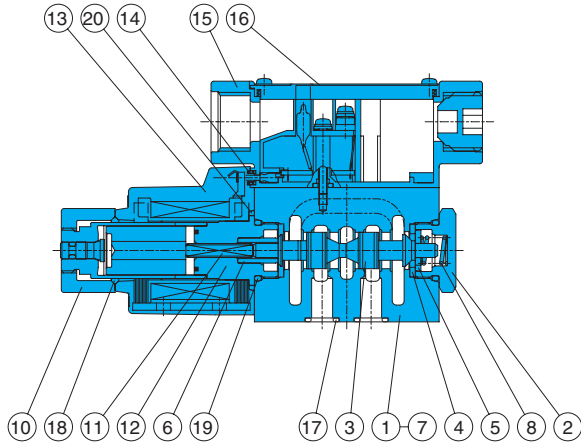
Pressure – Flow Volume Allowable Value

Model No.	Standard Form, with AC Solenoid			Standard Form, with DC Solenoid		
	SS-G03-**-R-C*-J21			SS-G03-**-R-**-J21		
Operation Example						
Operation Symbol						
A2X	—	F	E	—	E	F
H2X	—	E	F	—	F	E
E2X	—	C	C	—	C	C
A3X	A	E	E	A	D	F
H3X	A	E	E	A	F	D
A3Z	A	A	C	A	C	C
H3Z	A	C	A	A	C	C
E3X, E3Z	A	C	C	A	C	C
A5	A	—	D	A	—	E
H5	A	D	—	A	E	—
C1, C1S, C5, C6, C6S	A	D	D	A	E	E
C2	A	G	D	A	G	E
A4, H4, C4	A	A	A	A	A	A
C9	A	G	G	A	G	G
C7Y, C8	B	B	B	Note1) B(H)	B(H)	B(H)
Model No.	Shockless Type, with DC solenoid					
	SS-G03-**-FR-**-J21					
Operation Example						
Operation Symbol						
A2X	—	E	F			
H2X	—	F	E			
E2X	—	C	C			
A3X	A	D	F			
H3X	A	F	D			
A3Z	A	C	C			
H3Z	A	C	C			
E3X, E3Z	A	C	C			
A5	A	—	E			
H5	A	E	—			
C1, C1S, C5, C6, C6S	A	E	E			
C2	A	G	E			
A4, H4, C4	A	A	A			
C9	A	G	G			
C7Y, C8	Note1) B(H)	B(H)	B(H)			

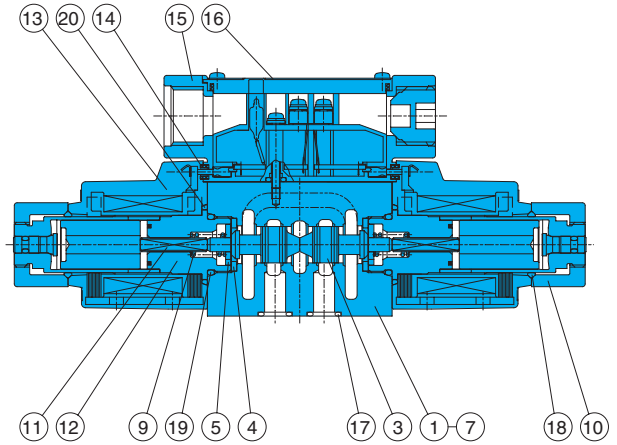
Note) 1. Letter in parentheses is for solenoid with built-in rectifier (E*), but without Quick Return, and for DC solenoid (D*) with surge voltage absorbing diode on the electrical circuit.
 2. There is no shockless type for the AC solenoid (C*), so use a solenoid with built-in rectifier (E*) when shockless operation is required with an AC power supply.
 3. The maximum flow rate is the allowable value of each port.

Cross-sectional Drawing

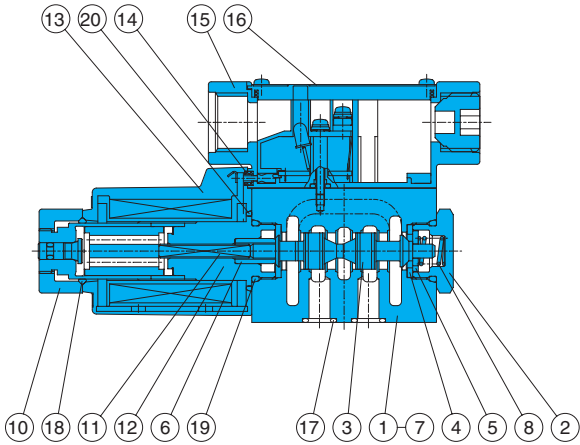
SS-G01-A**-R-C*-31



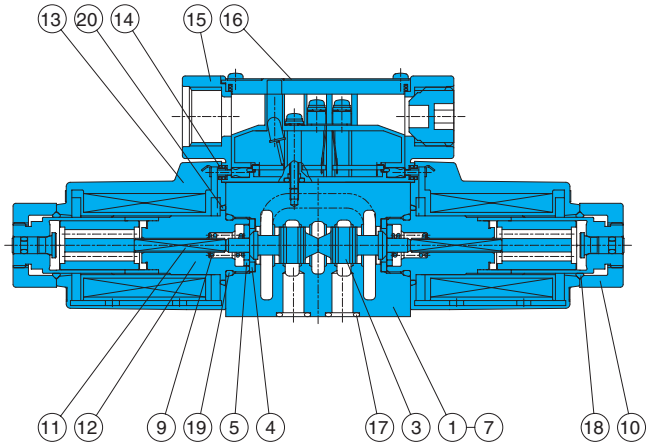
SS-G01-C**-R-C*-31



SS-G01-A**-R-D/E*-31



SS-G01-C**-R-D/E*-31



List of Sealing Parts

Part No.	Part Name	Part Number	Q'ty	
			Single Solenoid	Double Solenoid
17	O-ring	AS568-012(Hs90)	4	4
18	O-ring	1A-P20	1	2
19	O-ring	1B-P18	2	2
20	O-ring	S-25	1	2

Note) 1A and 1B are JIS Standard B 2401, while AS568 is SAE standard.

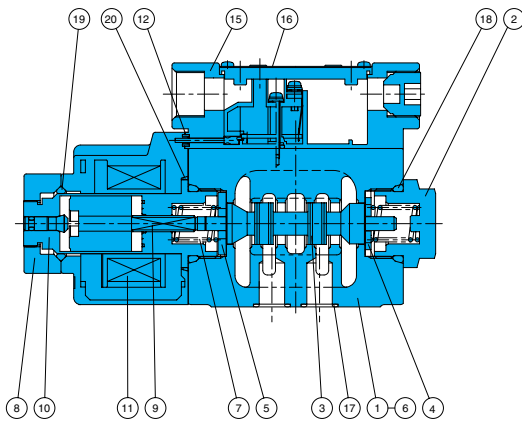
Seal Kit Number

Single Solenoid	Double Solenoid
EDCS-A	EDCS-C

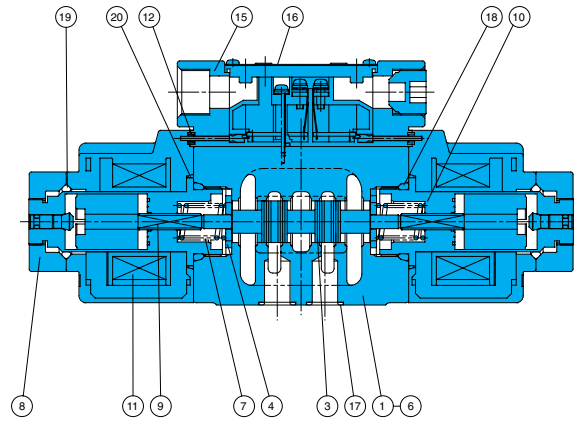
Part No.	Part Name	Part No.	Part Name
1	Body	11	Rod
2	Plug	12	Solenoid guide
3	Spool	13	Solenoid coil
4	Retainer A	14	Packing
5	Retainer B	15	Terminal box kit
6	Retainer C	16	Nameplate
7	Spacer	17	O-ring
8	Spring A	18	O-ring
9	Spring C	19	O-ring
10	Nut	20	O-ring

Cross-sectional Drawing

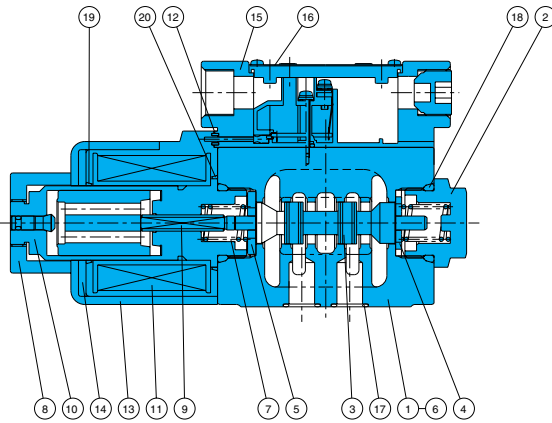
SS-G03-A**-R-C*-J21



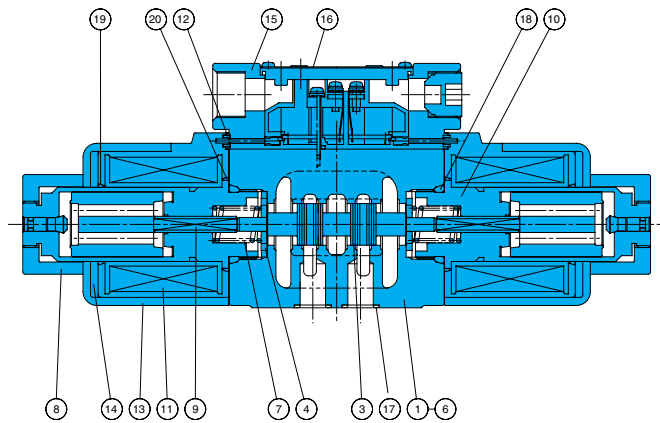
SS-G03-C**-R-C*-J21



SS-G03-A**-R-D/E*-J21



SS-G03-C**-R-D/E*-J21



List of Sealing Parts

Part No.	Part Name	Type/Part Number		Q'ty	
		AC SOL.	DC SOL.	Single Solenoid	Double Solenoid
17	O-ring	AS568-014(Hs90)		5	5
18	O-ring	1B-P28		2	2
19	O-ring	1A-P26	AS568-026	1	2
20	O-ring	AS568-029		2	2

Note) 1A and 1B** indicate JIS Standard B 2401-1A/1B**.

Seal Kit Number

AC SOL.		DC SOL.	
Single Solenoid	Double Solenoid	Single Solenoid	Double Solenoid
ECBS-AA	ECBS-CA	ECBS-AD	ECBS-CD

Part No.	Part Name	Part No.	Part Name
1	Body	14	Coil yoke
2	Plug	15	Terminal box kit
3	Spool	16	Nameplate
4	Retainer	17	O-ring
5	Retainer B	18	O-ring
6	Spacer	19	O-ring
7	Spring	20	O-ring
8	Nut		
9	Rod		
10	Solenoid guide		
11	Solenoid coil		
12	Packing B		
13	Coil case		



SA Series (Wiring System: DIN Connector Type) Wet Type Solenoid Valve

100 to 160 ℓ /min
35MPa

Features

- ① Very long life
The movable iron core of the wet type solenoid is immersed in oil, which keeps it lubricated and cushions it from impact and vibration, ensuring very long life.
- ② Low switching noise
The wet-type solenoid valve provides very low core switching noise, for quiet operation.
- ③ Shockless
A switching speed adjustment mechanism enables direct, shockless operation (Option F).
- ④ No surge voltage
Sparking and surge voltage during solenoid switching is canceled for stable switching (Option G).
- ⑤ Easy coil replacement
A DIN connector type coil enables one-touch coil replacement.
- ⑥ Wide-ranging backward compatibility makes it simple to replace previous valve models with this one. Combining this valve with a modular valve contributes to the compact configuration of the overall device.
- ⑦ Global support (G01 size)
Meets overseas safety standards (CE, UL, and CSA). It can be safely used anywhere in the world. Contact your agent for certified products.

Specifications

Model No.		SA-G01				SA-G03								
		Standard Type		Shockless Type		Standard Type				Shockless Type				
						AC Solenoid Type		DC Solenoid Type (With built-in rectifier)						
JIS Symbol	Operation Symbol	Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kgf/cm ²)			
	-A2X-	30	35{357}	30	25{255}	40	35{357}	85	35{357}	85	25{255}			
	-H2X-													
	-E2X-					85								
	-A3X-	80		50		40		85		130		160	130	
	-H3X-													
	-E3X-													
	-A3Z-	65		50		40		85		130		160	130	
	-H3Z-													
	-E3Z-													
	--A4-	50		50		40		85		130		160	130	
	-H4-													
	-A5-			100		50		40		85		130	160	130
	-H5-													
	-C2-	AC Solenoid 65 DC Solenoid 80				50		40		85		130	160	130
	-C5-													
	-C9-													
	-C1S-													
	-C6S-	50	50	40	85	130	160	130						
	-C1-													
	-C6-													
	-C4-	50	50	40	85	130	160	130						
	-C7Y-													
	-C8-	70	25{255}	100	25{255}	85								

Note) The maximum flow rate of each valve depends on the pressure. For details, see pages E-21 and E-22.

		SA-G01			SA-G03			
		AC Solenoid	DC Solenoid		AC Solenoid	DC Solenoid		
			Built-in Rectifier			Built-in Rectifier		
		C*	E*	D*	C*	E*	D*	
Maximum Working Pressure	P, A, B ports	35(25)MPa{357(255)kgf/cm ² } (Note 1)						
Maximum Allowable Backpressure	T port	21MPa{214kgf/cm ² }			16MPa{163kgf/cm ² }			
Switches/min.	Standard Type	300	120	300	240	120	240	
	Shockless Type	—		120	—		120	
Option	Indicator light	R			R			
	Shockless	—	F		—	F		
	Surgeless	G	—	G	G	—	G	
	G Screw Connector	J	—	J	J	—	J	
	With manual push-button	N			N			
	Quick Return	—	Q	—	—	Q	—	
Weight (kg)	Double Solenoid	1.8	2.0		4.2	5.5		
	Single Solenoid	1.4	1.5		3.5	4.1		
Operating Environment	Dust Resistance/Water Resistance Rank	JIS C 0920 IP65 (Dust-tight, Waterjet-proof) (Note 2)						
	Ambient Temperature	- 20 to 50°C						
	Operating Fluid	Temperature Range	- 20 to 70°C					
		Viscosity Range	15 to 300mm ² /s					
		Filtration	25 microns or less					
Mounting bolt	Size × Length	M5 × 45 (Four)			M6 × 70 (Four) (M8 × 70 (Four))			
	Tightening Torque	M5 5 to 7N·m{51 to 71kgf·cm}			M6 10 to 13N·m{102 to 133kgf·cm} (M8 20 to 25N·m{204 to 255kgf·cm})			

- Note) 1. Maximum operating pressure depends on the valve type. For details, see page E-13.
 2. The power supply type for E* is IP64 (dust-tight, splash-proof).
 3. For mounting bolts, use 12T or equivalent.
 4. Mounting bolts are not included with the 01 size. Bolts are included with the 03 size.

● Handling

- 1 In order to realize the full benefits of the wet type solenoid valve, configure piping so oil is constantly supplied to the T(R) port. Never use a stopper plug in the T(R) port.
- 2 Ensure that surge pressure in excess of the maximum allowable back pressure does not reach the T port.
- 3 Note that the maximum flow rate is limited when used as a four-way valve, or by blocking ports for use as a two-way valve or one-way valve.
- 4 Always keep the operating fluid clean. Allowable contamination is class NAS12 or less.
- 5 When using petroleum type operating fluid, use JIS K 2213 Class 1 or Class 2, or equivalent.
- 6 For details about using fire-resistant hydraulic fluid, see page D-1 for more information.
- 7 Use this valve only within the allowable voltage range.
- 8 Do not allow the AC solenoid to become charged until you install the coil into the valve.
- 9 In the case of operation symbols A2X, H2X, and E2X, run drain piping from the valve T port.

- 10 Maintaining a switching position under high pressure for a long period can cause abnormal operation due to hydraulic lock-up. Contact your agent when you need to maintain a switching position for a long period.
- 11 When using a detent type (E2X, 3X, E3Z), use constant energization in order to securely maintain the switching position.

- 12 Note that manual pin operating pressure changes in accordance with tank line back pressure.
- 13 The series described in the table below are available for use as the RSA Series solenoid control relief valve.

RSA-***-AR ⁺ -(H)-** ₁₅ ₂₃	SA-G01-AR-**-31
RSA-***-AQ ⁺ -(H)-** ₁₅ ₂₃	SA-G01-A3X-**-31
RSA-***-F(H)-** ₁₅ ₂₃	SA-G01-A8X0-**-31

- 14 The coil surface temperature increases if this valve is kept continuously energized. Install the valve so there is no chance of it being touched directly by hand.

- 15 Use the following table for specification when a sub plate is required.

Model No.	Pipe Diameter	Maximum Working Pressure MPa{kgf/cm ² }	Recommended Flow Rate (ℓ/min)	Weight (kg)	Applicable Valve Type
MSA-01X-10	1/4	25{255}	20	1.2	SA-G01-***-**-31
MSA-01Y-10	3/8		30		
MSA-03-10	3/8		45	2.3	SA-G03-***-**-J21
MSA-03X-10	1/2		80		
MS-03-30	3/8		45	2.3	SA-G03-***-**-21
MS-03X-30	1/2		80		

● Solenoid Assembly Specifications

Solenoid Type	Power Supply Type	Voltage (V)	Frequency (Hz)	For SA-G01				For SA-G03					
				Solenoid Coil Type	Drive Current (A)	Holding Current (A)	Holding Power (W)	Allowable Voltage Range (V)	Solenoid Coil Type	Drive Current (A)	Holding Current (A)	Holding Power (W)	Allowable Voltage Range (V)
AC	C1	AC100	50	EAC64-C1	2.2	0.52	25	80 to 110	EBB64-C1	5.4	0.92	36.0	80 to 110
			60		2.0	0.38	22			4.6	0.62	34.0	
		AC110	60		2.2	0.46	28	90 to 120		5.0	0.78	42.0	90 to 120
	C115	AC110	50	EAC64-C115	2.0	0.47	25	90 to 120	EBB64-C115	5.0	0.85	36.0	90 to 120
			60		1.8	0.35	22	100 to 130		4.2	0.57	34.0	
		AC115	60		2.0	0.42	28			4.6	0.72	42.0	100 to 130
	C2	AC200	50	EAC64-C2	1.1	0.26	25	160 to 220	EBB64-C2	2.7	0.46	36.0	160 to 220
			60		1.0	0.19	22	180 to 240		2.3	0.31	34.0	
		AC220	60		1.1	0.23	28			2.5	0.39	42.0	180 to 240
	C230	AC220	50	EAC64-C230	1.0	0.24	25	180 to 240	EBB64-C230	2.5	0.42	36.0	180 to 240
			60		0.91	0.17	22	200 to 260		2.1	0.29	34.0	
		AC230	60		1.0	0.21	28			2.3	0.36	42.0	200 to 260
DC with Built-in Rectifier	E1	AC100	50/60	EAC64-E1-1A	0.31		27	90 to 110	EBB64-E1	0.40		34.0	90 to 110
	E115	AC110	50/60	EAC64-E115-1A	0.26		25	100 to 125	EBB64-E115	0.33		31.0	100 to 125
		AC115			0.27		27			0.34		34.0	
	E2	AC200	50/60	EAC64-E2-1A	0.15		26	180 to 220	EBB64-E2	0.22		37.0	180 to 220
	E230	AC220	50/60	EAC64-E230-1A	0.12		24	200 to 250	EBB64-E230	0.16		30.0	200 to 250
AC230		0.13			27	0.17				33.0			
DC	D1	DC12	—	EAC64-D1-1A	2.2		26	10.8 to 13.2	EBB64-D1	2.6		31.0	10.8 to 13.2
	D2	DC24	—	EAC64-D2-1A	1.1		26	21.6 to 26.4	EBB64-D2	1.5		36.0	21.6 to 26.4

Understanding Model Numbers

SA - G 01 - A 3 X - * * - C2 - 31

Design number
 31: 01 size
 21: 03 size for mounting bolt M8
 J21: 03 size for mounting bolt M6

Power supply
 C: AC (50/60Hz) C1=AC100V C115=AC110V C2=AC200V C230=AC220V
 D: DC D1=DC12V D2=DC24V
 E: AC (Built-in rectifier; 50/60Hz)
 E1=AC100V E115=AC115V E2=AC200V E230=AC230V

Auxiliary symbol (Can be combined in alphabetic sequence.)
 F : Shockless type (Available with power supply D*, E)
 GR: Surgeless type with indicator (Available with power supply C*, D*)
 J : G screw conversion adapter (For power supply C*, D*)
 N : With manual push-button
 Q : Quick return type (Available with power supply E*)
 R : With indicator light

Transition Flow Path (Specify for A2X, H2X, E2X, *3*, C7Y only.)

X	Y	Z
Closed	Semi-open	Open

Center position

0	1	2	3	4	5
6	7	8	9	1S	6S

Note 1: P=Pressure port; A and B=Connection port to cylinder, etc.; T(R)=Connection port to tank

Operation Method

A	H	C	E
Spring Offset	Spring Center	Spring Center	Detent

Nominal diameter
 01 size
 03 size

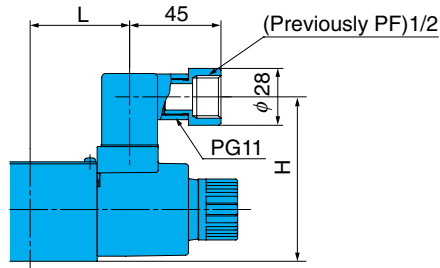
Mounting method
 G: Cascade mounting

Wet type solenoid operated directional control valve with DIN connector

Options

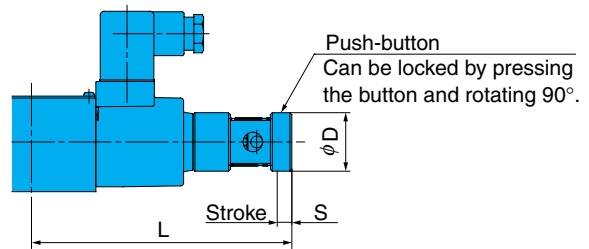
(Auxiliary Symbol Explanations)

G Screw Adapter (Auxiliary Symbol: J)



Model No.	L	H
SA-G01	49	81
SA-G03	60.5	100.5

With manual push-button (Auxiliary Symbol: N)

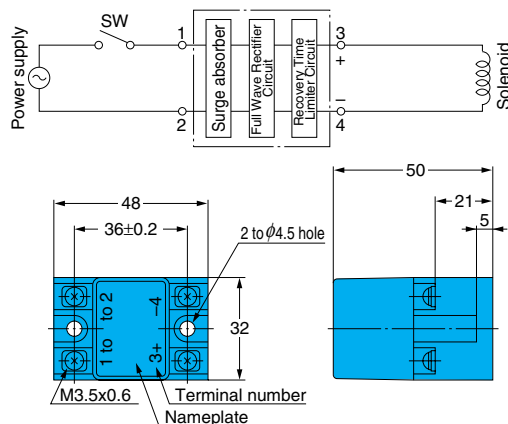


Model No.		L	S	D
SA-G01	AC Solenoid	133.5	7.5	30
	DC Solenoid	140.5		
SA-G03	AC Solenoid	155.5	9.5	35
	DC Solenoid	173.5		

Quick Return Type (Auxiliary Symbol: Q)

● Handling

- 1 This type is used in the case of power supply type E* (with built-in rectifier) to shorten the spring return time. This also applies to D*.
- 2 The Quick Return device is not built in. Mount to the electrical box, etc.
- 3 Even when power supply type E* is equipped with a Quick Return mechanism, response is not fast. (Replace the DIN connector with EA41-1A or EA41-R*-1C, without changing the coil.)
- 4 When multiple Quick Return devices are used, do not wire COM to the output side (pin number 3 and 4 side).



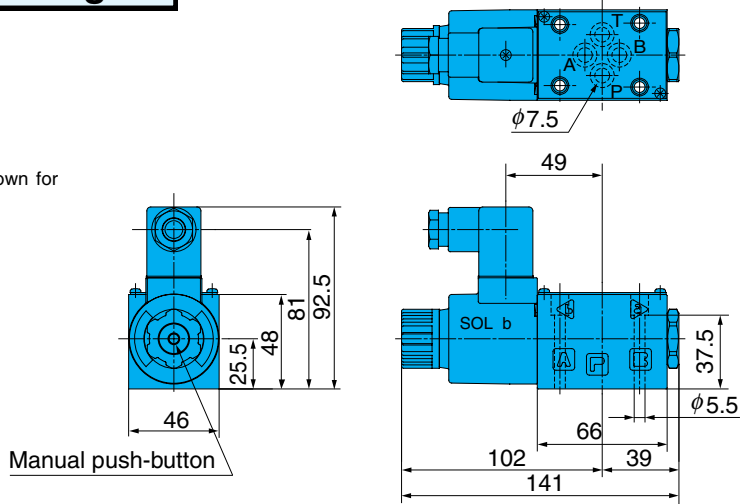
Other Options

Note) For information about the shockless and surgeless options, see page E-4.

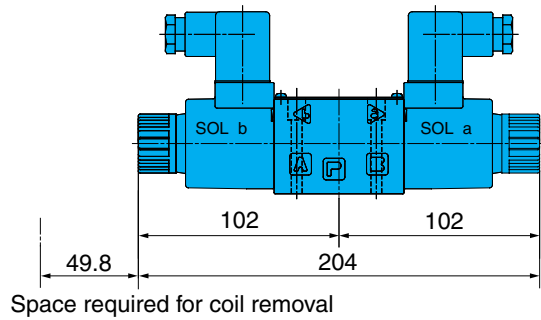
Installation Dimension Drawings

AC Solenoid
 SA-G01-A**-*-C*-31
 SA-G01-H**-*-C*-31

Note) SA-G01-H**-R**-31
 The solenoid is on the opposite side of that shown for SOLa in the illustrations shown here.

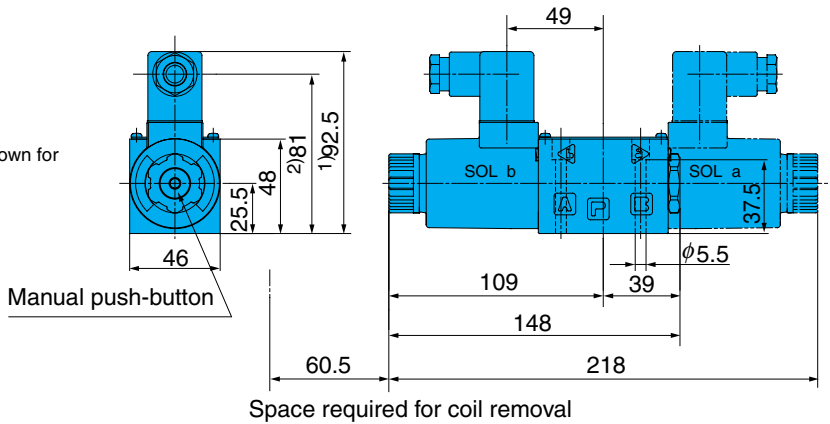


SA-G01-C**-R-C*-31
 SA-G01-E**-R-C*-31



DC Solenoid and Rectifier
 SA-G01-A**-D*/E*-31
 SA-G01-H**-D*/E*-31
 SA-G01-C**-D*/E*-31
 SA-G01-E**-D*/E*-31

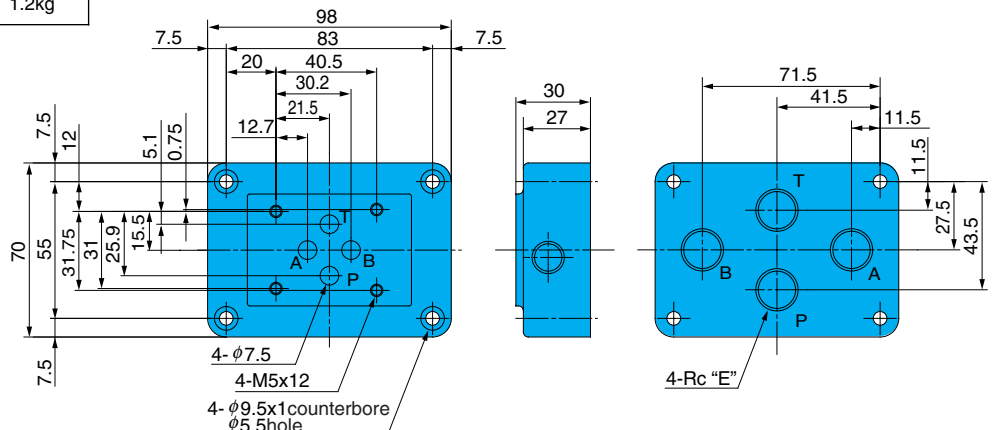
Note) 1.SA-G01-H**-D*/E*-31
 The solenoid is on the opposite side of that shown for SOLa in the illustrations shown here.
 2.SA-G01-E**-D*/E*-31
 Dimension 1 is 96.
 Dimension 2 is 73.



For sub plate SA-G01

Model No.	E	Weight
MSA-01X-10	1/4	1.2kg
MSA-01Y-10	3/8	1.2kg

Gasket Surface Dimensions
 (ISO 4401-03-02-0-94
 JIS B 8355 D-03-02-0-94)



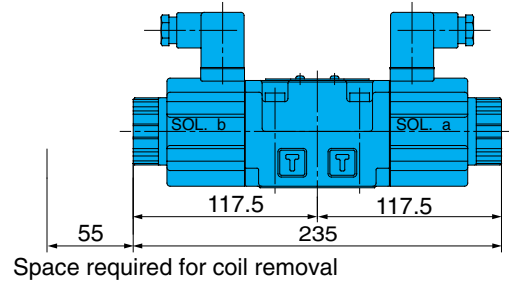
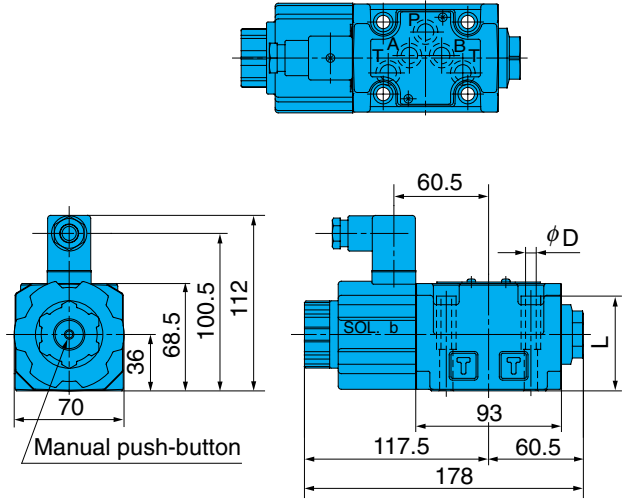
Installation Dimension Drawings

AC Solenoid
 SA-G03-A**-*-C*-J21
 SA-G03-H**-*-C*-J21

Note) SA-G03-H**-*-C*-J21
 The solenoid is on the opposite side of that shown for SOLa in the illustrations shown here.

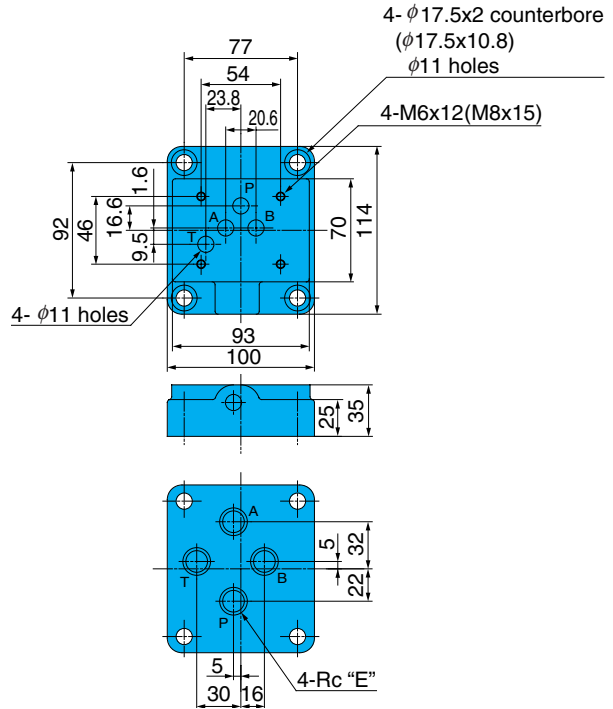
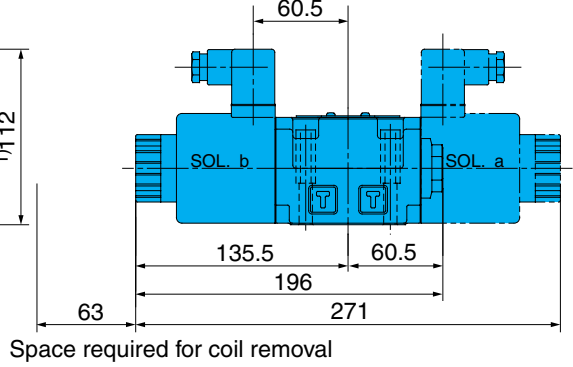
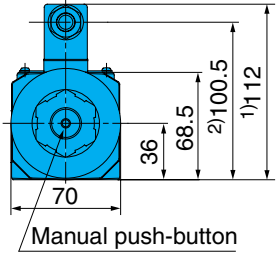
	SA-G03-**-*-C*-J21	SA-G03-**-*-J21
φD	φ6.8	φ8.5
L	60.5	58

SA-G03-C**-*-C*-J21
 SA-G03-E**-*-C*-J21



DC Solenoid and Rectifier
 SA-G03-A**-*-D*/E*-J21
 SA-G03-H**-*-D*/E*-J21
 SA-G03-C**-*-D*/E*-J21
 SA-G03-E**-*-D*/E*-J21

Note) 1.SA-G03-H**-*-D*/E*-J21
 The solenoid is on the opposite side of that shown for SOLa in the illustrations shown here.
 2.SA-G03-**-*-E*-J21
 Dimension 1 is 115.5.
 Dimension 2 is 92.5.

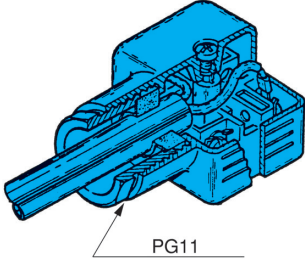
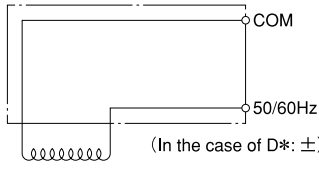
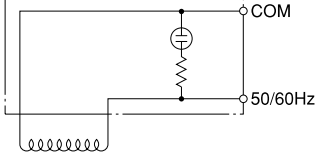
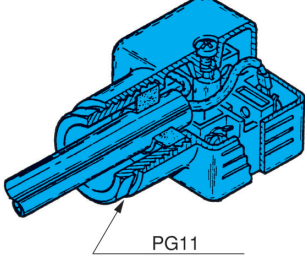
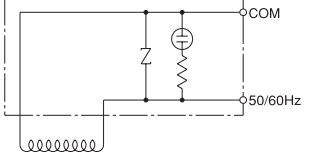

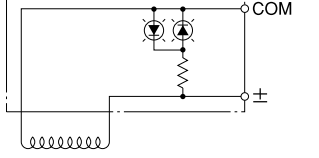
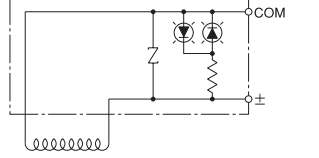
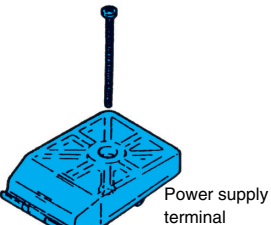
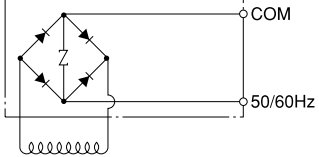
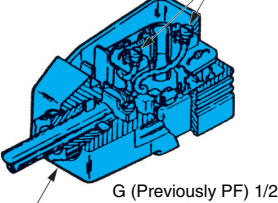
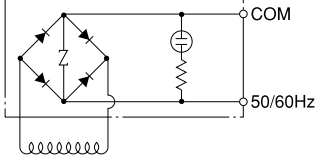


For sub plate SA-G03

Mounting bolt	Model No.	E	Weight
M6	MSA-03-10	3/8	2.3kg
	MSA-03X-10	1/2	
M8	MSA-03-30	3/8	
	MSA-03X-30	1/2	

M6 gasket surface dimensions
 (ISO 4401-05-04-0-94
 JIS B 8355 D-05-04-0-94)

● Connectors

Model No.	Wiring	Electrical Circuit Diagram
SA-G01-***-C* 31 G03-D* (J)21 (EA41-1A)	 <p>PG11</p>	 <p>(In the case of D*: ±)</p>
SA-G01-***-R-C* 31 G03 (J)21 (EA41-R*-1C)		
SA-G01-***-GR-C* 31 G03 (J)21 (EA41-GRC*-1C)	 <p>PG11</p>	
SA-G01-***-R-D* 31 G03 (J)21 (EA41-DR*-1C)	 <p>PG11</p>	
SA-G01-***-GR-D* 31 G03 (J)21 (EA41-GRD*-1C)		
SA-G01-***-E* 31 G03 (J)21 (EA42-1B)	 <p>Power supply terminal</p>	
SA-G01-***-R-E* 31 G03 (J)21 (EA42-R*-1B)	 <p>G (Previously PF) 1/2</p>	

Symbols in parentheses indicate connector configuration.

Note) 1. Asterisks in the connector configuration and power supply symbols are fillers for the voltage symbol (1 or 2).

2. The connector cord diameter is $\phi 8$ to 10 . Anything outside this range causes water tightness to be lost.

3. The orientation of the connectors can be changed in 90° increments by changing the terminal block.

4. The cover cannot be removed unless the installation screws are removed.

5. When J is specified for the auxiliary symbol, a G screw conversion adapter is attached to the connector, and the wiring port is a G (previously PF) 1/2 screw (standard: PG11). EA42 and EA42-R* also have a G (previously PF) wiring port.

6. Use M3 for round type and Y type solderless terminals.

7. Tighten the M3 screws that secure connectors and terminals to a torque of 0.3 to 0.5Nm (3.1 to 5.1kgf-cm).

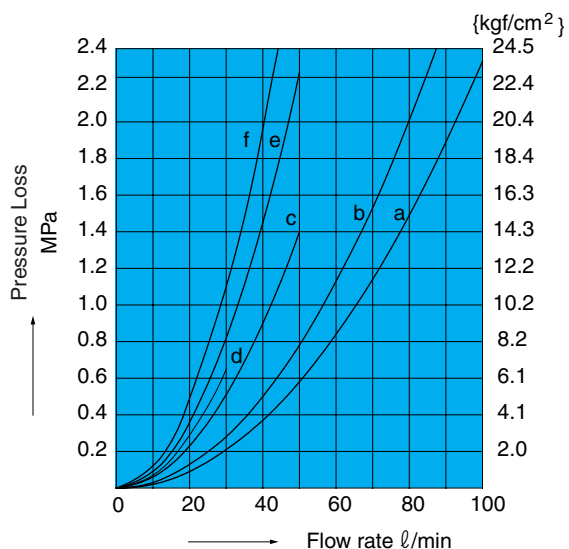
8. An EA-41-1A or EA41-R*-1C connector is used in the case of power supply type E* with Quick Return type Q.



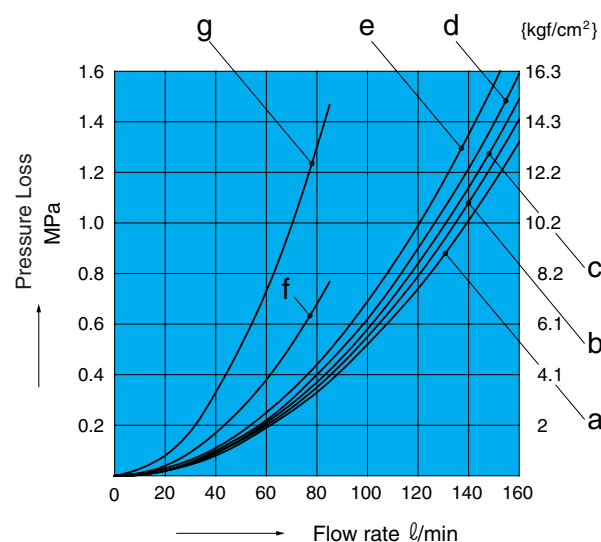
Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

Pressure Loss Characteristics



Pump Type	Flow Path	P→A	P→B	A→T	B→T	P→T
SA-G01	A2X, H2X, E2X	d	d	—	—	—
	A3X, H3X	b	b	b	b	—
	E3X	b	b	b	b	—
	A3Z, H3Z, E3Z	a	a	a	a	—
	A4, H4, C4	a	a	a	a	a
	A5, H5, C5, C6S	b	b	b	b	—
	C1, C1S	b	b	a	b	—
	C2	a	b	b	b	—
	C6	b	b	a	a	—
	C7Y	f	f	e	e	c
	C8	a	f	b	e	c
C9	a	a	b	b	—	



Pump Type	Flow Path	P→A	P→B	A→T	B→T	P→T
SA-G03	A2X, H2X, E2X	e	e	—	—	—
	A5	—	c	c	—	—
	H5	c	—	—	c	—
	A3X, H3X, E3X	c	c	d	d	—
	A3Z, H3Z	a	a	d	d	—
	E3Z	b	b	a	a	—
	C1	c	c	a	c	—
	C2	a	c	c	c	—
	A4, H4, C4	a	a	a	a	a
	C5, C1S, C6S	c	c	c	c	—
	C6	c	c	a	a	—
	C7Y	g	g	g	g	f
	C8	a	g	a	g	f
	C9	a	a	c	c	—

Switching Response Time

Model No.	Response Time (sec)		Measurement Conditions
	Solenoid ON	Spring Return	
SA-G01-**-*(GR)-C*-31	0.02 to 0.03	0.02 to 0.03	14MPa{143kgf/cm ² } 30 l /min
SA-G01-**-*(GR)-D*-31	0.03 to 0.04	0.02 to 0.04	
SA-G01-**-*(R)-E*-31	0.03 to 0.04	0.07 to 0.10	
SA-G01-**-*(F)(GR)-D*-31	0.07 to 0.10	0.04 to 0.07	
SA-G01-**-*(F)(R)-E*-31	0.07 to 0.10	0.10 to 0.15	
SA-G03-**-*(GR)-C*-J21	0.02 to 0.03	0.02 to 0.03	14MPa{143kgf/cm ² } 70 l /min
SA-G03-**-*(GR)-D*-J21	0.06 to 0.09	0.03 to 0.05	
SA-G03-**-*(R)-E*-J21	0.07 to 0.10	0.10 to 0.15	
SA-G03-**-*(F)(GR)-D*-J21	0.13 to 0.15	0.08 to 0.15	
SA-G03-**-*(F)(R)-E*-J21	0.10 to 0.15	0.15 to 0.20	

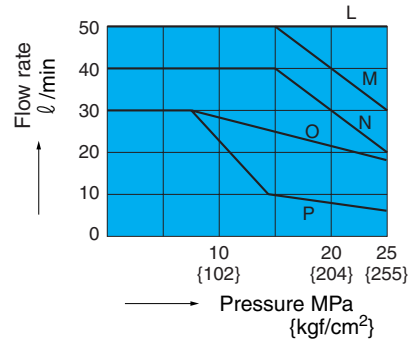
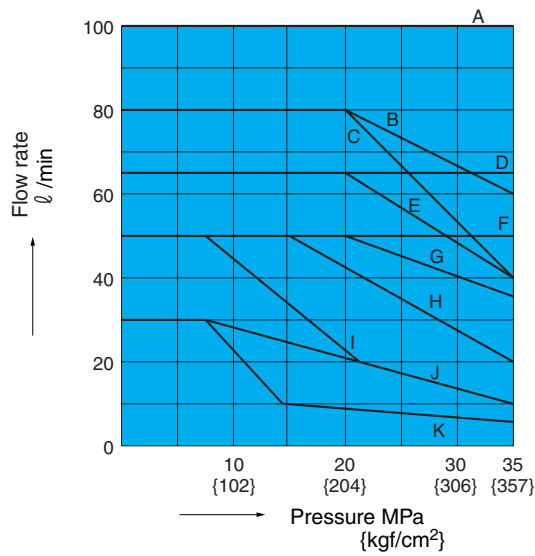
Note) 1. The switching response time changes slightly with operating conditions (pressure, flow rate, viscosity, etc.)
 2. In the case of power supply type E* (with built-in rectifier), the spring return time using Quick Return (option symbol: Q) is the same as D*.

Pressure – Flow Volume Allowable Value

Size	Standard Form, with AC, DC solenoid		
	SS/SA-G01-**-R-**-31		
Operation Example			
Operation Symbol			
A2X, H2X	–	K	K
E2X	–	J	J
A3X, H3X	B	K	K
E3X	A	J	J
A3Z, H3Z	D	D	D
E3Z	D	D	D
A5	A	–	I
H5	A	I	–
C1, C6	Note1) C(E)	I	I
C1S, C5, C6S	A	I	I
C2, C9	A	K	K
A4	F	F	F
H4	F	F	F
C4	F	F	F
C7Y, C8	Note2) G(H)	K	K

Size	Shockless Type, with DC solenoid		
	SS/SA-G01-**-FR-**-31		
Operation Example			
Operation Symbol			
A2X, H2X	–	P	–
E2X	–	O	P
A3X, H3X	L	P	P
E3X	L	O	L
A3Z, H3Z	L	L	L
E3Z	L	L	P
A5	L	–	
H5	L	P	
C1, C6	M	P	
C1S, C2, C5, C6S, C9	L	P	
A4, H4	L	L	
C4	L	L	
C7Y, C8	N	P	

Note) 1. Letter in parentheses is for AC solenoid.
 2. Letter in parentheses is for solenoid with built-in rectifier, but without Quick Return, and for DC solenoid with surge voltage absorbing diode on the electrical circuit.



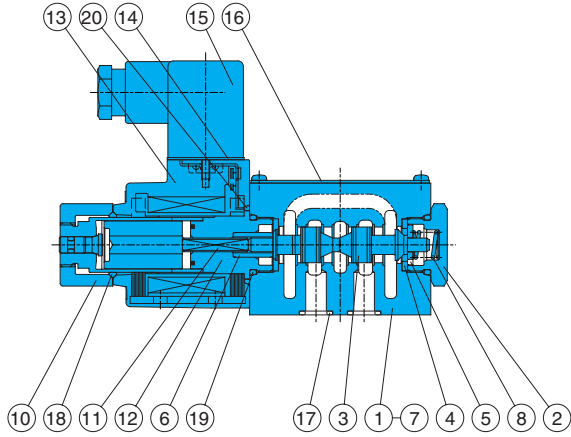
Pressure – Flow Volume Allowable Value

Model No.	Standard Form, with AC, DC solenoid			Standard Form, with DC solenoid		
	SA-G03-**-C*-J21			SA-G03-**-**J21		
Operation Example						
Operation Symbol						
A2X	—	F	E	—	E	F
H2X	—	E	F	—	F	E
E2X	—	C	C	—	C	C
A3X	A	E	E	A	D	F
H3X	A	E	E	A	F	D
A3Z	A	A	C	A	C	C
H3Z	A	C	A	A	C	C
E3X, E3Z	A	C	C	A	C	C
A5	A	—	D	A	—	E
H5	A	D	—	A	E	—
C1, C1S, C5, C6, C6S	A	D	D	A	E	E
C2	A	G	D	A	G	E
A4, H4, C4	A	A	A	A	A	A
C9	A	G	G	A	G	G
C7Y, C8	B	B	B	Note1) B(H)	B(H)	B(H)
Model No.	Shockless Type, with DC solenoid					
	SA-G03-**-F-**-J21					
Operation Example						
Operation Symbol						
A2X	—	E	F			
H2X	—	F	E			
E2X	—	C	C			
A3X	A	D	F			
H3X	A	F	D			
A3Z	A	C	C			
H3Z	A	C	C			
E3X, E3Z	A	C	C			
A5	A	—	E			
H5	A	E	—			
C1, C1S, C5, C6, C6S	A	E	E			
C2	A	G	E			
A4, H4, C4	A	A	A			
C9	A	G	G			
C7Y, C8	Note1) B(H)	B(H)	B(H)			

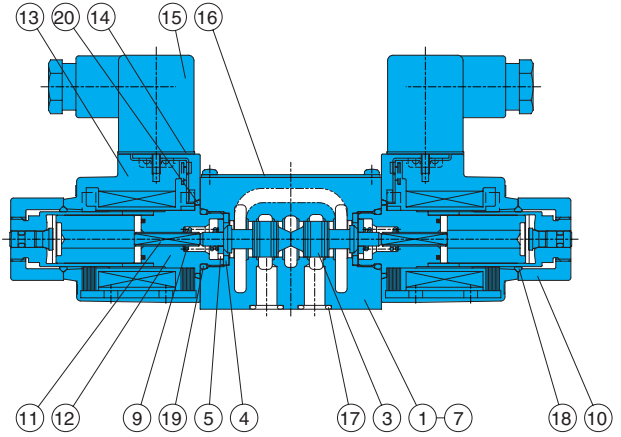
Note) 1. Letter in parentheses is for solenoid with built-in rectifier (E*), but without Quick Return, and for DC solenoid (D*) with surge voltage absorbing diode on the electrical circuit.
 2. There is no shockless type for the AC solenoid (C*), so use a solenoid with built-in rectifier (E*) when shockless operation is required with an AC power supply.
 3. The maximum flow rate is the allowable value of each port.

Cross-sectional Drawing

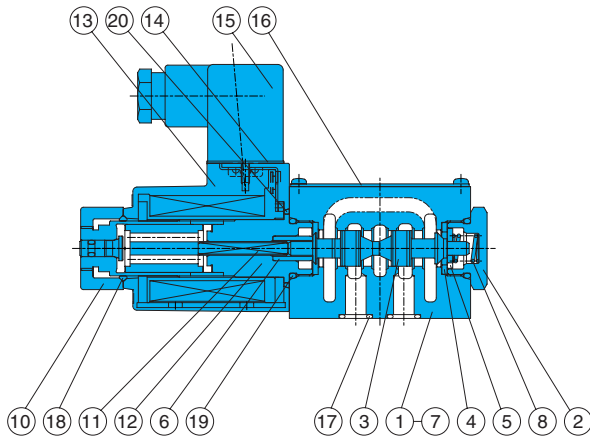
SA-G01-A**-C*-31



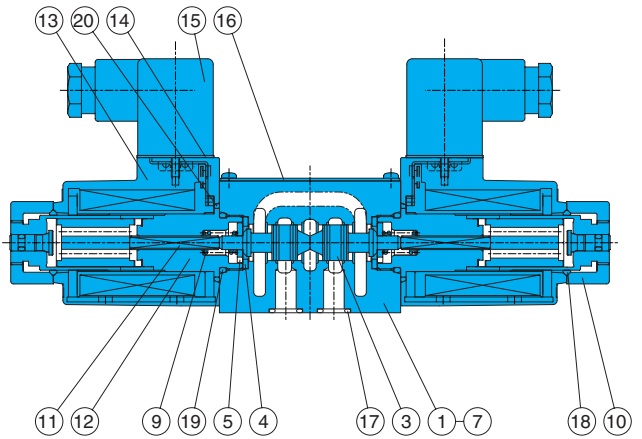
SA-G01-C**-C*-31



SA-G01-A**-D/E*-31



SA-G01-C**-D/E*-31



List of Sealing Parts

Part No.	Part Name	Part Number	Q'ty	
			Single Solenoid	Double Solenoid
17	O-ring	AS568-012(Hs90)	4	4
18	O-ring	1A-P20	1	2
19	O-ring	1B-P18	2	2
20	O-ring	S-25	1	2

Note) 1A and 1B are JIS Standard B 2401, while AS568 is SAE standard.

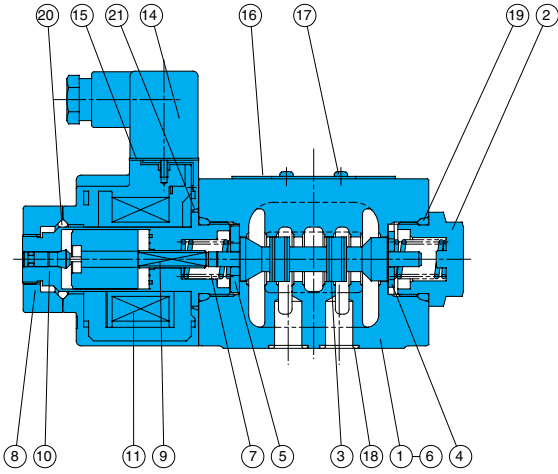
Seal Kit Number

Single Solenoid	Double Solenoid
EDCS-A	EDCS-C

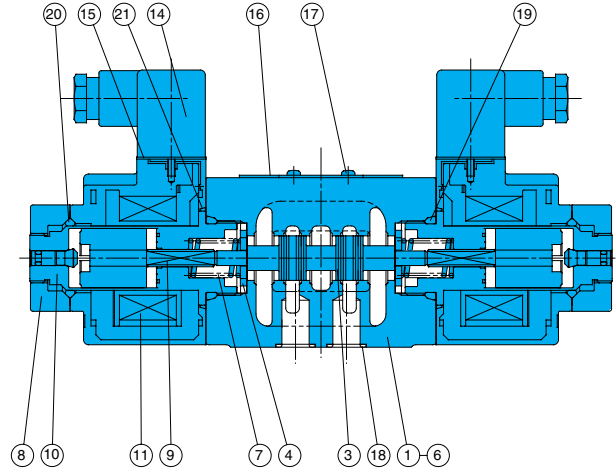
Part No.	Part Name	Part No.	Part Name
1	Body	11	Rod
2	Plug	12	Solenoid guide
3	Spool	13	Solenoid coil
4	Retainer A	14	Connector
5	Retainer B	15	Nameplate
6	Retainer C	16	Screw
7	Spacer	17	O-ring
8	Spring A	18	O-ring
9	Spring C	19	O-ring
10	Nut	20	O-ring

Cross-sectional Drawing

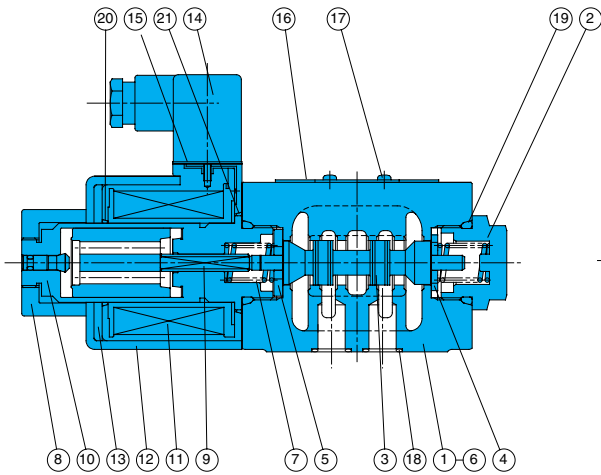
SA-G03-A**-C*-(J)21



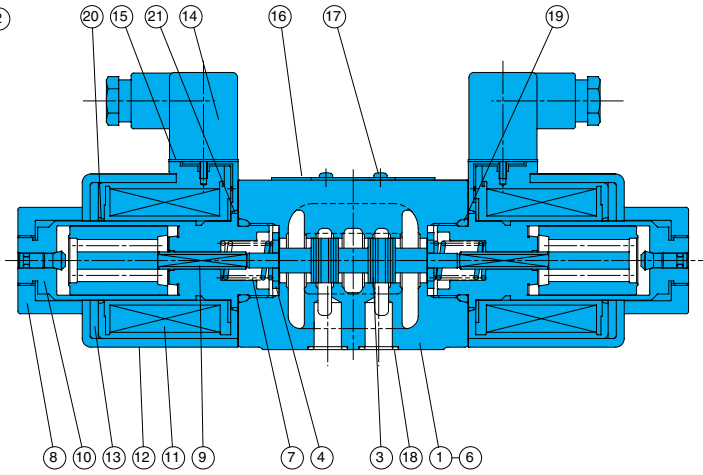
SA-G03-C**-C*-(J)21



SA-G03-A**-D/E*-(J)21



SA-G03-C**-D/E*-(J)21



List of Sealing Parts

Part No.	Part Name	Type/Part Number		Q'ty	
		AC SOL.	DC SOL.	Single Solenoid	Double Solenoid
18	O-ring	AS568-014(Hs90)		5	5
19	O-ring	1B-P28		2	2
20	O-ring	1A-P26	AS568-026	1	2
21	O-ring	AS568-029		1	2

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.

Part No.	Part Name	Part No.	Part Name
1	Body	11	Solenoid coil
2	Plug	12	Coil case
3	Spool	13	Coil yoke
4	Retainer	14	Connector
5	Retainer B	15	Connector packing
6	Spacer	16	Nameplate
7	Spring	17	Screw
8	Nut	18	O-ring
9	Rod	19	O-ring
10	Solenoid guide	20	O-ring
		21	O-ring

Seal Kit Number

AC SOL.		DC SOL.	
Single Solenoid	Double Solenoid	Single Solenoid	Double Solenoid
ECBS-AA	ECBS-CA	ECBS-AD	ECBS-CD

SE Series (Pilot Operated Lower Power Solenoid Valve)
 G01: Direct type valve)
 G03: Pilot type valve)

40 to 100 ℓ /min
10 to 21MPa



Features

① Low current, low power

The SE series magnetic switching valve's solenoid has significantly lower power consumption.

② Directly drivable by a programmable controller

Low-current operation means not only allows direct drive by a programmable controller (PC) output circuit, it also enables the use of a compact and simple control circuit.

③ Little coil temperature rise

Low power operation means there is little heat generated from the coil, which minimizes the effects of heat on mechanisms. Even with the AC solenoid, there is little chance of coil burnout.

Specifications

Operation Symbol	SE-G01-**-GR**-30			SE-G03-**-GR**-20		
	JIS Symbol	Rated Flow Rate - Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kgf/cm ²)	JIS Symbol	Rated Flow Rate - Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kgf/cm ²)
A2X		30	10		100	
A3X		35			80	
H2X	/				100	
H3X					80	
E3X		30			100	
C4				40		
C5		40				
C6						
C6S	/					
C7Y						
C1	/				100	

Note) The maximum flow rate of each valve depends on the pressure. For details, see page E-29.

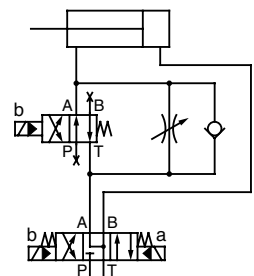
● Precautions During Use

The SE Series is an internal pilot and internal drain type valve, so the following precautions must be observed whenever using it.

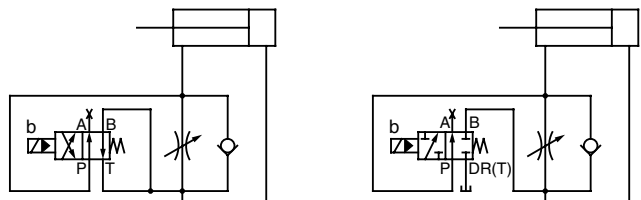
- 1) A pressure of 0.4MPa {4kgf/cm²} or greater is required at the P port for valve switching and holding.
- 2) For valve switching, a pressure of 4MPa {4kgf/cm²} or greater must be maintained between PT (DR) as minimum pilot pressure. In this case, make sure that P port pressure is always greater than T (DR) port pressure.
- 3) Never close the T (DR) port. Be sure to run piping from it.
- 4) A resistance valve is built in for flow paths C4 and C7Y, so there is no need to provide an external check valve.
- 5) Generally, operating fluid flow in the following directions: P→A, P→B, A→T, P→T. Do not configure for reverse flow.

Example of Non-allowed Circuits

When fast feed is done while SOL is ON, the valve does not switch because the pilot pressure cannot be obtained in the internal pilot.



The following shows the required circuit configurations in this case.

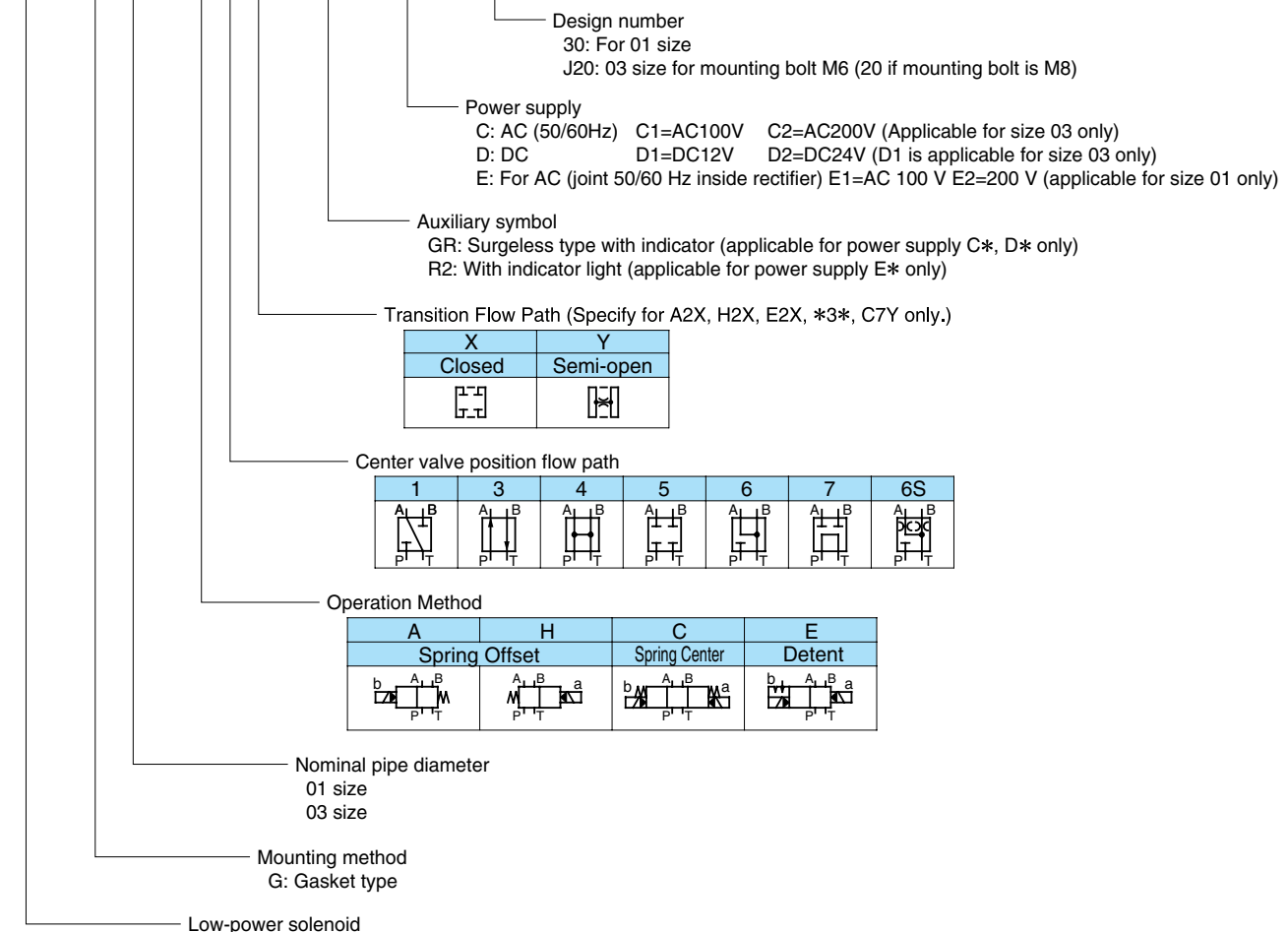


Solenoid Type		SE-G01-30			SE-G03-20			
		DC Solenoid	Internal DC solenoid for rectifier		AC Solenoid		DC Solenoid	
		D2	E1	E2	C1	C2	D1	D2
Maximum Working Pressure	P, A, B Ports	10MPa {102kgf/cm ² }			21MPa {214kgf/cm ² }			
Maximum Allowable Backpressure	T port	10MPa {102kgf/cm ² } (In the case of 2MPa {21kgf/cm ² } operation symbol E3X)			7MPa {71kgf/cm ² } (In the case of 2MPa {21kgf/cm ² } operation symbol E3X)			
Pilot Pressure (P-T Port Pressure)					0.4MPa{4kgf/cm ² } minimum			
Changeover Frequency (per minute)		120			120			
Standard	Indicator light Surgeless	GR	R		GR			
Weight (kg)	Double Solenoid	2.5			3.5			
	Single Solenoid	1.8			3.3			
Operating Environment	Dust Resistance/Water Resistance Rank	JIS C0920 IP55 (Dust-tight, Rain-proof)			JIS C0920 IP63 (Dust-tight, Rain-proof)			
	Ambient Temperature	-20 to 50°C						
	Operating Fluid	Temperature Range	-20 to 70°C					
		Viscosity Range	15 to 300mm ² /s					
	Filtration	25 microns or less						
Bundled Accessories	Mounting bolt	M5 x 30 (Four)			M5 x 35 (Four) (M8 x 70 (Four))			
	Tightening Torque	5 to 7N·m{51 to 71kgf·cm}			M6 10 to 13N·m {102 to 133kgf·cm} M8 20 to 25N·m {204 to 255kgf·cm}			

Note) For mounting bolts, use 12T or equivalent.

Understanding Model Numbers

SE - G 03 - A 3 X - GR - C2 - J20

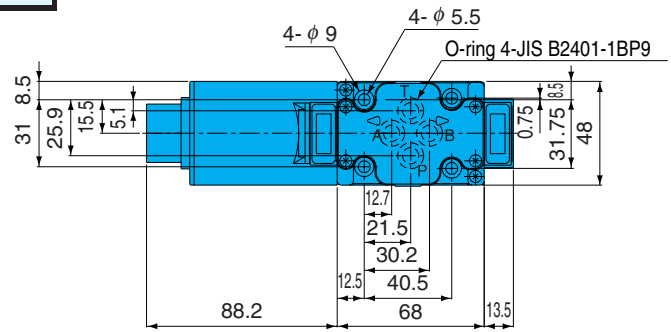


● Solenoid Assembly Specifications

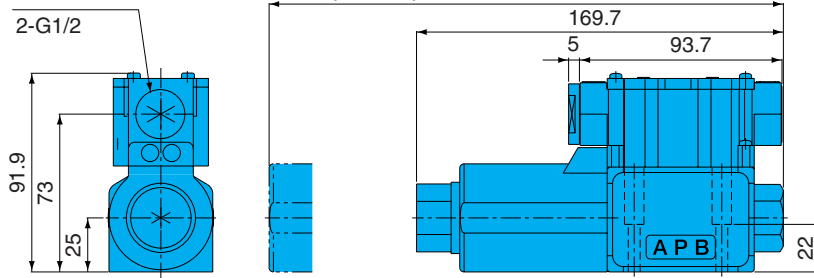
Solenoid Type	Power Supply Type	Voltage (V)	Frequency (Hz)	For SE-G01				For SE-G03								
				Solenoid Coil Type	Holding Current (A)	Holding Power (W)	Allowable Voltage Range (V)	Solenoid Coil Type	Drive Current (A)	Holding Current (A)	Holding Power (W)	Allowable Voltage Range (V)				
AC	C1	AC100	50	SLH1-025B-R1-01	0.07	6.5	80 to 110	EE64-01C1-1A	0.29	0.19	6.1	80 to 110				
			60						0.24	0.135	4.1					
		AC110	60						0.265	0.165	5.3	90 to 120				
	C2	AC200	50		0.05	8.1			160 to 220	EE64-01C2-1A	0.145		0.095	6.1	160 to 220	
			60								0.12	0.07	4.1			
		AC220	60								0.135	0.085	5.3	180 to 240		
Built-in rectifier type AC	E1	AC100	50	SLH1-025B-R2-01	0.05	9.87	21.6 to 26.4	EE64-01D1-1A			0.4	4.8	10.8 to 13.2			
			60													
		AC110	60													
	E2	AC200	50	0.05	9.87	180 to 240			EE64-01D2-1A	0.2				4.8	21.6 to 26.4	
			60													
		AC220	60													
DC	D1	DC12	-													
	D2	DC24	-													

Installation Dimension Drawings

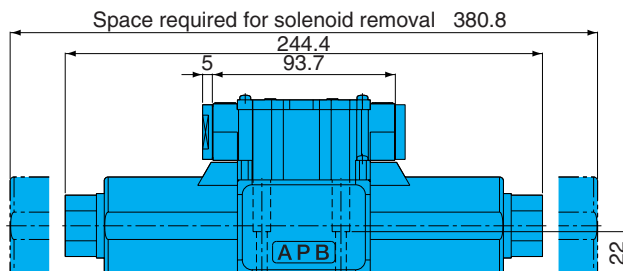
DC Solenoid
SE-G01-A***-GR-**-30



Space required for solenoid removal 237.9



SE-G01-C**-GR-**-30
SE-G01-E3X-GR-**-30



Note) Gasket surface dimensions and the sub plate are the same as those for SS-G01. See page E-5 for more information.

Installation Dimension Drawings

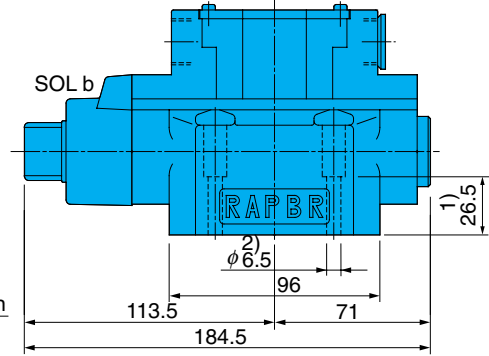
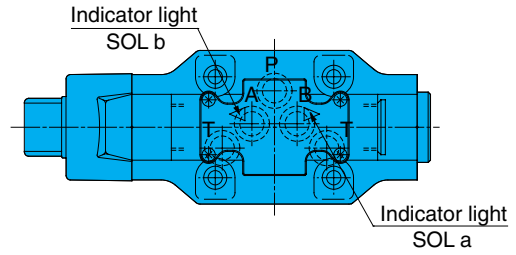
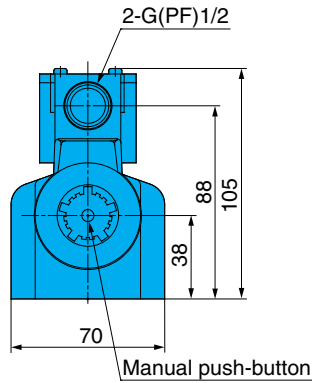
AC Solenoid

SE-G03-A**-GR-C*-J20

SE-G03-H**-GR-C*-J20

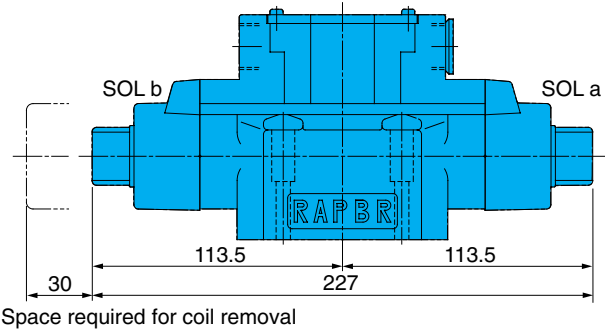
Note)

1. SE-G03-H**-GR**-J20
The solenoid is on the opposite side of that shown for SOLa in the illustrations shown here.
2. M8 mounting bolts
Dimension 1 is 59.
Dimension 2 is $\phi 8.5$.



SE-G03-C**-GR-C*-J20

SE-G03-E**-GR-C*-J20



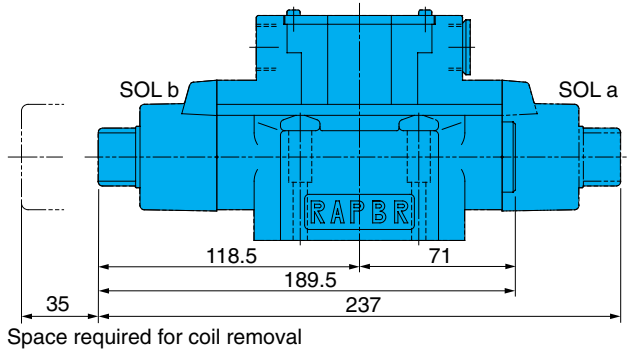
DC Solenoid

SE-G03-A**-GR-D*-J20

SE-G03-H**-GR-D*-J20

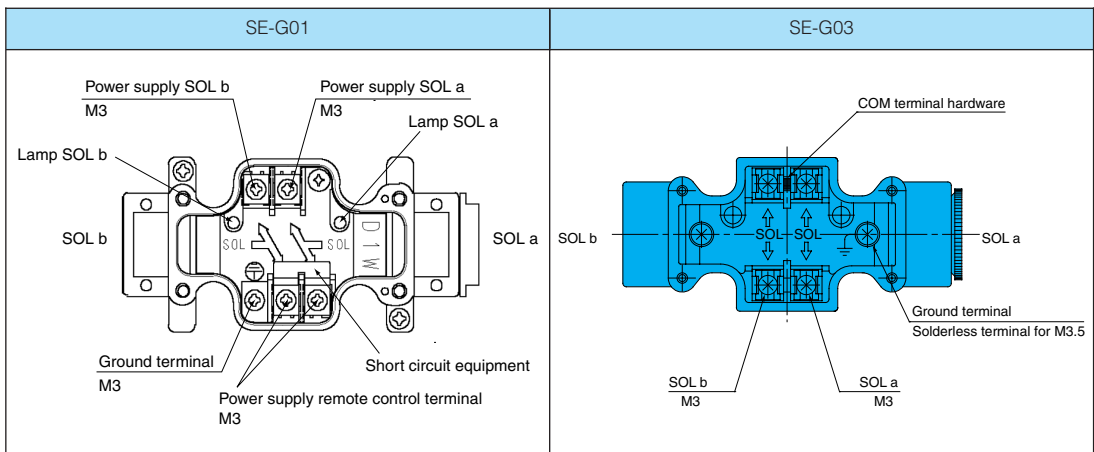
SE-G03-C**-GR-D*-J20

SE-G03-E**-GR-D*-J20



Note) Gasket surface dimensions and the sub plate are the same as those for SS-G03. See page E-6 for more information.

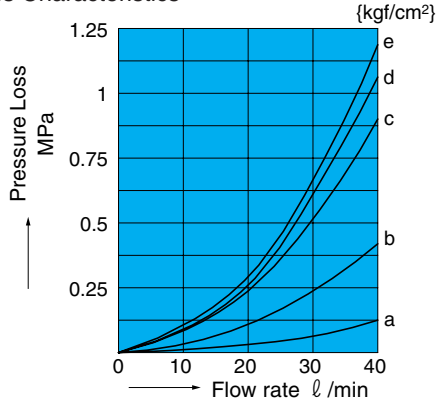
Wiring Diagram



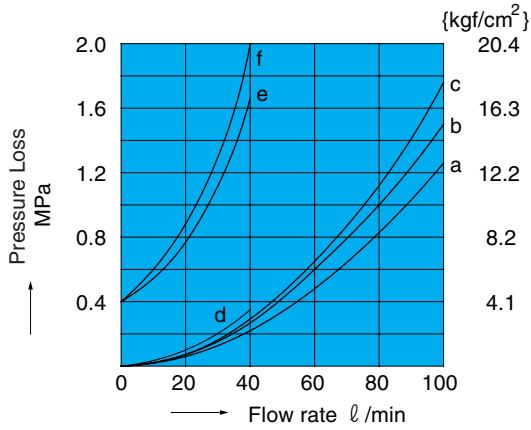
Performance Curves

Differential Hydraulic Fluid Viscosity 32mm²/s

Pressure Loss Characteristics



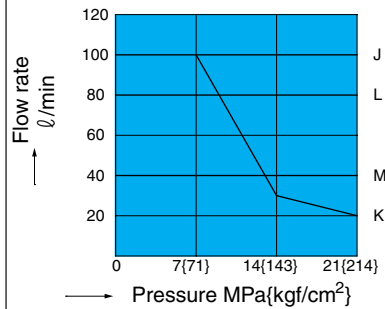
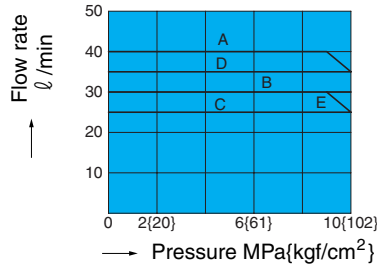
Pump Type	Flow Path	P→A	P→B	A→T	B→T	P→T
SE-G01	A2X	e	e	—	—	—
	A3X	e	e	d	d	—
	E3X	e	e	d	d	—
	C4	a	a	a	a	a
	C5	e	e	c	c	—
	C6	e	e	b	b	—



Pump Type	Flow Path	P→A	P→B	A→T	B→T	P→T
SE-G03	A2X, H2X	b	b	—	—	—
	A3X, H3X	b	b	c	c	—
	C1	b	b	a	b	—
	C4	e	e	a	a	e
	E3X, C5, C6S	b	b	b	b	—
	C6	b	b	a	a	—
	C7Y	f	f	d	d	e

Pressure - Flow Volume Allowable Value

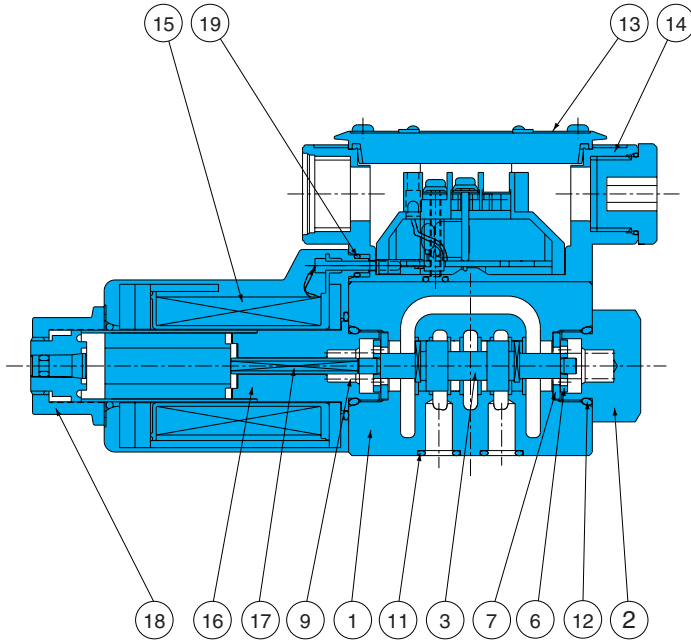
Pump Type	SE-G01			SE-G03		
	Operation Example	Operation Example	Operation Example	Operation Example	Operation Example	Operation Example
A2X	—	E	A	—	K	J
H2X	—	—	—	—	J	K
A3X	D	C	A	J	K	J
H3X	—	—	—	J	J	K
E3X	B	A	A	L	L	L
C1	—	—	—	J	J	J
C4	B	B	B	M	M	M
C5	A	B	B	J	J	J
C6	A	B	B	J	J	J
C6S	—	—	—	J	J	J
C7Y	—	—	—	M	M	M



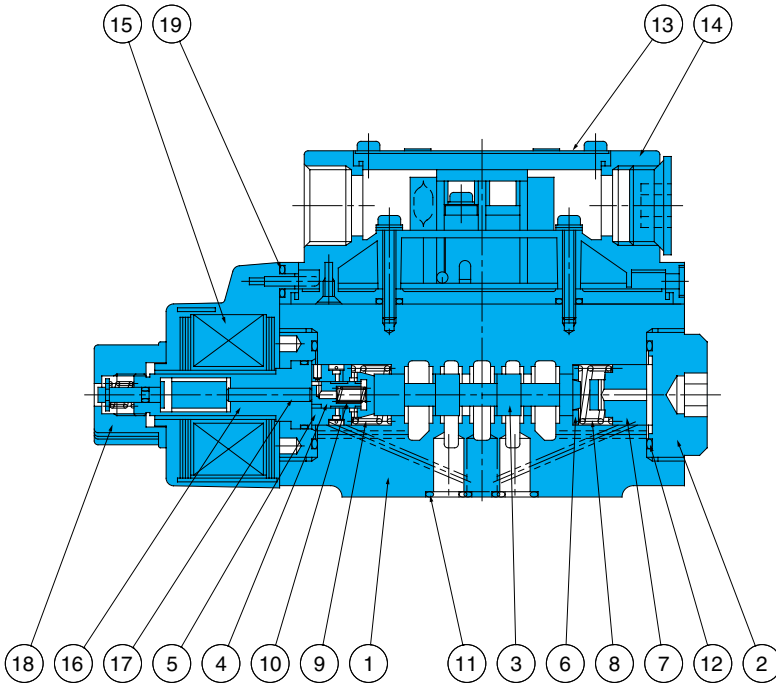
Note) 1. The maximum flow rate is the value when a rated 90%V is applied following solenoid temperature rise and saturation.
2. The maximum flow rate is the allowable value of each port.

Cross-sectional Drawing

SE-G03-A3X-GR-**-30



SE-G03-A3X-GR-**-20



Part No.	Part Name
1	Body
2	Plug
3	Spool
4	Piston
5	Sleeve
6	Retainer
7	Stopper
8	Spring
9	Spring
10	Spring
11	O-ring
12	O-ring
13	Nameplate
14	Terminal box
15	Coil
16	Guide
17	Rod
18	Nut
19	O-ring

List of Sealing Parts

Part No.	Part Name	SE-G01		SE-G03			
		Part Number	Q'ty		Part Number	Q'ty	
			Single Solenoid	Double Solenoid		Single Solenoid	Double Solenoid
11	O-ring	IB-P9	4	4	IB-P12	5	5
12	O-ring	IB-P18	2	2	S25(Hs90)	2	2
19	O-ring	S4	2	4	IA-P4	2	4

Note) O-ring 1A-** and 1-B** indicate JIS Standard B 2401-1A-** and 1B-**.

Seal Kit Number

SE-G01		SE-G03	
Single Solenoid	Double Solenoid	Single Solenoid	Double Solenoid
EECS-01A	EECS-01C	EES-03A-1A	EES-03C-1A

SL Series (Wiring System: Central Terminal Box) Lower Power Solenoid Valve

30 ℓ /min
7MPa



Features

- ① Very long life
The movable iron core of the wet type solenoid is immersed in oil, which keeps it lubricated and cushions it from impact and vibration, ensuring very long life.
- ② Low switching noise
The wet-type solenoid valve provides very low core switching noise, for quiet operation.
- ③ Low power consumption type.
The low power for the AC solenoid 9.6 W (60 Hz), DC solenoid 10 W contribute to energy conservation.
- ④ Easy connections
A special wiring box provides a COM port and indicator light as standard for simple wiring and maintenance.
- ⑤ Easy coil replacement
A plug-in type coil enables one-touch coil replacement.
- ⑥ Wide-ranging backward compatibility makes it simple to replace previous valve models with this one. Combining this valve with a modular valve contributes to the compact configuration of the overall device.
- ⑦ Global support
Meets overseas safety standards (CE, UL, and CSA). It can be safely used anywhere in the world. Contact your agent for certified products.

Specifications

JIS Symbol	Operation symbol	Maximum flow rate (ℓ /min)
	-A5-	30
	-H5-	
	-A3X-	
	-H3X-	
	-E3X-	
	-C1-	
	-C2-	

JIS Symbol	Operation symbol	Maximum flow rate (ℓ /min)
	-C4-	30
	-C5-	
	-C6-	
	-C9-	
	-C6S-	
	-C7Y-	15

Solenoid Type		AC Solenoid		DC Solenoid	
		C1	C2	Built-in Rectifier E1	D2
Maximum Working Pressure	P.A.B. Ports	7MPa (71kgf/cm ²)			
Maximum Allowable Backpressure	T Port	7MPa (71kgf/cm ²)			
Changeover Frequency (per minute)		24		120	240
Standard	Indicator light	R			
Options	Surgeless	G		—	G
	With manual push-button	N			
	Quick Return	—		Q	—
Mass (kg)	Double Solenoid	1.5		2.0	
	Single Solenoid	1.2		1.5	
Recommended	Ambient Temperature	-20 to 70°C			
	Viscosity Range	15 to 300mm ² /s {cSt}			
	Viscosity Index	90 or greater			
	Filtration	25 microns or less			
Mounting bolt		Hex bolt with hole of 12T hardness M5 × 45 4 each			
Tightening Torque		5 to 7N·m {51 to 71kgf·cm}			

Note) Mounting bolts are not included.

● Handling

- 1 In order to realize the full benefits of the wet type solenoid valve, configure piping so oil is constantly supplied to the T(R) port. Never use a stopper plug in the T(R) port.
- 2 Ensure that surge pressure in excess of the maximum allowable back pressure does not reach the T port.
- 3 Note that the maximum flow rate is limited when used as a four-way valve, or by blocking ports for use as a two-way valve or one-way valve.
- 4 Always keep the operating fluid clean. (contamination level: 12 or lower)

- 5 When using petroleum type operating fluid, use JIS K 2213 Class 1 or Class 2, or equivalent.
- 6 Use the SS series solenoid valve when using fire resistant hydraulic operating fluid.
- 7 Use this valve only within the allowable voltage range.
- 8 Do not allow the AC solenoid to become charged until you install the coil into the valve.
- 9 Maintaining a switching position under high pressure for a long period can cause abnormal operation due to hydraulic lockup. Contact your agent when you need to maintain a switching position for a long

period.

- 10 When using a detent type (3X), use constant energization in order to securely maintain the switching position.
- 11 Note that manual pin operating pressure changes in accordance with tank line back pressure.
- 12 Use the following table for specification when a sub plate is required.

Model No.	Pipe Diameter	Maximum flow rate (ℓ/min)	Weight (kg)
MSA-01X-10	1/4	20	1.2
MSA-01Y-10	3/8	40	

● Solenoid Assembly Specifications

Solenoid Type	AC Solenoid						DC Solenoid	
	C1			C2			Built-in Rectifier	
Power Supply Type	C1			C2			E1	D2
Voltage (V)	AC100		AC110	AC200		AC220	AC100	DC24
Cycles (Hz)	50	60	60	50	60	60	50/60	—
Solenoid Coil Type	EL64-C1			EL64-C2			ELC64-E1-1A	ELC64-D2-1A
Drive Current (A)	1.30	1.10	1.30	0.65	0.55	0.65	0.11	0.42
Holding Current (A)	0.30	0.24	0.28	0.15	0.12	0.14		
Holding Power (W)	12.0	9.6	12.2	12.0	9.6	12.2	10	10
Allowable Voltage Range	80 to 110	90 to 120		160 to 220	180 to 240		90 to 110	21.6 to 26.4
Allowable Pressure (MPa(kg/cm ²))	7 {71}							
Insulator Resistance (MΩ)	100 or greater (500 V)							

- Note) 1.A DC solenoid surge absorption circuit is effective in preventing misoperation in sensitive relays and IC circuits. (Applicable for power supply display D^o, option: G)
- 2.A DC solenoid RAC type (power supply E1) greatly increases the life of the contacts by eliminating contact arc without changing circuit sequence on an AC line, 50/60Hz can be used.

Understanding Model Numbers

SL - G 01 - A 3 X - ※ R - C2 - 31

Design Number

Power supply
 C: AC (50/60 Hz) C1 = AC100 V C2 = AC200 V
 D: For DC D2 = DC24V
 E: AC (Built-in rectifier; 50/60Hz) E1 = AC100V

With indicator light

Auxiliary symbol (Can be combined in alphabetic sequence.)
 G: Surgeless type (Power supply C※ D2 Applicable)
 N: With manual push-button
 Q: Quick return type (Available with power supply E1)

Transition flow path (*3*, C7* only)

X	Y
Close	Semi-open

Center position

1	2	3	4	5
6	7	9	6S	

Note 1. P is pressure port, A and B are connection ports to cylinder.
 T (R) shows the connection port to the tank.

Operation Method

A	H	C	E
Spring Offset type		Spring Center	Detent

Nominal Diameter: 01 size

Mounting method: Gasket type

Machine type: SL Series wet magnetic switching valve.

Options

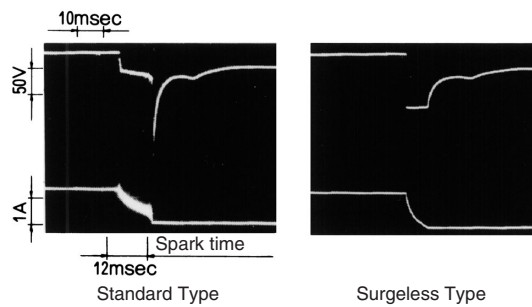
(Auxiliary Symbol)

Surgeless type (Auxiliary Symbol: G)

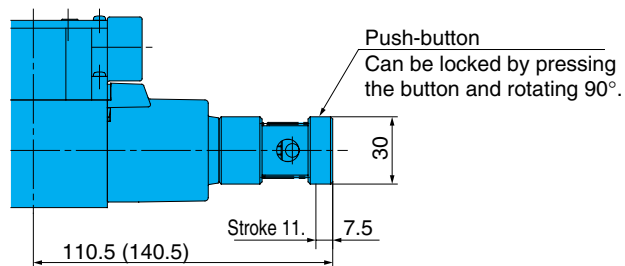
The surge pressure waveforms when the DC solenoid valve power supply is opened and closed by a relay are shown at the bottom of this block.

A built-in surge absorber element eliminates sparking and surge pressure.

- Features
- Surge voltage is inhibited.
 - Sparking at relay contact points is eliminated.

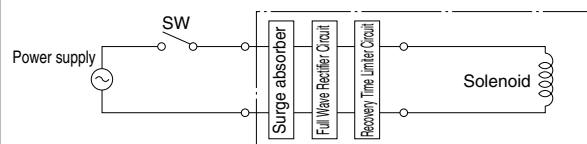


Manual push-button type (Auxiliary symbol: N)



Note)
Dimensions for the DC solenoid valve are in parenthesis.

Quick Return Type (Auxiliary Symbol: Q)



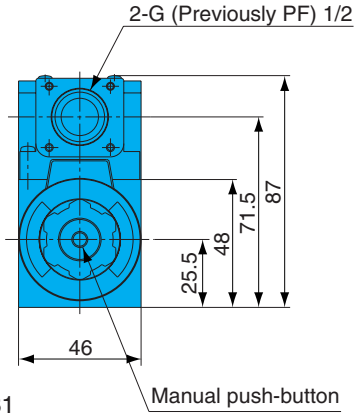
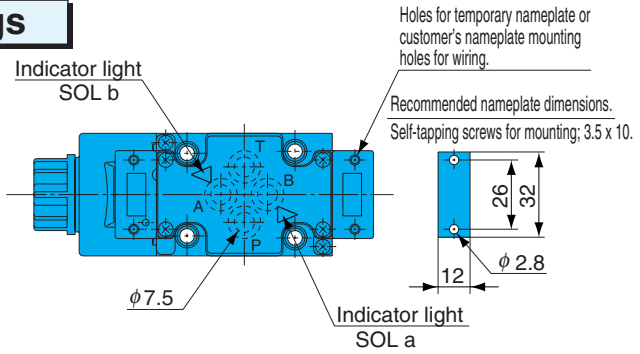
Handling

- 1 This type is used in the case of power supply type E1 (with built-in rectifier) to shorten the spring return time. This also applies to D2.
- 2 The quick return mechanism is built-in.

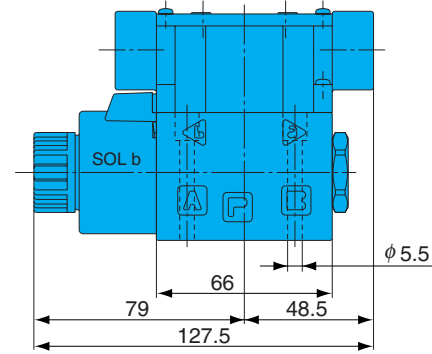
Installation Dimension Drawings

AC Solenoid
 SL-G01-A**-R-C*-31
 SL-G01-H**-R-C*-31

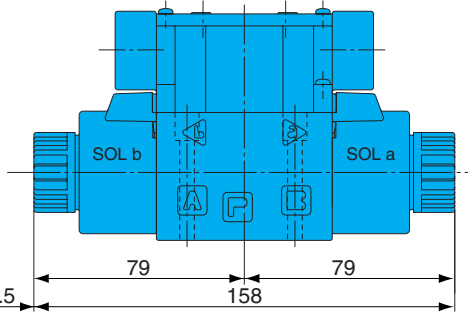
Note) The SL-G01-H**-R**-31 solenoid, is attached to the opposite side (SOL a) as shown in the diagram.



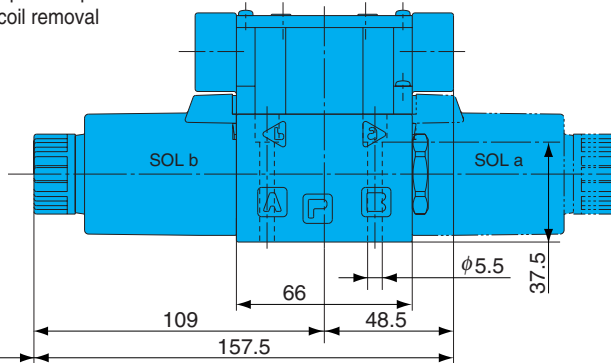
SL-G01-C**-R-C*-31
 SL-G01-E**-R-C*-31



DC Solenoid and Rectifier
 SL-G01-A**-R-D/E*-31
 SL-G01-H**-R-D/E*-31
 SL-G01-C**-R-D/E*-31
 SL-G01-E**-R-D/E*-31



Space required for coil removal

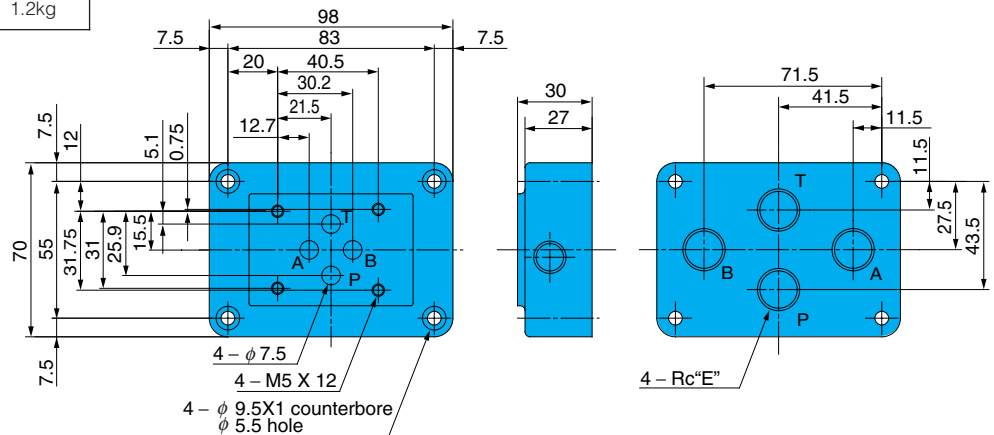


Space required for coil removal

For sub plate SL-G01

Model No.	E	Mass
MSA-01X-10	1/4	1.2kg
MSA-01Y-10	3/8	1.2kg

Gasket Surface Dimensions
 (ISO 4401-03-02-0-94
 JIS B 8355 D-03-02-0-94)



Wiring Diagram

The diagram shows a top-down view of a solenoid valve with two solenoid coils. The left coil is labeled 'SOL b' and the right coil is labeled 'SOL a'. Each coil has a 'Ground terminal' and a 'Common terminal'. The common terminals are connected to a central 'COM' terminal. Arrows indicate the flow of current from the common terminal to the solenoid coils.

Note) 1. In the case of a double solenoid valve, a common terminal is provided to simplify wiring. When the common terminal is not used, remove the terminal screws.

2. Use the ground terminal when grounding is required.

3. Use an M3 type as a solderless terminal.

4. Tighten terminal screws to a torque of 0.5 to 0.7Nm {5.1 to 7.1kgf-cm}.

Electrical Circuit Diagram

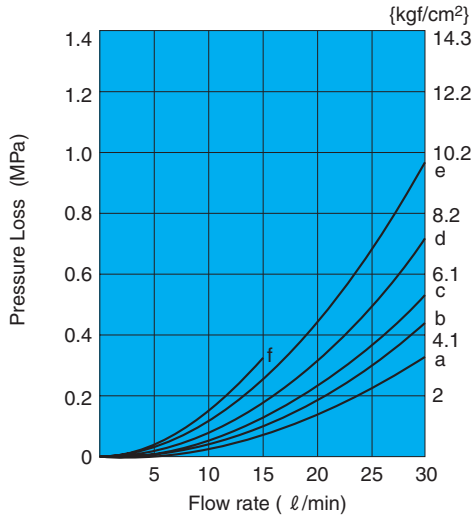
Type	Model No.	Electrical Circuits
AC Solenoid	SL-G01-***-R-C*-31	
AC Solenoid Surgeless type	SL-G01-***-GR-C*-31	
Built-in Rectifier	SL-G01-***-R-E*-31	
DC Solenoid	SL-G01-***-R-D*-31	
DC Solenoid Surgeless Type	SL-G01-***-GR-D*-31	
Built-in Rectifier Quick Return Type	SL-G01-***-QR-E*-31	See page E-4 for more information.



Performance Curves

Hydraulic Operating Fluid Viscosity 20 mm²/s {cSt}

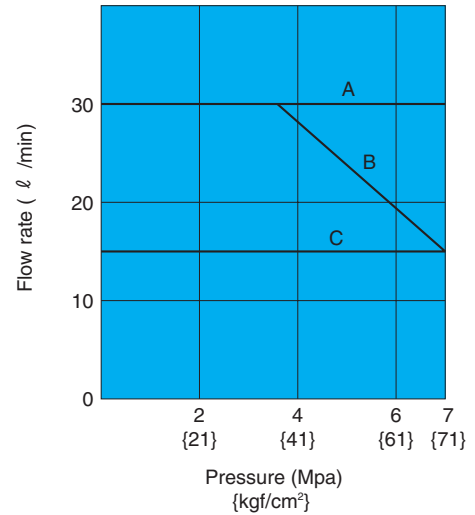
Pressure Loss Characteristics



Flow Path	P→A	P→B	A→T	B→T	P→T
A5	—	c	c	—	—
H5	c	—	—	c	—
A3X, H3X, E3X	b	b	e	e	—
C1	c	c	a	c	—
C2	a	c	e	c	—
C4	a	a	c	c	d
C5, C6S	c	c	c	c	—
C6	c	c	a	a	—
C7Y	f	f	e	e	d
C9	a	a	e	e	—

Pressure – Flow Volume Allowable Value

Operation Example	Operation symbol	Diagram 1	Diagram 2	Diagram 3
A5	A	A	—	B
H5			B	—
A3X, H3X, E3X C1, C2, C4, C5 C6, C9, C6S			B	B
C7Y			C	C



Switching Response Time

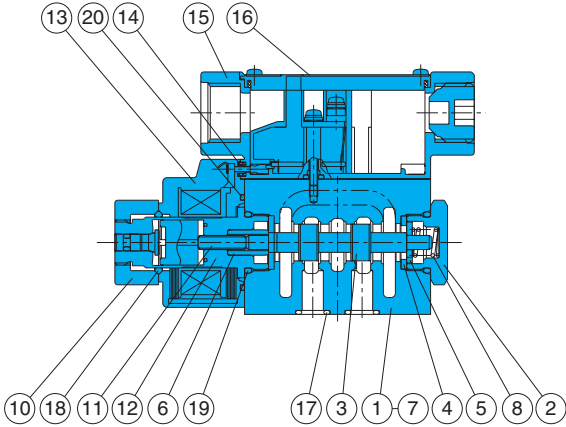
Model No.	Response Time (sec)		Measurement Conditions
	Solenoid ON	Spring Return	
SL-G01-**-R-C*-31	0.010 to 0.020	0.010 to 0.020	7MPa {71kgf/cm ² }
SL-G01-**-R-E1-31	0.055 to 0.080	0.150 to 0.185	20 l/min
SL-G01-**-G)R-D2-31	0.055 to 0.080	0.025 to 0.035	40mm ² /s {cSt}

Note) 1. The switching response time changes slightly with operating conditions (pressure, flow rate, viscosity, etc.)
 2. In the case of power supply type E1 (with built-in rectifier), the spring return time using Quick Return (option symbol: Q) is the same as D2.

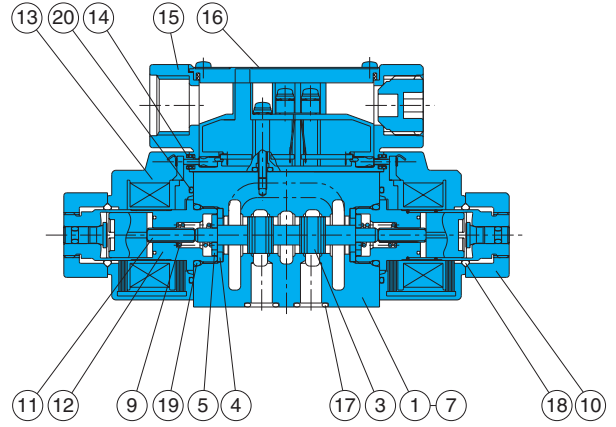


Cross-sectional Drawing

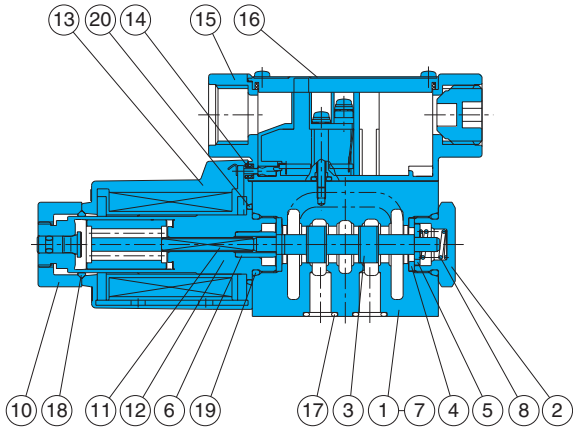
SL-G01-A**-R-C*-31



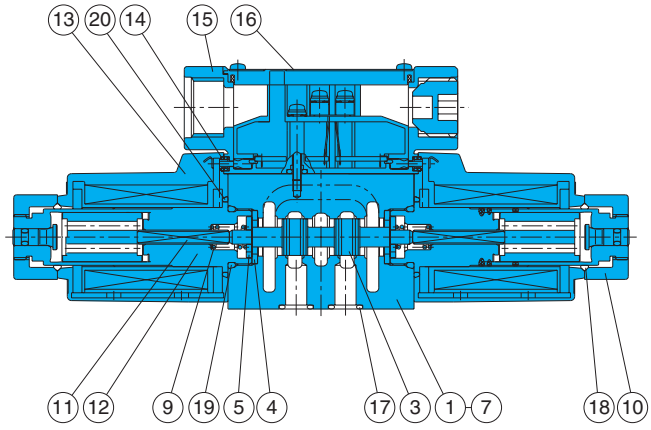
SL-G01-C**-R-C*-31



SL-G01-A**-R-D/E*-31



SL-G01-C**-R-D/E*-31



List of Sealing Parts

Part No.	Part Name	Type/Part Number		Q'ty	
		DC SOL	AC SOL	Single Solenoid	Double Solenoid
17	O-ring	AS568-012(Hs90)		4	4
18	O-ring	1A-P20	1A-P18	1	2
19	O-ring	1B-P18		2	2
20	O-ring	S-25	AS568-025(Hs70)	1	2

Note) O-ring 1A/1B-** indicates JIS B2401-1A/1B**. AS568 is SAE standard.

Part No.	Part Name	Part No.	Part Name
1	Body	11	Rod
2	Plug	12	Solenoid guide
3	Spool	13	Solenoid coil
4	Retainer A	14	Packing
5	Retainer B	15	Terminal box kit
6	Retainer C	16	Nameplate
7	Spacer	17	O-ring
8	Spring A	18	O-ring
9	Spring C	19	O-ring
10	Nut	20	O-ring





DSS (DSA) 22 Design Series Solenoid Control Valve

300 to 600 ℓ /min
32 to 35MPa

Features

- ① Long-life operation is ensured by use of the high-performance, renowned SS (SA)-G01 wet solenoid valve as the pilot valve.
- ② High pressure, high capacity
The 04 size can provides up to 300 ℓ /min, while the 06 size delivers up to 600 ℓ /min.
- ③ Low pressure loss
An original flow path design provides wide-ranging low pressure loss and enhanced system circuit efficiency.
- ④ Internal modification of the pilot and drain can be accomplished without removing the valve by simply connecting and disconnecting plugs.
- ⑤ Built-in pilot pressure check valve
When tandem center type valve is used for the internal pilot valve (option), pilot pressure required for switching is self-maintained.

Specifications

Valve Size		04 Size	06 Size	
Valve Model Number		DSS(DSA)-G04-***-R**-22	DSS(DSA)-G06-***-R**-22	
Maximum Working Pressure MPa(kgf/cm ²)	P.A.B. Ports	35{357}	32{326}	
	T Port	Internal Drain Type	16{163}	
		External Drain Type	21{214}	
Maximum Flow Rate ℓ /min		300	600	
Rated Flow Rate ℓ /min		150	300	
Maximum Pilot Pressure MPa(kgf/cm ²)		25{255}	25{255}	
Minimum pilot pressure MPa(kgf/cm ²)	A** (Spring Offset Type)	0.8{8.2}	0.8{8.2}	
	E** (No-spring Detent Type)			
	C** (Spring Center Type)	1.2{12.2}	1.2{12.2}	
	D** (Pressure Center Type)			
	Built-in Pilot Pressure Check Valve Type (For Internal Pilot)			0.45 {4.6} (for *3Z, *4, *7*, *8 pilot pressure generation)
Maximum Changeover Frequency (per minute)		120	120	
Pilot Volume (cm ³)	A** (Spring Offset Type)	8.0	20.0	
	C** (Spring Center Type)	4.0	10.0	
Weight (kg)	A** (Spring Offset Type)	8.7{9.5}	14.5{15.4}	
	E** (No-spring Detent Type)	9.2{10.0}	15.0{15.9}	
	C** (Spring Center Type)			
	D** (Pressure Center Type)	10.5	16.5	
Operating Environment	Dust-resistance/Water-resistance Rank JIS C 0920		DSS: IP64 (Dust-tight, Splash-proof) DSA: IP65 (Dust-tight, Waterjet-proof)	
	Ambient Temperature		-20 to 50°C	
	Operating Fluid	Temperature Range		-20 to 70°C
		Viscosity Range		15 to 300mm ² /s
		Filtration		25 microns or less
Bundled Accessories	Mounting bolt		M6 × 45 (Two) M10 × 50 (Four)	
	Tightening Torque		M6 10 to 13{102 to 133} M10 45 to 55{460 to 560}	
	N-m(kgf-cm)		M12 60 to 70{612 to 714}	

- Note) 1.The maximum flow rate of each valve depends on the pressure. For details, see pages E-43 and E-44.
2.Weight in parentheses is for stroke adjustment type.
3.Solenoid specifications are the same as those for SS (SA)-G01. For more information, see pages E-3 and E-15.

● Handling

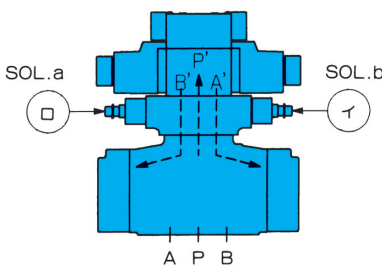
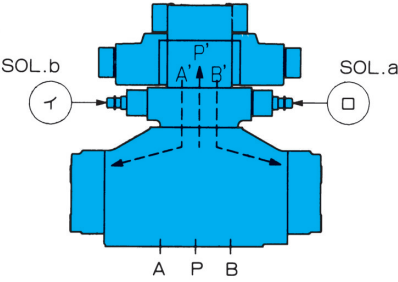
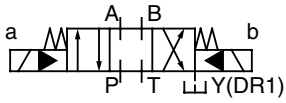
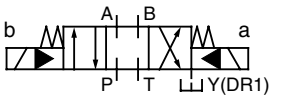
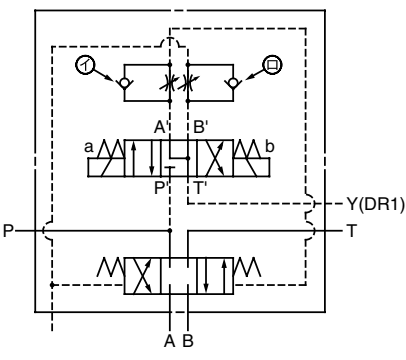
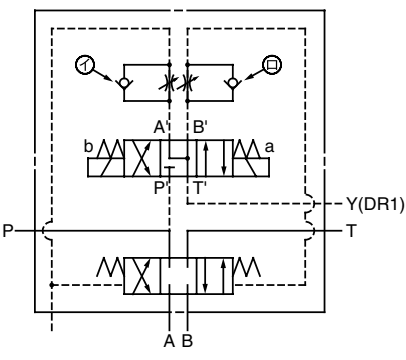
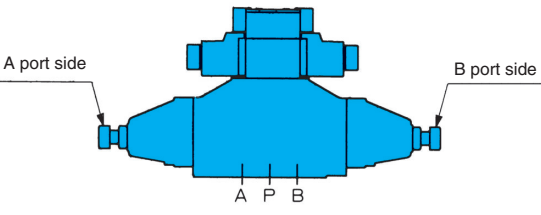
- 1 Pilot pressure values show the differential pressure between the pilot port and tank port or drain port. In the case of the pressure center, they show differential pressure between the pilot and drain ports (DR₁, DR₂).
- 2 The standard configuration is internal pilot and external drain, but other configurations are possible when required. See page E-45 for more information.
- 3 For the PT mounting type DSS (DSA)-G**-C7*-**-22, open cross over with

restrictor C7Y is standard.

- 4 When adjustable spool stroke is desired, specify L in the auxiliary symbol position of the model number. Note, however, that this is not available with the pressure center type.
- 5 When using a detent type (E3*), use constant energization in order to securely maintain the switching position.
- 6 Use of the pressure center type is recommended for large-volume flow control.
- 7 For the all ports open center type (A3Z,

E3Z, C4, D4), PT mounting type (C7X, C7Y, D7X, D7Y), and PAT mounting type, use the type with built-in external pilot pressure check valve.

- 8 The coil surface temperature increases if this valve is kept continuously energized. Install the valve so there is no chance of it being touched directly by hand.

Valve Model Number	DSS(DSA)-G04	DSS(DSA)-G06
Front Position		
Simplified Symbols		
Detailed Symbols		
Flow Regulator Adjusting Screw Positions	A Port Restrictor: Right side A B Port Restrictor: Left side B	A Port Restrictor: Left side A B Port Restrictor: Right side B
Adjustable Stroke Adjusting Screw Positions	<p>A Port Side: P→A, B→T flow rate adjustment (For C7Y, P→B, A→T) B Port Side: P→B, A→T flow rate adjustment (For C7Y, P→A, B→T)</p> 	

Understanding Model Numbers

DSS - G 06 - C 7 Y C - **R* - C2 - 22

Design number

Power supply

C: AC (50/60Hz) C1=AC100V C115=AC110V C2=AC200V C230=AC220V
 D: DC D1=DC12V D2=DC24V
 E: AC (Built-in rectifier; 50/60Hz)
 E1=AC100V E115=AC115V E2=AC200V E230=AC230V

Auxiliary symbol (For multiple specifications, use alphabetic sequence.)

A: Internal drain
 E: External pilot
 L: Spool stroke limiter
 P: Flow regulator valve to restrict P port
 Y: With meter-out flow regulator valve
 R: With indicator light
 N: With manual lock
 G: Surgeless type
 Q: Quick return type

Pilot pressure check valve

None: No check valve
 C: Built-in check valve

Transition flow path (Specify for *3*, *7* only.)

X: Closed Y: Restrictor open Z: Open

X	Y	Z
Closed	Semi-open	Open

Center valve position flow path

1, 2, 3, 4, 4S,
5, 6, 6S, 7, 8

1	2	3	4	4S	5	6	6S	7	8

Operation Method

A: Spring offset
 E: No-spring detent
 C: Spring center
 D: Pressure center

A	E	C	D
Spring Offset	No-spring detent	Spring Center	Pressure center

Nominal diameter 04 size, 06 size

Mounting method G: Gasket type

Pump Type DSS: Central terminal box solenoid control valve
 DSA: DIN connector type solenoid control valve

Pilot (PP), Drain (DR)

*High Pilot Pressure

Use at pressures that do not exceed 25MPa(255kgf/cm²)

*Internal PP, external DR are Nachi-Fujikoshi standards.

For external PP: Built-in stopper plug (Option E)

For internal DR: Stopper plug modification (Option A)

* Internal DR Precautions

Make sure that the differential pressure between the pilot pressure and tank back pressure is greater than the minimum pilot pressure.

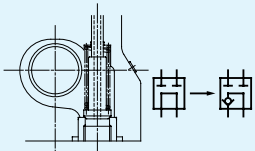
Do not connect any pipe that generates sudden surge pressure.

Built-in Pilot Solenoid Valve

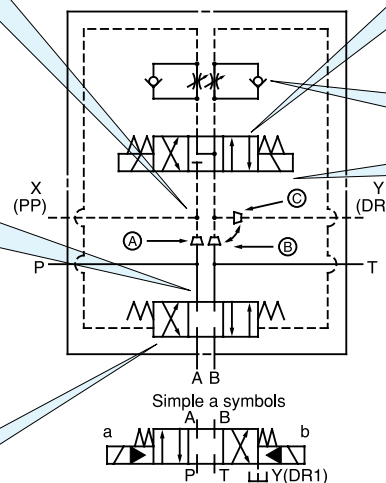
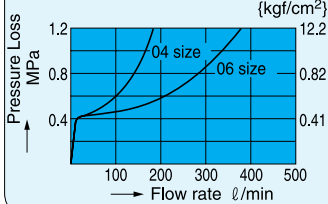
Valve Model Number	For G04	For G06
DSS(DSA)-G**-A**	SS(SA)-G01-A3X	SS(SA)-G01-H3X
DSS(DSA)-G**-E**	SS(SA)-G01-E3X	
DSS(DSA)-G**-C**	SS(SA)-G01-C6	
DSS(DSA)-G**-D**	SS(SA)-G01-C9	

Built-in Pilot Pressure Check Valve

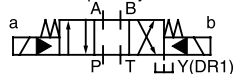
*Like the C7Y, this internal PP type is used in a flow path configuration where maintenance of pilot pressure is required.



Check Valve Pressure Loss



Simple a symbols



Note) Above symbols are for DSS(DSA)-G06.

Flow Regulator Valve

*Rotating the adjusting screw clockwise (rightward) slows the main spool switching speed.

P: Excitation of the solenoid (starting of the actuator) causes a restrictor effect.

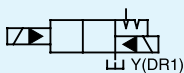
Y: The restrictor effect can be obtained especially when the solenoid is de-excited (actuator stopped).

Pilot Valve Mounting Bolts

Standard	M5 x 45 (four)
Stage 1	M5 x 85 (four)
Stage 2	M5 x 125 (four)
Stage 3	M5 x 165 (four)

(Tightening Torque: 5 to 7N·m[51 to 71kgf·cm])

Detent Type Installation



*Install the valve in a horizontal configuration.
 *Provide constant energization for secure holding.

Adjustable Stroke Type

*Tightening the adjusting screw makes the main spool stroke smaller, which restricts flow.

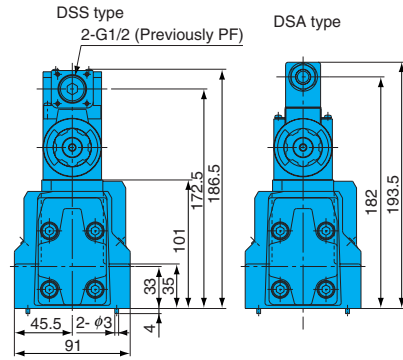
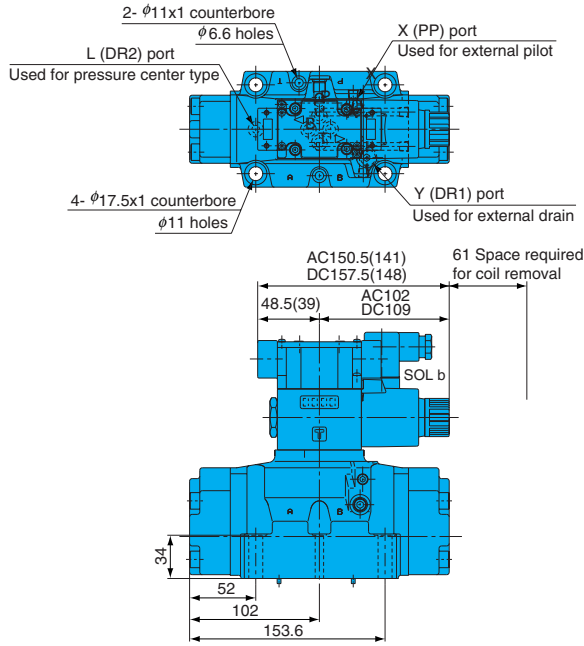
Pressure center

*Use this valve in a high-pressure, large-volume circuit to ensure reliable return of the main spool to the neutral position.

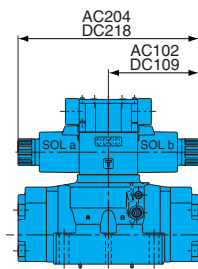
Sub Plate Number

Size	Model No.	Connecting Pipe Diameter	Weight (kgf)
For G04	MDS-04-10	Rc 1/2	4.5
	MDS-04X-10	Rc 3/4	
For G06	MDS-06-30	Rc 3/4	5.2
	MDS-06X-30	Rc1	

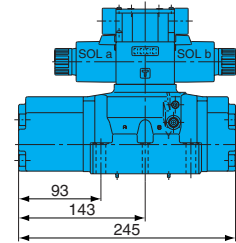
DSS(DSA)-G04-A**-R**-22
(Spring Offset Type)



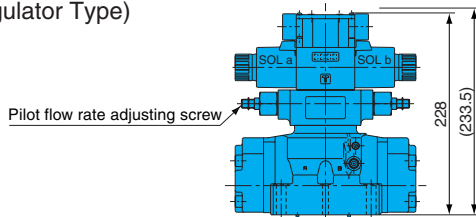
DSS(DSA)-G04-E**-R**-22
C
(No-spring Detent Type)
(Spring Center Type)



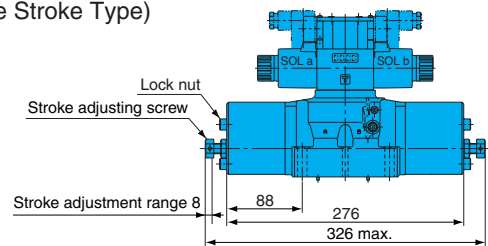
DSS(DSA)-G04-D**-R**-22
(Pressure Center Type)



DSS(DSA)-G04-E**-R**-22
C
D
(Flow Regulator Type)



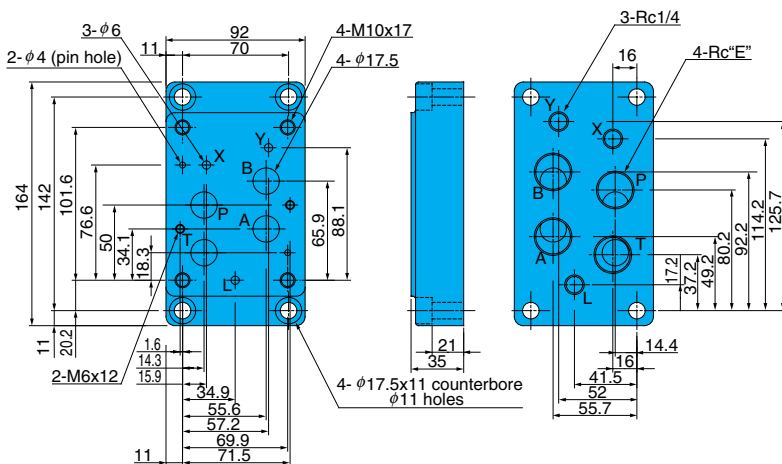
DSS(DSA)-G04-E**-LR**-22
C
(Adjustable Stroke Type)



Dimensions in the parentheses are for the DSA-G04-***-21.

Gasket Surface Dimensions

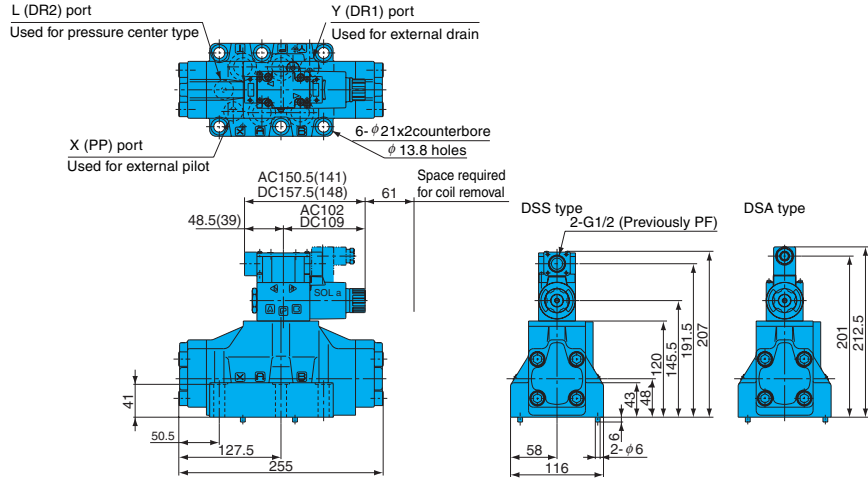
(ISO 4401-07-06-0-94
JIS B 8355 D-07-06-0-94)



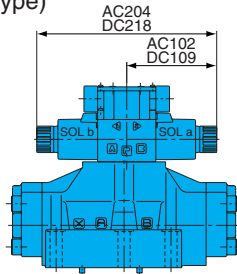
For sub plate DSS (DSA) -G04

Model No.	E	Weight
MDS-04-10	1/2	4.5kg
MDS-04X-10	3/4	

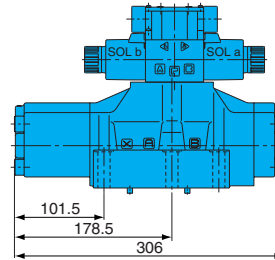
DSS(DSA)-G06-A**-R**-22
(Spring Offset Type)



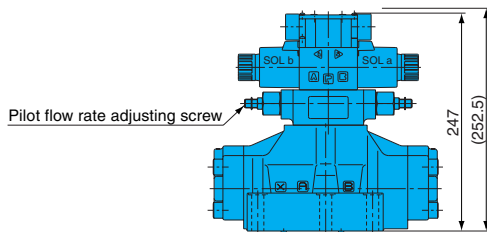
DSS(DSA)-G06-^E_C** -R**-22
(No-spring Detent Type)
(Spring Center Type)



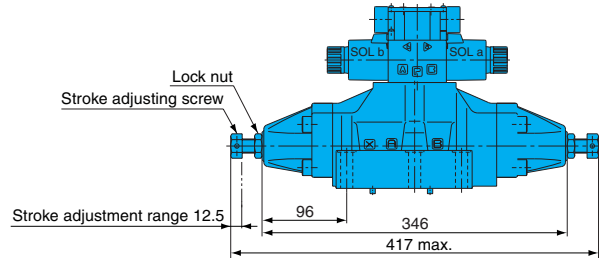
DSS(DSA)-G06-D**-R**-22
(Pressure Center Type)



DSS(DSA)-G06-^A_C** -R^D-22
(Flow Regulator Type)



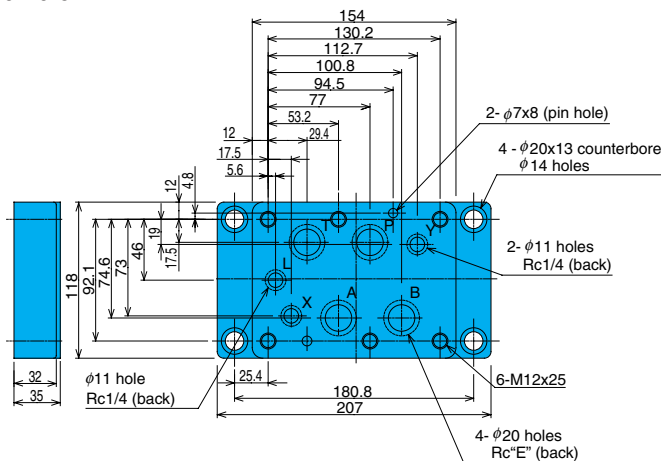
DSS(DSA)-G06-^A_C** -LR**-22
(Adjustable Stroke Type)



Dimensions in the parentheses are for the DSA-G06-***-RY**-21.

Gasket Surface Dimensions

(ISO 4401-08-07-0-94
JIS B 8355 D-08-07-0-94)



For sub plate DSS (DSA) -G06

Model No.	E	Weight
MDS-06-30	3/4	5.2kg
MDS-06X-30	1	

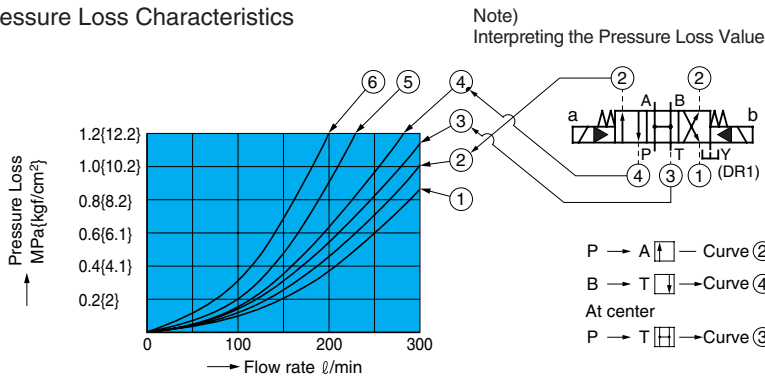
Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

DSS(DSA)-G04

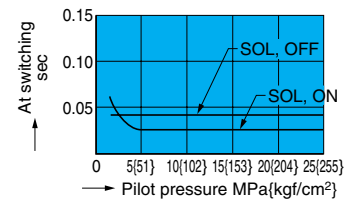
Model No.	JIS Symbol	Pressure - Flow Rate Allowable Value	Model No.	JIS Symbol	Pressure - Flow Rate Allowable Value
2-Position Spring Offset Type	DSS(DSA) -G04 -A3X-		2-Position Spring Offset Type	DSS(DSA) -G04 -E3X-	
	-A3Z-			-E3Z-	
	-A3Y-			-E3Y-	
3-Position Spring Center Type	DSS(DSA) -G04 -C1-		3-Position Spring Center Type	DSS(DSA) -G04 -D1-	
	-C2-			-D2-	
	-C5-			-D5-	
	-C6-			-D6-	
	-C6S-			-D6S-	
	-C4S-			-D4S-	
	-C4-			-D4-	
	-C8-			-D8-	
	-C7X- -C7Y-			-D7X- -D7Y-	

Pressure Loss Characteristics



Switching Response Time

Model No. : DSS-G04-C5
Voltage Symbol : C1 (AC Solenoid)

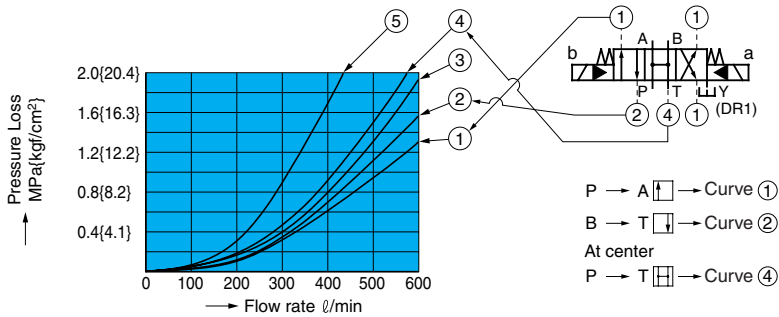


Solenoid Valve

Model No.	JIS Symbol	Pressure - Flow Rate Allowable Value	Model No.	JIS Symbol	Pressure - Flow Rate Allowable Value
2-Position Spring Offset Type					
DSS(DSA) -G06 -A3X-			DSS(DSA) -G06 -E3X-		
-A3Z-			-E3Z-		
-A3Y-			-E3Y-		
3-Position Spring Center Type					
DSS(DSA) -G06 -C1-			DSS(DSA) -G06 -D1-		
-C2-			-D2-		
-C5-			-D5-		
-C6-			-D6-		
-C6S-			-D6S-		
-C4S-			-D4S-		
-C4-			-D4-		
-C8-			-D8-		
-C7X- -C7Y-			-D7X- -D7Y-		

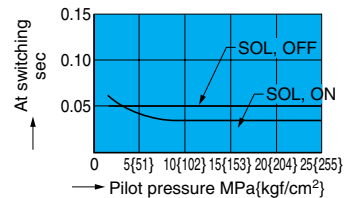
Pressure Loss Characteristics

Note)
Interpreting the Pressure Loss Value



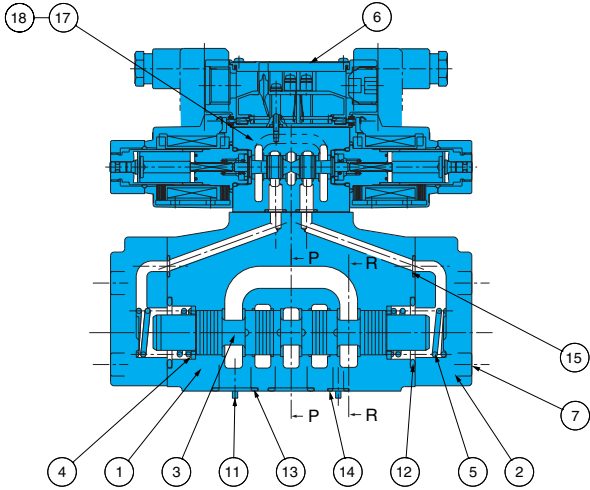
Switching Response Time

Model No. : DSS-G06-C5
Voltage Symbol: C1 (AC Solenoid)

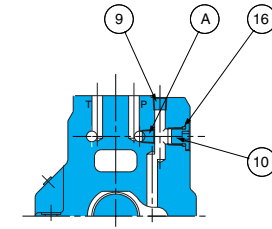


Cross-sectional Drawing

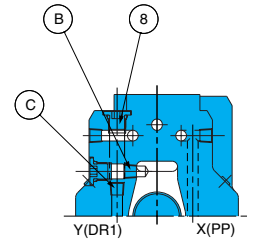
DSS(DSA)-G04-C**-R-C*-22



Pilot, Drain System Change

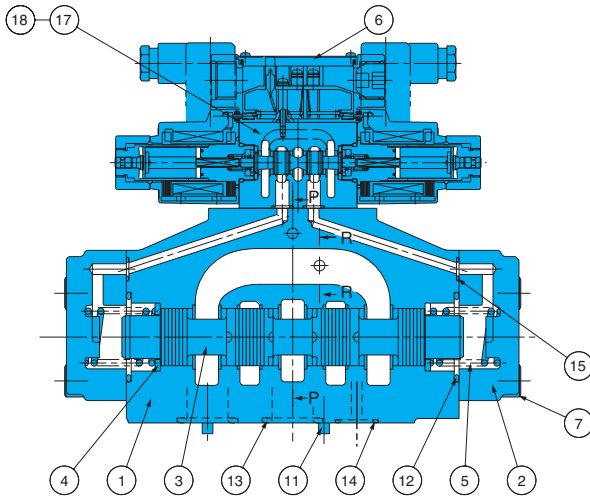


Cross-sectional P-P

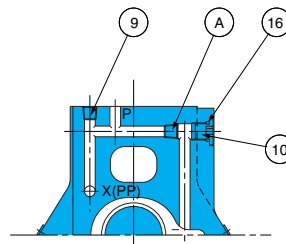


Cross-sectional R-R

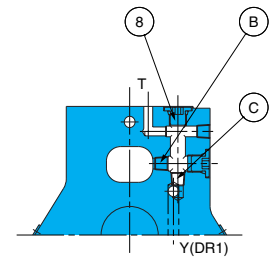
DSS(DSA)-G06-C**-R-C*-22



Pilot, Drain System Change



Cross-sectional P-P



Cross-sectional R-R

Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	8	Plug	14	O-ring
2	Cover	9	Plug	15	O-ring
3	Spool	10	Plug	16	O-ring
4	Ring	11	Pin	17	Solenoid Valves
5	Spring	12	O-ring	18	Screw
6	Nameplate	13	O-ring		
7	Screw				

Changing the Pilot and Drain Connections

After Change		Hexagon Socket Head Plug
Pilot	Internal	Remove from (A).
	External	Insert into (A)
Drain	Internal	Switch from (B) to (C).
	External	Switch from (C) to (B).

Note) A single hex head plug (NPTF 1/16) is required when changing to external pilot.

List of Sealing Parts

Part No.	Part Name	Part Number		Q'ty
		04 size	06 Size	
12	O-ring	1B-P34	1B-G45	2
13	O-ring	1B-P22	1B-P28	4
14	O-ring	1B-P10A	1B-P20	2
15	O-ring	1B-P9	1B-P10	2
16	O-ring	1B-P8	1B-P8	3

Note) 1.O-ring 1A/1B/4D-** indicate JIS Standard B 2401-1A/1B/4D-**. 2.See SS/SA-G01-**-31for information about the seal part for the pilot solenoid valve.

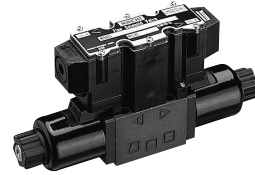
Seal Kit Number

04 size		06 Size	
Single Solenoid	Double Solenoid	Single Solenoid	Double Solenoid
EDBS-04AA-1A	EDBS-04CA-1A	EDBS-06AA-1A	EDBS-06CA-1A

Note) The seal kit includes a seal for the pilot solenoid valve.

Fine Solenoid Valve SF Series

10 to 40 ℓ /min
21MPa



Features

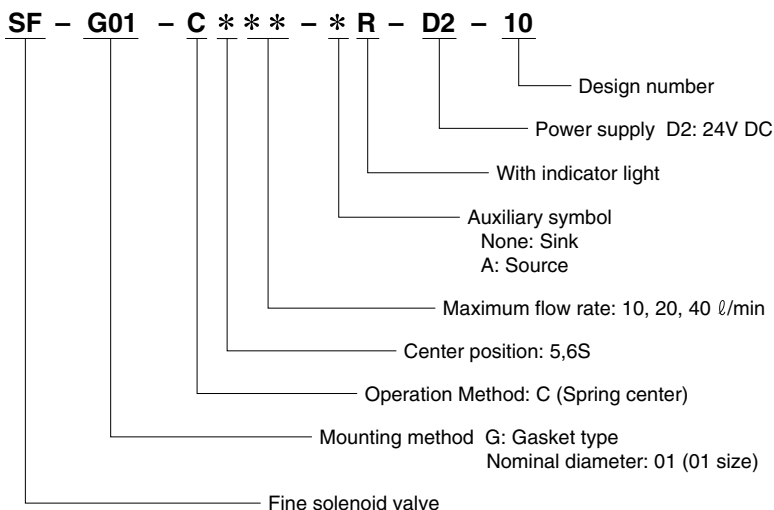
- ① The function of two valves in one
A two-speed controller provides smooth speed adjustment from low speed to high, and from high-speed to low.
- ② Quiet starts and stops
A low-speed startup and stop feature makes startups and stops smooth and soft.
- ③ Separate control of forward and back cylinder movement
There are five volume settings for high-speed flow rate and acceleration/deceleration times that can be independently adjusted SOL.a and SOL.b (ON side, OFF side).

Specifications

Item	Model No. SF-G01 -C*10-D2-10	SF-G01 -C*20-D2-10	SF-G01 -C*40-D2-10
Valve Maximum Operating Pressure MPa(kgf/cm ²)	21(214)		
Maximum Flow Rate ℓ /min(Note1)	10	20	40
High-speed Flow Rate ℓ /min(Note1)	5 to 10	10 to 20	20 to 40
Low-speed Flow Rate ℓ /min(Note1)	0.5 to 4	2 to 8	4 to 16
Maximum Allowable Pressure MPa(kgf/cm ²)	7(71)		
Acceleration/Deceleration Time Adjustment Range SEC	0.1 to 2		
Hysteresis (Note 2)	7%		
Repeatability (Note 2)	3%		
Power Supply Voltage V	D2: 24V DC regulated DC power supply		
Maximum Power Consumption W	36W		
Dust Resistance/Water Resistance Rank	JIS C0920 IP63 (Dust-tight, Rain-proof)		
Ambient Temperature	5 to 50°C		
Operating Environment	Operating Fluid	Temperature Range	5 to 60°C
		Viscosity Range	15 to 300mm ² /s
		Filtration	25 microns or less
Mounting Bolt	Size x Length	M5 x 45 (four)	
	Tightening Torque	5 to 7N-m{51 to 71kgf-cm}	

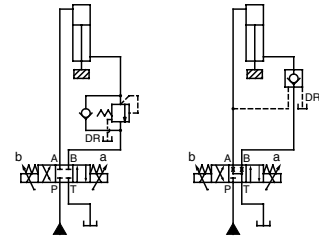
- Note) 1.The above high-speed and low-speed flow rates are obtained with a differential pressure (PA, PB) of 1.0MPa {10.2kgf/cm²}. The flow rates depend on differential pressure.
2.Hysteresis and repeatability values are those at maximum flow rate.
3.For mounting bolts, use 12T or equivalent.
4.Mounting bolts are not included.

Understanding Model Numbers



● Handling

- ① Valve differential pressure
Volume adjustment becomes sensitive when P→A (B) and B(A)→T differential pressure is large. Maintain the pressure differential so it is no greater than 3.5MPa {35.7kgf/cm²}.
- ② Low-speed flow rate
The spool may not move if the low-speed flow rate is below the minimum. Use this valve only within the allowable minimum low-speed flow rate range.
- ③ Deceleration circuit
● Use a C5** spool for the deceleration circuit. Deceleration is difficult with the C6S** spool.
● When large deceleration is required or for a system that uses a vertical cylinder, equip an external drain type counter balance valve. See the illustration below.
- ④ Pilot check circuit
● For a circuit with a pilot check valve, knocking may occur in the pilot check valve due to large load inertia and circuit pressure loss. In cases like this, use an external drain type pilot check valve. See the illustration below.



When large brake pressure is required (Use an external drain type counter valve.)

When there is the possibility of pilot check valve knocking (Use an external drain type pilot check valve.)

⑤ Environmental conditions

- The IC circuit board is located inside the central control box, so care must be exercised concerning water-resistance and ambient temperature.
- Water: Cover the box so there is no direct splashing with water.
- Ambient Temperature: Use in an area where the temperature is 5°C to 50°C.

⑥ Operating Fluid

- Always keep the operating fluid clean. Allowable contamination is class NAS11 or less.
 - Use oil-based hydraulic operating fluid.
 - Contact your agent when you want to use fire-resistant hydraulic fluid.
- (Continued on following page)

7 Note the following points to optimize operation.

(1) Control fluid temperature when using this valve. Since the valve performs restrictor valve control on all processes, temperature differential changes flow volume and acceleration/deceleration time. The recommended temperature range is 30°C to 60°C.

(2) During the positioning operation following deceleration, make sure that sufficient low-speed running is provided following

deceleration before stopping operation. If low-speed operation time is too short can cause stopping during deceleration and shock problems due to fluctuation in load, etc.

Spool Type and JIS Symbols

Spool Type	C5**	C6S**
JIS Symbol		

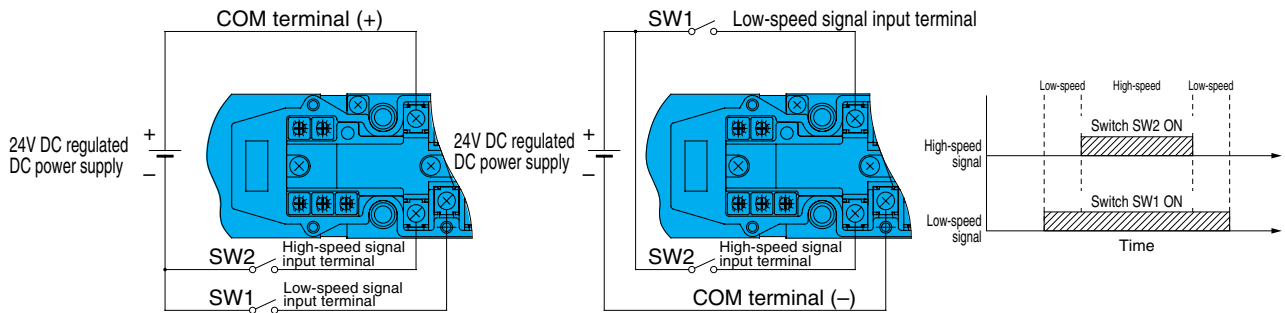
Electrical Wiring

● Sink Type (Auxiliary Symbol: None)

Switches on load and power supply minus side

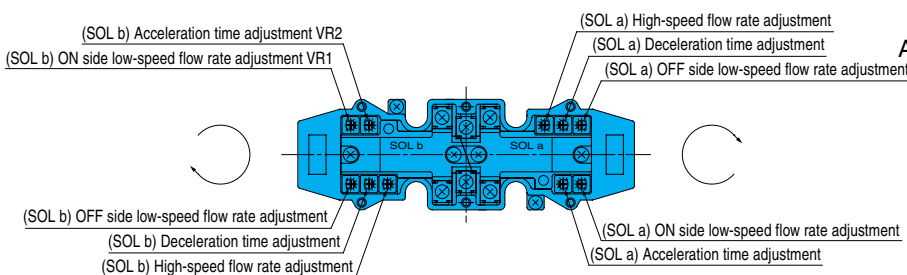
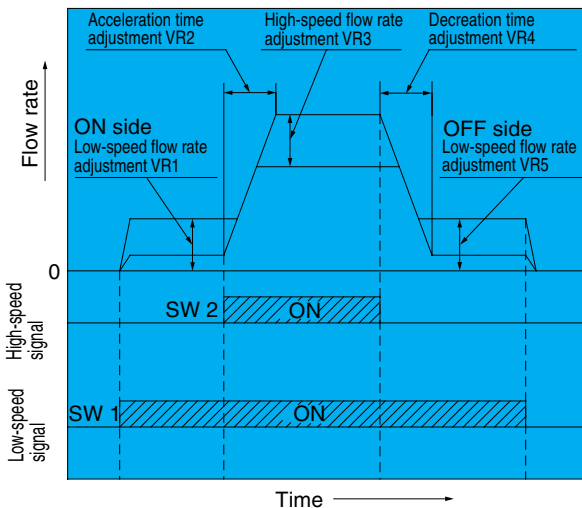
● Source Type (Auxiliary Symbol: A)

Switches on load and power supply plus side



Adjustment Elements

Control Pattern



Electrical Control Precautions

- Do not introduce a high-speed signal prior to a low-speed signal. Make sure the two signals are introduced simultaneously or that the low-speed signal is introduced first.

(1) Repeatedly introducing the high-speed signal first in a source type configuration can damage the IC board.

(2) The valve will not operate on the high-speed signal only.

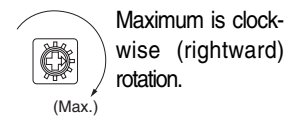
- The following adjustments in the range of VR1 through VR5 can be made independently for SOL.a and SOL.b. You can make adjustments for the best conditions for forward and back operations when considering the cylinder operations.
- Adjustment volume is arranged in from VR1 through VR5 in clockwise (rightward) rotation sequence when viewed from the coil side.
- The following are the factory default volume settings.

VR1 · 2 · 4 · 5

— Minimum setting

VR3 — Maximum setting

All Adjustment VRs

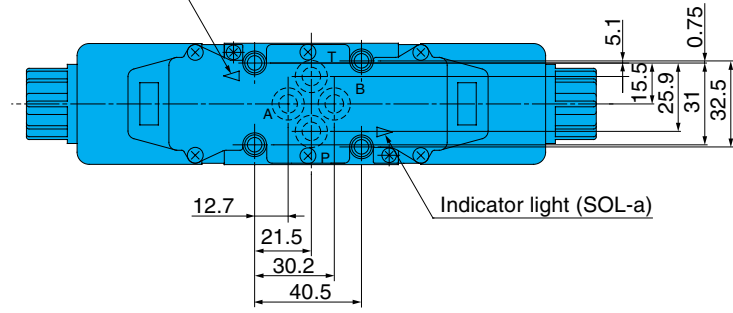


- The volume rotation angle is 270°. Contact your agent about a three-rotation type adjuster for fine adjustment.

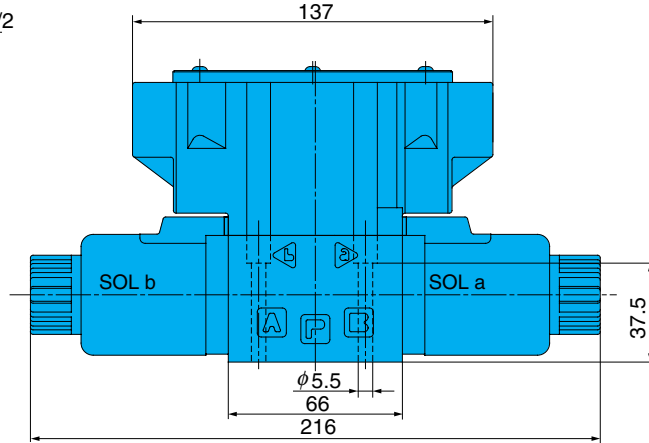
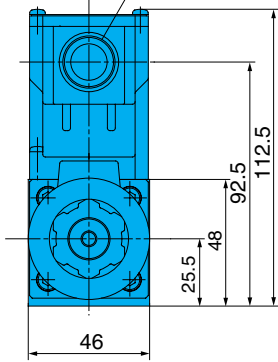
Installation Dimension Drawings

SF-G01-C***-(A)R-D2-10

Indicator light (SOL-b)



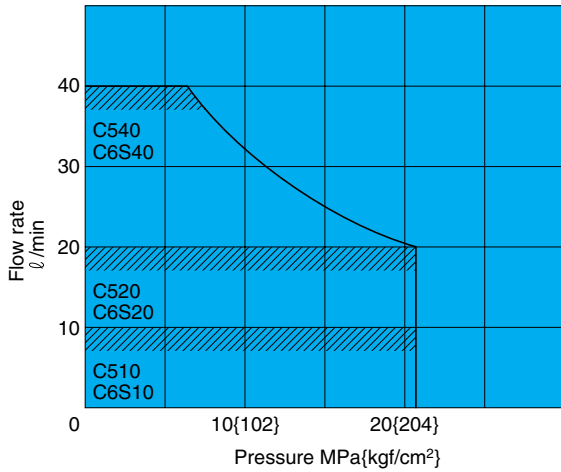
2 to G (Previously PF) 1/2



Performance Curves

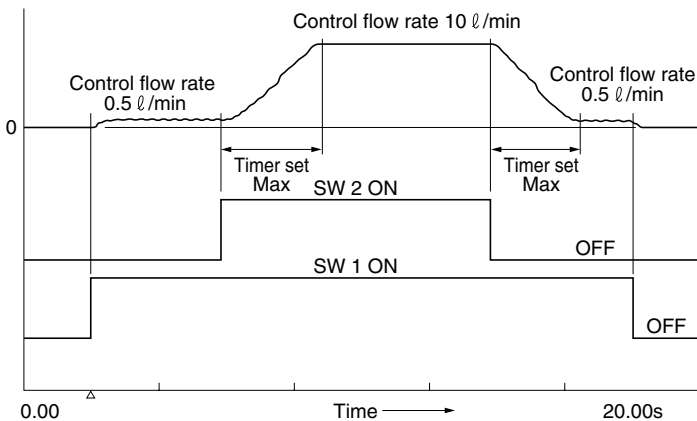
Hydraulic Operating Fluid Viscosity 32mm²/s

● Pressure - Flow Rate Characteristics

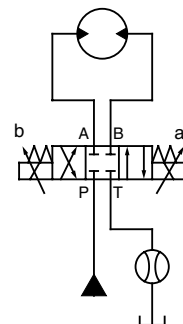


- Use the valve within the allowable flow rate range shown by the graph to the right.
- There are no operational problems within the allowable flow rate range, even when one-pass is used.

● Control Waveform Example

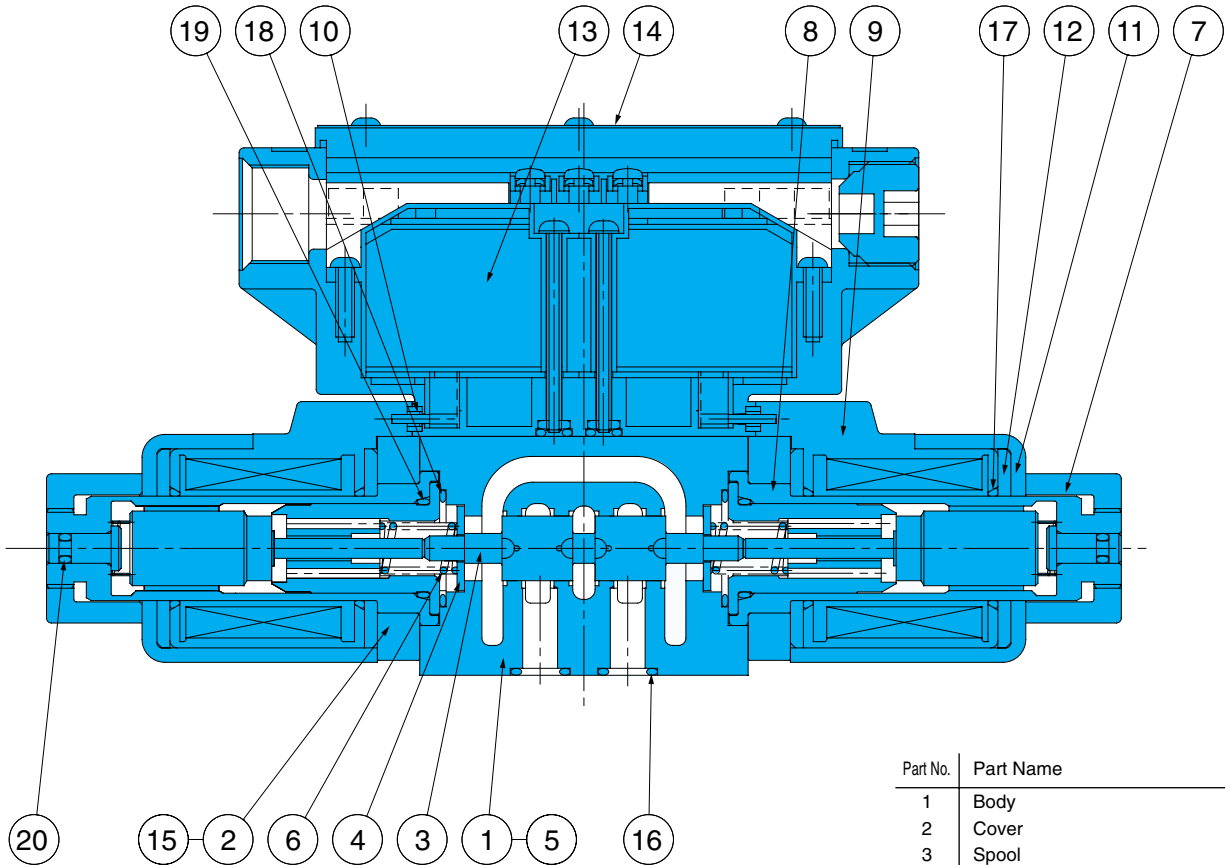


- Valve: SF-G01-C510-R-D2-10
- Supply Pressure: 21MPa{214kgf/cm²}
- Hydraulic Circuit



Cross-sectional Drawing

SF-G01-C***-(A)R-D2-10



Seal Part List (Kit Model Number EFS)

Part No.	Part Name	Type/Part Number	Q'ty
16	O-ring	AS568-012(Hs90)	4
17	O-ring	AS568-019	4
18	O-ring	AS568-019(Hs90)	2
19	O-ring	AS568-017(Hs90)	2
20	O-ring	P3 Note2	2

Note) 1.O-ring 1B-** refers to JIS B 2401-1B-**.
 2.Special fluororubber is used (Part Number: RO-P3-VS).

Part No.	Part Name
1	Body
2	Cover
3	Spool
4	Retainer
5	Spacer
6	Spring
7	Nut
8	Solenoid guide
9	Solenoid coil
10	Packing B
11	Coil case
12	Coil yoke
13	Central terminal box kit
14	Nameplate
15	Hexagon Socket Head Bolt
16	O-ring
17	O-ring
18	O-ring
19	O-ring
20	O-ring



SNH Series Non-leak Type Solenoid Valve

20 to 100 ℓ /min
35MPa



Features

① Virtually no internal leakage

A poppet structure minimizes internal leaks from low pressures to as high as 35MPa {357kgf/cm²}.

Enhanced hydraulic circuit efficiency reduces energy needs.

② Virtually no pressure loss at high volumes

An original fluid reaction force suppression mechanism is provided for all sizes. Though compact, this valve provides the highest level switching capacity for its class.

③ High reliability

Since a wet type solenoid valve is used, the movable iron core remains immersed in oil as it moves, which minimizes switching noise and ensures reliable operation. A wet type valve also provides superior water resistance and longer life than a dry type valve.

④ ISO standard mounting service (01, 03 sizes)

This valve can be ganged together with a modular valve, enabling simple configuration of circuits and an overall compact

device configuration.

⑤ EC connector for improved switching (06 size)

During switching, twice the current (starting current) flows to the coil than normal (holding current), which ensures reliable switching operations. The 06 size has compact configuration made possible by an original design that uses a small coil that provides high output, without the need for a large coil.

Specifications

Model No.		SNH-G01	SNH-G03	SNH-G04	SNH-G06	
JIS Symbol	AR					
	HQ					
	A2K					
Maximum Working Pressure MPa{kgf/cm ² } (P, A, B Ports)		35{357}				
Rated Flow Rate - Maximum Flow Rate ℓ /min		AR,HQ;10-20 A2K; 5-20	20-40	40-60	60-100	
Maximum Changeover Frequency (per minute)		120				
Operating Environment	Dust Resistance/ Water Resistance Rank	JIS C 0920 IP65 (Dust-tight, Waterjet-proof) (Note 2)			IP64 (Dust-tight, Splash-proof)	
	Ambient Temperature	-20 to 50°C				
	Operating Fluid	Temperature Range	-20 to 70°C			
		Viscosity Range	15 to 300mm ² /s			
	Filtration	25 microns or less				
Weight AR/HQ (A2K) kg		1.8 (2.2)	5.2	5.5	6.9	
Mounting bolt	Size x Length	M5 x 45 (Four)	M8 x 70 (Four)	M8 x 70 (Four)	M10 x 75 (Four)	
	Tightening Torque N·m{kgf·cm}	6 to 8 {61 to 81}	30 to 35 {306 to 357}	30 to 35 {306 to 357}	55 to 60 {561 to 612}	

Note) 1. Internal leaking does not exceed 1 droplet/minute (0.05cm³/min).

2. The power supply type for E* is IP64 (dust-tight, splash-proof).

3. For mounting bolts, use 12T or equivalent.

4. Mounting bolts are not included with the 01 size. Bolts are included with the 03, 04, 06 sizes.

● Handling

① Take care so the B port is not subjected to abnormal surge pressure that is in excess of the maximum operating pressure.

② The manual switching (Options M, N) push pin receives B port pressure, so it cannot be pressed with a pressure in excess of about 5MPa {51kgf/cm²}. In the case of the HQ and A2K types, note that leaks are not completely stopped, even in the locked state.

③ Use this valve only within the allowable voltage range.

④ Use of water- or glycol-based hydraulic operating fluid is standard. Contact your agent about using other fire-resistant hydraulic fluid.

⑤ Always keep the operating fluid clean. Allowable contamination is class NAS12 or less.

⑥ In order to realize the full benefits of the wet type solenoid valve, configure piping so oil is constantly supplied to the B port.

⑦ The coil surface temperature increases if this valve is kept continuously energized. Install the valve so there is no chance of it being touched directly by hand.

⑧ Never try to take this valve apart. The cap seal cannot be reassembled without using special tools.

● Solenoid Assembly Specifications

Solenoid Type	Power Supply Type	Voltage (V)	Frequency (Hz)	For SNH-G01				For SNH-G03			
				Solenoid Coil Type	Current (A)	Power (W)	Allowable Voltage Range (V)	Solenoid Coil Type	Current (A)	Power (W)	Allowable Voltage Range (V)
DC with Built-in Rectifier	E1	AC100	50/60	EAC64-E1	0.37	32	90 to 110	EBB64-E1	0.40	34	90 to 110
	E115	AC110	50/60	EAC64-E115	0.31	30	100 to 125	EBB64-E115	0.33	31	100 to 125
		AC115			0.32	32			0.34	34	
	E2	AC200	50/60	EAC64-E2	0.18	32	180 to 220	EBB64-E2	0.22	37	180 to 220
	E230	AC220	50/60	EAC64-E230	0.15	30	200 to 250	EBB64-E230	0.16	30	200 to 250
		AC230			0.16	32			0.17	33	
DC	D1	DC12	—	EAC64-D1	2.5	30	10.8 to 13.2	EBB64-D1	2.6	31	10.8 to 13.2
	D2	DC24	—	EAC64-D2	1.25	30	21.6 to 26.4	EBB64-D2	1.5	36	21.6 to 26.4

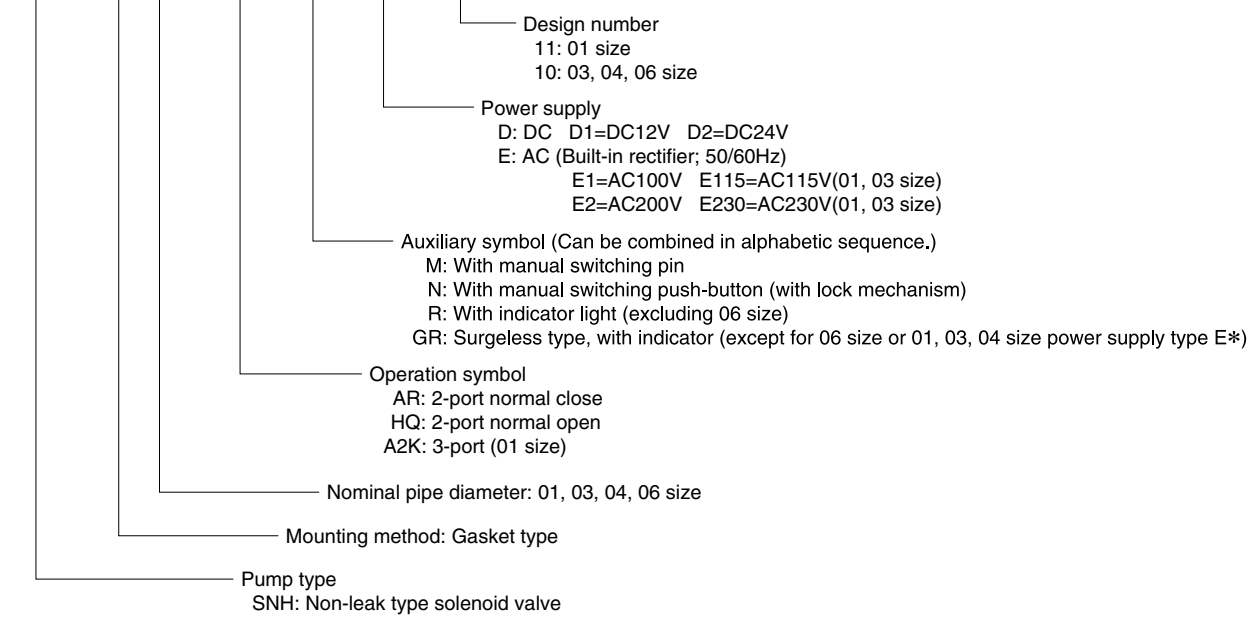
Solenoid Type	Power Supply Type	Voltage (V)	Frequency (Hz)	For SNH-G04			
				Solenoid Coil Type	Current (A)	Power (W)	Allowable Voltage Range (V)
DC with Built-in Rectifier	E1	AC100	50/60	EBB64-E1	0.40	34	90 to 110
	E2	AC200	50/60	EBB64-E2	0.22	37	180 to 220
DC	D2	DC24	—	EBB64-D2	1.5	36	21.6 to 26.4

Solenoid Type	Power Supply Type	Voltage (V)	Frequency (Hz)	For SNH-G06				
				Solenoid Coil Type	Drive Current (A)	Holding Current (A)	Holding Power (W)	Allowable Voltage Range (V)
DC with Built-in Rectifier	E1	AC100	50/60	EBB64-D60	0.71	0.36	33.2	90 to 110
	E2	AC200	50/60	EBB64-D120	0.39	0.19	36.4	180 to 220
DC	D2	DC24	—	EBB64-D17	3.0	1.5	37.4	21.6 to 26.4



Understanding Model Numbers

SNH - G 01 - AR - * - D2 - 11

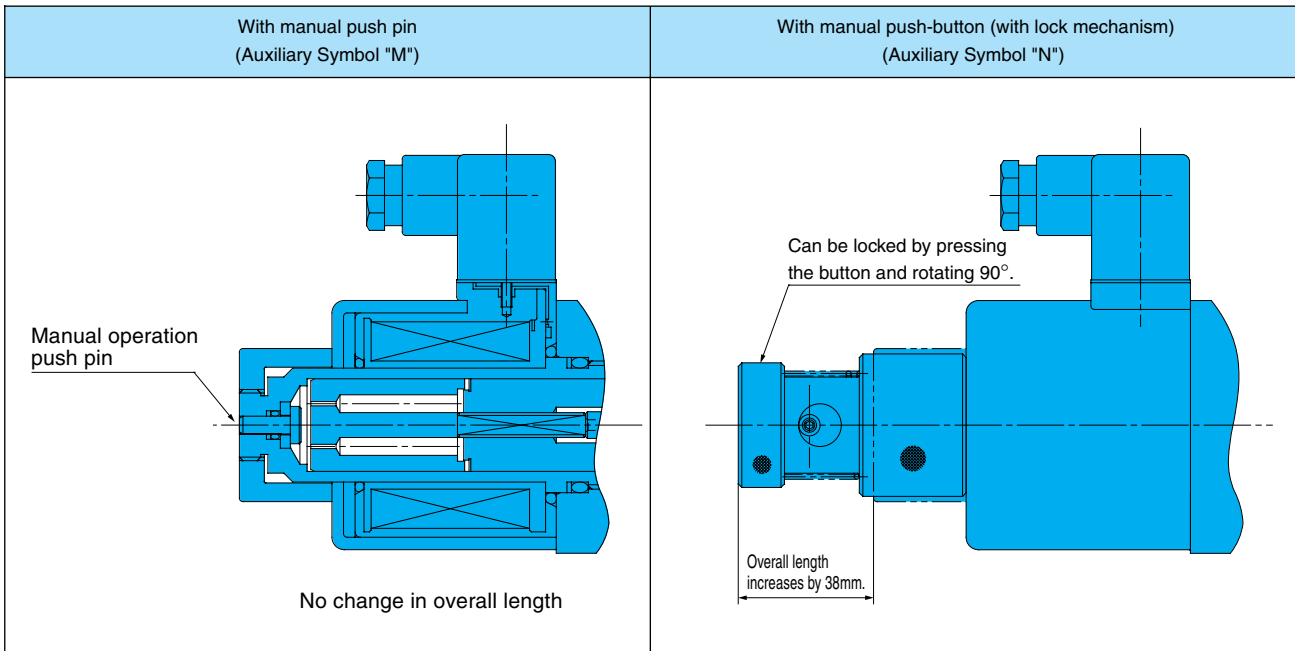


Options

(Auxiliary Symbol)

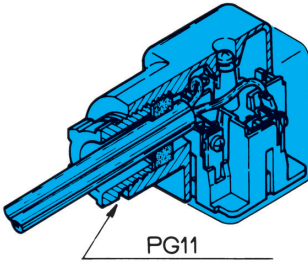
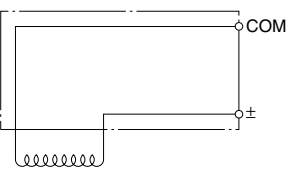
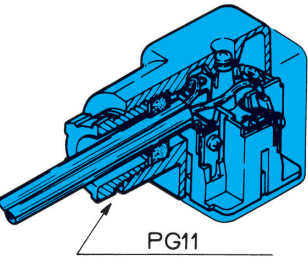
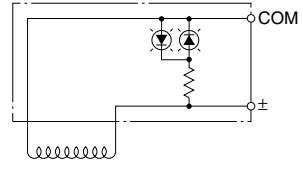
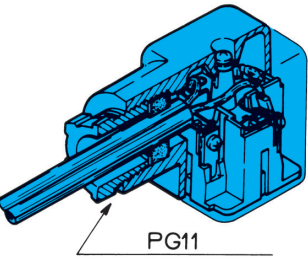
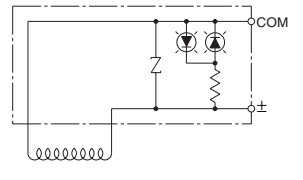
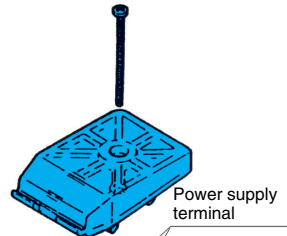
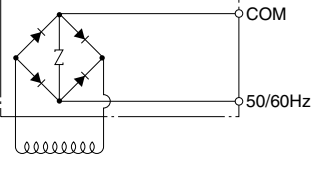
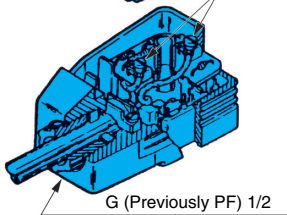
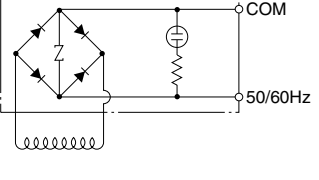
- Select options in accordance with size, as shown in the table to the right.
- (1) The 06 size has an EC connector and a built in surge killer as standard. However, an indicator light is not provided because of space considerations.
- (2) Option N increases the measurement by the size of the pushbutton only.

Size \ Auxiliary symbol	M	N	R	GR
01	○	○	○	○
03	○	○	○	○
04	○	○	○	○
06	○	○	—	—



Electrical Circuits

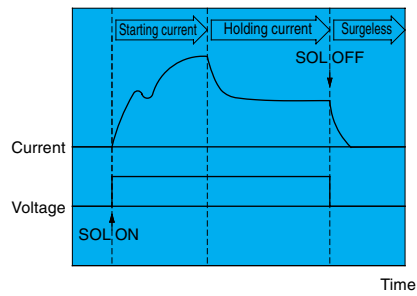
• These electrical circuits are for sizes 01, 03, 04. An EC connector is used for size 06. See the next page for more information.

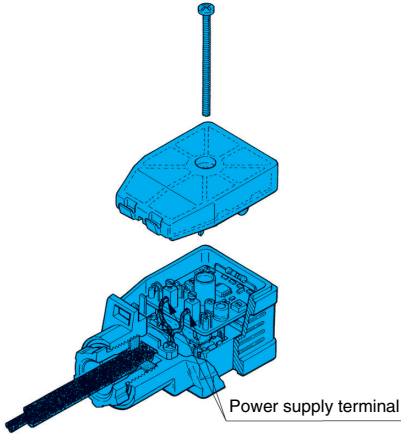
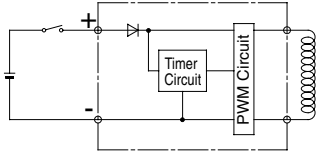
Valve	Connector Type	Wiring	Electrical Circuit Diagram
G01 G03 G04 Size	EA41-1A (Standard for power supply type D*)	 <p>PG11</p>	<p>Connect the power supply to terminals No.1 and No. 2. The ⊕ terminal is ground. Use this terminal as required.</p> 
	EA41-DR1/2-1C (D* option: R)	 <p>PG11</p>	<p>Connect the power supply to terminals No.1 and No. 2. The ⊕ terminal is ground. Use this terminal as required.</p> 
	EA41-GRD1/2-1C (D* option: GR)	 <p>PG11</p>	
	EA42-1B (For power supply type E*)	 <p>Power supply terminal</p>	<p>Connect the power supply to the terminals on the board. When ground connection is required, remove the board and use the ⊕ terminal. In this case, do not connect the power supply to the No. 1 and No. 2 terminals.</p> 
EA42-R1/2-1B (E* option: R)	 <p>G (Previously PF) 1/2</p>		

- Note) 1.Connector types 1 and 2 indicate voltage. (1: 100V AC or 12V DC; 2: 200V AC or 24V DC)
 2.Use a connector cord with a diameter that is in the range of $\phi 8$ to $\phi 10$.
 3.The orientation of the connectors can be changed in 90° increments by modifying the terminal block.
 4.The cover cannot be removed unless the installation screws are removed.
 5.Use an M3 type as a solderless terminal.
 6.Tighten the M3 screws that secure connectors and terminals to a torque of 0.3 to 0.5Nm (3 to 5.1kgf-cm).

● 06 Size EC Connector

SNH-G06 provides large switching power, so an EC connector is used. During switching, this EC connector supplies twice the current (starting current) that normally flows to the coil (holding current), and drops the current back to normal after switching is complete.

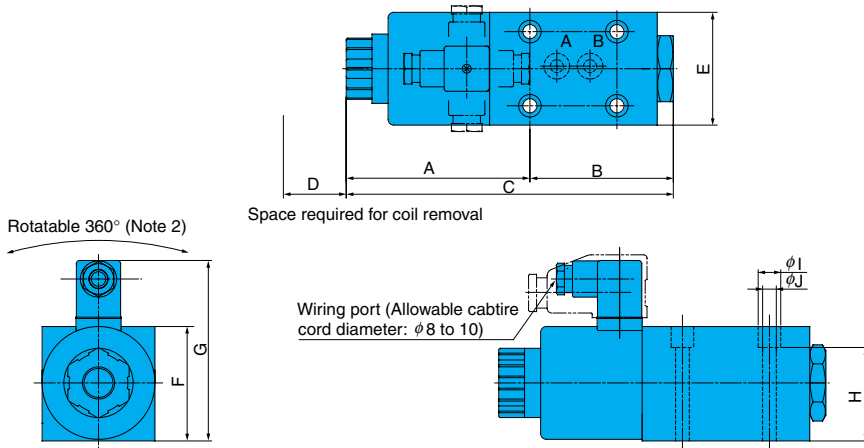


Valve	Connector Type	Wiring	Electrical Circuit Diagram
06 Size	Surgeless Type (24V DC) EC Connector EN41 – 06D2	 <p>Power supply terminal</p>	 <p>Note that correct polarity must be maintained with the power supply.</p>
	Built-in Rectifier EC Connector EN41 – 06E1/E2		<p>Connect the power supply to the terminals on the board. When ground connection is required, remove the board and use the ⊕ terminal. In this case, do not connect the power supply to the No. 1 and No. 2 terminals. Round type, Y type, and other solderless terminals cannot be used.</p>

Note) The orientation of the EN41-06** connector cannot be changed at 90° intervals by modifying the terminal block.

Installation Dimension Drawings

SNH-G**-AR**-**₁₁
10

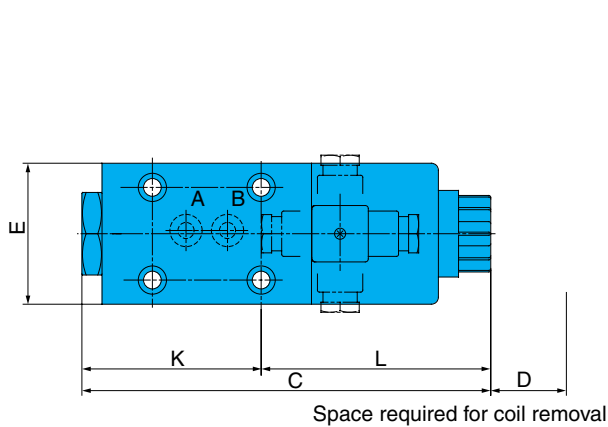


Dimension Table

Size	A	B	C	D	E	F	G(Note) ₂	H	I	J
01	100	60.5	160.5	60.5	46	48	91 (94.5)	37.5	9	5.5
03	114	89	203	63	70	72	112 (115.5)	58	14	8.5
04	132	71	203	63	75	71	112 (115.5)	58	14	8.5
06	137	82	219	63	85	71	115.5	60	18	11

- Note) 1. The 01, 03, 04 size power supply type E* allows rotation at 90° intervals, but the 06 size cannot be rotated.
 2. Values in parentheses are for 01, 03, 04 size power supply type E*.
 3. The P and T ports of the 01, 03 sizes do not have O-ring grooves, so if the manifold has P and T ports, use end plates to close off the valve P and T ports. Contact your agent for information about end plates.

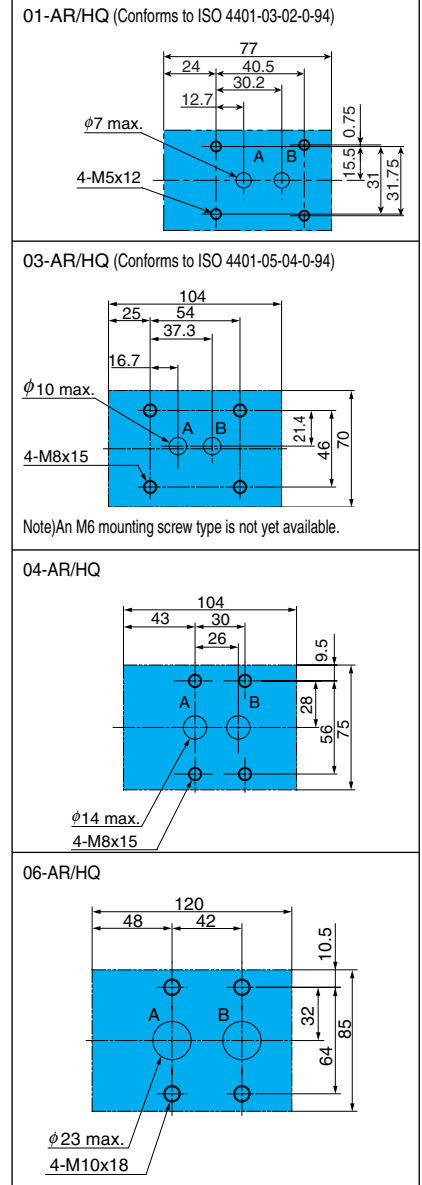
SNH-G**-HQ**-**₁₁
10

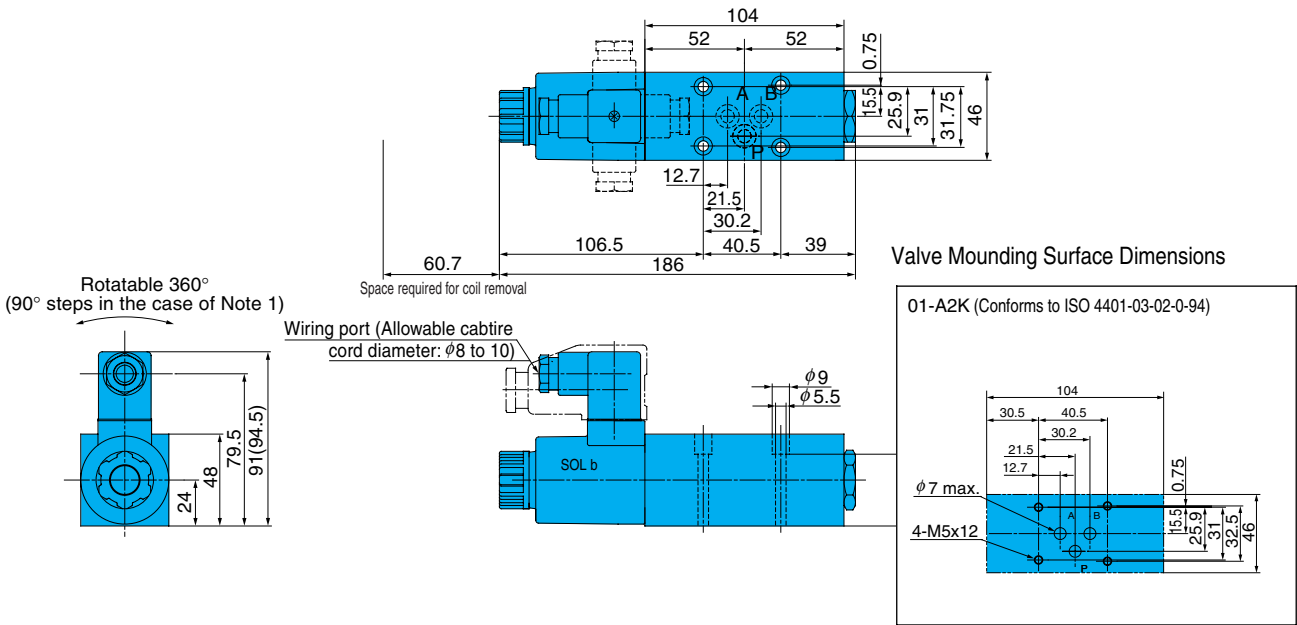


Dimension Table

Size	C	D	E	F	G(Note) ₂	K	L
01	160.5	60.5	46	48	91 (94.5)	70.5	90
03	203	63	70	72	112 (115.5)	89	114
04	203	63	75	71	112 (115.5)	83	120
06	219	63	85	71	115.5	100	119

Valve Mounting Surface Dimensions





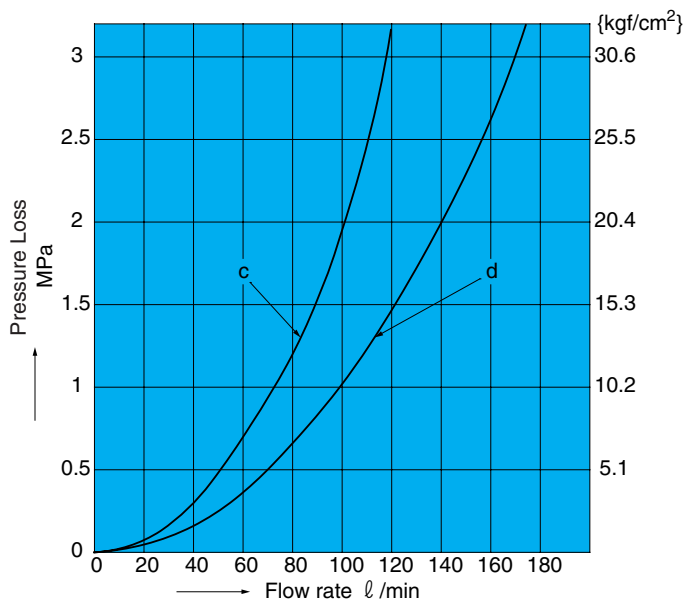
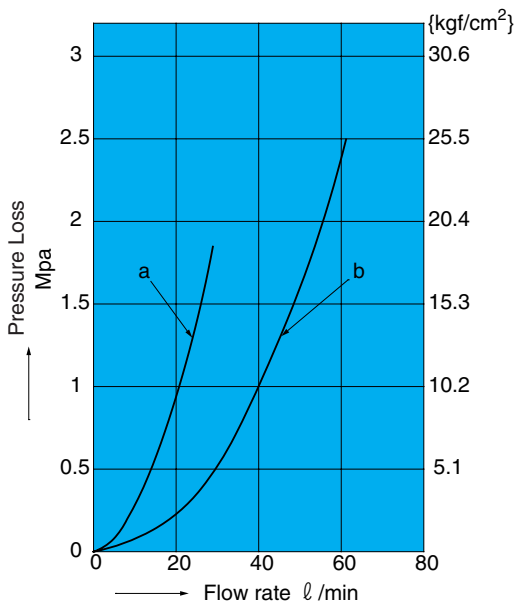
Note) 1. Power supply type E* allows rotation at 90° intervals.
2. Values in parentheses are for power supply type E*.

Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

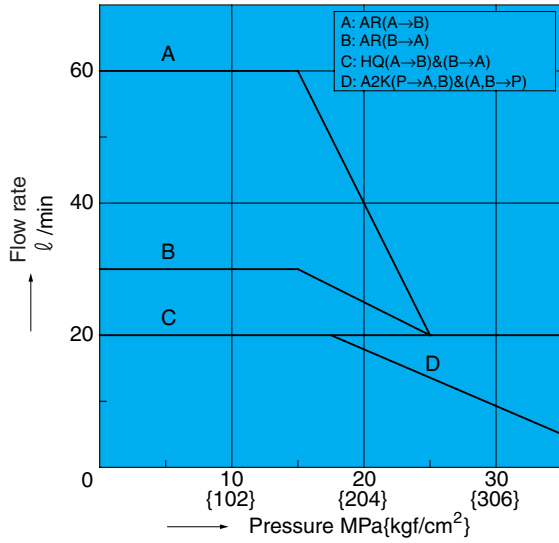
Pressure Loss Characteristics

Flow Path \ Size	01	03	04	06
A↔B	a	b	c	d
P↔A, P↔B	a	—	—	—

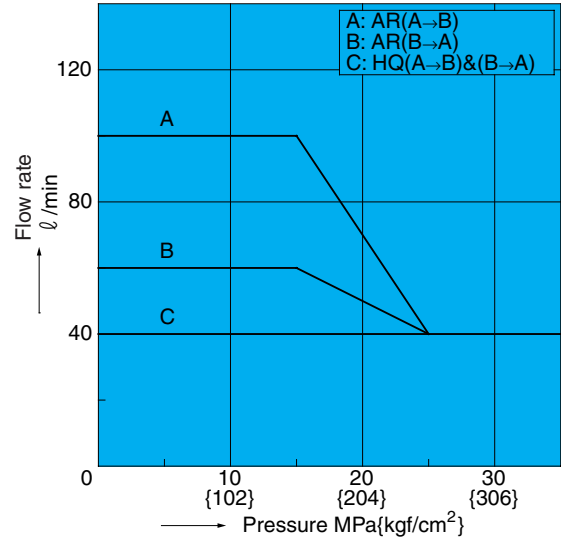


Pressure - Flow Volume Allowable Value

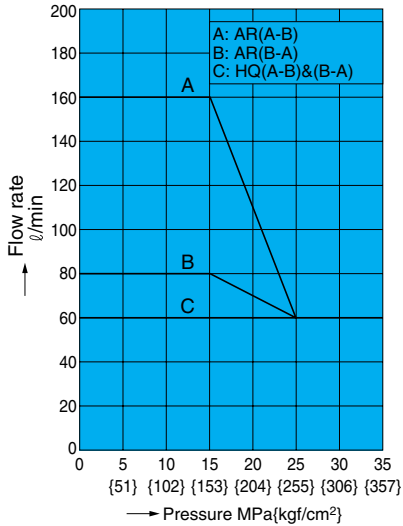
G01 Size



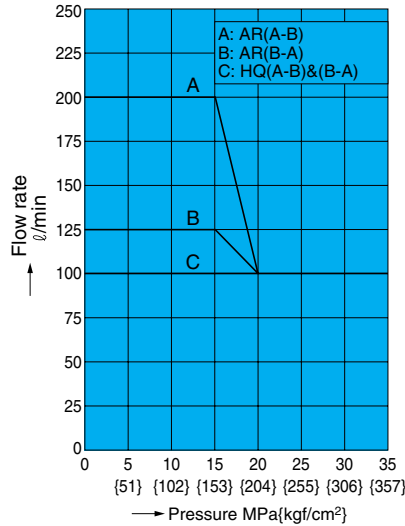
G03 Size



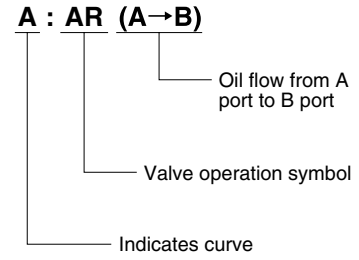
SNH-G04-AR/HQ



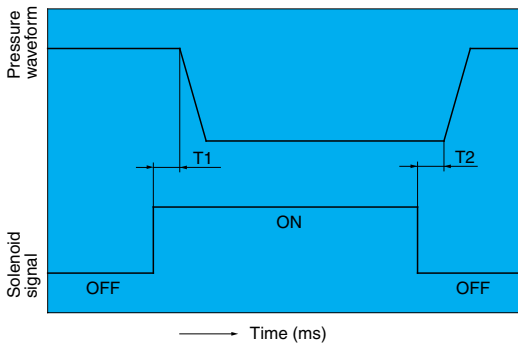
SNH-G06-AR/HQ



Note) Available flow rate values depend on pressure and fluid flow direction. The following shows how to read the data.



Switching Response Time



Pressure : 35MPa{357kgf/cm²}

Flow Rate : 01 : 20 l/min

03 : 40 l/min

04 : 60 l/min

06 : 100 l/min

Operating Fluid : ISO VG68

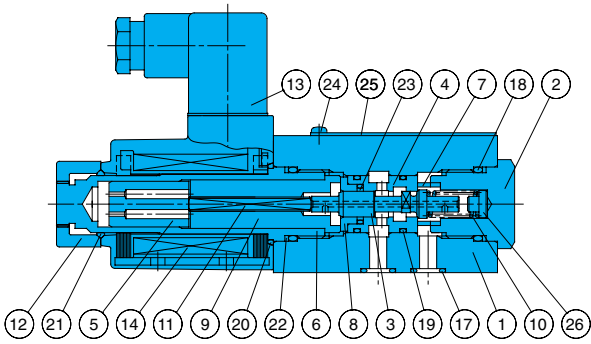
Size	Power supply	Response Time (sec)	
		T1(ON)	T2(OFF)
01	D*	0.03 to 0.05	0.04 to 0.06
	E*	0.04 to 0.06	0.08 to 0.10
03	D*	0.06 to 0.08	0.04 to 0.06
	E*	0.07 to 0.09	0.08 to 0.10
04	D*	0.09 to 0.11	0.06 to 0.08
	E*	0.12 to 0.14	0.14 to 0.16
06	D*	0.04 to 0.06	0.06 to 0.08
	E*	0.09 to 0.11	0.14 to 0.16

Note) The switching response time changes slightly with operating conditions (pressure, flow rate, viscosity, etc.)

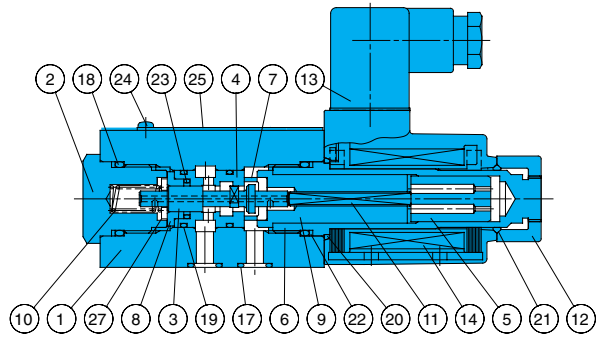


Cross-sectional Drawing

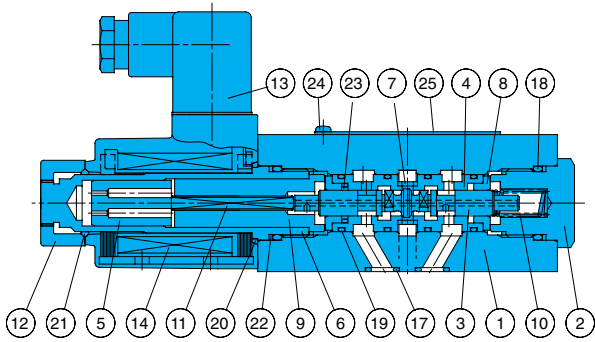
SNH-G01-AR**-11



SNH-G01-HQ**-11



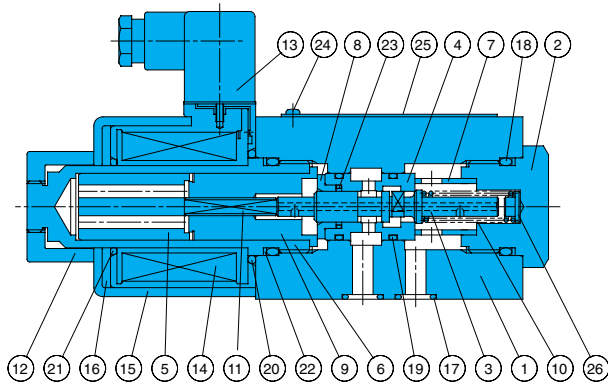
SNH-G01-A2K**-11



Part No.	Part Name	Part No.	Part Name
1	Body	15	Coil case
2	Plug	16	Coil yoke
3	Poppet	17	O-ring
4	Sleeve	18	O-ring
5	Plunger	19	O-ring
6	Solenoid guide	20	O-ring
7	Ring	21	O-ring
8	Collar	22	Backup ring
9	Solenoid stopper	23	Cap seal
10	Spring	24	Cross recessed head small screw
11	Rod	25	Nameplate
12	Nut	26	Stopper
13	Connector	27	Retainer
14	Solenoid coil		

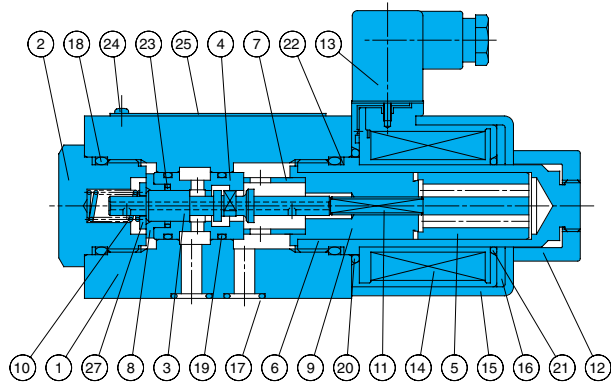
03

SNH-G04-AR**-10
06



03

SNH-G04-HQ**-10
06

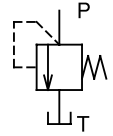


List of Sealing Parts

Part No.	Part Name	01	03	04	06	Qty	
						AR, HQ	A2K
17	O-ring	IB-P9	IB-P12	IB-P16	IB-P28	2	3
18	O-ring	IB-P22	IB-P32	IB-P32	IB-P32	2	2
19	O-ring	AS568-017(HS90)	IB-P22	IB-P24	IB-P26	2	4
20	O-ring	S-25	AS568-029	AS568-029	AS568-029	1	1
21	O-ring	1A-P20	AS568-026	AS568-026	AS568-026	1	1
22	Backup ring	T2-P22	T2-P32	T2-P32	T2-P32	2	2
23	Cap seal	*	*	*	*	1	1

Note) O-ring 1B-** refers to JIS B2401-1B. Backup ring T2 indicates JIS B 2407-T2.

Parts marked by an asterisk "" are not available on the market. Contact your agent for more information.



Relief Valve

20 to 380 ℓ /min
21MPa

Features

- ① Balanced piston relief valve.
- ② Optimum pressure control for hydraulic circuit allows operation as a safety valve.
- ③ A vent port enables remote control of pressure and use of an unloading circuit.

Specifications

Model No.		Nominal Diameter (Size)	Maximum Working Pressure MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	Pressure adjustment range MPa(kgf/cm ²)	Weight kg	
Screw Mounting	Gasket Mounting					T Type	G Type
R-T03- A-12 B-12	R-G03- A-12 B-12	3/8	21{214} P, X (Vent Ports)	20	* to 1{* to 10.2} * to 2.5{* to 25.5}	3.0	4.3
R-T03- 1-12 3-12	R-G03- 1-12 3-12	3/8		80	* to 7{* to 71.4} 3.5 to 21{35.7 to 214}	3.0	4.3
R-T06- 1-20 3-20	R-G06- 1-20 3-20	3/4		170	* to 7{* to 71.4} 3.5 to 21{35.7 to 214}	3.9	5.3
R-T10- 1-20 3-20	R-G10- 1-20 3-20	1 1/4		380	* to 7{* to 71.4} 3.5 to 21{35.7 to 214}	7.7	7.7

Note) See the Flow Rate - Low Pressure characteristics for information about items marked with an asterisk (*).

● Handling

- ① To adjust pressure, loosen the lock nut and then rotate the handle clockwise (rightward) to increase pressure or counterclockwise (leftward) to decrease it.
- ② Make sure that tank port back pressure is no greater than 0.2MPa {2.0kgf/cm²}. For tank piping of the A and B type pressure adjusting ranges, return directly to the tank without connecting any other piping and eliminate back pressure.
- ③ The pressure adjustment range for the high vent type is 1.3MPa {13.3kgf/cm²}. Note that R-T/G03 is not a high vent type.
- ④ When using a relief valve as a safety valve, use a pressure override that is higher than the required circuit pressure.
- ⑤ When using a remote control valve, connect piping to the relief valve port. Pipe capacity can be a source of vibration. Use of thick iron pipe with an inside diameter of no more than 4mm and a connection length of no more than three meters is recommended.
- ⑥ Pressure becomes unstable when at slow control flow rates. Use a flow rate of no less than 8 ℓ /min for the 03, 06 sizes, and 10 ℓ /min for the 10 size. Use a drain type

relief valve in the case of a flow rate that is less than the minimum flow rate.

- ⑦ Use the following table for specification when a sub plate is required.

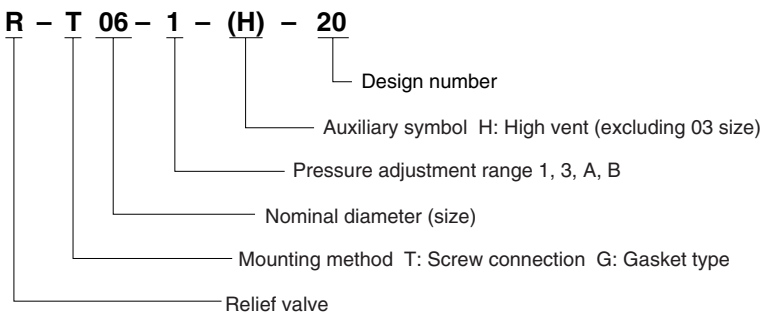
Model No.	Pipe Diameter	Weight kg	Applicable Pump Model
MR-03-10	3/8	1.6	R-G03-*-12
MR-06-20	3/4	3.5	R-G06-*-20
MR-06X-20	1		
MR-10-20	1 1/4	8.5	R-G10-*-20
MR-10X-20	1 1/2		

- ⑧ The following are the bundled mounting bolts.

Model No.	Bolt Dimensions	Qty	Tightening Torque N·m(kgf·cm)
R-G03-*-12	M10 × 75 ℓ	4	45 to 55 {460 to 560}
R-G06-*-20	M16 × 80 ℓ	4	190 to 235 {1940 to 2400}
R-G10-*-20	M20 × 105 ℓ	4	370 to 460 {3770 to 4690}

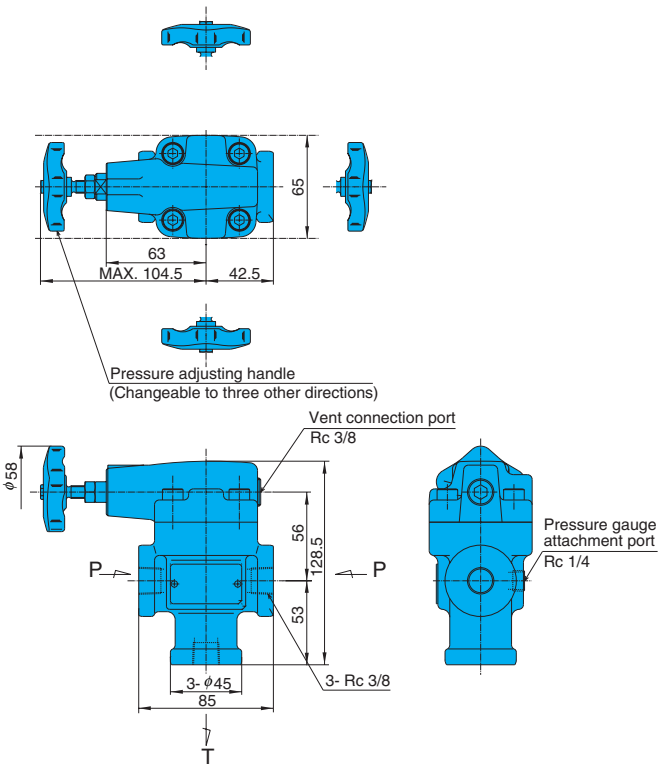
Note) For mounting bolts, use 12T or equivalent.

Understanding Model Numbers

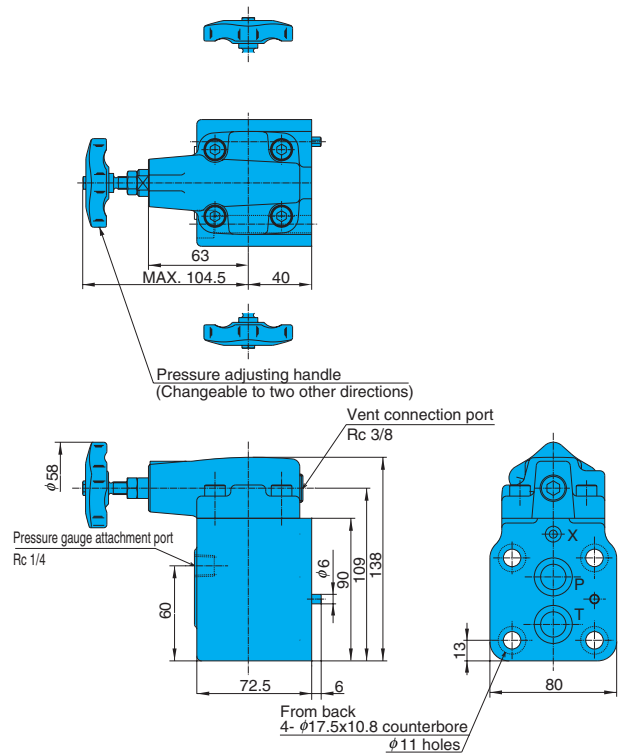


Installation Dimension Drawings

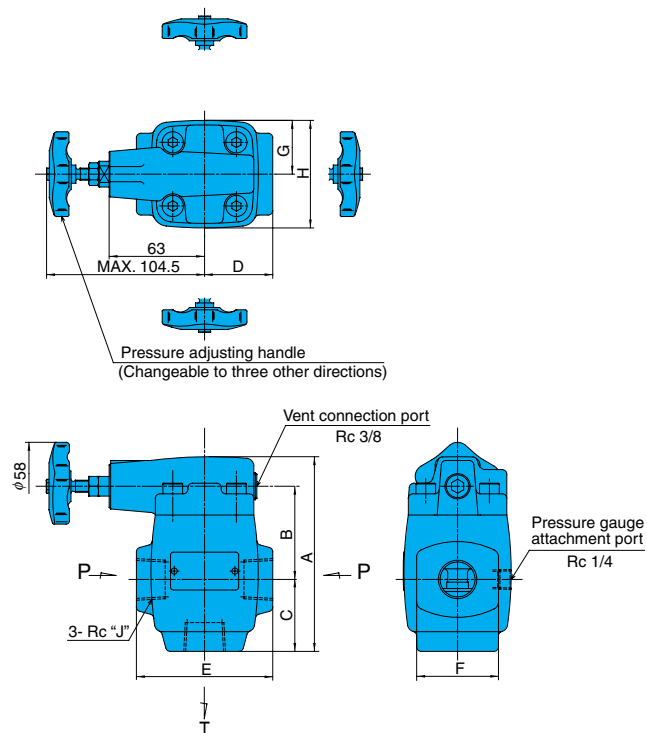
R-T03-*-12 (Screw Mounting)



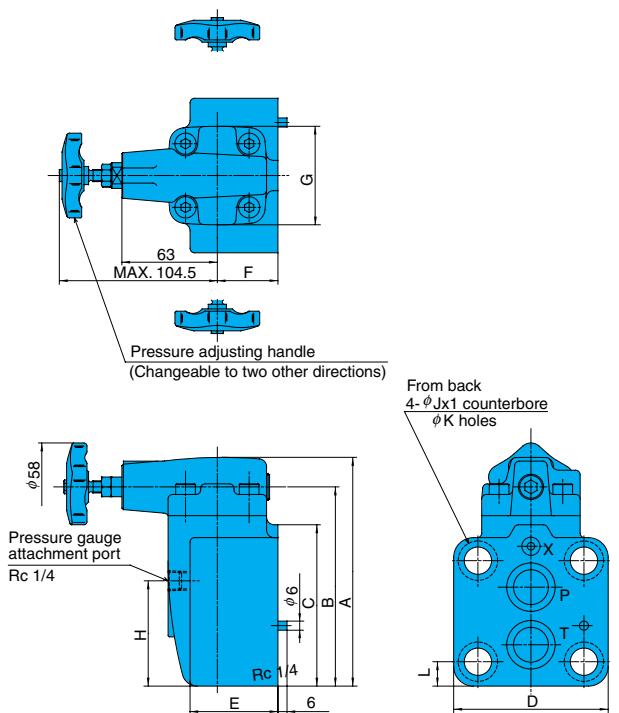
R-G03-*-12 (Gasket Mounting)



R-T**-*-20 (Screw Mounting)

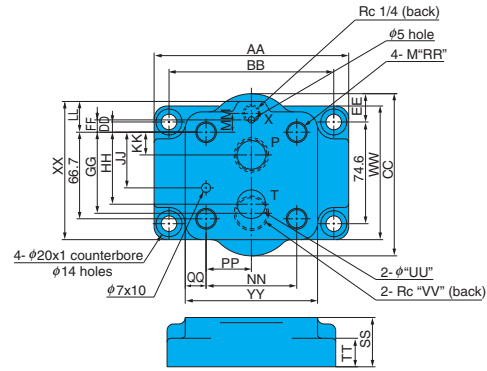
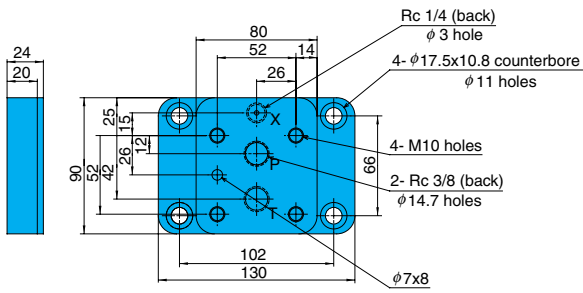


R-G**-*-20 (Gasket Mounting)



Model No.	A	B	C	D	E	F	G	H	J
R-T06-*-20	128.5	61.5	47.5	45	90	54	35.5	71	3/4
R-T10-*-20	153.5	72	62	62.5	125	69	47	94	1 1/4

Model No.	A	B	C	D	E	F	G	H	J	K	L
R-G06-*-20	151	131.5	106.5	102	58	40	65	69.5	26	18	16.1
R-G10-*-20	162.5	143	110	127	80	50	86	70.5	32	22	17.7



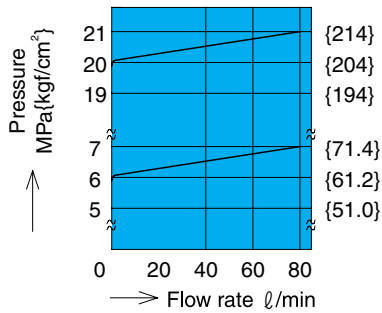
Model No.	Dimensions (mm)																						
	AA	BB	CC	DD	EE	FF	GG	HH	JJ	KK	LL	MM	NN	PP	QQ	RR	SS	TT	UU	VV	WW	XX	YY
MR-06-20	150	127	125	7.9	21.8	9.5	62.5	55.5	42.9	17.5	23.7	14.5	69.9	34.9	16.1	16	38	22	22	3/4	98.5	106.5	102
MR-06X-20																				1			
MR-10-20	175	152.4	150	6.4	39.2	15.9	71.3	58.7	50.8	14.3	25.6	25.9	92.1	46.1	17.5	20	55	22	28.5	1 1/4	102.5	110	127
MR-10X-20																				1 1/2			

Performance Curves

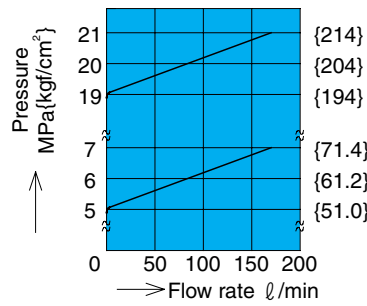
Hydraulic Operating Fluid Viscosity 32mm²/s

Pressure - Flow Rate Characteristics

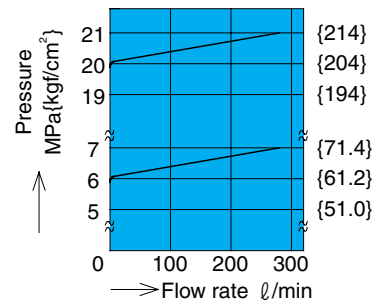
R-*03-**-12



R-*06-**-20

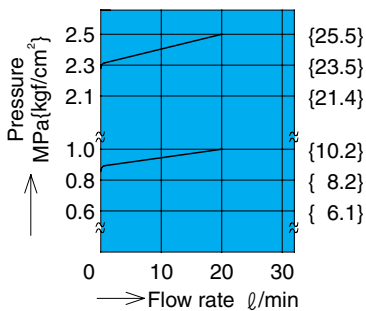


R-*10-**-20

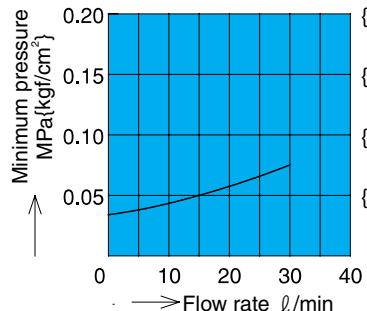


Flow Rate - Minimum Pressure Characteristics

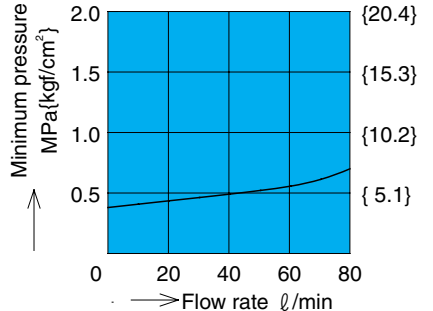
R-*03-^A/_B-12



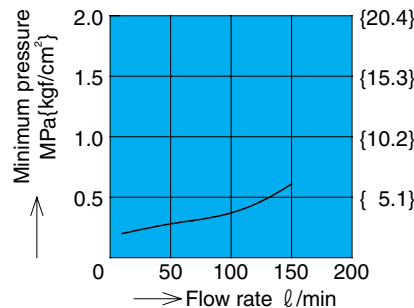
R-*03-^A/_B-12



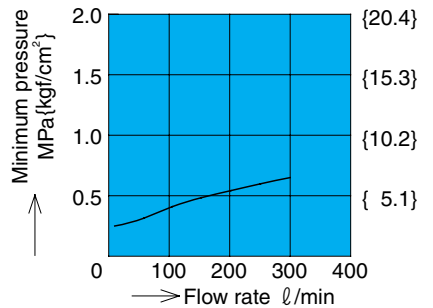
R-*03-1-12



R-*06-1-20



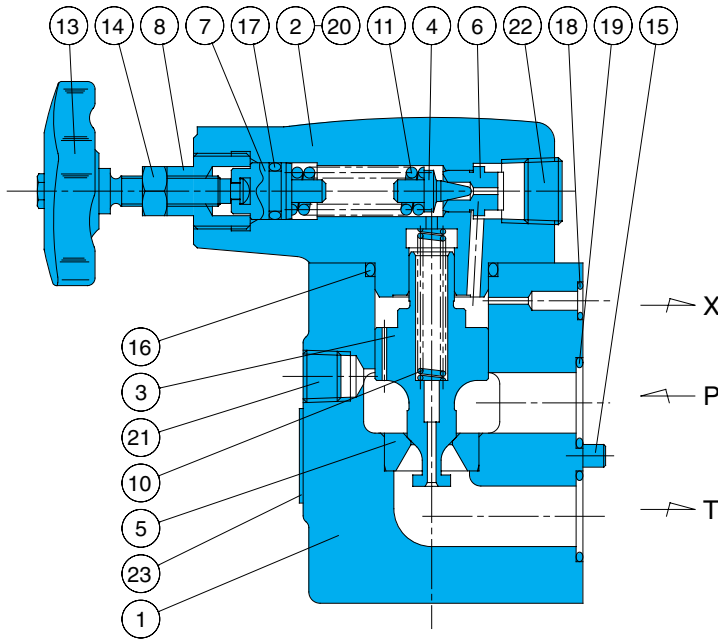
R-*10-1-20



Note) The performance curves do not include T port back pressure.

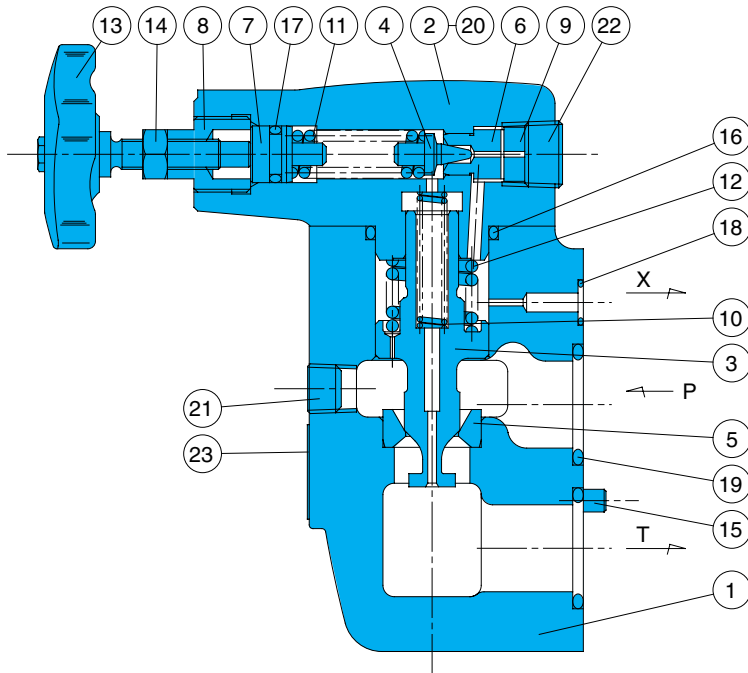
Cross-sectional Drawing

R-G03-^A/_B-12



R-G03-¹/₃-12

R-G^{06 1}/_{10 3}-20



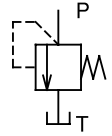
Part No.	Part Name
1	Body
2	Cover
3	Spool
4	Poppet
5	Seat
6	Seat
7	Plunger
8	Retainer
9	Collar
10	Spring
11	Spring
12	Spring
13	Handle
14	Nut
15	Spring pin
16	O-ring
17	O-ring
18	O-ring
19	O-ring
20	Screw
21	Plug
22	Plug
23	Nameplate

Note)
The No. 12 spring is not included when auxiliary symbol H is selected (except with the 03 size).

Seal Part List (Kit Model Number RRS-*** (03 size)
RRBS-*** (06, 10 size))

Part No.	Part Name	Type/Part Number						Q'ty
		R-G03*-12	R-T03*-12	R-G06*-20	R-T06*-20	R-G10*-20	R-T10*-20	
16	O-ring	IB-G30	IB-G30	IB-G30	IB-G30	IB-G40	IB-G40	1
17	O-ring	IA-P11	IA-P11	IA-P11	IA-P11	IA-P11	IA-P11	1
18	O-ring	IB-P7	-	IB-P9	-	IB-P9	-	1
19	O-ring	IB-P20	-	IB-P26	-	IB-G35	-	2

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.
*** in the kit number is used for specification of the valve size (G03, T06, etc.)



RI Series Relief Valve (ISO Mounting, Balanced Piston Type)

40 to 320 ℓ /min
35MPa

Features

- ① High pressure capacity balanced piston relief valve.
- ② Optimum pressure control for hydraulic circuit allows operation as a safety valve.
- ③ A vent port enables remote control of pressure and use of an unloading circuit.
- ④ ISO standard mounting service (see table below).

Specifications

Model No. Gasket Mounting	Nominal Diameter (Size)	Maximum Working Pressure MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	Pressure adjustment range MPa(kgf/cm ²)	Weight kg	Gasket Surface Dimensions
RI-G03-C-20	3/8	35{357} P, X Ports	40	0.15 to 3.5{1.5 to 35.7}	4.5	ISO 6264-AR-06-2-A
RI-G03-1-20 3 5	3/8		150	0.8 to 7{8.2 to 71.4} 3.5 to 25{35.7 to 255} 3.5 to 35{35.7 to 357}	4.5	
RI-G06-1-20 3 5	3/4		320	0.8 to 7{8.2 to 71.4} 3.5 to 25{35.7 to 255} 3.5 to 35{35.7 to 357}	5.6	ISO 6264-AS-08-2-A

● Handling

- ① To adjust pressure, loosen the lock nut and then rotate the handle clockwise (rightward) to increase pressure or counterclockwise (leftward) to decrease it.
- ② Make sure that tank port back pressure is no greater than 0.2MPa {2.0kgf/cm²}.
- ③ For use as a safety valve, use a pressure override that is higher than the required circuit pressure.
- ④ When using a remote control valve, connect piping to the relief valve port. Pipe capacity can cause vibration. Use of thick iron pipe with an

inside diameter of no more than 4mm and a connection length of no more than three meters is recommended.

- ⑤ The following are the bundled mounting bolts.

Model No.	Bolt Dimensions	Qty	Tightening Torque N·m(kgf·cm)
RI-G03-*-20	M12 × 50 ℓ	4	75 to 95 {765 to 970}
RI-G06-*-20	M16 × 60 ℓ	4	190 to 235 {1940 to 2400}

Note) For mounting bolts, use 12T or equivalent.

- ⑥ A small control flow rate can cause pressure instability. Use a control flow rate that is at least 8 ℓ /min.

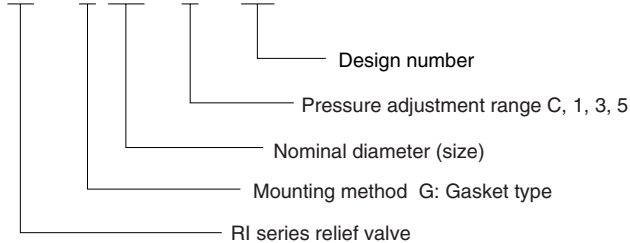
Use a drain type relief valve in the case of a flow rate that is less than the minimum flow rate.

- ⑦ Use the following table for specification when a sub plate is required.

Model No.	Pipe Diameter	Weight kg	Applicable Pump Model
MRI-03-10	3/8	2.6	RI-G03
MRI-03X-10	1/2		
MRI-06-10	3/4	3.5	RI-G06
MRI-06X-10	1		

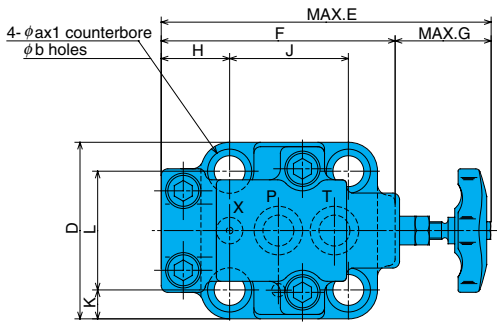
Understanding Model Numbers

RI - G 06 - 1 - 20

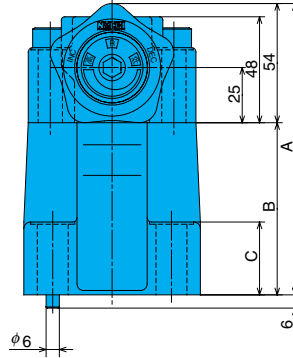
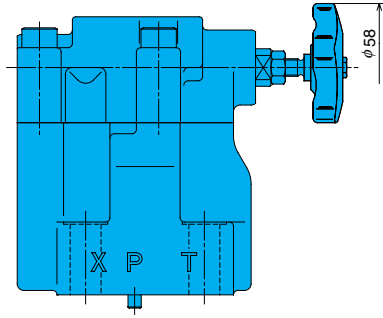


Installation Dimension Drawings

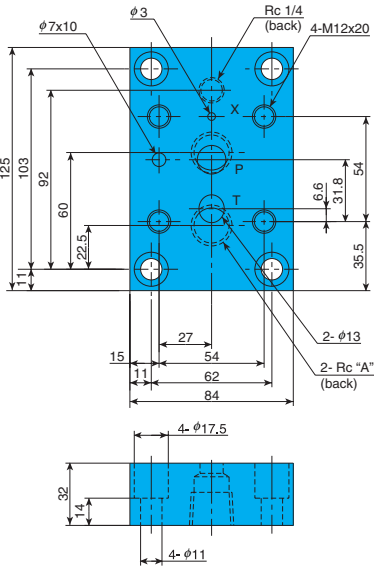
RI-G**-*-20



Model No.	A	B	C	D	E	F	G	H	J	K	L	a	b
RI-G03-*-20	132	78	32	80	149.5	106	43.5	31	53.8	13.1	53.8	20	14
RI-G06-*-20	137	83	36	100	158.5	119	39.5	37	66.7	15	70	26	17.5

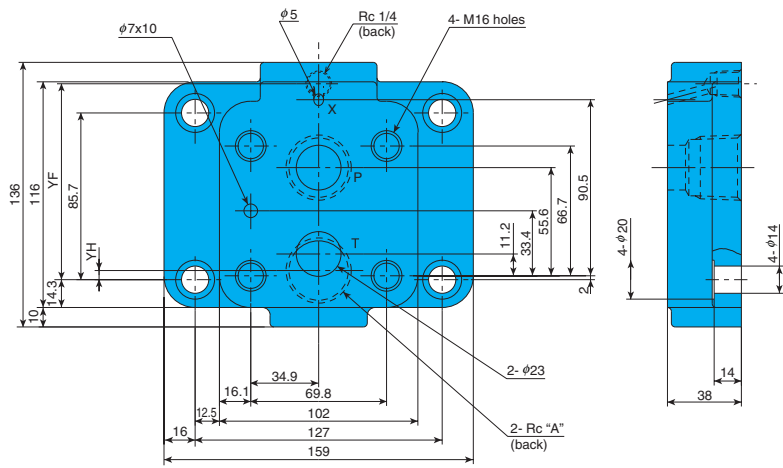


Sub Plate MRI-03*-10
(Maximum Operating Pressure: 25MPa)



Model No.	A
MRI-03-10	3/8
MRI-03X-10	1/2
MRI-06-10	3/4
MRI-06X-10	1

Sub Plate MRI-06*-10
(Maximum Operating Pressure: 25MPa)



Attach a plug when the vent (X) port is not used.

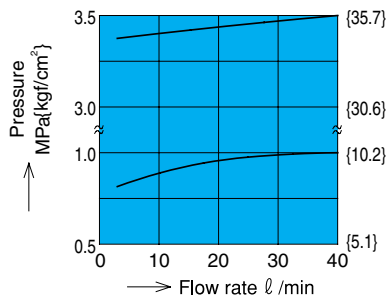
Model No.	YF	YH
MRI-06-10	92.5	13.2
MRI-06X-10	100.7	4.7

Performance Curves

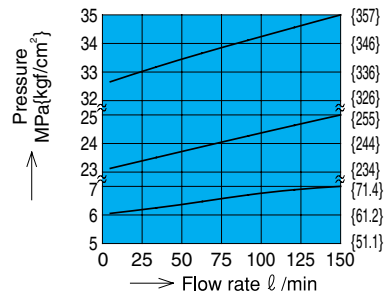
Hydraulic Operating Fluid Viscosity 32mm²/s

Pressure - Flow Rate Characteristics

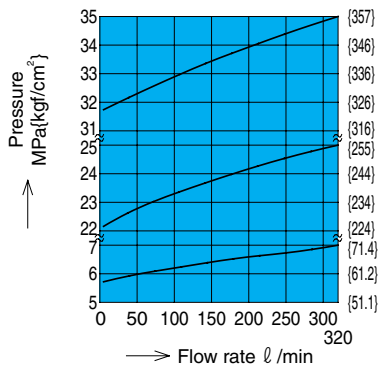
RI-G03-C-20



RI-G03*-20



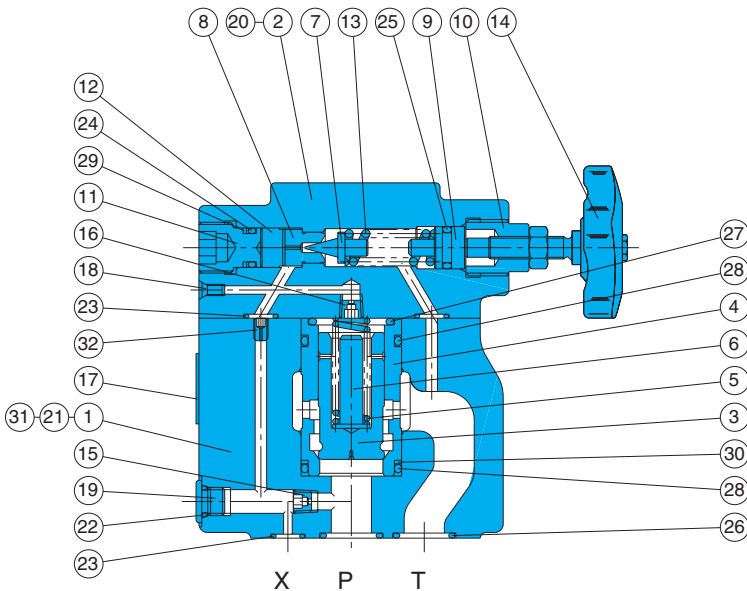
RI-G06*-20



Note) The performance curves do not include T port back pressure.

Cross-sectional Drawing

RI-G**-*-20



Part No.	Part Name	Part No.	Part Name
1	Body	17	Plate
2	Cover	18	Plug
3	Poppet	19	Plug
4	Sleeve	20	Screw
5	Spring	21	Pin
6	Spacer	22	O-ring
7	Poppet	23	O-ring
8	Seat	24	O-ring
9	Plunger	25	O-ring
10	Retainer	26	O-ring
11	Plug	27	O-ring
12	Collar	28	O-ring
13	Spring	29	Backup ring
14	Handle assy	30	Backup ring
15	Orifice	31	Screw
16	Orifice	32	Choke

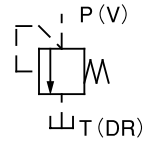
Seal Part List (Kit Model Number REBS-***)

Part No.	Part Name	Nominal Diameter/Part Number		Q'ty
		G03	G06	
22	O-ring	1B-P8	1B-P8	1
23	O-ring	1B-P9	1B-P9	3
24	O-ring	1B-P10A	1B-P10A	1
25	O-ring	1A-P11	1A-P11	1
26	O-ring	1B-P18	1B-P28	2
27	O-ring	1B-G25	1B-P28	1
28	O-ring	1B-G30	1B-P32	2
29	Backup ring	T2-P10A	T2-P10A	1
30	Backup ring	T2-G30	T2-P32	1

Note) O-ring 1A/B-** refers to JIS B 2401-1A/1B-**. For the *** part of the kit number, specify the valve size (G03, G06).

Remote Control Relief Valve

2 to 15 ℓ /min
21MPa



Features

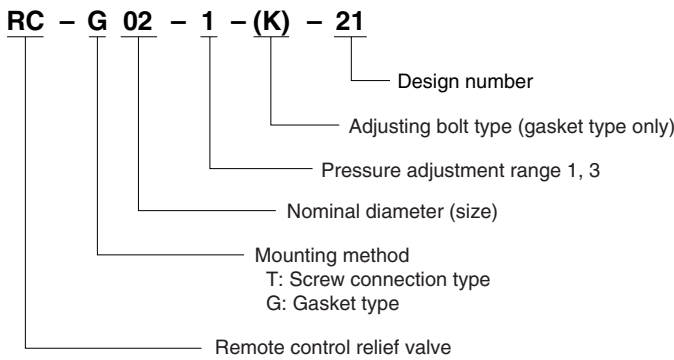
- ① Connecting a relief valve or reducing valve to the vent port of a balanced piston type pressure control valve provides simple remote control of pressure.
- ② RCD type can also be used as a direct type relief valve.

Specifications

Model No.		Nominal Diameter (Size)	Maximum Working Pressure MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	Pressure adjustment range MPa(0kgf/cm ²)	Weight kg
Screw Mounting	Gasket mounting					
RCD-T02-1-11 3-11	-	1/4	21{214} P, V ports	15	0.8 to 7{ 8.2 to 71.4 } 3.5 to 21{35.7 to 214 }	2.1
RC-T02-1-12 3-12	RC-G02-1-21 3-21					

Note) The pressure adjustment range indicates cracking pressure.

Understanding Model Numbers

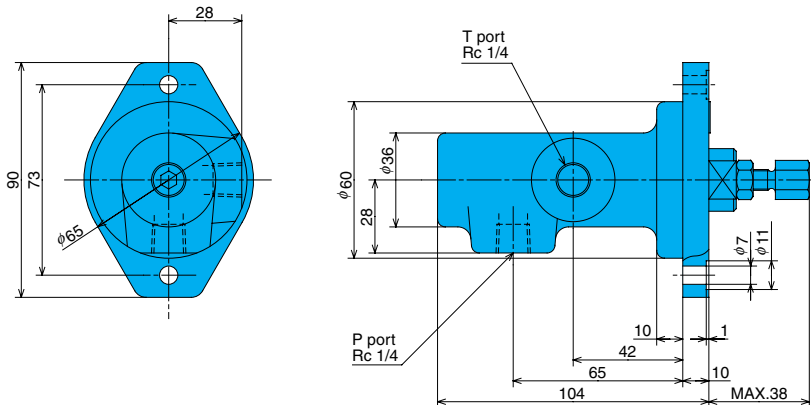


● Handling

- 1 To adjust pressure, loosen the lock nut and then rotate the handle clockwise (rightward) to increase pressure or counterclockwise (leftward) to decrease it.
- 2 Make sure that drain port back pressure is no greater than 0.2MPa {2.0kgf/cm²}.
- 3 When configuring pipes for the pressure control valve and remote control valve, use of thick iron pipe with an inside diameter of no more than 4mm and a connection length of no more than three meters is recommended. Pipe capacity can be a source of vibration.
- 4 When an adjustment bolt type is required for the pressure adjustment block, insert K for the type specification. See the dimension drawings, RC-G02 only.
- 5 Use the following to specify a sub plate.

Installation Dimension Drawings

RCD-T02-*-11 (Screw Mounting)



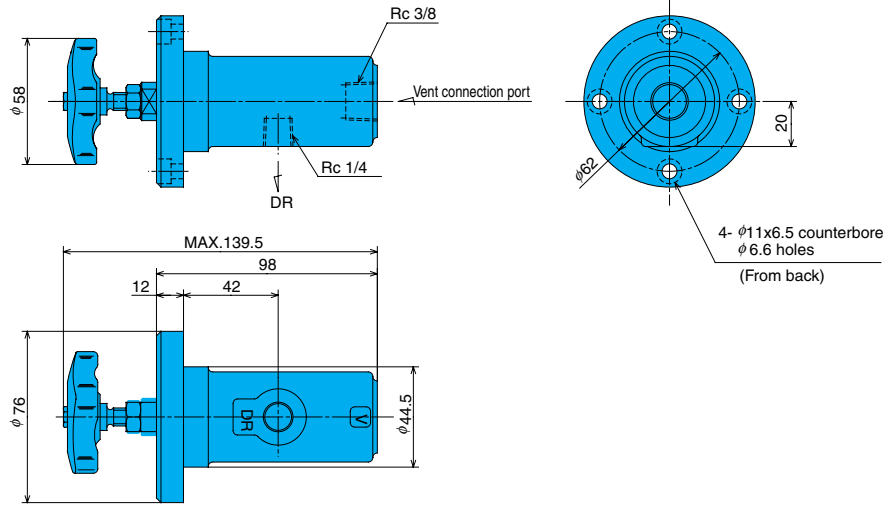
Model No.	Weight kg
MRC-02-20	1.0

- 6 The following are the bundled mounting bolts.

Model No.	Bolt Dimensions	Q'ty	Tightening Torque N.m(kgf·cm)
RC-G02-*-21	M8 × 25 ℓ	4	20 to 25 {205 to 255}

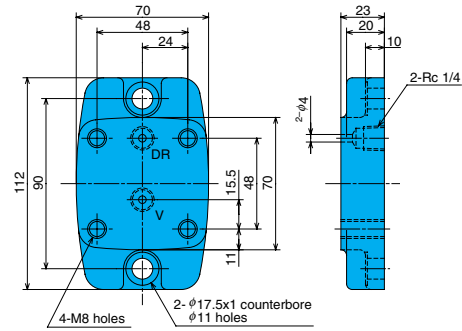
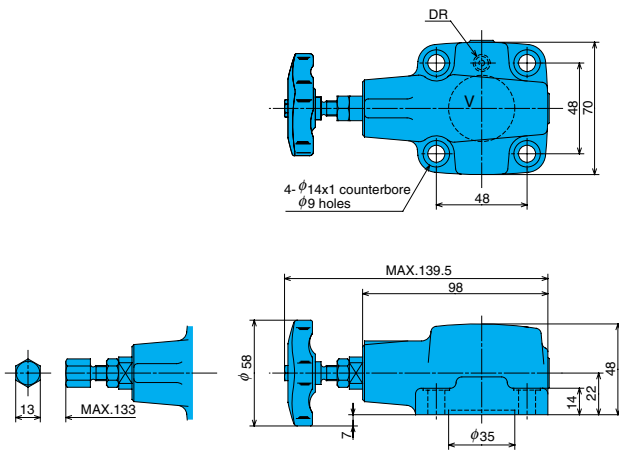
Note) For mounting bolts, use 12T or equivalent.

RC-T02-*-12 (Screw Mounting)



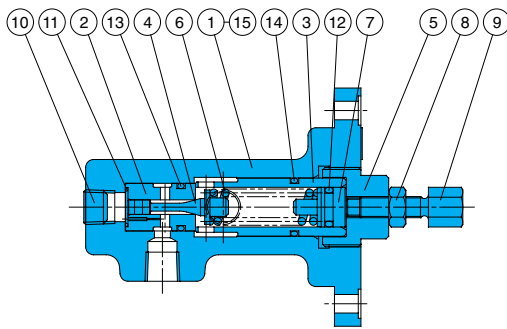
RC-G02-*-21 (Gasket Mounting)

Sub Plate MRC-02-20



Cross-sectional Drawing

RCD-T02-*-11



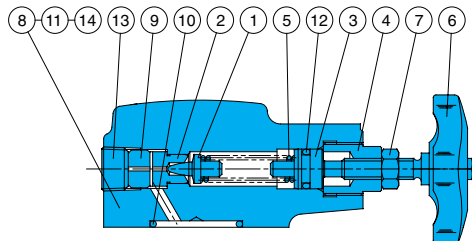
Part No.	Part Name	Part No.	Part Name
1	Body	12	O-ring
2	Sleeve	13	O-ring
3	Sleeve	14	O-ring
4	Poppet	15	Nameplate
5	Retainer		
6	Spring		
7	Guide		
8	Nut		
9	Screw		
10	Plug		
11	O-ring		

Seal Part List (Kit Model Number RCS-T02CD)

Part No.	Part Name	Part Number	Q'ty
11	O-ring	S12.5(NOK)	1
12	O-ring	1A-P11	1
13	O-ring	1B-P14	1
14	O-ring	1B-P18	1

Note) O-ring 1A/B-** refers to JIS B2401 1A/B.

RC-G02-*- (K)-21



Seal Part List (Kit Model Number RCBS-G02)

Part No.	Part Name	Part Number	Q'ty
10	O-ring	1B-G30	1
11	O-ring	1B-P6	1
12	O-ring	1A-P11	1

Note) O-ring 1A/B-** refers to JIS B2401 1A/B.

Part No.	Part Name
1	Poppet
2	Seat
3	Plunger
4	Retainer
5	Spring
6	Handle
7	Nut
8	Cover
9	Collar
10	O-ring
11	O-ring
12	O-ring
13	Plug
14	Plate



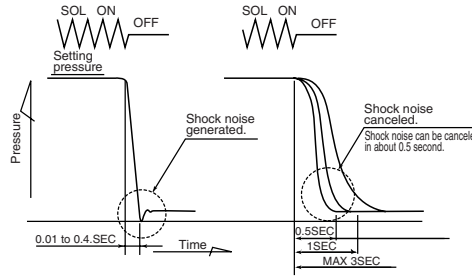
Solenoid Controlled Relief Valve

30 to 380 ℓ /min
21MPa

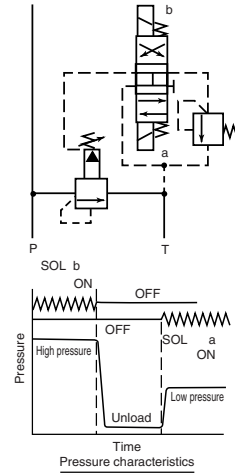
Features

- ① This valve adds a wet type solenoid valve to a balanced type piston type relief valve to form a hydraulic device unload circuit.
- ② The shockless type has an internal structure that prevents shock generated during unloading. This valve can also be used in a pressure relief circuit, and has a maximum adjustment time of three seconds. See the pressure relief circuit example.
- ③ A two-pressure control circuit can be configured by adding a relief modular valve. Contact your agent for more information.

(Pressure Relief Circuit Example)



(Two-pressure Control Circuit Example)



Specifications

Model No.		Nominal Diameter (Size)	Maximum Working Pressure MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	Pressure adjustment range MPa(kgf/cm ²)	Weight kg		JIS Symbol	Used Solenoid Valve Model Number
Screw Mounting	Gasket Mounting					T Type	G Type		
RSS (RSA)-T03-AQ ₃ -** ¹ -15	RSS (RSA)-G03-AQ ₃ -** ¹ -15	3/8	21{214} P, X Ports	80	Type 1 0.8 to 7 {8.2 to 71.4}	3.2	4.5		SS (SA)-G01-A3X-**-31
RSS (RSA)-T06-AQ ₃ -** ¹ -23	RSS (RSA)-G06-AQ ₃ -** ¹ -23	3/4		170		4.0	6.4		
RSS (RSA)-T10-AQ ₃ -** ¹ -23	RSS (RSA)-G10-AQ ₃ -** ¹ -23	1 1/4		380		8.8	10.0		
RSS (RSA)-T03-AR ₃ -** ¹ -15	RSS (RSA)-G03-AR ₃ -** ¹ -15	3/8		80	Type 3 3.5 to 21 {35.7 to 214}	3.2	4.5		SS (SA)-G01-AR-**-31
RSS (RSA)-T06-AR ₃ -** ¹ -23	RSS (RSA)-G06-AR ₃ -** ¹ -23	3/4		170		4.0	6.4		
RSS (RSA)-T10-AR ₃ -** ¹ -23	RSS (RSA)-G10-AR ₃ -** ¹ -23	1 1/4		380		8.8	10.0		

Shockless Type

RSS (RSA)-T03- ₃ -F-**-15	RSS (RSA)-G03- ₃ -F-**-15	3/8	21{214} P, X Ports	80	Type 1 1 to 7 {10.2 to 71.4}	4.2	5.5		SS (SA)-G01-A8XO-**-31
RSS (RSA)-T06- ₃ -F-**-23	RSS (RSA)-G06- ₃ -F-**-23	3/4		170		5.0	7.4		
RSS (RSA)-T10- ₃ -F-**-23	RSS (RSA)-G10- ₃ -F-**-23	1 1/4		380		9.8	12.0		

Note) For information about electrical specifications, see the SS type and SA type solenoid valve items on pages E-1 and E-13.

• Handling

- ① To adjust pressure, loosen the lock nut and then rotate the adjusting bolt clockwise (rightward) to increase pressure or counterclockwise (leftward) to decrease it.
- ② To adjust the time from onload to unload, loosen the lock nut and rotate the restrictor adjusting bolt clockwise (rightward) to make the time longer, or counterclockwise (leftward) to make it shorter.
- ③ Make sure that tank port back pressure is no greater than 0.2MPa {2.0kgf/cm²}.
- ④ The ** before the design number in the model number of the solenoid valve used shows voltage. See the voltage symbols in the model number explanation.
- ⑤ Pressure becomes unstable when at slow control flow rates. Use a flow rate of no less than 8 ℓ /min for the 03, 06 sizes, and 10 ℓ /min for the 10 size.
- ⑥ Use 90 to 110% of rated voltage.
- ⑦ The pressure adjustment range for the high vent type is 1.3MPa {13.3kgf/cm²}. Note that RSS (RSA) -T/G03 is not a high vent type.
- ⑧ Use the following table for specification when a sub plate is required.

Model No.	Pipe Diameter	Weight kg	Applicable Valve Type
MR-03-10	3/8	1.6	RSS (RSA)-G03-**-** ¹ -15
MR-06-20	3/4	3.5	RSS (RSA)-G06-**-** ¹ -23
MR-06X-20	1		
MR-10-20	1 1/4	8.5	RSS (RSA)-G10-**-** ¹ -23
MR-10X-20	1 1/2		

Note) See page relief valve page item on F-3 for dimensions.

- ⑨ The following are the bundled mounting bolts.

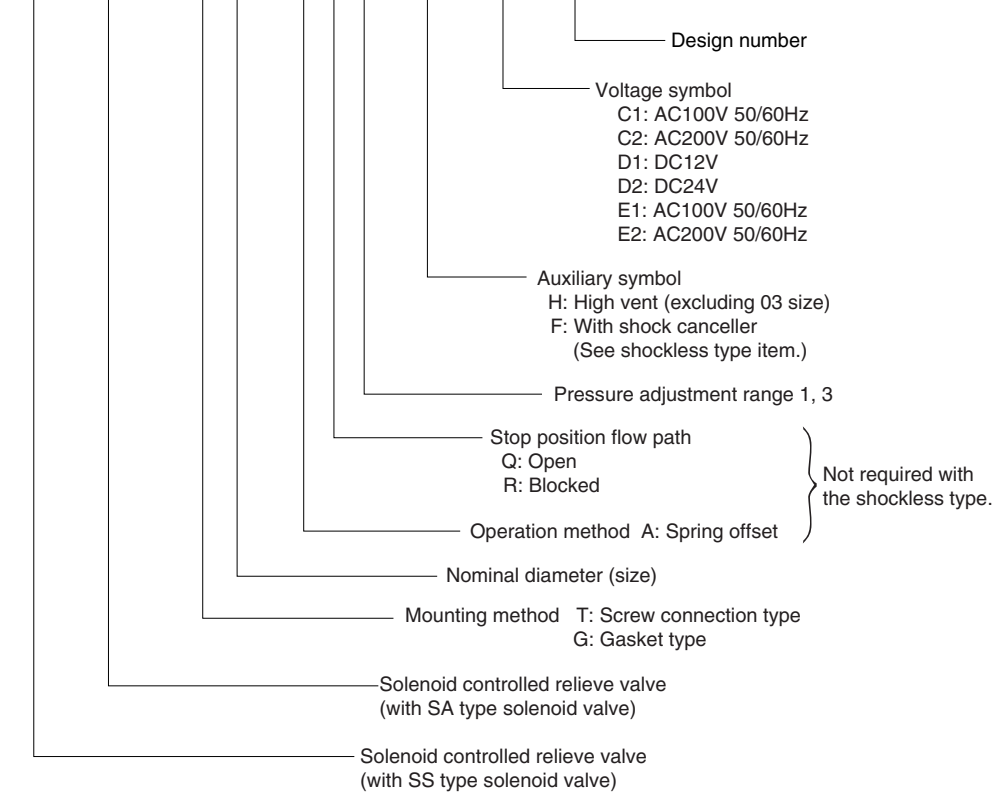
Model No.	Bolt Dimensions	Qty	Tightening Torque N·m(kgf·cm)
RSS (RSA)-G03-**-** ¹ -15	M10 × 75 ℓ	4	45 to 55 {460 to 560}
RSS (RSA)-G06-**-** ¹ -23	M16 × 80 ℓ	4	190 to 235 {1940 to 2400}
RSS (RSA)-G10-**-** ¹ -23	M20 × 105 ℓ	4	370 to 460 {3770 to 4690}

Note) For mounting bolts, use 12T or equivalent.

- ⑩ The coil surface temperature increases if this pump is kept continuously energized. Install the valve so there is not chance of it being touched directly by hand.

Understanding Model Numbers

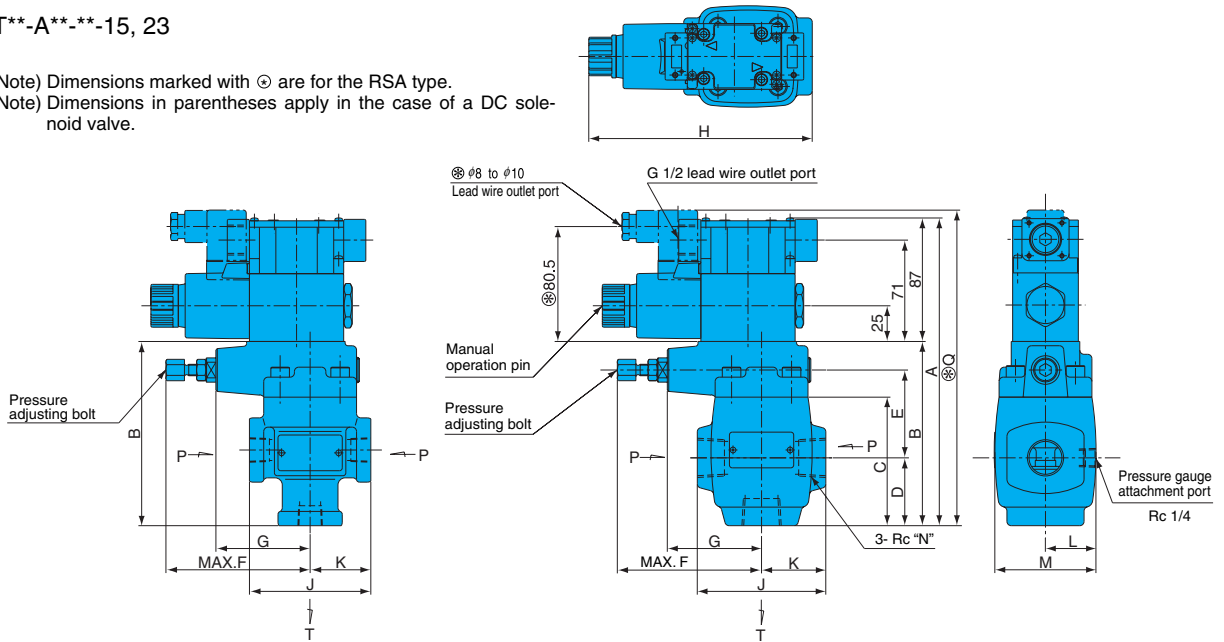
RSS (RSA) - G 06 - A Q 1 - (H) - C1 - 23



Installation Dimension Drawings

RSS (RSA) -T**-A**-**-15, 23

Note) Dimensions marked with ⊙ are for the RSA type.
 Note) Dimensions in parentheses apply in the case of a DC solenoid valve.



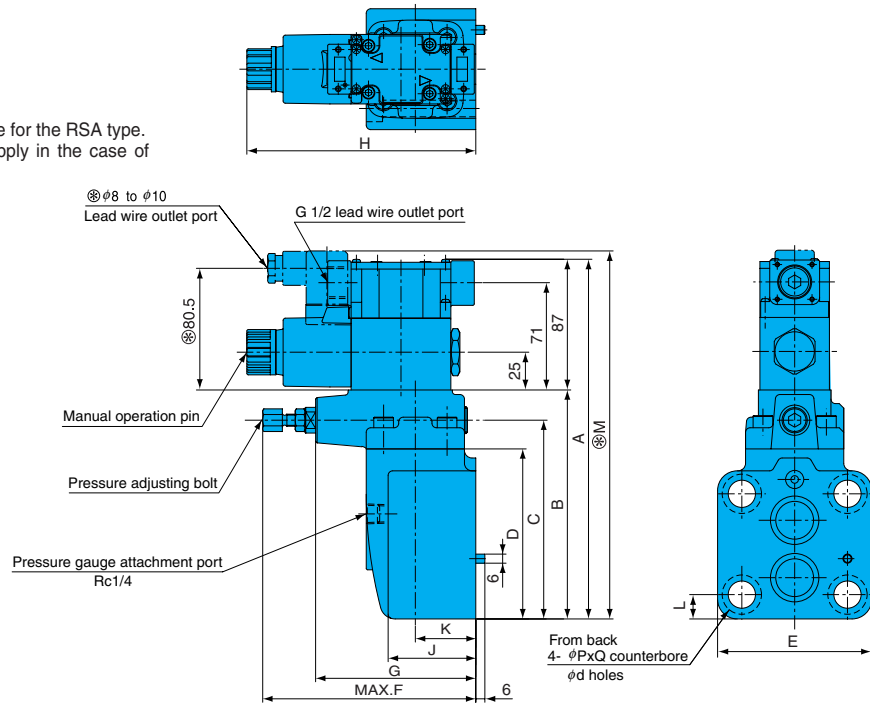
RSS (RSA) -T03-A**-**-15

RSS (RSA) -T₁₀-06-A**-**-23

Model No.	A	B	C	D	E	F	G	H	J	K	L	M	N	Q
RSS (RSA) -T03-A**-**-15	214.5	129	90	53	56	101	66	154 (161)	85	42.5	32.5	65	3/8	221.5
RSS (RSA) -T06-A**-**-23	214.5	129	90	47.5	61.5	101	66	156.5 (163.5)	90	45	35.5	71	3/4	221.5
RSS (RSA) -T10-A**-**-23	239	153.5	111.5	62	72	98	63	164.5 (171.5)	125	62.5	47	94	1 1/4	246

RSS
(RSA) -G**-A**-**-15, 23

Note) Dimensions marked with ⊙ are for the RSA type.
Note) Dimensions in parentheses apply in the case of a DC solenoid valve.

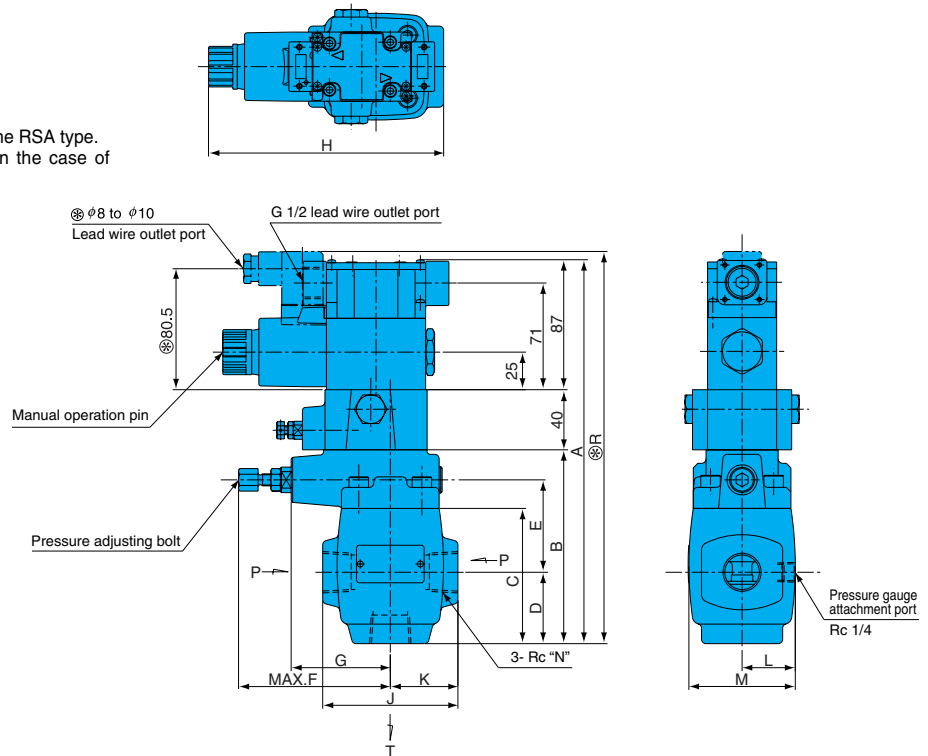


Model No.	A	B	C	D	E	F	G	H	J	K	L	P	Q	d	M
RSS (RSA) -G03-A**-**-15	214.5	129	109	90	80	141	106	150.5 (157.5)	72.5	40	13	17.5	10.8	11	221.5
RSS (RSA) -G06-A**-**-23	237	151.5	131.5	112.5	102	141	106	151.5 (158.5)	58	40	16.1	26	1	18	244
RSS (RSA) -G10-A**-**-23	248	162.5	143	120.5	127	148	113	152 (159)	80	50	17.7	32	1	22	255

Note) For gasket surface dimensions, see R-G**-** 12/20.

RSS
(RSA) -T**-*-F**-**-15, 23

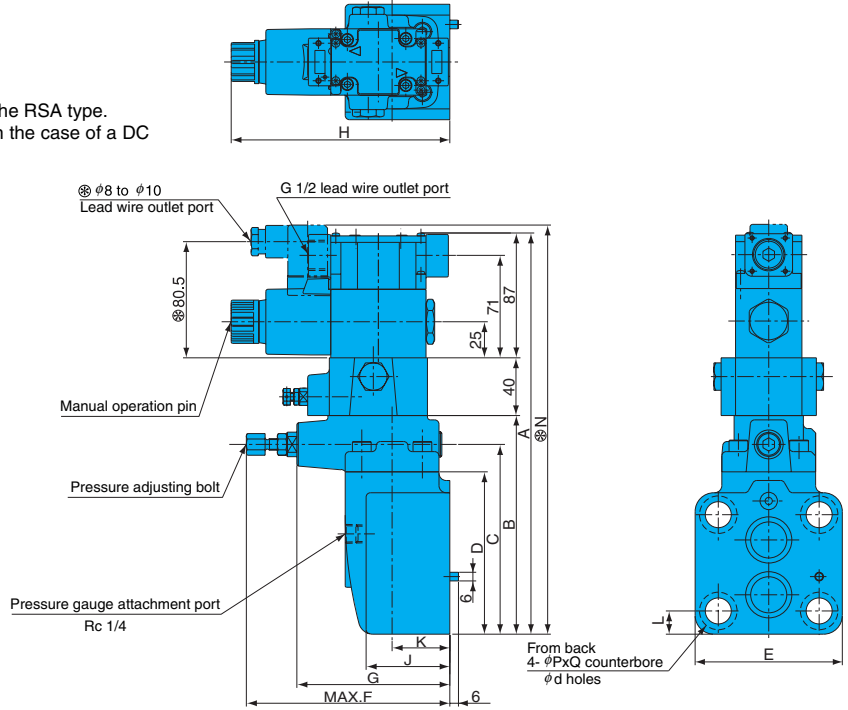
Note) Dimensions marked with ⊙ are for the RSA type.
Note) Dimensions in parentheses apply in the case of a DC solenoid valve.



Model No.	A	B	C	D	E	F	G	H	J	K	L	M	N	Q	R
RSS (RSA) -T03*-F**-**-15	254.5	129	90	53	56	101	66	154 (161)	85	42.5	32.5	65	32	3/8	261.5
RSS (RSA) -T06*-F**-**-23	254.5	129	90	47.5	61.5	101	66	156.5 (163.5)	90	45	35.5	71	33	3/4	261.5
RSS (RSA) -T10*-F**-**-23	279	153.5	111.5	62	72	98	63	164.5 (171.5)	125	62.5	47	94	32.5	1/4	286

RSS
(RSA) -G**-F**-15, 23

Note) Dimensions marked with \odot are for the RSA type.
Note) Dimensions in parentheses apply in the case of a DC solenoid valve.

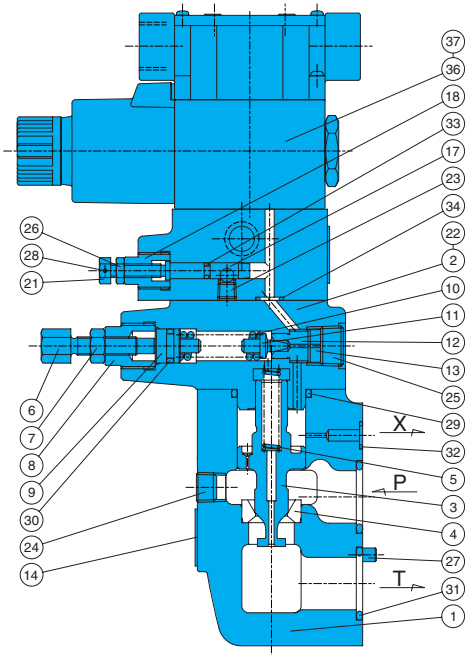


Model No.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	d
RSS (RSA) -G03-F**-15	254.5	129	109	90	80	141	106	150.5 (157.5)	72.5	40	13	32	261.5	17.5	10.8	11
RSS (RSA) -G06-F**-23	277	151.5	131.5	112.5	102	141	106	151.5 (158.5)	58	40	16.1	33	284	26	1	18
RSS (RSA) -G10-F**-23	288	162.5	143	120.5	127	148	113	152 (159)	80	50	17.7	32.5	295	32	1	22

Note) For gasket surface dimensions, see R-G**-12/20.

Cross-sectional Drawing

RSS-G**-F**-15, 23



Part No.	Part Name	Part No.	Part Name
1	Body	20	Spring
2	Cover	21	Nut
3	Spool	22	Screw
4	Seat	23	Plug
5	Spring	24	Plug
6	Screw	25	Plug
7	Nut	26	Nut
8	Retainer	27	Spring pin
9	Plunger	28	Spring pin
10	Spring	29	O-ring
11	Poppet	30	O-ring
12	Seat	31	O-ring
13	Collar	32	O-ring
14	Nameplate	33	O-ring
15	Body	34	O-ring
16	Spool	35	O-ring
17	Throttle	36	Solenoid Valves
18	Retainer	37	Screw
19	Spring guide		

Seal Parts List (Kit Model Number RSBS-***F)

Part No.	Part Name	Type/Part Number			Qty
		RSS-G03-*F**-15	RSS-G06-*F**-23	RSS-G10-*F**-23	
29	O-ring	1B-G30	1B-G30	1B-G40	1
30	O-ring	1A-P11	1A-P11	1A-P11	1
31	O-ring	1B-P20	1B-P26	1B-G35	2
32	O-ring	1B-P7	1B-P9	1B-P9	1
33	O-ring	1B-P4	1B-P4	1B-P4	1
34	O-ring	1B-P9	1B-P9	1B-P9	2
35	O-ring	1B-P12.5	1B-P12.5	1B-P12.5	2

- Note) 1. O-ring 1A/B-** refers to JIS B2401-1A/B.
 2. For the *** part of the kit number, specify the valve size (G03, G06, G10).
 3. SS (SA)-G01 pilot valve seal is available separately. For details, see pages E-11 (E-23).





RI Series Solenoid Controlled Relief Valve

150 to 320 ℓ /min
35MPa

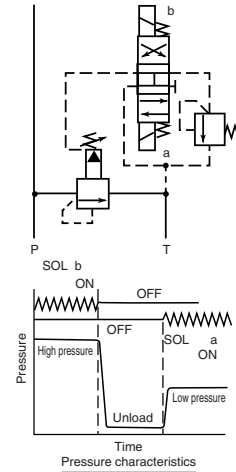
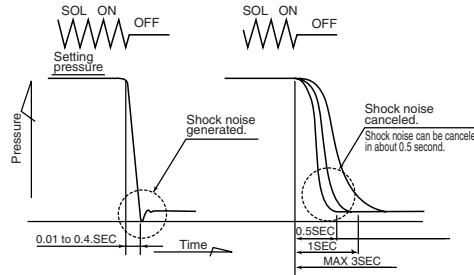
Features

- ① This valve adds a wet type solenoid valve to a balanced type piston type relief valve to form a hydraulic device unload circuit.
- ② The shockless type has an internal structure that prevents shock generated during unloading. This valve can also be used in a pressure relief circuit, and has a maximum adjustment time of three seconds. See the pressure relief circuit example.

- ③ A two-pressure control circuit can be configured by adding a relief modular valve. Contact your agent for more information.

(Two-pressure Control Circuit Example)

(Pressure Relief Circuit Example)



Specifications

Model No.	Nominal Diameter (Size)	Maximum Flow Rate ℓ /min	Maximum Working Pressure MPa(kgf/cm ²)	Pressure adjustment range MPa(kgf/cm ²)	Weight kg	Gasket Surface Dimensions	JIS Symbol	Used Solenoid Valve Type
RIS-G03-AQ3-**-21 5	3/8	150	35{357} P, X Ports	Type 1: 0.8 to 7 {8.2 to 71.4} Type 3: 3.5 to 25 {35.7 to 255} Type 5: 3.5 to 35 {35.7 to 357}	6.0	ISO 6264-AR-06-2-A		SS-G01-A3X-**-31
RIS-G06-AQ3-**-21 5	3/4	320			7.1	ISO 6264-AS-08-2-A		SS-G01-A3X-**-31
RIS-G03-AR3-**-21 5	3/8	150			6.0	ISO 6264-AR-06-2-A		SS-G01-AR-**-31
RIS-G06-AR3-**-21 5	3/4	320			7.1	ISO 6264-AS-08-2-A		SS-G01-AR-**-31

Shockless Type

RIS-G03-3-F-**-21 5	3/8	150	35{357} P, X Ports	Type 1: 1 to 7 {10.2 to 71.4} Type 3: 3.5 to 25 {35.7 to 255} Type 5: 3.5 to 35 {35.7 to 357}	7.0	ISO 6264-AR-06-2-A		SS-G01-A3X-**-31
RIS-G06-3-F-**-21 5	3/4	320			8.1	ISO 6264-AS-08-2-A		

Note) For electrical specifications, see the SS type solenoid valve item on page E-1.

• Handling

- ① To adjust pressure, loosen the lock nut and then rotate the handle clockwise (rightward) to increase pressure or counterclockwise (leftward) to decrease it.
- ② To adjust the time from onload to unload, loosen the lock nut and rotate the restrictor adjusting bolt clockwise (rightward) to make the time longer, or counterclockwise (leftward) to make it shorter.
- ③ Make sure that tank port back pressure is no greater than 0.2MPa {2.0kgf/cm²}.
- ④ The ** before the design number in the model number of the solenoid valve used shows voltage. See the

voltage symbols in the model number explanation.

- ⑤ A small control flow rate can cause pressure instability. Use a control flow rate that is at least 8 ℓ /min. Use a drain type relief valve in the case of a flow rate that is less than the minimum flow rate.
- ⑥ Use 90 to 110% of rated voltage.
- ⑦ Use the following table for specification when a sub plate is required. Maximum operating pressure is 25MPa {255kgf/cm²}.

Model No.	Pipe Diameter	Weight kg	Applicable Pump Model
MR1-03-10	3/8	2.6	RIS-G03
MR1-03X-10	1/2		
MR1-06-10	3/4	3.5	RIS-G06
MR1-06X-10	1		

- ⑧ The following are the bundled mounting bolts.

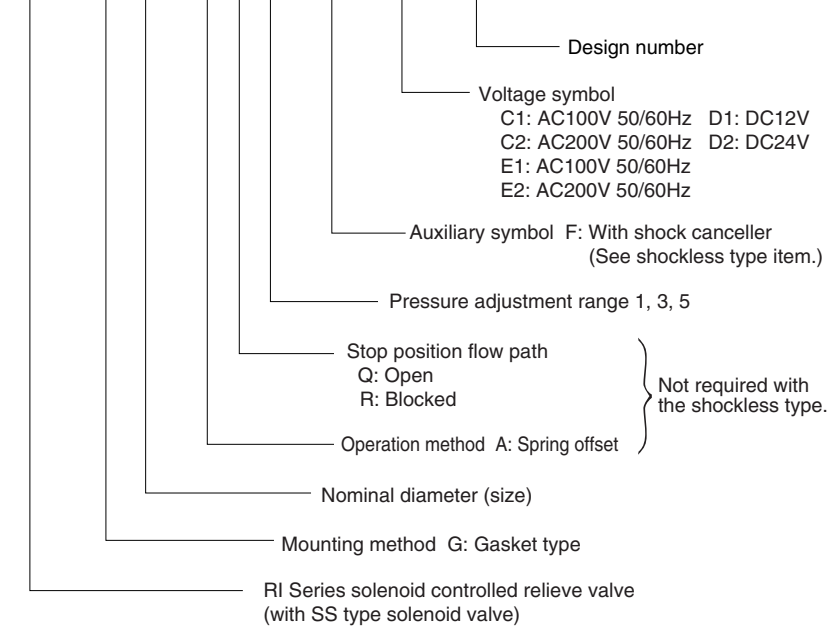
Model No.	Bolt Dimensions	Qty	Tightening Torque N·m(kgf·cm)
RIS-G03-**-21	M12 × 50 ℓ	4	75 to 95 {765 to 969}
RIS-G06-**-21	M16 × 60 ℓ	4	190 to 235 {1940 to 2400}

Note) For mounting bolts, use 12T or equivalent.

- ⑨ The coil surface temperature increases if this pump is kept continuously energized. Install the valve so there is not chance of it being touched directly by hand.

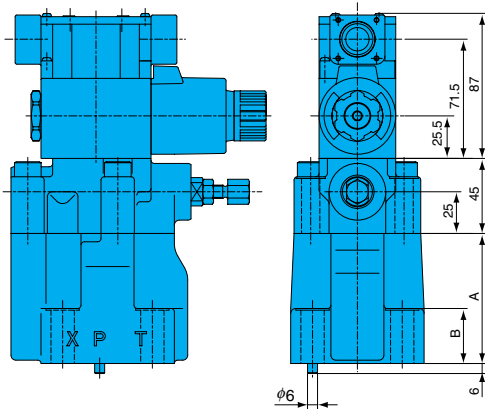
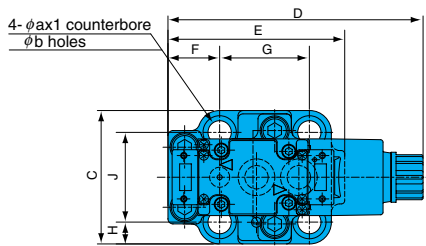
Understanding Model Numbers

RIS - G 06 - A Q 1 - (F) - C1 - 21

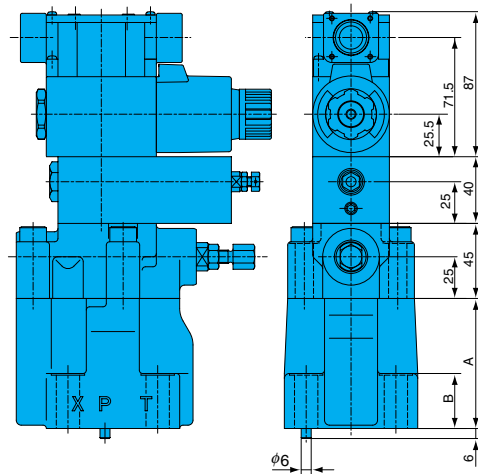


Installation Dimension Drawings

RIS-G**-A**-**-21



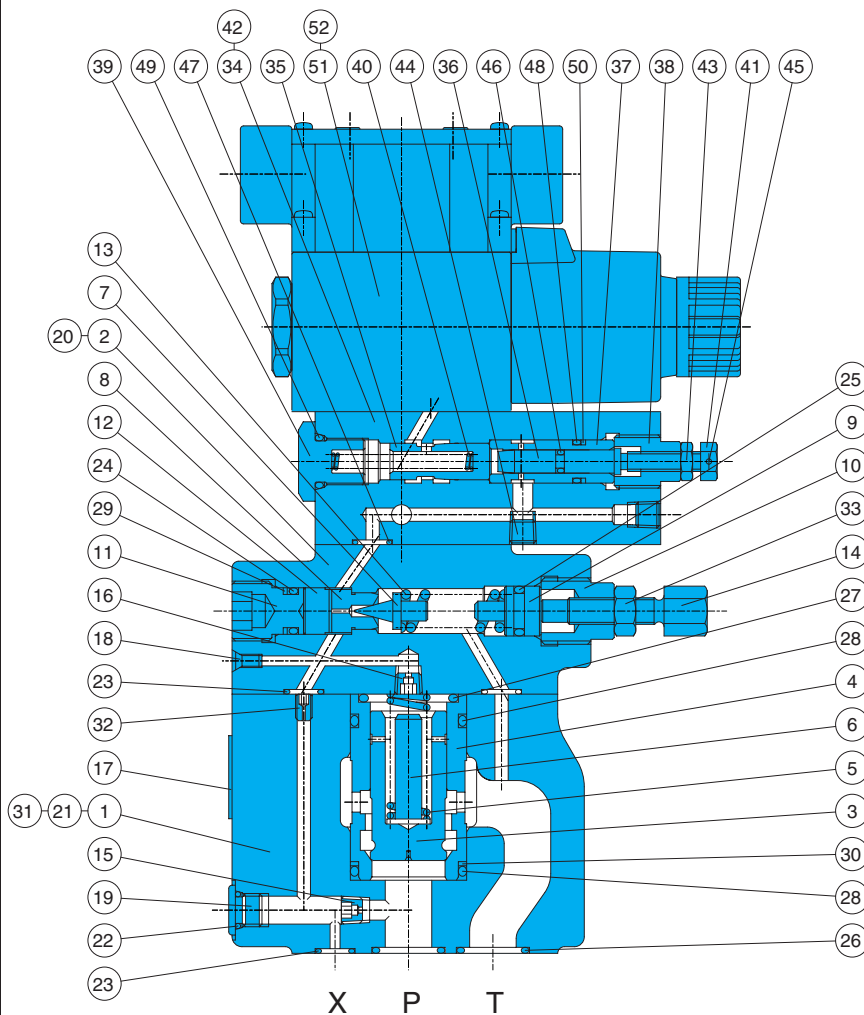
RIS-G**-*-F**-**-21



Model No.	A	B	C	D	E	F	G	H	J	a	b
RIS-G03-**-**-21	78	32	80	153 (160)	106	31	53.8	13.1	53.8	20	14
RIS-G06-**-**-21	83	36	100	162 (169)	119	37	66.7	15	70	26	17.5

Note) For gasket surface dimensions, see RI-G**-* on page F-5.

Cross-sectional Drawing



Part No.	Part Name
1	Body
2	Cover
3	Poppet
4	Sleeve
5	Spring
6	Spacer
7	Poppet
8	Seat
9	Plunger
10	Retainer
11	Plug
12	Collar
13	Spring
14	Handle assy
15	Orifice
16	Orifice
17	Plate

Part No.	Part Name
18	Plug
19	Plug
20	Screw
21	Pin
22	O-ring
23	O-ring
24	O-ring
25	O-ring
26	O-ring
27	O-ring
28	O-ring
29	Backup ring
30	Backup ring
31	Screw
32	Choke
33	Nut
34	Body

Part No.	Part Name
35	Spool
36	Throttle
37	Sleeve
38	Retainer
39	Guide
40	Spring
41	Nut
42	Plate
43	Nut
44	Plug
45	Pin
46	O-ring
47	O-ring
48	O-ring
49	O-ring
50	Backup ring
51	Solenoid Valves
52	Screw

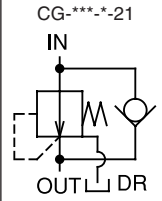
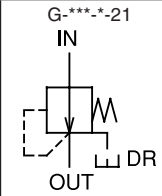
Seal Part List (Kit Model Numbers: Main REBS-***, Restrictor Valve DFS-01H)

Component Parts	Part No.	Part Name	Nominal Diameter/Part Number		Q'ty
			G03	G06	
Main	22	O-ring	1B-P8	1B-P8	1
	23	O-ring	1B-P9	1B-P9	3
	24	O-ring	1B-P10A	1B-P10A	1
	25	O-ring	1A-P11	1A-P11	1
	26	O-ring	1B-P18	1B-P28	2
	27	O-ring	1B-G25	1B-P28	1
	28	O-ring	1B-G30	1B-P32	2
	29	Backup ring	T2-P10A	T2-P10A	1
	30	Backup ring	T2-G30	T2-P32	1
Restrictor Valve	46	O-ring	1B-P4		1
	47	O-ring	1B-P9		2
	48	O-ring	1B-P10		1
	49	O-ring	1B-P12.5		1
	50	Backup ring	T2-P10		1

- Note) 1. O-ring 1A/1B-** refers to JIS B 2401-1A/1B-**.
 2. For the *** part of the kit number, specify the valve size (G03, G06).
 3. The restrictor valve kit is required only when a shockless valve is included.
 4. SS (SA)-G01 pilot valve seal is available separately. For details, see pages E-11 (E-23).

Pressure Reducing (and Check) Valve

20 to 280 ℓ /min
21MPa



Features

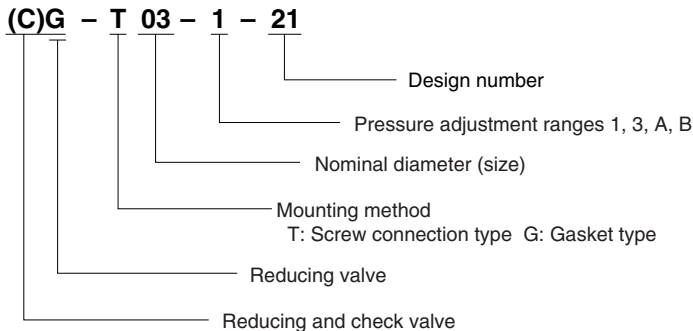
- ① This valve is used when part of the circuit uses pressure that is lower than the main circuit.
- ② Even when pressure changes in the primary main circuit, the reduced secondary pressure is adjusted automatically and maintained at a constant level.
- ③ Connecting a remote control valve to the vent port allows remote control of adjustment pressure.
- ④ The mounting surface of the gasket conforms to the ISO standards shown in the table below.

Specifications

Model No.		Nominal Diameter (Size)	Maximum Working Pressure MPa(kgf/cm ²)	Maximum Flow Rate ℓ/min	Pressure adjustment range MPa(kgf/cm ²)	Weight kg		Gasket Surface Dimensions
Screw Mounting	Gasket Mounting					T Type	G Type	
(C)G-T03-A-21 B-21	(C)G-G03-A-21 B-21	3/8	21{214} IN, OUT, Vent Port	20	0.25 to 1{2.6 to 10.2} 0.3 to 2.5{3.1 to 25.5}	3.3 (3.6)	3.9 (4.2)	ISO 5781-AG-06-2-A
(C)G-T03-1-21 3-21	(C)G-G03-1-21 3-21	3/8		50	0.8 to 7{8.2 to 71.4} 3.5 to 21{35.7 to 214}	3.3 (3.6)	3.9 (4.2)	
(C)G-T06-1-21 3-21	(C)G-G06-1-21 3-21	3/4		120	0.8 to 7{8.2 to 71.4} 3.5 to 21{35.7 to 214}	5.7 (6.1)	6.2 (6.6)	ISO 5781-AH-08-2-A
(C)G-T10-1-21 3-21	(C)G-G10-1-21 3-21	1 1/4		280	0.8 to 7{8.2 to 71.4} 3.5 to 21{35.7 to 214}	10.0 (11.3)	11.8 (13.1)	ISO 5781-AJ-10-2-A

Weight values in parentheses are for when a check valve is included.
The cracking pressure of the check valve is 0.1MPa{1.0kgf/cm²}

Understanding Model Numbers



● Handling

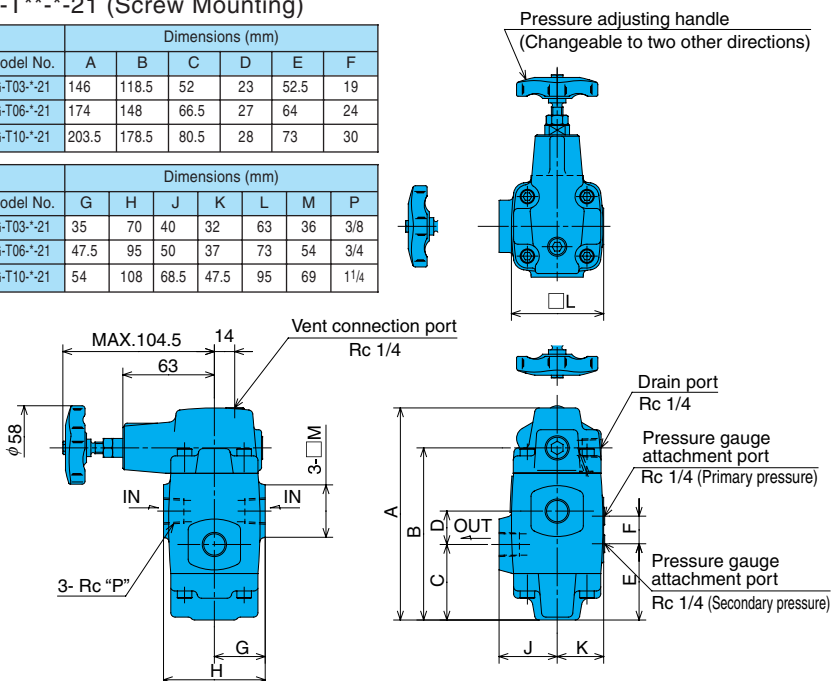
- ① Provide an independent drain pipe directly to the tank.
- ② When using a remote control valve, connect piping to the reducing valve vent port. Pipe capacity can be a source of vibration. Use of thick iron pipe with an inside diameter of no more than 4mm and a connection length of no more than three meters is recommended.
- ③ Use the following table for specification when a sub plate is required.

Installation Dimension Drawings

G-T***-*-21 (Screw Mounting)

Model No.	Dimensions (mm)					
	A	B	C	D	E	F
G-T03-*-21	146	118.5	52	23	52.5	19
G-T06-*-21	174	148	66.5	27	64	24
G-T10-*-21	203.5	178.5	80.5	28	73	30

Model No.	Dimensions (mm)						
	G	H	J	K	L	M	P
G-T03-*-21	35	70	40	32	63	36	3/8
G-T06-*-21	47.5	95	50	37	73	54	3/4
G-T10-*-21	54	108	68.5	47.5	95	69	1 1/4



Model No.	Pipe Diameter	Weight kg	Applicable Pump Model
MG-03-20	3/8	1.6	(C)G-G03-*-21
MG-03X-20	1/2		
MG-06-20	3/4	3.9	(C)G-G06-*-21
MG-06X-20	1		
MG-10-20	1 1/4	6.7	(C)G-G10-*-21
MG-10X-20	1 1/2		

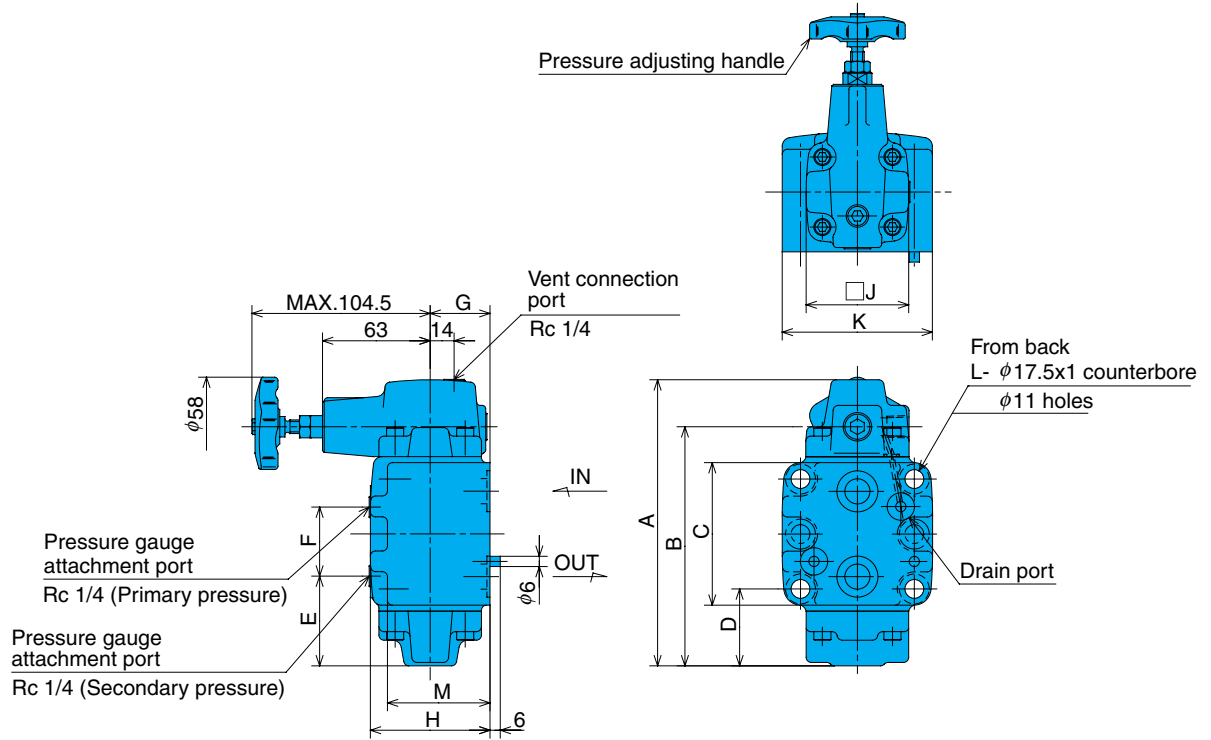
These sub plates can also be used for pressure control valves.

- ④ The following are the bundled mounting bolts.

Model No.	Bolt Dimensions	Qty	Tightening Torque N·m(kgf·cm)
(C)G-G03-*-21	M10 × 75 ℓ	4	45 to 55 {460 to 560}
(C)G-G06-*-21	M10 × 85 ℓ		
(C)G-G10-*-21	M10 × 105 ℓ		

Note) For mounting bolts, use 12T or equivalent.

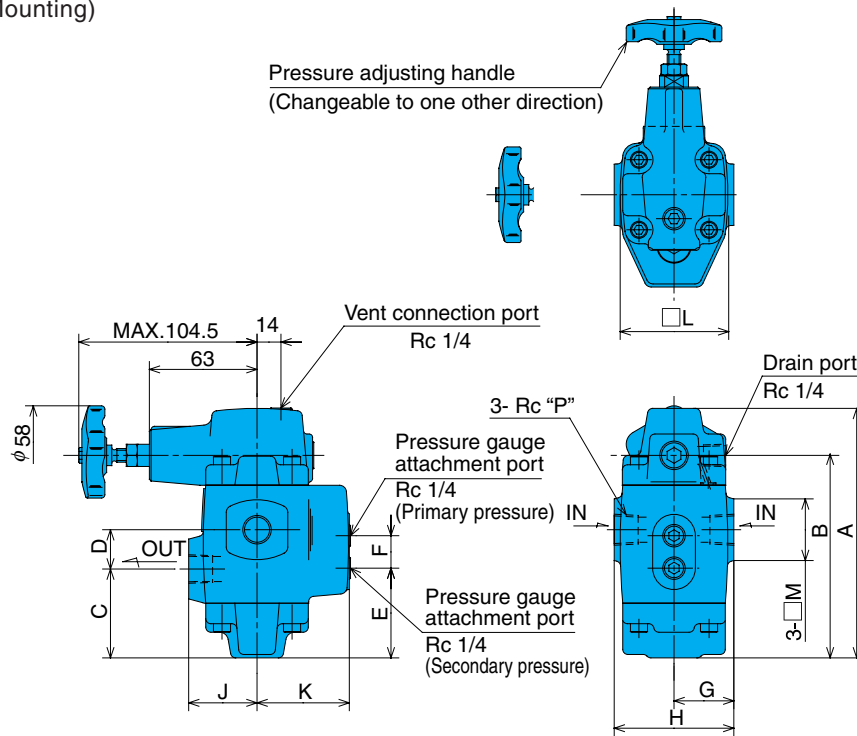
G-G**-*-21 (Gasket Mounting)



Model No.	A	B	C	D	E	F	G	H	J	K	L	M
G-G03-*-21	146	118.5	62	45.1	52.5	19	35	70	60	88	4	60
G-G06-*-21	174	148	82	51.4	64	24	40	80	70	102	4	70
G-G10-*-21	203.5	178.5	102	54	73	30	51	102	92	122	6	92

Note) The orientation of the pressure adjusting handle cannot be change.

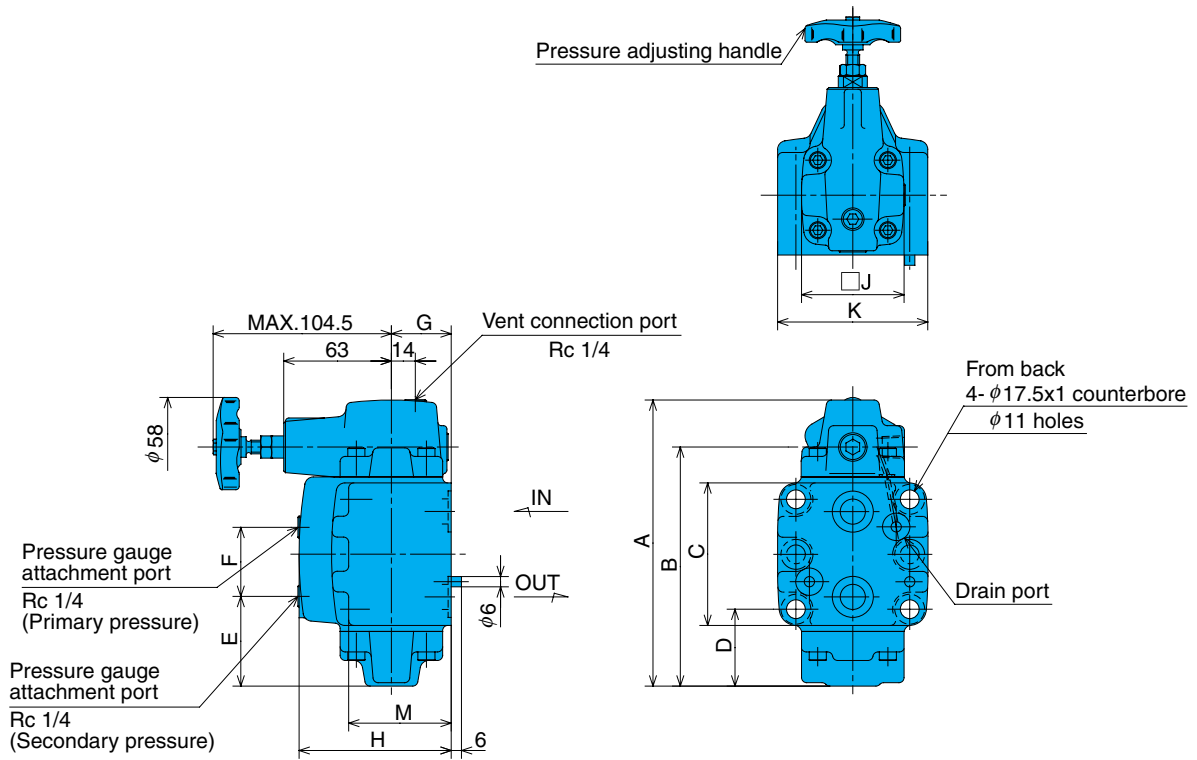
CG-T**-*-21 (Screw Mounting)



Model No.	A	B	C	D	E	F	G	H	J	K	L	M	P
CG-T03-*-21	146	118.5	52	23	52.5	19	35	70	40	54	63	36	3/8
CG-T06-*-21	174	148	66.5	27	64	24	47.5	95	50	60	73	54	3/4
CG-T10-*-21	203.5	178.5	80.5	28	73	30	54	108	68.5	80	95	69	1 1/4

Note) After the orientation of the pressure adjusting handle has been changed, also modify the cover alignment surface ring (1B-P6).

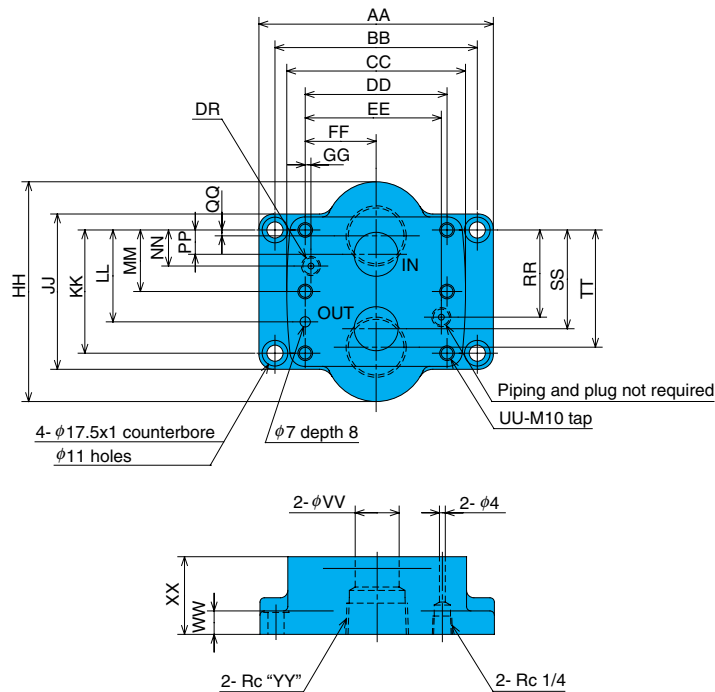
CG-G**-*-21 (Gasket Mounting)



Model No.	Dimensions mm											
	A	B	C	D	E	F	G	H	J	K	L	M
CG-G03-*-21	146	118.5	62	45.1	52.5	19	35	89	60	88	4	60
CG-G06-*-21	174	148	82	51.4	64	24	40	100	70	102	4	70
CG-G10-*-21	203.5	178.5	102	54	73	30	51	131	92	122	6	92

Note) The orientation of the pressure adjusting handle cannot be change.

Sub Plate MG-***-20

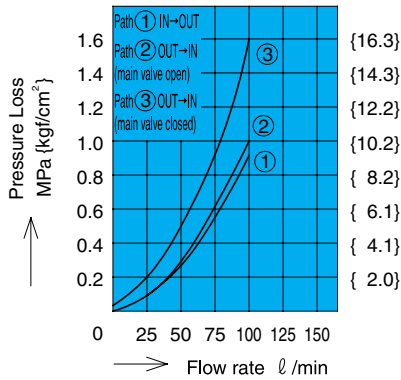


Model No.	Dimensions mm																						
	AA	BB	CC	DD	EE	FF	GG	HH	JJ	KK	LL	MM	NN	PP	QQ	RR	SS	TT	UU	VV	WW	XX	YY
MG-03-20	128	106.4	88	66.6	58.7	33.3	7.9	76	62	42.9	31.8	-	21.4	7.2	3.5	21.5	35.7	39.5	4	14	11	30	3/8
MG-03X-20																							1/2
MG-06-20	146	123.8	102	79.3	72.9	39.7	6.4	110	82	60.3	44.5	-	20.6	11.1	3.7	39.7	49.2	56.7	4	22	16	40	3/4
MG-06X-20																							1
MG-10-20	160	138.1	122	96.8	92.9	48.4	3.9	150	102	84.1	62.7	42.1	24.6	16.7	4.1	59.5	67.5	80.1	6	30	16	53	1 1/4
MG-10X-20																							1 1/2

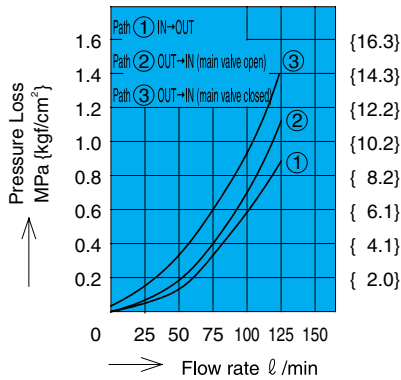
Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

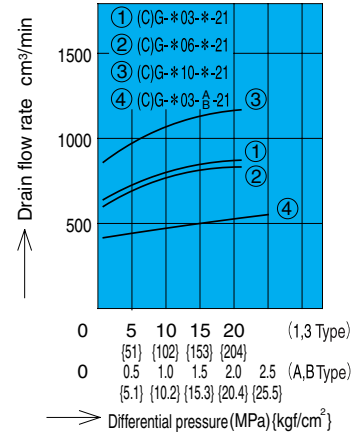
Pressure Loss Characteristics
(C)G-G03-*-21



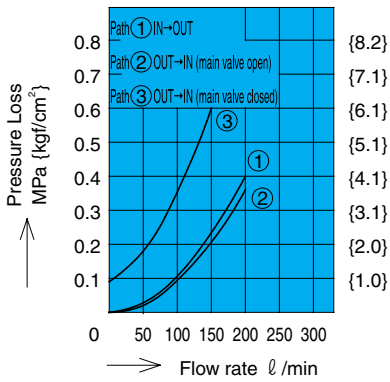
(C)G-T03-*-21



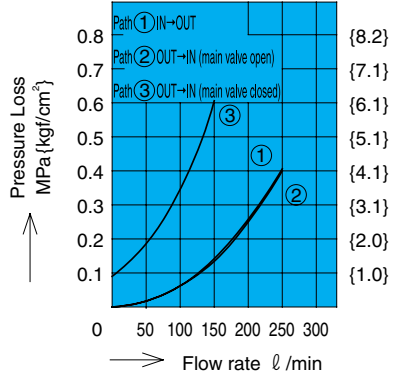
Pressure - Drain Flow Rate Characteristics
(C)G-***-*-21



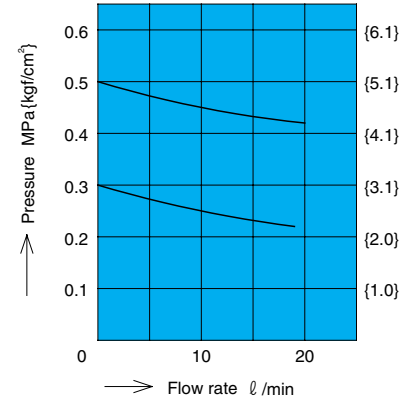
(C)G-G06-*-21



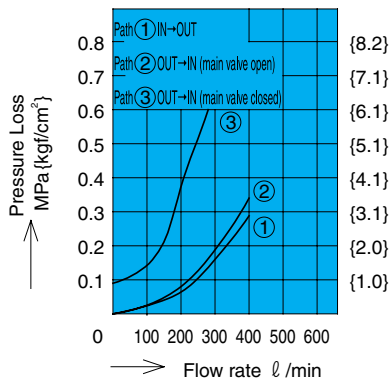
(C)G-T06-*-21



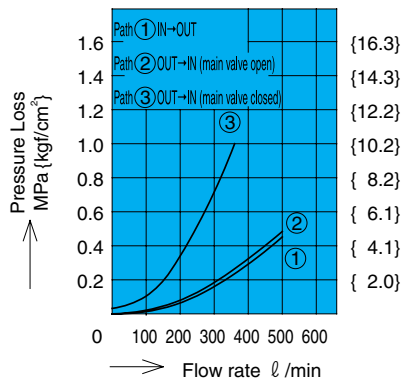
Secondary Pressure - Flow Rate Characteristics
(C)G-*03-A-B-21



(C)G-G10-*-21

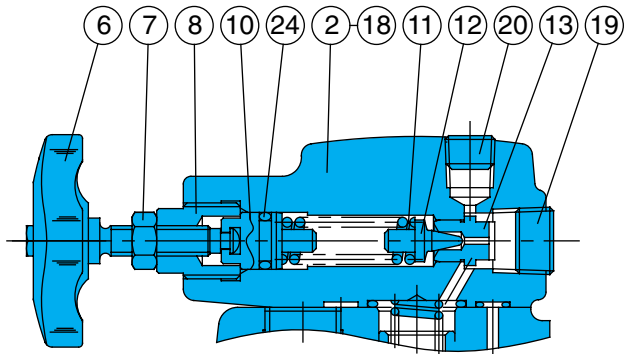


(C)G-T10-*-21

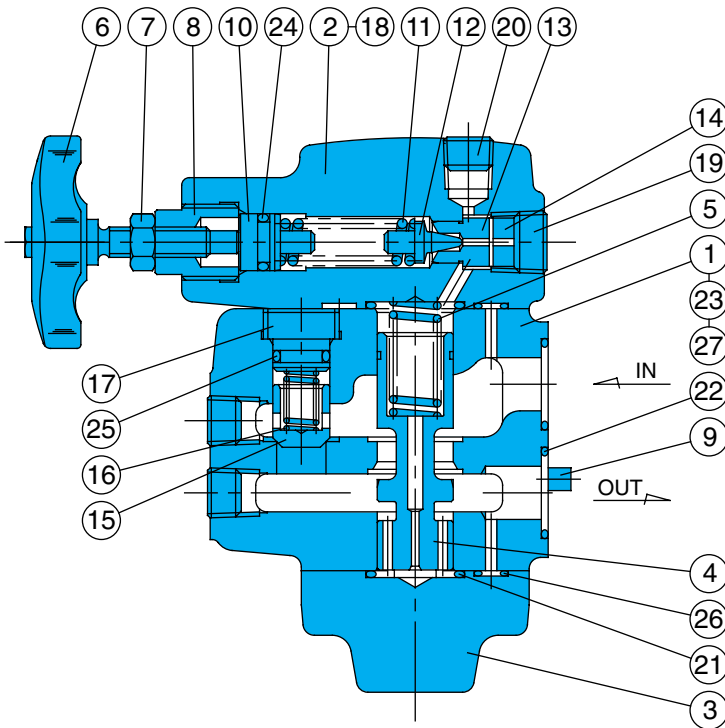


Cross-sectional Drawing

(C)G-G**-A
B-21



CG-G**-*-21



Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Piston
5	Spring
6	Handle
7	Nut
8	Retainer
9	Spring pin
10	Push rod
11	Spring
12	Poppet
13	Seat
14	Collar
15	Poppet
16	Spring
17	Spring guide
18	Screw
19	Plug
20	Plug
21	O-ring
22	O-ring
23	O-ring
24	O-ring
25	O-ring
26	O-ring
27	Nameplate

Note) Part numbers 15, 16, 17, and 25 are not required when there is no check valve.

Seal Part List (Kit Model Number RGBS-***)

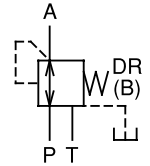
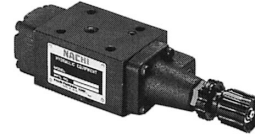
Part No.	Part Name	Part Number						Q'ty
		CG-G03-*-21	CG-T03-*-21	CG-G06-*-21	CG-T06-*-21	CG-G10-*-21	CG-T10-*-21	
21	O-ring	1B-P22	1B-P22	1B-G30	1B-G30	1B-G40	1B-G40	2
22	O-ring	1B-P20	-	1B-P26	-	1B-G35	-	2
23	O-ring	1B-P12	-	1B-P12	-	1B-P12	-	2
24	O-ring	1A-P11	1A-P11	1A-P11	1A-P11	1A-P11	1A-P11	1
25	O-ring	1B-P11	1B-P11	1B-P14	1B-P14	1B-P22	1B-P22	1
26	O-ring	1B-P6	1B-P6	1B-P6	1B-P6	1B-P6	1B-P6	4

Note) O-ring 1A/B-** refers to JIS B2401 1A/B-**.

*** in the kit number is used for specification of the valve size (G03, T06, etc.) To specify inclusion of a check valve, add C to the end.

Balancing Valve (Pressure Reducing and Relief Valve)

30 to 50 ℓ /min
14MPa



Features

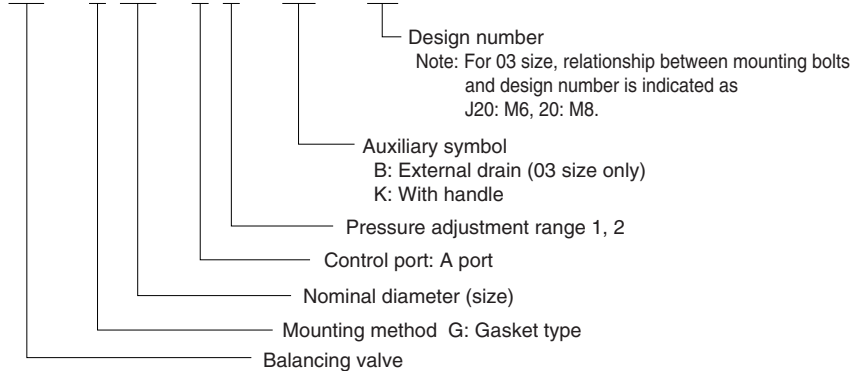
- ① 2-in-1 operation allows a simpler circuit configuration. Combination valve that provides both pressure reducing and counter balance functions.
- ② Pressure adjustment using a single screw (bolt).
- ③ Compact and lightweight valve that can be mounted using the same methods as a 01, 03 size solenoid valve.

Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	Pressure adjustment range MPa(kgf/cm ²)	Weight kg	Gasket Surface Dimensions
GR-G01-A1-20 A2	1/8	21{214} P port	30	0.8 to 7{ 8.2 to 71.4 } 3.5 to 14{35.7 to 143 }	1.5	ISO 4401-03-02-0-94
GR-G03-A1-(B)-20 A2	3/8		50	1.0 to 7{10.2 to 71.4 } 3.5 to 14{35.7 to 143 }	3.5	ISO 4401-05-04-0-94

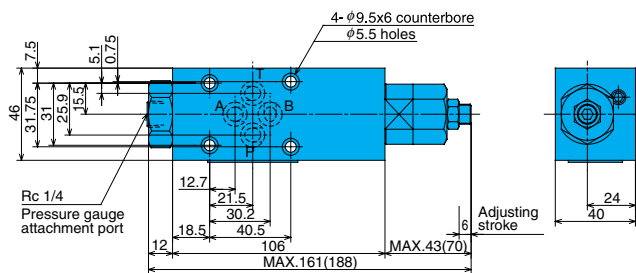
Understanding Model Numbers

GR - G 03 - A 1 - BK - 20

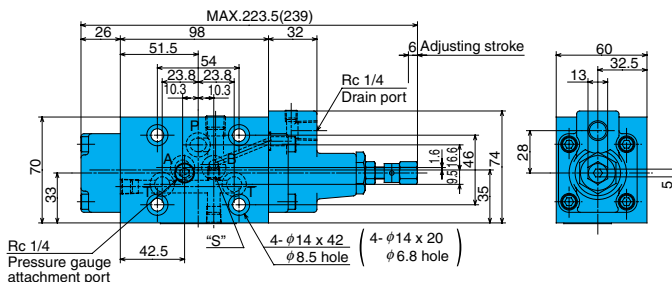


Installation Dimension Drawings

GR-G01-A*-20



GR-G03-A*-B-20



- Note) 1. For size 03, an escape valve with piping from the drain discharge port is standard for the drain (GR-G03-A*-B-20).
To change from internal drain to external drain, install a plug (NPTF 1/16) in part S, and remove the drain discharge port plug (RC 1/4).
To change from external drain to internal drain, install a plug (RC 1/4) into the drain discharge port, and remove the S part plug (NPTF 1/15).
In this case, however, the B port cannot be used as the tank port.
2. Dimensions in parentheses show dimensions with handle (K type).

Handling

- ① To adjust pressure, loosen the lock nut and then rotate the adjusting screw (bolt) clockwise (rightward) to increase pressure or counterclockwise (leftward) to decrease it.
- ② For the 01 size, draining is from the gasket side B port.
- ③ For the drain of a 03 size valve when auxiliary symbol B is specified, run a pipe from the drain discharge port directly to the tank. The drain discharge port can also be plugged for direct draining from the gasket side B port. In the case of modification, be sure to change the valve type marking on the nameplate. When using drain piping, use a tightening torque of 22 to 25N•m {215 to 245kgf•cm} for pipe joints.
- ④ The drain of 03 size valve that does not have a B auxiliary symbol can be directly from the T port.
- ⑤ Make sure that drain back pressure is no greater than 0.2MPa {2.0kgf/cm²}.
- ⑥ When an adjustment handle is required for pressure adjustment block, insert K for the type specification.
- ⑦ Use the following table for specification when a sub plate is required.

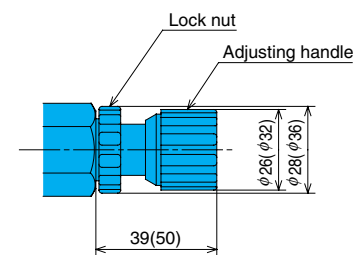
Model No.	Pipe Outlet Size	Weight kg
MSA-01Y-10	3/8	1.2
MS-03-30	3/8	3.8
MS-03X-30	1/2	

- ⑧ The following are the bundled mounting bolts.

Model No.	Bolt Dimensions	Q'ty	Tightening Torque N•m(kgf•cm)
GR-G01-A*-20	M5 x 45	4	5 to 7 {51 to 71}
GR-G03-A*-20	M8 x 30	4	20 to 25 {205 to 255}
GR-G03-A*-J20	M6 x 50	4	10 to 13 {102 to 133}

Note) For mounting bolts, use 12T or equivalent.

Adjusting Handle (Option)

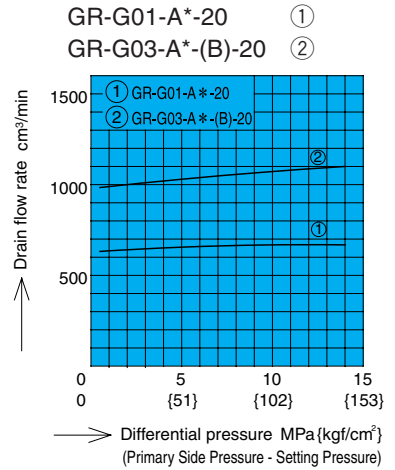
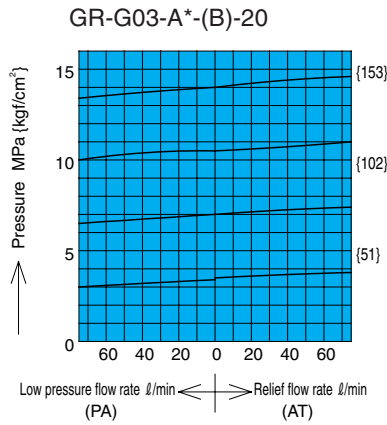
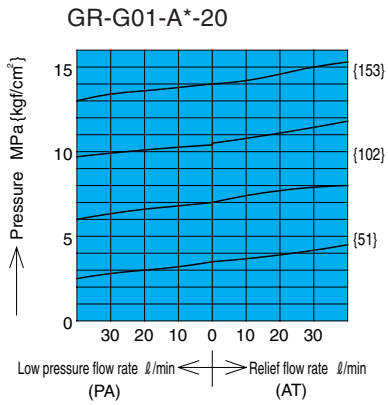


Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

Pressure – Flow Rate Characteristics

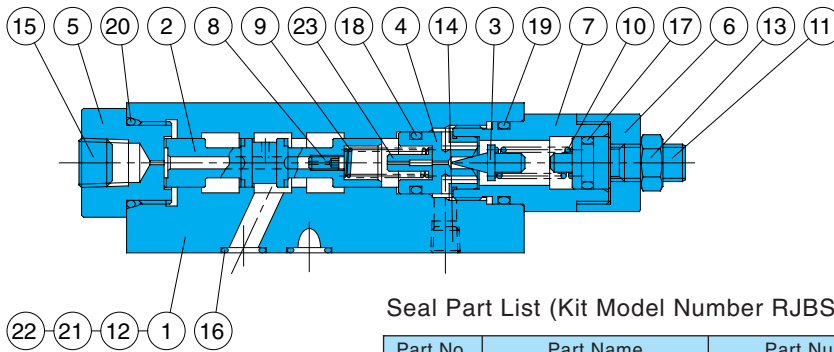
Setting Pressure – Drain Flow Rate Characteristics



Cross-sectional Drawing

Note) O-ring 1A/B-** refers to JIS B2401- 1A/B-**.

GR-G01-A*-20

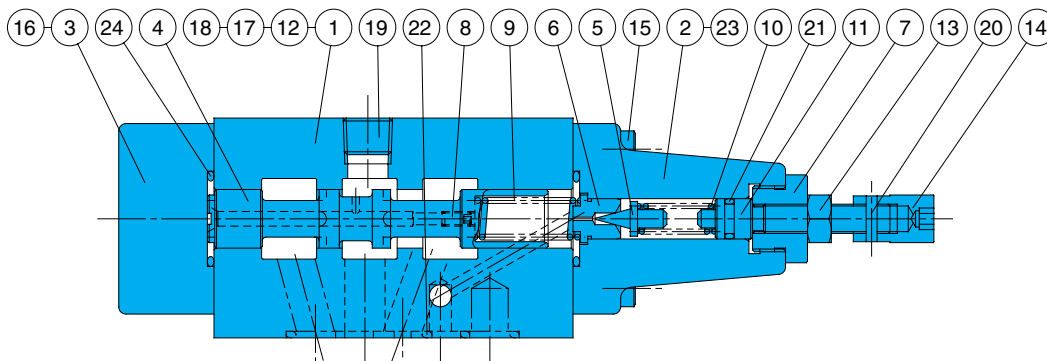


Seal Part List (Kit Model Number RJBS-G01)

Part No.	Part Name	Part Number	Q'ty
16	O-ring	1B-P9	4
17	O-ring	1A-P10A	1
18	O-ring	1B-P12.5	1
19	O-ring	1B-P18	1
20	O-ring	1B-P20	1

Part No.	Part Name
1	Body
2	Spool
3	Poppet
4	Seat
5	Bushing
6	Bushing
7	Retainer
8	Choke
9	Spring
10	Spring
11	Screw
12	Plate
13	Nut
14	Plug
15	Plug
16	O-ring
17	O-ring
18	O-ring
19	O-ring
20	O-ring
21	Plug
22	Spacer
23	Choke

GR-G03-A*-B-20



Seal Part List (Kit Model Number RJBS-G03)

Part No.	Part Name	Part Number	Q'ty
21	O-ring	1A-P8	1
22	O-ring	1B-P12	5
23	O-ring	1B-P9	1
24	O-ring	1B-P22	2

Part No.	Part Name
1	Body
2	Cover (A)
3	Cover (B)
4	Spool
5	Poppet
6	Seat
7	Retainer
8	Choke
9	Spring
10	Spring
11	Screw
12	Plate
13	Nut
14	Nut
15	Screw
16	Screw
17	Plug
18	Plug
19	Plug
20	Pin
21	O-ring
22	O-ring
23	O-ring
24	O-ring



Pressure Control (and Check) Valve

50 to 280 ℓ /min
14MPa

Features

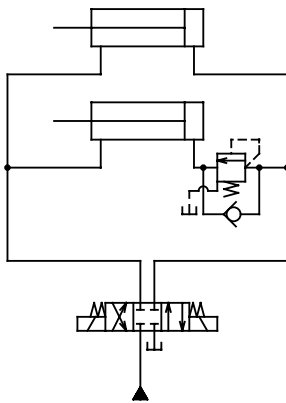
- ① This circuit control valve works as a sequence valve, unloading valve, and counter balance valve.
- ② Maximum operating pressure is 21MPa {214kgf/cm²}.
- ③ Though a direct type valve, there is little pressure override.
- ④ The mounting surface of the gasket conforms to the ISO standards shown in the table below.

Specifications

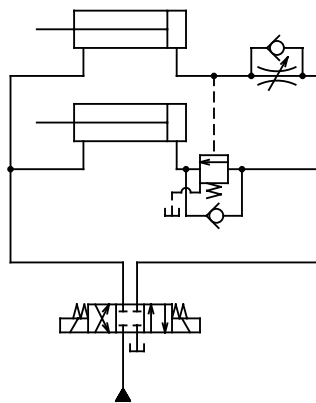
Model No.		Nominal Diameter (Size)	Maximum Working Pressure MPa(kgf/cm ²)	Maximum Flow Rate ℓ/min	Pressure adjustment range MPa(kgf/cm ²)	Weight kg		Gasket Surface Dimensions
Screw Mounting	Gasket Mounting					T Type	G Type	
(C)Q-T03-*A-21 B C D E	(C)Q-G03-*A-21 B C D E	3/8	21{214} IN, OUT, PP Ports	50	Type A 0.25 to 0.85 {2.6 to 8.7} Type B 0.5 to 1.75 {5.1 to 17.9}	2.9 (3.1)	3.5 (3.8)	ISO 5781-AG-06-2-A
(C)Q-T06-*A-21 B C D E	(C)Q-G06-*A-21 B C D E	3/4			Type C 0.85 to 3.5 {8.7 to 35.7}	5.0 (5.4)	6.0 (6.5)	
(C)Q-T10-*A-21 B C D E	(C)Q-G10-*A-21 B C D E	1 1/4		Type D 1.75 to 7 {17.9 to 71.4}	9.8 (11.1)	11.5 (12.8)	ISO 5781-AJ-10-2-A	
				280	Type E 3.5 to 14 {35.7 to 143}			

Weight values in parentheses are for when a check valve is included. The cracking pressure of the check valve is 0.1MPa {1.0kgf/cm²}.

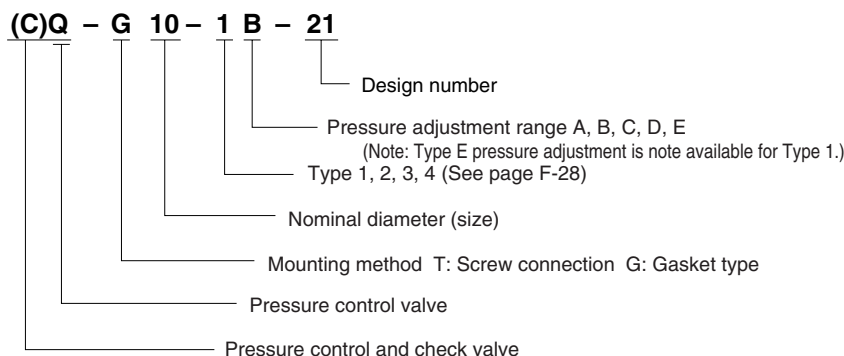
Example circuit 1
When using type 2.



Example circuit 2
When using type 3.



Understanding Model Numbers



● Handling

- ① To adjust pressure, loosen the lock nut and then rotate the adjusting bolt clockwise (rightward) to increase pressure or counterclockwise (leftward) to decrease it.
- ② The pressure adjustment range is expressed in terms of cracking pressure.
- ③ Run the out port of Type 1 and 4 directly to the tank.
- ④ The following describes the method for using Types 2 and 3. Application of back pressure to the valve output side such as in the example circuit shown below, use Type 2 or Type 3 and run the drain port directly to the tank.
- ⑤ When two or more of these valves are ganged in sequence, make sure the setting pressure (cracking pressure) differential between them is at least 1MPa {10.2kgf/cm²}.
- ⑥ For Type 1, there is no Type E pressure adjustment range (C) Q-***-1E-21.
- ⑦ Type 2 is standard. When Type 1, 3, or 4 is required, make modifications in accordance with the modification manual that comes with the product and with the figures on the next page. Modifications change the valve type, so be sure to change the markings on the nameplate.
- ⑧ Use the following table for specification when a sub plate is required.

Model No.	Pipe Diameter	Weight kg	Applicable Pump Model
MG-03-20	3/8	1.6	(C)Q-G03-**-21
MG-03X-20	1/2		
MG-06-20	3/4	3.9	(C)Q-G06-**-21
MG-06X-20	1		
MG-10-20	1 1/4	6.7	(C)Q-G10-**-21
MG-10X-20	1 1/2		

Note) These sub plates can also be used for reducing valves.

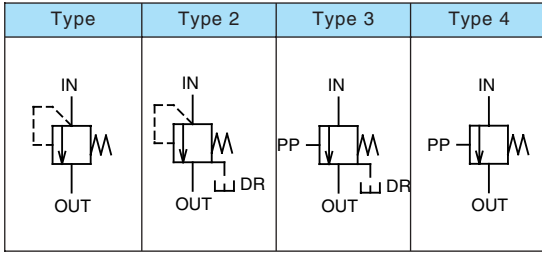
⑨ The following are the bundled mounting bolts.

Model No.	Bolt Dimensions	Qty	Tightening Torque N·m(kgf·cm)
(C)Q-G03-**-21	M10 × 75	4	45 to 55 {460 to 560}
(C)Q-G06-**-21	M10 × 85	4	
(C)Q-G10-**-21	M10 × 105	6	

Note) For mounting bolts, use 12T or equivalent.

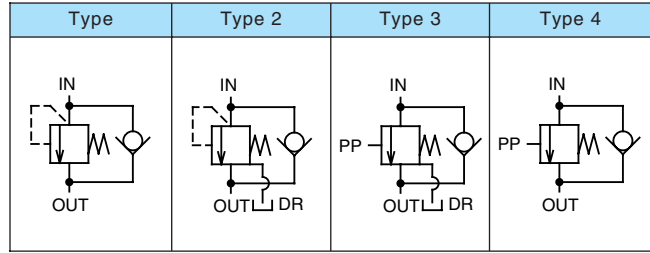
JIS Symbol

Q-***-**-21



Type 2 is standard.

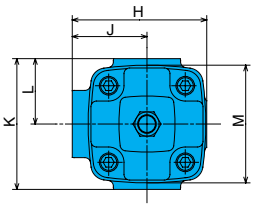
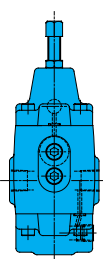
CQ-***-**-21



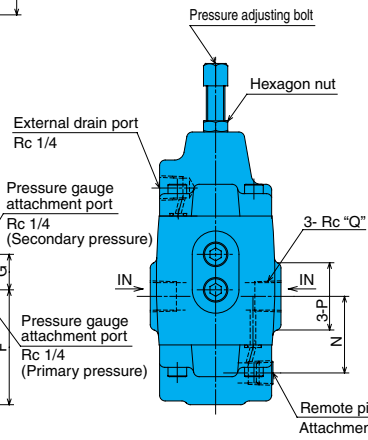
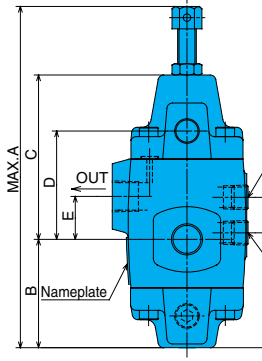
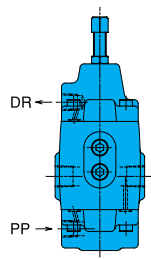
Installation Dimension Drawings

Q-T**-2*-21 (Screw Mounting)

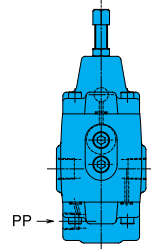
Type 1



Type 3



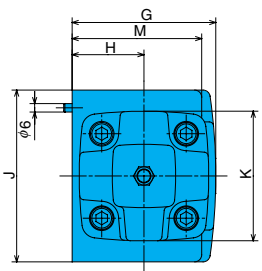
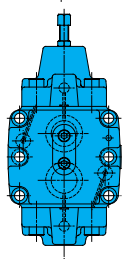
Type 4



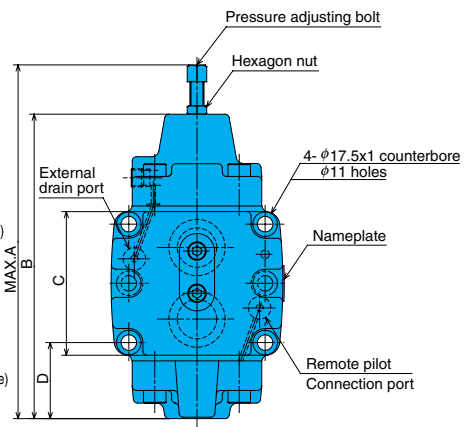
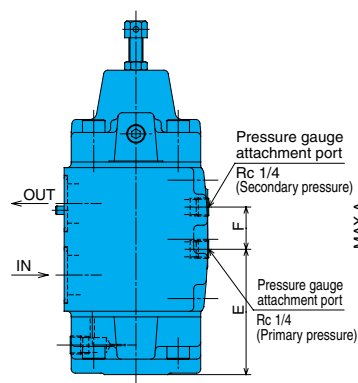
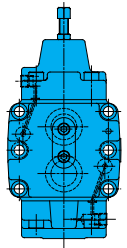
Model No.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
(C)Q-T03**-21	179.5	58	88	58	23	61.5	19	72	40	70	35	63	41	36	3/8
(C)Q-T06**-21	204.5	69.5	101.5	71.5	27	85	24	87	50	95	47.5	73	52.5	54	3/4
(C)Q-T10**-21	251	83.5	132.5	87.5	28	89	30	116	68.5	108	54	95	62.5	69	1 1/4

Q-G**-2*-21 (Gasket Mounting)

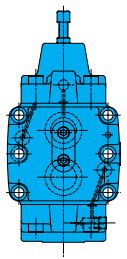
Type 1



Type 3



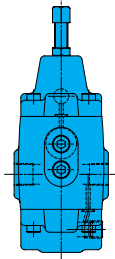
Type 4



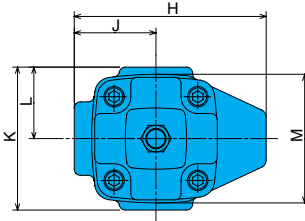
Model No.	A	B	C	D	E	F	G	H	J	K	L	M
Q-G03**-21	179.5	146	62	45.1	61.5	19	72	35	88	60	4	60
Q-G06**-21	204.5	171	82	51.4	75	24	80	40	102	70	4	70
Q-G10**-21	251	216	102	54	89	30	102	51	122	92	6	92

Installation Dimension Drawings

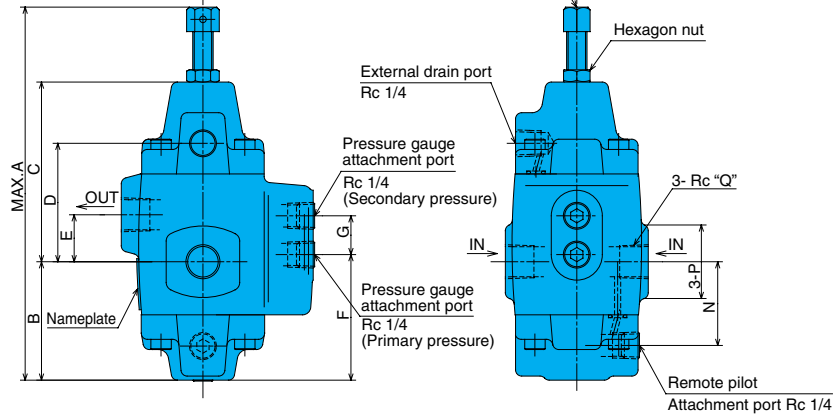
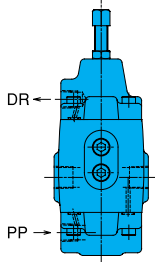
Type 1



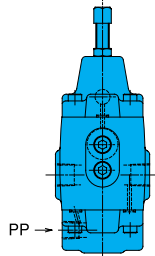
CQ-T** -2* -21 (Screw Mounting)



Type 3

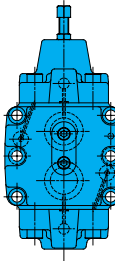


Type 4

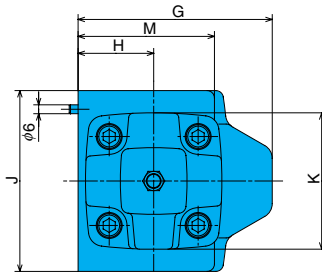


Model No.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
CQ-T03-**-21	179.5	58	88	58	23	61.5	19	94	40	70	35	63	41	36	3/8
CQ-T06-**-21	204.5	69.5	101.5	81.5	27	75	24	110	50	95	47.5	73	52.5	54	3/4
CQ-T10-**-21	251	83.5	132.5	87.5	28	89	30	148.5	148.5	108	54	95	62.5	69	1 1/4

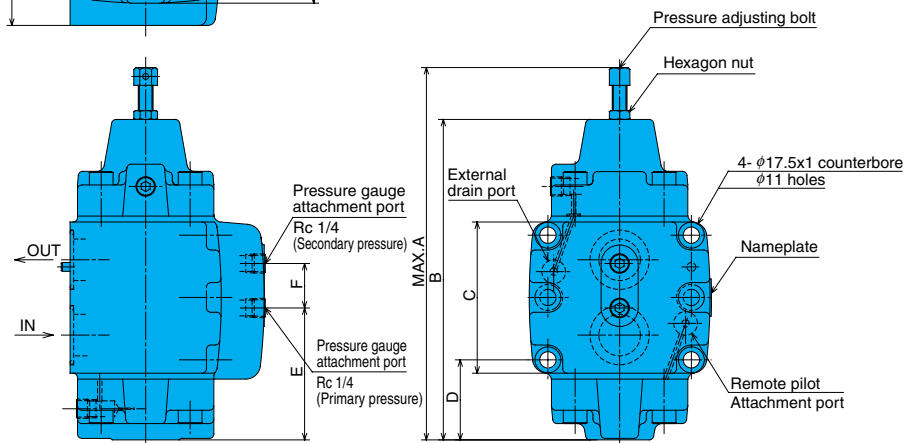
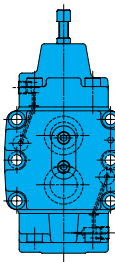
Type 1



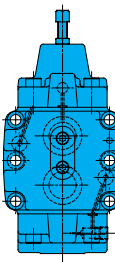
CQ-G** -2* -21 (Gasket Mounting)



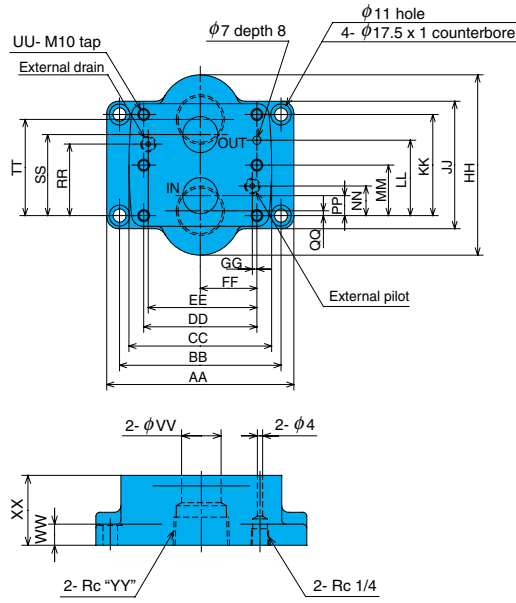
Type 3



Type 4



Model No.	A	B	C	D	E	F	G	H	J	K	L	M
CQ-G03-**-21	179.5	146	62	45.1	61.5	19	89	35	88	60	4	60
CQ-G06-**-21	204.5	171	82	51.4	75	24	100	40	102	70	4	70
CQ-G10-**-21	251	216	102	54	89	30	131	51	122	92	6	92



Note1) The figure shows size 10(X), with four M10 tap holes for size 03(X) and 06(X) valve mounting bolts.
 Note2) When a valve cover external drain and external pilot port are used, remove the plugs from the sub plate external drain and external pilot port.

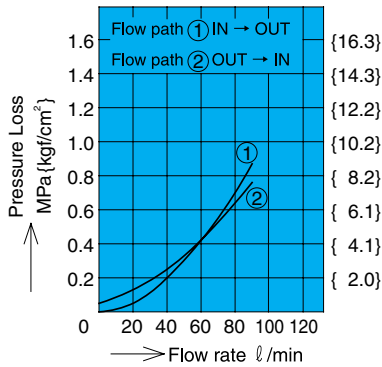
Model No.	AA	BB	CC	DD	EE	FF	GG	HH	JJ	KK	LL	MM	NN	PP	QQ	RR	SS	TT	UU	VV	WW	XX	YY
MG-03-20	128	106.4	88	66.6	58.7	33.3	7.9	76	62	42.9	31.8	-	21.4	7.2	3.5	21.4	35.7	39.5	4	14	11	30	3/8
MG-03X-20																							1/2
MG-06-20	160	123.8	102	79.3	72.9	39.7	6.4	110	82	60.3	44.5	-	20.6	11.1	3.7	39.7	49.2	56.7	4	22	16	40	3/4
MG-06X-20																							1
MG-10-20	160	138.1	122	96.8	92.9	48.4	3.9	150	102	84.1	62.7	42.1	24.6	16.7	4.1	59.5	67.5	80.1	6	30	16	53	1 1/4
MG-10X-20																							1 1/2

Performance Curves

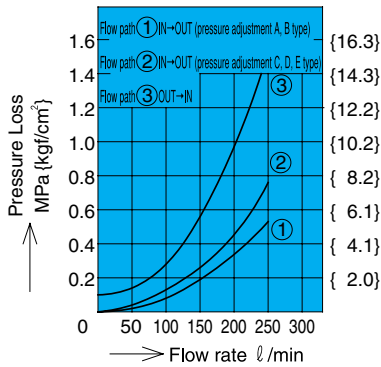
Hydraulic Operating Fluid Viscosity 32mm²/s

Pressure Loss Characteristics

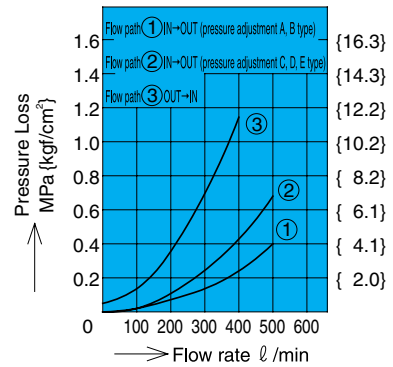
(C)Q-T03-**-21



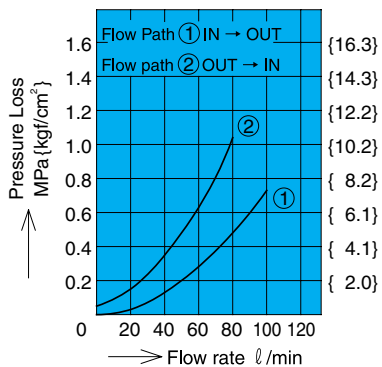
(C)Q-T06-**-21



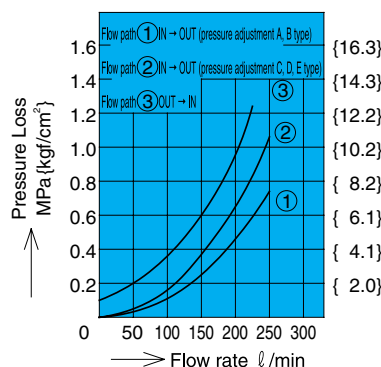
(C)Q-T10-**-21



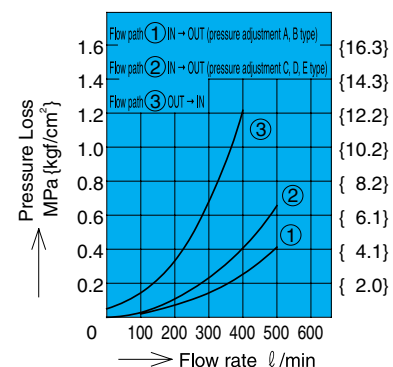
(C)Q-G03-**-21



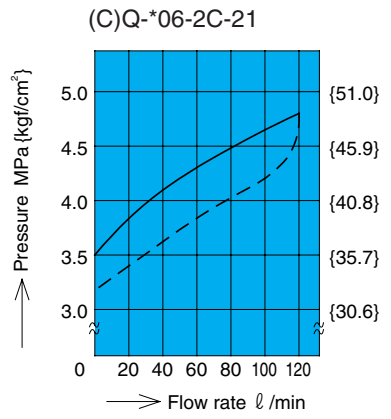
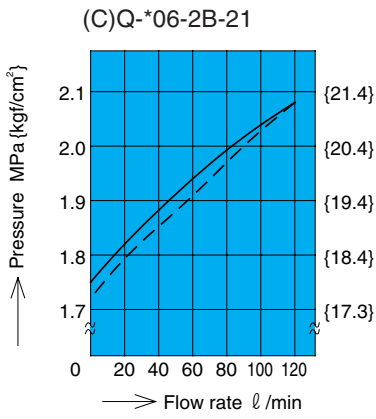
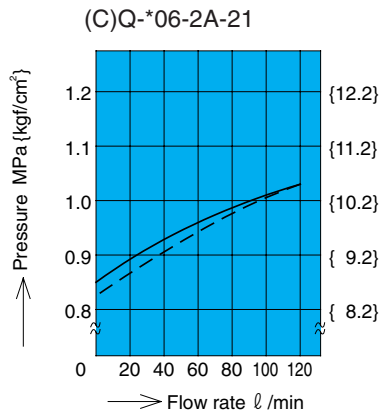
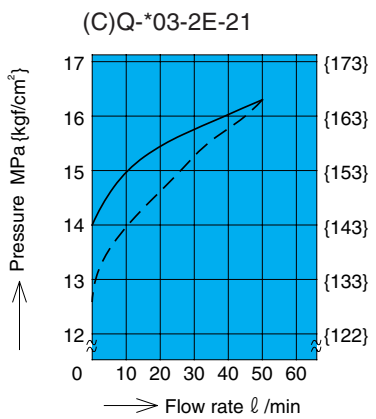
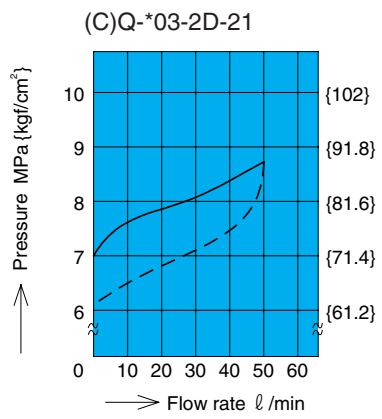
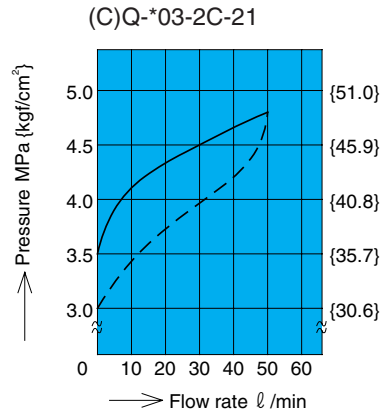
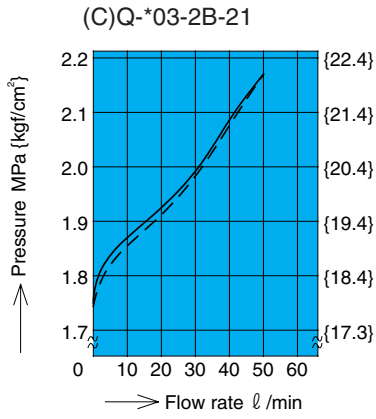
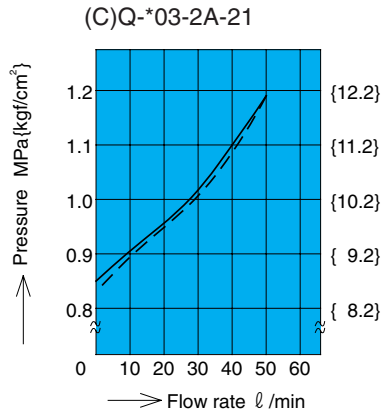
(C)Q-G06-**-21



(C)Q-G10-**-21

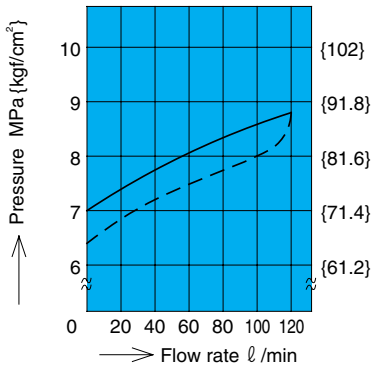


Pressure – Flow Rate Characteristics (— : Press rise
 - - - : Pressure drop)

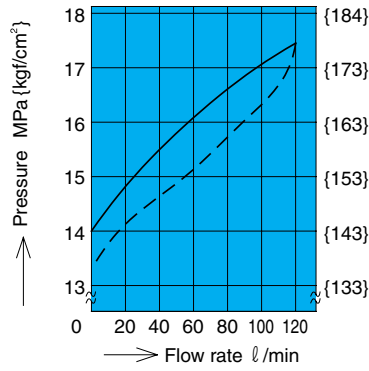


Pressure – Flow Rate Characteristics (— : Press rise
 - - - : Pressure drop)

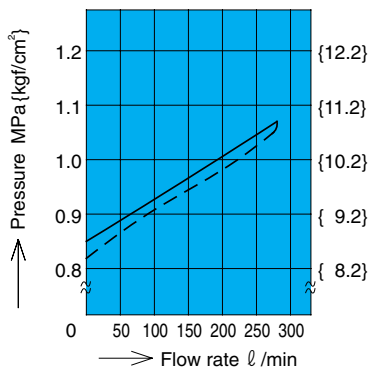
(C)Q-*06-2D-21



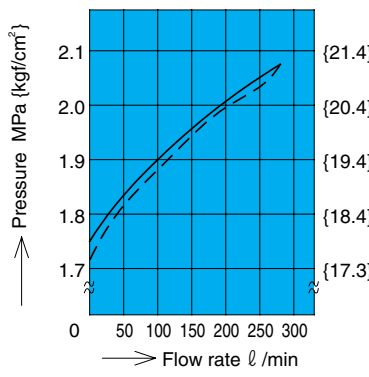
(C)Q-*06-2E-21



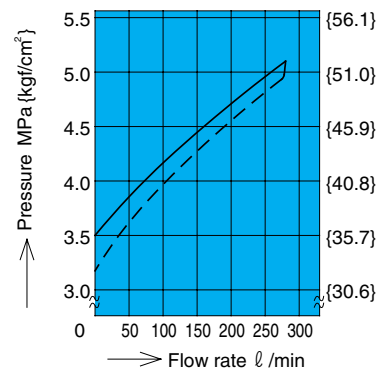
(C)Q-*10-2A-21



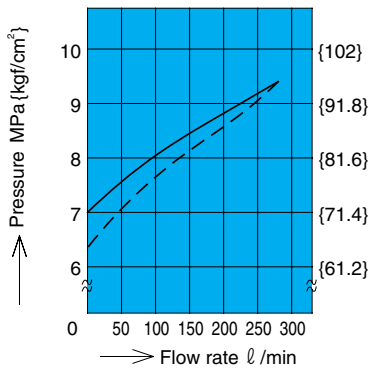
(C)Q-*10-2B-21



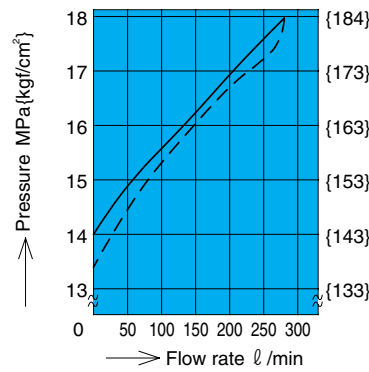
(C)Q-*10-2C-21



(C)Q-*10-2D-21

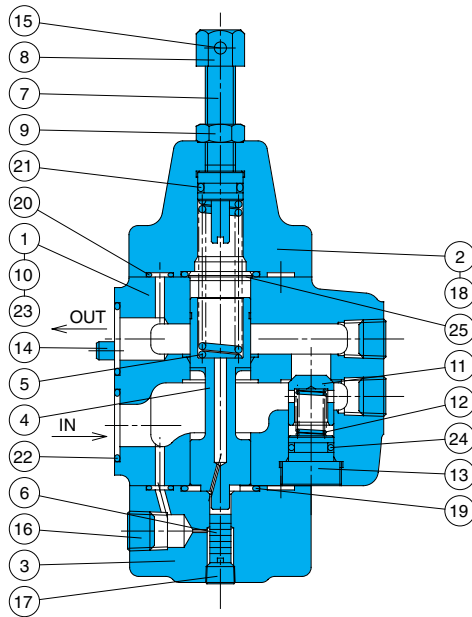


(C)Q-*10-2E-21



Cross-sectional Drawing

CQ-G**-**-21



Part No.	Part Name
1	Body
2	Cover
3	Cover
4	Piston
5	Spring
6	Plunger
7	Knob
8	Nut
9	Nut
10	Nameplate
11	Poppet
12	Spring
13	Spring guide
14	Pin
15	Pin
16	Plug
17	Plug
18	Plug
19	O-ring
20	O-ring
21	O-ring
22	O-ring
23	O-ring
24	O-ring
25	Spacer

Note) The illustration shows the configuration for pressure adjustment ranges Type C, Type D, and Type E. For Type A and Type B, the #6 piston is eliminated, and the #4 spool and #5 spring are different.

Note) Part numbers 11, 12, 13, and 24 are not required when there is no check valve.

Seal Part List (Kit Model Number RQBS-*** (C))

Part No.	Part Name	Type/Part Number						Q'ty
		CQ-G03**-21	CQ-T03**-21	CQ-G06**-21	CQ-T06**-21	CQ-G10**-21	CQ-T10**-21	
19	O-ring	1B-P22	1B-P22	1B-G30	1B-G30	1B-P40	1B-G40	2
20	O-ring	1B-P6	1B-P6	1B-P6	1B-P6	1B-P6	1B-P6	4
21	O-ring	1B-P11	1B-P11	1B-P16	1B-P16	1B-P22A	1B-P22A	1
22	O-ring	1B-P20	-	1B-P26	-	1B-G35	-	2
23	O-ring	1B-P12	-	1B-P12	-	1B-P12	-	2
24	O-ring	1B-P11	1B-P11	1B-P14	1B-P14	1B-P22	1B-P22	1

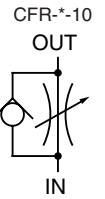
Note) O-ring 1B-** refers to JIS B2401-1B-**.

For the *** part of the kit number, specify the valve size (G03, T06). To specify inclusion of a check valve, add C to the end.



Throttle (and Check) Valve

190 ℓ /min
21MPa



Features

- ① Compact and lightweight, requires very little space for installation.
- ② Special needle valve configuration provides smooth flow rate control.
- ③ Pressure is internally balanced for light handle operation, even at high pressure.

Specifications

Model No.		Nominal Diameter (Size)	Maximum Flow Rate ℓ /min	Cracking pressure MPa{kgf/cm ² }	Maximum Working Pressure MPa{kgf/cm ² }	Weight kg	
Screw Mounting	Gasket Mounting					T Type	G Type
(C)FR-T03-10	(C)FR-G03-10	3/8	30	0.15{1.5}	21{214}	1.3	1.7
(C)FR-T06-10	(C)FR-G06-10	3/4	75	0.1{1.0}		3.0	3.7
(C)FR-T10-10	(C)FR-G10-10	1 1/4	190			5.6	5.8

● Handling

- 1 The control flow rate is increased by counter clockwise (leftward) rotation of the flow rate control handle.
- 2 The control flow rate does not become zero even if the handle is fully turned.
- 3 There is no pressure or temperature compensation mechanism.
- 4 Bi-directional restriction is possible when there is no check valve.
- 5 Use the table to the right for specification when a sub plate is required.
- 6 See the table to the right for installation hex socket bolts. However, bolts are not included for a screw mounting type.

Applicable Pump Model	Bolt Size	Q'ty	Tightening Torque m{kgf·cm}
(C)FR-G03-10	M8 × 65 ℓ	4	20 to 25{ 205 to 255}
(C)FR-G06-10	M12 × 75 ℓ	4	75 to 95{ 765 to 969}
(C)FR-G10-10	M14 × 90 ℓ	4	120 to 150{1220 to 1530}

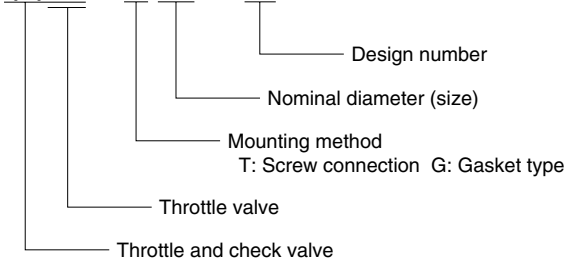
Note)For mounting bolts, use 12T or equivalent.

● Sub Plate

Model No.	Pipe Diameter	Recommended Flow Rate ℓ /min	Weight kg	Applicable Valve Type
MFR-03-10	3/8	30	1.0	(C)FR-G03-10
MFR-06-10	3/4	75	2.2	(C)FR-G06-10
MFR-10-10	1 1/4	190	4.1	(C)FR-G10-10

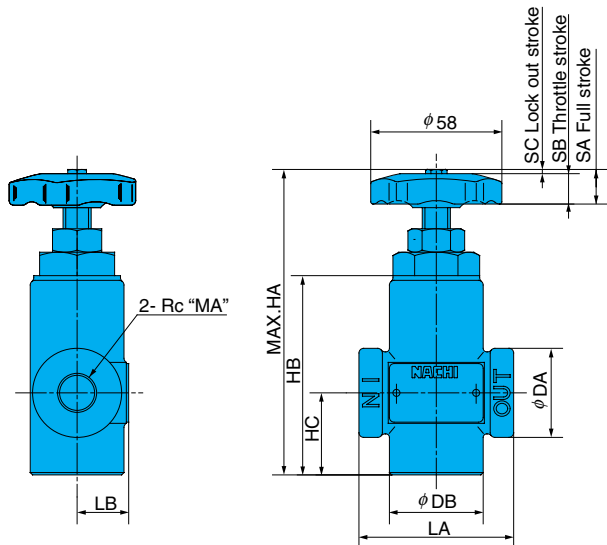
Understanding Model Numbers

(C)FR - G 03 - 10



Installation Dimension Drawings

(C)FR-T**-10 (Screw Mounting)

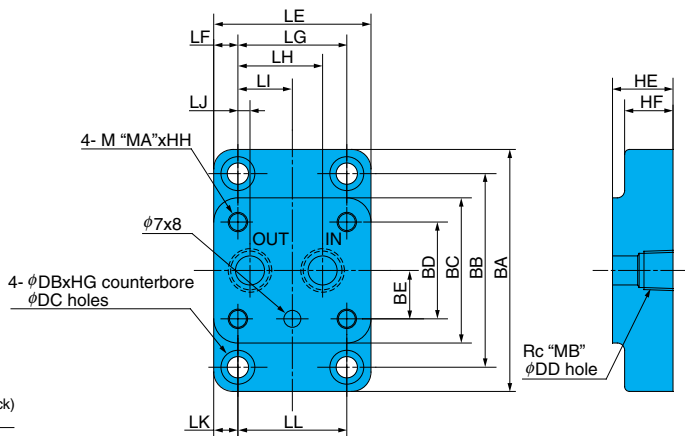
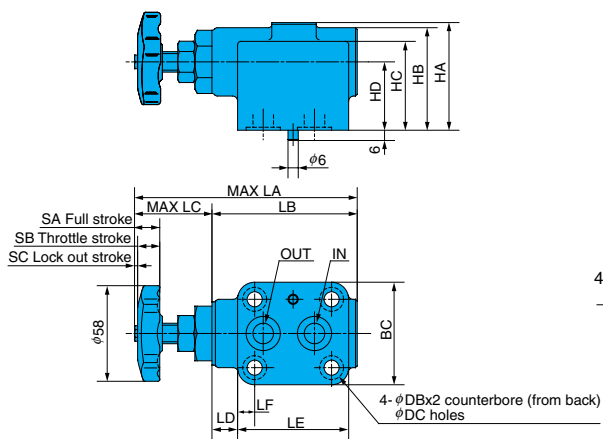


Model No.	LA	LB	DA	DB
(C)FR-T03-10	66	21.5	38	40
(C)FR-T06-10	95	30.5	55	55
(C)FR-T10-10	130	38.5	74	70

HA	HB	HC	SA	SB	SC	MA
130.5	85	35	7	6	1	3/8
175.5	123	55	10	9	1	3/4
206.5	150	70	14	12	2	1 1/4

(C)FR-G**-10 (Gasket Mounting)

Sub Plate MFR**-10



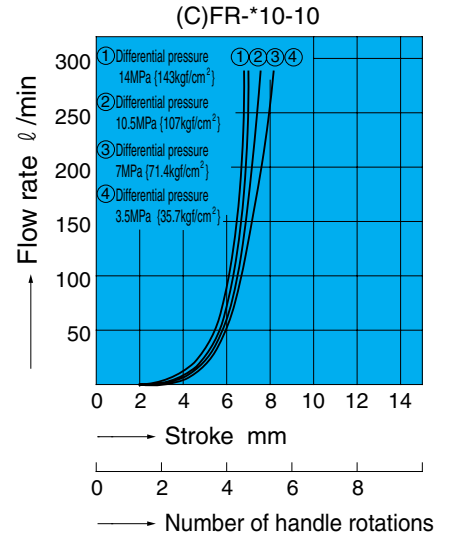
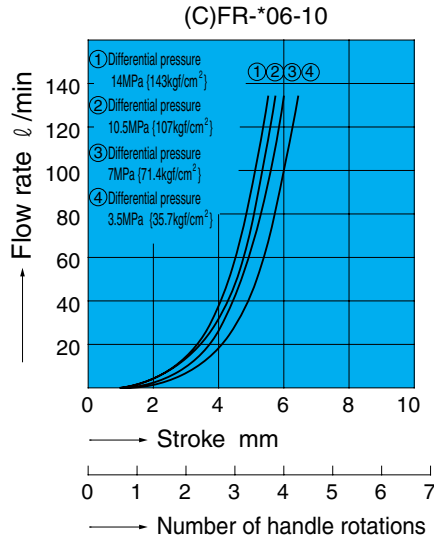
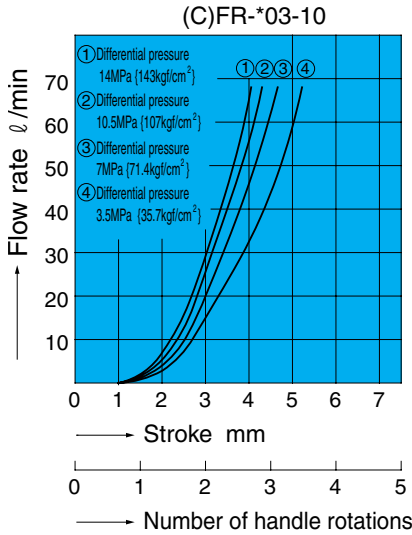
DB	DC	DD	MA	MB	SA	SB	SC
14	8.8	12	8	3/8	7	6	1
20	13	20	12	3/4	10	9	1
23	15	30	14	1 1/4	14	12	2

Model Number	LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ	LK	LL	BA	BB	BC	BD	BE	HA	HB	HC	HD	HE	HF	HG	HH
(C)FR-G03-10	130.5	85	45	15	65	10	45	35	22.5	5	10	45	100	80	60	40	20	63	60	52	40	25	20	8.6	18
(C)FR-G06-10	175.5	123	52	14	96	13	70	55	35	15	14	68	132	106	80	54	27	71	68	57	40	30	25	13	20
(C)FR-G10-10	206.5	150	56	14	120	15	90	72.5	45	17.5	16	88	154	122	90	60	30	83	80	68	45	40	35	15.2	25

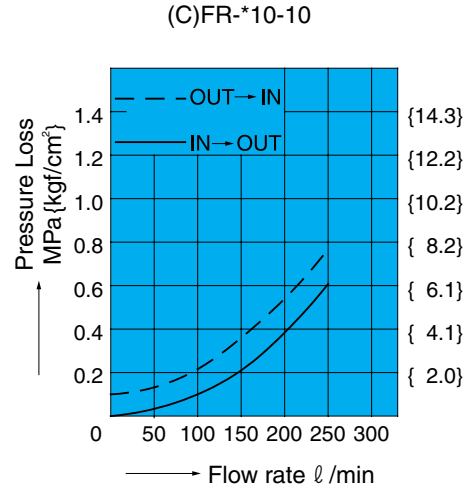
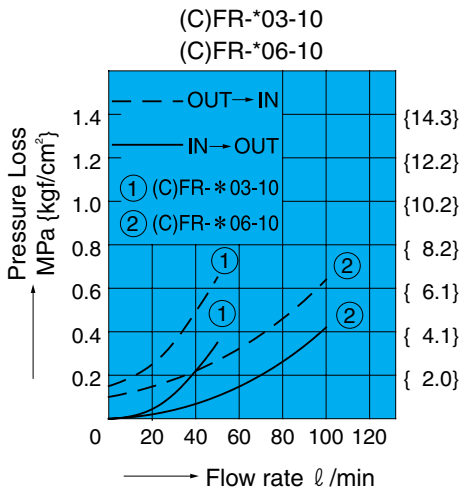
Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

Stroke – Flow Rate Characteristics

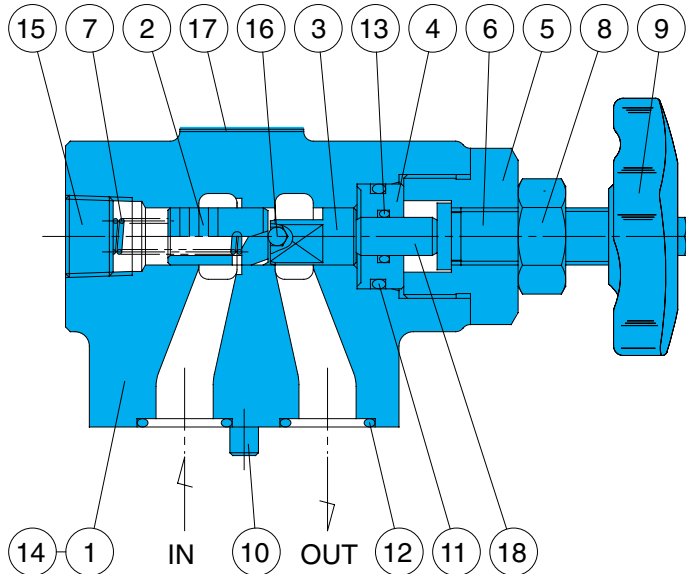


Pressure Loss Characteristics



Cross-sectional Drawing

CFR-G**-10



Part No.	Part Name
1	Body
2	Poppet
3	Piston
4	Bracket
5	Stopper
6	Screw
7	Spring
8	Nut
9	Handle
10	Pin
11	O-ring
12	O-ring
13	O-ring
14	Plug
15	Plug
16	Ball
17	Plate
18	Rod

Seal Part List (Kit Model Number FSS-***)

Part No.	Part Name	CFR-G03-10		CFR-G06-10		CFR-G10-10	
		Part Number	Q'ty	Part Number	Q'ty	Part Number	Q'ty
11	O-ring	IB-P18	1	IB-G25	1	IB-G25	1
12	O-ring	IB-P16	2	IB-G25	2	IB-G35	2
13	O-ring	IB-P8	1	IB-P8	1	IB-P8	1

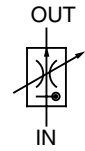
Note) O-ring 1B-** refers to JIS B2401-1B-**. *** in the kit number is used for specification of the valve size (G03, T06, etc.)



Flow Control Valve



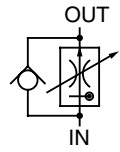
FT-G0*-**-22



FT Type Flow Control (and Check) Valve (With Pressure and Temperature Compensation)

**0.05 to 106 ℓ /min
21MPa**

CFT-G02*-**-22



Features

- ① Pressure compensation and temperature compensation mechanisms provide a stable control flow rate, even when fluid temperature fluctuates.
- ② A wider control flow rate range as well as easier minute flow rate adjustability than previous products.

Specifications

Model No.	Nominal Diameter (Size)	Volume control flow rate ℓ /min	Maximum Working Pressure MPa{kgf/cm ² }	Reverse Flow Rate ℓ /min	Cracking pressure MPa{kgf/cm ² }	Weight kg	Gasket Surface Dimensions
(C)FT-G02-8-22 30-22	1/4	0.05 to 8 0.1 to 30	21{214}	50	0.1{1.0}	3.7	ISO 6263-AK-06-2-A
FT-G03-42-22 106-22	3/8	0.1 to 42 0.2 to 106		*120		7.9	ISO 6263-AM-07-2-A

Asterisk (*) indicates values for auxiliary plate with check valve.

● Handling

- ① In the temperature range of 20°C to 60°C, flow rate fluctuation is within ±5% of the standard flow rate at 40°C.
- ② In the pressure range of 1.0 to 21MPa {10.2 to 214kgf/cm²}, flow rate fluctuation is within ±5% of the setting flow rate.
- ③ Note that flow rate fluctuation exceeds the rated fluctuation amount slightly in the vicinity of the minimum control flow rate, due to changes in operating temperature and hydraulic fluid viscosity.
- ④ When controlling flow rates that are less than 0.2 ℓ /min, use with a filter that does not exceed 10μm.
- ⑤ For flow rate control, make sure that the pressure differential between the input port and output port is at least 1MPa {10.2kgf/cm²}.
- ⑥ The control flow rate is increased by clockwise (rightward) rotation of the control handle.

⑦ See the table below for installation hex socket bolts.

⑧ Use the following table for specification when a sub plate is required.

● Sub Plate and Auxiliary Plate Application Table

Name	Model No.	Pipe Diameter	Recommended Flow Rate ℓ /min	Weight kg	Applicable Valve Type	Use With Sub Plate		
Sub Plate	MF-02X-10	3/8	30	2.2	(C)FT-G02*-**-22	-		
	MF-02Y-20	1/2	50					
Sub Plate	MF-03-10	3/8	42	3.3	FT-G03*-**-22	-		
	MF-03Y-20	3/4	75					
	MF-03Z-20	1	120					
Sub Plate with Check Valve	MF-03Y-C-22	3/4	75	5.7				
	MF-03Z-C-22	1	120	5.6				
Auxiliary Plate A with Check Valve	MCF-03-A-22	φ23	120	3.2				MF-03*-**

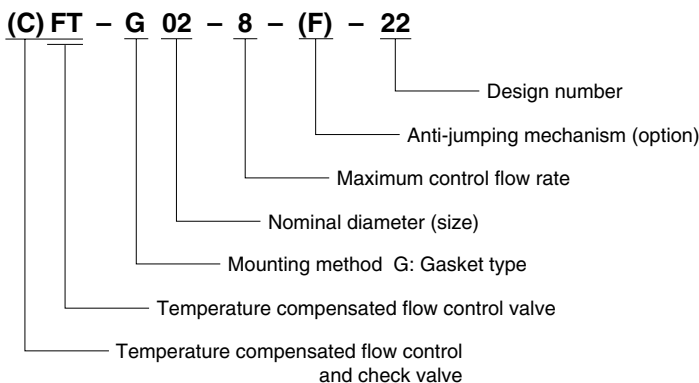
⑨ Though FT-G03 does not have a built-in check valve, a sub plate with check valve and auxiliary plate with check valve is used

in addition to the normal sub-plate. (Use the auxiliary plate in combination with the sub plate.)

Applicable Model	Bolt Size	Q'ty	Tightening Torque N·m{kgf·cm}
(G)FT-G02*-**-22	M8 × 55 ℓ	4	20 to 25{205 to 255}
FT-G03*-**-22	M10 × 75 ℓ	4	45 to 55{460 to 560}
With FT-G03 Auxiliary Plate	M10 × 110 ℓ	4	45 to 55{460 to 560}

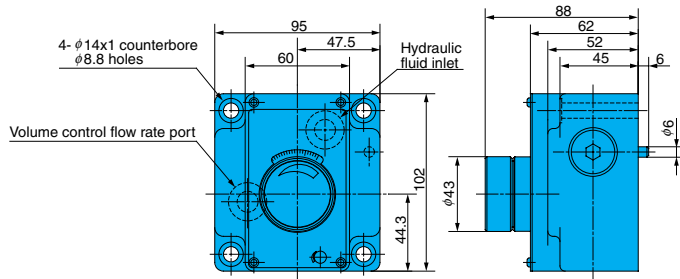
Note)For mounting bolts, use 12T or equivalent.

Understanding Model Numbers

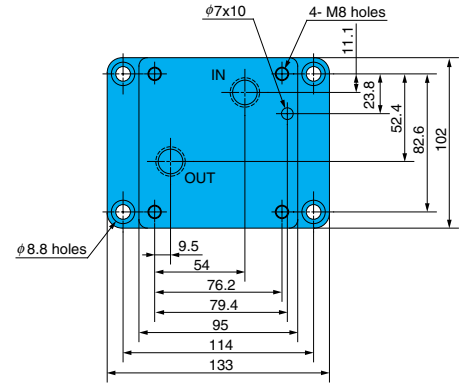


Installation Dimension Drawings

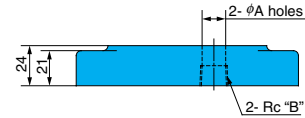
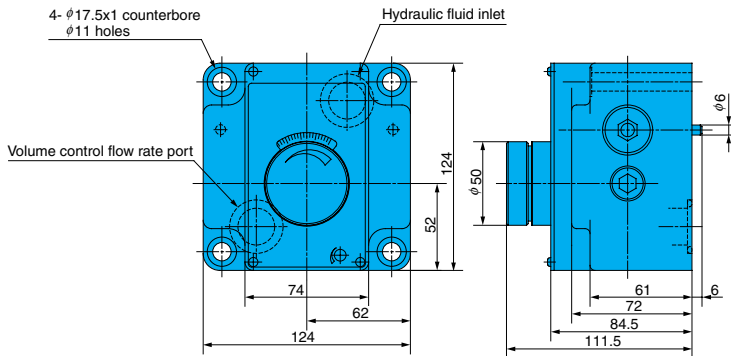
(C)FT-G02-**-22



Sub Plate MF-02*-*



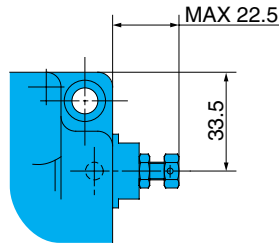
FT-G03-***-22



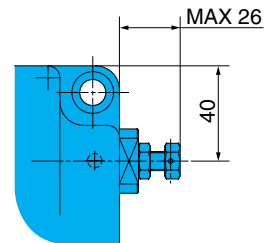
Sub Plate	A	B
MF-02X-10	14.7	3/8
MF-02Y-20	17	1/2

Anti-jumping mechanism

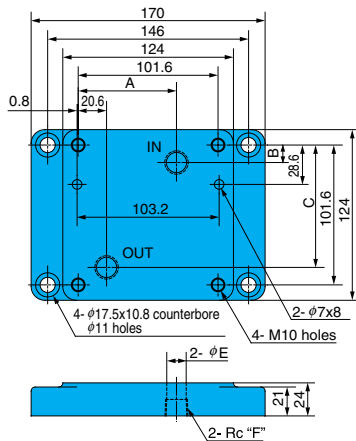
(C)FT-G02-* -F-22



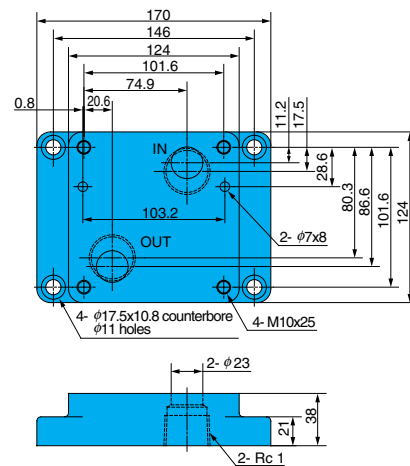
(C)FT-G03-**-F-22



Sub Plate MF-03-10
MF-03Y-20

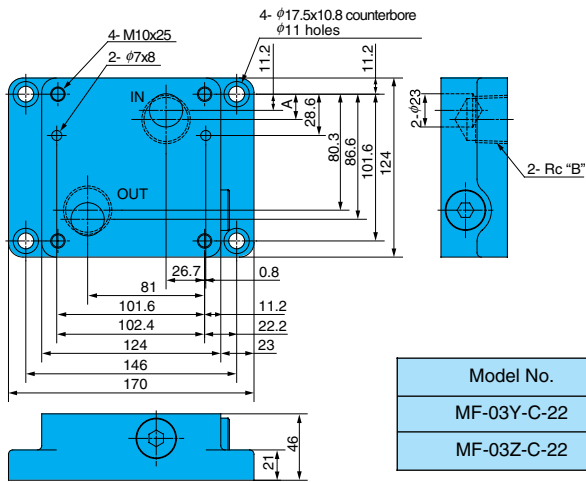


MF-03Z-20

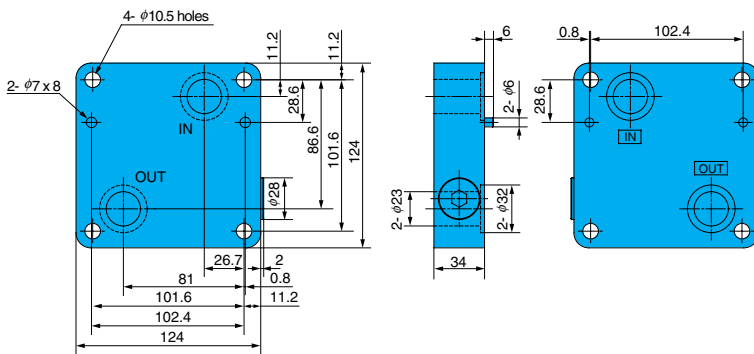


Sub Plate	A	B	C	E	F
MF-03-10	71.4	12.7	88.9	14.7	3/8
MF-03Y-20	74.9	11.2	86.6	23.0	3/4

Sub Plate with Check Valve MF-03*-C-22



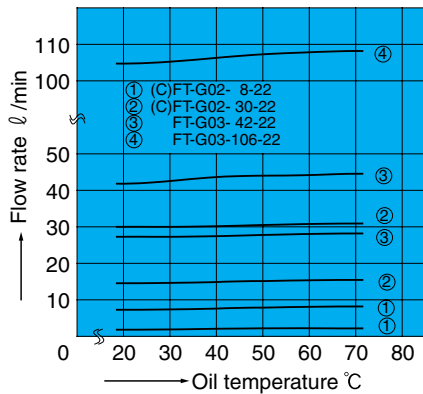
Auxiliary Plate with Check Valve MCF-03-A-22



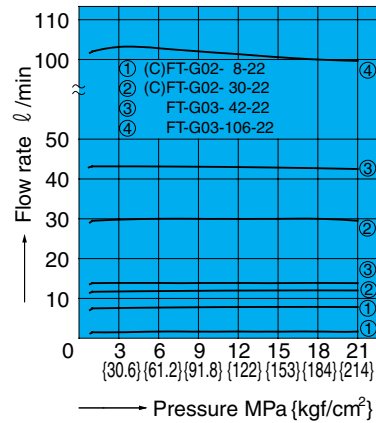
Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

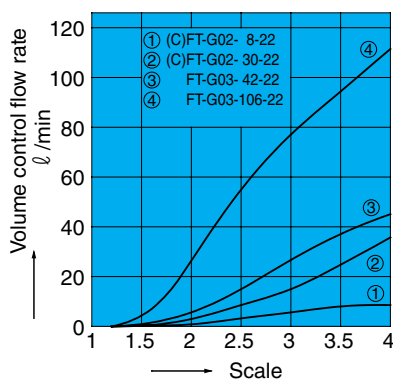
Fluid Temperature – Control Flow Rate Characteristics



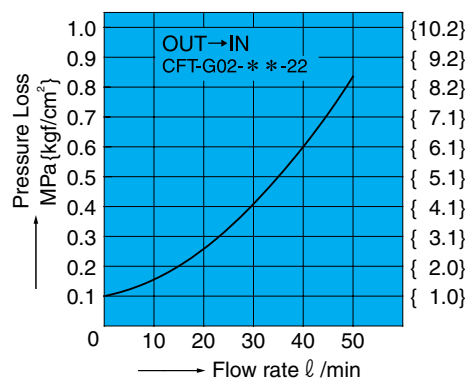
Pressure – Control Flow Rate Characteristics



Scale – Control Flow Rate Characteristics



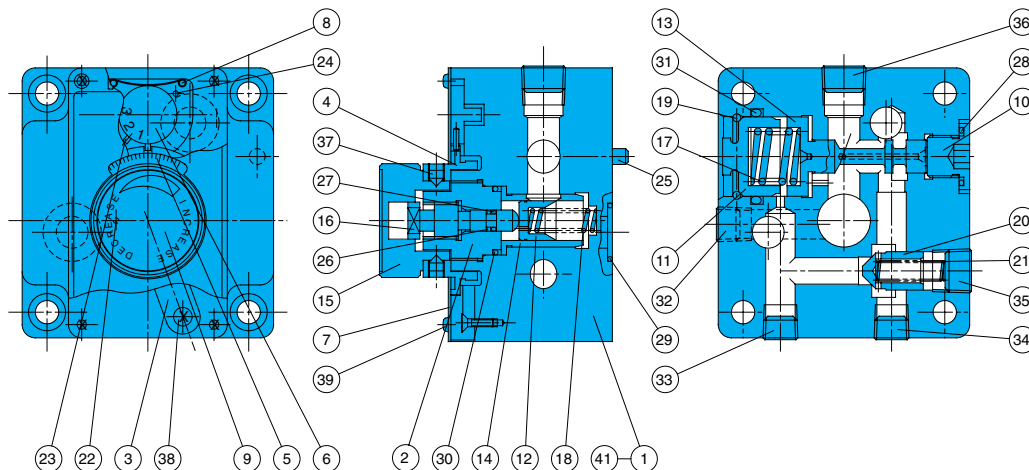
Pressure Loss Characteristics



Cross-sectional Drawing

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.

CFT-G02-*-22



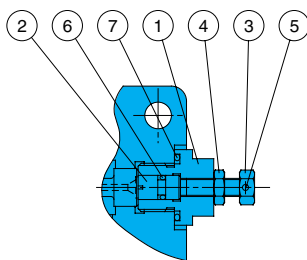
Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	15	Knob	29	O-ring
2	Retainer	16	Screw	30	O-ring
3	Stopper	17	Spring	31	O-ring
4	Dial	18	Spring	32	Plug
5	Plate	19	Snap ring	33	Plug
6	Plate	20	Poppet	34	Plug
7	Plate	21	Spring	35	Plug
8	Spring	22	Pin	36	Plug
9	Plate	23	Pin	37	Screw
10	Plug	24	Pin	38	Screw
11	Plug	25	Pin	39	Screw
12	Throttle	26	Backup ring	40	Washer
13	Piston	27	O-ring	41	O-ring
14	Sleeve	28	O-ring		

Seal Part List (Kit Model Number FBBS-***)

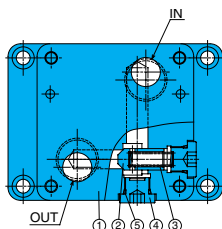
Part No.	Part Name	(C)FT-G02-*-22		FT-G03-*-22	
		Part Number	Q'ty	Part Number	Q'ty
26	Backup ring	T2-P5	1	T2-P5	1
27	O-ring	IB-P5	1	IB-P5	1
28	O-ring	IB-P18	1	IB-P20	1
29	O-ring	IB-P18	2	IB-P26	2
30	O-ring	IB-P22	1	IB-P26	1
31	O-ring	IB-P30	1	IB-P38	1
41	O-ring	-	-	IB-P20	1
Seal Kit Number		FBBS-G02-1A		FBBS-G03	

Note) 1.O-ring 1B-** refers to JIS B2401-1B-**. 2.Backup ring indicates JIS B2407-T2**.

Anti-jumping mechanism (C)FT-G02-*-F-22



Sub Plate MF-03*-C-22

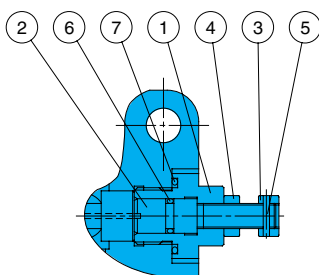


Part No.	Part Name	Part No.	Part Name
1	Sub Plate	4	Plug
2	Poppet	5	O-ring
3	Spring		

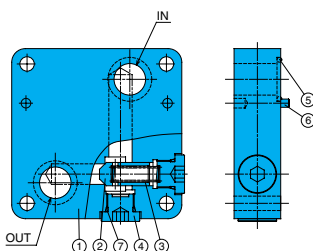
List of Sealing Parts

Part No.	Part Name	Part Number	Q'ty
5	O-ring	1B-P18	2

(C)FT-G03-*-22



MCF-03-A-22



Part No.	Part Name
1	Sub Plate
2	Poppet
3	Spring
4	Plug
5	O-ring
6	Pin
7	O-ring
8	Screw

List of Sealing Parts

Part No.	Part Name	Part Number	Q'ty
5	O-ring	1B-P26	2
7	O-ring	1B-P18	2

Anti-jumping mechanism

Part No.	Part Name
1	Retainer
2	Bolt
3	Nut
4	Nut
5	Spring pin
6	O-ring
7	O-ring

List of Sealing Parts

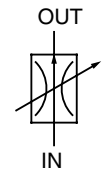
Part No.	Part Name	(C)FT-G02-*-22		FT-G03-*-22	
		Part Number	Q'ty	Part Number	Q'ty
6	O-ring	IB-P5	1	IB-P8	1
7	O-ring	IB-P18	1	IB-P20	1

Note) 1.O-ring 1B-** refers to JIS B2401-1B-**. 2.#7 O-ring and #29 O-ring are interchangeable.





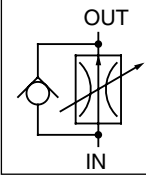
F-G***-20



F Type Flow Control (and Check) Valve (With Pressure Compensation)

9 to 373 ℓ /min
21MPa

CF-G***-20



Features

- ① Wide control flow rate range. there is pressure fluctuation.
- ② A pressure compensation mechanism ensures that the control flow rate does not change, even when

Specifications

Model No.	Nominal Diameter (Size)	Volume control flow rate ℓ /min	Maximum Working Pressure MPa{kgf/cm ² }	Cracking pressure MPa{kgf/cm ² }	Weight kg	Gasket Surface Dimensions
(C)F-G06-170-20	3/4	9 to 170	21{214}	0.1{1.0}	20.5	ISO 6263-AP-08-2-A
(C)F-G10-373-20	1 1/4	20 to 373			43.1	-

● Handling

- ① In the pressure range of 1.0 to 21MPa {10.2 to 214kgf/cm²}, flow rate fluctuation is within ±5% of the setting flow rate.
- ② For flow rate control, make sure that the pressure differential between the input port and output port is at least 1MPa {10.2kgf/cm²}.
- ③ The control flow rate is increased by clockwise (rightward) rotation of the control handle.

④ See the table below for installation hex socket bolts.

⑤ Use the following table for specification when a sub plate is required.

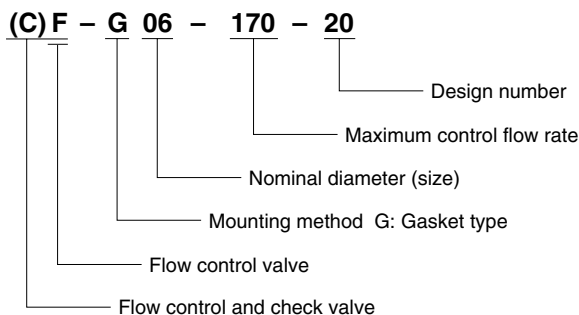
Sub Plate Application Table

Model No.	Pipe Diameter	Recommended Flow Rate ℓ /min	Weight kg	Applicable Valve Type
MF-06-10	3/4	106	6.3	(C)F-G06-170-20
MF-06X-20	1	170	9.7	
MF-10-10	1 1/4	246	21.1	(C)F-G10-373-20
MF-10X-20	2	373	28.0	
MF-10Y-20	2	373	28.0	

Applicable Model	Bolt Size	Q'ty	Tightening Torque N·m{kgf·cm}
(C)F-G06	M16 × 100 ℓ	4	190 to 235{1940 to 2400}
(C)F-G10	M20 × 115 ℓ	4	370 to 460{3770 to 4690}

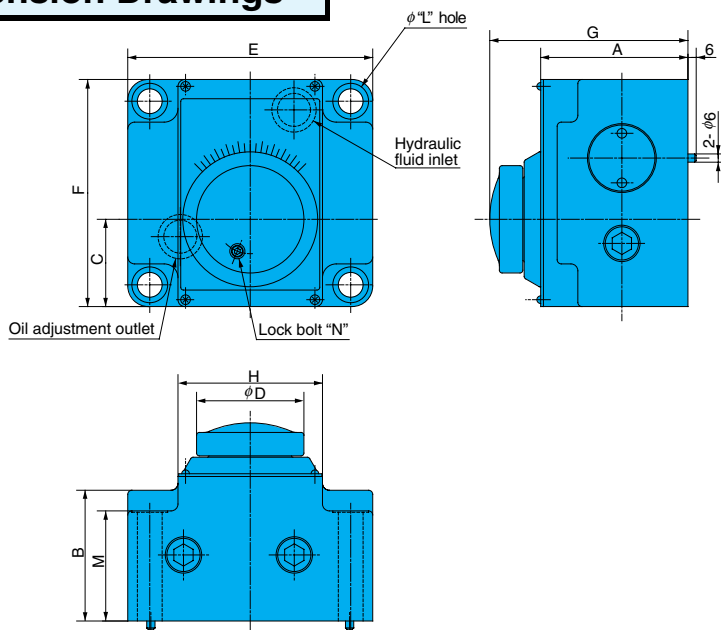
Note) For mounting bolts, use 12T or equivalent.

Understanding Model Numbers



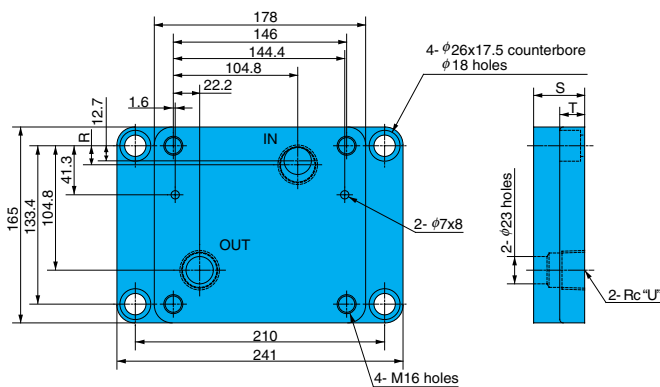
Installation Dimension Drawings

(C)F-G**-*-20



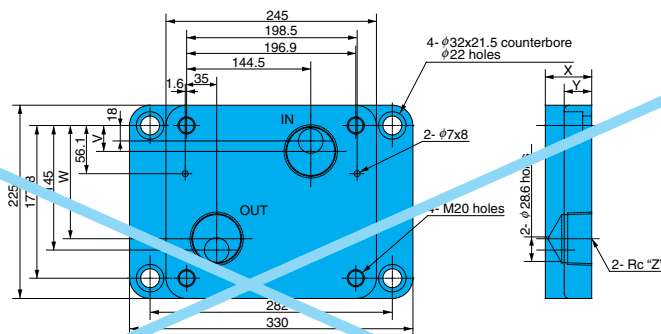
Model No.	Dimensions mm												
	A	B	C	D	E	F	G	H	J	K	L	M	N
(C)F-G06-*-20	107	95	63.4	80	178	165	144.5	105	26	1	18	80	M5
(C)F-G10-*-20	124	108	81.8	90	245	225	169.5	140	32	1	22	89	M6

Sub Plate MF-06*-20



Sub Plate	Dimensions mm			
	R	S	T	U
MF-06-20	12.7	25	22	3/4
MF-06X-20	16	43	21	1

~~Sub Plate MF-10*-**~~

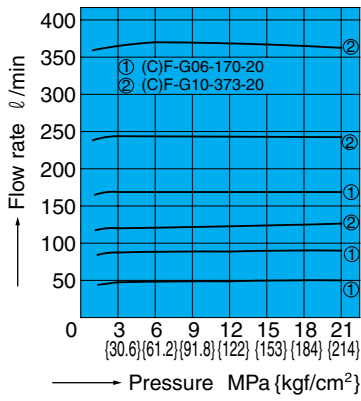


Sub Plate	Dimensions mm				
	V	W	X	Y	Z
MF-10-10	18	145	46	40	1 1/4
MF-10X-20	24	145	54	32	1 1/4
MF-10Y-20	30.2	131.8	54	32	2

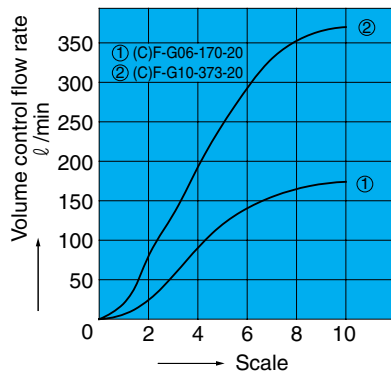
Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

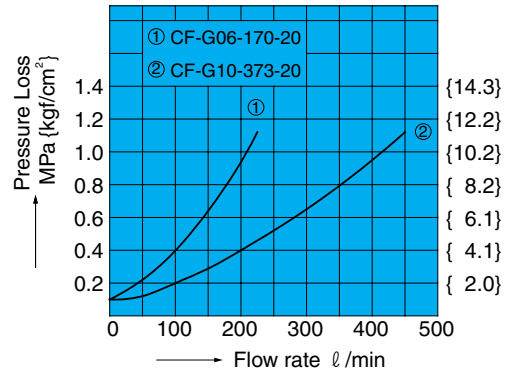
Pressure – Control Flow Rate Characteristics



Scale – Control Flow Rate Characteristics

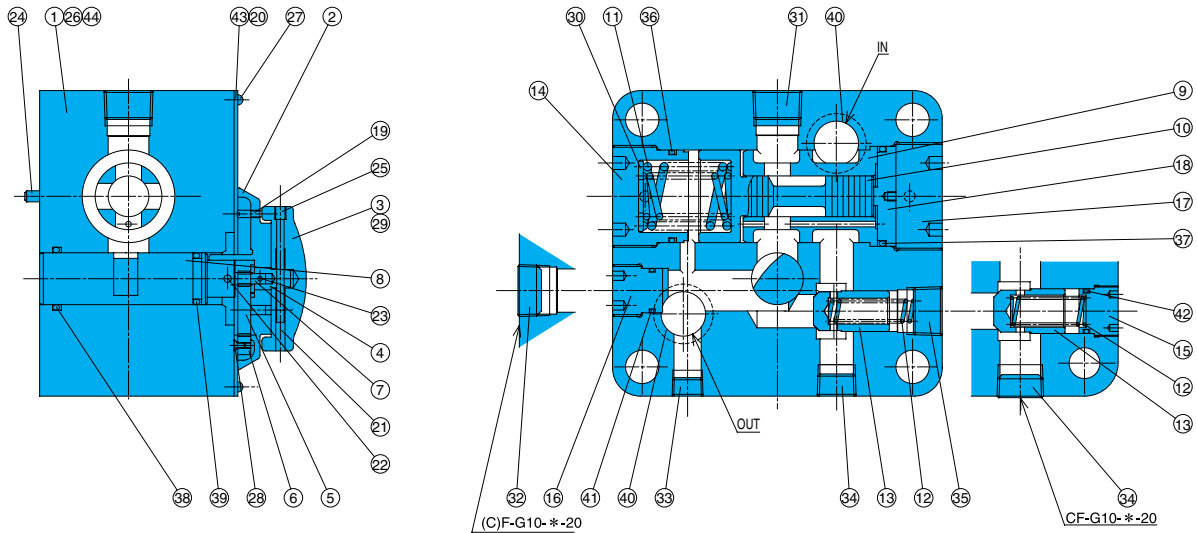


Pressure Loss Characteristics



Cross-sectional Drawing

CF-G**-**-20

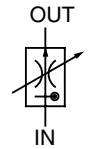


Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	16	Plug	31	Plug
2	Cover	17	Plug	32	Plug
3	Knob	18	Retainer	33	Plug
4	Gear	19	Stopper	34	Plug
5	Gea	20	Pin	35	Plug
6	Gear	21	Pin	36	O-ring
7	Bushing	22	Pin	37	O-ring
8	Throttle	23	Pin	38	O-ring
9	Sleeve	24	Pin	39	O-ring
10	Piston	25	Screw	40	O-ring
11	Spring	26	Screw	41	O-ring
12	Spring	27	Screw	42	O-ring
13	Poppet	28	Screw	43	Plate
14	Plug	29	Screw	44	Screw
15	Plug	30	Washer		

Seal Part List (Kit Model Number FBBS-***)

Part No.	Part Name	CF-G06-170-20		CF-G10-373-20	
		Part Number	Q'ty	Part Number	Q'ty
36	O-ring	IB-G45	1	IB-G60	1
37	O-ring	IB-P48	1	IB-G65	1
38	O-ring	IB-P28	1	IB-P45	1
39	O-ring	IB-P22A	1	IB-P39	1
40	O-ring	IB-P29	2	IB-P32	2
41	O-ring	IB-P20	1	-	-
42	O-ring	-	-	IB-P26	1

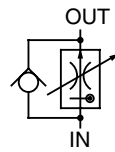
Note) O-ring 1B-** refers to JIS B2401-1B-**. For the *** part of the kit number, specify the valve size (G06, G10).



TN Type Flow Control (and Check) Valve

0.03 to 8 ℓ /min
10.5MPa

(Fine Adjustment Type With Pressure and Temperature Compensation)



Features

- ① With a very compact, lightweight configuration, the intelligent design of this valve makes it a low-cost option.
- ② Minute flow rate control from 30cm³.
- ③ Stable control of each setting flow rate, even as pressure and fluid temperature are fluctuating.
- ④ Dial markings are proportional to flow rate for simple and accurate control flow rate adjustment.

Specifications

Model No.	Nominal Diameter (Size)	Volume control flow rate ℓ /min	Maximum Working Pressure MPa{kgf/cm ² }	Reverse Flow Rate ℓ /min	Cracking pressure MPa{kgf/cm ² }	Weight kg
(C)TN-G02-2-11 8-11	1/4	0.03 to 2 0.05 to 8	10.5{107}	35	0.1{1.0}	2.2

● Handling

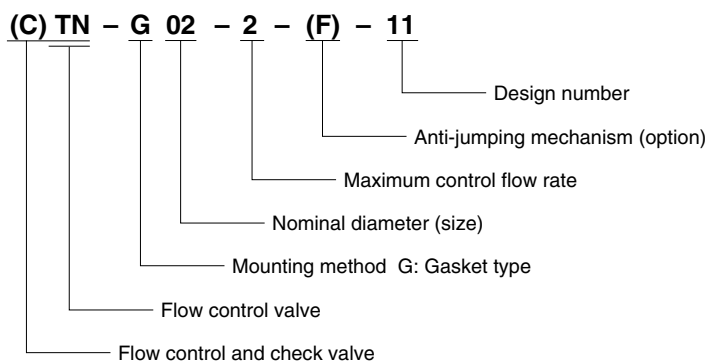
- ① In the temperature range of 20°C to 60°C, flow rate fluctuation is within ±5% of the standard flow rate at 40°C.
- ② In the pressure range of 1.0 to 10.5MPa {10.2 to 107kgf/cm²}, flow rate fluctuation is within ±5% of the setting flow rate.
- ③ Note that flow rate fluctuation exceeds the rated flow rate fluctuation amount slightly in the vicinity of the minimum control flow rate, due to changes in operating temperature and hydraulic fluid viscosity.
- ④ When controlling flow rates that are less than 0.2 ℓ /min, use with a filter that does not exceed 10μm.
- ⑤ Make sure that the pressure differential between the inlet port and outlet is at least 0.6MPa {6.1kgf/cm²} at 4 ℓ /min or less, and at least 1.0MPa {10.2kgf/cm²} at 4 ℓ /min or greater.
- ⑥ The control flow rate is increased by clockwise (rightward) rotation of the adjustment handle.
- ⑦ For connection to piping, normally connect to the sub plate. Valve mounting is gasket type, using an O-ring. When a screw in connection is required, seal the gasket surface, remove the side plug, and create a screw in connection directly to the valve unit. In this case, remove all seal material affixed to the plug.
- ⑧ Use the following table for specification when a sub plate is required.

Model No	Pipe Diameter	Recommended Flow Rate ℓ /min	Weight kg
MTL-03-10	3/8	35	1.3

⑨ Bundled Accessories: Hex Socket Bolts M8 x 60 ℓ , (four)

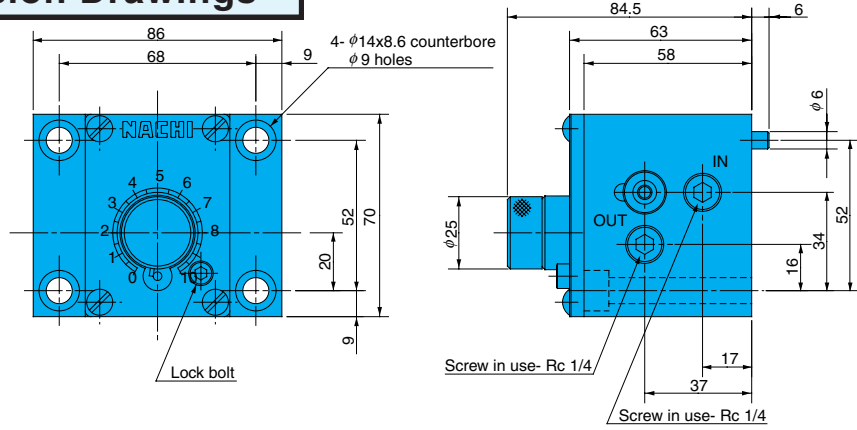
Note) 1.For mounting bolts, use 12T or equivalent.
2.Tightening torque is 20 to 25N·m {205 to 255kgf·cm}.

Understanding Model Numbers

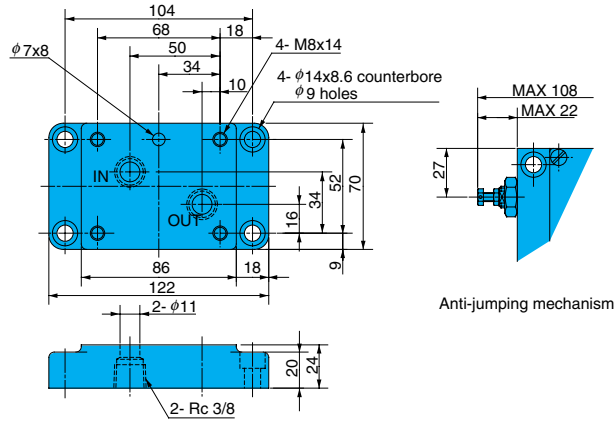


Installation Dimension Drawings

(C)TN-G02-**-11



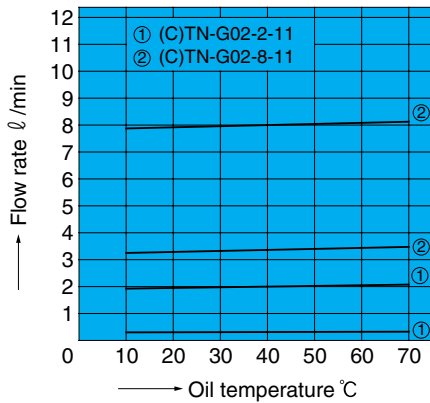
Sub Plate MTL-03-10



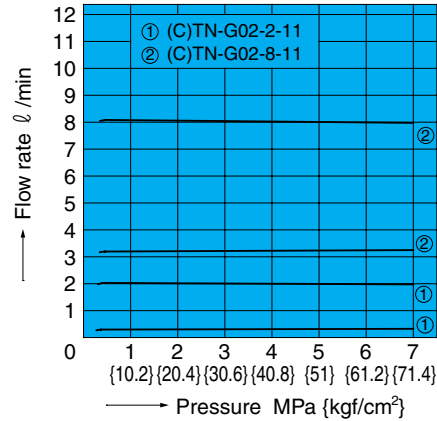
Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

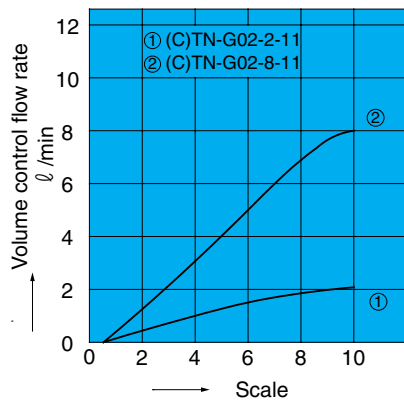
Fluid Temperature – Control Flow Rate Characteristics



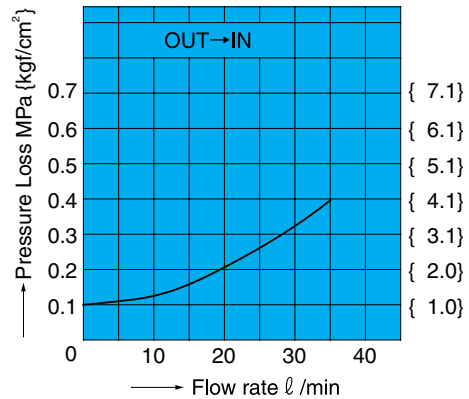
Pressure – Control Flow Rate Characteristics



Scale – Control Flow Rate Characteristics



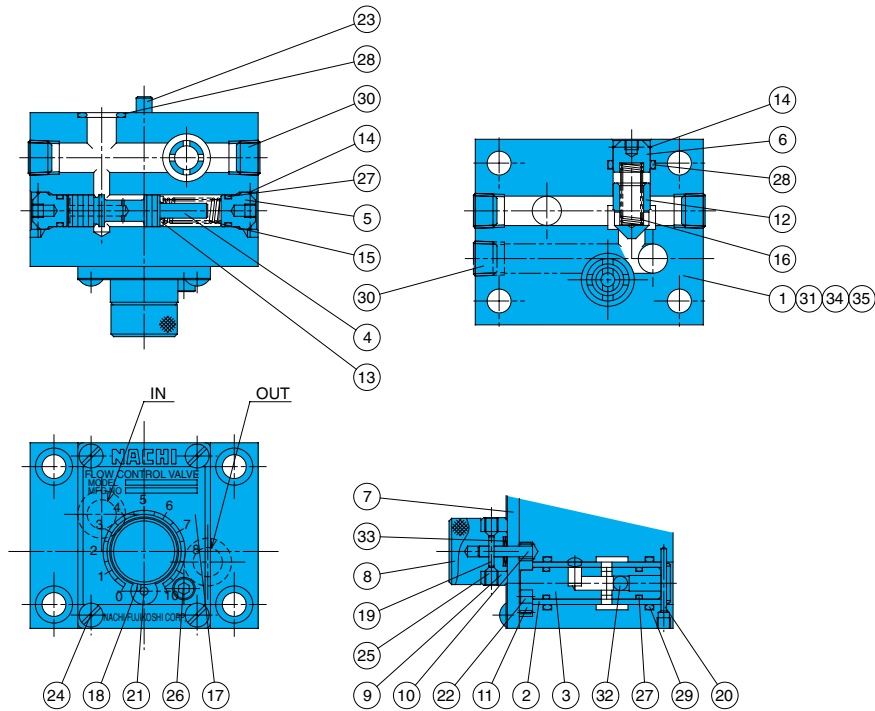
Pressure Loss Characteristics



Cross-sectional Drawing

Note) O-ring 1A-** refers to JIS B2401-1A-**.

CTN-G02-*-11



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	13	Spacer	25	Screw
2	Sleeve	14	Snap ring	26	Screw
3	Spool	15	Spring	27	O-ring
4	Piston	16	Spring	28	O-ring
5	Plug	17	Plate	29	O-ring
6	Plug	18	Pin	30	Plug
7	Plate	19	Pin	31	Ball
8	Knob	20	Pin	32	Ball
9	Ring	21	Pin	33	Washer
10	Gear	22	Pin	34	Screw
11	Gear	23	Pin	35	Plate
12	Poppet	24	Screw		

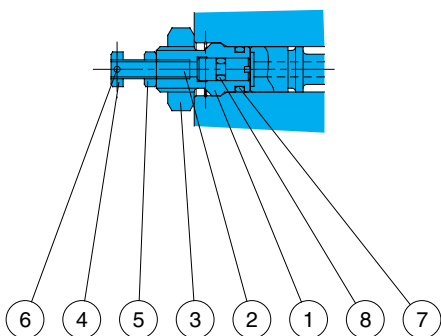
Seal Part List (Kit Model Number FNS-G02(C))

Part No.	Part Name	TN-G02-*-11		CTN-G02-*-11	
		Part Number	Q'ty	Part Number	Q'ty
27	O-ring	IA-P9	4	IA-P9	4
28	O-ring	IA-P14	2	IA-P14	3
29	O-ring	IA-P16	2	IA-P16	2

Note) Specify C at the end of the model number for the CTN kit.

Anti-jumping mechanism

(C)TN-G02-*-F-11



Part No.	Part Name
1	Retainer
2	Bolt
3	Nut
4	Nut
5	Nut
6	Spring pin
7	O-ring
8	O-ring

Seal Part List

Part No.	Part Name	Part Number	Q'ty
7	O-ring	IA-P9	1
8	O-ring	IA-P3	1

Note) #7 O-ring and #27 O-ring are interchangeable.

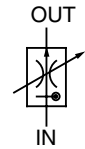
TS Type Flow Control (and Check) Valve

(Fine Adjustment Type With Pressure and Temperature Compensation)

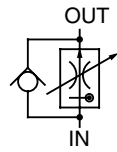
0.01 to 2 ℓ /min
10.5MPa



TS-G01-2-11



CTS-G01-2-11



Features

- ① Original compact, lightweight configuration.
- ② High-precision control up to minute flow rates of 10cm³.
- ③ Design allows large 20 ℓ /min reverse flow rate relative to control flow rate, which means there is no need to include an extra valve in the quick return circuit.
- ④ Stable control of each setting flow rate, even as pressure and fluid temperature are fluctuating.

Specifications

Model No.	Nominal Diameter (Size)	Volume control flow rate ℓ /min	Maximum Working Pressure MPa{kgf/cm ² }	Reverse Flow Rate ℓ /min	Cracking pressure MPa{kgf/cm ² }	Weight kg
(C)TS-G01-2-11	1/8	0.01 to 2	10.5{107}	20	0.08{0.8}	0.9

● Handling

- ① In the temperature range of 20°C to 60°C, flow rate fluctuation is within ±5% of the standard flow rate at 40°C.
- ② In the pressure range of 0.6 to 10.5MPa {6.1 to 107kgf/cm²}, flow rate fluctuation is within ±5% of the setting flow rate.
- ③ Note that flow rate fluctuation exceeds the rated fluctuation amount slightly in the vicinity of the minimum control flow rate, due to changes in operating temperature and hydraulic fluid viscosity.
- ④ When controlling flow rates that are less than 0.2 ℓ /min,
- ⑤ For flow rate control, make sure that the pressure differential between the input port and output port is at least 0.6MPa {6.1kgf/cm²}.
- ⑥ The control flow rate is increased by clockwise (rightward) rotation of the control handle.
- ⑦ Use the table to the right for specification when a sub plate is required.

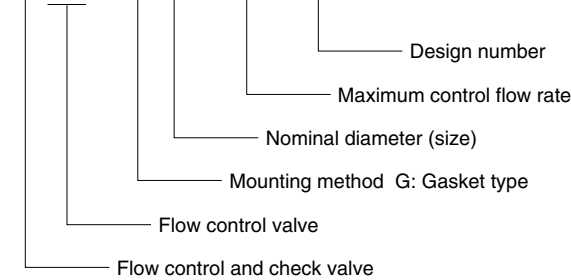
Model No.	Pipe Diameter	Recommended Flow Rate ℓ /min	Weight kg
MTS-01Y-10	3/8	20	0.8

⑧ Bundled Accessories: Hex Socket Bolts: M4 x 35 ℓ (four)

Note) 1.For mounting bolts, use 12T or equivalent.
2.Tightening torque is 2.6 to 3.3N·m {27 to 255kgf·cm}.

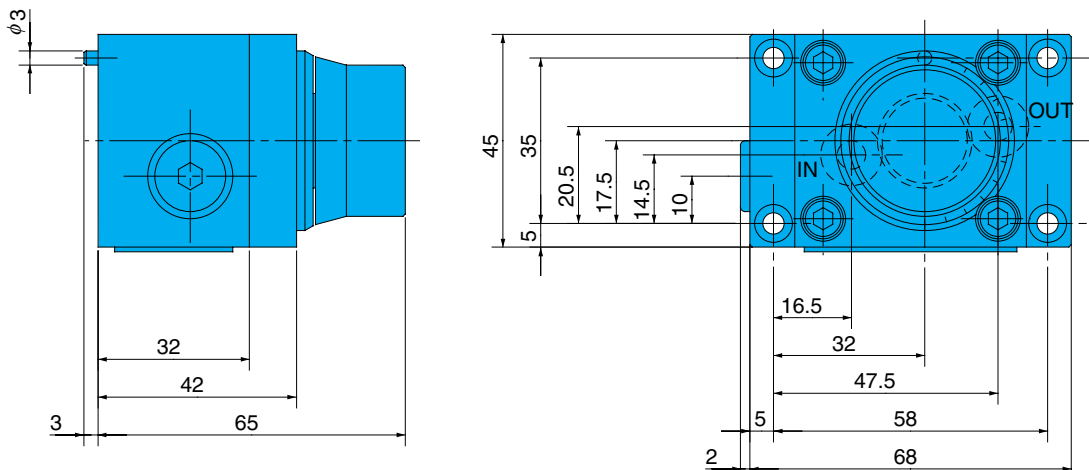
Understanding Model Numbers

(C) TS - G 01 - 2 - 11

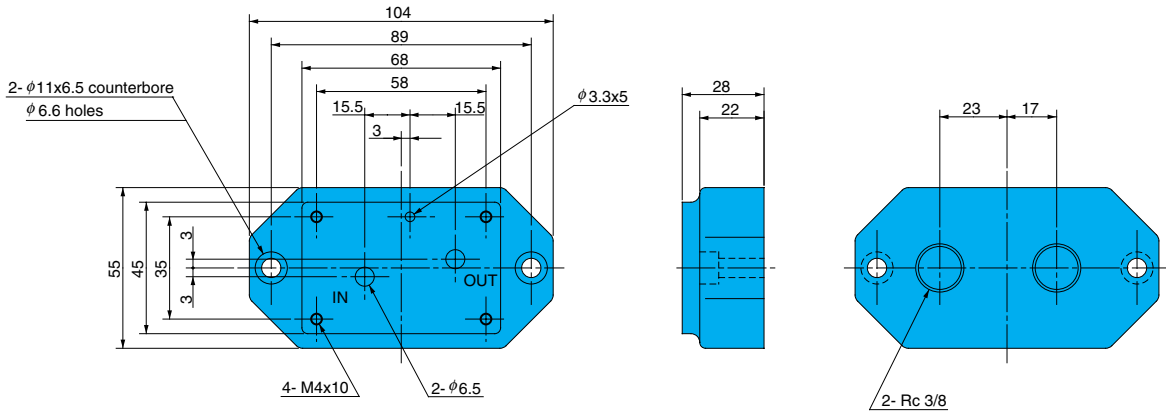


Installation Dimension Drawings

(C)TS-G01-2-11



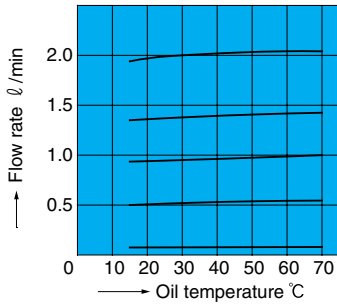
Sub Plate MTS-01Y-10



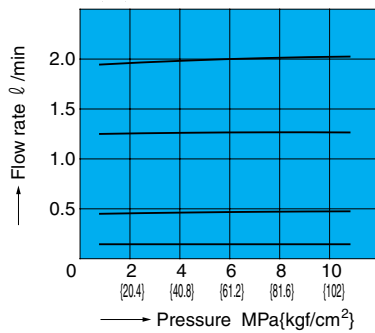
Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

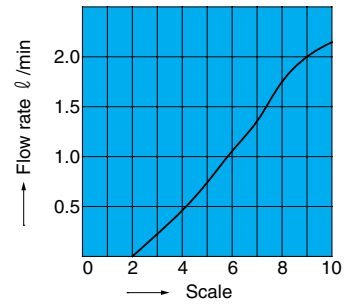
Fluid Temperature – Control Flow Rate Characteristics



Pressure – Control Flow Rate Characteristics

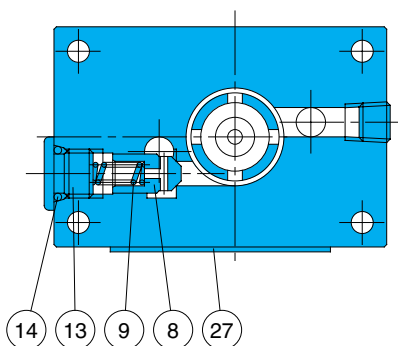
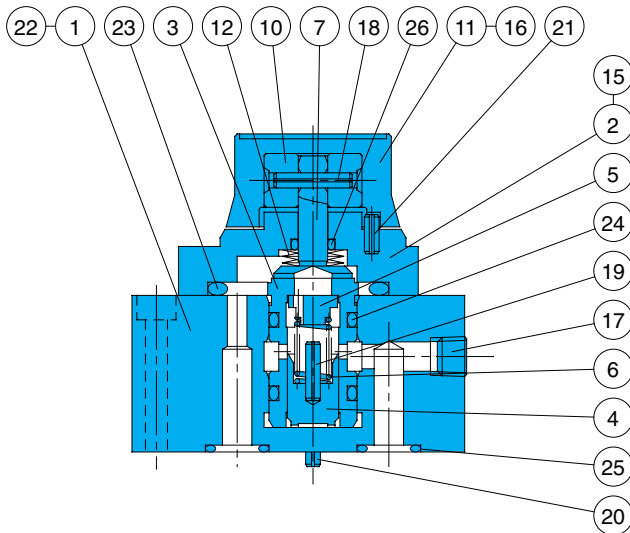


Scale – Control Flow Rate Characteristics

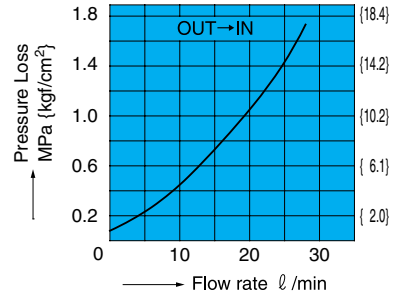


Cross-sectional Drawing

CTS-G01-2-11



Pressure Loss Characteristics



Part No.	Part Name	Part No.	Part Name
1	Body	14	O-ring
2	Cover	15	Screw
3	Sleeve	16	Screw
4	Piston	17	Plug
5	Guide	18	Spring pin
6	Spring	19	Spring pin
7	Throttle	20	Spring pin
8	Poppet	21	Spring pin
9	Spring	22	Spring pin
10	Spacer	23	O-ring
11	Knob	24	O-ring
12	Spring	25	O-ring
13	Plug	26	O-ring
		27	Nameplate

Seal Part List (Kit Model Number FKS-G01(C))

Part No.	Part Name	TS-G01-2-11		CTS-G01-2-11	
		Part Number	Q'ty	Part Number	Q'ty
14	O-ring	—	—	IB-P8	1
23	O-ring	IB-P31	1	IB-P31	1
24	O-ring	IB-P14	2	IB-P14	2
25	O-ring	IB-P10	2	IB-P10	2
26	O-ring	IB-P6	1	IB-P6	1

Note) O-ring 1B-*** refers to JIS B2401-1B-***. Specify C at the end of the model number for the CTS kit.

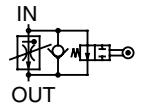
TL (TLT) Type Feed Control Valve

(Fine Control Type With Pressure Compensation)

0.08 to 8 ℓ /min
7MPa

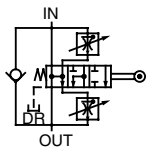


TL-G0^{*}-*-11



Note: 04 has DR

TLT-G04^{*}-*-11



Features

- ① Very compact, lightweight, and economically priced.
- ② Applicable for control of machine tool table operations.
For example, a single valve provides smooth control of: Fast Feed => Cutting Feed (2 stage) => Fast Return.
- ③ Stable control of each setting flow rate, even as pressure and fluid temperature are fluctuating.
- ④ Dial markings are proportional to flow rate for simple control flow rate adjustment.
- ⑤ Sealing the gasket surface allows as-is screw-in connection.

Specifications

Model No	Nominal Diameter (Size)	Volume control flow rate ℓ/min		Reverse Flow Rate ℓ/min	Maximum Working Pressure MPa(kgf/cm ²)	Cracking pressure MPa(kgf/cm ²)	Weight kg
		Feed 1	Feed 2				
TL-G03-2-11 8-11	3/8	0.08 to 2 0.1 to 8	-	35	7{71.4}	0.1{1.0}	2.2
TL-G04-2-11 8-11	1/2	0.08 to 2 0.1 to 8	-	53			7.0
TLT-G04-2-1.5-11 8-2-11		0.1 to 2 0.1 to 8	0.1 to 1.5 0.1 to 2				

• Handling

- ① In the temperature range of 20°C to 60°C, flow rate fluctuation is within ±5% of the standard flow rate at 40°C.
- ② In the pressure range of 1.0 to 7.0MPa {10.2 to 71.4kgf/cm²}, flow rate fluctuation is within ±5% of the setting flow rate.
- ③ Note that flow rate fluctuation exceeds the rated fluctuation amount slightly in the vicinity of the minimum control flow rate, due to changes in operating temperature and hydraulic fluid viscosity.
- ④ When controlling flow rates that are less than 0.2 ℓ /min, use with a line filter no greater than 10μm.
- ⑤ Make sure that the pressure differential between the inlet port and outlet is at least 0.6MPa {6.1kgf/cm²} at 4 ℓ /min or less, and at least 1.0MPa {10.2kgf/cm²} at 4 ℓ /min or greater.
- ⑥ The control flow rate is increased by clockwise (rightward) rotation of the control handle.
- ⑦ For connection to piping, normally connect to the sub plate. Valve mounting is gasket type, using an O-ring. When a screw in connection is required, seal the gasket surface, remove the side plug, and create a screw in connection directly to the valve unit. In this case, remove all seal material affixed to the plug.
- ⑧ See the table below for installation hex socket bolts.
- ⑨ Use the table to the right for specification when a sub plate is required.

Model No.	Pipe Diameter	Recommended Flow Rate ℓ/min	Applicable Valve Type
MTL-03-10	3/8	35	TL-G03 [*] -11
MTL-04-10	1/2	53	TL(T)-G04 [*] -*-11

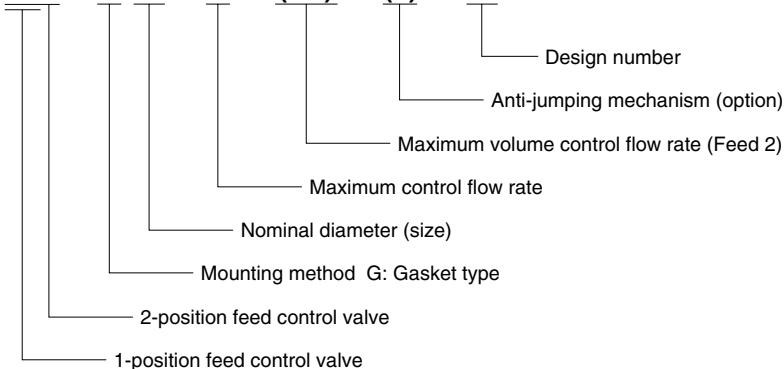
- ⑩ G03 does not require drain pipe connection.
- ⑪ Cam Down Force
TL-G03-11
Cam Down Force
120N {12.2kgf} minimum
TLT-G04^{*}-*-11
Feed 1 Cam Down Force
140N {14.3kgf} minimum
Feed 2 Cam Down Force
200N {20.4kgf} minimum
- ⑫ Make the cam angle no greater than 30 degrees.

Applicable Model	Bolt Size	Q'ty	Tightening Torque N·m(kgf·cm)
TL-G03 [*] -11	M8 × 60 ℓ	4	20 to 25{205 to 255}
TL(T)-G04 [*] -11	M10 × 75 ℓ	4	45 to 55{460 to 560}

Note) For mounting bolts, use 12T or equivalent.

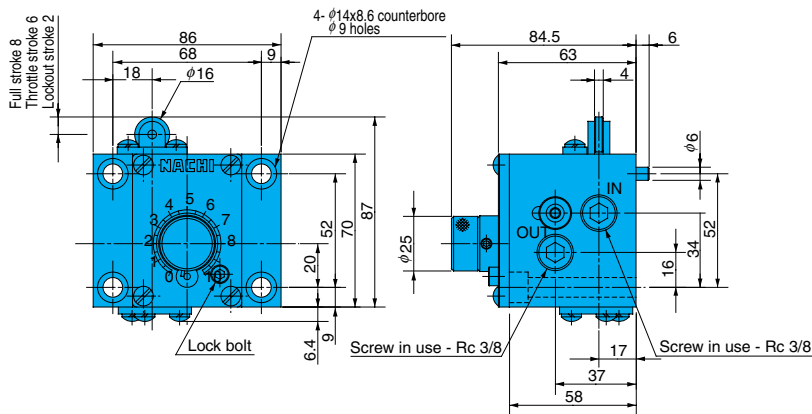
Understanding Model Numbers

TLT - G 04 - 2 - (1.5) - (F) - 11

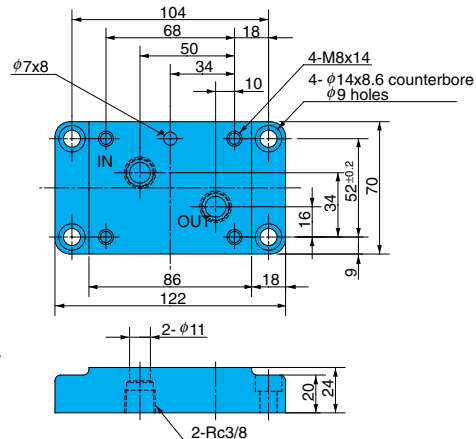


Installation Dimension Drawings

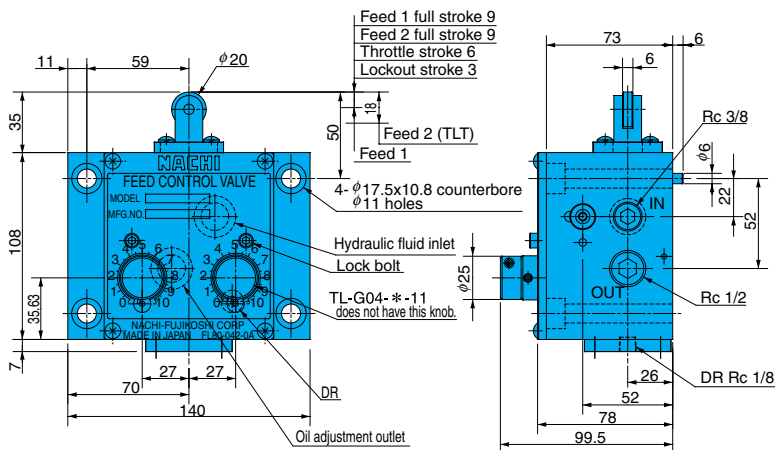
TL-G03-*-11



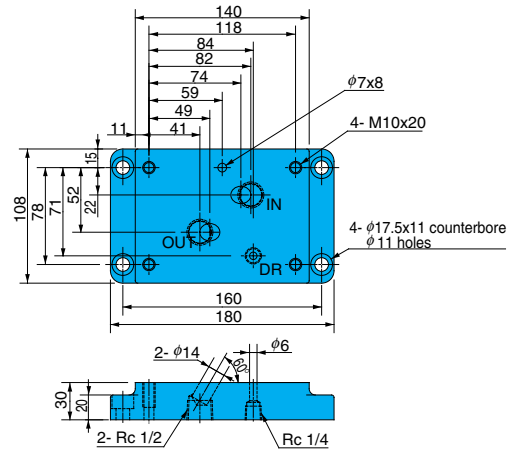
Sub Plate MTL-03-10



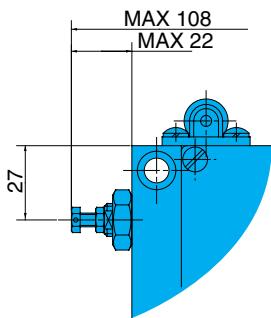
TL(T)-G04-*-11



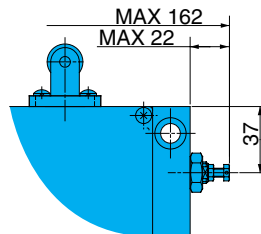
Sub Plate MTL-04-10



Anti-jumping Mechanism TL-G03-*-F-11



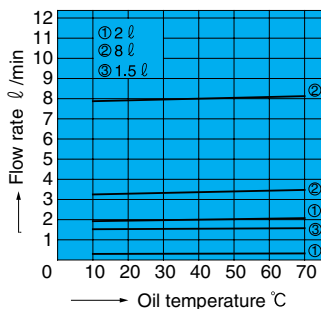
TL(T)-G04-*-F-11



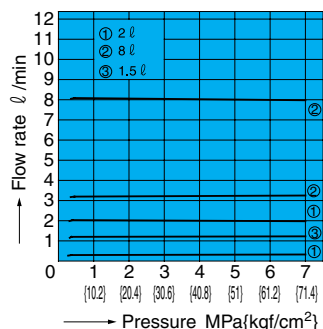
Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

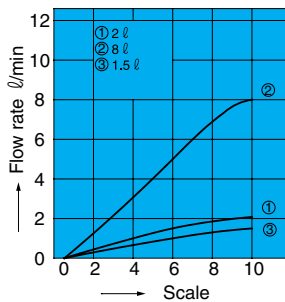
Fluid Temperature - Control Flow Rate Characteristics



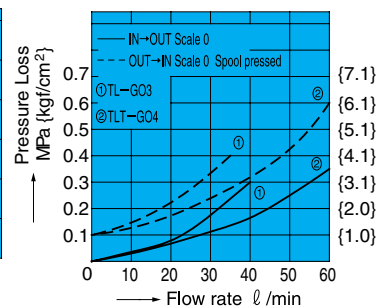
Pressure - Control Flow Rate Characteristics



Scale - Control Flow Rate Characteristics

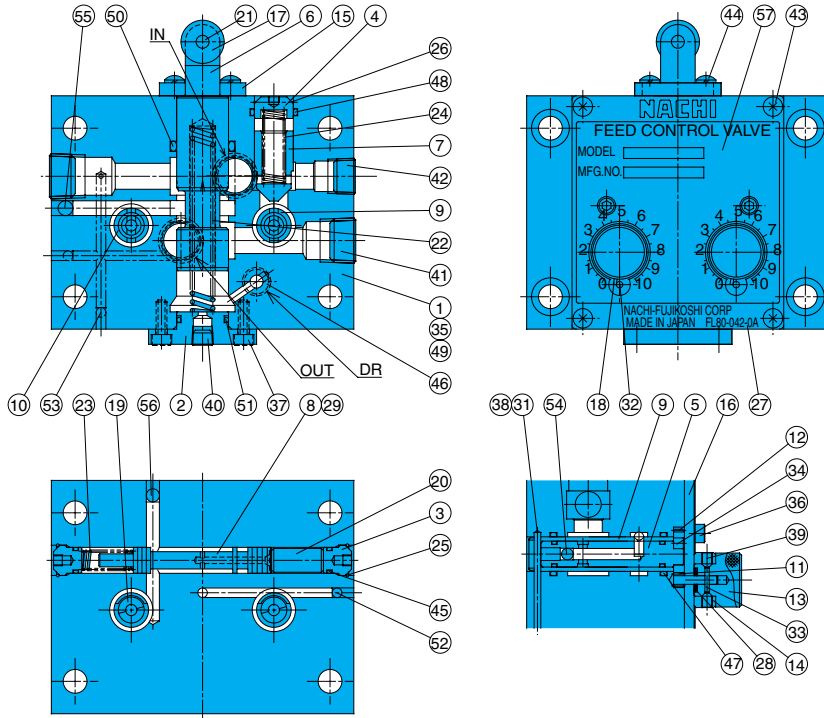


Pressure Loss Characteristics



Cross-sectional Drawing

TLT-G04-*-F-11

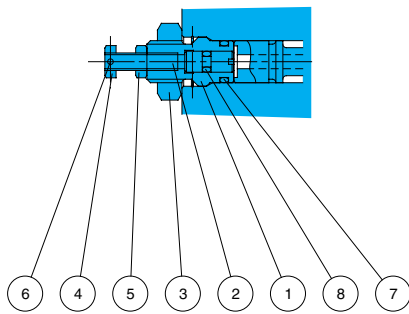


Note) The drawings on the left are TLT cross sections. In the case of TL, there is no knob on the right side.

Anti-jumping mechanism

TL-G03-*-F-11

TL(T)-G04-*-F-11



Part No.	Part Name
1	Retainer
2	Bolt
3	Nut
4	Nut
5	Nut
6	Spring pin
7	O-ring
8	O-ring

Seal Part List

Part No.	Part Name	Part Number	Q'ty
7	O-ring	IA-P9	1
8	O-ring	IA-P3	1

Note) 1.#7 O-ring and #45 O-ring are interchangeable.
2.O-ring 1A-** refers to JIS B2401-1A-**.

Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	20	Spacer	39	Screw
2	Cover	21	Pin	40	Plug
3	Plug	22	Spring	41	Plug
4	Plug	23	Spring	42	Plug
5	Throttle	24	Spring	43	Screw
6	Spool	25	Snap ring	44	Screw
7	Poppet	26	Snap ring	45	O-ring
8	Piston	27	Plate	46	O-ring
9	Sleeve	28	Washer	47	O-ring
10	Sleeve	29	Pin	48	O-ring
11	Gear	30	Pin	49	O-ring
12	Gear	31	Pin	50	O-ring
13	Knob	32	Pin	51	O-ring
14	Ring	33	Pin	52	Ball
15	Stopper	34	Pin	53	Ball
16	Plate	35	Pin	54	Ball
17	Roller	36	Screw	55	Ball
18	Pin	37	Screw	56	Ball
19	Spacer	38	Screw	57	Plate

Seal Part List (Kit Model Number FLS-***(2))

Part No.	Part Name	TL-G03-*-11		TL-G04-*-11		TLT-G04-*-F-11	
		Part Number	Q'ty	Part Number	Q'ty	Part Number	Q'ty
45	O-ring	IA-P9	4	IA-P9	4	IA-P9	6
46	O-ring	-	-	IA-P10	1	IA-P10	1
47	O-ring	IA-P16	2	IA-P16	2	IA-P16	4
48	O-ring	IA-P14	1	IA-P18	1	IA-P18	1
49	O-ring	IA-P14	2	IA-P20	2	IA-P20	2
50	O-ring	IA-P18	2	IA-P24	1	IA-P24	1
51	O-ring	-	-	IA-P20	1	IA-P20	1

Note) 1.*** in the kit number is used for specification of the valve size. To specify TLT, add 2 to the end.
2.O-ring 1A-** refers to JIS B2401-1A-**.



Right Angle Check Valve In-line Check Valve

320 ℓ /min
21MPa

Features

- ① The right angle type check valve changes the flow direction of fluid 90 degrees, while the in-line check valve allows only axial direction flow.
- ② The cracking pressures of these valves are fixed, so fluid passes freely in one direction, but is restricted from flowing in the opposite direction.

Specifications

	Model No.		Nominal Diameter (Size)	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Flow Rate ℓ /min	Cracking Pressure MPa{kgf/cm ² }	Weight kg	
	Screw Mounting	Gasket Mounting					T Type	G Type
Right Angle Check Valve	CA-T03-1-20 2 3	CA-G03-1-20 2 3	3/8	21{214}	40	0.04{0.4} 0.35{3.6} 0.50{5.1}	1.0	1.8
	CA-T06-1-20 2 3	CA-G06-1-20 2 3	3/4		110	0.04{0.4} 0.35{3.6} 0.50{5.1}	2.2	3.9
	CA-T10-1-20 2 3	CA-G10-1-20 2 3	1 1/4		320	0.04{0.4} 0.35{3.6} 0.50{5.1}	4.0	6.1
In-line Check Valve	CN-T03-1-11 2 3	-	3/8		30	0.04{0.4} 0.35{3.6} 0.50{5.1}	0.4	-
	CN-T06-1-11 2 3		3/4		75	0.04{0.4} 0.35{3.6} 0.50{5.1}	0.7	
	CN-T10-1-11 2 3		1 1/4		190	0.04{0.4} 0.35{3.6} 0.50{5.1}	2.2	

● Handling

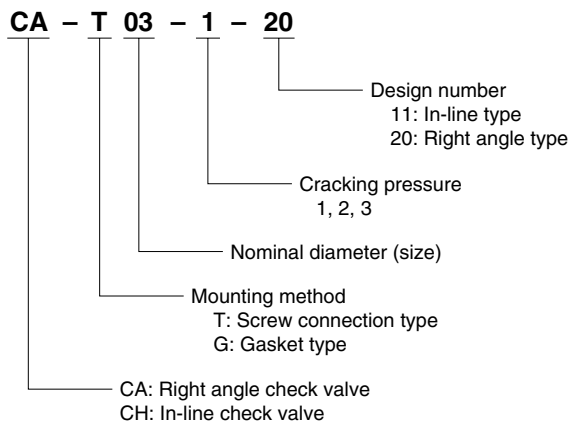
- ① Use the following table for specification when a sub plate is required.
- ② The following are the bundled mounting bolts.

Model No.	Pipe Diameter	Recommended Flow Rate ℓ /min	Weight kg	Applicable Valve Type
MCA-03-20	3/8	40	1.4	CA-G03-* ⁻ 20
MCA-06-20	3/4	110	3.5	CA-G06-* ⁻ 20
MCA-10-20	1 1/4	320	6.1	CA-G10-* ⁻ 20

Model No.	Bolt Dimensions	Q'ty	Tightening Torque N·m{kgf·cm}
CA-G03-* ⁻ 20	M8 × 45 ℓ	4	20 to 25{ 205 to 255}
CA-G06-* ⁻ 20	M16 × 65 ℓ	4	190 to 235{1940 to 2400}
CA-G10-* ⁻ 20	M20 × 75 ℓ	4	370 to 460{3770 to 4690}

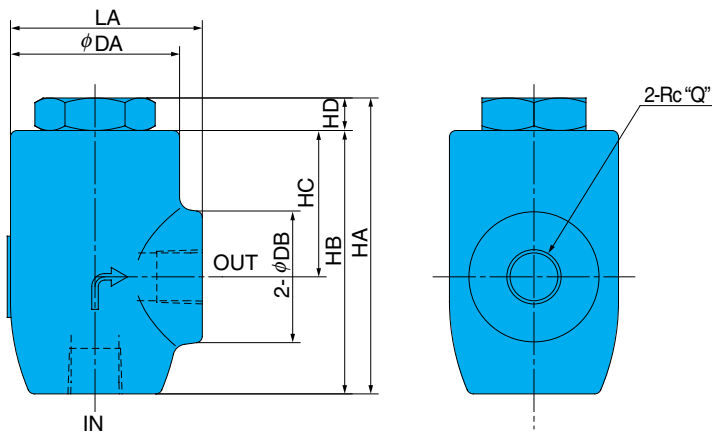
Note) For mounting bolts, use 12T or equivalent.

Understanding Model Numbers



Installation Dimension Drawings

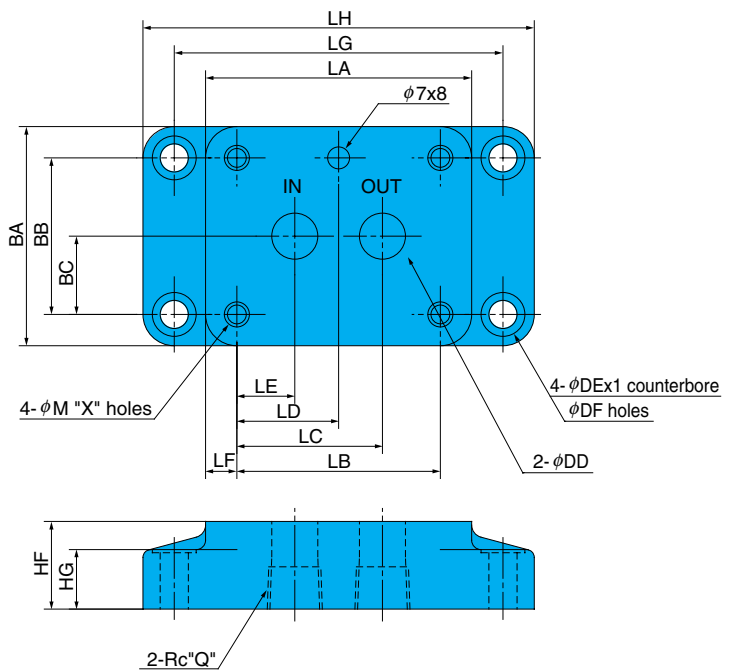
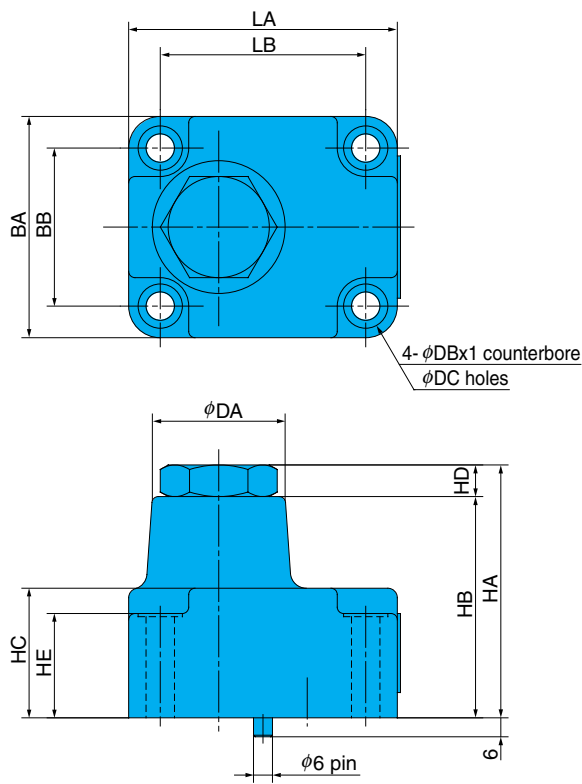
CA-T**-20(Screw Mounting)



Model No.	LA	HA	HB	HC	HD	DA	DB	Q
CA-T03*-20	59	91	81	45	10	52	40	3/8
CA-T06*-20	72	106	96	55	10	60	45	3/4
CA-T10*-20	96	139	127	70	12	80	62	1 1/4

CA-G**-20(Gasket Mounting)

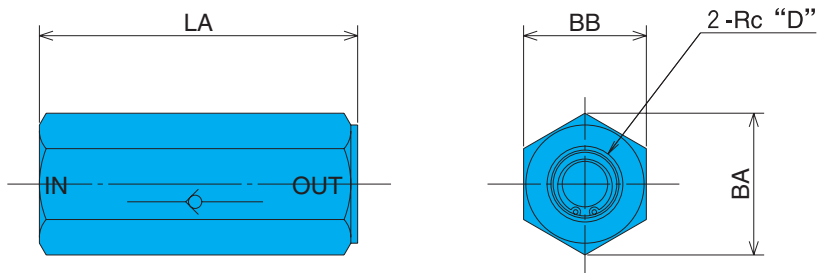
Sub Plate MCA**-20



DC	DD	DE	DF	Q	X
9	14.7	14	9	3/8	8
17	23	20	14	3/4	16
22	30	20	14	1 1/4	20

Model No.	LA	LB	LC	LD	LE	LF	LG	LH	BA	BB	BC	HA	HB	HC	HD	HE	HF	HG	DA	DB
CA-G03*-20	86	65	46.5	32.5	18.5	10.5	105	125	71	50	25	80	70	41	10	33	28	19	42	14
CA-G06*-20	117	81	68.2	40.5	22.2	18	140	172	101	65	32.5	98	88	58	10	43	31	19	52	26
CA-G10*-20	133	92	71.4	46	20.6	20.5	152	187	133	92	46	119	107	65	12	46	40	28	68	32

CN-T**-11(Screw Mounting)



Model No.	LA	BA	BB	D
CN-T03*-11	70	31.2	27	3/8
CN-T06*-11	95	43.9	38	3/4
CN-T10*-11	130	69.3	60	1 1/4

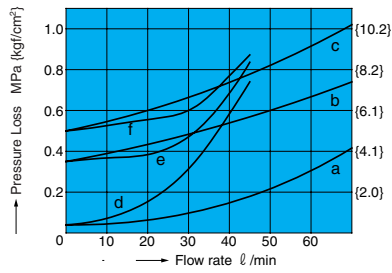


Performance Curves

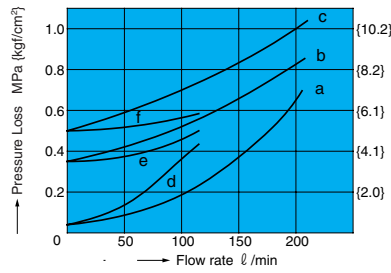
Hydraulic Operating Fluid Viscosity 32mm²/s

Pressure Loss Characteristics

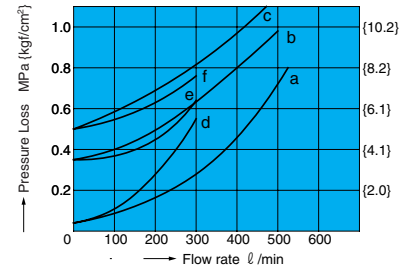
CA-*03 CN-T03



CA-*06 CN-T06



CA-*10 CN-T10



Applicable Valve Type

- a. CA-*03-1-20
- b. CA-*03-2-20
- c. CA-*03-3-20
- d. CN-T03-1-11
- e. CN-T03-2-11
- f. CN-T03-3-11

Applicable Valve Type

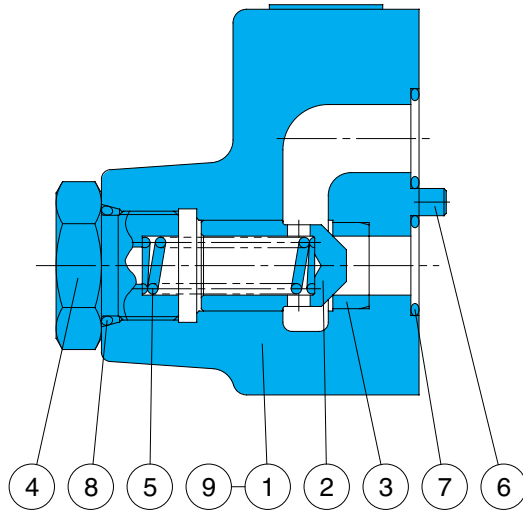
- a. CA-*06-1-20
- b. CA-*06-2-20
- c. CA-*06-3-20
- d. CN-T06-1-11
- e. CN-T06-2-11
- f. CN-T06-3-11

Applicable Valve Type

- a. CA-*10-1-20
- b. CA-*10-2-20
- c. CA-*10-3-20
- d. CN-T10-1-11
- e. CN-T10-2-11
- f. CN-T10-3-11

Cross-sectional Drawing

CA-G**-*-20



Part No.	Part Name
1	Body
2	Poppet
3	Seat
4	Plug
5	Spring
6	Pin
7	O-ring
8	O-ring
9	Nameplate

Seal Part List (Kit Model Number DAS-***)

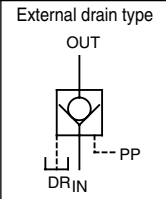
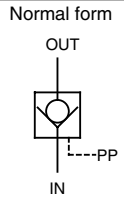
Part No.	Part Name	Type/Part Number			Q'ty
		CA-*03	CA-*06	CA-*10	
7	O-ring	1B-P18	1B-G30	1B-G40	2
8	O-ring	1B-P22	1B-P30	1B-P42	1

Note) O-ring 1B-** refers to JIS B2401-1B-**.

*** in the kit number is used for specification of the valve size (G03, T06, etc.)

Pilot Check Valves

320 ℓ /min
21MPa



Features

- ① Normally, fluid is allowed to flow in a single direction, just as with a standard check valve. Reverse flow can be enabled, however, when the check valve is pushed upwards by external pilot pressure.
- ② Very compact configuration.

Specifications

Model No		Nominal Diameter (Size)	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Flow Rate ℓ /min	Cracking Pressure MPa{kgf/cm ² }	Weight kg		Area Ratio		
Screw Mounting	Gasket Mounting					T Type	G Type	Pilot Piston	Valve	Small Valve
CP-T03-1-* 2	CP-G03-1-* 2	3/8	21{214}	40	0.2{2.0} 0.5{5.1}	3.8 (4.7)	4.3 (5.2)	1	0.35	0.05
CP-T06-1-* 2	CP-G06-1-* 2	3/4		110	0.2{2.0} 0.5{5.1}	7.0 (8.2)	6.6 (7.8)	1	0.37	0.03
CP-T10-1-* 2	CP-G10-1-* 2	1 1/4		320	0.2{2.0} 0.5{5.1}	12.0 (14.3)	12.5 (14.8)	1	0.36	0.03

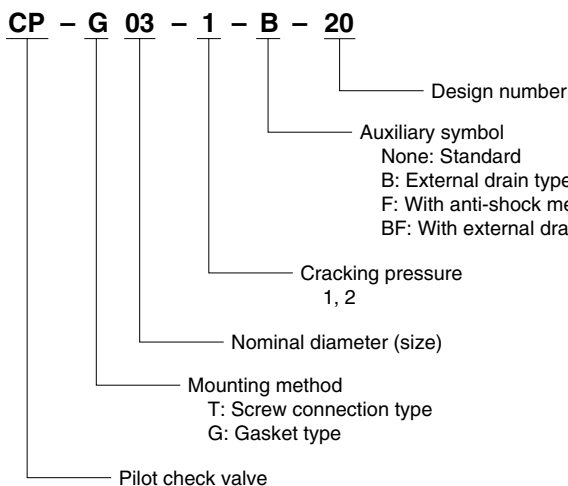
Note) Weight values in parentheses are for the external drain type.

• Handling

- ① The following explains how to use the external drain. Be sure to always use the external drain type when back pressure is applied to fluid outlet port side A during reverse flow as in the circuit illustrated below.
- ② Minimum pilot pressure is altered by input side B pressure during reverse flow. Because of this, operate the valve so pressure is at least twice as high as the required pilot pressure obtained using the minimum pilot pressure characteristics.
- ③ Use the following table for specification when a sub plate is required.

Model No.	Pipe Diameter	Recommended Flow Rate ℓ /min	Weight kg	Applicable Valve Type
MCP-03-20	3/8	40	1.1	CP-G03-* 20
MCP-06-20	3/4	110	1.7	CP-G06-* 20
MCP-10-20	1 1/4	320	3.6	CP-G10-* 20

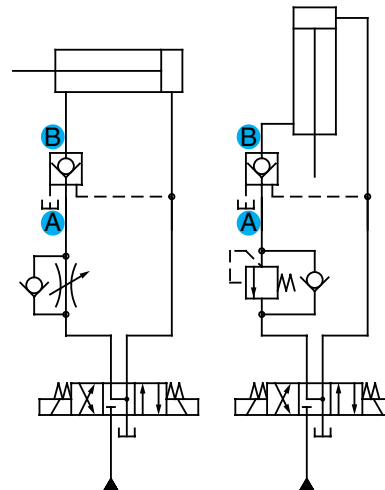
Understanding Model Numbers



Model No.	Bolt Dimensions	Q'ty	Tightening Torque N·m{kgf·cm}
CP -G03-* 20	M8 × 45 ℓ	4	20 to 25{205 to 255}
-G06-	M10 × 55 ℓ	4	45 to 55{460 to 560}
-G10-	M10 × 65 ℓ	6	45 to 55{460 to 560}

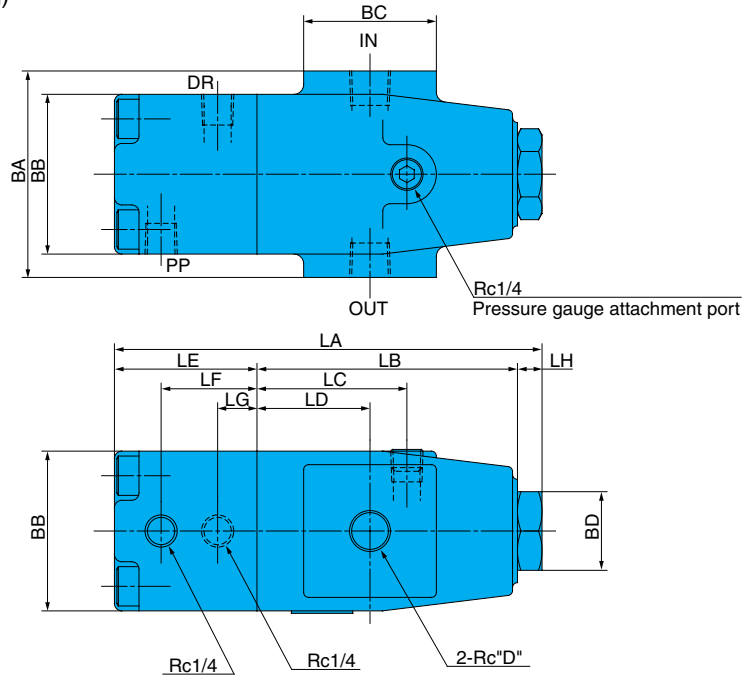
Note) For mounting bolts, use 12T or equivalent.

- ④ The following are the bundled mounting bolts.



Installation Dimension Drawings

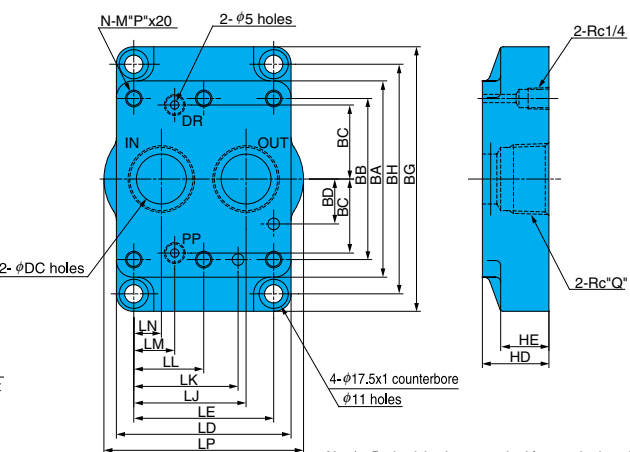
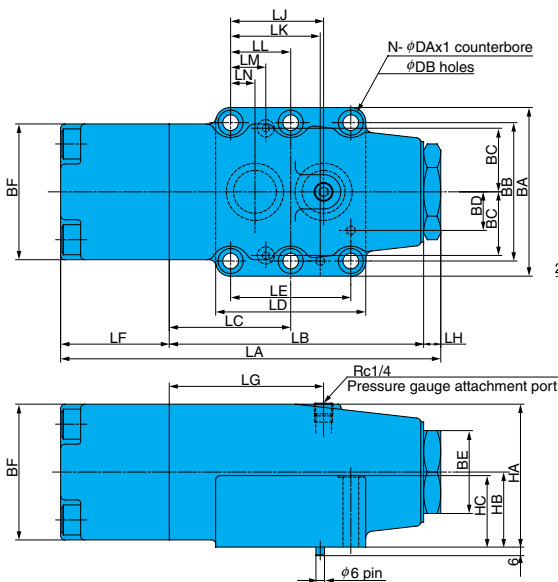
CP-T**-**-20(Screw Mounting)



Model No.	LA	LB	LC	LD	LE	LF	LG	LH	BA	BB	BC	BD	D
CP-T03-*(F)-20	146	106	61	46	30	15	-	10	84	65	54	32	3/8
CP-T03-*(B)(F)-20	174				58	39	16						
CP-T06-*(F)-20	180	140	85	66	30	15	-	10	122	76	64	41	3/4
CP-T06-*(B)(F)-20	212				62	43	16						
CP-T10-*(F)-20	225	178	108	85	35	15	-	12	150	95	85	58	1 1/4
CP-T10-*(B)(F)-20	266				76	57	16						

CP-G**-**-20(Gasket Mounting)

Sub Plate MCP**-**-20



Note) Drain piping is not required for standard products.
Drain piping is required in the case of external drain type (B).

BH	HA	HB	HC	HD	HE	DA	DB	DC	N	P	Q
106	68	35.5	33	30	19	14	9	14.7	4	8	3/8
124	79	41	38	30	19	17.5	11	22	4	10	3/4
138	100	52.5	50	40	29	17.5	11	30	6	10	1 1/4

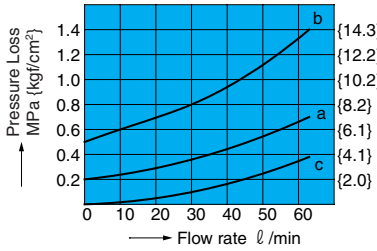
Model No.	LA	LB	LC	LD	LE	LF	LG	LH	LJ	LK	LL	LM	LN	LP	BA	BB	BC	BD	BE	BF	BG
CP-G03-*(F)-20	146	106	51	64	44	30	61	10	37	-	-	16	7	-	82	64	23	18	32	65	126
CP-G03-*(B)(F)-20	174					58															
CP-G06-*(F)-20	180	140	66	83	60.3	30	85	10	49.2	44.5	-	20.6	11.1	-	102	79.4	33.3	-	41	76	146
CP-G06-*(B)(F)-20	212					62															
CP-G10-*(F)-20	225	178	85	105	84.1	35	108	12	67.5	62.7	42.05	24.6	16.6	120	118	96.8	44.5	-	58	95	159
CP-G10-*(B)(F)-20	266					76															

Performance Curves

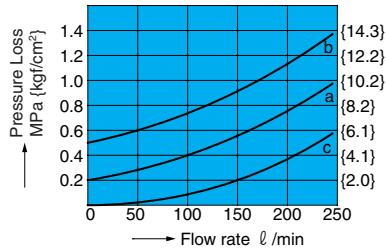
Hydraulic Operating Fluid Viscosity 32mm²/s

Pressure Loss Characteristics

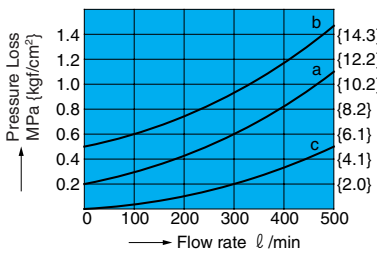
CP-*03 Applicable Valve Type
 a. CP-*03-1-*20 Free Flow
 b. CP-*03-2-*20 "
 c. CP-*03-*-*20 Reverse Flow



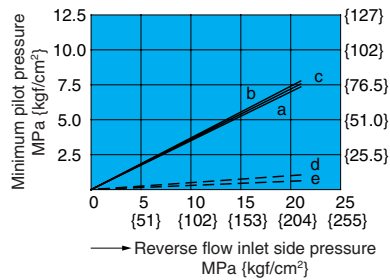
CP-*06 Applicable Valve Type
 a. CP-*06-1-*20 Free Flow
 b. CP-*06-2-*20 "
 c. CP-*06-*-*20 Reverse Flow



CP-*10 Applicable Valve Type
 a. CP-*10-1-*20 Free Flow
 b. CP-*10-2-*20 "
 c. CP-*10-*-*20 Reverse Flow



Minimum Pilot Pressure Characteristics



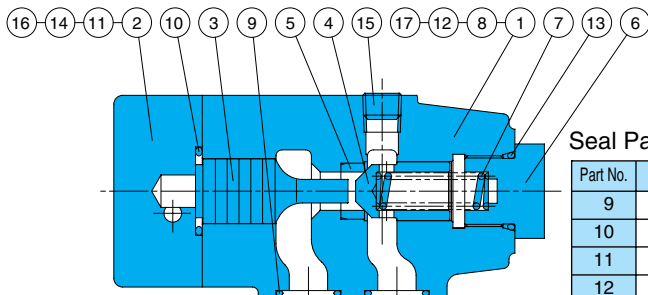
Applicable Valve

Model No.	Valve Open	Small Valve Open
CP-*03	a	d
CP-*06	b	e
CP-*10	c	e

Cross-sectional Drawing

Note) O-ring 1B-** refers to JIS B2401-1B-**.

CP-G**-*20



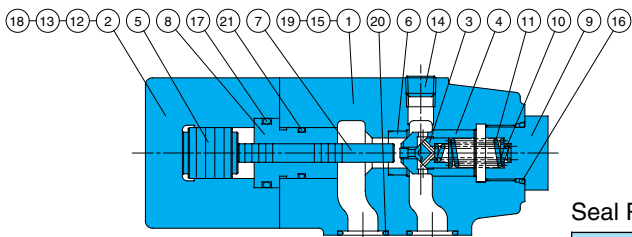
Part No.	Part Name	Part No.	Part Name
1	Body	10	O-ring
2	Cover	11	O-ring
3	Piston	12	O-ring
4	Poppet	13	O-ring
5	Seat	14	Screw
6	Plug	15	Plug
7	Spring	16	Plug
8	Pin	17	Plate
9	O-ring		

Seal Part List (Kit Model Number DPS-***)

Part No.	Part Name	CP-G03-*20	CP-G06-*20	CP-G10-*20	Q'ty
9	O-ring	1B-P18	1B-G25	1B-G35	2
10	O-ring	1B-G25	1B-G40	1B-G55	1
11	O-ring	1B-P7	1B-P9	1B-P9	2
12	O-ring	1B-P9	1B-P9	1B-P9	2
13	O-ring	1B-P22	1B-P30	1B-P42	1

***in the kit number is used for specification of the valve size.

CP-G**-*BF20



Part No.	Part Name	Part No.	Part Name	Part No.	Part Name
1	Body	9	Plug	17	O-ring
2	Cover	10	Spring	18	O-ring
3	Poppet	11	Spring	19	O-ring
4	Poppet	12	Screw	20	O-ring
5	Piston	13	Plug	21	O-ring
6	Seat	14	Plug	22	Plate
7	Rod	15	Pin		
8	Bushing	16	O-ring		

Seal Part List (Kit Model Number DPS-***R)

Part No.	Part Name	CP-G03-*BF20	CP-G06-*BF20	CP-G10-*BF20	Q'ty
16	O-ring	1B-P22	1B-P30	1B-P42	1
17	O-ring	1B-G25	1B-G40	1B-G55	1
18	O-ring	1B-P7	1B-P9	1B-P9	2
19	O-ring	1B-P9	1B-P9	1B-P9	2
20	O-ring	1B-P18	1B-G25	1B-G35	2
21	O-ring	1B-P18	1B-P30	1B-G45	1

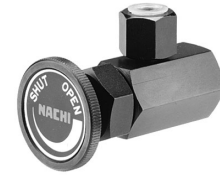
***in the kit number is used for specification of the valve size.



Direction Control Valves

Gauge Cock

35, ~~4~~2MPa



Features

- ① Ultra-compact configuration requires minimal installation space.
- ② Intelligent design packs plenty of function into a simple configuration.
- ③ Maximum operating pressure of 35MPa{357kgf/cm²} allows operation across a wide range.

Specifications

Model No.		G "A" (Nominal Dimension)	B mm	C mm	Maximum Working Pressure MPa{kgf/cm ² }	Weight kg
Float Type	Flange Type				21{214}	0.35
K2-T02-11	K2-F02-11	G1/4	10	19	35{357}	
K2-T03-10	K2-F03-10	G3/8	16	23		
K2-T04-10	K2-F04-10	G1/2	16	26		

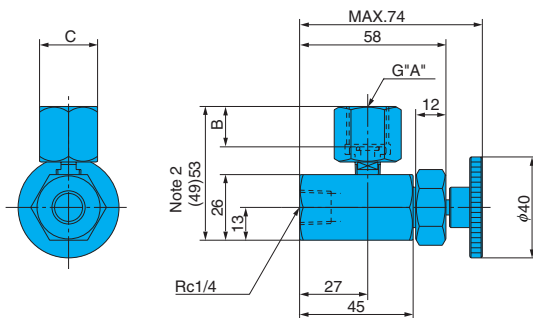
Understanding Model Numbers

K2 - T 02 - 10(11)

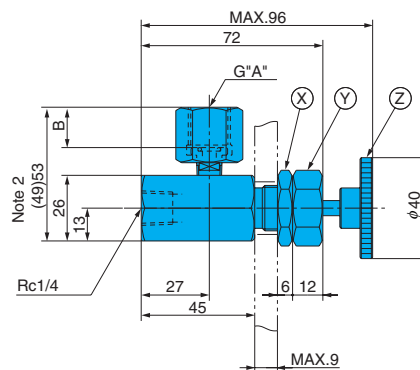
- Design number
11: For K2-T02, F02
- Nominal diameter (size)
- Mounting method
T: Float type F: Flange type
- Gauge cock K2: Rotatable pressure gauge attachment.

Installation Dimension Drawings

K2-T**-10 (11)



K2-F**-10 (11)



- Note) 1. Maximum iron plate thickness: 9t; Mounting Bolt Hole Diameter: φ20
When mounted to panel
Loosen the (X) lock nut and (Y) cap nut, and pull out the (Z) adjusting screw.
To return to its original position, reverse this process.
2. Dimensions in parentheses are for the 02 size.

3. For information about G "A" and B, see the specifications. The O-ring shown below is used as a pressure gauge seal beneath screw G.

G1/4 JIS B2401-1B-P5
G3/8 JIS B2401-1B-P6
G1/2 JIS B2401-1B-P9



DMA Type Manual Valve

40 to 100 ℓ /min
35MPa

Features

- ① The compact 01 and 03 sizes are perfect for small flow rate control.
- ② Since a balanced type valve is used, there is no need for drain piping, and use with back pressures up to 16MPa (163kgf/cm²) is possible.
- ③ Mounting methods are the same as SA-G01/03, and the 01, 03 size modular valve can be used, so circuit configuration is quick and easy.

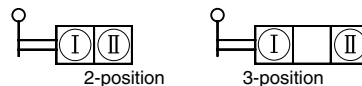
Specifications

Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa(kgf/cm ²)	Tank Port Back Pressure MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min	Spool Stroke (mm)		Weight kg
					2-position	3-position	
DMA-G01-***-20	1/8	35(25){357(255)}	16{163}	40	4	4 × 2	1.3
DMA-G03-***-(J)20	3/8			100	6	6 × 2	3.3

Positions	Type	JIS Symbol	Model No.	Maximum Working Pressure MPa(kgf/cm ²)	
2-position	Closed Cross		DMA-G01-A3X-20 G03-(J)20	35{357}	
	Open Cross		DMA-G01-A3Z-20 G03-(J)20		
	Closed Cross		DMA-G01-E3X-20 G03-(J)20		
	Open Cross		DMA-G01-E3Z-20 G03-(J)20		
3-position	All Ports Open		DMA-G01-C4-20 G03-(J)20		
			DMA-G01-F4-20 G03-(J)20		
	All Parts Blocked		DMA-G01-C5-20 G03-(J)20		
			DMA-G01-F5-20 G03-(J)20		
	ABT Connection		DMA-G01-C6-20 G03-(J)20		
			DMA-G01-F6-20 G03-(J)20		
	PT Connection	Closed Cross		DMA-G01-C7X-20 G03-(J)20	25{255}
		Restricted Open Cross		DMA-G01-C7Y-20 G03-(J)20	
		Closed Cross		DMA-G01-F7X-20 G03-(J)20	
		Restricted Open Cross		DMA-G01-F7Y-20 G03-(J)20	
PAT Connection		DMA-G01-C8-20 G03-(J)20	35{357}		
		DMA-G01-F8-20 G03-(J)20			

● Handling

- 1 The following are the three types of lever operations.
 - ① Spring Offset Type (Type A)
The lever is normally kept in the end position by the spring. Raising the lever performs switching, and the lever returns to its original position when released.
 - ② Spring Center Type (Type C)
The spool is normally in the center of position 3. After switching to either end, the spring returns the lever to its center position when the lever is released.
 - ③ Detent Type (Type F, Type E)
A notch at spool position 3 or position 2 acts as a stop.
- 2 Pressure loss is the same as that for the SA-G01/G03, so see SA-G01/G03 for more information.
- 3 The lever mounting orientation can be positioned at 90° increments by changing the orientation of the lever side cover.
- 4 For PT connection type DMA-G01/G03-*7-(J)20, closed cross DMA-G01/G03-*7X-(J)20 is the standard type.
- 5 The relationship between the lever switching positions and JIS symbols is shown below. (See the installation dimension diagrams for symbols ① and ②.)



- 6 Mounting bolts are not included with the 01 size.

DMA-G01-***-20	M5 × 45 ℓ	4
DMA-G03-***-J20	M6 × 70 ℓ	4
DMA-G03-***-20	M8 × 70 ℓ	4

Note) For mounting bolts, use 12T or equivalent.

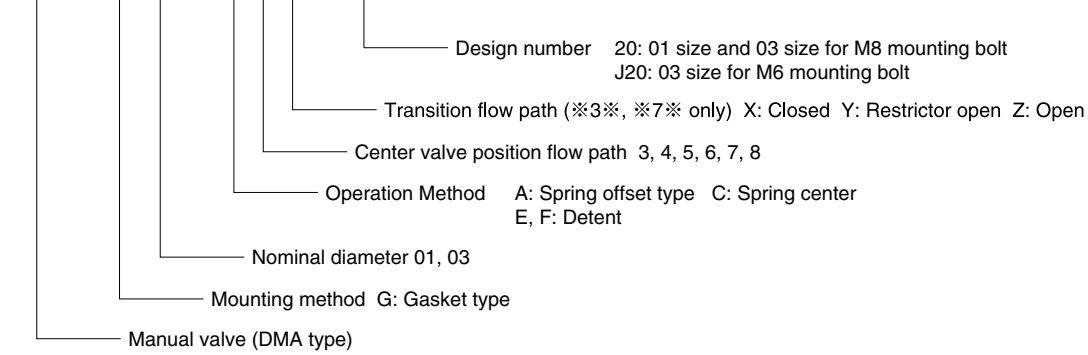
- 7 The following shows the sub plates.

Model No.	Pipe Diameter	Maximum Working Pressure MPa(kgf/cm ²)	Recommended Flow Rate (ℓ /min)	Weight (kg)	Applicable Valve Type
MSA-01Y-10	1/4	25{255}	40	1.2	DMA-G01-***-20
MSA-03-10	3/8		45	2.3	DMA-G03-***-J20
MSA-03X-10	1/2		80		
MS-03-30	3/8		45		
MS-03X-30	1/2		80	2.3	DMA-G03-***-20

These sub plates can also be used with SA (SS)-G01/G03, so see SA (SS)-G01/G03 for mounting methods.

Understanding Model Numbers

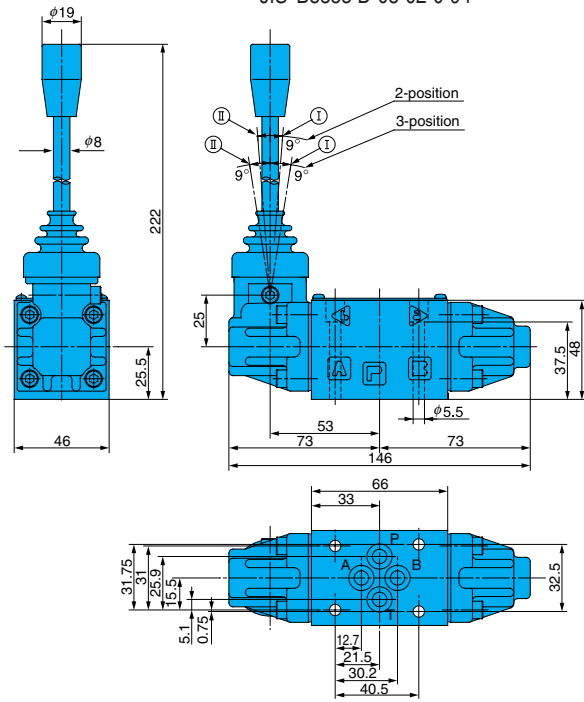
DMA - G 01 - A 3 X - 20



Installation Dimension Drawings

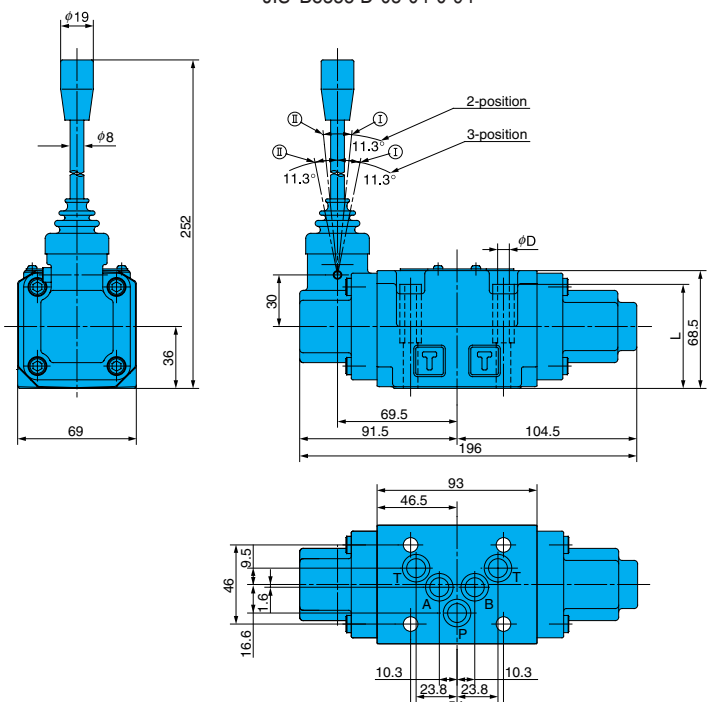
DMA-G01-***-20

Gasket Surface Dimensions (ISO 4401-03-02-0-94 / JIS B8355 D-03-02-0-94)



DMA-G03-***-(J)20

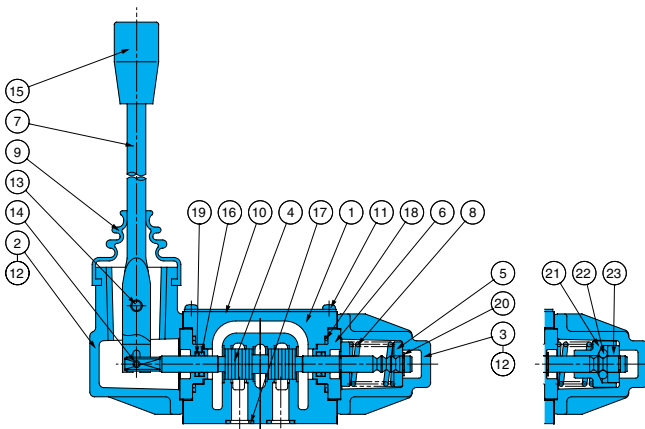
Gasket Surface Dimensions (ISO 4401-05-04-0-94 / JIS B8355 D-05-04-0-94)



	DMA-G03-**-J20	DMA-G03-**-20
φD	φ6.8	φ8.5
L	60.5	58

Cross-sectional Drawing

DMA-G01-***-20



Part No.	Part Name	Part No.	Part Name
1	Body	13	Screw
2	Cover A	14	Pin
3	Cover B	15	Knob
4	Spool	16	O-ring
5	Ring	17	O-ring
6	Bush	18	O-ring
7	Lever	19	Backup ring
8	Spring	20	Snap ring
9	Rod cover	21	Guide
10	Nameplate	22	Ball
11	Stopper screw	23	Retainer
12	Screw		

Seal Part List

Part No.	Part Name	Model No.			
		DMA-G01	Q'ty	DMA-G03	Q'ty
16	O-ring	1A-P7	2	1A-P10	2
17	O-ring	AS568-012 (Hs90)	4	AS568-014 (Hs90)	5
18	O-ring	AS568-019 (Hs90)	2	1B-P28	2
19	Backup ring	T2-P7	2	T2-P10	2

Note) 1.O-ring 1A/B-** refers to JIS B2401-1A/B.
2.Backup ring indicates JIS B2407-T2-**.



**Flange Type
Check Valve/Throttle Valve
Pilot Operated Check Valve**

**1300 ℓ /min
25MPa**



Features

① This series provides high capacity and flange connection, as well as compliance with new standards and

Japan Oil Hydraulic Standards (JOHS).

② Measurable higher pressure and higher capacity than previous models.

Specifications

Contact your agent for more information about mounting methods, etc.

	Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa(kgf/cm ²)	Rated flow rate ℓ /min	Cracking pressure MPa(kgf/cm ²)	Weight kg	Japan Hydraulic Standard Number
	Flange Mounting						
Right Angle Check Valve	CA-F06-1-30 2 3	3/4	25(255)	125	0.04(0.4) 0.35(3.6) 0.50(5.1)	3.8	JOHS-116
	CA-F10-1-30 2 3	1 1/4		300	0.04(0.4) 0.35(3.6) 0.50(5.1)	7.5	
	CA-F16-1-30 2 3	2		600	0.04(0.4) 0.35(3.6) 0.50(5.1)	20.1	
	CA-F24-1-30 2 3	3		1300	0.04(0.4) 0.35(3.6) 0.50(5.1)	63	
Pilot Operated Check Valve	CP-F06-1-*30 2	3/4	25(255)	125	0.2(2.0) 0.5(5.1)	6.4	JOHS-117
	CP-F10-1-*30 2	1 1/4		250	0.2(2.0) 0.5(5.1)	11.5	
	CP-F16-1-*30 2	2		600	0.2(2.0) 0.5(5.1)	32	

	Model No.	Nominal Diameter (Size)	Maximum Working Pressure MPa(kgf/cm ²)	Rated flow rate ℓ /min	Cracking pressure MPa(kgf/cm ²)	Weight kg	Japan Hydraulic Standard Number
	Flange Mounting						
+ Valve	(C)FR-F06-30	3/4	25(255)	85	0.1(1.0)	4.7	JOHS-116
	(C)FR-F10-30	1 1/4		230		11.0	
	(C)FR-F16-30	2		500		21.5	



Electro-hydraulic Proportional Valve Series

2 to 500 ℓ /min
21,25,28,35MPa

Overview

Today's hydraulic systems demand high levels of automation, power efficiency, and energy efficiency, which is why the use of electro-hydraulic proportional valves is on the rise. Built-in electronic

components deliver outstanding response and fluid pressure that allows high output, as well as superior operation, and control. The NACHI Electro-hydraulic Proportional Valve Series includes the

pressure control valves, flow control valves, and direction control valves that make it easy to meet these needs.

Features

① Pressure Control Valve Series

- EPR Series** — Small-volume direct driver type pilot relief valve
- ER Series** — Large-volume balanced piston type relief valve
- EGB Series** — Large-volume balanced piston type pressure reduction valve with relief function

The pressure control section uses a poppet structure, which is virtually impervious to the effects of dirt in the operating fluid for outstanding pressure stability.

② Flow Control Valve Series

- ES Series** — This 3-directional valve provides proportional flow control in accordance with input current.
- ESR Series** — With a built-in rod sensing function, this 3-way valve is for use in low-energy circuits.

A force feedback mechanism is used for main spool positioning, and amplification is performed by the pilot spool. The result is superior response

with small hysteresis and outstanding flow rate reproduction.

③ Direction Flow Control Valve Series

- ESD Series** — This electro-hydraulic proportional valve provides both direction control and flow control functions. Mounting methods are the same as those for standard switching valves, which allows simple structuring and maintenance.

④ Modular Type Control Valve Series

- EOG-G01** — This reduction valve with relief function can be used in ganged configurations.
- EOF-G01** — This flow control valve combines a restrictor valve with a pressure compensation valve.

This dual configuration provides easy installation along with dramatically reduced space requirements.

⑤ Power Amplifiers

- EMA Series** — Amplifier type
- EMC Series** — Controller type

A current-feedback amplifier system is used to virtually eliminate output current fluctuation. The same power supply specifications apply to all types.

⑥ Compact Power Amplifiers

- EBA Series** — Amplifier type

The highly efficient PWM control system of this new series ensures high reliability in a compact configuration.

⑦ Compact, Multi-function Power Amplifiers

- EDA Series** — Amplifier type

This compact amplifier can drive two solenoids with a single DC input.

- EDC Series** — Amplifier controller type

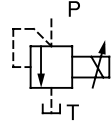
A choice of inputs: 6-contact or DC 2 input/4-contact

Series List

Name	Maximum Working Pressure MPa {kgf/cm ² }	Rated Flow Rate ℓ/min											
		1	2	10	50	100	200	300	400	500			
Electro-hydraulic Proportional Valve (EPR)	35 {357}	01 — Size											
Electro-hydraulic Proportional Relief Valve (ER)	35 {357}			03		06							
Electro-hydraulic Proportional Relief and Reducing Valve (EGB)	25 {255}			03		06							
Electro-hydraulic Proportional Flow Control Valve (ES)	21 {214}	02		03		06		10					
Load Sensitive Electro-hydraulic Proportional Relief and Flow Control Valve (ESR)	25 {255}			03		06		10					
Electro-hydraulic Proportional Flow Control Valve (ESD)	25 {255}	01		03		04		06					
Modular Type Electro-hydraulic Proportional Reducing Valve (EOG)	25 {255}	01											
Modular Type Electro-hydraulic Flow Control Valve (EOF)	21 {214}	01											
Power Amplifier (EMA) (EMC)													
Compact Power Amplifier (EBA)													
Compact, Multi-function Power Amplifier (EDA) (EDC)													

Electro-hydraulic Proportional Pilot Relief Valve

1.2 ℓ/min
0.3 to 28MPa



Features

This DC solenoid relief valve matches the suction force of a DC solenoid with fluid pressure. When connected to a small-volume hydraulic system or the poppet of a balanced piston type pressure control valve, this valve provides

continual pressure control in proportion to input current.

Specifications

Item	Model No.	EPR-G01-*-*-*-12
Rated Flow Rate ℓ/min		1.2
Pressure Control Range MPa{kgf/cm ² }		B : 0.3 to 2.5 { 3.1 to 25.5 } 1 : 0.7 to 7 { 7.1 to 71 } 2 : 1.0 to 14 { 10 to 143 } 3 : 1.5 to 21 { 15.3 to 214 } 4 : 1.5 to 28 { 15.3 to 286 } 5 : 2.0 to 35 { 20 to 357 }
Rated Current mA		800
Coil Resistance Ω		20 (20°C)
Hysteresis %		3 max. (Note)
Weight kg		1.6

Note) Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

Understanding Model Numbers

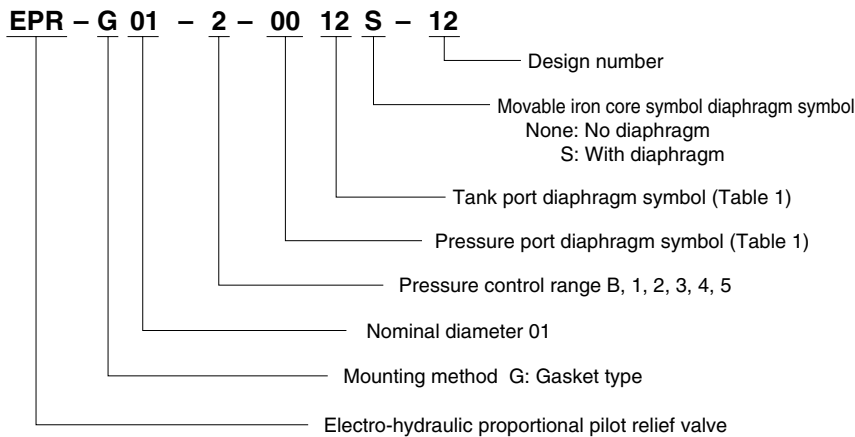


Table 1 Pressure Port and Tank Port Restrictor Symbols

Restrictor Symbol	00	08	09	10	11	12	13
Restrictor Diameter	None	φ0.8	φ0.9	φ1.0	φ1.1	φ1.2	φ1.3

Note) The following are the standards for the restrictor auxiliary symbols.

Pressure Control Range	Restrictor Auxiliary Symbol
Type B, Type 1	0013S
Type 2, Type 3	0012S
Type 4	1212S
Type 5	1111S

● Handling

1 Air Bleeding

To enable proper pressure control, loosen the air vent when starting up the pump in order to bleed any air from the pump, and fill the inside of the solenoid with hydraulic operating fluid. The position of the air vent can change by loosening the M4 screw and rotating the cover.

2 Mounting Method

Mounting on a vertical surface causes minimum pressure to increase by 0.1MPa {2kgf/cm²}.

3 Manual Pressure Adjusting Screw

For the initial adjustment or when there is no input current to the valve due to an electrical problem or some other reason, valve pressure can be increased by rotating the manual adjustment screw clockwise (rightward). Normally, the manual adjusting screw should be rotated back fully to the left (counterclockwise) and secured with the lock nut.

4 Minimum Relief Flow Rate

A small flow rate can cause setting pressure to become unstable. Use a flow rate of at least 0.3 ℓ/min.

5 Load Capacity

When using this valve to control direct circuit pressure, make sure the load volume (valve P port side volume) is at least 40cm³.

6 Bundled Accessories (Valve Mounting Bolts)

M5 x 45 ℓ (four) Tightening torque: 5 to 7N·m {51 to 72kgf·cm}

7 Sub Plate

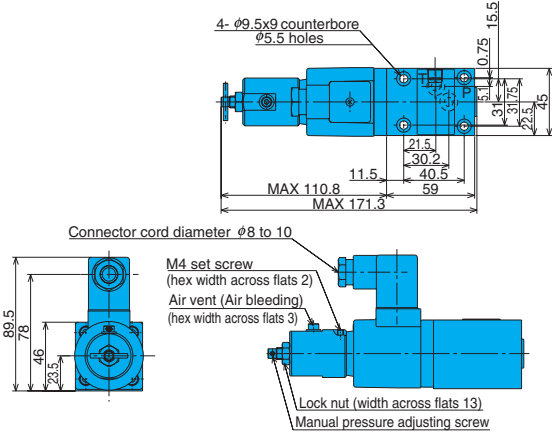
When a sub plate is required, order using the following model number. MSA-01Y-10 (See the next page for dimensions.)

8 Use an operating fluid that conforms to the both of the following.

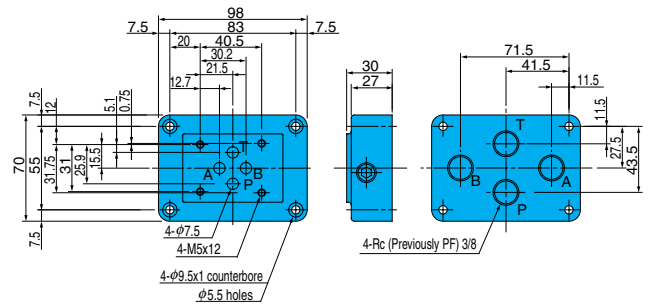
Fluid Temperature: -20°C to 70°C
Viscosity: 12 to 400mm²/s. The recommended viscosity range is 15 to 60mm²/s.

Installation Dimension Drawings

EPR-G01



Sub Plate
MSA-01Y-10

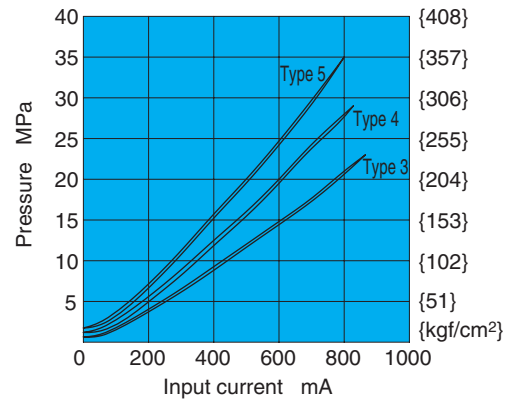
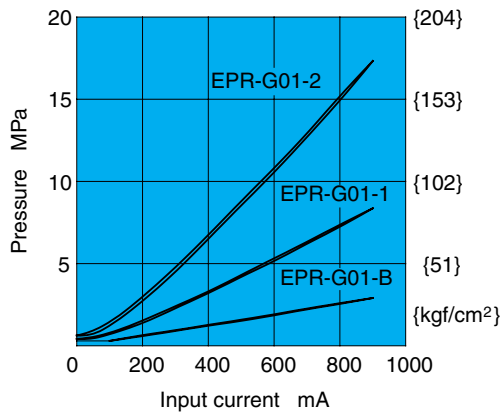


Note) Install the sub plate so the valve's P port is aligned with the sub plate's B port.
The gasket surface dimensions comply with the ISO standard shown below.
ISO 4401-03-02-0-94

Performance Curves

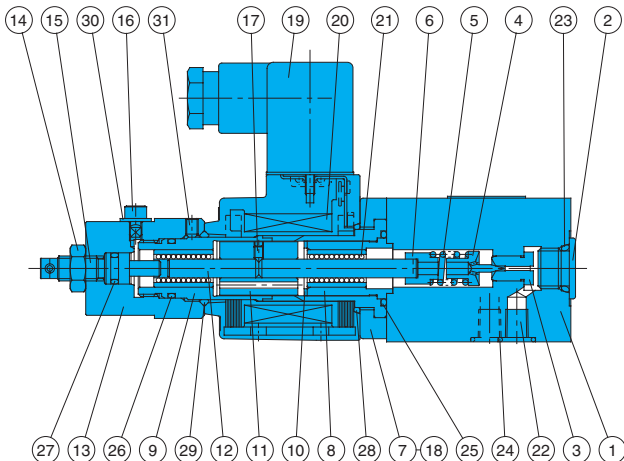
Hydraulic Operating Fluid Viscosity 32mm²/s

Input Current – Pressure Characteristics



Cross-sectional Drawing

EPR-G01-*-****-12



Part No.	Part Name
1	Body
2	Plug
3	Seat
4	Poppet
5	Spring
6	Retainer
7	Cover
8	Stopper
9	Guide
10	Shim
11	Plunger
12	Rod
13	Cover
14	Nut
15	Screw
16	Screw
17	Screw
18	Screw
19	Connector
20	Coil
21	Ball bush
22	Choke
23	O-ring
24	O-ring
25	O-ring
26	O-ring
27	O-ring
28	O-ring
29	O-ring
30	Seal
31	Screw

Seal Part List (Kit Model Number JPS-G01-1A)

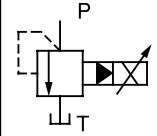
Part No.	Part Name	Part Number	Q'ty
23	O-ring	1B-P11	1
24	O-ring	1B-P9	2
25	O-ring	1B-P22	1
26	O-ring	AS 568-016(Hs90)	1
27	O-ring	1B-P7	1
28	O-ring	S-25	1
29	O-ring	1A-P20	1
30	Seal	CW1000FO	1

Note) O-ring 1A/B-** refers to JIS B2401-1A/B.

Note) Coil model number JD64-D2

Electro-hydraulic Proportional Relief Valve

150 to 320 ℓ /min
0.3 to 35MPa



Features

This valve combines a compact, high-performance electro-hydraulic proportional pilot relief valve and balanced piston type relief valve to provide pressure control in proportion to input current.

Throughput volume and fluid temperature fluctuation has little effect on control pressure, so this valve provides open loop control of even complex pressures (forces).

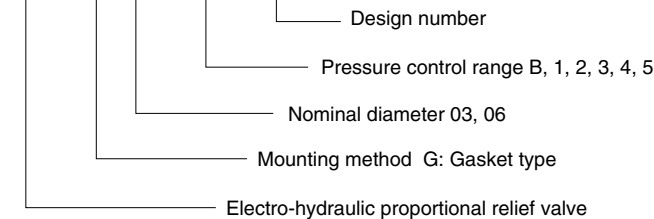
Specifications

Item	Model No.	ER-G03-*-21	ER-G06-*-21
Maximum Flow Rate ℓ /min		150	320
Pressure Control Range MPa{kgf/cm ² }		B : 0.3 to 2.5{3.1 to 25.5} (Note 1) 1 : 0.7 to 7 {7.1 to 71} 2 : 1.0 to 14 {10 to 143} 3 : 1.5 to 21 {15.3 to 214} 4 : 1.5 to 28 {15.3 to 286} 5 : 2.0 to 35 {20 to 357}	
Rated Current mA		800	
Coil Resistance Ω		20(20°C)	
Hysteresis %		3 max. (Note 2)	
Minimum Relief Flow Rate ℓ /min		5	8
Weight kg		6.0	7.1

Note) 1.G03 type only Flow rate: 40 ℓ /min
2.Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

Understanding Model Numbers

ER - G 03 - 3 - 21



Model No.	Bolt Size	Q'ty	Tightening Torque N·m(kgf·cm)
ER-G03	M12 × 50 ℓ	4	75 to 95{ 765 to 970}
ER-G06	M16 × 60 ℓ	4	190 to 235{1940 to 2400}

● Handling

1 Air Bleeding

To enable proper pressure control, loosen the air vent when starting up the pump in order to bleed any air from the pump, and fill the inside of the solenoid with hydraulic operating fluid.

2 Manual Pressure Adjusting Screw

For the initial adjustment or when there is no input current to the valve due to an electrical problem or some other reason, valve pressure can be increased by rotating the manual adjustment screw clockwise (rightward). Normally, the manual adjusting screw should be rotated back fully to the left (counterclockwise) and secured with the lock nut.

3 Tank Port Back Pressure

Make sure that tank port back pressure is as small as possible; no greater than 0.2MPa {2.0kgf/cm²}.

4 Safety Valve Setting Pressure

The safety valve is set to maximum adjustment pressure plus 1.5 to 2.0MPa {15.3 to 20.4kgf/cm²}. When actually using the valve, adjust in accordance with actual pressure.

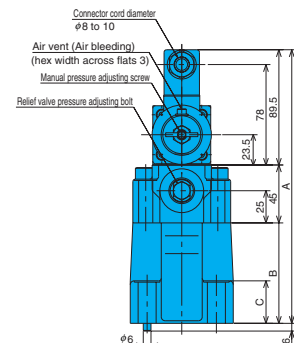
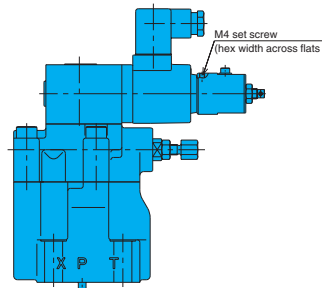
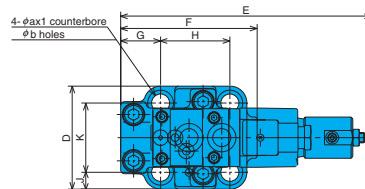
5 Bundled Accessories (Valve Mounting Bolts)

6 Use an operating fluid that conforms to the both of the following.

Fluid Temperature: -20°C to 70°C
Viscosity: 12 to 400mm²/s. The recommended viscosity range is 15 to 60mm²/s.

Installation Dimension Drawings

ER-G**-*-21

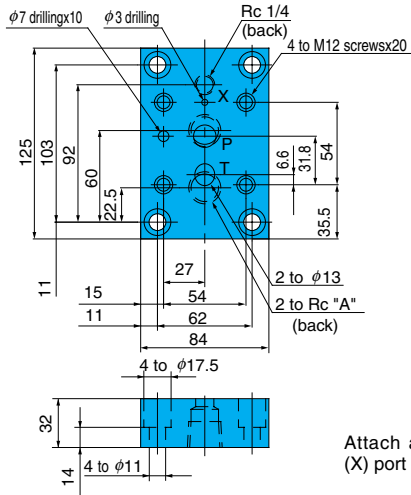


The gasket surface dimensions comply with the ISO standard shown below.

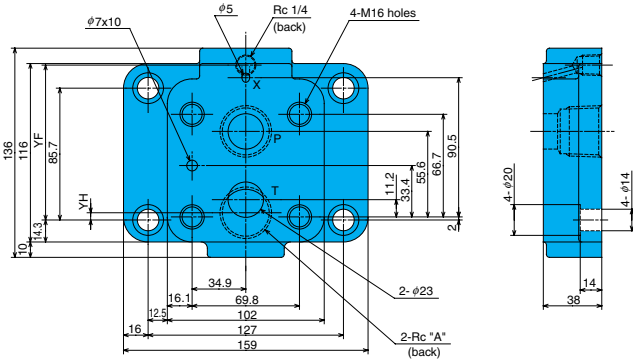
G03...ISO 6264-AR-06-2-A
G06...ISO 6264-AS-08-2-A

Model No.	A	B	C	D	E	F	G	H	J	K	a	b
ER-G03	212.5	78	33	80	194.8	106	31	53.8	13.1	53.8	20	14
ER-G06	217.5	83	37	100	203.8	119	37	66.7	15	70	26	17.5

Sub Plate (Maximum Operating Pressure: 25MPa)
MRI-03*-10



MRI-06*-10



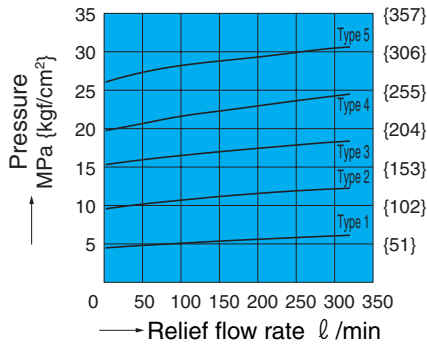
Model No.	A
MRI-03-10	3/8
MRI-03X-10	1/2
MRI-06-10	3/4
MRI-06X-10	1

Model No.	YF	YH
MRI-06-10	92.5	13.2
MRI-06X-10	100.7	4.7

Attach a plug when the vent (X) port is not used.

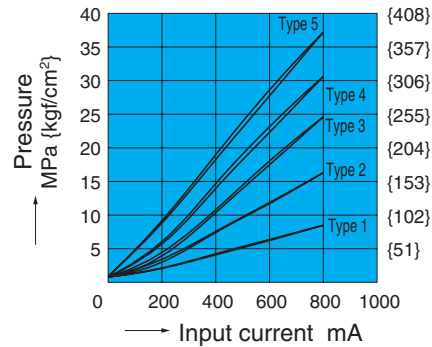
Performance Curves

Flow Rate – Pressure Characteristics
ER-G06*-21



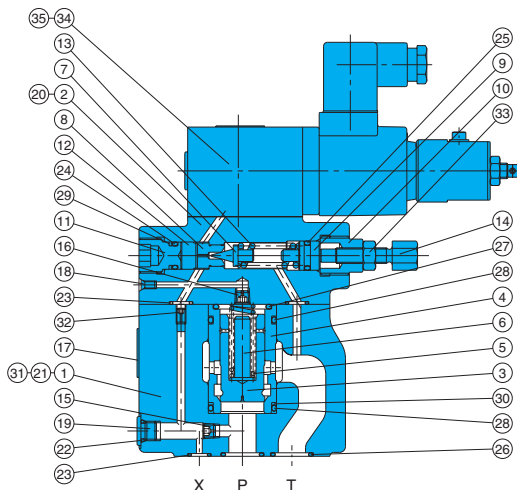
Hydraulic Operating Fluid Viscosity 32mm²/s

Input Current – Pressure Characteristics
ER-G06*-21



Cross-sectional Drawing

ER-G**-21



ER Valve Built-in Pilot Relief Valve List

Model No.	Built-in Pilot Relief Valve
ER-G03-B-21	EPR-G01-B-0011S-12
1	1-0011S-12
2	2-1313S-12
3	3-1212S-12
4	4-1111S-12
5	5-1010S-12
ER-G06-1-21	EPR-G01-1-0011S-12
2	2-1313S-12
3	3-1212S-12
4	4-1111S-12
5	5-1010S-12

Seal Part List (Kit Model Number JPS-G01-1A)

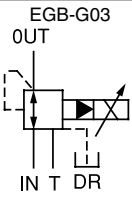
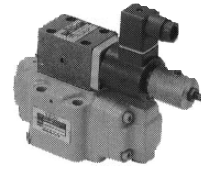
Part No.	Part Name	Nominal Diameter/Part Number		Q'ty
		G03	G06	
22	O-ring	1B-P8	1B-P8	1
23	O-ring	1B-P9	1B-P9	3
24	O-ring	1B-P10A	1B-P10A	1
25	O-ring	1A-P11	1A-P11	1
26	O-ring	1B-P18	1B-P28	2
27	O-ring	1B-G25	1B-P28	1
28	O-ring	1B-G30	1B-P32	2
29	Backup ring	T2-P10A	T2-P10A	1
30	Backup ring	T2-G30	T2-P32	1

Note) 1.O-ring 1A/B-** refers to JIS B2401-1A/B.
2.For the ** part of the kit number, specify the valve size (G03, G06).
3.EPR-G01 pilot valve seal is available separately. See page I-3 for more information.

Part No.	Part Name	Part No.	Part Name
1	Body	18	Plug
2	Cover	19	Plug
3	Poppet	20	Screw
4	Sleeve	21	Pin
5	Spring	22	O-ring
6	Spacer	23	O-ring
7	Poppet	24	O-ring
8	Seat	25	O-ring
9	Plunger	26	O-ring
10	Retainer	27	O-ring
11	Plug	28	O-ring
12	Collar	29	Backup ring
13	Spring	30	Backup ring
14	Handle	31	Screw
15	Orifice	32	Choke
16	Orifice	33	Nut
17	Plate	34	Pilot relief valve
		35	Screw

Electro-hydraulic Proportional Relief and Reducing Valve

50 to 100 ℓ /min
0.3 to 25MPa



Features

This valve combines a compact, high-performance electro-hydraulic pilot relief valve, and a reducing and relief valve for low-pressure control of pressure within a hydraulic system in proportion to input current.

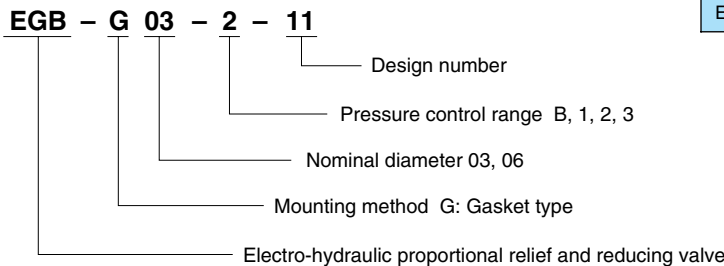
Since this valve includes a relief function, OUT side pressure can be maintained at a virtually fixed level, even when the valve's OUT side is used as reaction force. This valve also provides outstanding response as pressure drops.

Specifications

Item	Model No.	EGB-G03-*-11	EGB-G06-*-11
Maximum Operating Pressure MPa {kgf/cm ² }		25(255)	
Maximum Flow Rate ℓ /min		50	100
Pressure Control Range MPa {kgf/cm ² }		B : 0.3 to 2.5 {3.1 to 25.5 } (Note 1) 1 : 0.7 to 7 {7.1 to 71 } 2 : 1.0 to 14 {10 to 143 } 3 : 1.5 to 21 {15.3 to 214 }	
Rated Current mA		800	
Coil Resistance Ω		20 (20°C)	
Hysteresis %		3 max. (Note 2)	
Weight kg		5.5	7.8

Note) 1.G03 type only Rated flow rate: 20 ℓ /min
2.Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

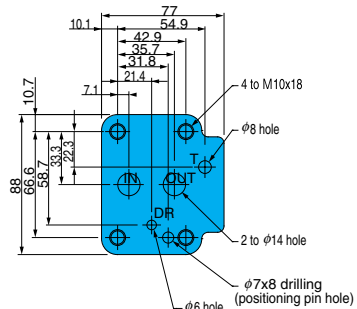
Understanding Model Numbers



Model No.	Bolt Size	Q'ty	Tightening Torque N-m{kgf-cm}
EGB-G03	M10 × 75 ℓ	4	45 to 55{460 to 560}
EGB-G06	M10 × 85 ℓ	4	45 to 55{460 to 560}

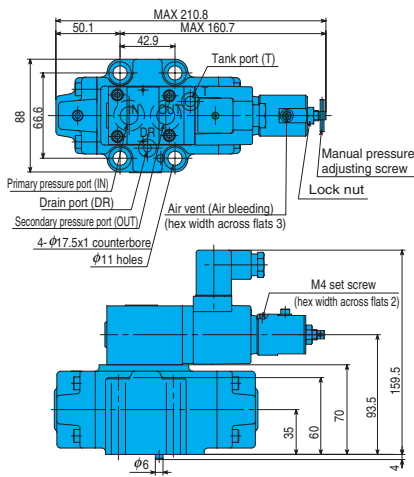
- 6] Use an operating fluid that conforms to the both of the following. Oil temperature: -20 to 70°C Viscosity: 12 to 400mm²/s The recommended viscosity range is 15 to 60mm²/s.

Mounding Gasket Dimensions EGB-G03-*-11

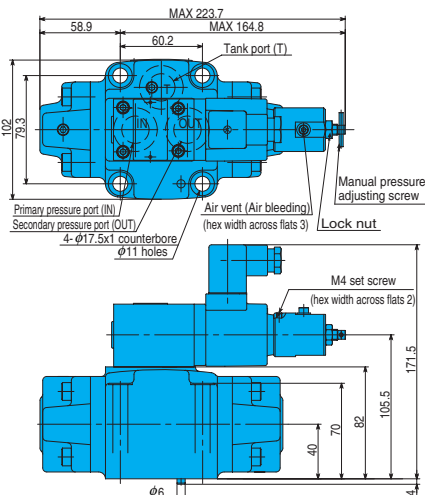


Installation Dimension Drawings

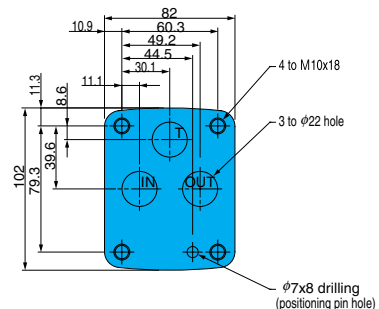
EGB-G03-*-11



EGB-G06-*-11



Mounding Gasket Dimensions EGB-G06-*-11

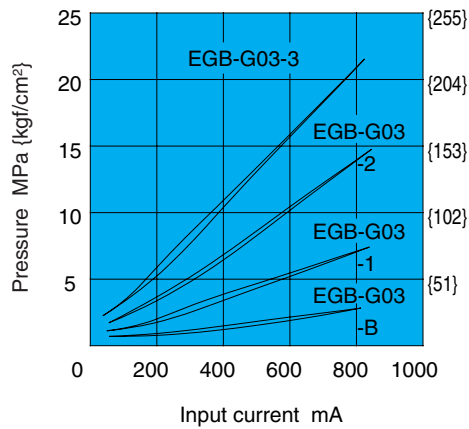


Performance Curves

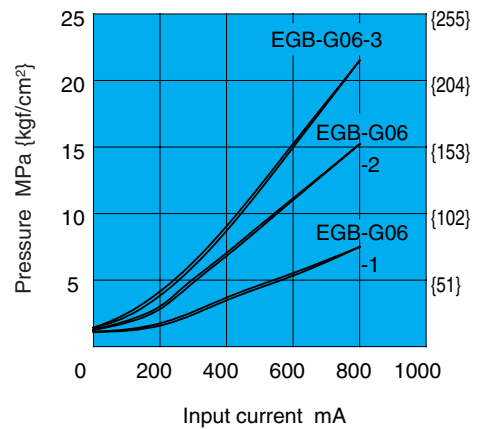
Hydraulic Operating Fluid Viscosity 32mm²/s

Input Current – Pressure Characteristics

EGB-G03

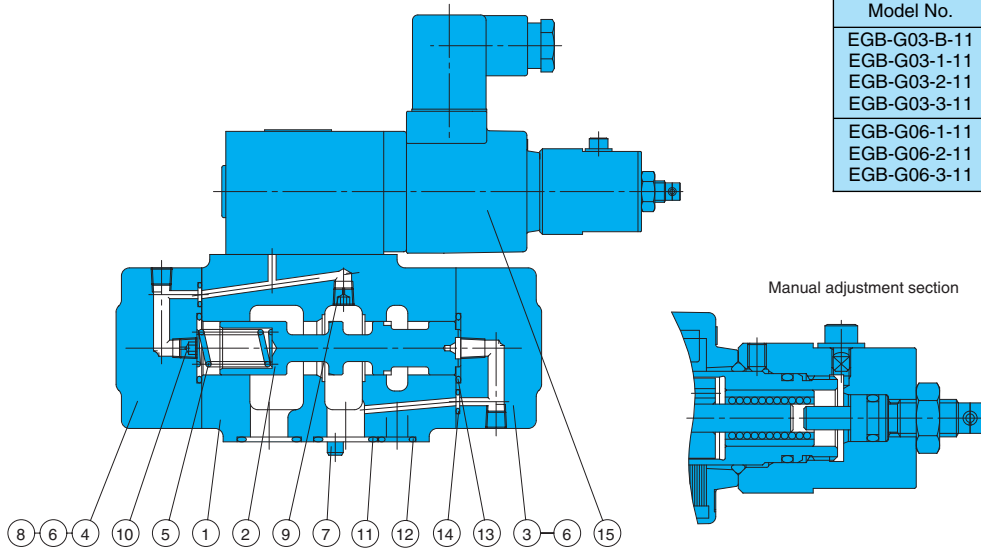


EGB-G06



Cross-sectional Drawing

EGB-G**-*-11



EGB Valve Built-in Pilot Relief Valve List

Model No.	Built-in Pilot Relief Valve
EGB-G03-B-11	EPR-G01-B-0000-12
EGB-G03-1-11	1-0013-12
EGB-G03-2-11	2-0012-12
EGB-G03-3-11	3-0011-12
EGB-G06-1-11	EPR-G01-1-0013-12
EGB-G06-2-11	2-0012-12
EGB-G06-3-11	3-0012-12

Seal Part List (Kit Model Number JGS-***)

Part No.	Part Name	EGB-G03-*-11		EGB-G06-*-11	
		Part Number	Q'ty	Part Number	Q'ty
11	O-ring	1B-P20	2	1B-P26	3
12	O-ring	1B-P10A	2	-	-
13	O-ring	1B-P22	2	1B-G30	2
14	O-ring	1B-P6	2	1B-P6	2

Note) 1.O-ring 1B-** refers to JIS B2401-1B-**.

2.For the ** part of the kit number, specify the valve size (G03, G06).

3.EPR-G01 pilot valve seal is available separately. See page I-3 for more information.

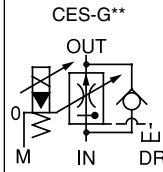
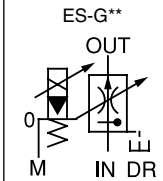
Part No.	Part Name
1	Body
2	Piston
3	Cover
4	Cover
5	Spring
6	Screw
7	Pin
8	Pin
9	Choke
10	Choke
11	O-ring
12	O-ring
13	O-ring
14	O-ring
15	Pilot relief valve

Note)

Coil model number JD64-D2

Electro-hydraulic Proportional Flow Control Valve

0.3 to 500 ℓ /min
21MPa



Features

This valve controls actuator speed in response to the size of input current. Pressure and control fluid temperature fluctuation has little effect on setting pres-

sure, which enables high-precision speed control. This valve is the perfect choice for actuator acceleration and deceleration control, and remote control.

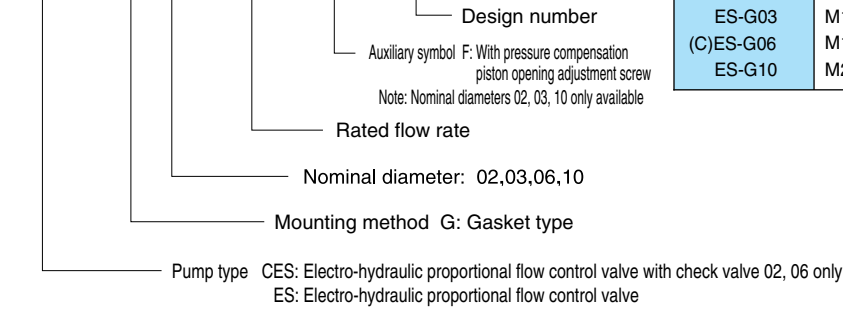
Specifications

Item	Model No.	(C)ES-G02-10-(F)-12	ES-G03-60-(F)-12	(C)ES-G06-250-11	ES-G10-500-(F)-11
Maximum Operating Pressure MPa (kgf/cm ²)		21{214}	21{214}	21{214}	21{214}
Flow Rate Control Range ℓ /min		0.5 to 10{0.5 to 30}	2 to 60{2 to 125}	5 to 250	15 to 500
Minimum Allowable Valve Pressure Differential MPa(kgf/cm ²)		1.0{10}{(Note1)}	1.3{13.3}{(Note1)}	1.5{15.3}{(Note1)}	2{20.4}{(Note1)}
Reverse Flow Rate ℓ /min (With check valve only)		50	(125){(Note3)}	200	-
Hysteresis %		3 max. (Note 2)	3 max. (Note 2)	3 max. (Note 2)	3 max. (Note 2)
Rated Current mA		800	800	800	800
Coil Resistance Ω		20 (20°C)	20 (20°C)	20 (20°C)	20 (20°C)
Weight kg		8.5	13	25	55

Note) 1.Control valve inlet and outlet pressure differential required to obtain favorable pressure compensation.
2.Value when a Nachi-Fujikoshi special amplifier is used (with dithering).
3.ES-G03 does not have a built-in check valve, but a sub plate with check valve (Model No. MCF-03-D-22) is available for it.

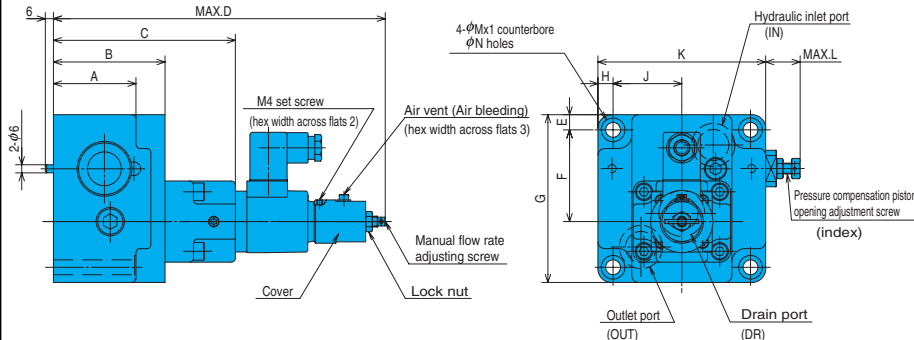
Understanding Model Numbers

(C)ES - G 02 - 30 - (F) - 12



Model No.	Bolt Size	Q'ty	Tightening Torque N-m(kgf·cm)
(C)ES-G02	M 8 × 80 ℓ	4	20 to 25{ 205 to 255}
ES-G03	M10 × 75 ℓ	4	45 to 55{ 460 to 560}
(C)ES-G06	M16 × 140 ℓ	4	190 to 235{1940 to 2400}
ES-G10	M20 × 160 ℓ	4	370 to 460{3770 to 4690}

Installation Dimension Drawings



Model No.	A	B	C	D	E	F	G	H	J	K	L	M	N
(C)ES-G02	66	80	132	242.8	9.7	48	102	9.4	38.1	95	22.5	14	8.8
ES-G03	61	82.5	134.5	245.3	11.2	67.8	124	11.2	50.8	124	26	17.5	11
(C)ES-G06	115	130	182	292.8	16.8	104.8	167	17	73	180	-	26	18
ES-G10	137	160	215	326.3	25	148	228	23.5	98.5	244	18	32	22

● Handling

1 Air Bleeding

To enable proper pressure control, loosen the air vent when starting up the pump in order to bleed any air from the pump, and fill the inside of the solenoid with hydraulic operating fluid. The position of the air vent can change by loosening the M4 screw and rotating the cover.

2 Manual Flow Rate Adjusting Screw

For the initial adjustment or when there is no input current to the valve due to an electrical problem or some other reason, the flow rate can be increased by rotating the manual adjustment screw clockwise (rightward). Normally, this adjusting screw should be returned completely to its original position and secured with the lock nut.

3 Drain Port

Make sure that back pressure is no greater than 0.2MPa {2kgf/cm²}, and that his port is connected directly to the fluid tank at a point that is below the oil surface.

4 Bundled Accessories (Valve Mounting Bolts)

5 The loss coefficient and control valve can cause resonance when there is a great distance between the flow control valve and actuator (when the pipe internal volume is large). Be sure to keep the distance between the flow control valve and actuator as small as possible, and to avoid the use of flexible hose as much as possible.

6 Sub Plate

See the next page for more information about sub plates.

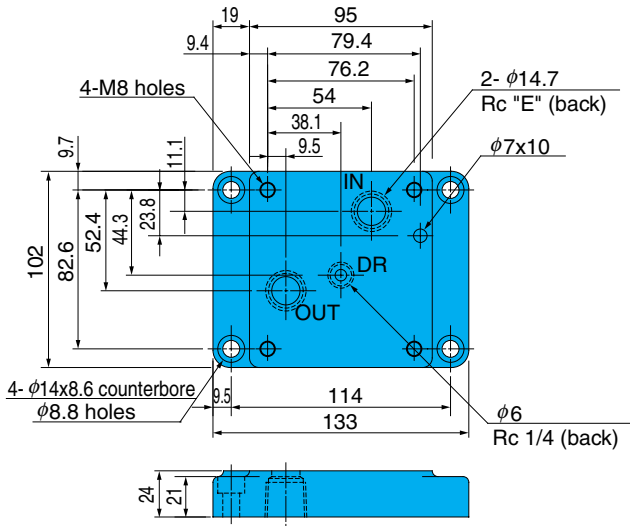
7 Use an operating fluid that conforms to the both of the following.

Oil temperature: -20 to 70°C
Viscosity: -12 to 400mm²/s.
The recommended viscosity range is 15 to 60mm²/s.

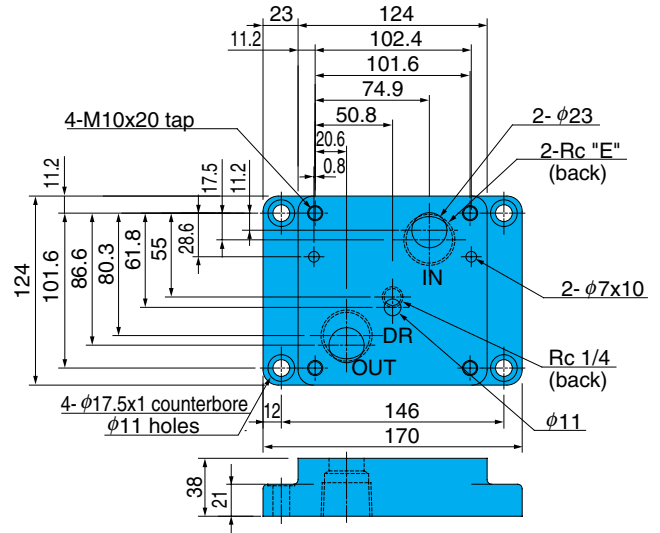
8 Since this valve has a built-in pressure compensation valve, changing of the inertial load (using a high inertial oil motor, etc.) can create the risk of hunching under certain conditions. Contact your sales agent before changing the inertial load.

· The gasket surface dimensions comply with the ISO standard shown below.
(C)ES-G02...ISO 6263-06-05-97
ES-G03...ISO 6263-07-09-97
(C)ES-G06...ISO 6263-08-13-97

Sub Plate
MES-02*-10



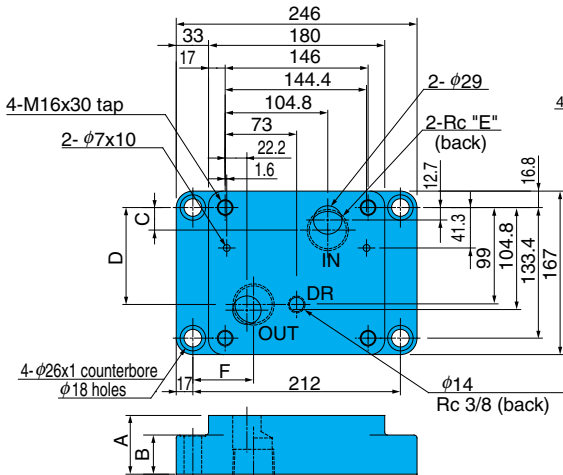
MES-03*-10



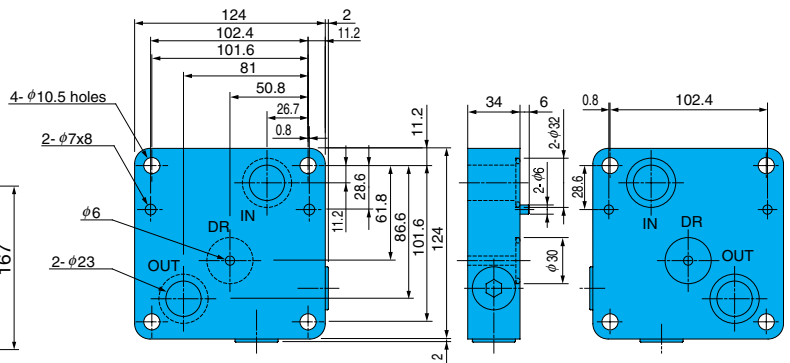
Model No.	E
MES-02X-10	3/8
MES-02Y-10	1/2

Model No.	E
MES-03Y-10	3/4
MES-03Z-10	1

MES-06*-10



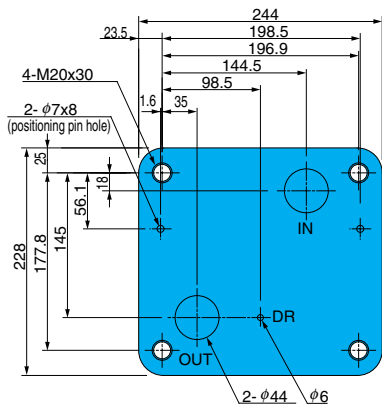
Auxiliary Plate with Check Valve
MCF-03-D-22



Bundled Items (Mounting Bolts) M10 x 110 ℓ (Four)

Model No.	A	B	C	D	E	F
MES-06X-10	45	25	16	104.8	1	55.2
MES-06Y-10	60	40	23	99	1 1/4	62

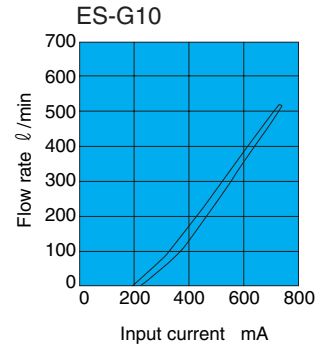
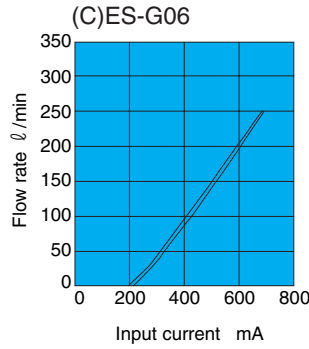
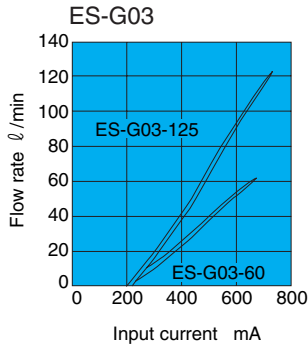
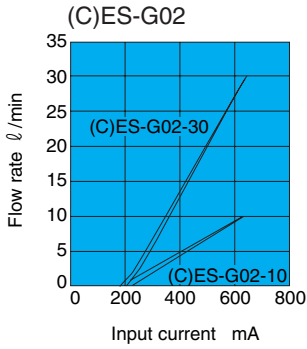
ES-G10 Mounting Gasket Surface Dimensions



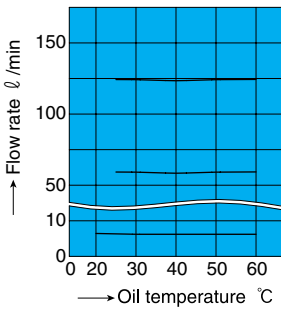
Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

Input Current – Flow Rate Characteristics

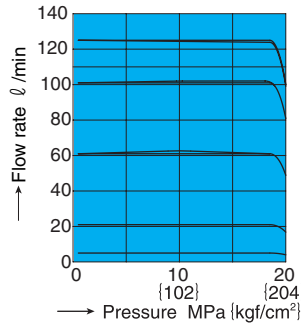


Fluid Temperature – Control Flow Rate Characteristics



Supply Pressure 14MPa
Load Pressure 10MPa
Operating Fluid VG32
Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

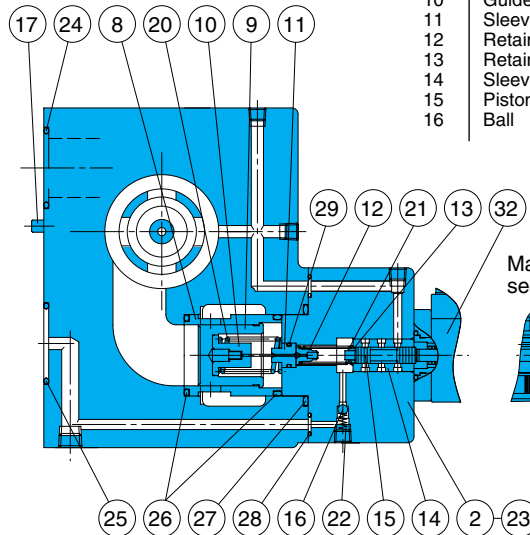
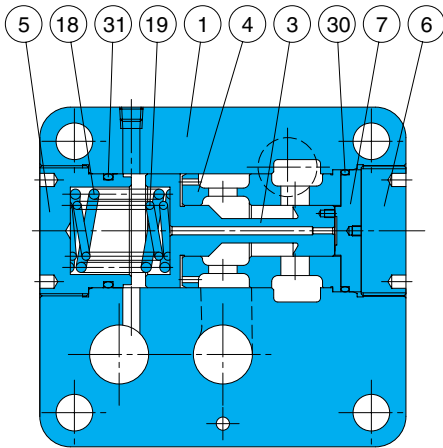
Pressure – Control Flow Rate Characteristics



Supply Pressure 21MPa
Operating Fluid VG32
Fluid Temperature 40°C
Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

Cross-sectional Drawing

ES-G**-*-11(12)



Manual adjustment section

Part No.	Part Name	Part No.	Part Name
1	Body	17	Pin
2	Cover	18	Spring
3	Piston	19	Spring
4	Sleeve	20	Spring
5	Plug	21	Spring
6	Plug	22	Spring
7	Retainer	23	Spring
8	Sleeve	24	O-ring
9	Spool	25	O-ring
10	Guide	26	O-ring
11	Sleeve	27	O-ring
12	Retainer	28	O-ring
13	Retainer	29	O-ring
14	Sleeve	30	O-ring
15	Piston	31	O-ring
16	Ball	32	Proportional solenoid

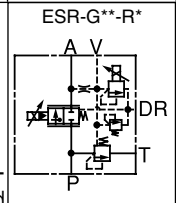
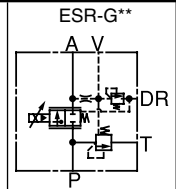
List of Sealing Parts

Part No.	Part Name	(C)ES-G02		ES-G03		(C)ES-G06		ES-G10	
		Part Number	Q'ty	Part Number	Q'ty	Part Number	Q'ty	Part Number	Q'ty
24	O-ring	1B-P18	2	1B-P26	2	1B-G35	2	1B-P48	2
25	O-ring	1B-P24	1	1B-P28	1	1B-G35	1	1B-P48	1
26	O-ring	—	—	—	—	1B-G35	2	1B-G50	2
27	O-ring	1B-P29	1	1B-P29	1	1B-G45	1	1B-G60	1
28	O-ring	1B-P5	4	1B-P5	4	1B-P8	3	1B-P9	3
29	O-ring	1B-P9	1	1B-P9	1	1B-P9	1	1B-P9	1
30	O-ring	1B-P18	1	1B-P20	1	1B-G55	1	1B-G75	2
31	O-ring	1B-P30	1	1B-P38	1	1B-P50	1	1B-G75	1
Seal Kit Number		JFS-G02		JFS-G03		JFS-G06		JFS-G10	

Note) O-ring 1B-** refers to JIS B2401-1B-**.

Load Response Electro-hydraulic Proportional Relief and Flow Control Valve

1 to 500 ℓ /min
25MPa



Features

The load sensing function of this meter in flow control valve makes it possible to control pump discharge pressure automatically in accordance with the size of the

load pressure.

Using this valve suppresses wasteful pump pressure rises and makes it possible to configure an energy-efficient circuit.

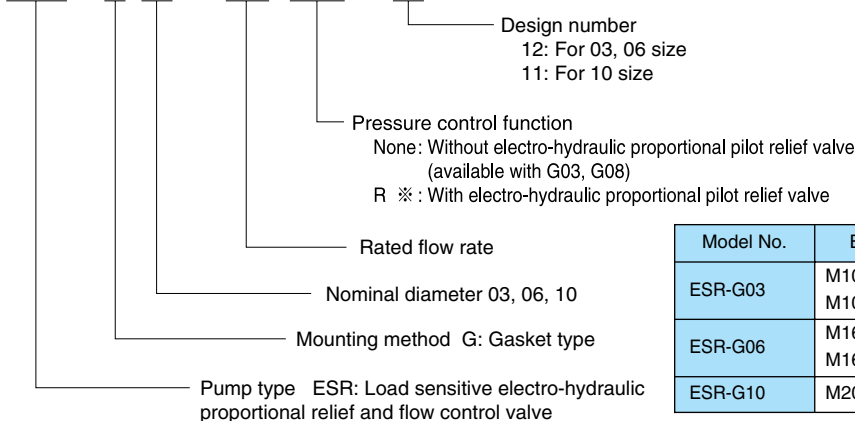
Specifications

Item	Model No.	ESR-G03-125 -(R*)-12	ESR-G06-250 -(R*)-12	ESR-G10-500 -R*-11
Maximum Operating Pressure MPa(kgf/cm ²)		25{255}	25{255}	25{255}
Rated Flow Rate ℓ /min		125	250	500
Flow Rate Control System	Flow Rate Control Range ℓ /min	2 to 125	5 to 250	15 to 500
	Valve Differential Pressure MPa(kgf/cm ²)	0.5{5.1}{(Note 1)}	0.7{7.1}{(Note 1)}	0.9{9.2}{(Note 1)}
	Hysteresis %	3 max. (Note 2)	3 max. (Note 2)	3 max. (Note 2)
	Repeatability %	1	1	1
	Rated Current mA	800	800	800
	Coil Resistance Ω	20 (20°C)	20 (20°C)	20 (20°C)
	Pressure Control System (Note 3)	Pressure Control Range MPa(kgf/cm ²)	R1 : 1.2 to 7{12.2 to 71} R2 : 1.4 to 14{14.3 to 143} R3 : 1.6 to 21{16.3 to 214} R4 : 1.6 to 25{16.3 to 255}	R1 : 1.2 to 7{12.2 to 71} R2 : 1.4 to 14{14.3 to 143} R3 : 1.6 to 21{16.3 to 214} R4 : 1.6 to 25{16.3 to 255}
Hysteresis %		3 max. (Note 2)	3 max. (Note 2)	3 max. (Note 2)
Repeatability %		1	1	1
Rated Current mA		800	800	800
Coil Resistance Ω		20 (20°C)	20 (20°C)	20 (20°C)
Weight kg		14	28	60

Note) 1.Indicates the pressure differential between the valve P port and A port.
2.Value when a Nachi-Fujikoshi special amplifier is used (with dithering).
3.These specifications apply to valves that include an electro-hydraulic proportional pilot relief valve (i.e. ESR-G06-250R2-11).
4.The maximum adjustment pressure is 25MPa {255kgf/cm²} for a valve that does not include an electro-hydraulic proportional pilot relief valve. Factory default is minimum output (3.5MPa max.) Set this value in accordance with the pressure of the hydraulic circuit being used.

Understanding Model Numbers

ESR - G 06 - 250 (**) - 12



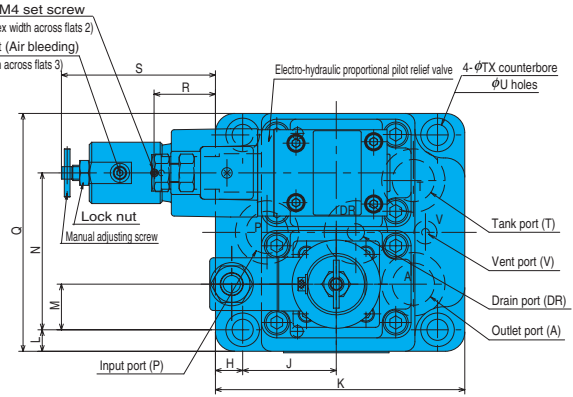
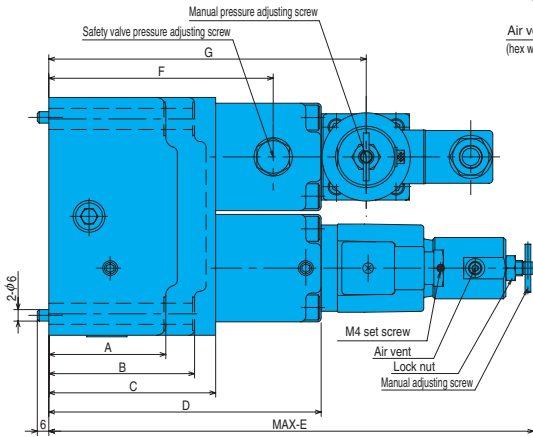
Model No.	Bolt Size	Q'ty	Tightening Torque N·m(kgf·cm)
ESR-G03	M10 × 75 ℓ	2	45 to 55{ 460 to 560}
	M10 × 90 ℓ	2	
ESR-G06	M16 × 100 ℓ	2	190 to 235{1940 to 2400}
	M16 × 135 ℓ	2	
ESR-G10	M20 × 130 ℓ	6	370 to 460{3770 to 4690}

- 8] Sub Plate
See the next page for more information about sub plates.
- 9] Use an operating fluid that conforms to the both of the following. Oil temperature: -20 to 70°C Viscosity: 12 to 400mm²/s. The recommended viscosity range is 15 to 60mm²/s.
- 10] Since this valve has a built-in pressure compensation valve, changing of the inertial load (using a high inertial oil motor, etc.) can create the risk of hunching under certain conditions. Contact your sales agent before changing the inertial load.

● Handling

- 1] Air Bleeding
In order to ensure stable control, loosen the air vent and bleed air from the valve before starting operation.
- 2] Manual Adjusting Screw
For the initial adjustment or when there is no input current to the valve due to an electrical problem or some other reason, pressure or flow rate can be increased by rotating the manual adjustment screw clockwise (rightward). Normally, this adjusting screw should be returned completely to its original position and secured with the lock nut.
- 3] Drain Port
Minimum control pressure is increased by drain port back pressure, so be sure to connect the drain port directly to the fluid tank at a point that is below the oil surface.
- 4] Safety Valve Setting Pressure
For a safety valve without an electro-hydraulic proportional pilot relief valve, safety valve pressure is set to minimum pressure (3.5MPa max.) In the case of a safety valve with an electro-hydraulic proportional pilot relief valve, the safety valve setting pressure is set to the minimum adjustment pressure plus 1.5MPa. When actually using the valve, adjust in accordance with hydraulic circuit pressure.
- 5] Minimum Relief Flow Rate During Pressure Control
Setting pressure can become unstable when the relief flow rate to the valve's T port is small. Because of this, use a relief flow rate of at least 10 ℓ /min with a nominal diameter of 03 or 06, and a relief flow rate of at least 20 ℓ /min with a nominal diameter of 10.
- 6] Valve Mounting Orientation
When an electro-hydraulic proportional pilot relief valve main valve is mounted on a vertical surface with the pilot relief valve part facing downwards make it difficult to bleed air from the pilot relief valve. Because of this, you should not use this type of mounting orientation.
- 7] Bundled Accessories (Valve Mounting Bolts)

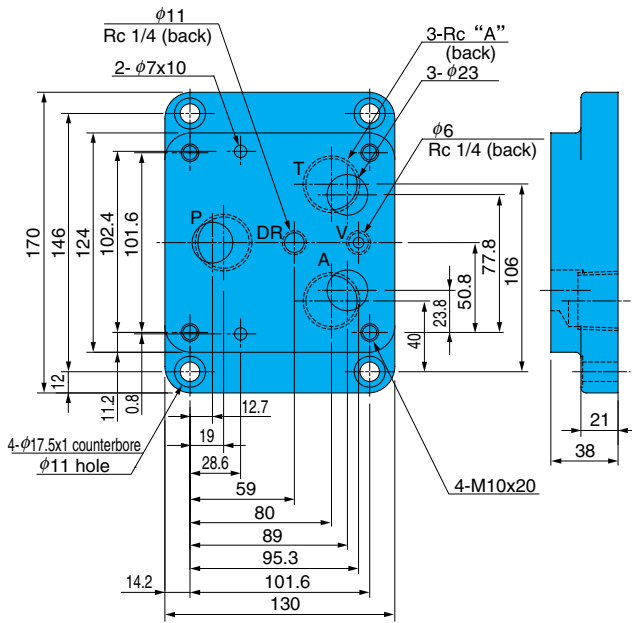
Installation Dimension Drawings



Model No.	A	B	C	D	E	F	G	H	J	K	L	M	N	Q	R	S	T	U
ESR-G03	61	76	87	142	252.8	117	165.5	14.2	48.8	130	11.2	23.8	81.8	124	32	80.3	17.5	11
ESR-G06	76	110	120	172	282.8	154	195.5	16.8	57.2	167	17	28	118	180	21	68.3	26	18
ESR-G10	107	107	150	205	317.3	183	228.5	25	76	228	23.5	35	162	244	-3	35.3	32	22

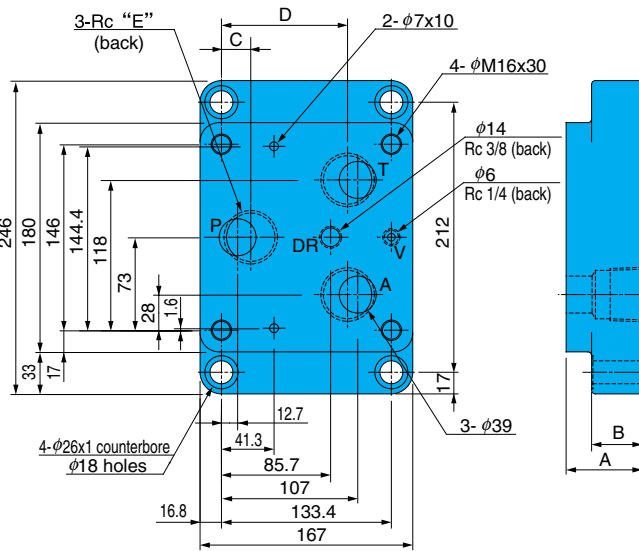
Sub Plate

MSR-03*-10



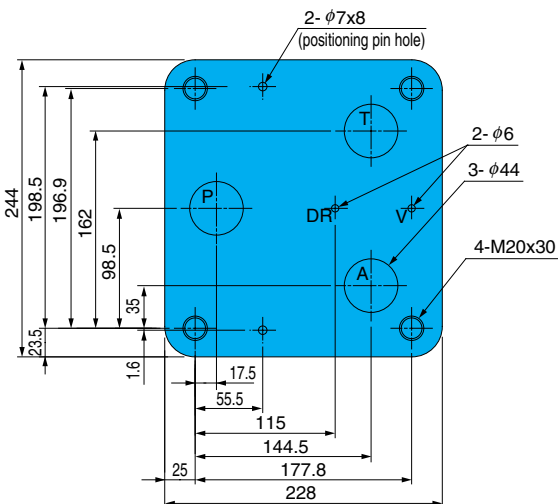
Model No.	A
MSR-03Y-10	3/4
MSR-03Z-10	1

MSR-06*-10



Model No.	A	B	C	D	E
MSR-06X-10	95	25	16	107	1
MSR-06Y-10	60	40	23	99	11/4

ESR-G10 Mounting Gasket Surface Dimensions

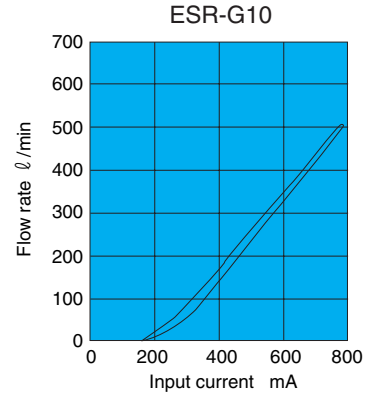
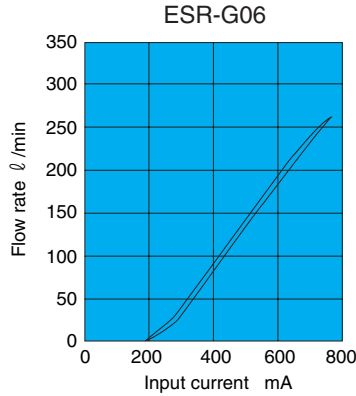
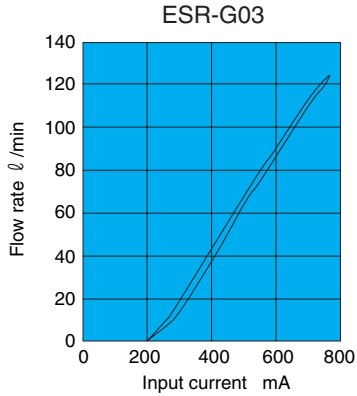


The gasket surface dimensions comply with the ISO standards shown below.
 ESR-G03...ISO 6263-07-11-97
 ESR-G06...ISO 6263-08-15-97

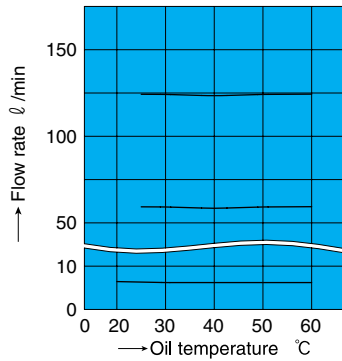
Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

Input Current – Flow Rate Characteristics

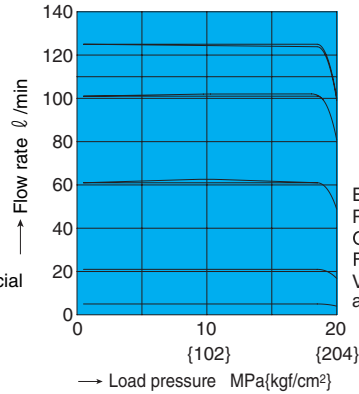


Fluid Temperature – Control Flow Rate Characteristics



Load Pressure: 10MPa
Operating Fluid: VG32
Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

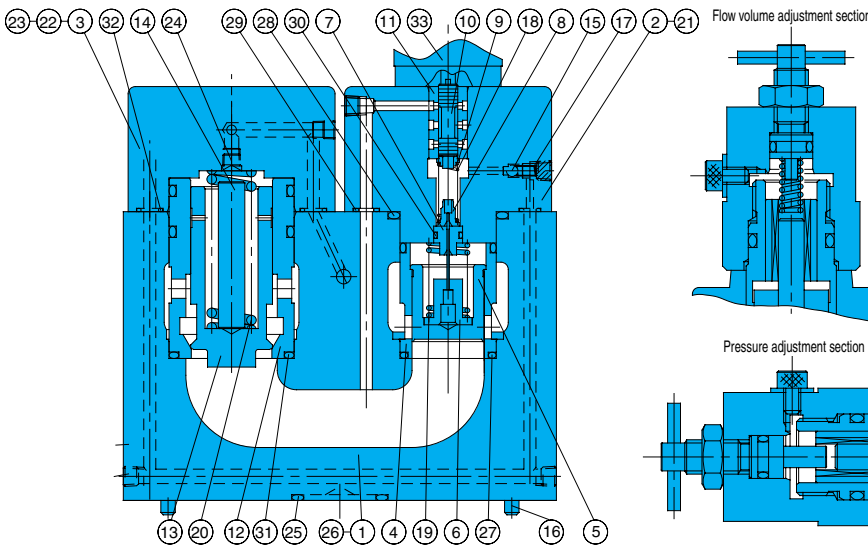
Pressure – Control Flow Rate Characteristics



Electro-hydraulic Proportional Pilot Relief Valve Setting Pressure 21MPa
Operating Fluid: VG32
Fluid Temperature: 40°C
Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

Cross-sectional Drawing

ESR-G**-***-11, 12



Part No.	Part Name	Part No.	Part Name
1	Body	18	Spring
2	Cover (A)	19	Spring
3	Cover (B)	20	Spring
4	Sleeve	21	Screw
5	Spool	22	Screw
6	Guide	23	Safety valve
7	Sleeve	24	Choke
8	Retainer	25	O-ring
9	Retainer	26	O-ring
10	Piston	27	O-ring
11	Sleeve	28	O-ring
12	Sleeve	29	O-ring
13	Poppet	30	O-ring
14	Guide	31	O-ring
15	Ball	32	O-ring
16	Pin	33	Proportional solenoid
17	Spring		

Note)
Coil model number JD64-D2

List of Sealing Parts

Part No.	Part Name	ESR-G03		ESR-G06		ESR-G10	
		Part Number	Q'ty	Part Number	Q'ty	Part Number	Q'ty
25	O-ring	1B-P26	4	1B-G35	4	1B-P48	4
26	O-ring	1B-P9	1	1B-P9	1	1B-P9	1
27	O-ring	1B-G25	2	1B-G35	2	1B-G50	2
28	O-ring	1B-G35	1	1B-G45	1	1B-G60	1
29	O-ring	1B-P6	3	1B-P8	3	1B-P9	3
30	O-ring	1B-P9	1	1B-P9	1	1B-P9	1
31	O-ring	1B-G35	3	1B-P46	3	1B-G65	3
32	O-ring	1B-P6	2	1B-P8	2	1B-P9	2
Seal Kit Number		JLS-G03R		JLS-G06R		JLS-G10R	

Note) 1.O-ring 1B-** refers to JIS B2401-1B-**. 2.EPR-G01 seal is available separately. See page I-3 for more information.



Electro-hydraulic Proportional Flow and Direction Control Valve

10 to 500 ℓ/min
25MPa

Features

This valve uses a DC solenoid in a traditional 4-way solenoid valve to create a solenoid valve capable of both direction switching and high-speed control. The lineup consists of the direct system 01 size and the pilot system 03, 04, and 06 sizes.

Direction control is performed by supplying input

current to one of the two proportional solenoid valves, and the size of the flow rate is controlled in accordance with the size of the input current.

This type of valve can be used for remote control and shockless acceleration and deceleration control, and for simple configuration of hydraulic circuits.

Specifications

Item	Model No.	ESD-G01-10 20 -12	ESD-G03-40 - (**)-12 80	ESD-G04-140 - (**)-12	ESD-G06-250 - (**)-13
Maximum Operating Pressure MPa(kgf/cm ²)		25(25.5)			
Rated Flow Rate ℓ/min		10/20(Note 1)	40/80(Note 1)	140(Note 1)	250(Note 1)
Maximum Flow Rate ℓ/min		25(Note 2)	100(Note 2)	140(Note 2)	250(Note 2)
Pilot Pressure MPa(kgf/cm ²)		At least 1.0{10}(Note 3)			
Pilot Flow Rate ℓ/min		-	At least 2(Note 4)	At least 3(Note 4)	At least 5(Note 4)
T Port Allowable Back Pressure MPa(kgf/cm ²)	25(25.5)	Internal Drain: 2.5 {25.5} External Drain: 21 {214}			
Rated Current mA		850			
Coil Resistance Ω		20(20°C)			
Hysteresis %		5 max.(Note 5)			
Response Time s		0.04(Note 6)	0.05(Note 6)	0.08(Note 6)	0.1(Note 6)
Weight kg		2.2	7	9.2	15

- Note 1. Value when pressure drop volume to P→A and P→B is ΔP = 1.0MPa {10kgf/cm²}.
 2. Indicates maximum throughput volume value between each port.
 3. Indicates differential between the pilot port and tank port, or drain port.
 4. Value when 0.1 second is assumed for the response time from zero to the rated flow volume.
 5. Value when a Nachi-Fujikoshi special amplifier is used.
 6. Response time is typical value for a supply pressure of 14MPa {143kgf/cm²} and fluid temperature of 40°C (kinematic viscosity: 40mm²/s).

Understanding Model Numbers

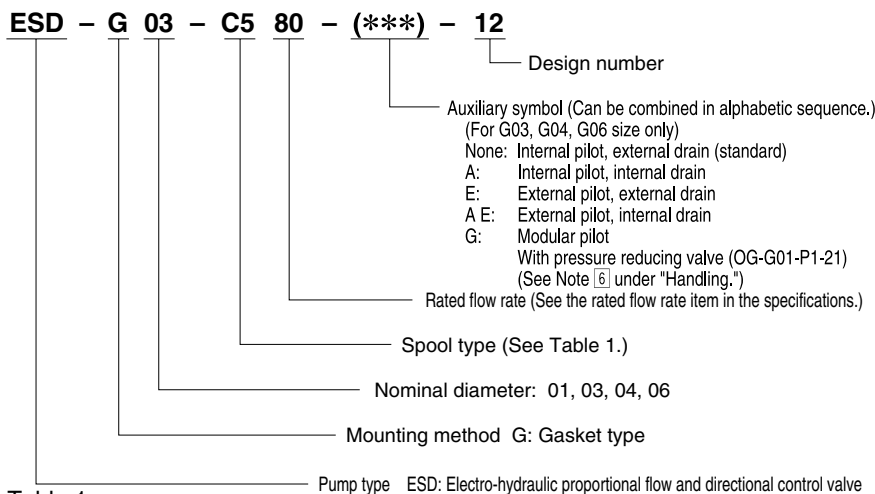


Table 1

Spool Type	Hydraulic Circuit		
	ESD-G01	ESD-G03, G04	ESD-G06
C5			
C6S			

● Handling

1 Air Bleeding

In order to ensure stable control, loosen the air vent and bleed air from the valve before starting operation. For details, see the user's guide.

2 T Port Piping

When configuring piping, ensure that the T port (pilot valve T port for the G03, G04, and G06 sizes) is filled with operating fluid.

3 Manual Adjusting Screw

For the initial adjustment or when there is no input current to the valve due to an electrical problem or some other reason, the valve can be operated and valve pressure can be increased by rotating the manual adjustment screw clockwise (rightward). Normally, the manual adjusting screw should be rotated back fully to the left (counterclockwise).

4 Valve Mounting Orientation

Install the valve so the spool axis line is horizontal.

5 Combining with a Pressure Compensation Valve

Use of the optional pressure compensation kit is recommended when higher precision flow rate control is required or in high-pressure applications. For details, see page I-20.

6 If pilot pressure (ESD-G03, G04, G06) exceeds 9MPa {92kgf/cm²} use a modular type P port reduction valve (OG-G01-P1-21) at a setting of 2MPa {20kgf/cm²}.

7 On a system that requires large brake pressure during deceleration or a system that uses a vertical cylinder, equip a counter balance valve.

Use a single rod, if the rod exit is not slowed sufficiently, use a counter balance valve on the rod.

8 Maintain hydraulic operating fluid contamination so it is at least Class 9.

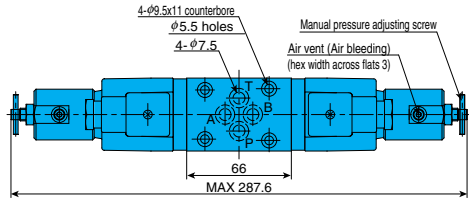
Use of a G01 modular filter (Absolute: 6μm) is also helpful. (Example: Taisei Kogyo Co., Ltd. MVF-01-6M-1)

(Continued on next page)

Installation Dimension Drawings

9 Bundled Accessories (Valve Mounting Bolts)

ESD-G01



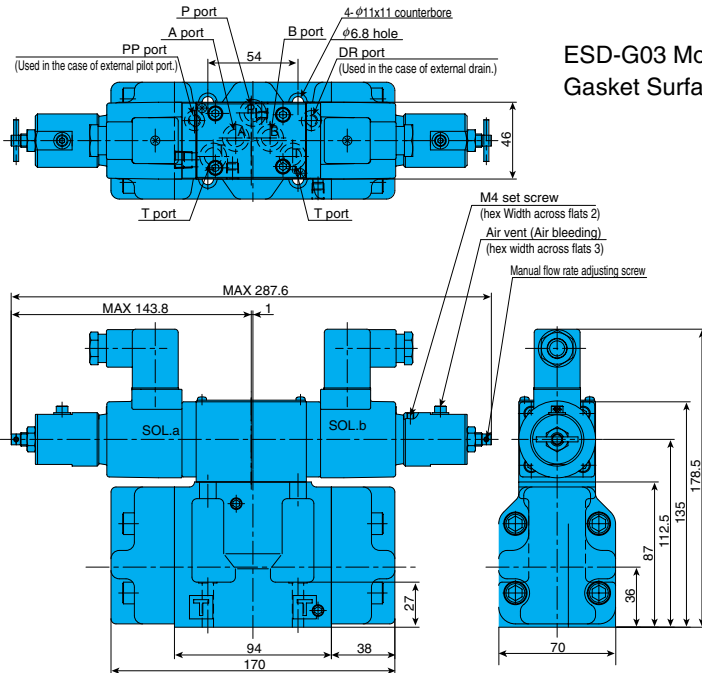
Model No.	Bolt Size	Q'ty	Tightening Torque N-m(kgf·cm)
ESD-G01	M 5 × 45 ℓ	4	5 to 7{ 51 to 71 }
ESD-G03	M 6 × 35 ℓ	4	10 to 13{ 102 to 133 }
ESD-G04	M 6 × 45 ℓ M10 × 50 ℓ	2 4	10 to 13{ 102 to 133 } 45 to 55{ 460 to 560 }
ESD-G06	M12 × 60 ℓ	6	60 to 70{ 610 to 715 }

For information about sub plates, see MSA-01Y-10 on page I-3.

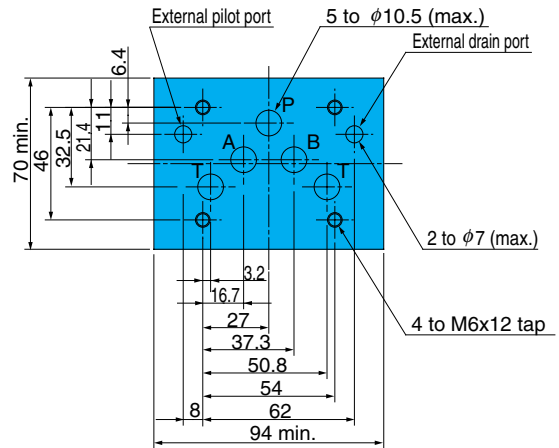
Gasket Surface Dimensions
(ISO 4401-03-02-0-94)

10 Use an operating fluid that conforms to the both of the following.
Oil temperature: -20 to 70°C Viscosity: 12 to 400mm²/s The recommended viscosity range is 15 to 60mm²/s.

ESD-G03



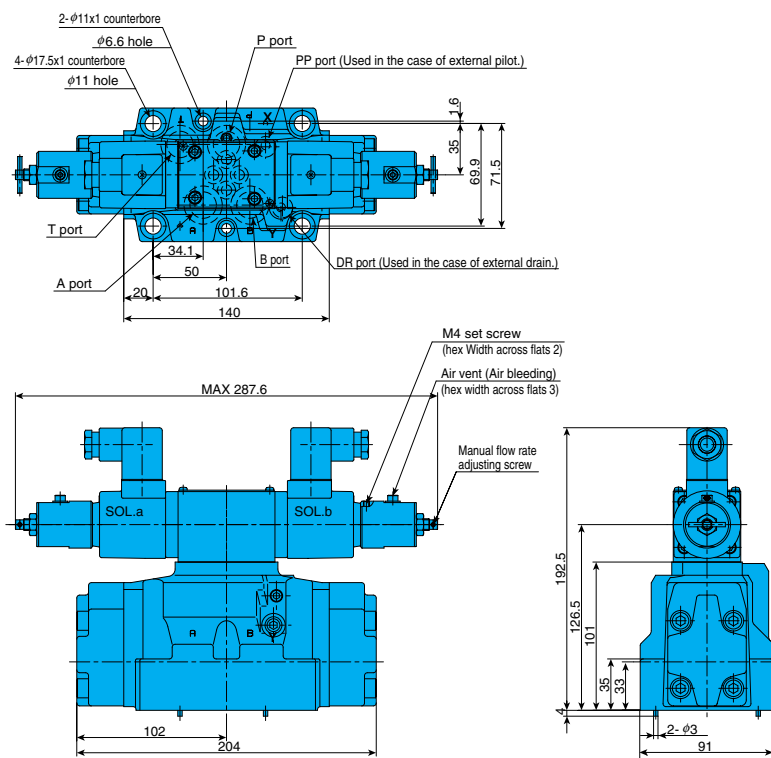
ESD-G03 Mounting Gasket Surface Dimensions
Gasket Surface Mounting Dimensions (ISO4401-05-0-94)



- Auxiliary symbol G: Equipping a modular type pilot reduction valve increases the height by 40mm.
- The gasket surface dimensions comply with the ISO standards shown below.

ESD-G04...ISO 4401-07-06-0-94
ESD-G06...ISO 4401-08-07-0-94
ESD-G10...ISO 4401-10-08-0-94

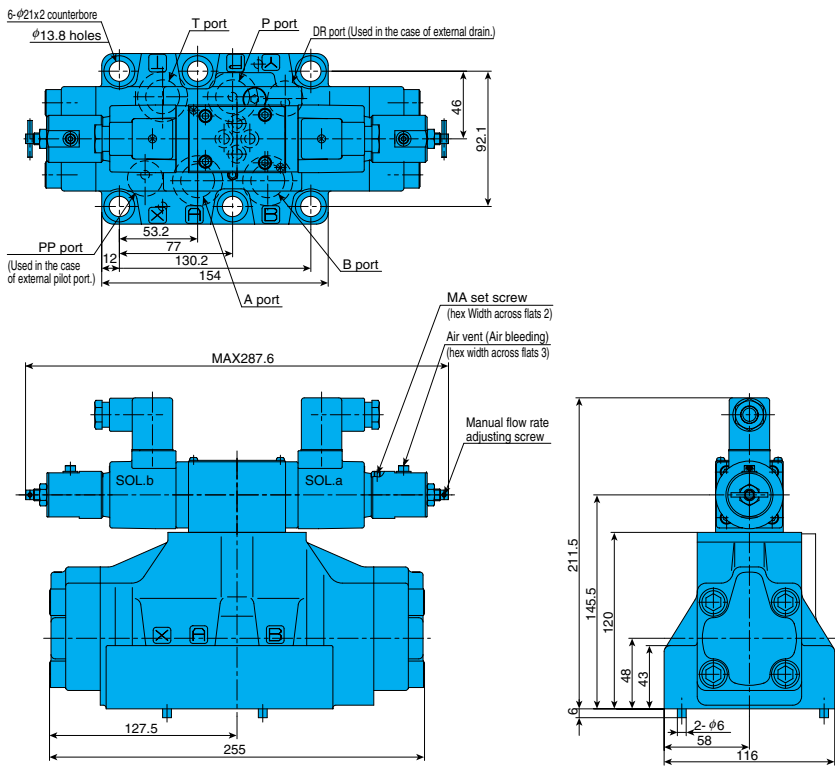
ESD-G04



Note) The coil cover has an M4 fastening screw.

To change the air vent orientation, loosen the M4 screw and then rotate the cover. After bleeding air, tighten the cover and then secure it with the M4 screw.

ESD-G06



Performance Curves

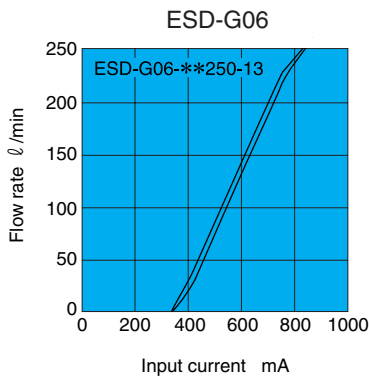
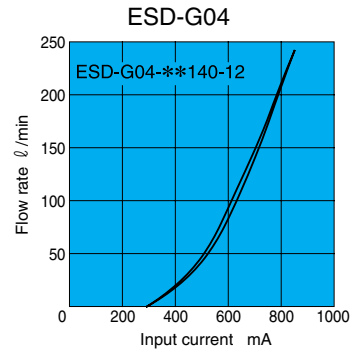
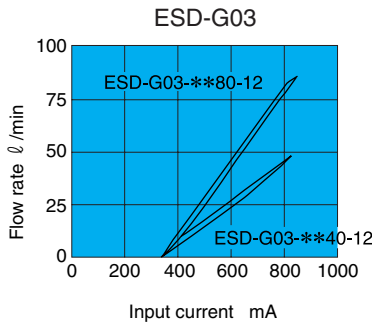
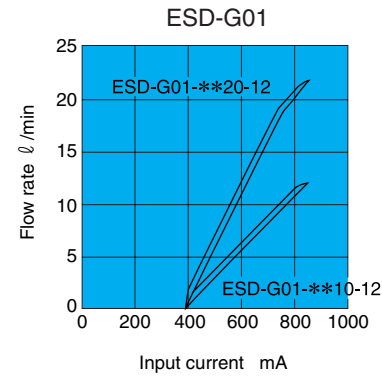
Hydraulic Operating Fluid Viscosity 32mm²/s

Input Current – Flow Rate Characteristics are characteristic when the P→A or P→B pressure drop is ΔP = 1.0MPa (10kgf/cm²).

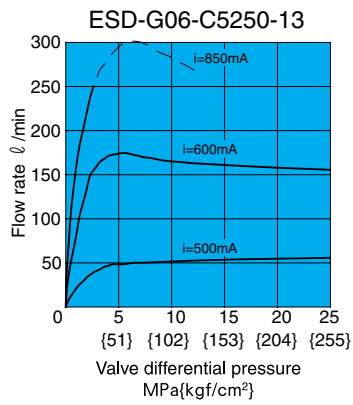
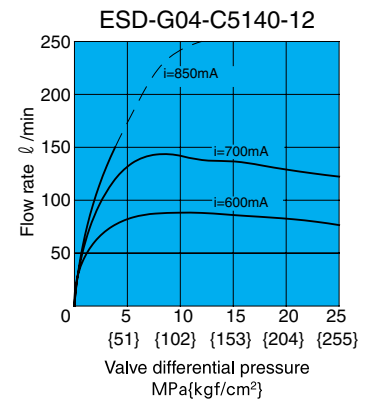
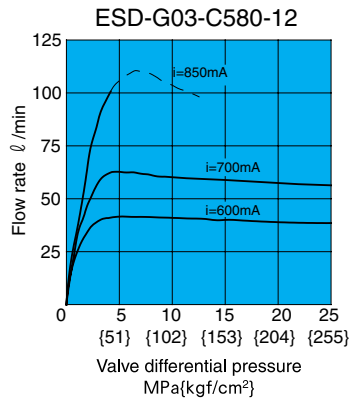
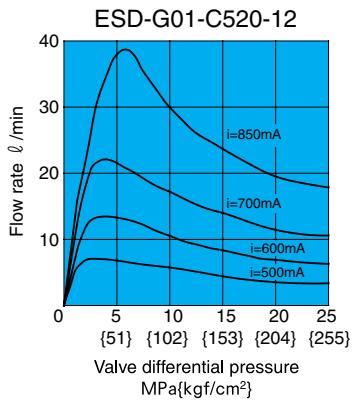
For Pressure – Flow Rate Characteristics, the horizontal shaft valve differential pressure indicates the pressure drop volume of the entire control valve

(between P, A, B, T), and flow rate is measured at the oil motor.

Input Current – Flow Rate Characteristics

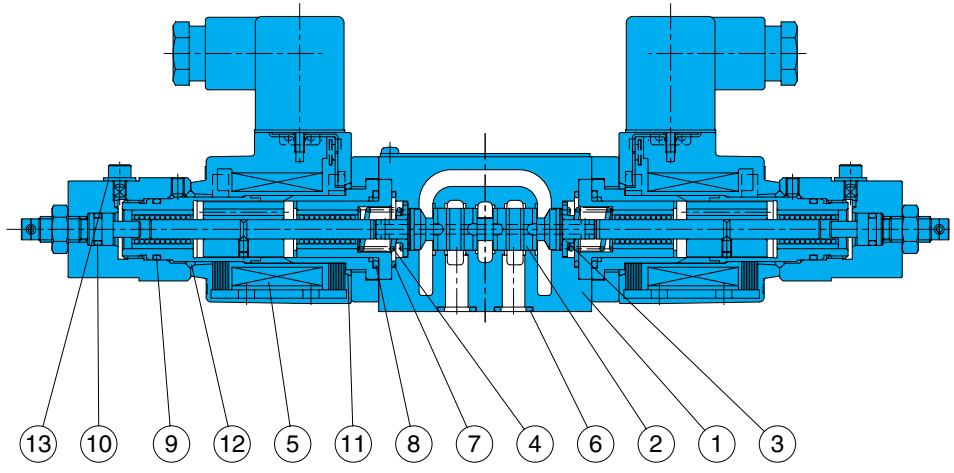


Pressure – Flow Rate Characteristics



Cross-sectional Drawing

ESD-G01-****-12



Part No.	Part Name
1	Body
2	Spool
3	Retainer
4	Spring
5	Coil
6	O-ring
7	O-ring
8	O-ring
9	O-ring
10	O-ring
11	O-ring
12	O-ring
13	Seal

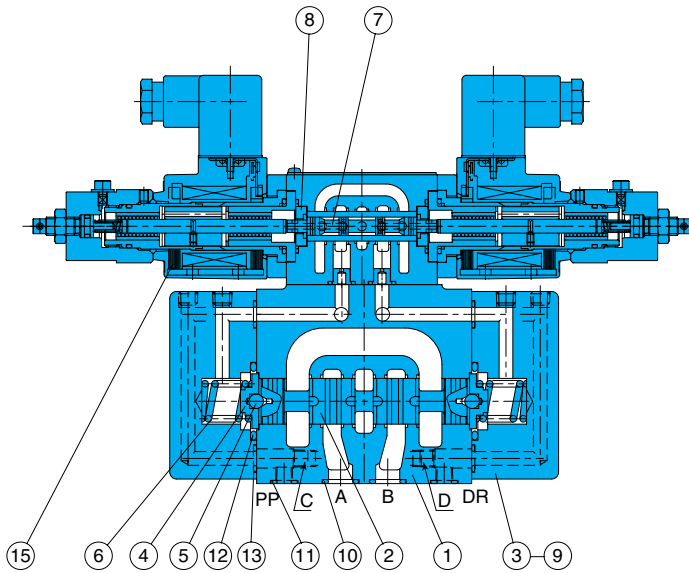
Note)
Coil model number JD64-D2

Seal Part List (Kit Model Number JDS-G01-1A)

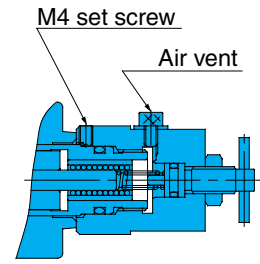
Part No.	Part Name	Part Number	Q'ty
6	O-ring	AS 568-012(Hs90)	4
7	O-ring	AS 568-019(Hs90)	2
8	O-ring	1B-P22	2
9	O-ring	AS 568-016(Hs90)	2
10	O-ring	1B-P7	2
11	O-ring	S-25	1
12	O-ring	1A-P20	1
13	Seal	CW1000F0	2

Note)O-ring 1A/B-** refers to JIS B2401-1A/B-**.

ESD-G03-****-(**)-12



Manual adjustment section
(ESD-G03, G04, G06, G10)

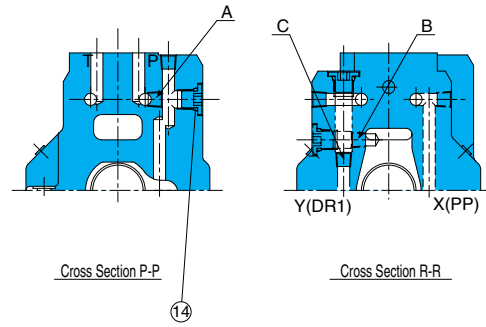
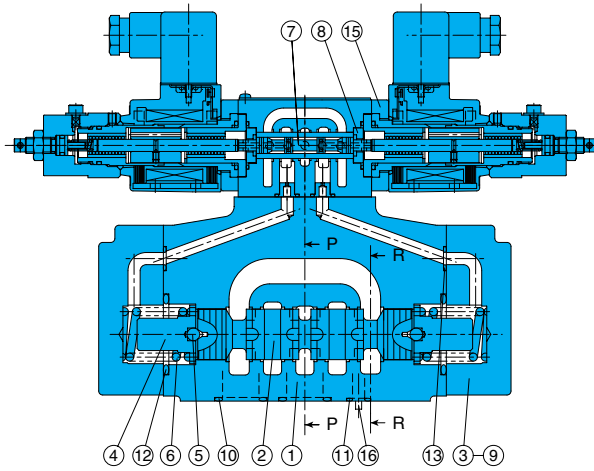


Note) The coil cover has an M4 fastening screw.
When changing the orientation of the air vent, loosen the M4 screw and rotate the cover. Retighten after bleeding the air.

Methods for Changing the Pilot/Drain System

After Change		Hexagon Socket Head Plug
Pilot	Internal	Change to PP port from C.
	External	Change from PP port to C.
Drain	Internal	Change from D to DR port.
	External	Change from DR port to D.

ESD-G04-****-(**)-12



Part No.	Part Name
1	Body
2	Spool
3	Cover
4	Retainer
5	Ball
6	Spring
7	Pilot spool
8	Stopper
9	Screw
10	O-ring
11	O-ring
12	O-ring
13	O-ring
14	O-ring
15	Proportional solenoid

Note) Coil model number JD64-D2

Methods for Changing the Pilot/Drain System

After Change		Hexagon Socket Head Plug
Pilot	Internal	Remove from (A)
	External	Insert from (A)
Drain	Internal	Change from (B) to (C)
	External	Change from (C) to (B)

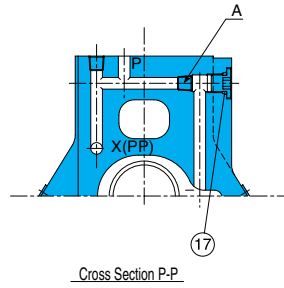
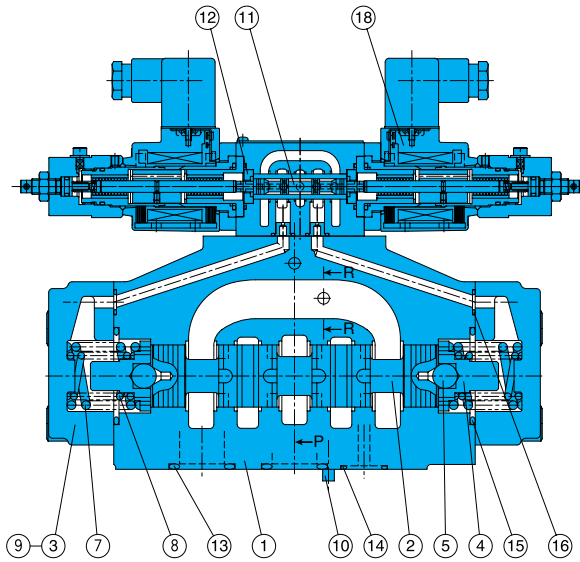
Note) A single hex head plug (NPTF 1/16) is required when changing to external pilot.
Hex Head Plug: TPUA-1/16

Seal Part List (Kit Model Number JHS-****)

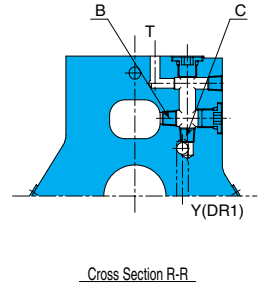
Part No.	Part Name	ESD-G03		ESD-G04	
		Part Number	Q'ty	Part Number	Q'ty
10	O-ring	1B-P12	5	1B-P22	4
11	O-ring	1B-P9	2	1B-P10A	2
12	O-ring	1B-P28	2	1B-P34	2
13	O-ring	1B-P9	6	1B-P9	2
14	O-ring	—	—	1B-P8	3
Kit Model No.		JHS-G03		JHS-G04	

Note) 1.O-ring 1B-** refers to JIS B 2401-1B-**.

ESD-G06-****-(***)-13



Cross Section P-P



Cross Section R-R

Methods for Changing the Pilot/Drain System

After Change		Hexagon Socket Head Plug
Pilot	Internal	Remove from (A)
	External	Insert from (A)
Drain	Internal	Change from (B) to (C)
	External	Change from (C) to (B)

Note) A single hex head plug (NPTF 1/16) is required when changing to external pilot.
Hex Head Plug: TPUA-1/16

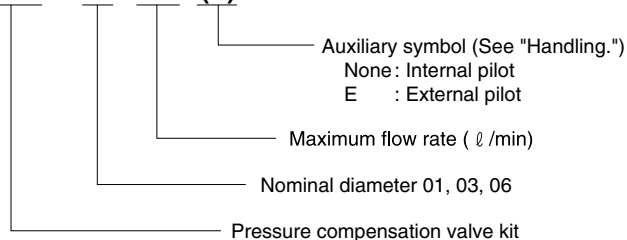
Pressure compensation valve kit

Specifications

Item	Model No.	JHF-01027	JHF-03040(E)	JHF-03080(E)	JHF-06170(E)
Maximum Operating Pressure MPa(kg/cm ²)		21{214}	25{255}	25{255}	21{214}
Pressure Compensation Differential Pressure MPa(kg/cm ²)		1.0{10}	0.6{6}	1.4{14}	0.8{8}
Maximum Flow Rate ℓ/min		27	40	80	170
Weight kg		1.5	4.7	5.0	12

Understanding Model Numbers

JHF - 03 040 (E)



● Handling

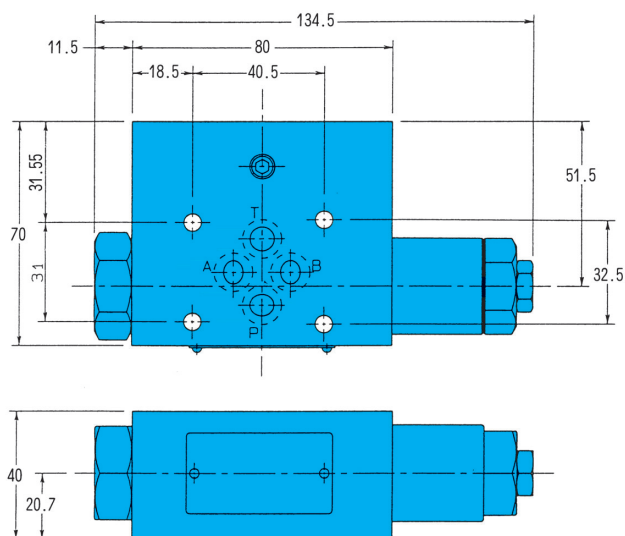
① When using the pressure compensation kit, use an external pilot type for the ESD valve (G03, 04, 06).

② An internal pilot type pressure compensation valve kit is used when the pilot flow rate is supplied from the P port, without an external pilot port (Pp port) on the manifold. An

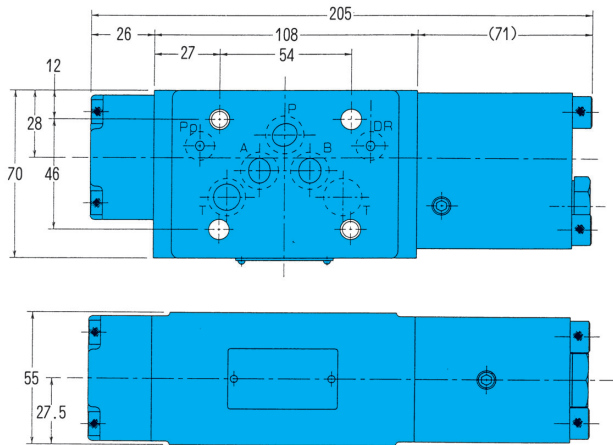
external pilot type pressure compensation valve kit is used when there is an external pilot port (Pp port) on the manifold.

Installation Dimension Drawings

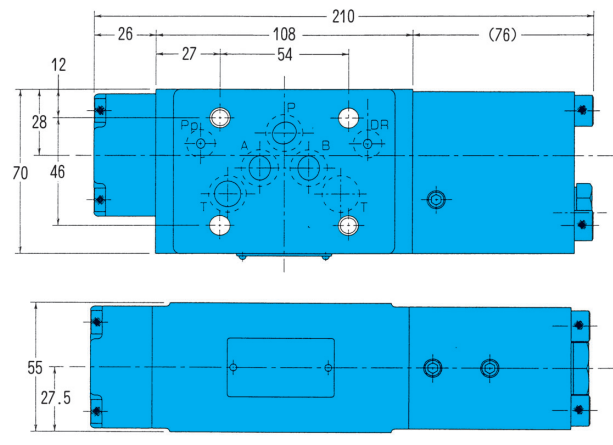
Pressure compensation valve kit
JHF-01027



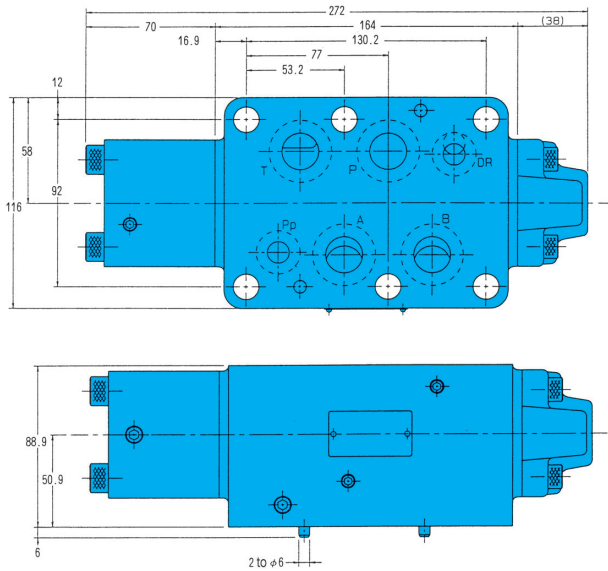
JHF-03040(E)



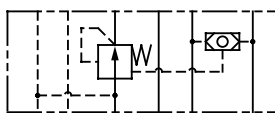
JHF-03080(E)



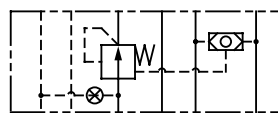
JHF-06170(E)



Note) Mounting bolts are not included with the pressure compensation kit. Use the valve mounting bolt lists on pages D-93 through D-95 to select mounting bolts.



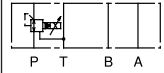
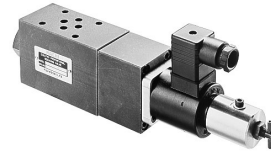
Internal pilot



External pilot

Modular Type Electro-hydraulic Proportional Reducing Valve

30 ℓ /min
0.3 to 14MPa



Features

This valve incorporates the ease-of-use principles of the modular valve into an electro-hydraulic proportional reducing valve to provide reduction

control of hydraulic system pressure in proportion to input current. This valve is perfect for a small-scale hydraulic system, such as those used

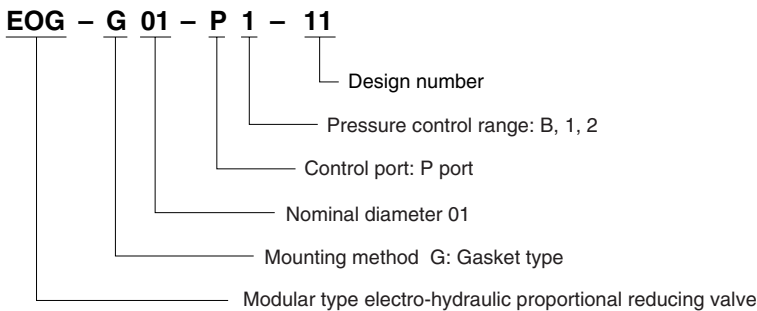
for continuous proportional control of lathe chuck pressure. A relief function ensures outstanding pressure response characteristics.

Specifications

Item	Model No.	EOG-G01-P*-11
Maximum Operating Pressure MPa(kgf/cm ²)		25(255)
Maximum Flow Rate ℓ /min		30
Pressure Control Range MPa(kgf/cm ²)		B : 0.3 to 2.5(3.1 to 25.5) 1 : 0.4 to 7 { 4 to 71 } 2 : 0.6 to 14 { 6 to 143 }
T Port Allowable Back Pressure MPa(kgf/cm ²)		2.5(25.5)max
Rated Current mA		850
Coil Resistance Ω		20 (20°C)
Hysteresis %		3 max. (Note 1)
Weight kg		3.6

Note) Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

Understanding Model Numbers



● Handling

1 Air Bleeding

To enable proper pressure control, loosen the air vent when starting up the pump in order to bleed any air from the pump, and fill the inside of the solenoid with hydraulic operating fluid.

2 Manual Pressure Adjusting Screw

For the initial adjustment or when there is no input current to the valve due to an electrical problem or some other reason, valve pressure can be increased by rotating the manual adjustment screw clockwise (rightward). Normally, the manual adjusting screw should be rotated back fully to the left (counterclockwise) and secured with the lock nut.

3 Minimum Control Pressure

Since this valve has an internal drain system, T port back pressure has an effect on minimum control pressure.

4 Load Capacity

Make load capacity (valve OUT side capacity) at least 0.5 ℓ .

5 Use an operating fluid that conforms to the both of the following.

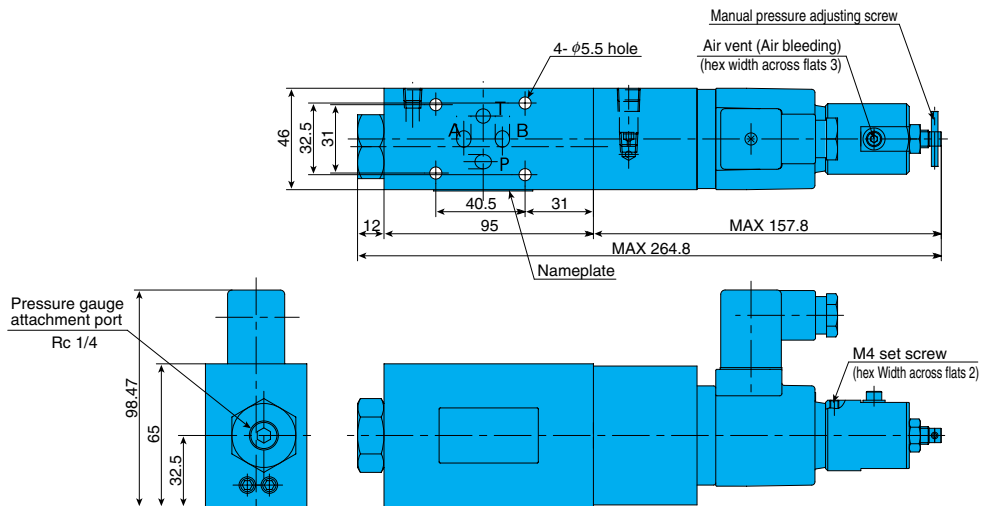
Oil temperature : -20 to 70°C

Viscosity : 12 to 400mm²/s

The recommended viscosity range is 15 to 60mm²/s.

Installation Dimension Drawings

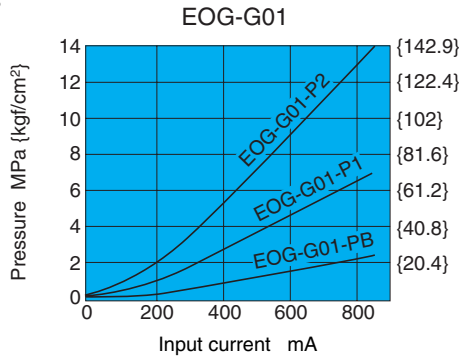
EOG-G01-P*-11



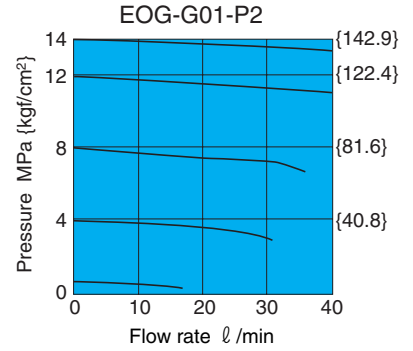
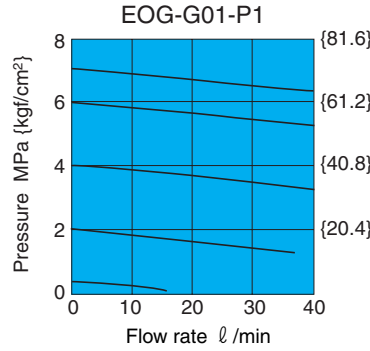
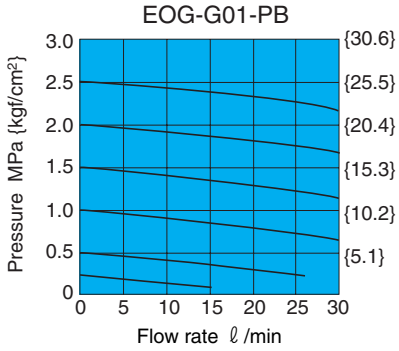
Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

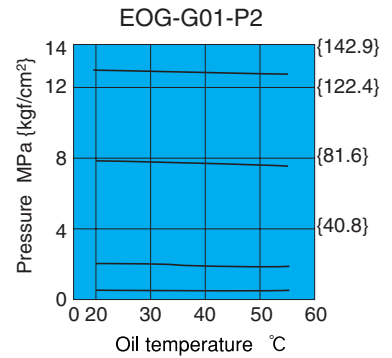
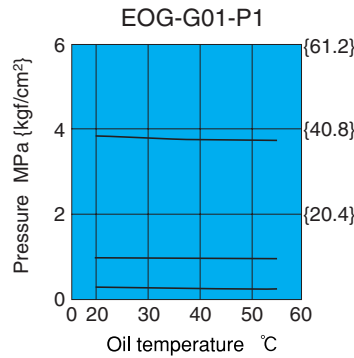
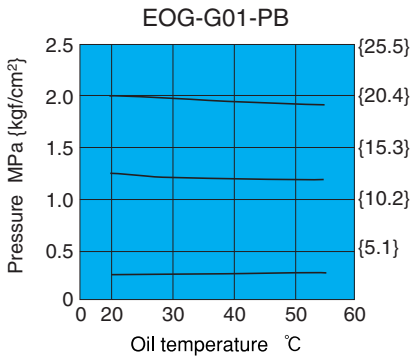
Input Current - Pressure Characteristics



Flow Rate - Pressure Characteristics

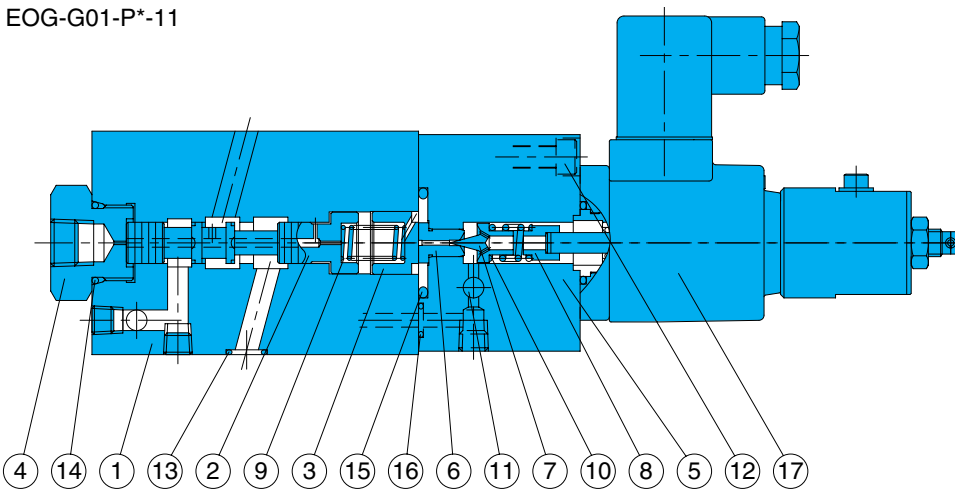


Fluid Temperature Characteristics



Cross-sectional Drawing

EOG-G01-P*-11



Part No.	Part Name
1	Body
2	Spool
3	Retainer
4	Plug
5	Cover
6	Seat
7	Poppet
8	Retainer
9	Spring
10	Spring
11	Choke
12	Screw
13	O-ring
14	O-ring
15	O-ring
16	O-ring
17	Proportional solenoid

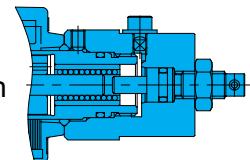
Note) Coil model number JD64-D2

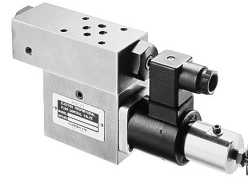
Seal Part List (Kit Model Number JBS-G01)

Part No.	Part Name	Part Number	Q'ty
13	O-ring	1B-P9	4
14	O-ring	1B-P20	1
15	O-ring	1B-P26	1
16	O-ring	1B-P7	1

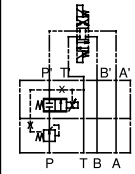
Note) O-ring 1B-** refers to JIS B2401 1B-**.

Manual adjustment section





EOF-G01-P25



Modular Type Electro-hydraulic Proportional Flow Control Valve

0.3 to 25 l/min
21MPa

Features

An electro-hydraulic proportional restrictor valve and pressure compensation valve are combined into a modular configuration, available as one of two types: the meter in control EOF-G01-P and meter out control EOF-G01-T.

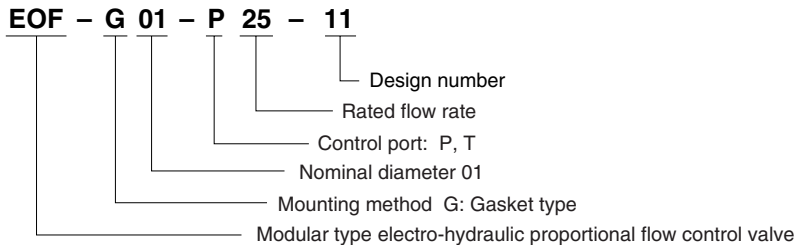
The pressure fluctuations have little influence on the setting flow rate making this valve perfect for electro-hydraulic proportional control of small hydraulic systems used for machine tool APC and ATC high-speed shockless control, remote control, etc.

Specifications

Item	Model No.	EOF-G01- ^P / _T 25-11
Maximum Operating Pressure MPa(kgf/cm ²)		21{214}
Flow Rate Control Range l/min		0.3 to 25
Flow Rate Control Port		EOF-G01-P : P port EOF-G01-T : T Port
T Port Allowable Back Pressure MPa(kgf/cm ²)		2.5 {25.5} max.
Hysteresis %		3 max. (Note 1)
Response Speed S		0.05
Rated Current mA		800
Coil Resistance Ω		20 (20°C)
Weight kg		3.7

Note) Value when a Nachi-Fujikoshi special amplifier is used (with dithering).

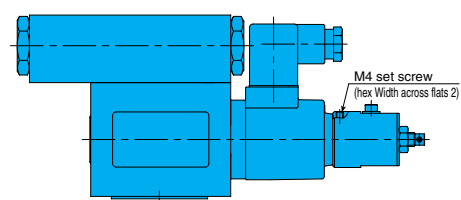
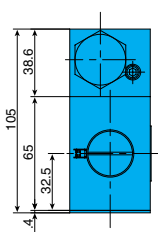
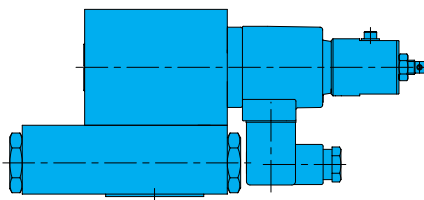
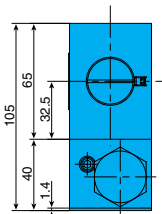
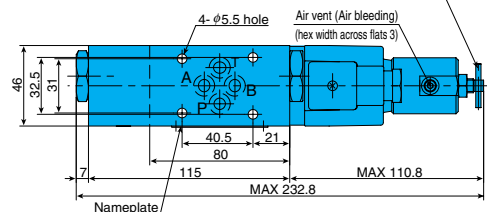
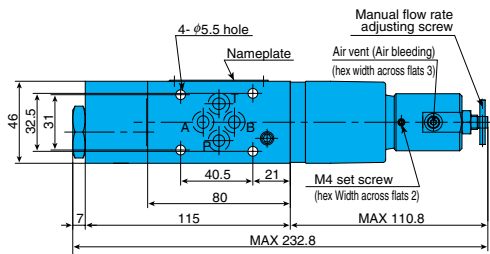
Understanding Model Numbers



Installation Dimension Drawings

EOF-G01-P25-11

EOF-G01-T25-11



● Handling

1 Air Bleeding

To enable proper pressure control, loosen the air vent when starting up the pump in order to bleed any air from the pump, and fill the inside of the solenoid with hydraulic operating fluid. The position of the air vent can change by loosening the lock screw and rotating the cover.

2 Manual flow rate adjusting screw

For the initial adjustment or when there is no input current to the valve due to an electrical problem or some other reason, the flow rate can be adjusted by rotating the manual adjustment screw. Rotate clockwise (rightward) to increase flow rate.

Normally, this adjusting screw should be returned completely to its original position and secured with the lock nut.

3 T Port Back Pressure

Since this valve has an internal drain system, make sure that valve T port back pressure is no greater than 2.5MPa {25.5kgf/cm²}.

4 Use an operating fluid that conforms to the both of the following.

Oil temperature: -20 to 70°C

Viscosity: 12 to 400mm²/s

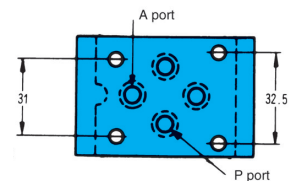
The recommended viscosity range is 15 to 60mm²/s.

5 O-ring Plate Orientation

① The port nearest the nameplate surface is the P port.

② The port with a mounting pitch width of 31 (narrow pitch width) is the A port.

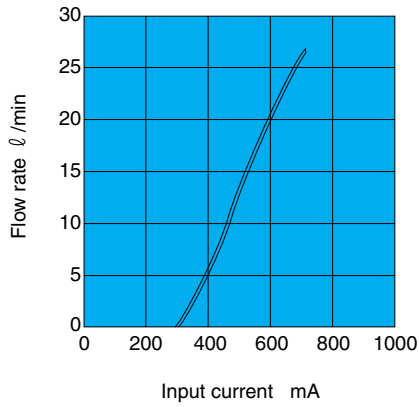
③ The cutout on the O-ring plate is on the A port side.



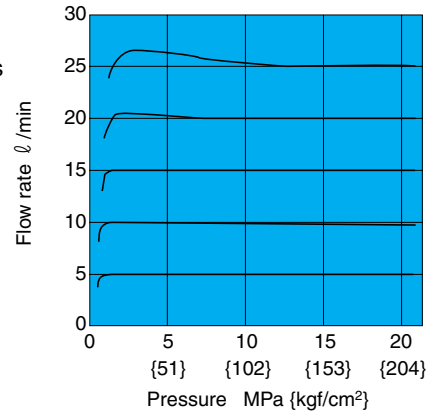
Performance Curves

Hydraulic Operating Fluid Viscosity 32mm²/s

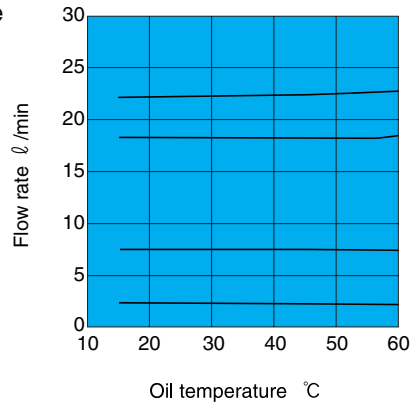
Input Current - Flow Rate Characteristics



Pressure - Flow Rate Characteristics

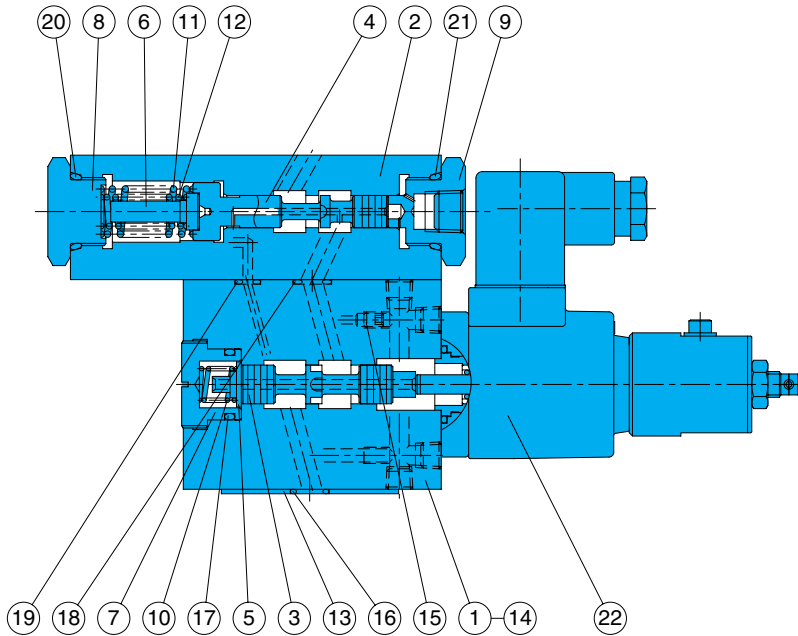


Fluid Temperature Characteristics



Cross-sectional Drawing

EOF-G01-T25



Part No. Part Name

1	Body
2	Body
3	Spool
4	Piston
5	Retainer
6	Retainer
7	Plug
8	Plug
9	Plug
10	Spring
11	Spring
12	Spring
13	Plate
14	Screw
15	Screw
16	O-ring
17	O-ring
18	O-ring
19	O-ring
20	O-ring
21	O-ring
22	Proportional solenoid

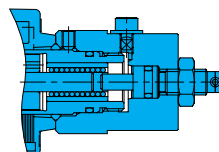
Note) Coil model number JD64-D2

Seal Part List (Kit Model Number JMS-G01)

Part No.	Part Name	Part Number	Q'ty
16	O-ring	1B-P9	4
17	O-ring	1B-P18	1
18	O-ring	1B-P9	4
19	O-ring	1B-P5	1
20	O-ring	1B-P20	1
21	O-ring	1B-P20	1

Note) 1B-** refers to JIS B2401-1B-**.

Manual adjustment section





Power Amplifier Series for Electro-hydraulic Proportional Valve Drive

Overview

This special amplifier is for driving electro-hydraulic proportional pressure control valves, electro-hydraulic proportional flow control valves, and electro-hydraulic proportional direction control valves. It comes in a choice of two different types: an amp type and a controller type.

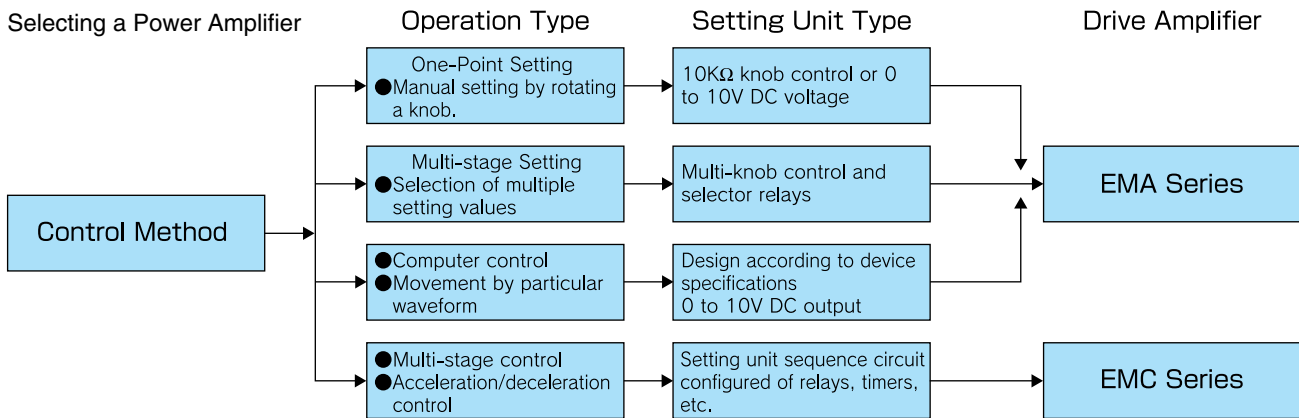
Basically, the amp type converts 0 to 10V DC range command voltage to a DC current of in the range of 0 to 900mA, which is then supplied to the control valve.

The control type performs multi-stage control of output current in accordance with the ON-OFF signal of external contacts.

Power Amplifier Types and Functions

Type	Model No.	Drive Control Valve	Functions
Amp Type	EMA-PD5-N-20	Pressure Control Valves Flow Control Valves Direction Control Valves	Three functions: open loop control, feedback control, and acceleration/deceleration control.
Controller Type	EMC-PC6-A-20	Same as above.	Built-in command voltage setting units (potentiometers) Setting unit selection is performed by relay contacts, limit switches, timer contacts, etc.

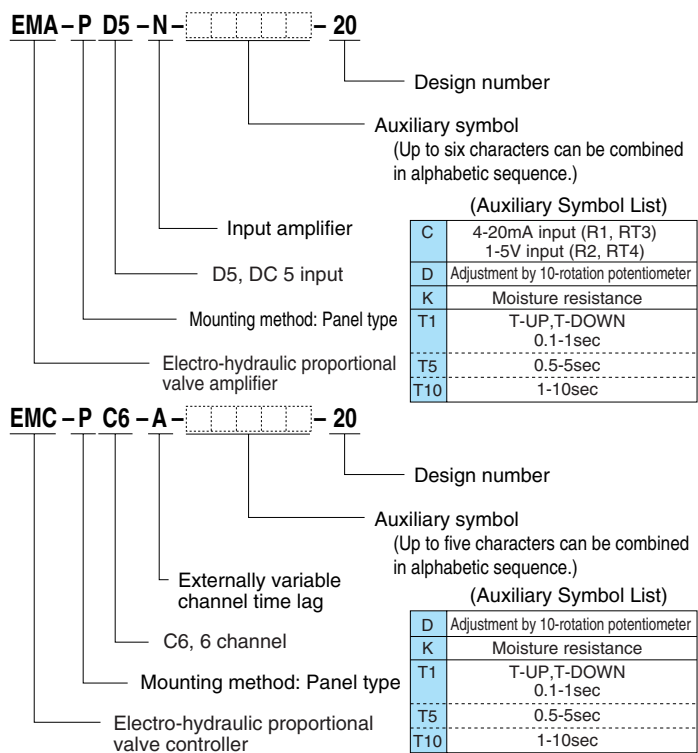
Selecting a Power Amplifier



Specifications

Item	Model No.	EMA-PD5-N-20	EMC-PC6-A-20
Function		Amp Type (Closed Loop)	Controller Type
Number of Inputs		5 DC inputs	-
Number of Channels		-	6
Maximum Output Current		900mA (20Ω solenoid)	900mA (20Ω solenoid)
Input voltage		0 to +10V DC	-
Feedback Voltage		0 to +10V DC	-
Input Impedance		At least 50kΩ	-
Externally Set Variable Resistance		10kΩ	-
Zero Adjust(NULL)		0 to 900mA	0 to 900mA
Time Lag (T-UP, DOWN)		0.3 to 3sec	-
Gain Adjustment (GAIN)		$\frac{900mA}{10V_{oc}}$ to $\frac{900mA}{1.5V}$	0 to $\frac{900mA}{80\% \text{ channel setting}}$
External power supply		+10V _{oc} (10mA)	-
External Contact Resistance		-	10Ω max. when closed
Dither (Internal, semi-fixed)		Level: 0 to 500mAp-p Frequency: 50 to 220Hz	Level: 0 to 500mAp-p Frequency: 50 to 220Hz
Channel Time Lag (TIME)		-	0.3 to 3 seconds Externally variable
Power Supply Voltage		AC100, 110, 200, 220V (±10%)50/60Hz	AC100, 110, 200, 220V (±10%)50/60Hz
Power Consumption		50VA	50VA
Allowable Ambient Temperature		0 to 50°C	0 to 50°C
Temperature Drift		0.2mA/°C max.	0.2mA/°C max.
Weight		3.5kg	3.5kg

Understanding Model Numbers



Handling

- Power supply voltage can be either 100V or 200V.
- When selecting a location, avoid areas subject to high temperatures and high

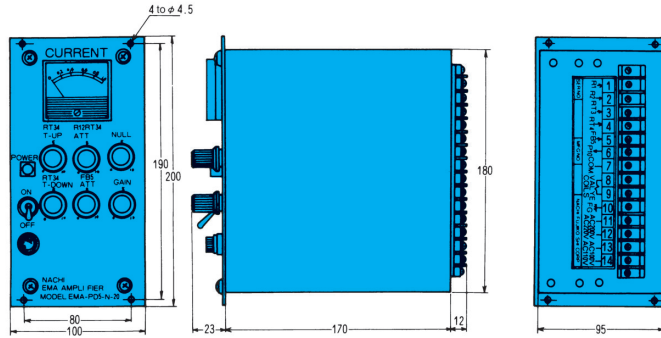
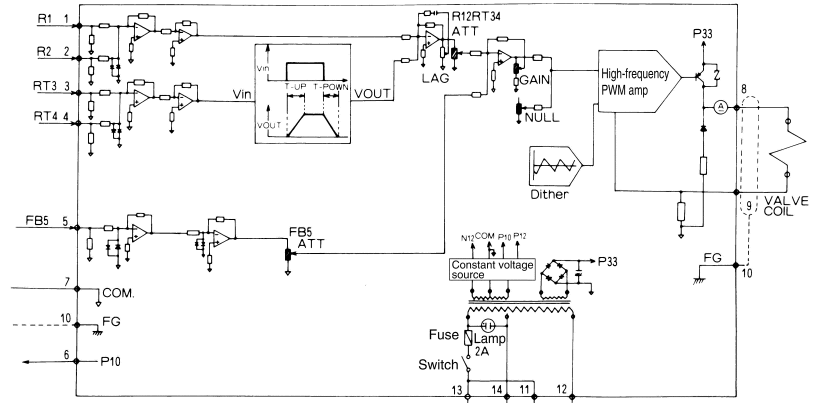
- humidity, and select an area where there is little vibration and dust.
- Use shielded wire for the analog signal and valve output signal wires.

- When performing valve output signal line ON-OFF switching with a relay, connect a surge absorber or varistor parallel with the relay.

Note: T-UP, DOWN, and TIMER all become 0.3-3 sec when there is no signal for T1, T5, and T10.

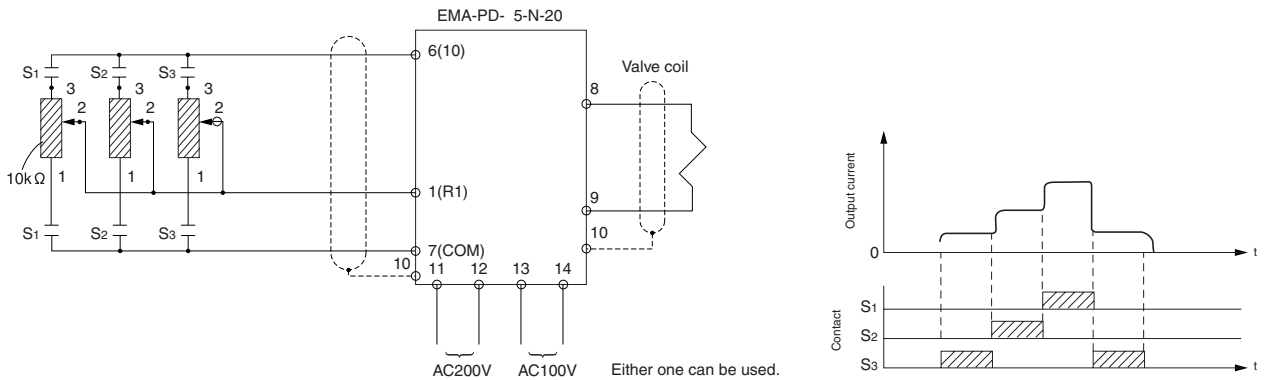
**Power Amplifier Series for Electro-hydraulic Proportional Valve Drive
EMA-PD5-N-20**

No.	Name	No.	Name	
1	R1	Input	8	Output terminal to VALVE COIL valve
2	R2	Input	9	VALVE COIL valve
3	RT3, delay input	10	FG, case ground	
4	RT4, delay input	11	AC200, 220V	
5	FB5, feedback input	12	AC100, 110V	
6	P10, external power supply	13	AC100, 110V	
7	COM, signal land	14		



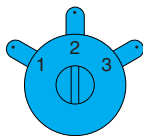
Application Examples

① Multi-stage Setting Using Multiple Potentiometers



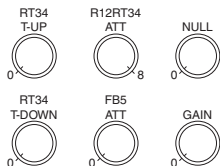
(1) Wiring the amp and external potentiometer

A potentiometer has three terminals numbered 1, 2, and 3.



(2) Setting the adjusting knobs

Terminals 2 (R2), 3 (RT3), and 4 (RT4) can also be used in place of terminal 1. An RT34T-UP and RT34T-DOWN acceleration/deceleration timer can also be used in the case of terminal 3 (RT3) and terminal 4 (RT4). In this case, the settings of the knobs on the front panel of the amp are normally as shown in the illustration below. The manual setting unit provides output current control in the range of 0 to 900mA as it is rotated from full counter-clockwise to full clockwise.

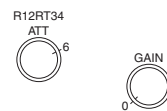


Wiring

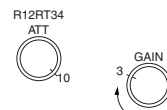
- Amp terminal 7 (0V) Potentiometer terminal 1
- Amp terminal 6 (10V) Potentiometer terminal 3
- Amp terminal 1 (R1) Potentiometer terminal 2

With this wiring, rotating the potentiometer clockwise causes the output current to increase.

① If an output in the range of 0 to 600mA is desired even while the manual setting unit is rotated fully clockwise, restrict the setting of R12RT34ATT to 6.



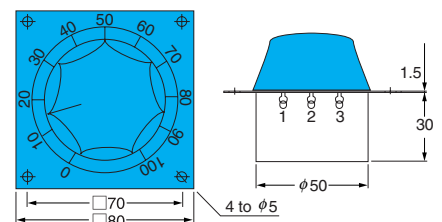
② When the level deceleration ratio and other factors limit the effective use of the manual setting unit to only 150° of the 300°, use GAIN to adjust the output current to 900mA.



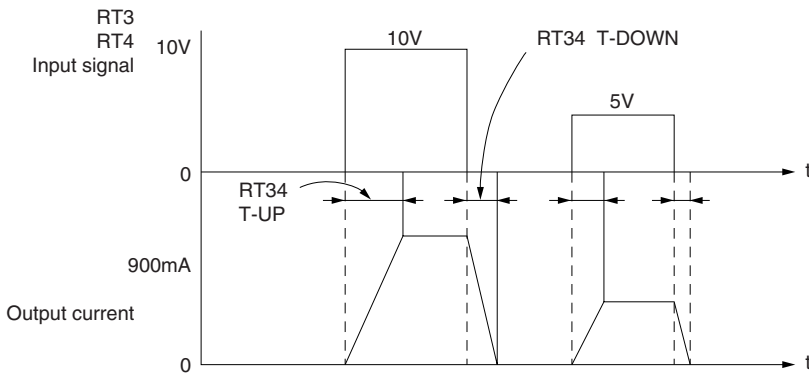
- Note) 1. A range of 5KΩ to 10KΩ is recommended for external knobs and potentiometers.
- 2. In order to prevent current loss across terminals 6 and 7, insert relays between terminal 6 and the potentiometers and terminal 7 and the potentiometers.
- 3. Do not enable more than one potentiometer at the same time.

(3) The following is available for the external setting knob.

Model No. F ZS-6350-101

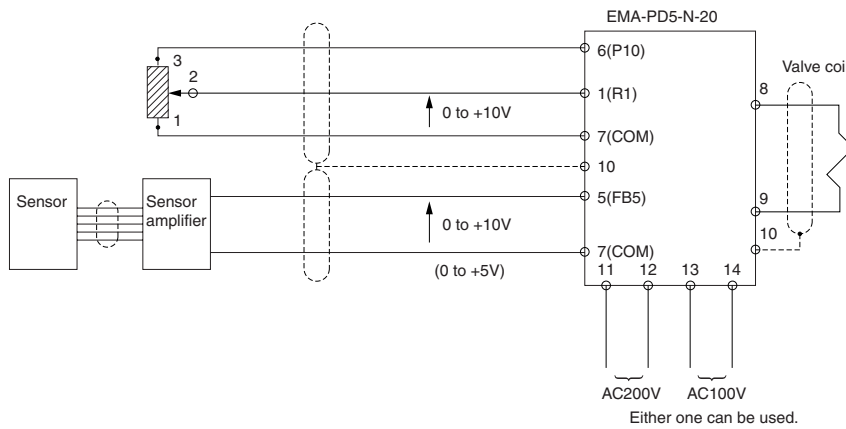


(4) Acceleration time adjustment (RT34T-UP) and deceleration time adjustment (RT34T-DOWN)



This circuit creates a fixed acceleration time lag in accordance with the voltage that added the input signal to terminals 3 and 4 (RT3, RT4). The time lag is adjustable in the range of 0.3 to 3 seconds, as standard. As shown in the diagram to the left, even when RT34T-UP is set to 3 seconds, the change to 5V during stepped input from 0 to 10V and stepped input from 0 to 5V takes 1.5 seconds, which is half the set time.

② Feedback Control.



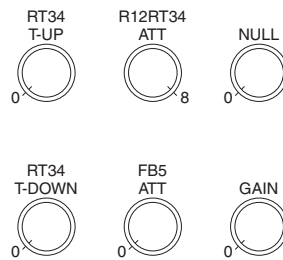
With the wiring shown to the left, output current is increased or decreased in accordance with the feedback signal of the sensor, which regulates pressure or the flow rate.

Note

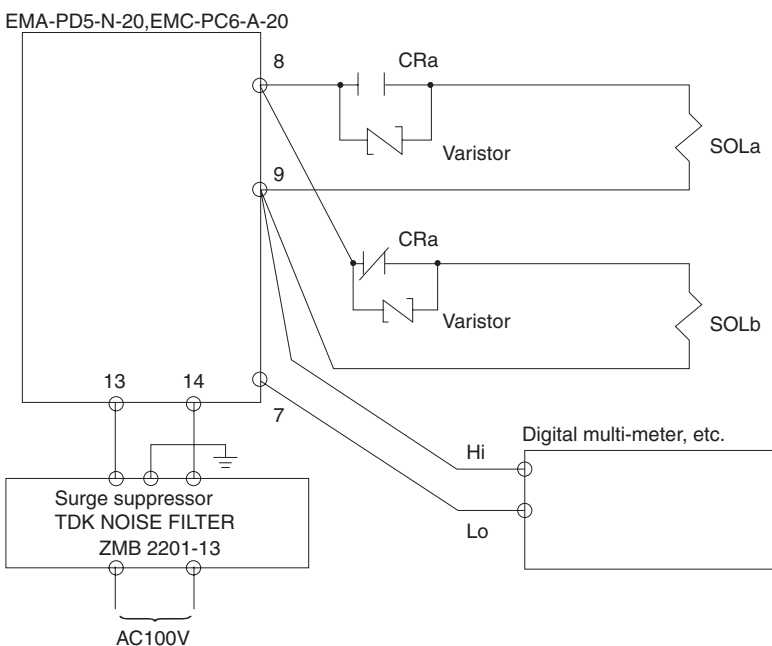
Using terminal 3 (RT3) and terminal 4 (RT4) in place of terminal 1 (R1) enables T-UP and T-DOWN, which allows feedback control without overshooting or undershooting, even when input signal voltage is stepped.

Adjustment Method

- ① Initially, set FB5ATT to 0 as shown in the illustration to the left, and check to see if open loop control is possible.
- ② Next, set FB2ATT to 2 and GAIN to 2, and input a feedback signal. Gradually rotate FB5ATT clockwise and increase gain. Set the feedback gain to the level that is immediately before the point where vibration is generated in the control system. (FB5ATT, GAIN)



③ Direction Control Valve (ESD) Drive



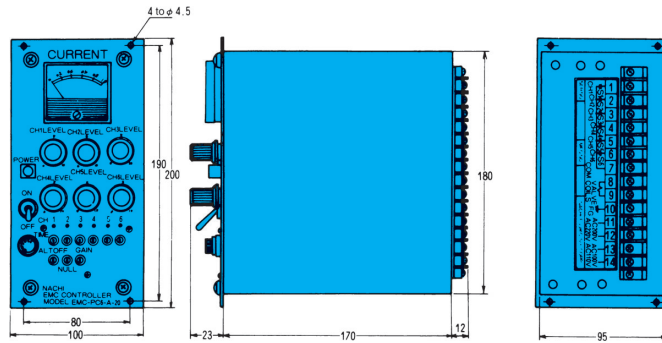
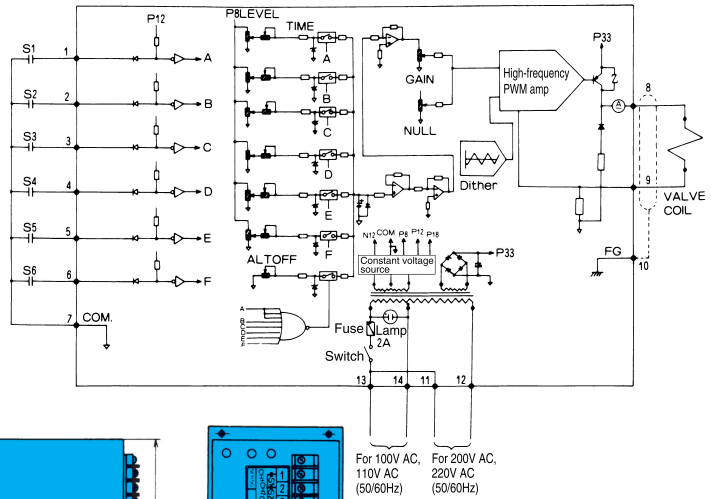
Note

1. To measure current, measure the voltage at terminal 9, using terminal 7 as reference. The voltage across the 0.5Ω current detection resistor at 1A is 0.5V. Use a measurement device with an input impedance of at least 1MΩ.
2. Switch the terminal 8 line using a relay. Make sure that both relays are not on at the same time.
3. To absorb surge voltage, include 82V varistors in parallel with the relay contacts.
4. For relays, use OMRON LY type power relays or the equivalent.
5. Too much noise in the 100V AC or 200V AC power supply line can result in unstable output current. If this happens, equip a surge absorber on the power supply.

Recommended Model
TDK NOISE FILTER
ZMB2201-13

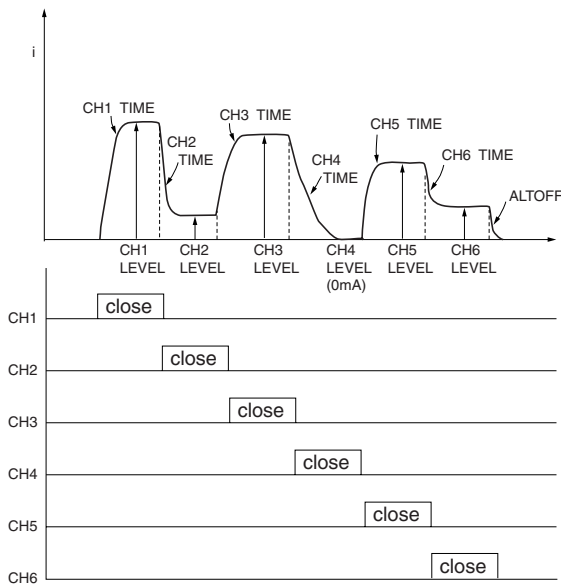
Power Amplifier Series for Electro-hydraulic Proportional Valve Drive
EMC-PC6-A-20

No.	Name	No.	Name
1	CH1 Input command contact	8	Output terminal to valve
2	CH2 "	9	VALVE COIL
3	CH3 "	10	FG, case ground
4	CH4 "	11	AC200 220V
5	CH5 "	12	AC100 110V
6	CH6 "	13	
7	Common COM input contact	14	



Note) When external contacts S1 through S6 are closed, use a non-voltage contact no greater than 10Ω.

Application

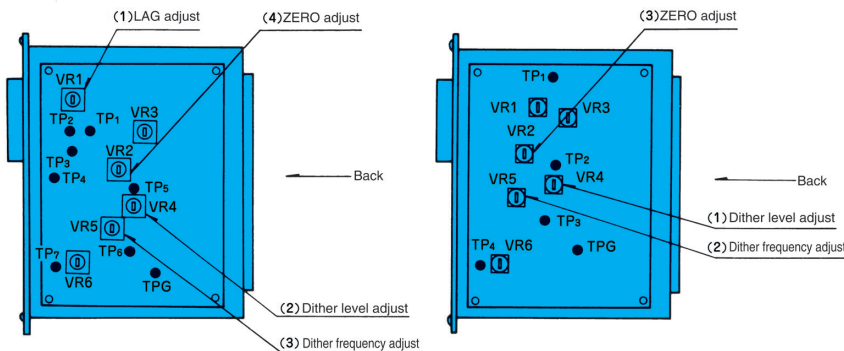


- LEDs are provided to indicate channel selection.
- The TIME knob of each channel adjusts the time until the selected channel's level is reached, as shown to the left. Make sure that the lap time (or time when channel is not selected) when changing the channel selection is 30msec maximum.
- Use independent external contacts. Even when external contacts are superimposed, output is not the sum of each channel, so use of superimposed external contacts is not supported.

Note) When replacing a Design Number 10 controller with a Design Number 20 controller, you must also change the sequence from superimposed external contacts to independent.

Dither Adjustment Method (Dither is set to load 400mA_{p-pm} 100Hz.)

- (1) EMA-PD-N-20 (2) EMC-PC6-A-20



Removing the left side panel when viewed from the front reveals the configuration shown in the illustrations to the left.

- ① If piping or other items vibrate in response to the dither, raise the dither frequency by rotating the trimmer clockwise.
- ② When repeat stability is poor and the hysteresis is large, increase the dither level by rotating clockwise. If this does not resolve the problem, lower the dither frequency by rotating the trimmer counter-clockwise.
- ③ When repeatability is poor with the ES valve or ESD valve due to insufficient air bleeding within the guide, raise the dither frequency by rotating the tripper clockwise, as described in ①.



Small Type Power Amplifier Series for Electro-hydraulic Proportional Valve Drive

Features

This power amplifier provides high efficiency and reliability in a compact configuration.

Lightweight, compact design —The configuration of this amplifier is 1/3 the weight and 1/2 the volume of existing models.

High efficiency —A PWM control system enables a highly efficient design with little heat generation.

High reliability —All functions are integrated onto a single circuit board for a highly reliable design with no internal wiring.

Specifications

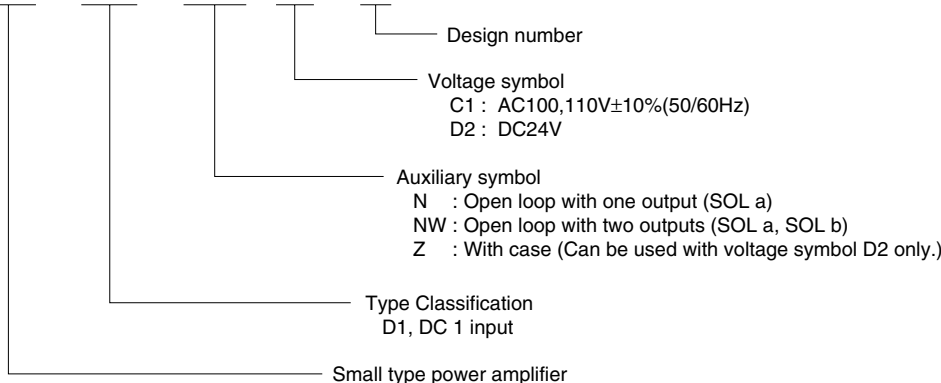
Item	Model No.	EBA-PD1-N-C1-10	EBA-PD1-NW-C1-10	EBA-PD1-N(Z)-D2-10	EBA-PD1-NW(Z)-D2-10
Function		Amp Type (Open Loop)	Amp Type (Open Loop)	Amp Type (Open Loop)	Amp Type (Open Loop)
Number of Inputs		1 DC inputs	1 DC inputs	1 DC inputs	1 DC inputs
Drive Solenoid		SOL a	SOL a, SOL b	SOL a	SOL a, SOL b
Maximum Output Current		900mA (20Ω solenoid)	900mA (20Ω solenoid)	900mA (20Ω solenoid)	900mA (20Ω solenoid)
Input voltage		0 to +10V DC	-10 to +10V DC	0 to +10V DC	-10 to +10V DC
Input Impedance		50kΩ	50kΩ	50kΩ	50kΩ
Externally Set Variable Resistance		10kΩ	10kΩ	10kΩ	10kΩ
Zero Adjust (NULL)		0 to 900mA	0 to 900mA	0 to 900mA	0 to 900mA
Gain Adjustment (GAIN)		0 to $\frac{900\text{mA}}{5\text{V input}}$	0 to $\frac{900\text{mA}}{5\text{V input}}$	0 to $\frac{900\text{mA}}{5\text{V input}}$	0 to $\frac{900\text{mA}}{5\text{V input}}$
External power supply		+5V DC (5mA)	+5V DC (5mA) -5V DC (5mA)	+5V DC (5mA)	+5V DC (5mA) -5V DC (5mA)
Dither Frequency (DITHER)		Variable: 80 to 220Hz	Variable: 80 to 220Hz	Variable: 80 to 220Hz	Variable: 80 to 220Hz
Time Lag (LAG)		Internally Variable: 0.05 to 2 seconds	Internally Variable: 0.05 to 2 seconds	Internally Variable: 0.05 to 2 seconds	Internally Variable: 0.05 to 2 seconds
Power Supply Voltage		AC100 · 110V±10% (50/60Hz)	AC100 · 110V±10% (50/60Hz)	DC24V (DC24 to 30V)	DC24V (DC24 to 30V)
Power Consumption		30VA	30VA	30VA	30VA
Allowable Ambient Temperature		0 to 50°C	0 to 50°C	0 to 50°C	0 to 50°C
Temperature Drift		0.2mA/°C max.	0.2mA/°C max.	0.2mA/°C max.	0.2mA/°C max.
Weight		2.2kg	2.2kg	0.14kg (0.6kg with Z)	1.14kg (0.6kg with Z)
Driven Valve		Pressure Control Valves Flow Control Valves	Direction Control Valve	Pressure Control Valves Flow Control Valves	Direction Control Valve

• Handling

- 1 When selecting a location, avoid areas subject to high temperatures and high humidity, and select an area where there is little vibration and dust.
- 2 Use shielded wire for the analog signal and valve output signal wires.
- 3 The brightness of the LED changes in accordance with the size of the output current.

Understanding Model Numbers

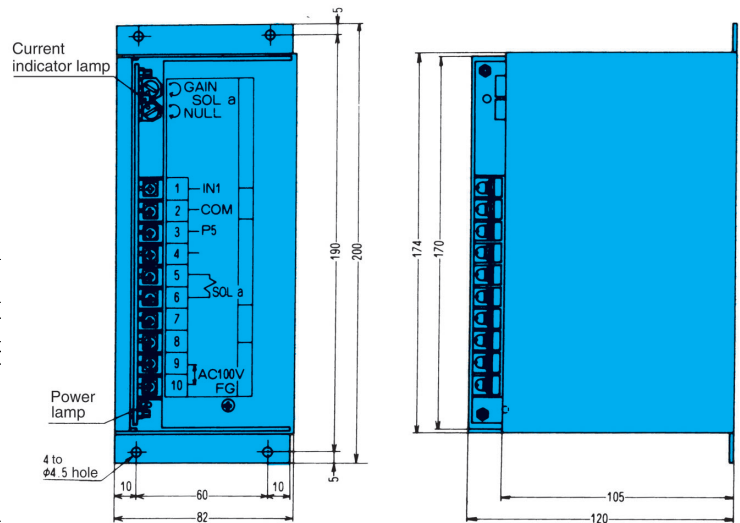
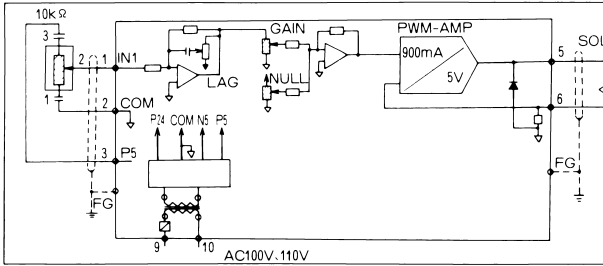
EBA - PD1 - NWZ - D2 - 10



Installation Dimension Drawings

EBA-PD1-N-C1-10

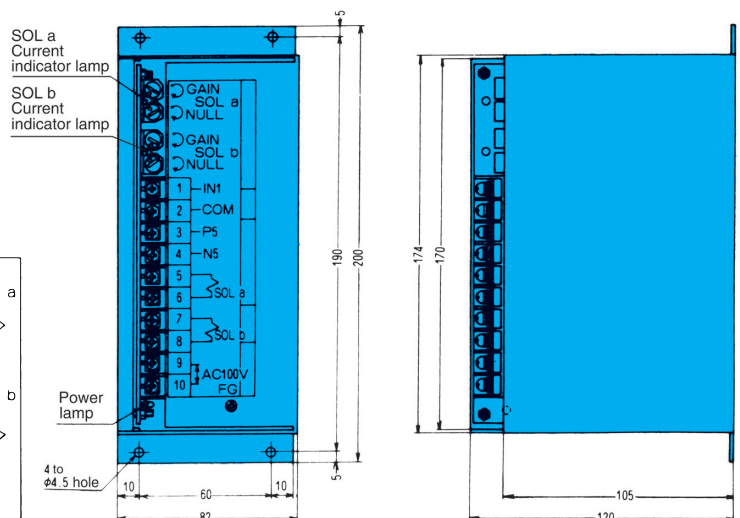
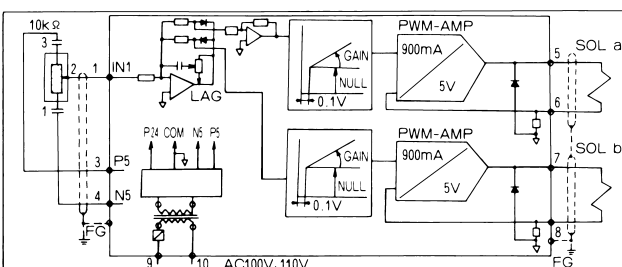
No.	Name	No.	Name
1	Input signal terminal IN1	5	Output terminal to valve SOL a
2	Input signal terminal COM	6	
3	External power supply P5	7	
		8	
		9	AC100 · 110V
		10	



- With EBA-PD1-N (Z), current is supplied to the control valve in proportion to input signal voltage in the range of 0 to +10V.
- To measure current, measure the voltage at terminal 6, using terminal 2 as reference. The voltage across the 0.5Ω current detection resistor at 1A is 0.5V. Input impedance of the measurement device should be at least 1MΩ.
- With EBA-PD1-NW (Z), the polarity of the input voltage is determined, and current is supplied to SOLa when it's positive and to SOLb when it is negative.
- NULL and GAIN for SOL a and SOL b are enabled when each of their input signal voltage is ±0.1V or more.

EBA-PD1-NW-C1-10

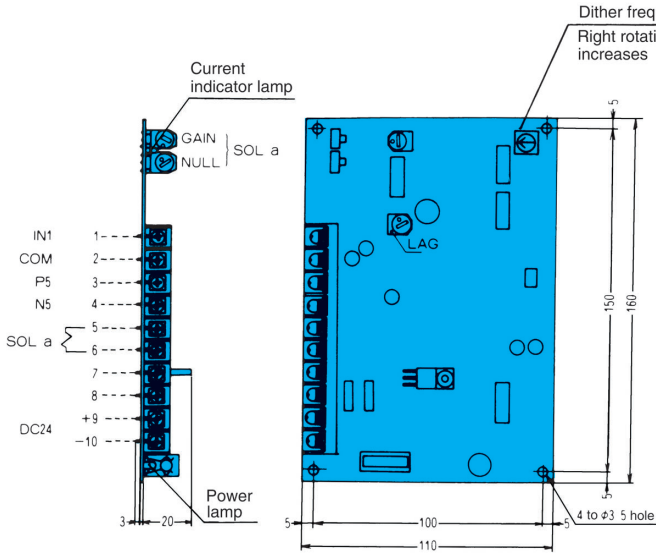
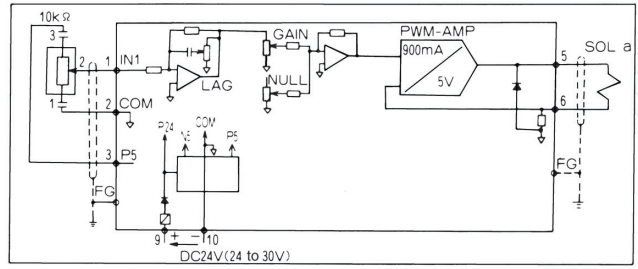
No.	Name	No.	Name
1	Input signal terminal IN1	5	Output terminal to valve SOL a
2	Input signal terminal COM	6	
3	External power supply P5	7	Output terminal to valve SOL b
4	External power supply N5	8	
		9	AC100 · 110V
		10	



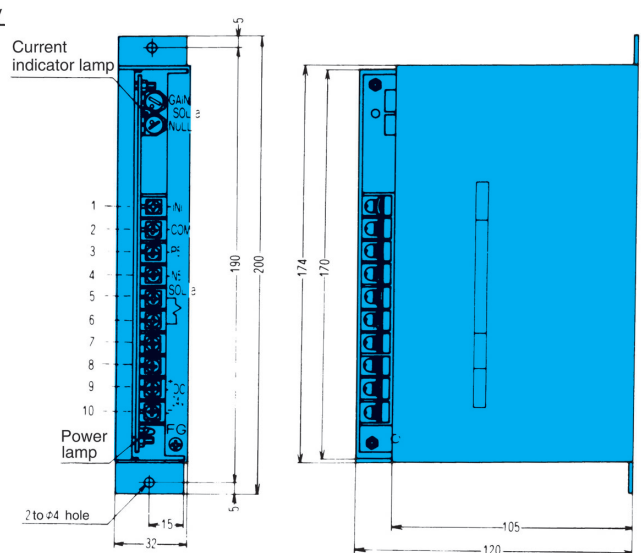
- To measure current, measure the voltage at SOLa terminal 6 and SOLb terminal 6, using terminal 2 as reference. The voltage across the 0.5Ω current detection resistor at 1A is 0.5V. Input impedance of the measurement device should be at least 1MΩ.

EBA-PD1-N(Z)-D2-10

No.	Name	No.	Name
1	Input signal terminal IN1	5	Output terminal to valve SOL a
2	Input signal terminal COM	6	
3	External power supply P5	7	
		8	
		9	+ DC24V
		10	- DC24V



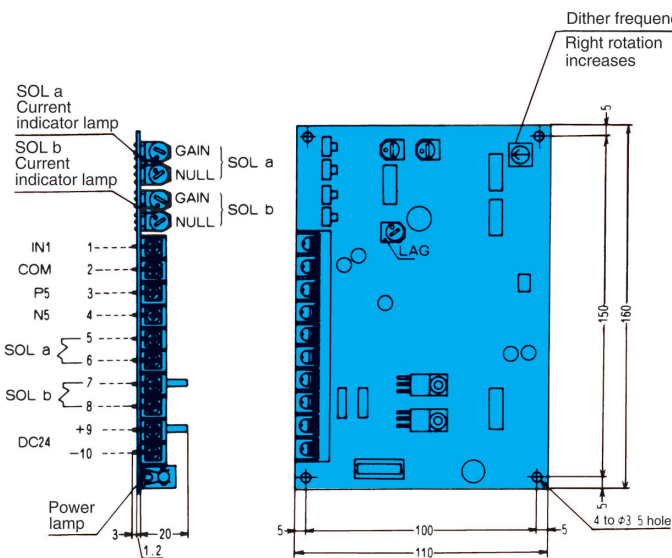
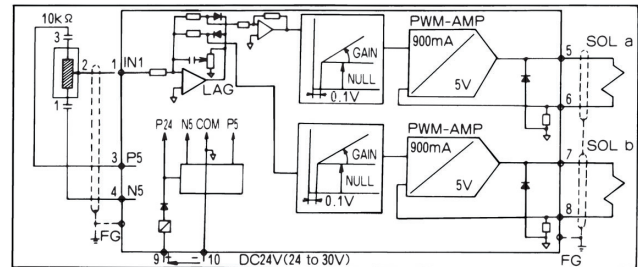
EBA-PD1-N-D2-10



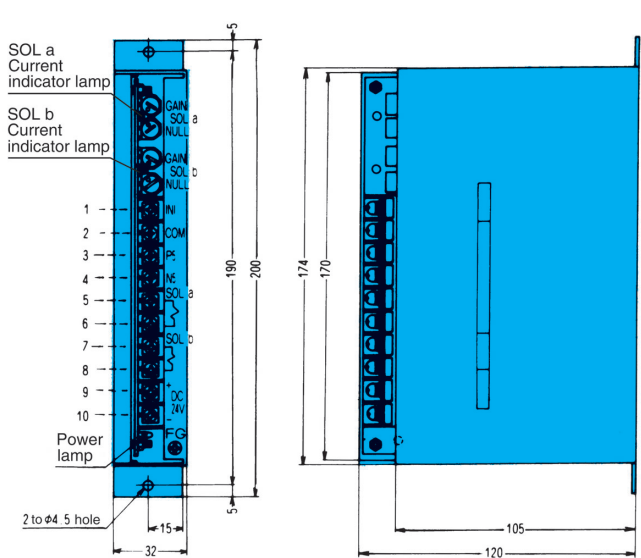
EBA-PD1-NZ-D2-10

EBA-PD1-NW(Z)-D2-10

No.	Name	No.	Name
1	Input signal terminal IN1	5	Output terminal to valve SOL a
2	Input signal terminal COM	6	Output terminal to valve SOL a
3	External power supply P5	7	Output terminal to valve SOL b
4	External power supply N5	8	Output terminal to valve SOL b
		9	+ DC24V
		10	- DC24V



EBA-PD1-NW-D2-10



EBA-PD1-NWZ-D2-10

Note) Use a 24V switching regulator with a capacitance of at least 1A.

Example

Manufacturer	Model No.	Capacity
COSEL	R25A-24	24V 1.1A
TDK	EAK24-1R3G	24V 1.3A
DENSEI-LAMBDA	EWS25-24	24V 1.2A

● General Precautions

① Measuring current flow in the solenoid coil

As shown in the illustration below, disconnect the line supplying current to the solenoid coil, and then insert a 1A DC rated current meter or measure voltage across terminals 5 and 6.

Solenoid coil resistance is 20Ω, so the relationship between voltage and current is as shown below. Note, however, that these values are not exact, because coil resistance changes with

Voltage (V)	Current (mA)
0	0
4	200
8	400
12	600
16	800

temperature.

Measurements across terminals 7 and 8 can be performed the same as shown in the illustration below.

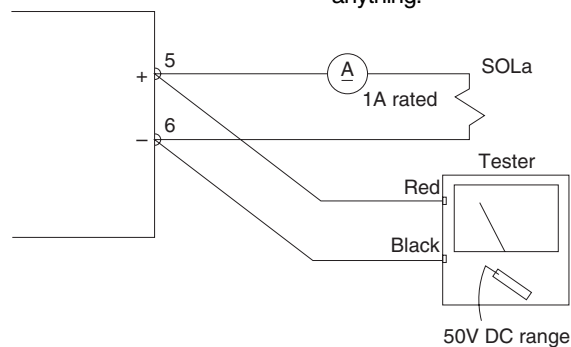
② Never energize only the solenoid coil.

The amp will not operate correctly if the iron coil is not inserted.

③ For connection between the amp/controller and solenoid coil, use a 2-conductor shielded wire with a conductor nominal cross-section area of 2.0mm². Type VCTF (Rated Voltage: 300V vinyl cab tire cord).

Wiring between the command voltage generator and amplifier should be VCTF 0.75m² 3-conductor wire.

Use a shield that conforms to JIS Class 3 grounding. If the ground line is unstable, do not connect the shield to anything.



Power Amplifier Operation and Terminology

① Zero Adjust (NULL)

This knob sets the lower limit of the operating pressure and flow rate. Rotating it clockwise increases the output current. This knob is also used for manual control while checking valve operation.

③ Channel Time Lag (TIME)

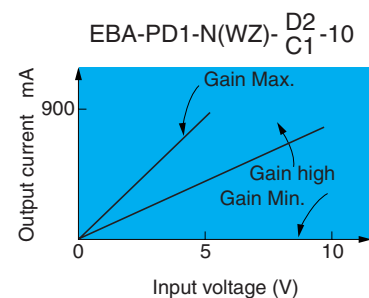
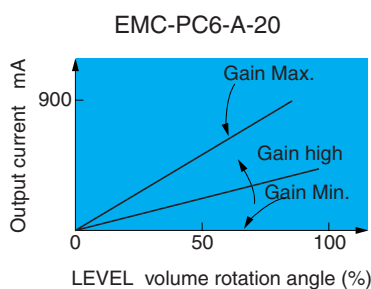
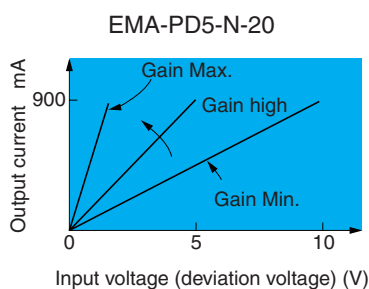
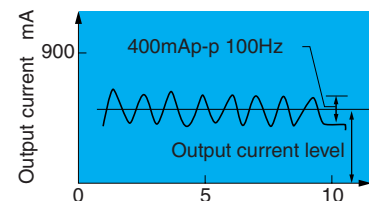
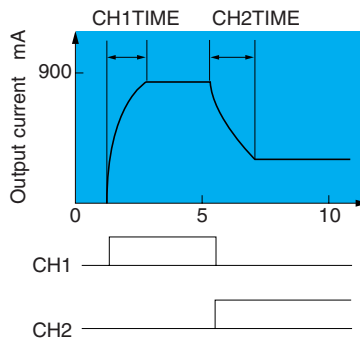
This knob adjusts the time it takes for a channel selected by external contact to reach its channel level. Rotating it clockwise increases the time lag.

④ Dither

Dither plays a role in improving control valve hysteresis, response, stability, etc.

② Gain Adjust (GAIN)

This knob adjusts output current in proportion to input signal voltage or the channel level knob rotation angle. Rotating it clockwise increases gain.





Small Type Multi-function Power Amplifier

Features

This compact, multi-function power amplifier uses advanced hybrid integrated circuits (HIC).

- Compact design** — Less than half the size of previous models
- High reliability** — Circuit board configuration eliminates the need for wiring.
- Multi-function** —
 - Simultaneous driving of two valves
 - Controller with built-in amplifier (EDC-PC6-AWZ-D2-20)
 - Dither frequency selection function (From Designs 11, 20)

Specifications

Item	Model No.	EDA-PD1-NWZ-D2-11	EDC-PC6-AWZ-D2-20
Function		Amp Type	Amp/Controller Type
Input type		1 DC inputs	Contacts, 6 inputs, DC 2 inputs
Maximum Output Current		900mA (20Ω solenoid)	900mA (20Ω solenoid)
Input voltage		-10 to +10VDC	0 to +10VDC
Input Impedance		50kΩ	50kΩ
Externally Set Variable Resistance		10kΩ	10kΩ
Drive Solenoid		SOL a, SOL b	SOL 1, SOL 2
Zero Adjust (NULL)		0 to 900mA	0 to 900mA
Gain Adjust (GAIN)		0 to $\frac{900\text{mA}}{2.5\text{V}}$	0 to $\frac{900\text{mA}}{2.5\text{V}}$
External power supply		+5VDC(5mA) -5VDC(5mA)	+5VDC(10mA)
Time Lag (LAG)		0 to 2sec	0 to 2sec
Dither Frequency (DITHER)		80 to 250Hz	80 to 250Hz
Power Supply Voltage		DC24V (DC24 to 30V)	DC24V (DC24 to 30V)
Power Consumption		30VA	60VA
Allowable Ambient Temperature		0 to 50°C	0 to 50°C
Temperature Drift		0.2mA/°C max.	0.2mA/°C max.
Weight		0.3kg	0.4kg
Driven Valve		Pressure, flow, direction control valves	Pressure, flow, direction control valves

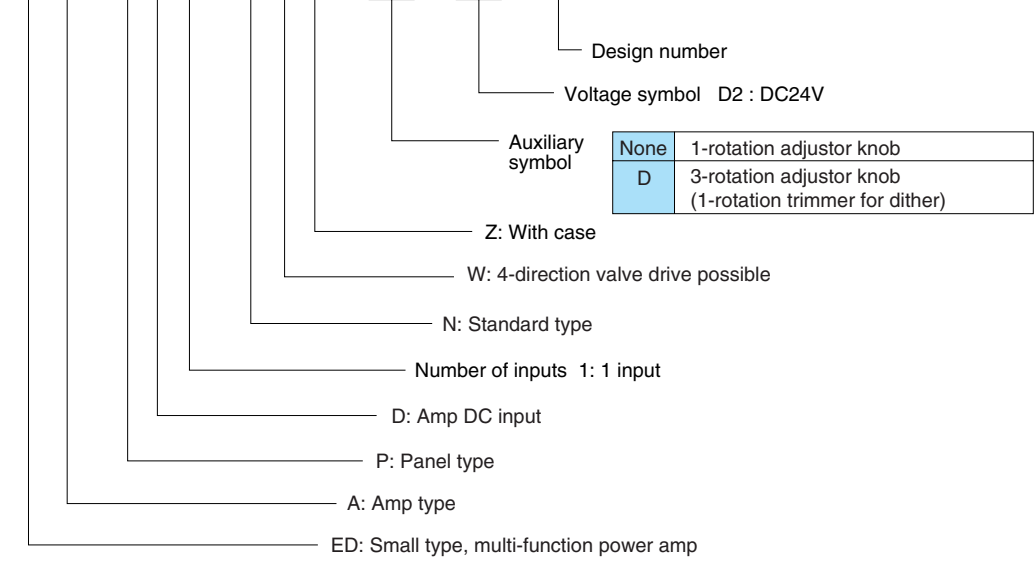
● Handling

- ① When selecting a location, avoid areas subject to high temperatures and high humidity, and select an area where there is little vibration and dust.
- ② Use shielded wire for the analog signal and valve output signal wires. See page I-33 for general precautions
- ③ The brightness of the LED changes in accordance with the size of the output current.

Understanding Model Numbers

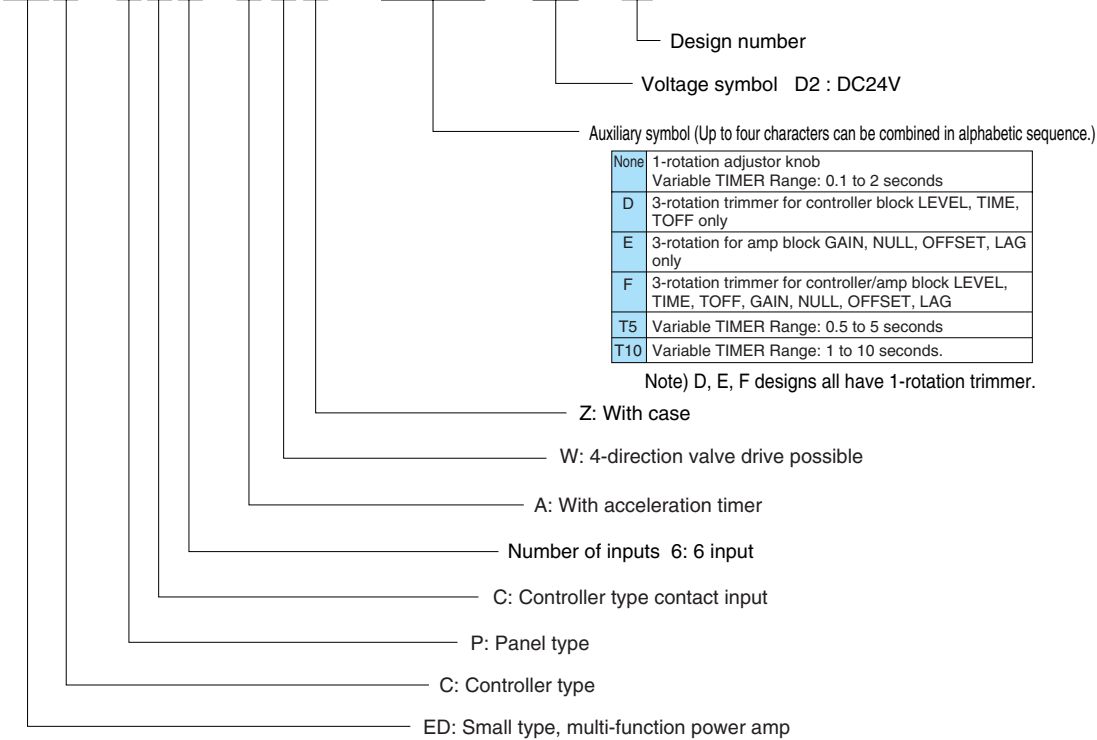
(1) Amp Type

ED A - P D 1 - N W Z - () - D2 - 11



(2) Amp/Controller Type

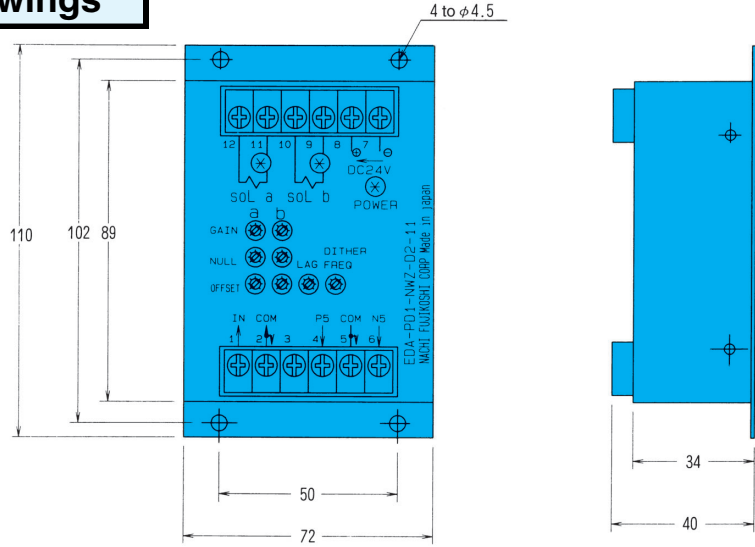
ED C - P C 6 - A W Z - () - D2 - 20



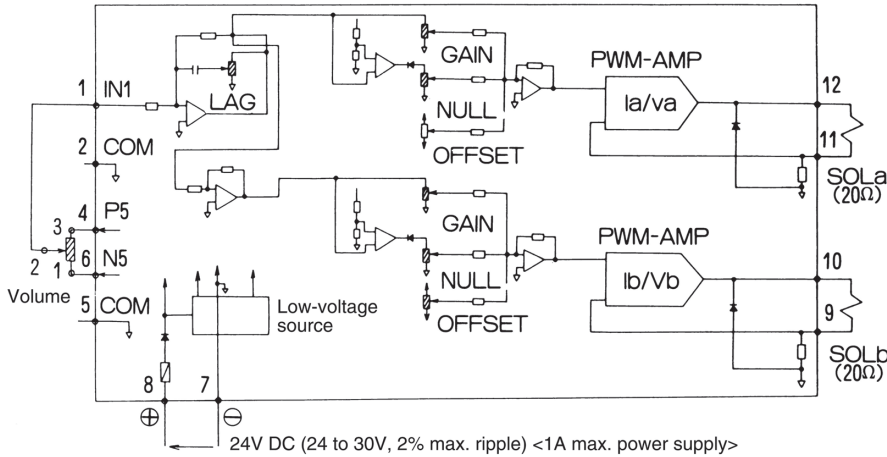
Installation Dimension Drawings

EDA-PD1-NWZ-D2-11

No.	Name	No.	Name
1	Input signal terminal IN1	7	- DC24V
2	Input signal terminal COM	8	+ DC24V
3		9	Output terminal to valve
4	External power supply P5	10	SOL b
5	Input signal terminal COM	11	Output terminal to valve
6	External power supply N5	12	SOL a



Block Diagram

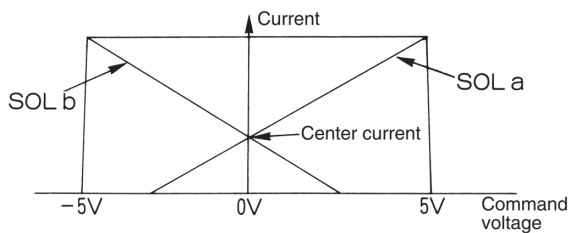


- Current is supplied to SOL a when input signal voltage polarity is positive, and to SOL b when negative. Either SOL a or SOL b can be driven at any one time.
- Push-pull drive is also supported.
- To measure current, measure the voltage at SOL a terminal 11 and SOL b terminal 9, using terminal 5 as reference. The voltage across the 0.5Ω current detection resistor at 1A is 0.5V. Use a measurement device with an input impedance of at least 1MΩ.
- To use SOL a only, connect terminal 1 of the knob to amp terminal 2, use an input voltage range of 0 to 5V. (ER, ES only)

Application Examples

① Adjusting Push-pull Drive for a Special Proportional Valve (Special Specification Direction Control Valve)

- a) Overlap Type Proportional Valve ESD-G01-C5¹⁰-6333D:300mA (Center Current)
20
- b) Zero-Lap Type Proportional Valve ESD-G01-C5¹⁰-6586C:200mA (Center Current)
20



As shown in the figure to the left, push-pull control aims at increasing response at the zero point by simultaneously energizing both solenoids.

Adjustment Procedure

1) NULL, GAIN, OFFSET

Rotate all seven knobs counterclockwise as far as they will go.

2) Without any connection between terminals ① and ②, use the OFFSET knob to simultaneously energize SOL a and SOL b as follows.

- { SOL a 300mA(200mA)
- { SOL b 300mA(200mA)

3) Next, apply +5V to terminal ① (connecting ① and ④), and set the SOL a

GAIN knob to the following.

- { SOL a 850mA
- { SOL b 300mA

For the SOL b current here, SOL b GAIN should be fully rotated counterclockwise, and its setting should not be changed.

4) Apply -5V to terminal ① (connecting ① and ⑥), and set the SOL b GAIN knob to the following.

- { SOL a 0mA
- { SOL b 850mA

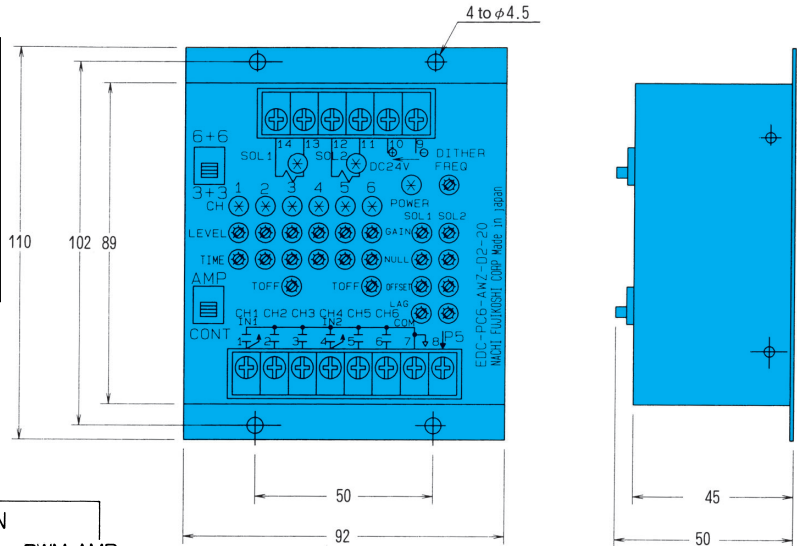
This completes the setting procedure.

• The three LAG and NULL knobs should be left rotated fully counterclockwise. There is no need to change their settings.

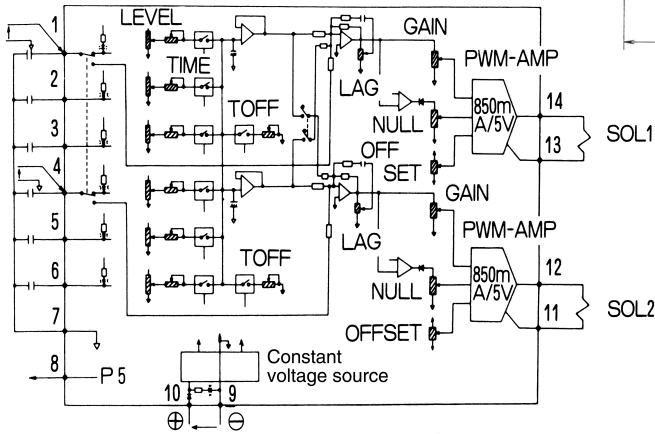
• EDA-PD1-NWZ-D2-11 is configured with a feedback system, so it does not have a feedback gain adjustment function. In this case, use EDA-PD1-NWZ-D2-11 in combination with the EA-PD4-D10-*-10 NACHI servo amp.

EDC-PC6-AWZ-D2-20

No.	Name	No.	Name
1	CH1 select terminal	7	COM
	Input signal terminal	8	External power supply P5
2	CH2 select terminal	9	- DC24V
3	CH3 select terminal	10	+ DC24V
4	CH4 select terminal	11	Output terminal to valve SOL 2
	Input signal terminal	12	
5	CH5 select terminal	13	Output terminal to valve SOL 1
6	CH6 select terminal	14	



Block Diagram



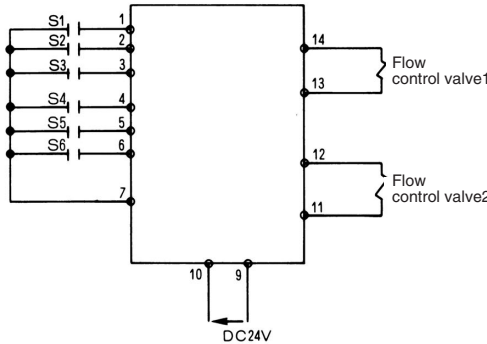
24V DC (24 to 30V, 2% max. ripple) <2A max. power supply>

- Dual simultaneous output to SOL 1 and SOL 2 is supported.
- To measure current, measure the voltage at SOL a terminal 13 and SOL b terminal 1, using terminal 7 as reference. The voltage across the 0.5Ω current detection resistor at 1A is 0.5V. Use a measurement device with an input impedance of at least 1MΩ.

Application Examples

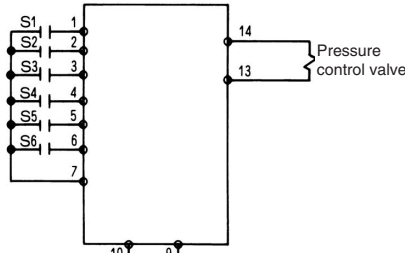
1) Switch Position

- CONT
- 3+3



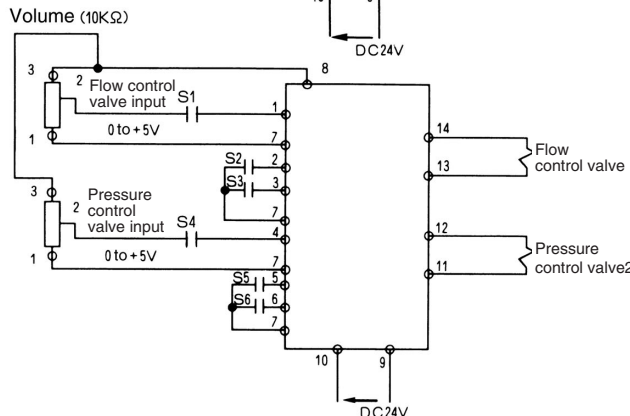
2) Switch Position

- CONT
- 6+6



3) Switch Position

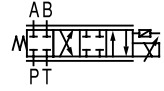
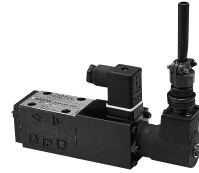
- AMP
- 3+3



- Simultaneous control using two flow control valves (3-speed)
As shown in the diagram to the left, flow control 1 speed is controlled with CH1 LEVEL when CH1 and CH2 are turned on at the same time. Next, flow control valve 2 speed is controlled by CH4 LEVEL, and simultaneous control is possible by adjusting flow control valve 1 speed in the same way. 3-speed synchronous control is possible by grouping CH1 through CH3 and CH4 through CH6.
- Pressure control valve 6-pressure control
As shown in the diagram to the left, this amplifier can be used as a 6-channel controller for a single pressure control valve. Minimum pressure at this time is in accordance with the setting of the OFFSET knob. The NULL knob cannot be used to configure settings unless a channel is selected.
- 2-output amplifier for simultaneous control of load-sensitive system pressure and flow rate
As shown in the diagram to the left, 0 to +5V input and channel CH2 or CH3 input are added together and output to the flow control valve. Likewise, 0 to +5V and CH5 or CH6 input is added together and output to the pressure control valve.

High-response proportional flow control valve ESH-G01

10 to 50 ℓ /min
32MPa



Features

- Frequency response equivalent to an electro-hydraulic servo valve.
- Direct spool by a high-output proportional solenoid.
- Differential transformer for accurate spool positioning with minor feedback.
- Recovery of all port block positions following amp power off or wiring disconnection (Failsafe Function).
- Steel spool and spring for long life.

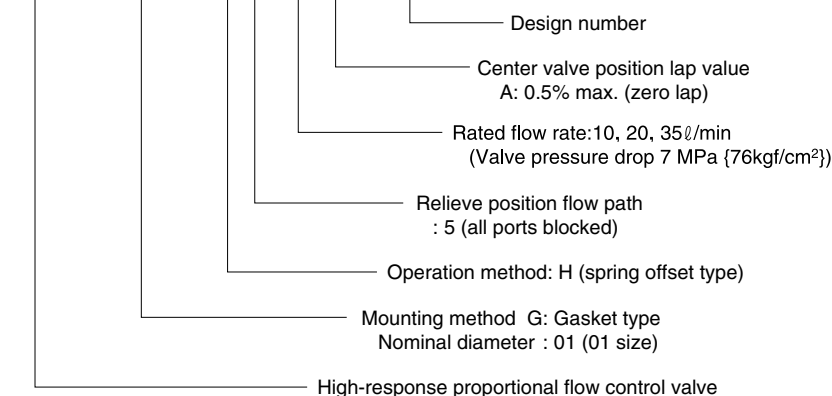
Specifications

Item	Model No.	ESH-G01-H510A-10	ESH-G01-H520A-10	ESH-G01-H540A-10
Maximum Operating Pressure P, A, B MPa(kgf/cm ²)		32{327}		
T Port Allowable Back Pressure MPa(kgf/cm ²)		2.5 {25.5} max.		
Rated Flow Rate ℓ /min (Valve pressure drop 7MPa{71kgf/cm ² })		10	20	35
Maximum Flow Rate ℓ /min		22	35	50
Limit Valve Pressure Drop MPa(kgf/cm ²)		32{327}	21{214}	14{143}
Hysteresis %		0.5 max.		
Step Response ms (0→100% Displacement)		16 max. (Note 1)		
Frequency Response Hz (90° Phase Delay ±10% Displacement)		At least 80 (Note 1)		
Center Drift	Supply Pressure	0.5% max/FS (Δp=25MPa{255kgf/cm ² })		
	Fluid Temperature	1.5% max/FS (Δt=40°C)		
Filtration		Class NAS9 max.		
Operating Fluid Temperature Range °C (Recommended Fluid Temperature Range °C)		0 to 60 (30 to 60)		
Water and Dust Resistance		IP53		
Weight kg		2.3		

Note) 1.Step response is typical value for a supply pressure of 7MPa {71kgf/cm²} and fluid temperature of 40°C (kinematic viscosity: 40mm²/s).

Understanding Model Numbers

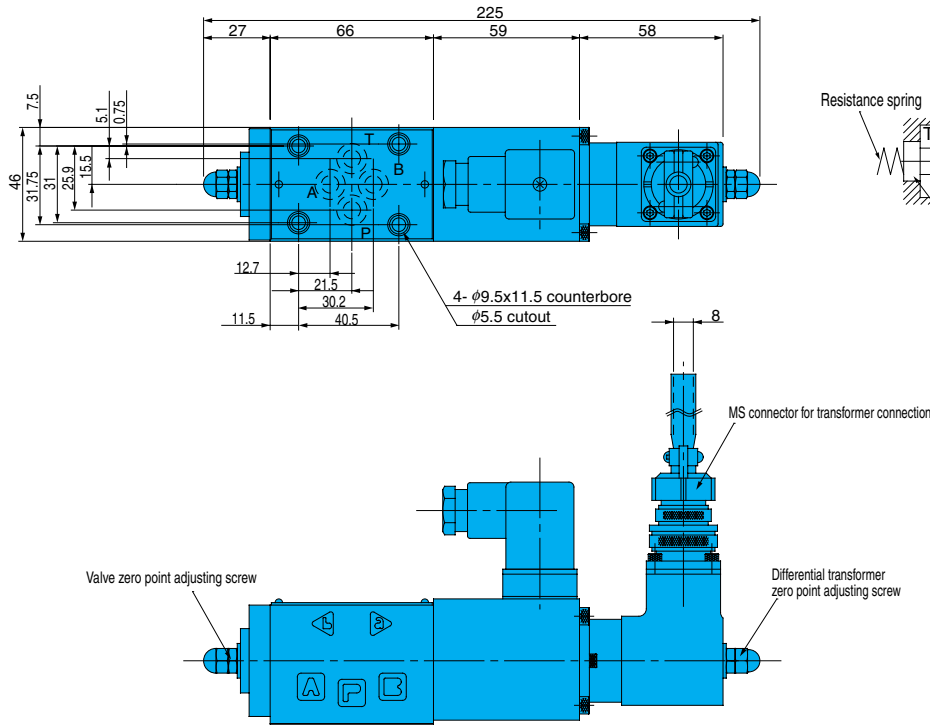
ESH - G 01 - H 5 20 A - 10



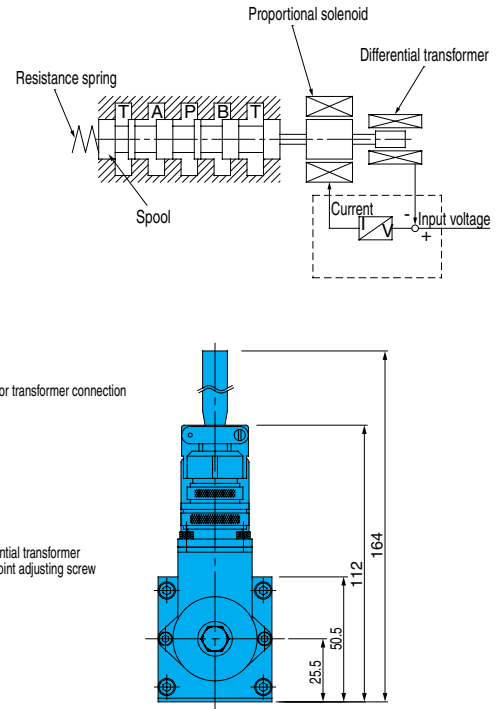
Handling

- 1) The amp and valve are adjusted to match at the factory, so be sure to use items that have the same MFG No.
- 2) The differential transformer zero adjust screw and valve zero adjust screw are adjusted and fixed at the factory. Because of this, you should not touch the screws (sealed cap nuts).
- 3) Install the valve so the spool axis line is horizontal.
- 4) In the case of 3-port applications and for the direction that throughflow is most common, use of the following flow is recommended P→A→B→T. P→A limit differential pressure is greater than that of P→B.
- 5) Be sure to perform sufficient flushing before a test run.
- 6) Use steel piping for this valve and the main actuator, and keep piping as short as possible.
- 7) There is no air bleeding.
- 8) Mineral oil hydraulic operating fluid is standard. Use an R&O type and wear-resistant type of ISO VG32, 46, or 68 or equivalent.
- 9) Use an operating fluid that conforms to the both of the following.
Kinematic viscosity : 20 to 140mm²/s
Oil temperature : 30 to 60°C
- 10) Filtration
Maintain hydraulic operating fluid contamination so it is at least NAS Class 9.
- 11) Electrical wiring between the amp and valve should be no longer than 30 meters. For the solenoid valve use VCTF 2 mm² 2-conductor shielded wire, and for the differential transformer use VCTF 0.5 mm² 4-conductor shielded wire.
- 12) After disassembling the valve, be sure to fill the inside of the guide with operating fluid before reassembling.
- 13) Bundled Accessories (Valve Mounting Bolts)
M5 x 45 ℓ , (four)
Tightening Torque : 5 to 7N · m{51 to 71kgf · cm}

Installation Dimension Drawings

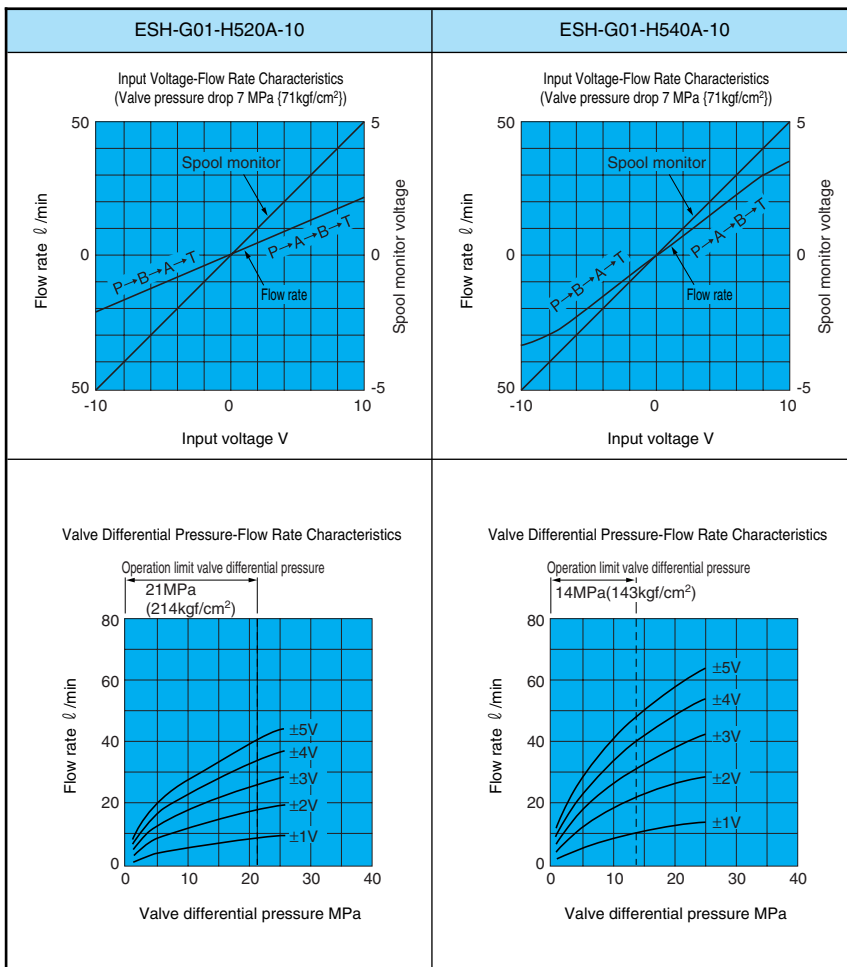


Operational Principle



The gasket mounting method conforms to ISO4401-AB-03-4-A.

Performance Curves



Note) $\pm 10V$ input amp factory default data.
Rotating the GAIN trimmer clockwise (rightward) increases the flow rate by up to 10%.

• Valve Pressure Drop and Rated Flow Rate

$$\text{Valve Pressure Drop } (\Delta P_x) = P_s - P_L - P_T$$

P_s : Valve supply pressure

P_L : Load pressure

P_T : T Port back pressure

The rated flow rate is the value when the above valve pressure drop is 7MPa {71kgf/cm²}.

• Valve Pressure Drop and Control Flow Rate

The following is the maximum control flow rate when the size of the obtained valve pressure drop is ΔP_x ,

$$Q_x = Q_{rate} \times \sqrt{\frac{\Delta P_x}{7}}$$

Q_{rate} : Rated flow rate

$$\Delta P_x = P_s - P_L - P_T$$

• Calculation example

When ESH-G01-H520A-10 is used under the following conditions:

$P_s = 10\text{MPa}$ {102kgf/cm²}

$P_L = 6\text{MPa}$ {61kgf/cm²}

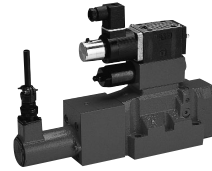
$P_T = 1\text{MPa}$ {10kgf/cm²}

Maximum control flow rate Q_x is as shown below:

$$Q_x = Q_{rate} \times \sqrt{\frac{P_s - P_L - P_T}{7}} = 20 \times \sqrt{\frac{10 - 6 - 1}{7}} = 13\ell / \text{min}$$

High-response proportional flow control valve ESH-G03,04,06

80 to 600 ℓ /min
28,32MPa



Features

- Main spool minor feedback for greatly increased hysteresis and repeatability.
- Response characteristics suitable to 20Hz and high precision acceleration control.
- Recovery of center position following amp power off or wiring disconnection (Failsafe Function).
- Single rod cylinder spool available for easy use.
- Built-in pilot pressure reducing valve for stable operation.

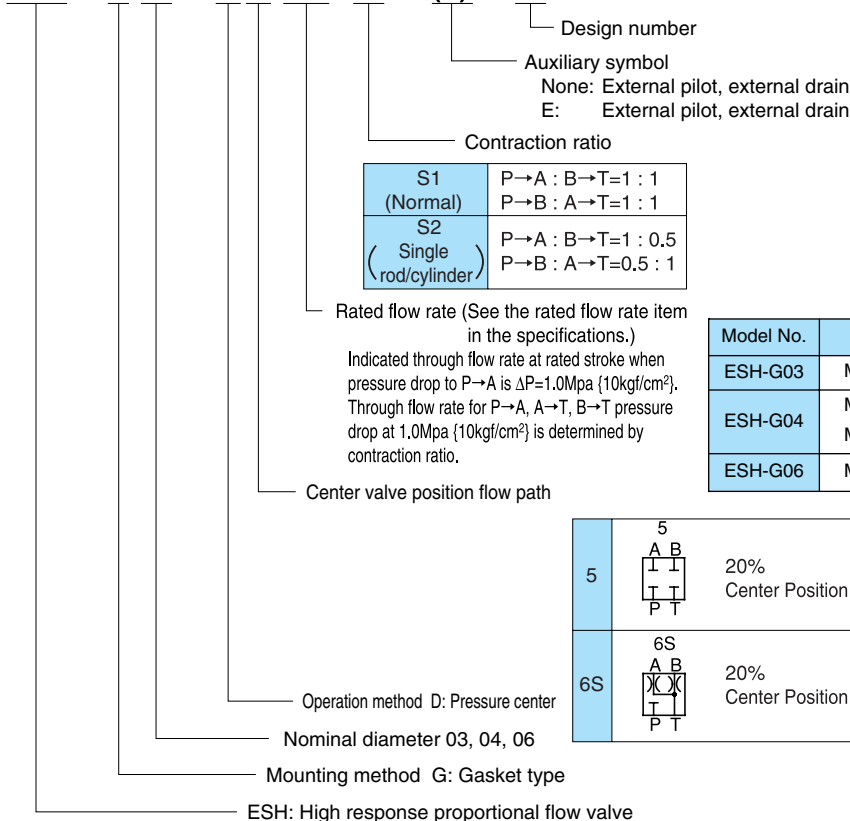
Specifications

Item	Model No.		ESH-G03-D*****(*)-11	ESH-G04-D*****(*)-11	ESH-G06-D*****(*)-11
	P,A,B Ports	External Pilot Internal Pilo	28{286}	32{327}	32{327}
Maximum Operating Pressure MPa(kgf/cm ²)	Internal Pilo		25{255}	25{255}	25{255}
	T Port		21{214}	21{214}	21{214}
	Pp Port		25{255}	25{255}	25{255}
Minimum Pilot Pressure MPa(kg/cm ²)			1.5{15}	1.5{15}	2.0{20}
Rated Flow Rate ℓ /min (Rated stroke, P→A pressure drop of 1MPa {10kgf/cm ² } flow rate)			80	180	350
Maximum Flow Rate ℓ /min			140	300	600
Pilot Pressure Reducing Valve Set Pressure MPa(kgf/cm ²)			2.0{20}	2.0{20}	4.0{40}
Hysteresis %			0.5 max.	0.5 max.	0.5 max.
Step Response ms (0→100% displacement)			50{Note1}	50{Note1}	50{Note1}
Frequency Response Hz (±10% input, 90° phase delay)			20{Note1}	20{Note1}	20{Note1}
Pilot Flow Rate ℓ /min			4	8	12
Y (DR1), L (DR2) allowable back pressure MPa(kgf/cm ²)			0.2{2}	0.2{2}	0.2{2}
Weight kg			8	12	18

Note 1. Step response is typical value for a supply pressure of 7MPa {71kgf/cm²} and fluid temperature of 40°C (kinematic viscosity: 40mm²/s).

Understanding Model Numbers

ESH - G 04 - D 5 180 S1 - (*) - 11



• Handling

1 Air Bleeding

In order to ensure stable control, loosen the air vent and bleed air from the valve before starting operation.

2 Y (DR1), L (DR2) Ports

Connect ports Y (DR1) and L (DR2) directly to the fluid tank so they are always supplied with operating fluid, in order to keep back pressure no greater than 0.2MPa {2kgf/cm²}.

3 L (DR2) Port

Since this valve is a pressure center type, G04 and G06 have an L (DR2) port. Be sure to connect this port directly to the fluid tank.

G03 has a Y (DR1) port only, and this is connected internally to L.

4 Valve Mounting Orientation

Install the valve so the spool axis line is horizontal.

5 Filtration

Maintain hydraulic operating fluid contamination so it is at least NAS Class 9.

6 The amp and valve are adjusted to match at the factory, so be sure to use items that have the same MFG No.

7 Mineral oil hydraulic operating fluid is standard. Use an R&O type and wear-resistant type of ISO VG32, 46, or 68 or equivalent.

8 Use an operating fluid that conforms to the both of the following.

Kinematic viscosity: 20 to 140mm²/s
Oil temperature: 30 to 60°C

9 Electrical wiring between the amp and valve should be no longer than 30 meters. For the solenoid valve use VCTF 2 mm² 2-conductor shielded wire, and for the differential transformer use VCTF 0.5 mm² 4-conductor shielded wire.

10 Bundled Accessories (Valve Mounting Bolts)

Model No.	Bolt Size	Q'ty	Tightening Torque N · m {kgf · cm}
ESH-G03	M 6 × 35 ℓ	4	10 to 13 {102 to 133}
ESH-G04	M10 × 50 ℓ	4	45 to 55 {460 to 561}
	M 6 × 45 ℓ	2	10 to 13 {102 to 133}
ESH-G06	M12 × 60 ℓ	6	60 to 70 {610 to 715}

11 With G03 and G04, providing command in the range of 0 to +10V to the amp's RF input produces a flow of P→A→B→T. With G06, flow is P→B→A→T.

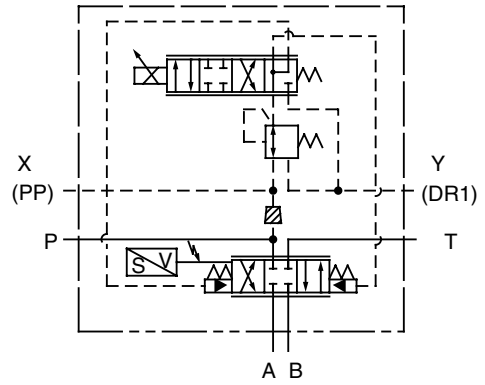
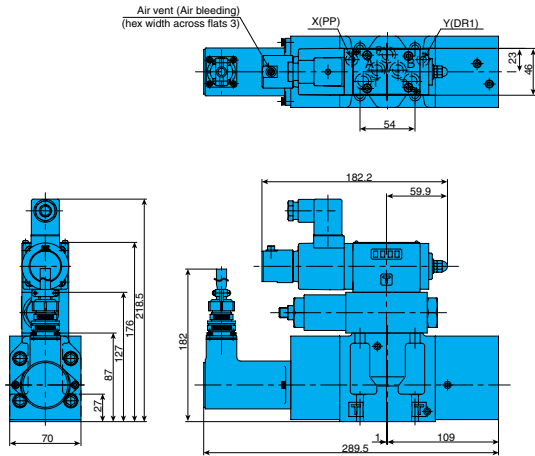
12 For G03 and G04, connect the ports and actuator to achieve a working of P→A→B→T. For G06, connect for a working of P→B→A→T.

13 Contact your agent for a contraction ratio S2 with the G06 size.

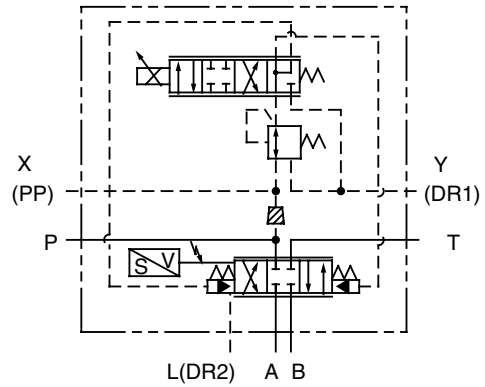
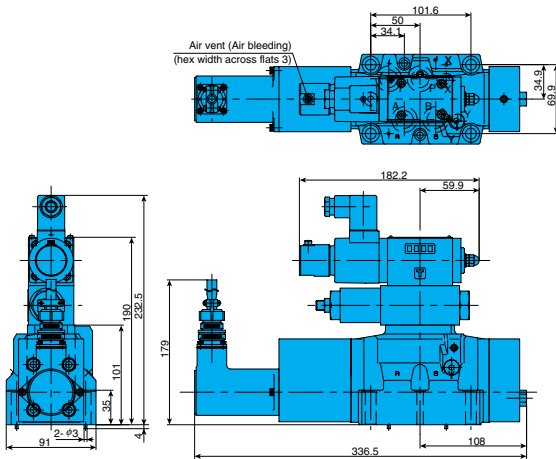
Installation Dimension Drawings

JIS Symbol

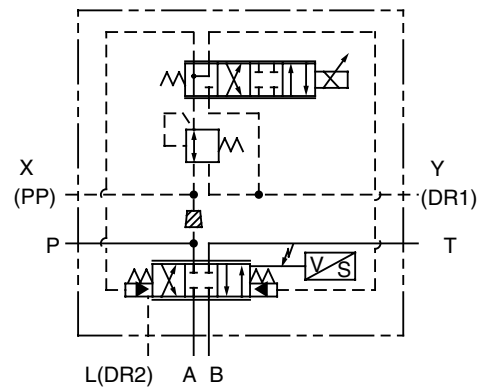
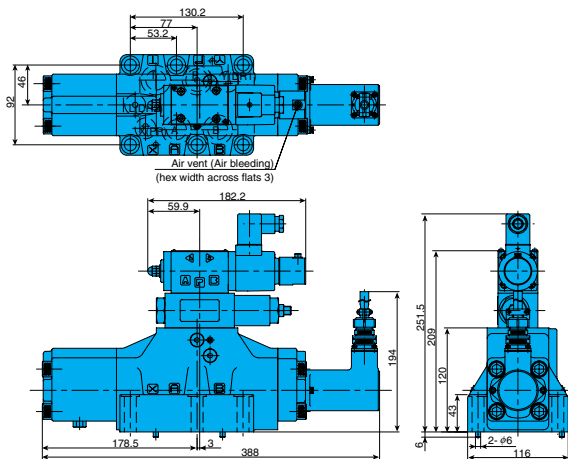
ESH-G03




ESH-G04



ESH-G06



Note:
A stopper plug is needed for the  area if the pilot is external.

Gasket Surface Dimensions

For G03, see ESD-G03 gasket surface dimensions, and for G04 and G06, see Dss-G04, 06-**-20 gasket surface dimensions. Y (DR1) and L (DR2) are required.

Gasket surface dimensions conform to the following.

G0 : ISO 4401-03-02-0-94

G04 : ISO 4401-07-06-0-94

G06 : ISO 4401-08-07-0-94



High-speed Response Proportional Control Valve Amplifier EHA Series

Features

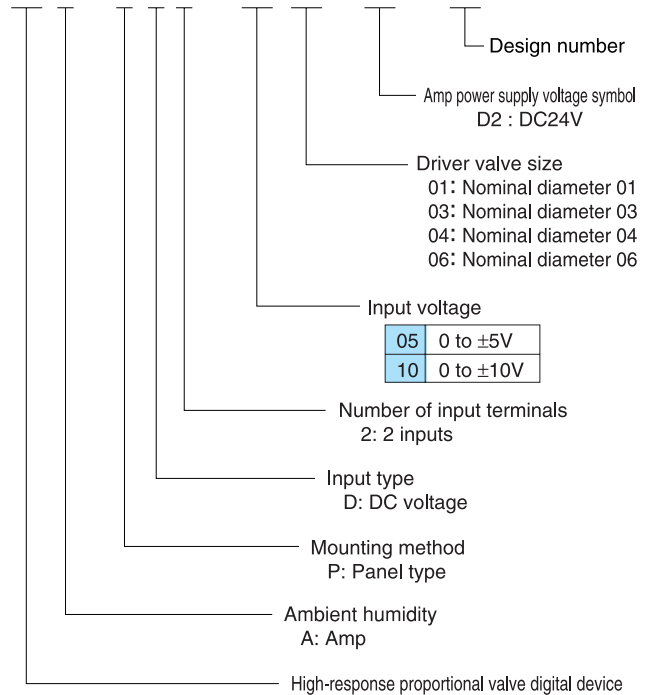
- Coil current feedback and spool position feedback amplification for stable, high-speed spool positioning.
- Built in check connector ICS simplifies maintenance.
- A single printed circuit board allows separation of connectors and the terminal box.
- Built-in differential transformer disconnect detection circuit drops coil current to 0mA when disconnection occurs.
- Servo ready and servo ON interfaces.
- Power supply and current control switching system for improved efficiency.

Specifications

Power Supply Voltage	24V DC (22V DC to 28V DC) Lip Noise: 150mVp-p max.
Power Supply Capacity	At least 2.1A (COSEL R50A-24 equivalent switching regulator)
Ambient Temperature	0 to 50°C
Ambient Humidity	35 to 85% RH (non-condensation)
Input Signal Voltage	0 to ±5V DC or 0 to ±10V DC
Input Impedance	50kΩ
Power Consumption	2.1A maximum consumption current at 24V
Weight	0.9kg
External Supply Voltage	+5V : (10mA maximum supply possible) -5V : (10mA maximum supply possible)
Drive Coil	2.5Ω; max. 2.7A or 5Ω; max. 2.4A
Spool Displacement Measurement	Differential transformer (LVDT)
Servo ON	Application of 24V DC during valve operation
Ready	During normal valve operation: ON
Spool displacement monitor	0 to ±5V

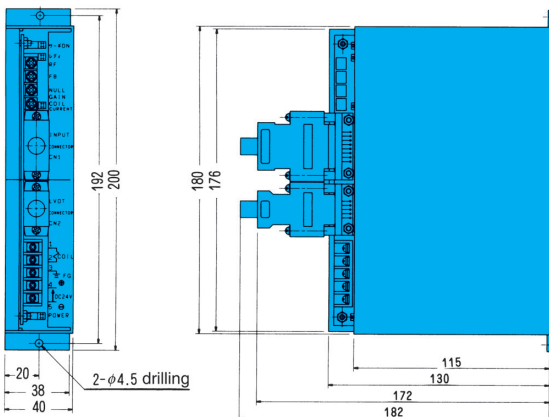
Understanding Model Numbers

EH A - P D 2 - 10 01 - D2 - 10

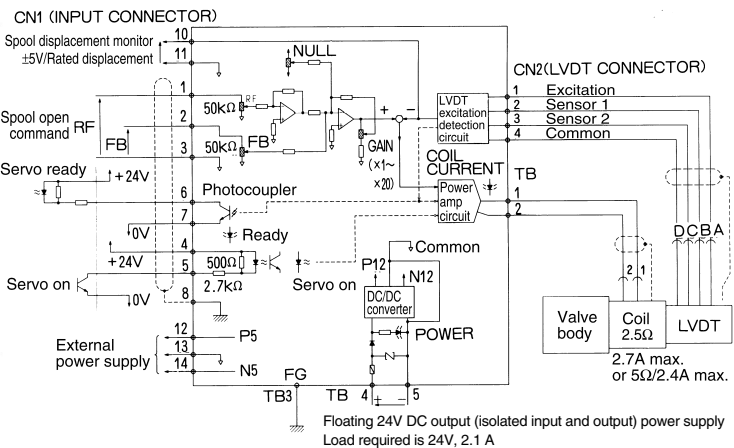


Note) Select an amp that matches the valve size.

Installation Dimension Drawings



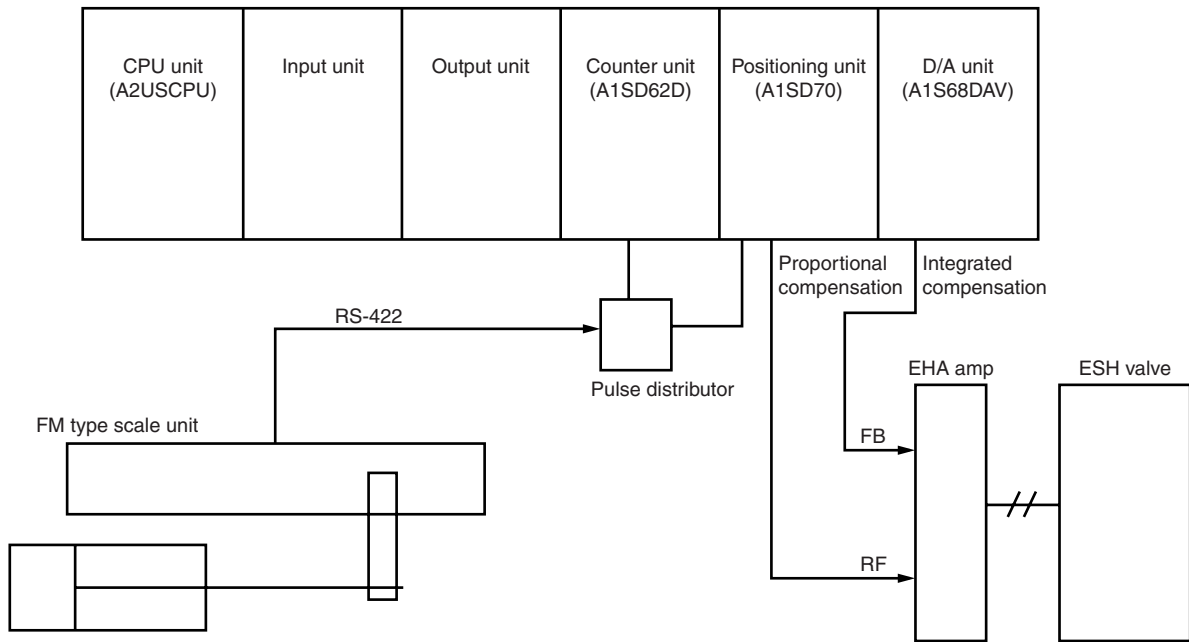
Block Diagram



Note)
Since G03, G04, and G05 are pilot operation types, there is an LVDT on the main spool, but connection is identical.

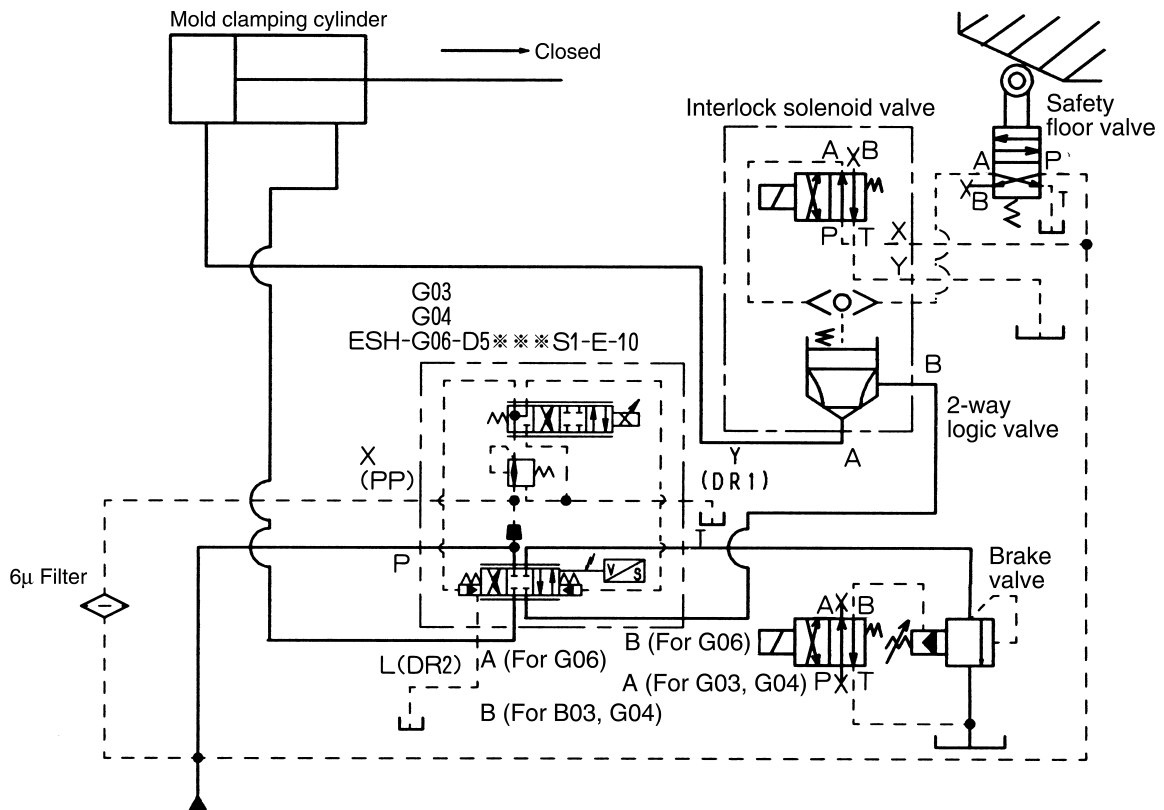
(1) Example Application in ESH0-G01 Positioning Circuit

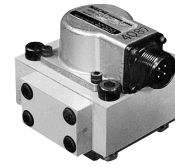
This is an ESH-G01 positioning circuit using a sequencer. Proportional control is performed by the positioning unit, while integral compensation is performed by the counter unit and D/A unit. The result is high-precision positioning.



(2) Example Application in ESH-G03, G04, G06 Molding Machine Mold Clamping Circuit

This hydraulic circuit is a basic application example. The actual application hydraulic circuit would require modification to match the machinery and to provide the necessary functions. Cut off flow to the cylinder with the safety door valve and interlock solenoid valve, in accordance with the logic valve.

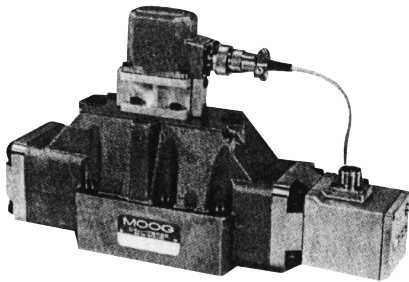




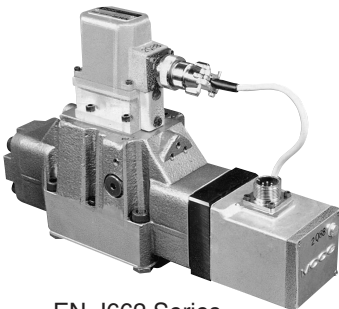
NACHI-MOOG Electro-hydraulic Servo Valve EN Series

Features

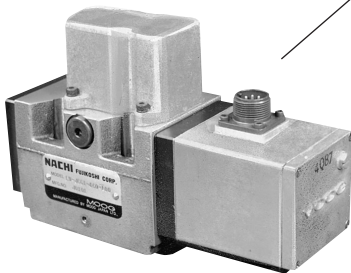
- ① A wide choice of variations
Basic 9 Series meets the needs of a wide range of specifications.
Pressure: 21 to 35MPa{214 to 357kgf/cm²}
- ② Closed loop structure makes it possible to configure a high-precision control system.
Rated flow rate: 4 ℓ/min to 900 ℓ/min
Response frequency: 20 to 300Hz
- ③ Outstanding performance in all types of industrial applications, especially those that require control of high power levels and highly dynamic characteristics.



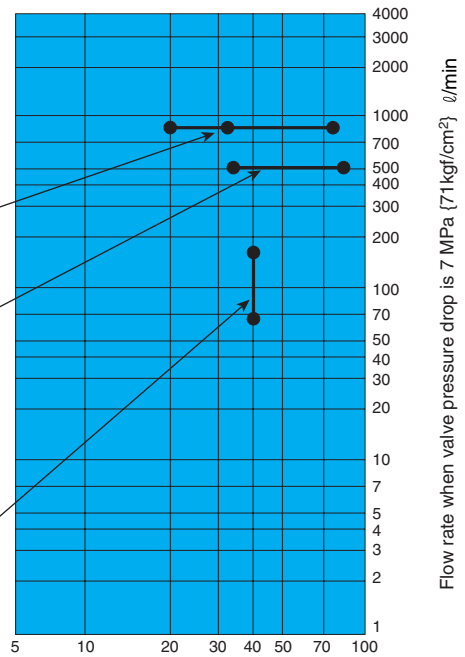
EN-J663 Series



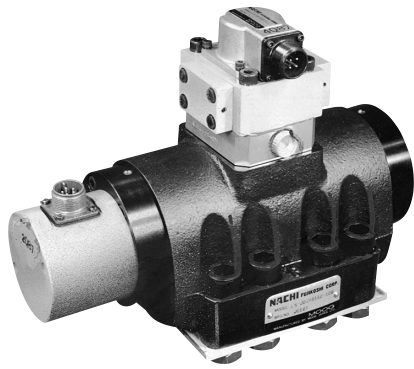
EN-J662 Series



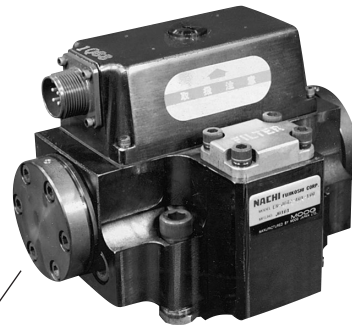
EN-J661 Series



Servo valve response frequency (Hz) at phase delay of 90°
This is the value when supply pressure is 21MPa {214kgf/cm²}

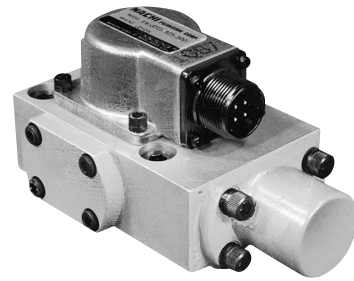


EN-J079-440 Series

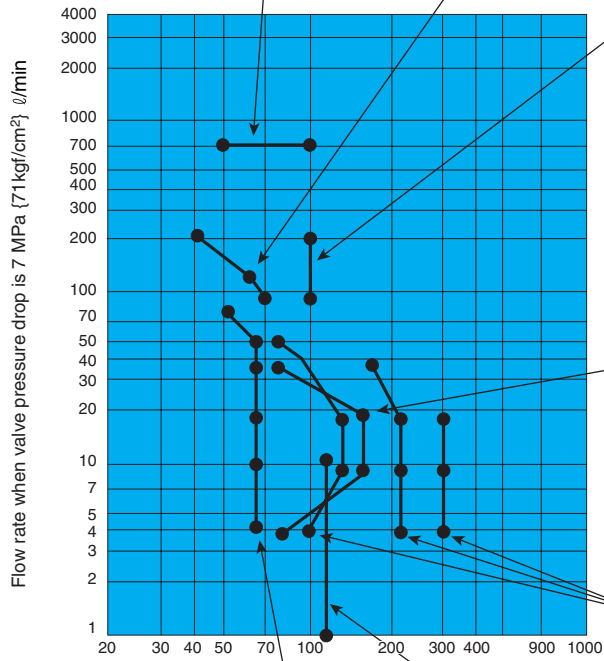


EN-J072 Series

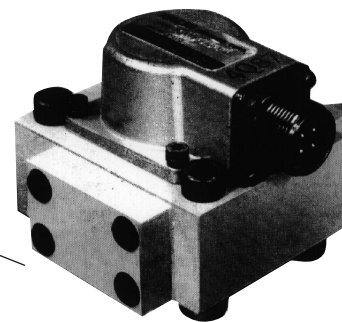
EN-J079-400 Series
420



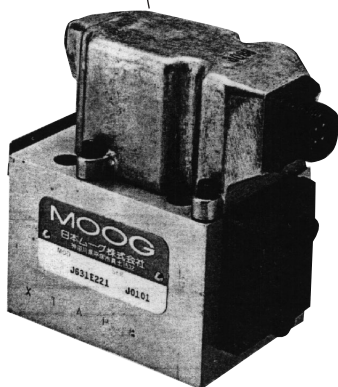
EN-J073 Series



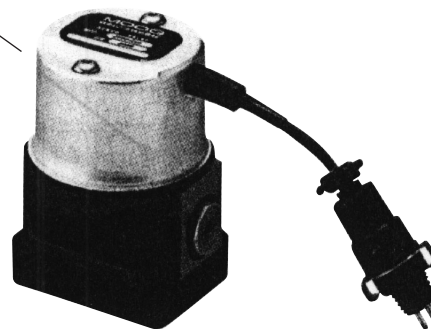
Servo valve response frequency (Hz) at phase delay of 90°
This is the value when supply pressure is 21MPa (214kgf/cm²)



EN-J076 Series



EN-J631 Series



EN-J770 Series

Electro-hydraulic Servo Valve Driver Servo Amplifier

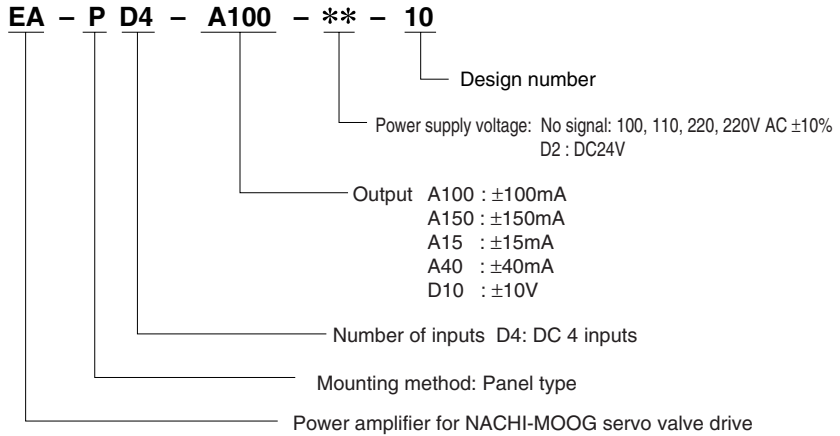
Features

- ① Compact design.
- ② Capable of driving virtually all NACHI-MOOG servo valve series.
- ③ Power supply support for 24V DC in addition to 100V AC and 200V AC.

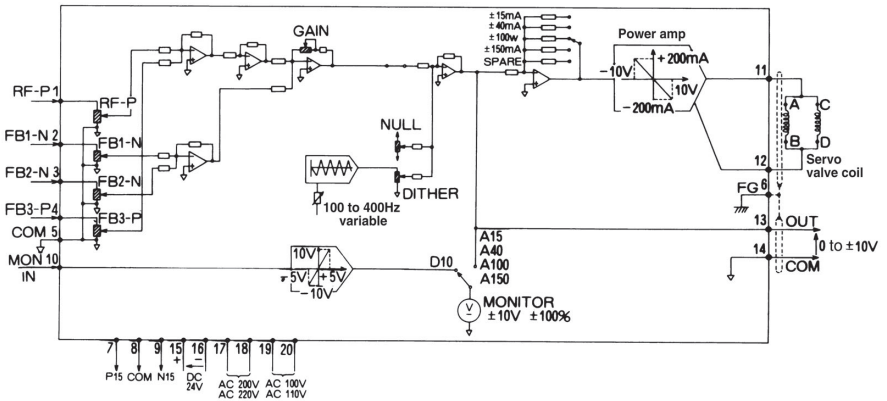
Specifications

Item	Description
Number of Inputs	4 (RF-P, FB1-N, FB2-N, FB3-P)
Input Voltage Range	±10VDC (Command Signal/ Feedback Signal)
Input Impedance	50kΩ
Gain Adjust (GAIN)	1 to 20 X/5 to 100 X switchable
Zero Adjust (NULL)	0 to ±20%
Frequency Characteristics	-3dB attenuation at 700Hz
Dither (DITHER)	100 to 400Hz variable (Factory default; 200Hz)
Power Supply Voltage	AC100, 110, 200, 220V (±10%) 50/60Hz
Power Consumption	20VA
External power supply	+15V (200mA) -15V (200mA)
Allowable Ambient Temperature	0 to 50°C
Temperature Drift	50μV/°C max.
Weight	3kg
Servo Valve Coil Drive Current	± 15mA(100Ω) ± 40mA(40Ω) ±100mA(14Ω) ±150mA(14Ω) It is possible to switch the output voltage ±10V for the four types noted above. Resistance values in parentheses indicate resistance in the case of parallel wiring of the servo valve coil.

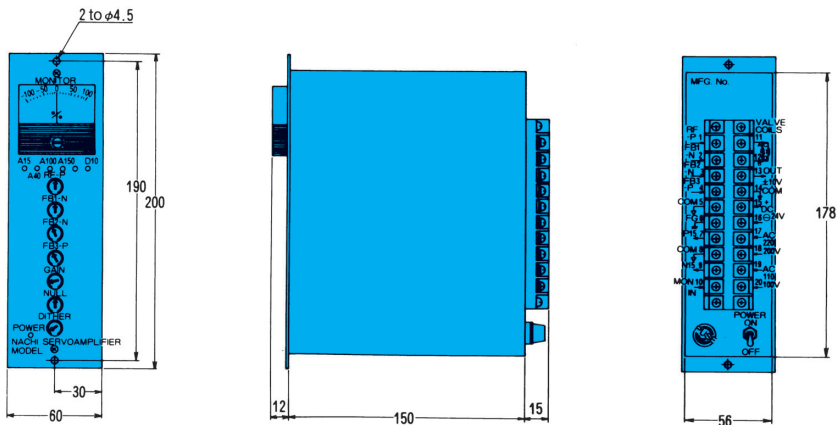
Understanding Model Numbers



Note: 24V DC only can be used in the case of power supply voltage signal D2. 100V, 200V AC cannot be used.



No.	Name	No.	Name
1	RF-P input	11	Control current
2	FB1-N- feedback input	12	Output terminal
3	FB2-N- feedback input	13	Control voltage
4	FB3-P- feedback input	14	Output terminal
5	COM signal land	15	+ DC24V
6	FG case ground	16	- DC24V
7	P15 external power supply	17	AC200, 220V
8	COM signal land	18	
9	N15 external power supply	19	AC100, 110V
10	MON/IN monitor in	20	

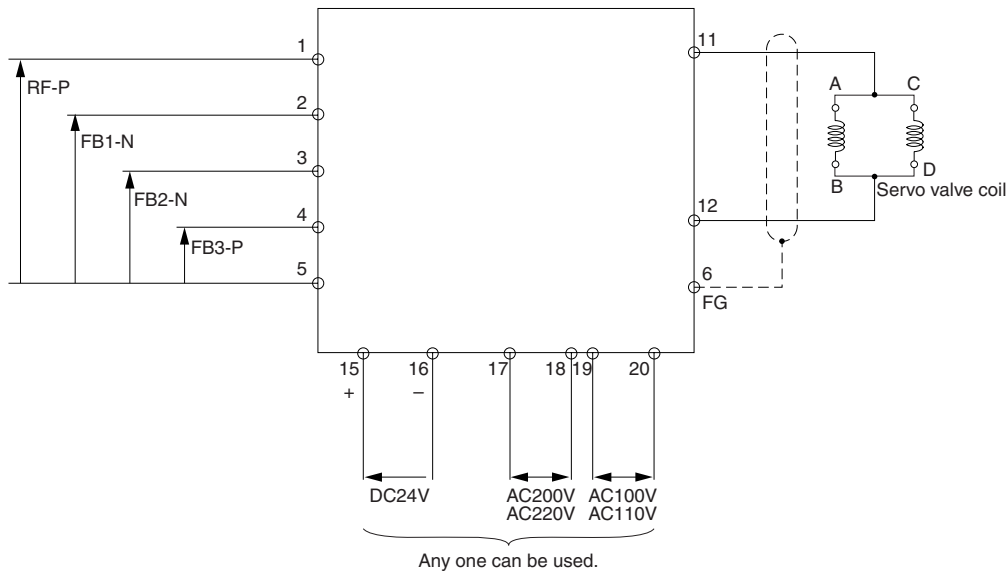


Servo Valve and Applicable Servo Amplifier Models

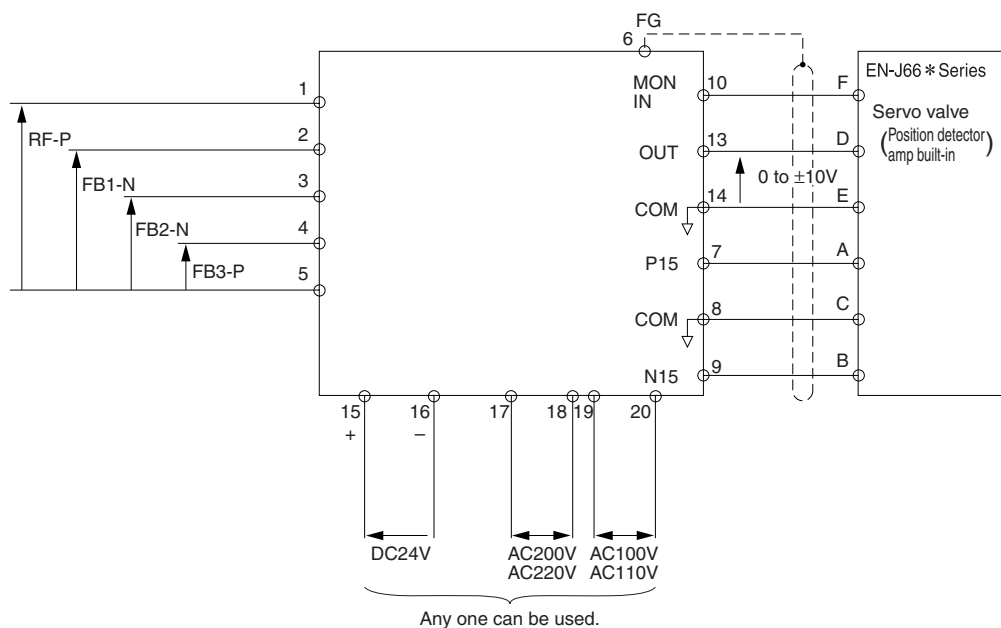
Servo Model Number	Rated Output	Applicable Servo Amplifier Model Number
EN-J631 Series	±100mA (parallel wiring)	EA-PD4-A100
EN-31 Series Center Flow 75 ℓ /min Rated Models	±150mA (parallel wiring)	EA-PD4-A150
EN-J072-401, EN-J072-402, EN-J073-401, EN-J073-402, EN-J073-403, EN-J073-404, EN-J073-405, EN-J076-401, EN-J076-402, EN-J076-403, EN-J076-404, EN-J076-405	±15mA (parallel wiring)	EA-PD4-A15
EN-J072-403, EN-J770, EN-J073-406, EN-J076-406	±40mA (parallel wiring)	EA-PD4-A40
EN-J661 EN-J662 (Main Valve Position Detector or AmP Built In) EN-J663	±10V	EA-PD4-D10

Wiring Diagram

EN-J631, J072, J073, J076, J770 Series

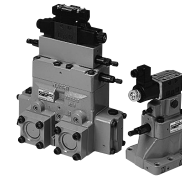


EN-J661, J662, J663 Series



Composite Valve Series Logic Valve

200 to 2300 ℓ /min
28,32MPa



Overview

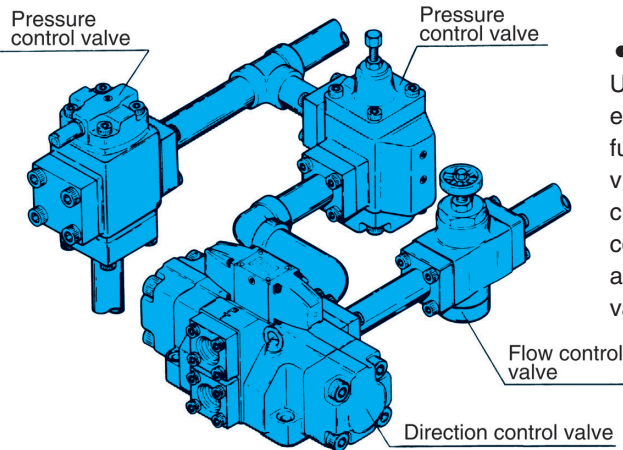
HYDRO-LOGIC composite valves revolutionize the structure of hydraulic control valves in a way that makes it possible to control multiple functions with a single valve. Unlike contemporary valves that limit each valve to a single function, the HYDRO-

LOGIC control valve allows a tremendous reduction in overall equipment size and energy savings as well. In addition, a poppet structure delivers high response, low leakage, and outstanding power.

These valves are made possible by fully

applying technology of the proven cartridge logic valve. A gasket type and flange type logic valve series can be used with total confidence in a wide variety of hydraulic applications.

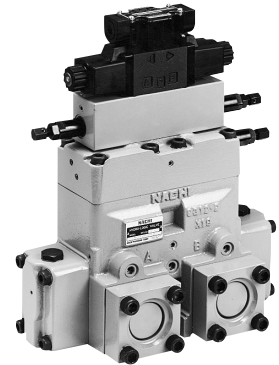
(For details, see catalog number 9236.)



Multi-function in a compact design

Unlike single-valve systems where each valve performs a particular function, the hydro-logic valve provides multiple functions in a very compact configuration. The more complex a circuit is, the greater the advantages of using this type of valve.

Hydro-logic valve



Features

① Multi-function composite valve to meet high-level hydraulic needs

A single multi-function composite valve controls direction, pressure and flow.

② Makes hydraulic equipment more compact

Since a single valve performs multiple functions, the number of required valves is reduced, which simplifies the hydraulic circuit and makes the overall design of the equipment more compact.

③ Fast switching with less shock

A poppet valve is used for the basic structure, which eliminates overrun and reduces mass for very fast switching. A restrictor

valve built into the pilot line makes it possible to freely set the open/close timing of each port and easily reduce shock.

④ Less internal leaking than spool type valves

Poppet seal construction minimizes seat leaks, while a long slide length ensures much less internal leaking than a spool type valve.

⑤ Dramatically reduced hydraulic equipment production cost

A fewer valves not only means more compact designs, it also translates into much lower production costs.

⑥ Dimensions conform to international ISO standards

The 06, 10 sizes gasket type valve mount-

ing dimensions conform to ISO standards for easy interchangeability with existing valves (except for 3-direction valves).

⑦ Simple mounting, without modification

Unlike cartridge type valves that require drilling of holes in the block, gasket installation and flange connection of this type of valve is quick and simple.

⑧ A wide selection of valve models

An extensive selection of models includes Size 13 2-direction valves and size 2000 3-direction and 4-direction valves to meet a wide range of needs.

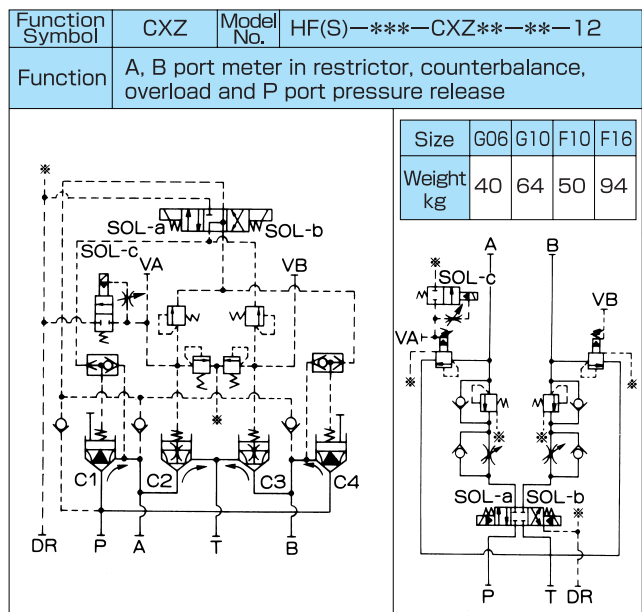
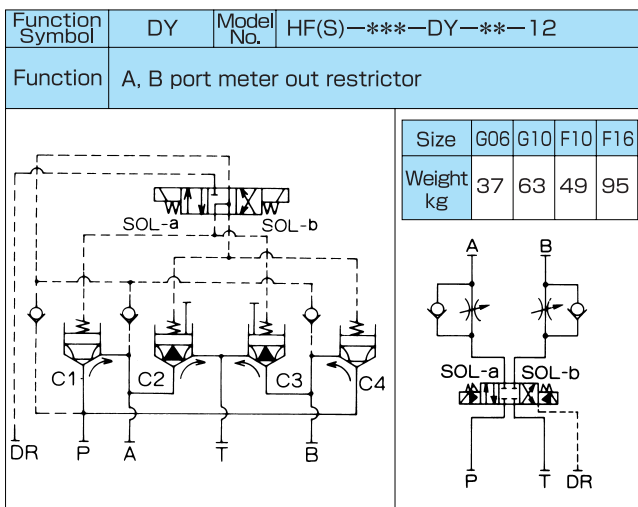
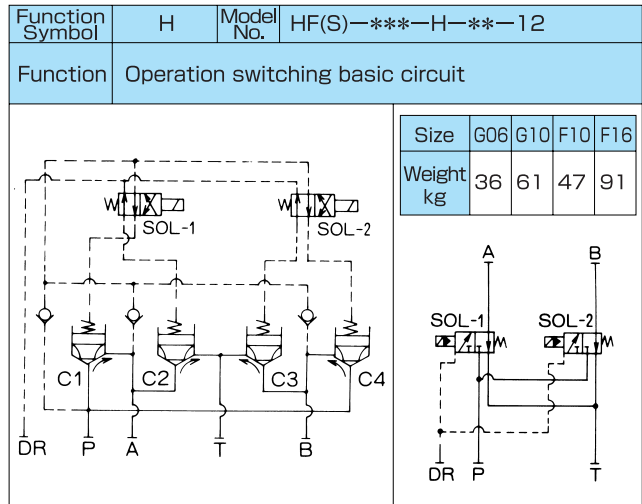
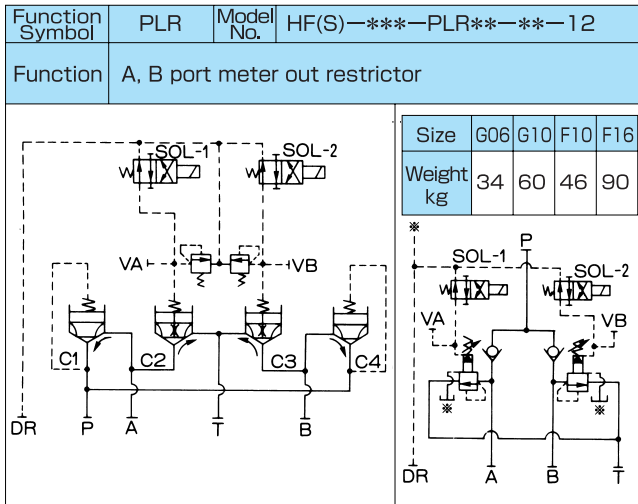
Main Specifications

2-Direction Valves	3-Direction Valves	4-Direction Valves		Pipe Diameter (Nominal Diameter)	Maximum Working Pressure MPa(kgf/cm ²)	Maximum Flow Rate ℓ /min
		Gasket Mounting	Flange Mounting			
HT(S)-G06	HY(S)-G06	HF(S)-G06	—	¾B	28{286}	200(*120)
HT(S)-G10	HY(S)-G10	HF(S)-G10	HF(S)-F10	1¼B	(32{326})	500(*300)
HT(S)-G16	—	—	HF(S)-F16	2B	Note 2	1000(*600)
—	—	—	HF(S)-F24	3B(4B)	32{326}	2300

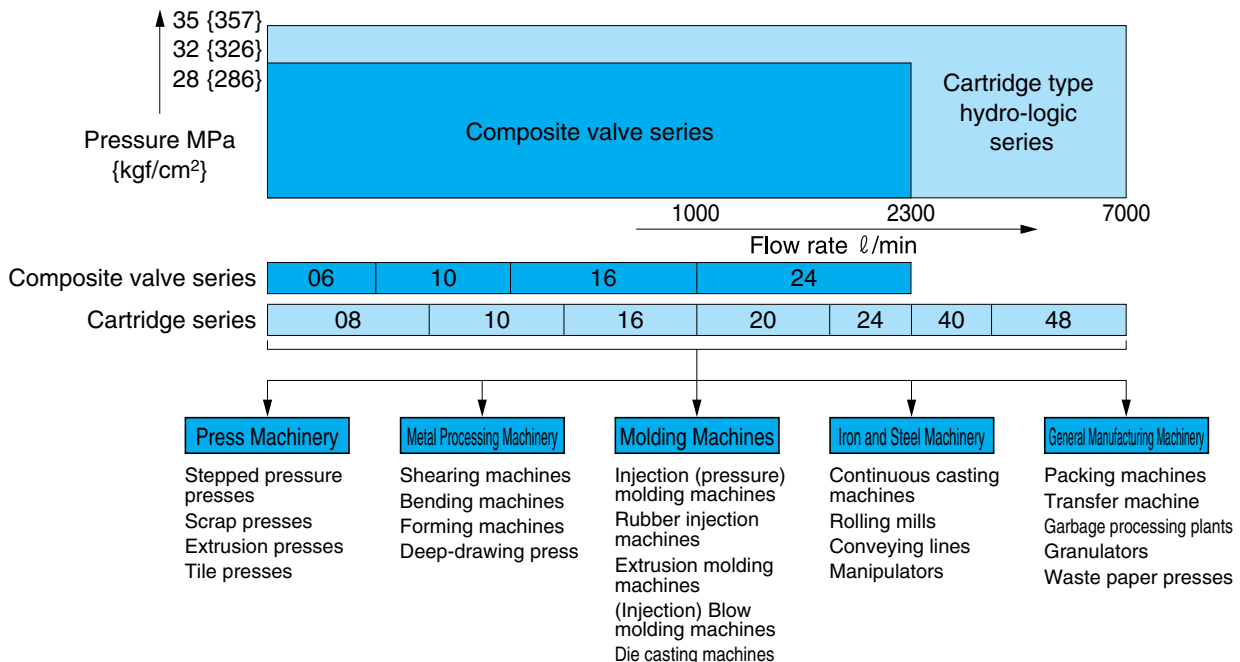
Note) 1.Flow rates marked with an asterisk (*) apply to 2-direction model number 2G* (pressure reducing valve).

2.The maximum operating pressure for 3-direction valves is 32MPa {326kgf/cm²}. For a 4-direction valve, maximum operating pressure can be 32MPa {326kgf/cm²} in accordance with specifications.

Main Circuit Symbol Examples

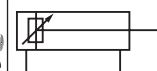


Applications



FJ Series General Purpose Hydraulic Cylinder

φ 30 to φ 250 × 1000ST
7, 14MPa



Features

- ① Standard series that conforms with JIS standards (JIS B8354-1985) A high level of general compatibility and interchangeability, plus very stable performance and quality.
- ② All component parts are completely standardized for quick delivery and easy parts replacement, maintenance, and inspection.
- ③ Specially selected materials used in tubes, rods, packing, bolts and all other parts ensures durability. In a tough environment.

For details see catalog number 9214.

Specifications

Item	7MPa{71.4kgf/cm ² }Series	14MPa{143kgf/cm ² }Series	Remarks
Maximum Working Pressure	7MPa{71.4kgf/cm ² }	14MPa{143kgf/cm ² }	When using a meter out inhibitor, take care that pressure generated in the rod side cylinder chamber does not exceed the limits shown to the left.
Withstand Pressure	10.5MPa{107kgf/cm ² }	21MPa{214kgf/cm ² }	
Minimum Operating Pressure	0.3MPa{3.06kgf/cm ² }	0.3MPa{3.06kgf/cm ² }	
Load Pressure Coefficient	At least 95%		
Allowable Maximum Speed	18m/min		
Allowable Minimum Speed	0.3m/min		
Cylinder Inside Diameter (mm)	30, 40, 50, 63, 80, 100, 125, 140 150, 160, 180, 200, 224, 250		
Stroke	Standard up to 1000mm.		See page K-2 for strokes greater than 1000mm.
Rod Diameter	See JIS B8354 Table 5, Series B and C.		
Operating Fluid and Fluid Temperature	Operating Fluid : Mineral oil hydraulic fluid Oil Temperature : -10°C to 80°C		Fire resistant hydraulic fluid is also handled as standard products. Contact your agent for more information.
Paint Color	Mancel No 5B 6/3 Melamin No. 51		Or red rust-resistant paint

Note) Contact your agent for non-standard requirements.

The following series are also available.

- FH Series (21MPa)
- FJS Series (with switch)
- FL Series (3.5MPa)
- FJM Series (Mill)

Cylinder Specifications (Major Characteristics Calculated Values)

		Cylinder Inside Diameter mm															
		30	40	50	63	80	100	125	140	150	160	180	200	224	250		
Major Characteristics																	
Port Diameter Rc (Previously PT)		3/8	3/8	1/2	1/2	3/4	3/4	1	1	1	1	1 1/4	1 1/2	1 1/2	2		
Head Side Area (cm ²)		7	12.5	19.6	31.1	50.2	78.5	122.7	153.9	176.7	201	254.4	314.1	394	490.8		
Rod Diameter Series B	Rod Diameter (mm)	18	22.4	28	35.5	45	56	71	80	85	90	100	112	125	140		
	Rod Side Area (cm ²)	4.5	8.6	13.5	21.3	34.3	53.9	83.2	103.7	120	137.4	175.9	215.6	271.3	336.9		
	Rod Area (cm ²)	2.5	3.9	6.1	9.8	15.9	24.6	39.5	50.2	56.7	63.6	78.5	98.5	122.7	153.9		
	Speed Ratio	Forward	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		Reverse	1.55	1.45	1.45	1.46	1.46	1.45	1.47	1.48	1.47	1.46	1.44	1.45	1.45	1.45	
	Output kN (kgf)	7MPa {71.4kgf/cm ² }	Forward	4.90 {500}	8.75 {893}	13.72 {1400}	21.77 {2221}	35.14 {3584}	54.95 {5605}	85.89 {8761}	107.73 {10988}	123.69 {12616}	140.70 {14351}	178.08 {18164}	219.87 {22427}	275.80 {28132}	343.56 {35043}
			Reverse	3.15 {321}	6.02 {614}	9.45 {964}	14.91 {1521}	24.01 {2449}	37.73 {3848}	58.24 {5940}	72.59 {7404}	84.00 {8568}	96.18 {9810}	123.13 {12559}	150.92 {15394}	189.91 {19371}	235.83 {24055}
		14MPa {143kgf/cm ² }	Forward	9.80 {1001}	17.50 {1788}	27.44 {2803}	43.54 {4447}	70.28 {7179}	109.90 {11226}	171.78 {17546}	215.46 {22008}	247.38 {25268}	281.40 {28743}	356.16 {36379}	439.74 {44916}	551.60 {56342}	687.12 {70184}
			Reverse	6.30 {644}	12.04 {1230}	18.90 {1931}	29.82 {3046}	48.02 {4905}	75.46 {7708}	116.48 {11898}	145.18 {14829}	168.00 {17160}	192.36 {19648}	246.26 {25154}	301.84 {30831}	379.82 {38796}	471.66 {48177}
	Rod Diameter Series C	Rod Diameter (mm)	-	18	22.4	28	35.5	45	56	63	67	-	-	-	-	-	
Rod Side Area (cm ²)		-	10	15.7	25	40.4	62.6	98.1	122.8	141.5	-	-	-	-	-		
Rod Area (cm ²)		-	2.5	3.9	6.1	9.8	15.9	24.6	31.1	35.2	-	-	-	-	-		
Speed Ratio		Forward	-	1	1	1	1	1	1	1	1	-	-	-	-	-	
		Reverse	-	1.25	1.24	1.24	1.24	1.25	1.25	1.25	1.24	-	-	-	-	-	
Output kN (kgf)		7MPa {71.4kgf/cm ² }	Forward	-	8.75 {893}	13.72 {1400}	21.77 {2221}	35.14 {3584}	54.95 {5605}	85.89 {8761}	107.73 {10988}	123.69 {12616}	-	-	-	-	
			Reverse	-	7.00 {714}	10.99 {1121}	17.50 {1785}	28.28 {2885}	43.82 {4470}	68.67 {7004}	85.96 {8768}	99.05 {10103}	-	-	-	-	
		14MPa {143kgf/cm ² }	Forward	-	17.50 {1788}	27.44 {2803}	43.54 {4447}	70.28 {7179}	109.90 {11226}	171.78 {17546}	215.46 {22008}	247.38 {25268}	-	-	-	-	
			Reverse	-	14.00 {1430}	21.98 {2245}	35.00 {3575}	56.56 {5777}	87.64 {8952}	137.34 {14028}	171.92 {17560}	198.10 {20235}	-	-	-	-	
Cushion Stroke (mm)		-		20				25					30		35		

Note) 1.Non-cushion (N) is standard for inside diameter φ30. Contact your agent for information about cushions.

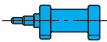
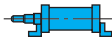
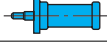
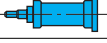



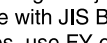

2.Speed ratio and out output specifications are theoretical values based on a JIS B8354 rod diameter.

Understanding Model Numbers

FJ - FA N 1 J 100 B 1000 T R - 21

Cylinder name _____

Mounting _____

LA type	Axial right-angle foot type	
*LB type	Axial foot type	
*FA type	Rod side flange type	
*FY type	Head side flange type	
*FB type	Head side flange type	
*FZ type	Head side flange type	
CA type	Rear clevis type	
TA type	Rod side trunnion type	
TC type	Intermediate trunnion type	

*LB, FA, and FB types are for 7Mpa {71.4kgf/cm²} high operating pressure types in accordance with JIS B8354. For flange types under higher pressures, use FY or FZ.

Cushioning _____

N	None
H	Head side cushioning
R	Rod side cushioning
B	Both side cushioning

Pressure classification _____

1	Maximum operating pressure: 7MPa{71.4kgf/cm ² }
2	Maximum operating pressure: 14MPa{143kgf/cm ² }

Bellows _____

A	Conex
C	Silicon
J	Nylon/tarpaulin (standard)
K	Neoprene
None	None

Cylinder I.D. _____

Rod diameter sequence (B, C) _____

Cylinder stroke _____

Stroke up to 1000mm is standard. See the following table for strokes greater than 1000mm.

Series	Inside diameter		
	30 · 40	50 to 150	180 to 250
7MPa{71.4kgf/cm ² }	1500	2000	1500 1501 to 2000
14MPa{143kgf/cm ² }	1500	2000	800 801 to 2000
Cover Fixing System	Tie Rod		Screw In Flange

Note) 1. Use a Nomograph to determine rod buckling.
2. With the screw in flange system, the tube and flange are fixed by being screwed in.

● Handling

Note the following installation and handling precautions to get the most out of cylinder performance and to obtain the long service life for which cylinders are designed.

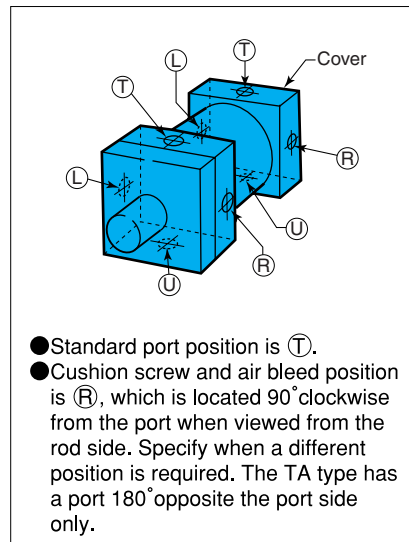
- 1] Cylinders are designed for rigidity. Be sure to secure them in place with bolts.
- 2] Install cylinders in a location that allows their easy removal, maintenance, and inspection.

- 3] When installing a cylinder in a location where the air quality is poor, or where there are large amounts of dust, metal powder, or other contaminants, install dust covers on the rod and shell to protect them.
- 4] When installing a cylinder, align it with the center of the slide, and make sure it is not subjected to lateral or rotational force by the piston or rod. When lateral force is

unavoidable, make sure it does not exceed 1/100 of cylinder maximum output.

- 5] When coupling the piston rod and machinery, adjust so there is no unnecessary force applied to the piston rod sliding bush.
- 6] For other details, see catalog number 9214.

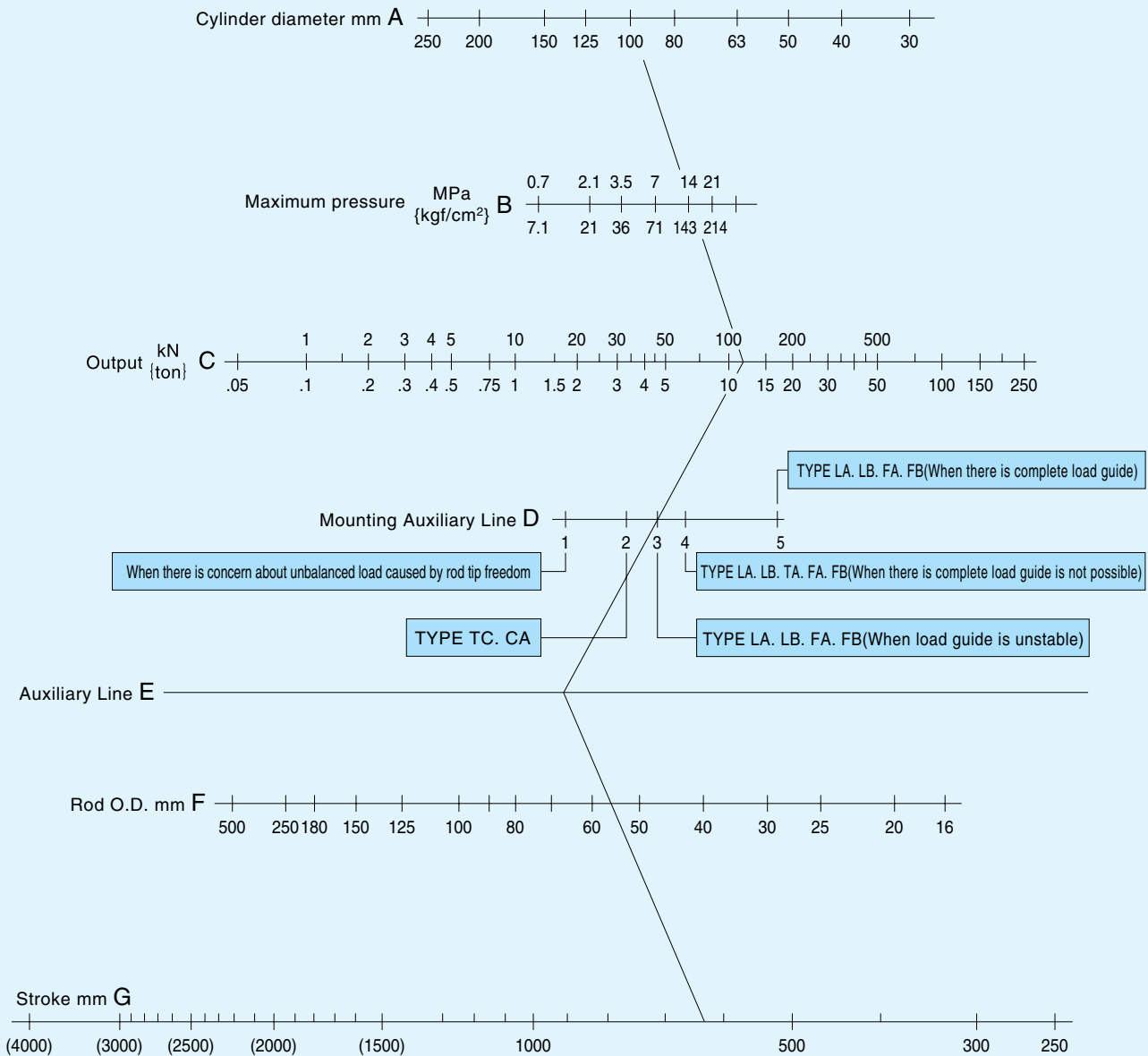
Design number
Cushion, air bleeder position
Port position



Nomograph

(Operation Conditions, Load, Rod, Stroke)

- Back Ring Safety Factor 4 According to Euler Equation



Note) TC type is intermediate trunnion type

- Nomograph Application Example
 - Determining Maximum Stroke
- The maximum stroke under the following operating conditions can be easily determined as shown below.

Operating Environment

- Cylinder I.D. : $\phi 100\text{mm}$
- Maximum Working Pressure: 14MPa{143kgf/cm²}
- Mounting Method : FA type (Rod Side Flange)
- Load Guide Condition : Unstable
- Piston Rod Diameter : 56mm

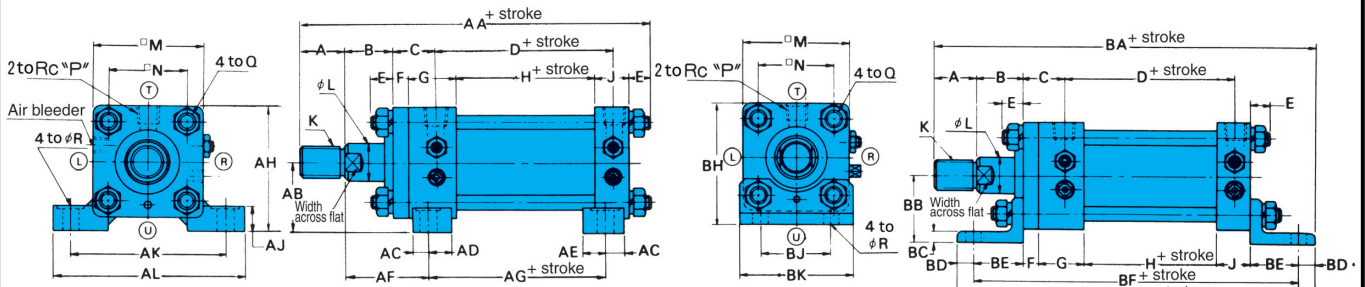
Determining Maximum Stroke

- 1 Draw a line through 100mm on Line A (Cylinder I.D.) and 14 on Line B (Maximum Pressure), and extend it to Line C (Output). The point of intersection on Line C is at 110kN.
- 2 Draw a line from 100kN on Line C to point 3 (FA type, unstable load guide) on Line D (Mounting Type Auxiliary Line), and then extend the line until it intersects with Line E.
- 3 Draw a line from the point of intersection on Line E to 56mm on Line F (Rod Diameter) and then extend the line until it intersects with Line G (Stroke). This indicates a maximum stroke of about 630mm.

Installation Dimension Drawings

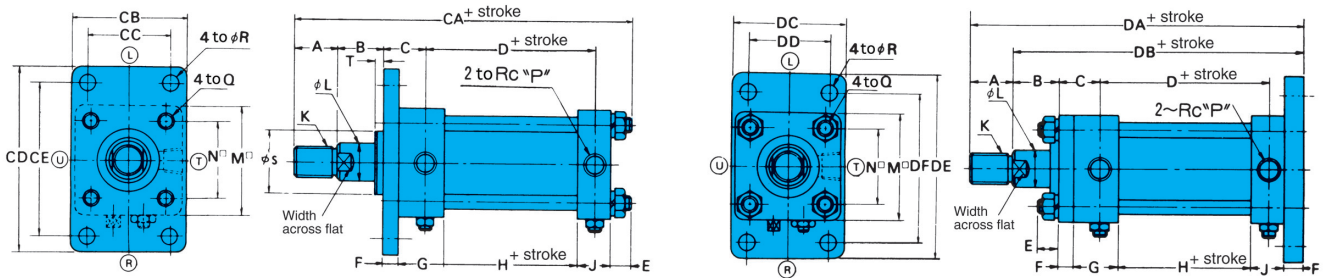
LA Type 7MPa{71.4kgf/cm²}.14MPa{143kgf/cm²}

LB Type 7MPa{71.4kgf/cm²}

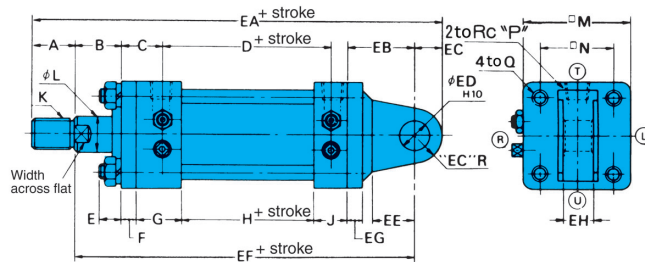


FA Type 7MPa{71.4kgf/cm²}

FB Type 7MPa{71.4kgf/cm²}

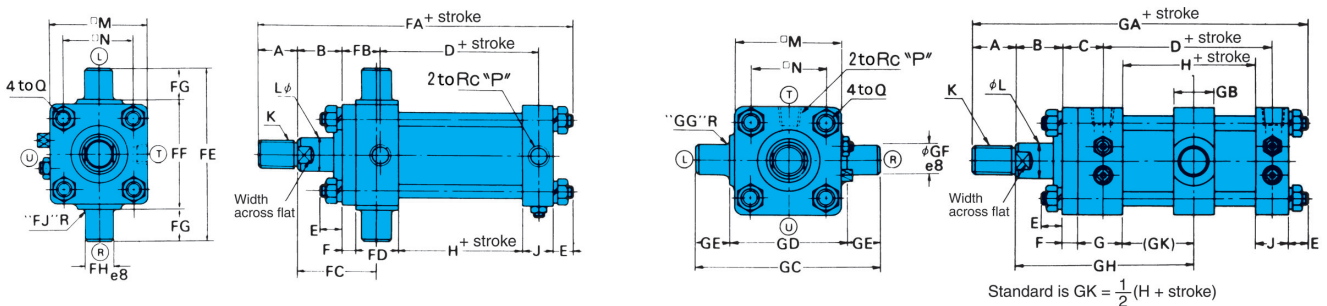


CA Type 7MPa{71.4kgf/cm²}.14MPa{143kgf/cm²}



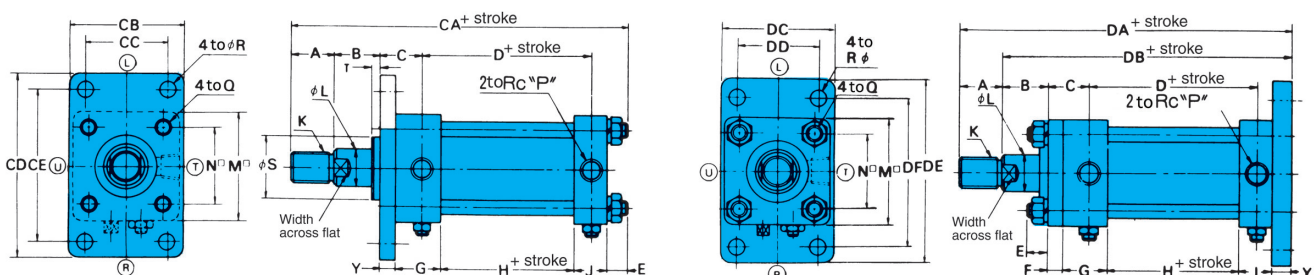
TA Type 7MPa{71.4kgf/cm²}.14MPa{143kgf/cm²}

TC Type 7MPa{71.4kgf/cm²}.14MPa{143kgf/cm²}



FY Type 7MPa{71.4kgf/cm²}.14MPa{143kgf/cm²}

FZ Type 7MPa{71.4kgf/cm²}.14MPa{143kgf/cm²}



K Hydraulic Cylinder

Symbol		Inside diameter															
		30	40	50	63	80	100	125	140	150	160	180	200	224	250		
Common	Rod diameter	Series B	A	25	30	35	45	60	75	95	110	115	120	140	150	180	195
			※ S	36	40	46	55	65	80	95	105	110	115	125	140	150	170
			※ T	10	10	10	10	10	10	10	10	10	10	10	10	10	10
		K	M16 P1.5	M20 P1.5	M24 P1.5	M30 P1.5	M39 P1.5	M48 P1.5	M64 P2	M72 P2	M76 P2	M80 P2	M95 P2	M100 P2	M120 P2	M130 P2	
		L	18	22.4	28	35.5	45	56	71	80	85	90	100	112	125	140	
		Width across flat	14	19	24	30	41	50	65	75	80	85	95	105	115	130	
		A	—	25	30	35	45	60	75	80	85	—	—	—	—	—	
		※ S	—	36	40	46	55	65	80	85	90	—	—	—	—	—	
		※ T	—	10	10	10	10	10	10	10	10	—	—	—	—	—	
		K	—	M16 P1.5	M20 P1.5	M24 P1.5	M30 P1.5	M39 P1.5	M48 P1.5	M56 P2	M60 P2	—	—	—	—	—	
	L	—	18	22.4	28	35.5	45	56	63	67	—	—	—	—	—		
	Width across flat	—	14	19	24	30	41	50	55	60	—	—	—	—	—		
	B	30	30	30	35	35	40	45	50	50	55	55	55	60	65		
	C	38	38	42	46	56	58	67	69	71	74	75	85	89	106		
	C(FY Type only)	40	40	47	51	62	66	76	80	82	84	88	99	106	125		
	D	90	90	98	102	110	116	130	138	146	156	172	184	184	200		
	E	11	13	13	16	20	24	26	28	31	31	34	38	45	50		
	H	60	60	64	68	70	76	80	88	96	104	86	90	90	90		
	J	28	28	32	32	38	38	48	48	48	49	71	79	79	95		
	M	55	65	75	90	110	135	165	185	196	210	235	262	292	325		
	N	40	46	54	66	82	100	126	138	150	160	182	200	225	250		
	P	3/8	3/8	1/2	1/2	3/4	3/4	1	1	1	1	1 1/4	1 1/2	1 1/2	2		
	Q	M8 P1.25	M10 P1.5	M10 P1.5	M12 P1.5	M16 P1.5	M18 P1.5	M22 P1.5	M24 P1.5	M27 P1.5	M27 P1.5	M30 P1.5	M33 P1.5	M39 P1.5	M42 P1.5		
	F	11	11	13	15	18	20	24	26	28	31	33	37	41	46		
	G	42	42	46	48	58	58	68	68	68	69	85	95	95	115		
	R	11	11	14	18	18	22	26	26	30	33	33	36	42	45		
	Y	13	13	18	20	24	28	33	37	39	41	46	51	58	65		
LA Type	AA	207	214	233	259	299	331	386	418	436	459	504	544	590	656		
	AB	35	37.5	45	50	60	71	85	95	106	112	125	140	150	170		
	AC	13	13	14	18	18	22	25	25	28	31	35	39	39	47		
	AD	31	31	34	32	42	38	41	41	38	40	50	56	56	68		
	AE	31	31	34	32	42	38	41	41	38	40	36	40	40	48		
	AF	57	57	60	71	74	85	99	106	111	122	123	131	140	158		
	AG	98	98	108	106	124	122	136	144	146	150	172	186	186	206		
	AH	62.5	70	82.5	95	115	138.5	167.5	187.5	204	217	242.5	271	296	332.5		
	AJ	14	14	17	19	25	27	32	35	37	42	47	52	52	57		
	AK	88	95	115	132	155	190	224	250	270	285	315	355	395	425		
	AL	109	118	145	165	190	230	272	300	320	345	375	425	475	515		
	LB Type	BA	241	246	270	303	349	385	455	490	510	538	595	644	705	786	
BB		40	43	50	60	72	85	105	115	123	132	148	165	185	208		
BC		8	8	8	10	12	12	15	18	18	18	20	25	30	35		
BD		13	13	15	18	20	23	29	30	30	35	40	40	45	50		
BE		32	32	35	42	50	55	66	70	75	75	85	98	115	130		
BF		205	205	225	247	284	302	352	370	390	403	445	497	535	606		
BG		231	231	255	283	324	348	410	430	450	473	525	577	625	706		
BH		67.5	75.5	87.5	105	127	152.5	187.5	207.5	221	237	265.5	296	331	370.5		
BJ		40	46	58	65	87	109	130	145	155	170	185	206	230	250		
BK		63	69	85	98	118	150	175	195	210	225	243	272	310	335		
FA FY Type	CA(FA Type)	207	214	233	259	299	331	386	418	436	459	504	544	590	656		
	CA(FY Type)	209	216	238	264	305	339	395	429	447	469	517	558	607	675		
	CB	63	69	85	98	118	150	175	195	210	225	243	272	310	335		
	CC	40	46	58	65	87	109	130	145	155	170	185	206	230	250		
	CD	109	118	145	165	190	230	272	300	320	345	375	425	475	515		
	CE	88	95	115	132	155	190	224	250	270	285	315	355	395	425		
FB FZ Type	DA(FB Type)	207	212	233	258	297	327	384	416	433	459	503	543	586	652		
	DA(FZ Type)	209	214	238	263	303	335	393	427	444	469	516	557	603	671		
	DB(FB Type)	182	182	198	213	237	252	289	306	318	339	363	393	406	457		
	DB(FZ Type)	184	184	203	218	243	260	298	317	329	349	376	407	423	476		
	DC	63	69	85	98	118	150	175	195	210	225	243	272	310	335		
	DD	40	46	58	65	87	109	130	145	155	170	185	206	230	250		
	DE	109	118	145	165	190	230	272	300	320	345	375	425	475	515		
	DF	88	95	115	132	155	190	224	250	270	285	315	355	395	425		

Symbol		Inside diameter													
		34	40	50	63	80	100	125	140	150	160	180	200	224	250
CA Type	EA	250	255	285	337.5	382.5	431	510	573	590	636	700	766	830	891
	EB	38	38	45	63	72	84	100	120	122	137	150	170	185	185
	EC	16	16	20	31.5	31.5	40	50	63	63	71	80	90	100	100
	ED	16	16	20	31.5	31.5	40	50	63	63	71	80	90	100	100
	EE	20	20	25	40	40	50	63	80	80	90	100	115	125	125
	EF	209	209	230	261	291	316	365	400	412	445	480	526	550	596
	EG	12	12	14	17	20	23	27	25	32	33	35	37	41	45
	EH	25 ^{-0.1} _{-0.4}	25 ^{-0.1} _{-0.4}	31.5 ^{-0.1} _{-0.4}	40 ^{-0.1} _{-0.4}	40 ^{-0.1} _{-0.4}	50 ^{-0.1} _{-0.4}	63 ^{-0.1} _{-0.4}	80 ^{-0.1} _{-0.6}	80 ^{-0.1} _{-0.6}	80 ^{-0.1} _{-0.6}	100 ^{-0.1} _{-0.6}	125 ^{-0.1} _{-0.6}	125 ^{-0.1} _{-0.6}	125 ^{-0.1} _{-0.6}
TA Type	FA	207	214	233	259	299	331	386	418	436	469	504	544	600	656
	FB	38	38	42	46	56	58	67	69	71	84	75	85	99	106
	FC	62	62	66	74	82	89	103	112	112	126	130.5	139.5	153.5	168.5
	FD	42	42	46	48	58	58	68	68	68	79	85	95	105	115
	FE	98	109	135	161	181	225	275	321	332	360	403	452	500	535
	FF	58 ⁰ _{-0.5}	69 ⁰ _{-0.5}	85 ⁰ _{-0.5}	98 ⁰ _{-0.5}	118 ⁰ _{-0.5}	145 ⁰ _{-0.5}	175 ⁰ _{-0.5}	195 ⁰ _{-0.5}	206 ⁰ _{-0.5}	218 ⁰ _{-0.5}	243 ⁰ _{-0.5}	272 ⁰ _{-0.5}	300 ⁰ _{-0.5}	335 ⁰ _{-0.5}
	FG	20	20	25	31.5	31.5	40	50	63	63	71	80	90	100	100
	FH	20 ^{-0.040} _{-0.073}	20 ^{-0.040} _{-0.073}	25 ^{-0.040} _{-0.073}	31.5 ^{-0.050} _{-0.089}	31.5 ^{-0.050} _{-0.089}	40 ^{-0.050} _{-0.089}	50 ^{-0.050} _{-0.089}	63 ^{-0.060} _{-0.106}	63 ^{-0.060} _{-0.106}	71 ^{-0.060} _{-0.106}	80 ^{-0.060} _{-0.106}	90 ^{-0.072} _{-0.126}	100 ^{-0.072} _{-0.126}	100 ^{-0.072} _{-0.126}
FJ	2	2	2.5	2.5	2.5	3	3	4	4	4	4	5	5	5	
TC Type	GA	207	214	233	259	299	331	386	418	436	459	504	544	590	656
	GB	28	28	33	43	43	53	58	78	78	88	98	108	117	117
	GC	98	109	135	161	181	225	275	321	332	360	403	452	500	535
	GD	58 ⁰ _{-0.5}	69 ⁰ _{-0.5}	85 ⁰ _{-0.5}	98 ⁰ _{-0.5}	118 ⁰ _{-0.5}	145 ⁰ _{-0.5}	175 ⁰ _{-0.5}	195 ⁰ _{-0.5}	206 ⁰ _{-0.5}	218 ⁰ _{-0.5}	243 ⁰ _{-0.5}	272 ⁰ _{-0.5}	300 ⁰ _{-0.8}	335 ⁰ _{-0.8}
	GE	20	20	25	31.5	31.5	40	50	63	63	71	80	90	100	100
	GF	20 ^{-0.040} _{-0.073}	20 ^{-0.040} _{-0.073}	25 ^{-0.040} _{-0.073}	31.5 ^{-0.050} _{-0.089}	31.5 ^{-0.050} _{-0.089}	40 ^{-0.050} _{-0.089}	50 ^{-0.050} _{-0.089}	63 ^{-0.060} _{-0.106}	63 ^{-0.060} _{-0.106}	71 ^{-0.060} _{-0.106}	80 ^{-0.060} _{-0.106}	90 ^{-0.072} _{-0.126}	100 ^{-0.072} _{-0.126}	100 ^{-0.072} _{-0.126}
	GG	2	2	2.5	2.5	2.5	3	3	4	4	4	4	5	5	5
	☆ GH	113+ ST ₂	113+ ST ₂	121+ ST ₂	132+ ST ₂	146+ ST ₂	156+ ST ₂	177+ ST ₂	188+ ST ₂	194+ ST ₂	207+ ST ₂	216+ ST ₂	232+ ST ₂	241+ ST ₂	271+ ST ₂

☆ : Specify when GH dimensions are different from those shown above.

Note) 1.ST is stroke.

2.The overall length dimensions are B Series dimensions. For Series C, Dimension A is different, so overall length is also different.

3.S and T rows marked with an asterisk (*) are FY type typical values. See FY Type for other types of mounting.

• Weight Table

Unit : kg

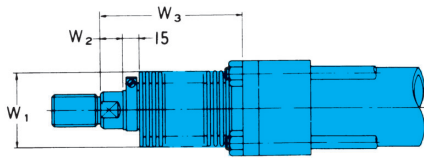
Model No.		Cylinder I.D.														
		30	40	50	63	80	100	125	140	150	160	180	200	224	250	
Rod Diameter Series B	Weight at Zero Stroke	LA	3.8	4.2	6.0	9.3	17.8	27.7	46.7	67.3	75.3	94.7	122.8	168.2	229.5	304.2
		LB	4	4.4	6.3	9.9	18.2	29.0	49.7	69.2	80.6	98.3	126.7	171.3	232.0	309.2
		FA	3.7	4.1	6.3	9.6	17.0	26.7	48.4	66.4	74.2	94	122.6	163.3	207.5	284.0
		FY	3.8	4.2	6.8	10.3	18.0	28.9	51.8	71.4	80.0	100.1	131.9	176.0	227.2	309.8
		FB	4.1	4.5	6.9	10.6	18.6	29.4	53.2	73.7	82.5	105.33	136.3	182.7	243.0	322.2
		FZ	4.2	4.6	7.4	11.3	19.6	31.6	56.6	78.7	88.3	111.4	145.6	195.4	262.7	348.0
		CA	4.2	4.6	7.0	11.1	18.9	31.1	56.5	78.6	88.0	110.8	151.0	203.6	267.3	339.2
		TA	3.6	4.0	6.2	9.4	16.6	26.3	48.0	66.2	73.7	92.9	121.9	162.7	206.0	281.5
		TC	4.1	4.5	6.6	10.6	18.0	28.5	51.3	74	79.8	103.7	133.8	180.2	236.0	309.2
	Weight at 100mm Stroke	0.8	1.1	1.4	2.2	3.4	4.9	7.9	10	12.2	13.1	17.4	21.4	27.2	33.6	
Rod Diameter Series C	Weight at Zero Stroke	LA	-	4.1	5.8	8.8	16.9	26.3	43.8	63.3	70.7	-	-	-	-	-
		LB	-	4.3	6.1	9.4	17.3	27.6	46.8	65.2	76	-	-	-	-	-
		FA	-	4.0	6.1	9.1	16.1	25.3	45.5	62.4	69.6	-	-	-	-	-
		FY	-	4.1	6.6	9.8	17.1	27.5	48.9	77.4	75.4	-	-	-	-	-
		FB	-	4.4	6.7	10.1	17.7	28	50.3	69.7	77.9	-	-	-	-	-
		FZ	-	4.5	7.2	10.8	18.7	30.2	53.7	74.7	83.7	-	-	-	-	-
		CA	-	4.5	6.8	10.6	18	29.7	53.6	74.6	83.4	-	-	-	-	-
		TA	-	3.9	6.0	8.9	15.7	24.9	45.1	62.2	69.1	-	-	-	-	-
		TC	-	4.4	6.4	10.1	17.1	27.1	48.4	70	75.2	-	-	-	-	-
	Weight at 100mm Stroke	-	1.0	1.2	1.9	2.9	4.2	6.7	8.5	10.5	-	-	-	-	-	

Note) Cylinder weight is the total of the zero stroke weight plus the stroke weight.

● Rod Cover Mounting Method

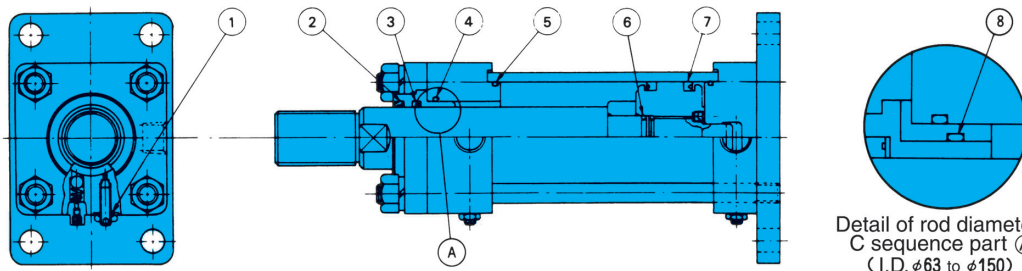
Symbol		Inside diameter														
		30	40	50	63	80	100	125	140	150	160	180	200	224	250	
W ₁	Rod diameter	B	50	50	60	70	80	100	120	130	140	140	150	170	180	200
		C	—	50	50	60	70	80	100	120	130	—	—	—	—	—
W ₂			20	20	20	30	30	30	40	40	40	40	40	50	50	
W ₃			45 + $\frac{ST}{3.5}$	45 + $\frac{ST}{3.5}$	45 + $\frac{ST}{3.5}$	55 + $\frac{ST}{4}$	55 + $\frac{ST}{4}$	55 + $\frac{ST}{4}$	65 + $\frac{ST}{5}$	65 + $\frac{ST}{5}$	65 + $\frac{ST}{5}$	65 + $\frac{ST}{5}$	65 + $\frac{ST}{5}$	80 + $\frac{ST}{6}$	80 + $\frac{ST}{6}$	

ST is stroke.



- Note) 1.The decimal part of the W₃ dimension is rounded down.
 2.This diagram shows dimensions for nylon tarpaulin (Standard: 80°C max. heat resistance), neoprene (130°C max. heat resistance), silicon (220°C max. heat resistance), and conex (300°C max. heat resistance), which are used with the standard FJ cylinder. Heat resistance does not indicate constant temperature, but maximum temperature within a short period. Asbestos/aluminum (400°C max. heat resistance) and other materials are also available, and using such materials changes the W₃ dimension. Contact your agent for more information.
 3.Use a heat wall when there is particularly intense heat radiation due to ambient temperature. Also avoid high temperatures due to heat conduction.
 4.When a rod cover is required, specify with the symbol described in the section that explains model numbers.

● Packing Type List



Note)O-ring 1A/B-** refers to JIS B2401-1A/B.

Rod Diameter Series B

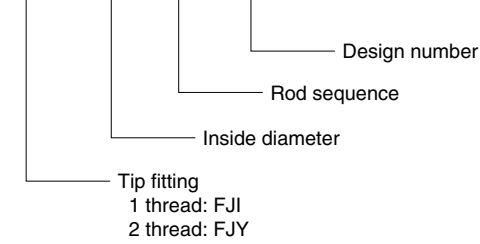
Part No.	1	2	3	4	5	6	7
Cylinder	Cushion Valve Nominal Diameter Screw Seat Packing (Fujikoshi)(Qty : 2)	Dust Seal SDR Type I.D. × O.D. × Height (Qty : 1)	Gland Packing SKY Type I.D. × O.D. × Height (Qty : 1)	Gland Bush Nominal Diameter (Qty : 1)	Cover Nominal Diameter (Qty : 2)	Piston I.D. Nominal Diameter (Qty : 1)	Piston Packing SKY Type I.D. × O.D. × Height (Qty : 2)
I.D.							
30	M10P1.5 × 3.5	18 × 26 × 4.5 × 6	18 × 26 × 5	1A-G30	1B-G25	1A-P14	22.4 × 30 × 5
40	M10P1.5 × 3.5	22.4 × 30.4 × 4.5 × 6	22.4 × 30 × 5	1A-G30	1B-G35	1A-P15	30 × 40 × 6
50	M10P1.5 × 3.5	28 × 36 × 4.5 × 6	28 × 35.5 × 5	1A-G35	1B-G45	1A-P20	40 × 50 × 6
63	M10P1.5 × 3.5	35.5 × 43.5 × 5 × 6.5	35.5 × 45 × 6	1A-G45	1B-G58	1A-G25	53 × 63 × 6
80	M10P1.5 × 3.5	45 × 53 × 5 × 6.5	45 × 55 × 6	1A-G55	1B-G75	1A-P32	71 × 80 × 6
100	M10P1.5 × 3.5	56 × 64 × 5 × 6.5	56 × 66 × 6	1A-G65	1B-G95	1A-G35	85 × 100 × 9
125	M10P1.5 × 3.5	71 × 81 × 6 × 8	71 × 80 × 6	1A-G80	1B-G120	1A-G45	112 × 125 × 8.5
140	M10P1.5 × 3.5	80 × 90 × 6 × 8	80 × 90 × 6	1A-G90	1B-G135	1A-G50	125 × 140 × 9
150	M10P1.5 × 3.5	85 × 95 × 6 × 8	85 × 100 × 9	1A-G95	1B-G145	1A-G55	136 × 150 × 8.5
160	M16P1.5 × 4.5	90 × 100 × 6 × 8	90 × 105 × 9	1A-G105	1B-G150	1A-G60	145 × 160 × 9
180	M16P1.5 × 4.5	100 × 110 × 6 × 8	100 × 115 × 9	1A-G115	1B-G170	1A-G70	165 × 180 × 9
200	M16P1.5 × 4.5	112 × 122 × 6 × 8	112 × 125 × 8.5	1A-G125	1B-G190	1A-G80	180 × 200 × 12
224	M16P1.5 × 4.5	125 × 138 × 7 × 9.5	125 × 140 × 9	1A-G140	1B-G214	1A-G90	204 × 224 × 12
250	M16P1.5 × 4.5	140 × 153 × 7 × 9.5	140 × 155 × 9	1A-G155	1B-G240	1A-G100	230 × 250 × 12

Rod Diameter Series C

Part No.	1	2	3	4	5	6	7	8
Cylinder	Cushion Valve Nominal Diameter Screw Seat Packing (Fujikoshi)(Qty : 2)	Dust Seal SDR Type I.D. × O.D. × Height (Qty : 1)	Gland Packing SKY Type I.D. × O.D. × Height (Qty : 1)	Gland Bush Nominal Diameter (Qty : 1)	Cover Nominal Diameter (Qty : 2)	Piston I.D. Nominal Diameter (Qty : 1)	Piston Packing SKY Type I.D. × O.D. × Height (Qty : 2)	Bush Nominal Diameter (Qty : 1)
I.D.								
40	M10P1.5 × 3.5	18 × 26 × 4.5 × 6	18 × 26 × 5	1A-G30	1B-35	1A-P15	30 × 40 × 6	—
50	M10P1.5 × 3.5	22.4 × 30.4 × 4.5 × 6	22.4 × 30 × 5	1A-G35	1B-45	1A-P20	40 × 50 × 6	—
63	M10P1.5 × 3.5	28 × 36 × 4.5 × 6	28 × 35.5 × 5	1A-G45	1B-58	1A-G25	53 × 63 × 6	1A-G35
80	M10P1.5 × 3.5	35.5 × 43.5 × 5 × 6.5	35.5 × 45 × 6	1A-G55	1B-75	1A-P32	71 × 80 × 6	1A-G45
100	M10P1.5 × 3.5	45 × 53 × 5 × 6.5	45 × 55 × 6	1A-G65	1B-95	1A-G35	85 × 100 × 9	1A-G55
125	M10P1.5 × 3.5	56 × 64 × 5 × 6.5	56 × 66 × 6	1A-G80	1B-120	1A-G45	112 × 125 × 8.5	1A-G65
140	M10P1.5 × 3.5	63 × 71 × 5 × 6.5	63 × 73 × 6	1A-G90	1B-135	1A-G50	125 × 140 × 9	1A-G75
150	M10P1.5 × 3.5	67 × 75 × 5 × 6.5	67 × 77 × 6	1A-G95	1B-145	1A-G55	136 × 150 × 8.5	1A-G80

• Tip Cap

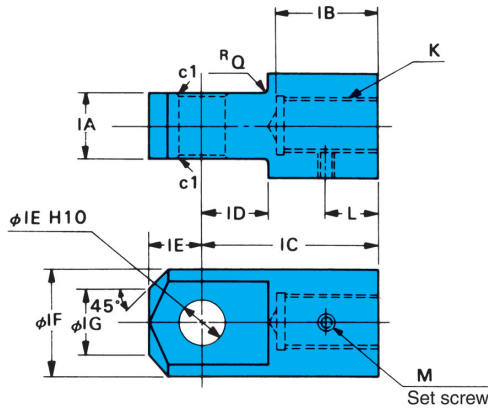
FJI - 40 - B - 10



1-Fork Tip Cap

Symbol		Inside diameter									
		30	40	50	63	80	100	125	140	150	
Common	IA	25 ^{+0.1} _{-0.4}	25 ^{+0.1} _{-0.4}	31.5 ^{+0.1} _{-0.4}	40 ^{+0.1} _{-0.4}	40 ^{+0.1} _{-0.4}	50 ^{+0.1} _{-0.4}	63 ^{+0.1} _{-0.4}	80 ^{+0.1} _{-0.6}	80 ^{+0.1} _{-0.6}	
	IC	50	55	65	92	107	135	168	210	215	
	ID	20	20	25	40	40	50	63	80	80	
	IE	16	16	20	31.5	31.5	40	50	63	63	
	IF	35	35	45	65	65	85	105	130	130	
	IG	25	25	32	40	40	55	68	85	85	
	L	15	15	15	15	15	20	20	20	20	
	M	M8	M8	M8	M8	M8	M10	M10	M10	M10	
	Q	2	2	2.5	2.5	2.5	3	3	4	4	
Rod diameter	Series B	IB	27	32	37	47	62	78	98	113	118
	Series C	K	M16 P1.5	M20 P1.5	M24 P1.5	M30 P1.5	M39 P1.5	M48 P1.5	M64 P2	M72 P2	M76 P2
Rod diameter	Series B	IB	-	27	32	37	47	62	78	83	88
	Series C	K	-	M16 P1.5	M20 P1.5	M24 P1.5	M30 P1.5	M39 P1.5	M48 P1.5	M56 P2	M60 P2

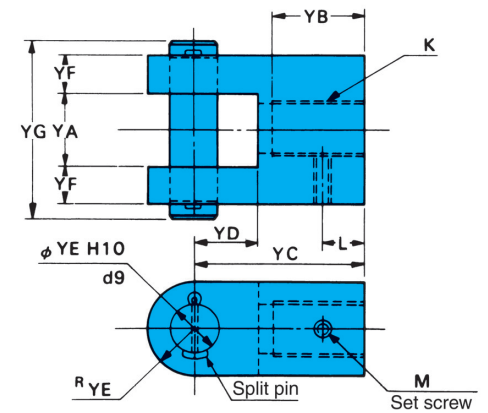
1-Fork Tip Cap



2-Fork Tip Cap

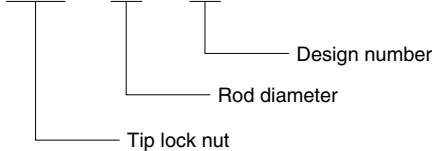
Symbol		Inside diameter									
		30	40	50	63	80	100	125	140	150	
Common	YA	25 ^{+0.4} _{+0.1}	25 ^{+0.4} _{+0.1}	31.5 ^{+0.4} _{+0.1}	40 ^{+0.4} _{+0.1}	40 ^{+0.4} _{+0.1}	50 ^{+0.4} _{+0.1}	63 ^{+0.4} _{+0.1}	80 ^{+0.6} _{+0.1}	80 ^{+0.6} _{+0.1}	
	YC	50	55	65	92	107	135	168	210	215	
	YD	20	20	25	40	40	50	63	80	80	
	YE	16	16	20	31.5	31.5	40	50	63	63	
	YF	12.5	12.5	16	20	20	25	31.5	40	40	
	YG	66	66	80	101	101	126	153	192	192	
	L	15	15	15	15	15	20	20	20	20	
	M	M8	M8	M8	M8	M8	M10	M10	M10	M10	
	YB	27	32	37	47	62	78	98	113	118	
Rod diameter	Series B	YB	27	32	37	47	62	78	98	113	118
	Series C	K	M16 P1.5	M20 P1.5	M24 P1.5	M30 P1.5	M39 P1.5	M48 P1.5	M64 P2	M72 P2	M76 P2
Rod diameter	Series B	YB	-	27	32	37	47	62	78	83	88
	Series C	K	-	M16 P1.5	M20 P1.5	M24 P1.5	M30 P1.5	M39 P1.5	M48 P1.5	M56 P2	M60 P2

2-Fork Tip Cap (With Pin)

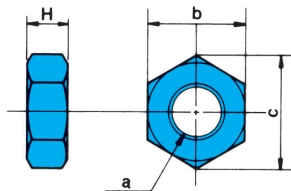


Locknut Type Description (Example)

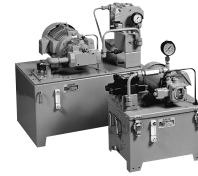
FJN - 28 - 10



Locknut (For FJ)



Symbol		Rod diameter										
		18	22.4	28	35.5	45	56	63	67	71	80	85
a	M16	M20	M24	M30	M39	M48	M56	M60	M64	M72	M76	
	P1.5	P1.5	P1.5	P1.5	P1.5	P1.5	P2	P2	P2	P2	P2	
b	24	30	36	46	60	75	85	90	95	105	110	
c	27.7	34.6	41.6	53.1	69.3	86.5	98.1	104	110	121	127	
H	10	12	14	18	23	29	34	36	38	42	46	



NACHI PACK (Standard Variable Pump Unit)

NACHI-PACK is a compact, low-cost standard unit that includes a variable vane pump (VDS, VDR, VDC Series) or a variable piston pump (PVS/PZS Series). The power unit is low-noise, low-heat, energy-efficient, and highly reliable. The NACHI PACK series has been expanded to include a choice of models that are optimized for a very wide range of needs. Available tank capacities range from 20 ℓ to 650 ℓ.

Features

Low energy, high efficiency

A built-in low-noise, high-efficiency NACHI variable pump ensures low-heat, high-efficiency, low-energy operation.

A rich range of options

A full selection of options include base block, cooler, terminal box, micro selector, oil pan, return filter, and more, so you can configure a unit that meets your particular needs.

A selection of versatile circuits

Virtually any type of circuit can be configured using ganged type NACHI modular valves.

Low cost, short lead time

Components are all standard and mass produced, so parts are readily available at low prices.

● Handling

- All pump rotation is clockwise (rightward) when viewed from the shaft side.
- See the table below for information about adjusting discharge volume and pressure.
- For operating fluid, use general mineral fluid type ISO VG32 to 68 or equivalent (Viscosity Index: 90 or greater).

	Adjusting Screw Rotation Direction	Pump type	
		VDS · VDC · PVS · PZS	VDR
Pressure	Clockwise	Increase	Decrease
	Counterclockwise	Decrease	Increase
Discharge rate	Clockwise	Decrease	
	Counterclockwise	Increase	

Specifications

- Note) ① Items marked with a star (☆) are NACHI PACK Series items.
 ② For direct connect type, use a Nachi Uni-pump.
 ③ Fluid temperature limit is room temperature +25°C setting conditions are full cutoff continual operation, tank located in a well-ventilated area.
 ④ An unload circuit is required when the motor is started under condition λ-Δ. Contact your agent about the unload circuit.
 ⑤ Unless specified otherwise, electrical systems and paint colors are NACHI standards (see page L-13).

Variable Vane Pump Series

Power supply for all types is 200V AC.

Model No.	Pump Model No.	Conne- ction	Motor (All External) kW, 4P	Tank Capacity ℓ	Full Cutoff Pressure at Tank Fluid Temperature Limit Note 3) (MPa/kgf/cm ²)			Approximate Weight kg
					No Fan Cooler	With Standard Fan Cooler	With High- power Fan Cooler	
☆ NCP-20-VD0A*-□-12	VDS-0B-1A*-10	Direct	0.4 0.75	20	3.5 (35.7)	-	-	27 30
☆ NCP-30-VD0A*-□-12	VDS-0B-1A*-10	Direct	0.75 1.5	30	4.5 (45.9)	-	-	33 43
(VC1A2) NCP-40-0.7VD1A2-□-12(21)	(VDC-1B-1A*-20) VDR-1B-1A*-22	Direct	0.75	40	3.0 (30.6)	8.0 (81.6)	-	70
(VC1A*) NCP-60-VD1A*-□-12(21)	(VDC-1B-1A*-20) VDR-1B-1A*-22	Direct	1.5 2.2 3.7	60	4.5 (45.9)	9.0 (91.8)	-	90 95 115
(VC1A3) NCP-100-3.7VD1A3-C-12(21)	(VDC-1B-2A3-20) VDR-1B-2A3-22	Direct	3.7	100	7.0 (71.4)	-	-	155
2A* NCP-160-VC2A*-□-12	VDC-2A-1A*-20 2A*	Coupling	5.5 7.5 11	160	3.5 (35.7)	6.5 (66.3)	8.5 (86.7)	240 250 300
2A* NCP-250-VC2A*-□-12	VDC-2A-1A*-20 2A*	Coupling	7.5 11 15	250	4.5 (45.9)	7.0 (71.4)	9.5 (96.9)	300 350 375
NCP-400-VC3A*-□-12	VDC-3A-1A*-20	Coupling	7.5 11 15 18.5 22	400	4.5 (45.9)	7.0 (71.4)	8.5 (86.7)	475 505 525 560 590
NCP-650-VC3A*-□-12	VDC-3A-1A*-20	Coupling	11 15 18.5 22 30	650	6.0 (61.2)	8.5 (86.7)	10.0 (102.0)	600 620 660 685 750

- Note) 1. Contact your agent when mounting motors enclosed in parentheses. These motors require special handling concerning operating pressure, heat generation, etc.
 2. Equip a return filter for pressures of 7MPa or greater.
 3. A radiator is equipped as standard with the 100 ℓ type.

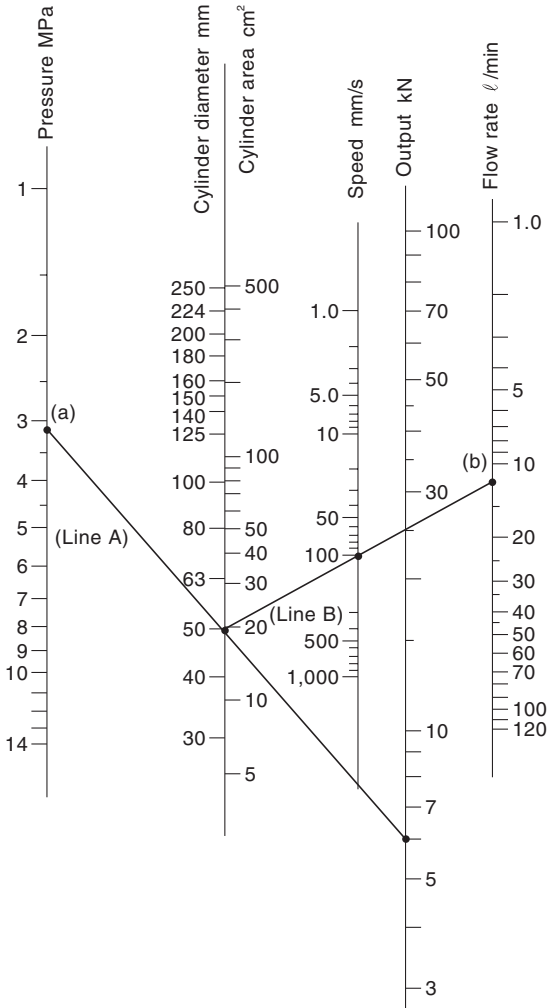
Variable Piston Pump Series

Power supply for all types is 200V AC.

Model No.	Pump Model No.	Conne- ction	Motor (All External) kW, 4P	Tank Capacity ℓ	Full Cutoff Pressure at Tank Fluid Temperature Limit Note 3) (MPa/kgf/cm ²)			Approximate Weight kg
					No Fan Cooler	With Standard Fan Cooler	With High- power Fan Cooler	
☆ NCP-30-PV8N*-R-12	PVS-0B-8N*-30	Direct	0.75 1.5	30	5.0 (51.0)	-	-	43 46
NCP-40-PV8N*-R-12	PVS-0B-8N*-30	Direct	0.75 1.5	40	5.0 (51.0)	21.0 (214.1)	-	75 80
NCP-60-PV8N*-R-12	PVS-0B-8N*-30	Direct	1.5 2.2 3.7	60	7.0 (71.4)	21.0 (214.1)	-	90 95 115
NCP-40-PV16N*-R-12(21)	PVS-1B-16N*-12	Direct	0.75 1.5	40	4.5 (45.9)	21.0 (214.1)	-	75 80
NCP-60-PV16N*-R-12(21)	PVS-1B-16N*-12	Direct	1.5 2.2 3.7	60	7.0 (71.4)	21.0 (214.1)	-	90 95 115
NCP-100-PV16 ¹⁶ ₂₂ N*-R-12(21)	PVS-1B-16 ¹⁶ ₂₂ N*-12	Coupling	3.7 5.5 7.5	100	8.5 (86.7)	21.0 (214.1)	-	145 170 185
NCP-160-PV35N*-R-12	PVS-2B-35N*-12	Coupling	5.5 7.5 11	160	7.0 (71.4)	14.0 (142.7)	21.0 (214.1)	235 245 295
NCP-250-PV35 ³⁵ ₄₅ N*-R-12	PVS-2B-35 ³⁵ ₄₅ N*-12	Coupling	7.5 11 15	250	9.5 (96.9)	17.0 (173.3)	21.0 (214.1)	295 345 370
NCP-400-PV70N*-R-12	PZS-3B-70N*-10	Coupling	7.5 11 15 18.5 22	400	5.5 (56.1)	14.0 (142.7)	16.0 (163.1)	490 525 545 580 605
NCP-650-PV70N*-R-12	PZS-3B-70N*-10	Coupling	11 15 18.5 22 30	650	8.5 (86.7)	16.0 (163.1)	18.0 (183.5)	620 640 680 705 770

Note) All models in this series are equipped with a return filter as standard.

NACHI PACK Selection Chart



Flow rate ℓ /min	Area	Pressure MPa	NACHI PACK Model	
			Variable Vane Pump Series	Variable Piston Pump Series
5		1.0 to 3.5 3.5 to 4.5 3.5 to 5.0	NCP -20-0.4VD0A2012 -30-0.7VD0A3-12	NCP -30-0.7V8N1-R-12
10		1.0 to 3.5 3.5 to 4.5 4.5 to 8.0 8.0 to 14.0	NCP -20-0.7VD0A2-12 -30-1.5VD0A3-12	NCP -40-1.5PV16N2-CR-12(21) -60-2.2PV16N2-CR-12(21)
15	50/60Hz	1.0 to 3.0 3.0 to 4.5 4.5 to 7.0 7.0 to 14.0	NCP -40-0.7V*1A2-12(21) -60-1.5V*1A3-12(21)	NCP -60-2.2PV16N1-R-12(21) -60-3.7PV16N2-CR-12(21)
20		1.0 to 3.0 3.0 to 5.0 5.0 to 10.0 10.0 to 14.0	NCP -40-0.7V*1A2-12(21) -60-1.5V*1A3-12(21)	NCP -60-3.7PV16N2-(C)R-12(21) NCP -100-5.5PV16N2-CR-12(21)
25	50Hz	1.0 to 3.0 3.0 to 5.0 5.0 to 12.0 12.0 to 14.0	NCP -60-1.5V*1A2-12(21) -100-3.7V*1A3-C-12(21)	NCP -100-5.5PV22N2-(C)R-12(21) -100-7.5PV22N2-CR-12(21)
	60Hz	1.0 to 3.5 3.5 to 5.0 5.0 to 12.0 12.0 to 14.0	NCP -60-1.5V*1A2-12(21) -60-2.2V*1A3-C-12(21)	NCP -100-5.5PV16N2-(C)R-12(21) -100-7.5PV16N2-CR-12(21)
30	50/60Hz	1.0 to 3.5 3.5 to 5.0 5.0 to 8.0 8.0 to 14.0	NCP -60-2.2V*1A2-12(21) -100-3.7V*1A3-C-12(21)	NCP -100-5.5PV22N2-(C)R-12(21) -100-7.5PV22N2-CR-12(21)
35	50Hz	2.0 to 7.0 7.0 to 10.5 10.5 to 14.0	NCP -160-5.5VC2A3-(C)-12	NCP -160-7.5PV35N2-CR-12 -160-11PV35N2-CR-12
	60Hz	2.0 to 6.0 6.0 to 10.5 10.5 to 14.0	NCP -100-3.7V*1A3-C-12(21)	NCP -100-7.5PV22N2-CR-12(21)
40		2.0 to 7.0 7.0 to 10.0 10.0 to 14.0	NCP -160-5.5VC2A3-(C)-12	NCP -160-7.5PV35N2-CR-12 -160-11PV35N2-CR-12
50	50/60Hz	2.0 to 5.0 5.0 to 7.0 7.0 to 11.5 11.5 to 14.0	NCP -160-5.5VC2A3-(C)-12 -160-7.5VC2A3-C-12	NCP -160-11PV35N2-CR-12 -250-15PV45N2-CR-12
60	50Hz	2.0 to 7.0 7.0 to 10.0 10.0 to 14.0	NCP -250-5.5VC2A3-12 -250-7.5VC2A3-C-12	NCP -250-7.5PV45N2-R-12 -250-11PV45N2-CR-12 -250-15PV45N2-CR-12
	60Hz	2.0 to 4.5 4.5 to 7.0 7.0 to 10.0 10.0 to 13.5	NCP -250-5.5VC2A3-12 -250-7.5VC2A3-C-12	NCP -250-11PV35N2-CR-12 -250-15PV35N2-CR-12
75	50Hz	2.0 to 4.5 4.5 to 7.0 7.0 to 10.0 10.0 to 13.0	NCP -400-7.5VC3A3-12 -400-11VC3A3-C-12	NCP -400-15PV70N3-CR-12 -400-18.5PV70N3-CR-12
	60Hz	2.0 to 5.5 5.5 to 8.0 8.0 to 11.0 11.0 to 13.5	NCP -250-7.5PV45N1-R-12 -250-11PV45N2-(C)R-12 -250-15PV45N2-CR-12 -250-18.5PV45N2-CR-12	NCP -250-7.5PV45N1-R-12 -250-11PV45N2-(C)R-12 -250-15PV45N2-CR-12 -250-18.5PV45N2-CR-12
90	50/60Hz	2.0 to 4.0 4.0 to 6.5 6.5 to 9.0 9.0 to 11.5 11.5 to 13.5	NCP -400-7.5VC3A3-12 -400-11VC3A3-C-12	NCP -400-15PV70N3-CR-12 -400-18.5PV70N3-CR-12 -400-22PV70N3-CR-12
100	50Hz	2.0 to 6.0 6.0 to 8.0 8.0 to 10.0 10.0 to 12.0 12.0 to 14.0	NCP -650-11PV70N1-R-12 -650-15PV70N3-R-12 -650-18.5PV70N3-CR-12 -650-22PV70N3-CR-12 -650-30PV70N3-CR-12	NCP -650-11PV70N1-R-12 -650-15PV70N3-R-12 -650-18.5PV70N3-CR-12 -650-22PV70N3-CR-12 -650-30PV70N3-CR-12
	60Hz	2.0 to 6.0 6.0 to 8.0 8.0 to 10.0 10.0 to 12.0 12.0 to 14.0	NCP -650-11VC3A3-12	NCP -650-15PV70N3-R-12 -650-18.5PV70N3-CR-12 -650-22PV70N3-CR-12 -650-30PV70N3-CR-12
110	60Hz	2.0 to 5.5 5.5 to 7.0 7.0 to 9.0 9.0 to 11.0 11.0 to 14.0	NCP -650-11VC3A3-12 -650-15VC3A3-(C)-12	NCP -650-18.5PV70N3(C)R-12 -650-22PV70N3-CR-12 -650-30PV70N3-CR-12
120	60Hz	2.0 to 5.0 5.0 to 7.0 7.0 to 8.5 8.5 to 10.0 10.0 to 13.5	NCP -650-11VC3A3-12 -650-15VC3A3-(C)-12	NCP -650-11PV70N1-R-12 -650-15PV70N3-R-12 -650-18.5PV70N3-CR-12 -650-22PV70N3-CR-12 -650-30PV70N3-CR-12

[Example]

To determine the NACHI PACK model that drives a $\phi 50$ cylinder with an output of 6kN and speed of 100mm/s.

(a) Draw a line (Line A) between 6kN on the output line and the $\phi 50$ point on the cylinder diameter line. Extend Line A until it intersects with the pressure line at Point (a). Though Point (a) indicates a pressure of 3.1MPa, we need to add about 1MPa to compensate for pressure loss due to piping and other factors, so a pressure of 4MPa is required.

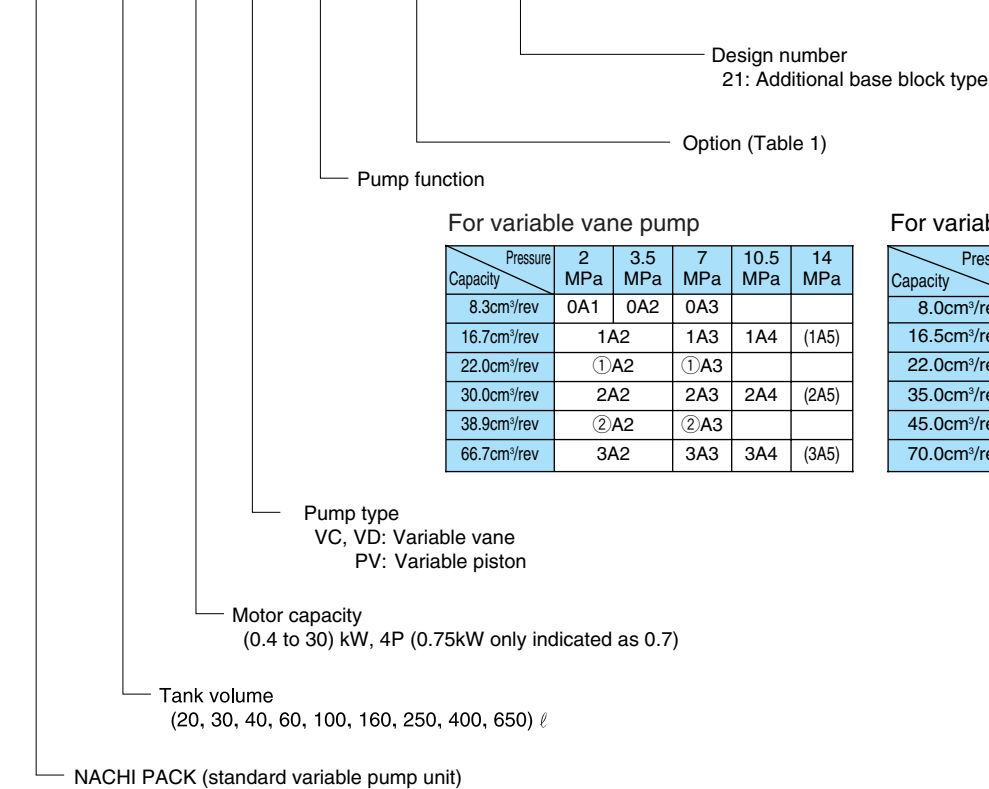
(b) From the $\phi 50$ point on the cylinder diameter line, draw a line (Line B) to the 100 mm/s point on the speed line. Extend Line B until it intersects with the flow rate line at Point (b), which indicates a required flow rate of 11.8 ℓ /min.

(c) Based on the required flow rate of 11.8 ℓ /min. and required pressure of 4MPa obtained above, we can now check the selection chart where we easily find out that the required model is NCP-60-1.5VD1A3-12. Next, select the required option from Table 1 on the following page.

- Note)
- Contact your agent if you need a low-pressure NACHI PACK with piston pump.
 - If flow rate and pressure are not specified, products are configured with company standard settings before shipping.
 - When running items marked with a star (★) to the right of the table for long periods at pump setting pressure, fluid temperature may exceed 60°C even when a fan cooler is used. In this case, use a water cooler.
 - Contact your agent for applications where there is the chance of frequent momentary return flow due to the use of ACC, or surge voltage generated due to the use of fast switching valve response and a high cycle.

Understanding Model Numbers

NCP - 100 - 3.7 * * * * - [] - 12(21)



For variable vane pump

Capacity	Pressure 2 MPa	3.5 MPa	7 MPa	10.5 MPa	14 MPa
8.3cm ³ /rev	0A1	0A2	0A3		
16.7cm ³ /rev	1A2		1A3	1A4	(1A5)
22.0cm ³ /rev	①A2		①A3		
30.0cm ³ /rev	2A2		2A3	2A4	(2A5)
38.9cm ³ /rev	②A2		②A3		
66.7cm ³ /rev	3A2		3A3	3A4	(3A5)

For variable piston pump

Capacity	Pressure 2 to 7MPa	7 to 14MPa
8.0cm ³ /rev	8N1	8N2
16.5cm ³ /rev	16N1	16N2
22.0cm ³ /rev	22N1	22N2
35.0cm ³ /rev	35N1	35N2
45.0cm ³ /rev	45N1	45N2
70.0cm ³ /rev	70N1	70N2

Table 1: Option Symbols

Symbol	Description	Model Number and Description	20, 30L	40 to 100L	160, 250L	400, 650L
B	Base Block (Design No. 12 Only)	MPU Series built-in	○Note 2	○Note 3	○	○
C	Radiator	3A92-001-1050	○	○		
C1	General-purpose Fan Cooler	3A92-001-0000 16/15W Single-phase 200V AC 50/60Hz		○	○	○
C2	High-power Fan Cooler	3A92-002-0000 33/30W Single-phase 200V AC 50/60Hz			○	○
D	Terminal Wiring (Drive System + Control System)	Wiring from each electrical device to the terminal box (Drive System + Control System)	○	○	○	○
E	Terminal Wiring (Control System Only)	Wiring from each electrical device to the terminal box (Control System Only)	○	○	○	○
F	Mounting Foot for Forklift	See mounting foot for forklift specifications.		○		
M	Microseparator	MSB-110	○	○	○	○
N	Noise Control	Motor 6P specifications				○
P	Oil pan	See oil pan specifications.		○	○	○
R	Return Filter	WS-20-20-V(20μ paper)	○			
R1	Return Filter	CF-0*(10μ paper) FRS-**-20P*** (20μ paper)		○Note 4	○Note 4	
R2	Return Filter	FPL-0*(10μ paper)		○	○	
T	Temperature Gauge (With Fluid Level Gauge)	φ6 × 80L φ25 φ8 × 120L φ35 (0 to 100°C) with guard	○	○	○	○
V	Vibration Control	Anti-vibration rubber, rubber hoses, etc.				○
W1	Self Leak Test	Tank leak test by NACHI		○	○	○
W2	Government-mandated Leak Test	Tank leak test by fire department		○	○	○
TH	Thermostat (Abnormal fluid temperature detection: Contact a)	TNS-C1070C (Contact on: 65°C and above)		○	○	○
PS	Pressure Switch (Abnormal pressure detection: Contact a)	CP20-223 Contact ON: (Pump Setting Pressure)–(1.5MPa) and above		○	○	○
FS	Float Switch (Low fluid level detection: Contact a)	OLV-2A Contact on: (Fluid Level Gauge Visual Low Level)–(10mm) or less		○	○	○
G	Fluid Level Gauge Guard	Protective cover installation	○	○	○	○
R3	Return Filter (Tank Top Type)	VLR**-**P-S				
L	Anchor Hole Outer Side	Anchor hole set on outer side				
	Motor Abnormal Voltage	Reference Voltage Other than 200V AC 50/60Hz; 220V AC 60Hz		Supported for Design Number 5100A		
	Special Paint (Exterior)	Other than standard lacquer paint (phthalates, epoxy, etc.)				
	Piston Pump Variable Control Option	Other than standard control system N (NQ, RS, WS, RQS, etc.)				
	Fire Resistant Operating Fluid (W/G Type)	Water- or glycol-based hydraulic operating fluid (Contact your agent about other fluid types.)				
	Water Cooler	When capacity of pump DR fan cooler is insufficient				
	Electric Oil Heater	When there is the possibility of fluid pressure dropping below 0°C				

- Note) 1.Design 12 when option symbol B is selected. (Base block additional 21 design is not applicable)
 2.With the optional Symbol B capacity 20L and 30L, a special base block can be used in a configuration of up to 01 × 3.
 3.Option symbol B cannot be selected in the case of NACHI PACK Economy Series NEP.
 4.Option symbol R1 CF-0* is applicable to pump functions *A2 and *NO only.
 5.FRS-08-20P08T for option symbol R1, capacity 250L using a 45cm³/rev type.
 6.Contact Nachi for information about design number 5100A.

Selecting a Motor

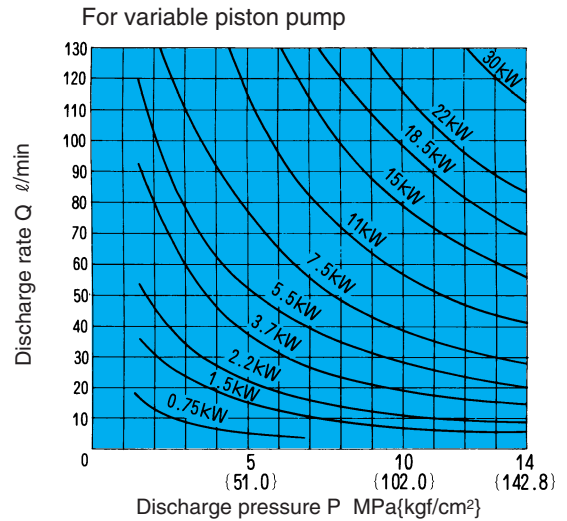
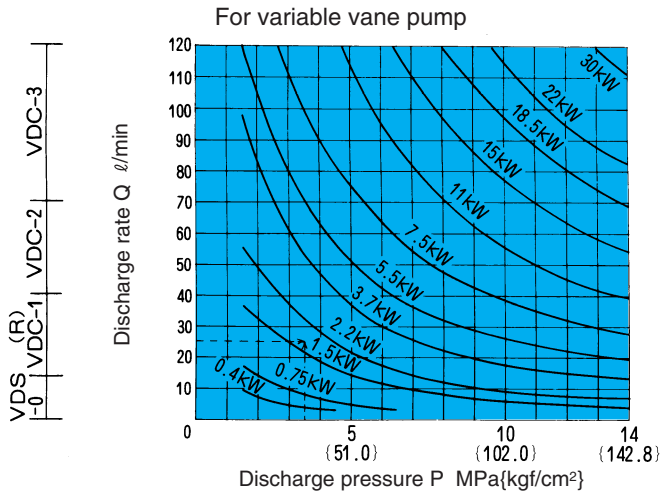
The lower side of the output curves for each of the motors shown in the graph indicates the operating range under rated output for that motor.

Example: To find the motor that can

produce pressure of 3.5MPa {35.7kgf/cm²} and a discharge rate of 25 l/min.

Since the intersection of the two broken lines from a pressure of 3.5MPa

{35.7kgf/cm²} and discharge rate of 25 l/min intersect in the area under the 2.2kW curve, it means that a 2.2kW motor should be used.



Installation Dimension Drawings

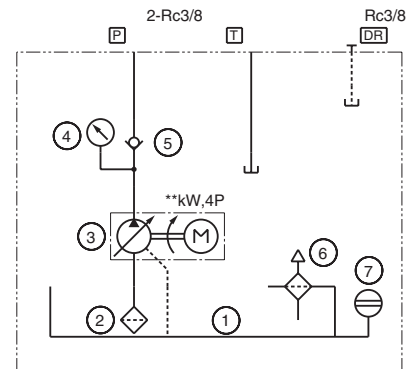
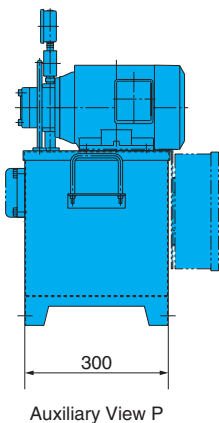
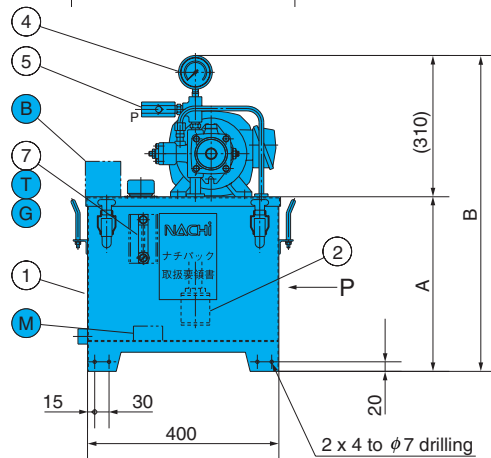
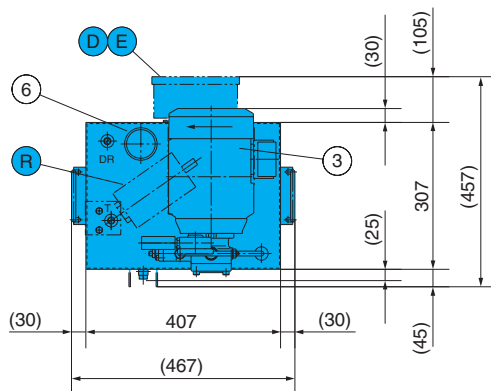
• Mini NACHI PACK Series

NCP-20-**VD0A*-12

NCP-30-**VD0A*-12

(Note) Catalog dimensions, layout, and used devices are subject to change without notice. In particular, be sure to check in cases where dimensions are limited.

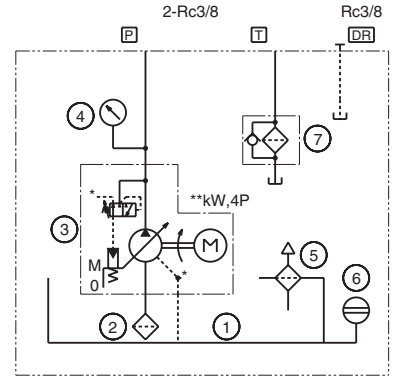
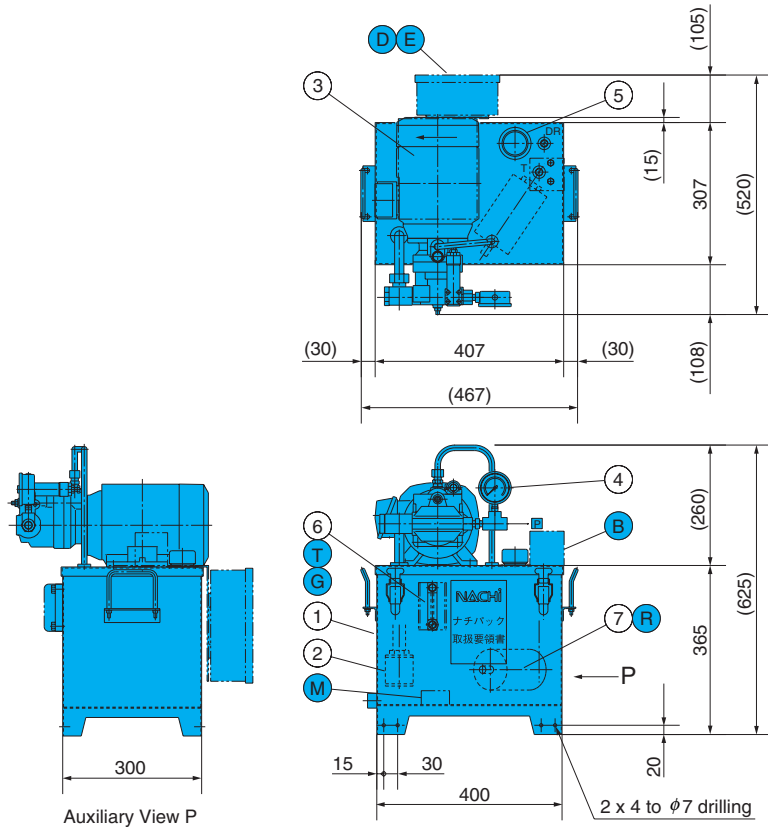
• Option item numbers are colored.



Part No.	Name	Model No.	Q'ty
1	Tank	** l	1
2	Strainer	CS-04(150 mesh)	1
3	Uni-pump	USV-0A-A**-4-13	1
4	Pressure gauge	AUR1/4-φ60 × **M	1
5	Check valve	CN-TO3-C-7841A	1
6	Fluid supply port/air breather	MSA-V30	1
7	Fluid level gauge	φ6 × 80L	1

Tank Capacity	A	B
20 l	285	595
30 l	365	675

NCP-30-****PV8N***-*-12

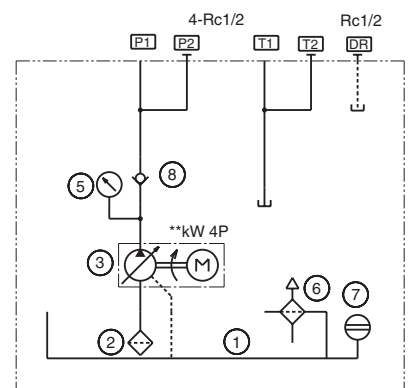
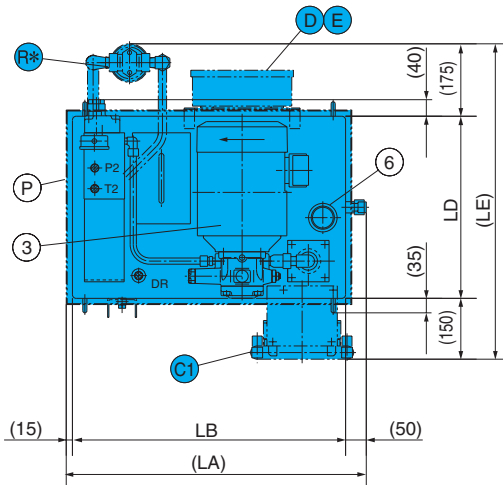


Part No.	Name	Model No.	Q'ty
1	Tank	30 l	1
2	Strainer	CS-06(150 mesh)	1
3	Uni-pump	UPV-0A-8N [*] -**A-4-31	1
4	Pressure gauge	AUR1/4-φ60 × **M	1
5	Fluid supply port/air breather	MSA-V30	1
6	Fluid level gauge	φ6 × 80L	1
7	Return filter	WS-20-20-V	1

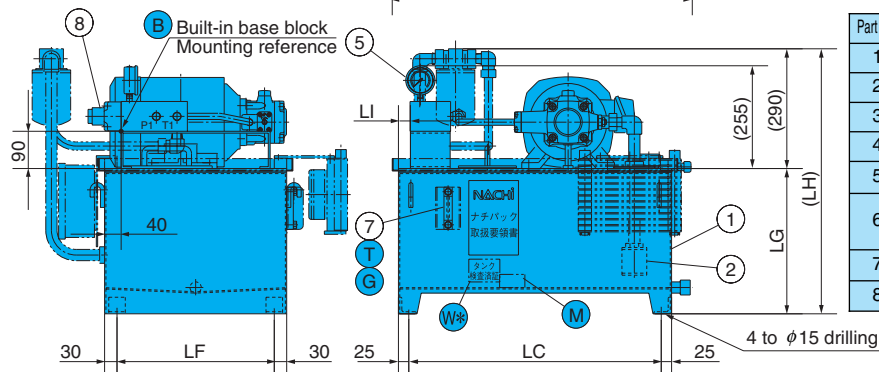
NCP-40-0.7V_D^C1A2^{*}-*-12

NCP-60-****V_D^C1A***-*-12

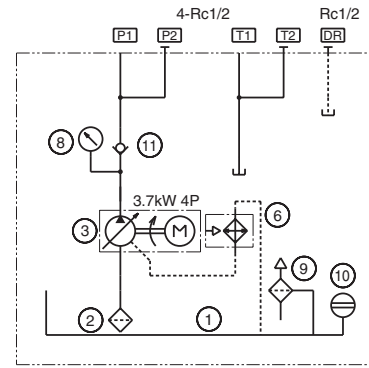
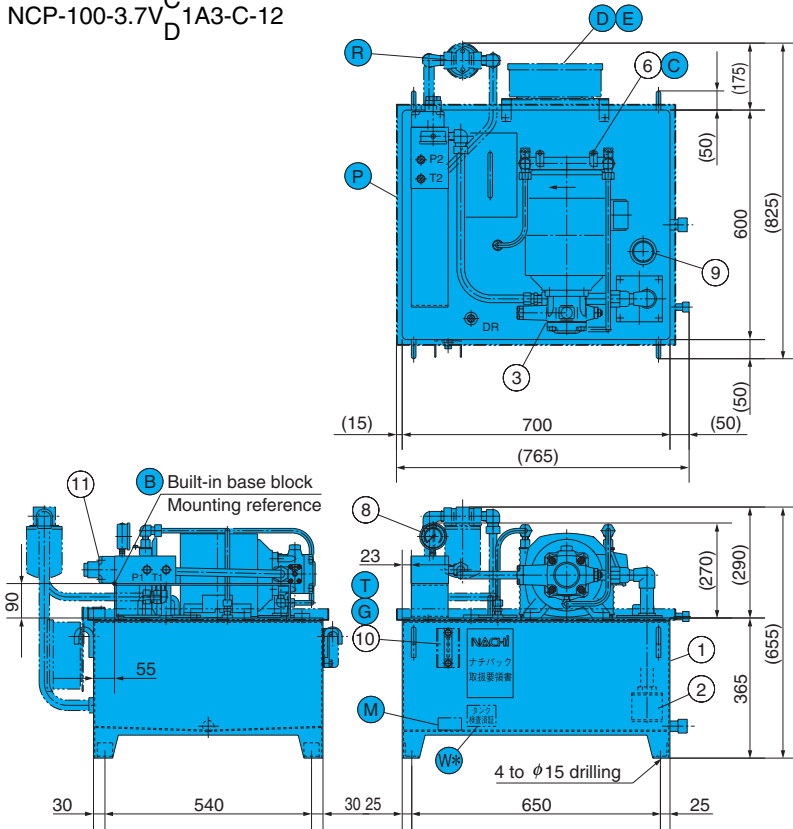
Symbol	Dimensions (mm)	
	40 l	60 l
LA	625	725
LB	560	660
LC	510	610
LD	350	440
LE	675	765
LF	290	380
LG	300	350
LH	590	640
LI	31	33



Part No.	Name	Model No.	Q'ty
1	Tank	** l	1
2	Strainer	CS-06(150 mesh)	1
3	Uni-pump	UVC(D)-1A-A [*] -**A-4-26	1
4			
5	Pressure gauge	AUR1/4-φ60 × **M	1
6	Fluid supply port/air breather	MSA-V30	1
7	Fluid level gauge	φ6 × 80L	1
8	Check valve	CA-G03-1-20	1



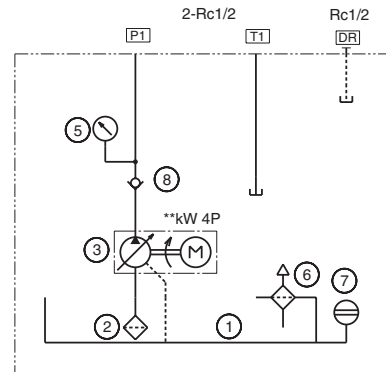
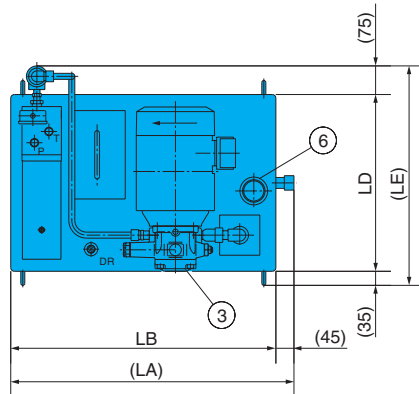
NCP-100-3.7V_D^C1A3-C-12



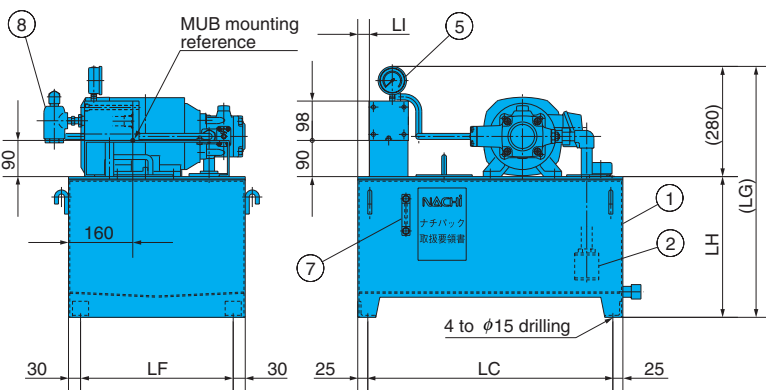
Part No.	Name	Model No.	Q'ty
1	Tank	100 ℓ	1
2	Strainer	CS-08(150 mesh)	1
3	Uni-pump	UVC(D)-1A-2A3-3.7-4-26	1
4			
5			
6	Radiator	3A92-001-1050	1
7			
8	Pressure gauge	AUR1/4-φ60 × **M	1
9	Fluid supply port/air breather	MSA-V30	1
10	Fluid level gauge	φ6 × 80L	1
11	Check valve	CA-G03-1-20	1

NCP-40-0.7VD1A2*-21
NCP-60-**VD1A*-21

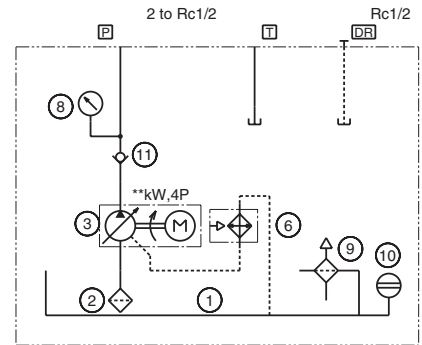
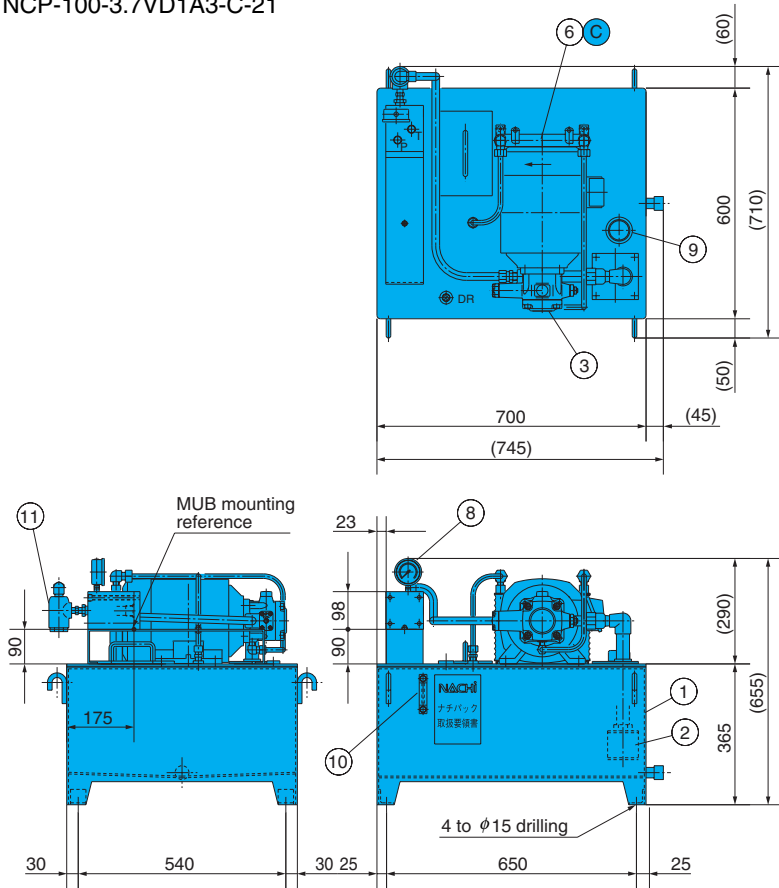
Symbol	Dimensions (mm)	
	40 ℓ	60 ℓ
LA	605	705
LB	560	660
LC	510	610
LD	350	440
LE	460	550
LF	290	380
LG	580	630
LH	300	350
LI	31	33



Part No.	Name	Model No.	Q'ty
1	Tank	** ℓ	1
2	Strainer	CS-06(150 mesh)	1
3	Uni-pump	UVD-1A-A*-**4-26	1
4			
5	Pressure gauge	AUR1/4-φ60 × **M	1
6	Fluid supply port/air breather	MSA-V30	1
7	Fluid level gauge	φ6 × 80L	1
8	Check valve	CA-T03-1-20	1



NCP-100-3.7VD1A3-C-21

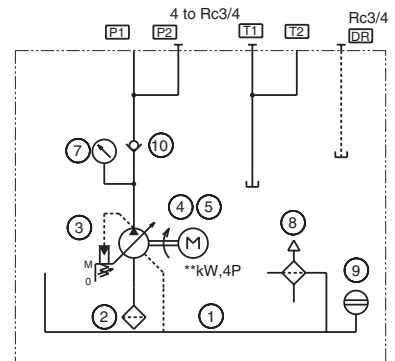
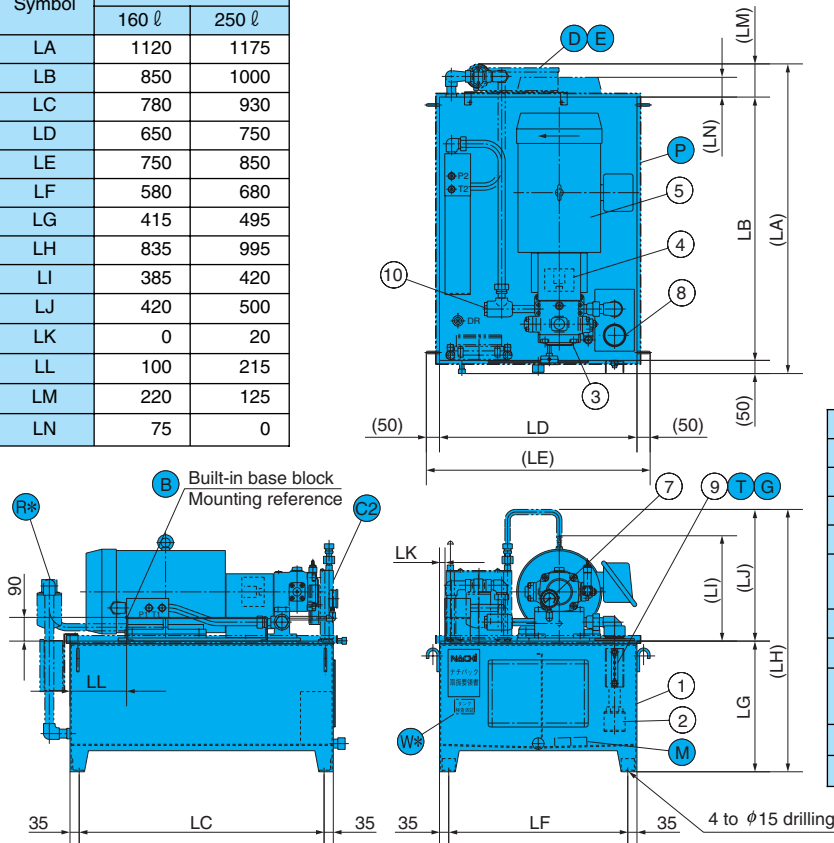


Part No.	Name	Model No.	Q'ty
1	Tank	100 ℓ	1
2	Strainer	CS-08(150 mesh)	1
3	Uni-pump	UVD-1A-2A3-3.7-4-26	1
4			
5			
6	Radiator	3A92-001-1050	1
7			
8	Pressure gauge	AUR1/4-φ60 × 16M	1
9	Fluid supply port/air breather	MSA-V30	1
10	Fluid level gauge	φ6 × 80L	1
11	Check valve	CA-T03-1-20	1

NCP-160-**VC2A**-*-12

NCP-250-**VC2A**-*-12

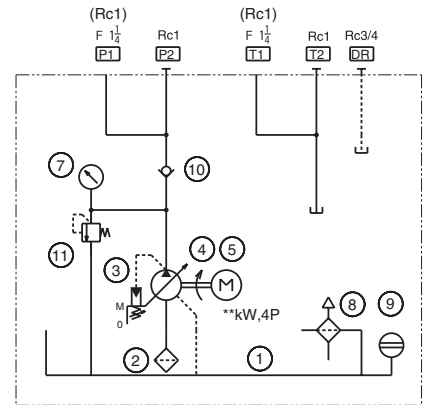
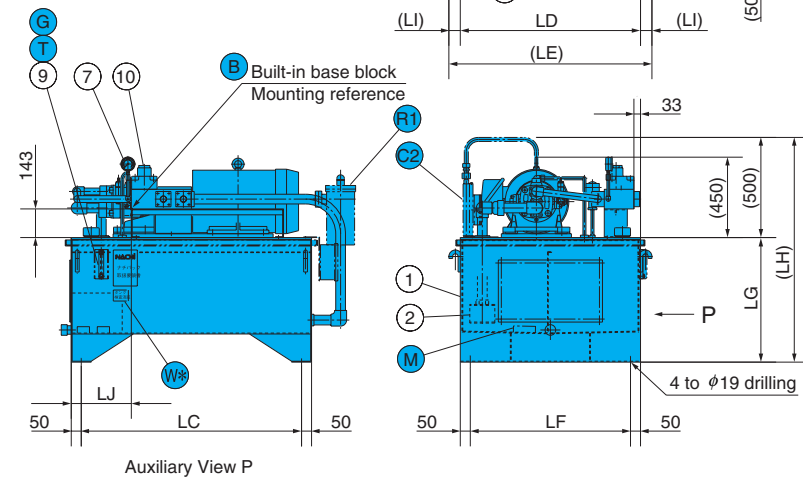
Symbol	Dimensions (mm)	
	160 ℓ	250 ℓ
LA	1120	1175
LB	850	1000
LC	780	930
LD	650	750
LE	750	850
LF	580	680
LG	415	495
LH	835	995
LI	385	420
LJ	420	500
LK	0	20
LL	100	215
LM	220	125
LN	75	0



Part No.	Name	Model No.	Q'ty
1	Tank	** ℓ	1
2	Strainer	CS-10(150 mesh)	1
3	Uni-pump	VDC-2A-*A*-20	1
4	Coupling	CR-***J	1
5	Motor	Fully closed external fan Terminal B **kW-4P	1
6			
7	Pressure gauge	AUR1/4-φ60 × **M	1
8	Fluid supply port/air breather	MSA-V50-VS10	1
9	Fluid level gauge	φ8 × 120L	1
10	Check valve	CA-T06-1-20	1

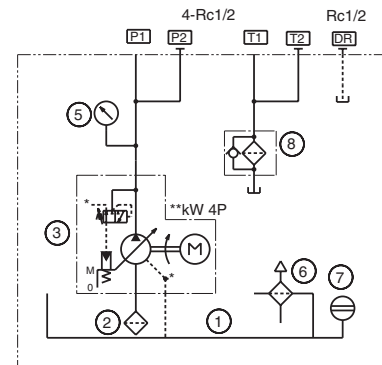
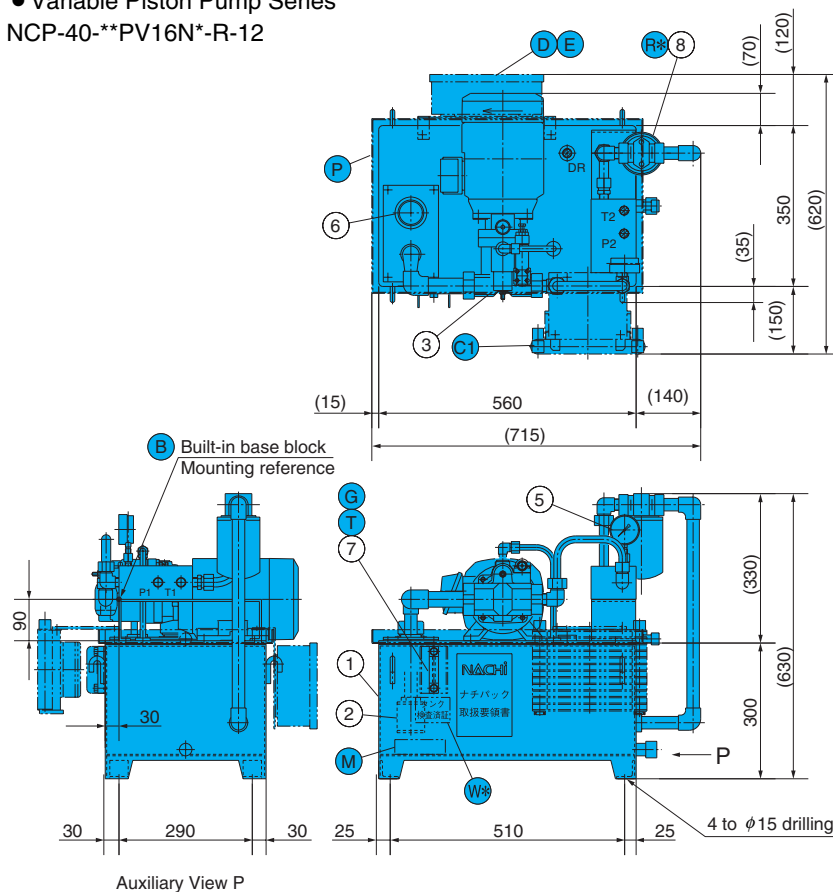
NCP-400-VC3A*-12
NCP-650-VC3A*-12

Symbol	Dimensions (mm)	
	400 l	650 l
LA	1470	1790
LB	1200	1520
LC	1100	1420
LD	900	1010
LE	1014	1164
LF	800	910
LG	620	670
LH	1120	1170
LI	57	77
LJ	300	450



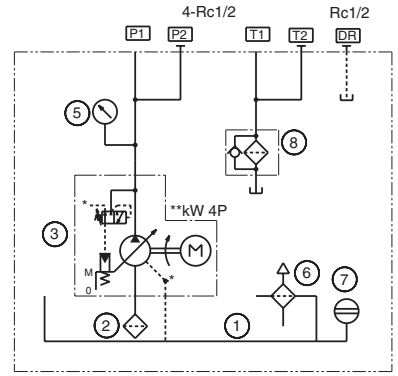
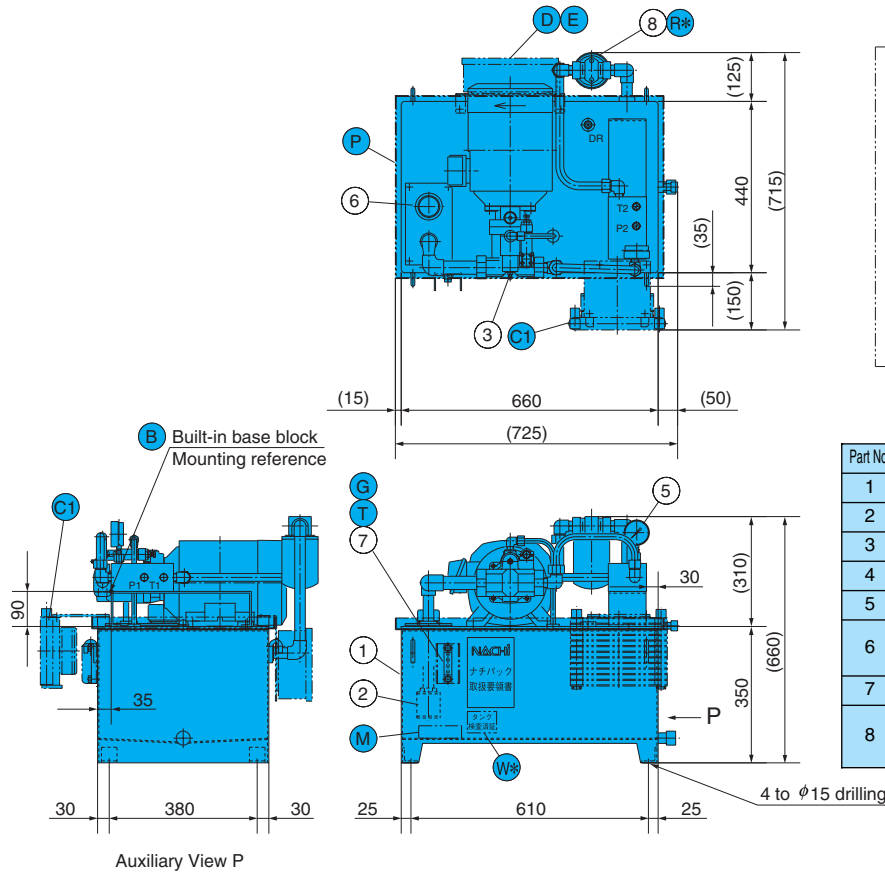
Part No.	Name	Model No.	Qty
1	Tank	** l	1
2	Strainer	CS-12(150 mesh)	1
3	Uni-pump	VDC-3A-1A*-20	1
4	Coupling	CR-****J	1
5	Motor	Fully closed external fan A terminal *kW-4P	1
6			
7	Pressure gauge	AUR1/4-φ60 × **M	1
8	Fluid supply port/air breather	MSA-V50-VS10	1
9	Fluid level gauge	φ8 × 120L	1
10	Check valve	CA-G10-1-20	1
11	Relief valve	R-T03-3-11	1

• Variable Piston Pump Series
NCP-40-PV16N*-R-12



Part No.	Name	Model No.	Qty
1	Tank	40 l	1
2	Strainer	CS-06(150 mesh)	1
3	Uni-pump	UPV-1A-16N*-**A-4-17	1
4			
5	Pressure gauge	AUR1/4-φ60 × **M	1
6	Fluid supply port/air breather	MSA-V30	1
7	Fluid level gauge	φ6 × 80L	1
8	Return filter	(FPL-06)CF-06 10μ paper	1

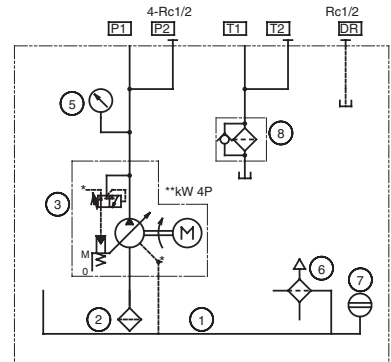
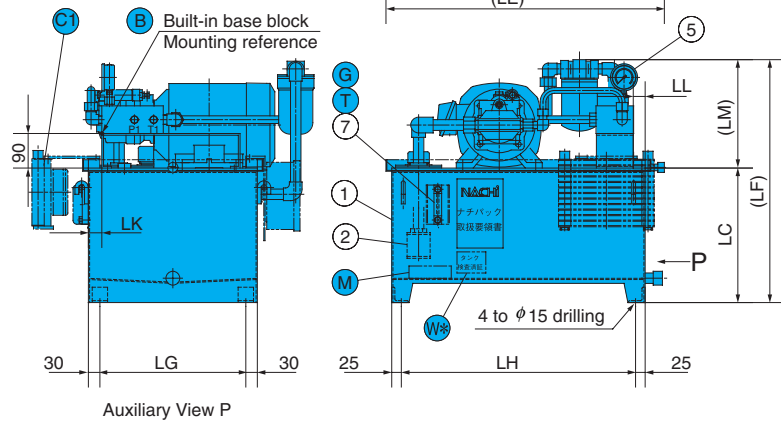
NCP-60-**PV16N*-R-12



Part No.	Name	Model No.	Q'ty
1	Tank	60 l	1
2	Strainer	CS-06(150 mesh)	1
3	Uni-pump	UPV-1A-16N*-**A-4-17	1
4			
5	Pressure gauge	AUR1/4-φ60 × **M	1
6	Fluid supply port/air breather	MSA-V30	1
7	Fluid level gauge	φ6 × 80L	1
8	Return filter	(FPL-06)CF-06 10μ paper	1

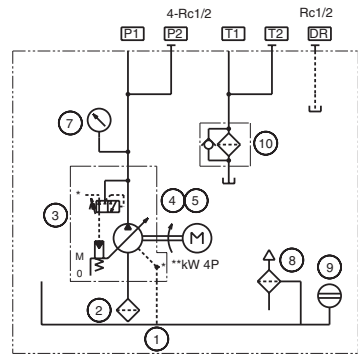
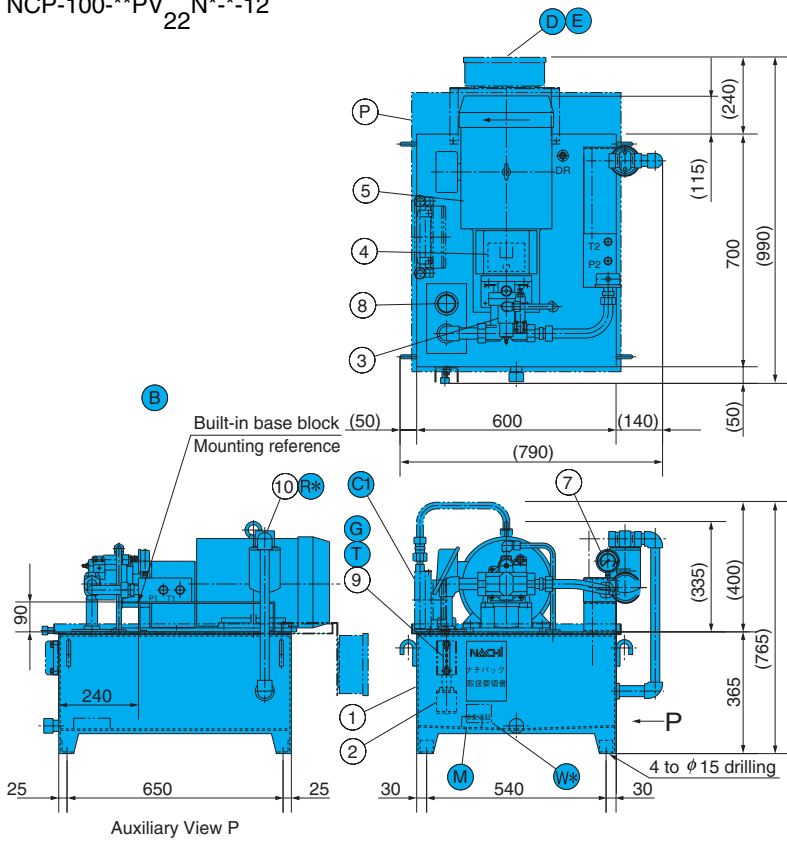
NCP-40-**PV8N*-R-12
NCP-60-**PV8N*-R-12

Symbol	Dimensions (mm)	
	40 l	60 l
LA	350	440
LB	560	660
LC	300	350
LD	620	715
LE	715	725
LF	630	660
LG	290	380
LH	510	610
LI	120	125
LJ	140	50
LK	30	35
LL	0	30
LM	330	310



Part No.	Name	Model No.	Q'ty
1	Tank	** l	1
2	Strainer	CS-06(150 mesh)	1
3	Uni-pump	UPV-0A-8N*-**A-4-31	1
4			
5	Pressure gauge	AUR1/4-φ60 × **M	1
6	Fluid supply port/air breather	MSA-V30	1
7	Fluid level gauge	φ6 × 80L	1
8	Return filter	(FPL-06)CF-06 10μ paper	1

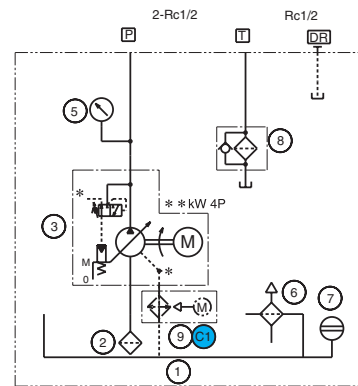
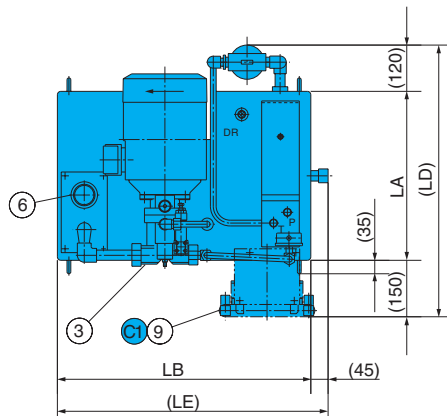
NCP-100-**PV¹⁶₂₂N*-*-12



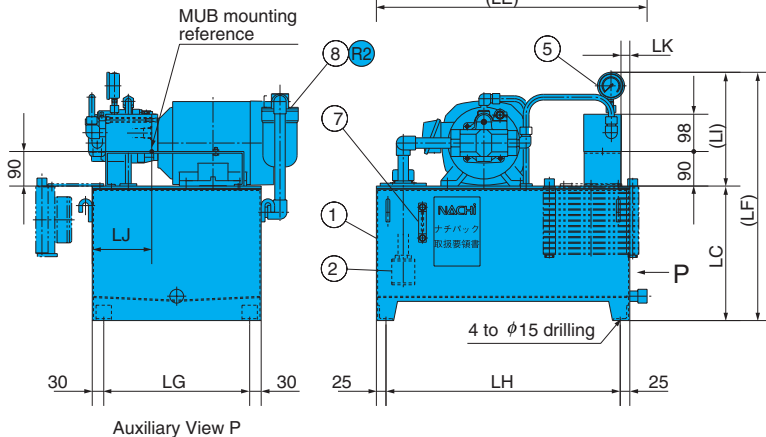
Part No.	Name	Model No.	Q'ty
1	Tank	100 l	1
2	Strainer	CS-06(150 mesh)	1
3	Pump	PVS-1A-**N*-12	1
4	Coupling	CR-***J	1
5	Motor	Fully closed external fan A terminal **kW-4P	1
6			
7	Pressure gauge	AUR1/4-φ60 × **M	1
8	Fluid supply port/air breather	MSA-V30	1
9	Fluid level gauge	φ6 × 80L	1
10	Return filter	(FPL-06)CF-06 10μ paper	1

NCP-40-**PV16N*-(C1)R2-21
NCP-60-**PV16N*-(C1)R2-21

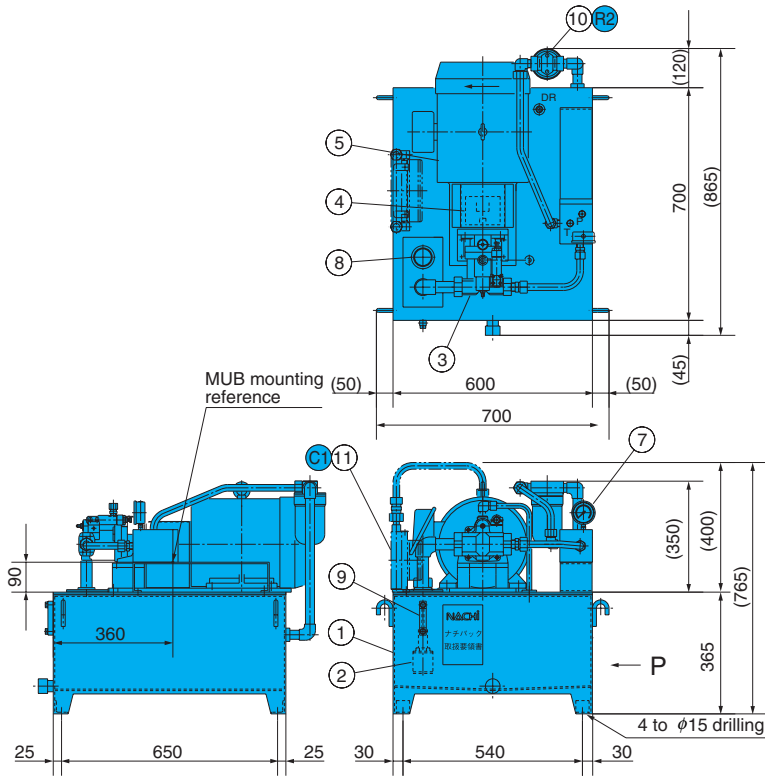
Symbol	Dimensions (mm)	
	40 l	60 l
LA	350	440
LB	560	660
LC	300	350
LD	505	710
LE	605	705
LF	630	665
LG	290	380
LH	510	610
LI	330	315
LJ	150	155
LK	0	30



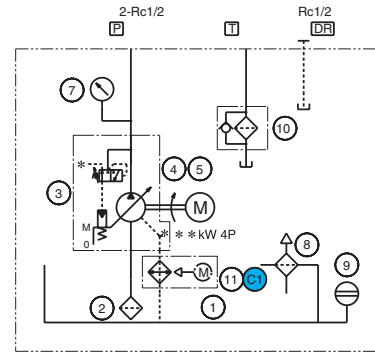
Part No.	Name	Model No.	Q'ty
1	Tank	** l	1
2	Strainer	CS-06(150 mesh)	1
3	Uni-pump	UPV-1A-16N*-**A-4-17	1
4			
5	Pressure gauge	AUR1/4-φ60 × **M	1
6	Fluid supply port/air breather	MSA-V30	1
7	Fluid level gauge	φ6 × 80L	1
8	Return filter	FPL-06(10μ paper)	1
9	Fan cooler	3A92-001-0000	1



NCP-100-****PV**¹⁶₂₂N^{*}-(C1)R2-21

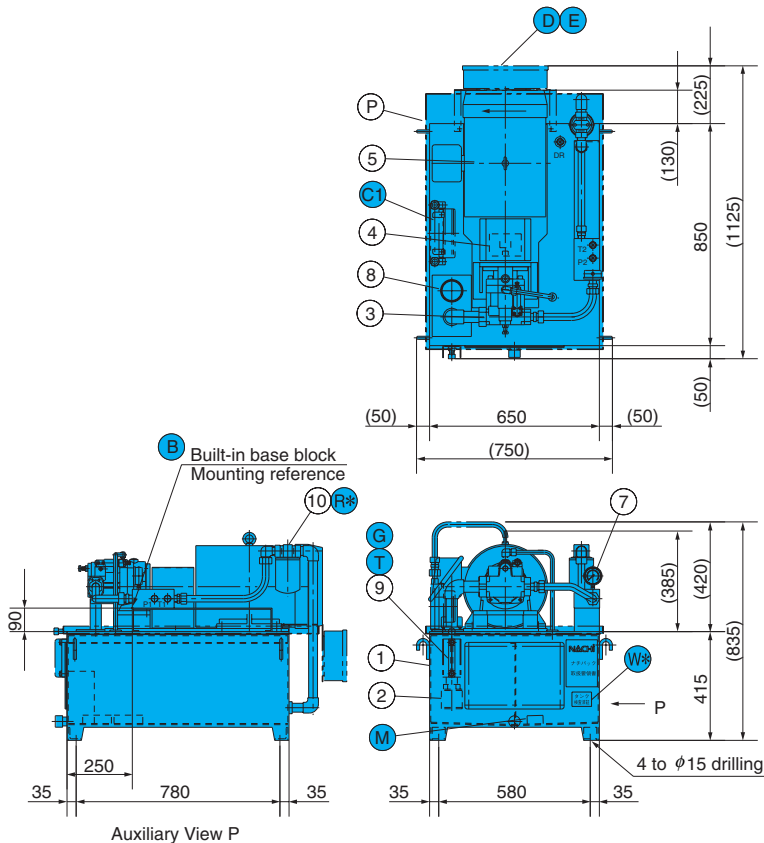


Auxiliary View P

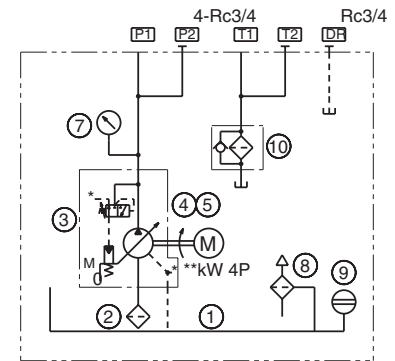


Part No.	Name	Model No.	Q'ty
1	Tank	100 ℓ	1
2	Strainer	CS-06(150 mesh)	1
3	Pump	PVS-1A- ¹⁶ ₂₂ N [*] -12	1
4	Coupling	CR-****J	1
5	Motor	Fully closed external fan A terminal *kW-4P	1
6			
7	Pressure gauge	AUR1/4-φ60 × **M	1
8	Fluid supply port/air breather	MSA-V30	1
9	Fluid level gauge	φ6 × 80L	1
10	Return filter	FPL-06(10μ paper)	1
11	Fan cooler	3A92-001-0000	1

NCP-160-****PV**35N^{*}-R^{*}-12

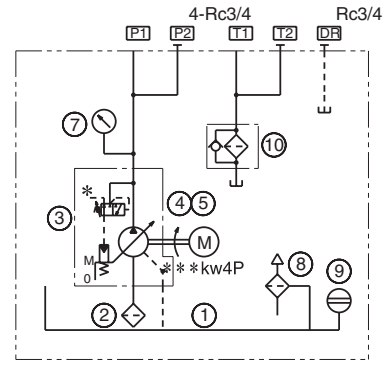
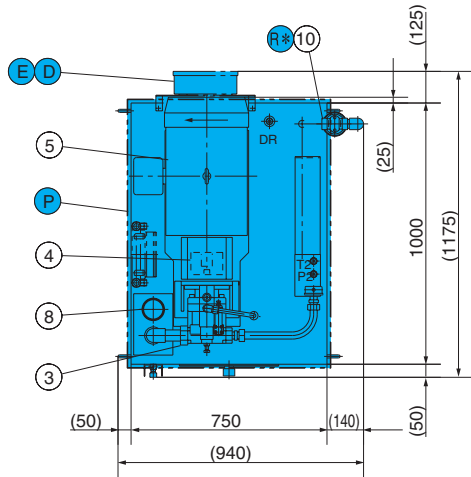


Auxiliary View P

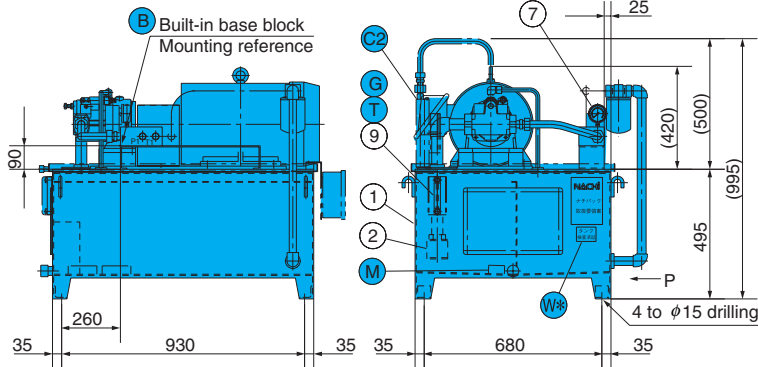


Part No.	Name	Model No.	Q'ty
1	Tank	160 ℓ	1
2	Strainer	CS-10(150 mesh)	1
3	Uni-pump	PVS-2A-35N [*] -12	1
4	Coupling	CR-****J	
5	Motor	Fully closed external fan A terminal *kW-4P	1
6			
7	Pressure gauge	AUR1/4-φ60 × **M	1
8	Fluid supply port/air breather	MSA-V50-VS10	1
9	Fluid level gauge	φ8 × 120L	1
10	Return filter	(FPL-08)CF-08 10μ paper	1

NCP-250-**PV³⁵₄₅N*-R*-12



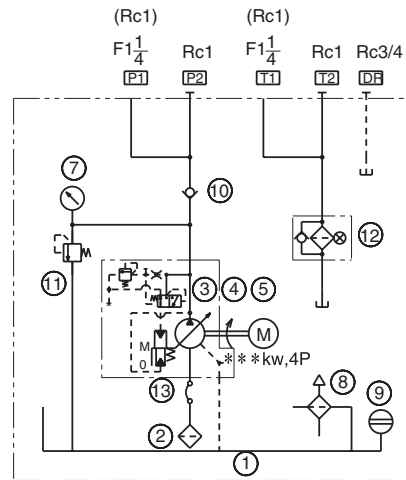
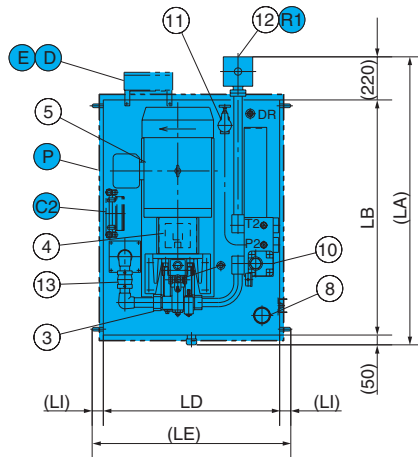
Part No.	Name	Model No.	Q'ty
1	Tank	250 l	1
2	Strainer	CS-10(150 mesh)	1
3	Uni-pump	PVS-2A-**N*-12	1
4	Coupling	CR-***J	1
5	Motor	Fully closed external fan A terminal **kW-4P	1
6			
7	Pressure gauge	AUR1/4-φ60 × **M	1
8	Fluid supply port/air breather	MSA-V50-VS10	1
9	Fluid level gauge	φ8 × 120L	1
10	Return filter	FRS-08-20P08T(20μ) (FPL-08)/CF-08 10μ paper	1



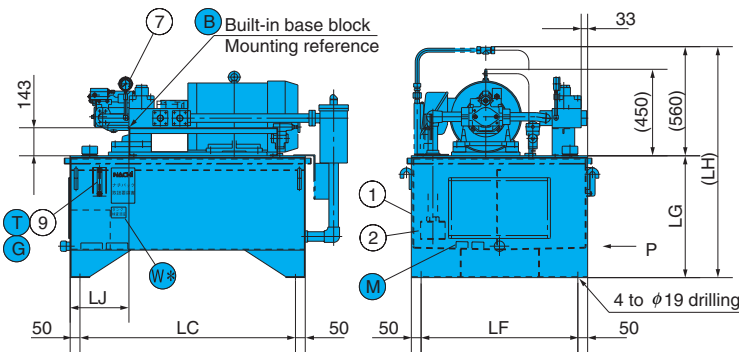
Auxiliary View P

NCP-400-**PV70N*-R1*-12
NCP-650-**PV70N*-R1*-12

Symbol	Dimensions mm	
	400 l	650 l
LA	1470	1790
LB	1200	1520
LC	1100	1420
LD	900	1010
LE	1014	1164
LF	800	910
LG	620	670
LH	1180	1230
LI	57	77
LJ	300	450



Part No.	Name	Model No.	Q'ty
1	Tank	** l	1
2	Strainer	CS-12(150 mesh)	1
3	Uni-pump	PZS-3A-70N*-10	1
4	Coupling	CR-***J	1
5	Motor	Fully closed external fan A terminal **kW-4P	1
6			
7	Pressure gauge	AUR1/4-φ60 × **M	1
8	Fluid supply port/air breather	MSA-V50-VS10	1
9	Fluid level gauge	φ8 × 120L	1
10	Check valve	CA-G10-1-20	1
11	Relief valve	R-T03-3-11	1
12	Return filter	FRS-12-20P-12F	1
13	Flexmaster joint	M1600-150-0350	1

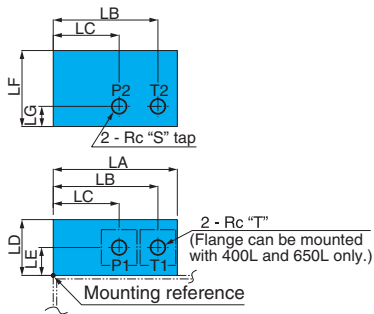


Auxiliary View P

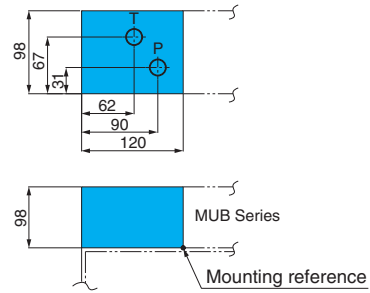
Note) Set ⑪ relief valve setting pressure so it is equivalent to pump setting pressure plus 1.0MPa {10.2kgf/cm²}.

Outlet Block Specifications

Design number 12
Outlet Block Dimensions

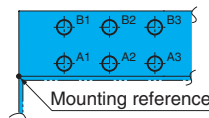


Design number 21
Outlet Block Dimensions



Tank Capacity	Dimensions (mm)							Outlet Size	
	LA	LB	LC	LD	LE	LF	LG	S	T
40L 60L 100L	160	135	85	72	36	98	26	1/2	1/2
160L 250L								3/4	3/4
400L 650L	300	260	160	98	49	148	48	1	JIS B 2231 SSA-32 (Rc)

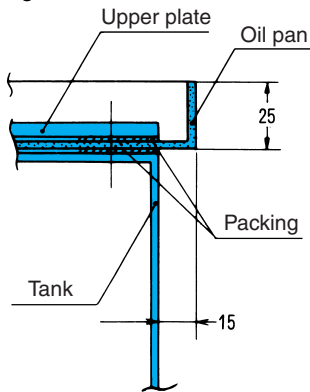
Option B
MPU Series Built-in
(See base block specifications for dimensions.)



Oil Pan Specifications

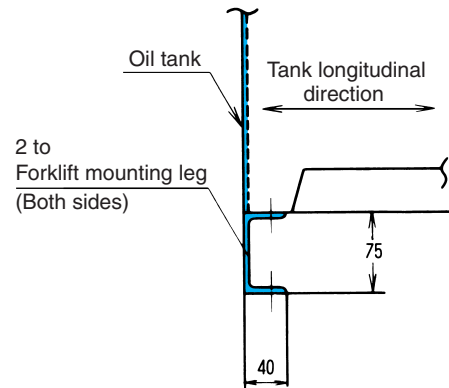
A "headband type" oil pan is standard, and an oil pan drain is provided at one location (Rc3/8).

Structural Diagram



Forklift Mounting Leg Specifications

Forklift Mounting Leg Specifications



Standard Specifications

1. Paint Color: Mancel No. 5B6/3 (lacquer)

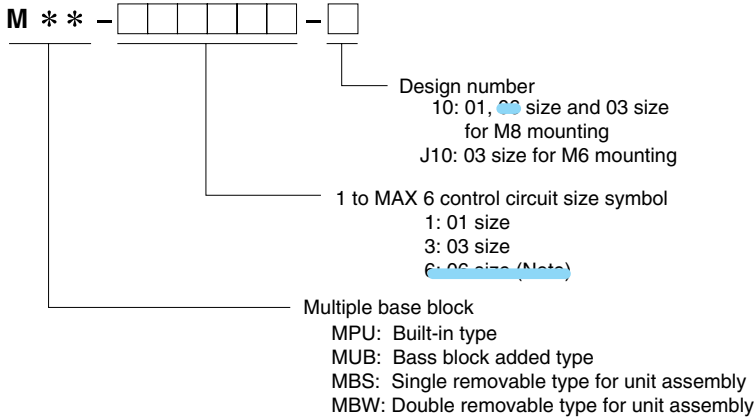
Note) Mancel No. 5B/0.5 for tank capacity 20, 30L uni-pump motor only.

2. Motor Specifications:

		Wiring	Color Coding	Terminal number	Terminal	Terminal box specifications
Control System	SA	VCT-1.25mm ²	Single SOL White, Black	1, 2, ... Consecutive numbers (Common: C)	Y Type Solderless	Inner : Mancel No. 2.5Y8/2 Dust-tight type, cover fastened by screws
	SS		Double SOL Red, White, Black, Green			
Drive System	to 3.7kW	VCT	Red, White, Black, Green	U, V, W, E	Round Solderless	Outer : Mancel No 5B6/3 (Lacquer)
	5.5kW to	IV + PF	Black (3) + Green			

Base Block Specifications

Understanding Model Numbers

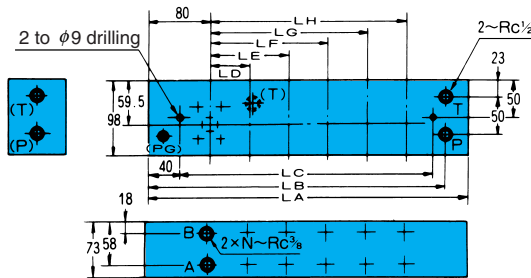


● MPU Series (Unit Built-in)

This base block is a special type built into the Nachi Block.

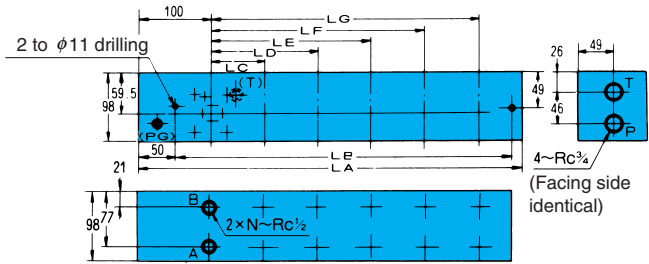
Block Model Numbers, Appearance, Dimensions

01 size



Model No.	Dimensions (mm)									Weight kg
	LA	LB	LC	LD	LE	LF	LG	LH	N	
MPU -1-10	160	130	75						1	8.3
-11-10	210	180	125	50					2	10.9
-111-10	260	230	175	50	100				3	13.4
-1111-10	310	280	225	50	100	150			4	16.0
-11111-10	360	330	275	50	100	150	200		5	18.6
-111111-10	410	380	325	50	100	150	200	250	6	21.2

03 size



Model No.	Dimensions (mm)									Weight kg
	LA	LB	LC	LD	LE	LF	LG	N		
MPU -3-J10(10)	160	95							1	11.1
-33-J10(10)	235	170	75						2	16.3
-333-J10(10)	310	245	75	150					3	21.5
-3333-J10(10)	385	320	75	150	225				4	26.7
-33333-J10(10)	460	395	75	150	225	300			5	31.9
-333333-J10(10)	535	470	75	150	225	300	375		6	37.0

Note) 1. There are two types of mounting bolts available for the 03 size: M6 and M8. Be sure to specify the type of bolt you need.

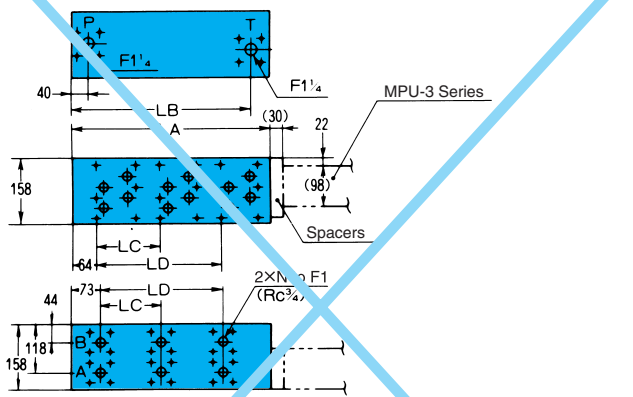
M6 : SA, SS-J Series
 M8 : SS Series

2. When using the 01/03 combination type

a) The installation pitch uses the 03 size dimensions shown above, and for A and B ports only the 01 size installation part is Rc3/8.

b) In the case of MPU-313131-J10, for example, valve installation locations 1, 3, and 5 counting from the left are 03 size, while 2, 4, 6 are 01 size.

06 size



Model No.	Dimensions (mm)				Weight kg
	LA	LB	LC	LD	
MPU -6-10	185	142			33.3
-66-10	335	292	150		60.2
-666-10	485	442	150	300	87.2

Note) 1. Use spacers (MPU-06P) when connecting the MPU-3 Series.

2. Check valve (CA-G10-1-20) for P port line is attached to the left side, so allow space (119 mm) for the valve.

Other

Space is limited in accordance with tank capacity, so use the basic data in the following table when designing the circuit.

	Tank Capacity	01 Space Block	03 Space Block	06 Space Block	
VD* Series	20, 30 l	Up to 3			
	40 l	Up to 4	Up to 3		
	60 l	Up to 5	Up to 3		
	100 l	Up to 6	Up to 5		
	160 l	Up to 6	Up to 5		
	250 l	Up to 6	Up to 6		
	400, 650 l		Up to (2, 4, 6) + Up to (3, 2, 1)		
PVS Series	30 l	Up to 3			
	40 l	Up to 4	Up to 3		
	60 l		Up to 5	Up to 3	
		Z	Up to 6	Up to 4	
	100 l	Up to 6	Up to 4		
	160, 250 l	Up to 6	Up to 6		
	400, 650 l		Up to (2, 4, 6) + Up to (3, 2, 1)		

Note) Note that using in series larger than those noted above causes overhang from the top plate.

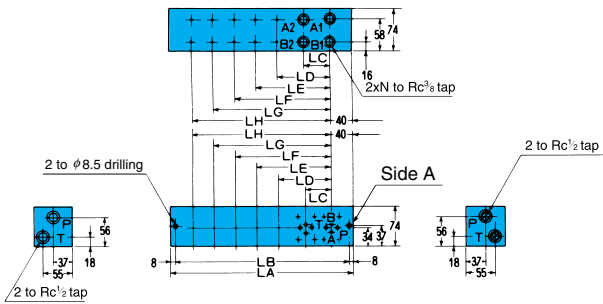
● MBS, MBW Series (Unit Assembly Type)

This base block is used to install the valve unit only around machinery.

Block Model Numbers, Appearance, Dimensions

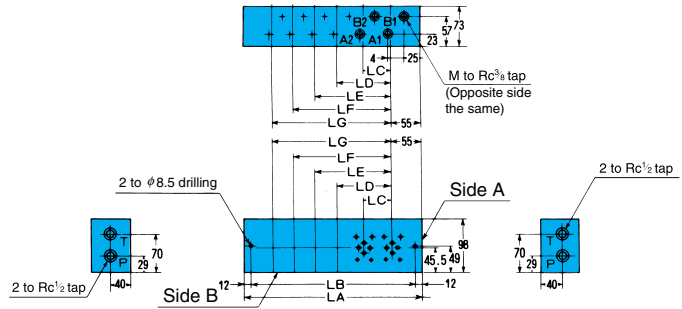
MBS Series (Single Ejection Multi Block)

01 size



MBW Series (Double Ejection Multi Block)

01 size



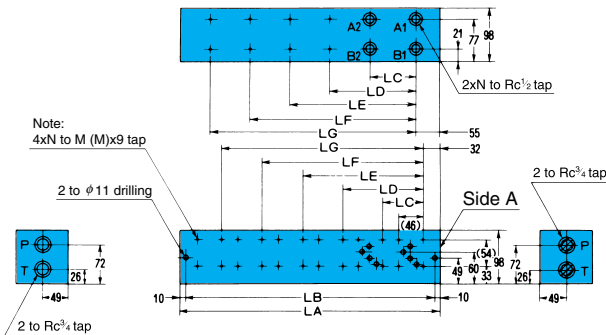
Model No.	Dimensions (mm)									Weight kg
	LA	LB	LC	LD	LE	LF	LG	LH	N	
MBS -1-10	80	64							1	3.4
-11-10	130	114	50						2	5.5
-111-10	180	164	50	100					3	7.6
-1111-10	230	214	50	100	150				4	9.8
-11111-10	280	264	50	100	150	200			5	11.9
-111111-10	330	314	50	100	150	200	250		6	14
-1111111-10	380	364	50	100	150	200	250	300	7	16

Note) Unless specified otherwise, the (A) side ports are plugged when shipped.

Model No.	Dimensions (mm)									Weight kg
	LA	LB	LC	LD	LE	LF	LG	M	N	
MBW -1-10	110	86						2x2	1	5.7
-11-10	160	136	50					4x2	2	8.3
-111-10	210	186	50	100				6x2	3	10.9
-1111-10	260	236	50	100	150			8x2	4	13.4
-11111-10	310	286	50	100	150	200		10x2	5	16
-111111-10	360	336	50	100	150	200	250	12x2	6	18.6

Note) Unless specified otherwise, the (A) and (B) side ports are plugged when shipped.

03 Size (01, 03 Connection Type)



Model No.	Dimensions (mm)									Weight kg
	LA	LB	LC	LD	LE	LF	LG	M ^(mm)	N	
MBS-3 -J10(10)	110	90						6(8)	1	8.2
-**-J10(10)	185	165	75					6(8)	2	13.8
-***-J10(10)	260	240	75	150				6(8)	3	19.4
-****-J10(10)	335	315	75	150	225			6(8)	4	25.0
-*****-J10(10)	410	390	75	150	225	300		6(8)	5	30.7
-*****-J10(10)	485	465	75	150	225	300	375	6(8)	6	36.3

Note) 1. There are two types of mounting bolts available for the 03 size: M6 and M8. Be sure to specify the type of bolt you need.

M6 : SA, SS-J Series

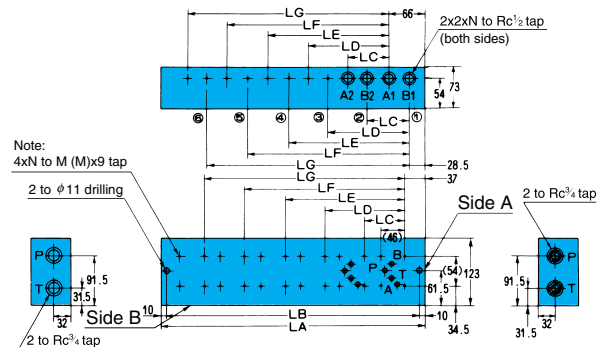
M8 : SS Series

2. When using the 01/03 combination type

- The installation pitch uses the 03 size dimensions shown above, and for A and B ports only the 01 size installation part is Rc3/8.
- In the case of MBS-313131-J10, for example, valve installation locations 1, 3, 5 counting from the right are 03 size, while 2, 4, 6 are 01 size.

3. Unless specified otherwise, the (A) side ports are plugged when shipped.

03 Size (01, 03 Connection Type)



Model No.	Dimensions (mm)									Weight kg
	LA	LB	LC	LD	LE	LF	LG	M ^(mm)	N	
MBW -3-J10(10)	120	100						6(8)	1	8.4
-**-J10(10)	195	175	75					6(8)	2	13.6
-***-J10(10)	270	250	75	150				6(8)	3	18.9
-****-J10(10)	345	325	75	150	225			6(8)	4	24.1
-*****-J10(10)	420	400	75	150	225	300		6(8)	5	29.4
-*****-J10(10)	495	475	75	150	225	300	375	6(8)	6	34.6

Note) 1. There are two types of mounting bolts available for the 03 size: M6 and M8. Be sure to specify the type of bolt you need.

M6 : SA, SS-J Series

M8 : SS Series

2. When using the 01/03 combination type

- The installation pitch uses the 03 size dimensions shown above, and for A and B ports only the 01 size installation part is Rc3/8.
- In the case of MBS-313131-J10, for example, valve installation locations 1, 3, and 5 counting from the right are 03 size, while 2, 4, 6 are 01 size.

3. Unless specified otherwise, the (A) and (B) side ports are plugged when shipped.

Control Circuit Option Specifications

A wide variety of systems can be configured by combining a base block with valve unit that forms the assembly of the basic control circuit and a NACHI PACK. Or the base block alone can be used by installing it in the vicinity of the valve unit.

Understanding Model Numbers

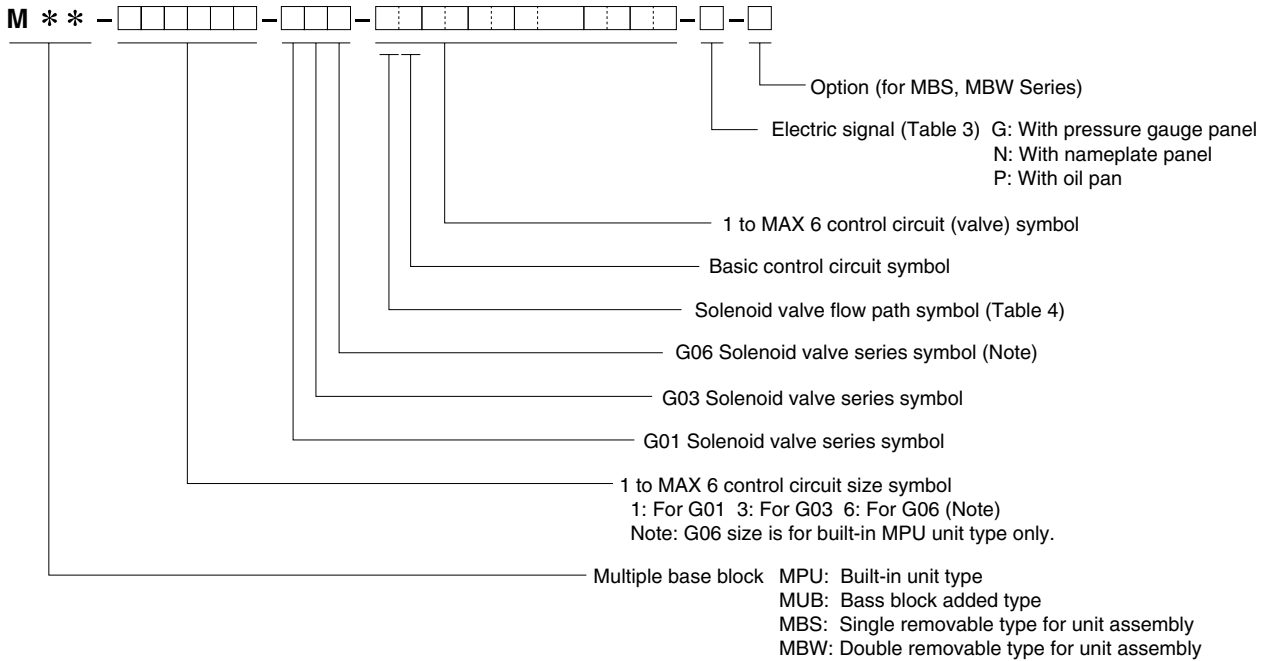


Table 2: Solenoid Valve Series Symbols

Series Size	G01, (G06)	G03
(D)SA	A	A
(D)SS	S	(S)
SS-J	-	J

Table 3: Solenoid Valve Voltage Symbols

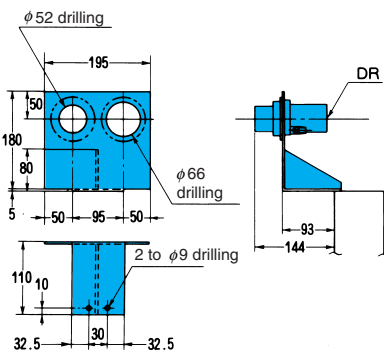
Power Supply Voltage	Symbol	Remarks
AC 100V	C1 E1	50/60Hz
AC 200V	C2 E2	
DC 12V	D1	
DC 24V	D2	

Table 4: Solenoid Valve Flow Path Symbols

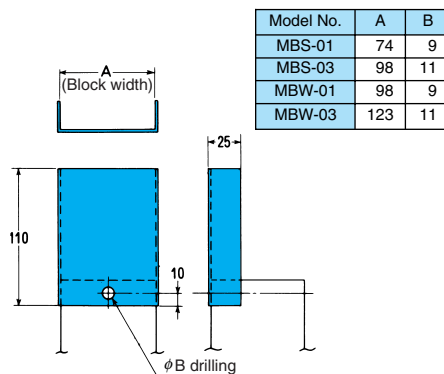
JIS Symbol	Symbol	JIS Symbol	Symbol	JIS Symbol	Symbol
No solenoid valve	-		1		7
	A		2		8
	H		4		9
	E		5		1S
			6		6S

Note) A separate basic control circuit selection table is also available for control circuit symbols. Contact your agent for more information. Also contact your agent concerning hydraulic circuit drawings, specification drawings, etc.

Option G (Pressure Gauge Panel Dimension Diagram)

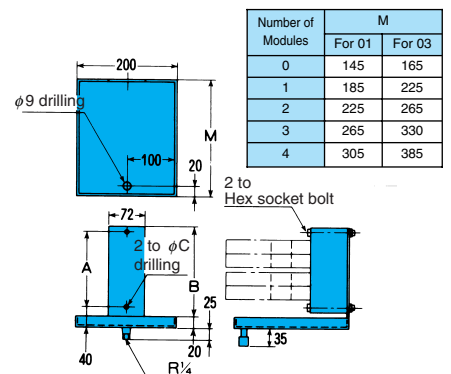


Option N (Nameplate Panel Dimension Diagram)



Note)The nameplate panel is separate from the base block when shipped, so fasten them together during installation.

Option P (Oil Pan Dimension Diagram)



Note)When shipped, the oil pan is fastened from the back by the same nut as the block.

Option P Dimension Table

Model No.	A	B	C	Applicable
P-S1-1	64	92	9	MBS- 1
-2	114	142	9	11
-3	164	192	9	111
-4	214	242	9	1111
-5	264	292	9	11111
-6	314	342	9	111111
-7	364	392	9	1111111

Model No.	A	B	C	Applicable
P-W1-1	86	118	9	MBW- 1
-2	136	168	9	11
-3	186	218	9	111
-4	236	268	9	1111
-5	286	318	9	11111
-6	336	368	9	111111

Model No.	A	B	C	Applicable
P-S3-1	90	120	11	MBS- 3
-2	165	195	11	33
-3	240	270	11	333
-4	315	345	11	3333
-5	390	420	11	33333
-6	465	495	11	333333

Model No.	A	B	C	Applicable
P-W3-1	100	130	11	MBW- 3
-2	175	205	11	33
-3	250	280	11	333
-4	325	335	11	3333
-5	400	430	11	33333
-6	475	505	11	333333

NACHI PACK Economy Series (NEP)

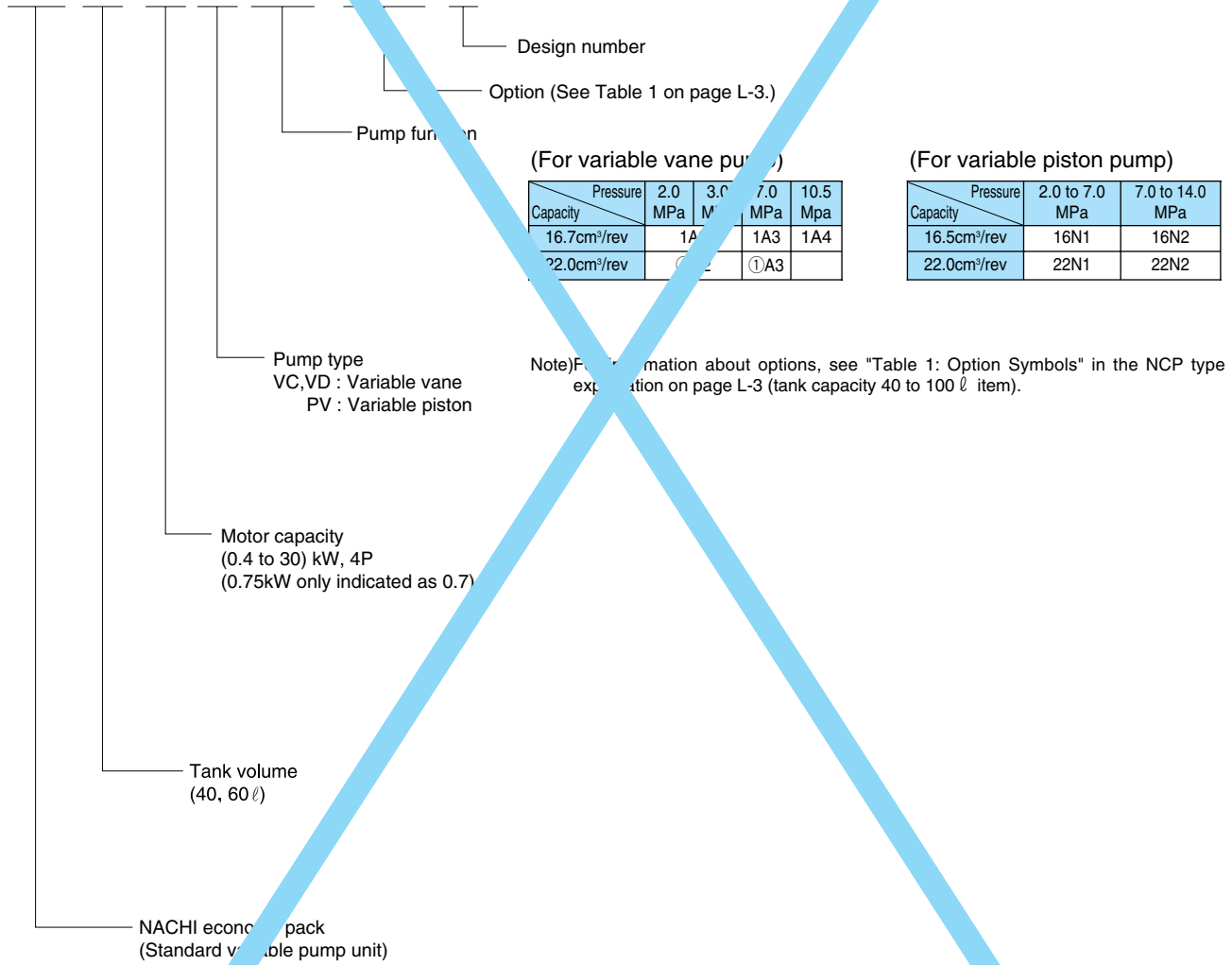
Features

- No ejection block
- Port

Port Name	Number of Ports	Port Location
P	1	Pump discharge side
T	1	Return filter connection port or on upper plate
DR	1	On upper plate

Understanding Model Numbers

NEP - 60 - 3.7 * * * * * - [] - 12

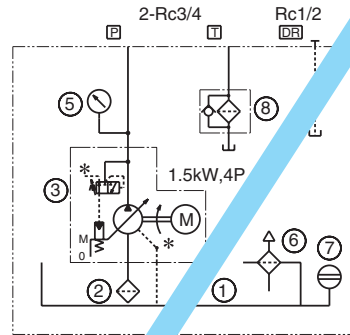
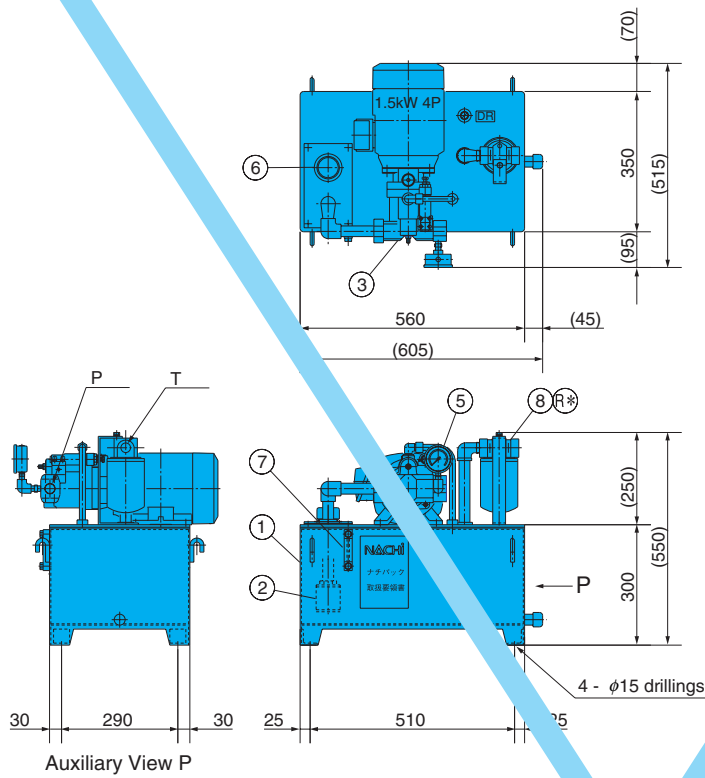


Pump Motor Tank Selection Table

Pump	Tank (ℓ)		60		
	40	60	1.5	2.2	3.7
VDR	○		○	○	○
VDC	○		○	○	○
P	○	○	○	○	○

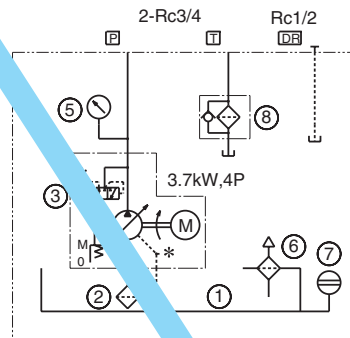
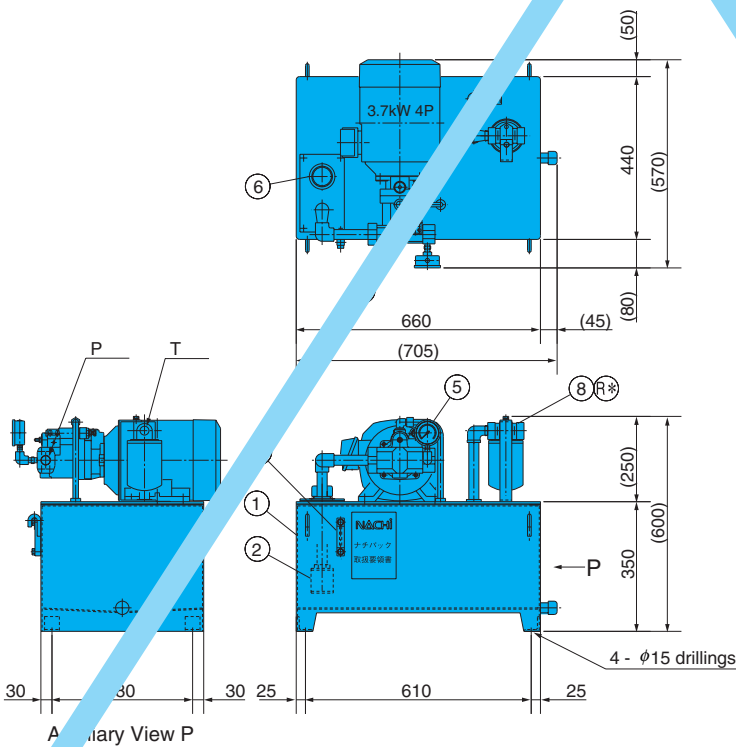
Installation Dimension Drawings

NEP-40-1.5PV16N*-R-12



Part No.	Name	Model No.	Q'ty
1	Tank	40 ℓ	1
2	Strainer	CS-06(150 mesh)	1
3	Uni-pump	UPV-1A-16N*-1.5A-4-17	1
5	Pressure gauge	AUR1/4-φ60 × **M	1
6	Fluid supply port/air breather	MSA-V30	1
7	Fluid level gauge	φ6 × 80L	1
8	Return filter	(FPL-06)CF-06 10μ paper	1

NEP-60-3.7PV16N*-R-12



Part No.	Name	Model No.	Q'ty
1	Tank	60 ℓ	1
2	Strainer	CS-06(150 mesh)	1
3	Uni-pump	UPV-1A-16N*-3.7A-4-17	1
4	Pressure gauge	AUR1/4-φ60 × **M	1
6	Fluid supply port/air breather	MSA-V30	1
7	Fluid level gauge	φ6 × 80L	1
8	Return filter	(FPL-06)CF-06 10μ paper	1



NACHICCO II (Compact Variable Pump Unit)

Compact hydraulic units are widely used as a power source in such machine tool applications as NC lathe check opening and closing, tool rotation, machining center spindle raise and lower operations, etc. During pressure holding, NACHICCO II enables machine efficiency that delivers energy savings of approximately 40% when compared with standard Nachi units, all in a compact, lightweight hydraulic unit.

Features

Space-saving, lightweight design

A smaller tank capacity makes it easier for the unit to fit in, and greatly reduces space requirements.

New structure increases efficiency

A structure that draws on years of accumulated know-how includes an improved pump joint that provides more efficient operation.

Greatly improved cooling capacity

A powerful, energy-efficient built-in cooling system eliminates the need for fan motor wiring and coolant pipes.

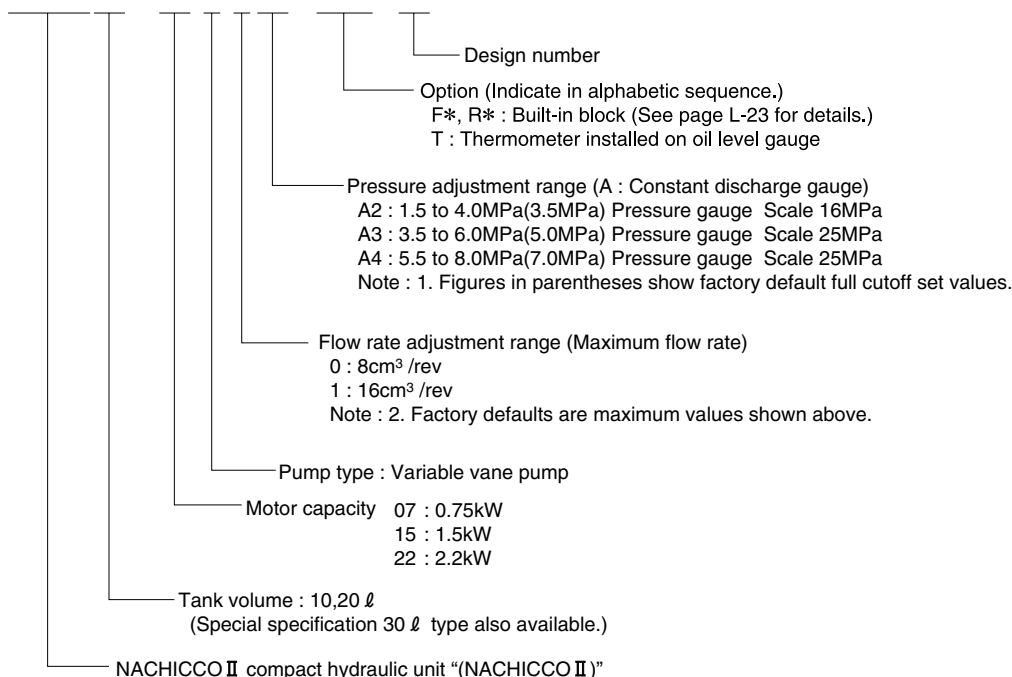
Specifications

Item	Model No.	NSP-*.VOA*	NSP-*.V1A*
Pump Capacity	cm ³ /rev	8.0	16.0
Maximum Pressure	MPa	8.0 (81.6kgf/cm ²) (Full Cutoff Pressure)	
Motor Output	kW	0.75, 1.5	1.5, 2.2
Tank Capacity	ℓ	10, 20	
Installation Space	mm	300 × 400	
Approximate Weight	kg	37 (10 ℓ, 1.5kW, excluding options)	

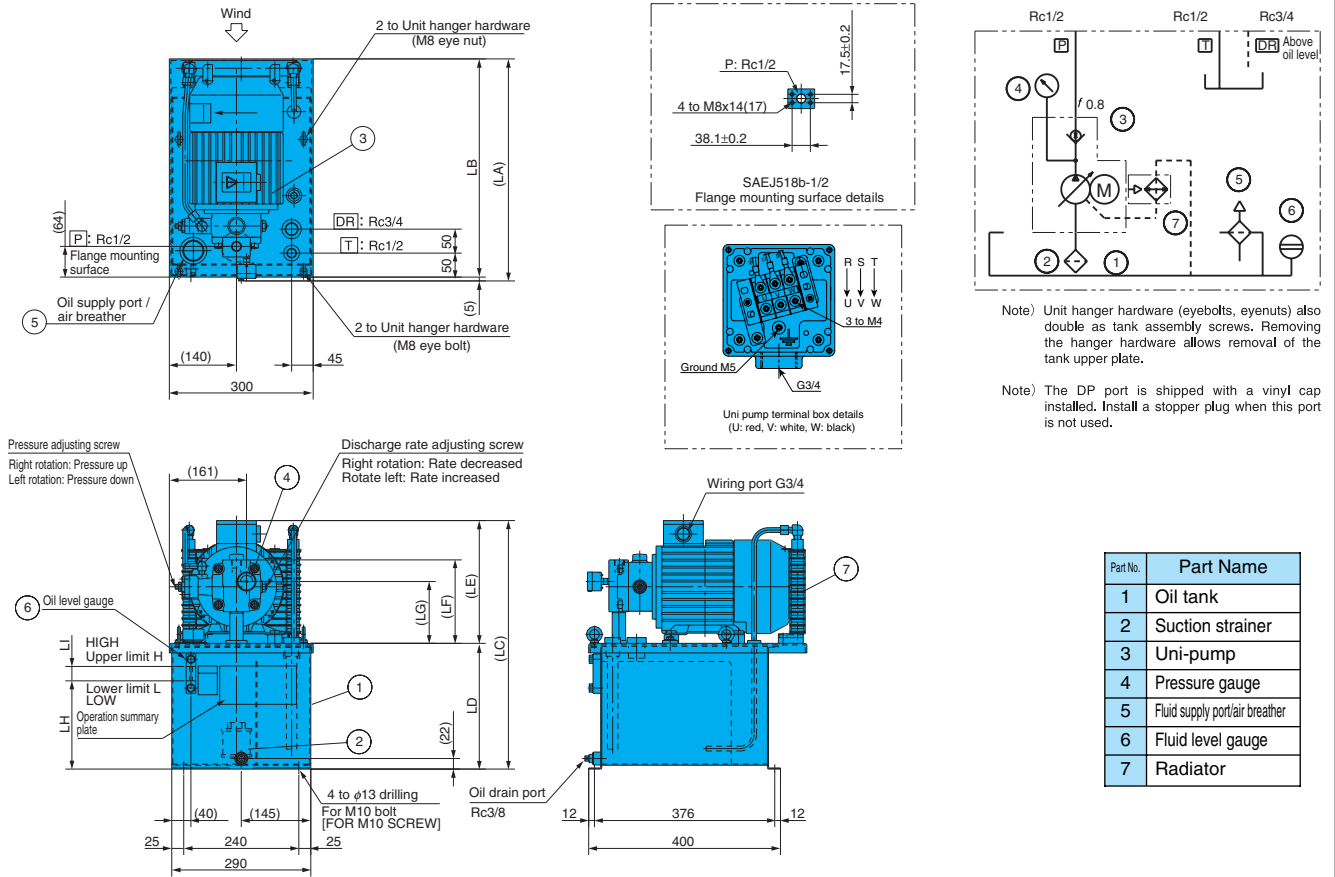
Understanding Model Numbers

Note) 1.Note that there are certain restrictions on pump capacity and motor capacity combinations. See the Selection Precautions on page L-23 before selecting a model.
2.Design numbers are subject to change without notice.

NSP – 10 – 07 V 0 A2 – F2T – 12

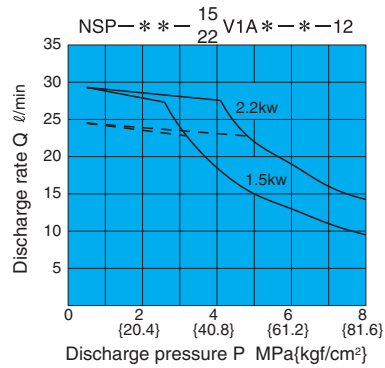
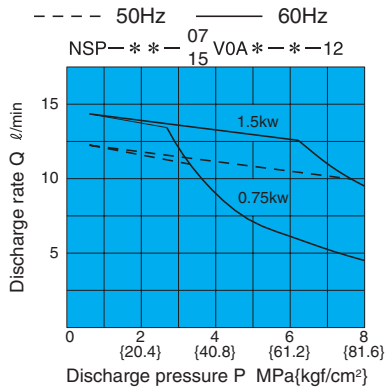


Design Drawings, Dimension Tables



Selecting a Motor

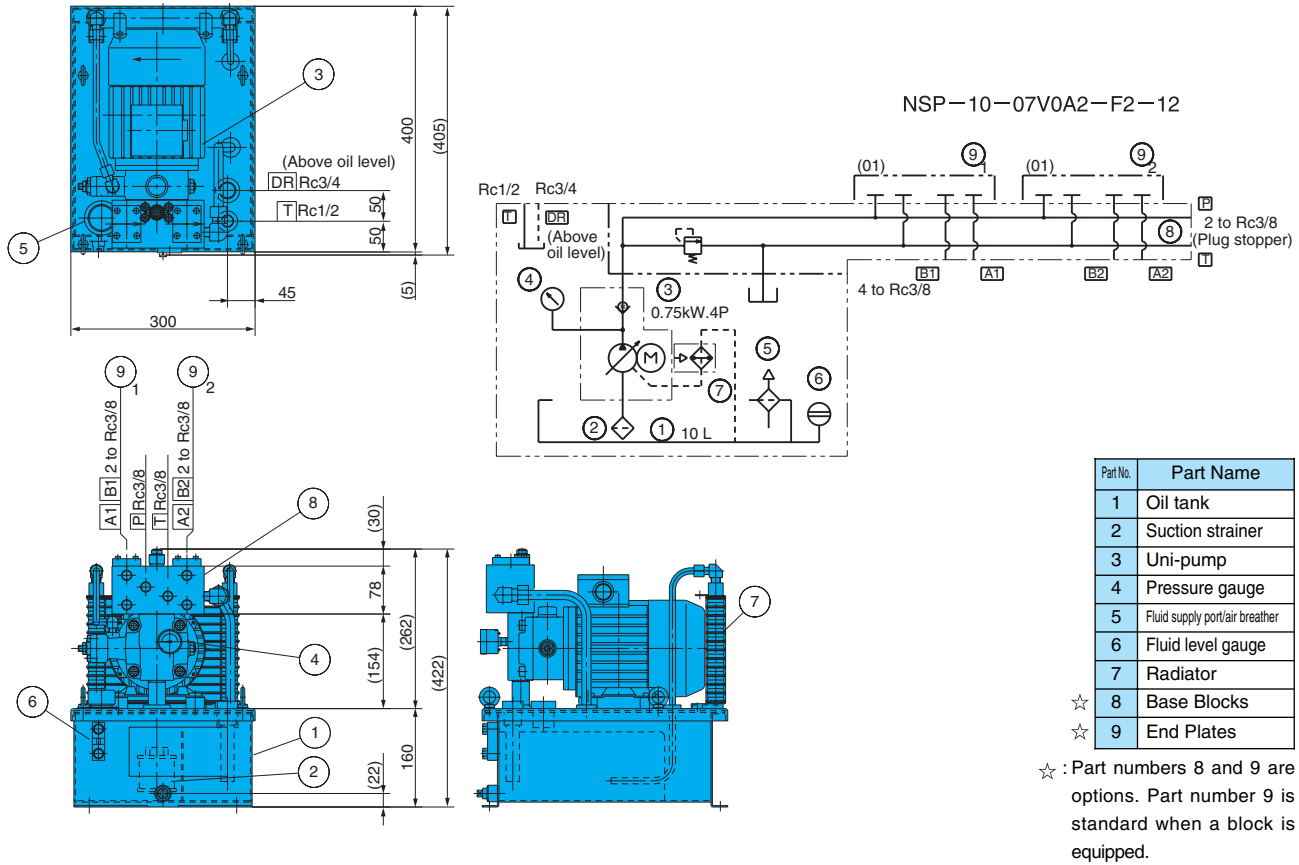
NSP Motor Selection Curves



Model No.	Motor (kW-P)	Dimensions											Approximate Weight (kg)
		LA	LB	LC	LD	LE	LF	LG	LH	LI	H	L	
NSP-10-07V*A*-12	0.75 - 4	405	400	400	160	240	154	109	102	10	10L	9L	33
NSP-10-15V*A*-12	1.5 - 4	430	425	402		242	164	119					37
NSP-10-22V*A*-12	2.2 - 4	460	455	422		262	174	129					42
NSP-20-07V*A*-12	0.75 - 4	405	400	502	262	240	154	109	185	30	20L	17L	35
NSP-20-15V*A*-12	1.5 - 4	430	425	504		242	164	119					39
NSP-20-22V*A*-12	2.2 - 4	460	455	524		262	174	129					44

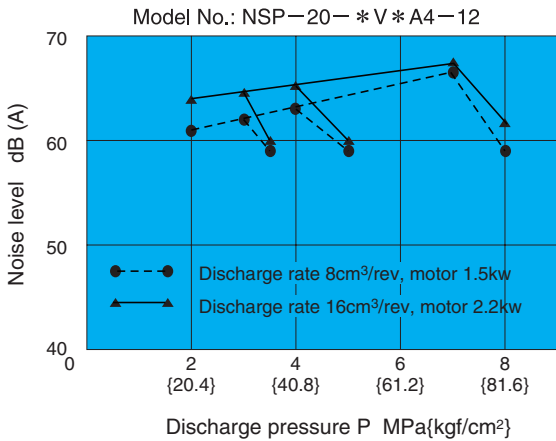
(Excluding operating fluid)

[Block Addition Example]
NSP-10-07V0 A2-F2-12

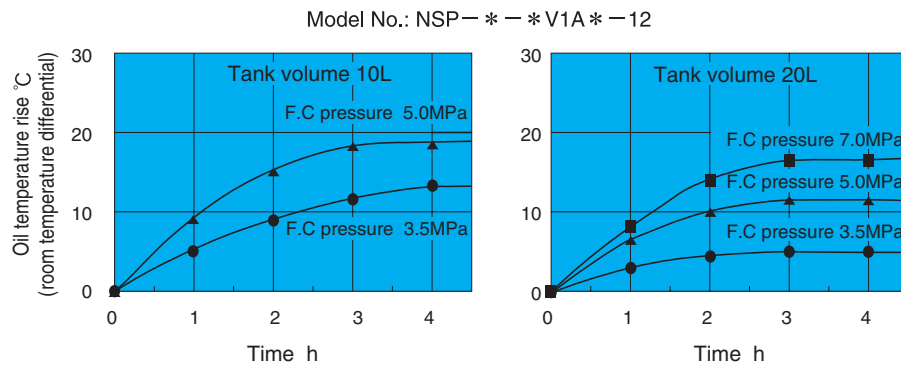


Performance Characteristics

① Noise Characteristics



② Fluid Temperature Characteristics



Note) For information about power consumption, see the data for the UVN Series variable vane uni-pump on page B-41.

Conditions

(The values shown in the graph to the left are typical characteristics under the following conditions.)

Operating Fluid: ISO VG32 equivalent

Fluid Temperature: 40±5°C

Revolution Speed: 1800min⁻¹

Measurement Distance:

1 meter around the unit
(Average value from four directions)

Note) Noise characteristics are affected by the condition of the floor and stand where the unit is mounted, whether there are noise reflective items nearby, and other factors. Such factors can produce different characteristics than those indicated above.

Conditions

(The values shown in the graph to the left are typical characteristics under the following conditions.)

Operating Fluid: ISO VG32 equivalent

Revolution Speed: 1800min⁻¹

Room Temperature: 29°C

Motor: 0.75 to 2.2kW

Note) 1. Note that continuous operation at pressures of 5.0MPa or greater with the 10 l tank cause a large rise in fluid temperature. A 20 l tank is recommended in this case.
2. Rises in fluid temperature depend on actual operating conditions, and so actual temperatures may be different from those indicated above.

Selection Precautions

Model Combinations

- 1 The table on the right shows the standard pump and motor combinations.
- 2 A 30 ℓ tank capacity requires special specifications.
- 3 A model equipped with a block comes with a stopper plate on the block.

Motor kW	0.75	1.5	2.2
0A*	○	○	
1A*		○	○

Circuit Configuration

- 1 The basic configuration is a standard Nachicco product (NSP-**) plus an external manifold (circuit).

- 2 Provide piping with sufficient flexibility between the Nachicco unit and external manifold.

- Make sure the maximum peak pressure (setting pressure + surge pressure) during operation does not exceed 14MPa. The following are typical pipe conditions at a reference maximum peak pressure at 14MPa or less as reference. Rubber hose (for 14MPa) 1/2" x 2m (Pipe Capacity: 250cm³) pump operating conditions: 1MPa→7MPa, full cutoff
- At pressures in excess of 14MPa, equip a circuit side surge cutoff relief valve.

Built-in Manifold Block

- 1 When a manifold block (optional) is built into the pump, make sure the block and valve total weight is not greater than 15kg.

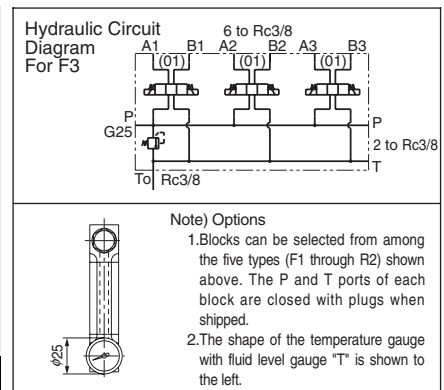
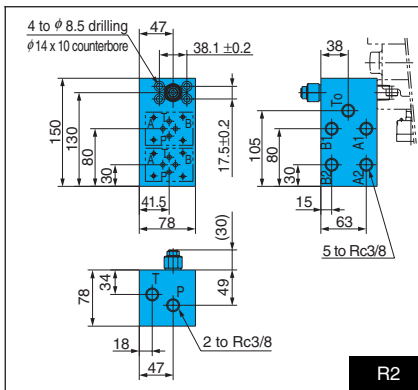
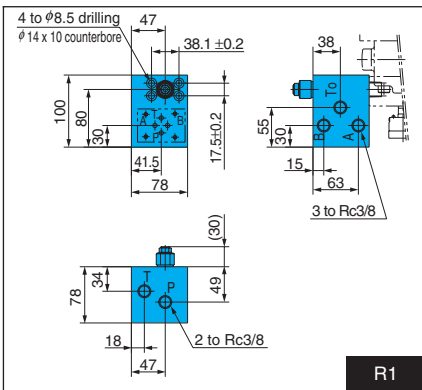
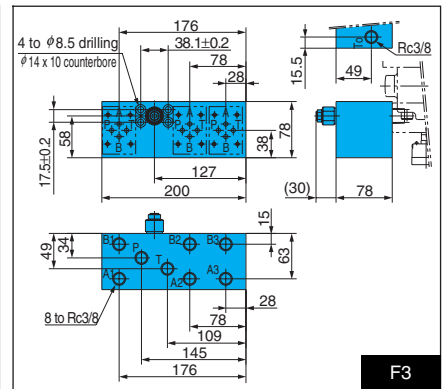
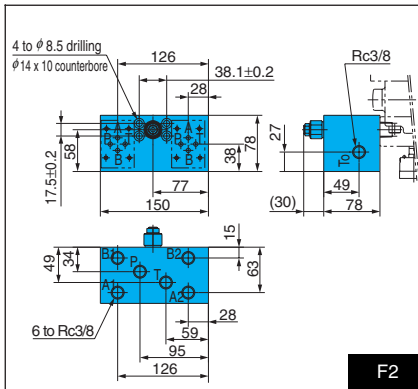
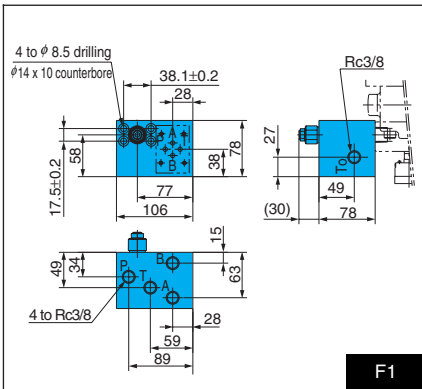
Block Type	F1-R1	F2-R2	F3
Block Weight (kg)	4.5	6.5	8.5
Allowable Additional Weight (kg)	10.5	8.5	6.5

- 2 Contact your agent for information about equipping a circuit.

Paint Specifications

- 1 The interior and exterior of the tank and the motor are covered with a melanin baked-on resin coating, while the pump is spray painted with a lacquer finish. Color is Nachi standard color (Mancel No. 5B6/3).
- 2 Contact your agent about specifying external paint colors.

Option Details



Handling Overview

Startup Precautions

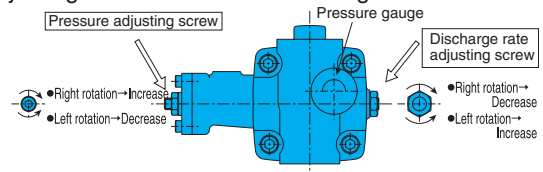
- 1 Check to make sure that the operating fluid in the tank is at the prescribed level.
 - A Upper Limit Mark (Yellow): Prescribed fluid level (nominal capacity)
 - B Lower Limit Mark (Red): Minimum fluid level
- 2 Perform electrical wiring exactly as shown below.

Motor and Power Supply Polarity
U→R
V→S
W→T

If wiring is performed incorrectly...
 · Electric pump rotates in reverse, fluid is not discharged. Continued operation can damage the pump.
 · Attach a pressure gauge to the discharge side and check for pressure rise.

- 3 Perform repeated motor starts and stops to bleed air from the interior of the pump and the suction piping. A no-load circuit allows faster bleeding.

Adjusting the Pressure and Discharge



Note: Do not touch anything except the adjustment screw shown above.

Maintenance and Inspection

- 1 Fluid Temperature: Use in an area where the temperature is 15°C to 60°C.
- 2 Operating Fluid Replacement Cycle: Perform the initial fluid replacement after three months of operation. After that, replace fluid when it becomes dirty or once a year, whichever comes first.
- 3 Radiator Fin Cleaning and Fin Strainer Cleaning: Every six months or 4,000 hours of operation, whichever comes first.

Environment

- 1 Temperature: 10 to 35°C
- 2 Avoid areas exposed to mist of water-soluble coolant.



NACHI NN PACK

(Low-noise Standard Variable Pump Unit)

Features

The new NACHI NN PACK is the perfect choice as a hydraulic pressure source for machine tools, manufacturing machinery, and other applications that require a low-noise, low fluid temperature rise, environment-friendly, and compact variable pump unit. A wide range of models let's you select the one that delivers exactly the performance you need.

Low Noise = 54dBa

〔 NNP-20-22P16N1-10
60Hz, 7MPa Full Cutoff 〕

With a new low-noise NACHI NN uni-pump this pump provides a combination of simple configuration and low noise (10dBa less noise than previous Nachi models).

Low Temperature Rise = Room Temperature +7°C

〔 NNP-20-22P16N1-10
60Hz, 7MPa Full Cutoff Continuous Operation
Internal Tank Fluid Temperature Saturation Temperature 〕
With a pump drain fan cooler equipped as standard, this model features a tank configuration designed to inhibit foaming and suppress fluid temperature rise.

A wide selection of models from which to choose

〔 Basic Series: 10 types
Pump Variable Controllers: 5 types
Options: 8 types 〕

A wide range of models provides a selection of capacity levels, and selecting a variable control mechanism helps to reduce energy needs.

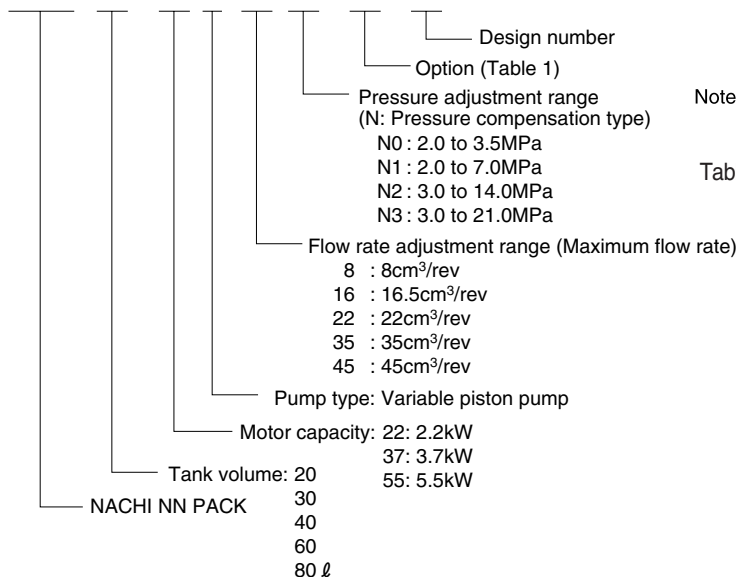
Specifications

Power supply: AC200V-50/60Hz AC220V-60Hz

Model No.	Pump Capacity cm ³ /rev	Motor capacity kW-P	Maximum Pressure (Full Cutoff Pressure) MPa(kgf/cm ²)	Tank Capacity ℓ	Fan Cooler Motor Input W[at50/60Hz]	Standard Weight kg		
NNP-20-22P8N*-**-10	8.0	2.2 - 4	21{214}	20	16/15W Single-phase	85		
NNP-20-37P8N*-**-10		3.7 - 4		20		95		
NNP-20-22P16N*-**-10	16.5	2.2 - 4		20		90		
NNP-30-37P16N*-**-10		3.7 - 4		30		100		
NNP-20-22P22N*-**-10	22.0	2.2 - 4		14{143}		20	33/30W Single-phase	90
NNP-30-37P22N*-**-10		3.7 - 4				30		100
NNP-40-37P35N*-**-10	35.0	3.7 - 4	21{214}	40	33/30W Single-phase	130		
NNP-60-55P35N*-**-10		5.5 - 4		60		155		
NNP-80-37P45N*-**-10	45.0	3.7 - 4	14{143}	80		80		145
NNP-80-55P45N*-**-10		5.5 - 4		80				160

Understanding Model Numbers

NNP - 20 - 22 P 16 N2 - ** - 10



Note) N3 not available for flow rate adjustment ranges 22 and 45.

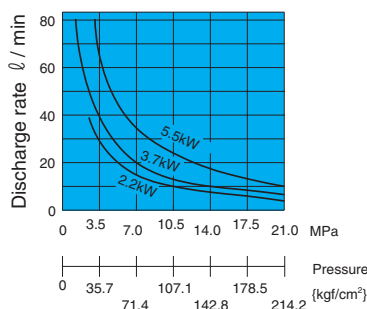
Table 1: Option Symbols (Specify in alphabetic sequence.)

Symbol	Description
F*	F*Type block (See block specifications.)
R*	R*Type block (See block specifications.)
G	Fluid level gauge guard
H	Temperature switch (Contact on at fluid temperature of 65°C)
M	Microseparator
P	Bottom oil pan
S	Front switch (Contact on at fluid low limit level)
T	Fluid level gauge with temperature gauge (with guard)
W	Self Leak Test

Note) Return filter and fan cooler are equipped as standard.

Selecting a Motor

The lower sides of the curves for each of the motors shown in the graph indicate the operating range under rated output for that motor.

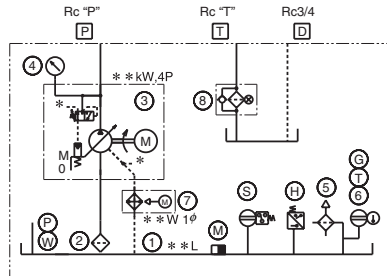
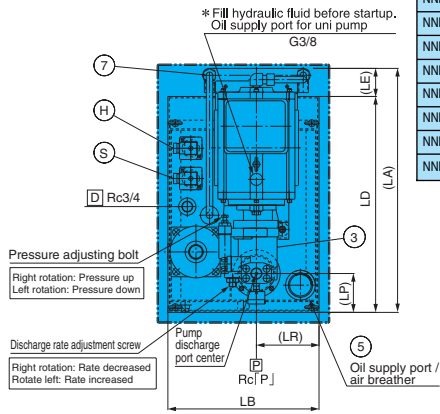


Tank Capacity and Motor/Pump Combinations

Tank Capacity (ℓ)	Motor capacity (kW-P) 2.2 - 4			3.7 - 4					5.5 - 4		
	Pump Capacity (cm ³ /rev)	8	16	22	8	16	22	35	45	35	45
20 ℓ	○	○	○	○							
30 ℓ					○	○					
40 ℓ								○			
60 ℓ										○	
80 ℓ									○		○

Design Drawings, Dimension Tables

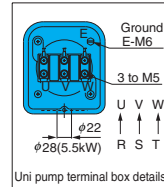
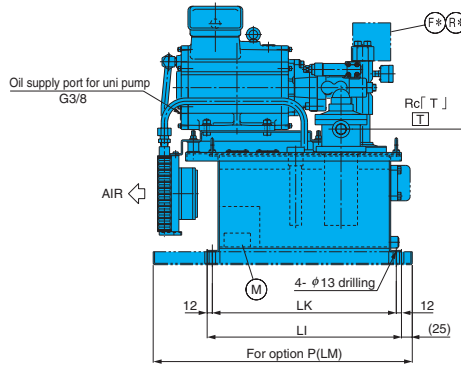
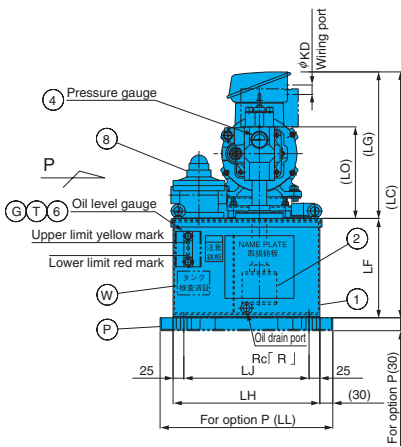
Model No.	Dimensions																			
	LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ	LK	LL	LM	LO	LP	LR	KD	P	T	R
NNP-20-22P 8N***-10														205	120			1/2		
NNP-20-22P16N***-10			575				345							212	90			3/4		
NNP-20-22P22N***-10	565	350		500	65	230		340	450	290	426	400	600	217	113	145	∅22		3/4	3/8
NNP-20-37P 8N***-10			595											217	113			1/2		
NNP-30-37P16N***-10			670				305	365						224	83			3/4		
NNP-40-37P35N***-10			645				265	380						249	117		∅22			
NNP-60-55P35N***-10	670	450	780	570	100	355	425	440	560	390	536	500	710	269	98	175	∅28	1	1	1/2
NNP-80-37P45N***-10			830				380							249	117		∅22			
NNP-80-55P45N***-10			875				425							269	98		∅28			



Part No.	Part Name
1	Fluid tank
2	Suction strainer
3	Uni-pump
4	Pressure gauge
5	Fluid supply port/air breather
6	Fluid level gauge
7	Fan cooler
8	Return filter

Options

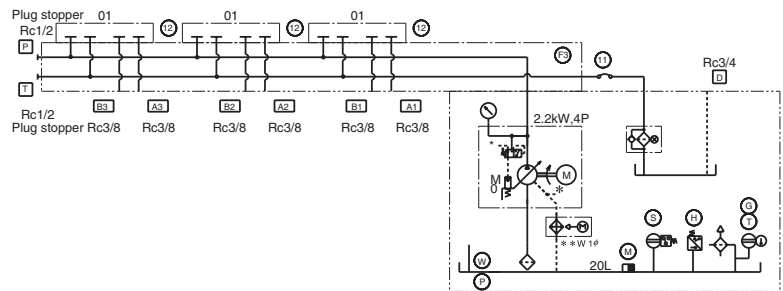
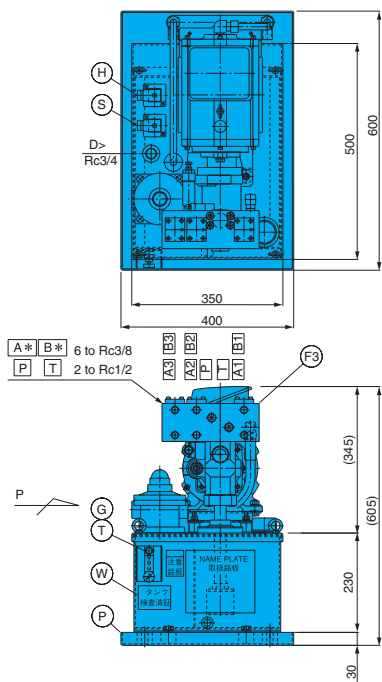
Part No.	Part Name
F*	Built-in block (F Type)
R*	Built-in block (R Type)
G	Fluid level gauge with guard
H	Temperature switch
M	Microseparator
P	Bottom oil pan
S	Float switch
T	Fluid level gauge with temperature gauge (with guard)
W	Self leak test



Auxiliary View P

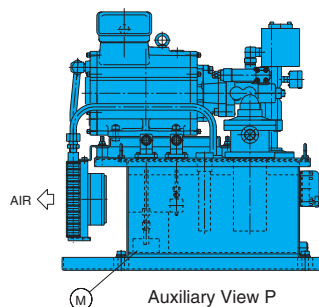
Option Installation Example

Model No. : NNP-20-22P16N2-F3HMPSTW-10



Symbol	Name
11	Flexible hose
12	End Plates

Note) Part numbers 11 and 12 are standard with a built-in block.



Auxiliary View P

F* and R* Block Specifications

Note) Note that there are certain restrictions on block-equipped combinations. See the Selection Precautions on page L-28.

Options F1, F2, F3, F6

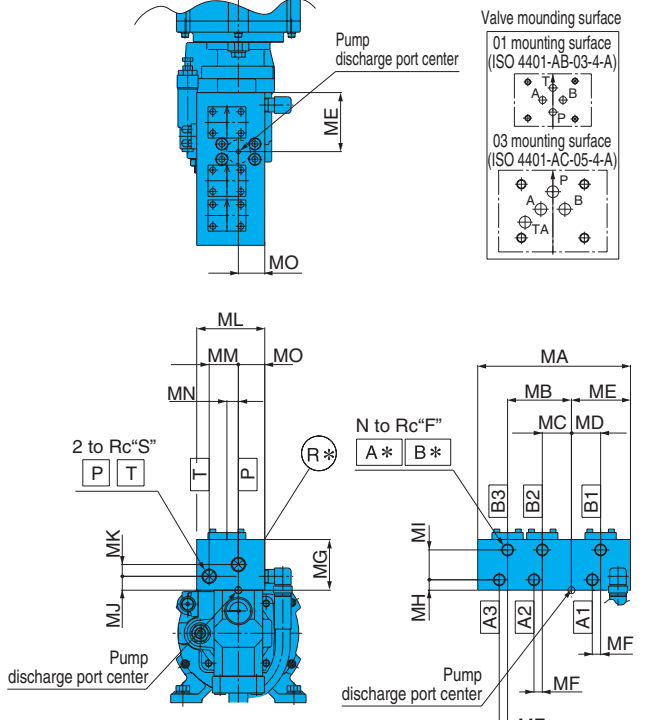
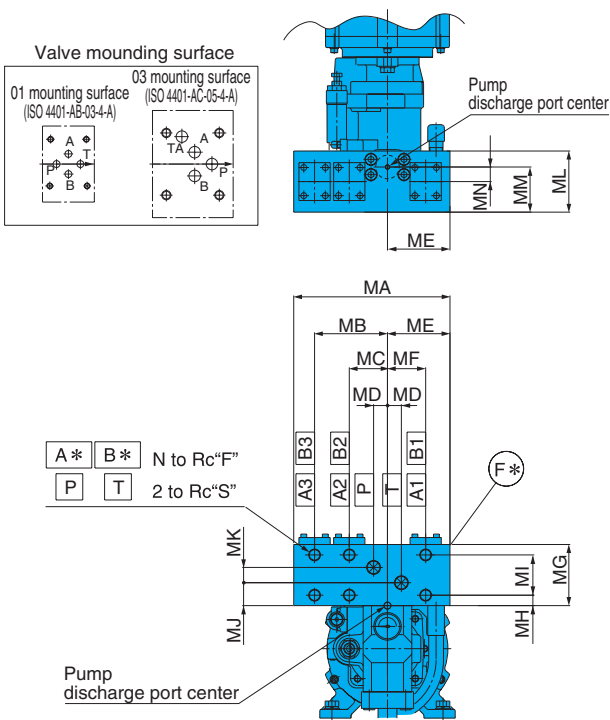
Symbol	Description	Model No.	
		Tank Capacity 20, 30 ℓ	Tank Capacity 40, 60, 80 ℓ
F1	F1 Type Block (01 x 1)	F1-1A	F1-2A
F2	F2 Type Block (01 x 2)	F2-1A	F2-2A
F3	F3 Type Block (01 x 3)	F3-1A	F3-2A
F6	F6 Type Block (03 x 1 - M6)	F6-1A-M6 (Standard M6)	F6-2A-M6 (Standard M6)

Tank Capacity	Options	Dimensions																
		MA	MB	MC	MD	ME	MF	MG	MH	MI	MJ	MK	ML	MM	MN	N	F	S
20 ℓ	F1	133	-	-	-	-	-	-	-	-	-	-	-	-	21	2	-	-
	F2	175	-	-	20	90	55	88	15	58	33	22	88	65	21	4	3/8	1/2
	F3	225	105	-	-	-	-	-	-	-	-	-	-	-	21	6	-	-
	F6	152	-	-	25	102	67	103	18	67	39	25	103	80	26	2	1/2	3/4
40 ℓ	F1	143	-	-	-	-	-	-	-	-	-	-	-	-	21	2	-	-
	F2	183	-	-	20	96	58	88	15	58	33	22	98	68	24	4	3/8	1/2
	F3	233	108	-	-	-	-	-	-	-	-	-	-	-	24	6	-	-
	F6	155	-	-	25	105	70	103	18	67	39	25	103	73	24	2	1/2	3/4

Options R1, R2, R3, R6

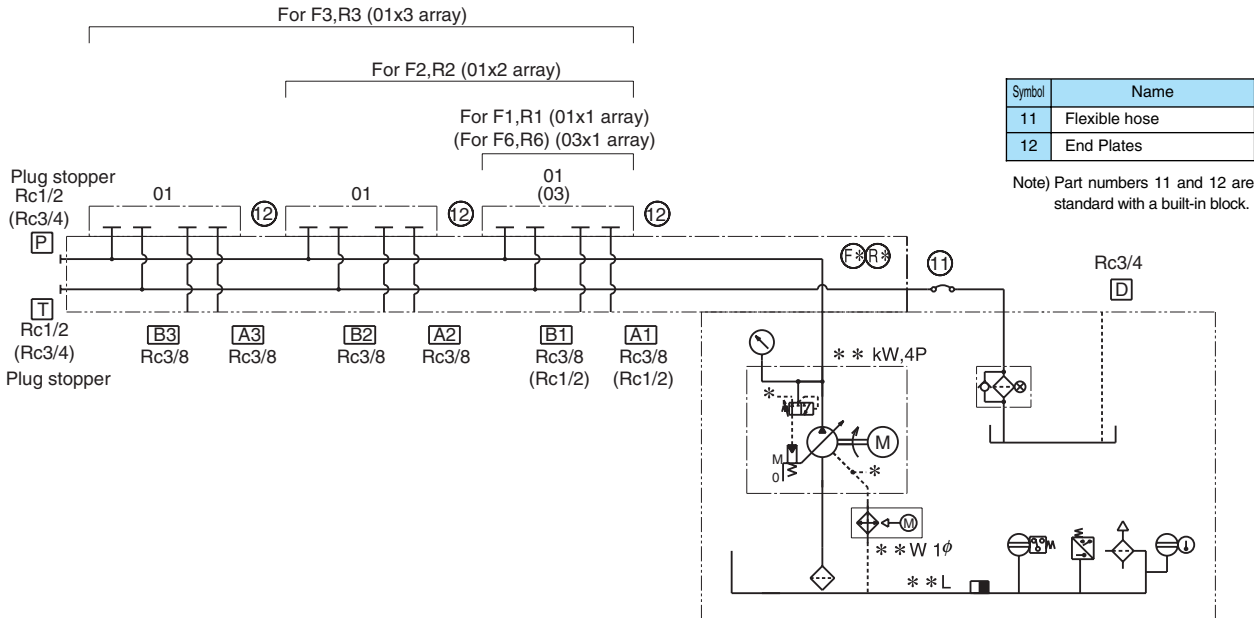
Symbol	Description	Model No.	
		Tank Capacity 20, 30 ℓ	Tank Capacity 40, 60, 80 ℓ
R1	R1 Type Block (01 x 1)	R1-1A	R1-2A
R2	R2 Type Block (01 x 2)	R2-1A	R2-2A
R3	R3 Type Block (01 x 3)	R3-1A	R3-2A
R6	R6 Type Block (03 x 1 - M6)	R6-1A-M6 (Standard M6)	R6-2A-M6 (Standard M6)

Tank Capacity	Options	Dimensions																	
		MA	MB	MC	MD	ME	MF	MG	MH	MI	MJ	MK	ML	MM	MN	MO	N	F	S
20 ℓ	R1	123	-	-	-	-	-	-	-	-	-	-	-	-	-	21	2	-	-
	R2	170	-	-	42	85	12	73	15	43	20	17	98	42	16.5	38	4	3/8	1/2
	R3	220	92	-	-	-	-	-	-	-	-	-	-	-	-	21	6	-	-
	R6	160	-	-	54	119	0	98	18	62	49	0	108	47	9	2	1/2	3/4	3/4
40 ℓ	R1	132	-	-	-	-	-	-	-	-	-	-	-	-	21	2	-	-	-
	R2	180	-	-	45	92	13	73	15	43	23	14	103	45	16.5	40	4	3/8	1/2
	R3	230	95	-	-	-	-	-	-	-	-	-	-	-	-	24	6	-	-
	R6	167	-	-	57	122	0	98	18	62	49	0	110	47	9	2	1/2	3/4	3/4



Note) Each block is shipped with plug stoppers in the P and T ports.

Hydraulic Circuit Diagram



Typical Performance Characteristics

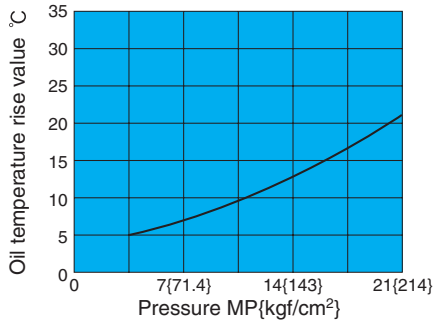
Fluid Temperature Rise Characteristics - Full Cutoff

These graphs show fluid temperature rise during continuous operation.

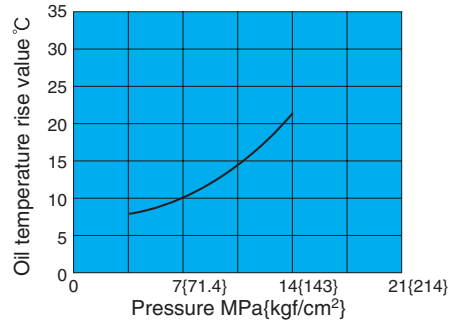
- Tank Fluid Pressure = Room Temperature + Fluid Temperature Rise Value
- Operating Fluid: ISO VG32 equivalent
- Revolution Speed: 1800min⁻¹ (60Hz)

Note) The fluid temperature rise value depends on actual operating conditions, and so actual temperatures may be different from those indicated above.

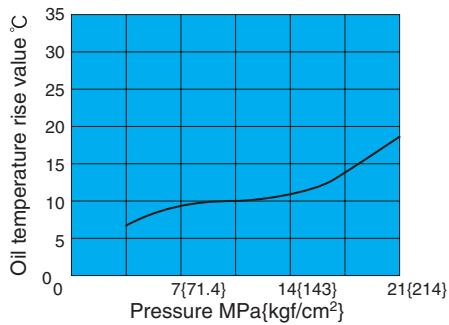
NNP-20-22P16N*-10



NNP-30-37P22N*-10



NNP-60-55P35N*-10



Noise Characteristics - Measurement Position

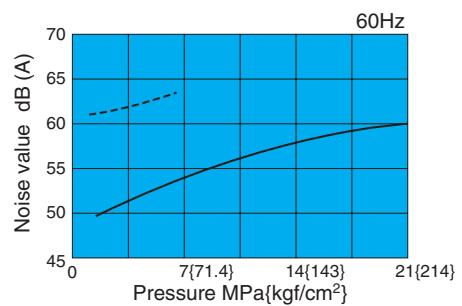
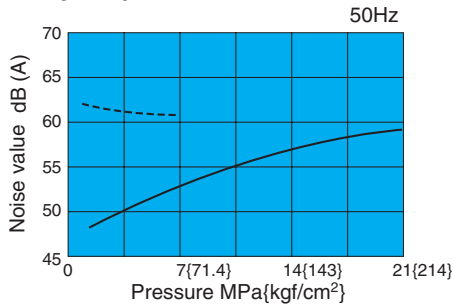
These graphs show noise values at locations one meter in front of and behind the pump.

- ISO VG32 equivalent
- Fluid Temperature: 40±5°C

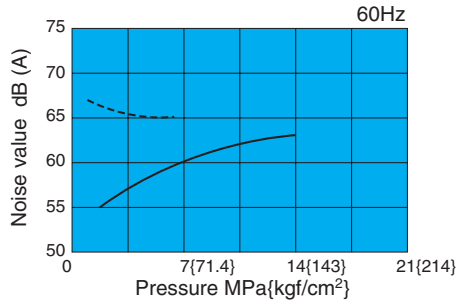
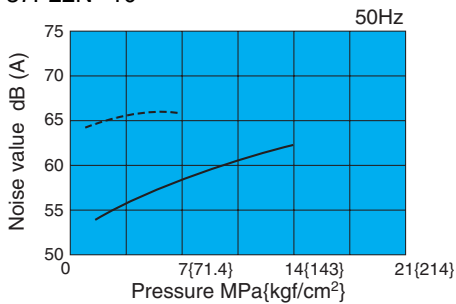
Note) Noise characteristics are affected by the condition of the floor and stand where the unit is mounted, whether there are noise reflective items nearby, and other factors. Such factors can produce different characteristics than those indicated below.

----- Full flow
 ——— Full cutoff

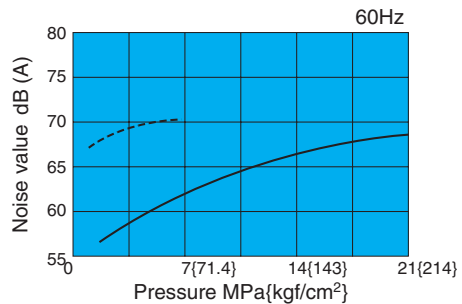
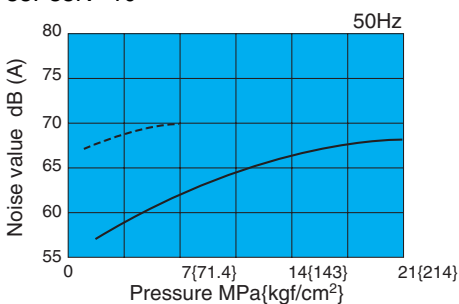
NNP-20-22P16N*-10



NNP-30-37P22N*-10



NNP-60-55P35N*-10



Selection Precautions

● Standard Accessories

A return filter with visual clogging inspection tool, and a fan cooler are equipped as standard.

● Options

- Options F* and R* cannot be selected for inclusion with an 8N* pump (NNP-**-*P8N* Type).
- For optional F* and R* blocks, up to three blocks can be specified for 01 size, and only one block can be specified for 03 size. Note, however, that the total weight of blocks and valves should not exceed 20kg.

· Tank Capacity 20 l , 30 l

Block Type	F1	F2	F3	F6	R1	R2	R3	R6
Block Weight (kg)	7.5	9.5	12.5	11.5	6.5	8.5	11.0	12.0
Allowable Additional Weight (kg)	12.5	10.5	7.5	8.5	13.5	11.5	9.0	8.0

· Tank Capacity 40 l , 60 l , 80 l

Block Type	F1	F2	F3	F6	R1	R2	R3	R6
Block Weight (kg)	8.5	11.0	14.0	11.5	7.0	9.5	12.0	12.5
Allowable Additional Weight (kg)	11.5	9.0	6.0	8.5	13.0	10.5	8.0	7.5

Note) M6 is the standard mounting tap for 03 size.

Handling Overview

● Hydraulic Operating Fluid

- Use general mineral oil type operating fluid equivalent to viscosity grade ISA VG32 or 46. Use of fluids other than mineral oil type operating fluid is not supported.
 - Up to 7.0MPa: ISO VG32
 - 7.0MPa or higher: ISO VG46
- Keep the moisture content of the operating fluid below 0.1% vol. Excessive moisture in the fluid creates the risk of short-circuiting and current leakage.
- Contaminated operating fluid can lead to malfunction and shortened pump life. Manage operating fluid so that contamination is maintained at class NAS10 or lower.

● Startup Precautions

- Before starting the pump, fill the uni-pump body with the same operating fluid as that used for normal operation through the uni-pump oil supply port.

Model No.	Supply Amount	Model No.	Supply Amount
NNP-20-22P**	2800cm ³	NNP-40-37P35	3500cm ³
NNP-20-37P**	3200cm ³	NNP-80-37P45	
NNP-30-37P**			NNP-60-55P35
		NNP-80-55P45	

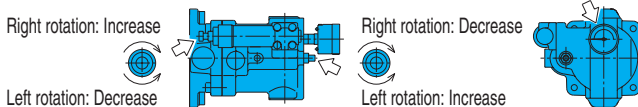
- Check to make sure that the operating fluid in the tank is at the prescribed level.
 - Upper Limit Mark (Yellow): Prescribed fluid level (nominal capacity)
 - Lower Limit Mark (Red): Minimum fluid level
- The surface of the motor and pump become hot during normal operation. Do not touch them.

● Adjusting the Pressure and Discharge Rate

Pressure adjusting bolt

Discharge rate adjustment screw

Pressure gauge



- 01, 03 size solenoid valves and modular valves can be selected.
- With option F* and R*, block and cylinder piping is hoses, configured by Nachi.
- Contact your agent for information about equipping a circuit.
- Option P is a bottom type oil pan. The oil pan does not have an oil drain port. The oil drain port is secured in place with the same mounting holes as the hydraulic unit.
- Option W is a leak test performed by Nachi.

● Circuit Configuration

- Provide piping with sufficient flexibility between NN PACK and external manifold (Recommended: Hose no longer than 1 meter).

● Paint

- Nachi-Fujikoshi standard color: Mancel No. 5B6/3 (lacquer)
- Contact your agent about specifying external paint colors.

● Electrical Wiring

- Perform electrical wiring exactly as shown below.

Motor and Power Supply
R - U
S - V
T - W

If wiring is performed incorrectly...
· Electric pump rotates in reverse, fluid is not discharged
· Attach a pressure gauge to the discharge side and check for pressure rise.

- Do not forget to ground the pump!
 - After wiring is complete, be sure to cover the terminal box with the cover that comes with it.
 - Do not forget to wire the fan motor of the fan cooler. The power supply is single-phase 200V AC, non-polarity.
- Provide a no fuse breaker on the main power supply to protect electric circuitry against shorts and other current leakage, and as protection against motor overload. Also provide a leak breaker to protect against the risk of electric shock, etc.

● Air intake and Exhaust

- Take care so there is nothing blocking the area around air intake and exhaust of the pump drain fan cooler. Also, be sure to locate the pump in a well-ventilated area where heat will not build up.

● Transport and Installation

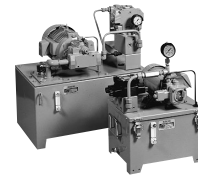
- Use the hangers when transporting the pump.
- Since this is a stationary type pump, secure it with bolts on a vibration-free, level surface.

● Maintenance and Inspection

- Fluid Temperature: Use the pump in an area where the temperature is 10°C to 60°C.
- Operating Fluid Replacement Cycle: Perform the initial fluid replacement after three months of operation. After that, replace fluid when it becomes dirty or once a year, whichever comes first.
- Straining and Tank Internal Inspection and Cleaning: Every three months
- Return Filter Element Inspection: Every three months (replace as required)
- Fan Cooler Fin Inspection and Cleaning: Every six months

● Environment

- Temperature: 10 to 35°C
- Avoid areas exposed to mist of water-soluble coolants, etc.



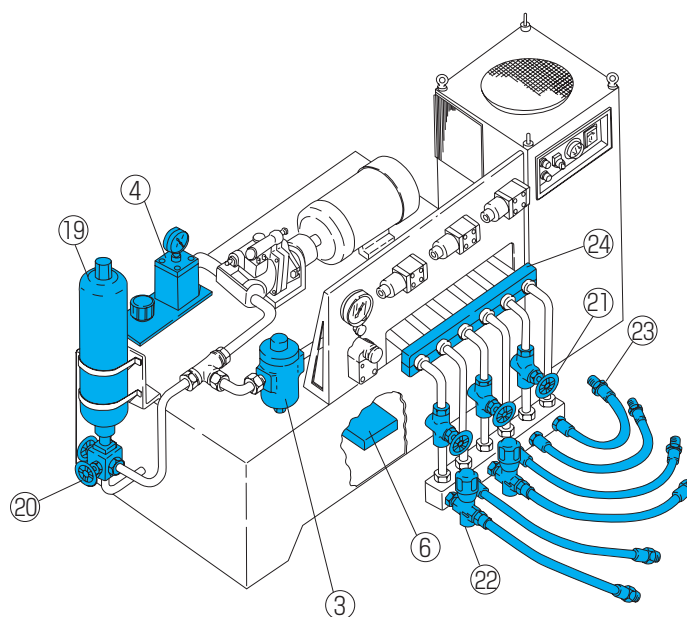
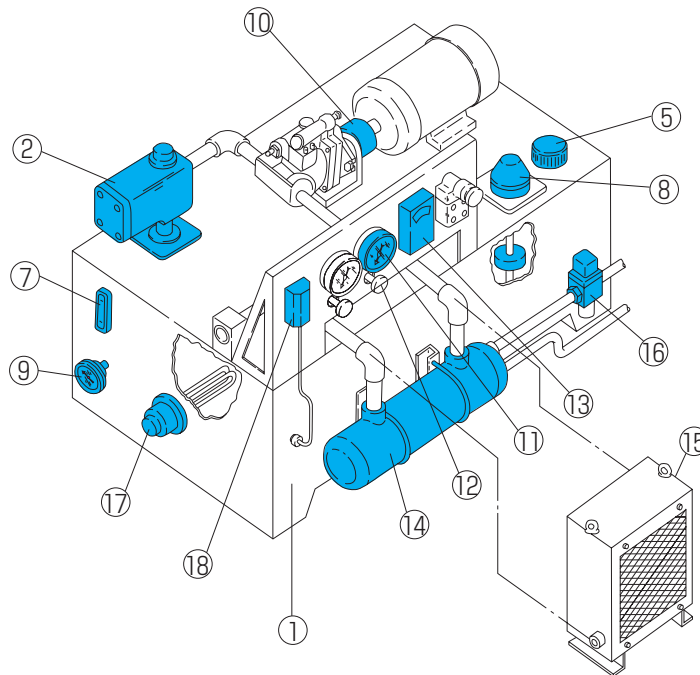
Hydraulic Accessories

Fujikoshi hydraulic accessories are made possible through a long history of accumulated know-how, and provide you with the tools you need to configure the hydraulic circuits and systems you need.

Fujikoshi accessories not only maximize the performance of your hydraulic system, they also provide you with the versatility to configure the simplest, most economical solution for virtually any type of

system imaginable. Use the illustration below to select the Fujikoshi hydraulic accessories that best suit your needs.

- ① Tank
- ② Section Filter
- ③ Line Filter
- ④ Boss Unit
- ⑤ Air Breather
- ⑥ Microseparator
- ⑦ Fluid Level Gauge
- ⑧ Fluid Level Switch
- ⑨ Temperature Gauge
- ⑩ Coupling
- ⑪ Pressure Gauge
- ⑫ Gauge Isolator
- ⑬ Pressure Switch
- ⑭ Oil Cooler
- ⑮ Fan Cooler
- ⑯ Coolant Valve
- ⑰ Heater
- ⑱ Thermostat
- ⑲ Accumulator
- ⑳ Accumulator Line Valve
- ㉑ Stop Valve
- ㉒ Throttle Valve
- ㉓ Rubber Boss
- ㉔ Multi Clamp



• For detailed specifications and dimensions of hydraulic accessories, see the "Hydraulic Accessories Catalog."

Operating Fluid

Operating fluid is liquid inside of a hydraulic device that acts as a medium to transmit power. In addition to its operational task, hydraulic operating fluid also performs such

tasks as lubrication, rust prevention, sealing, and cooling. Because of the vital contributions hydraulic operating fluid makes to the operation, efficiency, and reliability of

hydraulic equipment, it is important to exercise sufficient care when selecting the correct type for your needs and when storing fluid.

● **Mineral Oil Hydraulic Fluid**
The most commonly used mineral oil hydraulic fluids are general operating fluid and anti-wear operating fluid. General operating fluid is called "R&O type." It is made by adding oxidation inhibitors, rust inhibitors, foam inhibitors, and other additives to a highly refined paraffin base oil to enhance its characteristics. Anti-wear operating fluid contains extreme pressure additives that enhances the extreme pressure characteristics required for high-pressure, high-speed hydraulic operations. These mineral oil operating fluids have a very wide range of application

in hydraulic equipment, and account for most hydraulic operation fluid in use today.

● **Fire-resistant Hydraulic Fluid**
Fire-resistant hydraulic fluid (FRHF) is used in fire fighting equipment and in hydraulic equipment in applications where there is the danger of fire. There are two types of FRHF: water-containing and synthetic. The common types are water-glycol type and water in oil emulsion type for water-containing FRHF, and phosphate ester type and fatty acid ester type for synthetic FRHF. Care is required when using an FRHF

concerning seal material, paint and metal compatibility (see table below), and because their lubrication characteristics are different from those of mineral oil.

● See the pages for each hydraulic device or contact your agent to find out if a fire-resistant hydraulic fluid can be used with a particular device.

Fire-resistant Hydraulic Fluid Seal Material Compatibility

Fluid	Water In Oil Emulsion	Water-glycol	Phosphate Ester	Fatty Acid Ester
Nitril Rubber	○	○	×	○
E . P . R .	×	○	○	○
Fluro Rubber	○	×	○	○
Teflon	○	○	○	○
Butyl Rubber	×	○	△	×
Urethane Rubber	×	×	×	○
Silicon Rubber	×	×	○	○
Leather (Wax Sealed)	×	×	○	○
Beech N	○	○	×	○
Beech S	○	○	×	○

Fire-resistant Hydraulic Fluid Paint Compatibility

Fluid	Water In Oil Emulsion	Water-glycol	Phosphate Ester	Fatty Acid Ester
Epoxy Resin	×	×	×	○
Vinyl Resin	×	×	×	○
Urethane Resin	×	×	×	○
Phtalic Resin	×	×	×	×
Phenolic Resin	×	×	×	×

Fire-resistant Hydraulic Fluid Metal Compa-tibility (△ indicates partial problem.)

Fluid	Water In Oil Emulsion	Water-glycol	Phosphate Ester	Fatty Acid Ester
Aluminum	○	×	△	○
Cast Iron	○	○	○	○
Steel	○	○	○	○
Brass	○	○	○	○
Copper	△	○	○	○
Magnesium	○	×	△	○
Cadmium	△	×	△	△
Zinc	△	×	○	△

Note) The △ symbol indicates items that may have problems. For details, consult your agent or a hydraulic operating fluid manufacturer.
○ symbol indicates items that may be used. × symbol indicates not ok.

● **General Properties of Hydraulic Fluid (Typical)**

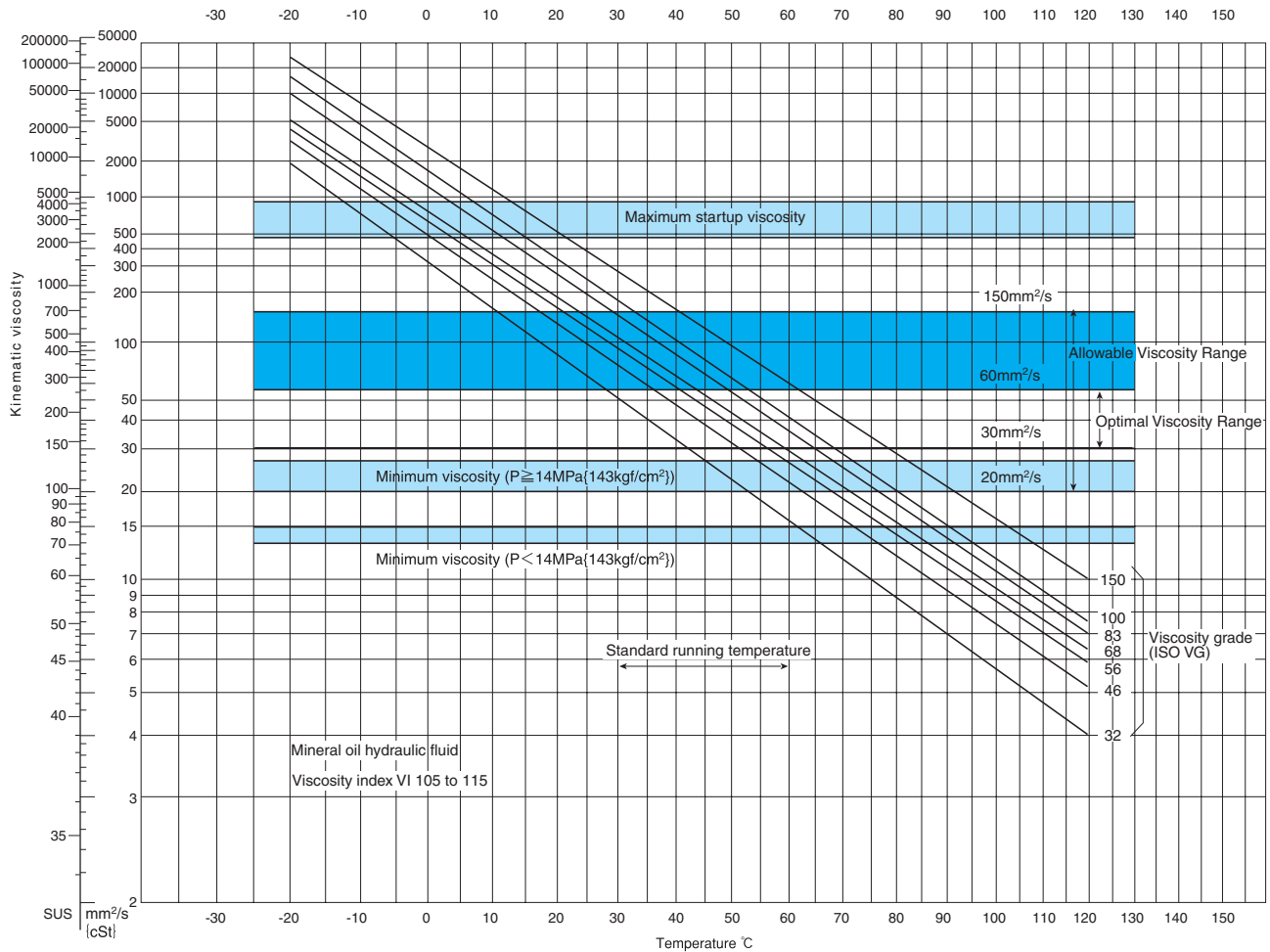
Item	Type	Mineral Oil	Water-glycol	Water In Oil Emulsion	Phosphate Ester	Fatty Acid Ester
Specific Gravity	15/4°C	0.874	1.072	0.890	1.152	0.900
Fire Point	°C	224	None	None	262	257
Viscosity	40°C	59.8	45.5	67.9	36.4	43.6
	mm ² /s	8.09	9.09	12.0	4.72	8.00
Viscosity index		113	206	146	11	165
Pour Point	°C	-25	-40	-12.5	-20	-10 or less

● **Viscosity-Temperature Characteristics (Mineral Oil Type Hydraulic Fluid)**

Viscosity is the most important factor to consider when selecting hydraulic operating fluid. Viscosity has a major effect on a variety of characteristics, including the volumetric efficiency, mechanical efficiency, and pipe resistance, valve leakage, operational characteristics, etc.

Though the overall efficiency and characteristics of the hydraulic device should be considered when determining the proper viscosity of the fluid, the main consideration should be the needs of the hydraulic pump at the heart of the hydraulic system. The following pages show typical

Viscosity-Temperature characteristics for mineral oils with viscosity indexes from 105 to 115, as well as ASTM Viscosity Index-Temperature tables with information about suitable and optimal viscosity ranges for hydraulic pumps.



• Fluid Cleanliness Levels

Today's high-pressure, high-speed, high-precision control hydraulic equipment is more susceptible than ever before to problems caused by hydraulic fluid contaminants. Fluid contaminants can cause a loss of machine performance, shorten machine life, and even lead to equipment malfunction.

Because of this, the U.S. has taken the lead in defining numeric contamination limits to govern cleanliness levels for hydraulic operating fluid.

Japan also applies the same standards (normally, NAS-1638) to classify fluid contamination limits.

In the future, the world standard ISO contamination limit codes (ISO 4406) will simplify the task of determining the correct contamination limit.

ISO contamination codes are expressed as A/B, with A representing the scale number for the number of particles of 5µm or greater, and B representing the number of particles of 15µm or greater.

Allowable Number of Particles in Hydraulic Fluid–NAS-1638 (100m ℓ), ISO Contamination Limit Code

Particle Size Class	Particle Size					Device	Filter	Remarks	ISO Contamination Limit Code ISO4406
	5 to 15µm	15 to 25µm	25 to 50µm	50 to 100 µm	100 µm or larger				
00	125	22	4	1	0				8/5
0	250	44	8	2	0				9/6
1	500	89	16	3	1				10/7
2	1,000	178	32	6	1				11/8
3	2,000	356	63	11	2				12/10
4	4,000	712	126	22	4				13/11
5	8,000	1,425	253	45	8				14/11
6	16,000	2,850	506	90	16		From nominal 0.8µm to absolute 3µm		14/12
7	32,000	5,700	1,012	180	32				15/13
8	64,000	11,400	2,025	360	64	↓ Electric-Hydraulic Servo Device		↕ Clean oil	16/14
9	128,000	22,800	4,050	720	128	↓ Electric-Hydraulic Pulse Motor	From nominal 10µm to absolute 40µm	↕ NC hydraulic fluid	17/15
10	256,000	45,600	8,100	1,440	256			↕ In drum General hydraulic fluid (new)	18/16
11	512,000	91,200	16,200	2,880	512				19/17
12	1,024,000	182,400	32,400	5,760	1,024	↓ General Industrial Hydraulic Device			20/18

Weight of Contaminants Per 100 m ℓ of Hydraulic Fluid–NAS-1638

Class	100	101	102	103	104	105	106	107	108
Weight mg	0.02	0.05	0.01	0.30	0.50	0.70	1.0	2.0	4.0

ISO Contamination Limit Equivalents (ISO 4406:1999) Number of particles show upper limit values for each scale number.

Number of Particles (Particles/m ℓ)	Scale Number	Number of Particles (Particles/m ℓ)	Scale Number	Number of Particles (Particles/m ℓ)	Scale Number
2,500,000 +	>28	5,000	19	5	9
2,500,000	28	2,500	18	2.25	8
1,300,000	27	1,300	17	1.3	7
640,000	26	640	16	0.64	6
320,000	25	320	15	0.32	5
160,000	24	160	14	0.16	4
80,000	23	80	13	0.08	3
40,000	22	40	12	0.04	2
20,000	21	20	11	0.02	1
10,000	20	10	10	0.01 or less	<1

Water-Glycol Type Operating Fluid Hydraulic Devices

Water-Glycol Type Operating Fluid Hydraulic Pump Specifications

Use the following tables to select the appropriate type of pump when using a water-glycol type hydraulic operating fluid.

1. PVS, PZS Series Variable Piston Pump

W/G Pump Type	Rated Voltage MPa{kgf/cm ² }	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Revolution Speed min ⁻¹	Suction Pressure MPa{kgf/cm ² }
W-PVS-0B - 8N*-30	14 {143}	14 {143}	1200	-0.01{-0.1} or larger
W-PVS-1B - 16N*-12 - 22N*-	14 {143} 10.5{107}	14 {143} 10.5{107}	1200	-0.01{-0.1} or larger
W-PVS-2B - 35N*-12 - 45N*-	14 {143} 10.5{107}	14 {143} 10.5{107}	1200	-0.01{-0.1} or larger
W-PZS-3B - 70N*-10	14 {143}	14 {143}	1200	-0.01{-0.1} or larger
W-PZS-4B -100N*-10	14 {143}	14 {143}	1200	-0.01{-0.1} or larger
W-PZS-5B -130N*-10	14 {143}	14 {143}	1200	-0.01{-0.1} or larger

2. VDR22 Design Series Variable Vane Pump

W/G Pump Type	Rated Voltage MPa{kgf/cm ² }	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Revolution Speed min ⁻¹	Suction Pressure MPa{kgf/cm ² }
W-VDR-1* -1A2-22 -1A3- -2A2- -2A3-	3.5{35.7} 7 {71.4} 3.5{35.7} 5 {51 }	3.5{35.7} 7 {71.4} 3.5{35.7} 5 {51 }	1800	-0.015 to +0.03 {-0.15 to +0.3}

3. VDC Series Variable Vane Pump

W/G Pump Type	Rated Voltage MPa{kgf/cm ² }	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Revolution Speed min ⁻¹	Suction Pressure MPa{kgf/cm ² }
W-VDC-1* -1A2-20 -1A3- -2A2- -2A3-	3.5{35.7} 7 {71.4} 3.5{35.7} 5 {51 }	3.5{35.7} 7 {71.4} 3.5{35.7} 5 {51 }	1800	-0.015 to +0.03 {-0.15 to +0.3}
W-VDC-2* -1A2-20 -1A3- -2A2- -2A3-	3.5{35.7} 7 {71.4} 3.5{35.7} 5 {51 }	3.5{35.7} 7 {71.4} 3.5{35.7} 5 {51 }	1800	-0.015 to +0.03 {-0.15 to +0.3}
W-VDC-3* -1A2-20 -1A3-	3.5{35.7} 7 {71.4}	3.5{35.7} 7 {71.4}	1800	-0.015 to +0.03 {-0.15 to +0.3}

4. IPH Series IP Pump

W/G Pump Type	Rated Voltage MPa{kgf/cm ² }	Maximum Working Pressure MPa{kgf/cm ² }	Maximum Revolution Speed min ⁻¹	Suction Pressure MPa{kgf/cm ² }
W-IPH-2*-*-11	21{214}	25 {255}	1200	-0.015 to +0.03{-0.15 to +0.3}
W-IPH-3*-*-20	21{214}	25 {255}	1200	-0.015 to +0.03{-0.15 to +0.3}
W-IPH-4*-*-20	21{214}	25 {255}	1200	-0.015 to +0.03{-0.15 to +0.3}
W-IPH-5*-*-21(11)	21{214}	25 {255}	1200	-0.015 to +0.03{-0.15 to +0.3}
W-IPH-6*-*-21(11)	21{214}	25 {255}	1200	-0.015 to +0.03{-0.15 to +0.3}

Note) Use the air bleed off valve to bleed air during test running.
W-CAB-T02*-*-10 maximum operating pressure 25MPa (255kgf/cm²)

Water-Glycol Type Operating Fluid Hydraulic Valve Specifications

Use the following tables to select the appropriate type of hydraulic valves when using a water-glycol type hydraulic operating fluid.

1. Pressure Control Valves

Name	W/G Valve Type	Specifications	
		Maximum Working Pressure	Maximum Flow Rate
Relief valve	R-03-* R-06-* R-10-*	21MPa{214kgf/cm ² }	(Note) 30(20) ℓ /min 150 340
Relief valve	RI-G03-* RI-G06-*	21MPa{214kgf/cm ² }	(Note) 120(30) ℓ /min 260
Remote Control Relief Valve	RCD-T02-* RC-T02-* RC-G02-*	21MPa{214kgf/cm ² }	15 ℓ /min 2 2
Solenoid Controlled Relief Valve	RSA-03-* RSA-06-* RSA-10-* RSS-03-* RSS-06-* RSS-010-*	21MPa{214kgf/cm ² }	30 ℓ /min 150 340 30 150 340
Solenoid Controlled Relief Valve	RIS-G03-* RIS-G06-*	21MPa{214kgf/cm ² }	120 ℓ /min 260
Pressure Reducing (and Check) Modular Valve	W-(C)G-03-* W-(C)G-06-* W-(C)G-10-*	21MPa{214kgf/cm ² }	(Note) 40(20) ℓ /min 100 250
Balancing Valve	GR-G01-A* GR-G03-A*(B)	14MPa{143kgf/cm ² }	20 ℓ /min 40
Pressure Control (and Check) Valve	(C)Q-03-* (C)Q-06-* (C)Q-10-*	21MPa{214kgf/cm ² }	40 ℓ /min 100 250

Note) Flow rate values in parentheses are for when the pressure adjusting range field indicated by the asterisk (*) is A, B, or C.

2. Direction Control Valves

Name	W/G Valve Type	Specifications	
		Maximum Working Pressure	Maximum Flow Rate
Right Angle Check Valve	CA-03-* CA-06-* CA-10-*	21MPa{214kgf/cm ² }	40 ℓ /min 110 320
In-line Check Valve	CN-T03-* CN-T06-* CN-T10-*	21MPa{214kgf/cm ² }	30 ℓ /min 75 190
Pilot Check Valve	CP-03-* CP-06-* CP-10-*	21MPa{214kgf/cm ² }	40 ℓ /min 110 320
DMA Type Manual Valve	W-DMA-G01-* W-DMA-G03-*	21MPa{214kgf/cm ² }	35 ℓ /min 65
SA Wet Type Solenoid Valve	SA-G01-* SA-G03-(J) DSA-G04-* DSA-G06-*	28MPa{286kgf/cm ² }	Note1) 85 ℓ /min 250 500
SS Wet Type Solenoid Valve	SS-G01-* SS-G03-(J) DSS-G04-* DSS-G06-*	28MPa{286kgf/cm ² }	Note1) 85 ℓ /min 110 250 500
	SS-G01-FR-* SS-G03-FR-(J)	21MPa{214kgf/cm ² }	Note1) 45 ℓ /min 65
Fan Solenoid Valve	W-SF-G01-*	14MPa{143kgf/cm ² }	Note1) 34 ℓ /min
Non-leak Type Solenoid Valve	SNH-G01-* SNH-G03-* SNH-G04-* SNH-G06-*	31.5MPa{321kgf/cm ² }	Note1) 17 ℓ /min 34 50 85
Gauge cock	K2-02-10	21MPa{214kgf/cm ² }	-
	K2-03/04-10	35MPa{357kgf/cm ² }	-

Note) 1. Maximum flow rate depends on the flow path. Use a maximum flow rate that is within 85% of the standard valve.
2. Wet type solenoid valves other than those noted above cannot be used with W/G.

3. Flow Control Valves

Name	W/G Valve Type	Specifications	
		Maximum Working Pressure	Maximum Flow Rate
Throttle (and Check) Valve	(C)FR-03-10 (C)FR-06-10 (C)FR-10-10	21MPa{214kgf/cm ² }	30 ℓ /min 75 190
FT Type Flow Control (and Check) Valve	(C)FT-G02-**-22 FT-G03-**-22	21MPa{214kgf/cm ² }	(Note)
F Type Flow Control (and Check) Valve	(C)F-G06-170-20 (C)F-G10-373-20	21MPa{214kgf/cm ² }	
TN Type Flow Control (and Check) Valve	(C)TN-G02-2-11 (C)TN-G02-8-11	10.5MPa{107kgf/cm ² }	
TS Type Flow Control (and Check) Valve	(C)TS-G01-2-11	10.5MPa{107kgf/cm ² }	
TL (TLT) Type Feed Control Valve	W-TL-G03-*-11 W-TL-G04-*-11 W-TLT-G04-*-11	7MPa{71kgf/cm ² }	

Note) Due to the hydraulic fluid gravity differential, maximum flow rate is about 15% less than standard.

4. Modular Valve

Name	W/G Valve Type	Specifications	
		Maximum Working Pressure	Maximum Flow Rate
Modular Type Relief Valve	OR-G01-**-20(21) OR-G03-**- (J)50	21MPa{214kgf/cm ² }	30 ℓ /min 65
Break Modulator Valve	ORO-G01-**-20 ORO-G03-**- (J)50	21MPa{214kgf/cm ² }	20 ℓ /min 30
Direct Relief Modular Valve	ORD-G01-**-20 ORD-G03-**- (J)50	21MPa{214kgf/cm ² }	20 ℓ /min 30
Pressure Reducing Modular Valve	OG-G01-P*-21 OGB-G01-P*-20 W-OG-G03-P*- (J)51 W-OG-G03-PC- (J)51	21MPa{214kgf/cm ² }	30 ℓ /min 30 65 45
	OGS-G01-P*C-22	21MPa{214kgf/cm ² }	30 ℓ /min
Pressure Reducing (and Check) Modular Valve	OG-G01-**-21 OGB-G01-**-20 W-OG-G03-**- (J)51 OG-G03*C- (J)51	21MPa{214kgf/cm ² }	30 ℓ /min 30 65 45
Sequence Modular Valve	OQ-G01-P2-20 OQ-G03-P2*- (J)50 OQ-G06-P2*-11	21MPa{214kgf/cm ² }	30 ℓ /min 65 120
Counter Balance Modular Valve	OCQ-G01-*1*-20 OCQ-G03-*1*- (J)50	21MPa{214kgf/cm ² }	30 ℓ /min 65
Pressure Switch Modular Valve	OW-G01-**-30	21MPa{214kgf/cm ² }	30 ℓ /min
Flow Regulator Modular Valve	OY-G01*-20 OCY-G01-P-20 OCY-G03-P- (J)50 OCY-G06-P-10 OCY-G01*-X/Y-20 OCY-G03*-X/Y- (J)51	21MPa{214kgf/cm ² }	30 ℓ /min 30 85 120 30 85
	OF-G01-P20-20 OF-G03-P60-J50 OCF-G01-*40-X/Y-30 OCF-G03-*60-X/Y- (J)50	21MPa{214kgf/cm ² }	(Note)
Check Modular Valve	OC-G01-**-20(21) OC-G03-**- (J)50 OC-G06-**-10	21MPa{214kgf/cm ² }	30 ℓ /min 85 120
Vacuum Check Modular Valve	OCV-G01-W-20 OCV-G03-W- (J)-50	21MPa{214kgf/cm ² }	30 ℓ /min 65
Pilot Operated Check Modular Valve	OCP-G01-**- (F)-21 OCP-G03-**- (J)50	21MPa{214kgf/cm ² }	30 ℓ /min 85
04 Series Relief Modular Valve	ORH-G04-P*-10	31.5MPa{321kgf/cm ² }	250 ℓ /min
04 Series Direct Relief Modular Valve	ORH-G04-D*-10	31.5MPa{321kgf/cm ² }	40 ℓ /min
04 Series Reducing Modular Valve	OGH-G04-**-10	31.5MPa{321kgf/cm ² }	250 ℓ /min
04 Series Counter Balance Modular Valve	OQH-G04-**-10	31.5MPa{321kgf/cm ² }	250 ℓ /min
04 Series Flow Regulator Modular Valve	OYH-G04-**-10	31.5MPa{321kgf/cm ² }	250 ℓ /min
04 Series Flow Control Modular Valve	OFH-G04-*200-X/Y-10	31.5MPa{321kgf/cm ² }	(Note)
04 Series Check Modular Valve	OCH-G04-**-10	31.5MPa{321kgf/cm ² }	250 ℓ /min
04 Series Vacuum Check Modular Valve	OVH-G04-W-10	31.5MPa{321kgf/cm ² }	250 ℓ /min
04 Series Pilot Check Modular Valve	OPH-G04-**-10	31.5MPa{321kgf/cm ² }	250 ℓ /min

Note) Due to the hydraulic fluid gravity differential, maximum flow rate is about 15% less than standard.

5. Electro-hydraulic Control Valves

Name	W/G Valve Type	Specifications	
		Maximum Working Pressure	Maximum Flow Rate
Pilot Relief Valve	EPR-G01-*-12	28MPa{286kgf/cm ² }	1 ℓ /min
Relief Valve	ER-G03-*-21 ER-G06-*-21	25MPa{255kgf/cm ² }	120 ℓ /min 260
Relief and Reducing Valve	W-EGB-G03-*-11 W-EGB-G06-*-11	25MPa{255kgf/cm ² }	40 ℓ /min 80
Flow Control Valve	(C)ES-G02-*- (F)-12 ES-G03-*- (F)-12 (C)ES-G06-250-11 ES-G10-500-(F)-11	21MPa{214kgf/cm ² }	(Note)
Load Response Flow Control Valve	ESR-G03-125-12 ESR-G03-125R*-12 ESR-G06-250-12 ESR-G06-250R*-12 ESR-G10-500-11 ESR-G10-500R*-11	25MPa{255kgf/cm ² }	(Note)
Flow Direction Control Valve	ESD-G01-***-12 ESD-G03-***-12 ESD-G04-***-12 ESD-G06-***-13	25MPa{255kgf/cm ² }	(Note)
Modular type reducing valve	EOG-G01-P*-11	25MPa{255kgf/cm ² }	25 ℓ /min
Modular Type Flow Control Valve	EOF-G01-*25-11	21MPa{214kgf/cm ² }	(Note)

- Note) 1. Due to the hydraulic fluid gravity differential, maximum flow rate is about 15% less than standard.
2. The ESH series high-speed response proportional valve does not support water or glycol-based hydraulic operating fluid.

SI Units and Conversion Formulas

Table 1: SI Base Units

Quantity	Name	Symbol
Length	meter	m
Mass	kilogram	kg
Time	second	s
Electric Current	ampere	A
Thermodynamic Temperature	kelvin	K
Amount of Substance	mole	mol
Luminous Intensity	candela	cd

Table 2 : SI Derived Units

Quantity	Name	Symbol
Plane Angle	radian	rad
Solid Angle	steradian	sr

Table 3: Derived SI Units with Special Names and Symbols

Quantity	Name	Symbol
Frequency	hertz	Hz
Force	newton	N
Pressure, stress	pascal	Pa
Energy, Work, Quantity of Heat	joule	J
Power, Radiant Flux	watt	W
Electric Charge, Quantity of Electricity	coulomb	C
Electric Potential Difference, Electromotive Force	volt	V
Capacitance	farad	F
Electric Resistance	ohm	Ω
Electric Conductance	siemens	S
Magnetic Flux	weber	Wb
Magnetic Flux Density	tesla	T
Inductance	henry	H
Celsius Temperature	degree Celsius	$^{\circ}\text{C}$
Luminous Flux	lumen	lm

* $^{\circ}\text{C}=(t+273.15)\text{K}$

Table 4: SI Prefixes

Factor	Name	Symbol
10^{18}	exa	E
10^{15}	peta	P
10^{12}	tera	T
10^9	giga	G
10^6	mega	M
10^3	kilo	k
10^2	hecto	h
10^1	deka	da
10^{-1}	deci	d
10^{-2}	centi	c
10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	n
10^{-12}	pico	p
10^{-15}	femto	f
10^{-18}	atto	a

Table 5: SI Derived Units whose Names and Symbols Include SI Derived Units with Special Names and Symbols

Quantity	Name	Symbol
Dynamic Viscosity	pascal second	Pa·s
Moment of Force	newton meter	N·m
Surface Tension	newton per meter	N/m
Heat Flux Density, Irradiance	watt per square meter	W/m ²
Heat Capacity, Entropy	joule per kelvin	J/K
Specific Heat Capacity, Specific Entropy*	joule per kilogram kelvin	J/(kg·K)
Thermal Conductivity	watt per meter kelvin	W/(m·K)
Permittivity	farad per meter	F/m
Permeability	henry per meter	H/m

*Also called weight entropy.

Table 6: Units Outside the SI but Accepted for Use with the SI

Name	Symbol	Value in SI Units
Minute (Time)	min	1 min=60s
Hour	h	1h=60min=3,600s
Day	d	1d=24h=86,400s
Degree	$^{\circ}$	$1^{\circ}=(\pi/180)\text{rad}$
Minute (Angle)	'	$1'=(1/60)^{\circ}=(\pi/10,800)\text{rad}$
Second (Angle)	"	$1''=(1/60)'=(\pi/648,000)\text{rad}$
Liter	ℓ	$1 \ell = 1\text{dm}^3 = 10^{-3}\text{m}^3$
Ton	t	$1\text{t}=10^3\text{kg}$

Force

N	dyn	kgf
1	1×10^5	1.020×10^{-1}
1×10^{-5}	1	1.020×10^{-6}
9.807	9.807×10^5	1

(Note) $1 \text{ dyn} = 10^{-5} \text{ N}$

Torque

N-m	kgf-m	gf-cm
1	1.020×10^{-1}	1.020×10^4
9.807	1	1×10^5
9.807×10^{-5}	1×10^{-5}	1

Pressure

Pa	MPa	bar	kgf/cm ²	atm	mHg	mH ₂ O
1	1×10^{-6}	1×10^{-5}	1.019×10^{-5}	9.869×10^{-6}	7.501×10^{-6}	1.020×10^{-4}
1×10^6	1	1x10	1.019×10	9.869	7.501	1.020×10^2
1×10^5	1×10^{-1}	1	1.020	9.869×10^{-1}	7.501×10^{-1}	1.020×10
9.807×10^4	9.807×10^{-2}	9.807×10^{-1}	1	9.678×10^{-1}	7.356×10^{-1}	1x10
1.013×10^5	1.013×10^{-1}	1.013	1.033	1	7.60×10^{-1}	1.033×10
1.333×10^5	1.333×10^{-1}	1.333	1.360	1.316	1	1.360×10
9.807×10^3	9.807×10^{-3}	9.807×10^{-2}	1×10^{-1}	9.678×10^{-2}	7.355×10^{-2}	1

(Note) $1 \text{ Pa} = 1 \text{ N/m}^2$

Work, Energy, Quantity of Heat

J	kgf-m	kW-h	kcal
1	1.02×10^{-1}	2.778×10^{-7}	2.389×10^{-4}
9.807	1	2.724×10^{-6}	2.343×10^{-3}
3.60×10^6	3.671×10^5	1	8.60×10^2
4.186×10^3	4.269×10^2	1.163×1^{-3}	1

(Note) $1 \text{ J} = 1 \text{ W-s}$. $1 \text{ kgf-m} = 9.807 \text{ J}$. $1 \text{ W-h} = 3600 \text{ W-s}$. $1 \text{ cal} = 4.186 \text{ J}$

Heat Transfer Coefficient

W/m ² -K	kcal/m ² -h-°C	cal/cm ² -s-°C
1	8.60×10^{-1}	2.389×10^{-5}
1.163	1	2.778×10^{-5}
4.186×10^4	3.60×10^4	1

Thermal Conductivity

W/m-K	kcal/m-h-°C	J/cm-s-°C
1	8.60×10^{-1}	1×10^{-2}
1.163	1	1.163×10^{-2}
1×10^2	8.60×10	1

Power, Radiant Flux

W	kW	kgf-m/s	kcal/s
1	1×10^{-3}	1.020×10^{-1}	2.389×10^{-4}
1×10^3	1	1.020×10^2	2.389×10^{-1}
9.807	9.807×10^{-3}	1	2.343×10^{-3}
4.186×10^3	4.186	4.269×10^2	1

(Note) $W = 1 \text{ J/s}$. $1 \text{ kgf-m/s} = 9.807 \text{ W}$

Dynamic Viscosity

Pa-s	P (Poise)	cP
1	1x10	1×10^3
1×10^{-1}	1	1×10^2
1×10^{-3}	1×10^{-2}	1

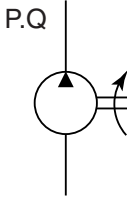
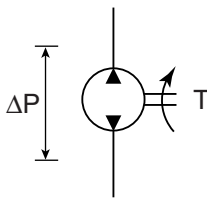
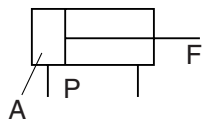
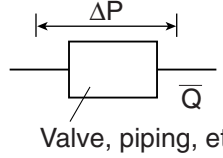
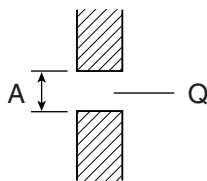
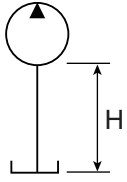
Flow rate

m ³ /s	m ³ /h	ℓ /min	gal(US)/min
1	3.6×10^3	6×10^4	1.585×10^4
2.778×10^{-4}	1	1.667×10	4.403
1.667×10^{-5}	6×10^{-2}	1	2.642×10^{-1}
6.304×10^{-5}	2.271×10^{-1}	3.782	1

Kinematic viscosity

m ² /s	St	cSt
1	1×10^4	1×10^6
1×10^{-4}	1	1×10^2
1×10^{-6}	1×10^{-2}	1

(Note) $1 \text{ cSt} = 1 \text{ mm}^2/\text{s}$

	Item	SI units	Power (engineering) units
Requirement		$L = \frac{P \cdot Q}{60 \times \eta}$ <p>L : Power Requirement [kW] P : Discharge Pressure [MPa] Q : Discharge Rate [ℓ /min] η : Pump Efficiency</p>	$L = \frac{P \cdot Q}{612 \times \eta}$ <p>L : Power Requirement [kW] P : Discharge Pressure [kgf/cm²] Q : Discharge Rate [ℓ /min] η : Pump Efficiency</p>
Oil Motor Output Torque		$T = \frac{\Delta P \cdot q}{2\pi} \times \eta$ <p>T : Output Torque [N·m] ΔP : Inlet/Outlet Pressure Differential [MPa] q : Volume per Oil Motor Turn [cm³] η : Torque Efficiency</p>	$T = \frac{\Delta P \cdot q}{200 \times \pi} \times \eta$ <p>T : Output Torque [kgf·m] ΔP : Inlet/Outlet Pressure Differential [kgf/cm²] q : Volume per Oil Motor Turn [cm³] η : Torque Efficiency</p>
Cylinder Output		$F = 100 \times P \times A \times \eta$ <p>F : Cylinder Output [N] P : Working Pressure [MPa] A : Cylinder Contact Area [cm²] η : Cylinder Efficiency</p>	$F = P \times A \times \eta$ <p>F : Cylinder Output [kgf] P : Working Pressure [kgf/cm²] A : Cylinder Contact Area [cm²] η : Cylinder Efficiency</p>
Pressur Loss Conversion Energy	 <p>Valve, piping, etc.</p>	$H = 60 \times P \times Q$ <p>H : Heat Release [kJ/h] P : Pressure Loss [MPa] Q : Flow Rate [ℓ /min]</p>	$H = 1.4 \times P \times Q$ <p>H : Heat Release [kcal/h] P : Pressure Loss [kgf/cm²] Q : Flow Rate [ℓ /min]</p>
Orifice Flow		$Q = CA \sqrt{\frac{2\Delta P}{\rho}} \times 6000$ <p>Q : Flow Rate [ℓ /min] C : Compressible Flow Coefficient [Dimensionless] A : Passage Area [cm²] ΔP : Pressure Differential [MPa] ρ : Density [kg/m³]</p>	$Q = CA \sqrt{\frac{2g \cdot \Delta P}{\gamma}} \times 0.06$ <p>Q : Flow Rate [ℓ /min] C : Compressible Flow Coefficient [Dimensionless] (≈0.6) A : Passage Area [cm²] g : Gravitational Acceleration [980cm/s²] ΔP : Pressure Differential [kg/cm²] γ : Specific Gravity [kg/cm³] (≈0.87×10⁻³)</p>
Pressure Loss		$\Delta P = \rho \times g \times H \times 10^{-6}$ <p>ΔP : Pressure Loss [MPa] ρ : Density [kg/m³] g : Gravitational Acceleration [9.8m/s²] H : Height [m]</p>	$\Delta P = \gamma \times g \times H \times 10^{-4}$ <p>ΔP : Pressure Loss [kg/cm²] γ : Specific Gravity [kgf/cm³] H : Height [m]</p>

(Note) When performing calculations, make sure that you first convert values correctly. Cutting off and rounding up values can cause differences in calculation results.

Model No. Index

(alphabetic sequence)

Note) *Indicates value and symbol entries, but due to the amount of model numbers, they have been eliminated from this item. See the items in the catalog for specific details.

B

BRC41-01WD2 D-56
BRC41-01WC2 D-56

C

CA-G03-*20 H-10
CA-G06-*20 H- 1
CA-G10-*20 H- 1
CA-T03-*20 H- 1
CA-T06-*20 H- 1
CA-T10-*20 H- 1
CAB-T02-*10 C-13
CES-G02*-(F)-12 I- 8
CES-G06-250-11 I- 8
CF-G06-170-20 G- 8
CF-G10-373-20 G- 8
CFR-G03-10 G- 1
CFR-G06-10 G- 1
CFR-G10-10 G- 1
CFR-T03-10 G- 1
CFR-T06-10 G- 1
CFR-T10-10 G- 1
CFT-G02*-*22 G- 4
CG-G03-*21 F-18
CG-G06-*21 F-18
CG-G10-*21 F-18
CG-T03-*21 F-18
CG-T06-*21 F-18
CG-T10-*21 F-18
CN-T03-*11 H- 1
CN-T06-*11 H- 1
CN-T10-*11 H- 1
CP-G03*-*B(F)-20 H- 4
CP-G03*-(F)-20 H- 4
CP-G06*-*B(F)-20 H- 4
CP-G06*-(F)-20 H- 4
CP-G10*-*B(F)-20 H- 4
CP-G10*-(F)-20 H- 4
CP-T03*-*B(F)-20 H- 4
CP-T03*-(F)-20 H- 4
CP-T06*-*B(F)-20 H- 4
CP-T06*-(F)-20 H- 4
CP-T10*-*B(F)-20 H- 4
CP-T10*-(F)-20 H- 4
CQ-G03**21 F-25
CQ-G06**21 F-25
CQ-G10**21 F-25
CQ-T03**21 F-25
CQ-T06**21 F-25
CQ-T10**21 F-25
CTN-G02*-11 G-11
CTN-G02*-F-11 G-11
CTS-G01-2-11 G-14

D

DMA-G01***-20 H- 8

DMA-G03***-20 H- 8
DSA-G04***-(R)**-22 E-38
DSA-G06***-(R)**-22 E-38
DSS-G04***-(R)**-22 E-38
DSS-G06***-(R)**-22 E-38

E

EA-PD4***-10 I-46
EA41-1A E-19
EA41-DR-1C E-19
EA41-GR**1C E-19
EA41-R*1C E-19
EA42-1B E-19
EA42-R*1B E-19
EAC64-C* E-15
EAC64-D* E-15
EAC64-E* E-15
EBA-PD1-N-C1-10 I-30
EBA-PD1-NW-C1-10 I-30
EBA-PD1-NW(Z)-D2-10 I-30
EBA-PD1-N(Z)-D2-10 I-30
EBB64-C* E-15
EBB64-E* E-15
EBB64-D* E-15
ECB64-C* E- 3
ECB64-D* E- 3
ECB64-E* E- 3
EDA-PD1-NWZ-D2-11 I-34
EDC64-C* E- 3
EDC64-D* E- 3
EDC64-E* E- 3
EDC-PC6-AWZ-D2-20 I-34
EGB-G03*-*11 I- 6
EGB-G06*-*11 I- 6
EMA-PD5-N-20 I-26
EMC-PC6-A-20 I-26
EOF-G01*25-11 I-24
EOG-G01-P*-11 I-22
EPR-G01*-*12 I- 2
ER-G03*-*21 I- 4
ER-G06*-*21 I- 4
ES-G02*-(F)-12 I- 8
ES-G03*-(F)-12 I- 8
ES-G06-F-250-11 I- 8
ES-G10-500-(F)-11 I- 8
ESD-G01***-12 I-14
ESD-G03***-(*)-12 I-14
ESD-G04***-(*)-12 I-14
ESD-G06***-(*)-13 I-14
ESH-G01-H*A-10 I-38
ESH-G03-D*****(*)-11 I-40
ESH-G04-D*****(*)-11 I-40
ESH-G06-D*****(*)-11 I-40
ESR-G03-125(**)-12 I-11
ESR-G06-250(**)-12 I-11
ESR-G10-500(**)-11 I-11

F

F-G06-170-20 G- 8
F-G10-373-20 G- 8
FJ-*****21 K- 1
FR-G03-10 H-10
FR-G06-10 G- 1
FR-G10-10 G- 1
FR-T03-10 G- 1
FR-T06-10 G- 1
FR-T10-10 G- 1
FT-G02*-22 G- 4
FT-G03*-22 G- 4

(Page)
H- 8
E-38
E-38
E-38
E-38

G

G-G03*-*21 F-18
G-G06*-*21 F-18
G-G10*-*21 F-18
G-T03*-*21 F-18
G-T06*-*21 F-18
G-T10*-*21 F-18
GR-G01-A*-20 F-23
GR-G03-A*-(B)-20 F-23

H

HF(S)-F10 J- 1
HF(S)-F16 J- 1
HF(S)-F24 J- 1
HF(S)-G06 J- 1
HF(S)-G10 J- 1
HT(S)-G06 J- 1
HT(S)-G10 J- 1
HT(S)-G16 J- 1
HY(S)-G06 J- 1
HY(S)-G10 J- 1

I

IHAS-2S**** C- 9
IHF-2-T-20 C-10
IHF-3-T-20 C-10
IHF-4-T-20 A-41 · C-10
IHF-5-T-20 A-41-B-30-C-10
IHF-6-T-20 C-10
IHF-6X-T-20 A-41
IHF-22-T-20 C-10
IHF-23-T-20 C-10
IHF-24-T-20 C-10
IHF-25-T-20 C-10
IHF-26-T-20 C-10
IHF-33-T-20 C-10
IHF-34-T-20 C-10
IHF-35-T-20 C-10
IHF-36-T-20 C-10
IHF-44-T-20 C-10
IHF-45-T-20 C-10
IHF-46-T-20 C-10
IHM-2-10 A-18 · C-12
IHM-4-10 A-18 · C-12
IHM-22-10 C-12
IHM-44-10 A-41 · C-12
IHM-45-10 A-41 · B-36 · C-12
IHM-46-10 C-12
IHM-55-10 A-34 · A-41 · C-12
IHM-66-10 C-12
IPH-2A(B)*-*11 C- 1
IPH-3A(B)*-*20 C- 1
IPH-4A(B)*-*20 C- 1
IPH-5A(B)*-*21(11) C- 1
IPH-6A(B)*-*21(11) C- 1
IPH-22B***(*)-11 C-14
IPH-23B***(*)-11 C-14
IPH-24B***(*)-11 C-14
IPH-25B***(*)-11 C-14
IPH-26B***(*)-11 C-14
IPH-33B***(*)-11 C-14
IPH-34B***(*)-11 C-14
IPH-35B***(*)-11 C-14
IPH-36B***(*)-11 C-14
IPH-44B***(*)-11 C-14
IPH-45B***(*)-11 C-14
IPH-46B***(*)-11 C-14
IPH-55B***(*)-11 C-14
IPH-56B***(*)-11 C-14
IPH-66B***(*)-11 C-14

(Page)

	(Page)
PZS-4B-*100**10	A-22
PZS-5B-*130**10	A-22
PZS-6B-*180**10	A-22
PZS-6B-*220**10	A-22
PJF-10300E	A-34
PJF-10400E	A-34
PJF-10500E	A-34
PJF-10600E	A-34
PJF-10300T	A-34
PJF-10400T	A-34
PJF-10500T	A-34
PJF-10600T	A-34
PZ-2B-*35E*A-10	A-35
PZ-2B-*45E*A-10	A-35
PZ-3B-*70E*A-10	A-35
PZ-4B-*100E*A-10	A-35
PZ-5B-*130E*A-10	A-35
PZ-6B-*180E*A-20	A-35
PZ-6B-*220E*A-20	A-35
PZF-4-T-10	A-41
PZF-6-T-10	A-41
PZM-3-10	A-34
PZM-4-10	A-34
PZH-2B-28**5-10	A-42
PZH-2B-40**5-10	A-42

Q

Q-G03-**21	F-25
Q-G06-**21	F-25
Q-G10-**21	F-25
Q-T03-**21	F-25
Q-T06-**21	F-25
Q-T10-**21	F-25

R

RC-G02-*21	F- 8
RC-T02-*12	F- 8
RCD-T02-*11	F- 8
R-G03-*12	F- 1
R-G06-*20	F- 1
R-G10-*20	F- 1
R-T03-*12	F- 1
R-T06-*20	F- 1
R-T10-*20	F- 1
RI-G03-*20	F- 5
RI-G06-*20	F- 5
RIS-G03-*F**21	F-15
RIS-G03-AQ**21	F-15
RIS-G03-AR**21	F-15
RIS-G06-*F**21	F-15
RIS-G06-AQ**21	F-15
RIS-G06-AR**21	F-15
RSA-G03-*F**14	F-10
RSA-G03-AQ**14	F-10
RSA-G03-AR**15	F-10
RSA-G06-*F**23	F-10
RSA-G06-AQ**23	F-10
RSA-G06-AR**23	F-10
RSA-G10-*F**23	F-10
RSA-G10-AQ**23	F-10
RSA-G10-AR**23	F-10
RSA-T03-*F**15	F-10
RSA-T03-AQ**15	F-10
RSA-T03-AR**15	F-10
RSA-T06-*F**23	F-10
RSA-T06-AQ**23	F-10
RSA-T06-AR**23	F-10
RSA-T10-*F**23	F-10
RSA-T10-AQ**23	F-10
RSA-T10-AR**23	F-10
RSS-G03-*F**15	F-10
RSS-G03-AQ**15	F-10
RSS-G03-AR**15	F-10
RSS-G06-*F**23	F-10
RSS-G06-AQ**23	F-10

RSS-G06-AR**23	F-10
RSS-G10-*F**23	F-10
RSS-G10-AQ**23	F-10
RSS-G10-AR**23	F-10
RSS-T03-*F**15	F-10
RSS-T03-AQ**15	F-10
RSS-T03-AR**15	F-10
RSS-T06-*F**23	F-10
RSS-T06-AQ**23	F-10
RSS-T06-AR**23	F-10
RSS-T10-*F**23	F-10
RSS-T10-AQ**23	F-10
RSS-T10-AR**23	F-10

S

SA-G01-A**31	E-13
SA-G01-C**31	E-13
SA-G01-E**31	E-13
SA-G01-H**31	E-13
SA-G03-A**21	E-13
SA-G03-C**21	E-13
SA-G03-E**21	E-13
SA-G03-H**21	E-13
SE-G01.**30	E-25
SE-G03.**30	E-25
SF-G01-C***-R-D*-10	E-46
SS-G01-A**R**31	E- 1
SS-G01-C**R**31	E- 1
SS-G01-E**R**31	E- 1
SS-G01-H**R**31	E- 1
SS-G03-A**R**J21	E- 1
SS-G03-C**R**J21	E- 1
SS-G03-E**R**J21	E- 1
SS-G03-H**R**J21	E- 1
SNH-G01**11	E-50
SNH-G03**10	E-50
SNH-G04**10	E-50
SNH-G06**10	E-50

T

TL-G03*-11	G-16
TL-G04*-11	G-16
TLT-G04*-11	G-16
TN-G02*-11	G-11
TS-G01-2-11	G-14

U

UPV-0A-8N*-4-31	A-19
UPV-1A-16N*-4-17	A-19
UPV-1A-22N*-4-17	A-19
UPV-2A-35N*-4-17	A-19
UPV-2A-45N*-4-17	A-19
USV-0A-A*-0.4-4-12	B- 5
USV-0A-A*-4-13	B- 5
UVC-1A-A*-4-26	B-37
UVC-11A-A*-A*-4-26	B-37
UVD-1A-A*-4-16	B-22
UVD-1A-A*-4-26	B-12
UVD-11A-A*-A*-4-16	B-22
UVD-11A-A*-A*-4-26	B-12
UVD-2A-A*-4-16	B-22
UVN-1A-A*-4-10	B-39

V

VDC-1A(B)-*A*-20	B-25
VDC-2A(B)-*A*-20	B-25
VDC-3A(B)-1A*-20	B-25

(Page)	
VDC-11A(B)-*A*-A*-20	B-25
VDC-12A(B)-*A*-A*-20	B-25
VDC-13A(B)-*A*-A*-20	B-25
VDC-22A(B)-2A3-A*-20	B-25
VCM-11-20	B-36
VCM-22-20	B-36
VDR-1A(B)-*A*-22	B- 6
VDR-1A(B)-*A*-13	B-15
VDR-2A(B)-*A*-13	B-15
VDR-11A(B)-*A*-A*-22	B- 6
VDR-11A(B)-*A*-A*-13	B-15
VDS-0A(B)-1A*-10	B- 1

NACHI-FUJIKOSHI CORP.

Tokyo Head Office World Trade Center 2-4-1 Hamamatsu-cho, Minato-ku, Tokyo 105-6125 Phone: +81-(0)3-3435-5111 Fax: +81-(0)3-3435-5144
Web Site URL <http://www.nachi-fujikoshi.co.jp/> E-mail webmaster@nachi-fujikoshi.co.jp

Toyama Head Office 1-1-1 Fujikoshi-Honmachi, Toyama 930-8511 Phone: +81-(0)76-423-5111 Fax: +81-(0)76-493-5211

Overseas Sales Companies

AMERICA

● **NACHI AMERICA INC. HEADQUARTERS**
17500 Twenty-Three Mile Road, Macomb,
Michigan, 48044, U.S.A.
Phone: +1-586-226-5151 Fax: +1-888-383-8655
Web Site URL: <http://www.nachi.com>

INDIANA OFFICE
5022 West 79th Street, Indianapolis, Indiana
46268, U.S.A.
Phone: +1-317-228-1010 Fax: +1-317-228-9986
Web Site URL: <http://www.nachi.com>

EAST COAST OFFICE
80 Little Falls Road, Fairfield, New Jersey 07004, U.S.A.
Phone: +1-973-808-1855 Fax: +1-973-808-1848

WEST COAST OFFICE
12652 E. Alondra Blvd. Cerritos, California, 90703,
U.S.A.
Phone: +1-562-802-0055 Fax: +1-562-802-2455

CHICAGO OFFICE
570 "B" Teisler Road, Lake Zurich, Illinois, 60047,
U.S.A.
Phone: +1-847-726-9400 Fax: +1-847-726-9458

CHARLOTTE OFFICE
2818-F, Carolina Center Business Park,
South I-85, Service Rd. Charlotte, North Carolina,
28208, U.S.A.
Phone: +1-704-392-6160 Fax: +1-704-392-6141

LATIN AMERICA DIV.
2315 N.W. 107th Ave., Miami, Florida, 33172,
U.S.A.
Phone: +1-305-591-0054/0059/2604
Fax: +1-305-591-3110

● **NACHI ROBOTIC SYSTEMS INC.**
22285 Roethel Drive, Novi, Michigan, 48375,
U.S.A.
Phone: +1-248-305-6545 Fax: +1-248-305-6542
Web Site URL: <http://www.nachirobotics.com>

● **NACHI CANADA INC.**
89 Courtland Ave., Unit No.2, Concord, Ontario,
L4K 3T4, CANADA
Phone: +1-905-660-0088 Fax: +1-905-660-1146

● **NACHI MEXICANA, S.A. DE C.V.**
Gral. Mariano Arista No.54, Local 5, Col. Argentina
C.P. 11230, Mexico D.F. MEXICO
Phone: +52-55-5386-1396 Fax: +52-55-5386-1336

EUROPE

● **NACHI EUROPE GmbH**
Wiesenstrasse 148, 41460 Neuss (Heerd), GERMANY
Phone: +49-(0)2131-26830
Fax: +49-(0)2131-268330/268340
Web Site URL: <http://www.nachi.de>

SOUTH GERMANY BRANCH
Stuifenstr.52, 74385 Pleidelsheim, GERMANY
Phone: +49-(0)7144-8045-0
Fax: +49-(0)7144-8045-20

FRANCE BRANCH
19, Rue Alphonse de Neuville 75017 Paris,
FRANCE
Phone: +33-(0)1.44.01.70.30
Fax: +33-(0)1.44.01.70.32
Web Site URL: <http://www.nachi.fr>

SPAIN BRANCH
Calle Cardenal Marcelo Spinala no 8, Bajo 28036
Madrid, SPAIN
Phone: +34-(0)91-302-6440 Fax: +34-(0)91-383-9486

BARCELONA OFFICE
Josep Tarradellas, 58, 1-5, 08029 Barcelona, SPAIN
Phone: +34-(0)93-430-6247
Fax: +34-(0)93-419-0897

● **NACHI (U.K.) LTD.**
Unit 7, Junction Six Industrial Estate, Electric
Avenue, Birmingham B6 7JJ, U.K.
Phone: +44-(0)121-250-1880
Fax: +44-(0)121-250-1889
Web Site URL: <http://www.nachi.co.uk>

● **NACHI ROBOTIC SYSTEMS EUROPE GmbH**
Stuifenstr.52, 74385 Pleidelsheim, GERMANY
Phone: +49-(0)7144-8035-0
Fax: +49-(0)7144-8035-20

● **NACHI-FUJIKOSHI CORP.**
ITALY REPRESENTATIVE OFFICE
Via delle Lame 75, 3° piano-interno 8 40122,
Bologna, ITALY
Phone: +39-051-649-4808
Fax: +39-051-528-2149

ASIA and OCEANIA

● **NACHI SINGAPORE PTE. LTD.**
No.2 Joo Koon Way, Jurong Town, Singapore
628943, SINGAPORE
Phone: +65-65587393 Fax: +65-65587371

VIETNAM OFFICE
Room 1608, 16/F Saigon Tower 29 Le Duan Street,
District 1, Ho Chi Minh City, VIETNAM
Phone: +84-8-823-6299
Fax: +84-8-823-6288

● **FUJIKOSHI-NACHI (MALAYSIA) SDN. BHD.**
No.17, Jalan USJ 21/3, 47630 UEP Subang Jaya,
Selangor Darul Ehsan, MALAYSIA
Phone: +60-(0)3-80247900 Fax: +60-(0)3-80235884

● **P.T.NACHI INDONESIA**
Jl.H.R.Rasuna Said Kav.X-O
Kuningan,Jakarta 12950, INDONESIA

● **NACHI PILIPINAS INDUSTRIES, INC.**
1st Avenue, Manalac Compound, Sta. Maria
Industrial Estate, Bagumbayan, Taguig, Metro
Manilla, PHILIPPINES
Phone: +63-(0)2-838-3620 Fax: +63-(0)2-838-3623

MANILA OFFICE
Km23 East Service Road, Capang Muntinlupa,
City Metro Manila Philippines
Phone: +63-(0)2-850-0864 Fax: +63-(0)2-850-0864

● **NACHI-FUJIKOSHI CORP.**
SHANGHAI REPRESENTATIVE OFFICE
1602, Ocean Towers No. 550, Yanan Road (East)
Huangpu District, Shanghai, CHINA
Phone: +86-(0)21-6360-3680
Fax: +86-(0)21-6360-3682

● **NACHI-FUJIKOSHI CORP.**
TAIPEI REPRESENTATIVE OFFICE
6F (Room No.4), No.22 Nanking West Road,
Taipei, TAIWAN
Phone: +886-(0)2-2558-4670
Fax: +886-(0)2-2559-5568

● **NACHI-FUJIKOSHI CORP.**
THAILAND REPRESENTATIVE OFFICE
Chai-ho Wongwaiwat Bldg. 889 Srinakarinn Road
Samutprakarn, THAILAND 10270
Phone: +66-2-748-7322-4 Fax: +66-2-748-7325

● **NACHI-FUJIKOSHI CORP.**
KOREA REPRESENTATIVE OFFICE
2F Dongsan Bldg. 276-4, Sungsu 2GA-3DONG
Sungdong-Ku. Seoul 133-123. KOREA
Phone: +82-(0)2-469-2254 Fax: +82-(0)2-469-2264

● **NACHI (AUSTRALIA) PTY. LTD.**
Unit 3, 23-29 South Street, Rydalmere, N.S.W,
2116, AUSTRALIA
Phone: +61-(0)2-9898-1511
Fax: +61-(0)2-9898-1678
Web Site URL: <http://www.nachi.com.au>

Overseas Manufacturing Companies

AMERICA

● **NACHI TECHNOLOGY INC.**
713 Pushville Road, Greenwood, Indiana, 46143,
U.S.A.
Phone: +1-317-535-5000 Fax: +1-317-535-8484
Web Site URL: <http://nachtech.com>

● **NACHI MACHINING TECHNOLOGY CO.**
17500 Twenty-three Mile Road, Macomb,
Michigan, 48044, U.S.A.
Phone: +1-586-263-0100 Fax: +1-586-263-4571
Web Site URL: <http://www.nachimtc.com>

● **NACHI BRASIL LTDA.**
Avenida João XX III, No.2330, Jardim São Pedro,
Mogi das Cruzes,
S.P., BRAZIL, CEP 08830-000
Phone: +55-11-4793-8800 Fax: +55-11-4793-8870
Web Site URL: <http://www.nachi.com.br/>

EUROPE

● **NACHI INDUSTRIAL, S.A.**
Poligono Industrial, El Montalvo, Parcelas 74 y 75,
37080 Salamanca, SPAIN
Phone: +34-(0)923-19-0516
Fax: +34-(0)923-19-0527

ASIA and OCEANIA

● **NACHI INDUSTRIES PTE. LTD.**
No.2 Joo Koon Way, Jurong Town, Singapore
628943, SINGAPORE
Phone: +65-68613944 Fax: +65-68611153
Web Site URL: <http://www.nachinip.com.sg>

● **NACHI TECHNOLOGY (THAILAND) CO., LTD.**
3/16 M, 2, Rojana Industrial Estate
Nongbua, Ban Khai, Rayong, 21120 THAILAND
Phone: +66-38-961-682 Fax: +66-38-961-683

● **建越工業股份有限公司**
NACHI C.Y. CORP.
No.109, Kao Young North Rd, Lung-Tan Hsin,
Tao-Yuan Hsien, TAIWAN
Phone: +886-(0)3-471-7651
Fax: +886-(0)3-471-8402

● **大成・NACHI油圧工業(株)**
DAESUNG-NACHI HYDRAULICS CO., LTD.
289-22, Yousan-Dong, Yangsan-Si Kyungnam
626-800, KOREA
Phone: +82-(0)55-385-7891~3
Fax: +82-(0)55-384-3270

● **東莞建越精密軸承有限公司**
DONGGUAN NACHI CY CORPORATION
Dangyong Village, Hongmci Town Dongguan City,
Guangdong China
Phone: +86-769-884-1662
Fax: +86-(0)769-843-1330



This catalog is printed on recycled paper.