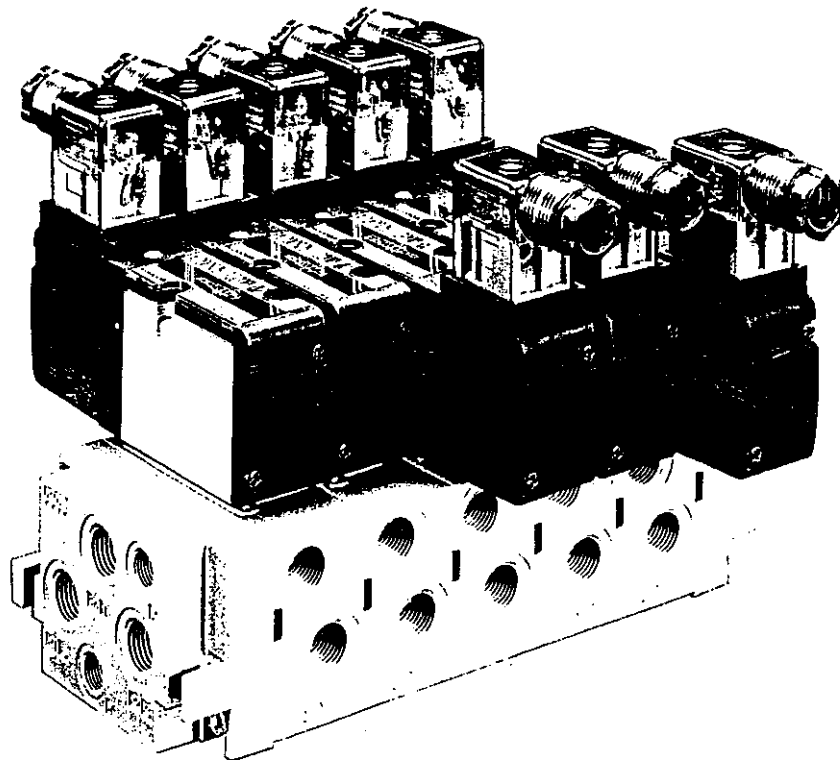


**KURODA**

PILOT OPERATED SOLENOID VALVE

**K20** SERIES

**Metal Seal/Sub-base Mounting Type**



# K20 SERIES

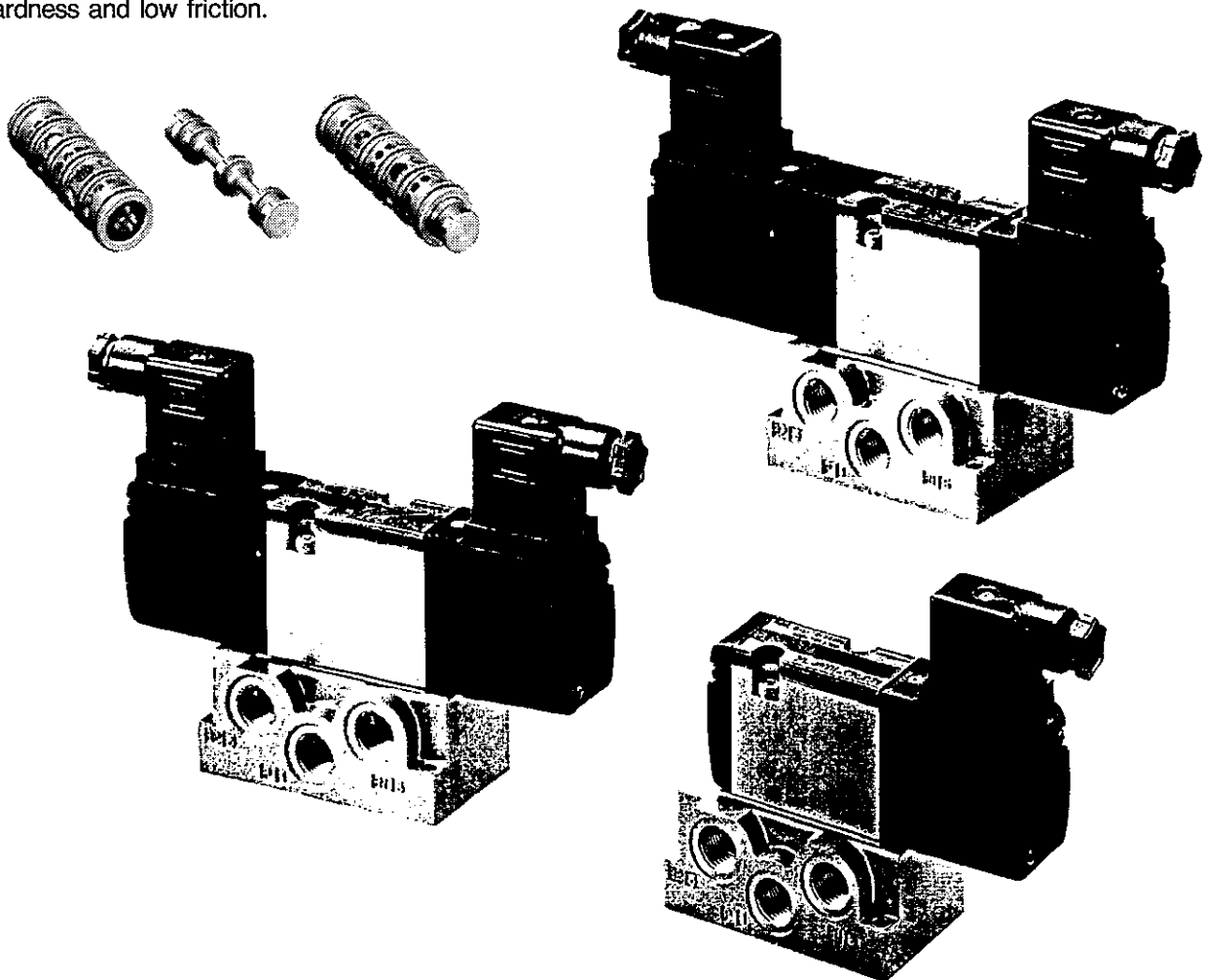
PILOT OPERATED SOLENOID VALVE • METAL SEAL TYPE

Setting a world-famous standard quality the "ISO 9000" is rapidly gaining popularity. Total system and individual product assurance of quality is now increasingly demanded. To carry out unattended operation of FA equipment over long periods, it is necessary to further upgrade the reliability and stability of FA equipment rather than placing emphasis on improving its accuracy and speed. K Series solenoid valves have been developed with a priority on "High quality and reliability".

## Reliable design assuring stable operation.

Our world-renowned miniature solenoid flap valve characteristic of Zero sliding resistance, is used as a pilot operator.

The main valve incorporates KURODA's uniquely designed lapped sleeve and spool with a high degree of hardness and low friction.



## Safety desing for prevention against environmental pollution.

K Series solenoid valves conform to "IP (International Protection Grade) 65" to provide protection against dust and water and can be used in any areas (outdoors) where it may be exposed to splashing water, oil etc., with the exception of direct sunlight. Plastic component parts are made of slow burning material equivalent to V0 grade of UL94 to prevent fire hazards from welding spatters.

### Protective housing

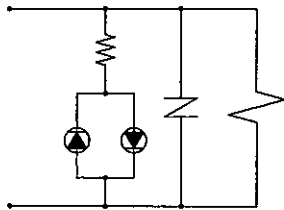
The IEC (International Electrotechnical Commission) pub.529 indicates applicable environmental conditions using a Property Mark "IP" (International Protection) and a 2-digit figure following the IP mark.

IP65 : Housing designed for proof against dust and direct water from all directions. Test is performed in accordance with JIS C0920 as follows:

- Sprinkling water at 12.5 ℓ /min using a φ6.3mm test nozzle.
- Sprinkling water from a distance of 3m for 3minutes.

### Bipolar type

As the DC model is of bipolar type despite incorporating a indicator light, polarity does not matter. So the solenoid valve is free from problems encountered from mis-wiring.

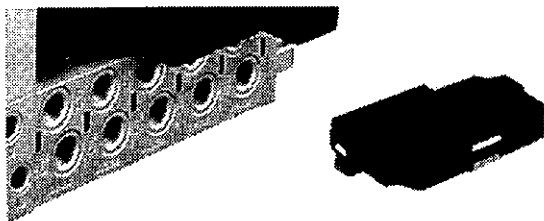


### Port size

In addition to standard port size Rc threaded (tapered pipe thread), G thread (parallel pipe thread), NPT and NPTF threaded models are available on request.

### Manifold blocking indicator

Where P and R ports are blocked, they can be clearly identified by blocking module color, making it easy to check manifold specifications.



## Friendly design

Sufficient capability to drive any cylinder of up to φ100 by using effective area of 18mm<sup>2</sup> (Cv 1).

### Sizing

Cylinder bore size (mm)	Cylinder speed (mm/s)					
	0	200	400	600	800	1000
φ40	[Bar chart showing speed range from 0 to 1000 mm/s]					
φ50	[Bar chart showing speed range from 0 to 800 mm/s]					
φ63	[Bar chart showing speed range from 0 to 600 mm/s]					
φ80	[Bar chart showing speed range from 0 to 400 mm/s]					
φ100	[Bar chart showing speed range from 0 to 200 mm/s]					

Load factor 30% for piping length of 1m

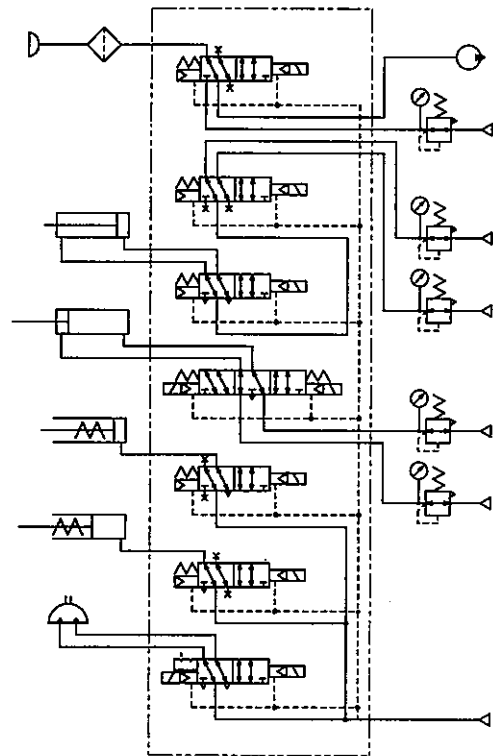
(Note) As cylinder speed varies according to piping and other components in the circuit, use these value as guide for selection.

### High pressure model

High pressure model that can withstand 1.6 MPa (16.3 kgf/cm<sup>2</sup>) is available on request. Standard model can withstand up to 1 MPa (10.2 kgf/cm<sup>2</sup>).

### Multi-purpose function

Solenoid valve designed with a balanced spool works as (common) external pilot system so that compressed air can be supplied from any port to provide multi-purpose functions.



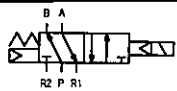
# 5-PORT PILOT OPERATED SOLENOID VALVE/METAL SEAL

# K20P SERIES

## Sub-base model

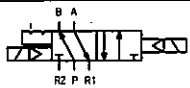
### K20PS25

2-position  
Single solenoid



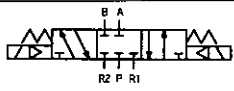
### K20PD25

2-position  
Double solenoid



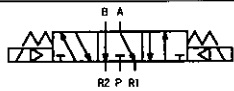
### K20PD35

3-position  
Center, all ports blocked



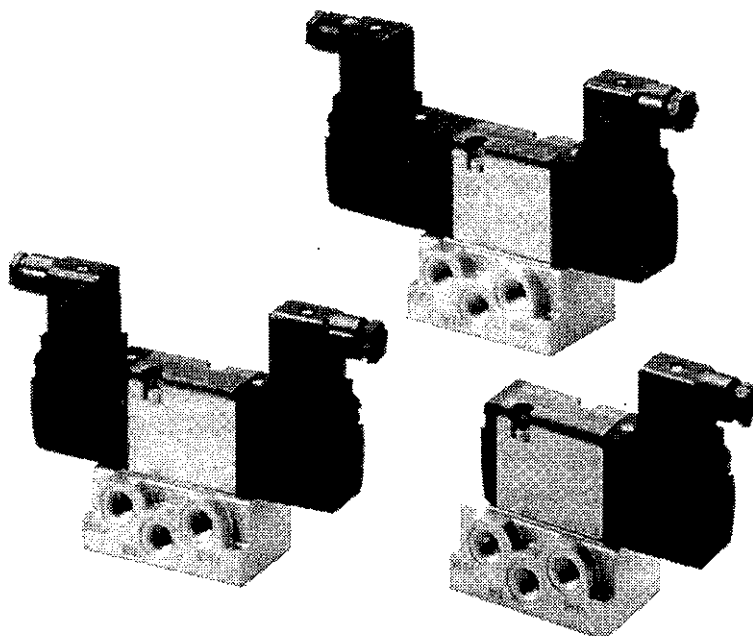
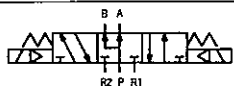
### K20PE35

3-position  
Center, cyl.ports open to exhaust



### K20PO35

3-position  
Center, cyl.ports open to pressure



## SPECIFICATIONS

Model No.	Unit	K20PS25	K20PD25	K20PD35	K20PE35	K20PO35	
Fluid		Non-lubricated/lubricated air					
Port size		Rc $\frac{1}{4}$ $\frac{3}{8}$ G $\frac{1}{4}$ $\frac{3}{8}$ NPT $\frac{1}{4}$ $\frac{3}{8}$ NPTF $\frac{1}{4}$ $\frac{1}{8}$ for bottom pipe connection					
Effective area	mm <sup>2</sup>	18					
Operating ambient temperature	°C	-5~50					
Operating humidity	%	Below 85 RH					
Pressure range	MPa(kgf/cm <sup>2</sup> )	0.15~0.8(1.5~8.2) -0.1 ~1(10Torr~10.2)For external pilot operation					
Maximum frequency	cycle/min	700			500		
Response time	AC	ON	s	0.025	0.02	0.025	0.015
		OFF	s	0.02	—	—	0.045
	DC	ON	s	0.03	0.02	0.02	0.025
		OFF	s	0.02	—	—	0.035
Pilot air exhaust		Captured exhaust					
Protection grade		IP65					
Weight	No base	g	220	315	425		
	With sub-base	g	395	490	600		

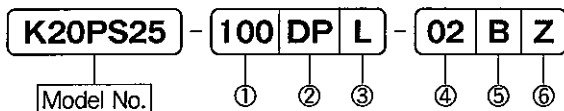
(Note) Pressure range of external pilot supply : 0.15~0.8MPa(1.5~8.2kgf/cm<sup>2</sup>)

## ELECTRICAL SPECIFICATIONS

Rated voltage	V	AC100/110, 200/220 DC24		
Permissible voltage fluctuation	V	AC90~120, 180~240 DC20.4~26.4		
Rated frequency	Hz	50/60		
AC solenoid power consumption	Holding	50Hz	VA	3.3
		60Hz	VA	2.2
	Inrush	50Hz	VA	4.3
		60Hz	VA	3.4
DC solenoid power consumption	W	2		
Insulation grade		JIS grade B		
Withstand voltage	V	AC1800V for 1 minute, DC1200V for 1 minute		
Wiring		DIN connector		

# PILOT OPERATED SOLENOID VALVE/K20P Series

## ORDERING INSTRUCTIONS



K20PS25  
K20PD25  
K20PD35  
K20PE35  
K20PO35  
\*K20PP35

### ① Voltage

100	AC100/110V
200	AC200/220V
D24	DC24

### ② Wiring

DP	DIN connector (With indicator light and surge suppressor)
D	DIN connector (With surge suppressor)
Q	Without DIN connector (With surge suppressor)

### ③ Manual override

No mark	Standard (Non-locking)
L	With locking button

### ④ Port size

NB	Without sub-base
02	Rc $\frac{1}{4}$
* G2	G $\frac{1}{4}$
* N2	NPT $\frac{1}{4}$
* F2	NPTF $\frac{1}{4}$
* 01	Rc $\frac{1}{8}$
* G1	G $\frac{1}{8}$
* N1	NPT $\frac{1}{8}$
* F1	NPTF $\frac{1}{8}$

(Note) 01, G1, N1, F1 : Only for bottom ported

### ⑤ Port

No mark	Standard (Sub-base side)
B	Bottom ported

### ⑥ Special specifications

No mark	Standard (Internal pilot, captured pilot exhaust)
* Z	External pilot, captured pilot exhaust

⊛ : Made to order

## SPARE PARTS

### ■ Sub-base

	Standard (Side piping)	Bottom ported
Standard	*K20P-SB-02	*K20P-SB-01B
External pilot	*K20P-SB-02Z	*K20P-SB-01BZ

### ■ Base gasket K20P-G

### ■ Body mounting screw set K20P-SB

### ■ DIN connector

	Standard (Without indicator light)	K20-D
* With indicator light	AC100/100V	K20-DP100
	AC200/220V	K20-DP200
	DC24V	K20-DPD24

(Note) Surge suppressor is incorporated in solenoid as standard.  
Indicator light, AC : Neon lamp, DC : LED, bipolar type

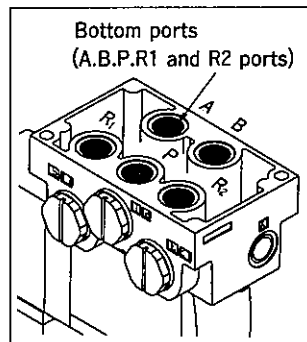
## MADE TO ORDER

### ■ Threads other than Rc thread

G, NPT, NPTF

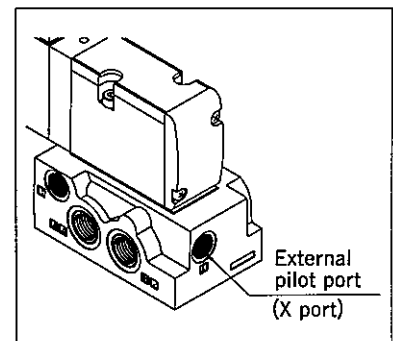
### ■ Bottom ported

- Port size for bottom ported : Rc $\frac{1}{8}$ , G $\frac{1}{8}$ , NPT $\frac{1}{8}$ , NPTF $\frac{1}{8}$
- For bottom ported, plugged side ports : G $\frac{1}{4}$ .
- P, A, B, R1 and R2 ports on side surface are plugged. Pilot exhaust port (Y) is provided on side.
- For external pilot type, external pilot port (X) is provided on side.



### ■ External pilot

External pilot port (X) is provided on side for all models including bottom ported.



### ■ Locking manual override

### ■ Special voltage

For specific voltage other than rated voltage, contact KURODA.

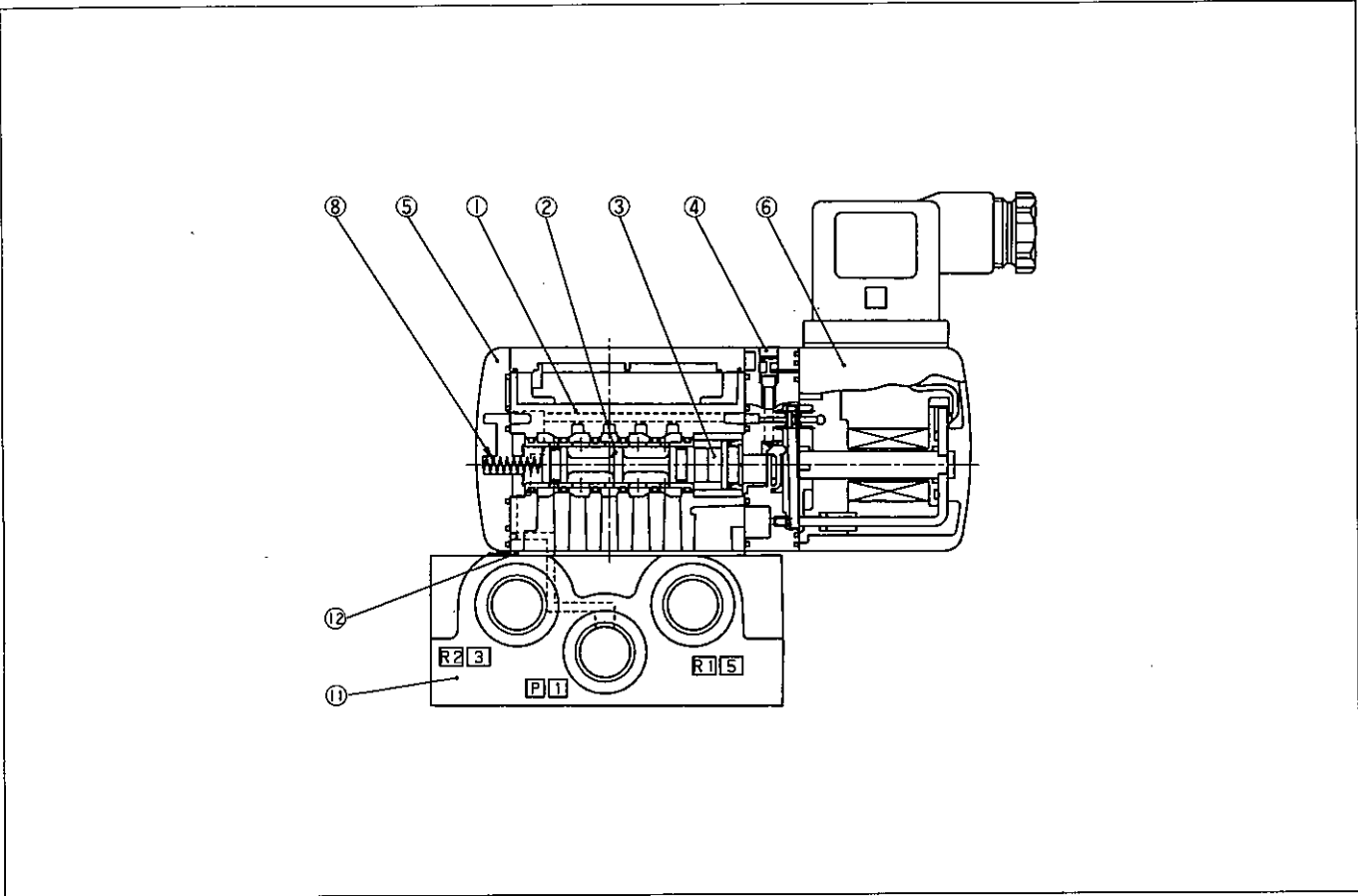
### ■ Cylinder halfway stopping solenoid valve/K20PP35

Rubber seal, 3-position, all port blocked type solenoid valve. It has same configuration as K20PO35. For detailed information, contact KURODA.

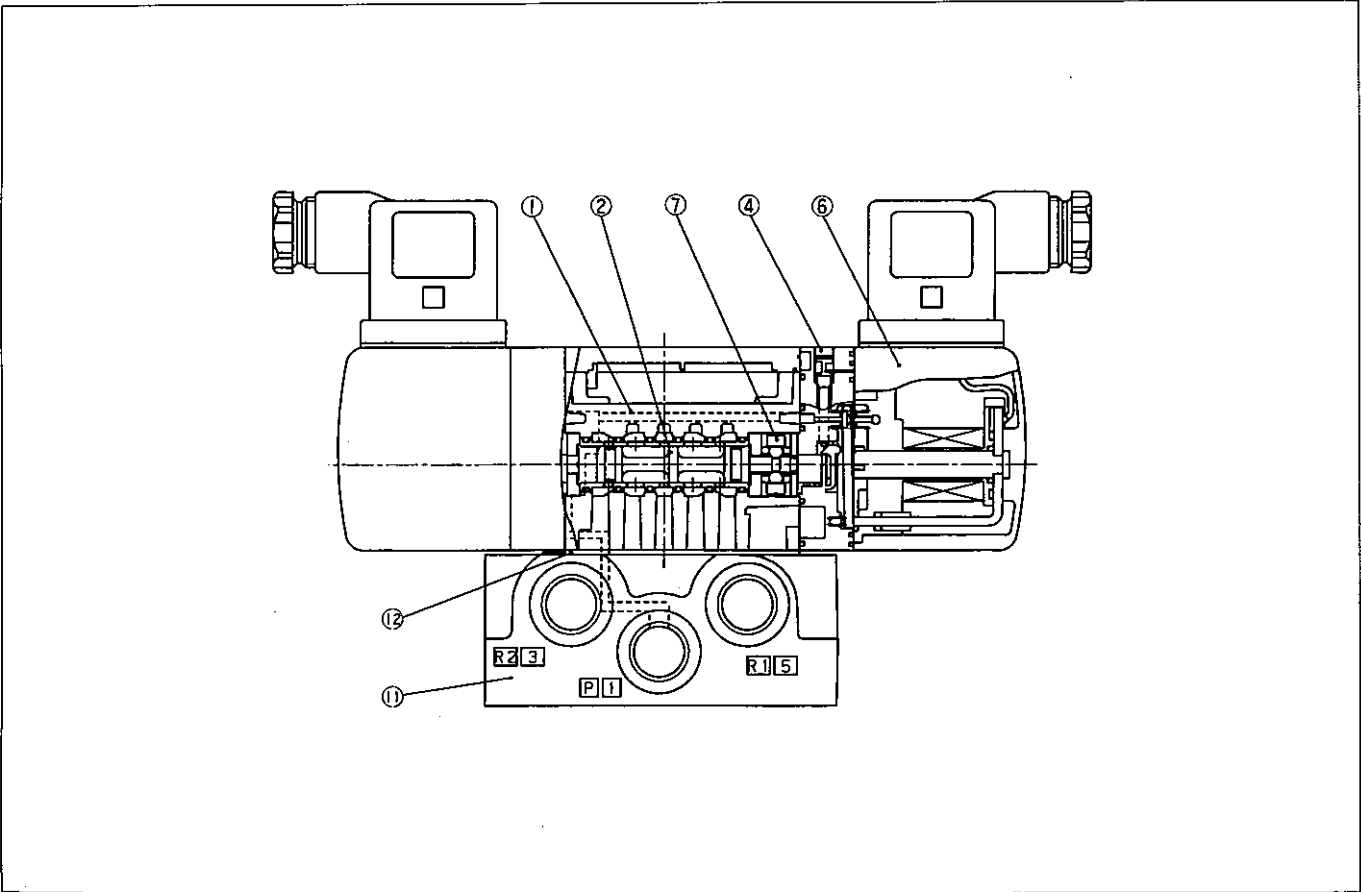
# PILOT OPERATED SOLENOID VALVE/K20P Series

## CONSTRUCTIONS

K20PS25



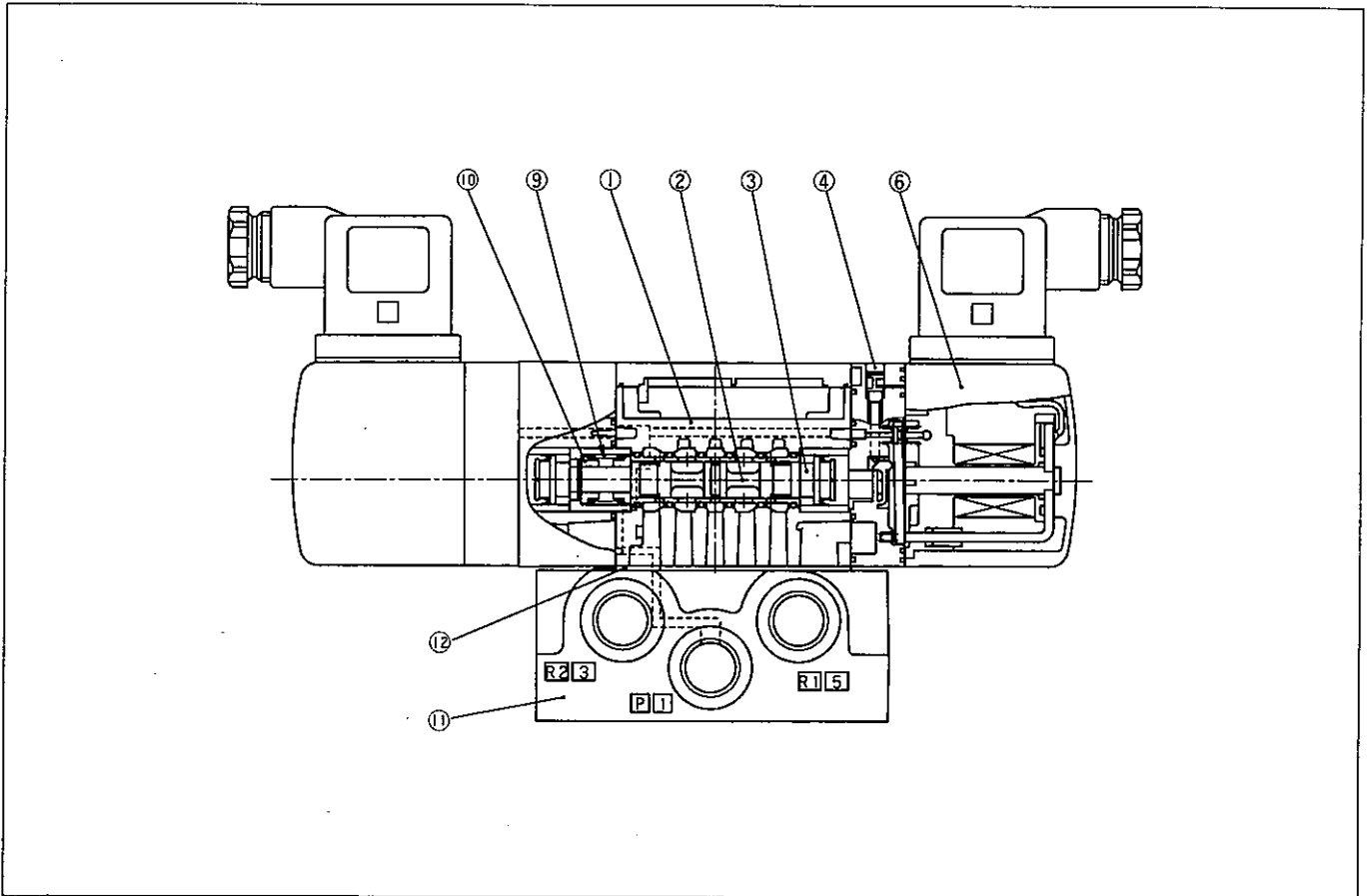
K20PD25



# PILOT OPERATED SOLENOID VALVE/K20P Series

## CONSTRUCTIONS

K20PD35, K20PE35, K20PO35



## MAIN PARTS

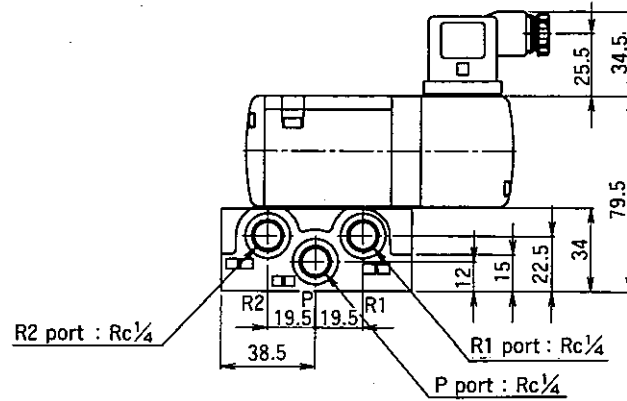
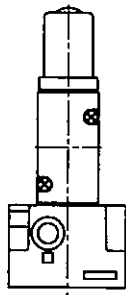
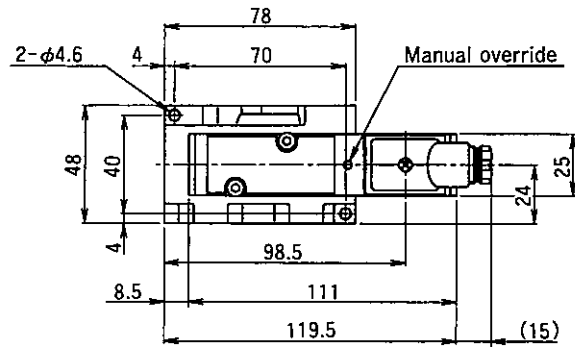
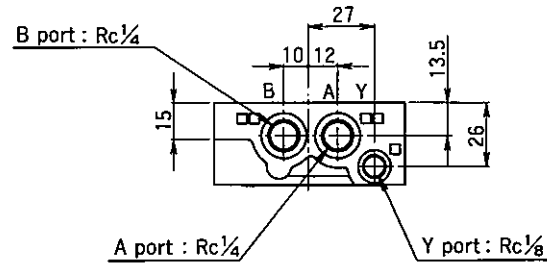
Part No.	Description	Material
①	Body	Aluminium alloy
②	Spool	Stainless steel
③	Piston	Resin
④	Manual override	Resin
⑤	End cover	Resin
⑥	Pilot operator	—
⑦	Detent	—
⑧	Return spring S	Stainless steel
⑨	Return spring 3P	Stainless steel
⑩	Spring retainer	Resin
⑪	Sub-base	Aluminium alloy
⑫	Base gasket	NBR

# PILOT OPERATED SOLENOID VALVE/K20P Series

## DIMENSIONS

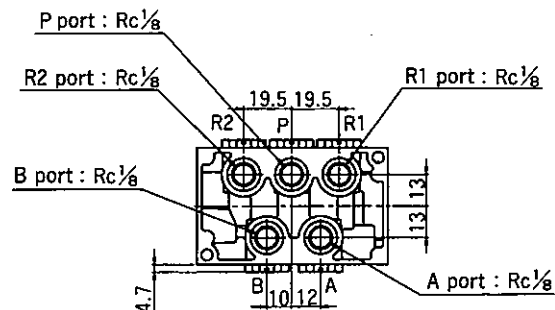
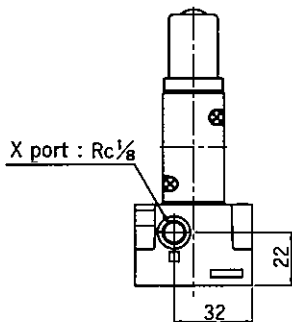
K20PS25

(Unit : mm)



Z type (External pilot)

B type (Bottom ported)



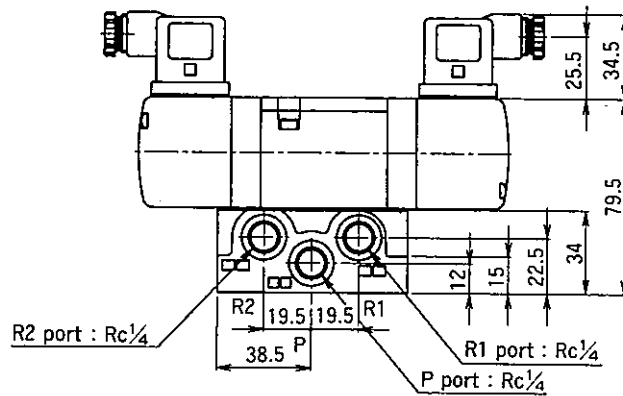
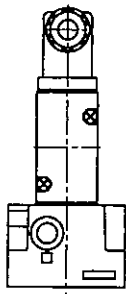
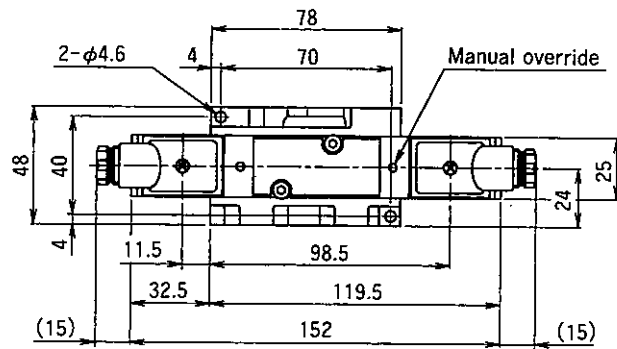
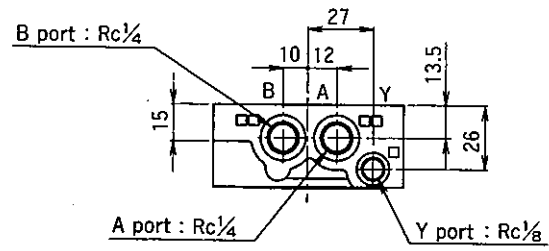


# PILOT OPERATED SOLENOID VALVE/K20P Series

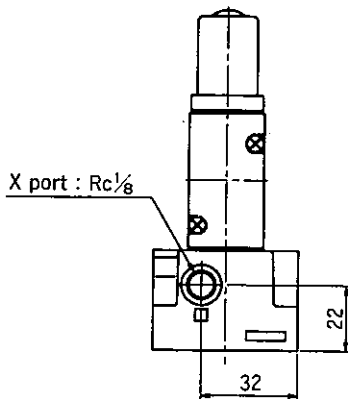
## DIMENSIONS

K20PD25

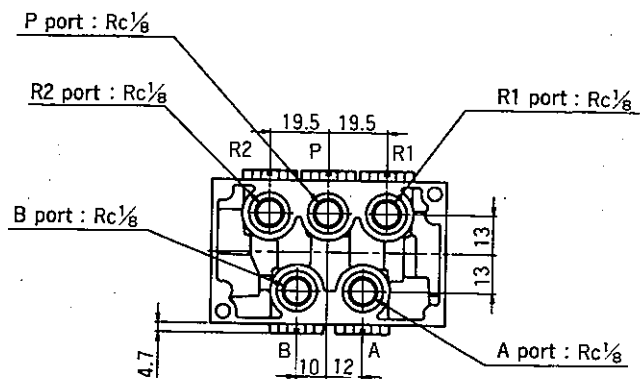
(Unit : mm)



Z type (External pilot)



B type (Bottom ported)

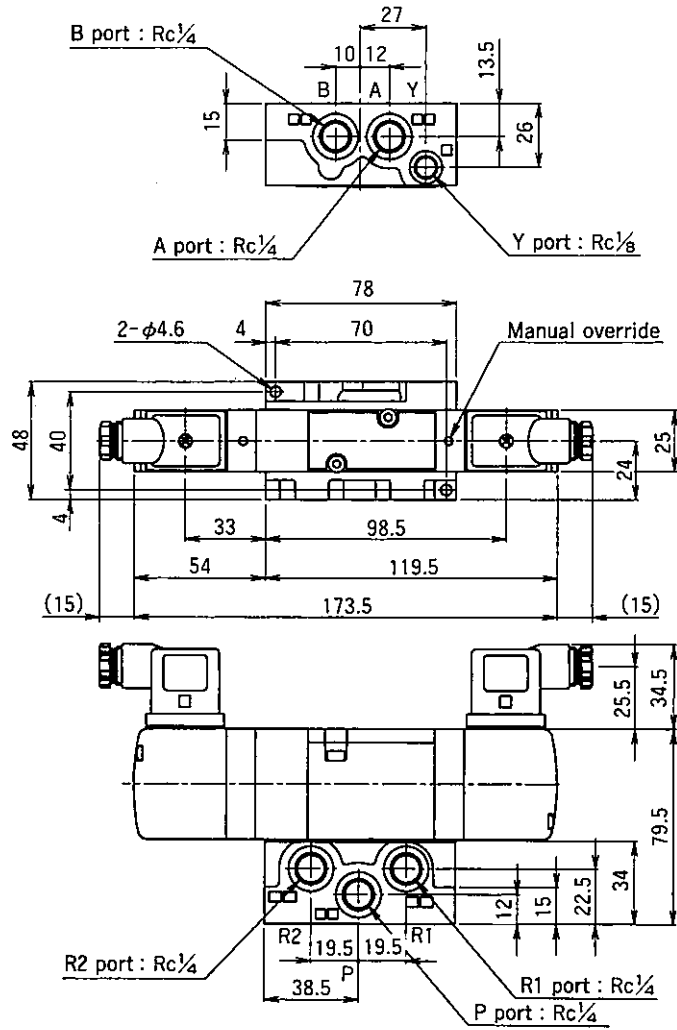


# PILOT OPERATED SOLENOID VALVE/K20P Series

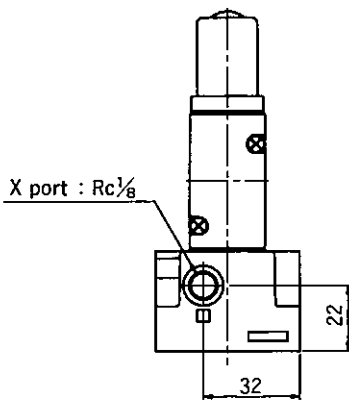
## DIMENSIONS

K20PD35, K20PE35, K20PO35, K20PP35 (Made to order)

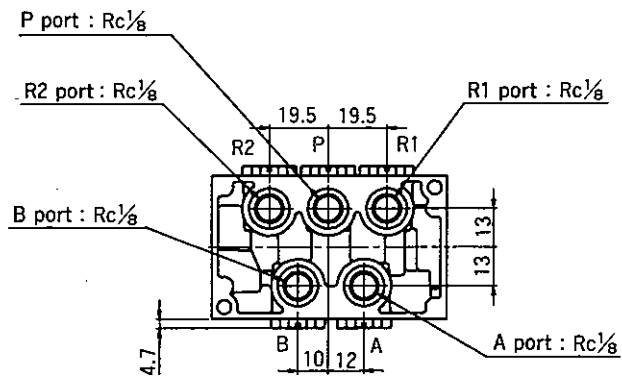
(Unit : mm)



Z type (External pilot)



B type (Bottom ported)



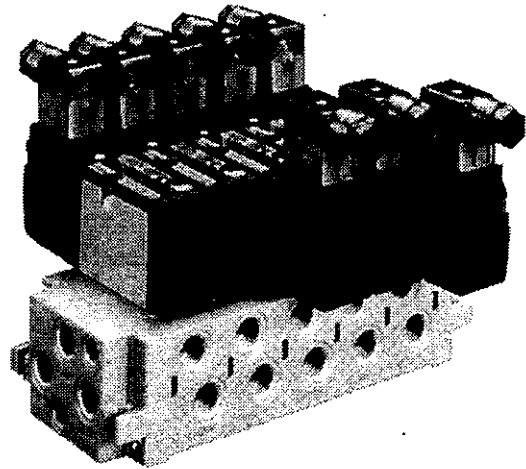
# INDIVIDUAL WIRING TYPE MANIFOLD

# MF○-K20P

Split type

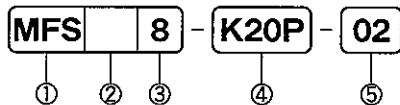
**MFS○-K20P** Common P, common R  
(End ported)  
Captured pilot exhaust  
A & B ports on side

**MFB○-K20P** Common P, common R  
(End ported)  
Captured pilot exhaust  
A & B ports on bottom



## ORDERING INSTRUCTIONS

### Manifold



#### ① Type of manifold

MFS	Common P, common R (End ported) Captured pilot exhaust A & B ports on side
※ MFB	Common P, common R (End ported) Captured pilot exhaust A & B ports on bottom

#### ② Special specifications

No mark	Internal pilot (Standard)
※ X	Common external pilot

#### ③ Number of stations

2	2 station
⋮	⋮
20	20 station

#### ④ Mountable solenoid valve models

#### ⑤ Port size

	A & B port	P & R port
02	Rc $\frac{1}{4}$	Rc $\frac{1}{4}$
※ G2	G $\frac{1}{4}$	G $\frac{1}{4}$
※ N2	NPT $\frac{1}{4}$	NPT $\frac{1}{4}$
※ F2	NPTF $\frac{1}{4}$	NPTF $\frac{1}{4}$

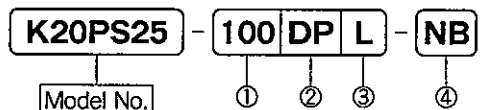
#### MFB

	A & B port	P & R port
※ 01	Rc $\frac{1}{8}$	Rc $\frac{1}{4}$
※ G1	G $\frac{1}{8}$	G $\frac{1}{4}$
※ N2	NPT $\frac{1}{8}$	NPT $\frac{1}{4}$
※ F2	NPTF $\frac{1}{8}$	NPTF $\frac{1}{4}$

⊗※ : Made to order

### Mountable solenoid valve

(For details refer to Pages 3~9.)



Model No.

K20PS25  
 K20PD25  
 K20PD35  
 K20PE35  
 K20PO35  
 ※K20PP35

#### ① Voltage

100	AC100/110V
200	AC200/220V
D24	DC24V

#### ② Wiring

DP	DIN connector (With indicator light and surge suppressor)
D	DIN connector (With surge suppressor)
Q	Without DIN connector (With surge suppressor)

#### ③ Manual override

No mark	Standard (Non-locking)
※ L	With locking button

#### ④ Port size

NB	Without sub-base
----	------------------

# INDIVIDUAL WIRING TYPE MANIFOLD

## MANIFOLD SPECIFICATIONS

		MFSO-K20P	MFBO-K20P
Type of manifold		Common P, common R (End ported) Captured pilot exhaust A & B ports on side	Common P, common R (End ported) Captured pilot exhaust A & B ports on bottom
Fluid		Non-lubricated/lubricated air	
Operating temperature range		-5~50°C	
Pressure range		0.15~0.8MPa[1.5~8.2kgf/cm <sup>2</sup> ] -0.1~1MPa[10Torr~10.2kgf/cm <sup>2</sup> ]For external pilot operation	
Port size	P, R port	Rc $\frac{1}{4}$ , G $\frac{1}{4}$ , NPT $\frac{1}{4}$ , NPTF $\frac{1}{4}$	Rc $\frac{1}{4}$ , G $\frac{1}{4}$ , NPT $\frac{1}{4}$ , NPTF $\frac{1}{4}$
	A, B port		Rc $\frac{1}{8}$ , G $\frac{1}{8}$ , NPT $\frac{1}{8}$ , NPTF $\frac{1}{8}$
	Y port	Rc $\frac{1}{8}$ , G $\frac{1}{8}$ , NPT $\frac{1}{8}$ , NPTF $\frac{1}{8}$	
	X port	Rc $\frac{1}{8}$ , G $\frac{1}{8}$ , NPT $\frac{1}{8}$ , NPTF $\frac{1}{8}$	
Number of stations		2~20 station	
Mounting		Direct mount	
Mountable solenoid valve		K20PS25 (2-position/single solenoid) K20PD25 (2-position/double solenoid) K20PD35 (3-position/center,all ports blocked) K20PE35 (3-position/center,cyl. ports open to exhaust) K20PO35 (3-position/center,all ports open to pressure) ※K20PP35 (3-position/center,all ports blocked/rubber seal)	
Option		Individual supply spacer (K20P-IS-O) Individual exhaust spacer (K20P-IE-O) Blank plate (K20P-BP)	

(Note) ※ : Made to order

Pressure range of external pilot supply : 0.25~0.7MPa[2.5~7.1kgf/cm<sup>2</sup>]

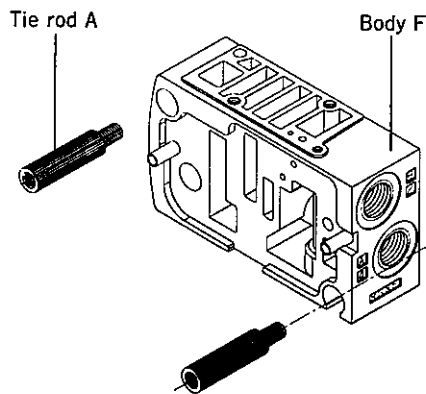
## BOTTOM PORTED

Manifold MFBO-K20P has cylinder ports A and B on bottom in ordinary cases. However, P, R1 and R2 on bottom are available upon request. For your specific requirements, contact KURODA.

# INDIVIDUAL WIRING TYPE MANIFOLD

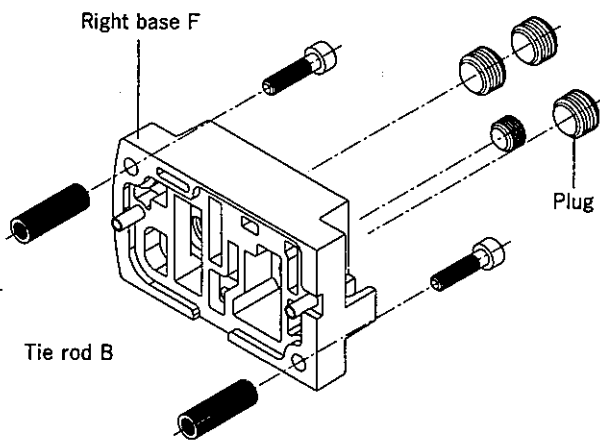
## MANIFOLD BLOCK

### Manifold



Part No. K20-MF-F

### End block



Tie rod B

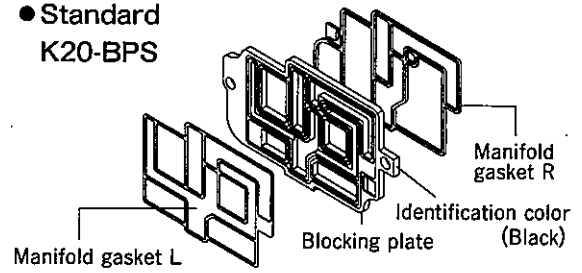
Connecting screw

Left base F

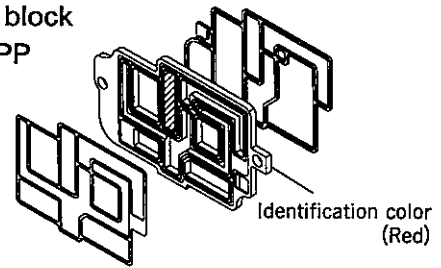
Part No. K20-MF-T

### Blocking module set

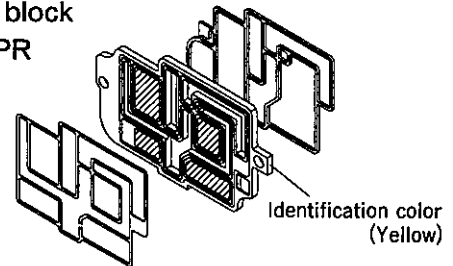
- Standard  
K20-BPS



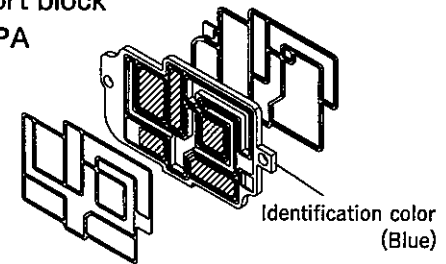
- P port block  
K20-BPP



- R port block  
K20-BPR

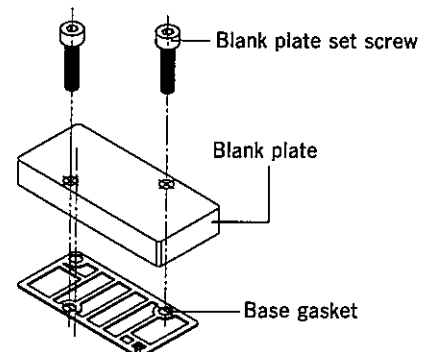


- P, R port block  
K20-BPA



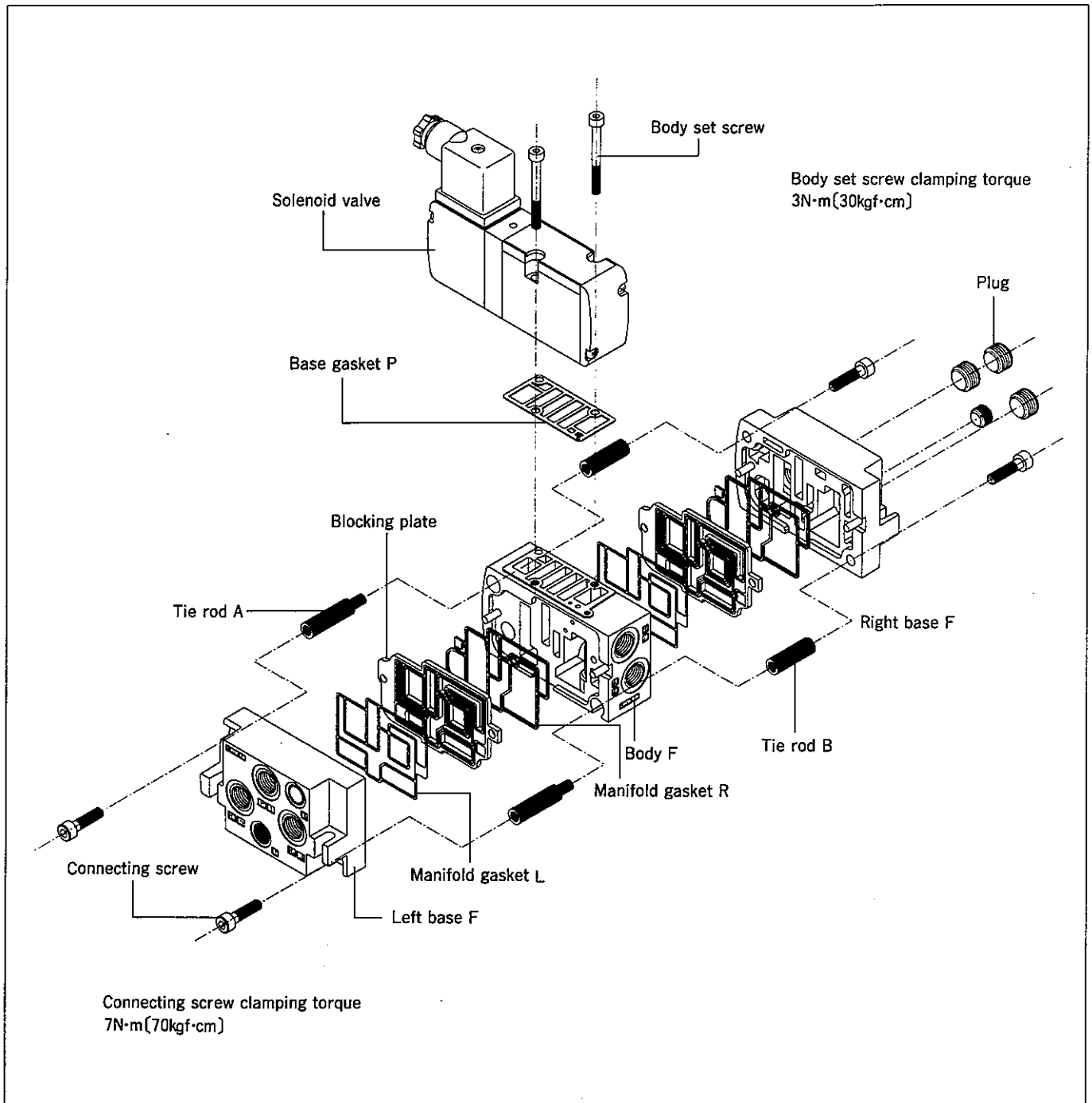
### Blank plate set

K20P-BP



# INDIVIDUAL WIRING TYPE MANIFOLD

## MANIFOLD EXPLODED VIEW

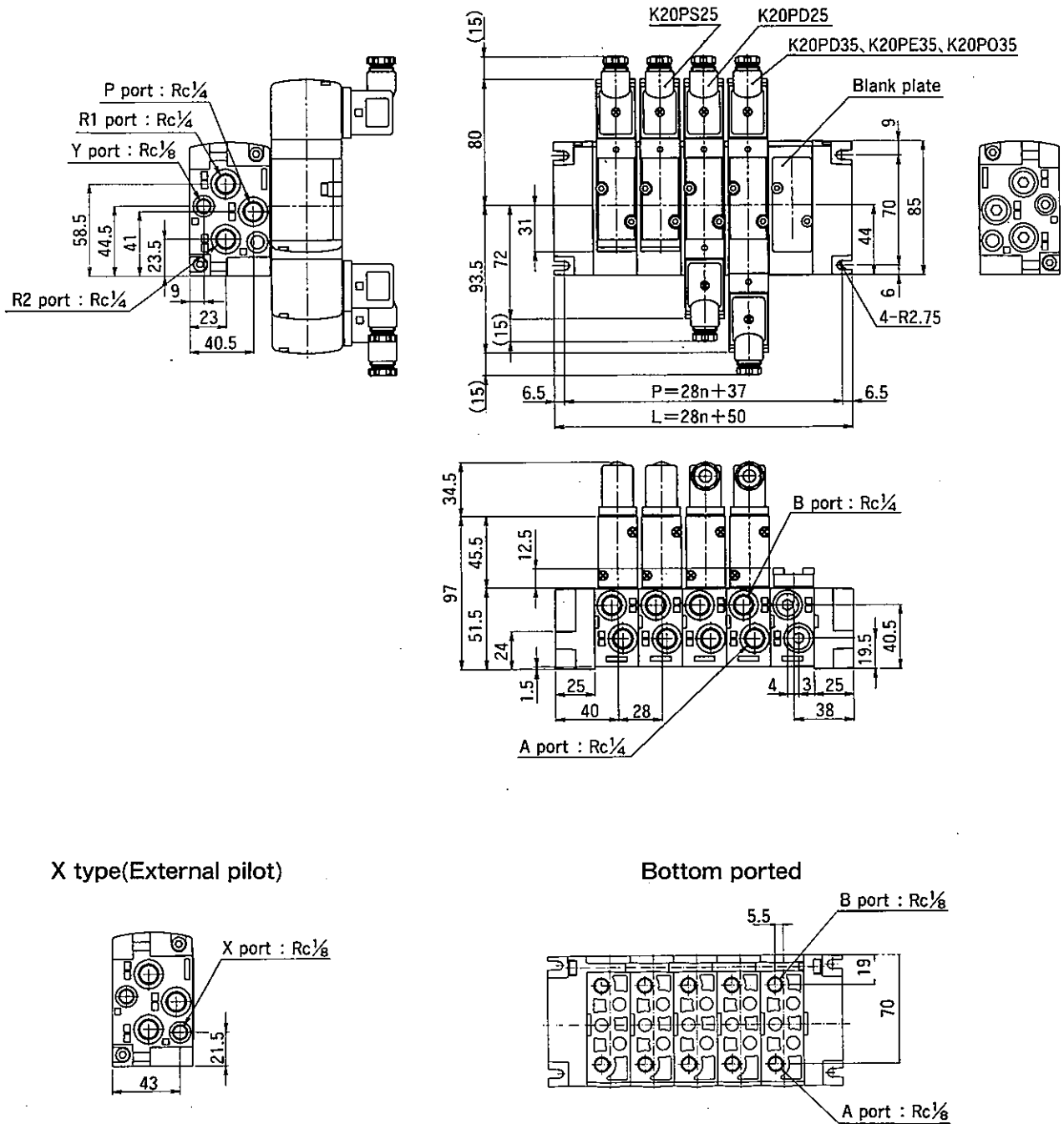


# INDIVIDUAL WIRING TYPE MANIFOLD

## DIMENSIONS

MF50-K20P, MF60-K20P

(Unit : mm)



X type(External pilot)

Bottom ported



K20P Series

# SAFETY PRECAUTIONS

The following safety precautions are provided to prevent damage and danger to personnel and to provide instructions on the correct usage of this product. These precautions are classified into 3 categories; "CAUTION", "WARNING" and "DANGER" according to the degree of possible injury or damage and the degree of impendence of such injury or damage.

Be sure to comply with all precautions along with JIS B8370<sup>(※1)</sup> and ISO 4414<sup>(※2)</sup>, as they include important content regarding safety.

## ⚠ CAUTION

- Indicates a potentially hazardous situation which may arise due to improper handling or operation and could result in personal injury or property-damage-only accidents.

## ⚠ WARNING

- Indicates a potentially hazardous situation which may arise due to improper handling or operation and could result in serious personal injury or death.

## ⚠ DANGER

- Indicates an impending hazardous situation which may arise due to improper handling or operation and could result in serious personal injury or death.

(※1) JIS B8370 : General Rules for Pneumatic Systems

(※2) ISO 4414 : Pneumatic fluid power-Recommendations for the application of equipment to transmission and control systems

## ⚠ WARNING

- **The applicability of pneumatic equipment to the intended system should be judged by the pneumatic system designer or the personnel who determined specifications for such system.**

As operating conditions for products contained in this catalog are diversified, the applicability of pneumatic equipment to the intended system should be determined by the pneumatic system designer or the personnel who determined specifications for such system after conducting an analysis or testing as necessary.

The system designer shall be responsible for assuring the intended system performance and safety.

Before making a system, the system designer should thoroughly examine all specifications for such a system and also take into consideration the possibility of any trouble with the equipment.

- **The pneumatic equipment should be handled by persons who have sufficient knowledge and rich experience.**

Inproper handling of compressed air will result in danger.

Assembling, operation and maintenance of machinery using pneumatic equipment should be performed by persons who have sufficient knowledge and rich experience.

- **Never operate machinery nor remove the equipment until safety is assured.**

- Before checking or servicing machinery and equipment, be sure to check that steps for prevention of dropping or runaway of the driven component have been completely taken.

- When removing the equipment, make sure that the above-mentioned safety measures have been done beforehand.

Then turn off air supply and power to the system and purge compressed air in the system.

- When restarting machinery and equipment, check that proper prevention of malfunction has been provided for and then restart carefully.

- **When using the pneumatic equipment in the following conditions or environments, take the proper safety measures and consult KURODA beforehand.**

- Conditions and environments other than specified and outdoor use.

- Applications to nuclear power equipment, railroads, aircraft, vehicles, medical equipment, equipment connected with food and drink, amusement facilities and safety devices such as emergency interruption devices, clutch/brake circuits for a press and the likes.

- Applications which require extreme safety and will also greatly affect men and property.





K20P Series

# PRECAUTIONS

Be sure to read the following precautions before use.

## Technical precaution

### ⚠ WARNING

#### ● Driving an actuator

When driving an actuator such as a cylinder etc. by means of a solenoid valve, take proper measures to prevent hazards which may be caused by the actuator.

#### ● Influence of back pressure when used with manifold

When using a solenoid valve mounted on a manifold, take the necessary precautions to prevent the malfunction of the actuator from back pressure.

When there is the possibility of such malfunction, take proper measures.

#### ● Holding pressure (and vacuum)

As solenoid valve operation may sometimes involve an air leak, it cannot be used for holding pressure (and vacuum) in a pressure vessel.

#### ● Solenoid valves cannot be used as emergency cutout valves.

Solenoid valves contained in this catalogue are not designed as safety valves such as emergency cutout valves etc.

When safety valves are required, select other solenoid valves intended for such exclusive use.

#### ● Keeping space for maintenance

Keep space for maintenance and inspection.

#### ● Releasing residual pressure

Be sure to provide a residual pressure releasing function in the pneumatic circuit to facilitate maintenance and inspection.

#### ● Using in a vacuum

When using a solenoid valve as a vacuum selector valve, take the proper measures to prevent the suction of dust and foreign matter from the pad and exhaust port.

## How to select

### ⚠ WARNING

#### ● Check specifications

Products contained in this catalogue are designed for use only in pneumatic systems (and vacuum systems). Avoid using them in pressures or temperatures outside the range of the specifications, otherwise a breakdown or faulty operation may result.

When using fluids (and vacuum) other than compressed air, contact KURODA beforehand.



K20P Series

# PRECAUTIONS

Be sure to read the following precautions before use.

## Environmental conditions

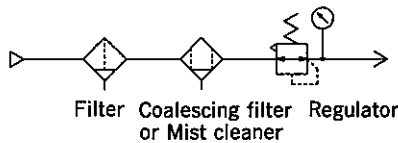
### ⚠WARNING

- Avoid using the valve in an atmosphere where corrosive gas, chemicals, seawater, water or vapor are permeating.
- When the valve is used at low temperature of less than 5 °C, it may be frozen.  
Use it in dry air passed through an air dryer.

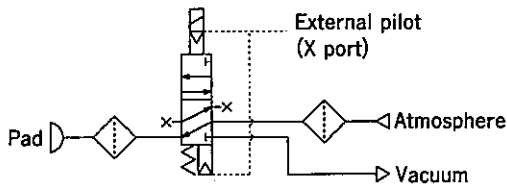
## Quality of air

### ⚠CAUTION

- Use a filter with filtration of 5 μm or fine. Using a coalescing filter or mist cleaner in combination with the filter will improve the quality of air.
- Take sufficient care of the filter drain. Drain can be removed by passing through an air dryer.
- If sludge contained in the compressor oil enters the valve the pneumatic equipment may sometimes go wrong. In this case, it is recommendable to use compressor oil (NISSEKI FAIRCALL A68, IDEMITSU DAPHUNYSUPER CS 68) or take a sludge prevention using an coalescing filter or mist cleaner in combination.



- When using the valve in a vacuum, install a filter between the valve and pad on the air inlet port.



## Pressure supply (For external pilot type)

### ⚠WARNING

- Supply pressure to external pilot valve from port X. (Port Y is pilot valve exhaust port.)
- To cut the pressure supply and exhaust air, do so for the main valve first and then for the external pilot valve.

## Air exhaust

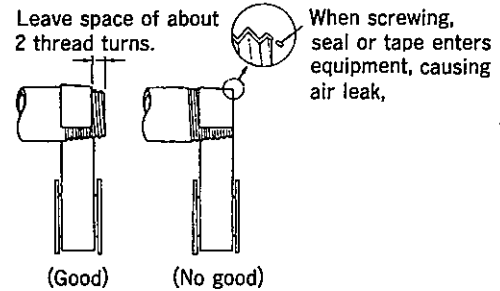
### ⚠WARNING

- As this solenoid valve is so constructed that exhaust air from pilot valve and exhaust air from valve are collected at port R. use care that exhaust air is not extremely choked. Otherwise, it may cause a malfunction.
- When operating 5 or more solenoid valves simultaneously on a manifold of 10 or more stations, piping both sides of port P and R ports. (For common external pilot type, also open port Y.) (Standard manifold is designed to open both sides.)

## Piping

### ⚠CAUTION

- Thoroughly flush the inside of pipes before piping.
- When screwing the pipe and fitting, use care to prevent thread cutting and sealants from entering the pipe and fitting.
- When taping the sealant, do so as shown below:



- When tightening the pipe and fitting, do so with proper torque.

Port size	Torque N·m[kgf·cm]
Rc $\frac{1}{8}$	7~10 [ 70~100 ]
Rc $\frac{1}{4}$	13~15 [ 130~150 ]

## Lubrication

### ⚠CAUTION

- No lubrication is recommended.
- When lubrication is applicable, use #1 turbine oil (ISO VG32).
- Do not use spindle oil and machine oil. Otherwise, the seal and packing may be damaged.



K20P Series

# PRECAUTIONS

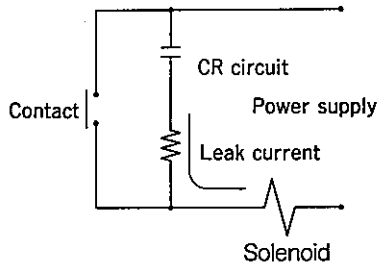
Be sure to read the following precautions before use.

## Leak current

### △CAUTION

When CR circuit is used to protect the contact, leak current from CR circuit is flowing. If this leak current increases, it may cause a malfunction.

Reduce leak current to less than 1 mA.



## Energizing duration

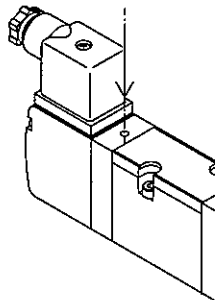
### △WARNING

- The valve is designed to be energized by frequent pulse signal, if your application requires continuously energizing for long time, consult KURODA representative.
- Do not energize both solenoid simultaneously on double solenoid valve to avoid malfunction.
- For 2-position double solenoid valve, energize it for more than 20m seconds for complete shifting and keeping the position by detent mechanism.

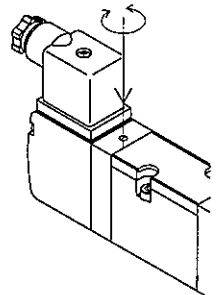
## Manual override

### △CAUTION

- Non locking type (Standard)  
Push manual rod (blue) with sharp-pointed tool, and the valve will be energized just like when solenoid is turned on.



- Locking type/locking button (Made to order)  
Push locking button (red) with slotted screw driver, and valve is energized just like when solenoid is turned on. When locking button is rotated 90° while depressed, valve is locked to hold it in energized state.



## Mounting

### △CAUTION

Valve can be mounted at any position. However, take care that no shocks nor vibrations are directly applied to valve body.

For double solenoid or 3-position solenoid valve, mount so that main valve (spool) is horizontal.

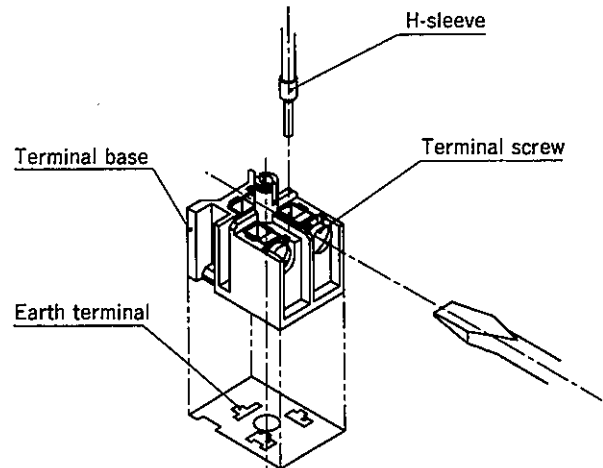
## Wiring of DIN connector

### △CAUTION

Before wiring, be sure to turn off power supply.

Connect wire to terminal 1 and terminal 2 on the built-in terminal base. When making the connection, put H-sleeve on the stripped wire end and clamp it with the end face of terminal screw.

- (Note)
- Avoid fixing with a terminal screw head.
  - avoid using Y-terminals and eye-terminals.



Type	Specifications		
H-sleeve	H0.5/13	0495.0	0.5mm <sup>2</sup> (AWG22)
	H0.75/13	0496.0	0.75mm <sup>2</sup> (AWG22)
	H1.0/13	0497.0	1.0mm <sup>2</sup> (AWG22)

H-sleeve : Made by Japan Widemyular

Clamping torque of terminal screw : 0.5N·m[5kgf·cm]

## Maintenance

### △CAUTION

Before carrying out any maintenance service, disconnect power supply, close the shut off valve on supply line and exhaust remaining air from the pneumatic line beforehand.

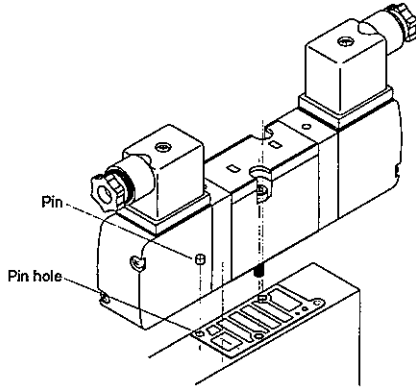
# K20P Series PRECAUTIONS

Be sure to read the following precautions before use.

## Replacing solenoid valve

### Dismounting

- Loosen mounting screw of solenoid valve body and pull valve body out straight.



### Mounting

- When mounting solenoid valve, adjust it to pin position of body and tighten with mounting screw.

Solenoid valve mounting screw clamping torque:

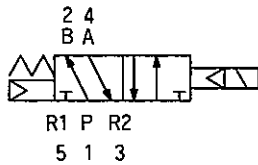
M4×40 ℓ 3N·m(30kgf·cm)

## Port identification

### Port mark

Piping port marks such as **P1**, **A4** conforming to JIS and ISO are given in the respective piping port positions.

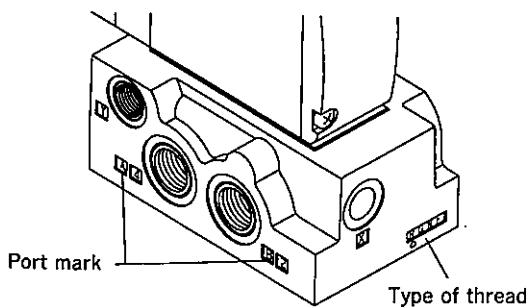
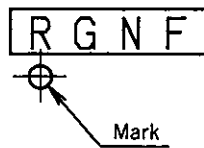
JIS	ISO	Use
P	1	Supply port
A	4	Cylinder port
B	2	Cylinder port
R <sub>1</sub>	5	Exhaust port
R <sub>2</sub>	3	Exhaust port



### Type of port thread

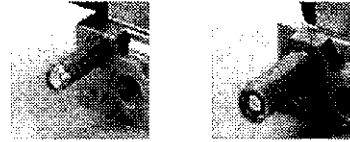
Type of port thread is marked on the sub-base by the following abbreviation.

Abbrev.	Type of thread
R	Rc
G	G
N	NPT
F	NPTF



## Air muffler

Equip air muffler (SL-1 or SL-2L) to exhaust port (R1, R2) and pilot exhaust port (Y) to decrease exhaust noise from solenoid valve and to prevent from entering dust and dirt from the outside.

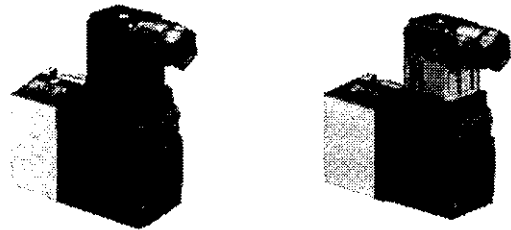


## Wiring for solenoid

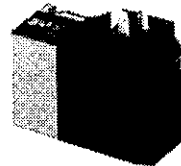
Wiring of the K20P Series is performed using a DIN connector.

A surge suppressor is incorporated in the solenoid.

- DIN connector (D)
- DIN connector/with indicator light (DP)

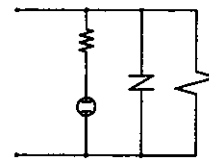


- Without DINconnector (Q)

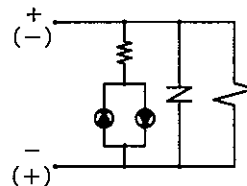


## Internal circuit of solenoid with indicator light & surge suppressor

### For AC



### For DC



As DC model is of bipolar type, polarity (plus and minus) does not matter.



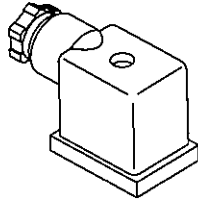
K20P Series

# PRECAUTIONS

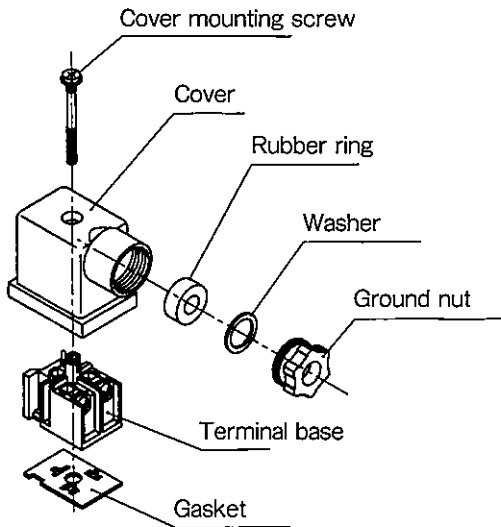
Be sure to read the following precautions before use.

## Indicator light and surge suppressor

Indicator light is mounted on terminal base within DIN connector so that power ON-OFF status can be checked through transparent cover. Surge suppressor is incorporated in solenoid.



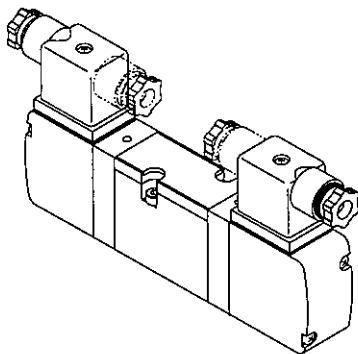
## Cable connector



Cable : Cable outside diameter  $\phi 6 \sim \phi 7 \text{mm}$   
 Cover mounting screw clamping torque :  $0.3 \text{N} \cdot \text{m} [3 \text{kgf} \cdot \text{cm}]$

## Changing cable connector set position

For K20P Series, remove cover from terminal base and turn cable connector 180°.



## Flow rate

Flow rate can be calculated from the following formula:

For values in the sonic velocity zone, find out from the attached table.

$P_H \leq 1.89 P_L$  (Subsonic velocity zone)

$$Q = 227 \times S \times \sqrt{P_L \times (P_H - P_L)} \times \sqrt{\frac{273}{T_H}}$$

$$[Q = 22.2 \times S \times \sqrt{P_L \times (P_H - P_L)} \times \sqrt{\frac{273}{T_H}}]$$

$P_H \geq 1.89 P_L$  (Sonic velocity zone)

$$Q = 113 \times S \times P_H \times \sqrt{\frac{273}{T_H}}$$

$$[Q = 11.1 \times S \times P_H \times \sqrt{\frac{273}{T_H}}]$$

Q : Flow rate ℓ / min(ANR)

S : Effective area of orifice mm<sup>2</sup>

$P_H$  : Pressure on upper stream MPa abs(kgf/cm<sup>2</sup>abs)

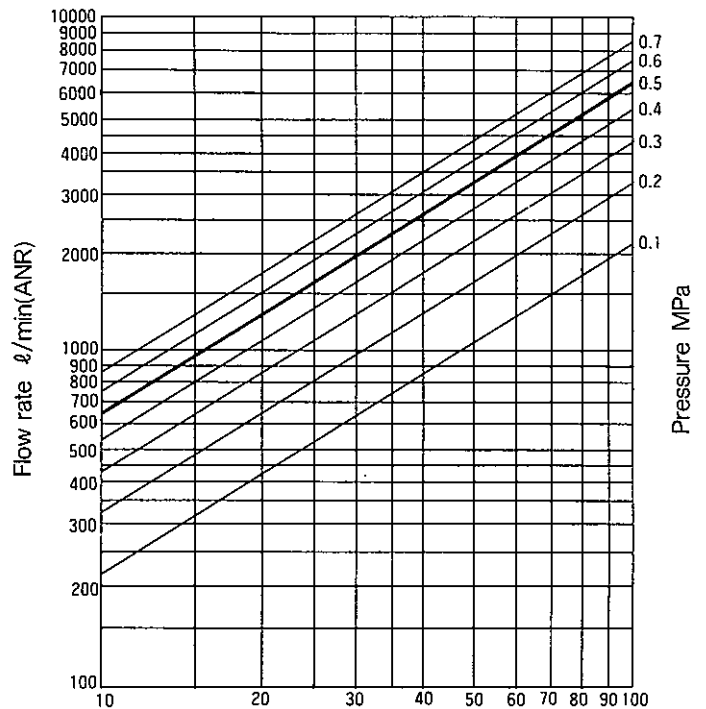
$P_L$  : Pressure on down stream MPa abs(kgf/cm<sup>2</sup>abs)

$T_H$  : Absolute temperature on upper stream K

(Note) Absolute pressure (MPa) = Supply pressure + 0.101 (MPa)

[Absolute pressure (kgf/cm<sup>2</sup>) = Supply pressure + 1.033 (kgf/cm<sup>2</sup>)]

Sonic velocity zone (at 20°C)



Effective area (mm<sup>2</sup>)

(When the value of effective area is  $\times 10^{-1}$  or  $\times 10^0$ , multiply the same figure by the flow rate.)

## **▲ WARNING**

**FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.**

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