CKD

SM—9040—A

INSTRUCTION MANUAL

SHOCKLESS VALVE

SKH

- Please read this instruction manual carefully before using this product, particularly the section describing safety.
- Retain this instruction manual with the product for further consultation whenever necessary.

CKD Corporation

Thank you for adopting CKD's quality product.

For maximum results and the most effective utilization of the CKD products, it is recommended you read and understand this manual prior to installation.

Rely upon our strict quality control exercised on every product of ours.

This manual is edited consisting of the following six sections.

- ◇ Product
- ◇ Caution
- ◇ Operation
- ◇ Installation
- ◇ Maintenance
- ◇ Model coding

It is, of course, desirable that you read this manual through before start using the product. This booklet is so edited that a certain idea will be conveyed by reading the related section only, first of all. For instance, just reading the section of the ◇ Installation, in case that an immediate installation is mandatorily required.

The measuring units shown within this manual are converted on the basis of the following formulae and approximate value is applied :

Pressure unit	$1MPa=10.1972kgf/cm^2 \fallingdotseq 10kgf/cm^2$
Torque	$1N \cdot m=0.101972kgf \cdot m \fallingdotseq 0.1kgf \cdot m$
Energy unit	$1J=0.101972kgf \cdot m \fallingdotseq 0.1kgf \cdot m$

NOTE : Letters & figures enclosed within Gothic style bracket (examples such as [C2-4PP07] · [V2-503-B] etc.) are editorial symbols being unrelated with contents of the book.

INDEX

SKH
Shockless valve
SM 9040-A

1. PRODUCTS

1.1 Outline of Products

This unit is for air control to cylinder. Major feature of it is external cushion circuit is built-in for the purpose of providing a smooth halting at the stroke end of cylinder. The type of cushion is making use of exhausting pressure.

1.2 Characteristics of Product

1) Capable to absorb large kinetic energy due to function of external cushion. It is also capable to control it under condition of high load and high speed.
2) This is the unit making use of external cushion effect of driving solenoid valve and requires remarkably less installation man-hours comparing with that of mounting cushion mechanism separately.
3) Able to squeeze the speed reduction ratio G when stopping, by setting cushion stroke.
4) Cushion structure is able to afford frequent operation due to being pressure control type of relief valve.

1.3 Principle of Cushion

Pressure control type

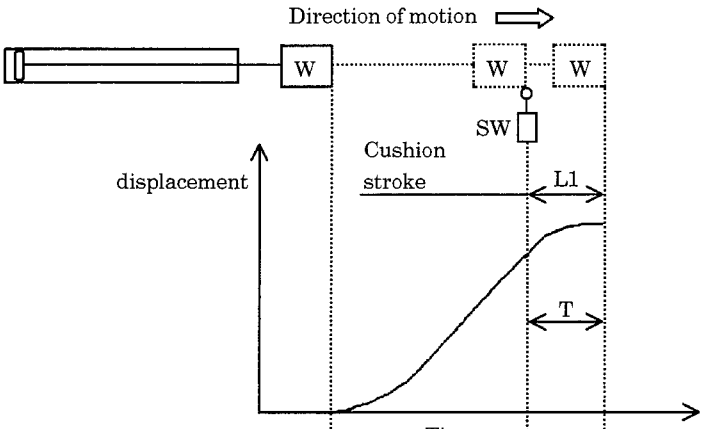


Fig. 1

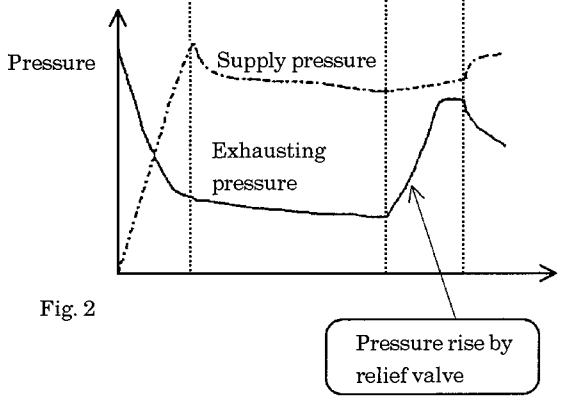


Fig. 2

Let's take the case of cylinder moving to the direction of arrow mark as illustrated to the left.

At first, solenoid valve is actuated. Due to the variation of pressure at supply port(cylinder head side)and exhaust port (piston rod side), cylinder starts its motion as illustrated in Fig. 2.

Propelling force actuates in the same direction of piston motion during the course of piston traveling owing to the pressure difference between supply side and exhaust side.

In a certain distance (L_1) before stroke end, make an external switch (such as proximity switch) tripped to shift the direction of air flow and let exhausting air control stopping piston.

(As for variable speed unit, relief valve is being used to control exhausting air pressure.) Therefore, exhausting air pressure is raised as piston approaches to the stroke end propelling force changes as pressure balance between supply side and exhaust side is changed.The speed of piston, thus, gradually reduces to its final stop.

Smooth halting is expected when setting cushion stroke fairly long. (Cushion time T, in this case, should be set longer.)

Parameter of setting cushion effect consist of such 3 elements as Cushion stroke L_1, Setting value of exhaust air pressure rising (Setting value of relief valve) and cylinder speed.

1.4 Specifications

1) SKH-3

<Fluid specifications>

Service fluid	: Compressed air
Working pressure (MPa)	: 0.3 ~ 0.7
Ambient temperature (°C)	: −5 ~ 50 (Not to be frozen)
Service fluid temperature (°C)	: 5 ~ 50
Lubrication	: Not required
Manual operation device	: Non-lock type
Effective sectional area (mm^2)	: 24

<Electric Specifications>

Rated voltage (V)	: AC100V, AC200V, DC24V
Power consumption (W)	: 1.8
Temperature rise (°C)	: 30
Range of voltage fluctuation	: ± 10%
Insulation class	: B class
Connecting cord	: Small terminal box w/Lamp

<Others>

Min. cylinder stroke (mm)	: 800
Min. cylinder speed (mm/s)	: 500

2) SKH-4

<Fluid specifications>

Service fluid	: Compressed air
Working pressure (MPa)	: 0.3 ~ 0.7
Ambient temperature (°C)	: −5 ~ 50 (Not to be frozen)
Service fluid temperature (°C)	: 5 ~ 50
Lubrication	: Not required
Manual operation device	: Non-lock type
Effective sectional area (mm^2)	: 45

<Electric Specifications>

Rated voltage (V)	: AC100V, AC200V, DC24V
Power consumption (W)	: 1.8
Temperature rise (°C)	: 30
Range of voltage fluctuation	: ± 10%
Insulation class	: B class
Connecting cord	: Small terminal box w/Lamp

<Others>

Min. cylinder stroke (mm)	: 800
Min. cylinder speed (mm/s)	: 500

3) SKH-5

<Fluid specifications>

Service fluid	: Compressed air
Working pressure (MPa)	: 0.3 ~ 0.7
Ambient temperature (°C)	: −5 ~ 50 (Not to be frozen)
Service fluid temperature (°C)	: 5 ~ 50
Lubrication	: Not required
Manual operation device	: Non-lock type
Effective sectional area (mm^2)	: 80

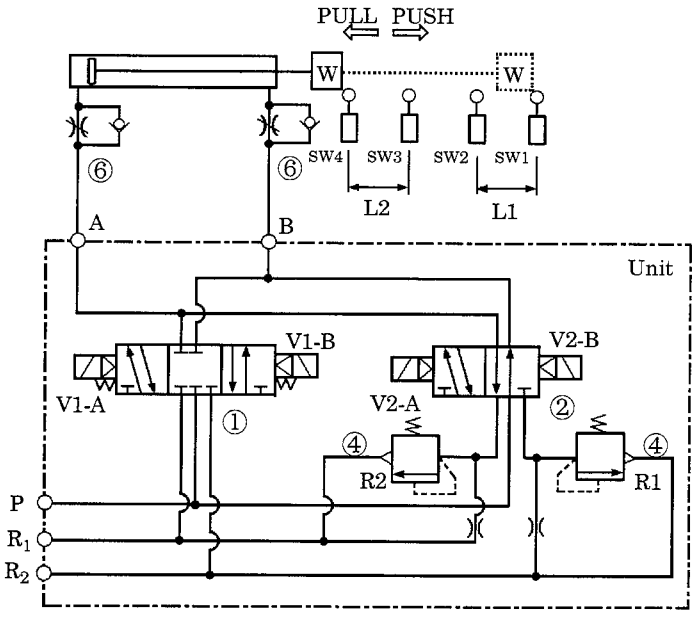
<Electric Specifications>

Rated voltage (V)	: AC100V, AC200V, DC24V
Power consumption (W)	: 1.8
Temperature rise (°C)	: 30
Range of voltage fluctuation	: ± 10%
Insulation class	: B class
Connecting cord	: Small terminal box w/Lamp

<Others>

Min. cylinder stroke (mm)	: 800
Min. cylinder speed (mm/s)	: 500

1.5 Architecture of System



Explanation of Circuit

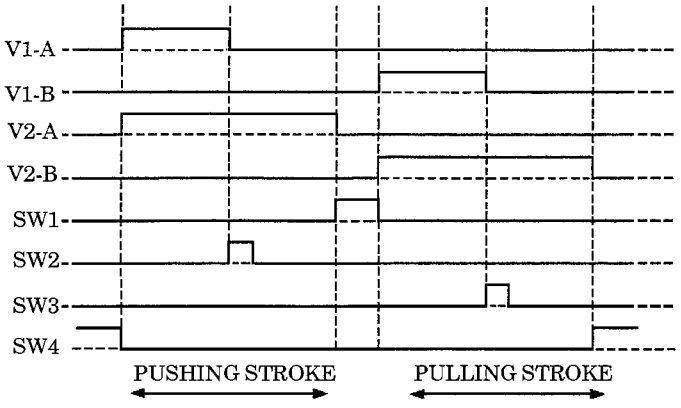
Solenoid valve ① is main solenoid valve to drive cylinder. Air cylinder is driven in high speed through this solenoid valve ① when ① is energized but is driven in slow speed through the solenoid valve ② when ① is di-energized.

In reality of motion (in case of pushing) both solenoids V1-A ① and V2-A ② are energized through sequencer. Air cylinder is thus driven in high speed. Solenoid ① is dに energized when proximity switch 2 is stripped. The air pressure within the rod side chamber of cylinder is raised due to relief valve R_1 ④ which is installed in exhausting side of solenoid valve ② hindering piston motion. Owing to this hindrance, piston stops smoothly. The distance L_1 between Sw 1 and Sw 2 is cushion stroke in pushing motion. whereas the distance L_2 between Sw 3 and Sw 4 is cushion stroke in pulling motion. Adjusting the air cylinder stopping time is achieved by setting pressure of relief valve. Smooth stopping of piston is accomplished due to combined effect of cushion stroke and setting pressure of relief valve.

The circuit explained above is when SKH-420 is used. Solenoid valve ② is revised when either SKH-430 or SKH-450 is used.

Solenoid valve ① built of two valves in parallel when SKH-5 type is used.

≪Time chart≫

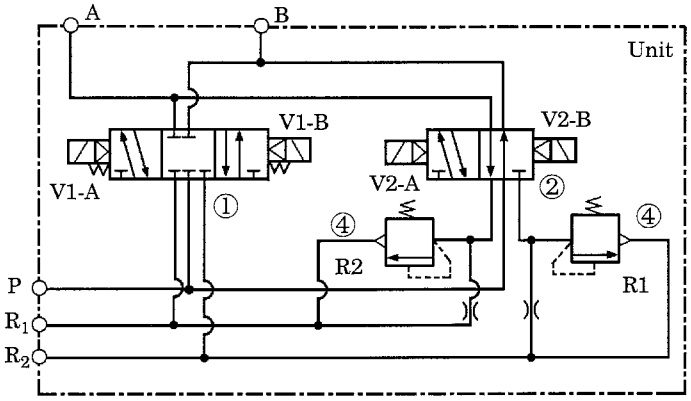


1.6 Composition of Component parts

1) SKH-320

Circuit diagram

It is used for normal ON-OFF control. There is no intermediate stopping. Piston only stops at stroke end.

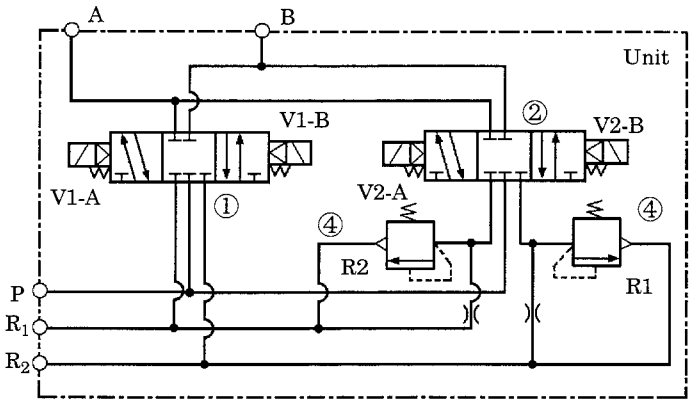


	Parts	Model code	Qty	Remarks
1	Solenoid valve	4KB339	1	For acceleration
2	Solenoid valve	4KB329	1	For deceleration
3	Manifold block		1	
4	Spacer Relief valve	SKH-3-SR	1	

2) SKH-330

Circuit diagram

Intermediate stopping is available. However, particular attention is required because there is a possible popping out of piston rod after a long time halting due to air leakage of cylinder.

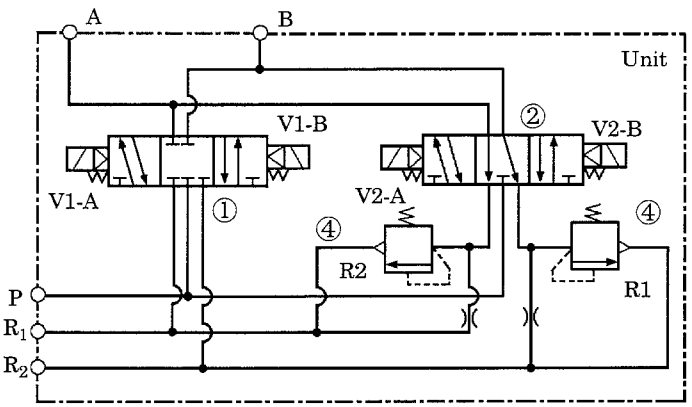


	Parts	Model code	Qty	Remarks
1	Solenoid valve	4KB339	1	For acceleration
2	Solenoid valve	4KB339	1	For deceleration
3	Manifold block		1	
4	Spacer Relief valve	SKH-3-SR	1	

3) SKH-340

Circuit diagram

Intermediate stopping is available. However, particular attention is required because there is a possible popping out of piston rod after a long time halting due to air leakage of cylinder.

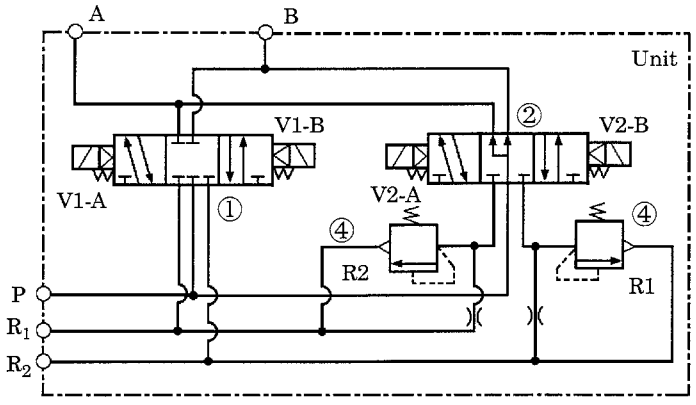


	Parts	Model code	Qty	Remarks
1	Solenoid valve	4KB339	1	For acceleration
2	Solenoid valve	4KB349	1	For deceleration
3	Manifold block		1	
4	Spacer Relief valve	SKH-3-SR	1	

4) SKH-350

Circuit diagram

Intermediate stopping is available. Pressurized air is supplied to both ends.of cylinder in case of controlling cylinder with braking device or long time halting of cylinder.



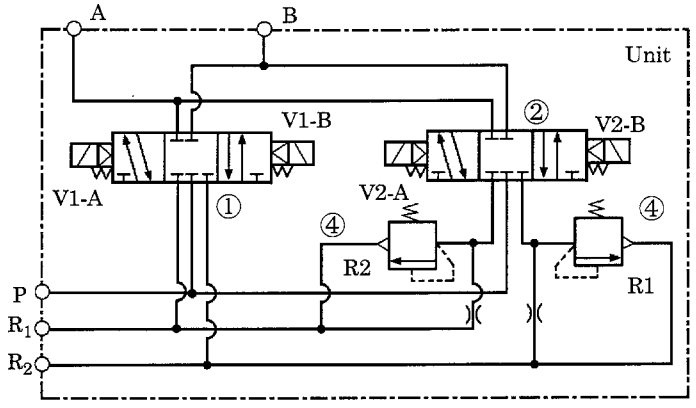
	parts	Model code	Qty	Remarks
1	Solenoid valve	4KB339	1	For acceleration
2	Solenoid valve	4KB359	1	For deceleration
3	Manifold block		1	
4	Spacer Relief valve	SKH-3-SR	1	

Note: There is a case of requiring reverse regulator because of both end pressurization when halting the piston

5) SKH-430

Circuit diagram

Intermediate stopping is available. However, particular attention is required because there is a possible popping out of piston rod after a long time halting due to air leakage of cylinder.

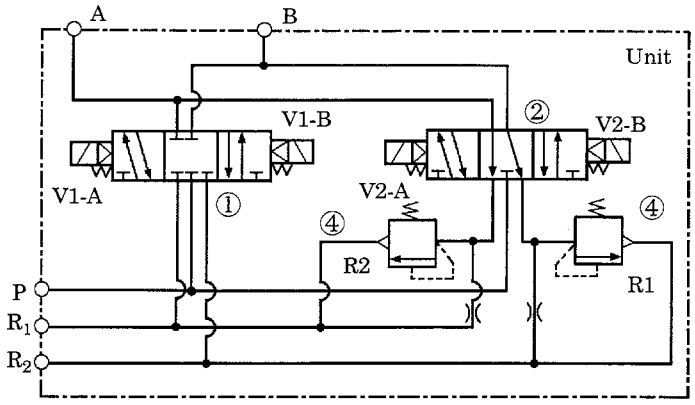


	Parts	Model code	Qty	Remarks
1	Solenoid valve	4KB439	1	For acceleration
2	Solenoid valve	4KB439	1	For deceleration
3	Manifold block		1	
4	Spacer Relief valve	SKH-4-SR	1	

6) SKH-440

Circuit diagram

Intermediate stopping is available. However, particular attention is required because there is a possible popping out of piston rod after a long time halting due to air leakage of cylinder.

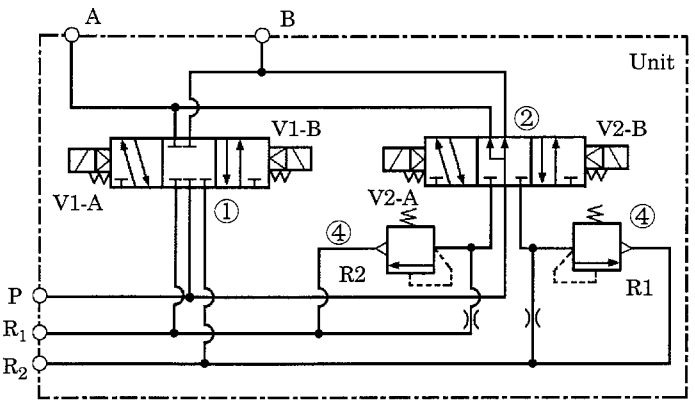


	Parts	Model code	Qty	Remarks
1	Solenoid valve	4KB439	1	For acceleration
2	Solenoid valve	4KB449	1	For deceleration
3	Manifold block		1	
4	Spacer Relief valve	SKH-4-SR	1	

7) SKH-450

Circuit diagram

Intermediate stopping is available. Pressurized air is supplied to both ends.of cylinder in case of controlling cylinder with braking device or long time halting of cylinder.



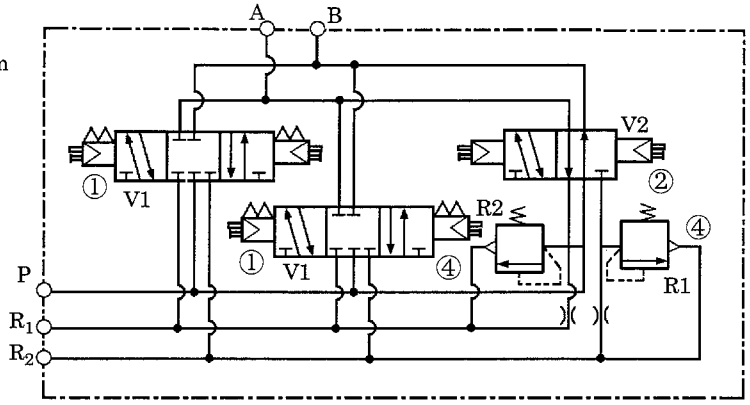
	parts	Model code	Qty	Remarks
1	Solenoid valve	4KB439	1	For acceleration
2	Solenoid valve	4KB459	1	For deceleration
3	Manifold block		1	
4	Spacer Relief valve	SKH-4-SR	1	

Note: There is a case of requiring reverse regulator because of both end pressurization when halting the piston

8) SKH-520

Circuit diagram

It is used for normal ON-OFF control. There is no intermediate stopping. Piston only stops at stroke end.

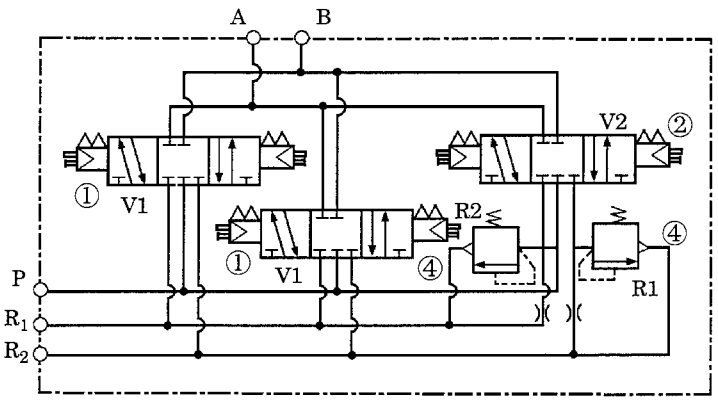


	Parts	Model code	Qty	Remarks
1	Solenoid valve	4KB439	2	For acceleration
2	Solenoid valve	4KB429	1	For deceleration
3	Manifold block		1	
4	Spacer Relief valve	SKH-4-SR	1	

9) SKH-530

Circuit diagram

Intermediate stopping is available. However, particular attention is required because there is a possible popping out of piston rod after a long time halting due to air leakage of cylinder.

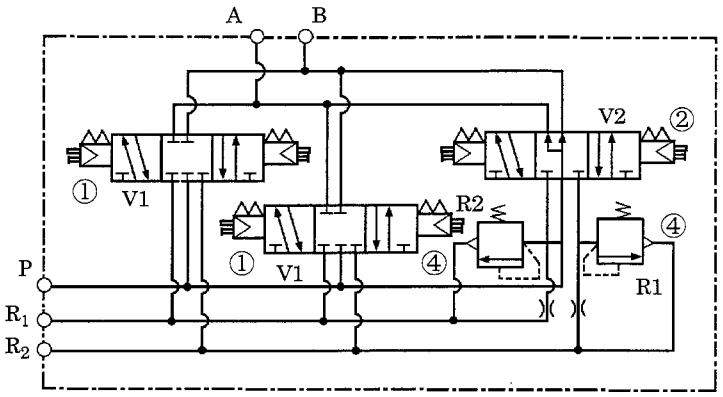


	Parts	Model code	Qty	Remarks
1	Solenoid valve	4KB339	2	For acceleration
2	Solenoid valve	4KB339	1	For deceleration
3	Manifold block		1	
4	Spacer Relief valve	SKH-4-SR	1	

10) SKH-550

Circuit diagram

Intermediate stopping is available. Pressurized air is supplied to both ends.of cylinder in case of controlling cylinder with braking device or long time halting of cylinder.

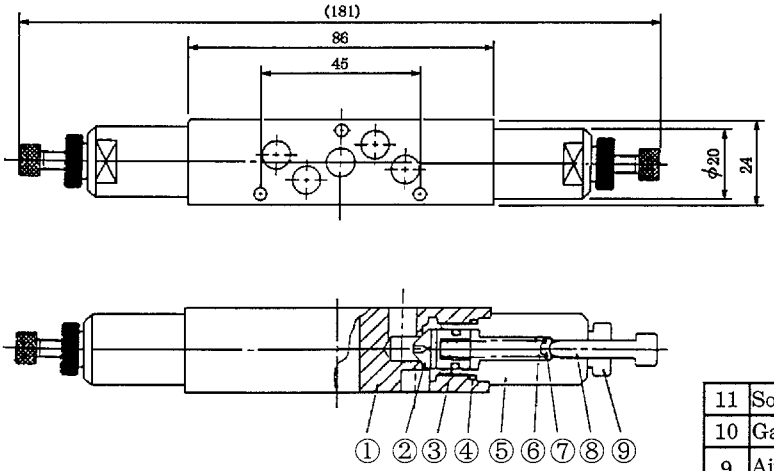


	parts	Model code	Qty	Remarks
1	Solenoid valve	4KB439	2	For acceleration
2	Solenoid valve	4KB459	1	For deceleration
3	Manifold block		1	
4	Spacer Relief valve	SKH-4-SR	1	

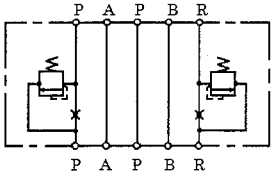
Note: There is a case of requiring reverse regulator because of both end pressurization when halting the piston

1.7 External Dimensions

1) SKH-3-SR

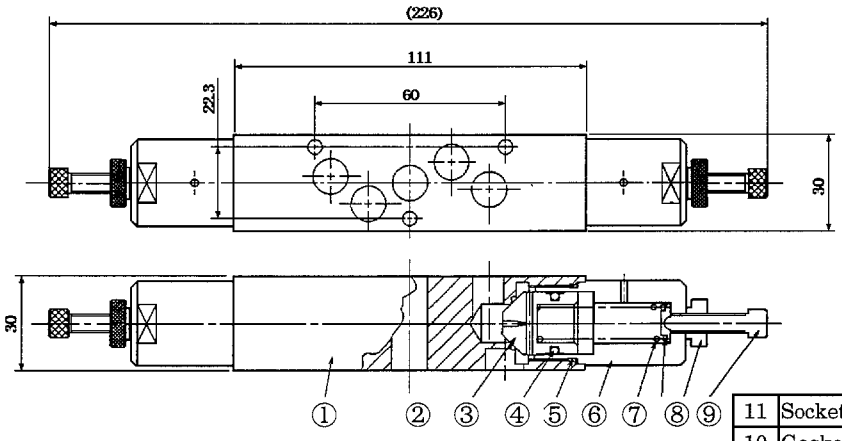


JIS SYMBOL

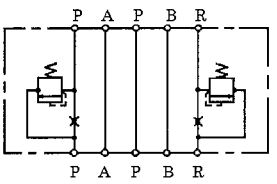


品番 NO	部品名 PARTS	材料 MATERIAL	数量 Q'TY	備考 REMARK
11	Socket headed bolt	SCM435	3	
10	Gasket	NBR	1	
9	Ajusting-screw	C3604	2	
8	Stop-nut	SUS303	2	
7	Spring disk	S35C	2	
6	Spring	SWPB	2	
5	Cover	A2011	2	
4	O-ring	NBR	2	AS568-015
3	O-ring	NBR	2	AS568-012
2	Valve-retainer	POM	2	
1	Spacer	A2011	1	

2) SKH-4-SR

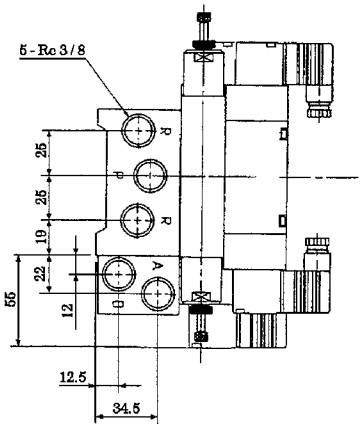


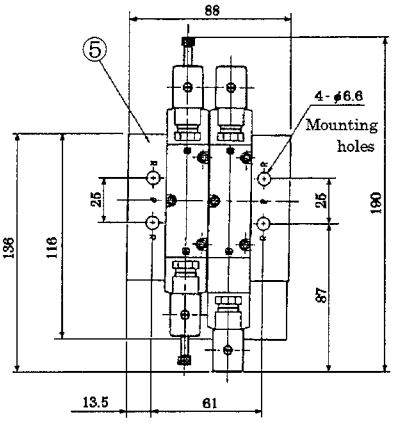
JIS SYMBOL



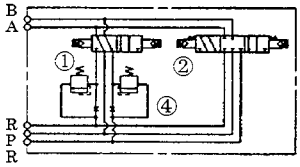
品番 NO	部品名 PARTS	材料 MATERIAL	数量 Q'TY	備考 REMARK
11	Socket headed bolt	SCM435	3	
10	Gasket	NBR	1	
9	Ajusting-screw	C3604	2	
8	Stop-nut	SUS303	2	
7	Spring disk	S35C	2	
6	Spring	SWPB	2	
5	Cover	A2011	2	
4	O-ring	NBR	2	AS568-019
3	O-ring	NBR	2	AS568-114
2	Valve-retainer	POM	2	
1	Spacer	A2011	1	

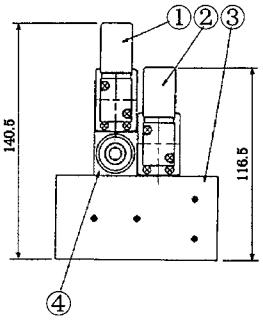
3) SKH-320





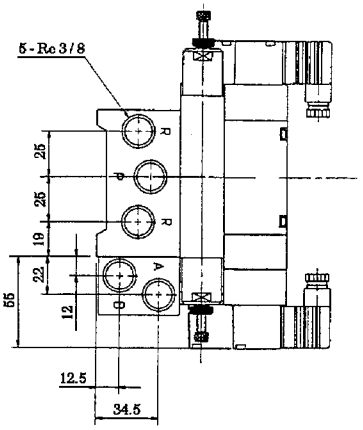
JIS SYMBOL

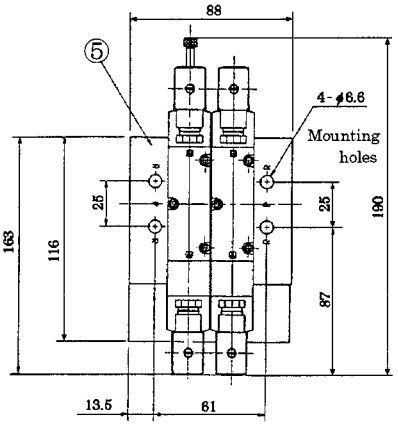




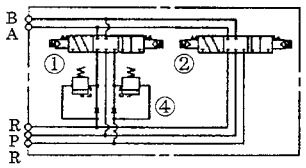
5	Sub-plate	A6063	1	
4	Spacer-relief valve		1	
3	Side-plate	A2017	1	
2	4KB339-00		1	Acceleration
1	4KB329-00		1	Deceleration
品番 NO	部 品 名 PARTS	材料 MATERIAL	数量 Q'TY	備 考 REMARK

4) SKH-330
SKH-340
SKH-350

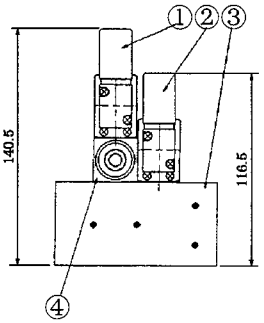




JIS SYMBOL (For SKH-430)

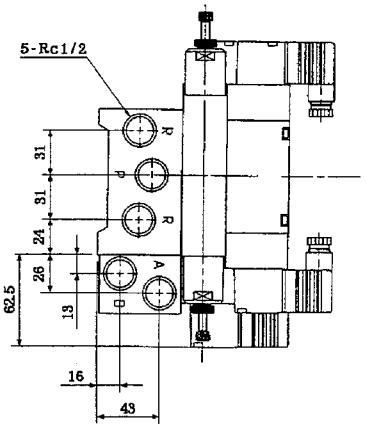


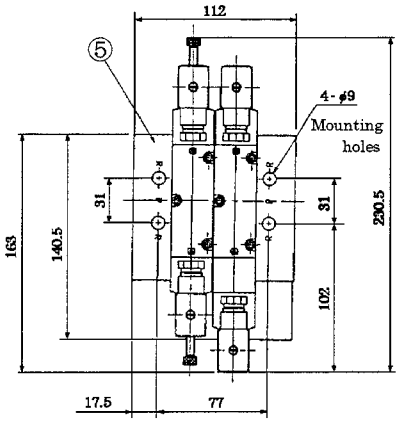
Solenoid valve ① is PAB port counection when SKH-450 is used.



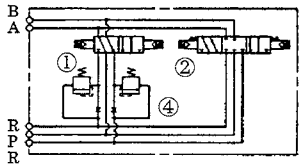
5	Sub-plate	A6063	1	
4	Spacer-relief valve		1	
3	Side-plate	A2017	1	
2	4KB339-00		1	Acceleration
1	4KB339-00 4KB349-00 4KB359-00		1	Deceleration
品番 NO	部 品 名 PARTS	材料 MATERIAL	数量 Q'TY	備 考 REMARK

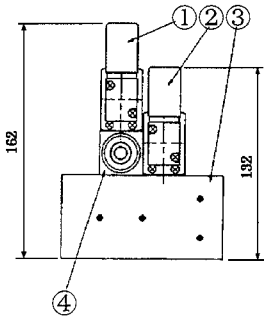
5) SKH-420





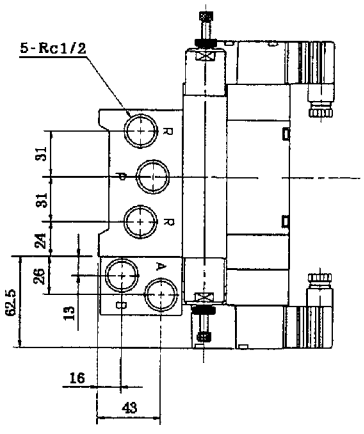
JIS SYMBOL

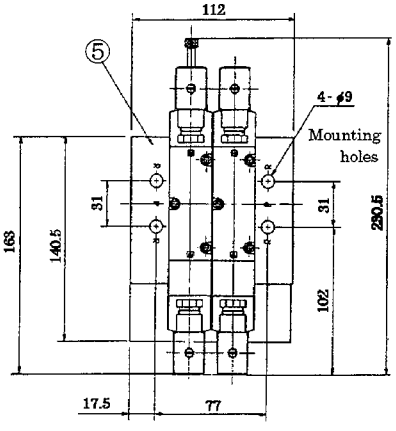




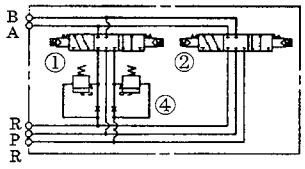
5	Sub-plate	A6063	1	
4	Spacer-relief valve		1	
3	Side-plate	A2017	1	
2	4KB439-00		1	Acceleration
1	4KB429-00		1	Deceleration
品番 NO	部 品 名 PARTS	材料 MATERIAL	数量 Q'TY	備 考 REMARK

6) SKH-430
SKH-440
SKH-450

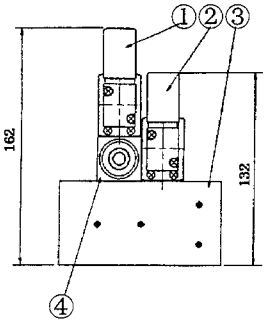




JIS SYMBOL (For SKH-430)

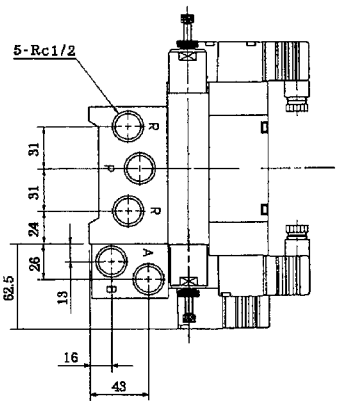


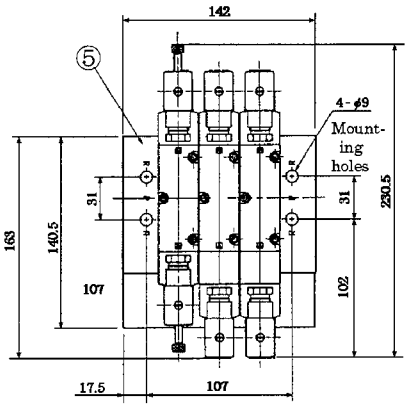
Solenoid valve ① is PAB port counection when SKH-450 is used.



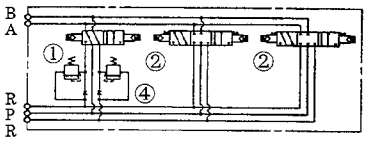
5	Sub-plate	A6063	1	
4	Spacer-relief valve		1	
3	Side-plate	A2017	1	
2	4KB439-00		1	Acceleration
1	4KB439-00 4KB449-00 4KB459-00		1	Deceleration
品番 NO	部 品 名 PARTS	材料 MATERIAL	数量 Q'TY	備 考 REMARK

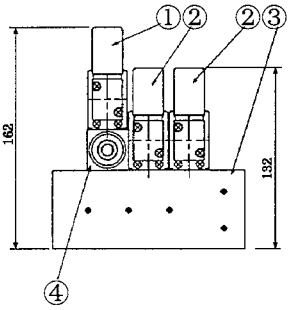
7) SKH-520





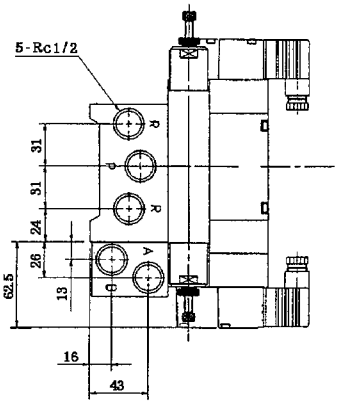
JIS SYMBOL

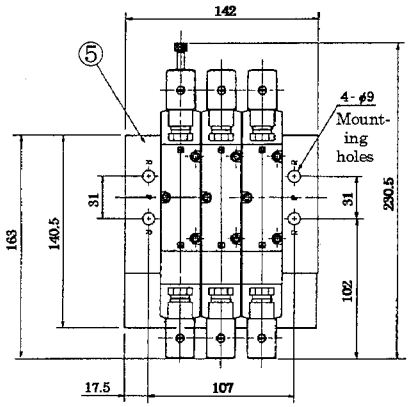




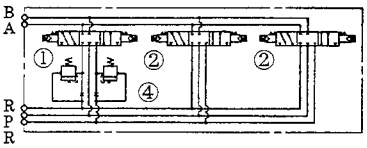
5	Sub-plate	A6063	1	
4	Spacer-relief valve		1	
3	Side-plate	A2017	1	
2	4KB439-00		2	Acceleration
1	4KB429-00		1	Deceleration
品番 NO	部 品 名 PARTS	材料 MATERIAL	数量 Q'TY	備 考 REMARK

8) SKH-530
SKH-550

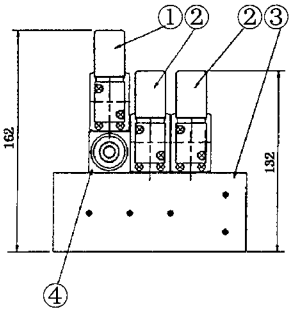




JIS SYMBOL (For SKH-530)



Solenoid valve ① is PAB port counection when SKH-550 is used.



5	Sub-plate	A6063	1	
4	Spacer-relief valve		1	
3	Side-plate	A2017	1	
2	4KB439-00		2	Acceleration
1	4KB439-00 4KB459-00		1	Deceleration
品番 NO	部 品 名 PARTS	材料 MATERIAL	数量 Q'TY	備 考 REMARK

2. CAUTIONS

2.1 Operational cautions

1) Environmental conditions

Instead of leaving water dripping over the solenoid, either provide a cover or install the solenoid within a panel box.

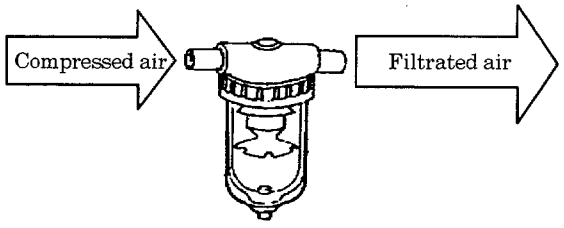
2) Installation auxiliary equipment

(1) Filter

Select a filter element of 5μm or smaller.

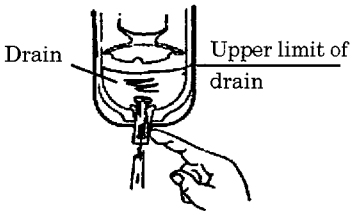
(2) Lubricator

Solenoid valves do not require lubrication.



3) Drain the sludge

Much sludge (such as condensed humidity, oxide oil, tarry material and foreign particles) apt to be contained within the compressed air which destructs the reliability of pneumatic equipment remarkably. Consider the following remedies of removing such sludge.



• Improving the quality of compressed air

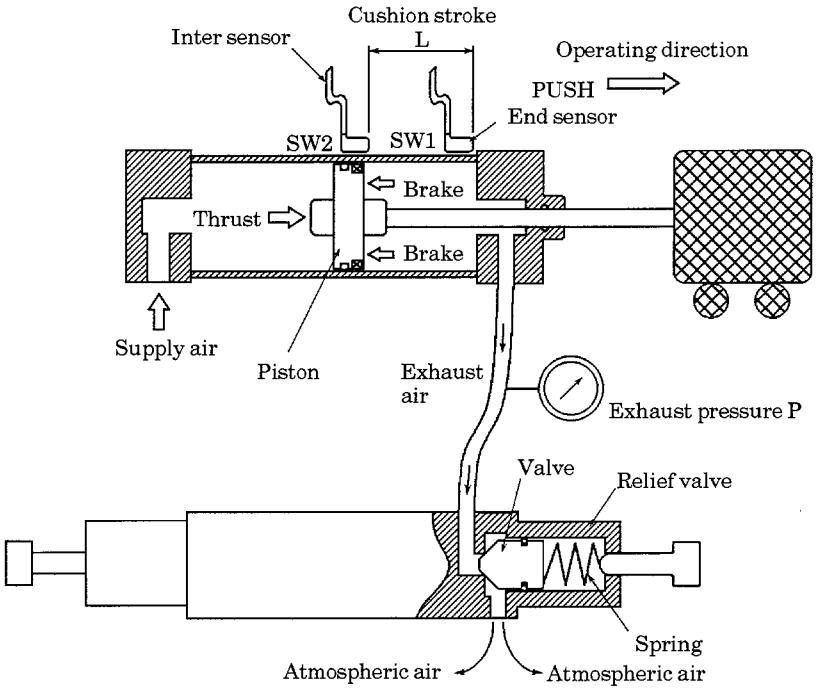
Dehumidifying by use of after-cooler dryer, removing foreign particles by use of air filter, removing tarry accumulation by use of tar removal filter, etc.

Requirement of air regulator

Cushioning of the speed varying unit (SKH) operates by utilizing exhaust pressure. Fluctuation of primary pressure results in changes of the cushioning characteristics.
Use of an air regulator to this unit is required to stabilize the primary pressure.

3. OPERATION

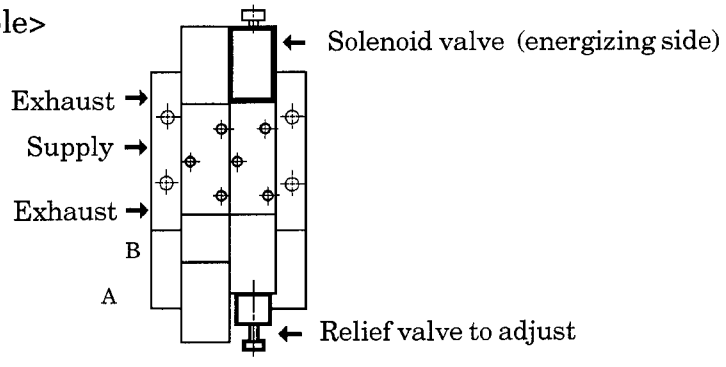
3.1 Operating principle



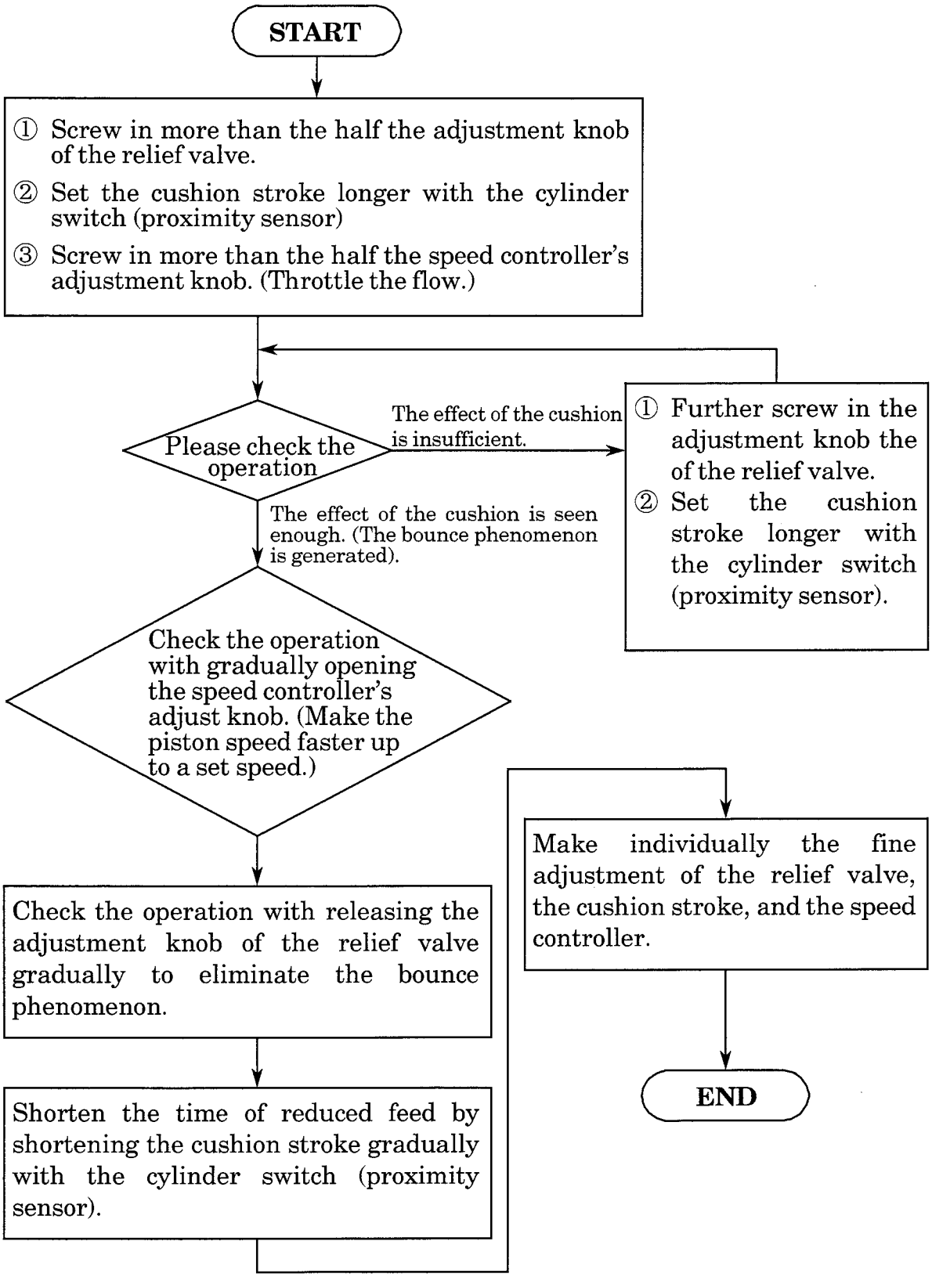
The exhaust pressure P can be adjusted by installing the relief valve on the exhaust side of the air cylinder. The exhaust pressure P enables the piston for soft by deing increased to the set pressure gradually with the spring of the relief valve, and works in the opposite direction as brake to the thruse

Cushioning effect is increased because the set pressure to Relief valve is raised as the knob is turned in. Make sure to use lock knob to lock set position upon completion of setting. Although there are two relief valves, it is solenoid valve on exhausting side which affects cushioning effect and alters situation with other valve on the energized side.

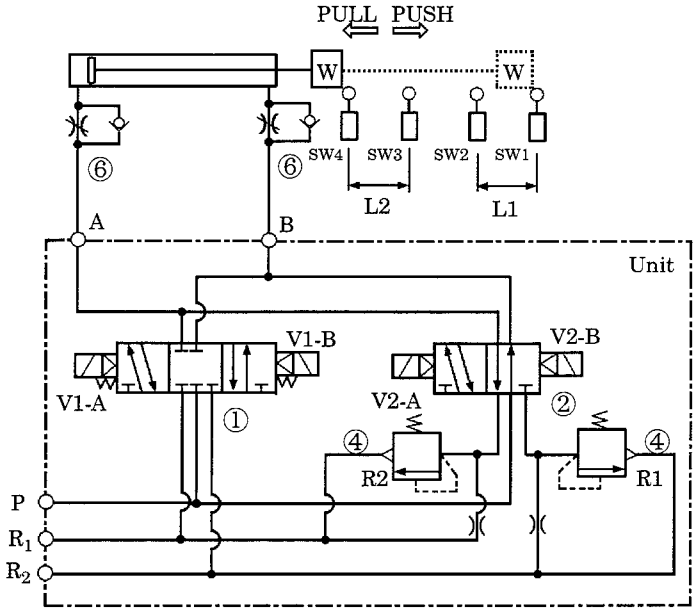
<Example>

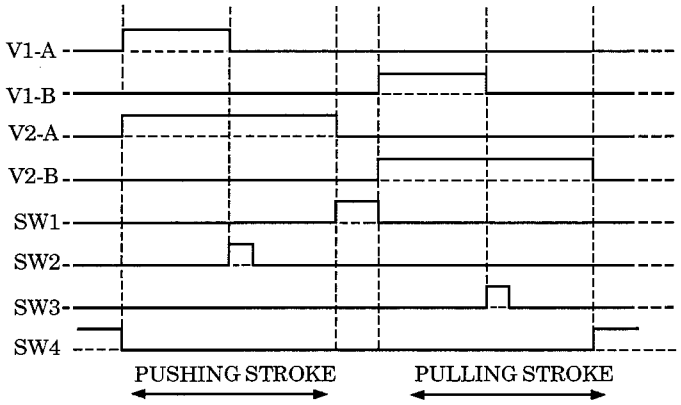


3.2 Initial adjustment



3.3 Time chart





3.4 Cushion Stroke

Guide line of mounting positions of proximity switches (SW2 & SW3)
(Air cylinder of ID 80mm with horizontal stroke guide)

Weight of load	PUSH Stroke (L1)	PULL Stroke (L2)
40kgf	40~50cm	35~45cm
80kgf	45~55cm	45~55cm
120kgf	55~65cm	50~60cm
160kgf	60~60cm	50~60cm

(Those rae the data at the Max. speed, 1250mm/sec)

3.5 Caution for Adjustment

Regarding with Cushion time

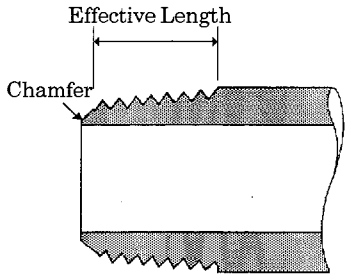
Cushion time is sometimes stretches during the course of adjustment. It is because of either tentative stopping near by the stroke end or piston is shortly pushed back due to bouncing phenomena. Adjustment of Tact time as well as that of Cushion time should be accomplished gradually.

4. INSTALLATION

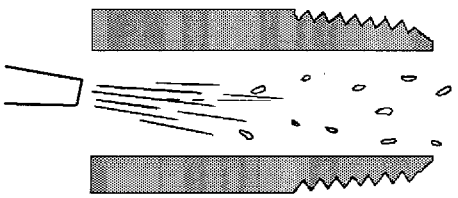
4.1 Piping

1) For piping beyond the filter, use pipes that hardly get corroded such as galvanized pipes, nylon tubes, rubber tubes, etc.

2) Strictly observe the effective thread length of gas pipe and give a chamfer of approx. 1/2 pitch from the threaded end.

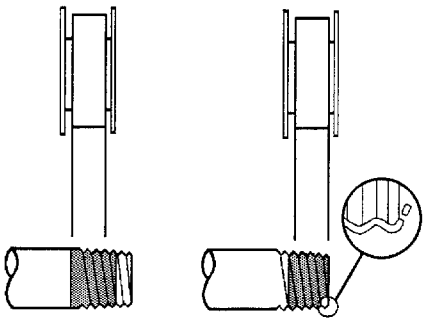


3) Flush air into the pipe to blow out foreign substances and chips before piping.

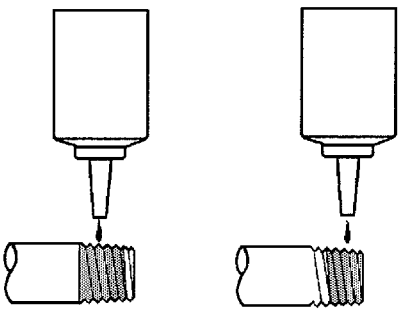


4) Refrain applying sealant or sealing tape approx. two pitches of thread off the tip of pipe to avoid residual substances from falling into piping system.

●Seal Tape



●Sealant (Paste or liquid)



5) There is no restriction of mounting posture of Solenoid valves. It is recommended, however, to mount it on a flat surface or horizontal mounting. Avoid using it within the area of more than 5G vibration or of more than 30G shock.

4.2 Electric wiring

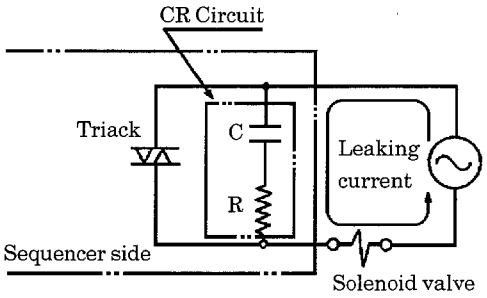
1) Cautions of wiring
   (1) Install a 0.5 ~1A fuse in the circuit to provide a protection.
   (2) It is recommended the use of snap action switch(es) such as relay or magnetic switch to build a circuit.
   (3) Use connector type (C, C1, C2 & C3) in the area with least amount of dust and where no splashing water or oil takes place.
   (4) Maintain voltage within the variation of± 10% of the rated voltage.
2) Limitation of leaking current

   Be extremely careful that it apt to give some undesirable effect to the function of product due to the leaking current through the CR element, when attempting to make use of the sequencer which has built-in CR circuit for absorbing surge voltage from the switching element.

   Regulate the residual leaking current within the limitations as shown in the following table.

Unit : mA

	WO/Surge killer	W/ Surge killer
AC 200V	1.5	3
AC 100V	3	6
DC 24V	1.8	3

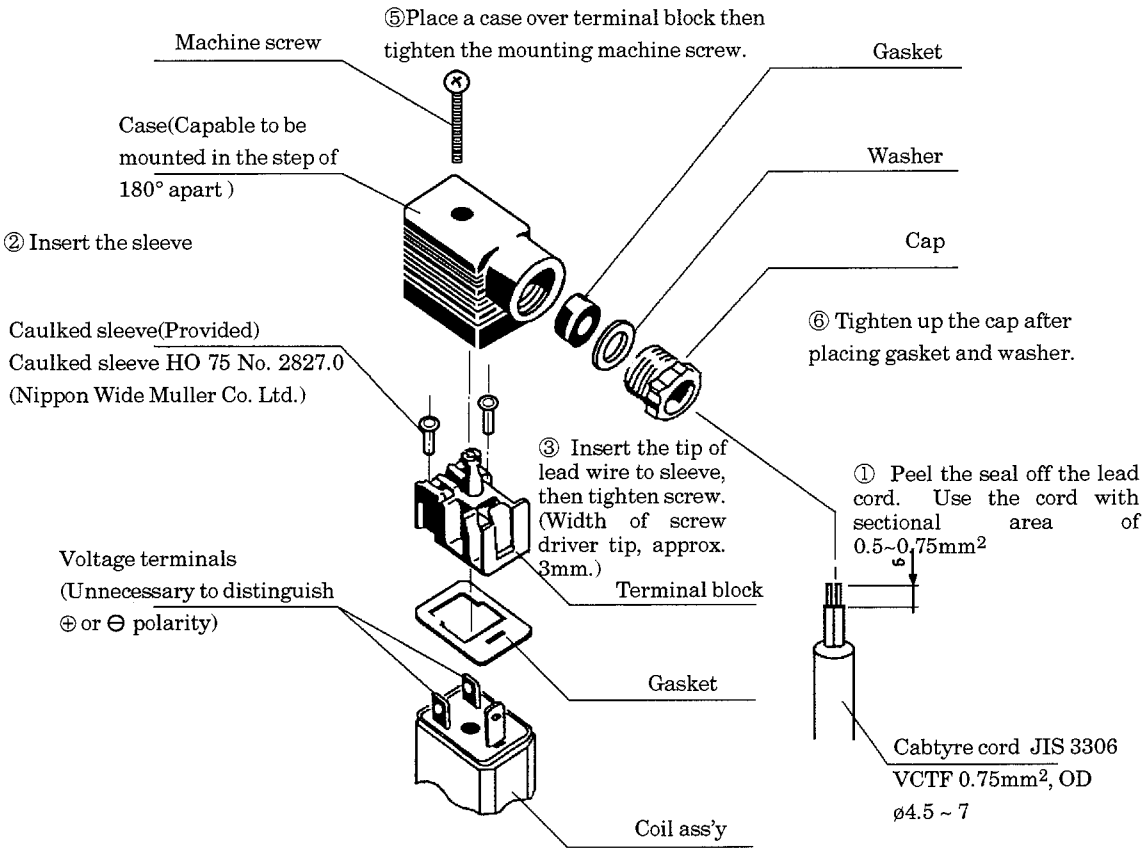


4.3 Wire connection

1) Connect the wire to 1 & 2 for wiring to the terminals. Use the wire with sectional area of 0.5 ~0.75mm^2. (Use a cabtyre cord where dust proof or water proof measure is required.)
2) Use caulked sleeve at the tip of wire to prevent insufficient contact or slipping off. (Spec. for caulked sleeve = H0 75 No. 2827.0, Nippon Wide Muller Co. Ltd.)
3) Insert the tip of wire (approx. 6 mm) to cramped sleeve and tighten the mounting screw. (Width of screw driver tip, approx. 3 mm)

Wiring to the small terminal box

Wire the small terminal box Ⓑ in the sequence of ① ~ ⑥ referring to the following illustration.



④ Place gasket and terminal block over the coil ass'y.

- Use caulked sleeve at the tip of wire to prevent insufficient contact or slipping off.
- Direction of cord output is reversible when pulling the terminal block out and push it back to the case after turning the block 180°

5. MAINTENANCE

5.1 Trouble Shooting (Solenoide Valve)

Motion troubles	Suspected cause	Remedies
Does not actuate	No electric signals	Turn on the power
	Damage to signal wiring system	Repair the control circuit
	Excessive fluctuating range of current or voltage	Reaffirm the power capacity. (within ±10% of air pressure fluctuation)
Malfunctions	Excessive leaking current	Correct control circuit and/or set a bleed circuit
	Chattering	Inspect switching system and/or tighten each loosen terminal screw
	Voltage deviates than specified on the name plate	Rectify the voltage to meet the specification
	Damaged or short circuited coil	Replace the coil
	Erroneous shut off pressure source	Turn on the power source
	Insufficient pressure	Reset the pressure reducer valve or install a pressure raising valve
	Insufficient flow of fluid	Rectify the size of pipe or install a surge tank
	Pressure supplied through exhaust port	Change the piping to an external pilot system
	Erroneous piping, erroneous omitting some piping	Rectify the piping system
	Speed control valve completely closed by error	Reset the needle valve
	A port or B port is directly released to an open air	Install pipe joints to A and B ports with diameter equal to or smaller than that of to P port joint or change the piping to an external pilot system
	Valve is frozen	Add remedies of avoiding freezing (Heating system or dehumidifying system etc.)
	Delayed return of a plunger (Excessive oil, existence of tar)	Check the quality of the lubricant. (Turbine oil class 1, ISO VG 32 or equivalent)
	〃	Rectify the quantity of lubricant drip
	〃	Install a tar removing filter
	Clogged-up exhausting port with dust	Install a cover or silencer and clean it regularly
High actuating pressure is required	Bulged or decomposed packings	Check the quality of the lubricant. (Turbine oil class 1, ISO VG 32 or equivalent)
	〃	Relocate the valves away from splashing area of cutting coolant
	〃	Keep organic chemicals away from valves.
	Release of A and/or B port to an open air directly	Install pipe joints to A and B ports with diameter equal to or smaller than that of to P port joint or rectify the piping to an external pilot system. Change the piping to an external pilot system. Grease it up
	Foreign particles cut into packing lips	Remove the foreign particle away from the packing

5.2 Replacvement of Component parts

<Parts List>

★ In case that Exhaust disposition classification is Non-marking

	Solenoid valve ① for acceleration	Solenoid valve ② for deceleration	Relief Valve ④
SKH-420 SKH-520 type	4KB439-00-LS-Voltage	4KB429-00-LS-Voltage	SKH-4-SR
SKH-430 SKH-530 type	4KB439-00-LS-Voltage	4KB439-00-LS-Voltage	SKH-4-SR
SKH-440 type	4KB439-00-LS-Voltage	4KB449-00-LS-Voltage	SKH-4-SR
SKH-450 SKH-550 type	4KB439-00-LS-Voltage	4KB459-00-LS-Voltage	SKH-4-SR

	Solenoid valve ① for acceleration	Solenoid valve ② for deceleration	Relief Valve ④
SKH-320 type	4KB339-00-LS-Voltage	4KB329-00-LS-Voltage	SKH-3-SR
SKH-330 type	4KB339-00-LS-Voltage	4KB339-00-LS-Voltage	SKH-3-SR
SKH-340 type	4KB339-00-LS-Voltage	4KB349-00-LS-Voltage	SKH-3-SR
SKH-350 type	4KB339-00-LS-Voltage	4KB359-00-LS-Voltage	SKH-3-SR

★ In case that Option classification is "P6"
(Copper ionizing preventive treatment added)

	Solenoid valve ① for acceleration	Solenoid valve ② for deceleration	Relief Valve ④
SKH-420 SKH-520 type	4KB439-00-LS-Voltage-P6	4KB429-00-LS-Voltage-P6	SKH-4-SR
SKH-430 SKH-530 type	4KB439-00-LS-Voltage-P6	4KB439-00-LS-Voltage-P6	SKH-4-SR
SKH-440 type	4KB439-00-LS-Voltage-P6	4KB449-00-LS-Voltage-P6	SKH-4-SR
SKH-450 SKH-550 type	4KB439-00-LS-Voltage	4KB459-00-LS-Voltage-P6	SKH-4-SR

	Solenoid valve ① for acceleration	Solenoid valve ② for deceleration	Relief Valve ④
SKH-320 type	4KB339-00-LS-Voltage-P6	4KB329-00-LS-Voltage-P6	SKH-3-SR
SKH-330 type	4KB339-00-LS-Voltage-P6	4KB339-00-LS-Voltage-P6	SKH-3-SR
SKH-340 type	4KB339-00-LS-Voltage-P6	4KB349-00-LS-Voltage-P6	SKH-3-SR
SKH-350 type	4KB339-00-LS-Voltage	4KB359-00-LS-Voltage-P6	SKH-3-SR

<Caution when ordering the solenoid valve>

When the working voltage of the solenoid valve is alternate current (AC100V, AC200V, AC110V, AC220V), special processing is employed for the perfomance improvement.

That is, AC voltage is changed to the DC voltage in the terminal box attached on the solenoid valve, and charged to the coil. For this reason, DC is indicated on the coil for the rated voltage. Accordingly, AC used must be charged through the terminal box to the coil, and must not be charged directly to the coil.

(The coil of DC88V is used for AC100V.
  The coil of DC176V is used for AC200V.)

<Replacement of parts>

Solenoid valve ①&②	:	Replace it after removing sub-plate. (Matter of removing 3 socket head bolts.)
Relief valve ④	:	Replace entire assembly. (Matter of removing 3 socket head bolts for solenoide valve②.)

<Cautions after replacing parts>

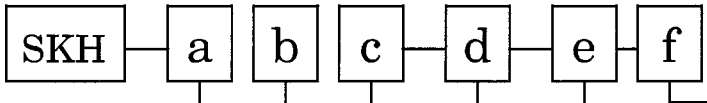
Carefully avoid confounding installation of solenoid ① type and solenoid ② type. Facing gasket is also important. (Speed reduction solenoid is to be relief valve side.)

There is, of course, affected variation to cushion effect, when Relief valve ④ is replaced,

Squeeze throttling of Relief valve ④ beforehand and gradually open it to start cylinder smoothly.

In case air cylinder is also given maintenance work, provide initial adjustment all over again.

6. MODEL CODING



a. Effective sectional area		b. Classification of shifting position		c. Operator type	
3	25mm²	2	2-position, double	0	Solenoid valve
4	45mm²	3	3-position, All port block	1	Master valve
5	80mm²	4	3-position ABR	8	Solenoid valve ※1
		5	3-position, PAB Connection	9	Master valve ※1

※1 Only cushion unit.
(Main solenoid valve is nothing)

d. Piping size		e. Voltage			f. Exhaust air disposition classification	
10	R_C3/8	1	AC100V 50/60HZ	standard	No symbol	Standard
15	R_C1/2	2	AC200V 50/60HZ		P6	Copper ionization preventive treatment added
		3	DC24V			
		4	AC110V 50HZ	Option		
		5	AC220V 50HZ			
		6	DC12V			