CKD

SM-220283-A

INSTRUCTION MANUAL

PICOSOL

4SA1, 4SB1, M4SA1, M4SB1

- 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

For Safety Use

To use this product safely, basic knowledge of pneumatic equipment, including materials, piping, electrical system and mechanism, is required (to the level pursuant to JIS B 8370 Pneumatic System Rules).

We do not bear any responsibility for accidents caused by any person without such knowledge or arising from improper operation.

Our customers use this product for a very wide range of applications, and we cannot keep track of all of them. Depending on operating conditions, the product may fail to operate to maximum performance, or cause an accident. Thus, before placing an order, examine whether the product meets your application, requirements, and how to use it.

This product incorporates many functions and mechanisms to ensure safety. However, improper operation could result in an accident. To prevent such accidents, read this instruction manual carefully for proper operation.

Observe the cautions on handling described in this manual, as well as the following instructions:

⚠ Precautions

- Do not touch electric wiring connections (exposed live parts) : this will cause an electric shock. During wiring, keep the power off. Also, do not touch these live parts with wet hands.

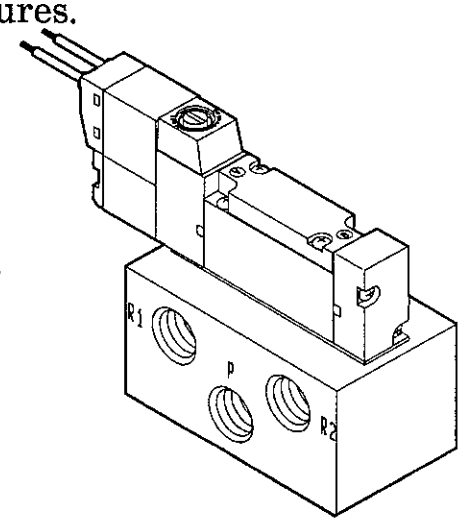
INDEX

4SA1, 4SB1, M4SA1, M4SB1
Picosol
Manual No. SM-220283-A

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.

1. PRODUCTS

1.1 General description and special features.



1) Compact, width 10mm
   It is able to build the total system smaller as this valve is designed compactly.
2) Effective sectional area 4.5mm^2 (Cv flow factor 0.1)
   It is the most suitable to drive cylinder of bore up to ϕ40.
3) Low wattage design (0.6W) 0.029A (with lamp) at DC24V. It is capable to be connected directly to electronics controls.
4) Broad varieties of connecting cable.
   It allows to make a choice of lead cord, series of A type connecters, C type connecters or D type connecters and also combination with lamp and surge killer.

1.2 Specifications

1) Common Specifications

(1) Fluid specifications

Item	Specification
Media	Pneumatic pressure
Actuation type	Pilot (Soft spool)
Withstanding pressure MPa	1.05
Ambient temperature °C	5~50 (Not to be frozen)
Service fluid temperature °C	5 to 50
Lubrication	Not required (Use Turbine oil, Class 1, ISO VG32 if lubrication is preferred.)
Protective Structure	Dust prevention
Manual operation device	Non lock type (Standard), Lock type (Optional)

(2) Electrical specification

Item	Specification	
Rated voltage V	DC24V	DC12V
Holding current A (Include Lamp & Surge killer)	0.025 (0.029)	0.050 (0.058)
Power consumption W (Include Lamp & Surge killer)	0.6 (0.7)	
Temperature raise °C	50	
Range of voltage fluctuation	±10%	
Insulation class	Class B	
Wire connecting style	Grommet lead wire, A type connecter, C type connecter and D type connecter	
Option	w/surge killer, w/lamp indicator (However manifold type with fewer wiring means includes Surge killer and Lamp indicator as standard)	

2) Model code and specifications

(1) 4SA1 series

No. of position and No. of solenoid	Model code	Connecting port dia.	Effective sectional area mm^2	Working fluid pressure MPa	Response time ms	Mass g
2-position · Single	4SA110	A · B port : ϕ4, ϕ6 Push-in joint R · R_1 · R_2 port : M5	3.5	0.2 to 0.7	20 or less	48
2-position · Double	4SA120					60
3-position · All ports block	4SA130		3.0		30 or less	62
3-position· ABR connection	4SA140		3.5			
3-position· PAB connection	4SA150		3.0			
2-position · Single normal close	3SA110		3.5		20 or less	46
2-position · Single normal open	3SA1110					

(2) M4SA1 series

Model / Item		M4SA1
Type of Manifold		Single Block Manifold
Applicable Solenoid		4SA1 Series
Effective Sectional Area mm^2		M3SA1 4.5, M4SA110 · 120 4.5 M4SA130 3.5, M4SA140 4.5, M4SA150 3.5
No. of Blocks		2 blocks~24 blocks
Kind of Manifold		Concentrated Supply Air and Concentrated Exhaust
Connecting Style of Electric Cord		Individual wiring(Grommet Lead Cord·A type·C type or D type connectors) Reduced wiring(A type connector)
Plumbing	P port	Rc1/8
	A · B port	M5 ϕ4, ϕ6 push-in joint
	R port	Rc1/8
Manual Operation Device		Use this one as non-locked type and locked type

(3) 4SB1 series

No. of position and No. of solenoid	Model code	Connecting port dia.	Effective sectional area mm^2	Working fluid pressure MPa	Response time ms	Mass g
2-position · Single	4SB110	Rc1/8	4.5	0.2 to 0.7	20 or less	103
2-position · Double	4SB120					115
3-position · All ports block	4SB130		3.5		30 or less	117
3-position· ABR connection	4SB140		4.5			
3-position· PAB connection	4SB150		3.5			

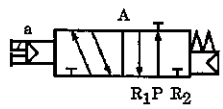
(4) M4SB1 series

Model / Item		M4SB1
Type of Manifold		Single Block Manifold
Applicable Solenoid		4SA1 Series
Effective Sectional Area mm^2		M4SB110・120 4.5, M4SB130 3.5, M4SB140 4.5, M4SB150 3.5
No. of Blocks		2 blocks~24 blocks
Kind of Manifold		Concentrated Supply Air and Concentrated Exhaust
Connecting Style of Electric Cord		Individual wiring(Grommet Lead Cord·A type·C type or D type connectors) Reduced wiring(A type connector)
Plumbing	P port	Rc1/8
	A・B port	M5 ϕ4, ϕ6 push-in joint
	R port	Rc1/8
Manual Operation Device		Use this one as non-locked type and locked type

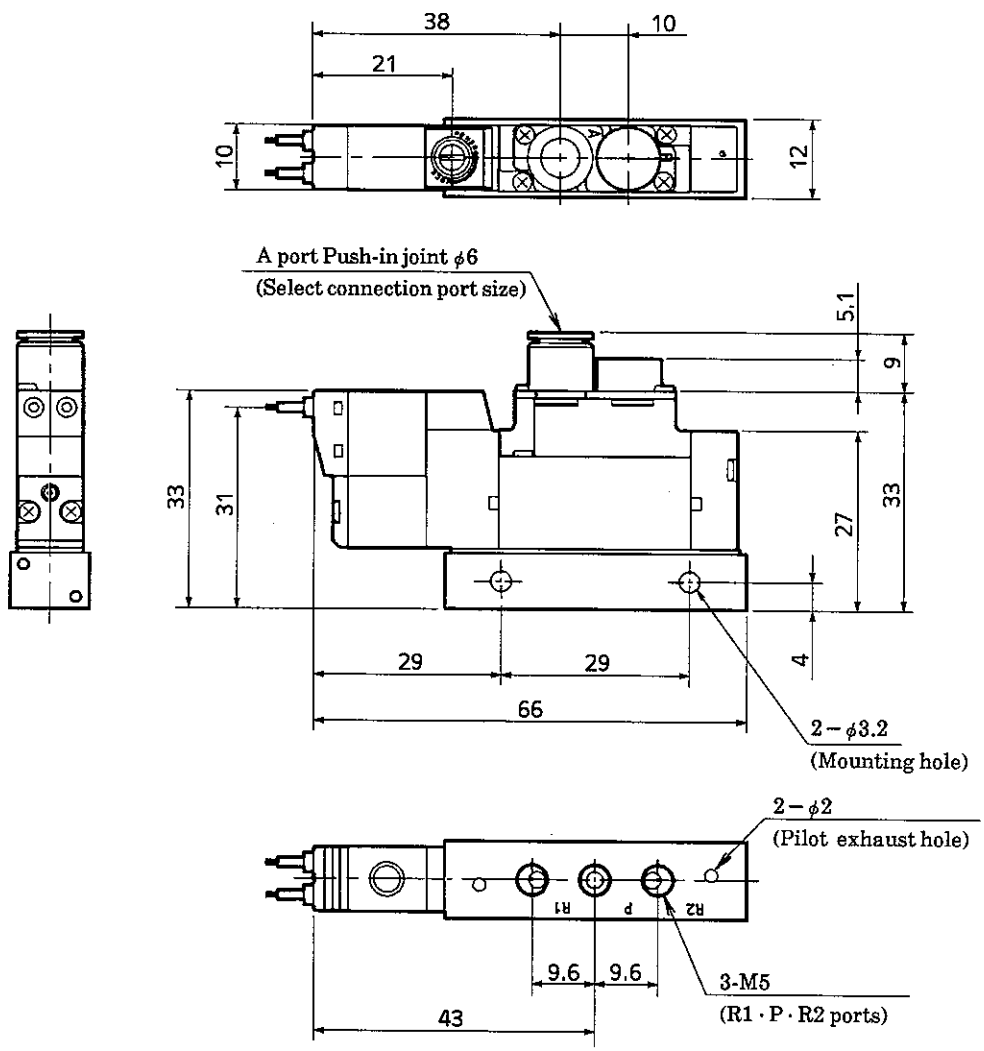
1.3 External dimensions

1) 3SA1 series

- 3SA110

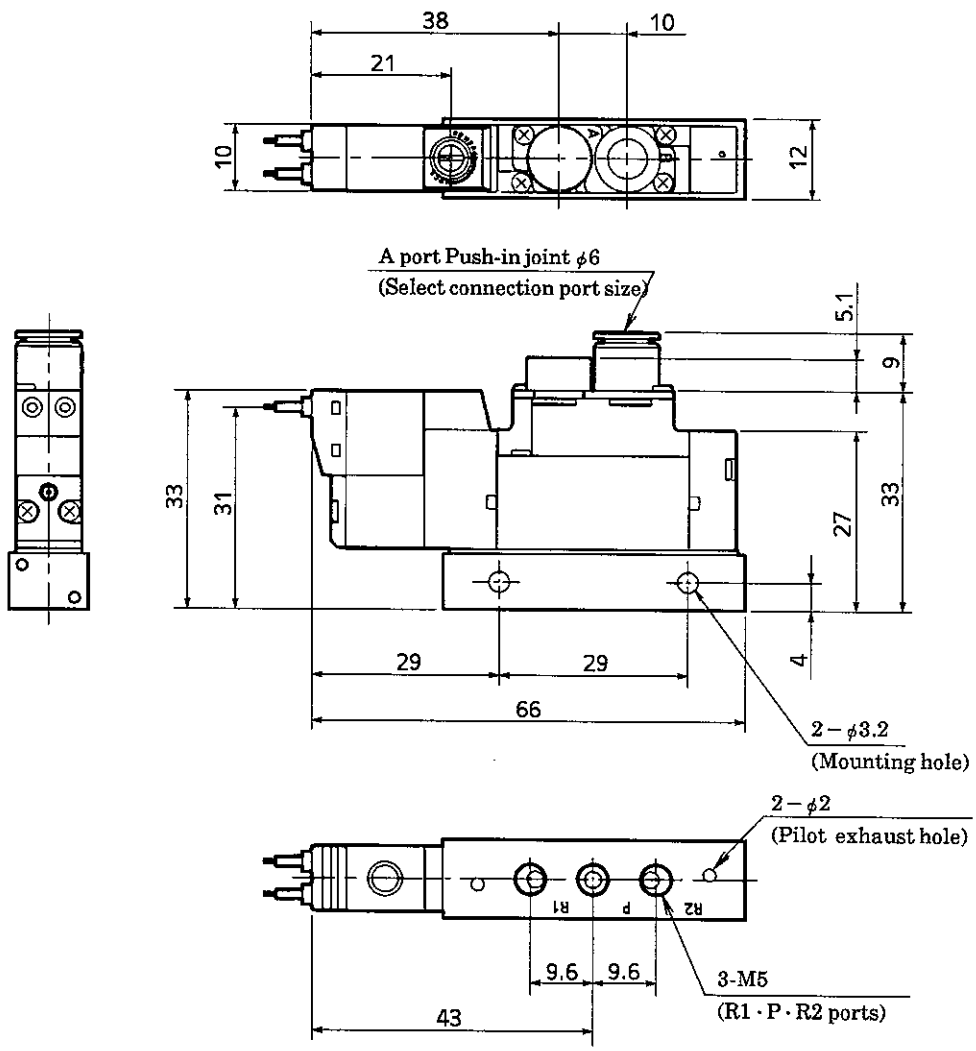


- 3SA110 Grommet lead wire



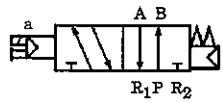
- 3SA1110

- 3SA1110 Grommet lead wire

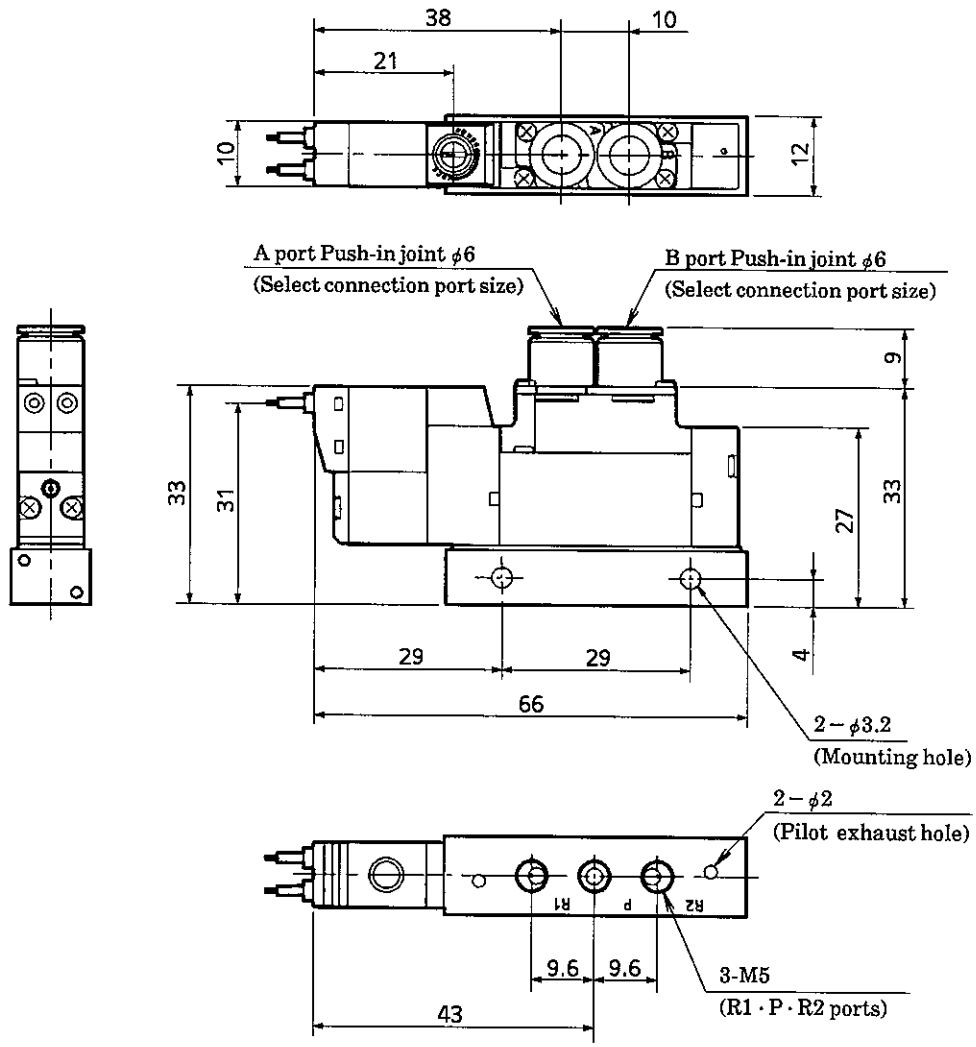


2) 4SA1 series

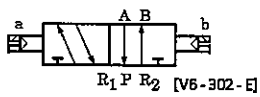
- 4SA110



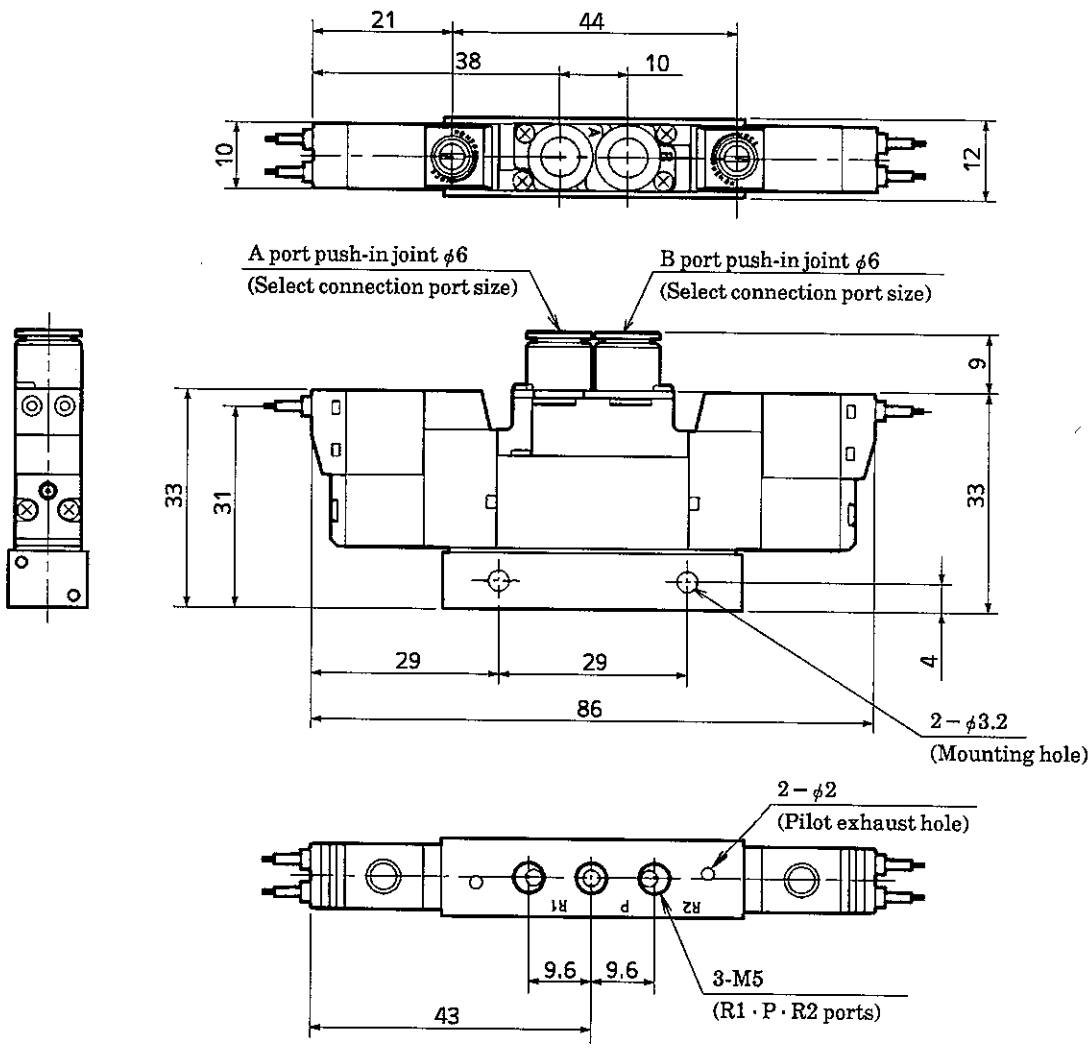
- 4SA110 Grommet lead wire



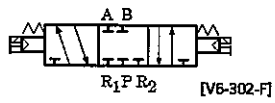
- 4SA120



- 4SA120 Grommet lead wire



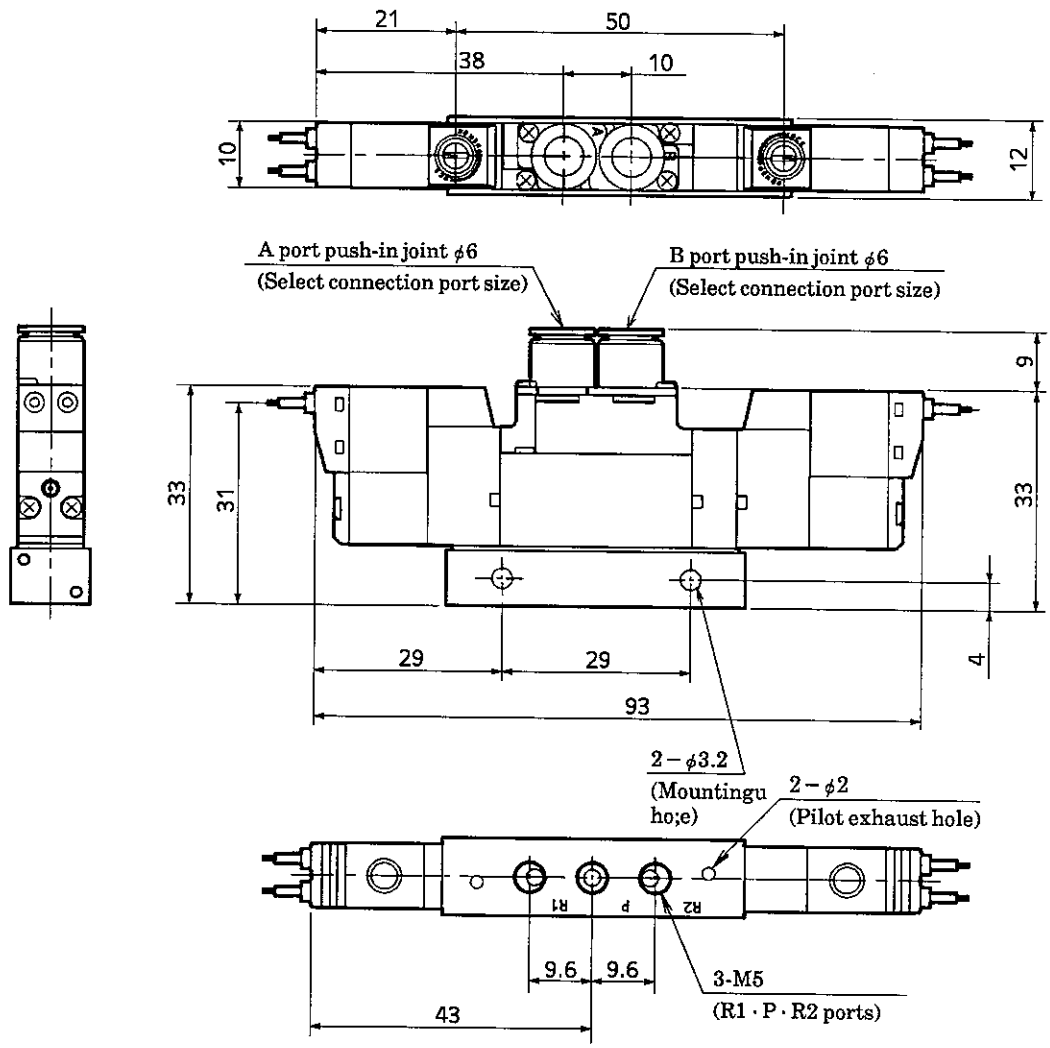
- 4SA130



- 4SA140

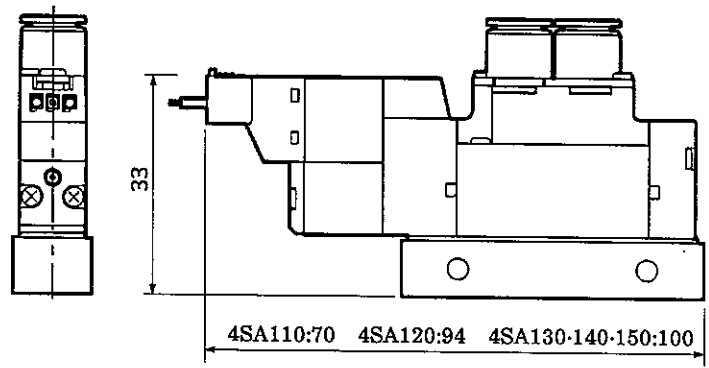
- 4SA150

- 4SA130, 140, 150 Grommet lead wire

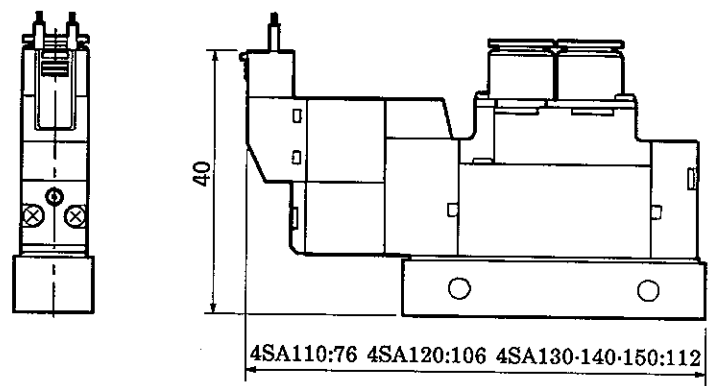


4SA1 series options

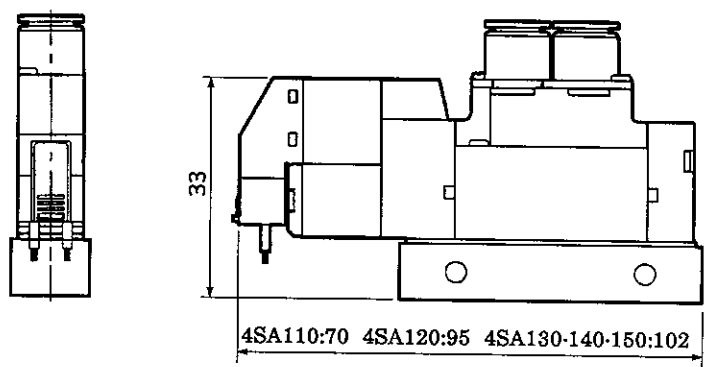
● 4SA1 1 2 3 4 5 — 0-C type connecter



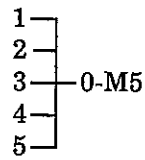
● 4SA1 1 2 3 4 5 — 0-D type connecter

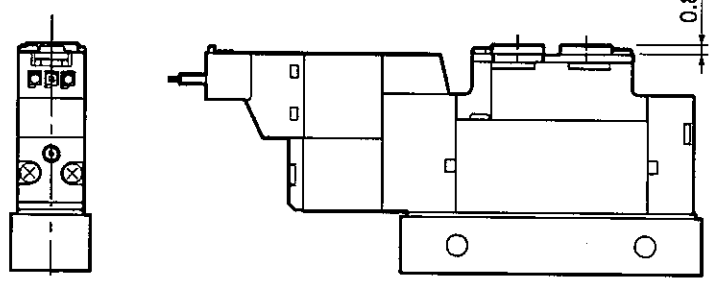


● 4SA1 1 2 3 4 5 — 0-A type connecter



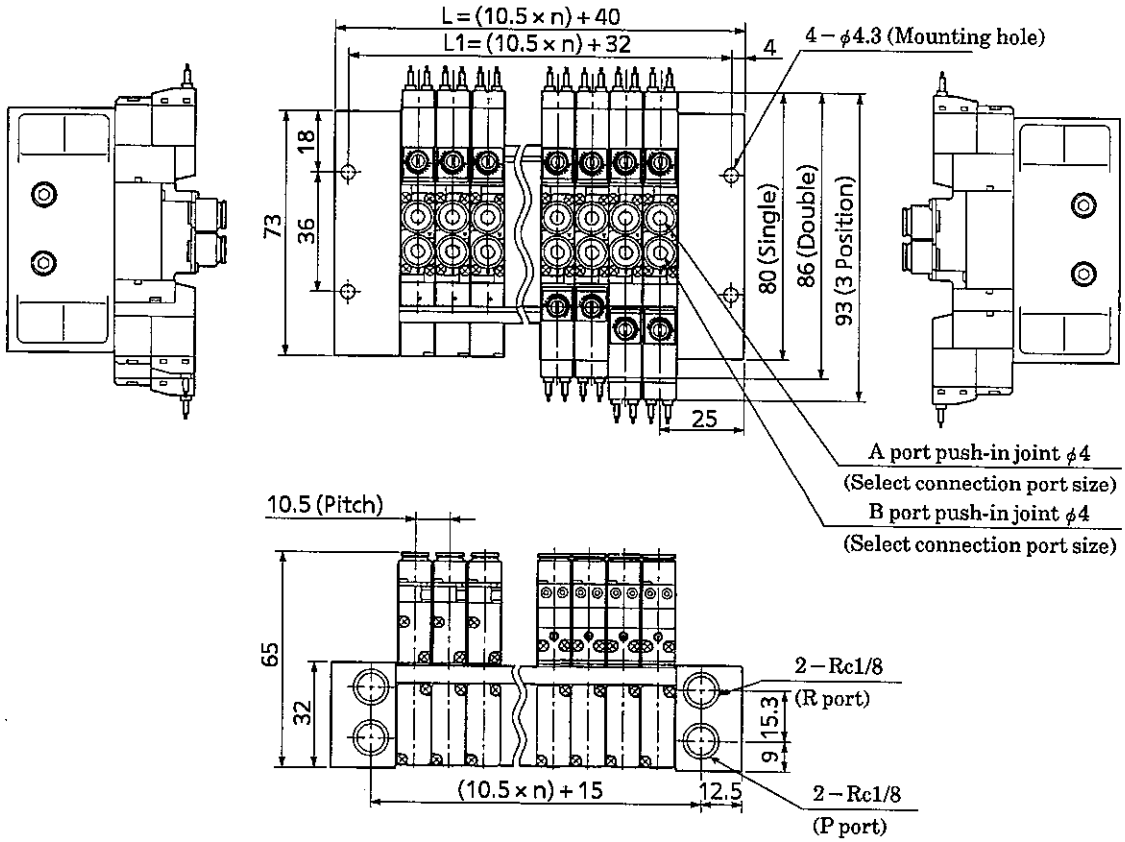
● 4SA1





3) M4SA1 Individual wiring series

- M4SA1※0 Grommet lead

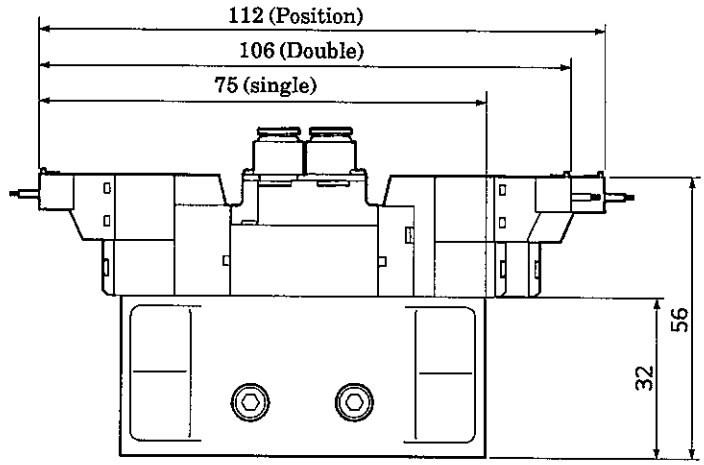


Symbol \ Block No.	2	3	4	5	6	7	8	9	10	11	12	13	14	15
L	61	71.5	82	92.5	103	113.5	124	134.5	145	155.5	166	176.5	187	197.5
L1	53	63.5	74	84.5	95	105.5	116	126.5	137	147.5	158	168.5	179	189.5

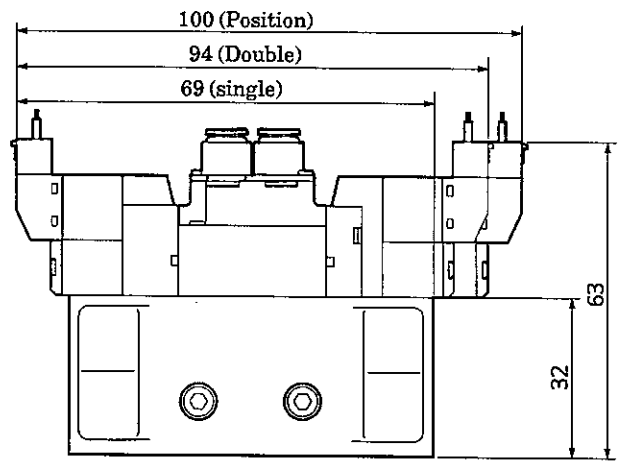
Symbol \ Block No.	16	17	18	19	20	21	22	23	24
L	208	218.5	229	239.5	250	260.5	271	281.5	292
L1	200	210.5	221	231.5	242	252.5	263	273.5	284

Options

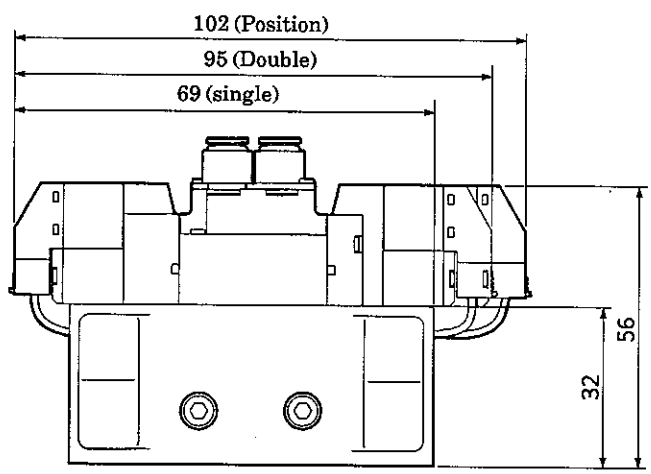
- M4SA1※0- C type connecter



- M4SA1※0- D type connecter

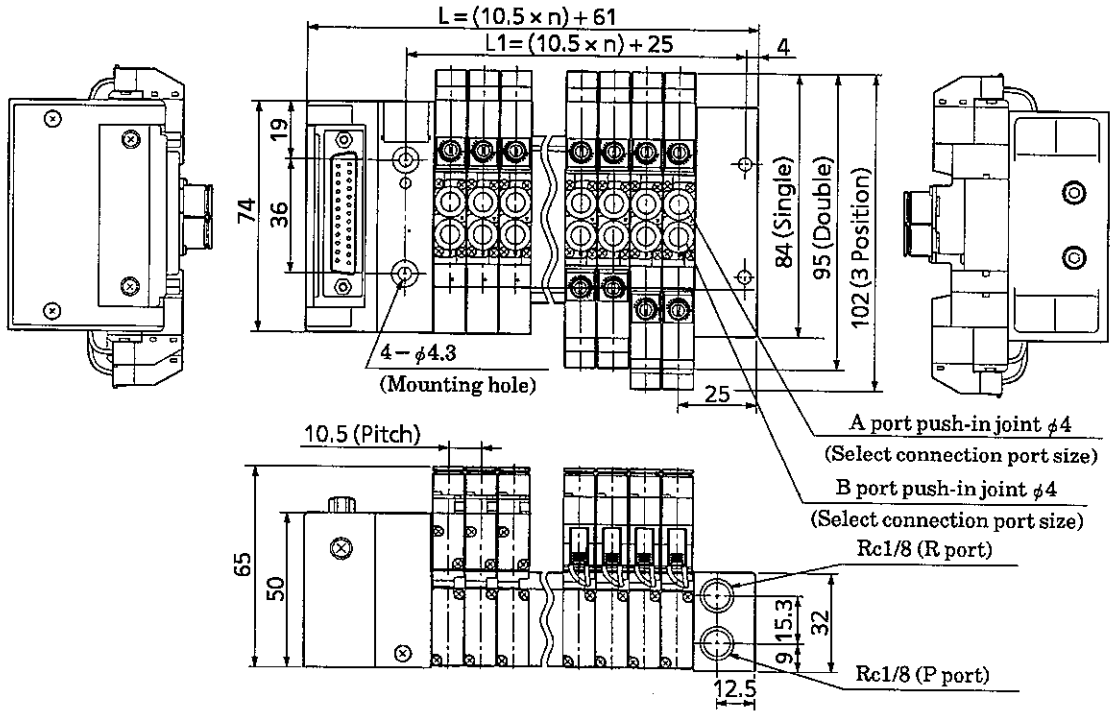


- M4SA1※0- A type connecter



4) M4SA1 Reduced wiring series

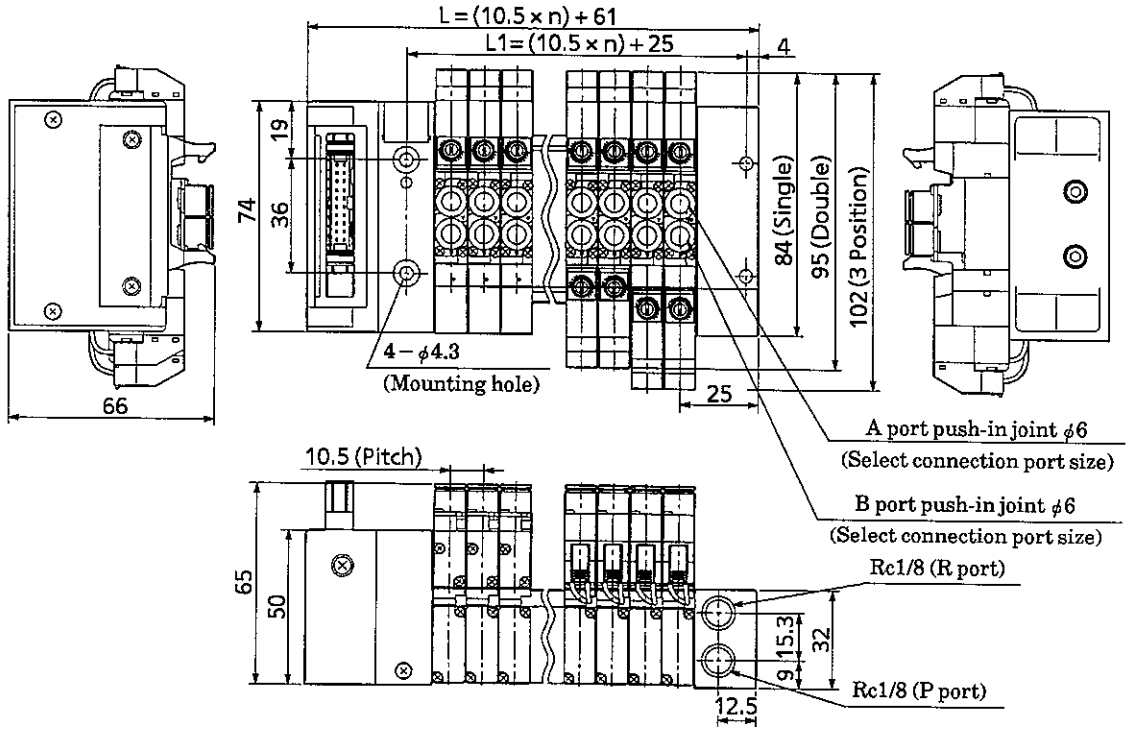
- M4SA1※0-D sub-connector T30



Symbol \ Block No.	2	3	4	5	6	7	8	9	10	11	12	13	14	15
L	82	92.5	103	113.5	124	134.5	145	155.5	166	176.5	187	197.5	208	218.5
L1	46	56.5	67	77.5	88	98.5	109	119.5	130	140.5	151	161.5	172	182.5

Symbol \ Block No.	16	17	18	19	20	21	22	23	24
L	229	239.5	250	260.5	271	281.5	292	302.5	313
L1	193	203.5	214	224.5	235	245.5	256	266.5	277

- M4SA1※0-Flat cable connector T50

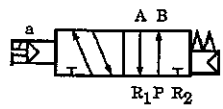


Symbol \ Block No.	2	3	4	5	6	7	8	9	10	11	12	13	14	15
L	82	92.5	103	113.5	124	134.5	145	155.5	166	176.5	187	197.5	208	218.5
L1	46	56.5	67	77.5	88	98.5	109	119.5	130	140.5	151	161.5	172	182.5

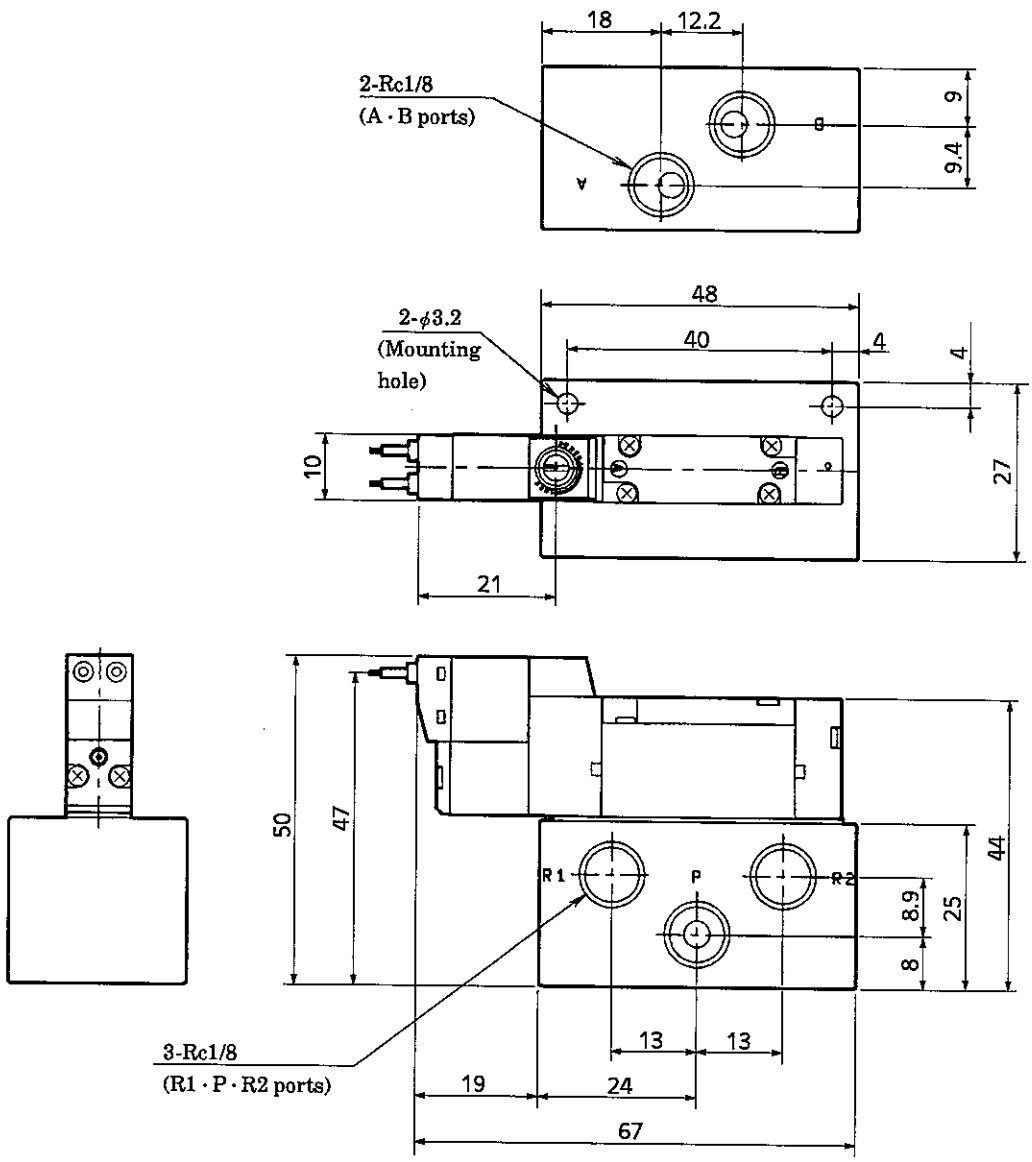
Symbol \ Block No.	16	17	18	19	20	21	22	23	24
L	229	239.5	250	260.5	271	281.5	292	302.5	313
L1	193	203.5	214	224.5	235	245.5	256	266.5	277

5) 4SB1 series

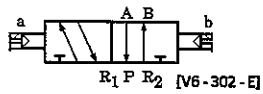
- 4SB110



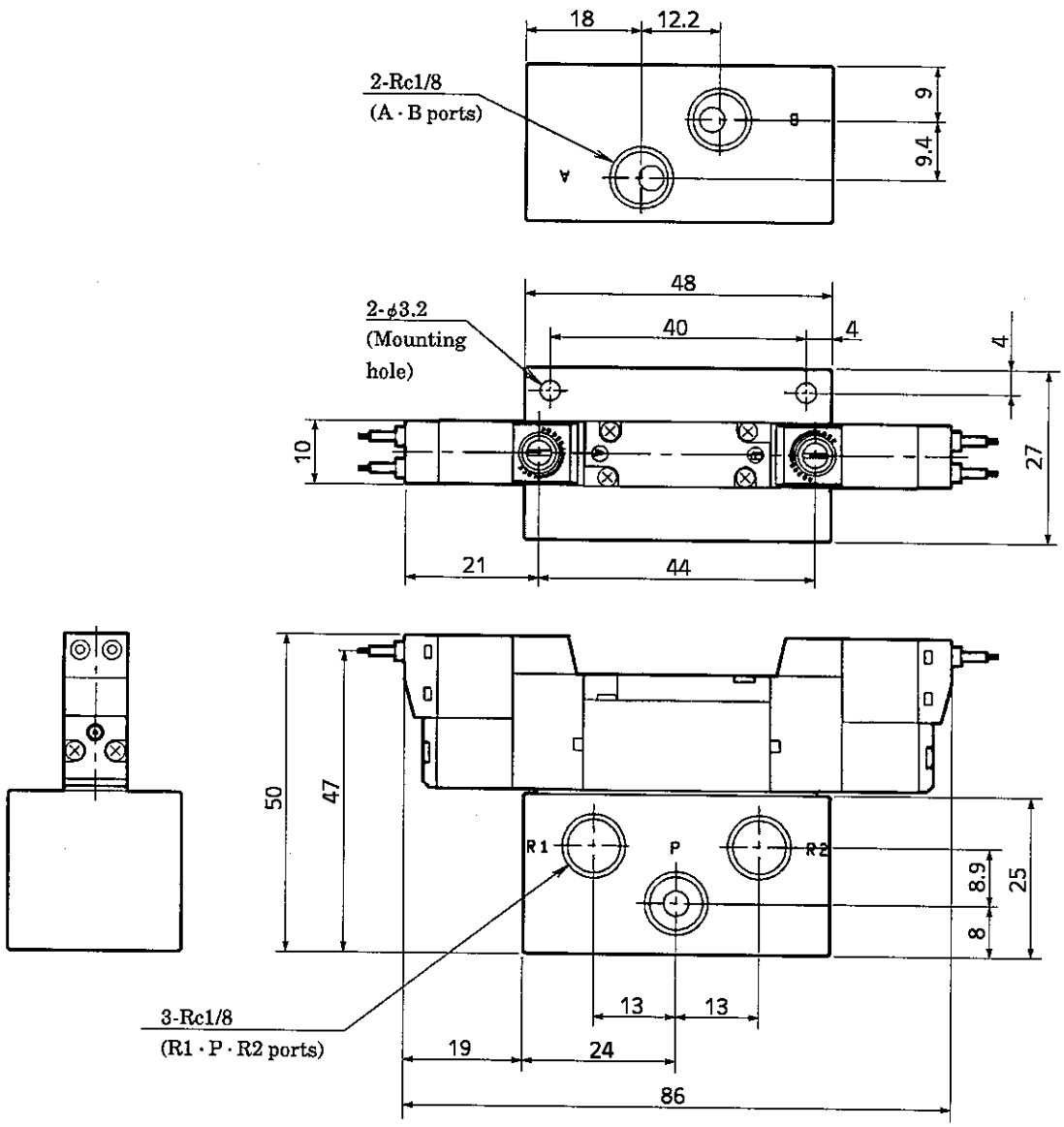
- 4SB110 Grommet lead wire



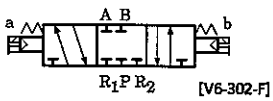
- 4SB120



- 4SB120 Grommet lead wire

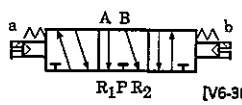


● 4SB130



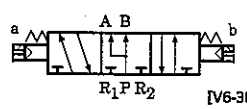
[V6-302-F]

● 4SB140



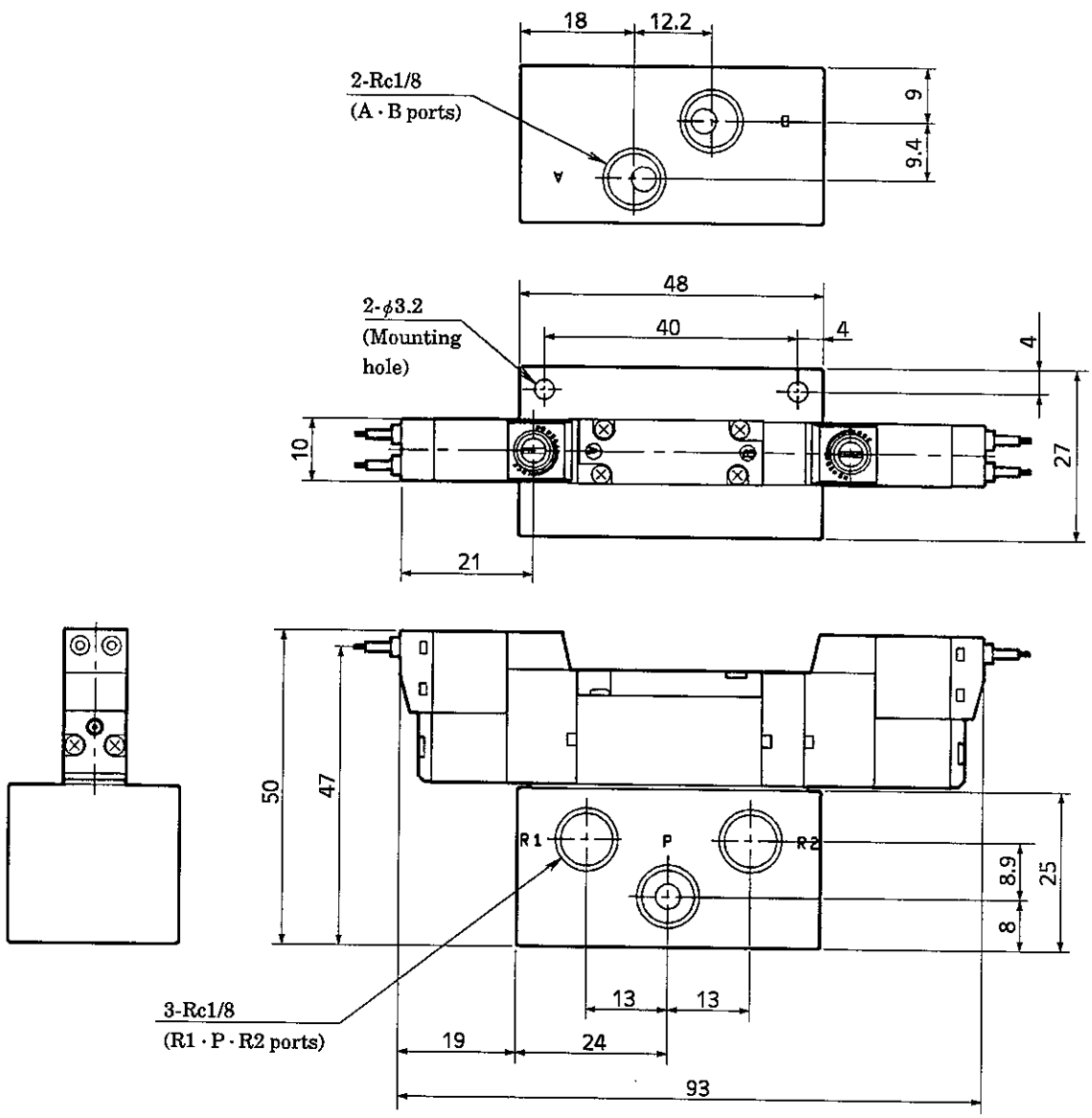
[V6-302-G]

● 4SB150



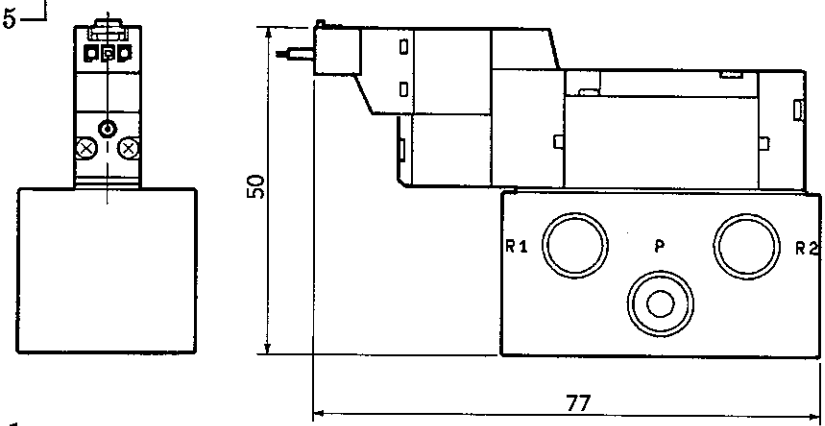
[V6-302-H]

● 4SB130, 140, 150 Grommet lead wire

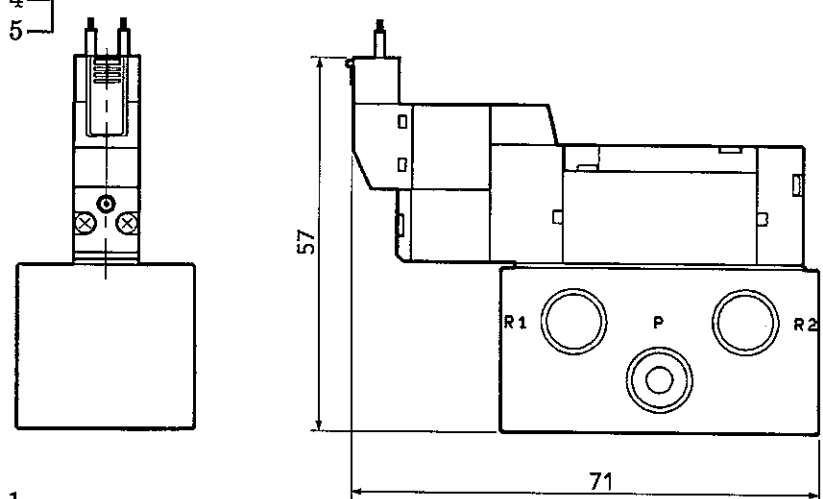


6) 4SB1 series options

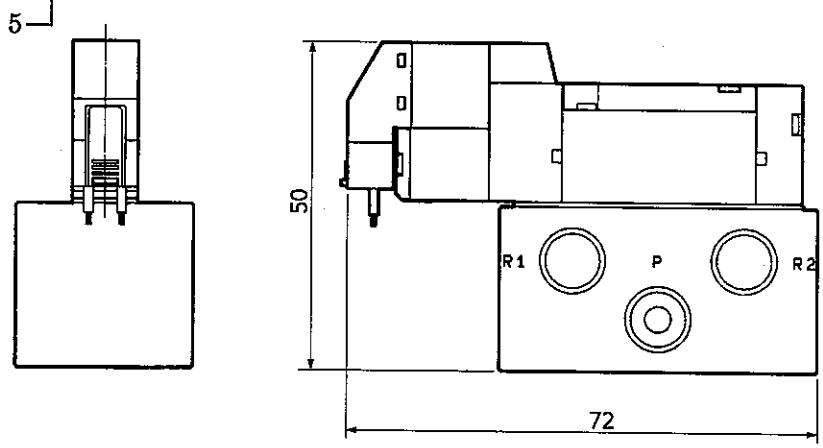
- 4SB1 1 2 3 4 5 — 0- C type connecter



- 4SB1 1 2 3 4 5 — 0- D type connecter

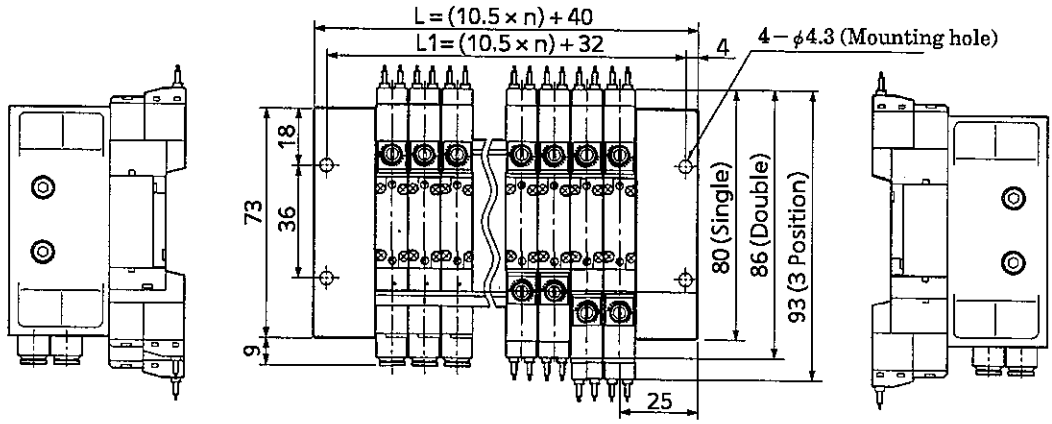


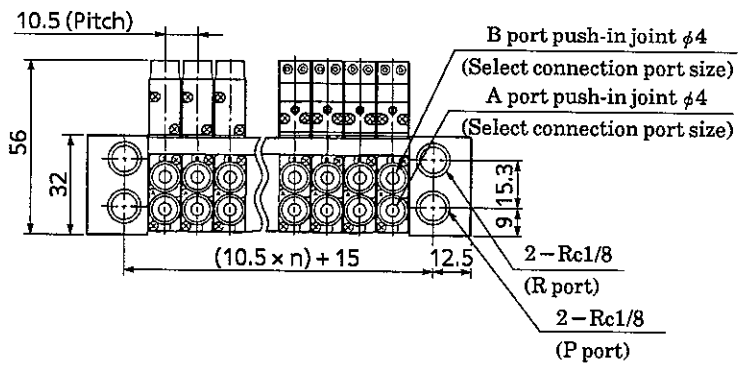
- 4SB1 1 2 3 4 5 — 0- A type connecter



7) M4SB1 Individual wiring series

- M4SB1※0- Grommet lead wire



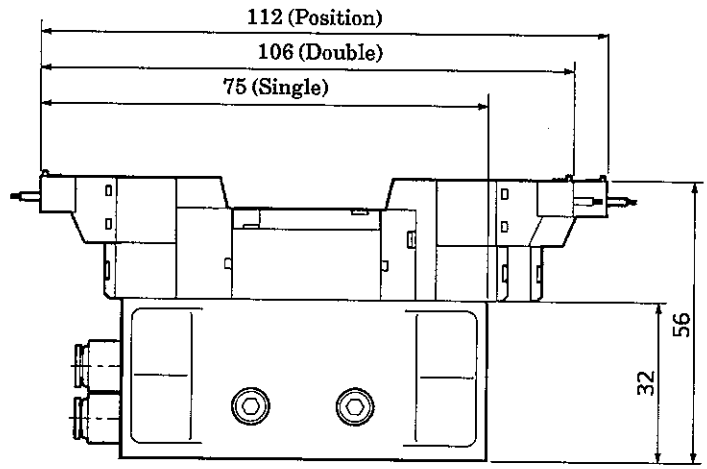


Symbol \ Block No.	2	3	4	5	6	7	8	9	10	11	12	13	14	15
L	61	71.5	82	92.5	103	113.5	124	134.5	145	155.5	166	176.5	187	197.5
L1	53	63.5	74	84.5	95	105.5	116	126.5	137	147.5	158	168.5	179	189.5

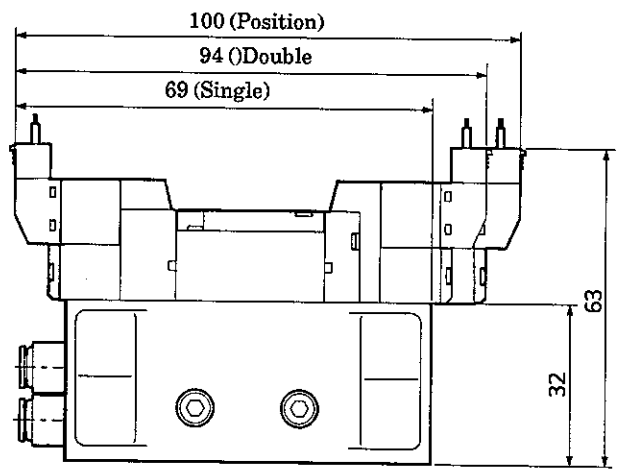
Symbol \ Block No.	16	17	18	19	20	21	22	23	24
L	208	218.5	229	239.5	250	260.5	271	281.5	292
L1	200	210.5	221	231.5	242	252.5	263	273.5	284

Options

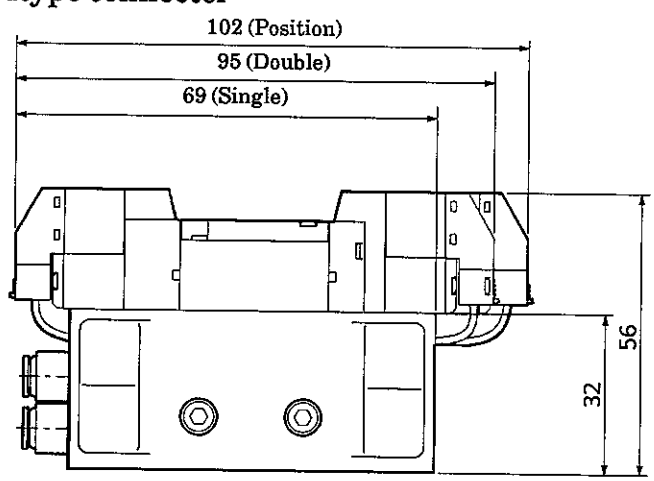
- M4SB1※0- Ctype connecter



- M4SB1※0- Dtype connecter

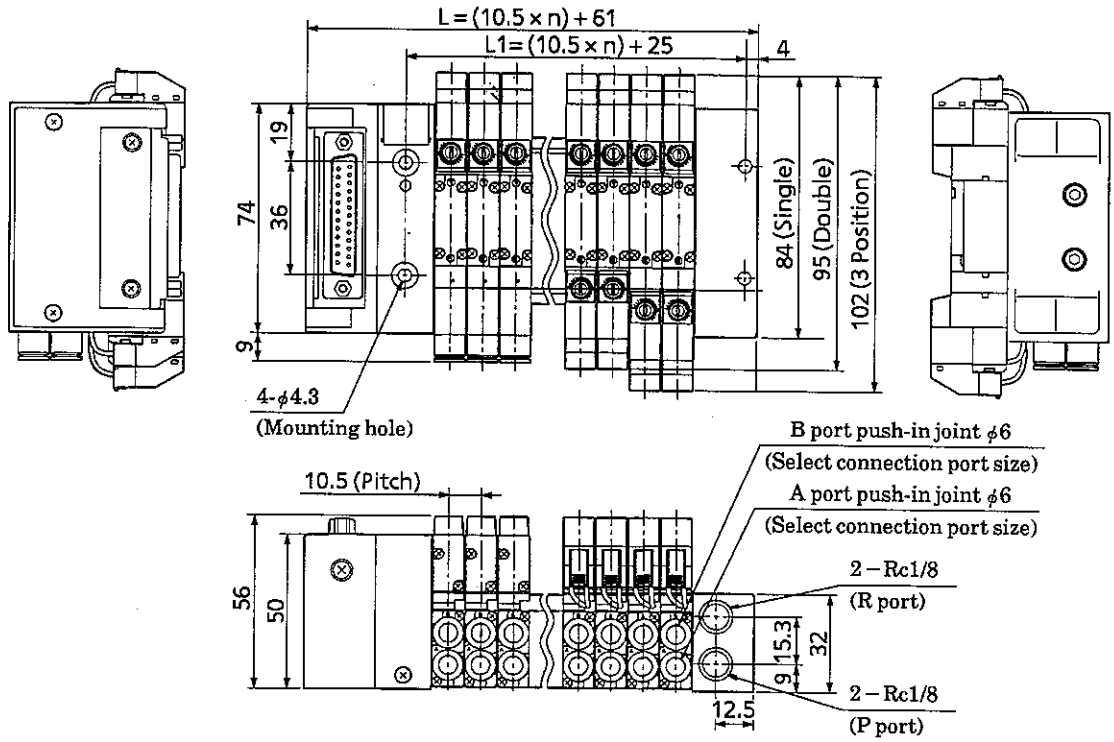


- M4SB1※0- Atype connecter



8) M4SB1Reduced wiring series

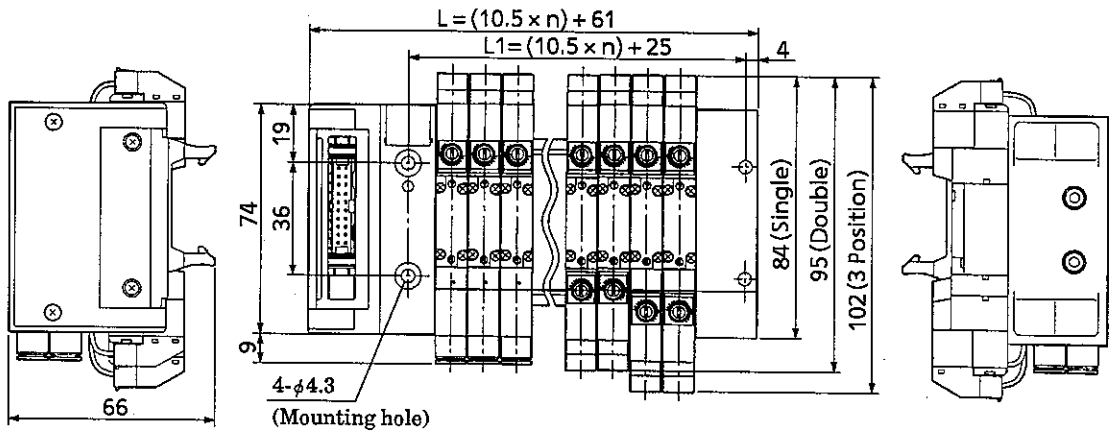
- M4SB1※0-D sub-connector T30

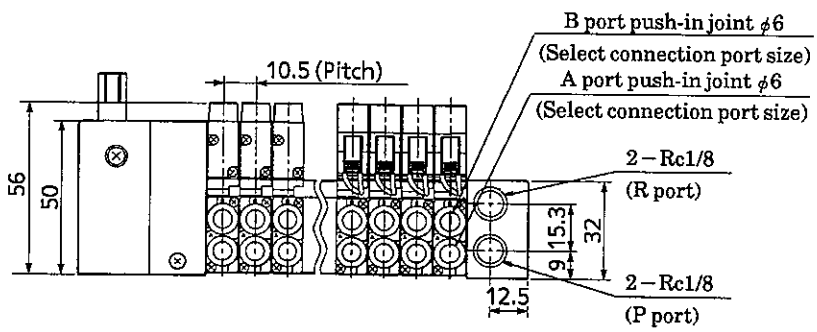


Symbol \ Block No.	2	3	4	5	6	7	8	9	10	11	12	13	14	15
L	82	92.5	103	113.5	124	134.5	145	155.5	166	176.5	187	197.5	208	218.5
L1	46	56.5	67	77.5	88	98.5	109	119.5	130	140.5	151	161.5	172	182.5

Symbol \ Block No.	16	17	18	19	20	21	22	23	24
L	229	239.5	250	260.5	271	281.5	292	302.5	313
L1	193	203.5	214	224.5	235	245.5	256	266.5	277

- **M4SB1※0-Flat cable connecter T50**



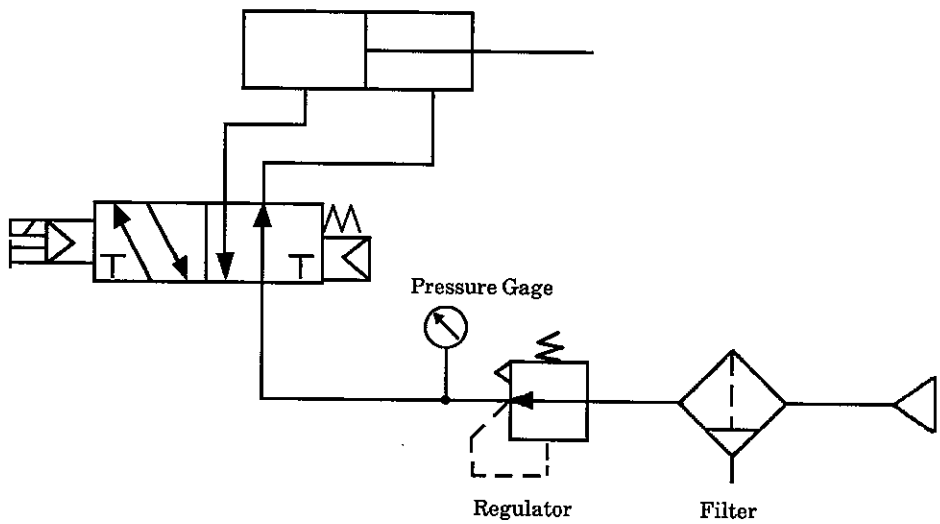


Symbol \ Block No.	2	3	4	5	6	7	8	9	10	11	12	13	14	15
L	82	92.5	103	113.5	124	134.5	145	155.5	166	176.5	187	197.5	208	218.5
L1	46	56.5	67	77.5	88	98.5	109	119.5	130	140.5	151	161.5	172	182.5

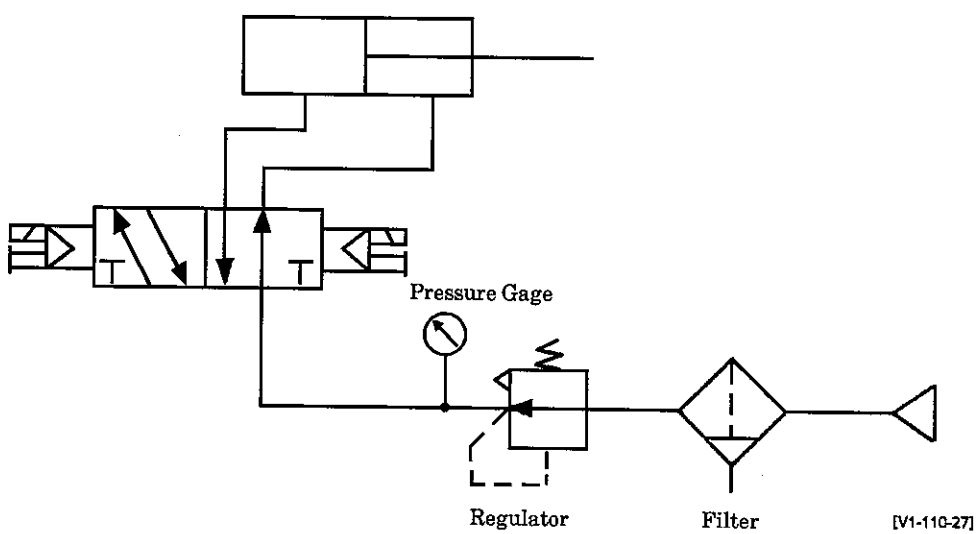
Symbol \ Block No.	16	17	18	19	20	21	22	23	24
L	229	239.5	250	260.5	271	281.5	292	302.5	313
L1	193	203.5	214	224.5	235	245.5	256	266.5	277

1.4 Fundamental circuit diagrams

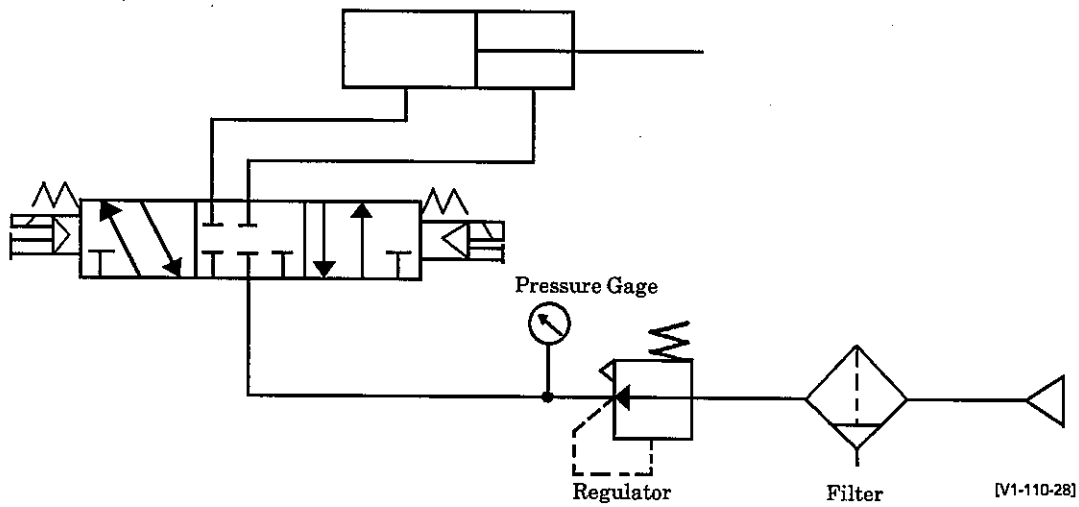
1) Single
4SA110, 4SB110



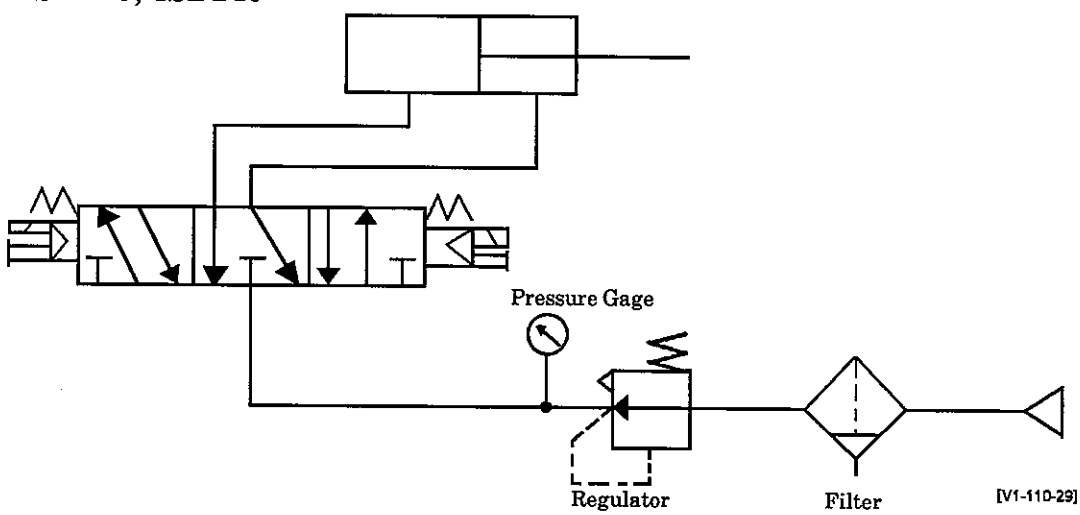
2) Double
4SA120, 4SB120



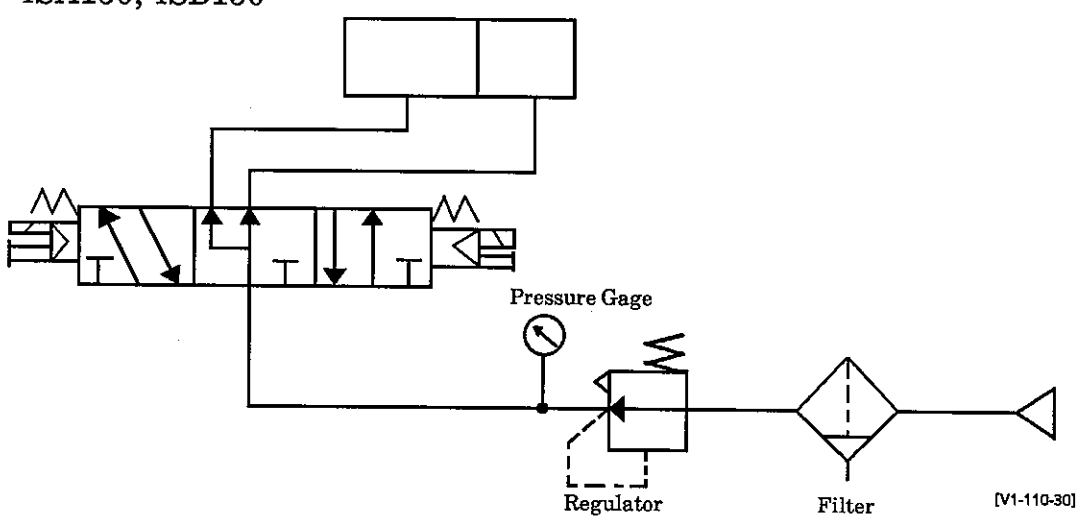
3) 3 position (All ports blocked)
4SA130, 4SB130



4) 3 position (ABR connection)
4SA140, 4SB140



5) 3 position (PAB connection)
4SA150, 4SB150



2. CAUTIONS

2.1 Quality of Compressed air

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

Improve the quality of compressed air by dehumidifying using after-cooler dryer.

1) How to purge drain (sludge)
   - Dehumidifying the air by means of after-cooler dryer
   - Removal foreign particles and material by means of filter
   - Removal tarcarbide by means of tar-removing filter

2.2 Cautions to build system with manifold

1) Direction of flow

   Both Compressed air supply (P) ports and Exhaust (R) ports are provided at both end of manifold block. Make use either one of them.

2) Number of blocks limitation

   When anticipating to operate more than 6 valves simultaneously, connect Air supply lines to P ports on both end of manifold block and lead exhaust to open air at both R ports. Otherwise, it may cause malfunction of valves.

3) Connecting pipe diameter

   Use the pipe of diameter corresponding to P port size of manifold. Insufficient flow or pressure may cause either malfunction of valve or short propelling force of cylinders.

4) Cylinder malfunction

   There may be possible malfunction of cylinders when intending to drive double acting cylinders with 3-position ABR connection on manifold or to drive single acting cylinder making use 4-position valve in place of 3-position valve due to the exhaust pressure coming through a round-about route when the other solenoid valve is actuated. Connect an isolated solenoid valve alone to build a cylinder driving circuit as for preventive measure of such trouble.

   It is further recommended, however, to contact nearest CKD dealer when intending to use manifold blocks.

2
CAUTION

2.3 Cautions to mount subplate onto manifold

Tighten 2es. of mounting screws uniformly with tightening torque of 0.16 to 0.25 N · m.

2.4 Manual Operation Devices

Even though using the device, main valve will not be shifted unless P port is pressurized, due to its structure of being an Internal pilot type spool valve.

The valve is shifted to the position as if coil is energized when button is pressed with a small screw driver until it hits the bottom and is locked when button is turned about 90° clockwise.

Only clock wise turning is possible. Carefully avoid turning it forcibly beyond the limitation to prevent its damage. Make sure to release locking of manual operation device prior to starting normal operation.

2.5 Responding time

1) Supplying pressure

Responding time posted on a catalog is for the case of energizing with Non-lubricat at the pressure of 0.5MPa.

2) Lubrication

There may be a delay of responding time in case of excessive volume of lubrication or low pressure.

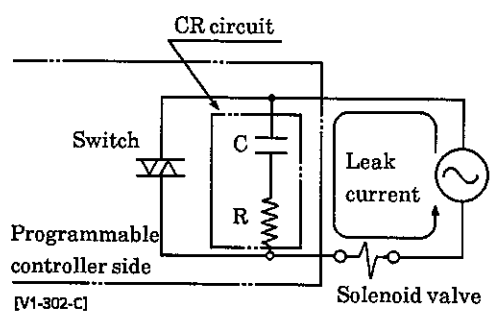
2.6 Range of Supply pressure

At least lower limited pressure or more is required due to its structure of being Internal pilot type spool valve. Always confirm the line pressure.

2.7 Solenoid valve

1) Limitation of Leak current

Make sure that the leak current of programmable controller output is less than DC24V, 1mA when anticipating to drive solenoid coil valve with programmable controller, etc. Otherwise, it may cause malfunction of coil.



2) Polarity of solenoid coil

There is a polarity of DC solenoid coil with lamp and surge killer. Confirm the electric circuit.

2.8 Ambient Conditions

1) Dust

Mount either silencer or elbow joint to R port keeping its open end downward within the area of much dust or floating foreign particles, to provide protective measurement of keeping those foreign particles from falling into R port.

2) Water drops and cutting coolant

Instead of leaving water or cutting coolant dripping over the solenoid, either provide a cover or install the solenoid within enclosed panel as it may causes short circuit or coil burning. Prevent allowing cutting coolant drip over cylinder rod because it will result malfunction of solenoid valve due to penetrated coolant to secondary piping of solenoid through cylinder. Contact nearest CKD dealer if the case is as such.

3) Continuous charging

When it is installed within enclosed control box or charging time is long, take some measure of ventilation or radiation. Otherwise it may cause rising temperature excessively.

4) Corrosive gas ambient

Prevent installation the valve within the corrosive gas such as sulfurous acid gas. Contact nearest CKD dealer for installation valve in the ambient of sea breeze or splash of sea water.

5) Ambient temperature

Contact nearest CKD dealer for installation valve in the ambient of high temperature higher than 50°C or such lower temperature as below 5°C.

6) Vibration and Shock

Prevent installation of valve within the area of 50m/s^2 or higher vibration and/or 300m/s^2 or higher shock.

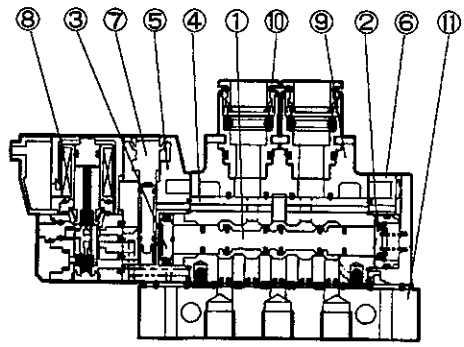
3. OPERATION

3.1 Function

1) 4SA series

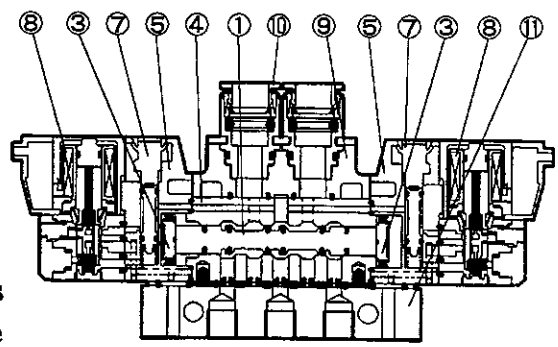
- 4SA110

No signal current
(Illustrated)
P→B
A→R_1 (R_2 port is closed.)
When actuated
P→A
B→R_2 (R_1 port is closed.)
PR is pilot exhaust port.



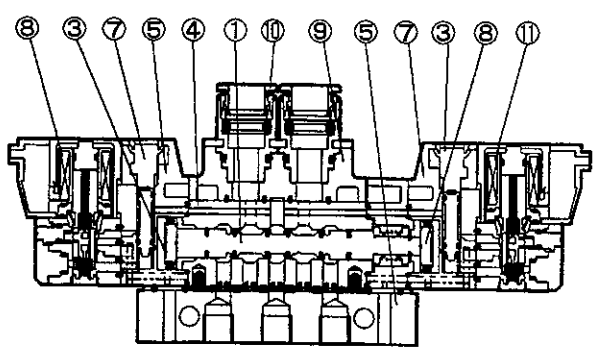
- 4SA120

When Sol "a" is actuated
P→A
B→R_2 (R_1 port is closed.)
When Sol "b" is actuated
(Illustrated)
P→B
A→R_1 (R_2 port is closed.)
New position of the spool is held where it is even after the solenoid is deactuated.



- 4SA130, 4SA140, 4SA150

No signal current to 4SA130
(Illustrated)
P · A · B · R_1 · R_2 are closed.
No signal current to 4SA140
P (Closed)
A→R_1
B→R_2
No signal current to 4SA150
P→A · B
R_1 . R_2 (Closed)
Refer 4SA120 as to the cases actuating Sol "a" or Sol "b".



Main part list

Parts No.	Parts	Material	Remarks
①	Spool ass'y	—	
②	Piston S ass'y	—	
③	Piston D ass'y	—	
④	Body	Aluminum	
⑤	Piston chamber	Polyphenilen sulfide	
⑥	Cap	Polyphenilen sulfide	
⑦	Manual operation axle	Polyacetal	
⑧	Coil ass'y	—	
⑨	Connection adapter	Polyphenilen sulfide	
⑩	Cartridge type push-in joint	—	
⑪	Piping adapter	Aluminum	

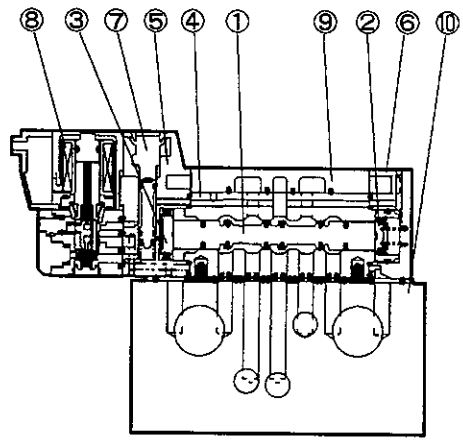
Expendable Parts list

Parts No.	Parts		Model code
⑧	Coill ass'y		4S1 - [Connecting wire] - Coil- [Voltage] ↑ No marking for Grommet lead wire
⑩	Cartridge type push-in joint (and relational parts)	ϕ4 straight type	4S1-joint-C4
		ϕ6 straight type	4S1-oint-C6
		Stopper joint	4S1-oint-CP
		M5 cartridge	4S1-oint-CM5
		M5 plug cartridge	4S1-oint-CMB
		M5 stopper	4S1-oint-CMP
—	Socket ass'y (Lead wire 300mm)		4S1-soket ass'y-300

2) 4SB series

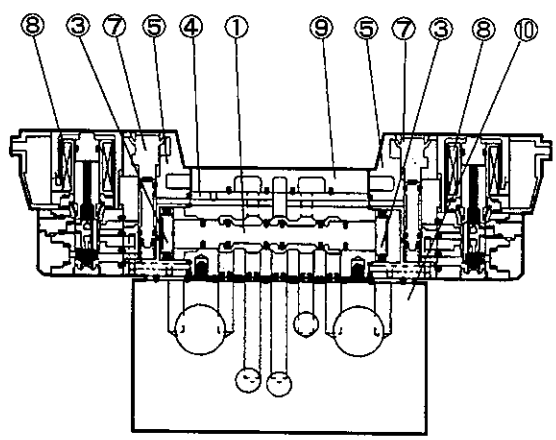
- 4SB110

No signal current
(Illustrated)
P→B
A→R_1 (R_2 port is closed.)
When actuated
P→A
B→R_2 (R_1 port is closed.)



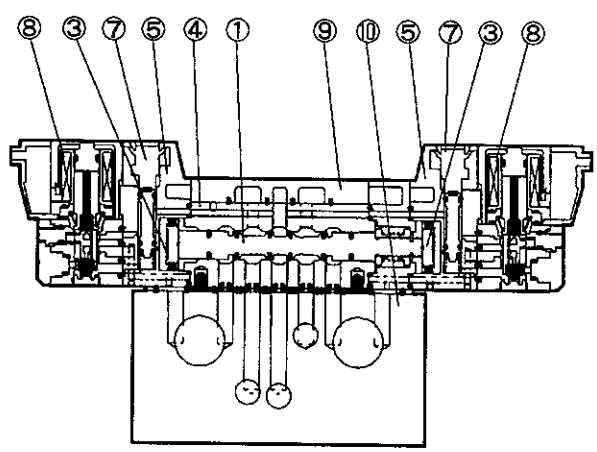
- 4SB120

When Sol "a" is actuated
P→A
B→R_2 (R_1 port is closed.)
When Sol "b" is actuated
(Illustrated)
P→B
A→R_1 (R_2 port is closed.)
New position of the spool is held where it is even after the solenoid is deactuated.



- 4SB130, 4SB140, 4SB150

No signal current to 4SB130
(Illustrated)
P · A · B · R_1 · R_2 are closed.
No signal current to 4SB140
P (Closed)
A→R_1
B→R_2
No signal current to 4SB150
P→A · B
R_1 . R_2 (Closed)
Refer 4SB120 as to the cases actuating Sol "a" or Sol "b".



Main part list

Parts No.	Parts	Material	Remarks
①	Spool ass'y	—	
②	Piston S ass'y	—	
③	Piston D ass'y	—	
④	Body	Aluminum	
⑤	Piston chamber	Polyphenilen sulfide	
⑥	Cap	Polyphenilen sulfide	
⑦	Manual operation axle	Polyacetal	
⑧	Coil ass'y	—	
⑨	Masking plate	Polyphenilen sulfide	
⑩	Sub-plate	Aluminum	

Expendable Parts list

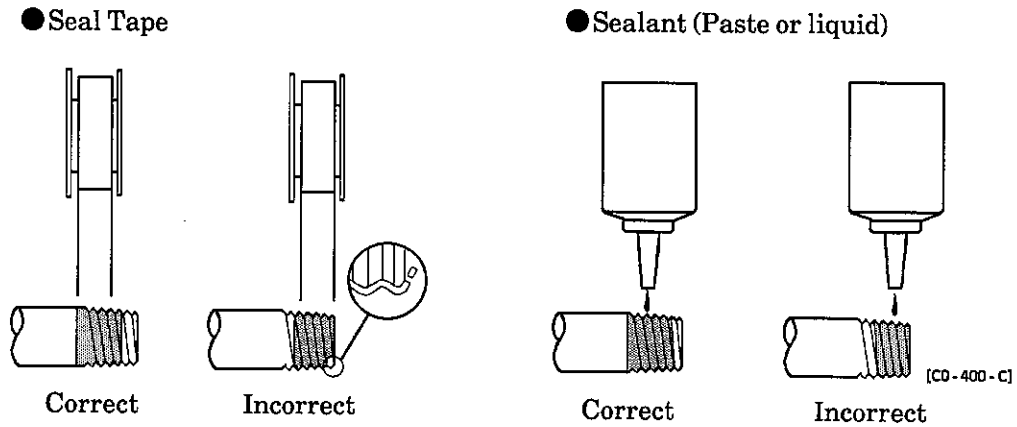
Parts No.	Parts	Model code
⑧	Coill ass'y	4S1 - [Connecting wire] - Coil- [Voltage] ↑ No marking for Grommet lead wire
—	Socket ass'y (Lead wire 300mm)	4S1-soket ass'y-300

4. INSTALLATION

4.1 Piping

1) Application of sealant

Carefully apply it so as to prevent it from flowing into pipe but sufficient to prevent air leakage.



When applying the seal tape of Fluorine resin over threaded pipe, apply it 2~3 layers leaving blank 1~2 pitches of thread off the end of pipe and press it with finger nail to make it stick to thread. Leave the same blank of thread when applying sealant sufficiently but not excessive to prevent it from falling into pipe. Never apply sealant to female threaded part.

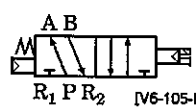
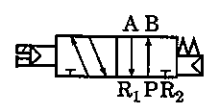
2) Rust scale or dust in pipes cause malfunction of valve seat leakage. Install a filter preferably adjacent upper-stream to solenoid valve for eliminating rust, foreign substance and drain from falling into the system.

3) Flush air into the pipes, solenoid valve and peripheral equipment to blow out foreign substances and chips before piping.

4) Flow direction

Note arrangement of ports such as A and B, and R_1 and R_2 of 4S1 series is in a reverse order with that of 4K series. Carefully confirm flow direction to prevent reversed actuation of valve.

Comparison table of port symbols

	4K series	4S1 series
Single solenoid		

5) Mounting posture

There is no restriction as to its mounting posture.

6) Air supply piping

Avoid piping to let A port and B port exhaust to open air. Also prevent chalking P port line as it may cause malfunction of valve. Carefully select pipes of sufficiently large enough diameter particularly when working pressure is low.

7) Piping of 3-position all port block type

Make sure that there is no external leakage from piping between solenoid valve and cylinder.when making cylinder stop at an intermediate position while controlling it with 3-position all port block valve. Also select cylinder with no leakage through rod packing and piston packing. Otherwise, cylinder may be unable to make intermediate stop even when shifted to all port block position due to its leakage.

Select cylinder with brake (such as SELTOP cylinder, CKD products) when long holding at its intermediate stop position or stopping accuracy is required.

8) Tightening torque

Apply appropriate torque referring to the following table for the purpose of preventing leakage and damage.

Connecting thread	Appropriate torque
M5	1.0 to 1.5 N · m
Rc1/8	3.0 to 5.0 N · m

Gasket (Model code: FGS) is used to seal M5. Avoid additional tightening while pressure is on. Design and build the system to provide ample room around piping for hand tools at later maintenance work.

4.2 Applicable tubes

1) Appropriate tubes

Select tubes specified by CKD for solenoid valves with fittings.

Soft nylon tube (F-1500 series)

Urethane (U-9500 series)

Carefully examine its Outside Diameter accuracy as well as its wall thickness and hardness when selecting commercially available tubes. As for urethane tube hardness, select 93° or over (Rubber hardness gage).

OD tolerance

Soft·hard nylon	±0.1mm
Urethane φ4, 6	+0.1mm
	−0.15mm
φ8	±0.1mm
	−0.2mm

Wall thickness of tube

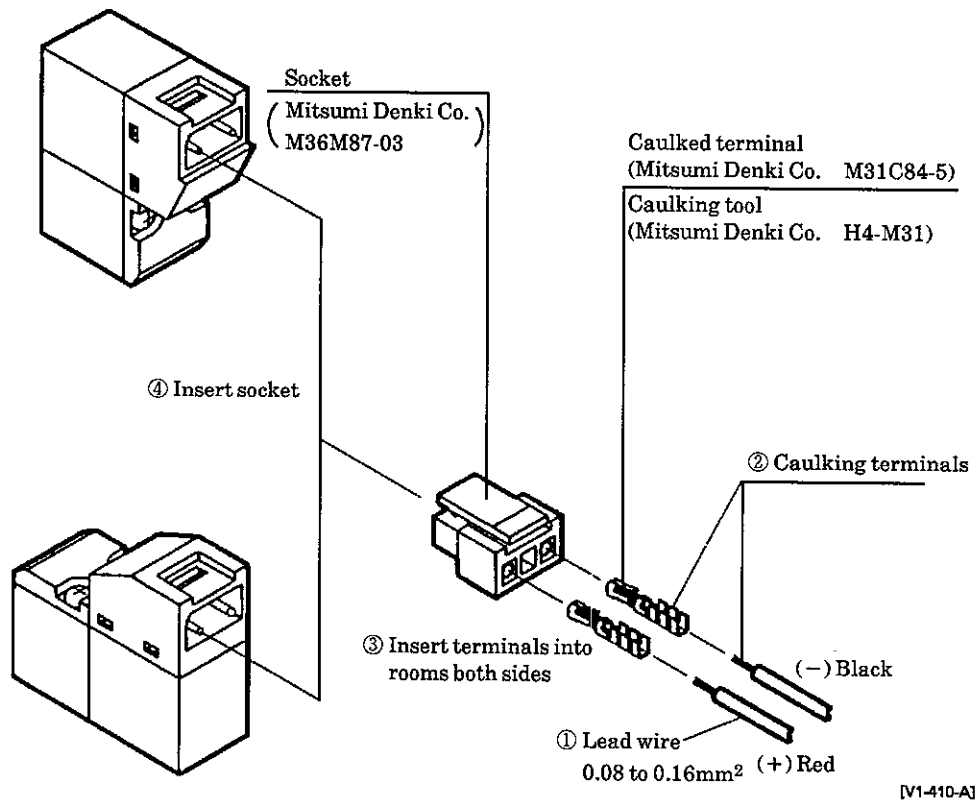
OD mm	ID mm	
	Nylon	Urethane
φ4	φ2.5	φ2
φ6	φ4	φ4
φ8	φ5.7	φ5

2) Apply tube bending radius more than the least bending radius posted in the table below. Otherwise it may cause slipping off or leakage.

Tube diam.	Least bending radius mm	
	Nylon	Urethane
φ4	10	10
φ6	20	20
φ8	30	30

4.3 Wire connection to C type and D type connecters.

Refer to the following illustration and comply with steps ① to ④.



Note : Confirm the polarity when it is the type with lamp and surge killer.
It results no short circuit but valve does not function.

4.4 Installation of Peripheral equipments

1) Air filter

Select the air filter with a filter element of 5μm mesh or smaller.(Refer to CKD's SELEX air filter catalog.) Also, periodically purge drain.

2) Lubricator

Models 4SA1, 4SB1 series are serviceable with no lubrication. It is recommended, if lubrication is preferred due to peripheral equipment, to use Turbine oil, Class 1, ISO VG32 (Additive free) or equivalent, but maintain volume only to the extent of reasonable.

Spindle oil, machine oil are inappropriate because packings will be swollen causing malfunction of equipment.

5. MAINTENANCE

5.1 Trouble Shooting

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 voltage 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	Rectify the piping 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.
	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	Rectify the piping to an external pilot system. Grease it up
	Foreign particles cut into packing lips	Remove the foreign particle away from the packing
Malfunctions when manifold is used	Adjacent cylinder pops out (Single-acting cylinder connected with 3-position valve or 3-position ABR connection)	Rewire to have the solenoid valve in question is actuated prior to others sequentially. Install a locking system to the cylinder

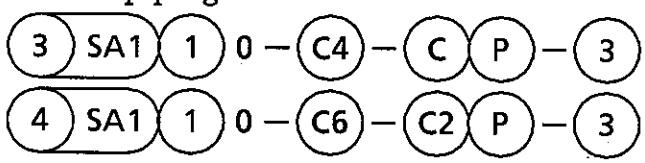
5.2 Disassembly

It is not recommended to disassemble this equipment in field due to it consistency of precision components.

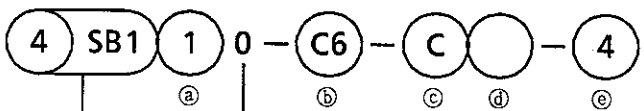
6. MODEL CODING

6.1 $4S\frac{A}{B}1$

- Dilect piping



- Sub-plate piping



Siries model

Operational style of Solenoid

ⓑ Port size

※1 : In case of A and B ports with Filter (because of preventing foreign material to enter) write on "F" at the back of the mark of connection port size. (Option)

※2 : The standard of push-in joint is straight type. Ask us for elbow type of the one.

ⓒ Wiring type

※3 C type : Lead wire : horizontal direction
D type : Lead wire : upper direction
A type : Lead wire : down direction

※4 (G) : With lead wire
(S) : With surge killer
(L) : With lamp

ⓓ Other options

ⓔ Voltage

Symbol		Content		Series model 3SA1	4SA1	4SB1
ⓐ Position and status	1	2-position, Single		–	●	●
	2	2-position, Double		–	●	●
	3	3-position, All port block		–	●	●
	4	3-position, A・B・R connection		–	●	●
	5	3-position, P・A・B connection		–	●	●
	1	2-position, Single solenoid・normal colsed type		●	–	–
	11	2-position, Single solenoid・normal open type		●	–	–
ⓑ Port size	Port	A・B port	P・R1・R2 port			
	C4	φ4 push-in joint	M5	●	●	–
	C6	φ6 push-in joint	M5	●	●	–
	M5	M5	M5	●	●	–
	06	Rc1/8		–	–	●
ⓒ Wiring type	No mark	Grommet lead wire (300mm)		●	●	●
	C	C type connecter (300mm) Ⓖ		●	●	●
	C00	C type connecter (500mm) Ⓖ		●	●	●
	C01	C type connecter (1000mm) Ⓖ		●	●	●
	C02	C type connecter (2000mm) Ⓖ		●	●	●
	C 1	C type connecter, with Socket		●	●	●
	C 2	C type connecter (300mm) ⒼⓈⓁ		●	●	●
	C20	C type connecter (500mm) ⒼⓈⓁ		●	●	●
	C21	C type connecter (1000mm) ⒼⓈⓁ		●	●	●
	C22	C type connecter (2000mm) ⒼⓈⓁ		●	●	●
	C 3	C type connecter, with Socket ⓈⓁ		●	●	●
	D	D type connecter (300mm) Ⓖ		●	●	●
	D00	D type connecter (500mm) Ⓖ		●	●	●
	D01	D type connecter (1000mm) Ⓖ		●	●	●
	D02	D type connecter (2000mm) Ⓖ		●	●	●
	D 1	D type connecter, with Socket		●	●	●
	D 2	D type connecter (300mm) ⒼⓈⓁ		●	●	●
	D20	D type connecter (500mm) ⒼⓈⓁ		●	●	●
	D21	D type connecter (1000mm) ⒼⓈⓁ		●	●	●
	D22	D type connecter (2000mm) ⒼⓈⓁ		●	●	●
	D 3	D type connecter, with Socket ⓈⓁ		●	●	●
	A 2	A type connecter (300mm) ⒼⓈⓁ		●	●	●
	A20	A type connecter (500mm) ⒼⓈⓁ		●	●	●
	A21	A type connecter (1000mm) ⒼⓈⓁ		●	●	●
	A22	A type connecter (2000mm) ⒼⓈⓁ		●	●	●
	A 3	A type connecter, with Socket ⓈⓁ		●	●	●
ⓓ	No mark	No option		●	●	●
	P	With mounting plate (Only single type)		●	●	–
ⓔ	3	DC24V		●	●	●
	4	DC12V		●	●	●

6.2 M4S$^{A}_{B}$1 Individual wiring type manifold

- Solenoid valve only for manifold

4 SB1 1 9 – 00 —— D2 ———— 4 ※Gasket, mounting screws are attached.

- Individual wiring manifold

M 4 SB1 8 0 – C6 ◯ – D2 – 8 – 4 – 3 2 2 0 0 0 0 1

ⓐ ⓑ ⓒ ⓓ ⓔ ⓕ ⓖ

Write on at the case of mix-manifold

ⓒ Port size

※1 : In case of A and B ports with Filter (because of preventing foreign material to enter) write on "F" at the back of the mark of connection port size. (Option)

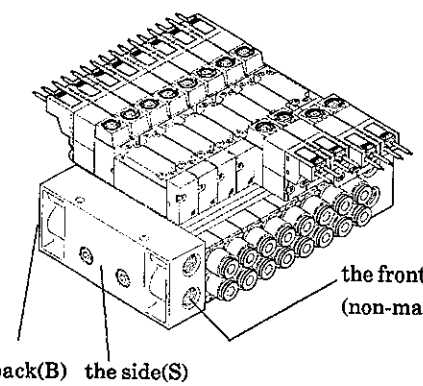
※2 : Write on the mark "CX" at the case of mixed connecters. Necessary to specify "Manifold Specifications" in that case.

※3 : The standard of push-in joint is straight type. Ask us for elbow type of the one.

ⓓ Port direction of the supply and exhaust ports

※4

The supply and exhaust ports are decided as b solenoids are front (cap side at the case of single solenoid)



The upper figure showes the front piping type. And "Supply and exhaust blocks" are additional on both sides at the case of "Indicidual wiring type manifold"

ⓔ Wiring type

※5 C type : Lead wire : horizontal direction
D形 : Lead wire : upper direction
A形 : Lead wire : down direction

※5 Ⓖ : With lead wire
Ⓢ : With surge killer
Ⓛ : With lamp

ⓕ Block No.

ⓖ Voltage

Symbol		Content		Series model: Manifold M3SA1	Manifold M4SA	Manifold M4SB1	Individual 3SA1	Individual 4SA1	Individual 4SB1
a	3	3-port valve		●	–	–	●	–	–
	4	4-port valve-mixed 3 and 4 port valve		–	●	●	–	●	●
b Position and status	1	2-position, Single		–	●	●	–	●	●
	2	2-position, Double		–	●	●	–	●	●
	3	3-position, All port block		–	●	●	–	●	●
	4	3-position, A・B・R connection		–	●	●	–	●	●
	5	3-position, P・A・B connection		–	●	●	–	●	●
	1	2-position, Single solenoid-normal closed type		●	–	–	●	–	–
	11	2-position, Single solenoid-normal open type		●	–	–	●	–	–
	8	Mix		●	●	●	–	–	–
c Port size	Port	A・B port	P・R port						
	C4	φ4 push-in joint	Rc1/8	●	●	●	●	●	–
	C6	φ6 push-in joint	Rc1/8	●	●	●	●	●	–
	M5	M5	Rc1/8	●	●	●	●	●	–
	CX	Mix	Rc1/8	●	●	●	●	●	–
	00	Non port selection	Non port selection	–	–	–	–	–	●
d	No mark	The front		●	●	●	–	–	–
	B	The back		●	●	●	–	–	–
	S	The side		●	●	●	–	–	–
e Wiring type	No mark	Grommet lead wire (300mm)		●	●	●	●	●	●
	C	C type connecter (300mm) Ⓖ		●	●	●	●	●	●
	C00	C type connecter (500mm) Ⓖ		●	●	●	●	●	●
	C01	C type connecter (1000mm) Ⓖ		●	●	●	●	●	●
	C02	C type connecter (2000mm) Ⓖ		●	●	●	●	●	●
	C1	C type connecter, with Socket		●	●	●	●	●	●
	C2	C type connecter (300mm) ⒼⓈⓁ		●	●	●	●	●	●
	C20	C type connecter (500mm) ⒼⓈⓁ		●	●	●	●	●	●
	C21	C type connecter (1000mm) ⒼⓈⓁ		●	●	●	●	●	●
	C22	C type connecter (2000mm) ⒼⓈⓁ		●	●	●	●	●	●
	C3	C type connecter, with Socket ⓈⓁ		●	●	●	●	●	●
	D	D type connecter (300mm) Ⓖ		●	●	●	●	●	●
	D00	D type connecter (500mm) Ⓖ		●	●	●	●	●	●
	D01	D type connecter (1000mm) Ⓖ		●	●	●	●	●	●
	D02	D type connecter (2000mm) Ⓖ		●	●	●	●	●	●
	D1	D type connecter, with Socket		●	●	●	●	●	●
	D2	D type connecter (300mm) ⒼⓈⓁ		●	●	●	●	●	●
	D20	D type connecter (500mm) ⒼⓈⓁ		●	●	●	●	●	●
	D21	D type connecter (1000mm) ⒼⓈⓁ		●	●	●	●	●	●
	D22	D type connecter (2000mm) ⒼⓈⓁ		●	●	●	●	●	●
	D3	D type connecter, with Socket ⓈⓁ		●	●	●	●	●	●
	A2	A type connecter (300mm) ⒼⓈⓁ		●	●	●	●	●	●
	A20	A type connecter (500mm) ⒼⓈⓁ		●	●	●	●	●	●
	A21	A type connecter (1000mm) ⒼⓈⓁ		●	●	●	●	●	●
	A22	A type connecter (2000mm) ⒼⓈⓁ		●	●	●	●	●	●
	A3	A type connecter, with Socket ⓈⓁ		●	●	●	●	●	●
f	2~24	2~24 stations		●	●	●	–	–	–
g	3	DC24V		●	●	●	●	●	●
	4	DC12V		●	●	●	●	●	●

How to order

M4SA110-C6S-5-3

ⓐ Valve type : 4 port valve
ⓑ Position and status : 2-position single
ⓒ Port size : ϕ6 Push-in joint
ⓓ Port direction ofthe supply and exhaust ports : Side
ⓔ Wiring type : Grommet lead wire
ⓕ Block No. : 5 blocks
ⓖ Voltage : DC24V

Mixed Manifold

- Describing procedure of Combination concept

When ordering mixed combined manifold (marking 8 in column of Ⓐ), affix the solenoid valve information (type of function, quantity intended and sequential location in combination). An example of coding description depending upon individual function (marking left block No.1) and its sequential location is shown in the last line of this note.

When function list is as follows :

Marking	Function
S1	2-positon, Single
S2	2-position, Double
S3	3-position, All port block
S4	3-position, ABR Connection
S5	3-position, PAB Connection
S10	2-position, Single solenoid·normal closed type
S11	2-position, Single solenoid·normal open type
MP	Masking plate

1	2-pos. Single, (S1)
2	2-pos. Double, (S1)
3	3-pos. All port block, (S3)
4	2-pos. Single, (S1)
5	2-pos. double, (S2)
6	2-pos. double, (S2)
7	3-pos. All port block, (S3)
8	Masking plate (MP)

The model coding is as follows when intending to line up 7 blocks of combined blocks of A · B port connection, M3, DC 24V line numbered as above example.

M4SB180-C6-D2-8-4-

3	2	2	0	0	0	0	1
S1	S2	S3	S4	S5	S10	S11	MP

(S1 = 1 to 2, 4, S2 = 5 to 6, S3 = 3, 7, MP = 8)

ⓐ Valve type : 4 port valve
ⓑ Position and status : Mix
ⓒ Port size : ϕ6 Push-in joint
ⓓ Port direction ofthe supply and exhaust ports : The front
ⓔ Wiring type : D-sub connecter with lead wire (300mm), surge killer and lamp
ⓕ Block No. : 8 blocks
ⓖ Voltage : DC12V

6.3 M4S$\frac{A}{B}$1 Fewer wiring type manifold

- Solenoid valve only for manifold

4 SA1 1 9 – C4 — A4 ——— 3

- Solenoid valve only for Reduced wiring manifold

M 4 SA1 8 0 – C4 T30 – 6 – 4 – 2 1 1 0 0 0 0 2

ⓐ ⓑ ⓒ ⓓ ⓔ ⓕ ⓖ

Write on at the case of mix-manifold

ⓒ Port size

※1 : In case of A and B ports with Filter (because of preventing foreign material to enter) write on "F" at the back of the mark of connection port size. (Option)

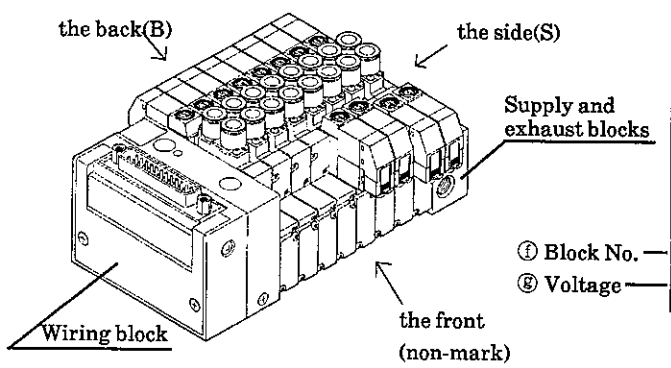
※2 : Write on the mark "CX" at the case of mixed connecters. Necessary to specify "Manifold Specifications" in that case.

※3 : The standard of push-in joint is straight type. Ask us for elbow type of the one.

ⓓ Port direction of the supply and exhaust ports

※4

The supply and exhaust ports are decided as b solenoids are front (cap side at the case of single solenoid)



The upper figure showes the front piping type. And "Supply and exhaust blocks" are additional on the opposite side of "Wiring block" at the case of "fewer wiring type manifold".

	Symbol	Content		Series model: Manifold M3SA1	Manifold M4SA	Manifold M4SB1	Individual 3SA1	Individual 4SA1	Individual 4SB1
ⓐ	3	3-port valve		●	–	–	●	–	–
	4	4-port valve·mixed 3 and 4 port valve		–	●	●	–	●	●
ⓑ Position and status	1	2-position, Single		–	●	●	–	●	●
	2	2-position, Double		–	●	●	–	●	●
	3	3-position, All port block		–	●	●	–	●	●
	4	3-position, A · B · R connection		–	●	●	–	●	●
	5	3-position, P · A · B connection		–	●	●	–	●	●
	1	2-position, Single solenoid-normal closed type		●	–	–	●	–	–
	11	2-position, Single solenoid-normal open type		●	–	–	●	–	–
	8	Mix		●	●	●	–	–	–
ⓒ Port size	Port	A · B port	P · R1 · R2 port						
	C4	φ4 push-in joint	Rc1/8	●	●	●	●	●	–
	C6	φ6 push-in joint	Rc1/8	●	●	●	●	●	–
	M5	M5	Rc1/8	●	●	●	●	●	–
	CX	Mix	Rc1/8	●	●	●	●	●	●
	00	Non port selection		–	–	–	–	–	●
ⓓ	No mark	The front		●	●	●	–	–	–
	B	The back		●	●	●	–	–	–
	S	The side		●	●	●	–	–	–
ⓔ Wiring type	T30	D-sub connecter type · left side		●	●	●	–	–	–
	T50	Flat cable connecter type · left side		●	●	●	–	–	–
	T30R	D-sub connecter type · right side		●	●	●	–	–	–
	T50R	Flat cable connecter type · right side		●	●	●	–	–	–
	AD4	A type connecter (non-socket ass'y)		–	–	–	●	●	●
ⓕ	2~24	2~24 stations		●	●	●	–	–	–
ⓖ	3	DC24V		●	●	●	●	●	●
	4	DC12V		●	●	●	●	●	●

How to order

M4SB120-C6S-T30-5-3

ⓐ Valve type : 4 port valve
ⓑ Position and status : 2-position double
ⓒ Port size : ϕ6 Push-in joint
ⓓ Port direction ofthe supply and exhaust ports : Side
ⓔ Wiring type : D-sub connecter type · left side
ⓕ Block No. : 5 blocks
ⓖ Voltage : DC24V

Mixed Manifold

- Describing procedure of Combination concept

When ordering mixed combined manifold (marking 8 in column of Ⓐ), affix the solenoid valve information (type of function, quantity intended and sequential location in combination). An example of coding description depending upon individual function (marking left block No.1) and its sequential location is shown in the last line of this note.

When function list is as follows :

Marking	Function
S1	2-positon, Single
S2	2-position, Double
S3	3-position, All port block
S4	3-position, ABR Connection
S5	3-position, PAB Connection
S10	2-position, Single solenoid·normal closed type
S11	2-position, Single solenoid·normal open type
MP	Masking plate

1	2-pos. Single (S1)
2	2-pos. Double (S1)
3	2-pos. double (S2)
4	3-pos. All port block (S3)
5	Masking plate (MP)
6	Masking plate (MP)

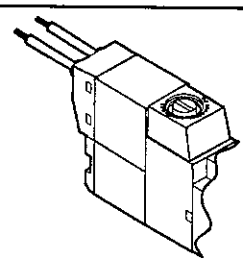
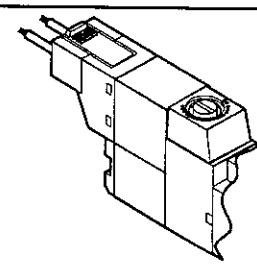
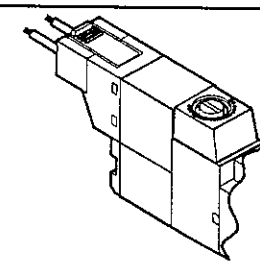
The model coding is as follows when intending to line up 7 blocks of combined blocks of A · B port ϕ4 push-in joint, DC 12V line numbered as above example.

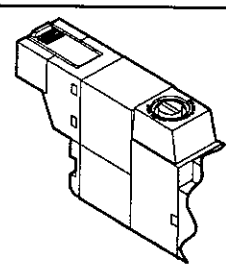
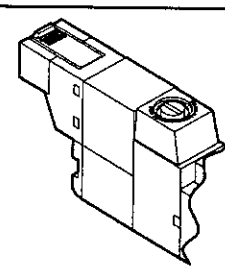
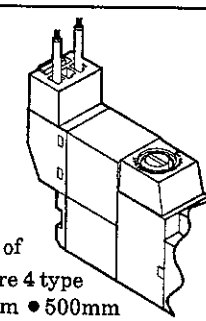
M4SA180-C4-T30-6-4- | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 2 |
S1 S2 S3 S4 S5 S10 S11 MP

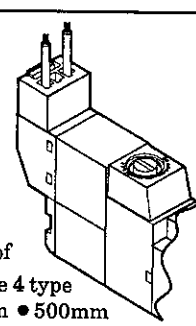
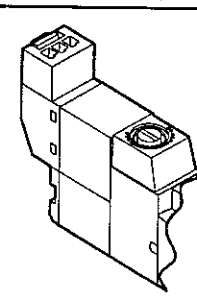
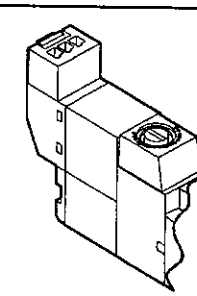
(S1 = 1 to 2, S2 = 3, S3 = 4, MP = 5, 6)

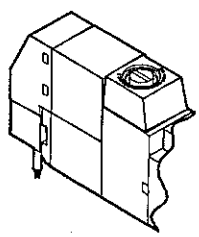
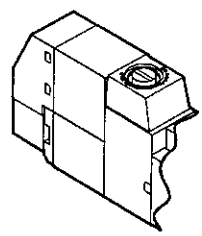
ⓐ Valve type : 4 port valve
ⓑ Position and status : Mix
ⓒ Port size : ϕ4 Push-in joint
ⓓ Port direction ofthe supply and exhaust ports : The front
ⓔ Wiring type : D-sub connecter type · left side
ⓕ Block No. : 6 blocks
ⓖ Voltage : DC12V

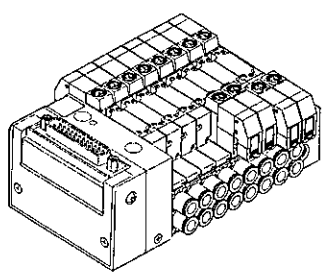
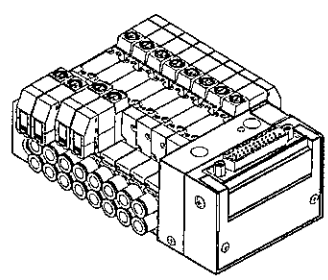
6.4 Explanation of wiring type

Wiring type			
Individual valve · individual wiring type manifold			
Device name	Grommet lead wire	C type connector, with lead wire	C type connector, with lead wire / Surge killer and lamp
Option marking	No marking	C · Co※	C2※
Shape	 Length of lead wire 4 type ● 300mm ● 500mm ● 1000mm ● 2000mm	 Length of lead wire 4 type ● 300mm ● 500mm ● 1000mm ● 2000mm	 Length of lead wire 4 type ● 300mm ● 500mm ● 1000mm ● 2000mm

Individual valve · individual wiring type manifold			
Device name	C type connector, with Socket	C type connector, with Socket / Surge killer and lamp	D type connector, with lead wire
Option marking	C1	C3	D · Do※
Shape	 With Socket / Crimp terminal	 With Socket / Crimp terminal	 Length of lead wire 4 type ● 300mm ● 500mm ● 1000mm ● 2000mm

Individual valve · individual wiring type manifold			
Device name	D type connector, with lead wire / Surge killer and lamp	D type connector, with Socket	D type connector, with Socket / Surge killer and lamp
Option marking	D2※	D1	D3
Shape	 Length of lead wire 4 type ● 300mm ● 500mm ● 1000mm ● 2000mm	 With Socket / Crimp terminal	 With Socket / Crimp terminal

Wiring type		
Individual valve · individual wiring type manifold		
Device name	A type connector, with lead wire / Surge killer and lamp	A type connector, with Socket / Surge killer and lamp
Option marking	A2※	A3
Shape	 Length of lead wire 4 type ● 300mm ● 500mm ● 1000mm ● 2000mm	 With Socket / Crimp terminal

Fewer wiring type manifold		
Device name	D sub-connector type (left)	D sub-connector type (right)
Option marking	T30	T30R
Shape		

Fewer wiring type manifold		
Device name	Flat cable connector type (left)	Flat cable connector type (right)
Option marking	T50	T50R
Shape