Discontinue

CKD

SM-10406-A

INSTRUCTION MANUAL

REDUCED WIRING SELEX VALVE

M4TB $\frac{3}{4}$-T10

- 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.

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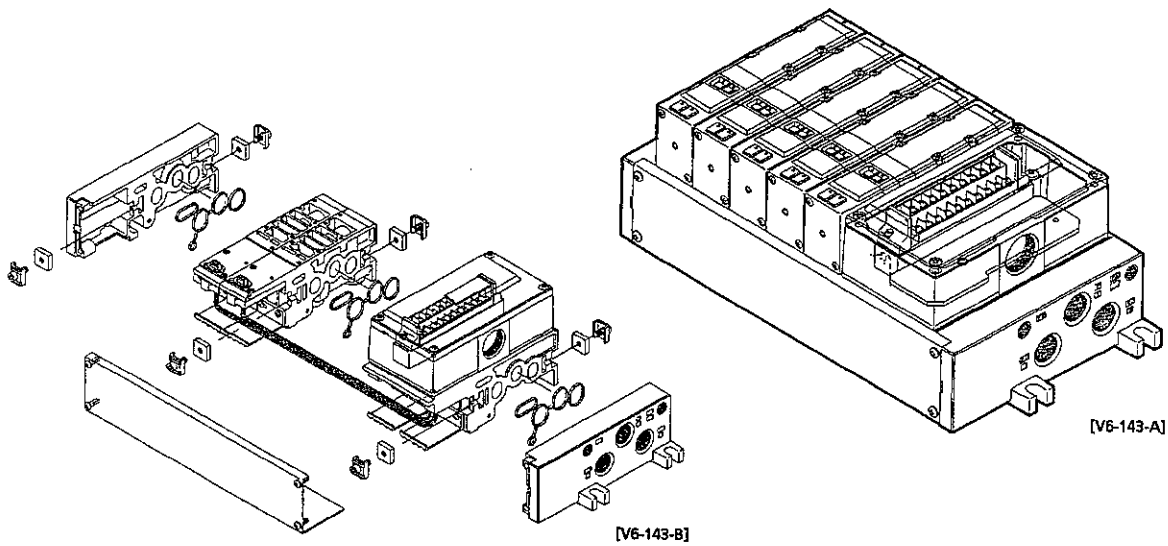
M4TB□ - T10
Reduced Wiring Selex Valve
Manual No. SM-10406-A

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.

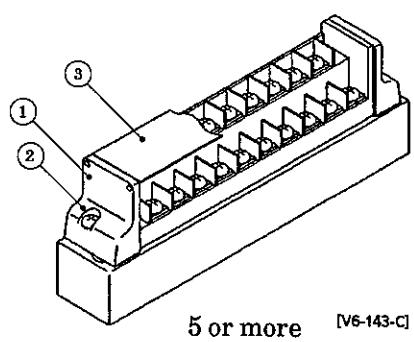
Mar.29.1999

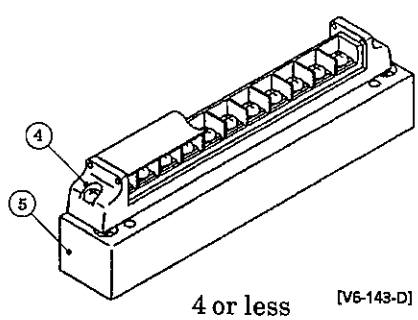
1. PRODUCTS

1.1 Name of components and their functions



○ Terminal Stand (Type 10)





① Connector type terminal stand (20 terminals)
Control wire terminals for manifold electric solenoid valve are collectively located. Terminal stand itself is detachable.

② Stand mounting screw
It fixes the terminal stands to wiring block cover. Terminal stand is able to be pulled out by loosening this screw.

③ Protective cover
Marking sheet with Terminal block Nos. is inserted in.

④ Connector type terminal stand (11 terminals)

⑤ Terminal block cover
Printed circuit boad for junction connector is built-in.

1.2 Specifications

Specifications of Manifold

Item	Specifications			
	M4TB3		M4TB4	
Type of manifold	Manifold block type		Manifold block type	
Applicable solenoid valve	4TB3 Series		4TB4 Series	
Number of blocks	2 - 8 blocks (Max.16 when single)		2 - 8 blocks (Max.16 when single)	
Kind of manifold	Common Supply air / Common exhaust		Common Supply air / Common exhaust	
Ambient temperature ℃	5 - 50		5 - 50	
Ambient humidity	35~85%RH (No dewing)		35~85%RH (No dewing)	
Work ambience	No corrosive gas should exist		No corrosive gas should exist	
Media temperature ℃	5 - 50		5 - 50	
Port size	Pressure port (P) Exhaust port (R)	Cylinder port (A · B)	Pressure port (P) Exhaust port (R)	Cylinder port (A · B)
	Rc1/2	Rc1/4 · Rc3/8	Rc1/2	Rc3/8 · Rc1/2
	Pilot eexhaust port (PR)	External pilot port (PA)	Pilot eexhaust port (PR)	External pilot port (PA)
	Rc1/8	Rc1/8	Rc1/8	Rc1/8

Specifications of solenoid valve

Item \ Series Model No. / No. of positions, / No. of solenoids	M4TB3 Series				
	4TB310 2-position Single	4TB320 2-position Double	4TB330 3-position All ports blocked	4TB340 3-position ABR ports connected	4TB350 3-position PAB ports connected
Media	Compressed air				
Type of actuation	Pilot (soft spool)				
Max. working pressure MPa	1.0				
Min. working pressure MPa	0.15	0.1	0.2		
Guaranteed withstanding pressure MPa	1.5				
Effective sectional area mm^2	40		33		
Responding time ms	30 or les (at 0.5MPa)		50 or les (at 0.5MPa)		
Type of manual operation device	Non-lock type, Lock type (Option)				
Lubrication	Not required (Use Turbine oil, Class 1, ISO VG32(#90) when rerquired.)				
Protective structure	Dust proof, Drip prouf (Option)				

Item \ Series Model No. / No. of positions, / No. of solenoids	M4TB4 Series				
	4TB410 2-position Single	4TB420 2-position Double	4TB430 3-position All ports blocked	4TB440 3-position ABR ports connected	4TB450 3-position PAB ports connected
Media	Compressed air				
Type of actuation	Pilot (soft spool)				
Max. working pressure MPa	1.0				
Min. working pressure MPa	0.15	0.1	0.2		
Guaranteed withstanding pressure MPa	1.5				
Effective sectional area mm^2	70 (3.89)		60 (3.33)		
Responding time ms	50 or les (at 0.5MPa)		70 or les (at 0.5MPa)		
Type of manual operation device	Non-lock type, Lock type (Option)				
Lubrication	Not required (Use Turbine oil, Class 1, ISO VG32(#90) when rerquired.)				
Protective structure	Dust proof, Drip prouf (Option)				

Electical specifications

Rated voltage	V	AC100V50/60Hz	AC200V50/60Hz	DC24V
Inrush current	A	0.056/0.044	0.028/0.022	0.080
Holding current	A	0.028/0.022	0.014/0.011	
Power consumption (w/lamp)	W	1.8/1.4	1.8/1.4	1.9
Temperature rise	℃	50		
Voltage fluctuation range		±10%		
Insulation class		Class B, molded coil		
Surge absorber		Standard		
Indicator		Standard		

- AC100V · 200V coils are serviceable with AC 110 · 220 (60Hz).

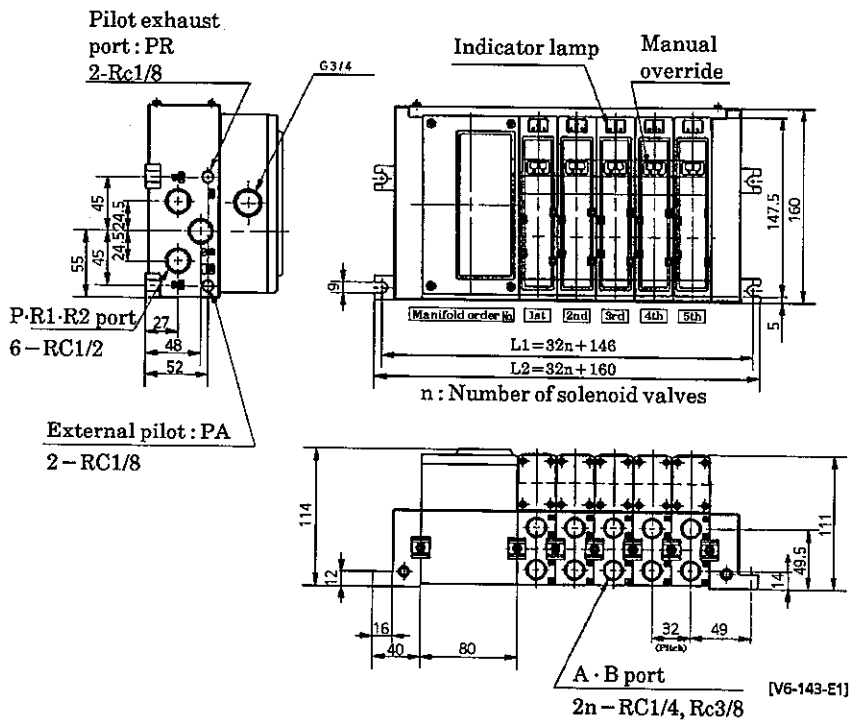
Wiring specifications

Item		Max. nos. of station			Voltage correspondence			
		Single solenoid	Double solenoid	Mixed manifold (Nos. of solenoid)	AC100V	AC200V	DC24V	DC12V
Concentrated terminal blocks type	T10	9 blocks	9 blocks	9 blocks	○	○	○	○

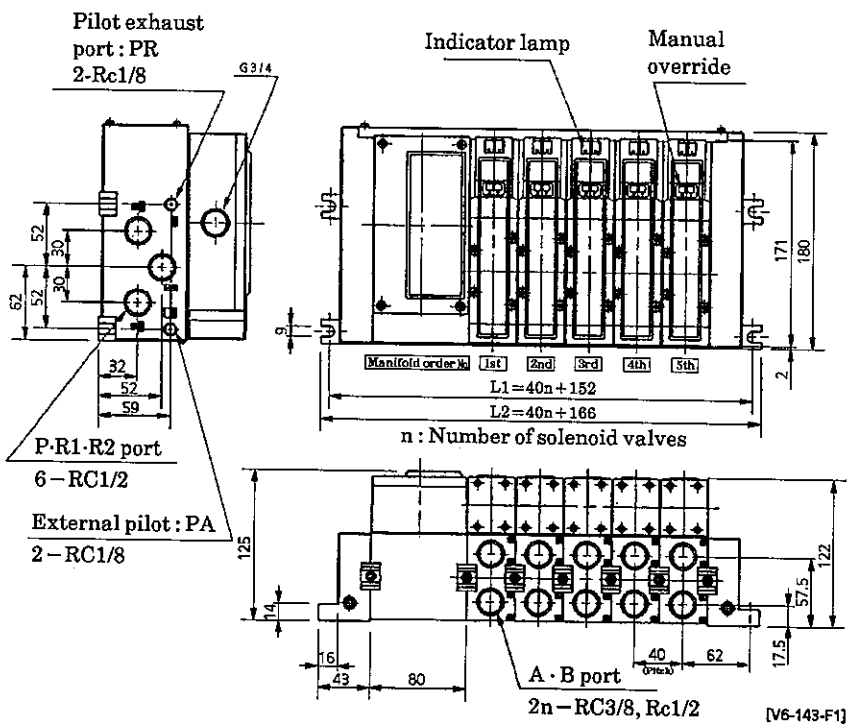
- Terminal screw size-for M3.5.

1.3 External dimensions

○ M4TB3※0-※-※T10-※



○ M4TB4※0-※-※T10-※



2. CAUTION

2.1 Cautions at Operation

1) Environmental conditions

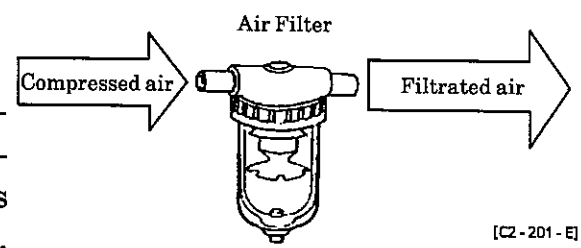
(1) Within the area of much dust or floating foreign particles, mount either silencer or elbow joint to R1 · R2 (Exh.) port keeping its open end downward to provide protective measurement of keeping those foreign particles from falling into R port.

(2) 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.



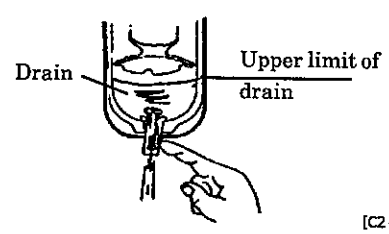
[C2-201-E]

(2) Lubricator

Both 4TB3 series and 4TB4 series do not particularly require lubrication. (Use Turbine oil, Class 1, ISO VG32 (#90) or equivalent, if and when lubrication is preferred.)

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.



[C2-201-F]

- 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.

4) Super dry air

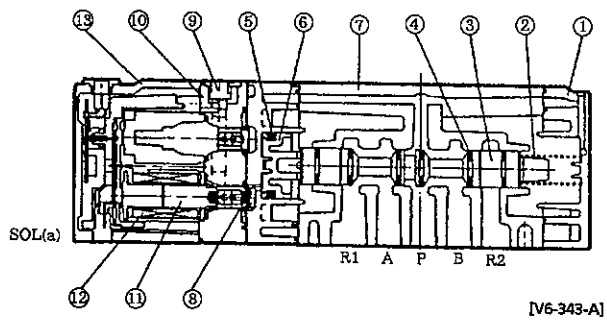
It is recommended to adopt DC driven solenoid valve when super dry air is intended to operate the unit because it may shorten service life of unit.

3. OPERATION

3.1 Functions

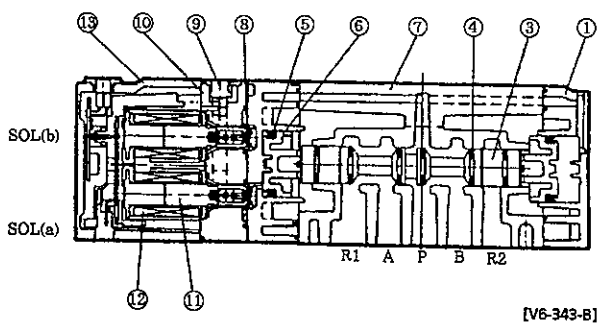
Functional drawing of individual valve

- 4TB319 · 4TB419
  When de-energized (Illustrated)
  P → B
  A → R1 (But R2 closes)
  When energized
  P → A
  B → R2 (But R1 closes)
  PR is a Pilot exhaust port.



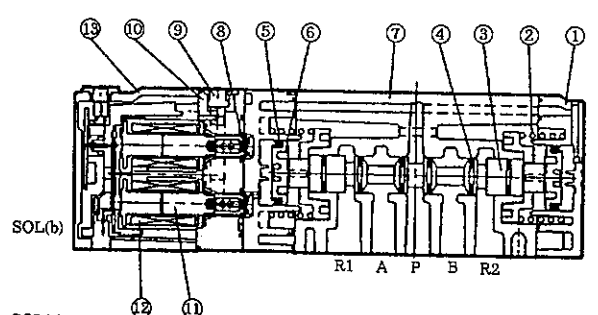
[V6-343-A]

- 4TB329 · 4TB429
  When Solenoid B is energized (Illustrated)
  P → B
  A → R1 (But R2 closes)
  When Solenoid A is energized
  P → A
  B → R2 (But R1 closes)
  Once energized, shifted position is maintained even after the electricity is cut off.



[V6-343-B]

- 4TB349 · 4TB449
  When 4TB330 is de-energized (Illustrated)
  P · A · B · R1 · R2 close
  When 4TB340 is de-energized
  P (Closes)
  A → R1
  B → R2
  When 4TB350 is de-energized
  P → A · B
  R1 · R2 (Closes)
  When either solenoid B or A is energized
  It becomes same structure as that of 4TB320 or 4TB420.



[V6-343-C]

Discontinue

No.	Parts	Materials	Note
①	Cap	Polyphenylene sulfide	
②	Spring	Stainless steel wire for spring	
③	Spool	Aluminum	
④	Spool packing	Nytril rubber	
⑤	Y shape packing	Nytril rubber	
⑥	Piston	Acetal resin	
⑦	Body	Aluminum alloy, die-casted	Painted
⑧	Valve seat	Nytril rubber	
⑨	Manual button	Acetal resin	
⑩	Pilot valve	Polyphenylene sulfide	
⑪	Plunger ass'y	——	
⑫	Coil ass'y	——	
⑬	Cover	Polyphenylene sulfide	

3.2 Operation

1) The range of working pressure

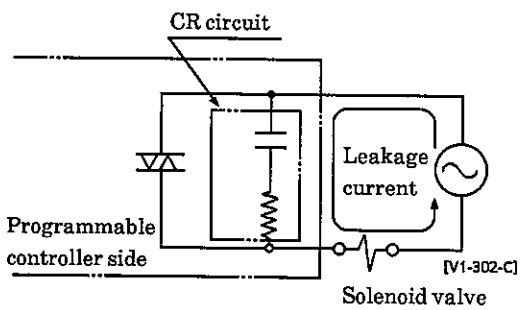
Always keep working pressure above specified, confirming the lowest limit of it including the case of pressure drop, due to it being internal pilot type solenoid valve. Rather use the one with external pilot type in case pressure drop is suspected to exceed the lowest limit.

	Min. working pressure MPa
4TB310 · 4TB410	0.15
4TB320 · 4TB420	0.10
4TB330 · 4TB430	0.20
4TB340 · 4TB440	
4TB350 · 4TB450	

2) Solenoid valve

- Leak current control

Keep confirmed that the leak current out of programmable controller output stays within the following specification, when operating solenoid valve by programmable controller to prevent wrong actuation.



DC24V	1.8mA or less
AC200V	1.5mA or less
AC100V	3 mA or less

- Working voltage

Coils for AC100V, 200V (50/60Hz) are serviceable with AC110V, 220V (60Hz).

- Continuous energize

Give remedy of radiating heat when installing unit within control box or operating unit with long energizing hours, because it is apt to generate quite some volume of heat.

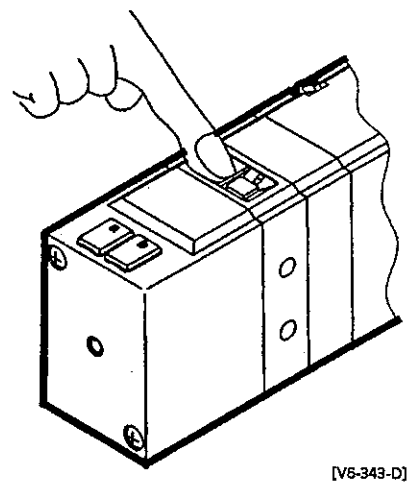
3) Manual override

- Manual override

  Main valve will not be shifted with this device, unless compressed air is supplied through pilot line supply port (P), due to it being pilot operated type solenoid valve.

- Non-locking type manual override

  Press operating button down to it hitting the bottom. As for 3-position single solenoid valve, it generates as the same effect as if it is energized, while the button is being pressed down and retracts when button is released. 2-position double solenoid valve on the contrary generates as the same effect as if solenoid coil A(B) is energized when Button A (B) is pressed down but does not retract even when the button is released. Press B (A) button down to make it retract.



[V6-343-D]

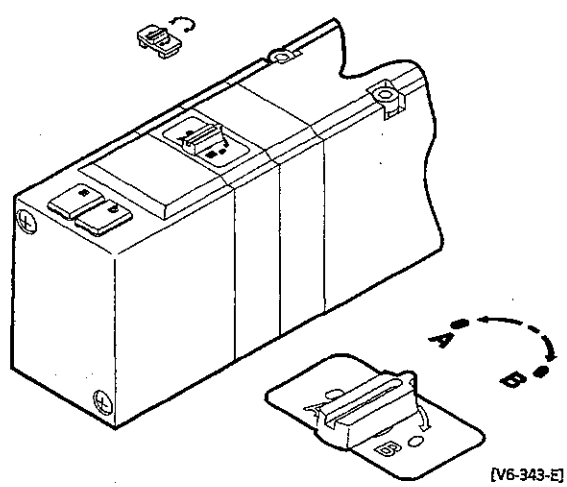
- Locking type manual override

  Valve A(B) generates as the same effect as if it is energized when the knob is turned for approx. 90°, by either screw driver or fingers, toward the direction of A(B).

  Center position of knob, for 3-position type, is neutral position.

  Avoid forcible turning the knob beyond locking position to prevent its damage.

  Also, make it sure to release the locking before starting regular operation.



[V6-343-E]

4) Response time

- Supply pressure

  Response time posted in catalog is the one when energized with no lubrication at pressure of 0.5MPa.

- Lubrication

  It may some time be caused delayed response time in case when the volume of lubricant is excessive or working pressure is remarkably low.

4. INSTALLATION

4.1 Piping

1) Avoid such usage as discharging A or B port to an open air by choking supply port (P).
2) Make sure that there is no leakage from tubing between solenoid valve and cylinder particularly when using 3-position, all port blocked models such as 4TB330 OR 4TB430. and also see to that cylinder has no leakage through rod packing and piston packing. Cylinder may rather keep moving instead of stopping in the position when there is leakage.

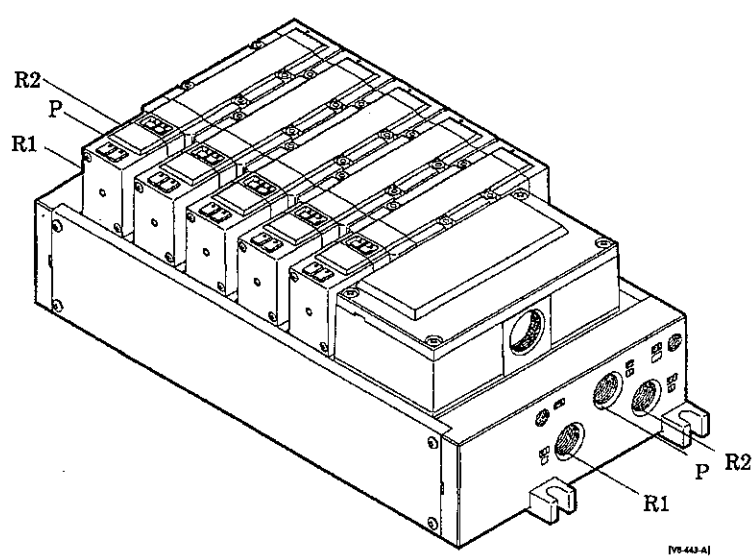
   It may be advisable, however, to use cylinder with brake where there is requirement of holding cylinder long in an intermediate stopping position or retaining repeating accuracy.
3) There is no restriction of mounting posture of solenoid valve. It is still recommended to install the unit on a flat and horizontal surface. Avoid installation of the unit where there is vibration more than 50m/s^2 or shock more than 300m/s^2.

Vibration ~~50 m/s^2~~ or more Shock ~~300 m/s^2~~ or more

4.2 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) Nos. of station

   When intending to operate 6 blocks or more simultaneously, connect Pressure ports to both inlets on each end of manifold ports as well as connecting to dischaging exhaust in an open air from both exhaust ports (R). Otherwise, it may generates only insufficient speed of cylinder.q

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) There may be an incident that a discharge pressure throuh an unrelated solenoid valve cause a malfunction of system due to the pressure going by round about route when building system to drive double acting cylinder with A·B·R (3-position) connection thorugh manifold or intending to drive single acting cylinder with 4 directional valve altering it to 3 directional valve. As for preventive measure of this kind of malfunction, either seperate dischage circuit with partition plug or install an individual discharge spacer.

4.3 Ambient Conditions

1) Dust

It may cause malfunction of system or oil leakage when there are much dusts around the system.

Mount either silencer or elbow joint to R port keeping its open end downward within the area of much dusts 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 cause 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 the nearest CKD dealer if the case is as such.

3) Continuous energize

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.

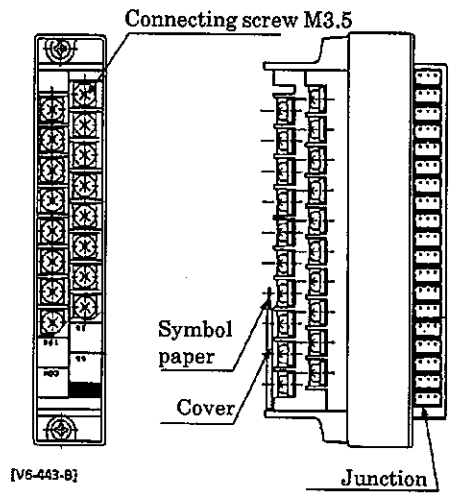
5) Ambient temperature

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.

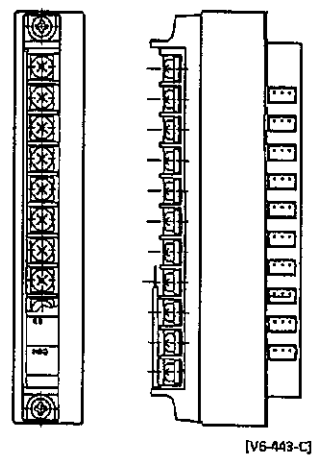
4.4 Electric wiring

1) Concentrated terminal base type (T10)

(1) External appearance

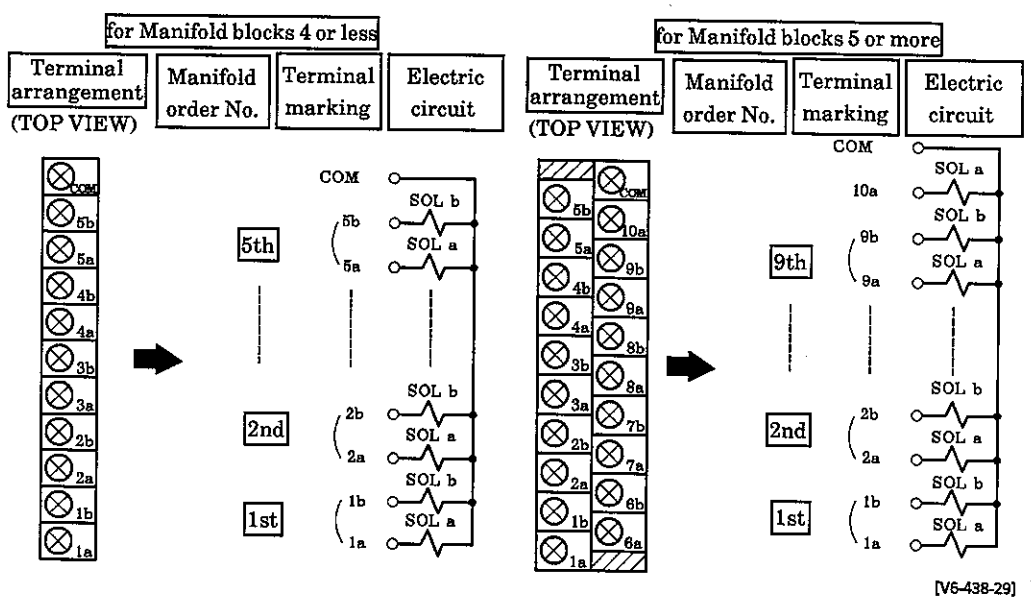


Manifold blocks, over 5 ea.

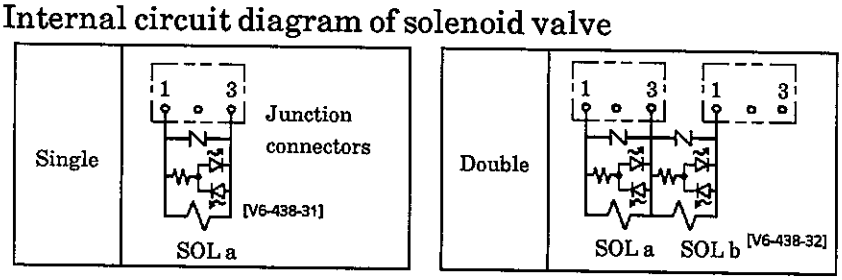


Manifold blocks, less than 4 ea.

(2) Circuit architecture and terminal arrangement



Internal circuit diagram of solenoid valve

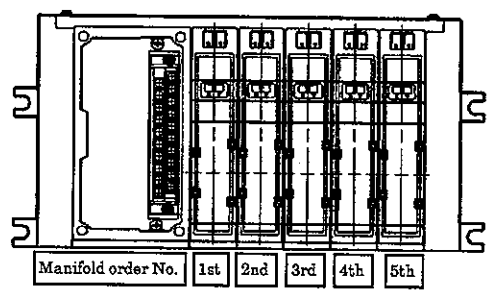


Solenoid valve, Standard specifications

(3) Correspondence of circuit architecture with terminal arrangement

Terminal numbers are, in accordance with markings on terminal cover, allocated to respective solenoids.

Numeric figures in markings such as "1a", "1b", "2a" ··· denote order of sequential number of blocks and letters in the markings denote either a solenoid side or b solenoid side, respectively. Allocation of sequential block numbers of manifold is began from left end block while facing to port side, regardless the location of wiring block.



[V6-443-D]

An example of correspondence is shown below.

○ for Single solenoid valve

	Connector pin No.																	
	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b	7a	7b	8a	8b	9a	9b	10a
1st	○																		
2nd			○																
3rd					○														
4th							○												
5th									○										
6th											○								
7th													○						
8th															○				
9th																	○		
10th																			○
Marking	○ SOL. (a) side / ● SOL. (b) side																		

○ for Double solenoid valve

	Connector pin No.																	
	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b	7a	7b	8a	8b	9a	9b	10a
1st	○	●																	
2nd			○	●															
3rd					○	●													
4th							○	●											
5th									○	●									
6th											○	●							
7th													○	●					
8th															○	●			
9th																	○	●	
10th																			○
Marking	○ SOL. (a) side / ● SOL. (b) side																		

○ for mixed (Double and single) solenoid valve

	Connector pin No.																	
	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b	7a	7b	8a	8b	9a	9b	10a
1st	○																		
2nd			○																
3rd					○	●													
4th							○	●											
5th									○										
6th											○								
7th													○	●					
8th															○				
9th																	○		
10th																			○
Marking	○ SOL. (a) side / ● SOL. (b) side																		

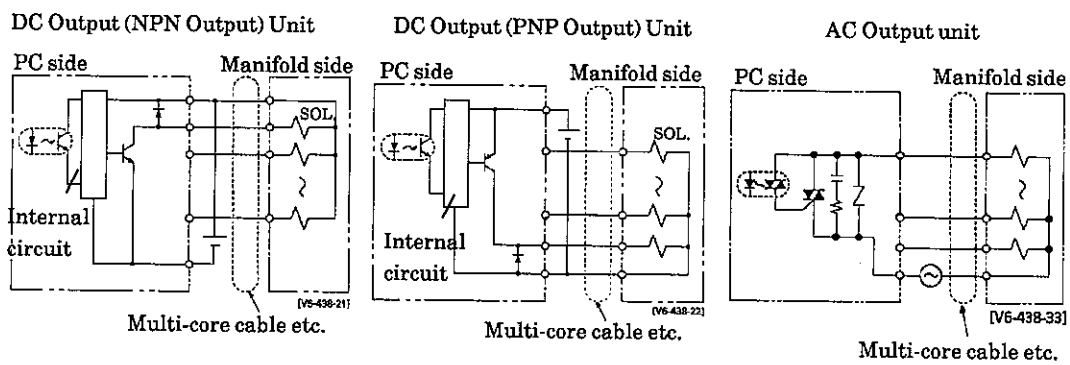
The table, left, indicate corresponding relation between pin Nos.and solenoid on 10-block manifold when installing single solenoid onto blocks No. 1, 2, 5, 6, 8 9 & 10 while installing double solenoid (including 3-position valve) onto other blocks, as an example of mixing installation of single and double valved.

(4) How to connect with PC

Common wiring is internally laid in advance. It is able to be connected either to ⊕ or ⊖ terminal because there is no polarity on solenoid valve.

Wire it according to illustrations below, respectively.

Terminal blocks are provided M3.5×7 screws. Width of clamp terminal should be less than 7, for M3.5 size. Apply tightening torque of 1.0N·m or over.



(5) How to mount or dismount terminal blocks

Lift terminal block base upward by loosening mounting screws at both end of base.

For mounting the unit, tighten screws with the torque of more than 1.0 N · m.

Note there is no inter changeability between terminal bases No. 11 and No. 20.

5. MAINTENANCE

5.1 Periodic inspection

1) Carry out periodic inspection(s) once or twice per annum to maintain the best service condition of solenoid valves.
2) Items to be inspected are slacken screws, accumulation of dust or foreign particles or drain inside of tubing. Give air blow to clean it when accumulation is abnormal.

Discontinue

6. HOW TO ORDER

● Solenoid valve body only for manifold control

4TB3 (1) 9 — 00 — (L) ——— (1)

● Block manifold

M4TB3 (1) 9 — (08) — (L)(T10) — (2) — (1)

Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓒ Ⓗ

Ⓐ Position and Status	
Symbol	Description
1	2-position, Single
2	2-position, Double
3	3-position, All port block
4	3-position, ABR connection
5	3-position, PAB connection
8	Mixed Manifold

Ⓑ Connecting Port diam (Cylinder port)	
Symbol	Description
08	Rc 1/4
10	Rc 3/8
08Y	Rc 1/4 (Plumbing on reverse side)

Ⓒ Manually Operation Devices	
Symbol	Description
No code	Non-locking type manual override
M1	Lock type man. OP. decice

Ⓓ Indicator, Protection circuit	
Symbol	Description
L	with Lamp & surge absorber
No code	without Lamp & surge absorber

Ⓔ Wiring type	
Symbol	Description
T10	Terminal stand type

Ⓕ Other options	
Symbol	Description
No code	No others
K	External pilot
P	Drip proof

● Describe options in order of K and P when purchasing duplicate of options.

Ⓖ Manifold nos. of station	
Symbol	Description
2	2 blocks
⌇	⌇
	Up to max. nos. of station

Ⓗ Voltage		
Symbol	Description	Description
1	AC100 50/60Hz	Standard
2	AC200 50/60Hz	
3	DC 24	
4	DC 12	Option
5	AC100 50/60Hz	
6	AC200 50/60Hz	

Discontinue

● Solenoid valve body only for manifold control

4TB4 (1) 9 — 00 — (L) ——— (1)

● Block manifold

M4TB4 (1) 9 — (10) — (L)(T10) — (2) — (1)

Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ Ⓗ

Ⓐ Position and Status	
Symbol	Description
1	2-position, Single
2	2-position, Double
3	3-position, All port block
4	3-position, ABR connection
5	3-position, PAB connection
8	Mixed Manifold

Ⓑ Connecting Port diam (Cylinder port)	
Symbol	Description
10	Rc 3/8
15	Rc 1/2
10Y	Rc 3/8 (Plumbing on reverse side)

Ⓒ Manually Operation Devices	
Symbol	Description
No code	Non-locking type manual override
M1	Lock type man. OP. decice

Ⓓ Indicator, Protection circuit	
Symbol	Description
L	with Lamp & surge absorber
No code	without Lamp & surge absorber

Ⓔ Wiring type	
Symbol	Description
T10	Terminal stand type

Ⓕ Other options	
Symbol	Description
No code	No others
K	External pilot
P	Drip proof

● Describe options in order of K and P when purchasing duplicate of options.

Ⓖ Manifold nos. of station	
Symbol	Description
2	2 blocks
⟆	⟆
	Up to max. nos. of station

Ⓗ Voltage		
Symbol	Description	Description
1	AC100 50/60Hz	Standard
2	AC200 50/60Hz	
3	DC 24	
4	DC 12	Option
5	AC100 50/60Hz	
6	AC200 50/60Hz	

Discontinue

Discontinue

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