CKD

SM－1766－A

INSTRUCTION MANUAL

MAVL

- 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 operation manual carefully for proper operation.

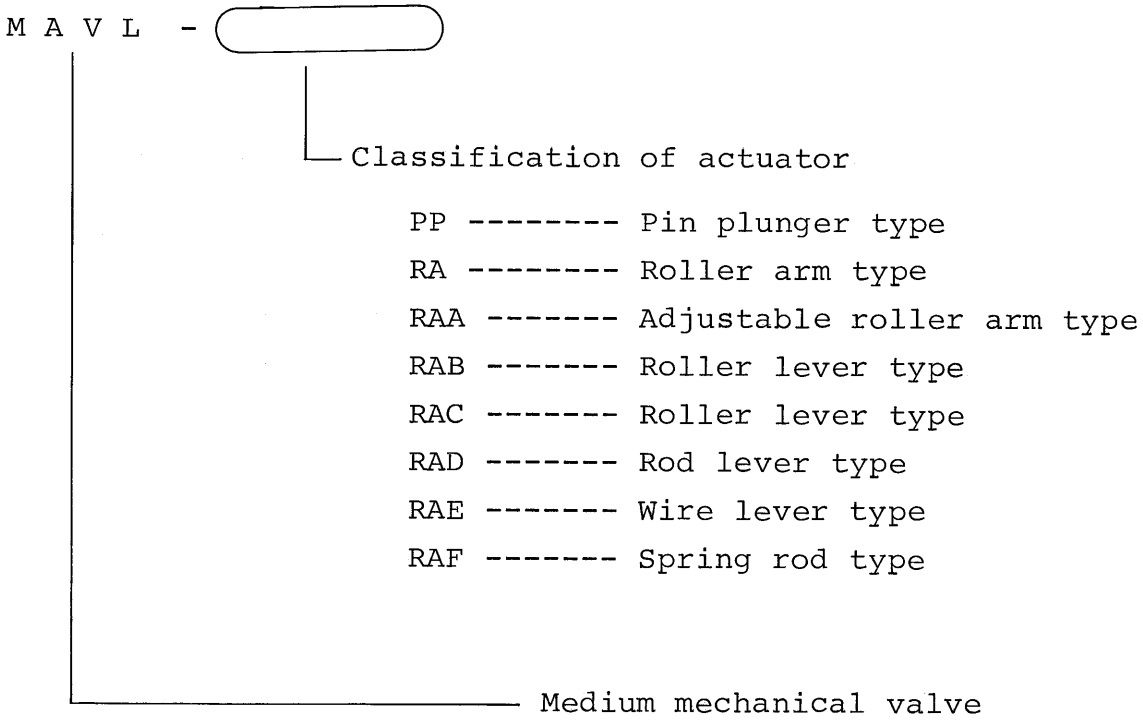
We thank you for purchasing CKD products.

We are confident that all CKD products will satisfy the needs since they are produced under severe quality control.

Please read through this manual containing the specification and instructions on installation and maintenance of the product in order to use CKD MECHANICAL VALVES effectively.

CONTENTS

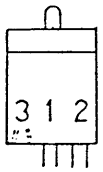
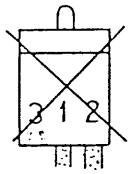
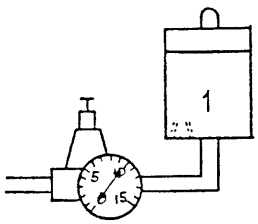
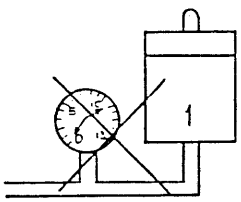
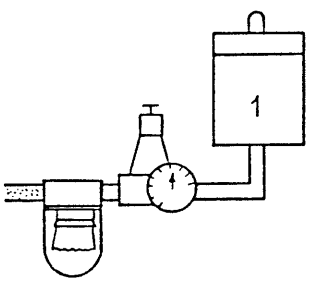
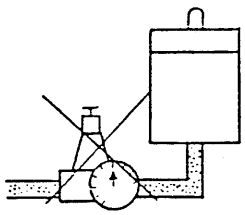
1. How to read model codes



2. Specification

(1) Fluid used: Air — Air
(2) Working pressure range: 0～1.0MPa
(3) Working fluid temperature: 5 ～ 60 °C (Freezing prohibited)
(4) Working ambient temperature: 5 ～ 60 °C

3. Important points in installation

Item	Correct usage	Incorrect usage	Description
1			Remove the dust and other foreign matters in the pipes before piping the MECHANICAL VALVE.(Air flushing)
2			Be careful that the primary (the first port) pressure should not exceed the working pressure range. Use a regulator for high pressure.
3			Provide a filter before the regulator in order to prevent the dust and water from coming in it.

A 3-way valve for pneumatic control, which functions by means of mechanical detection and is equal to a vertical limit switch of electrical limit switch of electrical equipment.

4. Features

1) No intermediate bleeding because the MECHANICAL VALVE opens the main valve after stopping the exhaust valve.

2) As the pressure can be applied from three ways, the MECHANICAL VALVE can be also used as a normal open valve, normal close valve and distributor.

3) A housing head arm of limit switch is mountable.

4) The pressure necessary for function will not change even if the supplied pressure should change, because of the pressure-balanced mechanism of MECHANICAL VALVE.

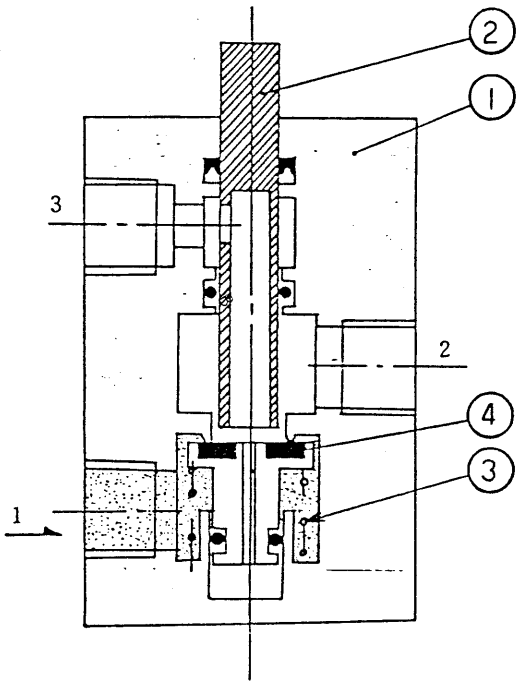
5) Smaller stroke up to function and larger stroke for function.

6) The arm can be set to function at any position freely in 360°.

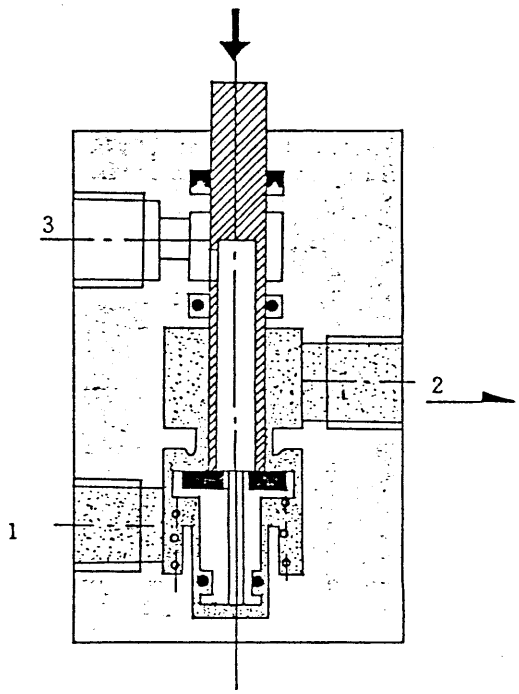
7) The housing head can be set in four positions.

5. Description of function

When the valve is not functioning



When the valve is functioning



(3-way pressuring)

1. Applying the pressure to port 1

   Port 2 OUT, Port 3 EXH (Normal close valve)

2. Applying the pressure to port 3

   Port 2 OUT, Port 1 EXH (Normal open valve)

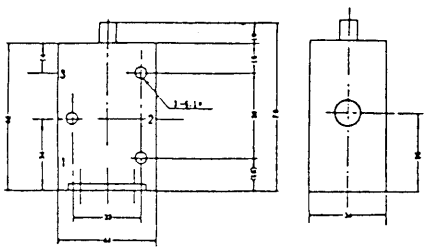
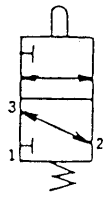
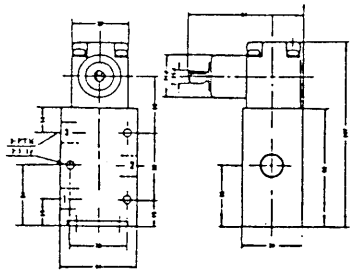
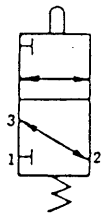
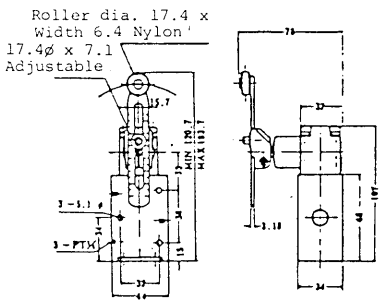
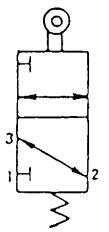
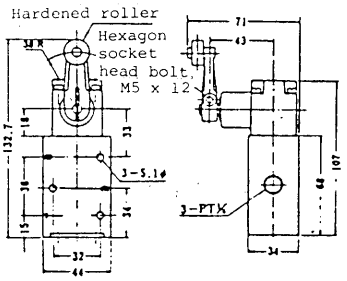
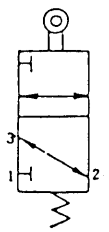
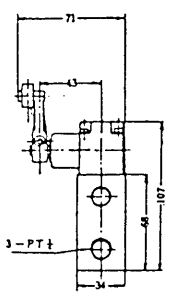
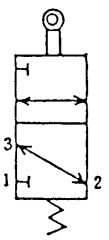
3. Applying the pressure to port 2

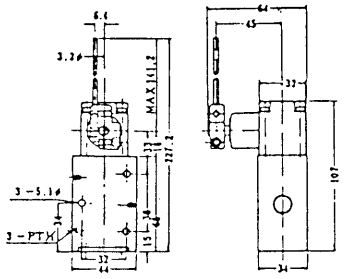
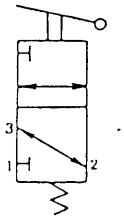
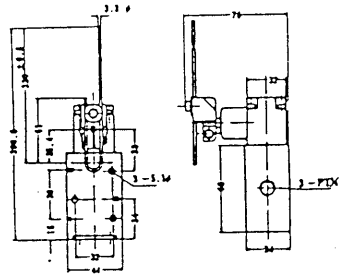
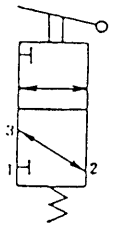
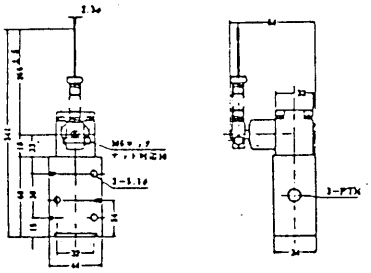
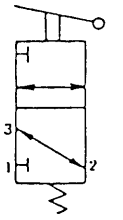
   Port 1 OUT, Port 2 OUT (Distributor)

Materials of main parts

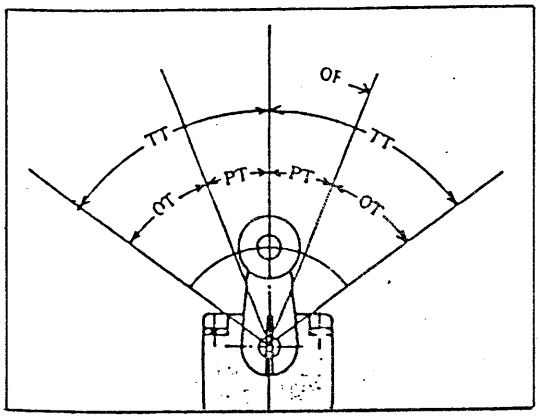
Parts	Material
① Body	AC-4
② Spool	SUS304
③ Spring	SUS304
④ Valve	NBR
⑤ Gasket	NBR

6. External dimensions and specifications

Type	Outline dimensions	Specification	Symbol
Pin plunger type MAVL-PP		O.F: NC pressure 51.0N (0.49MPa) NO pressure 37.3N (0.49MPa) P.T: 3 mm O.T: 2 mm T.T: 5 mm	
Roller arm type MAVL-RA		O.F: NC pressure 82.4N (0.49MPa) NO pressure 66.7N (0.49MPa) P.T: 25° O.T: 30° T.T: 55°	
Adjustable roller arm type MAVL-RAA		O.F: NC pressure 9.8N (0.49MPa) When arm max. NO pressure 7.9N (0.49MPa) When arm max. P.T: 25° O.T: 30° T.T: 55° Part of function: Straight cam, low-speed cam and other rotators.	
Roller lever type MAVL-RAB		O.F: NC pressure 21.6N (0.49MPa) NO pressure 20.0N (0.49MPa) P.T: 25° O.T: 30° T.T: 55°	
Roller lever type MAVL-RAC		O.F: NC pressure 21.6N (0.49MPa) NO pressure 20.0N (0.49MPa) P.T: 25° O.T: 30° T.T: 55° Only the arm is different from RAB.	

Item	Outline dimensions	Specification	Symbol
Rod lever type MAVL-RAD		O.F: NC pressure 4.9N (0.49MPa) NO pressure 4.0N (0.49MPa) P.T: 25° O.T: 30° T.T: 55° The rod lever made of hard aluminium can be cut off and machine depending upon the requirements.	
Wire lever type MAVL-RAE		O.F: NC pressure 1.8N (0.49MPa) NO pressure 1.2N (0.49MPa) P.T: 25° O.T: 30° T.T: 55°	
Spring rod type MAVL-RAF		O.F: NC pressure 3.0N (0.49MPa) NO pressure 1.6N (0.49MPa) P.T: 45° O.T: 10° T.T: 55°	

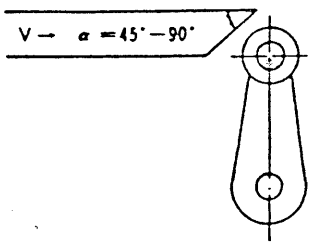
7. Method to use arm and lever



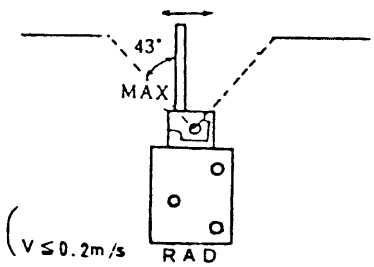
Code	Description
O.F	A force necessary up to functioning
P.T	Movement up to fully open the valve.
O.T	Movement after the valve opens fully
T.T	Total movement

- o The dog-cut-angle θ be within 45°.
- o Decrease θ if the dog speed is fast.
- o When setting the function position and depth of dog, $(P.T + \frac{O.T}{2})$ is desirable. (Do not use more than T.T.)
- o Do not use the MECHANICAL VALVE body as a mechanical stopper.
- o So design the cams and dogs that the lever should return slowly.

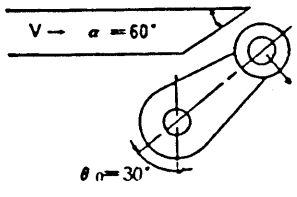
① $V \leqq 0.2$ m/s



α °	V max (m/s)
90°	0.05
75°	0.07
60°	0.1
45°	0.2



② $V \leqq 0.1$ m/s

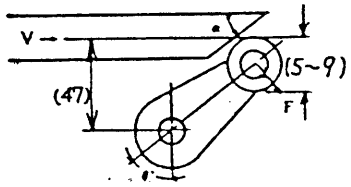


Set the arm in parallel to the cut surface of dog so that the force should work at a right angle to the arm.

Generally, the designing of dog and arm setting are the easiest.

α = 60° and θ = 30° are recommended.

③ $V \leqq 2$ m/s



The dimensions in ( ) are those for RAB(C).

α = 90-θ	V max (m/s)
40°	0.7
35°	0.9
30°	1.3
25°	2.0

When the angle is decreased, Vmax (Max. speed) will increase.

So set the arm that it should be always in parallel to the cut surface of dog.

o Possible to set in three kinds of sequences.

The limit switch of lever type can be set electrically to both directions, clockwise direction and counter-clockwise direction by means of the direction of the incorporated step-plunger.