

# **Three-Way Lock-Up Valve**

## **Model : VF03**

### **User's Manual**



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# Three-Way Lock-Up Valve Model VF03

## 1. Overview

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Three-Way Lock-Up Valve Model VF03 is a small three-way On/Off valve incorporated with a diaphragm motor having a reset mechanism. It is used for special on-off switching operations where automatic and manual operations are available. It has a structure to change over air pressure lines by the balance between the signal air pressure acting on the upper diaphragm and a preset spring force.

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## 2. Principle of Operation

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The Three-Way Lock-Up Valve consists of a locking mechanism and a valve body assembly.

The locking mechanism has a handle ①, adjusting screw ②, diaphragm chamber, and diaphragm spring ⑬. Press the handle ① down by hand, and the signal air pressure will be led into diaphragm chamber. In this situation, the vent seal ⑨ will shut down without any leakage. Diaphragm spring ⑬ will operate to adjust the signal air pressure in diaphragm chamber.

For instance, when the diaphragm spring ⑬ is compressed to 50 kPa {0.5 kgf/cm<sup>2</sup>} of air pressure, fluid will flow in the direction of “AB” → “A” through the valve body under conditions of 50 kPa {0.5 kgf/cm<sup>2</sup>} to 100 kPa {1.0 kgf/cm<sup>2</sup>} in signal air pressure, because downward force makes the stem ⑰ hold the seat adapter ⑳ closed.

Next, if the signal air pressure decreases below 50 kPa {0.5 kgf/cm<sup>2</sup>}, the air in the diaphragm chamber will vent out through a hole on the diaphragm case ⑩ by increment of upward force exerted by the diaphragm spring ⑬, and by closing of the diaphragm air passage with diaphragm ⑭ while the thrust button ⑫ pushes up the reset stem ⑥. At this stage, the stem ⑰ will be pushed upward, and the seat adapter ⑳ is pushed upward by valve spring ㉑ equipped in the adapter assembly ㉒. Then, fluid will flow in the direction of ‘AB’ → ‘B’ through the valve body.

Once this state is attained, this state will be held until handle ① is pushed down again even if the signal air pressure rises to the change-over signal pressure or higher.

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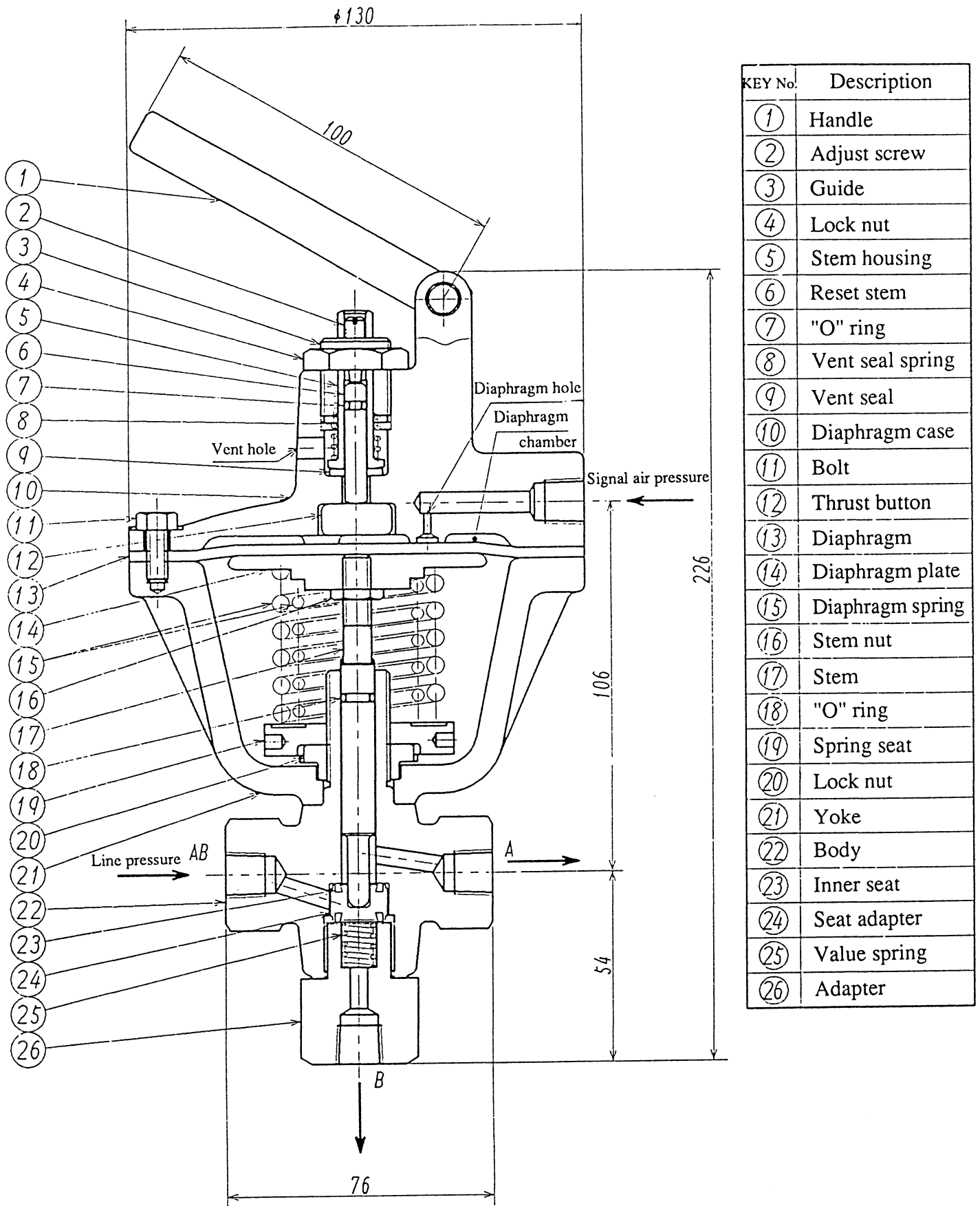


Figure 1 Three-Way Lock-Up Valve

### 3. Piping

The Three-Way Lock-Up Valve has four piping connections. Signal air pressure is introduced into the hole on the locking mechanism. The marks 'AB', 'A', and 'B' on the body indicate each piping connection. 'AB' is the main pressure supply hole and is capable of introducing maximum air pressure of 490 kPa {5.0 kgf/cm<sup>2</sup>}. Pushing the handle ① downward in a locked-up state opens 'AB' → 'A' while it will switch to 'AB' → 'B' when unlocked. Note the respective markings before connection for this purpose.

All connecting holes are Rc 1/4 thread.

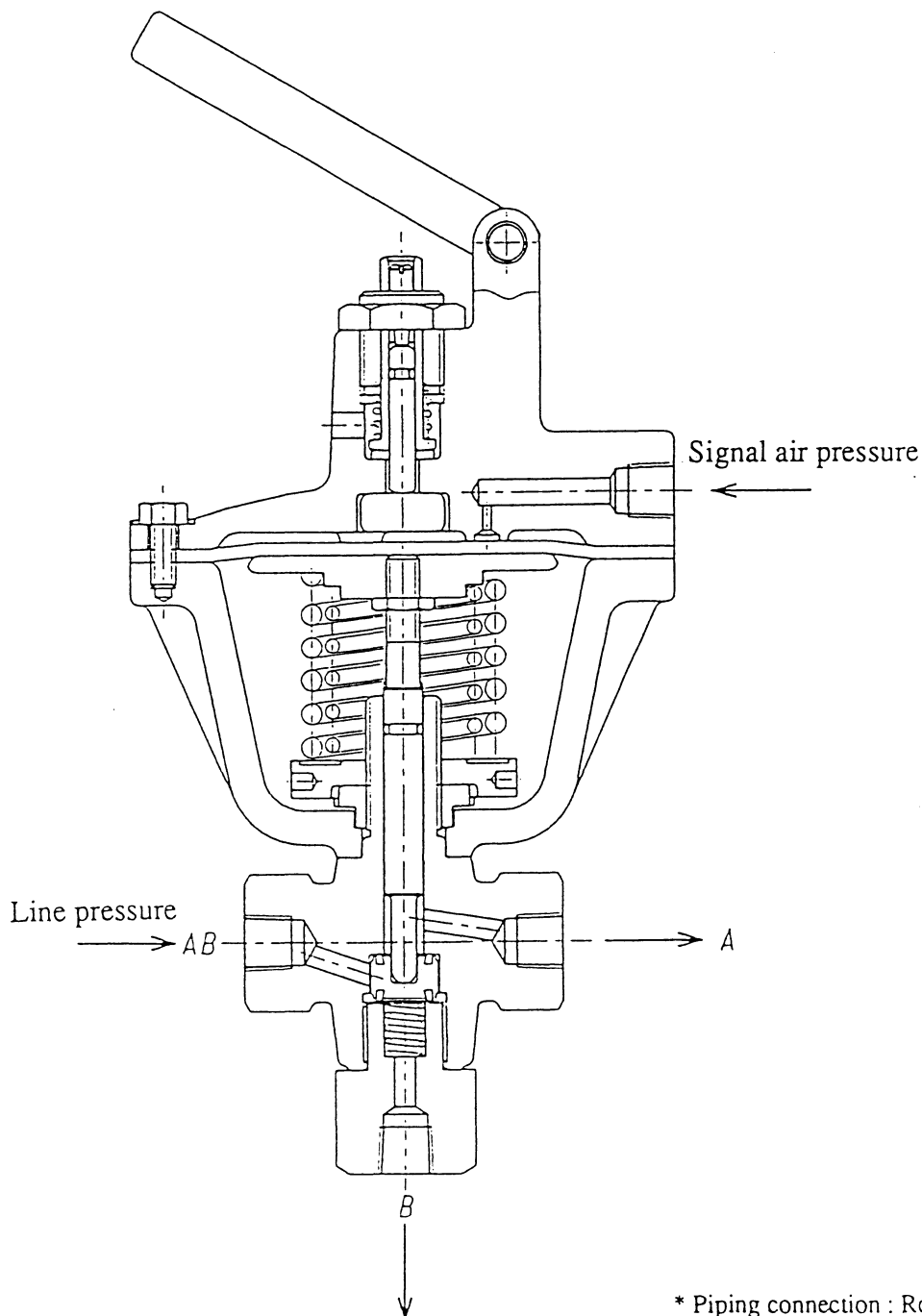


Figure 2. Air Piping Instruction

## 4. Specifications

Body rating : 690 kPa { 7.0 kgf/cm<sup>2</sup> }

Main materials:

Body : Brass

Diaphragm : Ethylene propylene rubber

Trim : SUS 304 (with neoprene sheet)

Actuator : Aluminum alloy

Line pressure : 490 kPa { 5.0 kgf/cm<sup>2</sup> }

Signal air pressure : 20 to 100 kPa { 0.2 to 1.0 kgf/cm<sup>2</sup> }  
[max.: 270 kPa { 2.8 kgf/cm<sup>2</sup> }]

Adjustable range of air pressure for

Change-over point setting range : 40 to 80 kPa { 0.4 to 0.8 kgf/cm<sup>2</sup> }

Dead band : 10 kPa { 0.1 kgf/cm<sup>2</sup> } (max.)

Air piping connection : Rc 1/4 thread

Ambient temperature range : -30 to +80°C

## 5. Assembly, Adjustment and Disassembly

### 5-1 Assembly and Adjustment

Assembly and Adjustment		Remarks
a)	Assemble the yoke ⑪ and the body ⑫. Insert the valve stem ⑬ with "O" Ring ⑭ into the body ⑫, then push it down lightly by hand from the top so as not to touch the adapter ⑮ (or instead of inserting the stem ⑬, it can be accomplished by plugging the hole on the body with the finger). At this stage, it is necessary to prevent leakage from the 'AB' and 'B' holes when an air pressure of 490 kPa { 5 kgf/cm <sup>2</sup> } is applied through the 'A' hole.	If there is leakage, it is because the inner seat ⑯ of seat adapter ⑮ is not properly seated in the body. Therefore, it is necessary to correct either the adapter or the inner seat ⑯.
b)	If there is no leakage from the 'AB' and 'B' holes install the diaphragm case ⑩ to the yoke ⑪.	However, in this case, remove the guide ③ on the top portion of the diaphragm case, adjust the screw ②, and the stem housing ⑤.
c)	Apply an air pressure of 100 kPa { 1 kgf/cm <sup>2</sup> } through the signal air pressure hole, check for any leakage from the hole on the diaphragm case.	If there is leakage, tighten diaphragm spring ⑮ within one full turn or less. If there is further leakage, readjust either the hole of the diaphragm case ⑩ or the diaphragm ⑬.
d)	If the leakage from the diaphragm case holes has been completely stopped, once again, check for leakage in the 'AB' and 'B' holes with the body ⑫ and diaphragm case ⑩ assembled.	If there is leakage, this is due to excessive length of the stem ⑬ which is pressing down the seat adapter ⑮. Therefore, the stem ⑬ and the diaphragm plate must be adjusted and the step readjusting procedure repeated.
e)	If there is no leakage from the 'AB', 'B' holes, and the diaphragm hole assembly adjuster screw ②, guide ③, and stem housing ⑤. Then push down the adjuster screw ② after the guide ③ been properly screwed in. Again, at this stage, push down the adjuster screw ② until a momentary	

Assembly and Adjustment		Remarks
	leakage from diaphragm case hole begins by checking for leakage with soapy water.	
f)	Push down the handle ① after signal the adjuster screw ② at the point when leakage starts.	The normal condition of this stage is that the air pressure is to be released from the 'A' hole to 'AB'. But, if there is leakage from 'B', this is due to the excessive shortening of the length of the stem ⑰ at step d) adjustment. Between the shortened stem ⑰ and the seat adapter ⑳ there is some clearance which causes a floating effect in the seat adapter ⑳ while the handle ① is pushed down. In such a case, it is necessary to extend the length of the stem ⑰ to a desirable length by disassembling the body ㉒ and the diaphragm case ⑩ while leaving the adjuster screw ② in position. Also, be cautious in adjustment of stem length as a minimum clearance between the point of the stem ⑰ and the seat adapter ⑳ must be obtained when the body ㉒ and the diaphragm case ⑩ are assembled.
g)	The above stem ⑰ adjustment steps should be carried out until leakage from the 'B' hole is ceases. After leakage is completely stopped, a set point for lock up can be obtained by merely adjusting the diaphragm spring ⑱.	

## 5-2 Disassembly

To disassemble, follow the assembly procedure in reverse.

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