

# Mixing valve

## MIX-S

# INSTRUCTION MANUAL

- For your safety, read and understand this manual thoroughly before handling the equipment.
- Keep this manual at a designated place for easy access at all times.



**LUBE CORPORATION**

# Introduction

## ■ System application

The MIX-S mixing valve model is a metering valve for oil/air lubrication. It uses air to break up the oil into fine particles and continuously transport these particles of oil to the lubrication points.

Do not use this system for any other purposes.

## ■ Marks used in manual

In this manual, safety precautions are provided using the marks below in order to prevent accidents which might cause injuries to human bodies. Be sure to carefully read these safety precautions to understand the contents thoroughly before handling the equipment.

 <b>WARNING</b>	Indicates a potentially hazardous situation which, if ignored, could result in death or serious injury.
 <b>CAUTION</b>	Indicates a potentially hazardous situation which, if ignored, may result in minor or moderate injury.

In addition to the above, the marks below will also appear in this manual. Please read the following explanation in order to handle the equipment correctly.

	Indicates referential information or points to which special attention should be paid while handling the equipment. If ignored, the equipment and/or the machine could be damaged.
	Indicates referential information or points which are helpful for handling the equipment.
	Indicates a reference clause.

## ■ Questions/Contacts

If any question or doubt arises concerning the contents of this manual, contact following:

### ■ Japan

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## ■ Details of contents

Details of all illustrations and specifications in this manual are subject to change without prior notice for improvement and development of the equipment.

## ■ Resale or leasing

At the time of resale, leasing out or lending out the equipment to the third party, make sure to include with the equipment all the manuals and any other documents found supplied at the time of initial installation.

## ■ Disposal of equipment/Oil

Make sure to dispose equipment or oil as designated by National laws and/or local regulations.

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# 1 .Safety precautions

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## 1-1 Basic safety precautions

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- Carefully read this manual to understand the contents before handling the equipment.
- Keep this manual at a designated place for easy access at all times.
- This equipment is handled by only personnel who have the knowledge and skill of its installation and adjustment.
- Never modify or change this equipment without prior permission of LUBE.

## 2.Specification

### 2-1 Specification

Model	MIX-S
Discharge amount	0.005 ml/shot, 0.001 ml/shot, 0.015 ml/shot, 0.03 ml/shot, 0.05ml/shot
Operating pressure	1.0MPa
Reset pressure	0.15MPa
Working pressure	1.5~2.5
Supply air pressure	Refer to “2-6 setting of supply air”
Discharge permissible error range	0.005ml/shot . . . ±15% 0.01 ml/shot . . . ±10% 0.015ml/shot . . . ±10% 0.03 ml/shot . . . ±10% 0.05 ml/shot . . . ±10%
Durability	1,000,000 shot (Minimum no of shots guaranteed)
Connection screw and pipe outside diameter	Discharge port : M8 x 1, OD Φ4mm Oil inlet : M10 x 1, OD Φ6mm Air inlet : M14 x 1.5, OD Φ8mm Note: For the above connections use compression bushing, compression sleeves and tubing inserts suitable for the pipe diameter.
Pipe length	Refer to “3-3 Tubing connection”

## 2-2 Name of each component

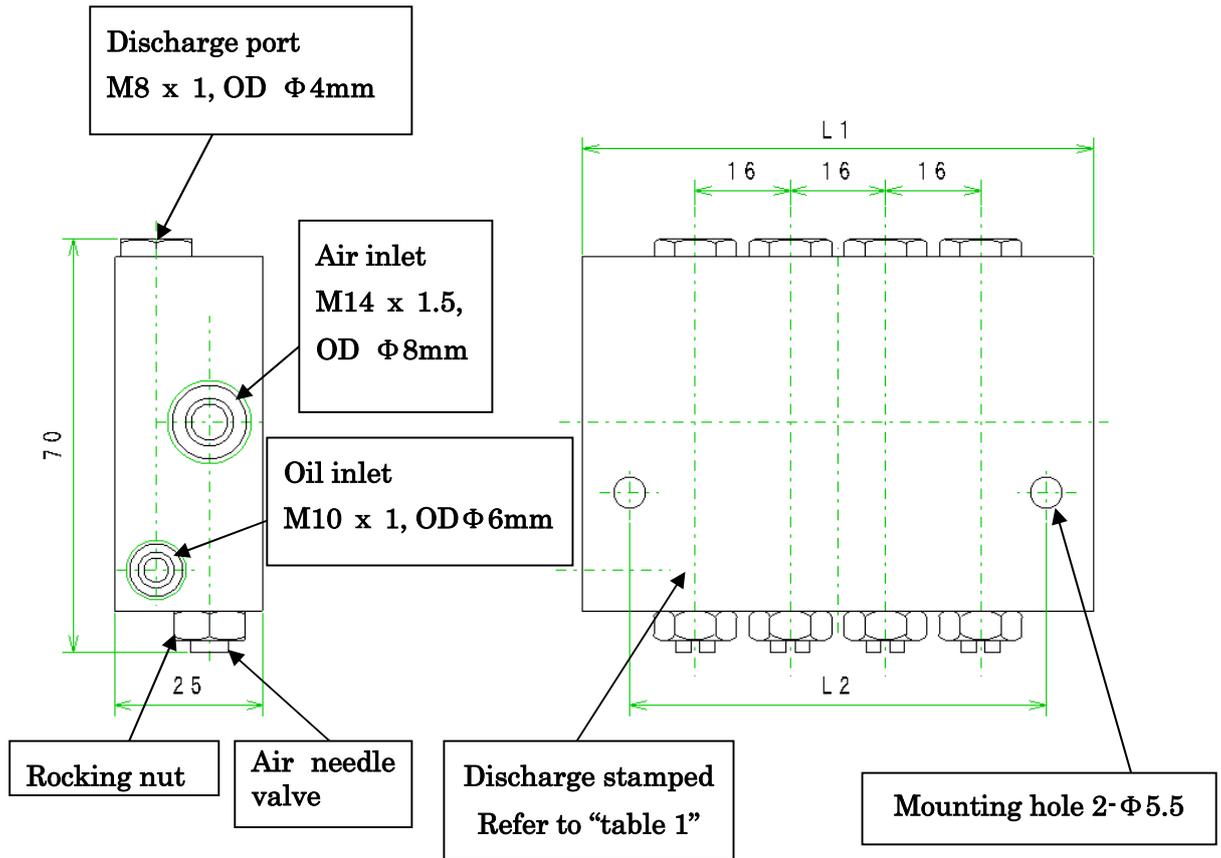


Table 1: Discharge stamped

Number	Discharge amount	Number	Discharge amount
05	0.005ml / shot	3	0.03 ml / shot
1	0.01 ml / shot	5	0.05 ml / shot
15	0.015ml / shot		

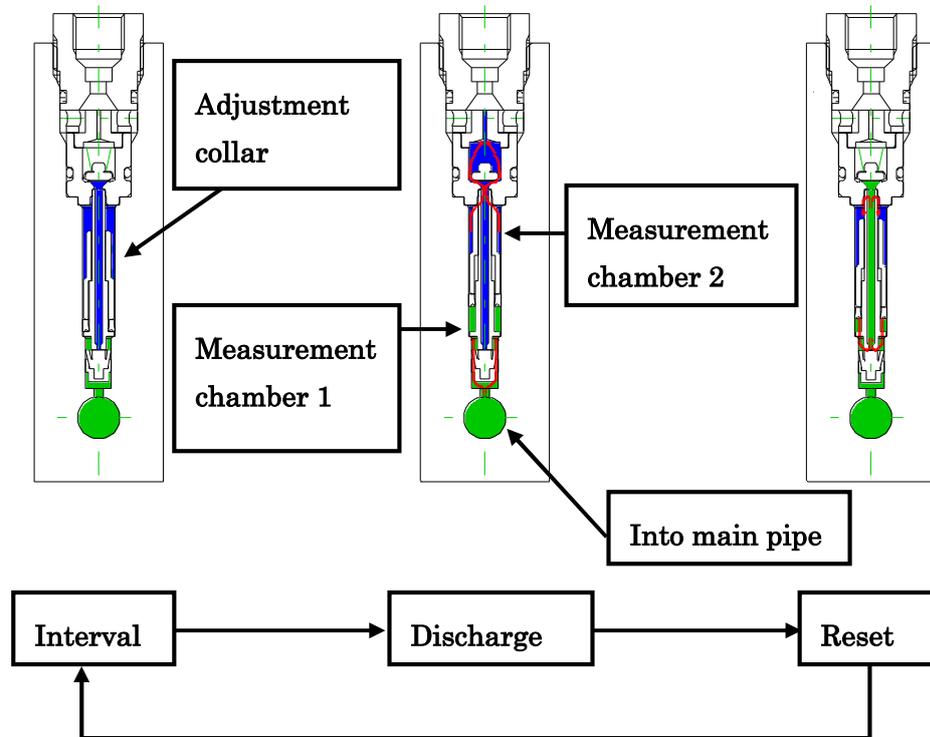
Table 2: Length

Discharge amount	1	2	3	4	5	6
L <sub>1</sub>	38	54	70	86	102	118
L <sub>2</sub>	22	38	54	70	86	102

## 2-3 Basic operation diagram

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### MIX-S valve basic operation diagram



#### [Interval]

As shown in the diagram above, the adjustment collar is in the return state.

#### [Discharge]

When pressure is raised in the main piping by the pump, oil enters measurement chamber 1 and the adjustment collar is pushed up. With this movement, the oil in measurement chamber 2 is discharged.

#### [Reset]

When the specified volume of oil is discharged, the adjustment collar is pushed back by means of a spring. With this movement, the oil in measurement chamber 1 is sent to measurement chamber 2 in preparation for the next discharge operation.

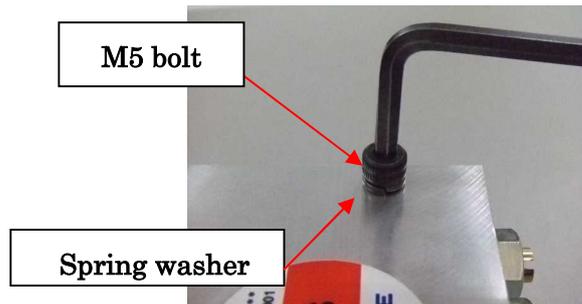
# 3. Handling for safety

## 3-1 Mounting unit 1

With the discharge port facing upward or transverse, mount tightly to the M5 bolt using a spring washer and a flat washer.



Tighten the bolt to a torque of 1 to 1.5 N · m.

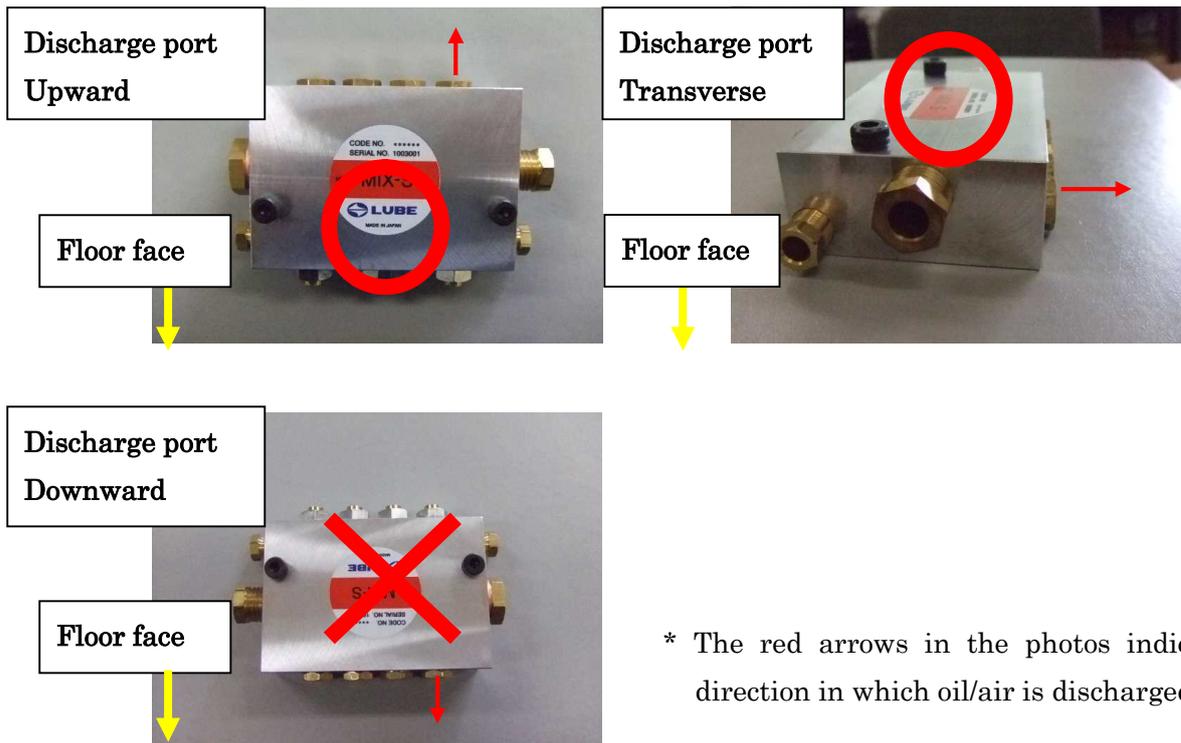


## 3-2 Mounting unit 2

Mount the mixing valve so that the discharge port is facing upward or is transverse.



Do not mount with the discharge port facing downward. If air enters inside the valve, air cannot be bled from inside the valve when mounted (or it becomes difficult for air to be bled).



\* The red arrows in the photos indicate the direction in which oil/air is discharged

## 3-3 Tubing connection

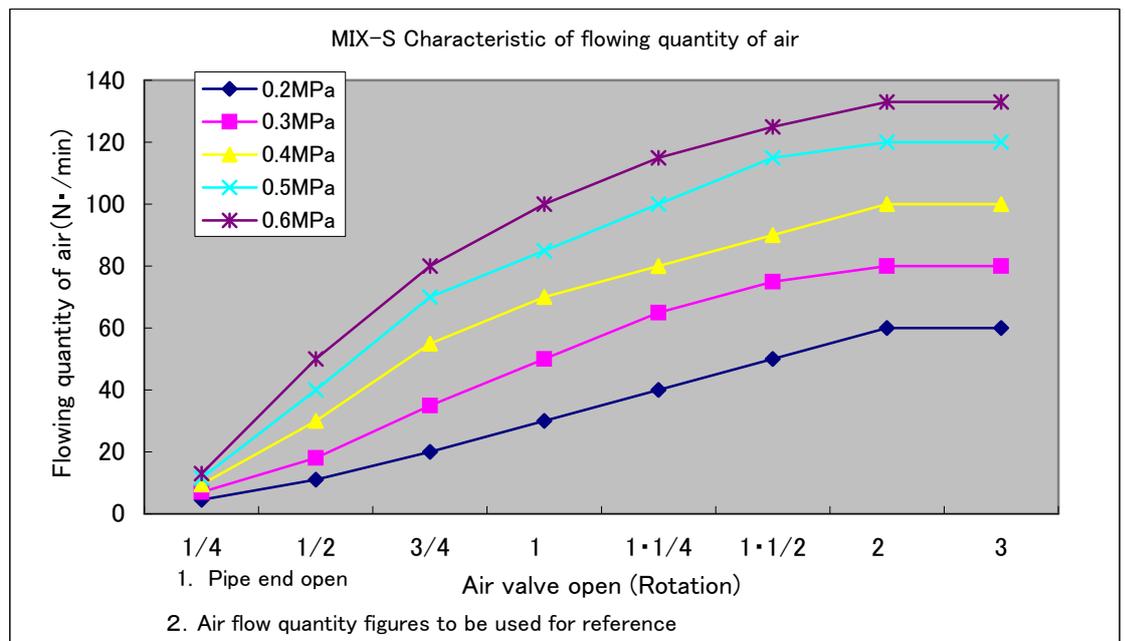
The length of the piping (4 mm OD) connecting the discharge port is to be between **1000 mm and 5000 mm**. To shorten the initial lubrication time, put two or three loops between the mixing valve discharge port and the end fitting.



Contact LUBE if the above conditions are to be exceeded.

## 3-4 Adjustment of flowing quantity of air

Use the graph below as a guide for adjusting the air flow quantity.



After adjusting the air flow quantity, make sure the locking nut (HEX12) is tightened to prevent the air needle valve from rotating.

## 3-5 Setting of supply air

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a. Use supply air

Dry air must always be used for supply air.

b. Setting of supply air pressure

The air pressure setting for the mixing valve is restricted according to the pump discharge pressure.

The relationship between the pump discharge pressure, the valve operating pressure, and the air pressure (back pressure) is as follows.

$$\text{Pump discharge pressure} > \text{Valve operating pressure} + \text{Air pressure (back pressure)}$$

As such, if a pump with 1.5 MPa discharge pressure is used, the valve operating pressure is 1 MPa, so the air pressure (back pressure) is no more than 0.5 MPa, as shown below.

$$1.5 - 1 = 0.5\text{MPa}$$

As the air pressure (back pressure) is discharged as needed from the pipe end at the discharge side, it does not rise as high as the source pressure, but the air pressure should be set so that it does not exceed 0.5 MPa.

## 3-6 Bleeding air

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When using for the first time, or after the device has been out of use for a year or more, or if air has entered the system, air must be bled. To bleed the air, first fit the valve, then carry out the procedure below.

- ① Loosen the locking nut and put the air needle to completely closed.



Product is shipped with the air needle valve completely closed. If the air needle valve has not been opened by the customer there is no need to carry out the following procedure.

- ② Open the end of the main piping, operate the pump, and bleed the air from the main piping. Run the pump for **two minutes** to clean the main piping.



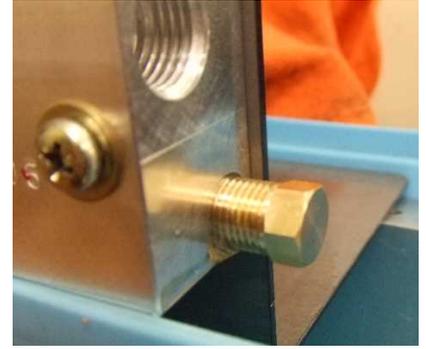
- ③ After confirming continuous oil flow from the opened end section, secure the fitting to the mixing valve.



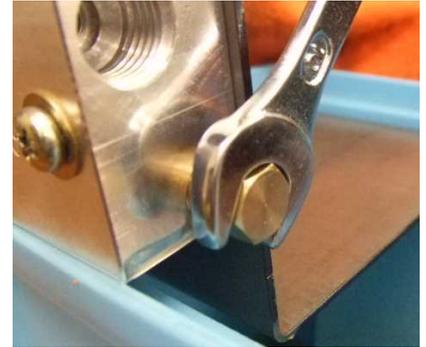
- ④ Operate the pump again and when no more air is released from the end of the mixing valve, stop the pump.



- ⑤ Put a closure plug into the end of the mixing valve, screw in about **half a turn** and run the pump again.



- ⑥ A small amount of air is released. After that, tighten the closure plug when oil comes out from the screw section.



- ⑦ Connect an air bleeding pipe(4 mm OD, about 150 mm length) to the mixing valve discharge port and operate the pump again. Keep operating the pump until no more air is released. The frequency for bleeding air depends on the discharge amount. See Table 3 for the frequency for bleeding air.

Table 3: Frequency of bleeding air by discharge amount

Discharge amount	Frequency of bleeding air
0.005ml / shot	About 60~70 times
0.01 ml / shot	About 30~40 times
0.015ml / shot	About 25~35 times
0.03 ml / shot	About 15~25 times
0.05 ml / shot	About 10~15 times



The frequencies for bleeding air shown above were actual measurements when a 4 mm OD pipe was connected to the discharge port and air was no longer detected in the piping directly after the discharge port.

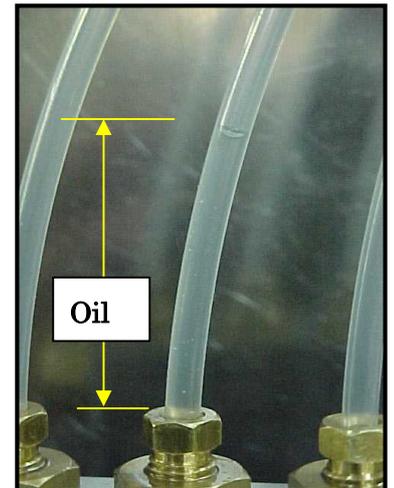
**\* When using a small OA sensor and 0.005 ml/shot, consider the frequency for bleeding air to be about 80 to 100 times.**

## 3-7 Confirm method of discharge amount

When air bleeding is complete, use the following method to confirm the discharge amount. If the pump is operated when the air needle valve is completely closed, only oil is discharged from the mixing valve discharge port. Measure the oil displacement distance at this time (the amount the oil has moved within the oil supply pipe).

Table 4: Relationship between mixing valve discharge amount and oil displacement distance

Discharge amount display	Discharge amount (ml/shot)	Oil displacement distance (mm)
05	0.005	1
1	0.01	2
15	0.015	3
3	0.03	6
5	0.05	10



The table above shows oil displacement distance for 4 mm OD, 2.5 mm ID piping.

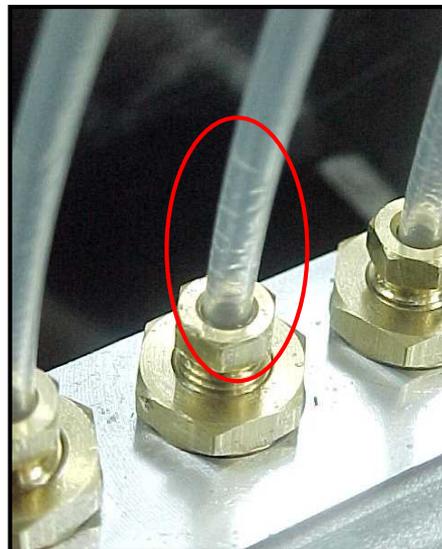
## 3-8 Confirm method of oil/air lubrication status

When air bleeding from the mixing valve is complete, open the air valve and check around the discharge port pipe connection to see whether oil is being transported by air (at the discharge port, oil is transported around the inner wall of the piping).

However, on the first operation, sometimes the oil is not transported to the discharge port area and is not detected by the oil/air sensor. From the second time onward, the oil is always transported and the oil/air sensor detects it.



Valve stopped



Valve operating

## 3-9 Operation following machine stoppage

When operation is started, air flows into the oil supply pipe and the mixing valve operates, the approximate speed at which the discharged oil is sent to the lubrication points is as below. Before running the machinery, prepare the oil/air device for operation by running it for a period of time determined by the length of oil supply piping.

0.03 ml	40cm / min
0.01 ml	20cm / min
0.005 ml	10cm / min

Example) When oil supply piping is 3 m and discharge amount is 0.01 ml

$$\begin{aligned} & 300 \text{ cm} / 20 \text{ cm} / \text{min} \\ & = 15 \text{ min of running to prepare for operation} \end{aligned}$$

# 4 Troubleshooting

When troubles occur, take the measures as defined in the chart below.

Trouble	Cause	Measures to take
No oil/air discharged	Pump does not operate	Pump operate
	Pump fault (specified pressure in main piping is not reached)	Exchange of pumps
	LHL leaking from pump discharge port or pipe connection parts on machine (Due to looseness or excessive tightness)	Tighten them with proper torque or re-pipe them
	Pump filter or main piping line filter blocked	Clean or replace filter
	Air in the main pipe and valve	Refer to above measures for "3-6 Bleeding air"
	Air pressure is too high	Lowers up to the specified pressure Refer to above measures for "3-5 Setting of supply air"
No air discharged from discharge port	Air needle valve is closed	Open air needle valve
	Air is not supplied	Confirm compressor operation, adjust regulator
	Piping puncture (example: when pipe was connected a tube insert was not attached and the tube was punctured)	Use tube insert for nylon tubes
Large amount of oil coming from discharge port	Moisture coming from air supply side (compressor)	Fit air filter on supply air line



If troubles are not resolved with the steps above, please contact LUBE.