

Instruction Manual
for
Valve Control

Type LTMD-01/LTMD-02



SEIBU ELECTRIC & MACHINERY CO., LTD.

Head office&Factory : Koga,Fukuoka,JAPAN 811-3193

Phone (092)941-1507 Fax (092)941-1517

CAUTION— FOR YOUR SAFETY

These safety instructions list the most important safety items, with particular attention to operating this valve actuator.

Before using, first read these safety instructions carefully, then operate the valve actuator correctly, as instructed.

Furthermore, the operation of this valve actuator should only be done by a trained specialist.

Receipt; Transportation; Storage



CAUTION Preventing accidents caused by falling.

- (1) When hooking up and lifting valve actuator, first check the weight, then take great care and attention, never standing beneath the load.
- (2) With goods packed in cardboard boxes, if the cardboard packing gets wet, its strength can decrease, so take extra care when handling and/or storing.

If these cautions are neglected, it could result in serious injury.

Installation; Test running



CAUTION Preventing accidents caused by dropping or falling.

- (1) When hooking up and lifting valve actuator, first check the weight, then take great care and attention, never standing beneath the load.
- (2) While working, maintain a sure and safe footing, and avoid working on unstable things, such as pipes.

If these cautions are neglected, it could result in serious injury.



CAUTION Preventing electric shock.

- (1) When connecting uninsulated wires, ensure that water or moisture doesn't come into contact with those wires.
- (2) Always make sure there is a suitable earth connection.

If these cautions are neglected, it could result in electric shock



CAUTION Preventing serious injury (For electric actuator only)

- (1) Always ensure interlocking switches are connected properly.
- (2) When working, always keep in contact with the power switch operator.

If these cautions are neglected, it could result in electric shock.

Keep this notice in a place where it can be clearly seen at any time, and when installing and test runs are complete, hand it to the maintenance manager.

Maintenance control; Maintenance checks



CAUTION Preventing electric shock (For electric actuator only)

- (1) When connecting uninsulated wires, ensure that water or moisture doesn't come into contact with those wires.
- (2) Always make sure there is a suitable earth connection.

If these cautions are neglected, it could result in electric shock.

Keep this notice in a place where it can be clearly seen at any time, and when installing and test runs are complete, hand it to the maintenance manager.

In order to use the valve actuator properly and safely, maintenance, checking and care are of great importance.

MANUFACTURER

SEIBU ELECTRIC & MACHINERY CO., LTD.

CAUTIONS

- (1) Prior to starting the wiring works of LTMD Valve Control, check the following items.

Instructions for Handling the Valve Control

- 1.1 Prior to closing the switch cover, clean the mating surfaces and ensure the packing is complete clamp the fitting bolts securely.

In case of "Explosion type", when the liquid packing is stained by sand and dust. Cleaning up with alcohol apply the liquid packing uniformly again and then clamp the bolts.

If it is forgotten to clamp the bolts or clamped insufficiently, it may result the fault of explosion-proof feature.

- 1.2 Cable entrance should be sealed to prevent the entrance of rain water.
- 1.3 Don't hold open the switch cover and terminal cover after wiring, adjusting and inspections.
- 1.4 Wiring works in the rain weather should be avoided for outdoor use.
- 1.5 Use a water proof type enclosure for valve that are to be installed underground.
- 1.6 In case of "Explosion proof type", the outdoor cover should face upper.
- 1.7 As the revolving direction of motor and the Valve Control is the same, connect the outdoor leads as follows (R-U, S-V, T-W).
Refer 10.3 sequence Diagram.

- (2) Refer to the following parts of this operation manual before attempting a trial operation.

1. TRIAL OPERATION
2. POWER-MANUAL CHANGE-OVER
7. POWER OPERATION
8. MANUAL OPERATION

- (3) When reinstalling a Valve Control which has been removed from the valve, check and adjust each section of the device in accordance with the instruction manual, prior to power operation.

CONTENTS

1. TRIAL OPERATION
 - 1.1 Preliminary Check
 - 1.2 Preparation for Power Operation
 - 1.3 Check the valve Operating Direction
 - 1.4 Check the Limit Switch Operation
 - 1.5 Check the Torque Switch Operation

2. DESCRIPTION OF MACHANISM
 - 2.1 General
 - 2.2 Power Operation Mechanism
 - 2.3 Manual Operation Mechanism
 - 2.4 Power-Manual Change Over
 - 2.4.1 Power-to-Manual Change Over
 - 2.4.2 Manual-to-Power Change Over

(Accompanying Drawing: Construction of Valve Controls Type
LTMD-01, -02)

3. LIMIT SWITCHES
 - 3.1 Setting of Limit Switches
 - 3.1.1 Setting Procedure

4. TORQUE SWITCHES
 - 4.1 Setting of Torque Switches

5. POSITION INDICATOR
 - 5.1 Setting of Position Indicator for Local Indication
 - 5.2 Setting of Position Indicator for Remote Indication

6. MOTOR

7. POWER OPERATION

8. MANUAL OPERATION

9. MAINTENANCE
 - 9.1 Lubrication
 - 9.2 Others

1. TRIAL OPERATION

The trial operation should be performed in accordance with the following instructions.

1.1 Preliminary Check

- (1) Check electrical terminal connections referring to the terminal code label attached to the inside, of the switch cover of the Valve Control.
- (2) Connecting the conduit tube or waterproof flexible conduit to the wiring entrance, and using the liquid packing agent or seal tape on the screw surface certify that rain water can not enter it.
- (3) Make sure that the space heater for moisture prevention and electrical wiring do not contact each other.
- (4) The space heater should be energized, especially if the Valve Control had been kept in wet place before mounting.
- (5) Wash exposed parts of the valve stem and sleeve, and apply grease to them.
- (6) Make sure that there will be nothing to impede movement of levers of the limit switch and torque switch.
- (7) Make sure that the switch cover has been closed tightly again after it had removed for performing electrical wiring or adjustment.
- (8) Make sure that fuses at main power supply switch have not been blown.
- (9) Make sure that thermal relay has not been operated.
- (10) When the Valve Control and valve are separately supplied, the trial operation must be performed in accordance with suggestions obtained from the manufacturer's representative at the work site.

1.2 Preparation for Power Operation

Manually, open the valve to the half way position before any adjustments are made in the power mode, so as not to damage the valve.

1.3 Check the Valve Operating Direction

- (1) Manually open the valve to middle position.
- (2) Confirm that the indication of the handwheel coincides with the direction of valve movement.

- (3) Press push button in the order of OPEN→STOP→CLOSE→STOP to check that the motor starts and stops as required.
- (4) When terminals U, V, W are connected respectively to the power source R, S, T the valve can be operated to open. Therefore certify that when push button "OPEN" is pressed, the valve opens and when the push button "CLOSE" is pressed, the valve closes. If this movement is reverse, change two lead wires among three in the terminal box of the motor.
- (5) In conjunction with the above step, confirm that the pointer of the position indicator also moves in the correct direction.

1.4 Check the Limit Switch Operation

After checking the direction of the valve movement as above, confirm the limit switch operates in the predetermined position, as follows:

- (1) First, press the CLOSE push button, stop the valve shortly before its fully closed position. Close the valve manually.
- (2) Certify whether the arrow mark of limit switch in closing side indicates mark A simultaneously with full opening.
- (3) Similarly certify whether the arrow mark of the limit switch in opening side indicates mark A upon full opening.
- (4) When the above (2), (3) conditions are not obtained, readjust the limit switch in accordance with paragraph 3.1 [Setting of Limit Switch].
- (5) When the limit switch is correctly set, and the OPEN push button is pressed, when the valve is in full close, the motor may stop shortly after starting this is because of the operation of torque switch in the open side.

If the motor similarly behaves upon closing the valve in the fully opened position, the cause is operation of the torque switch on the close side.

In either case, readjust the torque switch in accordance with paragraph 4.1 [Setting of Torque Switch].

1.5 Check the Torque Switch Operation

The torque switch is normally set at the valve manufacturers' plant.

If the indication is within the red portion of the scale, that is, out of the permissible operating range, readjust the torque switch in accordance with paragraph 4.1 [Setting of Torque Switch].

2 DESCRIPTION OF MECHANISM (Refer to Fig. 1 — page 7)

2.1 General

Our Valve Controls are designed for motorized actuation of relatively small sized valves.

The major components of Valve Control are an electric motor and a reduction gear system. The Valve Control is also provided with such auxiliary mechanisms as (1) a position indicator, (2) limit switches to permit automatic stop control in the fully opened, fully closed or any desired position, (3) torque switches to prevent over load damage to some valve parts from excessive torque, and (4) a handwheel for manual operation.

To change—over from power operation to manual operation, the change—over lever is used, but the return from the manual operation to power operation is carried out automatically.

The manual handwheel is designed not to rotate even if the motor is started by mistake during manual operation.

Therefore the interlock switch is not provided.

2.2 Power Operation Mechanism

When "CLOSE" or "OPEN" push button is pressed, the motor starts, and the rotation speed of the motor is reduced by one-stage spur gear consisting of gear A (2) and gear B (3) as shown in Fig. 1 and one-stage worm gear consisting of worm (7) and worm wheel (32), and then it is transmitted to the sleeve (31) through the clutch (53) to open and close the valve which is connected to the stem bush (35) inserted inside the sleeve.

The worm is connected to the gear boss B with sliding key and transmits rotating force, and is designed to be movable in an axial direction.

In normal condition this worm (7) is kept by the torque spring (13) in normal position.

However, if the valve requires abnormally large operating force, it shifts in axial direction, compressing the torque spring.

This motion is used to operate the torque switch.

By the aid of the rotation transmitted from the sleeve (31) through crown gear (54), the limit switch functions to fully open, or close the valve as well as to stop it automatically at the required degree of opening.

If the "STOP" push button is pressed, the valve stops immediately to function regardless of valve position.

Although the worm wheel (32) can move freely on the sleeve (31), it engages with the clutch (53) in case of power operation and begins to rotate integrally with the sleeve.

Furthermore being connected to the sleeve spline, this clutch (53) is movable in axial direction.

Besides, there is a play of about 90° between clutch pawls, and bammer blow effect due to the inertia of motor rotor facilitates valve opening and closing.

2.3 Manual Operation Mechanism

To operate the valve manually, press the change lever (55) in Fig. 1 to manual operation side, then as the right side pawls of clutch (53) engage with pawls of the handwheel, the valve is actuated by rotating the handwheel.

2.4 Power—Manual Change—Over Mechanism

2.4.1 Power-to-Manual Change-Over

Clutch (53), having pawls on both sides, can engage with either of worm wheel (32) and handwheel (17).

When change lever (55) in Fig. 1 is pressed to manual operation side, clutch (53) moves to handwheel side being pressed by fork (48) and it is disengaged with the pawls at the side of the worm wheel (32) and the pawls at the reverse side are engaged with the pawls of handwheel (17), simultaneously clutch (53) is held in that position by lock lever (58) and the ratchet (59) of the holding mechanism.

2.4.2 Manual—to—Power Change—Over

Automatic returning system is employed.

When the motor rotates by pressing the push button "OPEN" or "CLOSE", a projection of B gear boss pushes out the lock lever, and the ratchet (59) kept in manual position is disengaged, further the clutch (53) is disengaged from the manual handle (17) being pressed by the clutch spring (53), and then returned to the power operation, engaging with worm wheel (32).

(Since the power operation can not be returned by the change-over lever, it should not be operated by force.)

CAUTION

Don't shift the change-over lever by force to the power operation position against the arrow mark, as it returns automatically when the motor starts.

Otherwise the mechanism will be damaged.

3. LIMIT SWITCH

As the standard, limit switch is provided with cam switches.

The setting of limit switch is completed at the valve manufacturer's plant.

If field setting is required, take the following procedure.

3.1 Setting of Limit Switch

Set the limit switch for the close side first, then for the open side.

3.1.1 Setting procedure

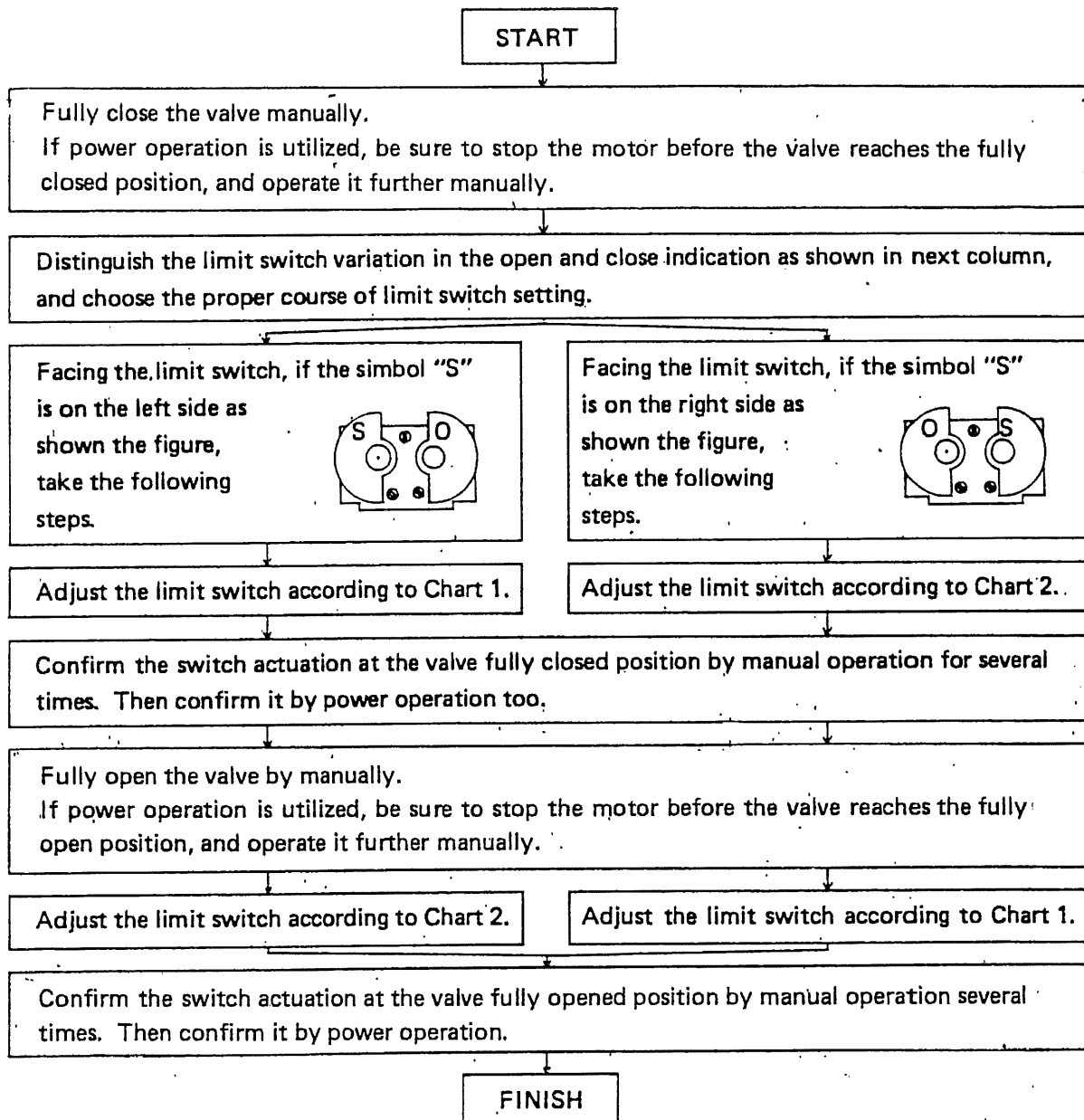
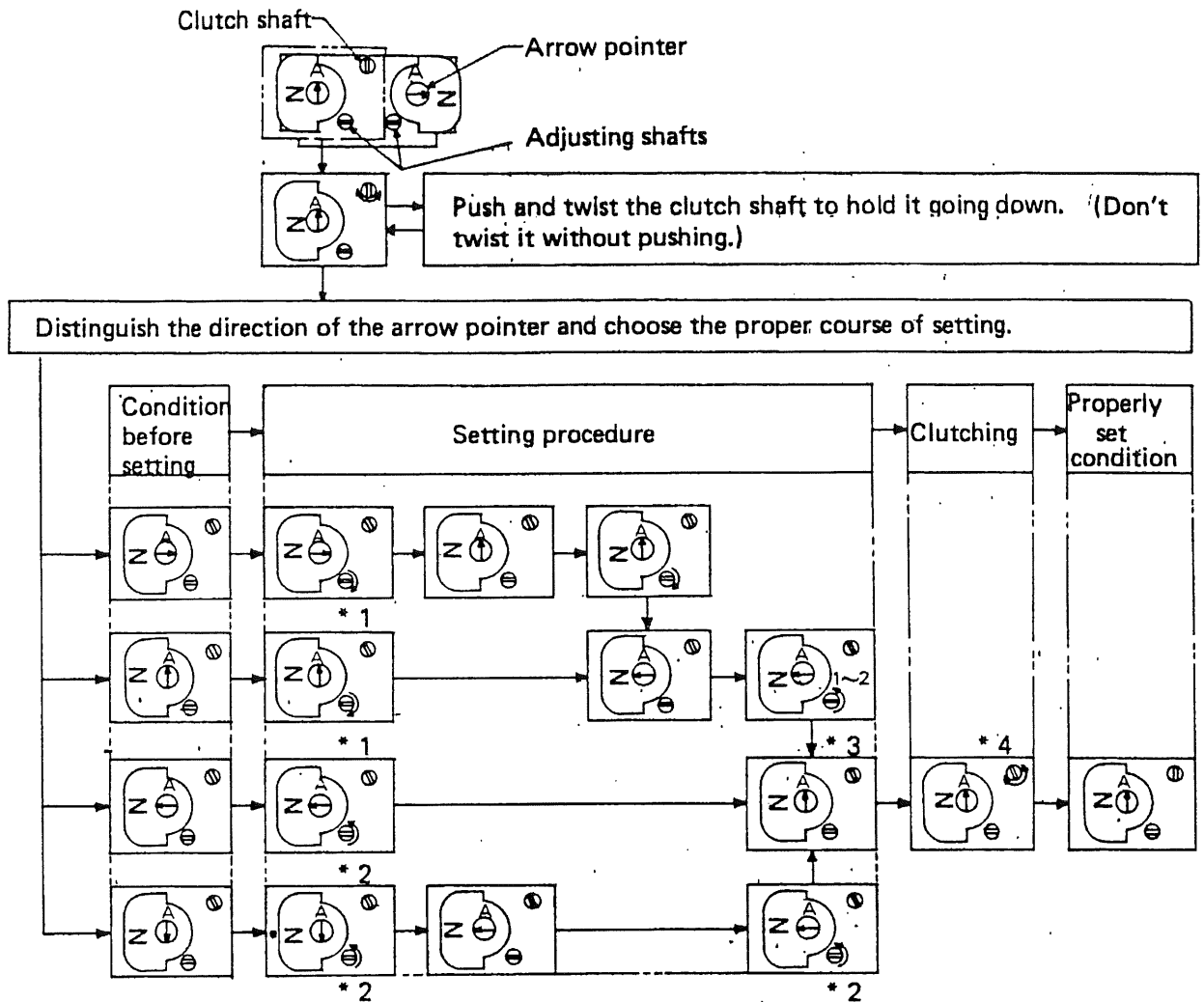


Chart 1



Explanation of figures

- * 1 : Turn the adjusting shaft clockwise until arrow pointer changes direction.
- * 2 : Turn the adjusting shaft counterclockwise until arrow pointer changes direction.
- * 3 : Turn the adjusting shaft counterclockwise once or twice until arrow pointer changes direction.
- * 4 : Twist the clutch shaft to come up. (If the valve is operated without coming up of the clutch shaft to the original position, the adjustment will come to nothing.)

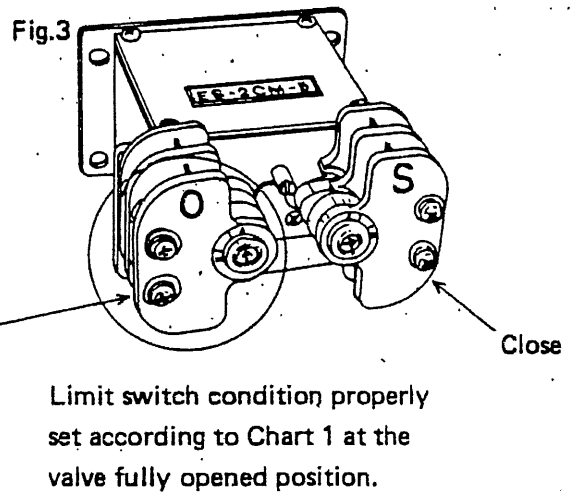
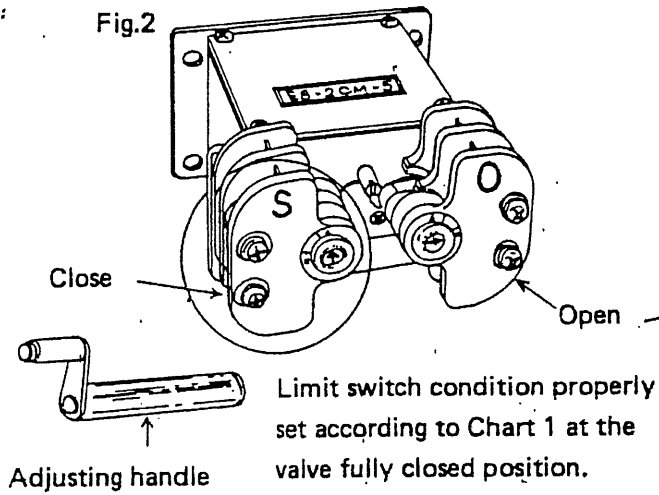
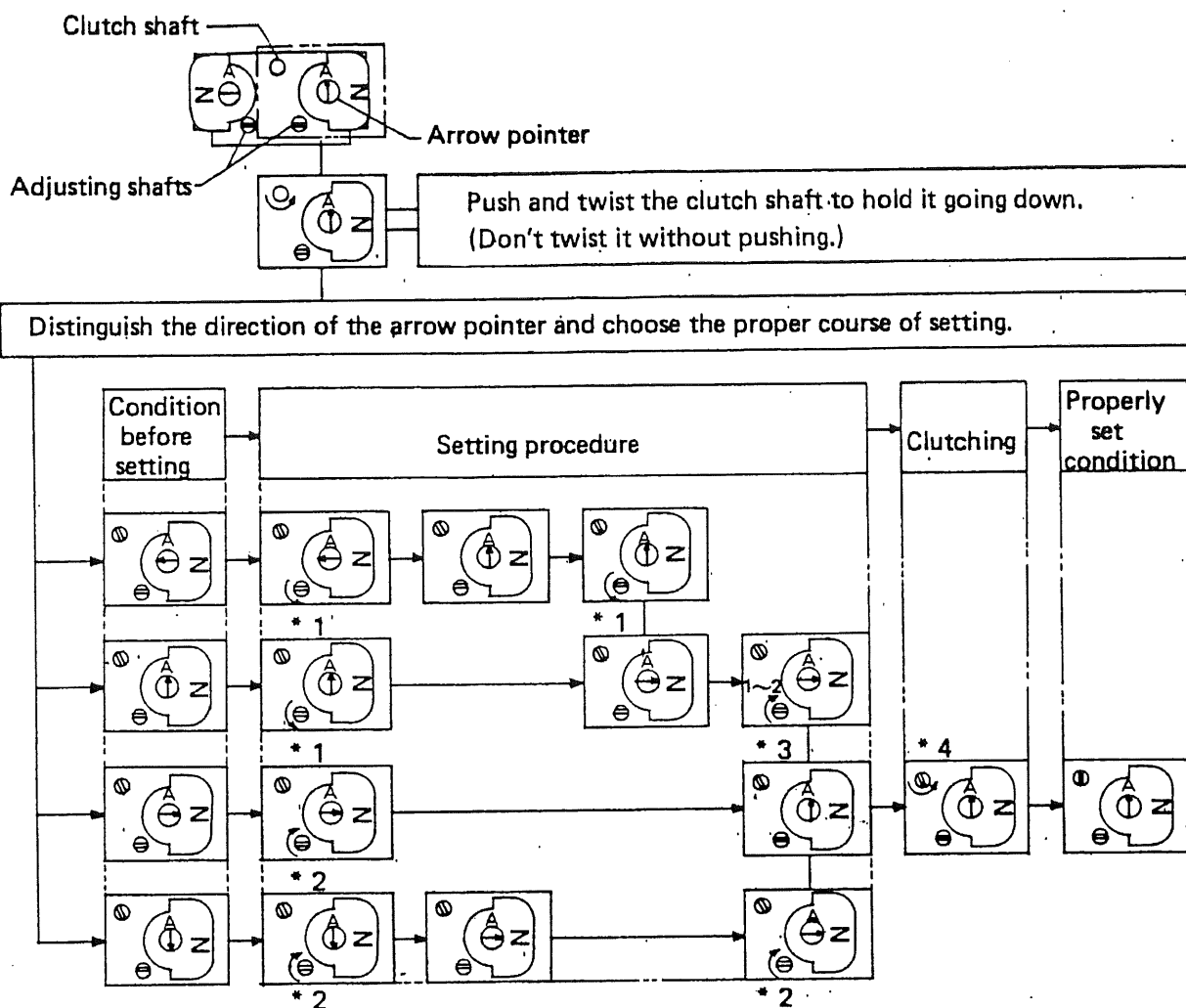
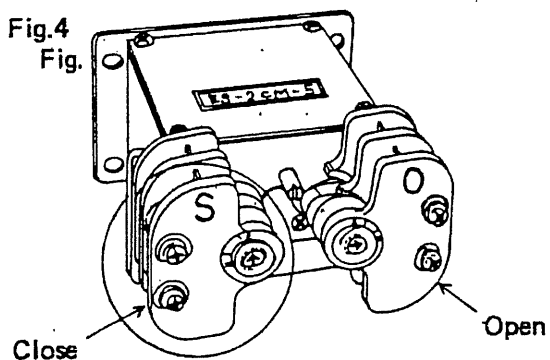


Chart 2

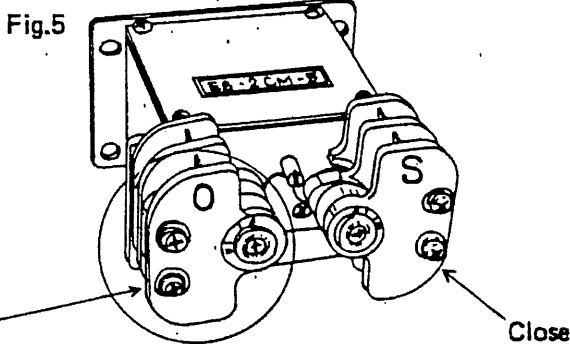


Explanation of figures

- * 1 : Turn the adjusting shaft counterclockwise until arrow pointer changes direction.
- * 2 : Turn the adjusting shaft clockwise until arrow pointer changes direction.
- * 3 ^{1~2} : Turn the adjusting shaft clockwise once or twice until arrow pointer changes direction.
- * 4 : Twist the clutch shaft to come up. (If the valve is operated without coming up of the clutch shaft to the original position, the adjustment will come to nothing.)



Limit switch condition properly set according to Chart 2 at the valve fully opened position.



Limit switch condition properly set according to Chart 2 at the valve fully closed position.

4 TORQUE SWITCH

As described in the paragraph 2.1, the torque switch functions automatically to stop the motor when an excessive torque is applied to the valve stem.

The torque switch is provided with two switches for both opening and closing the valve, and they can be adjusted independently.

4 - 1 Setting of Torque Switch

The torque switch is adjusted at factory before shipment so that it will operate at proper torque. If readjustment of the torque switch is required by some reason, take the following steps.

The operating torque will increase in proportion to the scale indication on the switch dial. When the adjusting screw (refer to Fig. 4) is loosened, the pointer can be freely moved.

First, set the pointer to position 1 on the scale and operate the valve electrically. Now, as the torque switch operates prior to the operation of the limit switch, gradually move the pointer toward larger indications on the scale.

An ideal setting is such that the torque switch will operate immediately after tripping of the limit switch.

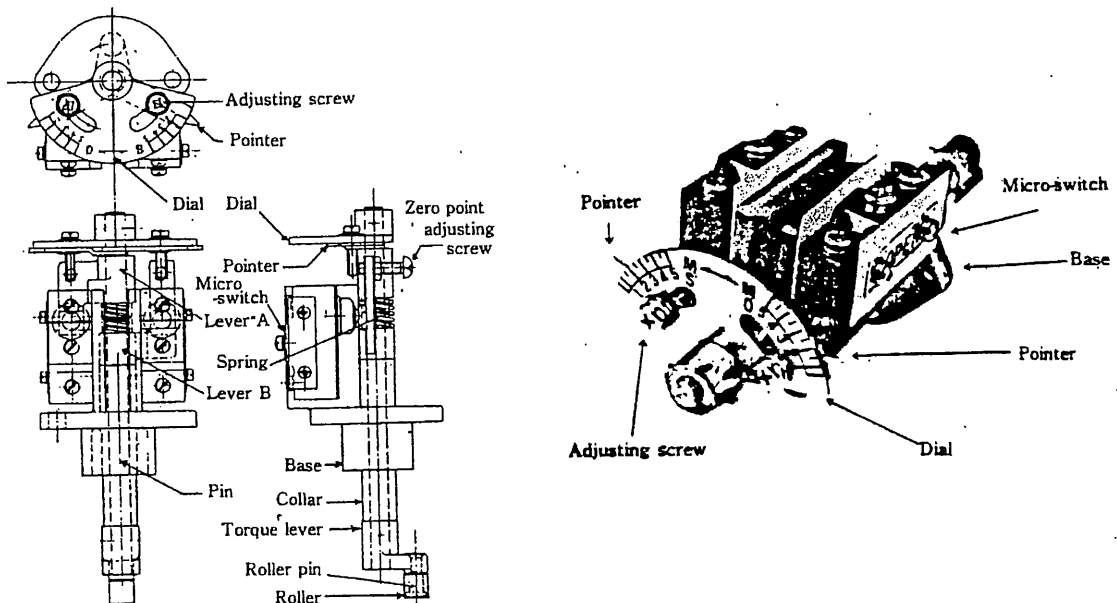
Operation of the limit switch can be identified by watching the signal lamp or by the movement of the arrow pointer of the limit switch.

Adjust the torque switch for opening direction and closing direction separately.

After completion of the setting, fully tighten the adjusting screw.

Note : Don't touch the zero point adjusting screw as it is already adjusted.

Fig. 4 CONSTRUCTION OF TORQUE SWITCH



5 POSITION INDICATOR

The local position indicator is provided in the Valve Control.

In the case of remote indication, a transmitter is mounted inside of the local position indicator and a receiver is mounted on the remote control panel.

5 - 1 To Set Local Position Indicator (Refer to Fig. 5)

Fully close the valve, remove the switch cover and pull the pointer out.

Set the pointer to zero position and press in.

5 - 2 Setting of Remote Position Indicator

- (1) In case of synchro motor (selsyn), the adjustment of synchro transmitter is not necessary. Setting of synchro receiver is achieved by adjusting the pointer of receiver to that of transmitter applying the rated voltage. If the pointer of the receiver turn reversely to the transmitter, change the connections of two lead wires among three which are connected to terminals S1, S2 and S3.

As the pointer is of the press in type, pull it out by holding its base part, in case of removing.

- (2) Potentiometer (Refer to Fig. 6)

Adjustment of transmitter should be performed simultaneously with the setting of pointer of the local position indicator.

Close the valve fully, loosen a set screw of the bellows joint for the potentiometer, and find the zero ohm point between terminals A and B using a circuit tester while turning the potentiometer by the pointer. When the resistance just reaches zero ohm, tighten the set screws of the joint; and finally set the pointer of the position indicator. Adjustment of indicator is achieved by opening the valve fully and adjusting the span of R/I converter (SEIMITTER); and then adjust the zero point, closing the valve fully. Make minute adjustment by repeating this procedure two or three times.

Fig. 5 POSITION INDICATOR WITH SYNCHRO TRANSMITTER

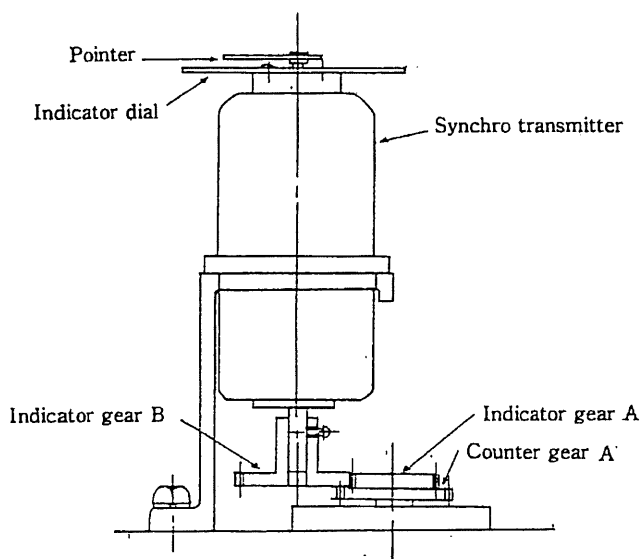
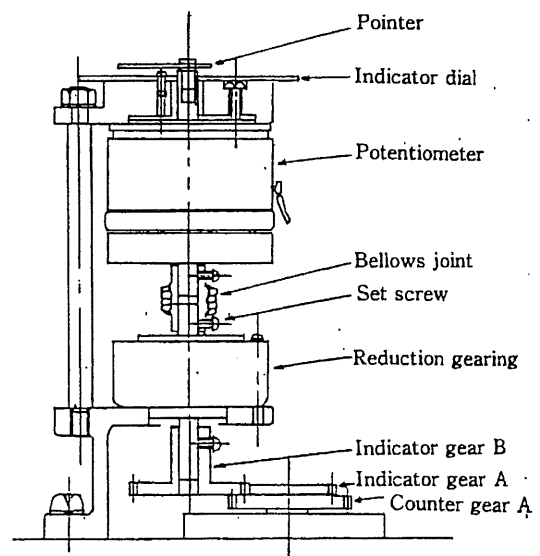


Fig. 6 POSITION INDICATOR WITH POTENTIOMETER



6 MOTOR

As a standard, a specially designed high resistance squirrel-cage type 3-phase induction motor of IEC-flange mounted, class E insulation and totally enclosed non-ventilated for outdoor-use is applied.


This motor features 250% or higher starting torque, low starting current, and very small moment of inertia of the rotor.


A brake motor or a DC motor is also available upon request.

7 POWER OPERATION

The Valve Control is normally operated by pressing the OPEN, CLOSE and STOP push-buttons. When the OPEN or CLOSE push-button for electrical operation is pressed, the motor starts to actuate the valve in the intended direction and the valve stops immediately upon pressing of the STOP push-button. At the fully opened or fully closed position, the limit switch actuates and stops the motor instantly. In the case of an automatic control or sequential control, the motor can be operated automatically by other electrical control signals.

8 MANUAL OPERATION

Press down the change lever  toward the manual operation side. The change lever will be kept by the holding mechanism at this position.

If change-over can not be made smoothly, shift the change lever while turning the handwheel  to the right or left.

CAUTION

In case of the manual operation, do not insert a bar into the handwheel to turn it. This will cause damage.

If abnormally large force is required, check for the causes before proceeding with the operation.

9 MAINTENANCE

9 - 1 Lubrication

This Valve Control is lubricated with ample amount of Lithium soap grease of very longer life. During normal operation of several years, renewal of grease is not necessary, but when the Valve Control is disassembled at the occasion of periodic inspection or for repair, renew grease in accordance with the following table.

Lithium soap grease of different brand can be mixed with each other : however avoid mixing with different soap base grease.

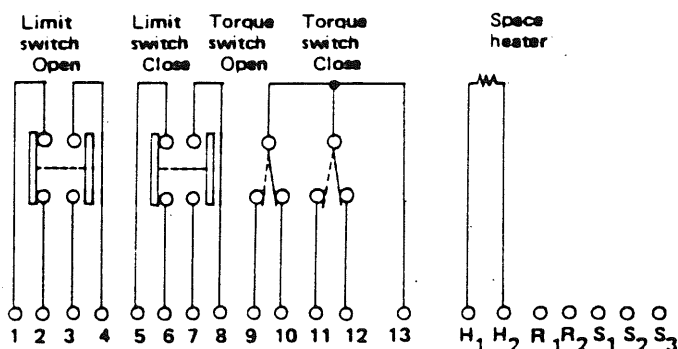
TYPE	Quantity of grease kg	Recommended Grease	
		Description	Manufacturer
LTMD-01	2.6	Hanyo Grease No.0	KYODO YUSHI Co.,Ltd
LTMD-02	3.4	Nightight LYW No.0	NIPPON GREASE Co.,Ltd
		DAPHNE EPONEX GREASE EP0	IDEMITSU KOUSAN Co.,Ltd
		DAINAMAX EP-0	COSUMO OIL Co.,Ltd
		MOBILUX GREASE EP0	Mobil Sekiyu Co.,Ltd
		ESSO LITHTAN EP0	ESSO STANDARD SEKIYU Co.,Ltd
		Alvania EP Grease R0	HOWA SHELL GREASE Co.,Ltd
		EPNOC AP0	NIPPON OIL Co.,Ltd
		RIZONIX GREASW EP0	JAPAN ENERGY Co.,Ltd

9 - 2 Others

- (1) For the threaded part of the rising stem type valve, grease mixed the molybdenum disulphide should be applied regularly to diminish the wear of stem bushing.
- (2) In case the valve is seldom operated, it is recommended to establish a schedule of periodical (for example, once a week) test run for the valve, to confirm satisfactory operating condition.

10 STANDARD TERMINAL ARRANGEMENT AND SEQUENCE DIAGRAM

10.1 Standard Terminal Arrangement

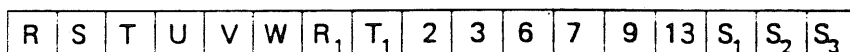


- 1~2 ... OFF at full opening
- 4~3 ... ON at full opening
- 5~6 ... OFF at full closing
- 8~7 ... ON at full closing
- 9~13 .. ON at opening over torque
- 10~13 .. OFF at opening over torque
- 11~13 .. ON at closing over torque
- 12~13 .. OFF at closing over torque

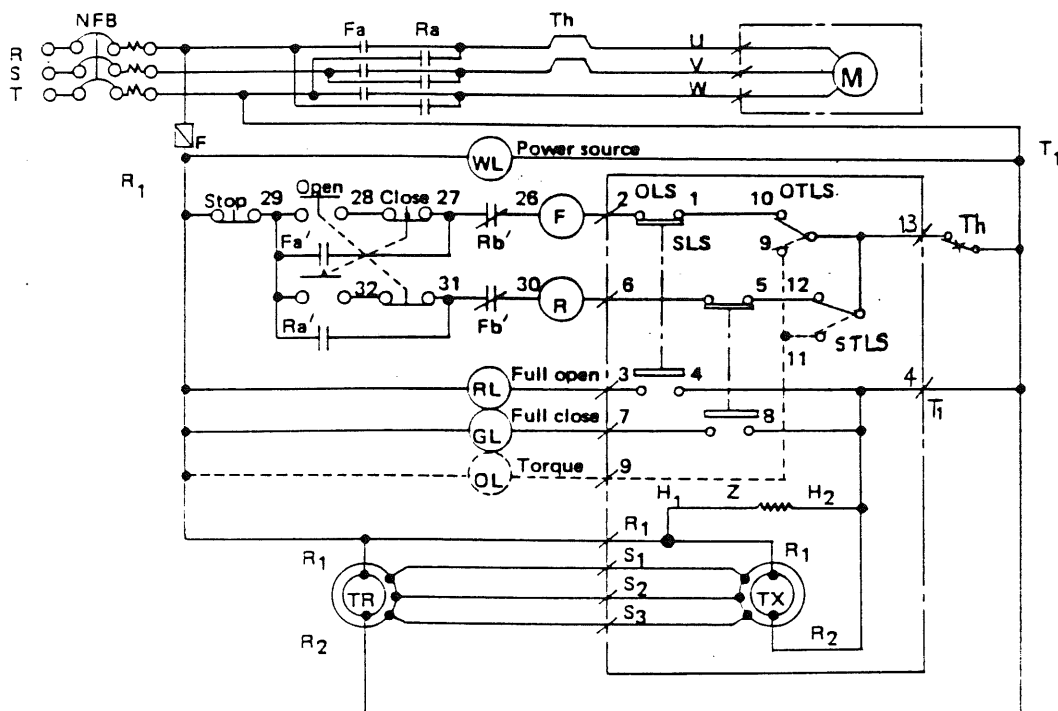
H₁, H₂... Heater terminals
 R₁, R₂, S₁, S₂, S₃ ... Terminals for Synchro

Regarding the wiring on the terminal blocks, refer to the sequence diagram.

10.2 Terminal Arrangement in the Control Box



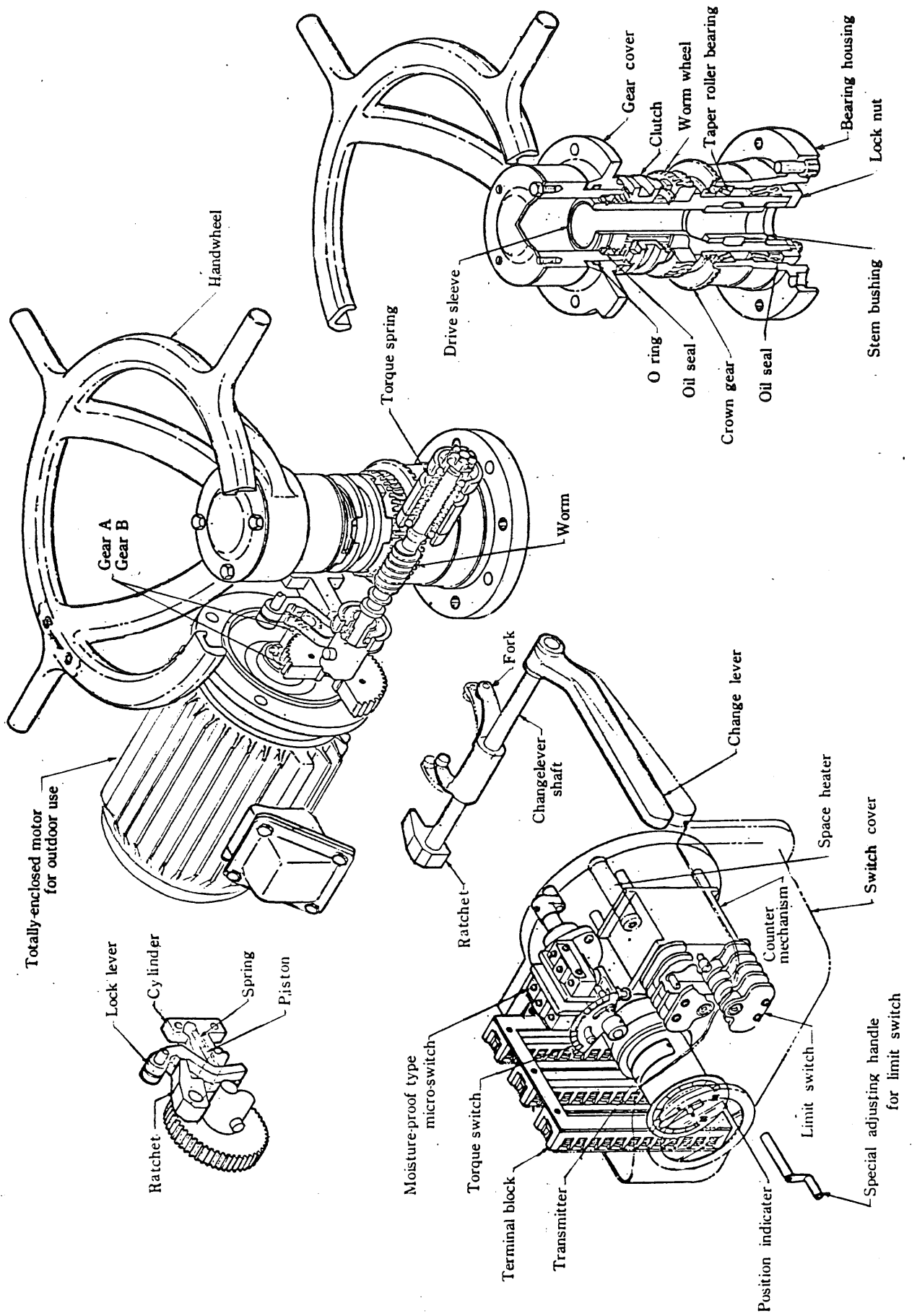
10.3 Sequence Diagram of Standard Type LTMD



Internal wiring of switch box and motor terminal box.
 This wiring shows the case of over torque indication.

NFB	No-Fuse Breaker	GL	Full close signal lamp (green)
Th	Thermal relay	OL	Torque signal lamp (orange)
(F)	magnetic switch open coil	OLS	Open limit switch (Ia, Ib)
Fa	magnetic switch open main contact	SLS	Close limit switch (Ia, Ib)
Fa' Fb'	magnetic switch open auxiliary contact	OTLS	Open torque switch (Ic)
(R)	magnetic switch close coil	STLS	Close torque switch (Ic)
Ra	magnetic switch close main contact		
Ra' Rb'	magnetic switch close auxiliary contact	Z	Space heater
Open, Close, Stop	3 push button switches	F	Fuse
(WL)	Power source signal lamp (white)	TX	Synchro transmitter
(RL)	Full open signal lamp (red)	TR	Synchro receiver

TECHNICAL ILLUSTRATION



Disassembling and Assembling the Stem Bushing

Take the following steps on disassembling and assembling the stem bushing from/into Valve Control.

Disassembling

1. Put the Valve Control with the switch cover upward.
2. Release the lock washer ①.
3. Take off the set bolt ② together with the lock washer.
4. Turn the lock nut ③ counterclockwise and take off it.

※ Caution : Take care not to remove the liner(s) ⑥.

: Don't strike the sleeve ⑧ in the axial direction without tightening the lock nut, or proper arrangement of the parts may be spoiled.

5. Take off the collar ④.
6. Draw out the stem bushing ⑦.

Assembling

1. Lubricate the interior surface of the sleeve ⑧.
2. Insert the stem bushing ⑦ into the sleeve taking care of adjusting splines of both parts.

※ Caution : Don't strike the stem bushing into the sleeve, or proper arrangement of the parts is spoiled.

3. Insert the collar ④ into the sleeve.
4. Lubricate the threads of the lock nut ③.
5. Turning the lock nut clockwise and tighten it up to the sleeve so that one of the tapped holes of the lock nut fit to one of the slots on the end of the sleeve.

※ Caution : Confirm that the gap between sleeve and collar is maximum 0.5 mm when the lock nut is tightened up. Large gap may cause a trouble.

6. Screw firmly the set bolt ② with the lock washer ① into the tapped hole.
7. Fix the set bolt by bending the lock washer.

