

Seibu

**OPERATION MANUAL
FOR
VALVE OPERATOR**

Type : LTMD-05,1,3,5

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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.

Instillation; 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 safety, maintenance, checking and care are of great importance.

MANUFACTURER

SEIBU ELECTRIC & MACHINERY CO., LTD.

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

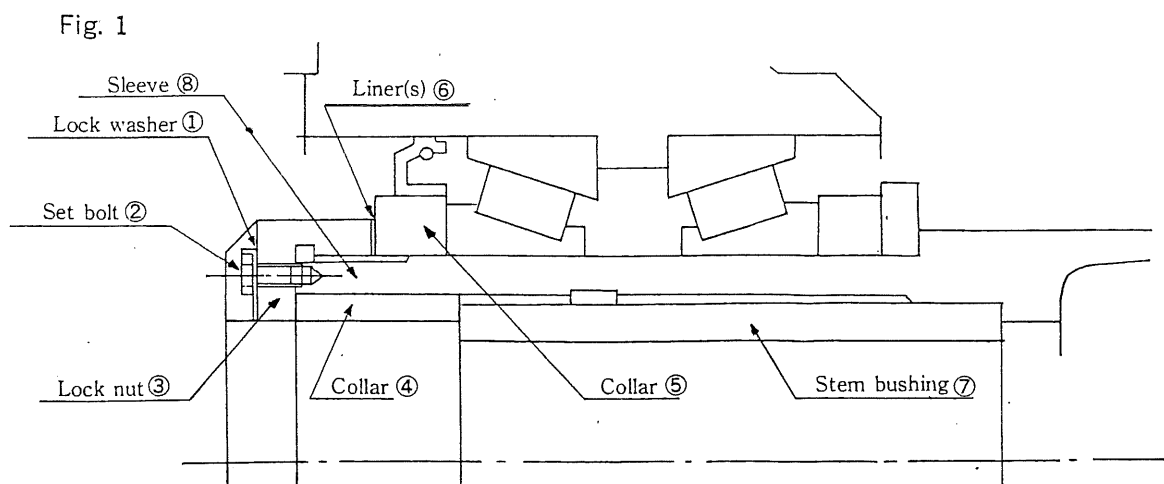
1. Lubricate the interior surface of the sleeve ⑧.
2. Insert the stem bushing ⑦ into the sleeve taking care of adjusting splines of both parts.

※ 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.



CAUTIONS

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

Instructions for Handling the Valve Control

- 1.1 Upon-closing the switch cover make sure that the packing is complete and clamp the fitting bolts surely cleaning the joints.

In case of "Explosion type", when the liquid packing: -----

Tokyo three bond No.1 --- 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 worked to prevent the entrance of rain water.
- 1.3 Don't hold open the switch cover and terminal cover.
- 1.4 Upon installing in the outdoor, wiring works in the rain weather should be avoided strictly.
- 1.5 Except the water proof type, don't keep the Valve Control in the earth and sand or puddles.
- 1.6 In case of "Explosion type", the outdoor cover should be fitted to be upside.
- 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).

- (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 once removed from the valve, check and adjust each section of the device once more in accordance with the instruction manual, prior to a power operation.

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LTMD-05, -1, -3 and -5)

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1. TRIAL OPERATION

The trial operation should be performed exactly 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 surely energized, especially it must be executed when the Valve Control is 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 that of the torque switch.
- (7) Make sure that the switch cover has been closed tightly again after once removed for performing electrical wiring or adjustment.

Loose closing of the cover may result in trouble from entry of rainwater.
- (8) Make sure that fuses at main power supply switch have not been blown out.
- (9) Make sure that thermal relay is 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 Power Operation

Before adjustment of every part, if power operation is carried out, as the valve is in full opening or full closing, the valve may be damaged.

Therefore when power operation is carried out, the valve should be manually opened first at the intermediate position.

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 the motor starts or stops surely.
- (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 pressing the CLOSE push button, stop the valve shortly before its fully closed position. Further 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) Notwithstanding the limit switch is correctly set, when the OPEN push button is pressed in case of 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].

Seibu	DESCRIPTION OF MECHANISM	5
Valve Control		LTMD-05,-1,-3,-5

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

2.1 General

Our Valve Controls are designed for motorized actuation of valves of various types.

The major components of Valve Controls are an electric motor and a reduction gear system. Valve Controls are also provided with such auxiliary mechanism 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 the valve spindle from excessive torque, and (4) handwheel for manual operation.

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

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

Therefore interlock switch is not provided.

2.2 Power Operation Mechanism

When "OPEN" or "CLOSE" push button is pressed, the motor starts, and the rotation speed of the motor is reduced by the power operation gear A (2) and the power operation gear B (3).

Since the manual operation gear B (44) serving also as clutch is connected to the worm shaft with spline, the rotating force of the motor is transmitted to the worm shaft through this manual operation gear B.

Further, it is transmitted to the worm wheel (32) through the worm (7) connected to the worm shaft with spline.

The worm wheel is provided with lost motion of about 90° which engages with the hammer blow clutch to transmit force to the sleeve.

Rotation of the sleeve enables the opening and closing of the valve connected to the stem bush (35) inserted inside the sleeve.

Since the worm (7) is connected to the worm shaft (8) with the spline, it transmits rotation, however it is designed to be able to shift in an axial direction.

This worm is normally held in the normal position by Torque spring (13) but when the valve requires an extraordinary high operating power, the worm moves in the axial direction compressing the Torque spring. This movement is used to actuate torque switch.

Revolution of worm shaft (8) is transmitted to counter mechanism through the worm (41) for switch and actuate limit switch.

Operation of this limit switch controls automatic stopping of the valve actuating motor at fully opening, fully closing or any predetermined position. The motor stops instantly regardless of the valve position upon pressing of the STOP push button.

Worm wheel (32) can rotate freely on the sleeve (31), and of clutch rotates in one body with the sleeve and stem bush through pawls of clutch on the sleeve.

2.3 Manual operation Mechanism

To operate manually the valve turn the manual handle (17) which set the change-over lever (55) as shown in Fig. 1 to the manual operation side and keeps it in this condition.

2.4 Power - Manual Change-Over Mechanism

2.4.1 Power-to-Manual Change-Over

The manual operation gear B (44) is connected to the worm with the spline and transmits rotation. It is designed to be able to shift in an axial direction. When the change-over lever (55) is set to the manual operation side, the manual gear B is shifted to the manual operation side, being pressed by the fork (48).

As a result, the manual operation gear B is disengaged from the pawl of power operation gear B (3) side, and the gear of opposite side engages with the manual operation gear A (45).

At the same time the lock lever (69) of holding mechanism.

Therefore, the manual operation gear B is held in this position and is kept in the manual operation.

2.4.2 Manual-to-Power Change-Over

Automatic return mechanism is employed.

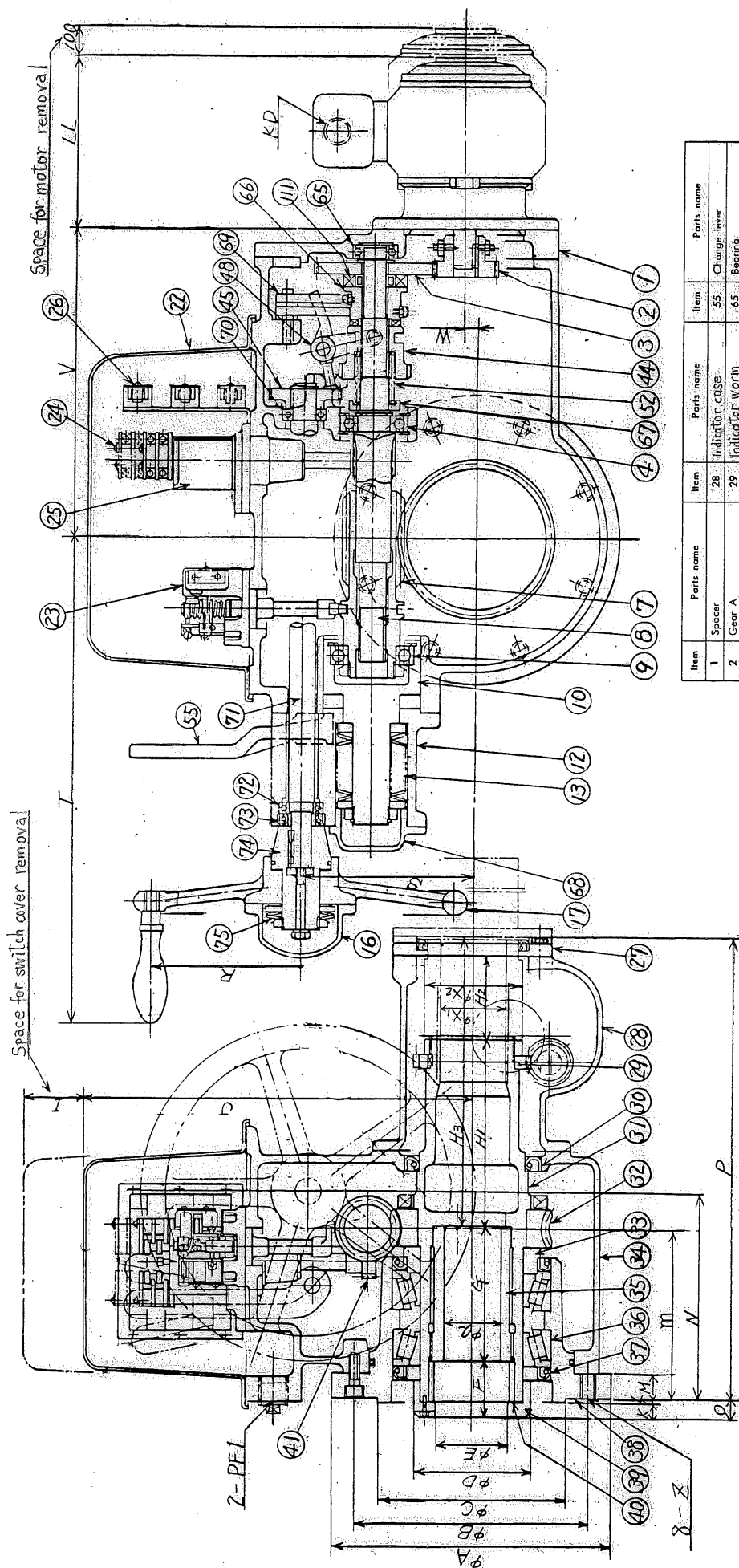
When the "OPEN" or "CLOSE" push button is pressed to start the motor, the lock lever (69) being kept in the manual operating position is disengaged and the power operation condition is set up following the procedure of change-over from the power operation to manual operation in reverse.

At the same the change-over lever is returned automatically to the power operating position.

Note : 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 should be damaged.

Fig. 1 Construction of Valve Control
LTMD-05-1, 3 and 5



Item	Parts name	Item	Parts name	Item	Parts name
1	Spacer	28	Indicator case	55	Change lever
2	Gear A	29	Indicator worth	65	Bearing
3	Gear B	30	Oil seal	66	Clutch
4	Bearing	31	Sleeve	67	Collar
7	Worm	32	Worm wheel	68	Spring cover
8	Worm shaft	33	Collar	69	Lock lever
9	Bearing	34	Gear case	70	Bearing
10	Cartridge	35	Stem bushing	71	Change
12	Spring case	36	Bearing	72	Bearing
13	Torque spring	37	Oil seal	73	Oil seal
16	Cover	38	Bearing housing	74	Hand
17	Hand wheel	39	Lock nut	75	Belleville spring
22	Switch cover	40	Collar	111	Buffer rubber
23	Torque switch	41	Switch worth wire		
24	Limit switch	44	Manual gear B		
25	Counter mechanism	45	Manual gear A		
26	Terminal block	48	Fork		
27	Cover	52	Clutch spring		

Size	Dimensions																											
	A	B	C	D	E	F	G	H ₁	H ₂	H ₃	H ₄	I	J	K	L	M	N	O	P	R	S	T	V	W	X	Y	Z	
-05	220	180	130	163	60	43	100	178	100	175	380	111	5	25	180	16	425	160	142	463	300	15	54	76	M16	140		
-1	62	70	300	250	200	132	81	133	140	197	92	175	420	12	5	25	212	17	490	160	175	490	338	14	72	162	M16	175
-3	80	90	340	300	250	166	100	143	180	169	112	175	465	15	5	30	253	21	545	200	225	553	377	49	92	127	M20	200
-5	100	115	410	360	310	206	128	168	220	223	145	175	495	13	5	40	330	18	662	200	247	600	443	57	118	150	M24	263

Motor kW	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11
KD								
Without brake	155	245	290	300	300	300	340	410
With brake	290	290	320	350	380	430	460	605

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, and later for the open side.

3.1.1 Setting procedure

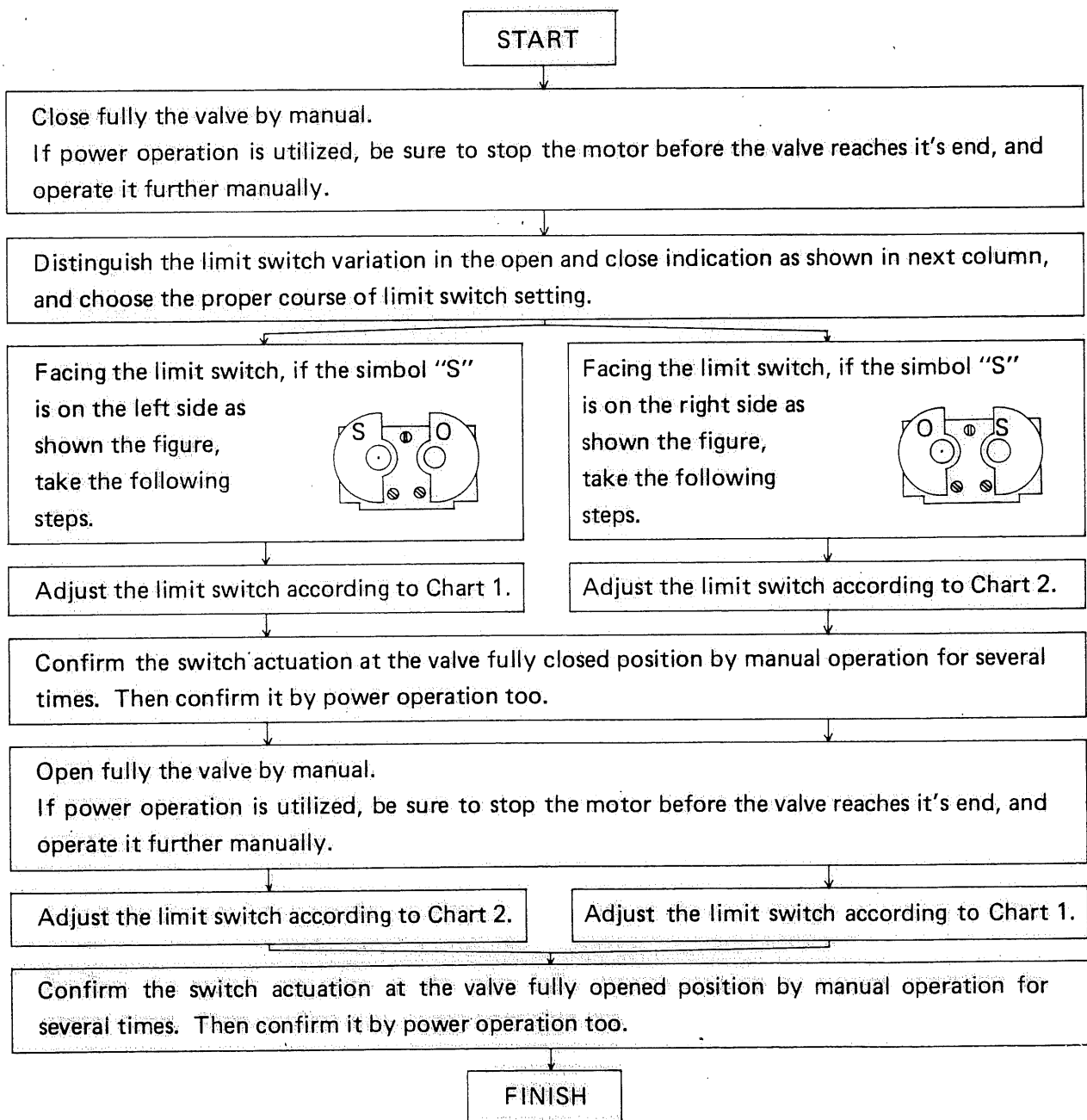
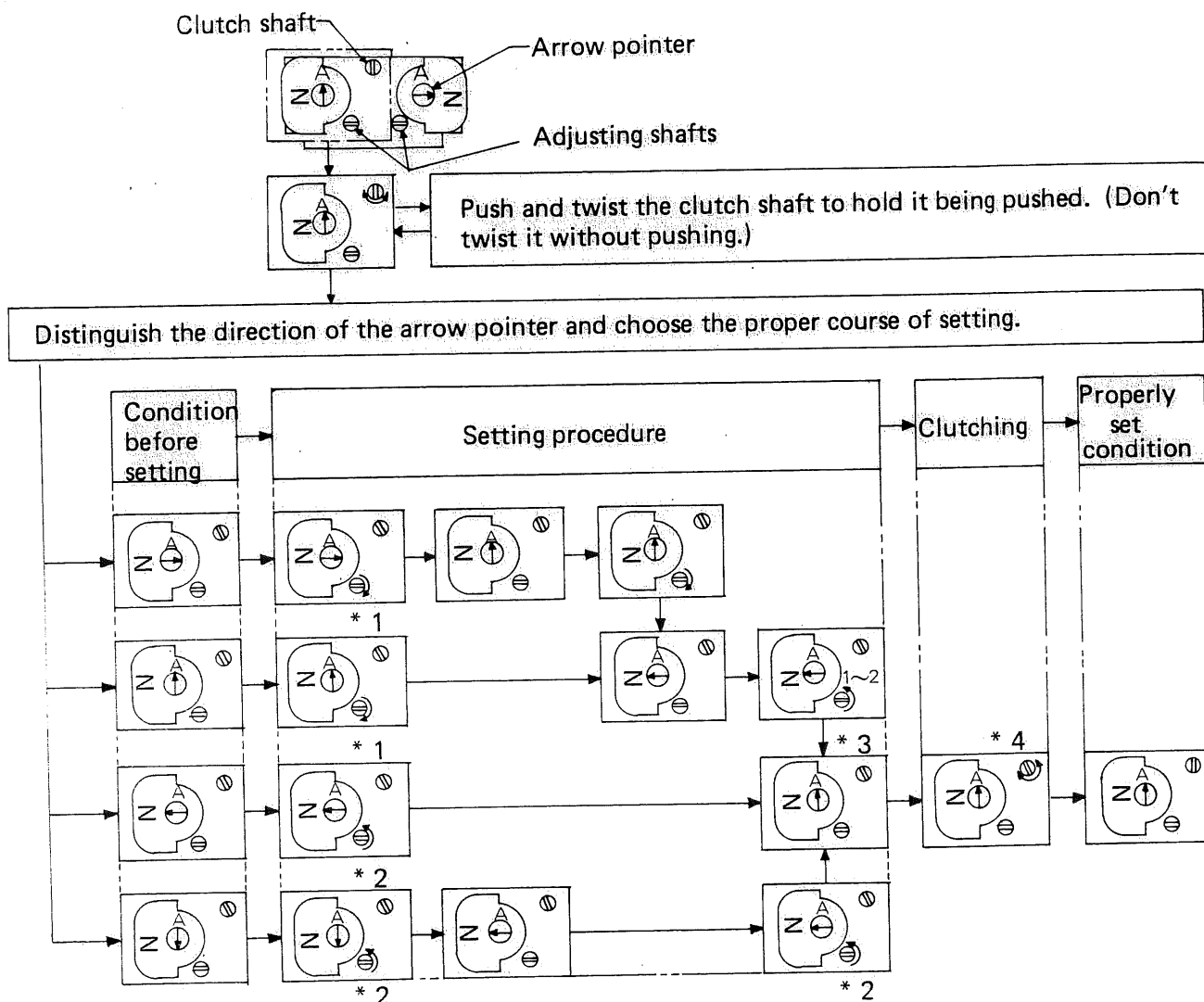


Chart 1



Explanation of figures





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

Fig.2

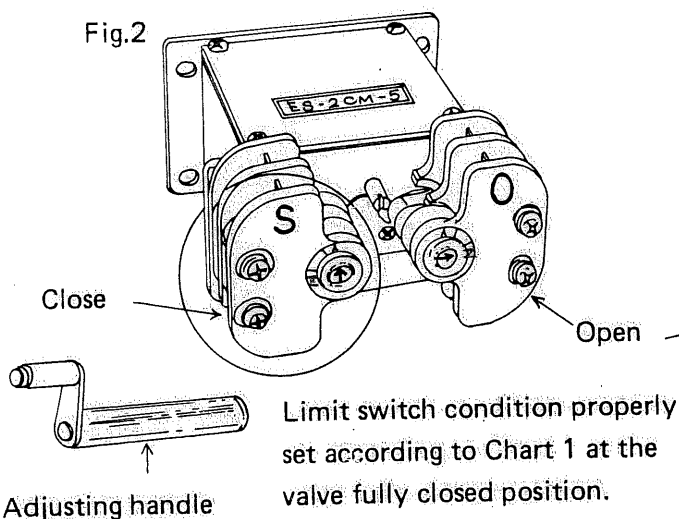


Fig.3

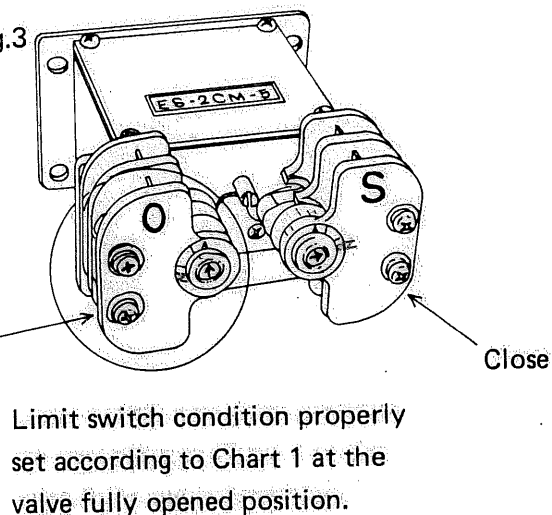
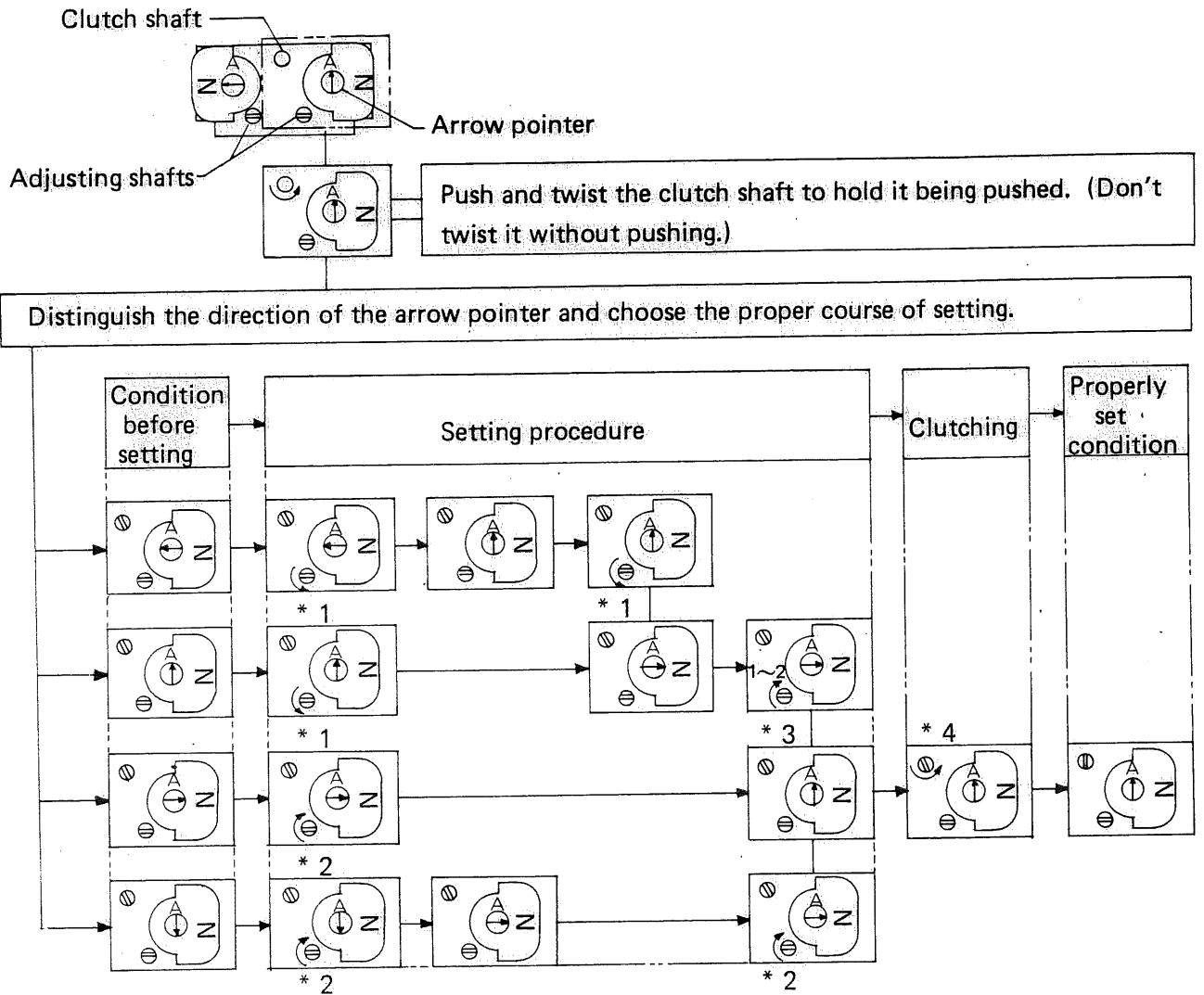




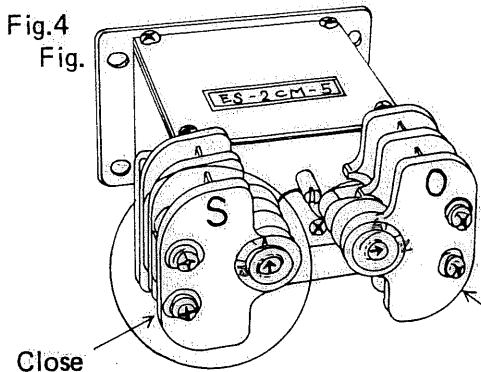


Chart 2

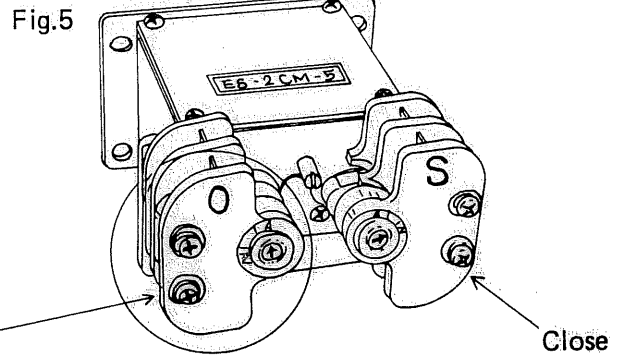


Explanation of figures

- * 1  : Turn the adjusting shaft counterclockwise until arrow pointer changes the direction.
- * 2  : Turn the adjusting shaft clockwise until arrow pointer changes the direction.
- * 3 ¹⁻²  : Turn the adjusting shaft clockwise once or twice until arrow pointer changes the direction.
- * 4  : Twist the clutch shaft to stick out. (If the valve is operated without sticking out 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 prescribed in paragraph 2.1, the torque switch functions automatically to stop the motor when an excessive torque is applied to the valve spindle. Directions of movement of the sleeve and worm for open and close operations are opposite to each other, therefore, two separate switches are actuated, each corresponding to open or close operation.

4.1 Setting of Torque Switch

The supplied Valve Controls have been adjusted at our works so that it will operate at proper torque. If the torque switch is to be readjusted to a different torque or for any other reason, take the following steps.

The operating torque will increase in proportion to the scale indication on the switch dial. When the adjusting screw is loosened, as shown in Fig.6, 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 limit switch, gradually move the pointer toward greater indication 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 cam of the limit switch.

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

After completion of the setting, positively tighten the lock nut.

Note: 1) Don't touch the zero pointer adjusting screw.

2) When setting of torque switch is changed for the device provided with motor slip, setting valve of torque for motor slip should be changed at the same time.

5. POSITION INDICATOR

The local position indicator is provided on the Valve Control.

In the case of remote indication, a transmitter is mounted on the Valve Control (local indication) and a receiver with dial is mounted on the remote control board.

5.1 Setting of Local Position Indicator (Refer to Fig.7)

Fully closing the valve, remove acylite cover, and loosen the nut for fastening the pointer and then set the pointer to zero position. Tighten the nut again.

5.2 Setting of Position Indicator for Remote Indication

- (1) In case of synchronous motor (selsyn), the adjustment of transmitter is unnecessary. Setting of indicator (receiver) should be set to the dial of transmitter after the rated voltage is applied.

If the opening pointer of the indicator turn reversely to transmitter, change two lead wires among three which are connected to terminals S1, S2 and S3 and as the pointer is the press type, when it should be removed, pull out holding its base part.

- (2) Potentio meter

Adjustment of transmitter is performed simultaneously with the setting of pointer of the local position indicator. As the connecting gears of the potentiometer is disengaged, find the zero point turning the shaft and reading the resistance of the potentiometer with the tester. When the resistance just reached 0 Ohm, loosening the set screw of connection gear to set engagement again, and set finally the pointer of the position indicator. Adjustment of indicator is carried out opening the valve fully by adjusting the span of R/I converter or constant voltage device, and then adjust the zero point fully closing the valve. Thus repeating this procedure, adjust minutely.

Repeating this procedure two or three times, perform the slight adjustment.

6. MOTOR

As a standard, a specially designed, outdoor-use, damp-proof, totally-enclosed, flange-mounted, high resistance squirrel-cage type brakeless 3-phase induction motor with insulation class E is used.

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

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

7. POWER OPERATION

Standard operation the LTMD 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 depressed, the motor starts to actuate the valve in the intended direction and the valve stops immediately upon depressing of the STOP push button. In the fully opened or fully closed position, the limit switch actuates and stops the motor instantly.

In the case of an automatic control or linked control, the motor can be controlled automatically from extraneous electrical control signals.

8. MANUAL OPERATION

Shift the change over lever (55) toward the manual operation side (in the direction of the arrow mark). The change-over lever (55) is held by holding mechanism at the manual operating position.

If change-over is not smooth, shift the change-over lever, turning the manual handwheel (17) right or left.

When change-over has been finished, the valve can be opened or closed by turning the manual handwheel in the direction of opening "O" or closing "S".

Note : In case of the manual operation do not hit a bar to the handwheel to turn it. Such proceeding causes damages.

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

9. MAINTENANCE

9.1 Lubrication

This Valve Control is lubricated by Lithium grease of long life, and is provided with a necessary amount of grease.

While it is operated normally, renewal of grease is unnecessary, but on the regular inspection or disassembling for repair, renew grease in accordance with the following table.

If the grease is the same quality of lithium grease, it can be mixed with each other, however another soap base grease should be avoid for mixing.

TYPE	Quantity of grease kg	Recommended Grease	
		Description	Manufacturer
LTMD-05	7.5	Hanyo Grease No.0 Nigtight LYW No.0	KYODO YUSHI Co.,Ltd NIPPON GREASE Co.,Ltd
LTMD-1	12.5	DAPHNE EPONEX GREASE EP0 DAINAMAX EP-0	IDEMITSU KOUSAN Co.,Ltd COSUMO OIL Co.,Ltd
LTMD-3	20.0	MOBILUX GREASE EP0 ESSO LITHTAN EP0	Mobil Sekiyu Co.,Ltd ESSO STANDARD SEKIYUCo.,Ltd
LTMD-5	28.5	Alvania EP Grease R0 EPNOC AP0 RIZONIX GREASW EP0	HOWA SHELL GREASE Co.,Ltd NIPPON OIL Co.,Ltd JAPAN ENERGY Co.,Ltd

9.2 Others

- (1) For the threaded part of the outthread type valve, grease mixed with molybdenum disuphide should be applied regularly to prevent wear of stem bush.
- (2) In case the valve is seldom operated, establish a schedule for a periodical (for example, once a week) test run for the valve, to confirm operating condition.

Fig.6 Construction of Torque Switch

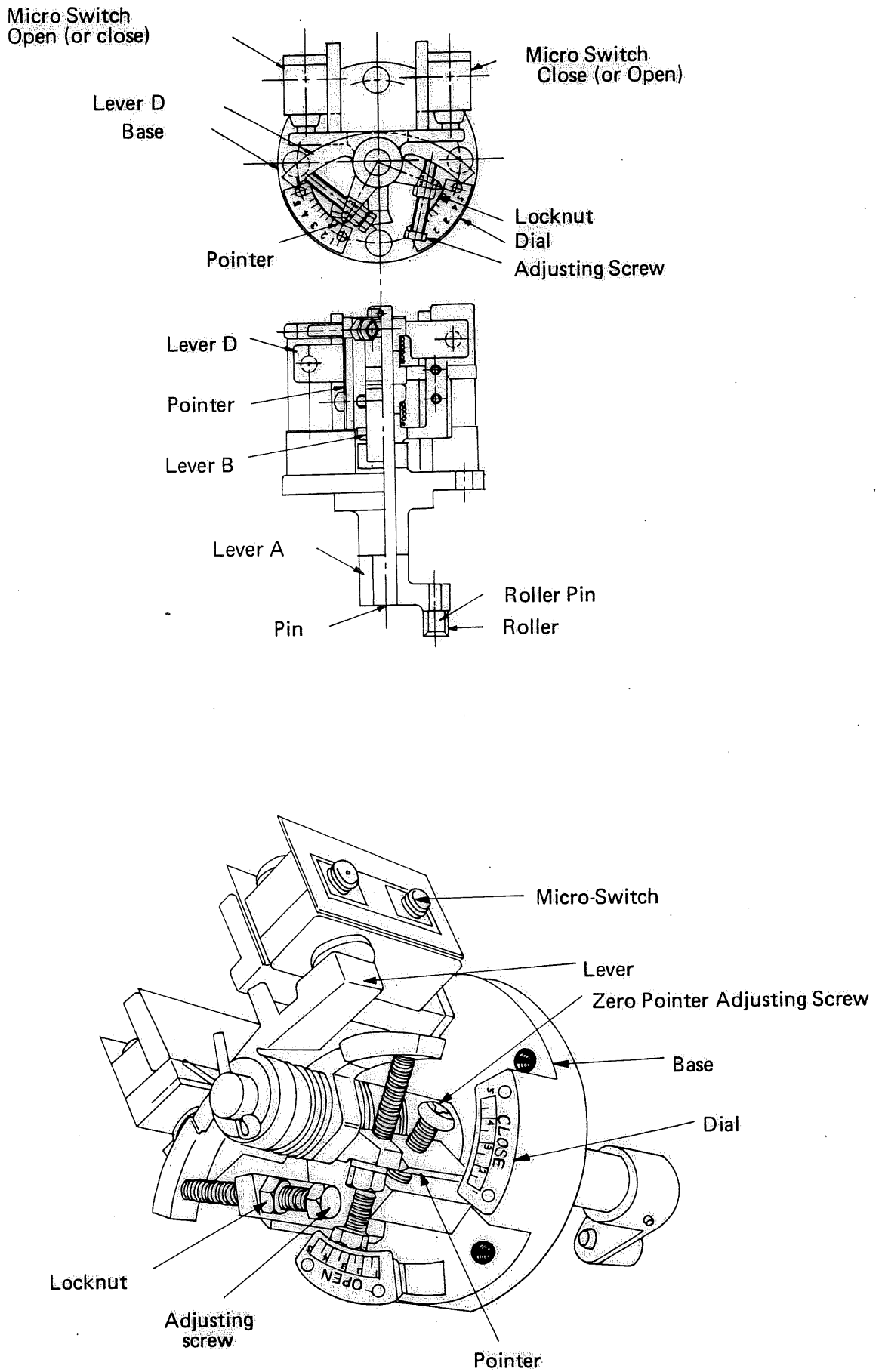
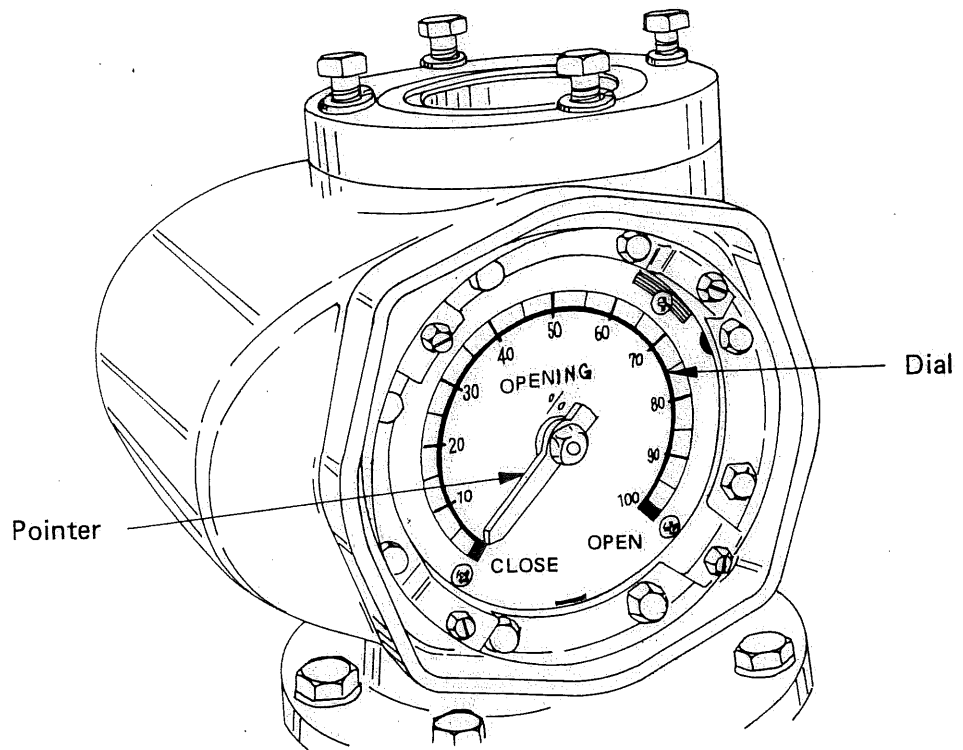
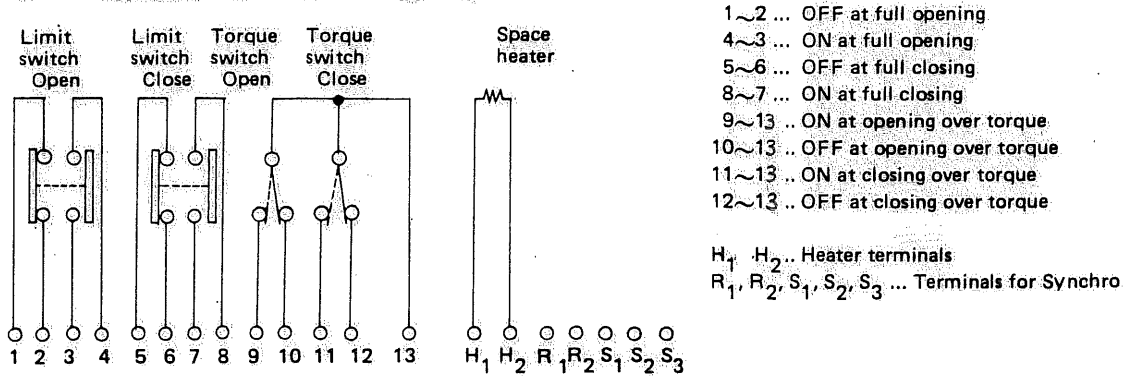


Fig.7 Position Indicator



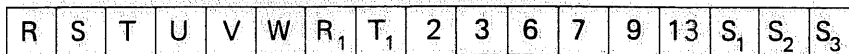
10 STANDARD TERMINAL ARRANGEMENT AND SEQUENCE DIAGRAM

10.1 Standard Terminal Arrangement

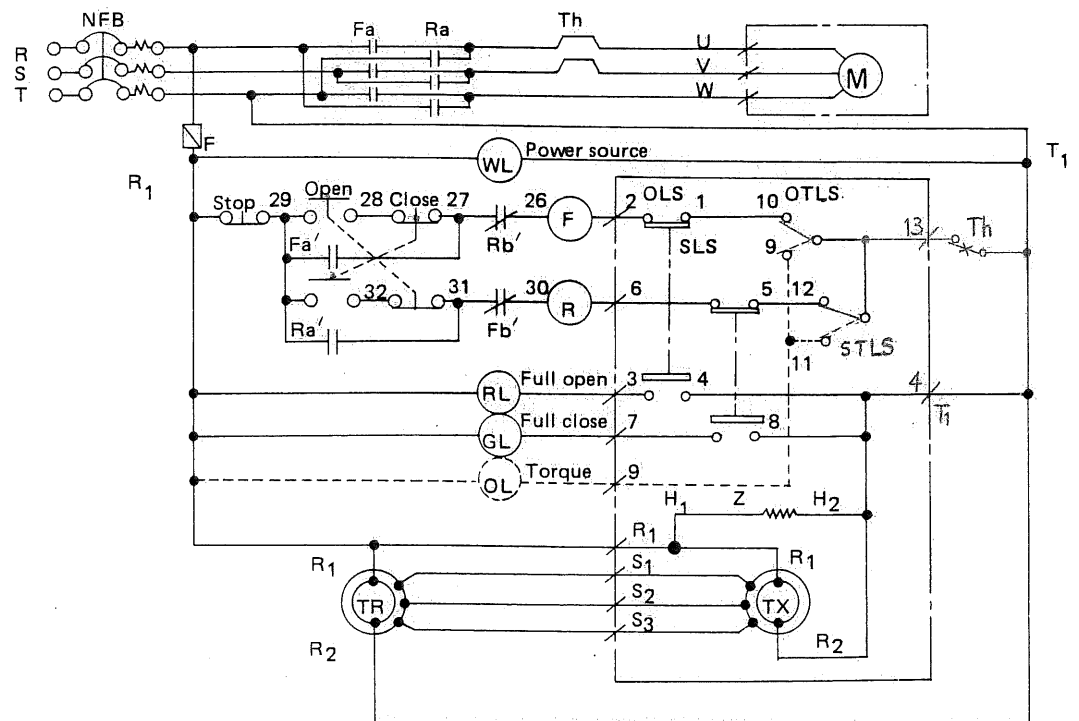


Regarding the wiring on the terminal blocks, refer to the sequence diagram.

10.2 Terminal Arrangement in the Control Box



10.3 Sequence Diagram of Standard Type LTMD

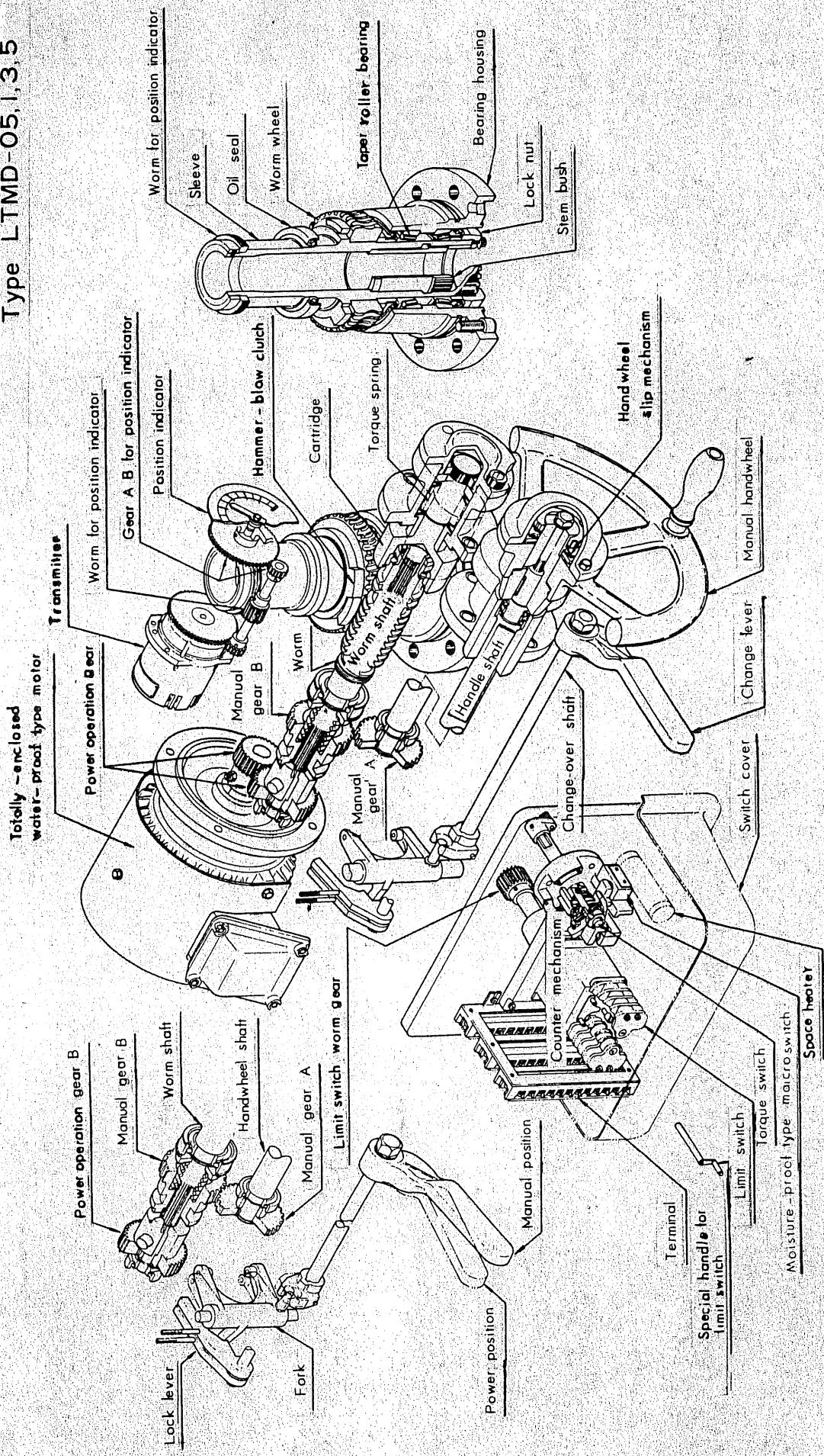


Internal wiring of switch box and motor terminal box.
 - - - - - This wiring shows the case of over torque indication.

NFB	No-Fuse Breaker	ⓄL	Full close signal lamp (green)
Th	Thermal relay	ⓄL	Torque signal lamp (orange)
Ⓞ	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)
Ⓞ	magnetic switch close coil	STLS	Close torque switch (Ic)
Ra	magnetic switch close main contact	Z	Space heater
Ra' Rb'	magnetic switch close auxiliary contact	F	Fuse
Open, Close, Stop	3 push button switches	TX	Synchro transmitter
ⓄL	Power source signal lamp (white)	TR	Synchro receiver
ⓄL	Full open signal lamp (red)		

Seibu VALVE CONTROL

Type LTMD-05.1,3,5



Totally enclosed water-proof type motor