

MOTOR DRIVE

MIGHTY CYLINDER

INSTRUCTION MANUAL

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Love & Technique



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We thank you for the purchase of the Mighty Cylinder.

Mighty Cylinder is a kind of linear actuator combined with high efficient lead screw and totally enclosed motor. This cylinder is very strong both mechanically and electrically, however mishandling and misuse may cause unexpected accident or trouble.

Read this instruction manual with extreme care, in order to prevent causing accidents or troubles.

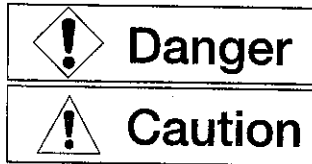
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1. Caution for safety

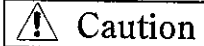
Never fail to read carefully this instruction manual and other documents before use (installment, operation, maintenance and such). And enough understanding for the cylinder and caution items shall be required as well.

Caution items are classified by two ranks "Danger" and "Caution".



: Dangerous situations may occur when mishandling causing death or injury is supposed.

: Dangerous situations may occur when mishandling causing middle-class injury slight damage and material damage are supposed.

Even items written in  Caution may result in serious consequence. Anyway contents of caution items are so important those shall be strictly observed.

Danger

(General)

- Transportation, installation, piping, wiring, operation, manipulation and check shall be done by staffs with expertise and technique. There is a fear of electric shock, injury, fire, apparatus and such.
- Explosive atmosphere shall be avoided. It may cause injury or fire.

(Installation)

- When the Mighty Cylinder is installed on the ceiling or wall, rigidity shall be taken into consideration.

Personal damage or apparatus breakage may occur depending on the conditions.

(Wiring)

- Make sure power is off before starting wiring. If not there is a fear of electric shock.
- Earth shall be done to prevent electric shock.
- Wiring to power cable shall be done after reference to the wiring diagram on the motor or limit switches.
miswiring may cause electric shock or fire.
- Power cable, wiring lead cable etc shall not be flexed by force, pulled and put between. There is a fear of electric shock or fire.



Danger

(Operation)

- Confirm the direction of the movement of the Mighty Cylinder. Difference of the direction of the movement may result in the equipment breakage.
- Never operate the Mighty Cylinder with the cover of the terminal box removed. Install the cover of the terminal after work to avoid electric shock.
- Never approach the movement side of the Mighty Cylinder (knuckle joint side) or touch it during the operation.
There is a fear of injury.
- Never manipulate the brake release during the operation. If not it may result in the fear of reckless running of the apparatus or personal damage or apparatus breakage by the fall of the load.
- In case of power failure, power switch shall be cut without fail. There is a fear of damage.

(Maintenance. Check)

- Never manipulate the brake release with the load on.
There is a fear of drop accident.



Caution

(General)

- Mighty Cylinder shall be used within the specifications.
There is a fear of electric shock, injury, apparatus breakage and such.
- Damaged Mighty Cylinder shall not be used to avoid injury or fire etc.
- Mighty Cylinder modified by customers shall not be guaranteed.
- Name plate shall not be removed.

(Unpacking)

- Unpack taking care of the packing hardware (nails, stapler needles etc). There is a fear of injury.
- Confirm if the products are in accordance with the ones ordered. If the different product is installed, injury, breakage and such may occur.



Caution

(Transportation)

- Take care of drop and overturning when transported.
Suspension metal shall be used when the Mighty Cylinder has it. However the suspension metal is not equipped on the center of gravity, therefore never fail to install the suspension belt or things like that on the balanced place in addition to the suspension metal.
- The suspension bolt on the motor shall not be used to suspend the Mighty Cylinder. It shall not be removed. If removed, it may cause trouble by infiltration of water, odd things and such.
- Suspension tool with sufficient strength shall be used. If not there is a fear of injury or breakage due to the fracture of the suspension tool.
- Never suspend the total machine through the suspension metal of the Mighty Cylinder after the installation of the Mighty Cylinder.

(Installation)

- Take care of the centering when the Mighty Cylinder is connected with the mating machine. Extreme care shall be required to avoid lateral load. There is a fear of failure of movement.
- Never mount on the Mighty Cylinder or hang from it.
There is a fear of injury.
- Never place the combustible things around the motor of the Mighty Cylinder. There is a fear of fire. And things to prevent ventilation shall not be placed around the motor. There is a danger of scald through extreme heating because of obstruction of cooling and fire.

(Wiring)

- Wiring shall be in accordance with the technical standard for electrical facilities. There is a fear of burning, electric shock, injury and fire.
- Never touch the terminal when insulation resistance is measured. There is a fear of electric shock.

(Operation)

- Motor may grow too hot during operation. Take care not to touch it. There is a fear of scald.
- Stop the operation immediately when something abnormal happened. There is a fear of electric shock, injury and fire.

(Maintenance. Check)

- Take care of movable parts when lubricated. There is a fear of injury.

(Repair. Disassembly)

- Shall be done by experts. There is a fear of electric shock, injury and fire.

2. Construction

Straight type

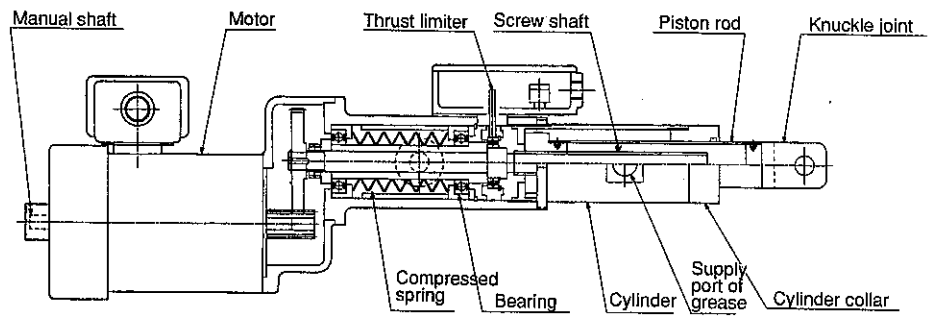


Fig.2-1

Return type (I) MC01~MC2

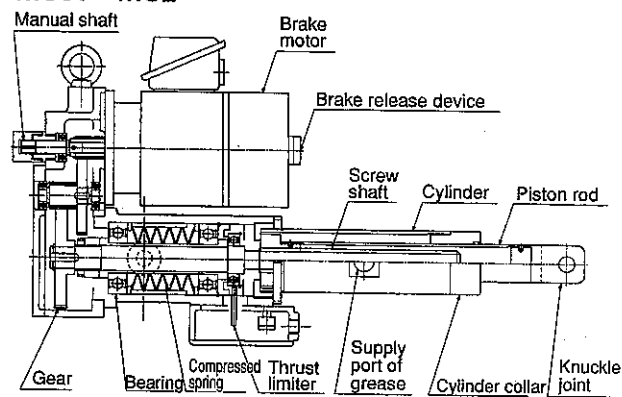


Fig.2-2

Return type (II) MC4~MC32

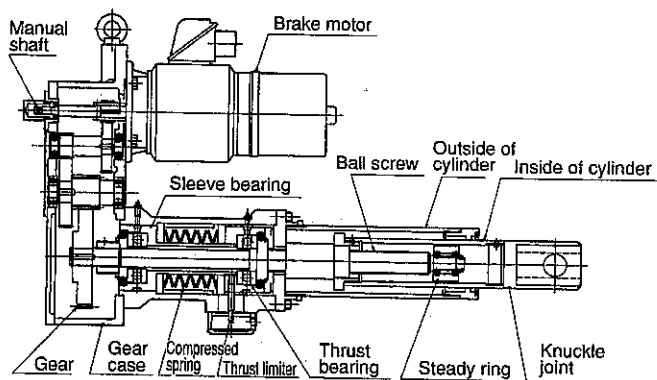


Fig.2-3

Positioner unit

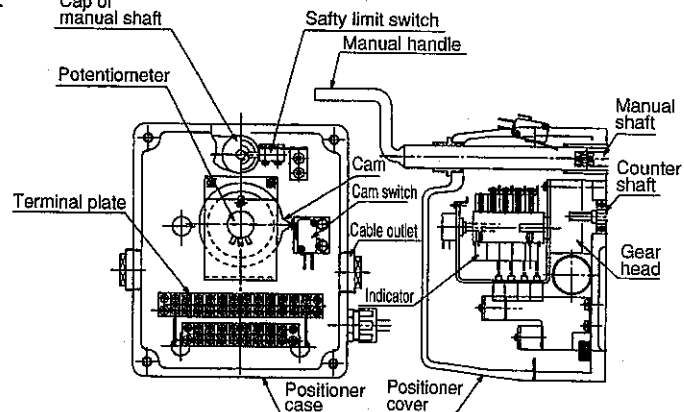


Fig.2-4

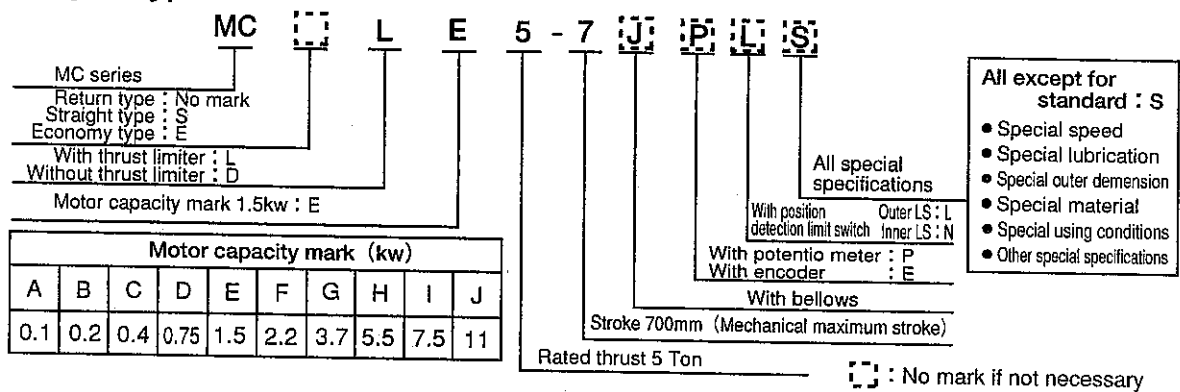
3. Inspection and check in acceptance

Check the following points when the Mighty Cylinder is delivered.

- To see if the items on the name plate is identical with the ones you ordered.
- To see if it is free from damage in transit.
- To see if bolts and nuts are tightened enough.
- To see if the insulation resistance of the electric parts is $1M\Omega$ or more. (Mega voltage:500v)
- To see if the accessories are delivered.

In case there are any troubles, immediately inform the agent of the manufacturing No. (MFG. NO.), type and situations.

(Display of type)



4. Custody

- Mighty Cylinder shall be kept in good surroundings of the house. Even if outdoor type, terminal treatment of the terminal box and things like that is not done before installation which may cause breakage of apparatus due to the infiltration of water or odd things.
- When the Mighty Cylinder is kept for a long period, it shall be covered with polyethylene sheet or things like that. Dehumidifier shall be put inside the sheet and tightly sealed. It shall be exchanged with the new one once in a while.
- Take care of grease deterioration in case the Mighty Cylinder is left unused or in custody for a long term.

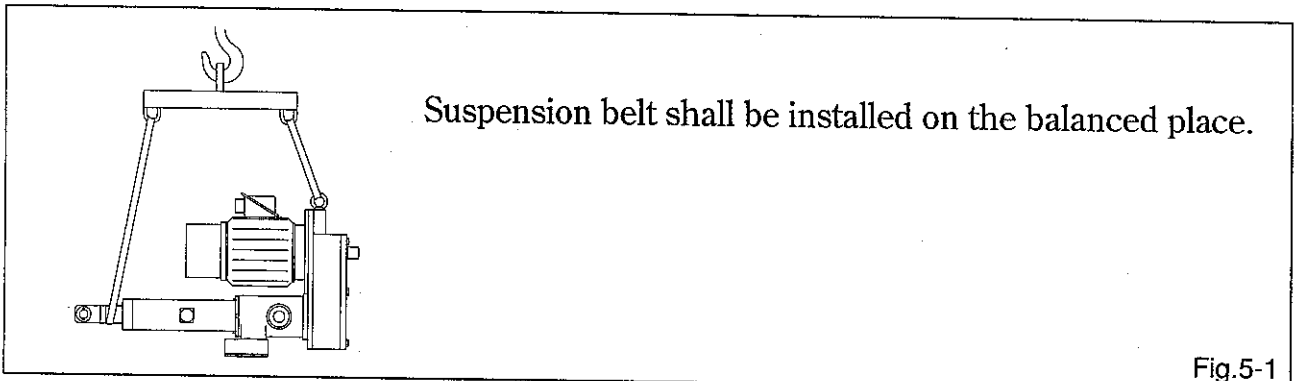
Insulation resistance measurement, check of movable parts, check of connecting point of power and such shall be done to see if there is no things abnormal before operation.

5. Transportation

⚠ Caution

- Suspension metal shall be used. If not, there is a fear of accident or breakage.
 - Never enter the place under the suspended Mighty Cylinder. There is a fear of injury or breakage because of the drop.
 - Never suspend the total apparatus with the suspension metal of Mighty Cylinder. Suspending bolt on the motor shall not be used to suspend the Mighty Cylinder.
- Shock shall be avoided. There is a fear of breakage.

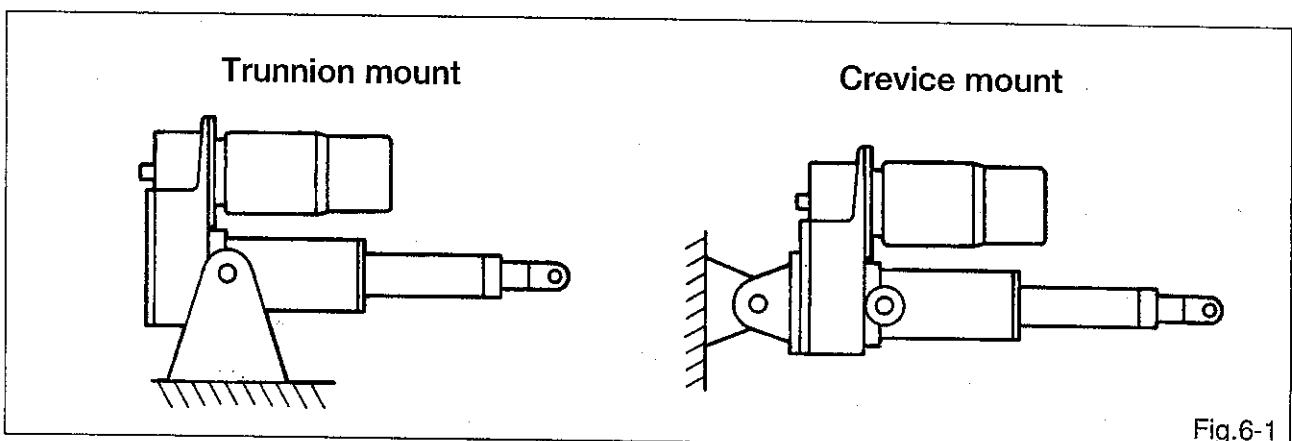
- Suspension metal shall be used in case of the type with it. However the suspension metal is not equipped on the center of gravity, therefore never fail to install the suspension bolt or things like that on the balanced place in addition to the suspension metal.



6. Installation

⚠ Danger

- Mighty Cylinder shall be installed under the circumstances of no explosive, inflammable, erodent gas and things like that. There is a fear of inflammability and explosion.
 - Rigidity of the installation shall be taken into consideration. There is a fear of personal damage or apparatus breakage due to the drop depending on the conditions.
- Installation place
 - Ambient temperature $-15^{\circ}\text{C} \sim 50^{\circ}\text{C}$
 - Humidity 85% or less
 - Ambience no gas with explosion inflammability and erosion
 - There is no limit to installation direction. (horizontal, vertical, slanted are available)
 - Never place the combustable things and something to prevent ventilation around the motor of the Mighty Cylinder.
 - Mighty Cylinder shall be protected with proper covers or things like that when installed in the place where water, vapor, oil, rain, snow and such always affect it. Install the awning cover when the Mighty Cylinder is exposed to direct sunlight which can cause the surface temperature of it to rise too hard.
 - Installation method shall be trunnion mount or crevice mount.



7. Connection with mating machine

⚠ Caution

- Take care of the centering when the Mighty Cylinder is connected with the mating machine. Extreme care shall be required to avoid lateral load through the entire stroke. Lateral load cause thrust drop and apparatus breakage by bending of piston rod or screw shaft.

(1) Connection with mating apparatus

- Make sure that knuckle joint pin shall be parallel with trunnion or crevice pins when connected.
- Accuracy of installation place shall be fully checked to prevent the bending of the piston rod and such.
- Fitting of cross direction between knuckle joint crevice and column and mating apparatus needs a clearance of around 1mm.
- When connected with the arm or things like that, the shape shall be taken into consideration. The recess parts of the arm and the knuckle joint may interfere with each other resulting in the trouble of the bending of the piston rod.
- Take care the Mighty Cylinder does not touch the things around when it swings based on the connecting shaft (trunnion, crevice pin).

Figure for connection with mate machine

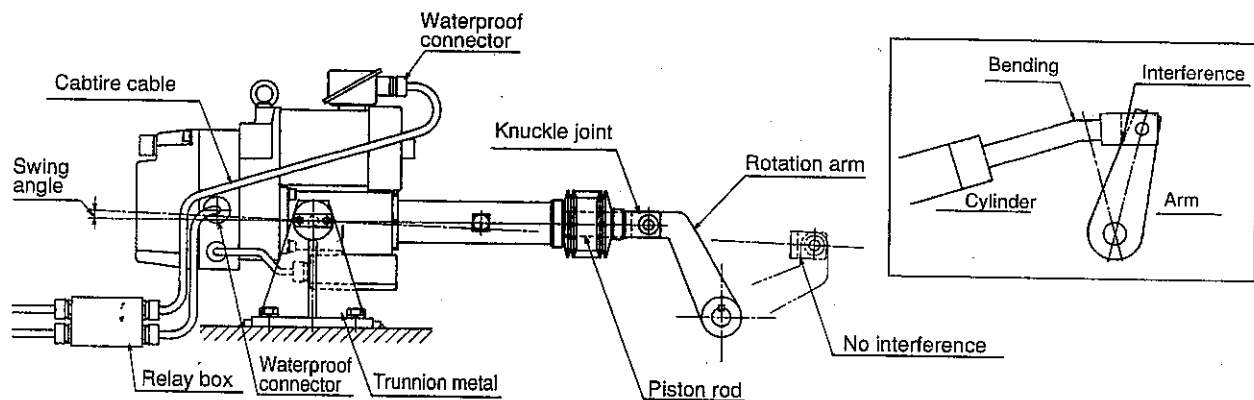


Fig.7-1

- When the knuckle joint is connected with the mating machine, manual shaft shall be used to adjust the position.
- (2) Work to prevent the rotational torque of piston rod
- The piston rod (knuckle joint) generates the rotational torque because it reciprocates through the thread mechanism. As standard type has no device to prevent the rotational torque, it has to be prevented by mating machine. The strength of the device shall be three times or more the rod rotational torque.

- Prevention of the rotational torque shall be available by connecting the knuckle joint with the mate arm if the strength of the arm is larger than that of knuckle joint. As to the rotational torque, refer to the catalog or outdrawing.
- In case of type with bellows and outer LS unit, those may break by rotation of the piston rod if operated without the prevention of rotational torque.
- The type with the prevention of rotational torque has a sliding key bar within the cylinder to prevent the rotation of the piston rod (knuckle joint). In this case, the slide key bar may break when the torque more than three times or more the rotational is applied.

(3) Procedures for fixing bellows

Bellows is fixed when shipped. In case bellows is to be repaired or exchanged, refer to the following procedures.

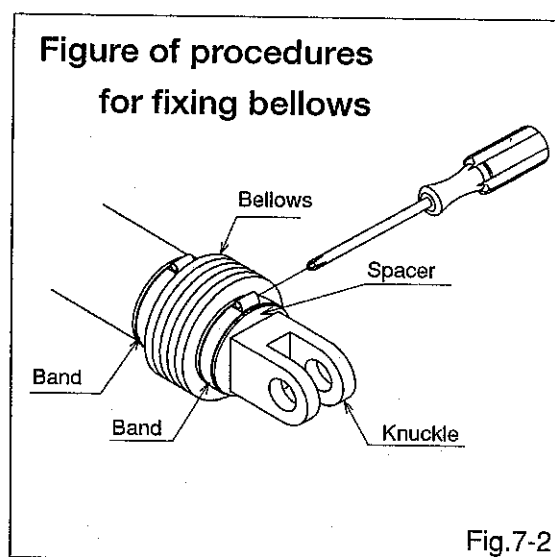
- Fixing of bellows shall be done after preventing the rotational torque by connecting the knuckle joint with the mate machine.
- Retract the knuckle joint right before the dead end of the stroke by manual or inching operation. In case of manual operation, refer to the items of manual operation.

Take care not to lock at the stroke end. There is a fear of breakage.

- Tighten the band on the side of the knuckle joint.

In this case, never fail to insert the spacer made of rubber.

- Shrink the bellows and tighten the other band on the cylinder part. Bellows may break when it was too shrunk for tightening. If the bellows is fastened too extended, it may break when the piston rod stretched.
- Bellows has several air inlets which shall be faced the earth to prevent the infiltration of rain or things like that.



8. Manual operation

⚠ Danger

- Never fail to cut off the power source. There is a fear of injury.
- Load shall be removed before manual operation and brake release. There is a fear of injury, apparatus breakage.

- Manual operation shall be done after removing the protection cap of manual shaft and releasing the brake.

After that the cap shall be installed without failure.

- Motor 0.3kw has no brake release device.
- Exclusive handle shall be used in case of the type with positioner.
- The brake release of the motor can be done by turning the release lever or wing bolt on the rear part of the motor. Refer to the plate about the rotational direction. The release lever or wing bolt has to be put back where it was. If not, the brake unit breaks.

9. Wiring

⚠ Danger

- Excellent wiring appliances shall be used and wiring must be in accordance with the technical standard for electrical facilities and power company's regulations.
- Wiring shall be done in accordance with the electric circuit or instruction manual. There is a fear of electric shock and fire.
- Never fail to earth.
- Power source has to be cut off in case of wiring. There is a fear of electric shock.
- Reinstall the cover surely after the completion of wiring. There is a fear of electric shock.

(1) Wiring

- Take care the motor may not start due to the voltage drop when the wiring distance is too long.
- Take care fire may break out because of overheat and such when the small cable is used.
- The direction of the service entrance of the terminal box of the motor shall be downward in case of outdoor type. However the box of thrust limiter is unchangeable.
- Complete the terminal treatment so as to prevent water and odd things from entering the terminal box.
- Flexible wiring shall be adopted when the cylinder swings in accordance with the movement of the piston rod.
- Flexible tube shall not be used because of insufficient water proof. In case flexible tube is used unwillingly, waterproof one shall be adopted and connection parts must

be sealed by liquid gasket and such.

(2) Earth

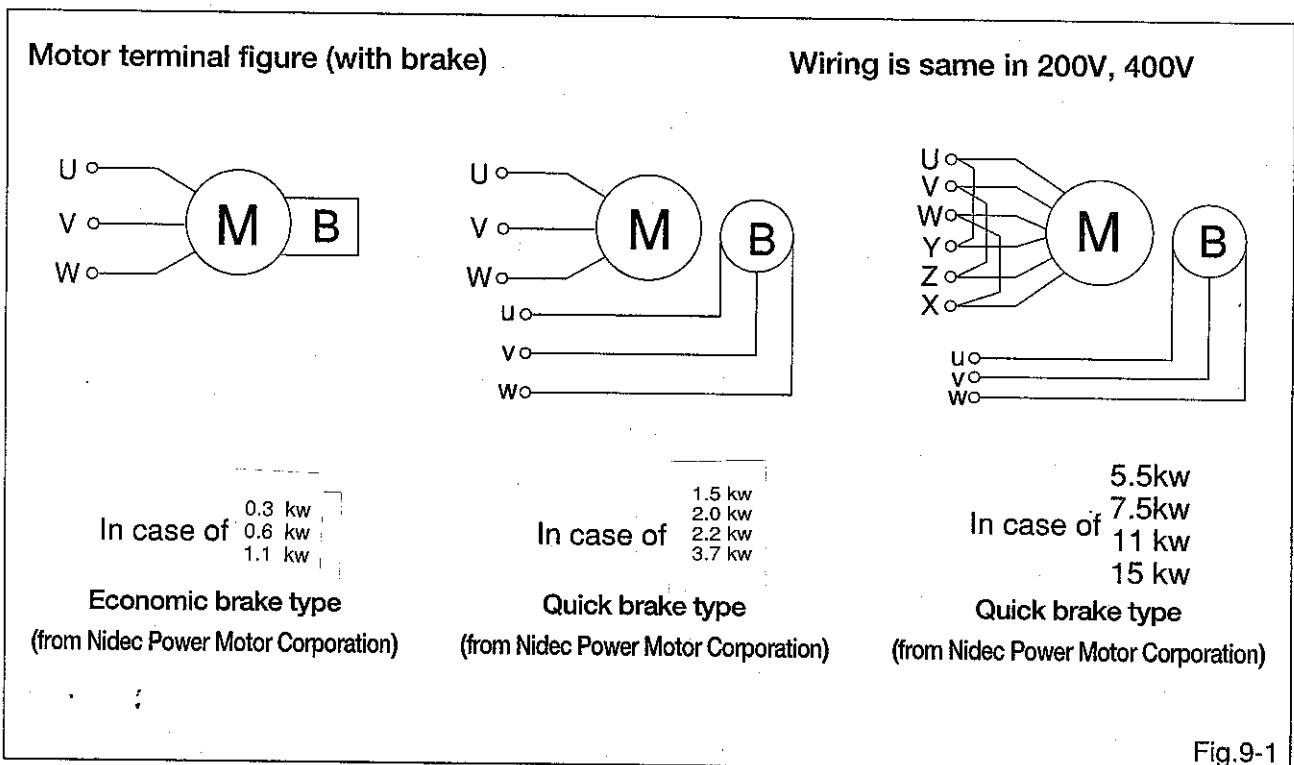
- In wiring, the third earth works shall be done.

(3) Motor

- The connection between motor lead wire and power cable shall be completed without failure.
- In case of three phase motor, take care not to do misoperation due to the phase error caused by miswiring.
- In case of the type with brake, wire the brake lines.

The motor does not start or burn out if not wired because the brake is deenergisation type (OFF brake). There is a fear of early abrasion and accident.

- Voltage variation shall be controlled within $\pm 10\%$ of the rated voltage and frequency variation within $\pm 5\%$. The use beyond that scope may result in trouble.



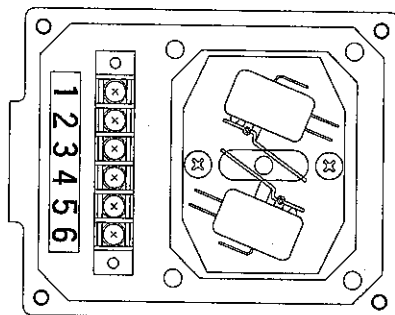
Refer to the motor manual or exclusive circuit diagram in case of different motors.

(4) Thrust limiter

- Thrust limiter is a kind of limit switch unit for thrust detection (for protection against overload). Thrust limiter shall be wired in the circuit.
- When the thrust limiter actuates during operation, check and confirm the cause of overload and remove the overload conditions after power source is switched off. Overload can be released by inching toward the opposite direction without switching off the power source. In this case never fail to confirm that the reverse movement does not cause any problem before starting operation.
- Thrust limiter has two limit switches for advancement and retreat. If the wiring of

the thrust limiter is not properly done, the thrust limiter does not work, resulting in the lock, burning of the motor and breakage of inner parts of Mighty Cylinder.

Terminal figure of thrust limiter



Electric capacity
250V, 10A

Contact construction
1C

Fig.9-2

● Thrust limiter Operation of limit switch

LS01 : Overload detection in advancement

Terminal 3—1 : When the piston rod advances (extrudes), the limit switch becomes off in case of the following situations. Normal is on.

- Overload
- Continuous pressing beyond the rated thrust power
- Reaching the tip (extruding limit) of the normal stroke

Terminal 3—2 : Contact for reverse work from above mentioned. (for signal confirmation)

LS02 : Overload detection in retreat

Terminal 4—6 : When the piston rod retreats (intrudes), the limit switch becomes off. Normal is on.

- Overload
- Continuous pressing beyond the rated thrust power
- Reaching the tip (intruding limit) of the normal stroke

Terminal 4—5 : Contact for reverse work from above mentioned (for signal confirmation)

(5) Outer limit switches (LS unit)

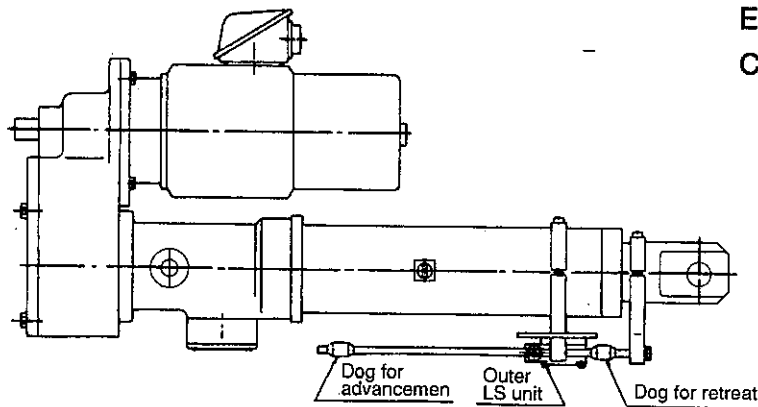
● Outer limit switches are used to adjust the stroke (within the mechanical stroke). Take care of the following points when used.

● Dogs shall be fixed each before the stopping points taking the coasting distance into consideration.

The high speed type requires longer buffer distance.

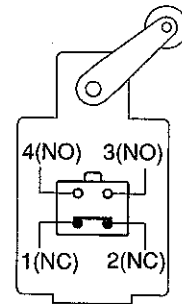
● In case of the type with thrust limiter, every limit switch is recommended to be wired in series.

Outline for outer limit switches



Electrical capacity : AC250V 10A

Connection composition : 1a1b



Stroke is set by adjusting dogs.

Fig.9-3

(6) Positioner

- Positioner is a general nomination installed on Mighty Cylinder which integrates limit switches for stroke setting and a potentiometer for detecting stroke.

(6) - 1 Position limit switch

- The standard type can integrate four position limit switches which are to be used as signal confirmation for operation, stop, position indication and such.
- Position limit switches (limit switch actuating cams) are arranged from this side (opposite side of the piston rod) in order of LS11,12,13,14.
- After connecting Mighty Cylinder with the mate machine, move the piston rod to the end of the one side by manual or inching operation and fix the cams by two set screws one after another at certain points of the stroke. In this case take care of the movement direction of the piston rod (knuckle joint) and the revolutionary direction of the cam. After setting, make sure if the limit switches actuate surely at fixed positions.

(6) - 2 Potentiometer

- Potentiometer is a resistor which increases value of resistance within the nominal stroke. The movement of Mighty Cylinder can be confirmed all the time by indicators and things like that by changing the value of resistance into desired signal by R/I converter and such. (0~1kΩ)
- Never turn the piston rod (knuckle joint) when connected with the mate machine because the potentiometer is set when shipped. Turning the piston rod (knuckle joint) displaces the phase of the piston rod causing abnormal actuation.
- Confirm the normal operation within using stroke after connected with the mate machine.
- When the adjustment of the potentiometer

Outline for position limit switches

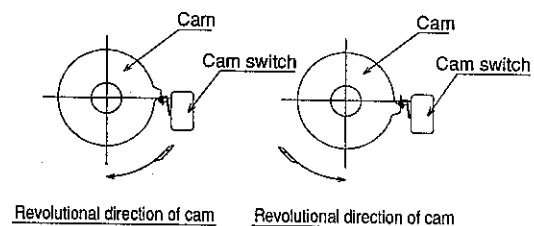


Fig.9-4

is required in case of exchange, loosen the setting screw of the potentiometer and adjust by turning the shaft of the potentiometer. When the setting screw is fixed, anti-loosening agent shall be applied to the screw.

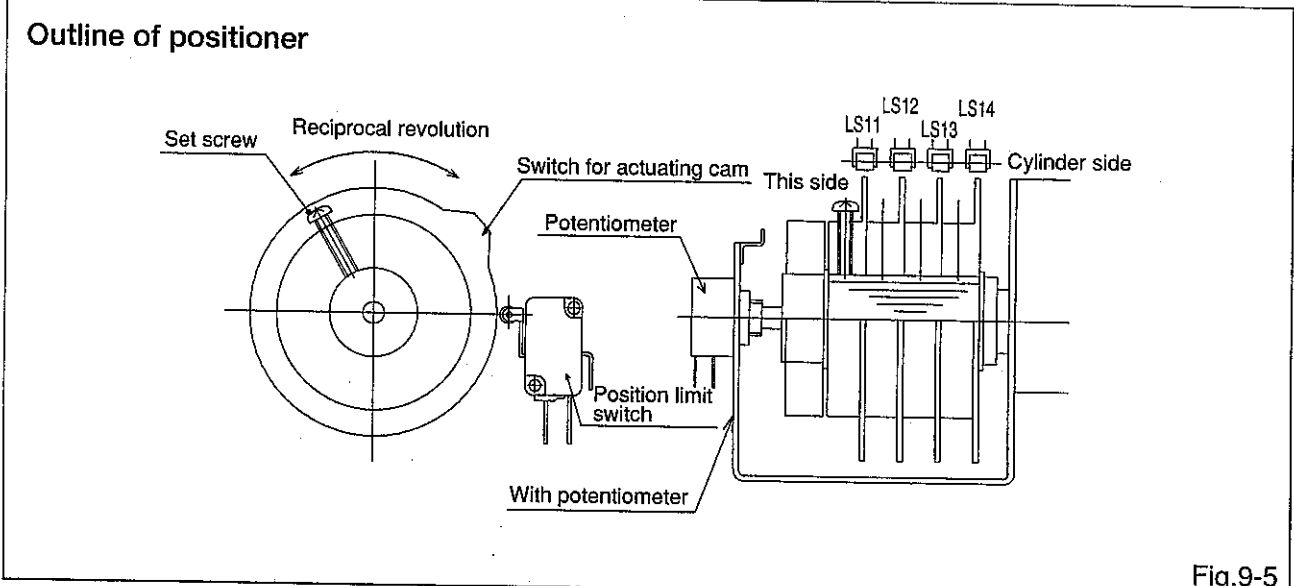


Fig.9-5

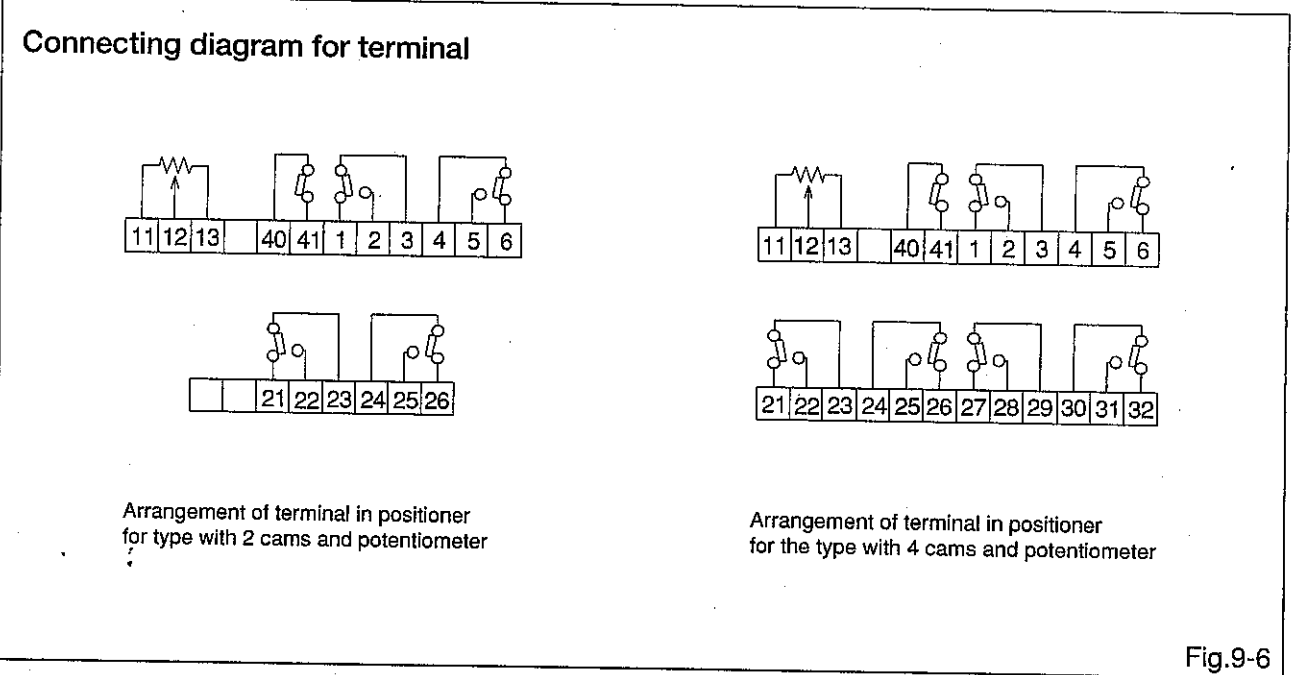


Fig.9-6

- This diagram shows the type with potentiometer, two cams and four cams.
- In case of the type without potentiometer, there is no terminal NO.11, 12, 13.
- As to MCPD series, refer to the exclusive diagram for terminal arrangement.

(6) -3 Safty limit switch (Option)

- The purpose of the safty limit switch is to prevent the accident from occuring when operated manually.
- The limit switch actuates when the exclusive handle is inserted to the manual shaft. For the purpose of safty the wiring of this limit switch in the circuit is recommended.
- Manual operation shall be done by exclusive handle. If not, the safty limit switch may not actuate.

(6) -4 Option

- R/I converter and indicator are avaiable as option.

(7) Basic operational circuit (for reference)

- Reference circuit for Mighty Cylinder is shown as follows. Compose the operational circuit in accordance with your desired operational method.

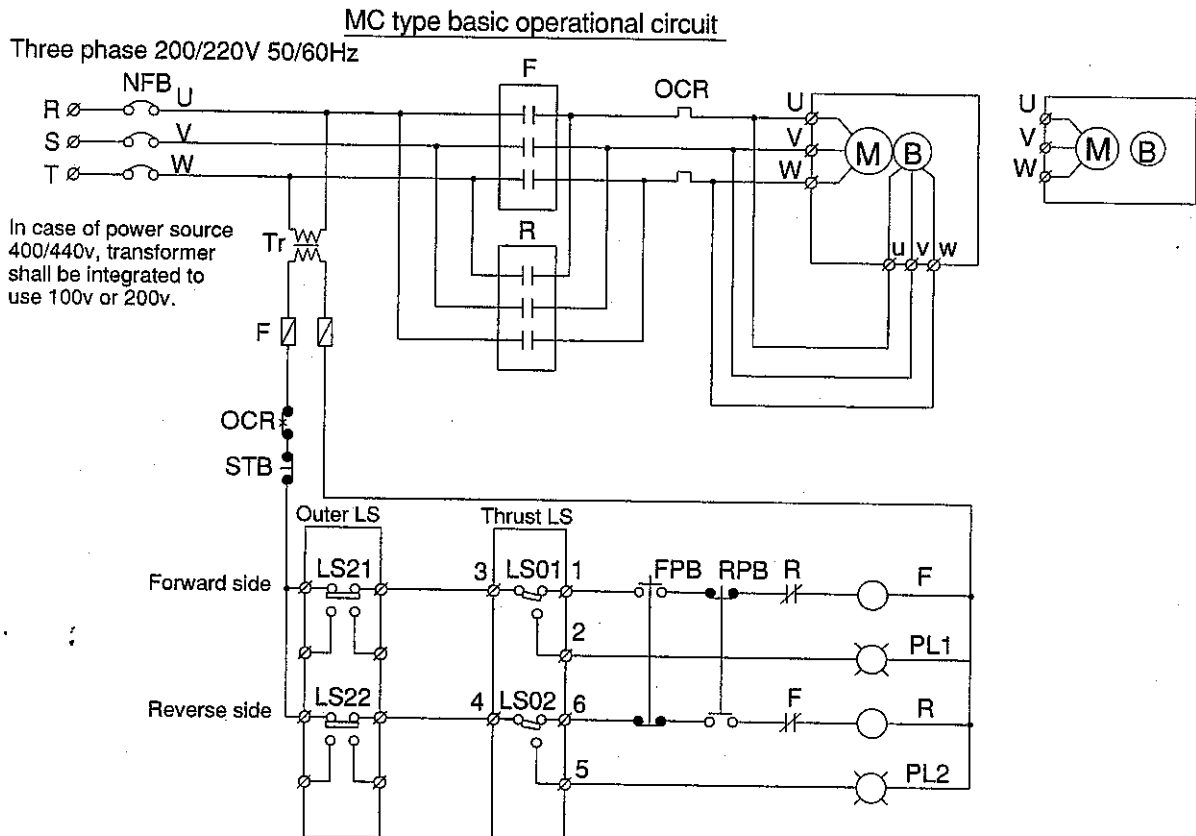


Fig.9-7

- When FPB is on, the piston rod advances, when off, the piston rod stops.
- When RPB is on, the piston rod retreats, when off, the piston rod stops.
- Advance and retrast movement of the piston rod varies depending on the type. Confirm the movement direction by inching and if it differs, change the two of the three lines on the power source.

10. Operation

Danger

- Confirm the movement direction of the Mighty Cylinder. Mistake of the movement direction may result in accident or breakage of the apparatus.
- Never fail to switch off the power source in case of power failure during operation. If not, Mighty Cylinder may move and cause accident without being noticed when reenergized.
- Make sure that if the brake is released surely in case of the type with brake. Operation with the brake unreleased causes early wear of brake leading to accidents.

Caution

- The temperature of motor may grow extremely high during the operation. Do not touch it. There is a fear of burning.

(1) Confirmation before operation

Confirm the following points after installation and wiring.

- To see if wired correctly.
- To see if the connection with the mate machine is properly done.
- To see if earthed surely.
- To see if there is no short between the frame and each wiring.

(2) Confirmation of power phase

- Confirm if the movement direction of the piston rod (knuckle joint) is normal by inching operation using operational switch. If the power phase is reverse, the piston rod moves toward the opposite direction and the thrust limiters, outer limit switches and such do not actuate normally causing locking phenomenon in the stroke end, motor breakage, breakage of inner parts of Mighty Cylinder, fracture of the apparatus and so on.

In this case switch off the power source and exchange two of three lines to reconfirm the movement direction.

- Extreme care shall be required in case of the type without thrust limiter and high speed.

(3) Position and stroke setting

- Set the limit switches by moving the piston rod (Knuckle joint) to the using stroke by manual or inching operation. As to setting method, refer to the wiring item.
- Limit switches shall be set taking the coasting distance into consideration in case of high speed type.
- Take care not to mistake the movement direction of Mighty Cylinder and actuating

side of limit switches.

(4) Pressing stop

Pressing stop is available in case of the type with thrust limiter. However the type with the speed of 60mm/sec or more can not be used by pressing stop normally because the sliding clearance of the spring integrated may be zero.

- Pressing stop is an operation by using the thrust limiter. There is no need for the outer limit switches because the movement is stopped by pressing at the stroke end or pressing the mate machine or stopper before the stroke end. However it is safer to install the outer limit switches to clarify the difference between pressing stop and abnormal overload detection.
- Complete cutoff is available in case of pressing stop because pressing or pulling power at rated thrust power generates continuously.
- In this case the strength of the stopper of the mate machine shall be 250% or more the rated thrust power.

(5) Frequency

- Frequency shall be limited due to the heat capacity of the motor because Mighty Cylinder reciprocates by normal or reverse revolution of the motor. Frequency shall be less than the starting times below mentioned.
- Duty factor shall be 25% ED or less.

(Table10-1)

Type (Motor capacity)	MCL,MD,MCD (0.3kw,0.6kw) MSCL (0.3kw)	MCL,MD,MCD (1.1kw~3.7kw)	MCL (5.5kw,7.5kw)	MCL (11kw)
Starting times (times/min.)	5	4	3	2

$$\text{Duty factor (\%ED)} = \frac{\text{Operation time of one cycle} \times 100 (\%)}{\text{Operation time of one cycle} + \text{pause time}}$$

Grease supply cycle (Table 11-1)

Frequency	Grease supply cycle
500~1000 times/day	3 months~6 months
100~500 times/day	6 months~1 year
10~100 times/day	1 year~1.5 year

Recommended grease (Table 11-2)

Company name	Grease nomination	
New Nippon Sekiyu	EPNOC GREASE	AP-1
Mobil Sekiyu	PLEX	No.46
Idemitsu Kousan	DAPHNE EPONEX	SRNo.1
Cosmo Sekiyu	DYNAMAX	SHNo.1
Showa Shell Sekiyu	SHELL ALVANIA	EPNo.1

(2) Overhaul

Overhaul shall be done every two years or after the operation of 100,000 times.

Overhaul of Mighty Cylinder is recommended to be done in our factory because it requires skill and experience.

(3) Daily Check

Daily check shall be done by referring to the following items.

(Table 11-3)

Check items	Check contents
Current Value	To see if less than rated current value (Refer to the table 11-4)
Movement	To see if there is no abnormal movement
Noise	To see if there is no noise
Bolts and such	To see there is no loosening
Vibration	To see if there is no abnormal vibration

Rated current value (A)

(Table 11-4)

Motor capacity (kw)	Voltage V / Frequency Hz					
	200/50	200/60	220/60	400/50	400/60	440/60
0.3	4.0	2.8	3.3	2.0	1.4	1.7
0.6	4.0	3.2	3.4	2.0	1.8	1.7
1.1	6.1	5.2	5.3	3.2	2.8	2.7
1.5	6.8	6.3	6.0	3.4	3.2	3.0
2.0	10	9.5	9.0	5.2	4.8	4.5
2.2	9.4	8.8	8.3	4.7	4.4	4.2
3.7	15	14	13.2	7.5	7.1	6.6
5.5	20	20	19	11	10	9.5
7.5	29	28	26	15	14	13
11	42	40	37	21	20	19

※In case of 0.2, 0.4, 0.75kw, Mighty Cylinder's rated current value is current value of 150% load. It is different from the rated current value of the motor shown on the name plate. However in case of the type using ball screw, the rated current value is quite same.

※In case of the type with the motor 1.5kw or more, the rated current value shown on each name plate is same.

12. Cause and countermeasures of troubles

Phenomena		Cause	Countermeasure
No movement	No revolution of motor	Power failure	Contact power company
		Circuit failure, Disconnection	Correct circuit and wiring
		Fusing of fuse	Exchange fuse, Investization of fusing cause
		Failure of switch	Repair or exchange of switch
		Breakage of motor (coil, bearing, etc.)	Repaired in specialized factory
		Operation of safety device for overload (thrust limiter etc.)	Remove the cause of overload (To see if piston rod touches stroke end)
	No revolution of motor and groaning	Different power source and voltage	Confirmation of power source and voltage, Consult power company
		One of three phases is disconnected	Correct connecting part
		Trouble of brake	Repaired in specialized factory
		Touched stroke end	Wiring of thrust limiter is reversed
Though motor revolves	Breakage of gears etc. by overload	Fixed in specialized factory	
Though cylinder itself moves	Movement direction is different	Mistake of wiring	Change connecting of motor
	Motor overheats or thermal relay operates	Voltage is low or high	Fix voltage or consult power company
		High frequency	Reduce frequency
		Disaccordance of shaft center with mate machine	Accord shaft center each other
		Short of motor coil, Layer short	Repaired in specialized shop
Thrust limiter actuates suddenly	GD ² of load is too large	Reduce GD ²	
	Load is larger than rated thrust power	Lower load	
	Lateral load on piston rod	Remove lateral load	
	Overload	Reduce load	
	Mistake of selection	Exchange capable type	
Shortage of stroke	Bad installation	Adjust installation position by confirming dimension	
Thrust limiter actuates in operation	Overload	Remove cause of overload	
	Mating machine does not move smoothly	Check bearing and such	

Phenomena		Cause	Countermeasure
Coasting		Abrasion of brake lining	Brake lining shall be exchanged in the factory
		Failed to recover brake release device	Recover
		Failure of brake operational circuit	Confirm and rectify brake circuit
Thrust limiter does not actuate		Limit switches are wired vice versa	Revise wiring
		Line's short	Find abnormal parts and correct
Thermal protector actuates		High frequency	Lessen frequency

11. Maintenance

⚠ Danger

- Never release the brake when the load is suspended which may cause drop accidents.

⚠ Caution

- Grease and such shall be supplied under the pause condition. If not, there is a fear of damage.

Mighty Cylinder is filled with grease before shipment. It can be used as it is.

(1) Lubrication

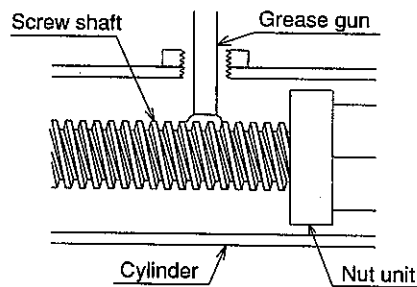
The supply cycle and recommended grease are as follows. Supply quantity shall be depended on using conditions.

- Lead screw part

Screw and nut are supplied with grease beforehand. The supply method on the screw is shown in the following figure.

Advance the piston rod to the bead end and supply the grease little by little with a grease gun or spatula through the supply port of grease on the middle of the cylinder. Reciprocate the piston rod several times and repeat its work 3 to 4 times.

Figure for grease supply method



Fug.11-1

- Bearing part

Bearings are the grease-sealed type. Open type has grease nipples from which grease is to be supplied.

- Gear box part

Grease is supplied before shipment. There is no need to supply grease for 1 year under the normal operation.

Check and supply grease if necessary when the cylinder is left unoperated for a long time.

- Liquid packing shall be applied on the composition place and screw-in parts when reassembled.

(Liquid gray bond 1215 {from THREE BOND} is used for Mighty Cylinder.)