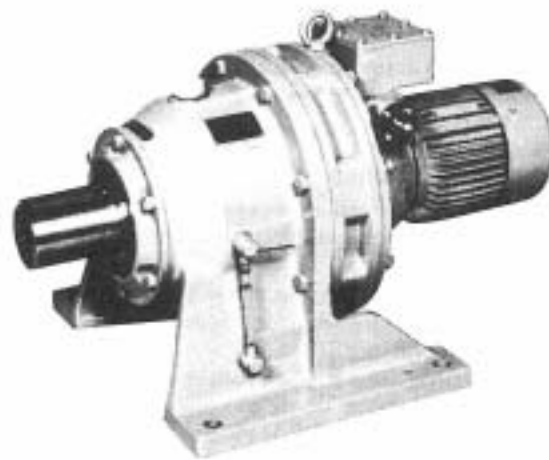


CYCLO[®] DRIVE

Torque Limiter Equipped



- Torque Limiter Equipped should be handled, installed and maintained by trained technicians. Carefully read the maintenance manual before use.
- A copy of this maintenance manual should be sent to the actual user of Torque Limiter Equipped.
- This maintenance manual should be maintained by the user.

CAUTION

General

- Use the unit in conformity with specifications shown on a rating plate or manufacturer's specifications ; otherwise, electric shock, injury, or damage to the equipment may result.
- Do not put fingers or other objects into an opening of the gearmotor or speed reducer ; otherwise, electric shock, injury, or damage to the equipment may result.
- Do not operate broken reducer and motor ; otherwise, personal injury or fire may result.
- Do not remove a rating plate.
- Any modifications or alterations of any kind, to the unit, will void our warranty and all subsequent claims.

Inspection upon delivery

- Unpack the unit after verifying that it is positioned right side up ; otherwise, injury may result.
- Verify that the unit received is in fact one ordered. When a different unit is installed, injury or damage to the equipment may result.

Transport

- Exercise ample care not to drop the unit during transport. When a hanging bolt or hole is provided, be sure to use it. After mounting the unit on a equipment, however, do not hoist the entire equipment using the hanging bolt or hole ; otherwise, injury or damage to the equipment and / or lifting device may result.
- Before hoisting, check weight with a rating plate, crate, outline drawing, catalog, etc. Never hoist the unit that exceeds a rating of the crane or other mechanism being used to lift it ; otherwise, injury or damage to the equipment and / or lifting device may result.

Installation

- Do not put inflammable thing around the reducer and motor ; otherwise, fire may result.
- Do not place any objects that will hinder ventilation around the unit ; otherwise, cooling effect is reduced, and may lead to a possible fire hazard due to excessive heat build-up.
- Do not step on or hang from the unit ; otherwise, injury may result.
- Do not touch a key way at the shaft end or on the inside of the reducer and the motor ; otherwise, injury may result.
- When the unit is used in food processing applications vulnerable to oil contamination, install an oil pan or other such device to cope with oil leakage due to failure or limited service life. Otherwise, oil leakage may damage products.

Coupling with other machines

- When coupling the reducer and motor with a load, check that a belt tension and parallelism of a pulley are within specified limits. When the unit is directly coupled with another machine, check that the direct coupling accuracy is within specified limits.
When the belt is used for coupling the unit with another machine, check that the belt tension.
Before operating correctly tighten respective bolts for the pulley and coupling ; otherwise, personal injury, due to misalignment, may result.
- Install appropriate guard devices around rotating parts ; otherwise, injury may result.
- Confirm directions of rotation before coupling the unit with its driven machine. Difference in the direction of rotation may cause injury or damage to the equipment.

Wiring

- Do not touch a terminal when measuring insulation resistance ; otherwise, electric shock may result.
- When wiring, follow technical standards for electric facilities and extension regulations ; otherwise, burning, electric shock, injury, or a fire may result.
- The motor is not equipped with a protective device. However, it is compulsory to install an overload protector according to technical standards for electric facilities. It is recommended to install other protective devices (earth leakage breaker, etc.), in addition to an overload protector, in order to prevent burning, electric shock, injury, and fire.
- Remove a key temporarily attached to the output shaft of the gearmotor or speed reducer, when the shaft is free rotating (i.e. : not loaded) ; otherwise, injury may result.
- Confirm directions of rotation before coupling with its driven machine. Difference in the direction of rotation may cause injury or damage to the equipment .
- **When Δ start-up is to be used** , select one with an electromagnetic switch on the primary side (3-contact type) ; otherwise, fire may result.
- **When a 400V class inverter** is used for driving a motor, mount a suppressor filter or reactor on the inverter side, or provide reinforced insulation on the motor side ; otherwise, fire or damage to the equipment due to dielectric breakdown may result.
- When an ambient temperature is over 60°C, relocate a rectifier of the brakemotor under the condition below 60°C. At that time the rectifier must be protected by the cover.
- When an inverter is used for an explosion-proof type motor, use the approved inverter for the motor.
- Do not use a start-up condenser for operation condenser ; otherwise, the condenser may break.

CAUTION

- Do not damage a plastic cover of a start-up condenser ; otherwise, electric shock may result.
- Long wiring causes substantial drop in voltage. Select cables with appropriate thickness so that the voltage drop will be less than 2%.
- When stopping a brake of the gearmotor with a brake or brakemotor, do not turn on the power to the brake continually ; otherwise, damage of the coil, fire may result.

Operation

- The reducer and motor will get very hot during operation. Do not touch or come in contact in any way with the unit ; otherwise, you may suffer burns.
- If the unit is operating in an abnormal way, stop the unit immediately ; otherwise, injury may result.
- Do not operate the unit in a manner that exceeds its rating criteria ; otherwise, injury or damage to the equipment may result.
- Do not loosen an oil filler plug during operation ; otherwise, splashing lubricant may cause burns.
- Do not touch a start-up condenser, before grounding (earth) the condenser ; otherwise, electric shock may result.
- When a single-phase motor (except reversible motor) is reversed, turn on the power to the motor after complete stopping ; otherwise, out of control may result.
- For an equipment in which a lubricant motor pump is provided separately, switch on the pump motor prior to switching on the reducer moto ; otherwise, damage to the equipment may result.

Daily inspection and maintenance

- Do not touch a terminal when measuring insulation resistance ; otherwise, electric shock may result.
- Change lubricant according to the maintenance manual, and use only those recommended lubricants ; otherwise, damage to the equipment may result.
- The surface of the speed reducer and motor will get hot during operation. Do not touch or come in contact in any way with the unit ; otherwise, you may suffer burns.
- Do not change oil during operation or soon after operation has ceased ; otherwise, the hot oil may cause burns.
- When measuring insulation resistance of **an explosion-proof type motor** , confirm that there is no gas, steam, or other explosive atmosphere in the vicinity, in order to prevent possible explosion or ignition.
- Identify and provide appropriate corective action in a timely fashion for any abnormal operation characteristics according as the maintenance manual. Do not operate the unit until corrective action has been taken.

Inspection and maintenance of the brake

- When the gearmotor or motor with brake is to be used for elevator, use a fast brake action for a brake wiring ; otherwise, fallen accident may result.

Disassembly and reassembly

- Repair, disassembly, and reassembly should be handled by properly trained technicians ; otherwise, damage to the equipment may result.

Disposal

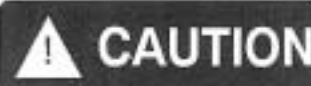
- Dispose the unit and lubricant as general industrial waste.

SAFETY AND OTHER PRECAUTIONS

- Carefully read this manual and all accompanying documents before use (installation, operation, maintenance, inspection, etc.). Thoroughly understand the unit, information about safety and all precautions for correct operation. Maintain this manual for future reference.
- Pay particular attention to the "DANGER" and "CAUTION" warnings regarding safety and proper use.



: Improper handling may result in physical damage, serious personal injury and/or death.



: Improper handling may result in physical damage and/or personal injury.

Matters described in  CAUTION may lead to serious danger depending on the situation. Be sure to observe important matters described herein.

DANGER

General

- Do not use the unit in an explosive atmosphere. Use the explosion-proof motor in that case ; otherwise, explosion, ignition, electric shock, injury, fire, or damage to the equipment may result.
- Do not handle live wires. Be sure to turn off the power ; otherwise, electric shock may result.
- Transport, installation, plumbing, operation, maintenance, and inspections should be handled by properly trained technicians ; otherwise, injury, electric shock, fire, or damage to the equipment may result.
- Use a proper explosion-proof type motor in the danger zone (which is likely to be filled with explosive gas or steam) ; otherwise, explosion, ignition, electric shock, injury, fire, or damage to the equipment may result.
- In case of **an explosion-proof motor**, technicians who have knowledge of the principle and functions and skill concerning respective explosion-proof construction, installation of electric facilities, and related laws and regulations should be engaged in transportation, installation, plumbing, wiring, operation, maintenance, and inspection; otherwise, explosion, ignition, electric shock, injury, fire, or damage to the equipment may result.
- Do not disassemble or remodel **an explosion-proof type motors** ; otherwise, explosion, ignition, electric shock, injury, fire, or damage to the equipment may result.
- When the unit is to be used in a system for transport of human beings, a secondary safety device should be installed to minimize chances of accidents resulting in injury, death, or damage to the equipment.
- When the unit is to be used for an elevator, install a safety device on the elevator side to prevent it from falling ; otherwise, personal injury, death, or damage to the equipment may result.
- Protect a brake lining from oil and water ; otherwise, fallen depend on dropping brake torque or out of control may result.

(Note)

- A copy of this manual should be sent to the actual user of the unit.
- This manual should be maintained by the user.



DANGER

Transport

- Do not stand directly under the unit suspended by a crane or other lifting mechanism ; otherwise, personal injury or death may result.

Installation

- When an explosion - proof motor is operated by an inverter drive, install the inverter drive outside of an explosive atmosphere. Because the construction of an inverter does not suit an explosion - proof ; otherwise, explosion, ignition, fire or damage to the equipment may result.

Wiring

- Connect a power cable to the unit according to the connection diagram shown inside the terminal box or in the instruction manual ; otherwise, electric shock or fire may result.
- Do not forcibly curve, pull, or clamp a power cable and motor lead wires ; otherwise, electric shock or fire may result.
- Correctly ground the earth bolt ; otherwise, electric shock may result.
- The lead - in condition of **an explosion - proof type motor** shall conform to the technical standards for electric facilities, extension regulations, and explosion - proofing guide, as well as the maintenance manual ; otherwise, explosion, ignition, electric shock, injury, or damage to the equipment may result.
- Use a power supply which is showed in a name plate ; otherwise, fire or damage to a motor may result.

Operation

- Do not operate the unit with a terminal box cover removed. After maintenance, return the terminal box cover to the original position ; otherwise, electric shock may result.
- Do not approach or touch rotating parts (output shaft, etc.) during operation ; otherwise, loose clothing caught in these rotating parts may result in severe injury and / or death.
- When a power supply is interrupted, be sure to turn off the power switch ; otherwise, resumption of the power supply without notice may cause electric shock, injury, or damage to the equipment.
- Do not open a terminal box cover of **an explosion - proof type motor** during energization ; otherwise, explosion, ignition, electric shock, injury, fire, or damage to the equipment may result.

Daily inspection and maintenance

- The lead - in condition of **an explosion - proof type motor** shall conform to the technical standards of electric facilities, extension regulations, and explosion - proofing guide, as well as the maintenance manual ; otherwise, explosion, ignition, electric shock, injury, or damage to the equipment may result.
- Do not approach or touch any rotating parts (output shaft, etc.) during maintenance or inspection of the unit ; otherwise, loose clothing caught in these rotating parts may result in severe injury and / or death.
- Do not remove any covers or open the unit during operation ; otherwise, splashing lubricant may cause burns.
- Do not operate the unit with a safety cover removed during inspection of the unit ; otherwise, loose clothing caught in these rotating parts may result in severe injury and / or death.

Inspection and maintenance of the brake

- Do not operate the unit with a brake released by brake release bolts ; otherwise, injury or death to the elevator may result.
- Inspect the function of a brake before operation ; otherwise, injury or death to the elevator may result.
- Do not operate the unit with a fancover removed, after gap inspecting or adjusting ; otherwise, loose clothing caught in these rotating parts may result in severe injury and / or death.
- When the unit is to be used for an elevator, do not release a brake of the unit during lifting the unit ; otherwise, injury or death to the elevator may result.

This Operation Manual specifically describes the torque limiting device of the Torque Limiter Equipped Cyclo Drive. For operation of the Cyclo Drive, refer to "Cyclo Drive Maintenance Manual."

1. INTRODUCTION

In response to the recent rapid increase in the automated or unattended operation of plants, facilities and equipment in various industries, Sumitomo has developed the Torque Limiter Equipped Cyclo Drive — a drive with a compact built-in overload protection device.

This equipment automatically protects not only the Cyclo Drive, but also the prime mover and the driven machine from overload. When a fault occurs in the driven machine, causing the load torque to exceed the preset limit, the motor current is automatically and instantaneously cut off, stopping operations and protecting the equipment. In consequence of its high performance, this equipment enjoys a favorable reputation for its simple structure, easy operation and reliability.

2. CONSTRUCTION(See 8. Assembly Drawing)

Frame (2) will freely rotate in the fixed frame (1), and bush (6) is secured by threaded level for dog (5).

Movement of bush (6) is restricted by coil spring (7) inserted into spring case (10), spring retaining plates A (8), B (9) and adjusting bolt (12).

Dog (16) is fitted on the threaded level for dog (5). Dog (16) will activate limit switch (21) located in switch box (14). Seals for torque limiter are provided in the following places: In the main unit, seal packing (0.3mm thick) is installed at (25) and (26) while washers with rubber (35) and (36) are used for locking bolts (33) and (34). In the torque limiter section, rubber packing is used in bellows (15), O-ring (30) and seat packing.

Because of its completely sealed construction as described above, this unit can be used for ordinary outdoor applications without any problem at all on the performance as a torque limiter. Direction in which torque adjusting parts (spring (7), spring case (10), adjusting bolt (12), etc.) are installed on the fixed frame (1) differs according to the rotating direction of the slow speed shaft. In case the shaft is rotated clockwise as viewed from the input side, the adjusting parts are installed in the same direction as the rotation of the shaft (in the reverse direction for single stage type). In other words, the parts are installed on the right-hand side tube from the input side of the fixed frame (1) (on the left-hand side tube for single stage type).

The tube on the other side has stopper (31) which will prevent frame (2) from turning in the reverse direction under spring pressure when the torque limiter is in operation.

In case the slow speed shaft is rotated counter-clockwise, the torque adjusting parts are installed in the position on the side opposite to the above.

For wiring to limit switch (21), wire conducting hardware (20) for marine use is installed.

3. OPERATION(See 8. Assembly Drawing)

During the course of operation of the Cyclo Drive, the load reaction torque applied to the slow speed shaft is transmitted to the ring gear housing (2) through the Cycloid Discs. Under normal loading, the free rotation of the ring gear housing within the fixed frame (1) is restricted by the coil spring through the bush rod and spring holder.

As the load torque increases, the ring gear housing (2) turns in a reverse direction to the slow speed shaft rotating, compressing the coil spring (7).

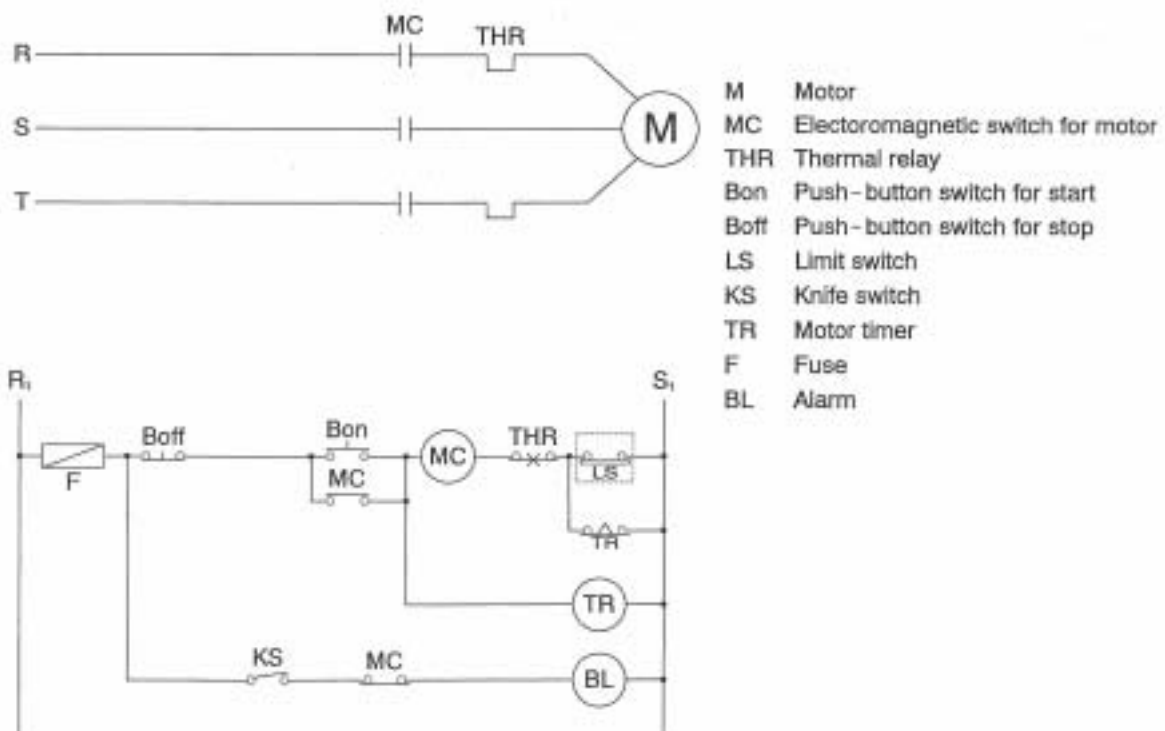
When the load reaction torque exceeds the pre-fixed limit, the dog (16) at the top of the bush rod (6) actuates the limit switch (21), instantly cutting the power source and stopping the motor.


After the motor has stopped, the coil spring automatically returns the bush rod and ring gear housing to their normal position.

4. WIRING TO LIMIT SWITCH

- 1) For wiring to the limit switch, remove terminal cover (24) from terminal box (43), turn the cable through wire conducting hardware (20), and connect this cable with lead wires (41) from the limit switch.
Of the 3 lead wires from the limit switch, make connection only to 2 wires, terminal code C (common) and NC (normally closed).
- 2) Make wiring connections within terminal box (43) without fail. The terminal box is so designed that connections can easily be made within the box.
- 3) In case starting torque is greater than the preset torque (in case there is a starting shock or a motor equipped with a brake is used), the limit switch may be tripped at the time of start-up. In such case, bypass the current flowing to the limit switch by using a time relay, knife switch, etc. at the time of start-up until load torque drops to below the preset torque.
- 4) Inserting an alarm device in the circuit will further increase safety.
- 5) The wiring diagram below shows an example which uses both a time relay and an alarm device.

Wiring Example for CYCLO-DRIVE with Torque Limiter (fitted with an alarm device)



Note1. Limit switch inside  is installed in TORQUE LIMITER EQUIPPED CYCLO DRIVE.
Other parts should be prepared by users.

Specification of Limit Switch for Torque Limiter-equipped Cyclo Drive

1. Limit switch

Type Z-15 GQ22-B of Omron, Tateisi Electric Co.

Rating

Rush current	Normally closed circuit 30A max Normally open circuit 15A max
Ambient temperature	Ordinary type -25 to +80°C*
Ambient humidity	Ordinary type less than 80% RH

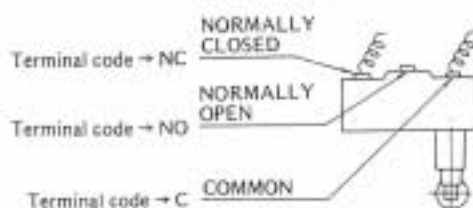
* To be free from freezing.

Rated voltage (V)	Non-inductive load (A)			Inductive load (A)			
	Resistance load	Lamp load		Inductive load		Motor load	
		Normally closed circuit	Normally closed circuit	Normally open circuit	Normally closed circuit	Normally open circuit	Normally closed circuit
AC 125	15	3	1.5	15	5	2.5	
250	15	2.5	1.25	15	3	1.5	
500	10	1.5	0.75	6	1.5	0.75	
DC 8	15	3	1.5	15	5	2.5	
14	15	3	1.5	10	5	2.5	
30	6	3	1.5	5	5	2.5	
125	0.5	0.5	0.5	0.05	0.05	0.05	
250	0.25	0.25	0.25	0.03	0.03	0.03	

*Figure in () indicates rating for micro load.

Terminal At 3 places on the right.

For connection of limit switch (L.S.), connect to COM and N.C. at contact b.



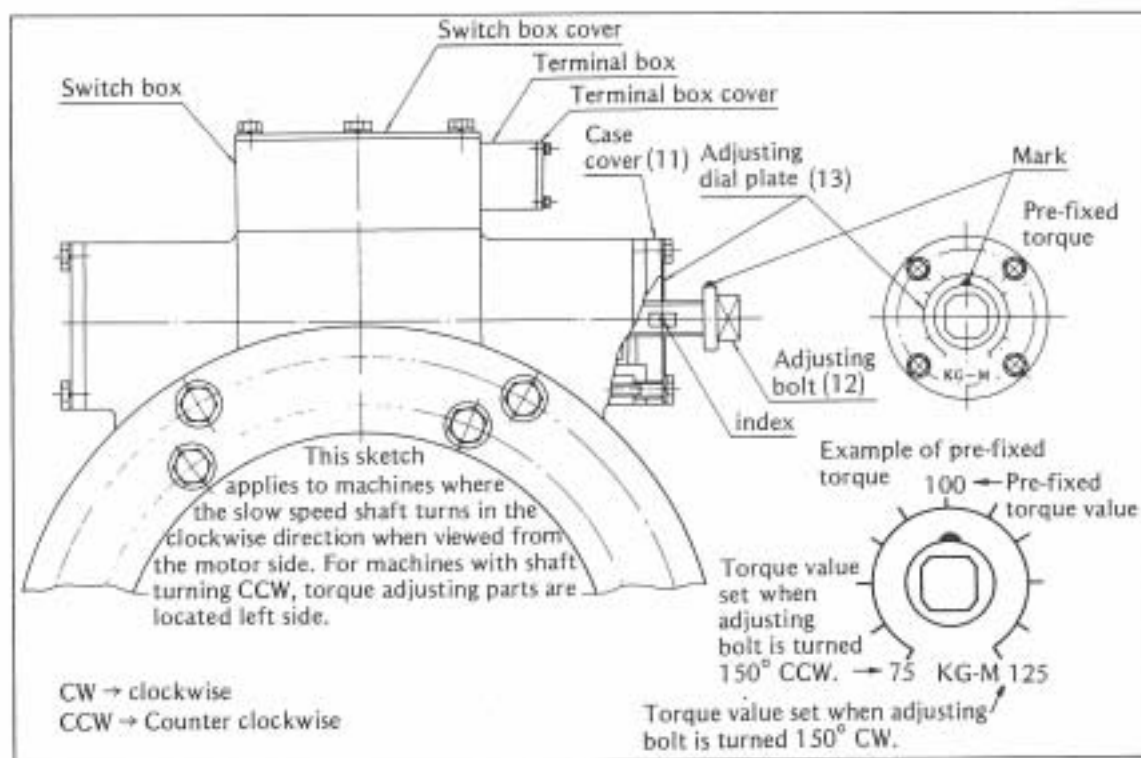
2. Wire conduct pipe As per JISF-8801 (for Box) nominal 15-b, marine use wire conduct pipe.

Note: When providing wiring to the limit switch, be careful not to alter the position of the limit switch. If the position of limit switch is altered, the torque setting will be disturbed.

5. PRE-FIXED TORQUE

- 1) Before shipment from the factory, a load test is conducted and the torque is set to the user's requirements.
- 2) If the Cyclo Drive is used at the originally requested torque setting, there is no need to increase or decrease the torque with the adjusting bolt. Use the Cyclo Drive as it is.
- 3) In case it becomes necessary to increase or decrease the preset torque, perform this work by manipulating the adjusting bolt (12). In such an event, adjust the torque value within a range of $\pm 25\%$ of the prefixed torque value. No plus adjustment should be made if the pre-fixed torque = rated torque. Never set the pre-fixed torque at a value higher than the rated torque, as this may result in equipment break-downs.
- 4) Adjustment of pre-fixed torque
A mark is provided on notched portion on the side of the adjusting bolt thread. The preset torque is obtained by aligning this mark with the end surface of the casing cover (11). Therefore, make fine adjustments, with this mark as reference.
To make fine adjustments, adjust the mark on bolt head to an appropriate value inscribed on the adjusting dial plate (13). If the adjusting bolt is excessively loose or tight, reset the adjusting bolt so that its index will align with the end surface of the casing cover.
- 5) The adjusting dial plate is graduated in steps of 30° . When adjusting the torque, this value may be set slightly beyond the maximum or minimum division. However, in such an event, limit such setting to $\pm 25\%$ of pre-fixed torque. Even if overscaled, the slow speed shaft load torque will remain proportional to the scale.

Adjustment of Pre-fixed Torque



6. MAINTENANCE

Check the following parts, when changing or replenishing the lubrication oil or grease :

1) Limit switch

Since this is a critical component, activate the limit switch and check to confirm that the motor positively stops. Furthermore, use a tester, to check the limit switch for any abnormal condition. Even though the Cyclo Drive may be operated only several times a year, check the limit switch every six months to ensure safety in operation.

2) Ring gear housing

The ring gear housing of the torque limiter is designed to enable rotations within a range of the bush's movement. Disassembly and inspection will be required, if the dog should remain stationary after the load torque has varied.

3) Dog

Check the nuts securing dog, to ensure they are tight. Also check to assure that the dog and roller of limit switch are properly positioned.

4) Oil leakage

Special care should be taken to prevent oil leakage into the switch box, since this may result in the malfunction of the limit switch.

5) Pre-fixed torque value

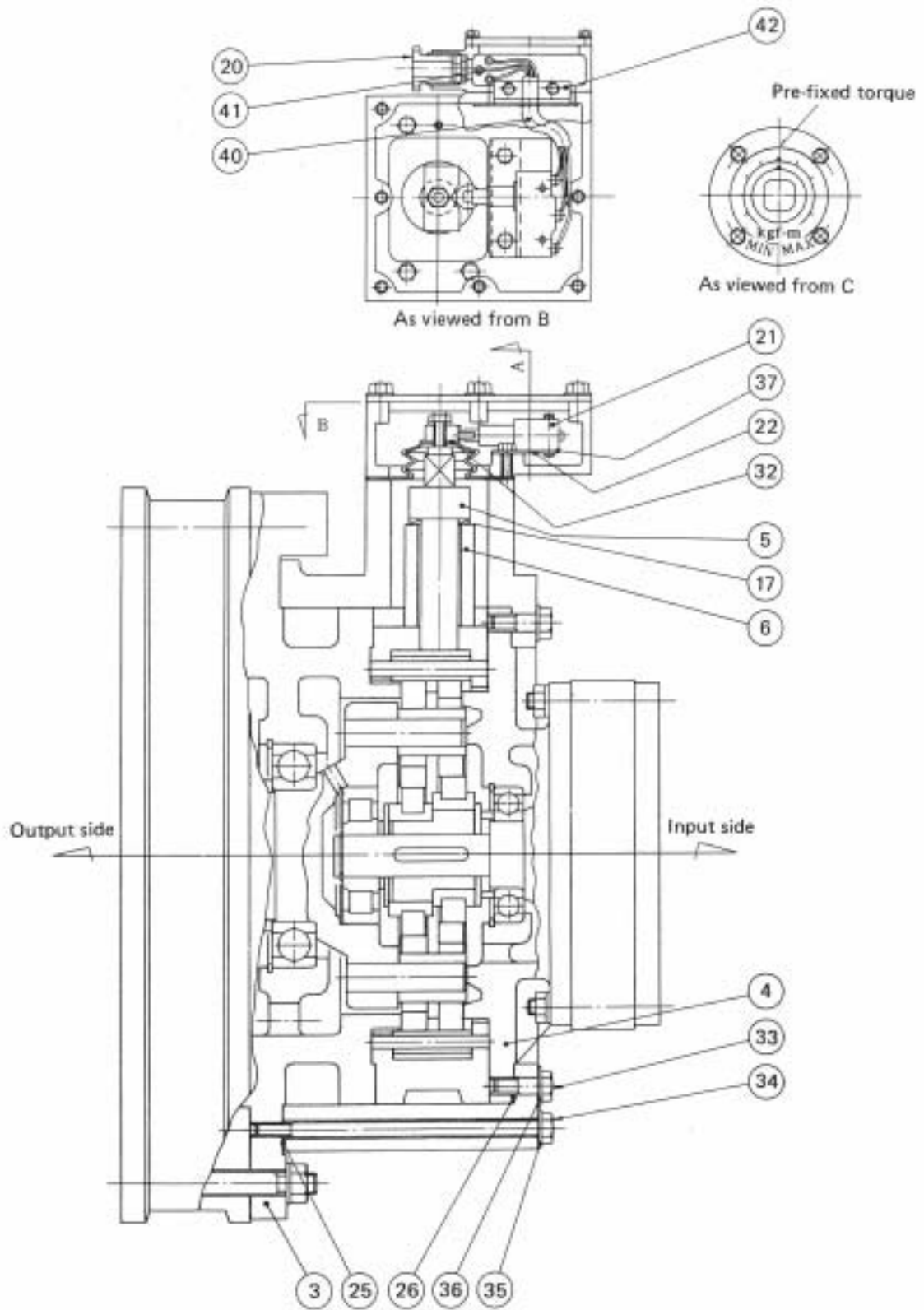
will be disturbed if the positions of the limit switch and dog in the switch box are changed. Therefore, they should never be moved. It is for this reason that the lock nut for dog and the limit switch mounting bolts are painted red. (Refer to instructions attached to the switch cover.)

If adjustment becomes necessary, please contact a nearby dealer, distributor, sales office or service shop.

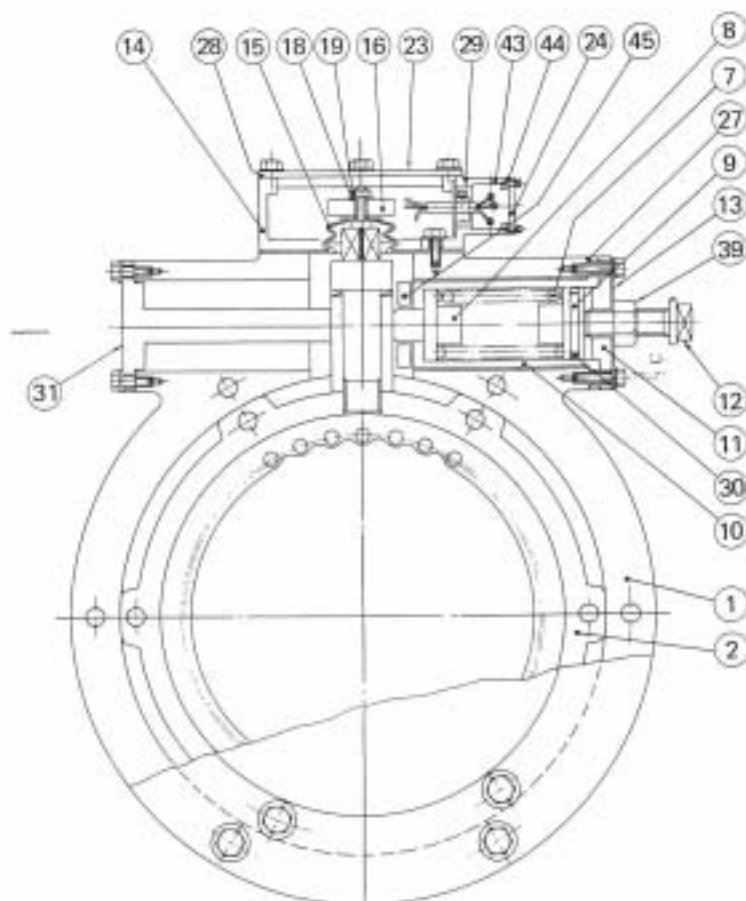
7. DISASSEMBLY • REASSEMBLY

If disassembly of the torque limiter section becomes necessary, please contact a nearby dealer, distributor, sales office or service shop.

8. SECTIONAL DRAWINGS



- Note 1. This drawing shows the Cyclo Drive with Torque Limiter when the slow speed shaft rotates clockwise as seen from the input side. In case of counterclockwise rotation, the torque adjusting parts (spring, spring case, etc.) are mounted on the left-hand side.
2. This drawing is a view of the three-stage type. In a two-stage double shaft type and two-stage direct motor coupling type, the intermediate cover ④ will become the high speed end shield and the flanged cover of motor, respectively.
3. To increase the pre-fixed torque, turn the adjusting bolt clockwise. To decrease the pre-fixed torque, turn the adjusting bolt counterclockwise. The numerical values inscribed on the adjusting dial plate, show the torque values at the Cyclo's slow speed shaft. The maximum and minimum value inscribed on the adjusting dial plate are intended to serve as a guideline and will not necessarily define the adjusting range for the pre-fixed torque. The pre-fixed torque may be set in excess of these values within a tolerance of $\pm 25\%$.



As viewed from A

Part No.	Part Name	Qty
1	Fixed frame	1
2	Ring gear housing	1
3	Intermediate cover	1
4	Intermediate cover (high speed end shield and flanged cover of motor)	1
5	Threaded level for dog	1
6	Bush	1
7	Spring	1
8	Spring retaining plate A	1
8	Spring retaining plate B	1
10	Spring case	1
11	Case cover	1
12	Adjusting bolt	1
13	Adjusting dial plate	1
14	Switch box	1
15	Belows	1
16	Dog	1
17	Toothed washer	1
18	Toothed lock washer	1
19	Lock nut for dog	1
20	Marine use wire conduct	1
21	Limit switch	1
22	Limit switch mounting plate	1
23	Switch box cover	1
24	Terminal cover	1
25	Gasket	1
26	Gasket	1
27	Gasket	2
28	Gasket	1
29	Gasket	1
30	O-ring	1
31	Stopper	1
32	Plain washer	1
33	Bolts for intermediate cover, high speed end shield, flanged cover of motor	
34	Bolts for fixed frame	
35	Washer with rubber	
36	Washer with rubber	
37	Insulation board	1
38	Lock nut	2
40	Cabtype cable	1
41	Limit switch leader cable	3
42	Terminal plate	1
43	Terminal box	1
44	Gasket	1

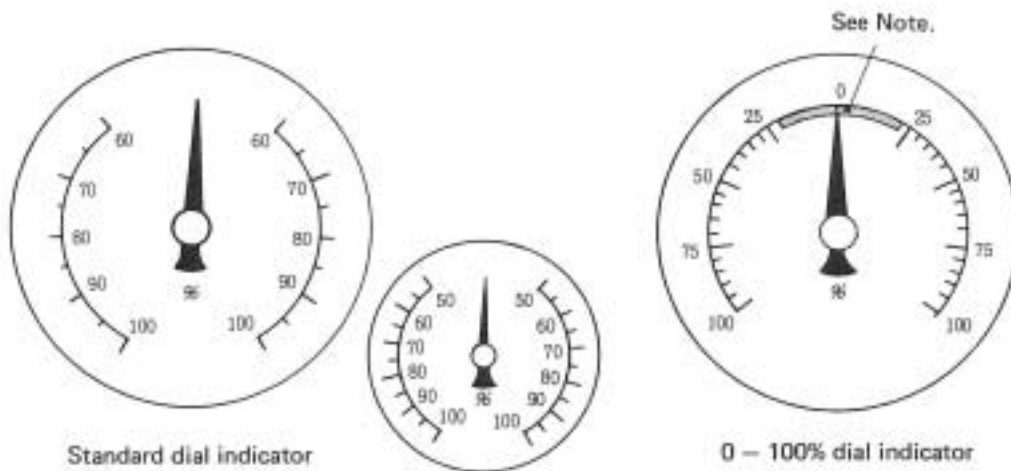
9. TORQUE LIMITER WITH INDICATOR

1. Features

- (1) The percentage of load can easily be measured by the pointer of the indicator. The adjusting dial plate shows torque value in % with the preset torque as 100%. Its accuracy is within $\pm 10\%$ for the full load range.
- (2) The pointer deflects in the same direction as the rotation. As viewed from the slow speed shaft, the pointer of the indicator will deflect clockwise if the shaft turns clockwise and will deflect counter-clockwise if the shaft turns counter-clockwise.

Note: The direction of the deflection is in the opposite direction to the above in case of single stage torque limiters.

2. Indicators



(Load percentage may be indicated in 50 to 100% depending on torque setting and reduction ratio.)

Note: When load is removed, the pointer may sometimes stop within the range marked. In case of need to accurately read load, starting from the vicinity of 0, use a load cell type torque limiter instead.

3. Difference in Construction between Standard Dial Indicator and 0 – 100% Dial Indicator, and Their Operating Principle

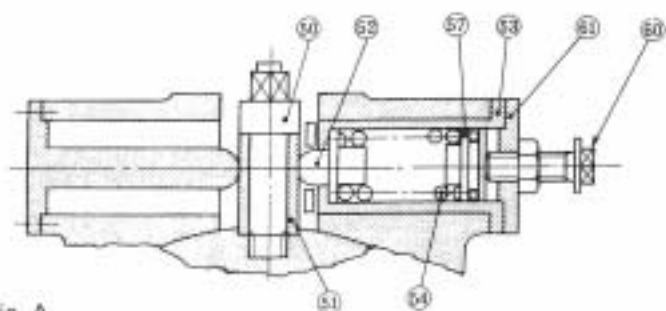


Fig. A

Construction of Spring Section of Standard Dial Indicator (This construction is the same as that of standard torque limiter without indicator.)

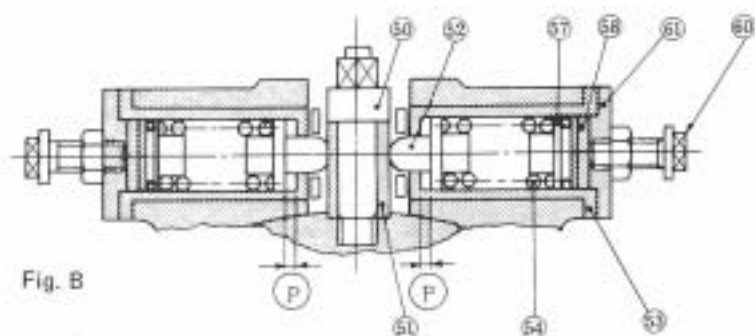


Fig. B

Construction of Spring Section of 0 – 100% Dial Indicator

⑤① Threaded level for dog	⑤③ Spring case	⑤⑧ Preload plate
⑤② Bush	⑤④ Spring	⑥① Adjusting bolt
⑤⑤ Spring retaining plate a	⑤⑦ Spring retaining plate b	⑥② Case cover

Difference between the standard indicator and 0 – 100% dial indicator lies in construction of the spring section. The indicator mechanism is completely identical between the two.

- (1) Fig. A shows the construction of the spring section of the standard torque limiter (the same as the standard indicator). Spring ⑤④ is inserted only on the side of rotating direction. The amount of the spring's deflection under load is determined by the spring constant. The effective deflection amount can be controlled by adjusting bolt ⑥①. For reversible rotation types, spring is inserted on both sides. Assuming threaded level for dog ⑤① has moved from the center toward the left-hand side, the spring pressure on the right-hand side will not be transmitted to threaded level for dog because movement of spring retaining plate A ⑤② is blocked by spring case ⑤③. In other words, it is only one of the springs that affects movement of the dog level at all times.
- (2) Fig. B shows construction of the spring section of the 0 – 100% dial indicator. As shown, the spring is inserted on both sides and the center of operation is established by applying preload with preload plate ⑤⑧. This will balance the springs on both sides and make it possible to sense variations in torque from no load to load. Now, let it be assumed dog level ⑤① has moved toward the left-hand side. The spring pressure will then be transmitted to dog level ⑤① because there is a clearance (P) between spring retaining plate A ⑤② and spring case ⑤③.

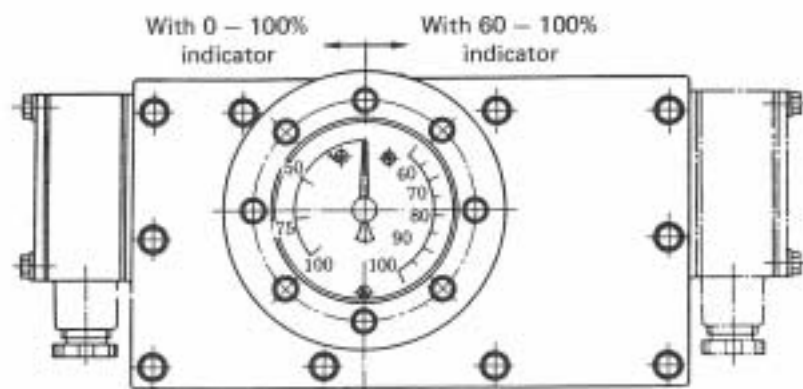
4. Instructions on Use

(1) Standard Dial Indicator

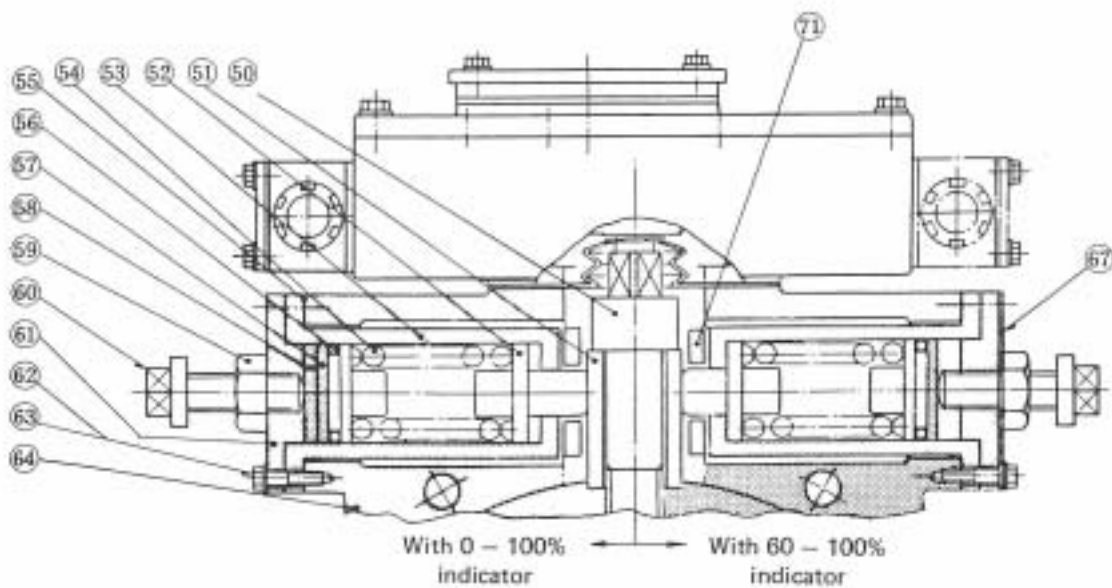
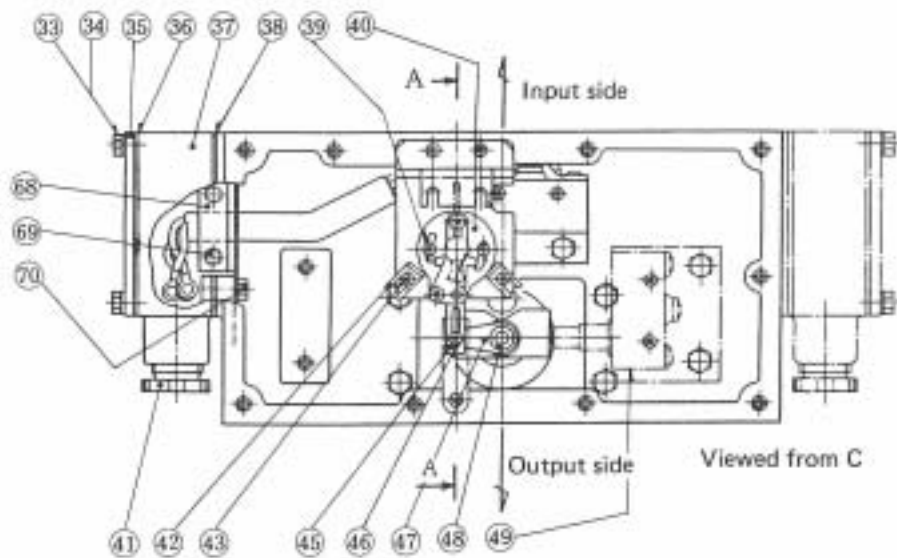
- 1) The standard dial indicator shows readings in a range of 60 to 100% but the indicator may show readings between 50 to 100% depending on torque setting and reduction ratio.
- 2) In case of reversible rotation, a slight gap may be formed between bush (51) and spring retaining plate A (52). In such case, the pointer may deflect for the amount corresponding to this gap as it stops or under no load condition. However, this slight deflection presents no functional problem at all.
- 3) Adjusting bolt (60) allows adjustment of torque setting within a range of $\pm 25\%$. This will result in some deviation of the pointer in the position of 60% although no such deviation occurs in the position of 100%.
- 4) In case of reversible rotation, torque setting may be changed for both left and right. However, this will cause some deviation of the pointer's indication.

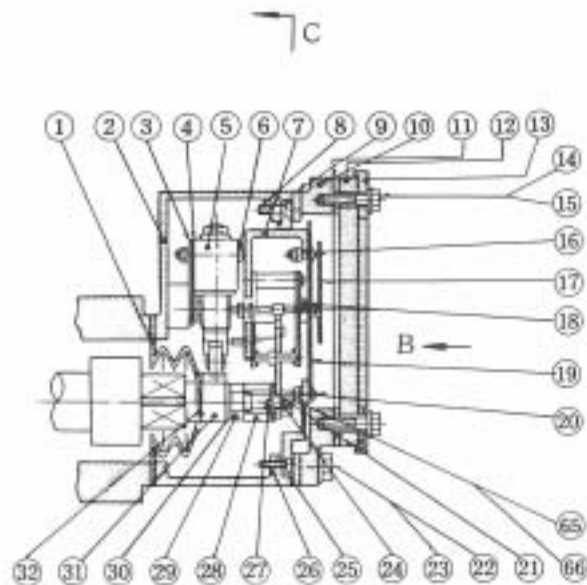
(2) 0 – 100% dial indicator

- 1) Torque setting cannot be changed by means of adjusting bolt (60).
- 2) The pointer may stop at a given point in the vicinity of 0. This is caused by the effect of friction between fixed frame (64) and movable frame (71).
- 3) Torque setting for left or right cannot be changed.



Viewed from B



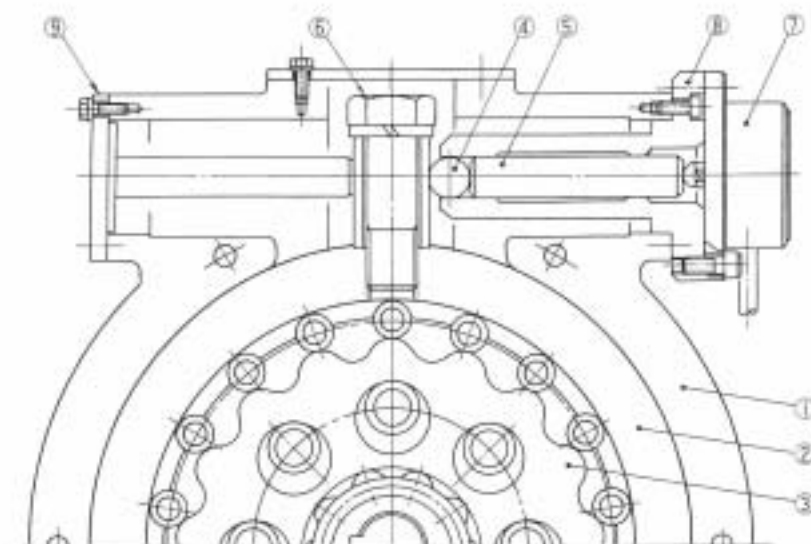


Section A-A

No.	Description	No.	Description
1	Belows	36	Gasket
2	Switch box	37	Terminal box
3	Switch mount fitting	38	Gasket
4	Insulation board	39	Cross-slot pan head screw (small)
5	Micro switch (for motor stop)	40	Meter assembly
6	Cross-slot pan head screw (small)	41	Ship-use wire-through hardware
7	Meter assembly mounting base	42	Stopper
8	Cross-slot pan head screw (small)	43	Cross-slot pan head screw (small)
9	Gasket	45	Sector
10	Switch box lid	48	Nut
11	Gasket	47	Rod
12	Clear cover	48	Bushing for rod
13	Clear cover retaining plate	49	Micro switch (for alarm)
14	Bolt	50	Screw bar for dog
15	Washer with rubber	51	Bushing
16	Cross-slot pan head screw (small)	52	Spring retaining plate A
17	Indicator needle	53	Spring case
18	Bushing for indicator needle shaft	54	Spring
19	Scale plate	55	Gasket
20	Cross-slot pan head screw (small)	56	O-ring
21	Screw for sector	57	Spring retaining plate B
22	Bolt	58	Pressure plate
23	Washer with rubber	59	Lock nut
24	Plain washer	60	Adjusting bolt
25	Scale plate mount base	61	Case lid
26	Cross-slot pan head screw (small)	62	Bolt
27	Retaining E-ring	63	Washer with rubber
28	Spacer for rod	64	Stationary frame
29	Nut	65	Nut
30	Toothed washer	66	Plain washer
31	Dog	67	Adjusting scale plate
32	Plain washer	68	Terminal Plate
33	Bolt	69	Bolt
34	Washer with rubber	70	Bolt
35	Terminal box lid	71	Spacer

10. LOAD CELL SENSOR

The torque is adjusted by performing a load test and set to the value specified by a customer at shipment from our factory. To change this preset torque value, it is necessary to follow a torque adjusting procedure which is different depending on types of equipment or devices used (a meter relay, an amplifier, etc.). Please contact us to obtain correct information on the torque adjusting procedure.



No.	Description
1	Fixed Frame
2	Frame
3	Cycloid Disc
4	Steel Ball
5	Rod
6	Dog Bar
7	LoadCell For reversible rotation, remove the stopper ⑨ and install the load cell on both sides.
8	Rod Case
9	Stopper

Worldwide Sumitomo Network

U.S.A.

Sumitomo Machinery Corporation of America
4200 Holland Blvd.,
Chesapeake, VA 23323
Tel: (1)757-485-3355
Fax: (1)757-487-3193

Canada

SM-Cyclo of Canada, Ltd.
870 Equestrian Court Oakville,
Ontario, Canada L6L 6L7
Tel: (1)905-469-1050
Fax: (1)905-469-1055

Mexico

SM-Cyclo De Mexico, S.A. de C.V.
Calle "C" No. 506A Parque Industrial
Almacentro Apodaca, N. L., Mexico 66600
Tel: (52)81-8369-3697
Fax: (52)81-8369-3699

Brazil

SM-Cyclo Redutores Do Brasil Ltda.
Av. Fagundes Filho, 191 Metro Sao Judas
Edificio Houston-Sala H123 Sao Paulo-SP
Brazil 04304-010
Tel: (55)11-5585-3600
Fax: (55)11-5585-9990

Chile

SM-Cyclo De Chile, Ltda.
San Pablo Ave. 3507 Quinta Normal,
Santiago, Chile
Tel: (56)2-786-6963
Fax: (56)2-786-6964

Argentina

SM-Cyclo De Argentina S.A.
Montes de Oca #6719, (B1606BMG) Munro,
Buenos Aires, Argentina
Tel: (54)11-4765-5288
Fax: (54)11-4765-5517

United Kingdom

Sumitomo (SH) Cyclo Drive Europe, Ltd.
Marfleet Kingston upon Hull HU9 5RA,
United Kingdom
Tel: (44)1482-788022
Fax: (44)1482-713205

SM-Cyclo U.K. Ltd.

Marfleet Kingston Upon Hull HU9 5RA,
United Kingdom
Tel: (44)1482-790340
Fax: (44)1482-790321

France

SM-Cyclo France E.U.R.L.
65/75 Avenue Jean Mermoz
F-93126 La Courneuve France
Tel: (33)149-929494
Fax: (33)149-929490

Italy

SM-Cyclo Italy Srl.
Via dell' Artigianato 231-20010
Cornaredo (MI), Italy
Tel: (39)02-9356-2121
Fax: (39)02-9356-9893

Netherlands

SM-Cyclo Benelux BV
Den Engelsman 16D NL-6026 RB
Maarheeze The Netherlands
Tel: (31)495599777
Fax: (31)495593177

Sweden

SM-Cyclo Scandinavia AB
Foretagsvägen 30A S-232 37
Arlöv Sweden
Tel: (46)40430220
Fax: (46)40431001

Spain

SM-Cyclo Iberia S.L.
C/Landabari N^o4 Escalera 1, 2^o Izqda Leioa
48940 Vizcaya Spain
Tel: (34)944-805 389
Fax: (34)944-801 550

Germany

Sumitomo (SH) Cyclo Drive Germany, GmbH
Cyclostraße 92
D-85229 Markt Indersdorf
Tel: (49)8136-66-0
Fax: (49)8136-5771

Austria

SCG Branch Austria Office
Grüntalerstraße, 30a A-4028 Linz, Austria
Tel: (43)732-330 958
Fax: (43)732-331 978

China

Sumitomo (SH) Cyclo Drive China, Ltd.
26F, Raffles City, No.268 Xizang
Road Central, Shanghai, 200001 China
Tel: (86)21-6340-4000
Fax: (86)21-6340-3673

Hong Kong

SM-Cyclo of Hong Kong Co., Ltd.
Unit 1802, 18/F., Park Building, 476
Castle Peak Road, Kowloon, Hong Kong
Tel: (852)3529-2093
Fax: (852)2460-1882

Singapore

Sumitomo (SH) Cyclo Drive
Asia Pacific Pte. Ltd.
No.36 Tuas South Street 3,
Singapore 638031
Tel: (65)6863-2238
Fax: (65)6863-4238

Malaysia

SM-Cyclo of Malaysia Sdn. Bhd.
NO.2, Jalan BP 4/1,
Bandar Bukit Puchong, 47100 Puchong,
Selangor Darul Ehsan, Malaysia.
Tel: (60)3-80612909
Fax: (60)3-80613909

Thailand

SM-Cyclo of Thailand Co., Ltd.
195, Empire Tower
Unit 1504, 15th Floor
South Sathorn Road, Yannawa Sathorn
Bangkok 10120, Thailand
Tel: (66)2-670-0998
Fax: (66)2-670-0999

Vietnam

Representative Office
4th Floor, 99 Nguyen Thi Minh Khai St.
Ward Ben Thanh, District 1, HCM City, Vietnam
Tel: (84)8-925-6504
Fax: (84)8-925-6505

Australia

SM-Cyclo of Australia Pty., Ltd.
9 Holbech Rd., Amdell Park, NSW, 2148
Tel: (61)2-8811-6555
Fax: (61)2-8811-6500

Philippines

Representative Office
Unit 23E Burgundy Corporate Tower
252 Sen. Gil Puyat Ave. Makati City
Tel: (63)2-888-5866
Fax: (63)2-843-0021

India

SCA Liaison Office
759/17, Ramkripa Apartment, Flat No.2,
First Floor Capt. A. Ranade Path,
Deccan Gymkhana, Pune-411004,
Maharashtra, India
Tel: (91)20-2565-3760
Fax: (91)20-2565-3755

Taiwan

Tatung SM-Cyclo Co., Ltd.
22 Chungshan N. Road.,
3rd Sec. Taipei,
Taiwan, 104 R.O.C.
Tel: (886)2-8676-1382
Fax: (886)2-8676-2285

Korea

SM-Cyclo of Korea Co., Ltd.
Royal Bldg. 9F Rm. 913,
5 Dangju-dong Chongro-ku,
Seoul, Korea 110-721
Tel: (82)2-730-0151
Fax: (82)2-730-0156

Japan

Sumitomo Heavy Industries, Ltd.
9-11, Kitashinagawa 5-Chome Shinagawa-Ku,
Tokyo 141-8686, Japan
Tel: (81)3-5488-8363
Fax: (81)3-5488-8365

Sumitomo Heavy Industries, Ltd.

POWER TRANSMISSION & CONTROLS GROUP

5-9-11, KITA-SHINAGAWA SHINAGAWA-KU, TOKYO 141-8686, JAPAN
PHONE: (03)5488-8363 FAX: (03)5488-8365
TELEX: J24580 SUMIJUKA