

Tsubaki

MITER GEAR BOX

Instruction Manual

Thank you for purchasing a Miter Gear Box.

To ensure full use of the features of this product, be sure to carefully read this instruction manual and refer to it for installation and inspection.

Provide the instruction manual at a location that is accessible to the operator.

1. After Purchase

Check the following items upon receipt:

1) Verify that the specifications on the nameplate match your order.

Note) Pay special attention to the mounting direction. Check this against the position of the oil gauge and plugs. Also check the rotational direction. (No oil gauge is provided on ED2M and ED4M(B) because they are lubricated with grease.)

2) Visually inspect for damage sustained during transport.

3) Make sure there are no loose bolts.

Contact your distributor if there are any problems.

2. Installation

1) Ambient conditions

The installation area of the reducer should have an ambient temperature of -10 to 50°C, be well-ventilated, low in humidity, and have little or no dust. Avoid use in areas with corrosive liquids and gases, and in explosive and flammable atmosphere.

If the reducer is to be used outdoors, supply a cover or similar protection to avoid direct exposure to rain.

2) Transport

Be sure to use the eye bolt on the top surface of the housing or lifting hardware when transporting the reducer. Never hook wires or slings to the lateral and cross shafts. Doing so may lead to a shorter life or malfunction of the reducer due to shaft eccentricity or other cause.

Note) No eye bolt is provided on ED2M to 6M(B).

5) Mounting example

	Floor installation Y	Ceiling installation T	Wall installation K1	Wall installation K2	Wall installation K3	Wall installation K4
1-LR(-O) 1-R(-O) 1-L(-O)						
1-UD(-O) 1-U(-O) 1-D(-O)						

3) Installation

Select a solid and flat installation platform and tighten the gear box firmly. Make sure that the entire installation face of the gear box comes into contact with the platform to prevent vibration or other problems. The installation angle is not restricted on 2M and 4M(B) but should be within $\pm 5^\circ$ on 6M(B) to 16M(B) and within $\pm 2^\circ$ on 20M(B) and 25M(B).

Recommended Mounting Bolt Sizes

Size	2M	4M	6M	7M	8M	10M	12M	16M	20M	25M
Bolt	M8	M8	M12	M12	M12	M14	M18	M20	M18	M20

Note) The mounting direction is not restricted on ED2M and 4M(B). However, ED6M(B) to 25M(B) must be used only in the direction specified when ordering. (Contact us if you need to make any changes to the mounting sample because it requires relocation of parts such as the oil gauge and grease nipple.)

Note) ED12M(B) and above models require pressure vents to be installed. For these models, replace the plug with hole at the specified position with the supplied pressure vent after installation is completed.

Note) ED6M(B) and above models with their shafts mounted upright require grease to be added to the bearings during maintenance because the bearings are located above the oil level. (Bearings are greased before shipment.) For these models, replace the stop plug with the supplied grease nipple. For the mounting position of the grease nipple, refer to "(5) Mounting example" in "2. Installation".

4) Connection

- Be careful not to bend the lateral and cross shafts of the Miter Gear Box or damage bearings, oil seals and other parts when installing pulleys, sprockets, or couplings to the shafts.
- Perform accurate alignment. Shaft eccentricity and overhang loads that exceed allowable values may shorten gear, bearing, and shaft life or cause vibration or noise.
- When using a coupling, install it as precisely as possible within the allowable alignment range indicated by the manufacturer. We recommend the use of our Echt-Flex coupling, which is available in various types.

	Floor installation Y	Ceiling installation T	Wall installation K1		Wall installation K2	Wall installation K3	Wall installation K4
U-LR(-O) U-R(-O) D-L(-O)							
D-LR(-O) D-R(-O) D-L(-O)							
1-1-LR(-O) 1-1-R(-O) 1-1-L(-O)							
1-1-UD(-O) 1-1-U(-O) 1-1-D(-O)							
U-D-LR(-O) U-D-R(-O) U-D-L(-O)							

No oil gauge is provided on ED2M and 4M(B) because they are lubricated with grease.

Floor installation (Y) is the standard installation location for ED6M(B) to 25M(B). In the case of ceiling installation (T) and wall installation (K1 to K4), the positions of the oil gauge, plugs and grease nipple differ.

The above table shows examples for ED6M(B) to 16M(B). The positions of the oil gauge and plugs differ for ED20 and 25M(B).

3. Lubrication

1) Before use

Of our Miter Gear Box models, ED2M and 4M(B) are filled with Nigtight LMS No.000 made by Nippon Grease and ED6M(B) to 25M(B) with Shell Omala S2G150 made by Showa Shell before shipment. They can be used as shipped without having to add oil.

For ED6M(B) and above models, however, be sure to check the oil level using the oil gauge after mounting is completed. If you cannot see the oil level on the oil gauge, add lubricant of the same brand until it becomes visible. Depending on the shipping conditions, the grease for lubricating the bearings may be immersed in the oil. In this case, it is recommended to add more grease using the grease nipple. For the amount of grease to add, refer to the Approximate Greasing Volume table in "3) Adding grease".

When the gear box is used at an ambient temperature of 35 to 50°C with an input speed slower than 200 r/min, better performance will be achieved if the lubricant is changed to those recommended in the Recommended Lubricants table.

(2M and 4M(B) are ready for immediate use.)

2) Replacing the lubrication oil

- No replacement is technically required for ED2M and 4M(B) because they are lubricated with grease. However, replacing the oil about every 20,000 hours will produce a positive effect on the future performance and service life. During replacement, fill ED2M with about 150 g of the Nigtight LMS No.000 grease and ED4M(B) with about 350 g.
- For ED6M(B) to 25M(B), replace the oil with new oil, for the first time, 500 hours after starting operation. This is done to clean out abrasion powder and other substances caused by initial operation of each part and produces a positive effect on the future performance and service life.
- For subsequent lubricant replacement, replace the oil every 2,500 hours or six months depending on operating conditions, whichever comes first. (It is required, however, to replace the oil earlier if the gear box is operated at full load for lengthy periods of time, or under undesirable conditions such as high temperature, high humidity and activated gas.)

- Even when the oil level falls below the oil gauge when changing the oil or when the oil has decreased due to whatever conditions, the remaining oil may occasionally appear to be remaining at the lower end of the oil gauge due to surface tension. Therefore, in managing the oil level, please check that the oil level is maintained in the middle of the oil gauge.

Step	Lubricant replacement procedure
1	Replace the oil when the machine is stopped.
2	Prepare an oil pan and put it under the Miter Gear Box.
3	Remove the drain plug with an L wrench or other tool and drain the oil. The oil temperature is high immediately after operation. Do not start drainage until it drops to a normal temperature.
4	After drainage, apply sealant to the drain plug and tighten it securely. For the sealant, use Shin-Etsu Silicones One-component RTV or its equivalent.
5	Check the mounting direction and fill with the recommended lubricant (see the table below) from the oil plug until the oil level becomes visible on the oil gauge. Refer to the following table for the oil volume.
6	Tighten the oil plug after filling is completed.

Recommended Lubricants

Pinion speed (r/min)	Manufacturer	Ambient temperature	
		-10°C to 35°C	35°C to 50°C
1750 to 200	Industrial gear oil class 2	ISO VG150	ISO VG220
	Showa Shell	Shell Omala S2G150	Shell Omala S2G220
	Exxon Mobil	Mobilgear 600XP-150	Mobilgear 600XP-220
	Idemitsu Kosan	Super Gear Oil 150	Super Gear Oil 220
	Cosmo Oil	Cosmo Gear SE150	Cosmo Gear SE220

Pinion speed (r/min)	Manufacturer	Ambient temperature	
		-10°C to 35°C	35°C to 50°C
Less than 200	Industrial gear oil class 2	ISO VG220	ISO VG320
	Showa Shell	Shell Omala S2G220	Shell Omala S2G320
	Exxon Mobil	Mobilgear 600XP-220	Mobilgear 600XP-320
	Idemitsu Kosan	Super Gear Oil 220	Super Gear Oil 320
	Cosmo Oil	Cosmo Gear SE220	Cosmo Gear SE320

Approximate Filling Volume (Units: Liters)

Size	6M(B)	7M(B)	8M(B)	10M(B)	12M(B)	16M(B)	20M(B)	25M(B)
Volume	0.95	1.5	1.9	3.5	7	10	11	18

3) Adding grease

On ED6M(B) and above models with their shafts mounted upright, the bearings are located above the oil level. Therefore, these bearings are filled with Mobilux EP2 made by Exxon Mobil before shipment because lubrication is not sufficient with oil droplets only. For these bearings, add grease about every 1,000 hours using the grease nipple.

Recommended Greases

Manufacturer	Product
Exxon Mobil	Mobilux EP2
Showa Shell	Alvania EP No.2
JX Nippon Oil & Energy	EPNOC Grease AP2
Cosmo Oil	Cosmo Dynamax No.2

Approximate Greasing Volume (Units: Grams)

Size	6M(B)	7M(B)	8M(B)	10M(B)
Lateral shaft	22	35	70	100
Output bearing support I	3	7	12	17
Output bearing support II	6	9	12	17

Size	12M(B)	16M(B)	20M(B)	25M(B)
Lateral shaft	170	270	370	640
Output bearing support I	20	55	90	150
Output bearing support II	20	70	85	135

4. Operation Precautions

1) Pre-start inspection

After completing installation, inspect the following items before starting operation:

- The direction of rotation is correct.
- It is connected to the driven shaft properly.
- There are no loose mounting and tightening bolts.

Make sure the equipment incorporates failsafe measures to prevent accidents from occurring during operation of this gear box, or in the event this gear box stops working properly.

2) Test run

Before commencing actual operation, run the gear box with no load and then gradually apply a load only after making sure that there are no abnormalities such as vibration, noise or overheating.

3) Actual operation

Verify the following after starting operation:

- There is no abnormal noise, vibration or overheating.
- There is no shock or overload.

Note) The gear box may generate heat during the first two or three days of operation. This is expected and is not a problem. However, if the housing temperature exceeds 93°C, it could indicate a low or high oil level, or improper installation, so inspect these as necessary.

5. Maintenance Precautions

1) During maintenance

- During maintenance, wear appropriate clothing for the task and appropriate safety gear (safety glasses, gloves, safety shoes, etc.).
- Make sure your surroundings are safe so as not to create secondary damage.
- Be sure to turn off the power and check that the machine has come to a complete stop. Avoid accidentally turning on the power.
- The Miter Gear Box becomes hot during operation, so be careful not to touch it directly, as burns can occur.
- Follow Part II, Chapter I, Section 1, "General Standards" of the Ordinance on Industrial Safety and Health.

2) Maintenance items

On a daily basis, perform maintenance using the necessary measuring equipment according to the following procedures, while paying attention to the operation status.

Items	Details
Noise	Is the noise louder than usual? Are there any unusual periodic noises?
Vibration	Is there any unusual vibration?
Temperature rise	Is there any abnormal temperature rise?
Lubricant leakage	Is there any leakage from the oil seals and connection points?

Notes) ① If a problem occurs, immediately stop operation and perform a detailed inspection.

② Contact your distributor if the cause cannot be determined or repair is not possible.

6. Parts List

When replacing consumables, use the following or equivalent:

	Size and number of bearings	Type and number of oil seals	Plug size	Oil gauge	Grease nipple
2M	6203R SH Lateral: 2 Cross: 2	D16.28.7 Lateral: 1 Cross: 1 or 2	1/8"	-	—
4M(B)	6304R SH Lateral: 2 Cross: 2	DM20.35.10 (*DM17.35.8) Lateral: 1 Cross: 1 or 2	1/8"	-	—
6M(B)	30306 Lateral: 2 Cross: 2	DM28.48.11 (*DM26.48.11) Lateral: 1 Cross: 1 or 2	3/8"	N-1	A-M6F (bracket) B-M6F
7M(B)	30307 Lateral: 2 Cross: 2	DM35.52.11 (*DM32.52.11) Lateral: 1 Cross: 1 or 2	3/8"	N-1	
8M(B)	30309 Lateral: 2 Cross: 2	DM42.65.12 Lateral: 1 Cross: 1 or 2	3/8"	N-1	
10M(B)	30310 Lateral: 2 Cross: 2	DM48.70.12 Lateral: 1 Cross: 1 or 2	1/2"	KMH-4	
12M(B)	30312 Lateral: 2 30311 Cross: 2	DM52.75.12 Lateral: 1 Cross: 1 or 2	1/2" 3/8" (bracket)	KMH-4 N-1 (bracket)	
16M(B)	32314 Lateral: 2 Cross: 2	DM65.88.12 Lateral: 1 Cross: 1 or 2	1/2" 3/8" (bracket)	KMH-4 N-1 (bracket)	A-PT1/8"
20M(B)	32316 Lateral: 2 Cross: 2	DM75.100.13 Lateral: 1 Cross: 1 or 2	1/2"	VAB	A-PT1/4"
25M(B)	32319 Lateral: 2 Cross: 2	DM90.115.13 Lateral: 1 Cross: 1 or 2	1/2"	VAB	

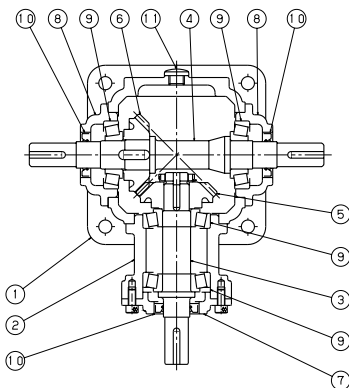
●Numbers of bearings and oil seals

- "Lateral: 2" means the number used on a lateral shaft. For example, for the two lateral shaft type, the required number is 2 pieces x 2 locations = 4.
- "Cross: 1 or 2" means one for a single shaft and two for double shafts.
- On 4B, 6B and 7B, oil seals marked with * are used on the lateral shaft side and those not marked with * are used on the cross shaft side.

- The above oil gauge model numbers are for those made by Koho Kosan (N and VAB types) and Kyowa (KMh type).

7. Internal Construction Diagram

Example: Internal construction diagram of ED6M 1-LR



No.	Part name	No.	Part name
1	Housing	7	Input seal support
2	Bracket	8	Output bearing support
3	Lateral shaft	9	Taper roller bearing*1
4	Cross shaft	10	Oil seal
5	Pinion	11	Oil gauge
6	Gear		

*1 Ball bearing for ED2M and ED4M(B)

8. Other

For special specifications, refer to this instruction manual together with the related drawings.

Safety Precautions

Thank you for purchasing this Tsubakimoto Chain Co. product.

For the safe use of this product, be sure to follow all precautions listed below.

- The gear box should be handled by trained individuals. Be sure to carefully read and familiarize yourself with the contents of the instruction manual before using the product.
- Keep the instruction manual in a location that is accessible to the operator during actual operation.
- Keep the instruction manual in a safe place for easy reference before using the product.
- The level of damage and injury that can occur if the correct operations are not followed is generally divided into "Warning" and "Caution" in the instruction manual. The definition of each is described below.

	Warning	Incorrect operation can result in death or serious injury.
	Caution	Incorrect operation can result in minor or moderate injury or damage.

Items denoted with "caution" can also lead to a serious result depending on the situation.

Be sure to read these, as they contain important information.

Warning

(General)

- Be sure to have a skilled individual with expert knowledge perform transport, installation, piping, wiring, operation, maintenance, and inspection. Otherwise, injury or equipment damage can occur.
- When using this product in a crew transport device, be sure to provide protective safety equipment on the device.
Equipment uncontrollability can result in personal injury or equipment damage.
- When using this product in an elevating device, be sure to provide safety equipment on the device to prevent falls. Falling of the elevating device can result in personal injury or equipment damage.

(Mounting)

- Never stand underneath the product while it is being lifted for transport. Falls can result in personal injury.

(Operation)

- Never approach or touch the shaft or other rotating parts during operation. Catching and injury can occur.

(Daily inspection and maintenance)

- Never touch the shaft or other rotating parts when maintaining or inspecting the gear box during operation. Catching and personal injury can occur.
- When performing inspection inside the product while it is stopped, be sure to stop rotation of the drive and driven equipment and allow the inside to cool sufficiently before inspecting while continually ventilating the inside. Also, during inspection, have safety check personnel positioned outside and continually check the safety with the operator. Carefully check whether the inside is slippery due to lubrication oil and take full safety measures. Otherwise, physical injury can occur.



Caution

(General)

- Do not use with specifications other than as provided on the gear box nameplate and the manufacturing specifications. Injury or equipment damage can occur.
- Do not insert fingers or objects into the openings on the gear box. Injury or equipment damage can occur.
- Do not use a damaged gear box. Injury or equipment damage can occur.
- Do not remove the nameplate.
- Modifications made to the product by the customer are outside the warranty, and Tsubakimoto Chain Co. is not responsible.

(Upon receipt of your gear box)

- Open the packaging right side up. Otherwise, injury can occur.
- Check the contents for all ordered parts. Installing an incorrect product can result in injury or equipment damage.

(Transport)

- Be careful during transportation so as not to drop or overturn the product. Be sure to use lifting hardware when available on the gear box. Avoid lifting the entire machine with the lifting hardware after installing the machine. Before lifting the gear box, check the load on the nameplate, packaging, external drawing or catalog. Do not lift a reducer that exceeds the rated load of the lifting equipment. Breaking of the lifting hardware, falls, or overturning can result in injury or equipment damage.

(Mounting)

- Do not place obstacles that can block ventilation around the gear box. This can prevent cooling and cause overheating, resulting in burns or fire.
- Never place objects on or hang objects from the gear box. Otherwise, injury can occur.
- Do not touch the keyways, such as the shaft end or other parts of the gear box, with a bare hand. Injury can occur.
- When using the gear box with food processing machines, especially equipment that is affected by oil vapor, install an oil pan or other protective device in case of oil leaks in the event of a malfunction or the end of operating life. Oil leaks can result in product faults.

(Connecting)

- When connecting the gear box to the motor and load, be careful of the alignment, belt tension, and parallelism of the pulley. When direct coupling, be careful of the direct coupling accuracy. When setting a belt, adjust the belt tension correctly. Before operation, securely tighten the pulley and coupling tightening bolts. Otherwise, launching of parts can cause injury or equipment damage.
- Provide a cover so that rotating parts cannot be touched. Otherwise, injury can occur.
- When rotating the gear box separately, remove the key temporarily attached to the output shaft. Otherwise, injury can occur.
- Check the direction of rotation before connecting to machinery. A difference in direction can result in injury or equipment damage.

(Operation)

- For a specification with a fan cover, do not insert your hand in the fan cover. Otherwise there is a risk of being caught in those parts resulting in injury.
- The gear box becomes very hot during operation. Be careful not to touch it with your hands or body. Burns can occur.
- If a problem occurs, immediately stop operation. Otherwise, injury can occur.
- Do not use at above the rated load. Injury or equipment damage can occur.
- Do not loosen the oil plug during operation. Lubrication oil can splatter, causing burns.
- For equipment with a lubricant motor pump placed separately, be sure to perform the priming specified in the instruction manual or other document before starting the main drive equipment. Otherwise, equipment damage can occur.
- When reversing operation, be sure to bring the gear box to a full stop before starting reverse operation. Plugging can cause the forward-reverse operation to damage the gear box or another machine.

(Daily inspection and maintenance)

- Follow the instruction manual for replacing the lubrication oil or grease. Be sure to use the oil or grease recommended by Tsubakimoto Chain Co. Failure to do so may damage the equipment.
- The surface of the gear box can get very hot, so do not touch it with a bare hand. Burns can occur.
- Do not replace the lubrication oil or grease during operation or immediately after stopping operation. Burns can occur.
- If a problem occurs, diagnose the problem according to the instruction manual. Never operate the reducer until the source of the problem is determined and corrective measures have been taken.

(Disassembly/assembly)

- Repair, disassembly, and assembly should be completed by qualified personnel only. Injury or equipment damage can occur.

(Disposal)

- Dispose of the gear box and lubrication oil in accordance with regulations on disposal of general waste.

Warranty

1. Warranty period

This period of warranty shall be 18 months from the time of shipment or 12 months from the time the product was first used (including completed assembly of this product to the equipment of the customer), whichever is shorter.

2. Scope of warranty

If the product malfunctions during the warranty period despite correct installation, operation, and maintenance by the customer in accordance with the instruction manual, the malfunctioning part(s) shall be replaced or repaired at no cost. However, the warranty only covers the Tsubakimoto Chain Co. product purchased by the customer and does not include the following costs.

- (1) Costs required to remove or install the product for replacement or repair from the customer's equipment and any associated work costs
- (2) Costs required to transport the product to the location for repair
- (3) Loss or major damage resulting from malfunction or repair

3. Repairs outside of warranty

If the product malfunctions due to any of the following situations, the product can be examined and repaired at a cost to the customer:

- (1) If the customer did not correctly install the product in accordance with the instruction manual
- (2) If the customer did not provide proper maintenance and did not operate the product correctly
- (3) If the product malfunctioned due to a problem with it being connected to another device
- (4) If the construction of the product was changed due to alterations by the customer
- (5) If the product was repaired by a company other than Tsubakimoto Chain Co. or not specified by Tsubakimoto Chain Co.
- (6) If the product was used outside the proper operation environment, as specified in the instruction manual
- (7) If the product malfunctioned due to disasters or other Acts of God or unlawful acts by a third party
- (8) If a malfunction on the customer's equipment caused secondary damage to the product
- (9) If the product malfunctioned due to parts received and mounted by the customer or parts used according to the specifications of the customer
- (10) If consumables, such as bearings and oil seals mounted to the product become worn, torn, or deteriorated
- (11) If damage occurs due to other factors not related to Tsubakimoto Chain Co.

◎Other

- (1) Please note that the content of this instruction manual is subject to change without notice.
- (2) Although this instruction manual has been prepared using the utmost caution, please let us know if you find any errors or inconsistencies in this manual.



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