

TM Series Instruction Manual

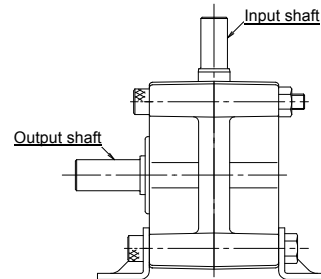
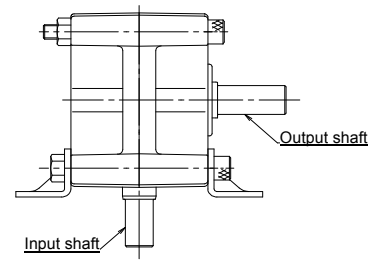
Thank you for purchasing the Tsubaki TM Series. In order to fully realize the characteristics of this reducer, please read this manual carefully and use it for installation and inspection. Please ensure that this manual is delivered to the customer who will use the reducer.

1. When purchased

First inspect the following items upon receipt of your reducer.

- (1) After unpacking the reducer, does the model number, reduction ratio, shaft arrangement, and motor capacity listed on the nameplate match your order?
- (2) Visually inspect for damage sustained during transport.
- (3) Make sure there are no loose screws or bolts.
If you find any problems, please contact the dealer where the reducer was purchased.

Mounting examples



(3)-2. Mounting directly (flange mounting)

When mounting the reducer directly to the floor or wall, take note of the following:

- 1) The oil seal and cap protrude about 1 mm from the mounting surface. Leave at least 1 mm of clearance between the reducer and mounting surface as shown in the following figure.
- 2) After removing the four mounting bolts, promptly install the reducer. Handle with care to prevent lubrication oil from leaking.

2. Installation

(1) Transport

When transporting the reducer, never hook wires or slings to the input/output shafts. (The reducer may slip off and be damaged or the shafts may be scratched and sprockets or other components can no longer be attached.)

(2) Installation

The area of installation should have an ambient temperature of 5 to 40°C, be well-ventilated, low in humidity, and have little or no dust.

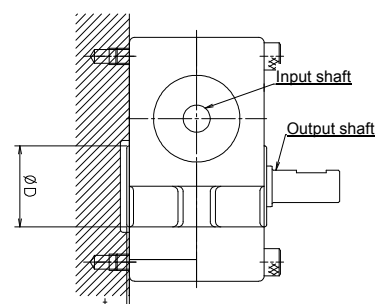
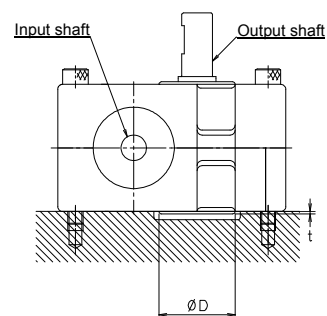
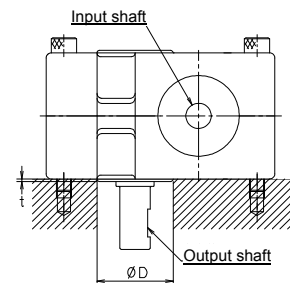
Do not use the reducer in locations with corrosive liquids or gases, or in flammable or explosive locations. If the reducer is to be used outdoors, furnish a cover or similar protection to avoid direct exposure to rain.

(3) Mounting

Use a strong and flat mounting stand and securely mount the reducer to it.

(3)-1. Using mounting feet

Loosen two of the four hex cap bolts on the reducer and use those to promptly attach the supplied feet. The TM10E does not have fixing bolts for combining the housing. The 13E, 16E, and 22E have fixing bolts, but after they are removed, there is a risk of lubrication oil leaking or damage due to rough handling. Use caution.

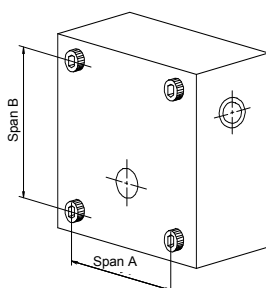


Unit: mm		
Model number	φD	t
TM10E	30	1
TM13E	35	1
TM16E	35	1
TM22E	72	0.5

(3)-3. Bolt sizes and tightening torque

Unit: mm		
Size	Bolt size (mm)	Tightening torque (N·m) (kgf·m)
TM10E	M6 x 60 (x4)	4.9 to 5.9 {0.50 to 0.60}
TM13E	M8 x 80 (x4)	12 to 14 {1.2 to 1.4}
TM16E	M10 x 90 (x4)	24 to 27 {2.4 to 2.7}
TM22E	M10 x 100 (x2)	24 to 27 {2.4 to 2.7}
	M10 x 120 (x2)	24 to 27 {2.4 to 2.7}

Bolt pitch width



Unit: mm		
	A	B
TM10E	57	76
TM13E	71	96
TM16E	88	111
TM22E	115	150

(3)-4. Connection with driven machine

When connecting the reducer, use caution as there is a risk of damage to the input/output shaft bearings if the sprockets and gears are tapped strongly. Accurately center the belts and chains and do not subject them to an overhanging load that exceeds the specified value.

3. Lubrication

- The reducer is shipped filled with premium quality lubrication oil (Mobil Cylinder Oil 600W) and should be used as is. In most situations the lubrication oil does not need to be replaced or topped off, but if it is replaced every 10,000 hours, this will increase the service life of the reducer.
- Replace the lubrication oil according to the following procedure.
 - Remove the plugs at the center of the worm shaft on both sides of the housing.
 - Turn the housing on its side and drain the lubrication oil.
 - When the lubrication oil is fully drained, rinse the interior of the housing by flushing it with oil.
 - Use a dropper and fill with lubrication oil from the oil filling port.
 - Do not mix the oil with other brands.

Oil volume outline

Type	10E	13E	16E	22E
Oil volume (ml)	80	170	290	520

4. Operating precautions

1) Inspecting prior to use

- When you have finished installing the reducer, check that the (1) direction of rotation is correct, (2) the bolts are not loose, and (3) the reducer is properly connected to the driven machine.
- In order to prevent accidents before they happen; Make sure the equipment incorporates failsafe measures due to the use of the reducer, or in the event the reducer malfunctions.

2) Load

Loading the reducer above its rated capacity can affect its life and result in damage. Use the reducer within the allowable torque value in the catalog.

3) Verification after operation starts

Verify the following after starting production:

- There is no abnormal vibration or noise.
 - There is no shock.
 - The temperature is not unusually high.
- The reducer may generate heat during the first two or three days of operation. This is expected and does not indicate a problem. However, if the reducer's housing surface temperature exceeds 93°C, it could indicate insufficient capacity. Please contact us.

5. Maintenance precautions

1) Maintenance

- When performing maintenance, wear suitable clothing and use protection including safety glasses, gloves, safety shoes, etc.
- To prevent secondary accidents, keep the surrounding area safe and tidy.
- Always turn the power off and wait for the machine to come to a full stop. Also, use lock-outs to prevent unintentional power supply.
- The reducer reaches extremely high temperatures during operation. Do not touch with your bare hands.
- Read and follow labor safety codes and standards.

2) Maintenance items

Make daily inspections using appropriate measuring instruments with the following procedures. Take note of operating conditions when performing maintenance.

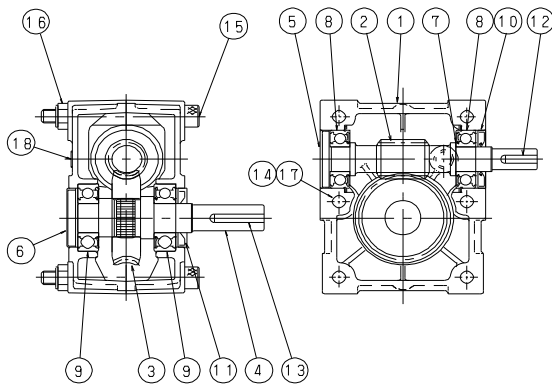
Item	Details
Noise	Is the noise louder than usual? Are there unusual periodic noises?
Vibration	Are there any unusual vibrations?
Temperature rise	Is there an unusual increase in temperature? (A rough guide is a temperature increase around 50°C)
Oil leakage	Are there any leakages from the connection points on the reducer, oil seals, or caps?

Note) (1) When a problem occurs, immediately stop operation and perform a detailed inspection.

(2) If the cause is unclear or repairs are not possible, consult the dealer where the reducer was purchased.

6. Internal construction diagram

Example) TM16E internal construction



(1) Housing	(7) Shim	(13) Parallel keyway II
(2) WG worm	(8) Bearing	(14) Hex cap bolt
(3) WG wheel	(9) Bearing	(15) Hex cap bolt
(4) Output shaft B	(10) Oil seal	(16) U nut
(5) Input cap	(11) Oil seal	(17) Hex nut I
(6) Output cap	(12) Parallel keyway II	(18) Plug with hole I

7. Others

1) Type with motor (GCE)

For details about the motor section, refer to the instruction manual for the motor. The following items are the couplings for connecting the motor and reducer (Tsubaki E&M L jaw couplings).

Type	16GCE	22GCE
Coupling	L070-S	L090-S

2) Special specifications

Check the drawings when using the instruction manual.

Tsubaki E&M TM Series Safety precautions

Thank you for your patronage.

In order to use this reducer safely, always observe the following items.

- An experienced technician should perform any work when handling the TM Series. The content listed in this instruction manual must also be carefully read and fully understood before using the reducer.
- Please ensure that this instruction manual is delivered to the customer who will use the reducer.
- Carefully store the instruction manual so that it can be used at any time before handling the reducer.
- The degree of harm and damage that can be expected to occur when the reducer is mishandled is essentially classified into the ranks of "DANGER" and "CAUTION", and these are indicated in the instruction manual. The definitions and indications are as follows.

	DANGER	This indicates the possibility that a dangerous situation may occur, resulting in death or serious injury if the reducer is mishandled.
	CAUTION	This indicates the possibility that a dangerous situation may occur, resulting in a moderate or light injury, or resulting in only physical damage, if the reducer is mishandled.

Depending on the situation, even items listed under CAUTION may

result in serious consequences.

Both indicate important content that must always be observed.

DANGER

(Overall)

- Work to transport, install, run tubing, wire, run/operate, and maintain/inspect the reducer must always be performed by a technician with specialized knowledge and skills. Otherwise there is a risk of injury and damage to equipment.
- When the reducer is installed in equipment to transport people, always install protective devices for safety on the equipment side. Otherwise there is a risk of accidents due to runaway equipment and damage to equipment.
- When the reducer is used in lift equipment, always install safety devices to prevent drops on the equipment side. Otherwise there is a risk of accidents and damage to equipment due to the lift falling.

(Installation)

- When hoisting the reducer to transport it, do not enter the area underneath it. Otherwise there is a risk of accidents due to the reducer falling.

(Operation)

- During operation, do not get near or touch any rotating bodies (shafts or other parts). Otherwise there is a risk of being caught in those parts resulting in injury.

(Daily inspection and maintenance)

- In inspection and maintenance during operation, do not touch any rotating bodies (shafts or other parts). Otherwise there is a risk of being caught in those parts resulting in accident.
- When entering the inside of the product to inspect it while stopped, first confirm that the rotation of the motor and the driven machine has stopped, and sufficiently cool the inside of the product, and then you must work while ventilating the interior. While performing the inspection work, arrange personnel for confirming safe working conditions on the exterior, and always confirm safety with the worker. Be aware that the product interior is slippery from lubrication oil and take sufficient safety precautions. Otherwise there is a risk of accidents.

CAUTION

(Overall)

- Do not use the reducer outside of the specifications listed on the TM Series nameplate or the reducer specifications in manufacturing specification document. Otherwise there is a risk of injury and damage to equipment.
- Do not insert fingers or objects into the openings on the TM Series. Otherwise there is a risk of injury and damage to equipment.
- Do not use the TM Series when damaged. Otherwise there is a risk of injury and damage to equipment.
- Do not remove the nameplate.
- Alterations to the reducer by the customer are not covered by the warranty and Tsubaki E&M assumes no responsibility for them.

(Upon receipt of your reducer)

- Check the orientation of the packaging and open it. Otherwise there is a risk of injury.
- Make sure the model number of the unit delivered matches your order. If the wrong reducer is installed, there is a risk of injury and damage to equipment.

(Transport)

- Use caution when transporting the reducer as it is dangerous if it drops or falls over. If the TM Series has lifting rings, always

use those lifting rings. However, after the reducer is installed in the machinery, do not hoist the machinery itself with the lifting rings. Before hoisting the reducer, check the TM Series weight on the nameplate, packaging, external diagram, catalog or other documents, and do not suspend a reducer that exceeds the weight rating of the lifting rings. Otherwise there is a risk of damaging the lifting rings, injury from the reducer falling over, and damage to equipment.

(Installation)

- Do not place obstructions around the TM Series that will interfere with ventilation. This will hinder cooling and may result in burns or a fire due to abnormal overheating.
- Do not get on the TM Series or hang from it under any circumstances. Otherwise there is a risk of injury.
- Do not touch the keyways on the ends of the shafts of the TM Series with bare hands. Otherwise there is a risk of injury.
- For equipment that is averse to greasiness such as food machinery, take precautions for an accidental oil leak due to breakdown or service life and install damage prevention equipment such as an oil pan. Otherwise there is a risk the reducer may become faulty due to an oil leak.

(Connection)

- When connecting the TM Series to a motor and the driven machine, pay careful attention to centering, belt tension, and the parallelism of the pulleys. When directly connected, pay careful attention to the accuracy of the direct connection. When belt driven, correctly adjust the belt tension. Before operation, ensure that the tie bolts for the pulleys and couplings have been fully tightened. Otherwise there is a risk of injury and damage to equipment due to flying debris.
- Install a cover so that rotating components will not be touched. Otherwise there is a risk of injury.
- When the TM Series will rotate independently, remove the key that is temporarily installed to the output shaft. Otherwise there is a risk of injury.
- Check the direction of rotation before connecting the reducer to the driven machine. There is a risk of injury and damage to equipment by mistaking the direction of rotation.

(Operation)

- During operation, the TM Series reaches high temperatures. Use caution not to touch the reducer with your hands or body. Otherwise there is a risk of burns.
- When a problem occurs, immediately stop operation. Otherwise there is a risk of injury.
- Do not use the reducer with a load that exceeds the rated load. Otherwise there is a risk of injury and damage to equipment.
- Do not loosen the oil plugs during operation. Otherwise lubrication oil may spray out resulting in burns.
- When running the reducer in reverse, first stop it, and then run it in reverse. Forward and reverse operation by plucking may damage the TM Series and the driven machine.

(Daily inspection and maintenance)

- Change the lubrication oil and grease according to the instruction manual. Always use the type of oil recommended by the manufacturer. Otherwise there is a risk of damage to equipment.
- The surface of the TM Series reaches high temperatures, so do not touch it bare hands. Otherwise there is a risk of burns.
- Do not change the lubrication oil or grease during operation or immediately after stopping. Otherwise there is a risk of burns.
- Diagnose problems that occur based on the instruction manual. Do not operate the reducer until the cause of the problem has been determined and action has been taken.

(Disassembly/assembly)

- Repair, disassembly, and assembly should always be performed by a specialist. Otherwise there is a risk of injury and damage to equipment.

(Disposal)

- The TM Series and its lubrication oil should be treated as general industrial waste.

Limited Warranty

Tsubaki E&M Co.: hereinafter referred to as "Seller"

Customer: hereinafter referred to as "Buyer"

Goods sold or supplied by Seller to Buyer: hereinafter referred to as "Goods"

1. Warranty period without charge

18 months effective the date of shipment or 12 months effective the first use of Goods, including installation of Goods to Buyer's equipment or machine - whichever comes first.

2. Warranty coverage

Should any damage or problem with the Goods arise within the warranty period, given that the Goods were operated and maintained according to the instructions provided in the manual, Seller will repair and replace at no charge once the Goods are returned to the Seller.

This warranty only covers individual Goods supplied by the Seller to the Buyer and therefore does not include the following:

- (1) Any costs related to the removal or re-installation of Goods from the Buyer's equipment or machine to repair or replace parts.
- (2) Cost to transport Buyer's equipment or machines to repair facility.
- (3) Costs to reimburse any profit loss due to any repair or damage and consequential losses caused by the Buyer.

3. Warranty with charge

Seller will charge for any investigation and repair of Goods (even during the warranty period without charge) caused by:

- (1) Improper installation by failing to follow the instruction manual.
- (2) Insufficient maintenance or improper operation by the Buyer.
- (3) Incorrect installation of Goods onto other equipment or machines.
- (4) Structure change of the Goods by any modifications or alterations by the Buyer.
- (5) Any repair by engineers other than the Seller or those designated by the Seller.
- (6) Operation in an inappropriate environment not specified in the manual.
- (7) Force Majeure or forces beyond the Seller's control such as a natural disaster and injustices committed by a third party.
- (8) Secondary damage or problems incurred by the Buyer's equipment or machines.
- (9) Defective parts supplied or specified by the Buyer.
- (10) Wear, tear or deterioration of parts including bearings and oil seals.
- (11) Loss or damage not liable to the Seller.

 **Tsubaki E&M Co.**

For inquiries related to this instruction manual, please contact customer service.

Customer service Tel: (0120) 251-602, Fax: (0120) 251-603

Headquarters Factory Kotari Kuresumi 1-1, Nagaokakyo, Kyoto, Japan 617-0833
Hyogo Factory Asazuma-cho 1140, Kasai, Hyogo, Japan 679-0181
Okayama Factory Niinohigashi 1515, Tsuyama, Okayama, Japan 708-1205

Nov. 1, 2013 Bulletin No. **GP25FE**

URL <http://www.tsubakimoto.jp>