GP30FE-2
Oct. 1, 2017

Tsubaki
Helical Gear Shaft-mounted Reducer
SMR Series
Instruction Manual

Thank you for purchasing the Tsubaki SMR Series Helical Gear Shaft-mounted Reducer.

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

Inspect the following items upon receipt of your reducer.

1) Verify that the specifications on the nameplate correspond to your order.

Note) Pay special attention mounting direction. Check this against the position of the oil gauge and plugs. For the B type, also check the rotation direction of the backstop cam clutch.
(The SM100 and 103 can be mounted in all directions and have no oil gauge.)

2) Make sure all accessories, such as pressure vents, are included. (The SM100 and 103 use grease lubrication and have no pressure vent.)

3) Check for any scratches or cosmetic defects caused during transport.

4) Check that no bolts are loose.

If you find any problems, please contact the dealer where the reducer was purchased.

2. Installation

(1) Ambient conditions

The area of installation for the reducer should have an ambient temperature of 0 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.

(2) Transport

Be sure to use the eye-bolts or lifting rings on the top surface of the housing when transporting the reducer. Never hook wires or slings to the input/output shafts. Doing so may make the shaft eccentric or cause other problems which will shorten the life of the reducer or cause it to fail.

Note) The SM100 to 107 have no eye-bolts.

(3) Mounting to the driven shaft

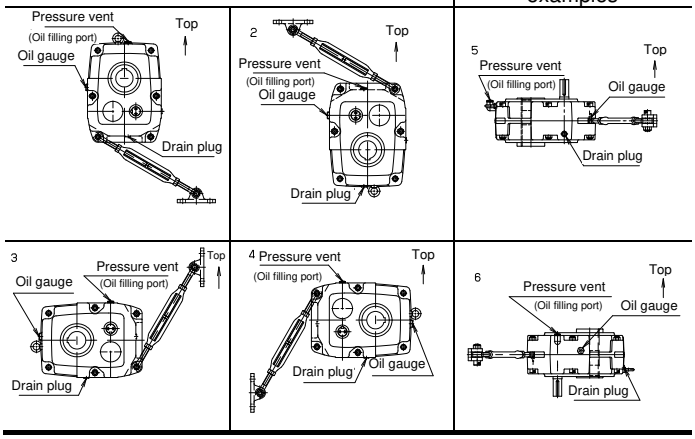
- The shaft to which the reducer is to be mounted should be g7. The hollow shaft bore is finished to H7 or H8. Refer to the following table for the length of the driven shaft.

<Recommended driven shaft length>

	100	103	107	115	203	207	215	307	315	407M	415M
Straight shaft	68	76	103	116	133	150	165	201	232	212	245
Taper bush	-	-	97	113	130	144	160	187	212	206	254

- The SM100 and 103 can be mounted in any direction. The SM107 to 415M are shipped as mounting example 1 unless a mounting example has been indicated when ordered. Contact us if the mounting example is different.
- The position of the oil gauge and plugs in the mounting examples in the table to the right for the SM107 to 315 is when the inclined surface is within ±10° from the mounting example. When ±10° is exceeded or when the mounting example is changed, the position of the oil gauge and plugs will change. Please contact us.
  The SM407M to 415M are handled as necessary. Refer to the external diagrams.

Mounting examples



(3-1) Straight shaft series

- Mount as outlined here.

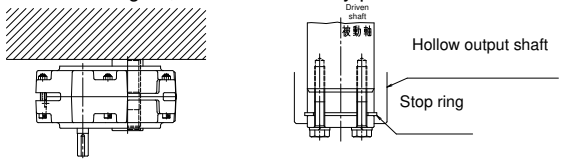
Steps	Mounting procedures
1	Install the key on the driven shaft. Note) Use a bar key. Do not use a tapered or gib headed key. Doing so may make the output shaft eccentric or cause other problems which will shorten the life of the reducer or cause it to fail.
2	For SM100 to 107, insert it onto the driven shaft as is. For SM115 to 415M, insert it onto the driven shaft by hoisting it with the eye-bolts or lifting rings on the top of the housing. Align the phase of the key before inserting it. Note) If the shaft fits too tightly, help the hollow output shaft slide smoothly by lightly tapping the edge with a plastic hammer. (Apply grease or molybdenum disulfide to the driven shaft.) Be careful not to damage the oil seal.
3	Use an end plate to fix the reducer and driven shaft in the thrust direction. The end plate can be fixed on the driven shaft with a stop ring in the stop ring groove of the hollow output shaft, or by fixing it to the end of the shaft, but taking disassembly into consideration, we recommend the method securing the stop ring and end plate. Place a stop ring in the stop ring groove on the hollow output shaft and mount the end plate on the reducer output shaft side of the stop ring. Then fix the end plate to the driven shaft with hex bolts.

Recommended end/draw plate dimensions

Size	Plate						Bolt for plate (with spring washer)	Stop ring size
	φD	T	H	Z	2-Y hole	P		
SM100	φ24.6	7	21	M8	5.5	16	2-M 5 x 30 mm	C25
	φ29.6	7	26	M8	5.5	20	2-M 5 x 30 mm	C30
SM103	φ34.6	10	30	M12	6.6	22	2-M 6 x 35mm	C35
SM107	φ39.6	10	35	M12	6.6	25	2-M 6 x 35mm	C40
SM115	φ44.6	12	39	M16	9	28	2-M 8 x 45mm	C45
SM203	φ54.6	14	48	M16	11	32	2-M10 x 55 mm	C55
SM207	φ64.6	14	57	M24	14	40	2-M12 x 60 mm	C65
SM215	φ74.6	14	67	M24	14	48	2-M12 x 60 mm	C75
SM307	φ84.6	17	75	M30	14	55	2-M12 x 65mm	C85
SM315	φ94.6	17	85	M30	18	60	2-M16 x 75mm	C95
SM407M	φ109.6	20	99	M30	18	60	2-M16×85mm	C110
SM415M	φ119.6	20	108	M30	18	70	2-M16×85mm	C120

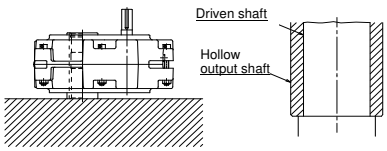
●If the driven shaft is vertical and points down

Use the stop ring and bolts as shown in the figure to prevent the reducer from falling off, and take all safety precautions necessary.



●If the driven shaft faces up

Machine a shoulder on the driven shaft as shown in the figure to prevent movement in the thrust direction.



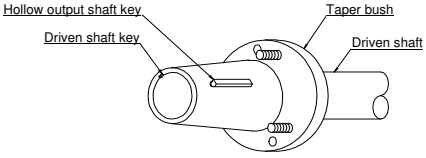
(3-2) Taper bush series

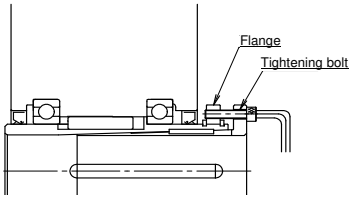
- For the taper bush, there is Type I (separate driven shaft key and hollow output shaft key) and Type II (combined driven shaft key and hollow output shaft key) according to the reducer size and hollow shaft bore diameter.

- **Mount as outlined here.**

Steps	Type I	Type II
1	Wipe dust and oil off of the driven shaft, taper bush, and hollow output shaft.	
2	Install the driven shaft key on the driven shaft.	Install the combined key on the driven shaft.
3	Insert the taper bush onto the driven shaft. Align the phase of the key before inserting it.	
4	Install the hollow output shaft key on the taper bush.	
5	Hoist the reducer with the eye-bolts or lifting rings on the top of the housing and insert the taper bush. Align the phase of the key before inserting it.	
6	Align the flange screw holes with the taper bush mounting bolts and tighten.	
7	First check that the reducer is in the correct position on the driven shaft, then evenly tighten the mounting bolts.	
8	After tightening the bolts, verify that the end face of the hollow output shaft is not interfering with the taper bush. (If it interferes, the driven shaft diameter may be too small, or the mounting bolts may not have been tightened evenly)	

Note) When removing the reducer from the driven shaft, the mounting bolts must be removed and inserted in the tap. Provide enough room to remove the bolts by referring to the taper bush bolt lengths and PCD.





Recommended taper bush mounting bolt tightening torque

Size	SM107	SM115	SM203	SM207	SM215	SM307
Bolt size	M6	M6	M8	M8	M10	M10
Tightening torque N·m (kgf·m)	13.7 (1.4)	13.7 (1.4)	34.3 (3.5)	34.3 (3.5)	67.6 (6.9)	67.6 (6.9)

Size	SM315	SM407M	SM415M
Bolt size	M10	M12	M16
Tightening torque N·m (kgf·m)	67.6 (6.9)	118 (12)	294 (30)

Note) Value per bolt.

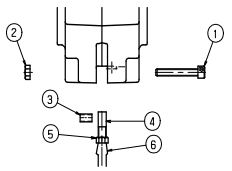
(4) Fixing

The S and B type reducers are fixed with tie rods and the F type reducer is fixed with the housing flange.

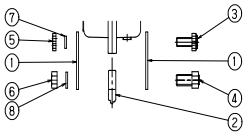
(4-1) Tie rod mounting

- These procedures describe mounting the tie rod to the reducer.

SM100 to 315

Steps	Mounting procedures	Mounting diagram
1	First remove the tie rod bolt (1) from the reducer housing.	
2	Attach the tie rod collar (3) to the tie rod (4).	
3	Pass the tie rod bolt (1) through the reducer housing bolt hole → tie rod collar (3) → reducer housing bolt hole, and then secure with the U nut (2).	* Do not loosen both tie rod bolts at the same time.
4	After attaching the lock nut (5) to the tie rod (4), attach the turnbuckle (6).	

SM407M to 415M

Steps	Mounting procedures	Mounting diagram
1	First remove tie rod bolt A (3) from the reducer housing.	
2	Pass tie rod bolt A (2) through washer A (7) → tie rod plate (1) → reducer housing bolt hole → tie rod plate (1) → washer A (7), and then secure with nut A (5).	
3	Pass tie rod bolt B (4) through washer B (8) -> tie rod plate (1) → tie rod (2) → tie rod plate (1) → washer B (8), and then secure with nut B (6).	* Do not loosen both tie rod bolts at the same time.

Recommended tie rod bolt, tie rod bolt A tightening torque

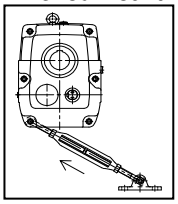
Size	SM100	SM103	SM107	SM115	SM203	SM207	SM215
Bolt size	M6	M8	M8	M10	M12	M16	M16
Tightening torque N·m (kgf·m)	4.9 (0.5)	12 (1.3)	12 (1.3)	25 (2.6)	44 (4.5)	108 (11)	108 (11)

Size	SM307	SM315	SM407M	SM415M
Bolt size	M20	M20	M16	M20
Tightening torque N·m (kgf·m)	196 (20)	196 (20)	108 (11)	196 (20)

SM407M to 415M tie rod bolt B size

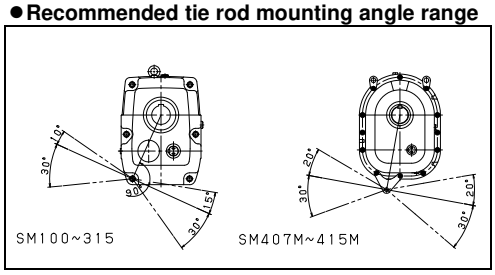
Size	SM407M	SM415M
Bolt size	M24	M30
Tightening torque N·m (kgf·m)	274 (28)	392 (40)

- **Tie rod mounting direction**



The tie rod is ideally mounted as shown in the figure to the left so that it is subjected to tension. The arrow shows the output rotation direction and the direction of the force that the tie rod is subjected to.

- **Recommended tie rod mounting angle range**



(4-2) Flange mounting

- Install on a smooth flat installation surface that can easily withstand the weight of the equipment.
- Use bolts compliant to JIS strength class 10.9T for mounting.
- Mount as outlined here.

Steps	Mounting procedures
1	Free the driven shaft in the thrust direction.
2	Insert the reducer onto the driven shaft.
3	Mount the reducer to the flange surface.
4	Fix the reducer in the thrust direction of the driven shaft. For the taper bush series, tighten the taper bush.
5	Fix the driven shaft in the thrust direction.

Note) If the reducer is mounted on its flange surface or the taper bush is tightened after the reducer is fixed to the driven shaft in the thrust direction, the bearings on the reducer or the driven shaft will be subject to thrust force which could result in reduced life or machine failure.

Note) When the output shaft is subjected to a radial load, verify that it is less than the allowable radial load. When it is subjected to a thrust load, please contact us.

Recommended mounting bolts

Size	100	103	107	115	203	207	215
Bolt size	M6	M8	M8	M10	M12	M16	M16

Size	307	315	407M	415M
Bolt size	M20	M20	M20	M20

Note) Determine the bolt length according to the plate thickness on the side of the driven machine.

(5) Connection

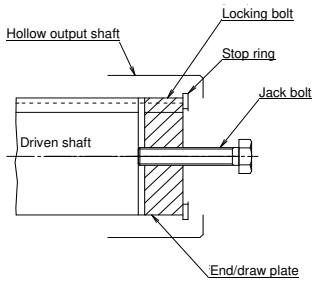
- Use caution so as to not bend the shaft or damage the bearings when attaching pulleys, sprockets, and couplings during reducer input.
- Align accurately. Any eccentricity in the shafts or an overhanging load greater than the allowable value will shorten the service life of the gears, bearings, and shaft, resulting in vibration and noise.

(6) Removal

(6-1) Straight shaft series

- When removing the reducer from the driven shaft, supply your own jack bolt and stopper, as illustrated in the figures below, with an end/draw plate (explained earlier) and a stop ring. (The driven shaft length is the recommended driven shaft length explained earlier.)
- Remove as outlined here.

Steps	Removal procedure
1	Loosen the hex bolt used to fix the end plate, and remove the end plate.
2	Mount the end/draw plate and stopper on the driven shift side.
3	Insert the jack bolt in the tap on the draw plate and pull the reducer from the driven shaft.



Recommended jack bolt

Size	Jack bolt (fully threaded)
SM100	M8 x 60 mm
	M8 x 60 mm
SM103	M12 x 80mm
SM107	M12 x 80mm
SM115	M16 x 100 mm
SM203	M16 x 100 mm
SM207	M24 x 150 mm
SM215	M24 x 150 mm
SM307	M30 x 180 mm
SM315	M30 x 180 mm
SM407M	M30 x 180 mm
SM415M	M30 x 180 mm

(6-2) Taper bush series

- Remove as outlined here.

Steps	Removal procedure
1	Remove the taper bush mounting bolts and insert them in the removal taps in two locations on the taper bush.
2	Suspend the reducer with the eye-bolts or lifting rings.
3	Tighten the bolts and push the hollow output shaft flange to start to push out the reducer.
4	Hoist up the reducer with the eye-bolts or lifting rings to remove.

3. Lubrication

(1) Introduction

- The SMR Series is filled with grease (for SM100 and 103, NIGTIGHT LMS No. 000) or lubrication oil (for SM107 to 415M, Shell Omala S2 G 150) when shipped from the factory and should be used as is.
  However, you should still check the oil level in the oil gauge after you finish mounting the reducer. If the oil level does not appear in the oil gauge, fill with the same brand of lubrication oil until it is visible.
- 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 will 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.
- The B type backstop cam clutch section has also been filled with grease (for SM107 to 315, Esso Beacon 325) or lubrication oil (for SM407M to 415M, Mobil ATF 220) and should be used as is.
- For the SM107 to 415M, be sure to replace the plug on the oil filling port with the supplied pressure vent.

Plug size (filling, drain)

Size	107	115	203	207	215	307	315	407M	415M
Plug sizes	1/4"	3/8"	3/8"	1/2"	1/2"	3/4"	3/4"	3/4"	3/4"

(Note) For a mounting direction other than that ordered, the reducer will have a different amount of lubrication oil, and the oil gauge and plugs will also be in different positions.

(Note) Contact us if the ambient temperature is less than 0°C or greater than 40°C.

(Note) When the SM107 to 415M are used at input speeds slower than 500 r/min, switch to recommended oil described in the following table.

(Note) When the SM107 to 608 are used in mounting example 1 at input speeds faster than 1000 r/min and under continuous operating conditions, the temperature of the reducer may increase. Before use, we recommend adjusting the oil level with the following procedure. In the mounting example 1 position, remove plug A in mounting example 1, and then drain the filled lubrication oil to the plug A level. Next, remove the oil gauge and install it in the plug A position, and install plug A in the position where the oil gauge was.

(2) Oil replacement

- The grease in the SM100 to 103 does not require replacement.
- Replace the oil in the SM107 to 415M every 1000 to 2000 hours after starting operation with the following procedure.

Steps	Replacement procedures
1	Perform the oil replacement when the machine is stopped. Warning) The housing and oil are very hot immediately after stopping operation. Wait for the housing surface to cool before replacing the oil.
2	Have a drip pan ready and place it under the reducer's drain plug.
3	Remove the drain plug with an Allen key wrench to drain the oil. Remove the pressure vent to allow the oil to drain quickly. Note) Do not loosen the drain plug all at once. Otherwise, oil may splash out.
4	Apply sealant to the drain plug and fully tighten it in place. Note) Shin-Etsu silicone one-component RTV rubber or an equivalent product is recommended for the sealant.
5	Check the mounting direction examples and refer to the following tables to determine the proper oil volume. Pour the recommended oil into the oil inlet until visible in the oil gauge. Note) If the reducer is mounted at a sharper angle than shown in the mounting examples, fill with a little more oil than indicated below.
6	After filling, attach the pressure vent.

Recommended oil

Input speed	500 to 1750 r/min		500 r/min or lower	
Ambient temperature	0 to 35°C	35°C to 60°C	0 to 35°C	35°C to 60°C
Type 2 industrial gear oil	ISO VG 150	ISO VG 220	ISO VG 220	ISO VG 320
Exxon Mobile	Mobile Gear 600XP-150	Mobile Gear 600XP-220	Mobile Gear 600XP-220	Mobile Gear 600XP-320
Showa Shell	Shell Omala S2G150	Shell Omala S2G220	Shell Omala S2G220	Shell Omala S2G320
Idemitsu	Daphne Super Gear Oil 150	Daphne Super Gear Oil 220	Daphne Super Gear Oil 220	Daphne Super Gear Oil 320
COSMO Oil	COSMO Gear SE 150	COSMO Gear SE 220	COSMO Gear SE 220	COSMO Gear SE 320

Lubrication oil volume

Mounting examples \ Size		SM107	SM115	SM203	SM207	SM215	SM307
Standard	1	1.0 (0.7)	1.3 (0.9)	1.9 (1.3)	3.0 (2.0)	3.7 (2.4)	6.3 (4.1)
	2	1.1	1.5	2.1	3.7	4.8	8.5
	3	0.9	1.2	1.7	3.0	4.0	6.9
	4	0.8	1.0	1.4	2.5	3.2	5.8
Special	5	1.1	1.5	2.1	3.7	4.8	8.5
	6	1.0	1.4	2.0	3.5	4.4	8.0

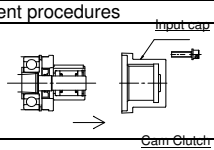
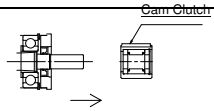
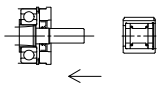
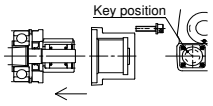
Mounting examples \ Size		SM315	SM407M	SM415M
Standard	1	9.7 (5.7)	15 (6.5)	24 (10)
	2	12	15	24
	3	10	15	24
	4	8.2	15	24
Special	5	12	21	27
	6	12	21	27

Note) The mounting example ( ) value is when the oil gauge is changed to the plug A position in mounting example 1 when the reducer is used at an input shaft speed of 1000 r/min or higher and under continuous operating conditions.

(3) Replacing grease, lubrication oil in the backstop cam clutch

- Replace the grease and lubrication oil once every one or two years with the following procedure.

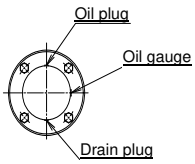
SM107 to 315

Steps	Replacement procedures		Notes
1	First remove the input cap mounting bolt and remove the input cap.		Do not tap with an iron hammer.
2	Remove the cam clutch from the shaft while gently turning it in the idle direction.		Do not apply excessive force to the bush. There is a risk of damaging the cam clutch.
3	Apply the specified amount of grease to the sliding surface of the cam clutch cam.		Always apply the specified amount of the recommended grease. An excessive application of grease will cause heat to be produced.
4	Attach the cam clutch to the shaft while gently turning it in the idle direction.		Do not force it when stiff and it cannot be inserted onto the shaft. There may be a problem with the cam clutch.
5	Align the keyway on the input cap and the key phase of the cam clutch and attach the input cap with the mounting bolt.		Make sure the cam clutch has entered the reducer properly, then tighten the mounting bolt to fix.

Input cap mounting bolt size

Size	SM107	SM115	SM203	SM207	SM215	SM307	SM315
Bolt size	M6	M6	M6	M8	M8	M10	M10

SM407M to 415M

Steps	Replacement procedures		Notes
1	First remove the drain plug from the cam clutch, then drain the old oil.		After draining the oil, it is more effective to rinse the interior with white kerosene.
2	Reattach the drain plug.		Always apply a sealant to the drain plug and fully tighten it.
3	Fill from the filling plug with the specified volume of new oil.		Always fill with the recommended lubrication oil.
4	After you check the oil level with the oil gauge, attach the filling plug.		Excessive oil will cause heat to be produced.

Filling, drain plug sizes

Size	SM407M to 415M
Plug sizes	PT 1/8

Recommended grease, lubrication oil

Size	SM107 to 315	SM407M to 415M
Brand	Esso Beacon 325 (grease)	Mobil ATF 220 (lubrication oil)

Note) The brand of grease and lubrication oil is extremely important for the performance and service life of the cam clutch. Use only the above grease and lubrication oil recommended by Tsubakimoto Chain Co. Do not mix other brands of oil or use grease or lubrication oil that contains extreme-pressure additives.
There is a risk that the cam clutch will not function properly.

Grease/lubrication oil volumes **Unit: g**

Size	SM107	SM115	SM203	SM207	SM215	SM307	SM315
Grease volume	11	11	14	17	27	31	40

Unit: L

Size	SM407M	SM415M
Lubrication oil volume	0.2	0.2

4. Operation

1) Inspecting prior to use

Upon completing the installation, check the following prior to operation:

- Is the direction of rotation is correct?
- Is the connection to the driven shaft secure?
- Are there any loose mountings or bolts?
- Make sure the equipment incorporates failsafe measures to prevent accidents from occurring due to the use of the reducer, or in the event the reducer malfunctions.

2) Trial run

Before running in production, run the reducer without loading. Check for abnormalities such as vibration, noise, and heat. Gradually increase the load.

3) Production run

Verify the following after starting production:

- Is the direction of rotation is correct?
- Is there any abnormal vibration, noise, heat, etc?
- Is the reducer subject to shock or overloads?

Note) Loading the reducer above the allowable capacity can shorten the life of the gears and other parts, resulting in damage to the reducer. Do not load the reducer above its allowable torque.

Note) The reducer 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 an incorrect oil level or improper installation. Check each location. Note, do not touch the reducer with your bare hands when checking. Doing so may cause burns.

5. Maintenance

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

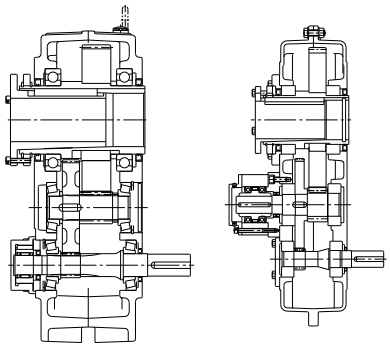
Make daily inspections using appropriate measuring instruments for the following procedures. Take note of operating conditions when performing maintenance.

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?
Lubrication oil leak	Is oil leaking from the oil seal or couplings?

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. Construction diagram

(B type, 2-stage reduction taper bush specification)



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 SMR 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 "WARNING" and "CAUTION", and these are indicated in the instruction manual. The definitions and indications are as follows.

⚠ WARNING	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.

⚠ WARNING

(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 maintenance and inspection 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 SMR 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 SMR Series. Otherwise there is a risk of injury and damage to equipment.
- Do not use the SRM 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 Tsubakimoto Chain Co. 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 SMR 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 SMR 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 SMR Series that will interfere with ventilation. This will hinder cooling and may result in burns or a fire due to abnormal heating.
- Do not get on the SMR 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 SMR 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.

- Mounting to the driven shaft -

- 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.
- Lightly tap the end of the output shaft with a plastic hammer to insert it. Do not tap the casing or the oil seal.
- Always secure the shaft to the driven shaft to prevent them from coming apart.

(Connection)

- Connection to a motor -

- When connecting the SMR Series to a motor, 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 SMR Series will rotate independently, remove the key that is temporarily installed to the output shaft. Otherwise there is a risk of injury.

(Operation)

- During operation, the SMR 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 SMR 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 SMR 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 SMR Series and its lubrication oil should be treated as general industrial waste.

Limited Warranty

Tsubakimoto chain 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.

◎Others

(1) The content in this instruction manual may be changed at any time without prior notification.
We have taken all precautions regarding the content of this instruction manual so that it contains no mistakes or flaws. However, if you find a mistake or flaw, please contact Tsubakimoto Chain Co.

TSUBAKI

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