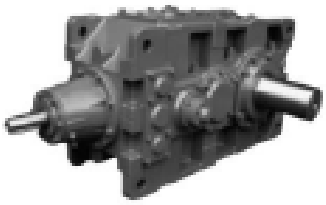
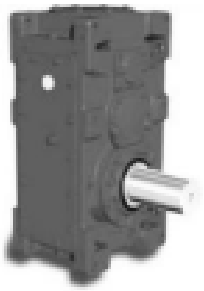
TRANSCYKO REDUCER & DRIVE UNITS
TSG GEARBOX

INSTALLATION AND MAINTENANCE MANUAL

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"BSI ISO 9002 Registered firm, accredited by the Dutch Council for Certification and National Accreditation of Certification Bodies"

A. Safety Precautions:

Before working on the machine (assembling, operating, maintaining, inspecting and so on), please read this operation and maintenance manual throughly so that you know exactly how to operate the Transcyko TSG Gear Box and aware of the safety rules to be applied and the warnings to be heeded. Keep this manual near the machine so that you can refer to them at any time if necessary.

Transporting, assembling, lubricating, operating, maintaining and inspecting must only be done by a trained technical experts or engineers otherwise there is the risk of injury or damaging the machine. Never reach into moving parts and remove foreign matters from them. This may cause injury or damage to the machine.
The gearbox unit must be put out of action and unplugged for maintenance and installation work.
The unit must only be used for the specified purpose otherwise there is the risk of injury or damage to the machine.

B. Safety precautions for Operating the Gear Box:

A drive motor connected to the gearbox may only be operated after ensuring that the information on the nameplate matches the documentation supplied (drawings, parts and so on).
The drive must be damage in any way.
The lubricants provided must be suitable and if necessary prepared for the environmental conditions.

A motor connected to the gearbox may only be operated on the frequency inverter if the information on the gearbox nameplate is obeyed. The gearboxes are intended for commercial equipment and must only be in accordance with the information in the technical documentation and the information on the nameplate.

C. Transporting and Inspection on Delivery:

Never stand under a unit hanging from a crane or similar lifting device. There is the risk of severe or fatal injuries.

Ensure that the gearbox is not dropped.
Always use eye bolts or holes for hanging. Only prescribed slings of the correct size that can be hooked into the existing eyebolts or can be put round the flange connections must be used. The screwed in eyebolts are only designed for the weight of the drive. No additional loads must suspended.

Do not use the centering holes on the shaft ends to lift the gearbox by the eyebolts. The bearings might be damaged.
After installing the TSG Gear Box motor into the unit the whole machine must never be lifted on the suspension hooks or holes. This may cause injury or damage to the equipment or the lifting device.

Before lifting check the weight of the gearbox using the information on / in the packaging, drawings supplied, and catalog, etc.
Do not lift any units whose weight exceeds the maximum load of the crane or the lifting device. This may cause injury or damage to the equipment or the lifting device.

1. Inspection Upon Delivery

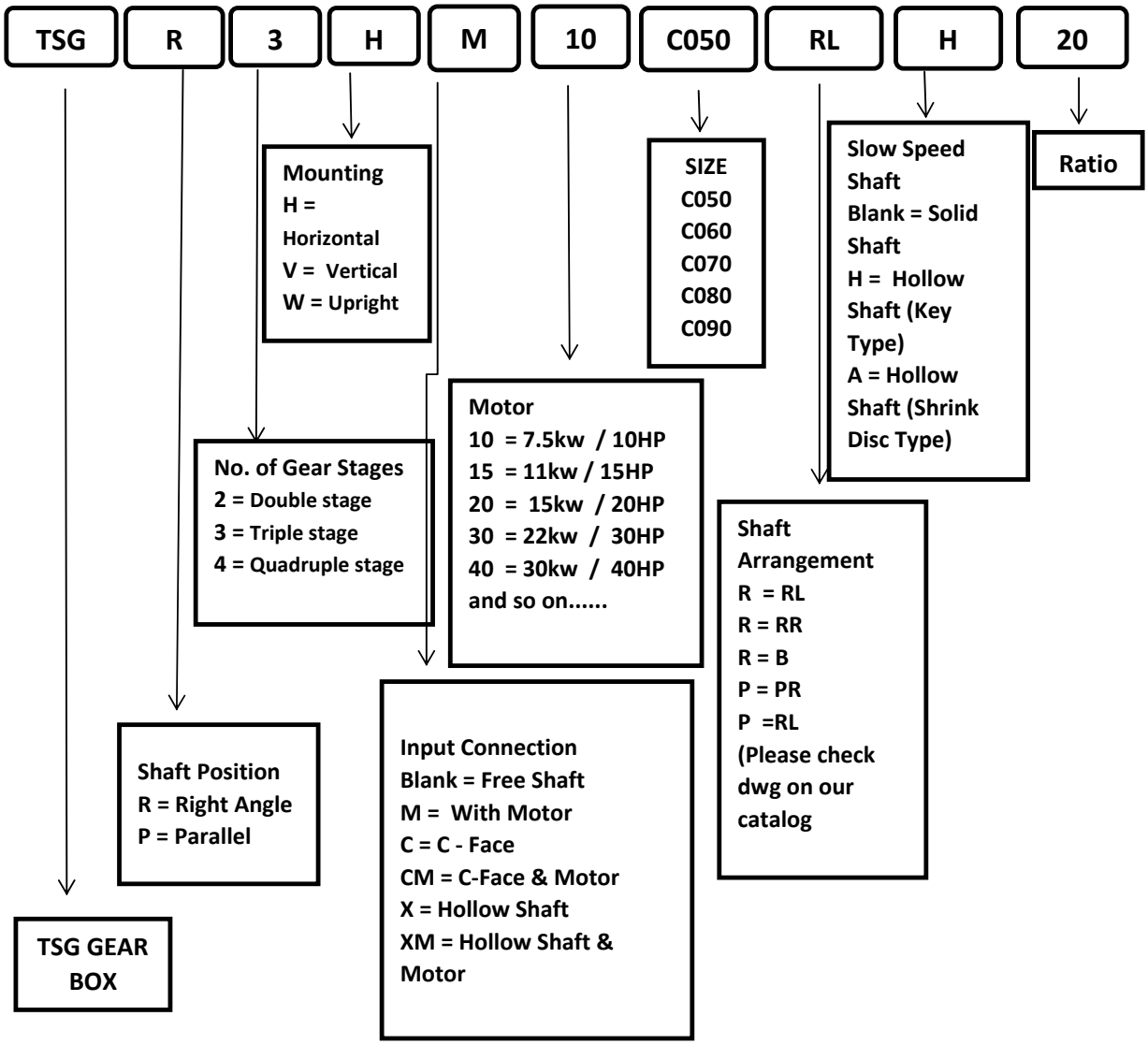
CAUTION

• Unpack the unit after verifying that it is positioned right side up; otherwise injury may result.
• Verify that the unit you have received is the unit what you ordered. If different unit is recevied injury or damage to the equipment may result.
• Do not remove the nameplate.

Upon delivery and receipt of TSG Gear Box please check the following. If a nonconformity or problem is found, please contact Transcyko representative or your local agent.

1. Does the unit on the name plate conform to what you ordered?
2. Was there any part broken during the transportation?
3. Are all bolts and nuts are tightened firmly?

1-1) NOMENCLATURE OF TSG GEAR BOX



Storage:

Do not store TSG Gear Box longer than six months, unless long-term storage was specified when the order was placed. Follow instruction outlined below when storing the gearbox for an extended period of time before installation.

Storage Location

Store the gearbox indoors in a clean, dry area that is relatively free from humidity, dust, extreme temperature fluctuation or corrosive gas. Do not store outdoors or in a wet location.

Storage Period - Up to Six Months

1. Fill the gearbox with the recommended lubricant.
2. Every two or three months, hand rotate the shaft for the number of turns that is equivalent to the gearbox or gearmotor ratio.

Six Months to One Year

1. Special rust-proofing is applied at the factory before shipping. The rust preventive NP-20 (Shell VSI Circulating Oil #32) is sprayed into the gearbox and the air vent is replaced with a red sealing plug.
2. Do not operate the gearbox with a rust preventive oil. Drain the rust preventive oil and fill with the recommended lubricant before operating.

More than One Year

1. Before shipping from the factory, the rust preventive oil NP-20 (Shell VSI Circulating Oil #32) is sprayed in the gearbox and the air vent is replaced with a red sealing plug.
2. After the first year of storage, add the correct amount of rust preventive oil NP-20 (Shell VSI Circulating Oil #32) into the gearbox as per table below.
3. Hand rotate the shaft for the number of turns that is equivalent to the gearbox ratio.
4. Replace the plug in the air vent. Repeat 2-4 times for every year of storage.
5. Do not operate the reducer with the rust preventive oil. Drain the rust preventive oil and fill the recommended lubricant before operating.

Rust Preventive Quantity - Shell VSI Circulating Oil #32 Liters

Table 1

Size	C015-C035	C040-C055	C060-C075	C080-C095	C100-C118	C121-C136
Qty	0.4	0.6	0.9	1.9	3.8	7.6

Operation After Storage

1. Oil Seals deteriorate when exposed to high temperature and UV rays. Inspect the Oil Seals before operating the TSG Gear Box.
2. After starting the reducer, verify that there is no abnormal sound, vibration or heat rise.

2. Installation

• The drive must be installed in such a way that inspection, maintenance and other work and any re-lubrication can be carried out easily.
• The fixing bolts must only be tightened to the prescribed torque after a perfectly level, rigid, vibration-reducing base for the whole installation area has been carefully made and after the drive has been aligned.
After approximate four (4) weeks all fixing screws must be checked again to ensure they are tightened to the correct torque.
• It is advisable to use DIN 10.9 fixing screws.

• If the drive is loaded up to the maximum output drive torque or the maximum shear force, not only must the feet be fixed with screws but also positive locking connections (e.g. Cyclindrical pins DIN 6325) must be provided.

• Mos2 paste is recommended to prevent electrochemical corrosion between the gearbox and the driven machine as a result of contact between different metals e.g.: cast iron and stainless steel. Also earth the housing.
Use earthing screws on the motor.

• If the drive is varnished or partially re-varnished you must ensure that the ventilation valve and the shaft seal rings are masked carefully. After you have finished varnishing the adhesive strips must removed.

DANGER

• Standard TSG Gear Box units must not be used in an area where there is a risk of explosion.
In such situations an explosion-proof gearboxes must be used. Otherwise, explosion, ignition, electric shocks injuries or damage to the equipment may result.

• When driving an explosion-proof motor with inverter, since the inverter itself is not explosion-proof, install an inverter in a place that is free from explosive gas mixtures or dust concentrations otherwise electric shocks, injuries, explosions or damage to the equipment or even body injury may result.

CAUTION

• TSG Gear Boxes must not be used for purposes other than those specified on the nameplate or in the manufacturer's specification: otherwise electric shocks, injuries or damage to the equipment may result.

• No inflammable materials must be placed near the unit to avoid the risk of fire.

• No objects that restrict ventilation must be put near the gearbox. Insufficient ventilation can cause excessive heat build-up that may result in burns or fire.

• Do not thread on the gearbox or hang on it because this could lead to injury.

• Do not touch the shaft end of the gearbox, internal gearing or the edges of the motor fan with bare hands because this could lead to injury.

• If the unit is used in food processing applications it is 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 the products.

2-1) Place of Installation

Ambient Temperature : - 10 ℃ + 40℃

- Operating at ambient - 10 ℃ and above 40℃ must be agreed with the manufacturer.
- When using oil heating (ambient temperature < - 10℃) a voltage must be applied to this permanently.
- An integral thermostat will control the oil heating if necessary.

Ambient Humidity : 85% maximum

Altitude : 1000 meters maximum

Ambient Atmosphere : There should be no corrossive gas, explosive gas or steam.
The place should be well ventilated without dust.

Location of Installation : Indoor with minimum dust and no water splashing.

- Units made to special specifications are necessary for installation under conditions other than the above.
- Units made according to the outdoor, explosion-proof or other specifications can be used under the specified conditions without any problem.
- Install the units where inspection, maintenance and other such operations can be carried out easily.
- Install the units on a sufficiently rigid base.

2-2) ANGLE OF INSTALLATION

- If the unit has been manufactured to be installed at an angle, the installation angle in the specifications must be observed.

- As much as possible do not remove the motor eyebolt. But if the eyebolt has to be removed insert an eyebolt into the thread hole or take action to prevent water getting into the motor.

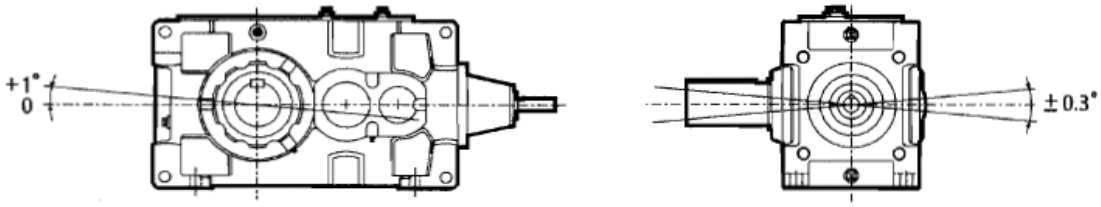


Fig. 1

2-3) TOOLS REQUIRED

- Spanner set
- Torque wrench for fixing screws to feet / flange housing, motor lamp, terminal coupling etc.
- Undoing device.
- Compensating tools.
- Corrosion protection (e.g.: Mos2 paste, molycote, copper paste).

CAUTION

- The corrosion protection used for transport and storage on the shaft ends or hollow shafts and on the centering seats must be removed before commissioning. The corrosion protection can be removed with an alkaline cleaner. Never use mechanical aids. The alkaline solvent must not come into contact with gaskets.

- When using lubricants, solvents and corrosion protection products the protection guidelines for people and the environment must be heeded.

Standard Input Drive Speed

Table 2

Configuration			Size	Input Speed (rpm) 750	1000	1500	1800
Right Angle Shaft	2 Stage	Horizontal	C015-C075	■	■	■	■
			C080-C085	■	■	■	■
			C095	■	■	■	■
			C105-C115	■	■	■	■
		Vertical	C015-C075	■	■	■	■
			C080-C085	■	■	■	■
		Upright	C015-C075	■	■	■	■
			C080-C085	■	■	■	■
	3 Stage	Horizontal	C030-C095	■	■	■	■
			C100-C115	■	■	■	■
		Vertical	C030-C095	■	■	■	■
			C100-C115	■	■	■	■
		Upright	C030-C085	■	■	■	■
	4 Stage	Horizontal	C040-C115	■	■	■	■
		Vertical	C040-C115	■	■	■	■
		Upright	C040-C085	■	■	■	■
Parallel Shaft	2 Stage	Horizontal	C015-C095	■	■	■	■
			C100-C105	■	■	■	■
			C110-C115	■	■	■	■
		Vertical	C015-C095	■	■	■	■
			C100-C105	■	■	■	■
			C110-C115	■	■	■	■
		Upright	C015-C085	■	■	■	■
	3 Stage	Horizontal	C015-C115	■	■	■	■
		Vertical	C015-C115	■	■	■	■
		Upright	C015-C085	■	■	■	■
	4 Stage	Horizontal	C030-C115	■	■	■	■
		Vertical	C030-C115	■	■	■	■
		Upright	C030-C085	■	■	■	■

Note:

1. The specified ranges except for the shaded areas show the standard input drive speeds.
2. Please contact Transcyko or your local agents if you have queries on speeds beyond the shaded areas.
3. Please contact Transcyko or your local agents if you have questions about standard input drive speeds for gearbox sizes C118 ~ C136.

If unit has a motor pump, the motor for the pump must be started before starting the gearbox motor. As soon as the lubrication oil is circulating through the bearing the gear motor must be started otherwise the unit could be damaged.
Use a flow switch or a flow inspection glass to check that the oil is flowing. Should irregulaties occur the gearbox motor must be stopped immediately.

First Lubrication Filling, Topping Up and Changing

Initial Oil Filling and Changing

Table 3

	Oil Change Intervals	Operating Conditions
Initial Filling	Before Commissioning	---
1st Oil Change	Up to a maximum of 500 hours or 6 months	---
2nd Oil Change	Every 2,500 hours or 6 months	---
	Every 5,000 hours or 6 months *	When operating at an oil temperature of <70℃
Further Oil Changes	Every 2,500 hours or 6 months *	When operating at an oil temperature of <71℃

* Whichever occurs first.

Please contact the lubricant manufacturer if operating the unit in environments with corrosive gases or widely fluctuating ambient temperatures.

3) INSTALLATION OF TSG GEARBOX WITH FAN (PARALLEL)

CAUTION

- Mind the edges of the feather key slot and other parts to avoid injury.
- Keep accessories such as screws in the box so that they don't get lost.
- Treat parts carefully to avoid damage. Protect them from water and dust.

Fitting the Gearbox

a. Unscrew bolts (1) and (2) and then remove the fan guard (3). Fig. 2.
b. Unscrew bolt (4) and then remove the fan guard (5) Fig. 3, If the fixing bolt (9) can still not be inserted yet.
c. Unscrew bolt (6) and remove the fan wheel (7) Fig. 4.
d. Fit the gearbox onto the mounting surface with bolts (Fig. 5).
e. Push the fan wheel (7) onto the fan hub (8) and secure with bolts (6).
f. Fit fan hub (3) and (5) and secure with bolts (1), (2) and (3) Figs. 2 & 3).
Please see below Table for Bolt Tightening Torques.

Fig. 2

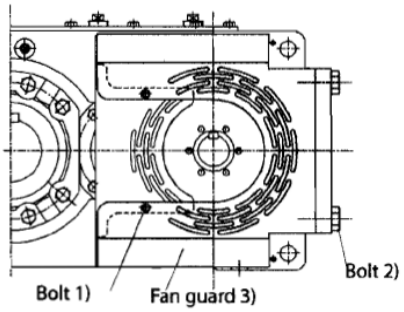


Fig. 3

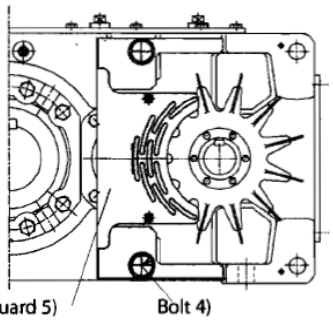


Fig. 4

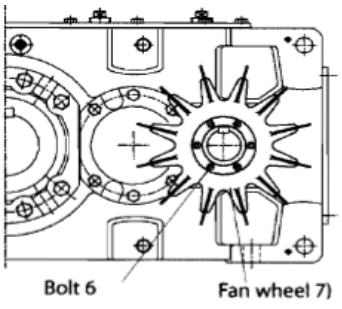


Fig. 5

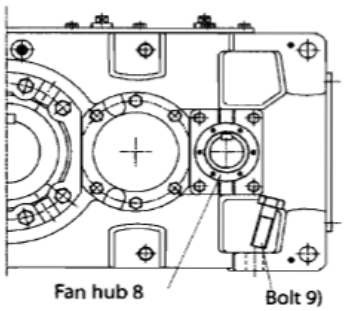


Table 4: Bolt Tightening Torque - Bolt tightening torque tolerance: + 10%

Bolt	Tightening Torque (Nm)	
	Bolts (1), (2) & (4)	Bolt (6)
M6	-	10.8
M8	11.3	-
M10	39.2	-
M12	97.4	-
M20	190	-
M24	328	-
M30	652	-
M36	1140	-

Lubrication Instructions

Please follow the lubrication instructions below. Incorrect maintenance reduces the service life of the gearbox.

Table 5

Lubrication method when operating at a standard input drive speed.

		Size	C015	C025	C030	C035	C040	C045	C050	C055	C060	C065	C070	C075	C080	C085
Right Angle Shaft	2 Stage	Horizontal	Oil Bath								Splash Oil Lubrication				*	*
		Vertical	Oil Pump (Shaft Input Drive)													
		Upright	Oil Bath & Grease								Splash Oil Lubrication				*	*
	3 Stage	Horizontal	-	-	Oil Bath						Splash Oil Lubrication					
		Vertical	-	-	Oil Pump (Shaft Input Drive)											
		Upright	-	-	Oil Bath & Grease						Splash Oil Lubrication					
	4 Stage	Horizontal	-	-	-	-	Oil Bath				Splash Oil Lubrication					
		Vertical	-	-	-	-	Oil Pump (Shaft Input Drive)									
		Upright	-	-	-	-	Oil Bath & Grease				Splash Oil Lubrication					
Parallel Shaft	2 Stage	Horizontal	Oil Bath								Splash Oil Lubrication					
		Vertical	Oil Pump (Shaft Input Drive)													
		Upright	Oil Bath								Splash Oil Lubrication					
	3 Stage	Horizontal	Oil Bath								Splash Oil Lubrication					
		Vertical	Oil Pump (Shaft Input Drive)													
		Upright	Oil Bath								Splash Oil Lubrication					
	4 Stage	Horizontal	-	-	Oil Bath						Splash Oil Lubrication					
		Vertical	-	-	Oil Pump (Shaft Input Drive)											
		Upright	-	-	Oil Bath						Splash Oil Lubrication					

		Size	C090	C095	C100	C105	C110	C115	C118	C121
Right Angle Shaft	2 Stage	Horizontal	-	*	-	*	-	*	-	-
		Vertical	-	-	-	-	-	-	-	-
		Upright	-	-	-	-	-	-	-	-
	3 Stage	Horizontal	Splash Oil Lubrication		*	*	*	*	*	*
		Vertical	Oil Pump (Shaft Input Drive)		Electric Pump				-	-
		Upright	-	-	-	-	-	-	-	-
	4 Stage	Horizontal	Oil Bath						Splash Oil Lubrication	
		Vertical	Oil Pump (Shaft Input Drive)					-	-	-
		Upright	-	-	-	-	-	-	-	-
Parallel Shaft	2 Stage	Horizontal	Splash Oil Lubrication		*	*	*	*	-	-
		Vertical	Electric Pump						-	-
		Upright	-	-	-	-	-	-	-	-
	3 Stage	Horizontal	Splash Oil Lubrication							-
		Vertical	Electric Pump						-	-
		Upright	-	-	-	-	-	-	-	-
	4 Stage	Horizontal	Splash Oil Lubrication							
		Vertical	Oil Pump (Shaft Input Drive)				Electric Pump		-	-
		Upright	-	-	-	-	-	-	-	-

NOTE: ***** In constant operating mode the splash lubrication system or the electric pump is used depending on the drive frequency.

Lubricating and Changing Lubrication

Grease lubricated models are filled with grease at the factory and supplied with grease nipples and grease drain screws.
Please check Table 5 to check whether lubrication is necessary.
Remove the lubrication drain screw on the gearbox unit housing to fill or change the lubricant.
Remove the lubricant drain plug, drain old lubricant and top up with a grease gun.
Top up with new lubricant until all the old lubricant has drained via the lubrication drain. Replace the plug. Top the gearbox up slowly during operation to ensure that the lubricant circulates properly. Please check accurately as possible the number and position of the grease nipples.

Table 6

Interval	Drive Speed
Every 1,500 hours	750 rpm or slower
Every 1,000 hours	750 rpm ~ 1,800 rpm

Table 7

Output Shaft Speed		Ambient Temperature		
		- 10 ℃ to 15 ℃	° 0 to 30 °	° 10 to 50 °
100 rpm or more	ISO * AGMA	VG68 EP	VG150 4EP	VG220 5EP
100 rpm or less	ISO * AGMA	VG100 EP	VG220 5EP	VG320 6EP

Table 8: Recommended Lubricants

	Brand	BP	Castrol			Chevron Texaco		Exxon Mobil		Shell	Total
Gear Oil	ISO VG68 AGMA 2EP	Energol GR-XP-68	Alpha SP68	Optigear BM68	Tribol 1100 / 68	Gear Compounds EP68	Meropa WM68	Spartan EP68	Mobilgear 626	Omala 68	Carter EP68
	ISO VG100 AGMA 3EP	Energol GR-XP-100	Alpha SP100	Tribol 1100/100	Gear Compounds EP100	Meropa WM100	Meropa WM100	Spartan EP100	Mobilgear 627	Omala 100	Carter EP100
	ISO VG150 AGMA 4EP	Energol GR-XP-150	Alpha SP150	Optigear BM150	Tribol 1100/150	Gear Compounds EP150	Meropa WM150	Spartan EP150	Mobilgear 629	Omala 150	Carter EP150
	ISO VG220 AGMA 5EP	Energol GR-XP-220	Alpha SP220	Optigear BM220	Tribol 1100/220	Gear Compounds EP220	Meropa WM220	Spartan EP220	Mobilgear 630	Omala 220	Carter EP220
	ISO VG220 AGMA 6EP	Energol GR-XP-320	Alpha SP320	Optigear BM320	Tribol 1100/320	Gear Compounds EP320	Meropa WM320	Spartan EP320	Mobilgear 632	Omala 320	Carter EP320
Bearing Grease		Ener-Grease LSEP2	Spheerol AP3	Olista Long-time 3EP	Tribol 3020/1000-2	Duralith Grease 68	Multi-Fak EP2	Beacon Ep2	Mobilux EP2	Alvania EP2	Multis EP2

Oil Quantity

Approximate Oil Quantity Unit: Liter (L)

The quantities given below are an average guide. The oil level must be checked with a dipstick or a sight glass.

Table 9

Type	Horizontal Type						Vertical Type						Upright Type					
	Parallel Shaft			Right Angle Shaft			Parallel Shaft			Right Angle Shaft			Parallel Shaft			Right Angle Shaft		
	P2	P3	P4	R2	R3	R4	P2	P3	P4	R2	R3	R4	P2	P3	P4	R2	R3	R4
C015	5	5	-	5	-	-	5	6	-	5	-	-	9	11	-	7	-	-
C025	7	8	-	7	8	-	7	8	-	7	-	-	13	15	-	11	-	-
C030	10	10	14	10	10	-	9	10	10	7	9	-	16	20	20	14	16	-
C035	12	13	17	12	12	-	12	14	14	9	12	12	22	25	25	19	21	-
C040	16	19	25	16	16	19	18	18	17	19	18	18	29	35	35	24	29	35
C045	18	21	28	18	18	21	22	22	21	23	22	22	36	43	43	30	36	43
C050	21	24	32	21	21	24	22	25	23	20	21	24	36	45	46	31	35	46
C055	28	29	40	28	28	29	31	35	33	26	30	34	47	59	59	45	46	59
C060	25	33	37	25	29	38	25	28	32	*	28	36	53	68	69	44	56	68
C065	29	38	42	29	33	43	32	35	40	*	35	45	67	85	86	56	65	85
C070	38	49	56	37	45	57	39	44	53	*	46	54	84	106	108	65	83	107
C075	47	59	67	46	52	67	49	56	67	*	59	68	100	120	122	87	100	122
C080	54	64	73	53	60	73	54	57	65	*	60	69	109	130	130	90	115	128
C085	68	80	90	67	75	90	71	79	89	*	80	94	137	176	175	126	144	174
C090	120	120	150	-	120	150	90	90	110	-	120	120	-	-	-	-	-	-
C095	140	155	180	100	155	180	120	120	140	-	145	155	-	-	-	-	-	-
C100	170	180	220	-	180	210	140	140	170	-	170	180	-	-	-	-	-	-
C105	205	225	260	150	220	255	175	175	210	-	210	220	-	-	-	-	-	-
C110	240	260	300	-	250	300	200	200	240	-	230	250	-	-	-	-	-	-
C115	290	325	365	200	310	360	255	255	295	-	290	315	-	-	-	-	-	-
C118	-	350	390	-	350	390	-	-	-	-	-	-	-	-	-	-	-	-
C121	-	470	530	-	460	540	-	-	-	-	-	-	-	-	-	-	-	-
C126	-	470	520	-	460	530	-	-	-	-	-	-	-	-	-	-	-	-
C128	-	390	450	-	350	460	-	-	-	-	-	-	-	-	-	-	-	-
C131	-	550	650	-	510	680	-	-	-	-	-	-	-	-	-	-	-	-
C136	-	540	640	-	500	660	-	-	-	-	-	-	-	-	-	-	-	-

* Please refer Table 10

Table 10: Right Angle Shaft Oil Quantity
Double Stage (Liters)

Size	Ratio		Ratio	
	6.3 - 9	**10 - 18**	**8 - 11.2**	**12.5 - 22.4**
C060	25	25	-	-
C065	-	-	32	32
C070	35	41	-	-
C075	-	-	47	54
C080	46	55	-	-
C085	-	-	58	68

Dis-assembly / Re-assembly of Gearbox or Gearmotor

Maintenance

To increase the service life of the gearbox replace these items every three to five years.

Replacement parts:

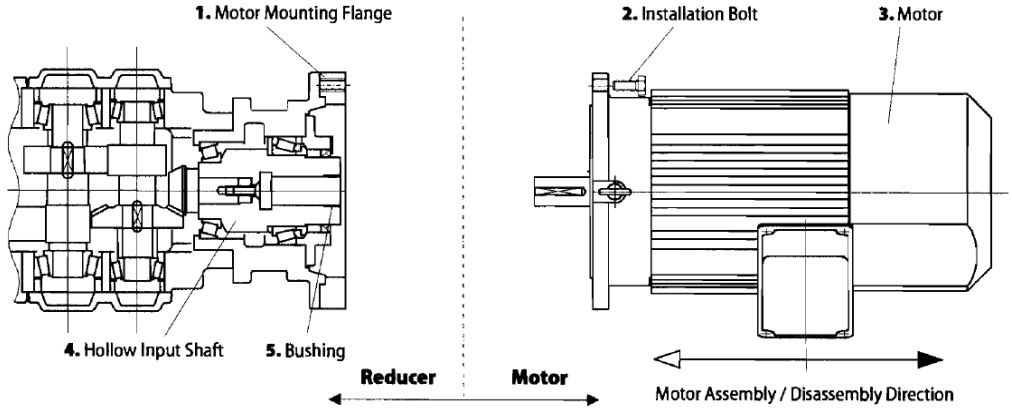
- Bearing, oil seal, collar, key, shim, packaging stopper and visible gauge.
- Check and replace shaft and gear if they are damaged.

Dis-assembly / Re-assembly

- Repair, dis-assembly and assembly must be performed by a well-trained technicians: otherwise, the system may be damaged.

- Keep hands and all foreign objects from keyway and other sharp edges; otherwise, injury may occur.
- Dis-assemble in a clean, dry location.
- Keep accessory parts, such as screws in a box to prevent loss.
- Handle parts carefully to avoid damage.

Fig. 6 : Separating Gearbox from the motor



Disassembly Procedure:

1. Remove the installation bolts.
2. Separate motor (3) from reducer. Handle reducer and motor carefully. Do not allow key or motor shaft to scrape the bushing (5) otherwise, bushing may be damaged.

Assembly Procedure:

1. Position the reducer so that the motor (3) may be easily mounted.
2. Apply grease to the motor (3) output shaft.
3. Align the motor (3) output shaft key with the hollow input shaft (4) keyway.
4. Slowlly insert the motor (3) output shaft into the hollow input shaft (4). Do not allow key or motor shaft to scrape the bushing (5) otherwise bushing may be damaged.
5. Ensure that the motor (3) is properly inserted into the hollow input shaft (4). Tighten the installation bolts (2) to secure the motor (3) to the motor mounting flange (1).

Troubleshooting

In the event of anomalies, appropriate action as set out in the operating instructions must be taken.
Do not operate the unit until the problem has been solved. If a repair is not possible, please contact Transcyko or your local agent.

Table 11

Malfunction			Possible Cause	Correction
The motor runs without a load.			Power failure.	Contact the electricity supply company.
			Defective electric circuit.	Check the circuit.
			Fuse burnt out.	Replace fuse.
			Safety clutch tripped.	Rectify malfunction and reset device.
			Load locking	Check the load and safety device.
			Loose connection.	Adjust connection.
			Connection to stator coil cut off.	Contact an authorized service agent.
			Bearing damage.	Contact an authorized service agent.
			3-phase is functioning as single-phase.	Check the power supply with a voltmeter. Check the motor, coil in the transformer, contactor, fuse, etc. and repair or replace them.
Motor running without load.	When load is applied.	Switches get hot.	Insuffiecient switch capacity.	Replace switch with a specified one.
			Overload.	Reduce the load to the specified one.
		Fuse burnt out	Fuse overloaded.	Use appropriate fuse.
			Overload.	Reduce the load to the specified one.
		Motor overheated and running too slowly.	Voltage drop.	Contact the electricity supply company.
			Overload.	Reduce the load to the specified one.
			Short-circuit motor stator coil.	Contact an authorized service agent.
			The key is missing.	Install a key.
			The bearing is burnt out.	Contact an authorized service agent.
			Fuse switch wrongly aligned.	Check fuse switch.
	Motor runs in the wrong direction.		Connection error.	Change the connection.
	Fuse burnt out.		The outline wire is short-circuited.	Contact an authorized service agent.
			Loose connection between motor and stater.	Connection error.
			Overload.	Reduce the load to the specified one.
Excesseive temperature rise.			Voltage drop or voltage rise.	Contact the electricity supply company.
			Bearing burnt out.	Contact an authorized service agent.
			The ambient temperature is high.	Inprove the ventilation method.
			Damage due to overload applied to gears, bearings, etc.	Contact authorized service agent.
Oil leakage.	Oil leaks from the input/output shaft sections.		Damaged oil seal.	Change the oil seal.
			Scratches or abrasions on the sealing lip.	Contact an authorized service agent.
Odd noises. Excessively strong vibrations.			Gearbox, shaft or bearing damage.	Contact an authorized service agent.
			Housing distorted because of uneven support.	Level support surface or use spacer blocks.
			Resonance as a result of the support surface not being rigid enough.	Make the support surface more rigid.
			Not properly aligned with the connection machine.	Align the centre of the shaft.
			The connection machine transmits vibrations to the TSG Gearbox.	Operate without the connection machine to check gearbox.
Odd motor noise.			Foreign bodies has got in.	Remove foreign bodies.
			Bearing damage.	Replace bearing.
Frequency inverter triggered.	Cut off because of excessive current.		Sudden acceleration / braking.	Increase acceleration / braking time.
			Sudden change in load.	Reduce load.
	Excessive earth current.		Earthing on the output side.	Remove earthing.
	Direct current too high.		Short-circuit on the output side.	Check cable, remedy malfunction.
	Cut off because of excessive current.		Sudden acceleration / braking.	Increase acceleration / braking time.
			Sudden change in load.	Reduce load.
	Excessive earth current.		Earthing on the output side.	Remove earthing.
	Direct current too high.		Short circuit on the output side.	Check cable, remedy malfunction.
	Cut off because of excessive regenerative voltage.		Sudden braking.	Increase braking time, reducer braking frequency.
	Thermo contact triggered.		Overload.	Reduce load to specified values.