MTMC 40 P - 207

TWIN DISC

TECHNODRIVE

allpa
marine equipment

TMC 40 P

Manuale di Servizio
Service Manual
Manuel d'Utilisation

Kerkenbos 1015, 6546 BB Nijmegen info@allpa.nl

allpa
marine equipment

TECHNODRIVE MARINE REVERSE-GEAR UNIT TYPE TMC 40 P
ISTRUCTIONS FOR INSTALLATION, USE AND MAINTENANCE - SPARE PARTS.

INTRODUCTION

- Prior to starting read and follow the istruction provided in this manual. Failure to do so will make warranty void.
- Technodrive shall not be responsible for any demages caused by faulty installation, wrong handling or deficient maintenance.
- It is the responsibility of users to provide and install guards and safety devices wich may be required by recognized safety standards on the respective country.

GENERAL INFORMATION

- The reverse-gear unit type TMC 40 P is built with alloy steel, casehardened, and hardened gears; the clutch-unit is a bronze double cone and the coupling device is mechanically servo controlled.
- The reverse-gear unit may be coupled only to engines which turn anti-clockwise (as seen from the flywheel side).
- In forward speed, the output flange rotating direction is reversed with regard to the engine rotating direction.
- The reverse-gear unit can transmit the full power only in forward speed. Reverse ratio is different from forward ratio.

INSTALLATION

- The gearbox is supplied without oil. Therefore, prior to its starting, it must be filled up with ATF oil up to the maximum level marked by the dipstick.
- The connection between the engine and the reverse-gear unit must be carried out by means of a proper flexible coupling.
- Before carrying out the connection, protect the splined shaft by putting a layer of water-repellent grease on it.
- Carefully carry out the fitting between the reverse-gear output shaft and the propeller shaft avoiding misalignments.
- The reverse-gear unit may be installed with a maximum inclination of 15° with respect to the horizont surface.
- The reverse-gear unit must be shifted by means of a singie-lever flexible cable. During the installation of the control cable make sure that the cable neutral position corresponds to that of the reverse-gear unit lever and that the cable allows the reverse-gear control lever to complete the stroke both in forward and in reverse speed. The stroke of the lever between forward speed and reverse speed, must not be less than 60 mm (lever lower hole), 70 mm (upper hole).
- Make sure that the lever forward speed position corresponds to the acual acivancement of the hull.

⚠ **Make certain that the control cable is easily movable.**

⚠ **Make sure that the control cable is able to perform the complete lever stroke both in forward and in reverse and that it is weli positioned in neutral.**

USE AND MAINTENANCE

- Use ATF oil; perform the first replacement after 30 working hours, then replace the oil every 500 working hours but at least once a year.
- Check the oil level weekly by means of the oil dipstick with the engine off.
- During continuous operations oil temperature must not exceed 90° C.
- The shìfting from one speed to the other must be performed by pausing in the neutral lever position with the engine running at idle speed. A direct shift from the forward speed to the reverse speed without stopping in the neutral position is allowed only in case of emergency.
- When the boat is sailing (engine stopped), the gear lever must be in neutral position. Never put the gear lever in the position corresponding to the direction of travel of the boat.
- The clutch-unit is self-adjusting and, therefore, needs no adjustment.
- If, after using the reverse-gear unit for a long time, shifting (from forward speed to neutral or from reverse speed to neutral) becomes particularly difficult, it is advisable first to check the status of the control cable and of its relevant box. Then, if necessary, unlock the nut ref. 57 (spanner 13) and mantein the screw ref. 28 in its position with an allen wrench (4 mm.). Than rotate clockwise the screw ref. 28 by a 1/4 of turn and lock the nut ref. 57. If one or both clutches slip, it is necessary to check if the control cable runs the whole stroke needed to couple the reverse-gear unit. (minimum 30 mm on each side in the lower hole and 35 mm on each side in the upper hole of the control lever). It is also critical that the neutral position of the reverse-gear unit must correspond to the neutral position of the control cable. If the problem persists, it is necessary to disassemble the reverse-gear unit in order to check the status of clutch ref. 22. If the clutch unit shows signs of wear or burns on its cone-shaped surfaces or on the groove, it must be replaced. The cone-shaped surface on gears ref. 25 and 24 must also be checked; such surface must show no marks of burning or seizure and no material deposits coming from the clutch cone otherwise the gears must be replaced. In the case the clutch-unit alone is replaced, it is not necessary to disassemble adjusting shims ref. 6 and, therefore, bearings need not to be adjusted during assembly.

⚠ **The gearbox is supplied without: oil. Before the first start-up it must be filled up to the maximum level marked on the dipstick. Use ATF oil.**

⚠ **Before to start the engine make sure that the gearbox is in neutral position.**

⚠ **The gearbox should only be shifted with the engine at idle speed so as to avoid that the gearbox or the coupling may be demaged.**

⚠ **Disassembly and assembly of the gearbox or of its parts is to be made by specialized technicians only.**

REVERSE-GEAR UNIT DISASSEMBLY

⚠ **Disassembly and assembly of the gearbox or of its parts is to be made by specialized technicians only.**

In order to completely disassemble the reverse-gear unit, operate as follows:

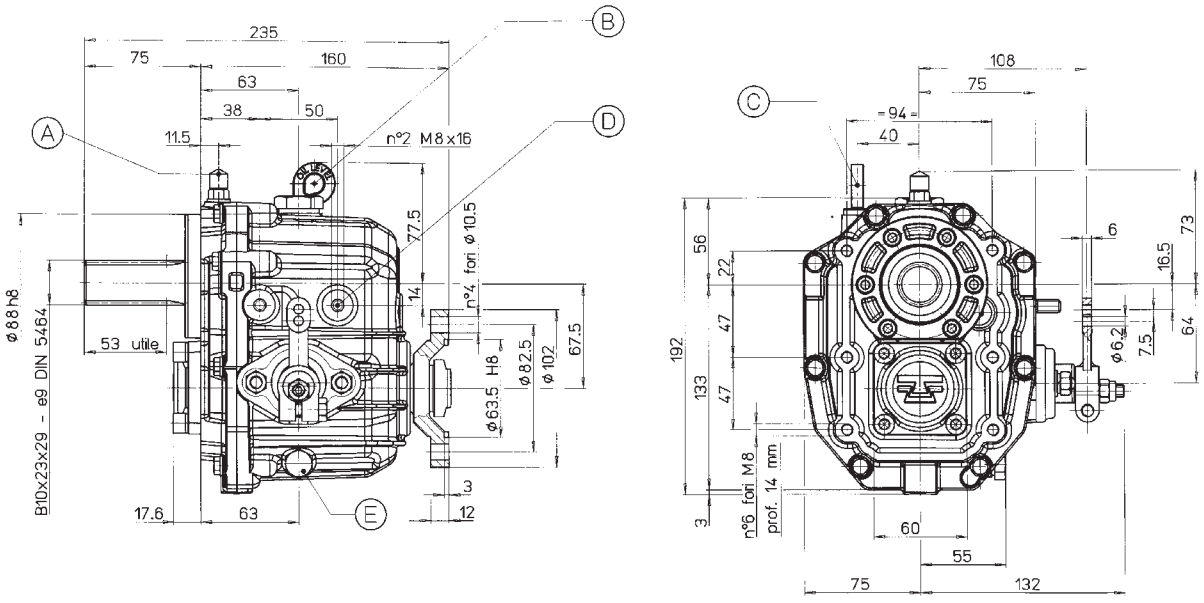
- Remove the reverse-gear control unit by unscrewing M8 two nuts ref. 56 and extracting the whole unit (control lever ref. 18, cover ref. 3, shaft ref. 13, guide shoe ref. 21, screw ref. 28, nut ref. 57) carefully avoiding to drop guide shoe ref. 21 into the reverse-gear unit as it has no axial lock.
- Remove output flange ref. 26 from the reverse-gear unit by unscrewing nut ref. 19 and by extracting the flange from the shaft spline.
- Loosen fastening screws ref. 47 located between the box and the cover and, gently, beat the head of output shaft ref. 12 with a copper hammer in order to separate the box from the cover.
- Unscrew the fastening screws ref. 48, remove the cover ref. 5 and the oil seal ref. 33
- While the reverse-gear unit is open, loosen screw ref. 50 which fastens the intermediate shaft to the reverse-gear cover and remove the wole intermediate shaft ref. 14. Remove input shaft ref. 11 together with bearings ref. 37 and 38, and the whole output shaft ref. 12.
- In order to disassemble the clutch cone from the output shaft, extract all parts according to the following sequence: bearing ref. 54 located on the flange side, spacer ref. 8, gear ref. 25, pin housing cage ref. 35, bush ref. 29 spacer ref. 8 and clutch cone ref. 22.
- In order to complete the disassembly of the output shaft remove nut ref. 19 and extract, in the following order, bearing ref. 55, spacer ref.8, gear ref. 24, pin housing cage ref. 35, bush ref. 29 and spacer ref. 8.
- Spacers ref. 6 are located between cover ref. 2 and bearing ref. 55; therefore, in order to remove them it is necessary to remove screws ref. 51 and the cover ref. 2.
  In order to disassemble the intermediate gear ref. 23, extract all parts according to the following sequence: spacer ref.9, gear ref. 23, bearings ref. 36.

REVERSE-GEAR UNIT REASSEMBLY

⚠ **Disassembly and assembly of the gearbox or of its parts is to be made by specialized technicians only.**

- *Output shaft unit assembly:* orderly assemble, starting from the end opposite the output flange, spacer ref. 8, bush ref. 29, bearing ref. 35, gear ref. 24, spacer ref. 8, bearing ref. 55, nut ref. 19 (torque wrench setting 125 Nm). Tighten the stop nut in the appropriate place on the shaft. Insert clutch unit ref. 22 and moving toward the output flange end, assemble, in sequence, the following parts: ref. 8, 29, 35, 25, 8, 54.
- *Intermediate shaft assembly:* assemble bearings ref. 36, gear ref. 23 and spacer ref. 9.
- *Input shaft assembly:* the gears are enbloc with the shaft; therefore it is necessary only to assemble the two ball bearings ref. 38 and 37.
- *Shafts assembly on cover:* place cover ref. 1, with the bearing seat upward, on a horizontal surface with a hole which allows the protuding part of shaft ref. 12. Place the assembled input shaft, insert the assembled intermediate shaft. Insert the assembled output shaft. Insert pins ref. 46. Assembled the cup of bearing ref. 55 on the box ref. 4, insert sealing paste into the connecting surface between the cox and the cover and close by tightening screws ref. 47. Insert the washer ref. 7 tightening the screw ref. 50 to 29 Nm. Place the cover ref. 5 inserting sealing paste on the contact surface, screw the fixing bolts ref. 48. Bearing ref. 54 and 55 are to be adjusted with a pre-load of 0,05 mm to 0,10 mm. Shims must be inserted between bearing ref. 55 and cover ref. 2. Insert sealing paste between cover ref. 2 and 4 and close by tightening screw ref. 51. Assemble oil seals ref. 33. Insert flange ref. 26 on the output shaft spiine tighten the screw ref. 19 to torque of 125 Nm.
- *Drive unit assembly:* upon positioning spring ref. 10 on the stem of guide shoe ref. 21, insert it into the hole of drive shaft ref. 13. Guide shoe ref. 21 must be positioned with its beveled side upward (behind the v-shaped surface touching the clutch-unit). Insert the complete drive unit assembly (cover ref. 3, shaft ref. 13, spring ref. 10, guide shoe ref. 21) into the reverse-gear unit box making sure to maintain the guide shoe position described above and to avoid dropping the guide into the casing. Fasten both bolts ref. 56 and assemble control level ref. 18 fastening it by means of screw ref. 49.
- *Clutch control unit adjustment:* with the operating lever ref. 18 in neutral position, turn by hand the output flange ref. 26 and, at the same time, screw the adjusting screw ref. 28 with an alien wrench (4 mm) until the output flange rotation gets hard on a small arc only. Unscrew of 3/4 of turn the adjusting screw and fix it by locking the nut ref. 57.

TMC 40 P – Dimensioni – Dimensions – Dimensions



- (A) - Sfiato - Oil breather plug - Reniflard
- (B) - Tappo carico olio - Filling plug - Bouchon de remplissage
- (C) - Asta livello olio - Oil dipstick - Bouchon de niveau
- (D) - Fori per staffa telecomando - Holes for control cables bracket - Trous pour bride télécommande
- (E) - Tappo scarico olio - Oil drain plug - Bouchon de vidange

Caratteristiche tecniche – Technical data – Caracteristiques techniques

RAPP. M.AVANTI * FORWARD RATIO * RAP. M. AVANT *	POTENZA MAX MOTORE - INPUT RATINGS - PUISSANCE MAXI MOTEUR KW					
	DIPORTO - PLEASURE - PLAISANCE		INTERMEDIO-INTERMEDIATE-INTERMEDIAIRE		CONTINUO - CONTINUOUS - CONTINU	
	3000 RPM	3600 RPM	2800 RPM	3000 RPM	1800 RPM	2300 RPM
1,45	26	26	26	26	18	23
2,00	26	26	21	24	13	17
2,60	22	26	17	19	9	12

Velocità massima motore - Max engine speed - Vitesse maxi moteur: 4500 Rpm
Potenza massima motore - Max engine power - Puissance maxi moteur: 26 Kw
Potenza massima in retromarcia limitata al 33% della potenza del motore - Max power in reverse: 33% of listed ratings - Puissance maxi en marche arriere limiteè au 33% de la puissance du moteur
* Rapporto in retromarcia - Reverse ratio - Rapport marche arriere: 2,13
Peso a secco - Dry weight - Poids sans huile: 8,8 Kg
Quantità olio - Oil quantity - Quantité d'huile: 0,20 L.
Tipo di olio - Oil type - Type d'huile: ATF

Per la definizione dei tipi di servizio vedere "Tabelle di Potenza"
Duty classification definition: see "Marine Transmissions Capacity Table"
Definition du type de service: voire "Tableau des puissances"

RICAMBI
Per ordinare i ricambi specificare il tipo di invertitore, il numero di serie, il rapporto, il numero di riferimento del disegno, la quantità.

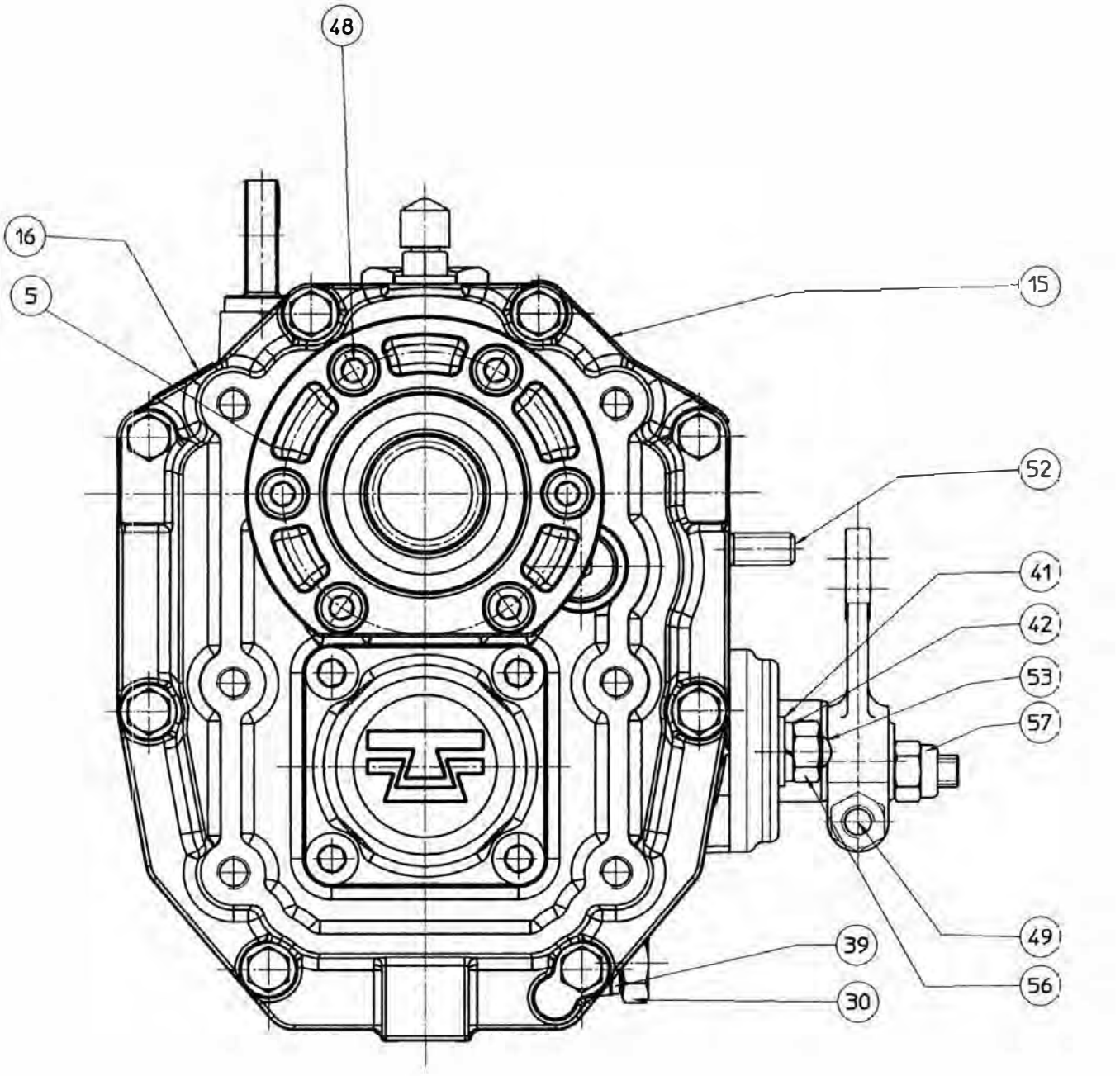
SPARE PARTS
When ordering spare parts specify the gearbox model, the serial number, ratio, reference number indicated on the drawing and desired quantity.

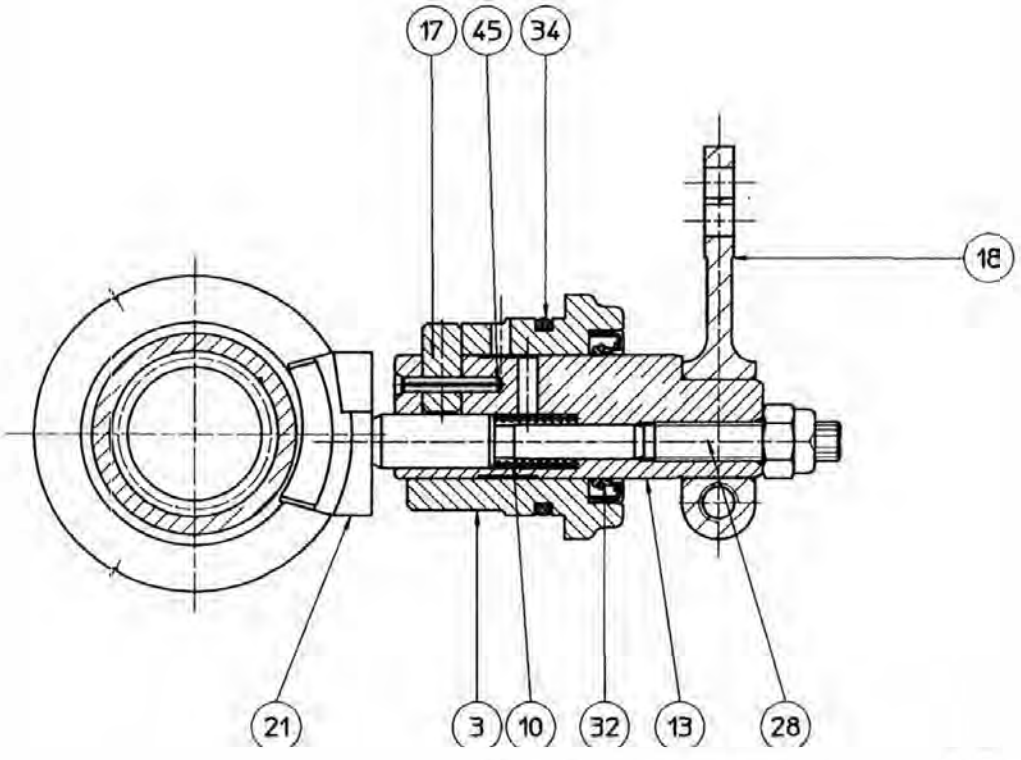
PIÉCES DÉTACHÉES
Pour la commande de pièces détachées, veuillez spécifier le type de l'inverseur, le numéro de série, le rapport, le numéro de rep, du plan ainsi que la quantité.

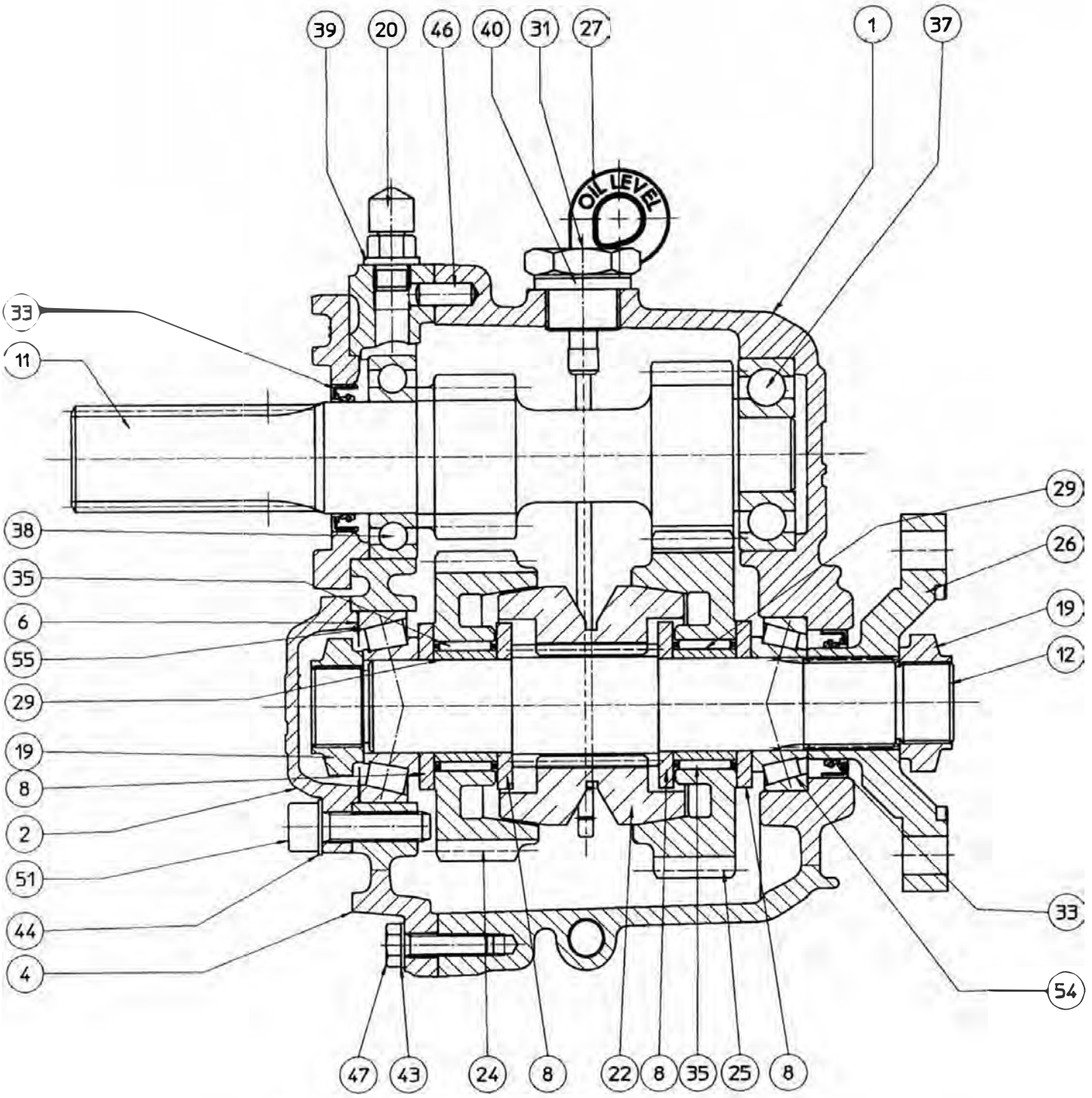
ERSATZEILE
Zum Bestellen von Ersatzteilen den Typ des Wendegetriebes, die Fabriknummer, die Untersetzung, die Bezugsnummer der Zeichnung und die Menge angeben.

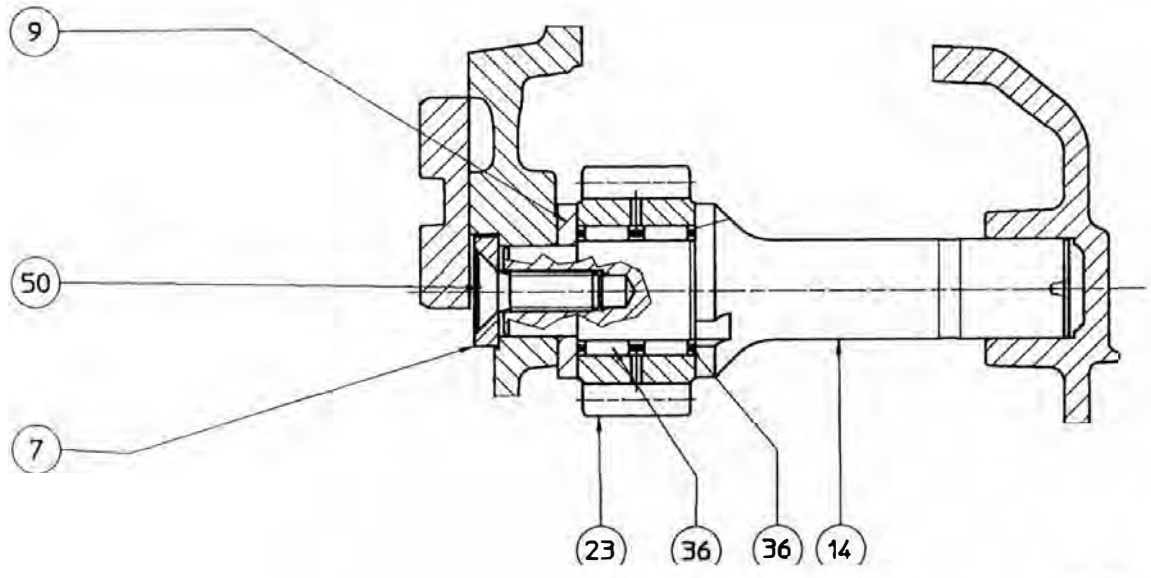
REPUESTOS
Para pedir los repuestos hay que especificar el tipo de inversor, el nùmero de serie, la relaciòn (ratio), el nùmero de referencia del dibujo y la cantidad.

Rif. Ref.	Denominazione Denomination	Quantità Quantity	Codice Code	Rif. Ref.	Denominazione Denomination	Quantità Quantity	Codice Code
57	Dado - Nut	1	4634008	25	Ingranaggio r. 1,45 - Gear r. 1,45	1	2061553
56	Dado - Nut	2	4632008	25	Ingranaggio r. 2,00 - Gear r. 2,00	1	2061554
55	Cuscinetto - Bearing	1	4622020	25	Ingranaggio r. 2,60 - Gear r. 2,60	1	2061555
54	Cuscinetto - Bearing	1	4622015	24	Ingranaggio - Gear	1	2061553
53	Prigioniero - Stud	2	4617067	23	Ingranaggio di rinvio - Gear	1	2061263
52	Prigioniero - Stud	2	4617062	22	Corpo frizione - Clutch	1	2056129
51	Vite - Screw	4	4615220	21	Pattino di comando - Pad	1	2056022
50	Vite - Screw	1	4615216	20	Tappo di sfiato - Breather	2	2055032
49	Vite - Screw	1	4615214	19	Dado fissaggio flangia - Nut	1	2038027
48	Vite - Screw	6	4615142	18	Leva di comando - Lever	1	2037036
47	Vite - Screw	8	4615141	17	Perno forato - Dower pin	1	2035054
46	Spina - Dowel pin	2	4614006	16	Targhetta OLIO ATF - ATF OIL plate	1	2028012
45	Spina - Dowel pin	1	4613034	15	Targhetta - Name plate	1	2028008
44	Rosetta - Washer	4	4611208	14	Albero di rinvio - Intermediate shaft	1	2021539
43	Rosetta - Washer	8	4611206	13	Albero di comando - Shaft	1	2021419
42	Rosetta - Washer	2	4611108	12	Albero secondario - Output shaft	1	2021417
41	Rosetta - Washer	2	4610008	11	Albero primario r. 1,45 - Input shaft r. 1,45	1	2021414
40	Rosetta - Washer	1	4609021	11	Albero primario r. 1,45 AC - Input shaft r. 1,45 AC	1	2021437
39	Rosetta - Washer	2	4609011	11	Albero primario r. 2,00 - Input shaft r. 2,00	1	2021415
38	Cuscinetto - Bearing	1	4605162	11	Albero primario r. 2,00 AC - Input shaft r. 2,00 AC	1	2021438
37	Cuscinetto - Bearing	1	4605137	11	Albero primario r. 2,60 - Input shaft r. 2,60	1	2021416
36	Gabbia a rullini - Bearing	2	4604053	11	Albero primario r. 2,60 AC - Input shaft r. 2,60 AC	1	2021439
35	Gabbia a rullini - Bearing	2	4604038	10	Molla - Spring	1	2020068
34	Guarnizione - OR - "O" Ring	1	4598135	09	Rasamento - Spacer	4	2016032
33	Anello di tenuta - Oil seal	2	4595101	08	Rasamento - Spacer	1	2016024
32	Anello di tenuta - Oil seal	1	4595083	07	Rosetta di fermo - Washer	2	2014088
31	Tappo - Plung	1	4588040	06	Spessore di registro - Shim	1	2013262
30	Tappo - Plung	1	4588030	05	Coperchio - Cover plate	1	2010358
29	Anello interno - Cage	2	4584020	04	Coperchio - Cover plate	1	2010357
28	Vite - Screw	1	4581017	03	Coperchio - Cover plate	1	2010265
27	Asta livello olio - Gauge	1	2071024	02	Coperchietto - Cover plate	1	2010264
26	Flangia di uscita - Output flange	1	2062219	01	Scatola - Housing	1	2009159


48
16
5
15
52
41
42
53
57
49
39
56
30


17
45
34
18
21
3
10
32
13
28


39
20
46
40
31
27
1
37
OIL LEVEL
33
11
38
35
6
55
29
19
8
2
51
44
4
29
26
19
12
33
54
47
43
24
8
22
8
35
25
8


9
50
7
23
36
36
14

The mechanical gears TMC40 and TMC60 have since the end of the year 2000, suffix "M" added to the type codes.

These mechanical gears with suffix "M" have an improved clutch mechanism with a less steeper thread on the secondary shaft and new type of friction material on the cones. This results in a much smoother shifting with dramatically less impact.

Gears with this new friction material, however, needs to be lubricated with ATF-transmission fluid, instead of the formerly used engine lubricating SAE oil.

The complete clutch units can be replaced also in the older gears while changing the oil into ATF.

Technodrive TMC-cone change & recommended oil types

TMC 40

Cone item code no. 2056098 : from serial no. 40004 up to 121583 – normal engine oil *
Cone item code no. 2056129 : from serial no. 121587 (06/12/2000) – ATF-oil

On the identification plate:	**TMC40**	**= normal engine oil ***
	TMC40M	**= ATF-oil**
	TMC40P	**= ATF-oil (high pressure die casting)**

TMC 60

Cone item code no. 2056092 (9 grooves)	**: from serial no. 60116 up to 602441**	**– normal engine lube oil***
Cone item code no. 2056113 (12 grooves)	**: from serial no. 602442 up to 119384**	**– normal engine lube oil***
Cone item code no. 2056128	**: from serial no. 119661 (01/09/2000)**	**– ATF-oil**

On the identification plate:	**TMC60**	**= normal engine lube oil ***
	TMC60M	**= ATF-oil**
	TMC60E	**= ATF-oil (helical gears)**
	TMC60P	**= ATF-oil (helical gears & high pressure die casting)**
	TMC60A	**= ATF-oil (down angled output shaft, helical gears & high pressure die casting)**

TMC 260

Cone item code no. 2056127 - ATF-oil right from the start.

All Hydraulic TM Gearboxes : API CD SAE 20W40 oil

***Normal engine lubrification oil: 20W30 or 15W40, 20W40, 20W50 et cetera.**

Revision date: July 13th, 2016