



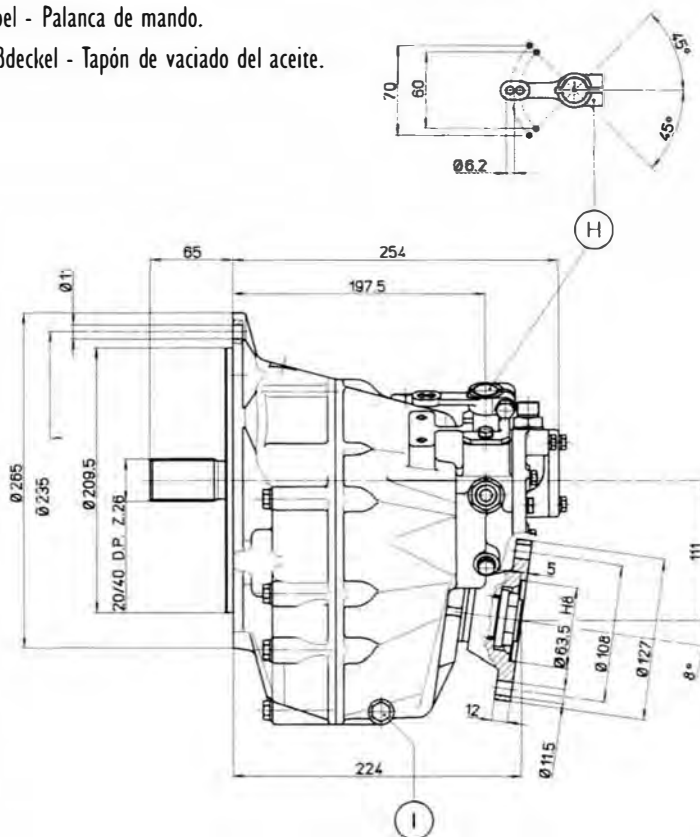
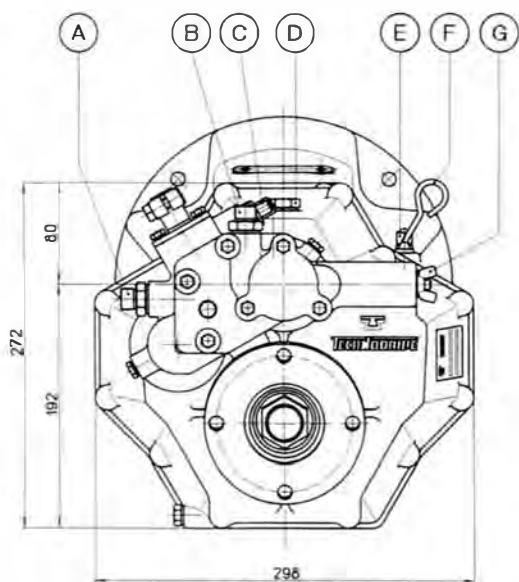
# **TM345A**

## **Service Manual**



# TM 345A - Dimensioni - Dimensions - Dimensions - Abmessungen - Medidas

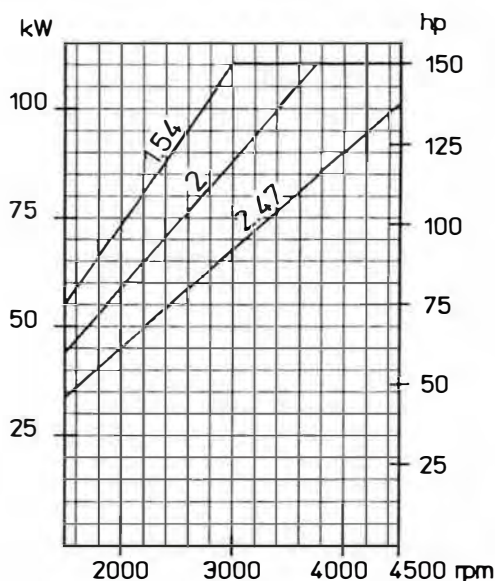
- A** - Ritorno olio da scambiatore - Oil from cooler - Retour huile de l'échangeur - Ölrücklauf vom Kühler - Regreso del aceite del intercambiador (3/8"Gas).
- B** - Mandata olio allo scambiatore - Oil to cooler - Refoulement huile ou échangeur - Ölzufluß zum Kühler - Impulsión del aceite al intercambiador (3/8"Gas).
- C** - Indicatore di folle - Neutral indicator - Indicateur point mort - Leerlauf Anzeiger - Neutral indicator.
- D** - Tappo carico olio - Filling plug - Bouchon de remplissage - Einfülldeckel Öl - Tapón de llenado del aceite.
- E** - Tappo di sfiato - Oil breather plug - Reniflard - Entlüftungsdeckel - Tapón de purga.
- F** - Asta livello olio - Oil dipstick - Bouchon de niveau - Ölmeßstab - Varilla del nivel del aceite.
- G** - Filtro olio - Oil filter - Filtre de l'huile - Ölfilter - Filtro del aceite.
- H** - Leva comando - Actuating lever - Levier de commande - Steuerhebel - Palanca de mando.
- I** - Tappo scarico olio - Oil drain plug - Bouchon de vidange - Ölablaßdeckel - Tapón de vaciado del aceite.



## Caratteristiche tecniche Technical data Caractéristiques techniques Technische Daten Características Técnicas

Rapporto-Ratio-Rapport-Untersetzung-Relation		1.54	2.00	2.47
Coppia max - Diporto Max torque - Pleasure Couple maxi - Plaisance Max Drehmoment - Vergnügungsboot Par max - Recreo	Nm	345	280	210
Coppia max - Lavoro Max torque - Continuous Couple maxi - Continu Max Drehmoment - Arbeit Par max - Servicio	Nm	215	215	160
Velocità max entrata Max input speed Vitesse maxi à l'entrée Max Eingangsgeschwindigkeit Velocidad max a la entrada		4500 RPM		
Peso a secco Weight without oil Poids sans huile Gewicht ohne öl Peso sin aceite		25 Kg.		

## Diagramma di potenza (diporto) Power curve (pleasure) Diagramme de puissance (plaisance) Leistungskurve (Vergnügungsboot) Diagrama de potencia (recreo)



## OPERATING PROCEDURE

- In forward speed motion is transmitted by means of the clutch unit mounted on the input shaft.
- In forward speed, the rotating direction of the marine gear output flange is opposite to engine direction.
- In reverse speed, motion transmission is achieved by means of a clutch unit mounted on the intermediate shaft.
- Clutches are driven by the oil pressure raised by a pump controlled by the intermediate shaft and are able to transmit full power both in forward and in reverse speed.
- The reduction ratio is the same in forward as well as in reverse speed.

## INSTALLATION

- TM 345 - TM 345A marine gear can be connected to engine rotating counterclockwise (as seen from the flywheel side) only.
- Before connecting the marine gear output flange to the propeller axle, it is necessary to make sure that its misalignment does not exceed 0,05 mm.
- The remote control must be connected so that the control lever can rotate completely from the forward speed position to the reverse speed position and a correct neutral position can be ensured. From the neutral position, forward speed is achieved by rotating the control lever counterclockwise.
- The heat exchanger connection is achieved as shown in fig. I.
- The marine gear is supplied without oil; therefore, before starting it, fill it up to the maximum level marked on the dipstick; then start the engine to allow the piping system to fill up and check the oil level again.



**Make sure 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 well positioned in neutral.**

## USE

- The engagement of forward speed and reverse speed and the shifting to neutral position must be carried out while the engine is running at minimum speed.



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



**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 damaged.**

## MAINTENANCE

- Check oil level daily.
- Change the oil for the first time after 50 working hours; afterwards, replace the oil after 1000 working hours (or, at the longest, every 12 months).
- Whenever the oil is replaced, clean the filter (ref. 65).
- Clutches require no adjustment.



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

## LUBRICATION

- Use class CD (API service classification) oil SAE 20 W 40.
- Oil quantity for the marine gear with standard cooler: 1,6 l.
- Max oil temperature: 90° C.
- Oil pressure measured at 1000 RPM engine speed, oil temperature 60° C, is to be between 13 and 15 bar. Pressure gauge connections M8x1 are placed, refer to fig. I, on L (forward) and M (reverse).

# Schema applicazione scambiatore - Attacchi manometri

## Exchanger application diagram - Pressure gauge connections

### Schema d'applicazione de l'échangeur - Fixations des manometres

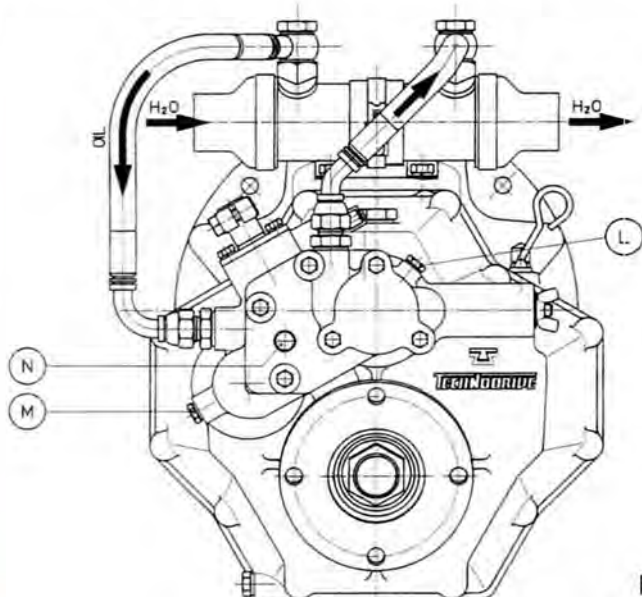


FIG. I

- L** - Pressione marcia avanti (M8x1)  
Forward pressure (M8x1)  
Pression marche-avant (M8x1)
- M** - Pressione marcia indietro (M8x1)  
Reverse pressure (M8x1)  
Pression marche-arrière (M8x1)
- N** - Pressione lubrificazione (M8x1)  
Lubrication pressure (M8x1)  
Pression lubrification (M8x1)

GUASTO - FAILURE - DEFAULT	CAUSA - CAUSE - CAUSE	RIMEDIO - SOLUTION - REMEDE
<ul style="list-style-type: none"> <li>- Pressione olio troppo bassa</li> <li>- Pressione olio troppo alta</li> <li>- Surriscaldamento</li> </ul>	<ul style="list-style-type: none"> <li>- Valvola regolatrice sporca (74)</li> <li>- Livello olio troppo basso</li> <li>- Pompa olio guasta</li> <li>- Anelli di tenuta sugli alberi frizione rotti (21)</li> <li>- Valvola regolatrice sporca (74)</li> <li>- Livello olio eccessivo</li> <li>- Portata acqua di raffreddamento insufficiente</li> <li>- Scambiatore sporco o intasato</li> <li>- La frizione slitta.</li> <li>- Eccessivo carico sull'invertitore</li> <li>- Precarico sui cuscinetti non corretto</li> <li>- Cuscinetto danneggiato</li> </ul>	<ul style="list-style-type: none"> <li>- Smontare valvola e pulire</li> <li>- Ripristinare livello</li> <li>- Sostituire pompa</li> <li>- Smontare e sostituire</li> <li>- Smontare valvola e pulire</li> <li>- Portare olio al livello prescritto</li> <li>- Portare al giusto valore</li> <li>- Smontare e pulire</li> <li>- Verificare la pressione dell'olio nel circuito di comando. Se la pressione è troppo bassa regolarsi come detto. Se la pressione è normale occorre smontare e sostituire i dischi frizione.</li> <li>- Ridurre la potenza del propulsore</li> <li>- Ripristinare precarico alberi (max 0,07 - min. 0,10)</li> <li>- Sostituire il cuscinetto</li> </ul>
<ul style="list-style-type: none"> <li>- Too low oil pressure</li> <li>- Too high oil pressure</li> <li>- Overheating</li> </ul>	<ul style="list-style-type: none"> <li>- Dirty bypass valve (74)</li> <li>- Too low oil level</li> <li>- Failure in oil pump</li> <li>- Broken O rings on clutch shaft (21)</li> <li>- Dirty bypass valve (74)</li> <li>- Excessive oil level</li> <li>- Insufficient cooling water intake</li> <li>- Dirty or clogged exchanger</li> <li>- Clutch slipping</li> <li>- Exchanger overload</li> <li>- Incorrect bearing preloading</li> <li>- Damaged bearing</li> </ul>	<ul style="list-style-type: none"> <li>- Remove valve and clean it</li> <li>- Restore oil level</li> <li>- Replace pump</li> <li>- Remove and replace them</li> <li>- Remove valve and clean it</li> <li>- Bring oil down to required level</li> <li>- Bring up to correct quantity</li> <li>- Remove and clean</li> <li>- Check oil pressure in the transmission circuit. If the pressure is too low, proceed as indicated above. If pressure is normal, remove and replace clutch plates.</li> <li>- Reduce propulsor power</li> <li>- Reset shaft preloading (max 0.07 - min 0.10)</li> <li>- Replace bearing</li> </ul>
<ul style="list-style-type: none"> <li>- Pression d'huile trop basse</li> <li>- Pression d'huile trop haute</li> <li>- Surchauffe</li> </ul>	<ul style="list-style-type: none"> <li>- Vanne de réglage sale (74)</li> <li>- Niveau d'huile insuffisant</li> <li>- Pompe à huile en panne</li> <li>- Cassure des bagues d'étanchéité sur axes embrayage (21)</li> <li>- Vanne de régulation sale (74)</li> <li>- Niveau d'huile excessif</li> <li>- Débit d'eau de refroidissement insuffisant</li> <li>- Exchangeur sale ou bouché</li> <li>- L'embrayage glisse</li> <li>- Charge excessive sur l'inverseur</li> <li>- Mauvaise pré-charge sur roulements</li> <li>- Roulement endommagé</li> </ul>	<ul style="list-style-type: none"> <li>- Démonter la vanne et nettoyer</li> <li>- Rétablir le niveau</li> <li>- Remplacer la pompe</li> <li>- Démonter et remplacer</li> <li>- Démonter la vanne et nettoyer</li> <li>- Amener l'huile au niveau indiqué</li> <li>- Amener à la bonne valeur</li> <li>- Démonter et nettoyer</li> <li>- Vérifier la pression de l'huile dans le circuit de commande. Si la pression est trop basse, procéder de la façon indiquée. Si la pression est normale, il faut démonter et remplacer les disques d'embrayage.</li> <li>- Réduire la puissance du propulseur.</li> <li>- Rétablir la pré-charge des axes (max. 0.07 - min. 0.10)</li> <li>- Remplacer le roulement.</li> </ul>



# Anbringungsplan für Kühler - Manometeranschlüsse

## Esquema de montaje del intercambiador - Conexiones de los manómetros

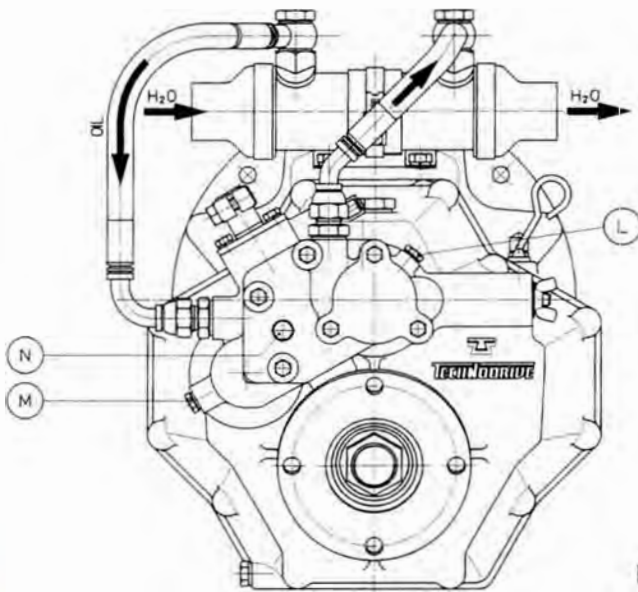


FIG. 1

- L** - Druck Vorwärtsgang (M8x1)  
Presión marcha adelante (M8x1)
- M** - Druck Rückwärtsgang (M8x1)  
Presión marcha atrás (M8x1)
- N** - Schmierdruck (M8x1)  
Presión lubricación (M8x1)

DEFEKT - AVERÍA	URSACHE - CAUSA	ABHILFE - SOLUCIÓN
<ul style="list-style-type: none"> <li>- Öldruck zu niedrig</li> <li>- Öldruck zu hoch</li> <li>- Überhitzung</li> </ul>	<ul style="list-style-type: none"> <li>- Regulierungsventil (74) verschmutzt</li> <li>- Ölstand zu niedrig</li> <li>- Ölpumpe defekt</li> <li>- Dichtungsringe auf der Kupplungswelle gebrochen (21)</li> <li>- Regulierungsventil (74) verschmutzt</li> <li>- Ölstand zu hoch</li> <li>- Kühlwasserumlauf nicht ausreichend</li> <li>- Kühler verschmutzt oder verstopft</li> <li>- Kupplung rutscht</li> <li>- Zu hohe Belastung auf dem Wendegetriebe</li> <li>- Vorladung auf den Lagern nicht korrekt</li> <li>- Lager beschädigt</li> </ul>	<ul style="list-style-type: none"> <li>- Ventil ausbauen und reinigen</li> <li>- Öl nachfüllen</li> <li>- Pumpe auswechseln</li> <li>- Ausbauen und auswechseln</li> <li>- Ventil ausbauen und reinigen</li> <li>- Ölstand auf den vorgeschriebenen Wert bringen</li> <li>- Auf den richtigen Wert bringen</li> <li>- Ausbauen und reinigen</li> <li>- Den Öldruck im Steuerkreislauf überprüfen. Wenn der Druck zu niedrig ist, einstellen wie beschrieben. Wenn der Druck normal ist, müssen die Kupplungsscheiben ausgebaut und ersetzt werden.</li> <li>- Die Antriebsleistung vermindern</li> <li>- Die Vorladung der Wellen korrigieren (max. 0.08 - min. 0.02)</li> <li>- Das Lager auswechseln</li> </ul>
<ul style="list-style-type: none"> <li>- Presión del aceite demasiado baja.</li> <li>- Presión del aceite demasiado alta.</li> <li>- Sobre calentamiento.</li> </ul>	<ul style="list-style-type: none"> <li>- Válvula de regulación sucia (74).</li> <li>- Nivel del aceite demasiado bajo.</li> <li>- Bomba del aceite estropeada.</li> <li>- Anillos de estanqueidad rotos en los ejes del embrague (21).</li> <li>- Válvula de regulación sucia (74).</li> <li>- Excesivo nivel de aceite.</li> <li>- Insuficiente caudal del agua de refrigeración.</li> <li>- Intercambiador sucio u obstruido.</li> <li>- El embrague patina.</li> <li>- Carga excesiva en el inversor.</li> <li>- Precarga incorrecta en los cojinetes.</li> <li>- Cojinete estropeado.</li> </ul>	<ul style="list-style-type: none"> <li>- Desmonten la válvula y límpiela.</li> <li>- Restablezcan el nivel.</li> <li>- Cambien la bomba.</li> <li>- Desmontenlos y cámbienlos.</li> <li>- Desmontenla y límpiela.</li> <li>- Restablezcan el nivel del aceite prescrito.</li> <li>- Ponganlo al nivel adecuado.</li> <li>- Desmóntenlo y límpielo.</li> <li>- Comprueben la presión del aceite en el circuito de mando. Si la presión es demasiado baja hagan lo que hemos indicado. Si la presión es normal desmonten los discos de embrague y cámbienlos.</li> <li>- Reduzcan la potencia del propulsor.</li> <li>- Restablezcan la precarga de los ejes (máx. 0.08 - min. 0.02).</li> <li>- Cambien el cojinete.</li> </ul>

**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.

**PIÈCES D'ETACHÉES**

Pour la commande de pièces d'etachées, veuillez spécifier le type de l'inverseur, le numéro de série, le rapport, le numero de rep. de la plan ainsi que la quantité.

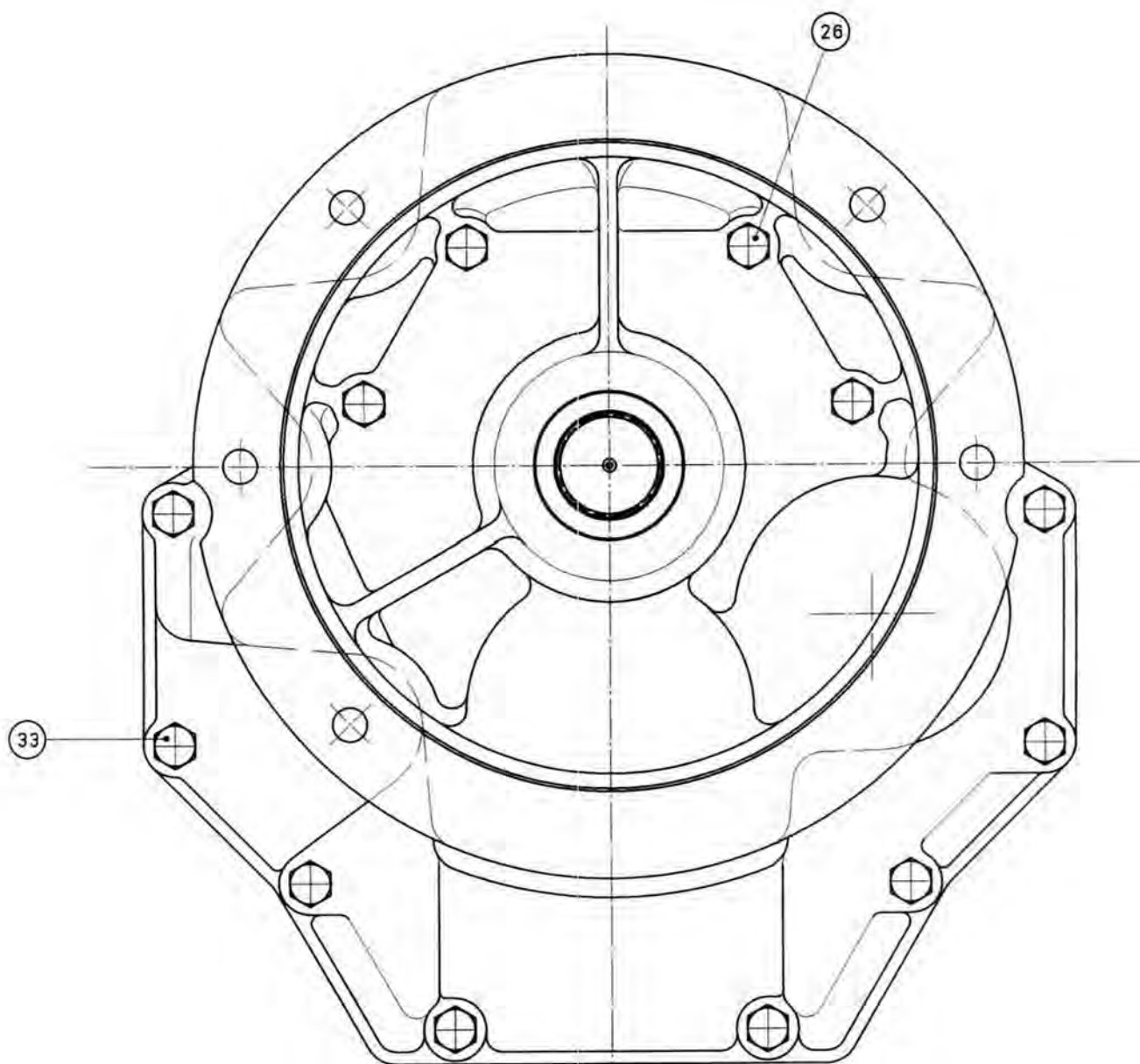
**ERSATZTEILE**

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

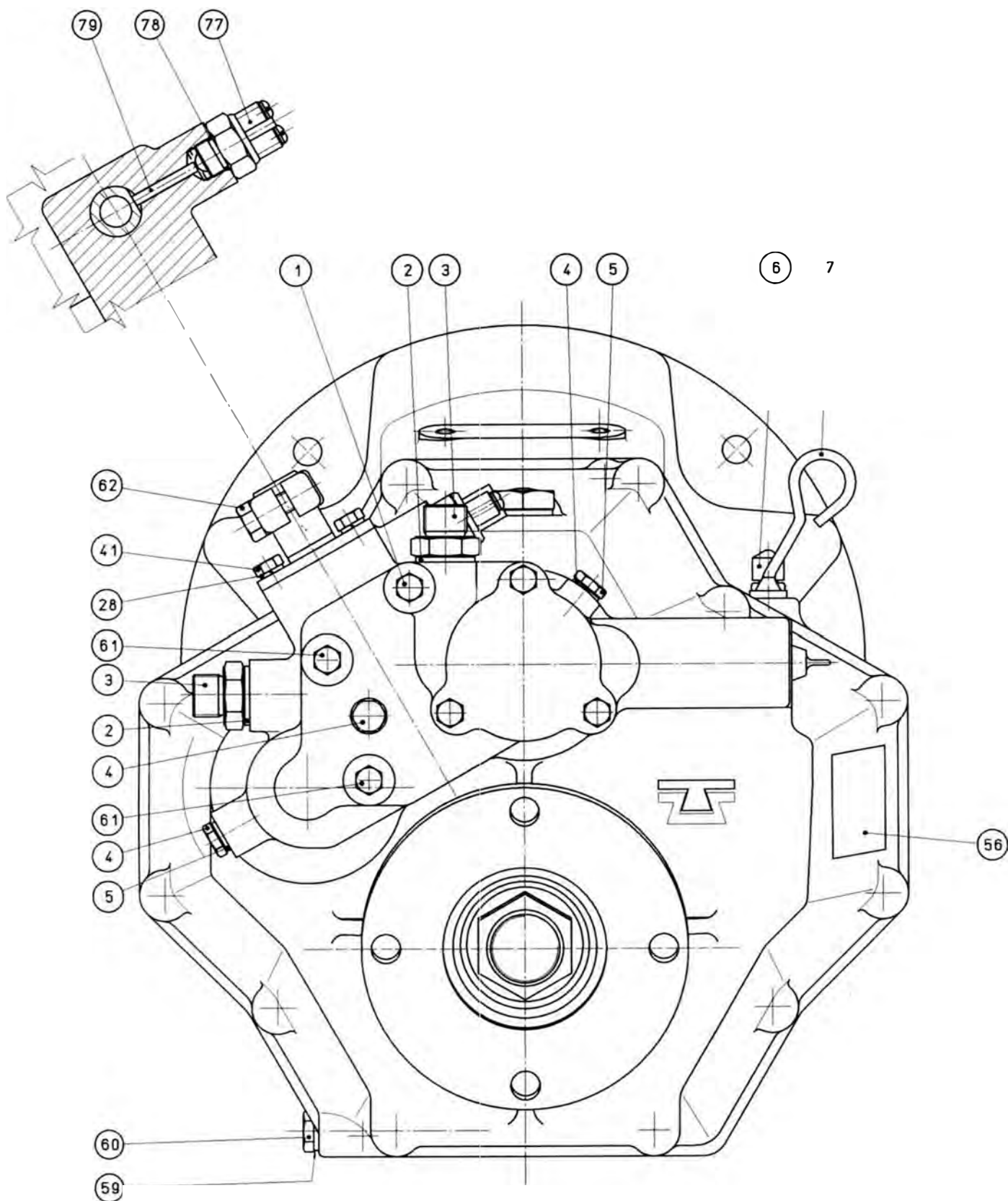
**REPUESTOS**

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

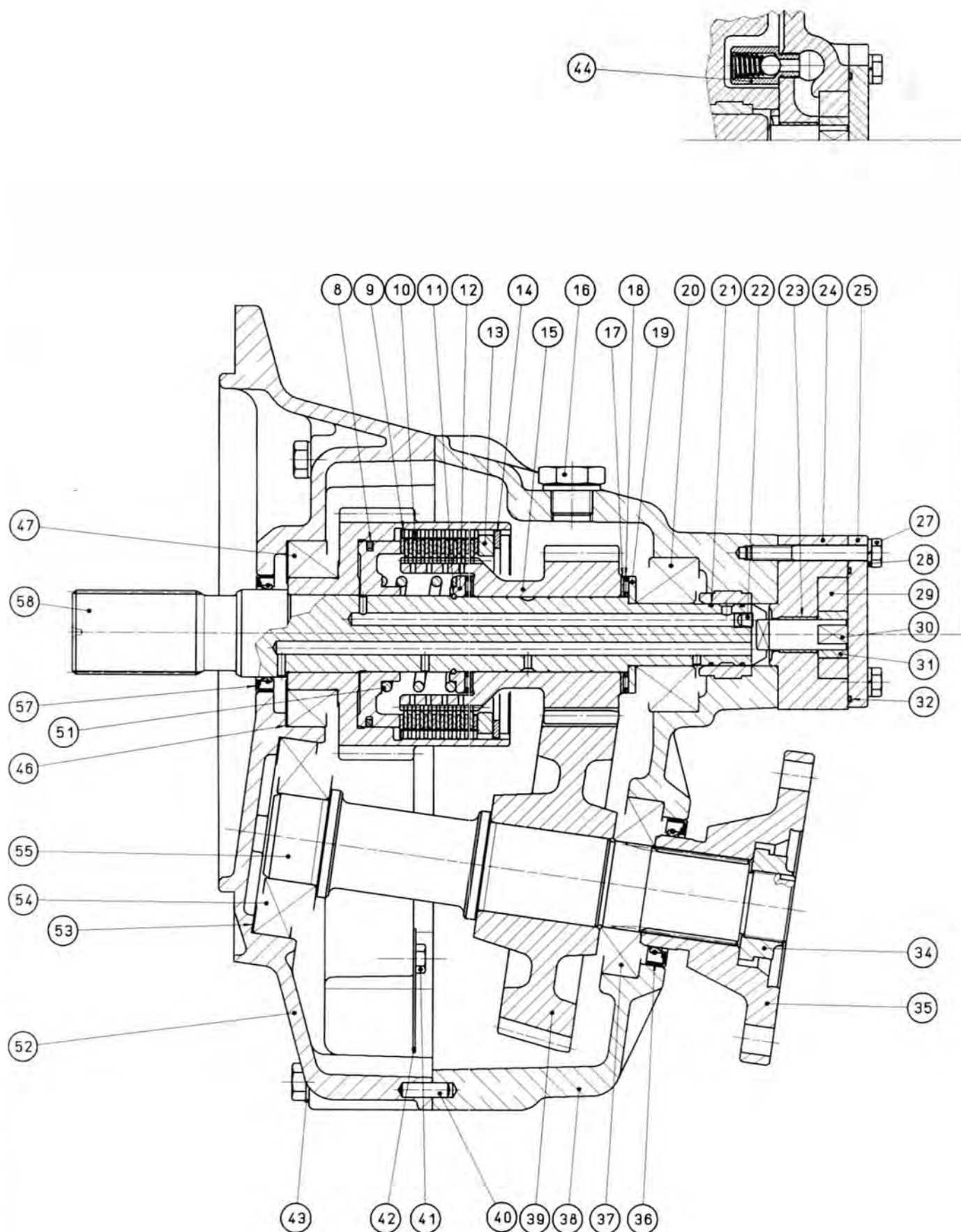
Rif. Ref	Denominazione Denomination	Quantità Quantity	Codice Code	Rif. Ref	Denominazione Denomination	Quantità Quantity	Codice Code
1	Vite T.E. - Screw hex.	1	4615149	39	Corona - Gear r. 1,54	TM 345A	2061596
2	Rosetta di rame - Washer	3	4609029	39	Corona - Gear r. 2,00		2061597
3	Nipple 3-8 - Nipple	2	4624007	39	Corona - Gear r. 2,47		2061598
4	Tappo - Plug	3	4588028	40	Spina - Dowel pin		4614007
5	Rosetta di rame - Washer	3	4609009	41	Vite T.E. - Screw hex.		4615134
6	Tappo di sfiato - Breather	1	2055032	42	Paratia - Bulkhead		2026009
7	Asta livello olio - Gauge	1	2070167	43	Rosetta ondulata - Washer		4611208
8	Fascia elastica - Seal ring	2	2024016	44	Valvola by pass - By pass valve		1036002
9	Disco frizione conduttore-Clutch plate	20	2022058	45	Pignone - Gear r. 1,54	TM 345	2061613
10	Disco frizione condotto - Steel plate	18	2022052	45	Pignone - Gear r. 2,00		2061614
11	Anello di fermo - Ring	2	2054028	45	Pignone - Gear r. 2,47		2061615
12	Rasamento - Ring	2	2016030	45	Pignone - Gear r. 1,54	TM 345A	2061593
13	Distanziale - Spacer	2	2013637	45	Pignone - Gear r. 2,00		2061594
14	Seeger- Seeger	2	4601080	45	Pignone - Gear r. 2,47		2061595
15	Pignone - Gear r. 1,54	TM 345	2061613	46	Spessore di registro - Shim		2013624
15	Pignone - Gear r. 2,00		2061614	47	Cuscinetto - Bearing		4622060
15	Pignone - Gear r. 2,47		2061615	48	Pistone - Piston		2017015
15	Pignone - Gear r. 1,54	TM 345A	2061590	49	Albero di rinvio - Intermediate shaft		2021476
15	Pignone - Gear r. 2,00		2061591	50	Campana frizione - Clutch housing		2061589
15	Pignone - Gear r. 2,47		2061592	51	Molla - Spring		2020082
16	Tappo 3-8 Gas - Plug	1	4588108	52	Coperchio - Cover	TM 345	2010295
17	Ralla - Thrust block	4	4603025	52	Coperchio - Cover	TM 345A	2010278
18	Gabbia a rullini - Needle bearing	4	4607016	53	Spessore - Shim		2013189
19	Rasamento - Shim	2	2016029	54	Cuscinetto - Bearing		4622047
20	Cuscinetto - Bearing	2	4622025	55	Albero secondario - Output shaft		2021478
21	Fascia elastica - Seal ring	4	2024015	56	Targhetta - Plate		2028008
22	Tappo conico - Plug	2	4588006	57	Anello di tenuta - Oil seal		4596111
23	Kit pompa olio Oil pump kit	1	1009034	58	Albero primario - Input shaft		2021559
24				59	Rosetta di rame - Washer		4609011
25				60	Tappo scarico olio - Drain plug		4588030
26				61	Vite T.E. - Screw hex		4615141
27				62	Vite T.E. - Screw hex		4615214
28				63	Guarnizione OR - "O" ring		4598016
29				64	Tubo di aspirazione - Tube		2042077
30				65	Filtro olio - Oil filter		2056039
31				66	Perno di chiusura - Pin		2035062
32				67	Guarnizione OR - "O" ring		4598148
32				68	Distanziale - Spacer		2014099
32				69	Dado - Nut		4633025
33	Vite T.E. - Screw hex.	1	4615234	70	Molla - Spring		2020084
34	Dado - Nut	1	2038024	71	Leva di comando - Lever		2037036
35	Flangia uscita-Output flange	TM 345	2062262	72	Piastrina di fermo - Plate		2054024
35	Flangia uscita-Output flange	TM 345A	2062249	73	Stelo distributore - Selector valve		2056115
36	Anello di tenuta - Oil seal	1	4596153	74	Valvola - Valve		2069002
37	Cuscinetto - Bearing	1	4622041	75	Molla - Spring		2020083
38	Scatola - Housing	TM 345	2009105	76	Grano - Dowel		4583004
38	Scatola - Housing	TM 345A	2009091	77	Interruttore - Switch		4639001
39	Corona - Gear r. 1,54	TM 345	2061616	78	Guarnizione or - O ring		4598070
39	Corona - Gear r. 2,00		2061617	79	Rullino cilindrico - Needle		4627007
39	Corona - Gear r. 2,47		2061618	/	/	/	/



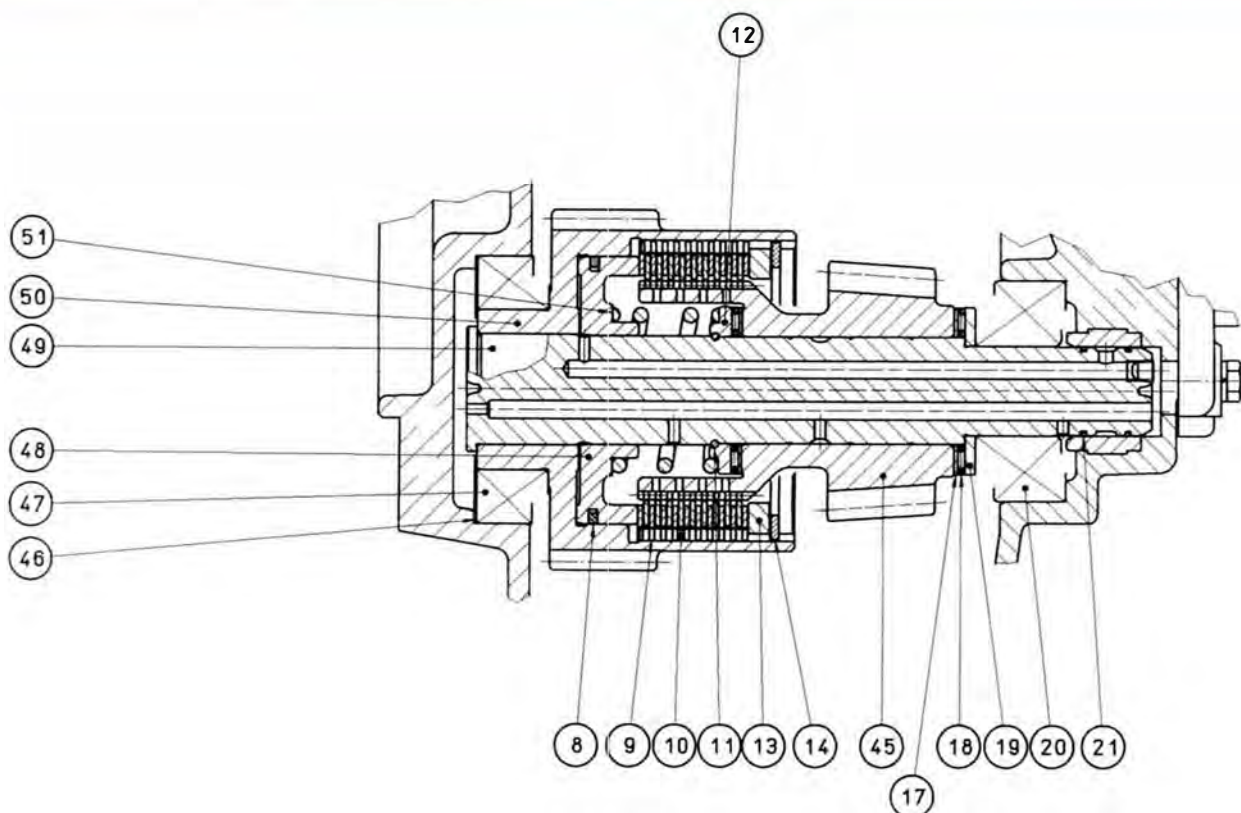




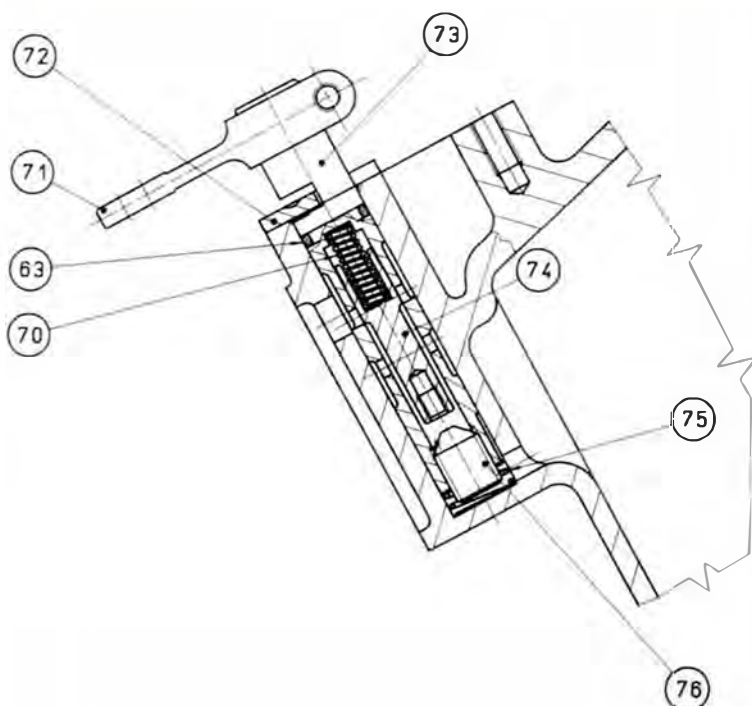




# ALBERO DI RINVIO - INTERMEDIATE SHAFT - ARBRE DE RENVOI - VORGELEGEWELLE - CONTRAEJE



## SELETORE - SELECTOR VALVE - SÉLECTEUR - VORWAHL - SELECTOR



## FILTRO OLIO - OIL FILTER - FILTRE - ÖLFILTER - FILTRO DE ACEITE

