CTM 360-0496

TECHNODRIVE S.p.A.

service manual

TM 360

allpa
marine equipment

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allpa
marine equipment

SCHEMA DI FUNZIONAMENTO: MARCIA AVANTI - KINEMATIC DIAGRAM: FORWARD SPEED
SCHEMA DE FONCTIONNEMENT: MARCHE-AVANT

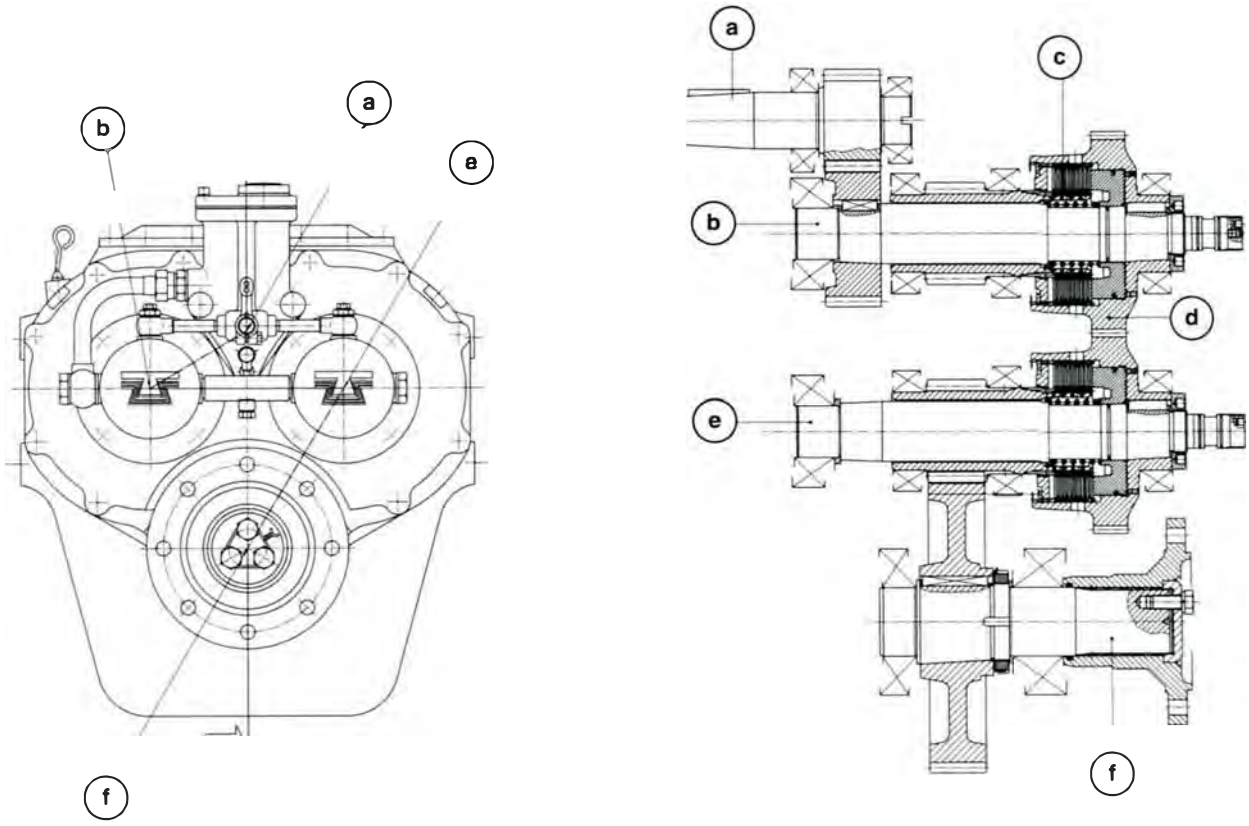


FIG. 1

SCHEMA DI FUNZIONAMENTO: MARCIA INDIETRO - KINEMATIC DIAGRAM: REVERSE SPEED - SCHEMA DE FONCTIONNEMENT: MARCHE-ARRIERE

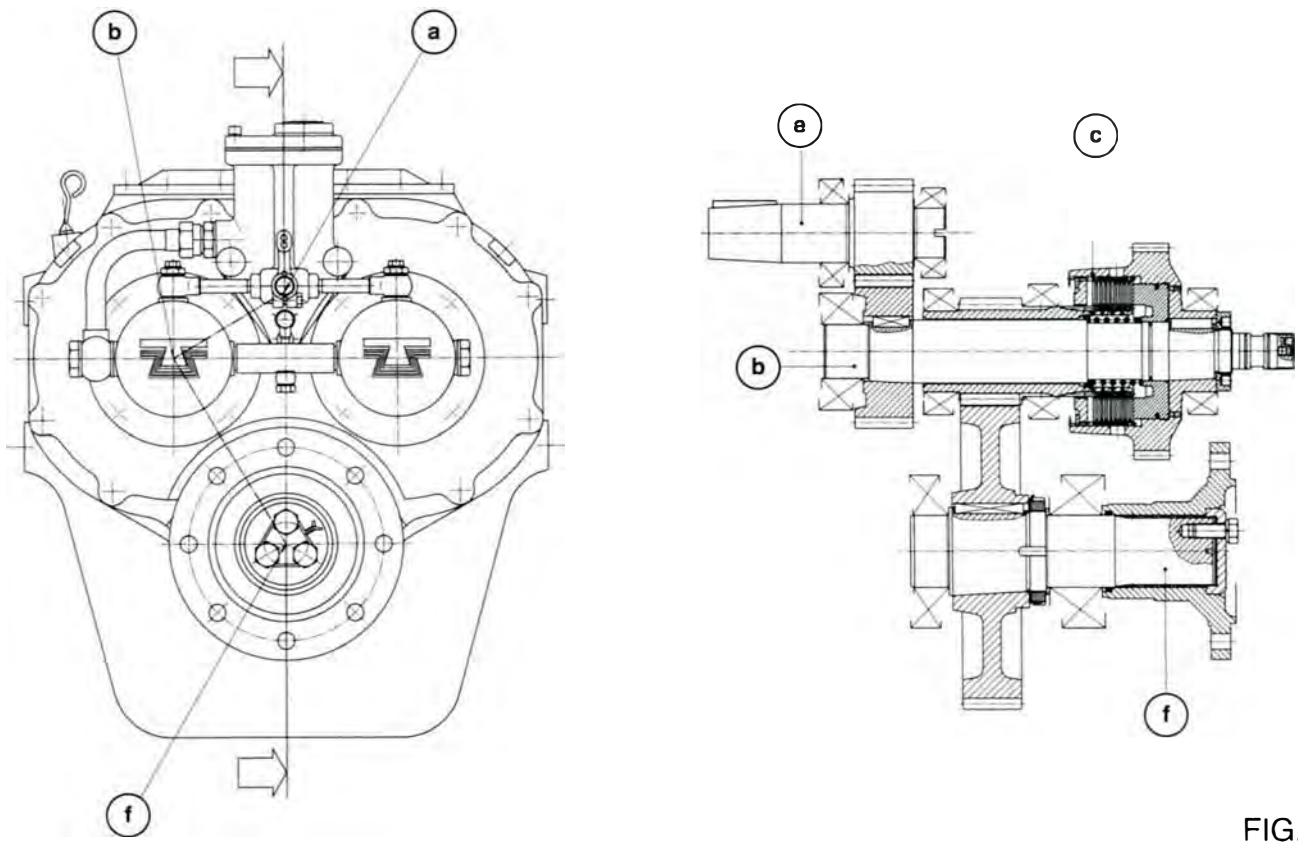
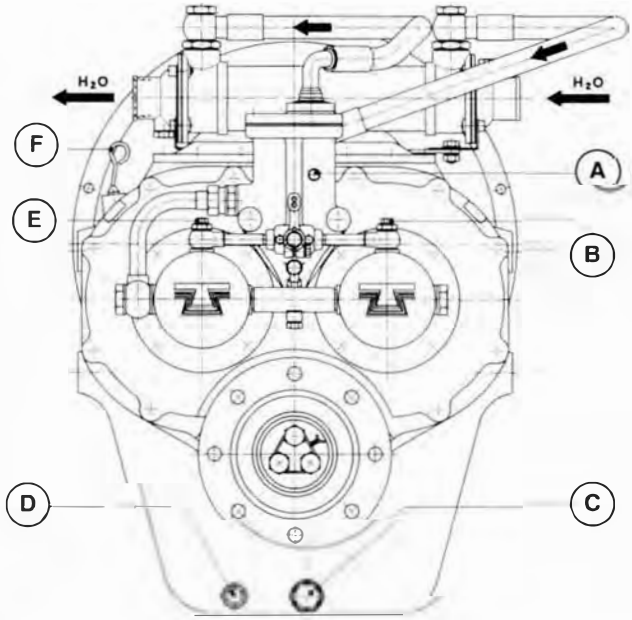
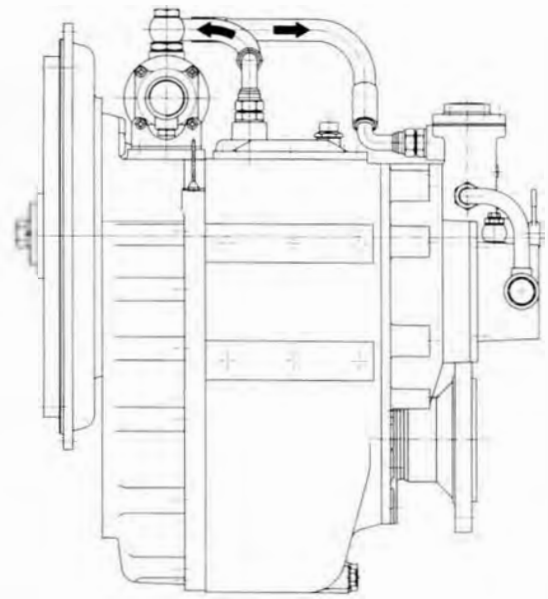


FIG. 2

ATTACCHI MANOMETRI/SCAMBIATORE - PRESSURE GAUGE CONNECTIONS/HEAT EXCHANGER - FIXATIONS DES MANOMETRES/ECHANGEUR.





Ⓐ- Pressione pompa (M8x1)
Pump pressure (M8x1)
Pression pompe (M8x1)

Ⓑ- Pressione marcia avanti (M8x1)
Forward pressure (M8x1)
Pression marche avant (M8x1)

Ⓒ- Tappo di scarico (M20x1,5)
Oil drain plug (M20x1,5)
Bouchon de vidange (M20x1,5)

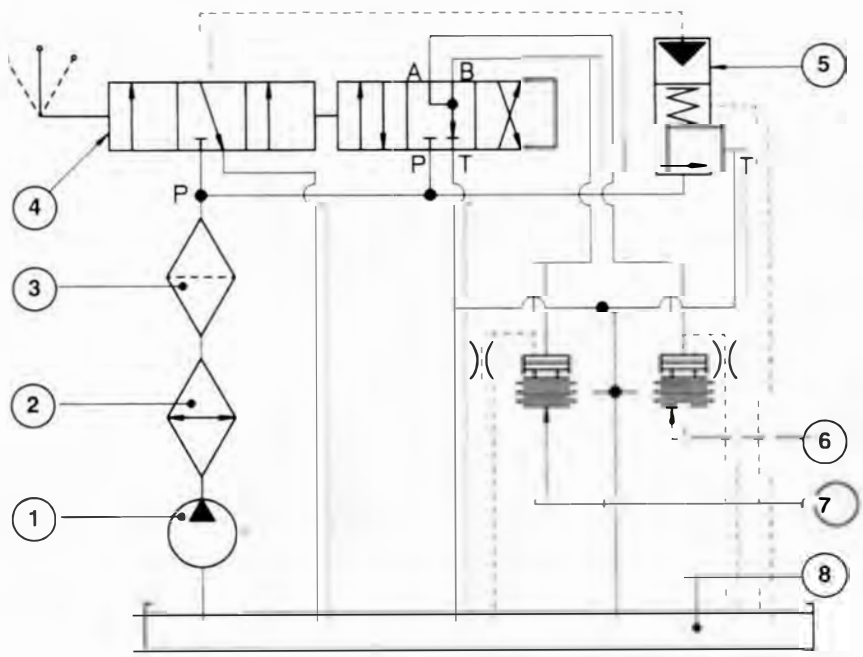
Ⓓ- Attacco per termometro (M14x1,5)
Oil temperature gauge (M14x1,5)
Prise de temperature d'huile (M14x1,5)

Ⓔ- Pressione marcia indietro (M8x1)
Reverse pressure (M8x1)
Pression marche-arriere (M8x1)

Ⓕ- Asta livello olio
Oil level gauge
Niveau

FIG. 3

SCHEMA IDRAULICO - HYDRAULICS DIAGRAM - SCHEMA HYDRAULIQUE



1	Pompa olio - Oil pump - Pompe a huile	5	Valvola - Valve - Vanne
2	Scambiatore - Heat exchanger - Echangeur	6	Frizione - Clutch - Embrayage
3	Filtro - Filter - Filtre	7	Frizione - Clutch - Embrayage
4	Distributore - Selector valve - Distributeur	8	Carter - Carter - Carter

FIG. 4

OPERATION DIAGRAM

- Forward gear (fig. 1) is transmitted through the clutch unit fitted on the shaft (e).
- The rotation direction of the output flange of the marine gear, in forward drive, is opposite to that of the motor.
- Reverse gear (fig. 2) is transmitted through the clutch unit fitted on the shaft (b).
- The clutches are operated by the oil placed under pressure by the pump activated by the input shaft and are able to transmit full power both in forward and in reverse gear.
- The reduction ratio is the same whether in forward or reverse gear.
- Forward gear (fig. 1): shaft (b) transmits drive through the gear (d) to the shaft (e) holding the forward gear clutch. If this is inserted, drive is transmitted from the input shaft (a) to the shaft (b), to the shaft (e) and finally to the outfeed shaft (f).
- Reverse gear (fig. 2): input shaft (a) transmits drive to the shaft (b) holding the reverse drive clutch (c). If this is inserted, drive is transmitted to the outfeed shaft (f).

INSTALLATION

- Marine gear TM 360 may be connected to engines whose rotation direction is anticlockwise (seen from flywheel side).
- Before connecting the output flange of the marine gear to the propeller axle, cheek that it is no more than 0,05 mm out of alignment.
- The remote control cable must be connected in such a way as to allow the complete rotation of the control lever of the marine gear from the forward gear position to the reverse gear position, ensuring the exact neutral position. From neutral, the forward gear is engaged by turning the control lever clockwise.
- The heat exchanger is connected as shown in fig. 3.
- The marine gear is supplied without oil. Before start up,fill with oil up to the maximum indicated on the dipstick, then start up the engine to allow the tubing to fill and check the oil level again.

use:

- Forward and reverse gear and neutral should be engaged with the motor idling.

MAINTENANCE

- Check the oil level every day.
- The first oil change should be done after 100 hours of operation and then after every 2000 hours of operation (in any case not later than 12 months).
- In order to drain the oil, unscrew the plug (C) (fig. 3)
- Clean the filter (58) each time the oil is changed.
- To remove the filter, unscrew the plug (53), extract the filter (58) and clean with diesel fuel. Extract the spring (59) and carefully clean its housing. Refit the spring (59) and the filter (58).The filter is pushed upwards by the spring. Check that the bottom of the filter is aligned with its housing before screwing home the plug (53) on which the OR (54) should be placed.
- The oil pressure is calibrated during manufacture and requires no further adjustment for start up.
  The fittings for the pressure gauges are shown in fig. 3.
- The clutches do not require adjustment.

LUBRICATION

- Use oil in accordance with API CD, SAE 20 W 40 specifications. It is normally possible to use the same type of oil as the engine.
- 14 litres of oil are required for the marine gear complete with standard exchanger.
- The maximum oil temperature is 105°C.

- The oil pressure to the clutches, measured at 1000 rpm of the engine with gear engaged and oil temperature of about 60°C, should be between 23 and 25 bar.
  The fitting for the pressure gauge shown in fig. 3 (outlet B for forward gear, outlet E for reverse).
- The oil pressure of the pump measured at outlet A with marine gear in neutral should be between 3 and 4 bar, while it should be between 23 and 24 bar with the gear engaged.

POSSIBLE PROBLEMS DURING OPERATION

OVERHEATING
- Check the oil level
- Check that the oil reaches the exchanger
- Check that the water capacity to the exchanger is sufficient
- Check that the exchanger is not dirty or blocked
- Check that the engine power is suitable for the marine gear
- Check the oil pressure to the clutches (outlets B, E) and the oil pressure of the pump (outlet A)

CLUTCH SLIPPING
- Check the oil pressure to the clutches (outlet B, E) and the oil pressure of the pump (outlet A)

THE MARINE GEAR DOES NOT ENGAGE
- Check that the coupling to the engine is in good condition
- Check the oil pressure of the pump (outlet A).

NO OR INSUFFICIENT OIL PRESSURE OF THE PUMP (OUTLET A).
- Where there is no pressure, check the coupling to the engine.
  If the coupling is not broken, replace the pump after checking the conditions of the gears.
- Where the pressure is insufficient, check the oil level. If this is correct, adjust the pressure as follows:
  remove the 6 screws (47), the lid (41), the gaskets (40) and the plate (39), with special attention for the ball (48). Extract the valve (42) using a magnet and place one more adjustment shims between the valve (42) and springs (43) and (46).
  Refit the whole , replacing the gaskets (40).
  Check that the oil pressure of the pump corresponds to the set values.

LOW OIL PRESSURE ON ONE OF THE TWO CLUTCHES
- If the pressure is low on just one of the two clutches (outlet B or E), the elastic strips (135) on the clutch shaft should be checked.

LOW OIL PRESSURE ON BOTH CLUTCHES
- This could be caused by the blocking of one of the two valves (51) and (42) in its housing.
  Remove the 6 screws (47), the lid (41), the gaskets (40) and the plate (39), with special attention for the ball (48). Extract the valve (42) using a magnet and extract the springs (43) and (46).
  Extract the valve (51) using a seeger gripper. If the valve is blocked in its housing, remove the tube (13) and use a bent wire as a lever under the valve.
  Replace the two valves (42) and (51), the springs (43) and (46), the gaskets (40) and refit.

Rif. Ref. Rep.	Denominazione Denomination Denomination	Quantità Quantity Quantitè	Codice Code Code
1	Vite - Screw hex.	3	2064015
2	Tappo scarico olio - Drain Plug	1	4588040
3	Rosetta - Washer	1	4609021
4	Tappo - Plug	1	4588034
5	Rosetta - Washer	1	4609015
6	Vite - Screw hex.	10	4615388
7	Tubo - Tube	1	2042047
8	Coperchio - Cover	1	2010229
9	Rosetta - Washer	6	4609026
10	Bocchettone - Union	1	4626040
11	Tubo - Tube	1	2042043
12	Vite - Screw hex.	22	4615362
13	Tubo - Tube	1	2042049
14	Tubo - Tube	2	2042042
15	Asta livello olio - Gauge	1	2070052
16	Rosetta - Washer	3	4609009
17	Tappo - Plug	3	4588028
18	Coperchio - Cover	1	2010228
19	Targhetta - Plate	1	2028001
20	Vite - Screw hex.	2	4615134
21	Rosetta - Washer	2	4611106
22	Guarnizione Or - "O" Ring	2	4598067
23	Vite T.E. - Screw hex.	2	4615326
24	Vite T.E. - Screw hex.	15	4615214
25	Guarnizione Or - "O" Ring	2	4598034
26	Tappo - Plug	1	4588110
27	Bocchettone - Union	4	4626004
28	Perno - Pin	2	2035042
29	Piastra - Plate	1	2030062
30	Guarnizione Or - "O" Ring	2	4598094
31	Guarnizione Or - "O" Ring	2	4598131
32	Tubo - Tube	1	2042040
33	Gruppo pompa - Pump	1	1009031
34	Molla - Spring	1	2020038
35	Perno - Pin	1	2035052
36	Tappo di sfiato - Breather	1	4589030
37	Coperchio - Cover	1	2010225
38	Nipple - Nipple	3	4624008
39	Piastrina - Plate	1	2054025
40	Guarnizione - Gasket	2	2012129
41	Coperchio - Cover	1	2010231
42	Valvola - Valve	1	2056100
43	Molla - Spring	1	2020079
44	Spessore - Shim	1	2045001
45	Targhetta - Plate	1	2028004
46	Molla - Spring	1	2020073
47	Vite - Screw	6	4615220
48	Sfera - Ball	1	4630010
49	Molla - Spring	1	2020065
50	Corpo distributore - Body	1	2056082
51	Valvola - Valve	1	2056114
52	Corpo valvola - Valve body	1	2056066
53	Tappo - Plug	1	2055035
54	Guarnizione Or - "O" Ring	1	4598003
55	Sfera - Ball	1	4630020
56	Molla - Spring	1	2020045
57	Anello seeger - Seeger ring	1	4601017
58	Filtro olio - Oil filter	1	2056096
59	Molla - Spring	1	2020064
60	Leva di comando - Lever	1	2037036
61	Stelo distributore - Selector valve	1	2056086
62	Piastrina - Plate	1	2054024
63	Guarnizione Or - "O" Ring	1	4598133
64	Rosetta elastica - Washer	9	4611110
65	Vite - Screw	1	4615297
66	Rosetta elastica - Washer	38	4611112
67	Vite - Screw	1	4615321
68	Vite - Screw	2	4615304
69	Rosetta elastica - Washer	3	4611116
70	Rosetta di fermo - Washer	1	2014077
71	Flangia di uscita - Output flange	1	2062202
72	Anello di tenuta - Oil seal	1	4597241
73	Vite - Screw Hex	2	4615309
74	Vite - Screw Hex	2	4615305
75	Guarnizione Or - "O" Ring	1	4598089
76	Distanziale - Spacer	1	2013515
77	Spessore - Shim	3	2013265
78	Cuscinetto - Bearing	1	4622135
79	Distanziale - Spacer	1	2013416
80	Ghiera - Nut	1	4579086
81	Rosetta - Washer	1	4608062
82	Ingranaggio rapp 5:1 - Gear ratio 5:1	1	2061488
82	Ingranaggio rapp 3:1 e 4:1 - Gear ratio 3:1 e 4:1	1	2061491
82	Ingranaggio rapp 3,5:1 - Gear ratio 3,5:1	1	2061489
83	Scatola - Housing	1	2009071
84	Coperchio - Cover	1	2010226
85	Albero - Shaft	1	2021397
86	Linguetta - Tang	1	4620152
87	Cuscinetto - Bearing	1	4622133
88	Rosetta - Washer	8	4609011
89	Coperchio - Cover	1	2010232
90	Cuscinetto - Bearing	1	4622106
91	Albero rapp. 3:1 e 3,5:1 - Shat ratio 3:1-3,5:1	1	2021399
91	Albero rapp. 4:1 e 5:1 - Shat ratio 4:1-5:1	1	2021400
92	Linguetta - Tang	1	4620119
93	Anello di tenuta - Oil Seal	1	4597199
94	Spessore - Shim	3	2013152
95	Cuscinetto - Bearing	1	4622086
96	Coperchio - Cover	1	2010227
97	Tubo - Tube	1	2042055
98	Vite - Screw	4	4615394
99	Vite - Screw Hex	18	4615359

Rif. Ref. Rep.	Denominazione Denomination Denomination	Quantità Quantity Quantitè	Codice Code Code
100	Rosetta elastica - Washer	20	4611108
101	Tappo conico - Plug	2	2055045
102	Tappo - Plug	3	4588008
103	Rosetta - Washer	4	4609029
104	Tappo - Plug	2	2055041
105	Linguetta - Tang	2	2015045
106	Tappo - Plug	2	2055036
107	Pistone - Piston	2	2017010
108	Campana frizione - Clutch Housing	2	2061497
109	Distanziale - Spacer	2	2013501
110	Seeger - Seeger	2	4601160
111	Cuscinetto - Bearing	2	4622162
112	Pignone rapp. 3:1 - Gear Ratio 3:1	2	2061484
112	Pignone rapp. 3,5:1 - Gear Ratio 3,5:1	2	2061487
112	Pignone rapp. 4:1 - Gear Ratio 4:1	2	2061484
112	Pignone rapp. 5:1 - Gear Ratio 5:1	2	2061486
113	Spessore di registro - Shim	6	2013243
114	Spina - Dowel pin	2	4614010
115	Linguetta - Key	1	4620155
116	Rosetta - Washer	2	2014070
117	Vite - Screw	6	4615306
118	Cuscinetto - Bearing	4	4622154

Rif. Ref. Rep.	Denominazione Denomination Denomination	Quantità Quantity Quantitè	Codice Code Code
119	Molla - Spring	1	2020061
120	Distanziale - Spacer	1	2013502
121	Cuscinetto - Bearing	2	4622095
122	Albero - Shaft	2	2021371
123	Dado - Nut	1	2038022
124	Tubo - Tube	1	2042041
125	Disco di ritegno - Back plate	2	2022043
126	Disco sinterizzato - Clucth plate	18	2022044
127	Spina - Dowel pin	2	4614032
128	Disco interno - Steel plate	16	2022045
129	Seeger - Seeger	2	4600065
130	Fascia elastica - Seal ring	2	2024010
131	Fascia elastica - Seal ring	2	2024012
132	Tappo conico - Plug	4	4588006
133	Guarnizione OR - "O" Ring	2	4598028
134	Ghiera - Nut	2	2038023
135	Fascia Elastica - Elastic strip	4	2024004
136	Corona rapp. 4 e 5:1 - Gear ratio 4 - 5:1	1	2061494
136	Corona rapp. 3 e 3,5:1 - Gear ratio 3 - 3,5:1	1	2061496
137	Rosetta - Washer	12	4650012
138	Molla - Spring	1	2020066

RICAMBI

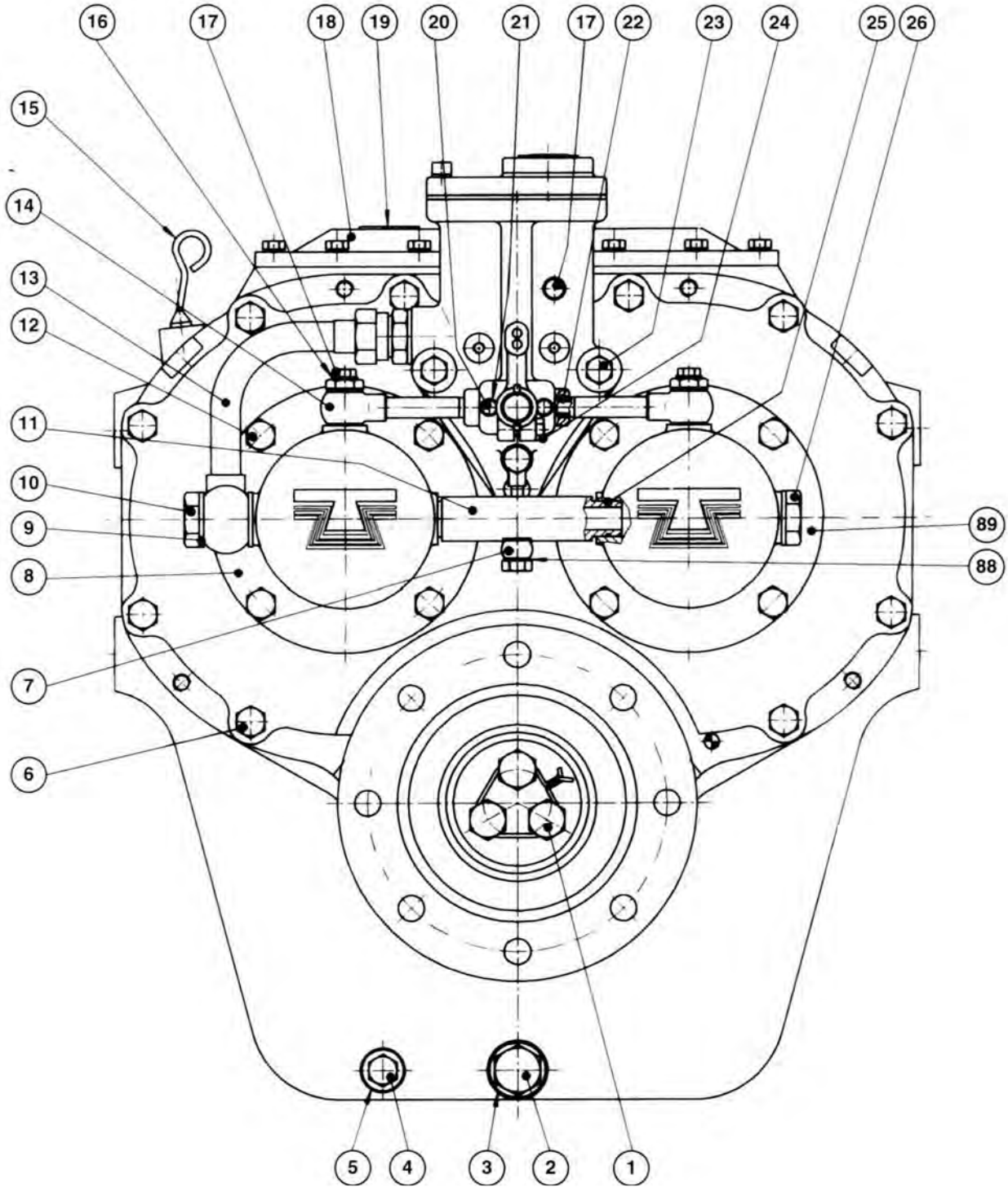
Per ordinare i ricambi specificare il tipo di invertitore, il numero di serie, il rapporto, il numero di riferimento del disegno, la quantità.

SPARE PARTS

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

PIÈCES D'ETACHÈES

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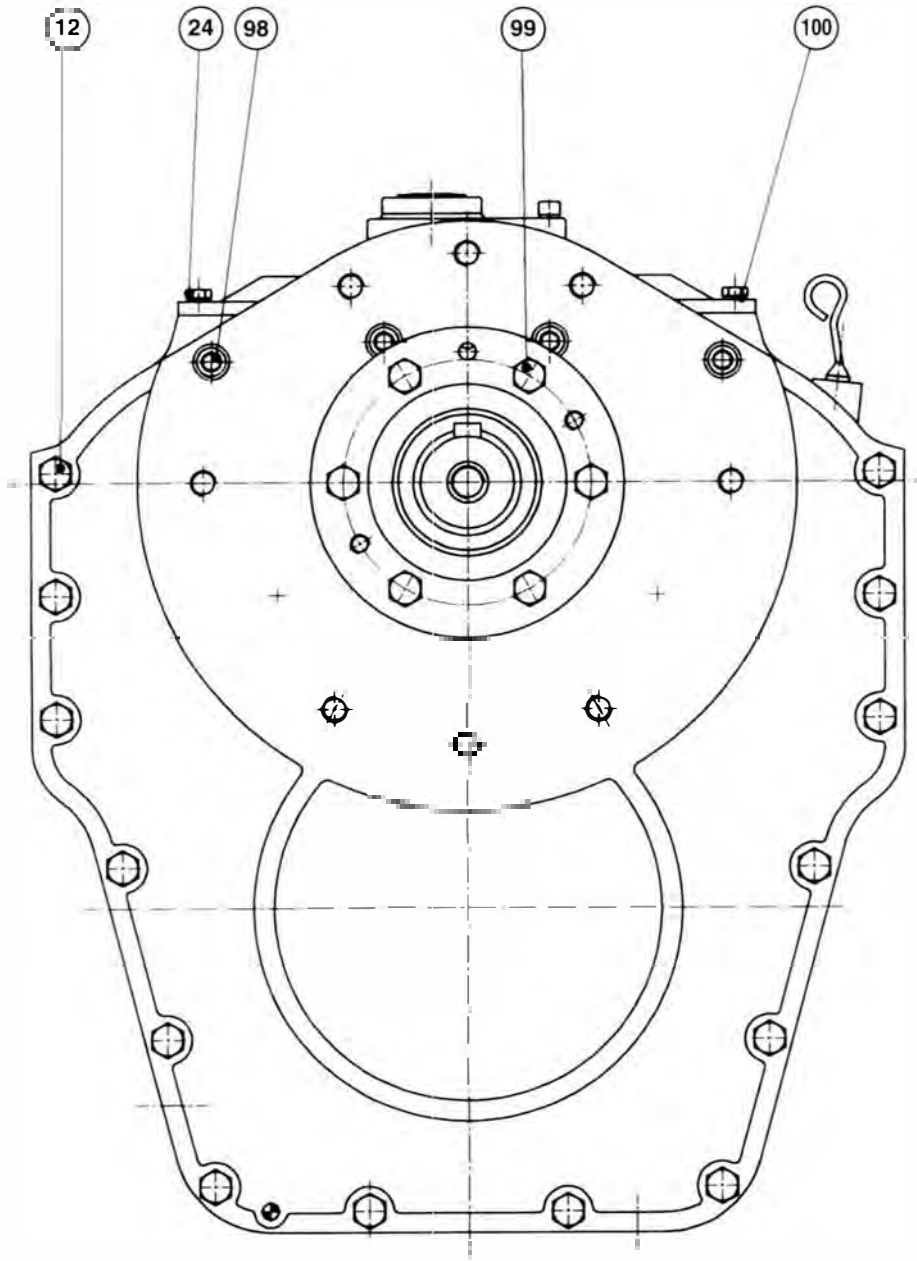
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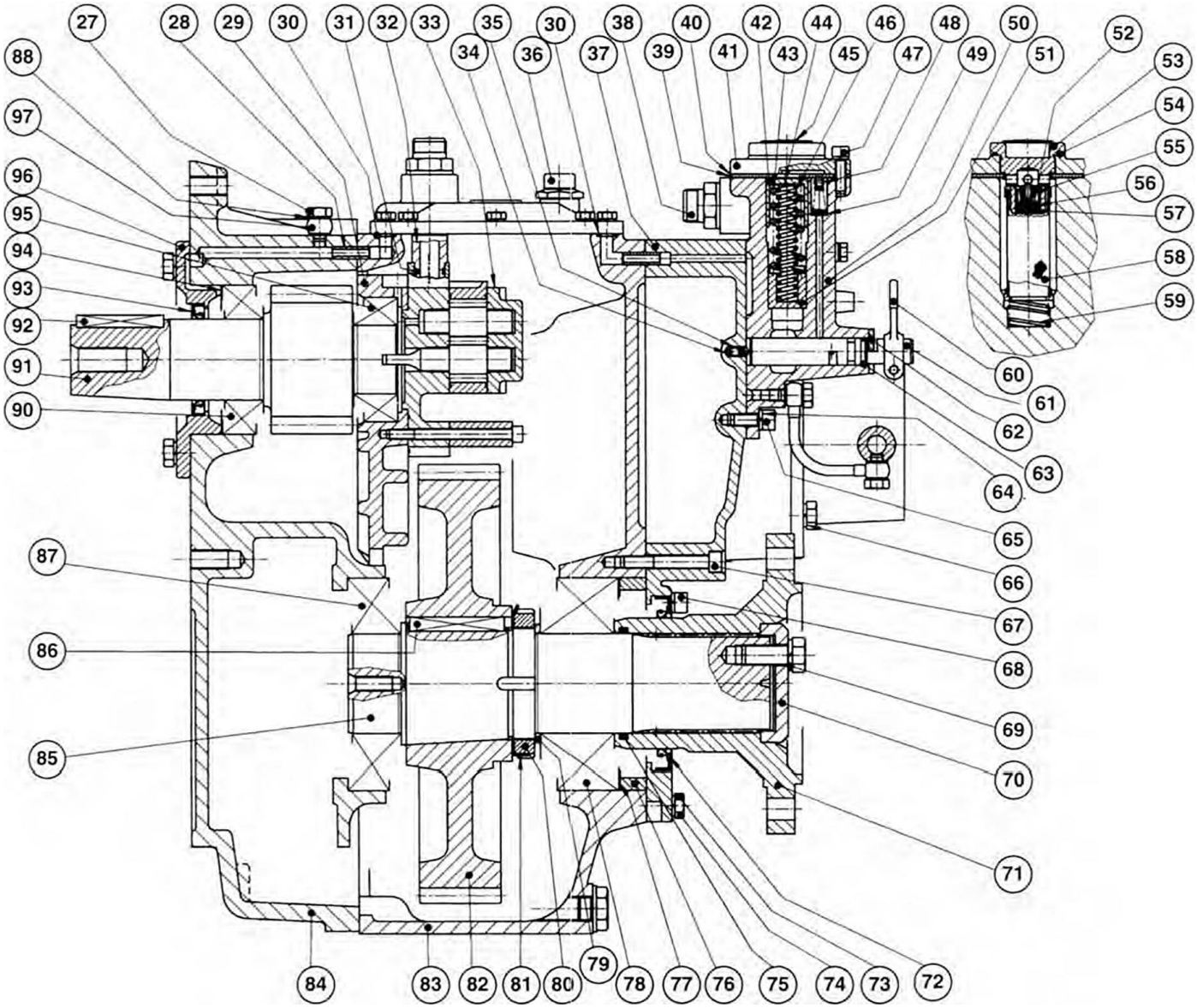
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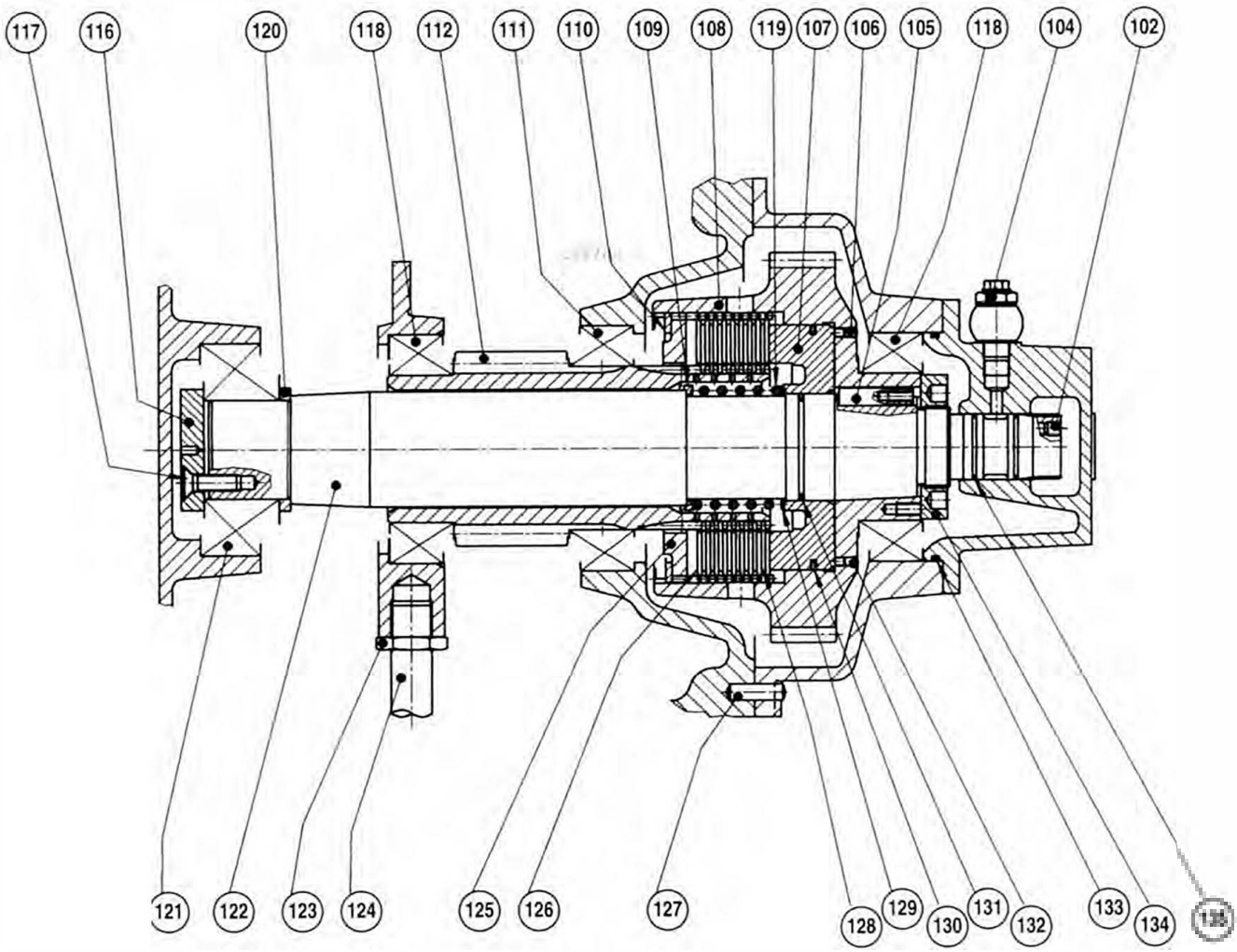
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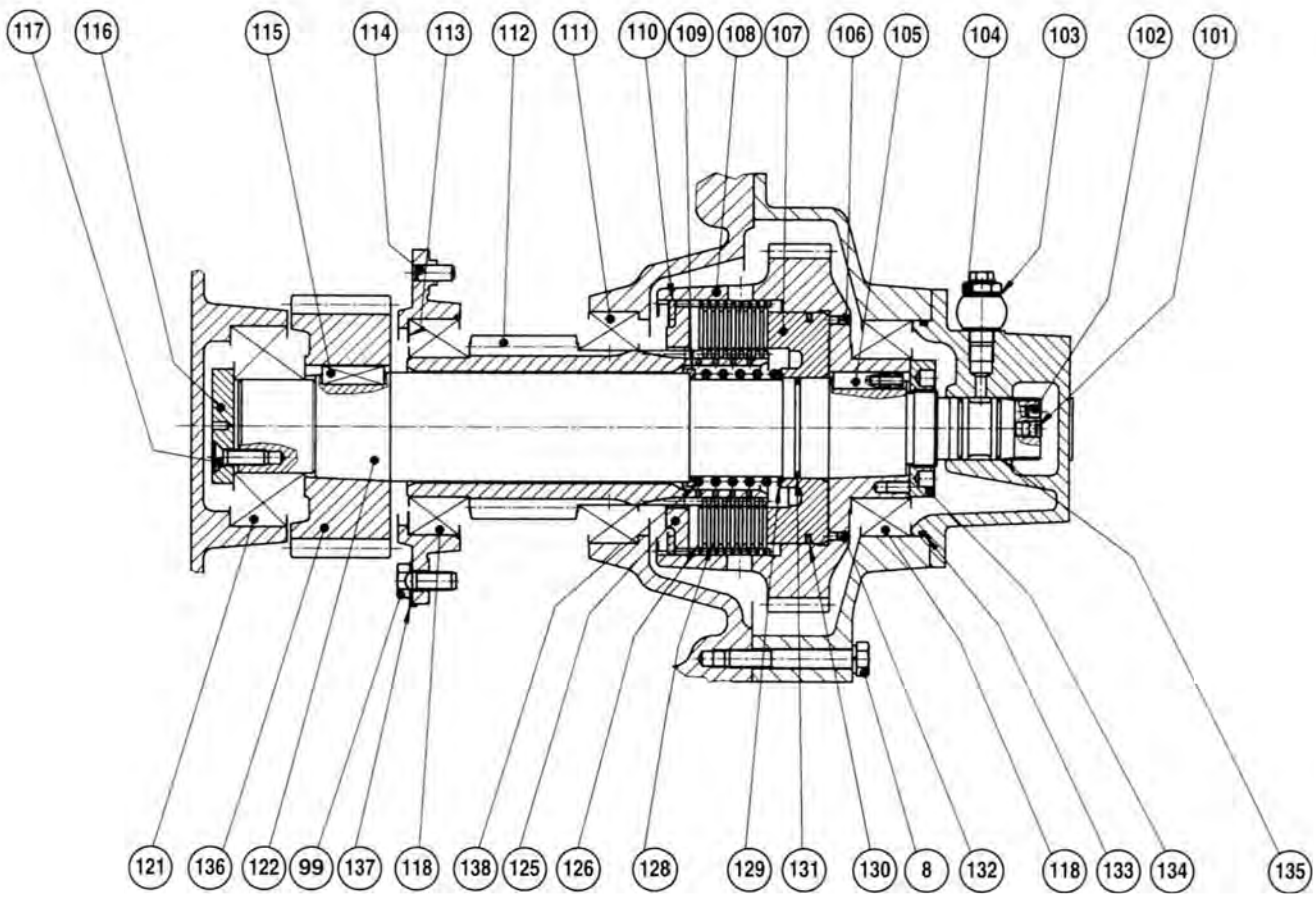
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