



ZF-Servocomtronic[®]

Supplement to the Repair Manual ZF-Servocom

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Important general information



- The present Manual aims to help the user properly to execute the necessary maintenance and repair work on the ZF product.
- Read the Manual before starting any inspection and repair work.
- On completion of the maintenance and repair work, the specialist personnel must make certain that the product is once more operating flawlessly.

→ ***Please note that the ZF product must be repaired only in workshops that***

- ☞ ***employ trained personnel***
- ☞ ***have the prescribed equipment, including a test rig, crack detector and special tools***
- ☞ ***use ZF genuine spare parts.***

- This Manual is only for foremen and fitters who have undergone practical and theoretical training in our Customer Service School. Together with service information bulletins, it is intended to supplement their knowledge.
- All work carried out on ZF products must be executed with extreme care and diligence. This applies in particular to products and transmission components from vehicles damaged in accidents.
- The manufacturer does not, of course, accept any liability for damage and its consequences arising from incorrectly or inexpertly executed repairs.
- This Manual draws attention to notes on safety as follows:

Note: Where incorrect and careless work can cause damage to the product.



Attention: Where incorrect and careless work can lead to personal injury and endanger life.

- This Manual is not part of the updating service.
 - The contents of the additional service information bulletins must also be observed.
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Notes:

- The processes necessary for the repair of a ZF-Servocomtronic have mostly been described in the Repair Manual ZF-Servocom.
- Any deviating or additional process will be described in the following.



I. Disassembly

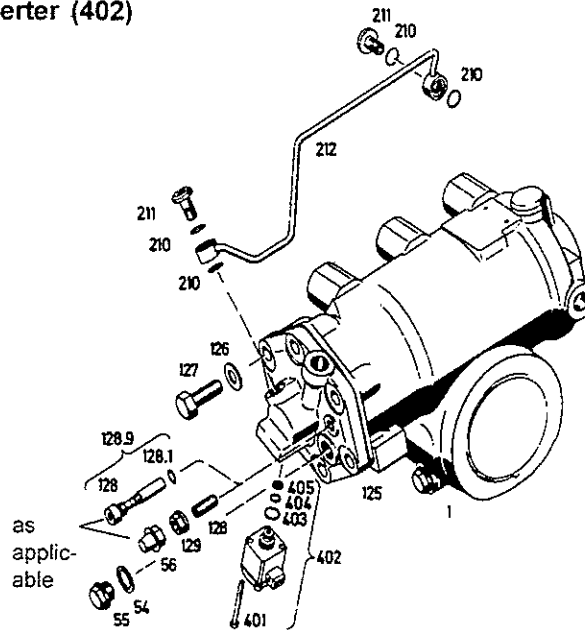
1 Removal of pipe (212) and converter (402)

Screw out union screws (211) and remove pipe (212) with O-rings (210).

Mark position of converter (402).

Turn out two cap screws (401) provided with an internal hexagon.

Remove converter (402) and dismantle O-rings (403 and 404) as well as oil screen (405).



Unscrew hexagon screws (127) with washers (126).

Drive piston (101) back towards bottom of housing so that the valve tappet of valve insert (109) is not damaged when turning the cylinder cover (125).

Remove screw (128) with O-ring (128.1) and set them aside for later use (required for functional tests, chapter IV.).

or:

Remove set screw (128) and collar nut (129).

Unscrew screw plug (55) with sealing ring (54).

Put steering drop arm onto sector shaft (80).



Disassembly

Turn worm (151) or steering drop arm to lift off cylinder cover (125).

Remove needle cage (120) and washer (121).

Remove sealing elements (122, 123 and 124).

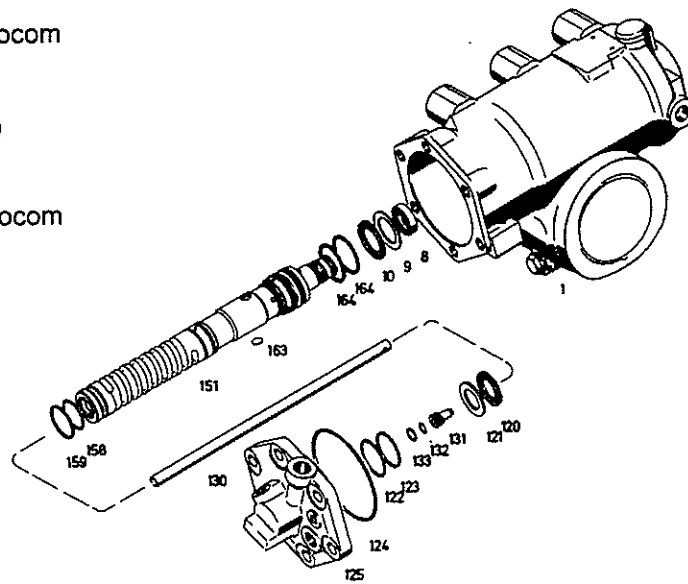
Pull pipe (130) together with reaction piston (131) out of worm (151).

2 Removal of piston (100) and worm (151)

See Repair Manual ZF-Servocom

3 Disassembly of worm (151)

See Repair Manual ZF-Servocom



Pull reaction piston (131) out of pipe (130).

Remove sealing ring (133) and O-ring (132) from reaction piston (131).

4 Removal of sector shaft (80) and disassembly of housing (1)

See Repair Manual ZF-Servocom



II. Examining the individual parts

See Repair Manual ZF-Servocom

1 Cylinder cover (125), reaction piston (131) and converter (402)

→ Tidiness of the bores

2 Reaction piston (131)

→ Free play in cylinder cover (125)

III. Assembly

1 Preassembly of housing (1) and housing cover (4) and installation of sector shaft (80)

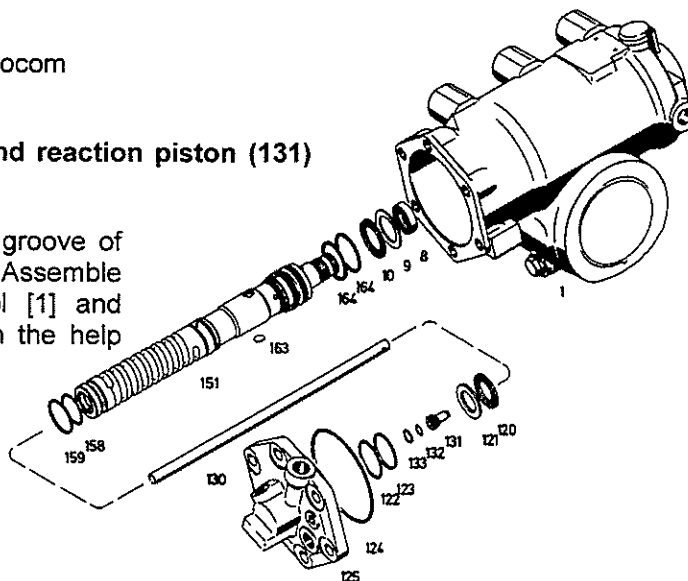
See Repair Manual ZF-Servocom

2 Preassembly of worm (151) and piston (100), installation of piston (100) and worm (151)

See Repair Manual ZF-Servocom

3 Installation of pipe (130) and reaction piston (131)

Insert O-ring (132) into the groove of the reaction piston (131). Assemble sealing ring (133) with tool [1] and press it into the groove with the help of a mounting ring.



Insert pipe (130) and reaction piston (131) in cylinder cover (125).



4 Installation of cylinder cover (125)

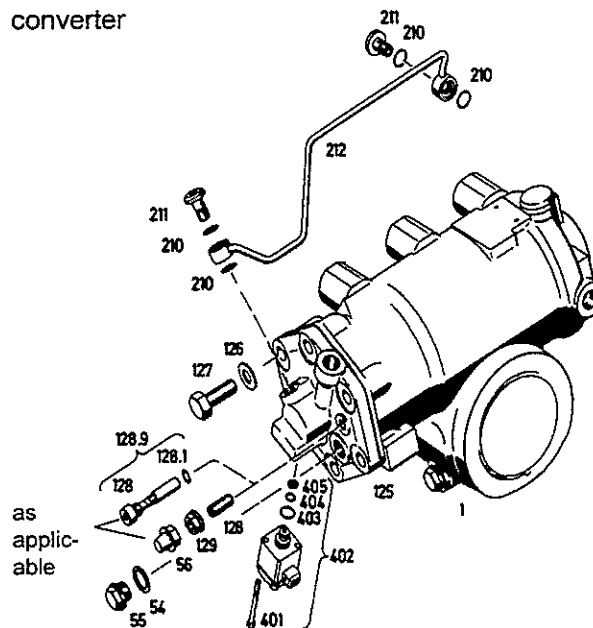
See Repair Manual ZF-Servocom

5 Completing assembly of cylinder cover (125)

Place oil screen (405) in cylinder cover (125).

Place O-rings (404 and 403) in converter (402).

Mount converter (402) as marked upon disassembly with cap screws (401) (tightening torque: 2.9 Nm).



6 Mounting of pipe (212)

Mount pipe (212) with union screws (211) and O-rings (210) (tightening torque: 20 ± 2 Nm).



IV. Setting and functional test

1 See Repair Manual ZF-Servocom

Note:

The checking for oil leakage described in the Repair Manual ZF-Servocom must be performed while the converter is closed. To do so, tool [2] (Servotronicstest) must expose the converter to a current that produces a scale reading of 0.65...0.85. Please observe the following description.

2 Functional test of the converter and of the control unit

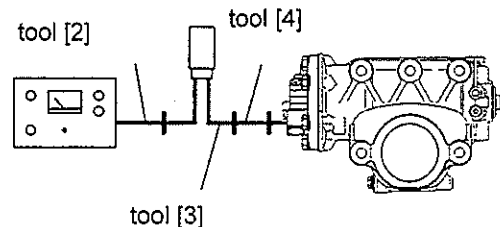
Note:

Before using the Servotronicstest unit, you should read the corresponding operating instructions.

The following functional test refers to the separate checking of the converter and of the control unit. The joint checking of both units is described in the above-mentioned operating instructions.

2.1 Functional test of the converter

- Set up the steering gear on the test bench. Adjust oil flow, pressure, and oil temperature as required for the hydraulic checking on the test bench (see Repair Manual ZF-Servocom). Lock the steering gear in central position.
- Connect the Servotronicstest (tool [2]) to a 220V mains supply with the help of a power supply unit. Now the ready-to-operate tell-tale lamp must light up.
- Connect the tools [2, 3, and 4] to the steering gear as described below.



- Set switch 8 of the Servotronicstest to position "0" .
- Note on the Servotronicstest unit:
By slowly turning the control knob 4 (converter) any driving speed can be simulated.



Turning the control knob to the right end position produces a large deflection of the pointer.

A scale reading of 0.65...0.85 means parking, i.e. low actuation force.

Turning the control knob to the left end position produces a smaller deflection of the pointer.

A scale reading 0...0.1 means maximum speed, i.e. high actuation force.

→ Testing in the parking mode

Put switch 8 of the Servotronic test in position "Wandler/converter" and turn control knob 4 (converter) to the right until the scale reading 0.65...0.85 is attained.

With the test bench switched on, turn the steering wheel to either direction until a pressure of 50 bar is built up at the test bench.

If the Servocomtronic and the converter function correctly the actuation momentum at the torque meter should be between 3.5...5.5 Nm, for example.

For the exact value, please refer to the technical data sheet of the spare parts list or the Service Information circulars.

→ Testing in the high speed mode

Turn control knob 4 (converter) of the Servotronic test to the left until the scale reading 0...0.1 is attained.

With the test bench switched on, turn the steering wheel to either direction until a pressure of 50 bar is built up at the test bench.

If the Servocomtronic and the converter function correctly the actuation momentum at the torque meter should be between 9...11 Nm, for example.

For the exact value, please refer to the technical data sheet of the spare parts list or the Service Information circulars.

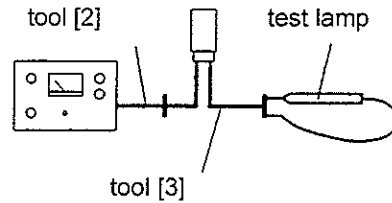
2.2 Functional test of the control unit:

→ Connect the Servotronic test to a 220V mains supply with the help of a power supply unit. Now the ready-to-operate tell-tale lamp must light up.

→ Set switch 8 of the Servotronic test to position "0".

→ Connect tool [3] to Servotronic test (tool [2]).

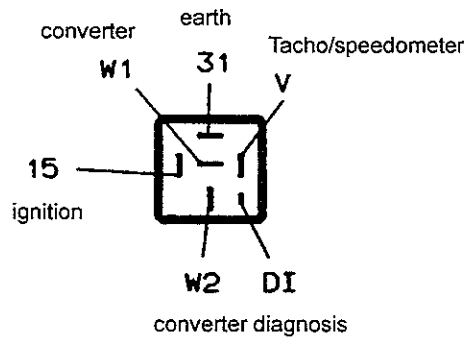
→ Connect the test lamp directly to the control unit or to the cable leading to the converter as accessibility allows.



- Set switch 8 of the Servotronic test to position "Tacho/speedometer".
- Turn control knob 5 (Tacho/speedometer).
 When the control knob is turned to the right end position, the test lamp must light up.
 When the control knob is turned to the left end position, the test lamp must go out.
 During this test, the scale reading indicated on the Servotronic test rises to max. 0.25.

V. Troubleshooting

Pin layout at the socket of the control unit (plug location):



Trouble	Cause	Remedy
Heavy when steering with the vehicle stationary	→ no on-board voltage	→ check and replace, if necessary – remove the control unit – measure at the socket ② with the help of a multimeter connecting pin 15 to 31 nom. value: 10...16 V

② **Attention!** Any measurement between V and 31 must be performed only with a voltmeter. Otherwise the speed signal sensor will be destroyed.



Trouble	Cause	Remedy
	→ wrong control unit	→ check → replace
	→ control unit placed at the wrong plug location	→ check
	→ defective cable connection from control unit to the steering gear	→ check and repair, if necessary – remove control unit – measure at the socket ² with the help of a multimeter connecting pin W1 to W2 nom. value: 5...9 Ω (at 20 ° 7,5 Ω)
	→ converter plug not engaged	→ check and repair, if necessary
	→ earth contact of converter cable	→ check → replace
	→ earth contact of converter	→ check → replace
	→ defective control unit	→ check → replace
	→ wrong speedometer signal before switching off ignition at a speed > 20 km/h	→ check speed signal sensor ¹ ²
	→ converter does not close	→ disassemble blow through clean
	→ defective pump	→ check → replace
	→ excessive internal oil leakage	→ check → replace

¹ see vehicle manufacturer's manual

² **Attention!** Any measurement between V and 31 must be performed only with a voltmeter. Otherwise the speed signal sensor will be destroyed.



Trouble	Cause	Abhilfe
Heavy steering when driving, o.k. when vehicle stationary	→ converter opens at too low speed	→ check control unit → replace control unit
	→ wrong control unit	→ check → replace
	→ wrong speedometer signal	→ check speedometer signal ¹
		→ replace speedometer signal ¹
Steering too easy when driving, o.k. when vehicle stationary	→ defective control unit	→ check → replace
	→ dirt in converter	→ disassemble clean blow through
	→ wrong speedometer signal at speed < 20 km/h	→ check speed signal sensor ¹
	→ cable connection to converter in contact with on-board voltage	→ check and replace, if necessary –remove control unit –measure at the socket ² voltage from pin W1 to 31 nom. value: 0V resistance from pin W2 to 31 nom. value: ∞Ω i.e. no connection

¹ see vehicle manufacturer's manual

² **Attention!** Any measurement between V and 31 must be performed only with a voltmeter. Otherwise the speed signal sensor will be destroyed.

Troubleshooting



Trouble	Cause	Remedy
	→ wrong control unit	→ check → replace
	→ defect in cable tree	→ check ① → replace
Alternate heavy and easy steering during travelling	→ wrong speedometer signal	→ check speedometer signal ① → replace speed signal sensor ①
	→ defective cable connections	→ check
	→ wrong control unit	→ replace
	→ defective control unit	→ check → replace
Pulsating steering-momentum (tingle at steering wheel) at any driving speed	→ defective control unit	→ check → replace

① see vehicle manufacturer's manual

② **Attention!** Any measurement between V and 31 must be performed only with a voltmeter. Otherwise the speed signal sensor will be destroyed.



VI. Special tools

Note:

The special tools listed below refer to the standard version and the design state of the ZF-Servocontronic on the basis of which the entire manual has been compiled.

Other tools may consequently be required for the particular ZF-Servocontronic unit to be repaired.

Tool [1].

Guide bush



Part-No.

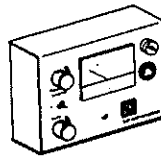
8098 798 004

Mounting ring

8098 798 655

Tool [2]

Servotronic test



7418 798 545

Power supply unit

7418 798 546

Tool [3]

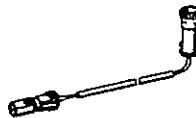
Adapter



7038 340 201

Tool [4]

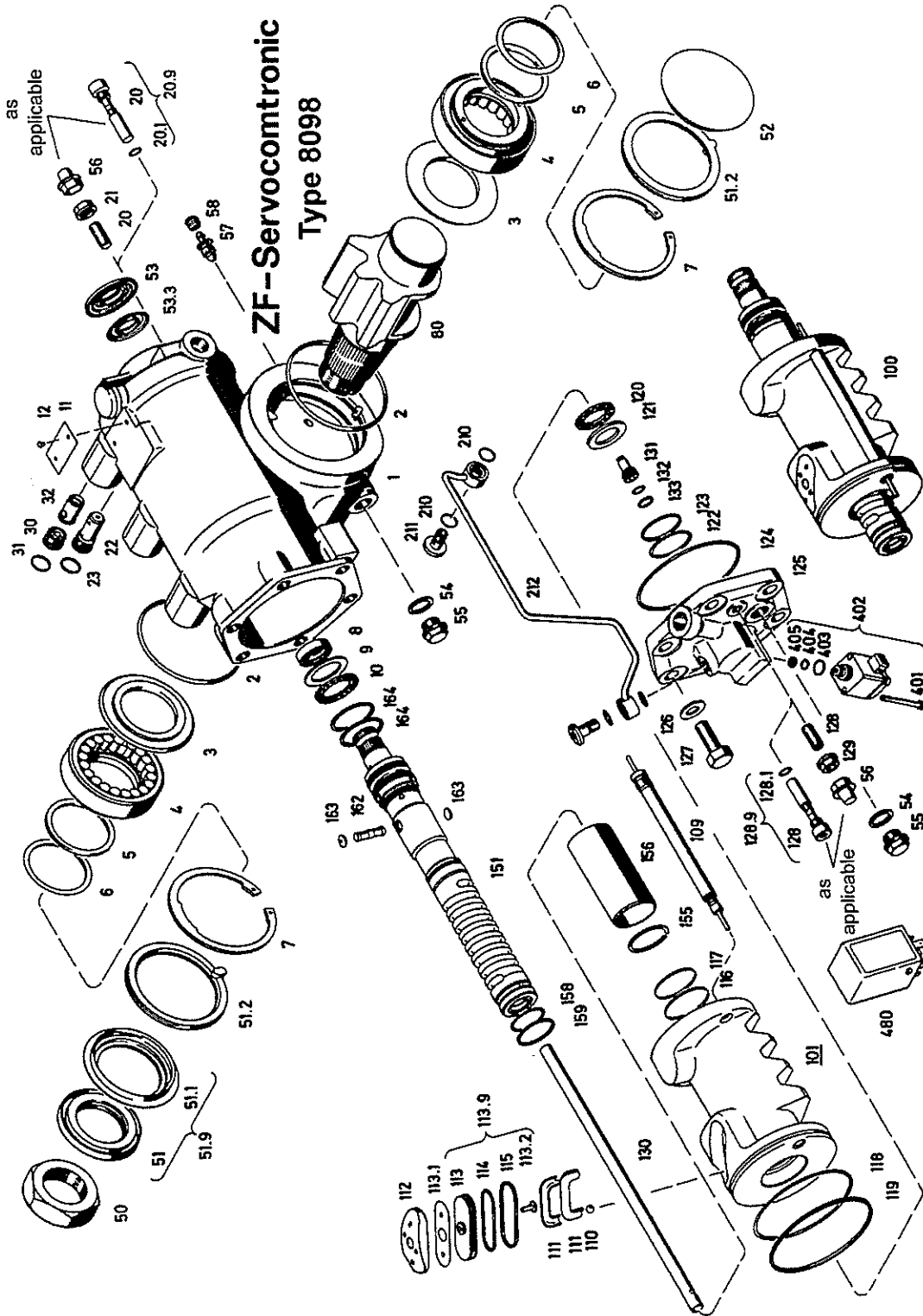
Adapter cable



7418 798 543

VII. Key to numbers in figures and exploded drawing

- 130.0 pipe
- 131.0 reaction piston
- 132.0 O-ring
- 133.0 sealing ring
- 401.0 cap screw
- 402.0 converter
- 403.0 O-ring
- 404.0 O-ring
- 405.0 oil screen



Notes



A series of horizontal dotted lines for taking notes.



Notes

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