Range selector keypad
Please read this operating manual carefully before driving your vehicle.

The specific instructions contained in the operating instructions of the manufacturer must also be observed.

You need the additional ZF-Intarder Operating Instructions, order number 6085 758 102, for servicing and maintaining the ZF-Intarder.

Your vehicle is fitted with a ZF-ASTronic automatic shift system. The more you familiarize yourself with this system, the more economically you can drive your vehicle. This operating manual will provide you with all the information you need to be able to make full use of the advanced technical features of the ZF-ASTronic.

To ensure operating safety, please note the maintenance specifications. Specialists employed by ZF Customer Services are always available to help with maintenance work on the transmission and are there to assist you should any other problems occur. The relevant addresses can be obtained from ZF in Friedrichshafen.

We would like to wish you pleasant driving with your ZF-ASTronic

ZF Friedrichshafen AG
Bus Transmissions Division (SB)
D-88038 Friedrichshafen, Germany

Phone: +49 (0) 75 41 77-0
Fax: +49 (0) 75 41 77-908000
Internet: www.zf.com
The following safety instructions appear in this manual:

**NOTE**
Referred to special processes, techniques, data, etc.

**CAUTION**
This is used when incorrect, unprofessional working practices could damage the product.

⚠️ **DANGER !**
This is used when lack of care could lead to personal injury and damage to property.

⚠️ **ENVIRONMENTAL HAZARD !**
Lubricants, consumables, and cleaning agents must not be allowed to enter the ground, the water table or the sewage system.
- Request safety information for the products concerned from your local environmental protection authority and follow any instructions herein at all times.
- Always collect used oil in a suitably large container.
- Always dispose of used oil, clogged filters, lubricants and cleaning agents in accordance with environmental protection laws.
- Always observe manufacturer instructions when dealing with lubricants and cleaning agents.
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Description of system

1 Description of system

1.1 General description

The ZF-ASTronic automatic transmission system is adapted to the engine via a standard dry clutch. The clutch is controlled via the transmission system; there is no clutch pedal.

In contrast to powershift transmissions, the power train of the ZF-ASTronic is open
• during shifts;
• at very low speeds, so that the engine does not stall;
• and when the vehicle is not moving.
This means that no drive power is transmitted.

⚠ DANGER!
In order to prevent the vehicle from accidentally rolling forward or backward, the brake must be engaged.

The ZF-ASTronic consists of a basic transmission and an integrated splitter and planetary group.

The basic transmission is shifted using constant mesh gears. The splitter and planetary groups are synchronized.

The transmission system performs gear shifts automatically.

A display in the range selector keypad shows the driver all the system information required (e.g. gear stage, fault codes etc.).

The transmission actuator and the clutch actuation unit (clutch actuator) are the most important components of the fully automated transmission.

The transmission actuator consists of the transmission electronics, shift valves, shift cylinders and sensors.

The transmission electronics process all incoming signals and initiate the gear shift via solenoid valves and shift cylinders.

The clutch actuator is controlled in an electro-pneumatic manner and is responsible for the entire clutch actuation process.

The ZF-Intarder is a hydrodynamic wear-free auxiliary brake integrated into the transmission.
1.2 Overview

Key
1. Range selector keypad and display
2. Electronic Module (optional)
3. Transmission actuator with integrated transmission TCU
4. Clutch actuator
5. Transmission
6. Accelerator pedal
7. Brake pedal
8. ZF-Intarder (optional)
1.3 Range selector keypad

The **range selector keypad** contains 6 buttons and a display.

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>«R»</td>
<td>Reverse travel</td>
</tr>
<tr>
<td>«N»</td>
<td>Neutral (no gears selected in transmission)</td>
</tr>
<tr>
<td>«D»</td>
<td>Forward travel</td>
</tr>
<tr>
<td>«↑»</td>
<td>Upshift</td>
</tr>
<tr>
<td>«↓»</td>
<td>Downshift</td>
</tr>
<tr>
<td>«Fn»</td>
<td>Switches between manual and automatic mode and vice versa.</td>
</tr>
</tbody>
</table>

**LED**

- **Flashing**: Transmission function change requested. If permanently illuminated, function change is complete.
- **Permanently illuminated**: Drive range is attained.

**Display (refer to Section 1.4)**

The «R», «N» and «D» only respond once released. If the buttons are held down for more than 5 seconds, the shift is ignored. When pressed, the «↑», «↓» and «Fn» buttons respond immediately.

---

**CAUTION**

- As regards electromagnetic influences (EMV), we wish to call your attention to the risk of functional disturbances of electronic systems which may result from the improper installation or handling of senders (mobile phones, radio sets ...).

- As regards the transmission system, the installation instructions and the instructions for use especially concerning the ZF-AS Tronic range selector must be observed.

- When senders are used (mobile phones, radio sets ...), a distance of at least 50 cm to the ZF-AS Tronic range selector must be observed.

- As a general rule, the installation instructions of the manufacturers of senders and sending antennas must be carefully observed.

- Consult the Technical Manual 1348 765 120 (Section 3.2.1 Push-Button Range Selector and 3.2.2 Installation Instructions) on the issue of electromagnetic influences.
1.4 Display

This operating manual only provides descriptions of those displays associated with transmission functions. For additional displays, refer to the vehicle manufacturer’s operating manual.

The display shows the number of the gear selected, the neutral position as well as faults.

1.4.1 Display: Automatic mode

The display screen shows Automatic Mode activated by means of 2 arrows and 2 bars. In the transmission for example, the 4th gear is engaged.

1.4.2 Display: Manual mode

If the Manual Mode is activated, no bars nor arrows/or only one arrow are shown on the display. In the transmission for example, the 4th gear is engaged.

In the case that the upper arrow is lit, then the transmission system recommends that the driver has to shift up one gear e.g. from the 5th into the 6th gear.

If the lower arrow is lit, then the transmission system recommends that the driver has to shift down one gear e.g. from the 8th into the 7th gear.

1.5 Accelerator pedal

The position of the accelerator pedal does not need to be changed during the shift process.

The clutch is actuated via the electronic transmission control (TCU) depending on accelerator pedal actuation.

During this shift, the engine is influenced by the electronic transmission control (TCU).
1.6 Automatic mode

Actuate the service brake and press the «D» button while the vehicle is not moving. The transmission system selects the optimal starting gear. Once the accelerator pedal is depressed, the clutch closes automatically and then the vehicle starts to move. The shift system automatically performs upshifts and downshifts during travel.

When in automatic mode, the shift system avoids shifts which result in the engine over-revving or stalling.

The driver can always intervene manually (upshift and downshift) without losing acceleration – for example, in difficult driving situations. The driving mode then changes from automatic to manual.

1.7 Manual mode

With the vehicle at a stop, actuate the service brake and press the «D» button. By pressing the «Fn» button, the shift system switches into manual mode.

The driver can also press the upshift or downshift button to select a setting off gear other than that proposed by the system.

Once the accelerator pedal is depressed, the clutch closes automatically and then the vehicle starts to move. The driver uses the control lever «↑» or «↓» to select the gears required.

The driver must avoid over-revving the engine.

The engine may stall if the accelerator pedal is depressed in too high a gear.

1.8 ZF-Intarder

Operating Instructions 6085 758 102 are available for servicing and maintaining the ZF-Intarder.
2 Operation

Some deviations from the controls and operating processes are permitted depending on the manufacturer and vehicle type. Therefore, also consult the vehicle manufacturer's operating manual.

⚠️ DANGER !
The driver must not leave the vehicle when the engine is running and a gear is selected.

**Warning**

LED in the R, N and D buttons

Flashing:  Transmission function change is requested. Here permanently illuminated, the function change is complete.

Permanently illuminated:  Drive range is attained.

2.1 Starting the engine

- Engage parking brake
- Switch on “ignition”
- Transmission system self-check. «CH» appears on the display. The LED of the «N» button lights up as soon as the neutral transmission shift has been detected.
- Start the engine
  - Self-check is complete. «N» (neutral) appears on the display, transmission is in neutral setting. On startup automode is default the setting.

**NOTE**

- Gear shifts are not possible when the engine is not running.
- If «TC» and/or «CC» appears on the display, the self-check was not successful. Transmission and/or clutch positions could not be taught in.
2.2 Starting

2.2.1 Forward start

- Actuate the service brake and tip the «D» button.
  - Automatic mode is activated
  - The display shows the starting gear selected. The LED of the «D» button lights up.
  (The system selects the starting gear itself, the clutch remains separated (disengaged).)

- Depress accelerator pedal and at the same time release the parking brake.
  - Vehicle sets off (clutch closes automatically).

⚠️ DANGER!
The vehicle can roll away, even if the accelerator pedal is not actuated.
For a dead start on a hill, engage the gear and release the parking brake only when depressing the gas pedal. Otherwise, the vehicle will roll backward.
2.2.2 Backward start

- The vehicle must be stationary and the transmission must be in Neutral.
- Actuate the service brake and tip the «R» button.
  - «R» appears on the display (clutch remains disengaged) The «R» button LED lights up.
  - Vehicle drives backward.

**DANGER !**
If the vehicle moves, no shift to R will be effected!
Stop vehicle immediately.
Only the display indicates the driving direction engaged by the transmission.

2.2.3 Correcting the starting gear

The system proposes a starting gear. This can be corrected to a gear within the range between minimum and maximum starting gears.

**How to undertake a correction:**
- Tip « ↑ » or « ↓ » button.
  - The display shows the starting gear selected.
2.2.4 Starting with roll control (optional)

The vehicle can be equipped with an electronic roll control (Easy Start). Its purpose is to prevent unwanted moving of the vehicle during uphill or downhill dead starts.

- Start engine (see 2.1).
- Actuate service brake and release parking brake.
- Tip the «D» or «R» button.
  - Automatic operation is activated.
  - The display shows the starting gear engaged.
  - The «D» or «R» button LED lights up.
- Release service brake.
  - The service brake remains activated briefly due to the roll control.
- Actuate gas pedal.
  - The brake is released.
  - Vehicle starts moving.

DANGER!
After release of the brake pedal, the brake remains actuated only briefly. The vehicle can start moving.

NOTE
- The time at which the brake is released depends on the accelerator pedal position, the clutch position, and the vehicle speed.
- The brake is also released if the transmission is shifted into neutral or if neither the brake nor the gas pedal is actuated within a certain time period.
2.3 Maneuvering

1st gear (depending on vehicle, 1st and 2nd gear) and R gear are provided as maneuvering gears for extremely slow travel. Maneuvering mode is not available in the other gears. For selecting a maneuvering gear, the current gear may have to be corrected by pressing the «↓» button.

When in maneuvering mode, the vehicle (accelerator pedal) is very sensitive and clutch control differs from the normal driving mode.

The system detects maneuvering mode from the position of the accelerator pedal and the low roadspeed.

⚠️ DANGER!
The switch from maneuvering mode to start mode depends on the accelerator-pedal position and the driving speed.
The vehicle may suddenly accelerate.

The «CL» display appears when the clutch is overloaded.

Maneuvering in 1st or R gear

Maneuvering time is not limited in 1st gear.

⚠️ CAUTION
If the driver does not respond to the «CL» display, the clutch may be damaged as a result of overload.

Maneuvering in 2nd gear

Depending on the type of vehicle, the 2nd gear can also be used as a maneuvering gear. Maneuvering time is limited in this gear. There is a switch from maneuvering mode to start mode.

⚠️ DANGER!
If the driver does not respond to the «CL», a change is made from maneuvering mode into setting off mode. The vehicle may accelerate.
RISK OF ACCIDENT!
2.4 Starting to roll on slopes

Precondition: the engine must be running

⚠️ DANGER!

• If the vehicle starts to roll and no gears are selected – the LED of the «N» button lights up – the engine brake is ineffective!
• Do not allow the vehicle to roll in the opposite direction of travel to that of the gear selected.

If the vehicle rolls forward – with transmission in neutral «N» – once the brake is released and the driver shifts from «N» to «D», then the system selects a gear suitable for the road speed. The driveline is then fully engaged.

2.5 Changing between manual mode and automatic mode

Always possible, even while the vehicle is in motion.

Changing from manual to automatic mode

• Tip «Fn» button

Changing from automatic to manual mode

• Tip «Fn» button
2.6 Changing gear

2.6.1 Changing gear in automatic mode

All upshifts and downshifts are performed automatically. These depend on:
- drive situation
- loading
- accelerator pedal position
- road speed
- engine speed

Display

E.g.
2 arrows and 2 bars = automatic mode;
8th gear is selected.

2.6.2 Changing gear in manual mode

- Tip the «↑» or «↓» button.

The shift system stops automatic driving operation if a manual shift occurs. Tip the «Fn» button to reactivate automatic driving.

Option: Depending on the type of vehicle and the manufacturer, the shift system switches back to automatic drive operation after a certain amount of time if no other manual shifts are made.

Jumping gears:

Jumping one gear:
- Tip «↑» or «↓» button twice in rapid succession.

Jumping two gears:
- Tip «↑» or «↓» button three times in rapid succession in the direction required.
NOTES
• The driver can shift into neutral from any gear at any time. This shift process always takes priority.
• The position of the accelerator pedal must not be changed during the shift process because the engine is automatically controlled.
• A shift command is not carried out if this shift would result in the maximum engine speed (governing speed) being exceeded.

DANGER!
The driver may shift to “Neutral” during travel. If the driver does shift to “Neutral”, the driveline is interrupted. The engine brake is then no longer effective.

2.6.3 Engine braking effect when changing gear
The engine brake is deactivated by the system during gear shifts. Once the gearshift is complete, the engine brake is then automatically reactivated.

If the engine brake is actuated, the system switches back into automatic mode so that the maximum engine braking effect is achieved.

DANGER!
The effect of the engine brake is interrupted during gear shifts. The vehicle may accelerate when travelling downhill.
2.7 Change in direction of travel, forwards/reverse

⚠️ DANGER!
The vehicle must be stationary before any change in direction of travel, otherwise the transmission will go into Neutral.
No gear change has taken place until the LED stops flashing.

Change in direction of travel from «R» to «D»
- Vehicle must be stationary.
- Apply the service brake.
- Tip the «N» button.
- Tip the «D» button.

Change in direction of travel from «D» to «R»
- Vehicle must be stationary.
- Apply the service brake.
- Tip the «N» button.
- Tip the «R» button.

⚠️ CAUTION
Before any change in direction of travel, always tip the «N» button, otherwise the transmission will go into Neutral and «FS» will appear on the display panel.
2.8 Stopping vehicle

- Do not actuate the accelerator pedal and use the service brake to bring the vehicle to a standstill.
  - The clutch opens automatically before the vehicle reaches a standstill so that engine “stalling” is prevented.

CAUTION
In order to protect the mechanical parts of the clutch release system, the transmission must be shifted to neutral during longer stops (more than approx. 1 - 2 min., e.g., traffic jam, grade crossing, etc.). This disengages the driveline, closes the clutch and eliminates the stress on the clutch release system.

- Always actuate service or parking brake if the vehicle is not moved.

NOTE
To preserve the clutch release mechanism, the AS Tronic is equipped with an automatic Neutral shift function. If the accelerator pedal or brake pedal are not actuated within a defined period of time, the transmission shifts into Neutral and the clutch is closed. Before this happens, the driver receives an «NS» warning message on the display panel.

⚠️ DANGER!
- If the vehicle is at a standstill with the engine running and a gear selected, the vehicle can be moved by simple depressing the accelerator!
- Before leaving a vehicle with the engine running, the transmission must be shifted into neutral and the parking brake engaged.
- Actuating the parking brake during travel on a smooth road surface may result in the engine coming to a standstill. Power-assisted steering is then no longer available!
2.9 Switching off engine / parking vehicle

- Bring vehicle to a standstill.
- Engage parking brake.
- Tip «N» button.
  - «N» appears on the display.
  - LED of «N» button lights up.
- Switch off engine via ignition button.

⚠️ DANGER!
When engine is switched off, transmission goes into neutral, NO gear is selected. The vehicle may roll away if brakes are not actuated.

NOTE
If the transmission is **not** shifted into neutral before the engine is switched off, this is done automatically once the ignition is “Off”.
2.10  Towing

Vehicle manufacturer instructions must be observed when towing!

CAUTION
For towing purposes, always disconnect the propellor shaft flange from the rear axle before setting off. If it cannot be disconnected, remove both axle shafts. Avoid polluting the environment in the event of oil loss.

2.11  Tow-starting

The engine cannot be tow-started.

2.12  Clutch protection

«CL» is displayed if there is a risk of clutch overload resulting from several starting processes occurring in a rapid succession or of crawling in too a high starting gear.

NOTE
Select an operating mode in which the clutch will not be overloaded, for example:

- Accelerate vehicle (to close the clutch)
- Stop the vehicle
- Set off quickly in a lower gear
- To conserve the mechanical components of the clutch release device, the transmission should be shifted to neutral if the vehicle stops for long periods of time (for more than approx. 1 to 2 min., for example, in traffic jams, at railway crossings etc.). This closes the clutch and relieves the clutch release device.

Even though the clutch is automated, the driver still has considerable influence on clutch service life. To keep levels of wear on the clutch low, we would recommend that when setting off, you always select the lowest gear possible.
2.13 Engine overspeed protection

For the protection of engine and transmission, the electronic system will only permit gearshifts within the speed ranges specified by the vehicle manufacturer.

⚠️ DANGER!
If a higher gear is automatically engaged during downhill driving, the vehicle may accelerate. RISK OF ACCIDENT!

CAUTION
If the vehicle accelerates during downhill driving and the engine speed reaches the overspeed range, the engine may be damaged.

Automatic driving mode
To protect the engine from damage caused by overspeeding (red line), a higher gear will be automatically engaged. This may cause the vehicle to accelerate during downhill driving.

Manual driving mode*
In the manual driving mode, no higher gear will be automatically engaged during downhill driving. Especially during downhill driving it is important to make sure that the engine speed does not exceed the permitted speed range. This is the responsibility of the driver.

* not released for some vehicles
2.14 Roller test rig

- Drive onto the roller test rig (brake test rig)

- Tip «N» button
  Transmission is in neutral

  - Once the roller is activated, the system detects the “driving vehicle” status. If a shift is made to «D» with the roller active, a gear appropriate for the speed is selected and the clutch is closed. Automatic shifts are not undertaken because the front axle does not rotate.

- Reverse gear cannot be selected when the roller is activated.

⚠️ DANGER!
The vehicle may drive off the roller even if the accelerator is not depressed.
2.15 Displays for ZF-AS Tronic

The display provides information on the status of the transmission.

Operating displays

- Manual mode
  - 4th gear is engaged in the transmission (no bars or arrows)
  Option: If, while traveling, the upper or lower arrow is lit, then, in general, the transmission system recommends to change gears (also refer to Chapter 1.4.2).

- Automatic mode
  is shown in the display by means of 2 bars and 2 arrows.
  (8th gear is selected in transmission)

- «CH» = system self-check.
  Display appears when ignition is "On".

- Transmission in neutral position.

- Reverse gear of the transmission is engaged.
Warning indication

• «AL» = Airless.
  Alternates with the normal display. The transmission compressed air system has insufficient pressure.

  NOTE
  Only set off once there is sufficient pressure in the pneumatic system. If pressure is too low when the vehicle stops, do not open the clutch otherwise the engine will “stall”.

⚠️ DANGER!
If shifts are undertaken when pneumatic pressure is too low, the transmission may remain in neutral to ensure that there is no direct drive and that the engine brake is ineffective.

• «BP» = Actuate brake pedal.
  - Actuate the brake pedal for gear engagement.

• «CC» = Clutch Check
  Clutch position cannot be learned.

• «CL» = Clutch Load
  Alternates with the normal display. Clutch is overloaded.
  - Remedy: Section 2.12 Clutch protection
• **CW** = Clutch Wear
  - Clutch has reached calculated wear limit.
  - Visit nearest specialist workshop to replace the clutch.

• **EE** = Electronic Error
  Is displayed when the communication of the display with the transmission electronics is disturbed.

• **ES** = Easy Start
  Temporarily, no electronic roll control is available.

⚠️ **DANGER: The vehicle can start moving!**

• **EX** = External signal active
  - Gear engagement is prevented by external signal.
  - Starting is prevented by external signal.

• **FP** = Accelerator
  - Move accelerator pedal into idling position after “ignition on”.
  - If the display does not go out, there is a system error. Vehicle cannot be driven any further.

• **FS** = False Shift
  - Incorrect gear change from «D» to «R» or from «R» to «D»
  Prior to each change of direction, first tip the button «N» and then change over to «R» or «D» otherwise, the transmission will shift into neutral and in the display, «FS» will be lit.
• «HT» = High Temperature
  - The transmission's temperature is too high; let the transmission system cool down.

• «NS» = Neutral Shift (shift to Neutral)
  - Tip the button «N» Neutral.

NOTE
Depending on the vehicle type, the transmission can automatically shift to neutral in order to protect the mechanical components of the clutch release after running a certain amount of time.

• «SM» = Severe system fault (system malfunction)
  - Stop the vehicle. The vehicle must not be driven any further. You must visit a workshop.

⚠️ DANGER: Wherever possible, do not stop the vehicle in danger zones.

• «TC» = Transmission Check
  - Transmission positions cannot be learned.

• «---» = Display Error
  Is displayed when the communication of the display with the transmission electronics is disturbed.

See also Section 2.16
2.16 System faults (error messages)

A **system fault** is present if the transmission warning light on the dashboard lights up.

For the driver, this means:
- increased vigilance
- restricted drive comfort, e.g. when setting off and shifting or automatic mode is no longer available
- the vehicle cannot be driven any further
- take vehicle to specialist workshop as soon as possible

A **serious system fault** is present if the transmission warning light on the dashboard lights up and «SM» is displayed on the range selector display.

For the driver, this means:
- vehicle must not be driven any further
- stop vehicle

**NOTE**
If «SM» is displayed on the range selector display without the transmission warning lamp on the dashboard lighting up, the transmission warning lamp is defective.
2.16.1 How should you respond to a system fault?

With the vehicle stationary, the fault message and resultant error response can be deleted if the driver:

- switches off the ignition and waits until the display disappears.
- If the display does not disappear after «ignition OFF», switch off system using main battery switch.
- Switch ignition back on.
- If the fault message is still present, the vehicle must be taken to specialist workshop. When contacting this workshop, the error number(s) must be specified.

**Display active error number:**

- Switch on ignition.
- Tip the «N» button.
- Tip the «↑» button and hold down.
- Error number appears on range selector display.

**Show all error numbers saved:**

- Switch on ignition.
- Tip the «N» button and actuate the service brake at the same time.
- Tip the «↑» button and hold down with the service brake actuated.

All errors stored in memory appear in sequence on the range selector display.
Error number display:

If two bars are lit in front of the error number indicated, then this means: Error no. + 100.

Example: Error number 162

If two arrows and two bars are lit in front of the error number indicated, then this means: Error no. + 200.

Example: Error number 227

If no arrows and no bars are lit in front of the error number indicated, then this means that the error number has only two digits.

Example: Error number 98
2.17 Use in sub-zero temperatures

The vehicle manufacturer's specifications should always be observed.

<table>
<thead>
<tr>
<th>Outside temperature</th>
<th>Down to −20 °C</th>
<th>−20 °C to −30 °C</th>
<th>−30 °C to −40 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil grade</td>
<td>in accordance with ZF-List of Lubricants TE-ML 02</td>
<td>in accordance with ZF-List of Lubricants TE-ML 02</td>
<td>in accordance with ZF-List of Lubricants TE-ML 02</td>
</tr>
<tr>
<td>Engine start</td>
<td>permitted</td>
<td>permitted</td>
<td>Transmission must be preheated before the engine is started.</td>
</tr>
<tr>
<td>When starting, note</td>
<td>−</td>
<td>Warm-up phase of at least 10 minutes, with increased idling speed of approx. 1500 rpm. Transmission in Neutral</td>
<td>This can be done e.g. with warm air which must not exceed 130 °C on the transmission. CAUTION Do not heat on the transmission and clutch actuator.</td>
</tr>
<tr>
<td>Limitations</td>
<td>None</td>
<td>At transmission temperatures in excess of −20 °C, the transmission is operable and all functions are provided. Longer shift times should be expected.</td>
<td>At transmission temperatures in excess of −20 °C, the transmission is operable and all functions are provided. Longer shift times should be expected.</td>
</tr>
</tbody>
</table>
NOTE
Air leakage on the transmission system will increase significantly at temperatures below –20° C. It is not sure that the clutch can be opened for the engine to start in this temperature range. In this case, the engine-based starter must be able to overcome the drag torque of the transmission in addition to that of the engine.

2.17.1 Parking the vehicle at very low temperatures
The vehicle may be parked for a long time or the transmission may be stored at outside temperatures down to –40 °C.
3 Maintenance

- Please also pay attention to details provided by the OEM.
- Regular maintenance improves the operational reliability of the transmission.
- Visual inspection for oil leaks in the course of a vehicle inspection.
- All transmission inspection work may only be carried out when the vehicle is standing on level ground and the engine is switched off.
- With all drain plugs, fill plugs, or screw plugs it must be ensured that the sealing ring has been renewed prior to assembly.
- Do not point pressurized water jet directly at the breather valve (causes ingress of water in transmission: risk of corrosion).
- For transmissions with ZF-Intarder, the ZF-Intarder Operating Manual 6085 758 102 is also required.

3.1 Visual inspection of the wiring

- Check wiring for damage in the course of a vehicle inspection.
- Ensure that connectors are seated correctly, connectors must be fitted with tension relief.

3.2 Maintenance of the compressed air system

- The maintenance instructions of the vehicle manufacturer must be observed.
- The compressed air reservoir must be drained every week (every day in winter).

NOTE
When the compressed air reservoir is drained, the compressed air cleaner and water separator must also be drained, unless these operate automatically.
- On vehicles equipped with an air drier, always comply with the specified interval for replacement of cartridges.
### 3.3 Type plate

The type plate contains the most important data. It can be found on the left-hand side of the transmission, when viewed from the output.

The following should always be specified when making enquiries or undertaking repairs:

1. parts list no. of transmission
2. transmission type
3. serial no. of transmission

![Type plate (example)](image)

<table>
<thead>
<tr>
<th>MODELPARTS LIST NO.</th>
<th>SERIAL NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1348 035 006</td>
<td>00200100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CUSTOMER SPEC NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>TOTAL RATIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OIL CAPACITY IN LITERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>OIL GRADE SEE LUBRIC. LIST TE-ML</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
</tr>
</tbody>
</table>

**1337 758 101 - 2008-11**
3.4 Breather function on the transmission

The transmission oil heats up during travel. This causes excess pressure to build up, and this needs to be relieved continuously through a breather valve and/or hose breather. Ensure that the breather valve and/or hose breather are able to function properly at all times.

As part of the vehicle inspections, check the following points with regard to hose breathers:

- The hose must be routed on a continuously rising gradient, without any S-shaped bends (siphon effect).
- The hose must not exhibit any signs of damage, sharp bends, or chafing.
- Never exceed the max. permitted hose temperature (e.g. near the exhaust pipes, exhaust turbocharger).
- End of hose must be in a dry compartment and should be approx. 150 mm lower.
3.5 Oil change intervals

To ensure the operational safety of the transmission, compliance must be maintained with the oil change intervals specified in the ZF List of Lubricants TE-ML 02! For the latest List of Lubricants, visit http://www.zf.com.

3.6 Oil grade

For lubricants released by ZF, please refer to the ZF List of Lubricants, TE-ML 02.

“We recommend the use of ZF-Ecofluid M”.

The ZF List of Lubricants, TE-ML 02, is made available by all ZF Service Centers or can be obtained from the Internet: http://www.zf.com.

3.7 Oil quantity

The correct oil quantity is shown on the type plate. Follow the oil fill process accurately to ensure the correct oil quantity is in the transmission (see Chapter 3.8.1).
Example: ZF-AS Tronic 12 AS 2300 BO

1. Tighten oil drain plug to 60 Nm
2. Tighten oil drain plug to 60 Nm
3. Tighten oil filler plug to 60 Nm
4. Type plate
5. Connection for hose breather and/or breather valve
3.8 Oil change

Oil changes must always be carried out with the vehicle standing on level ground and with the engine switched off.

Always change oil after long journeys provided that the transmission oil is still at operating temperature and is still thin.

⚠️ DANGER!
Risk of burning upon contact with parts and with the transmission oil.

- Remove oil drain plugs (1, 2 and 3) from transmission and collect transmission oil in a suitable container. Dispose of in an environmentally-friendly manner.
- Clean the magnet on the oil drain plug (2).
- Replace seals on oil drain and oil filler plugs.
- Screw in oil filler screws (1 and 2) and tighten to torque of 60 Nm.

3.8.1 Filling with oil

- Fill oil through oil filler point (3).
- The oil level is correct once the oil reaches the lower edge of the oil filler point, and/or whenever oil emerges at the oil filler point.
- Screw in oil filler plug (3) with new seal and tighten to torque of 60 Nm.
3.9 Control del nivel de aceite

¡PELIGRO!
Falta de aceite en la caja de cambios, origina una avería en la misma. ¡PELIGRO DE ACCIDENTE!

- Efectuar el control del nivel de aceite sólo con el vehículo situado horizontalmente.
- Evite realizar el control del nivel de aceite inmediatamente después de la marcha (resultado de medición erróneo). Realizar el control una vez que se haya enfriado el aceite (<40 °C).
- Desenroscar el tornillo de llenado de aceite (3).
- Si el nivel del aceite ha descendido por debajo del orificio de llenado, hay que rellenar aceite (ver capítulo 3.8.1).
- Volver a cerrar el orificio de llenado con tornillo-tapón (3) y anillo-junta nuevo.

Par de apriete $T_A = 60$ Nm

NOTA
En cada control hay que verificar la estanqueidad del sistema de transmisión.