Contents

1. Prior to installation

Before starting installation, please read this installation guide carefully. In particular, please pay attention to the safety and installation instructions.

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2. Symbols used in the installation guide

denotes instructions which are important for your safety and the safety of others.

denotes instructions which are important for the installation and function of the unit.

3. Safety instructions

Incorrect installation
Incorrect installation may result in damage to the unit or to the vehicle. Specialist knowledge and skills are required to install the unit and its components. We strongly recommend that you have the unit installed by a specialist workshop.

Risk of injury
Installing the components incorrectly may lead to injuries in the event of a road traffic accident or render safety devices ineffective. Please refer to the instructions provided by the vehicle manufacturer.

Damage to the airbag
Installing the components in the wrong location may damage the airbag or impair its operation. Do not install the components within the operating range of the airbag.

Risk of injury due to inadequate fastening
Fix the components in place so that they cannot be loosened in the event of a collision or sudden braking.

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4. Installation instructions

☞ Damage due to polarity reversal or short-circuit
Incorrect cable connections and short-circuits can seriously damage the unit.
Disconnect the vehicle battery before installing the unit.

☞ In order to avoid short-circuits and malfunctions, install the cables so that they cannot be pinched, kinked, chafed or detached.

☞ Before installation, park the vehicle in a safe and level place and remove the ignition key.

☞ In order to avoid malfunctions, it is absolutely essential to observe the relevant cable cross-section when using branch connections/cable connectors.

☞ In order to avoid short-circuits and any associated risk of fire, cables which have to be cut must be properly insulated.

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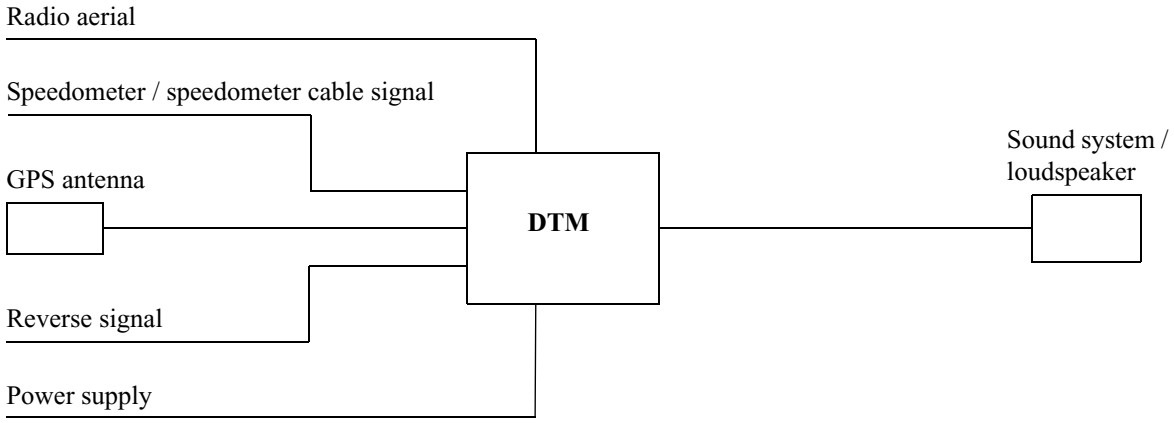
5. Connection diagram for the navigation system



Note: The various connection options are described in detail on page 53.

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6. Installation of the GPS antenna

Risk of injury
People with pacemakers should avoid physical contact with the magnetic antenna and should not carry the antenna on their person, as this may affect the function of the pacemaker.
Keep the magnetic antenna away from data storage media (disks, credit cards, magnetic cards etc.) and electronic and precision engineering equipment, as this may cause data to be deleted.
Do not use the antenna in areas at risk of explosion.
It is important to secure the antenna so that it cannot become detached in a collision or sudden brake manoeuvre.

Possible installation positions

- **Outside the vehicle**

  a. Attach the antenna to a flat, pre-washed metal surface.

  b. Then guide the antenna cable into the vehicle interior.

Risk of injury
The maximum vehicle speed for the antenna if magnetically attached is 180 km/h. The antenna must be removed or specially secured at higher speeds.
The antenna is not suitable for car-wash facilities.

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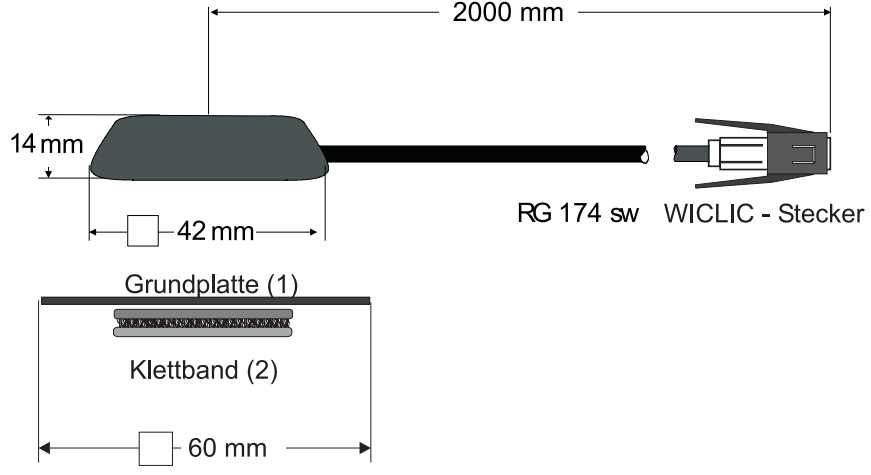
- **Inside the vehicle**

> The antenna can only be installed on a non-metallised windscreen.
> When selecting the installation position, ensure that the antenna has a clear view of all directions, and that it is not covered by the windscreen wipers. Obstructions caused by the bonnet, window crossbeams and roof should be avoided as far as possible.

a. Secure the antenna to the base plate (1) with magnets.

b. Remove protective strip from top of adhesive tape (2) and stick to the centre of the base plate underside.

c. Remove protective strip from bottom of adhesive tape (2) and stick the antenna and base plate onto the vehicle console beneath the windscreen at the installation position.



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GPS reception can be affected by screens with screen antenna, windscreen heating or thermally insulated screens. Some thermally insulated screens are coated with titanium or silver oxide. Installation of the GPS antenna in the vehicle interior can considerably impair the function of the navigation system.

7. Connecting the reverse signal

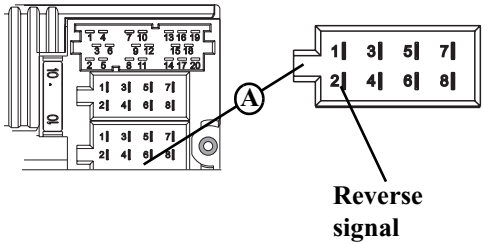
The pick-up points for the reverse signal vary from vehicle to vehicle.
If you are in any doubt, please contact your vehicle manufacturer or authorised specialist workshop.

If the switch on the gearbox or shift linkage is accessible:

- Connect a separate lead to the activated contact.
  Connect the lead to socket A pin 2.
  Low - level = earth, high - level 12 V - 16 V

If the switch is not accessible:

- Check which lead is routed to the reversing lamp. Then, if necessary, remove the inner cover for the reversing light.
  Connect a separate lead to the activated lead of the reversing lamp and connect to socket A pin 2.



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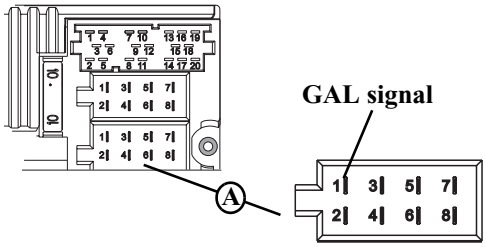
8. Connecting the speed signal (GAL) for the speedometer / speedometer cable

Accident hazard
Incorrectly connected wiring may result in damage to or destruction of vehicle components and safety devices. If you are in any doubt, please contact your vehicle manufacturer or authorised specialist workshop.

Electronic speedometer

- Remove the signal from the speedometer, extend and connect to socket A pin 1.



Depending on the vehicle equipment, the lead for the GAL signal is usually connected to the DIN - ISO plug of the car radio. The assignment of the DIN - ISO plug may vary depending on the vehicle type.

- Minimum requirement for the signal:
  0 Hz - 4 kHz / square-wave signal (no inductive sensor)
  Low - level < 1.5 V, high - level 5 V - 16 V

If you do not know the exact installation position / location of the speed signal, please consult the vehicle manufacturer.

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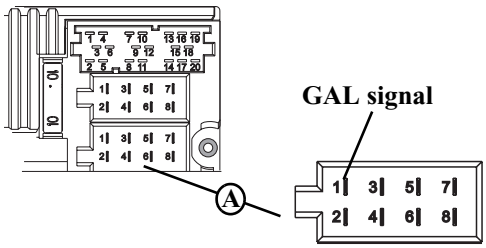
Mechanical speedometer with integrated speed sensor in the speedometer cable

- Remove the signal from the speed sensor, extend and connect to socket A pin 1.
- Minimum requirement for the signal:
  0 Hz - 4 kHz / square-wave signal (no inductive sensor)
  Low - level < 1.5 V, high - level 5 V - 16 V

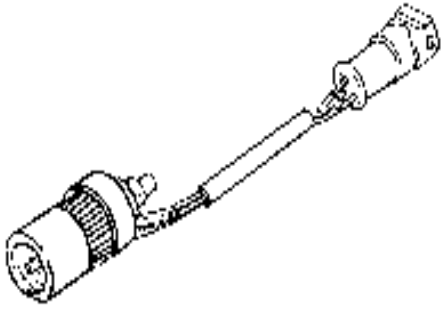


If you do not know the exact installation position / location of the speed signal, please consult the vehicle manufacturer.

Mechanical speedometer without speed sensor in the speedometer cable

A speed sensor which generates a digital, speed-dependent signal must be installed in the speedometer cable.

The VDO adapter 2152.30300000 or a vehicle-specific adapter which satisfies the minimum requirements can be used. The VDO speed sensor is suitable for direct installation on the gearbox (no further installation parts required) or in the speedometer cable (in conjunction with additional universal installation parts).



If the sealed speedometer cable is released, a correct display cannot be guaranteed. Incorrect installation leads to improper functioning of the navigation system or of the speedometer.

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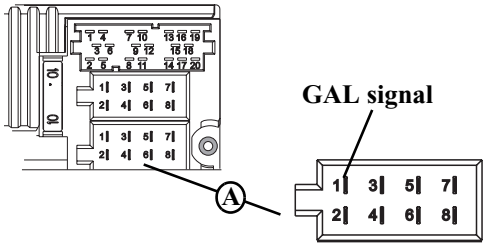
Installing the speed sensor directly on the gearbox

- Release the speedometer cable and screw speed sensor onto gearbox. Screw released speedometer cable onto the speed sensor and connect the wires.

Wire connections for the speed sensor

Brown - earth (terminal 31)
Black - power supply (terminal 15), 9 - 16V, 30 mA
Blue/red - signal for socket A pin 1



Installing the speed sensor in the speedometer cable

In order to install the speed sensor, the speedometer drive cable must be cut in one even piece for insertion of the speed sensor. When removing the speedometer cable from the vehicle, ensure that the location of the evenly running piece is established and marked accordingly.

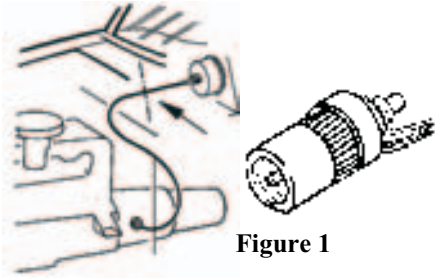


Figure 1

Installation is illustrated without reference to any specific vehicle. In addition to the sensor, the following VDO universal parts are required:

1 x connecting piece	1040 1300 025	(VDO part number)
2 x knurled nuts1	040 1000 003	(VDO part number)
2 x hose sleeves	1040 1000 031	(VDO part number)
2 x dogs1	040 1000 049	(VDO part number)
2 x friction washers	1040 0900 003 300	(VDO part number)
2 x fuel washers 4.0	KN07.0570.18	(VDO part number)
2 x washers	KN11.1904.122	(VDO part number)

An appropriate, complete kit from VDO (part number X 39397106191) can also be used.

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Recommended tool: Cable installation tool for speedometer cables from VDO, order number: 1999.10.13.000.110

If you require vehicle-specific parts, please consult the vehicle manufacturer or your nearest VDO branch.

- Using a metal saw, saw into the cable approx. 1 mm at right angles to the profile and break off (Figure 3).
- Then cut the cable in the centre with side-cutting pliers (Figure 4).

> For protective hoses with wire netting, the hose and flex cable can be cut directly with the side-cutting pliers.

- Shorten the protective hose again at both ends up to the plastic sheathing. Check whether the ends of the flex cable still engage in the speedometer and the gearbox.
- Shorten the inner cable to a projection of 13 mm (Figure 5).
- Connect the union nut and hose sleeve (Figure 6) and push onto the hose ends (Figure 7).
- Connect friction washer to dog (Figure 8).

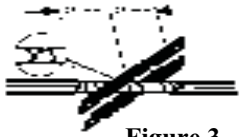

Figure 3

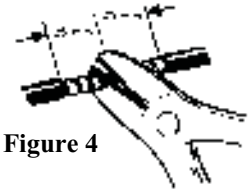

Figure 4

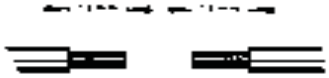

Figure 5

Figure 6

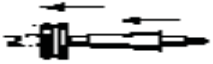

Figure 7

Figure 8

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- Remove grease from flex cable and connect dog to flex cable. Using a suitable installation tool, press the dog onto the flex cable (Figure 9).

Figure 9

> When pressing in, ensure that the dog is securely positioned and that it runs smoothly.

- Pull the hose sleeve and nut as far as possible in the direction of the dog, to achieve approx. 1-2 mm play (Figure 10).
  Slightly squeeze the hose sleeve with pliers. Wrap with isolating tape to secure (Figure 11).

Figure 10

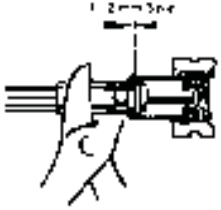
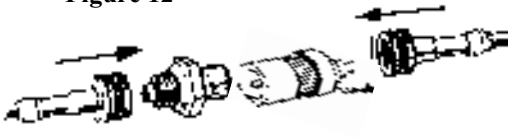


Figure 11

- Screw the connecting piece and the speed sensor into the cable (Figure 12).

Figure 12



- Connect speed sensor using the extension cable from VDO (part number: 2152.90 30 0100).

Wire connections for the speed sensor

Brown	-	earth (terminal 31)
Black	-	power supply (terminal 15), 9 - 16V, 30 mA
Blue/red	-	signal for socket A pin 1

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9. Installing and commissioning DTM

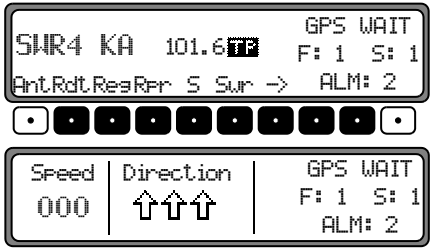
- This navigation system has an integrated universal bracket for DIN installation slots. An installation frame is not required. The unit is inserted into the installation slot and secured with the slides supplied.
  Further information is given in the operation guide in the chapter, "Installation and removal instructions".

> ☞ The installation angle of the unit must not exceed -10° to 35° (vertical).

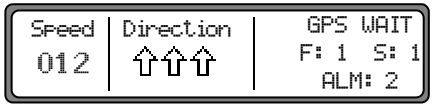
- Connect the battery.

10. Using GPS for the first time, and sensors

- Switch on the vehicle ignition to start using GPS for the first time and for the sensor test. Switch on DTM.
  Enter code (see the operation guide for a detailed description).
- Press the 1 multifunction button and the 10 multifunction button simultaneously.
- This calls up the menu for the initial GPS start-up and for the sensor test.
- Move the vehicle several metres forwards or backwards for the speed signal function test.



> ☞ The number under Speed must change (even at a low speed). The number under Speed should not increase when idling or pressing the accelerator when the vehicle is parked.



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- Engage the reverse gear for the reverse signal function test.

> The arrows under Direction must change direction on engaging the reverse gear.

- When using the GPS for the first time, the vehicle must be parked outdoors, while ensuring that it has a clear view in all directions (not in the immediate vicinity of buildings).
  Information on the GPS reception is given in the right-hand part of the display.
  Four different messages may appear:
  - GPS OK: GPS reception is already available.

  - GPS WAIT: It is necessary to wait for GPS reception. You must wait until GPS OK is displayed.

  - GPS ANTENNA ERROR: The GPS antenna is not properly connected.

  - GPS MODUL ERROR: If this message is displayed, please contact the hotline.

> You must wait until GPS OK, F: 2 (or F: 3) and ALM: 22 (or a higher value) is displayed.
> This procedure (first reception of the necessary GPS data) may take a few minutes. The unit must remain switched on for the entire duration of this procedure. The vehicle must not be moved. If after 5 minutes there has been no change in the values, the parked position (clear view in all directions as far as possible) or the installation location of the GPS antenna must be checked.

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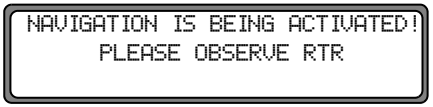
- The menu for initial GPS start-up and for the sensor test is quit by simultaneously pressing the 1 multifunction button and the 10 multifunction button.

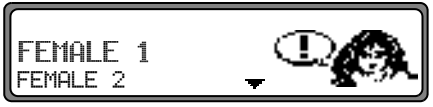
11. Installation of the Navigation Software

- Press the NAV button.
- Insert the Navigation CD to install the software for the navigation system.
- After the navigation software has been installed, the adjacent display appears. The language selection is then requested.



- Select the language using the right rotary control ⏺. The language selection is accepted by pressing the control.

You can choose either a male or a female voice for some languages.



Select the voice using the right rotary control ⏺. The voice is accepted and installed by pressing the control.

The adjacent display appears after installation. Then press the right rotary control ⏺ to confirm.

☞ The language selection can be changed at a later time, as described in the operating guide.

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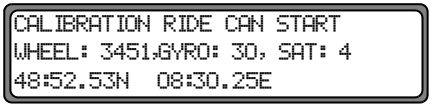
12. Calibration

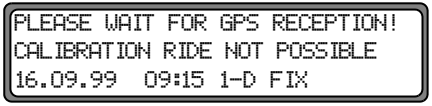
After commissioning, a calibration journey is required. During the journey, the speed signal (GAL) is automatically adapted to the vehicle-specific data and the gyro sensor is automatically adapted to the installation position of the unit.
The distance to be covered depends on the type of vehicle and the local conditions.

> The navigation system is only ready for operation on completion of the calibration journey. The main navigation menu is displayed. Final precision is only achieved after a further journey.

- The adjacent display appears after the language installation.



It is possible that GPS reception has deteriorated as a result of changing the vehicle position and due to obstructions. In this case, the adjacent display appears.



> Adequate GPS reception must be ensured for the calibration ride. This means at least 2-D FIX. With GPS FIX 3-D the calibration will be quicker. However: a lower accuracy of the GPS signal (2-D FIX) does not lead to a poorer calibration, but instead will mean that the time and distance needed for the calibration will increase.

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If, even after a relatively long period of time, the display with the request CALIBRATION RIDE CAN START does not appear, then you should check the GPS reception conditions again (as under Service Mode in the Section Function test of GPS antenna (GPS INFO)46).
As soon as the display with the request CALIBRATION RIDE CAN START appears, the calibration ride can be started.

> A calibration ride can also be performed in a non-digitised area. The insertion of the Navigation CD is not absolutely necessary after the navigation software has been installed. Without the Navigation CD inserted, no location is displayed.

- The basic requirement for a calibration ride is: **driving 200 - 300 metres in a straight line, then turning by at least 60 degrees and then driving 200- 300 metres in a straight line again, and turning again.**

> The direction you turn is of no significance. If these conditions cannot be fulfilled due to the road or the fact that you do not always have optimum GPS reception, this will not lead to a poorer calibration, but will simply mean the time and distance necessary for the calibration ride will be longer.
> If the unit is switched off during the calibration ride, language installation is requested when the unit is switched on again. Re-installation can be skipped by pressing the **NAV** button.

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- Calibration has been completed successfully if the main navigation menu is displayed.

- For correct navigation on routes with time-dependent traffic guidance, the time should be set correctly as described under "System settings" in the operation guide.

13. Service Mode

In Service Mode, various functions can be checked in detail and the calibration can be modified.

- Switch on the unit (see operation guide).
  Enter code (see operation guide).
- If the unit has already been calibrated, select the main navigation menu by pressing the **NAV** button.
  If the unit has not been calibrated, proceed as described in the next point but one.
- Press the **NAV** button again to access the system settings.
- Press and hold the 3 multifunction buttons. Then press the 5 multifunction button. This calls up the Service Mode.

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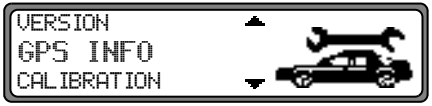
The following functions can be selected in the Service Mode:

- GPS INFO - GPS function test
- CALIBRATION - function for deleting the calibration or for setting a calibration
- CALIBRATION RIDE - display for calibration ride
- MODULE TEST - internal component test
- SENSORS - sensor function test
- SPEECH TEST - voice test
- DEMO - demo mode selection
- VERSION - the status of the Navigation CD is displayed

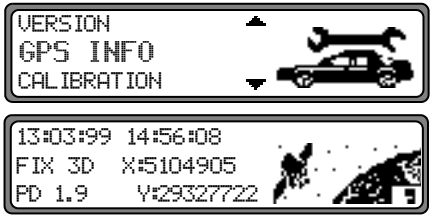
By turning the right rotary control ●, select the desired entry (large letters) and press to confirm.



Function test of GPS antenna (GPS INFO)

In Service Mode, select GPS-INFO with the right rotary control ● and press to confirm.

If functioning properly and with GPS reception, the number of satellites received (e.g. 5), the date and time (e.g. 13.03.99 14:56:08) and the type of positioning currently possible FIX: (e.g. 3D) are displayed.



> At least FIX 2D is required for quick and successful calibration. A certain amount of time may be required to reach this value (do not move the vehicle during this period).

In order to quit the GPS test, press the **NAV** button. The unit switches back to the Service Mode.

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Changing the calibration (CALIBRATION)

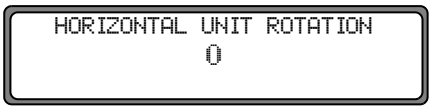
Deleting the calibration:
If the navigation system is removed from one vehicle and installed in another, it must be calibrated. However, to do so, the current calibration data must be deleted.
In the Service Mode, select CALIBRATION using the right rotary control ⊙ and press to confirm.
Using the right rotary control ⊙ select DELETE and press to confirm.
The calibration is deleted and the unit returns to the Service Mode.

Calibration setting:

> Calibration settings should only be made when the values to be entered are known. The unit cannot perform correct route calculations if incorrect values are entered.

It is possible to provide calibration settings.
In the Service Mode, select CALIBRATION using the right rotary control ⊙ and press to confirm.

Using the right rotary control ⊙ select MODIFY and press to confirm.
Unit rotation can be selected in degrees by turning the right rotary control ⊙ and pressing to confirm.



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> Unit rotation corresponds to horizontal rotation. A positive value means rotation of the front of the unit towards the driver (LHD).

The unit inclination can now be selected in degrees by turning the right rotary control ● and pressing to confirm.

> Unit inclination corresponds to vertical inclination. A positive value means upward inclination of the front of the unit.

The number of wheel impulses per wheel revolution (if known) can then be selected by turning the right rotary control ● and pressing to confirm.

> If the number of wheel impulses per wheel revolution is not known, UNKNOWN must be selected. It is then not possible to enter tyre data.

The previously entered data is displayed once more. If the data entered is correct, press the right rotary control ●.
If correction is necessary, select MODIFY by turning the right rotary control ● and press to confirm. The values can then be re-entered.

Once the previously entered data has been confirmed, the tyre data can be entered or self-calibration can be started.
To enter the tyre data, select INPUT TYRE VALUES by turning the right rotary control ● and press to confirm.

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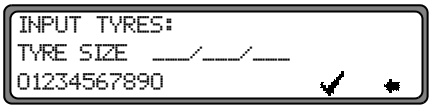
Enter the correct tyre size using the right rotary control and confirm the entry by pressing for more than 2 seconds.



> The letter "R" cannot be entered. 3 numbers must be entered before and after the slashes. Insert a "0" for any missing numbers.
> Example:
> Specification in vehicle registration papers: 185/55R15 81T
> Input into unit: 185/055/015

Then select between NEW TYRE TREAD and USED TYRE TREAD by turning the right rotary control ⊙ to enter the approximate tread depth value.
Press the right rotary control ⊙ to confirm the selection.

The previously entered data is displayed once more. If the data entered is correct, press the right rotary control ⊙.
If correction is necessary, select MODIFY by turning the right rotary control ⊙ and press to confirm. The values can then be re-entered.
After confirming the tyre data or the previously confirmed point START SELF CALIBRATION, the adjacent display appears.
After a short time, the unit switches to the main navigation menu or the calibration ride is requested.

> The unit is now in calibration status 2. Absolute precision is, however, only achieved as of calibration status 3.

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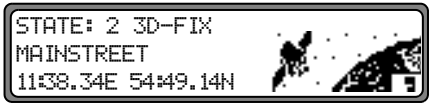
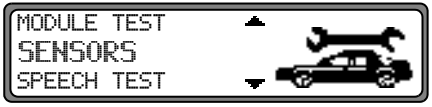
Status of calibration ride (CALIBRATION RIDE)
In the Service Mode, select CALIBRATION RIDE using the right rotary control ❶ and press to confirm.
The calibration status (e.g. STATE: 2) and the type of positioning (e.g. 3D) are displayed. After completing calibration, the street in which you are currently driving is displayed (provided that it is digitised) instead of WHEEL and REV..



Testing the system components (MODULE TEST)
A test program automatically tests the internal components of the navigation system.
In the Service Mode, select MODULE TEST using the right rotary control ❶ and press to confirm.
If OK is displayed, press the **NAV** button. The unit switches back to the Service Mode.

Function test of the GAL signal, reverse signal, internal sensors (SENSORS)

- In the Service Mode, select SENSORS using the right rotary control ❶ and press to confirm.
- Move the vehicle several metres forwards or backwards for the GAL signal function test.



☞ The number after WHEEL: should increase (even at a low speed).
The number after WHEEL: should not increase if idling or pressing the accelerator when the vehicle is parked.

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- Engage the reverse gear for the reverse signal function test.

> The number after REV.: should jump from 0 to 1 (1 to 0).

- Drive round a bend to test the function of the internal sensors.

> The values after X: and Y: should change.

In order to quit the sensor test, press the **NAV** button. The unit switches back to the Service Mode.

Testing the voice (SPEECH TEST)

A test program is used to test the voice.

- In the Service Mode, select SPEECH TEST using the right rotary control ● and press to confirm.
  The announcement "Please insert Navigation CD" is given.
  By pressing the right rotary control ●, the announcement can be repeated.
  After completing the test, press the **NAV** button. The unit switches back to the Service Mode.

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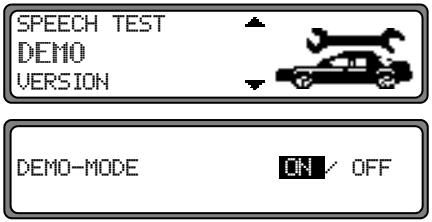
Demo Mode (DEMO MODE**)**

The demo mode is intended for demonstration purposes. A fixed location is given to the unit (Hamburg Werderstaße).

- In the Service Mode, select DEMO-MODE using the right rotary control ❶ and press to confirm.
  Select between ON and OFF by briefly pressing the right rotary control ❶. By holding down the right rotary control ❶, the selection is confirmed.
- You can now enter a destination as described in the operation guide.
- To switch off the demo mode, select OFF with the right rotary control ❶ and press to confirm.



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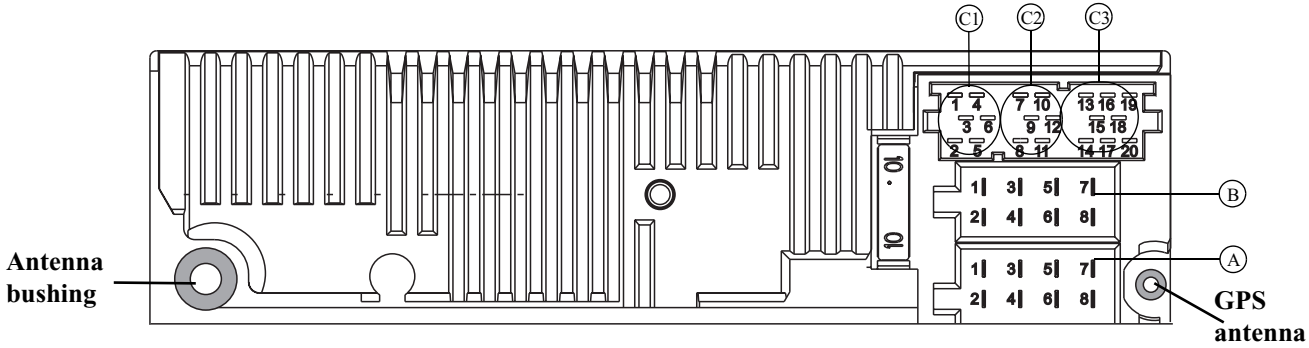
14. Connections



Socket A

1 Speed signal (GAL)
2 Reversing lamp signal
3 Telephone mute / clearing function
4 Permanent positive (terminal 30)
5 Control output for automatic antenna/amplifier
6 Illumination (terminal 58)
7 Switched positive (terminal 15)
8 Earth (terminal 31)

Socket B

1 Loudspeaker rear right +
2 Loudspeaker rear right -
3 Loudspeaker front right +
4 Loudspeaker front right -
5 Loudspeaker front left +
6 Loudspeaker front left -
7 Loudspeaker rear left +
8 Loudspeaker rear left -

Socket C1

1 LineOut rear left
2 LineOut rear right
3 AF earth
4 LineOut front left
5 LineOut front right
6 Subwoofer LineOut

Socket C2

7-12 Special connection for Becker CD changer

Socket C3

13 AF telephone input
14 Earth - telephone input
15-17 Special connection for Becker CD changer
18 CD AF earth (AUX)
19 CD AF left (AUX)
20 CD AF right (AUX)

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