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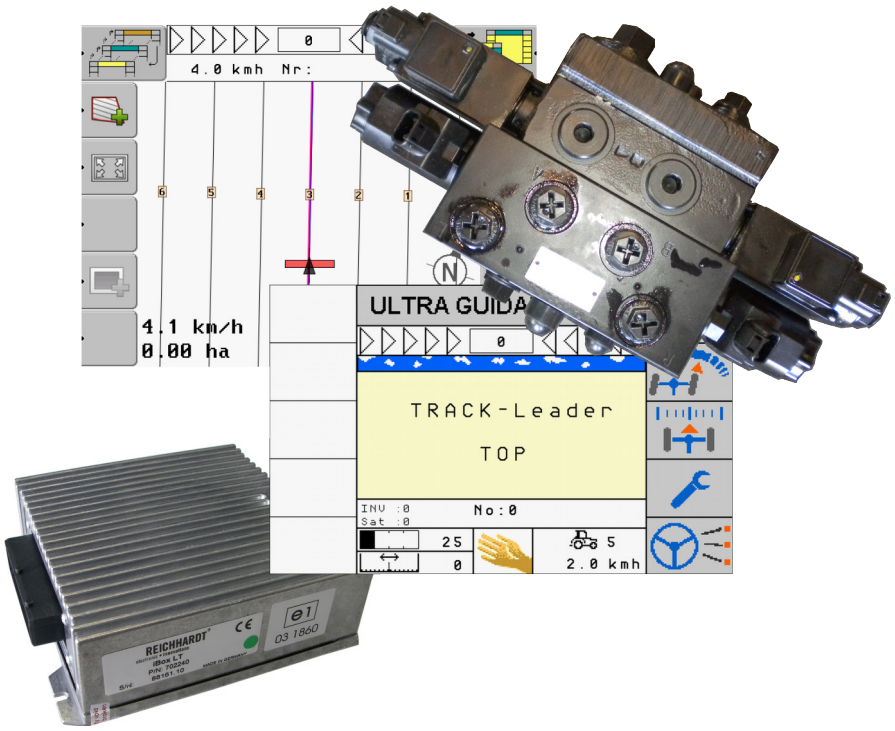
# Service manual

## *Automatic steering system with hydraulic steering*




Version: V1.20121009

30302635-02-EN-200

Read and follow this service manual.

Keep this service manual in a safe place for later reference.

# Imprint

**Document**

Service manual
Product: Automatic steering system with hydraulic steering
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# Contents

# 1 For your safety

## 1.1 Basic safety instructions

Please read the following safety instructions carefully before operating the product for the first time.

- Switch off the steering system before driving on a road.
- Do not attempt to active the steering system on a road. Activation of the steering system on the road may result in a traffic accident.
- Make yourself familiar with the system and vehicle on which it shall be mounted. Should you have any questions, please contact the client service of Müller-Elektronik.
- Read the enclosed operating instructions "PSR ISO TOP", particularly chapter "Safety". Follow the safety provisions provided in this chapter.
- Never leave the vehicle cabin when automatic steering is active. Before leaving the vehicle cabin, shut down the system and the engine.
- Ensure that nobody is in the cabin except for you when working. Any additional persons may distract you and cause an accident.
- Always ensure that there are no children close to the vehicle.
- Always be aware of your surroundings and risk area when working. Switch off the system immediately in a dangerous situation and steer yourself.
- If you drive faster than 10km/h and automatic steering is activated, always keep your hand on the steering wheel. This way, you can react quickly and steer yourself in the event of a system error or danger.

## 1.2 Intended use

This system for automatic steering is intended exclusively for use in agriculture as well as in wine-growing, fruit-cultivating, and hop-growing operations. Any installation or use of the system that deviates from or exceeds the scope of intended use is not allowed.

The system must not be operated on narrow dykes and embankments or on steep slopes where the vehicle may tip over.

The system must not be operated in explosive environments. The components must not come in contact with chemicals such as acids, lyes or aggressive substances from the petrochemical industry.

Intended use is also understood to include adherence to the conditions for operation and repair as prescribed by the manufacturer.

The manufacturer cannot be held liable for any personal injury or property damage resulting from such non-compliance. All risks involved in engaging in improper usage, lie solely with the user.

All applicable accident prevention regulations and all other generally recognized safety, industrial, and medical standards as well as all road traffic laws must be observed. Any unauthorized modifications made to the equipment will void the manufacturer's warranty.

## 1.3 Layout and meaning of warnings

All safety instructions found in these Operating Instructions are composed in accordance with the following pattern:

**DANGER**

This signal word identifies high-risk hazards, which can cause death or the most serious bodily injury, if not avoided.

**WARNING**

This signal word identifies medium-risk hazards, which could potentially cause death or serious bodily injury, if not avoided.

**CAUTION**

This signal word identifies low-risk hazards, which could potentially cause minor or moderate bodily injury or damage to property, if not avoided.

***NOTICE***

This signal word identifies actions which could lead to operational malfunctions if performed incorrectly.
These actions require that you operate in a precise and cautious manner in order to produce optimum work results.

There are some actions that need to be performed in several steps. If there is a risk involved in carrying out any of these steps, a safety warning will appear in the instructions themselves.

Safety instructions always directly precede the step involving risk and can be identified by their bold font type and a signal word.

**Example**

1. **NOTICE! This is a notice. It warns that there is a risk involved in the next step.**
2. Step involving risk.

## 1.4 Obligations of the owner

Only persons who have completely read and understood this service manual may work on and with this system.

This system may be only used, mounted, maintained and repaired by persons who are familiar with the job and have been explained the hazards connected with such jobs.

Applicable regional health and safety and accident prevention regulations are to be adhered to at all times and for all work with the system. This system must not be used on public roads.

Should this system be modified in a way not expressly permitted by the manufacturer, the manufacturer is not liable for any possible system faults.

If you do not understand parts of this manual or need help, please contact the client service of Müller-Elektronik or your vendor.

## 1.5 User requirements

The system may be operated, controlled, maintained and configured only by persons who meet the following conditions:

- they are of adult age,
- they are in a corresponding physical and mental condition,
- they are not under the influence of drugs, alcohol or medication which might negatively affect their response time in any manner,
- they fulfill all preconditions to drive and maintain vehicles equipped with this system.

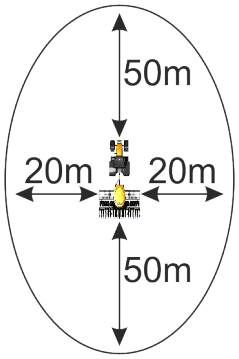
Only the following persons can install systems with hydraulic steering:

- Staff of Müller-Elektronik
- Staff of Reichhardt
- Vendors and fitters trained by Reichhardt or Müller-Elektronik.

This service manual is for specialist staff. The specialist staff must have deep-seated know-how in the following areas:

- Installation of agricultural machines
- Electrics and electronics
- Hydraulic equipment for agricultural machinery.

## 1.6 Danger zone




*Danger zone*

**⚠ DANGER**

Nobody is allowed to be in the danger zone when automatic steering is active.
If somebody is approaching the danger zone:

- Deactivate automatic steering immediately.
- Ask all persons to leave the danger zone.
- When the persons have left the danger zone, you can activate the system again.

Only authorized individuals may enter the danger zone to perform maintenance and inspection following prior agreement with the operator. Such individuals must have the most detailed knowledge of possible hazards before they enter the danger zone. All tasks must be discussed in great detail between the operator and these individuals prior to the commencement of any such work.

All maintenance, setting and inspection work on this system – as long as technically feasible – must be performed when the vehicle is at a standstill and the engine is off. The vehicle operator is liable should the vehicle be started by accident by unauthorized persons contrary to prior agreement.

## 1.7 Safety stickers on the vehicle

The following safety stickers are included in the delivery. Place them on a smooth surface within the driver's angle of view. You can order spare stickers from the manufacturer.

**Caution!** Read the operating instructions and safety notes prior to commissioning and follow them.


**Warning!** It is essential that automatic steering PSR ISO TOP is deactivated on all roads and public roads.

# 2 About this service manual

This service manual is the supplement to the operating instructions of Reichhardt.

## 2.1 Scope of the service manual

With this service manual you learn:

- how to fit the sensors;
- how to configure the IBox Lite steering job computer;
- how to configure the TRACK-Leader TOP app;
- how to test the configuration before the drive;
- how to make the first drive and how to utilize the drive for improving the settings;
- what defects can occur during operation and how to fix them.

## 2.2 Target group for this service manual

This service manual is intended for these individuals:

- Experts who install the system.
- Experts who configure and test the system.

# 3 Product description

## 3.1 System requirements

Before configuring the software, ensure that your system meets these preconditions:

- Terminal software version minimum 3.96
- Steering job computer software version 02-142

Note that due to the update of the terminal software also the software of these ISOBUS job computers must be updated:

- Field sprayer job computer: software version 6.03e and hardware version 3.01.

# 4 Installation

| | |
|---|---|
|  | **⚠ WARNING**<br>◦ Always switch off the steering job computer PSR ISO TOP with the main switch prior to any installation work. |

| | |
|---|---|
|  | **⚠ WARNING**<br>◦ After every hardware upgrade, check that the whole system is functioning correctly by using the diagnostics program, so that any possible faults such as incorrectly placed electric contacts can be eliminated from the very beginning. Read the "Diagnostics" chapter in the service manual on this.<br>◦ Whenever replacing a component, protection of open connections against moisture and dirt by using blind caps and/or blind plugs must be ensured. |

## 4.1 System overview

The components and their installation are described in the chapters below.

## 4.2 Fitting the IBox Lite job computer

### Selecting installation location

Take note of the following when selecting the installation location:

- Install the IBox Lite steering job computer in the vehicle cabin (e.g. under the driver's seat) or on the vehicle cabin (e.g. in the fuse box for Fendt).

## 4.3 Main switch


*Main switch*

You have to integrate the main switch into the vehicle dashboard.

Take note of the following when selecting the installation location:

- The switch must be within the driver’s reach. The driver must be able to reach the switch quickly and easily.

# 4.4 GPS receiver

## 4.4.1 Selecting correct GPS receiver

You can use automatic steering with different GPS receivers.

**Available GPS receivers**

| Name | Signal | Accuracy | Item no. |
|---|---|---|---|
| A100 | Egnos / Waas | +/- 20 cm | 30302466 |
| A320 | Omnistar XP<br>(the user must request activation with Omnistar) | +/- 12 cm | 30302487 |
| A320 | Omnistar HP<br>(the user must request activation with Omnistar) | +/- 10 cm | 30302487 |
| A320 | Axio-Net<br>(the user must request activation with Axio-Net) | 2 - 3 cm | 30302475 |

**Accessories**

| Item description | Item number |
|---|---|
| Cable for A100<br>If you already have an A100 GPS receiver, you only need this cable to connect to the main cable harness.<br>You also need to configure the "Steering" parameter in the "Service" application. | 31302464 |
| Cable on foreign receiver John Deere | 30302474 |
| Cable on foreign receiver Trimble/Agrocom | 30302473 |

If you want to use a foreign receiver, it must be configured as follows:

**Configuration for foreign receiver**

| | |
|---|---|
| GPS standard | NMEA 0183 |
| Update rates and signals | 10 Hz (GPRMC) |
| | 1 Hz (GPGGA) |
| Transmission rate | 19200 baud |

| | |
|---|---|
| Data bits | 8 |
| Parity | no |
| Stop bits | 1 |
| Flow control | none |
| Operating voltage | Clamp 15 / voltage supply of terminal / ignition |

### 4.4.2 Fitting the GPS receiver

**⚠ CAUTION**

**Crushing hazard due to very powerful magnet**
The GPS receiver has a very powerful magnetic base.

- Never place your fingers between the GPS receiver's magnetic base and a magnetic surface.
- Hold the GPS receiver in your hands firmly, but do not place your fingers beneath the magnetic base.

**Procedure**

1. Setting the installation location on the tractor for the GPS receiver.
   The GPS receiver must be in the utmost front, central and horizontal position (see photo).

2. Stick the metal plate included in the supply onto the roof.
3. Place the GPS receiver with the magnet foot onto the metal plate.
4. The magnet foot can be removed upon request, so that the GPS receiver can be screwed on directly.

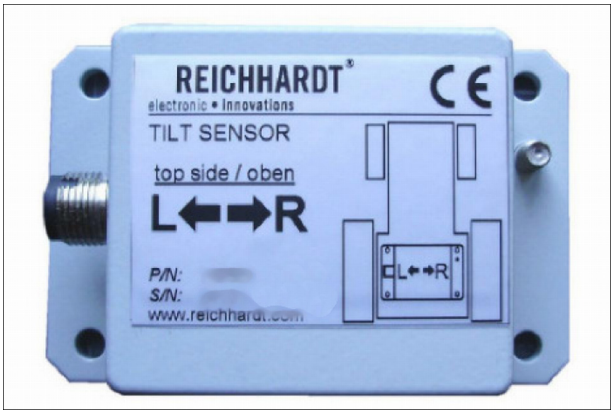
### 4.4.3 Connecting the GPS receiver

**Procedure**

☑ If you want to connect the A100 GPS receiver via an additional cable 31302464 to the steering job computer, you need to configure the "Steering" parameter in the "Service" application first.

1. Always connect the GPS receiver to the main cable harness of the steering job computer.
2. Activate the driver "GPS_PSRCAN" in the "Service" application.

## 4.5 Fitting the tilt sensor




*Tilt sensor*

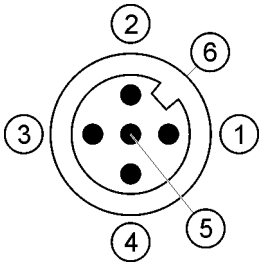
Take note of the following when selecting the installation location:

- The tilt sensor must be fitted on the same part as the GPS receiver, for example the vehicle cabin. The sensor must measure exactly the same slopes to which the GPS receiver is exposed.
- Place the sensor as low as possible. In the bottom section the sloping is not so heavy as on the cabin roof and the angle remains the same.
- In an ideal scenario, place the tilt sensor in a line underneath the GPS receiver.
- The sticker on the sensor indicates the installation direction. The "L" arrow must point to the left in the direction of driving and the "R" arrow to the right in the direction of driving. The sticker must point upwards.

**Technical specifications**

| | |
|---|---|
| Voltage supply | 11–30 VDC |
| Current consumption | 23mA – 33mA |
| Measurement axes | 1 axis (1D) |
| Measurement range | +/- 45° |
| Resolution in zero point | 0.05° |
| Calibration precision (at 25 °C) | +/- 0.5° (zero point and end values) |
| Non-linearity (Sinus) | max +/- 0.3° |
| Temperature coefficient (zero point) | max +/- 0.009 °K |
| Cross sensitivity | max 5% |
| Limit frequency | typ. 18 Hz |
| Working temperature | -40 °C – +80 °C |
| Casing protection type | IP65/67 |
| Interface | 0…10 V |

| | |
|---|---|
| Connection | Sensor connector, 5 poles (M12) |
| Impact load | max 3,500 g |
| Dimensions | 58 mm x 90 mm x 31 mm |
| Weight | approx. 200 g |

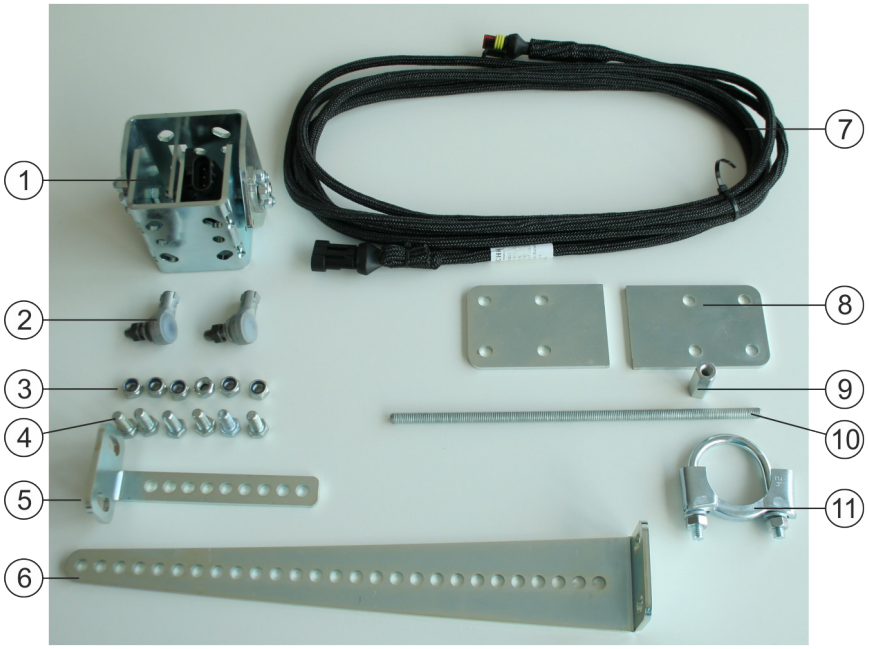



*M12 plug*

| | | | |
|---|---|---|---|
| 1 | Supply voltage | 4 | Sensor signal X axis |
| 2 | Sensor signal Y Axis (optional) | 5 | Analog GND |
| 3 | GND | 6 | --- |

## 4.6 Wheel angle sensor

The wheel angle sensor measures the angle in which the wheels are situated. This improves the steering precision of the job computer.




*Wheel angle sensor: Components for installation*

| | | | |
|---|---|---|---|
| (1) | Wheel angle sensor in casing | (7) | Connection cable |
| (2) | Angle screws for sensor bar | (8) | Fitting plate for fixing the wheel angle sensor to the axle |
| (3) | Nuts | (9) | |
| (4) | Bolts | (10) | Sensor bar |
| (5) | Adapter plate, small | (11) | U-bolt |
| (6) | Adapter plate, large | | |

Take note of the following when selecting the installation location:

- The wheel angle sensor must be fitted as to ensure that it can measure all positions of the steered wheel: maximum to the left, maximum to the right, middle position.

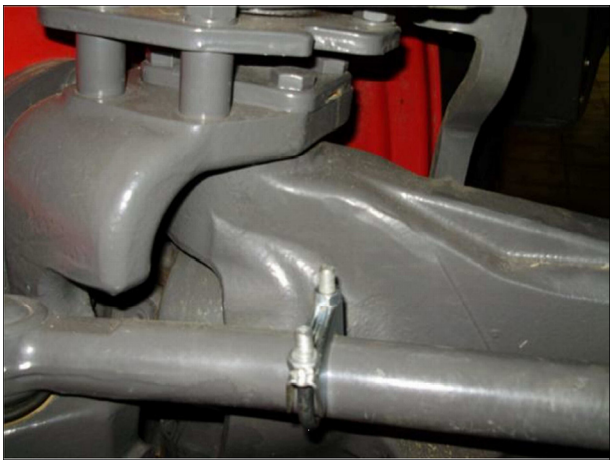
**Procedure**

1. Align the wheels.
2. **NOTICE! Do not bore or weld on the axle.**
3. Mount the holder on the axle. Use the holders provided. Alternatively, you can weld the fitting plates together (8) to reach the required angle.

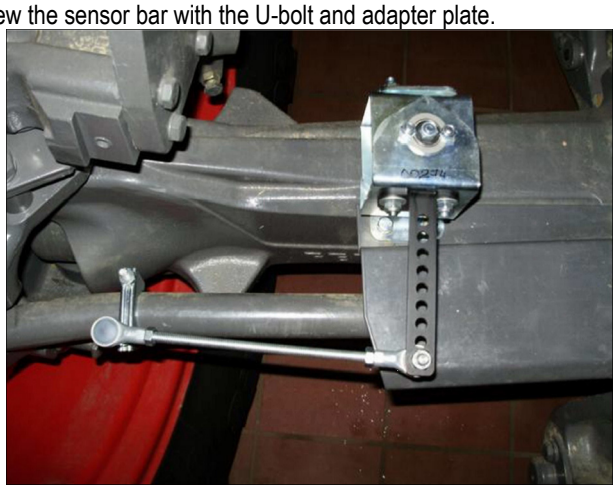
⇨ 

⇨ 

4. Screw one half with the sensor in the casing onto the fitting plate. When correctly installed, only the sensor axle can rotate when the steering wheel is moved. The holder must remain fixed.
5. Screw the U-bolt onto the coupling bar.

⇨ 

6. Screw the adapter plate onto the casing of the wheel angle sensor. Select the large or small plate.
7. Screw the sensor bar with the U-bolt and adapter plate.

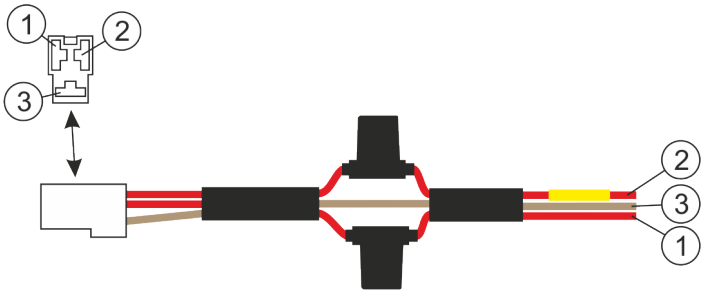
⇨ 

## 4.7 Connecting the voltage supply

**⚠ WARNING**

**Voltage**
Bodily injury due to electric shock

- Disconnect the voltage supply from the vehicle battery before connecting the cable to the voltage supply.




*Voltage supply cable*

| | |
|---|---|
| 1 | Red cable<br>+12 V (20 A fuse) |
| 2 | Red cable with yellow marking<br>Ignition (on clamp 15) (7.5 A fuse) |
| 3 | Brown cable<br>GND |

**Procedure**

1. Use the cable provided to connect the cable harness to the voltage supply.
2. Connect the cable to the cable harness.
3. Connect the cable to the voltage supply in the vehicle.

# 5 Basic control principles for the steering job computer

## 5.1 Switching the PSR steering job computer on and off

### Switching on the steering job computer

**Procedure**

1. Press the "AUTO" button on the main switch, so that the switch remains in the middle position. Ask the fitter where the main switch on your vehicle is located.
   ⇨ The "OFF" button will light up.
2. Open the selection menu of the terminal.
3. Start the PSR application in the selection menu:


### Switching off the steering job computer

This is how you switch off the steering job computer in the following scenarios:

- When you want to switch off the system.
- Before you leave the field.
- Before you drive on a road and communication.
- After work completion.

**Procedure**

1. Press the "OFF" key on the main switch.
2. Open the selection menu of the terminal.
   ⇨ The PSR application will not appear in the selection menu:

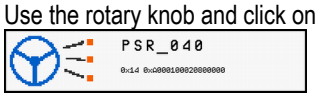

   ⇨ The main switch no longer lights on.

## 5.2 First commissioning of the steering job computer

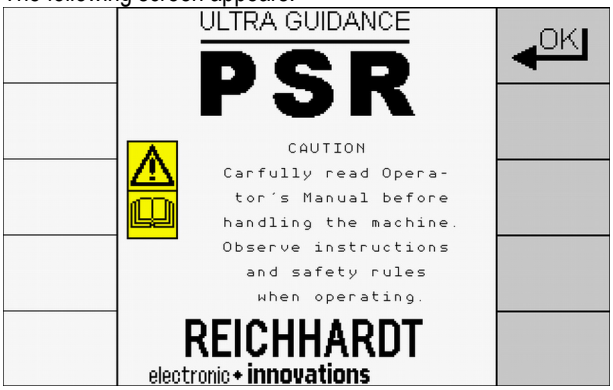
**Procedure**

☑ You have mounted and connected the system.

1. Switch on the terminal.
2. Switch on the steering job computer with the main switch.
3. Open the selection menu with the  key.
   ⇨ In name of the steering job computer in the selection menu is "PSR".
4. Use the rotary knob and click on:



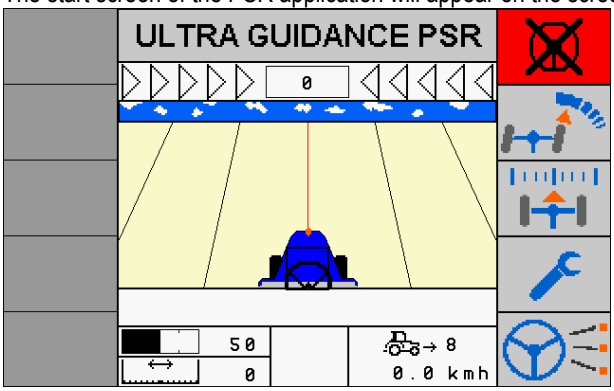
⇨ The following screen appears:




⇨ You will be requested to read the safety notes in the operating manual. These are the safety notes from the operating instructions of Reichhardt included in the delivery: "PSR ISO TOP"

5. After reading the operating manual and the safety notes, confirm the note.

⇨ The start screen of the PSR application will appear on the screen:



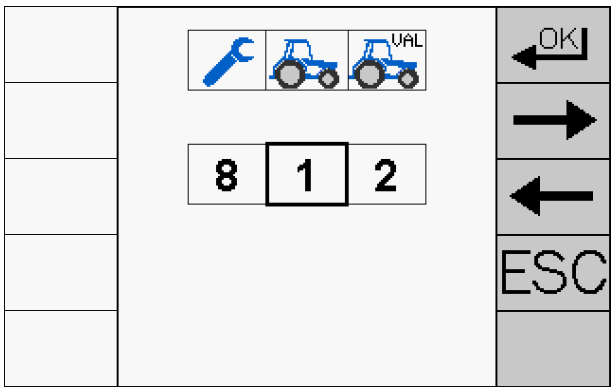

⇨ If there are any errors in the configuration, error messages will appear now. See section: Error messages [➞ 68]

## 5.3 Calling screens

In every operating manual you will find information about what function icons you need to press in a row in order to reach a certain screen.

**Example**

You will be asked to change for this screen:

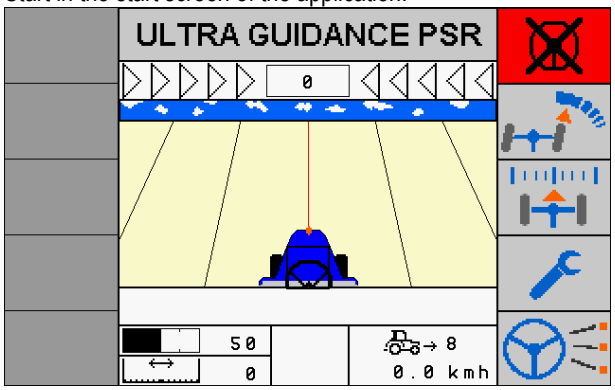



The three icons  in the upper screen section indicate how to reach this screen.

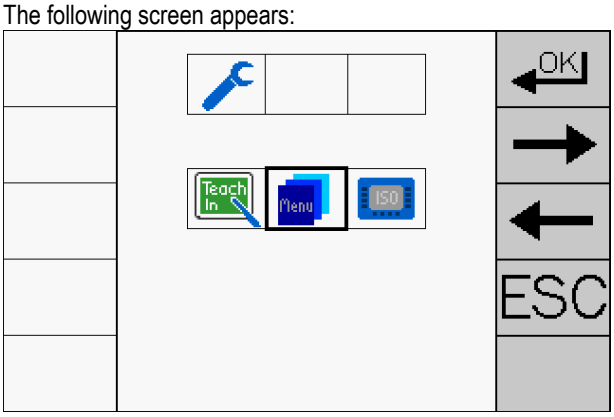
**Procedure**

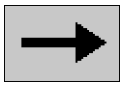
In this case you need to proceed as follows:

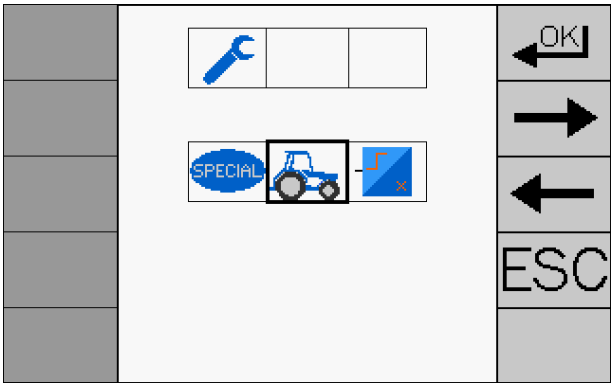
1. Start in the start screen of the application:




2.  - Keep the key pressed for about three seconds until the main menu has appeared.
   ⇨ The following screen appears:

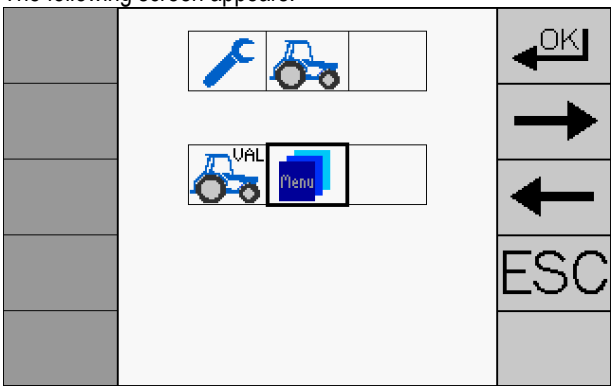


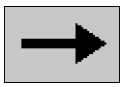

3. Push the  key repeatedly until the following icon appears in the middle of the screen:
   
   ⇨ It must look like this:




4. Press  shortly.

⇨ The following screen appears:

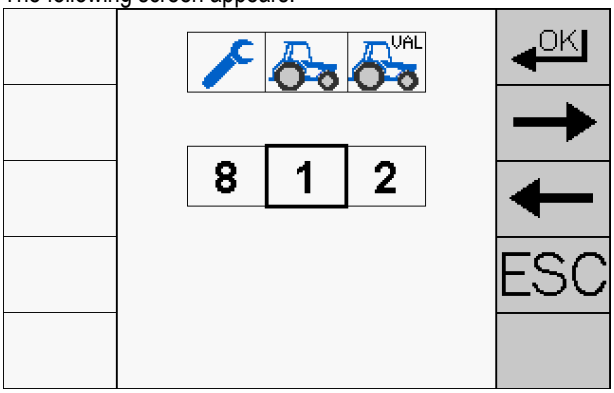



5. Push the  key repeatedly until the following icon appears in the middle of the screen:



6. Press  shortly.


⇨ The following screen appears:




⇨ In the upper screen section icons will appear showing how you have reached the screen.

⇨ In the lower screen section you will see parameters and values you can edit.

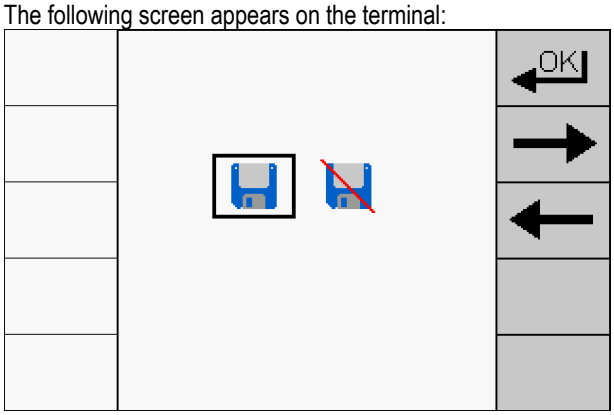
## 5.4 Saving changes

Every time you change something in the configuration you will have to save the changes. The software will automatically ask you to do so.

**Procedure**

☑ You have changed some settings.

☑ The following screen appears on the terminal:



1. To save the settings, mark the icon 
2. To reject and cancel the settings, use the arrows to mark the icon  .
3. Press 

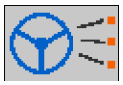
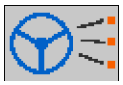
shortly.
4. The changes will be saved.
   ⇨ A double beep will confirm that the changes have been saved.
5. To accept the changes, restart the steering job computer. You can do this also when you have finished the configuration.

## 5.5 Controls in the PSR application

**Three conditions of the function key for automatic steering**

| Function icon | Meaning | This is what happens after pushing |
|---|---|---|
|  | Automatic steering was locked because errors have occurred. | Errors will be displayed on the screen. |
|  | Automatic steering is deactivated. | Automatic steering will be activated. |
|  | Automatic steering is activated. | Automatic steering will be deactivated. |

**Function keys**

| Function icon | Meaning |
|---|---|
|  | Keep pressed for long to open the main menu. |
|  | Press shortly to activate manual driving mode. [→ 56] |
|  | Keep pressed for long to change the driving mode. [→ 48] |

## 5.6 Activating and deactivating automatic steering

When the steering job computer is ON, you can activate or deactivate automatic steering:

- With the "AUTO" button on the main switch.
- With function keys on the terminal.

With function keys in the PSR and TRACK-Leader applications you can recognize whether automatic steering is active and you can activate/deactivate it.

### Function keys

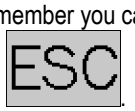
| Function icon | Application | Meaning | Sequence of pressing |
|---|---|---|---|
|  | TRACK-Leader | Automatic steering is deactivated. | Automatic steering will be activated. |
|  | TRACK-Leader | Automatic steering is activated. | Automatic steering will be deactivated. |
|  | TRACK-Leader | Automatic steering is locked. | Nothing happens. |
|  | PSR | Automatic steering is deactivated. | Automatic steering will be activated. |
|  | PSR | Automatic steering is activated. | Automatic steering will be deactivated. |
|  | PSR | Automatic steering is locked. | Error messages will be displayed. [→ 68] |

# 6 Configuring the steering job computer

## 6.1 Preparing the system for configuration

System configuration and calibration must be done under such conditions that will also prevail during the actual work later on.

This is how you will prepare yourself and the vehicle for configuration:

1. Use a vehicle without towed or connected equipment for the configuration.
2. Drive the vehicle for approx. 2 to 5 minutes at high rotations, so that the hydraulic liquid can reach the operating temperature.
3. Drive the vehicle on a big, open and even area where you can configure and test all functions. The ground should correspond to real conditions. It should however not be too humid or soft.
4. Make yourself familiar with the TRACK-Leader application from Müller-Elektronik. You will find the operating instructions on the Müller-Elektronik website.
5. Remember you can cancel the configuration if you move the steering wheel or press the function key 

.

## 6.2 Configuration steps

| NOTICE |
| --- |
| Read this chapter only after reading the chapter about the basic control principles. |

To be able to use automatic steering TRACK-Leader TOP, you need to configure the steering job computer connected.

During the first configuration you should proceed as follows:

**Check list: Configuration steps for all systems**

| No. | Chapter and page | Done? |
| --- | --- | --- |
| 1 | Preparing the system for configuration [→ 26] | |
| 2 | Selecting vehicle number [→ 28] | |
| 3 | Unlocking the steering job computer [→ 30] | |
| 4 | Setting the vehicle type [→ 31] | |
| 5 | Activating support for TRACK-Leader TOP [→ 32] | |
| 6 | Activating the tilt sensor [→ 33] | |
| 7 | Calibrating the tilt sensor [→ 33] | |
| 8 | Setting the GPS receiver offset [→ 40] | |

| No. | Chapter and page | Done? |
|---|---|---|
| 9 | Setting the speed signal source [→ 34] | |
| 10 | Entering the vehicle turning radius [→ 40] | |
| 11 | Activating the wheel angle sensor [→ 42] | |
| 12 | Entering the amount of wheel angle sensors [→ 42] | |
| 13 | Selecting signal type [→ 43] | |
| 14 | Calibrating the wheel angle sensor [→ 44] | |
| 15 | Setting the driving mode [→ 48] | |
| 16 | Restarting the steering job computer | |
| 17 | Calibrating the middle position of the wheel angle sensor during the drive [→ 45] | |
| 18 | Precise adjustment of wheel angle sensor middle position [→ 46] | |

**Check list: Configuration steps for systems with hydraulic steering**

| No. | Chapter and page | Done? |
|---|---|---|
| 1 | Activating the seat contact switch [→ 49] | |
| 2 | Configuring the pressure sensor [→ 50] | |
| 3 | Setting the PSR reaction speed of hydraulic steering [→ 53] | |
| 4 | Calibrating valve currents [→ 56] | |

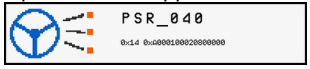
Refer to the following chapters to learn how to perform these steps.

## 6.3 Opening the main menu

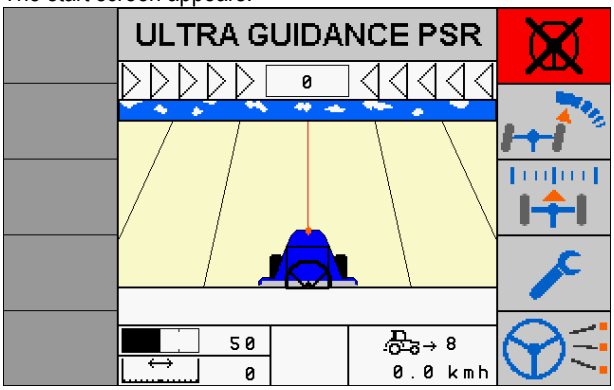
Before you make any settings, you have to change to the main menu first.

**Procedure**

1. Open the PSR application.

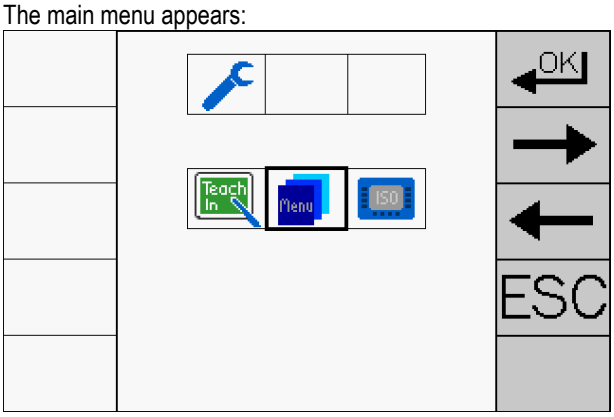


⇨ The start screen appears:




2.  - Keep the key pressed for about three seconds until the main menu has appeared.

⇨ The main menu appears:




## 6.4 Selecting vehicle number

Every vehicle to which you connect the steering job computer must be identified with a unique number. Thanks to this number the job computer will know to which vehicle it is connected.

Some vehicle types and systems are already pre-configured in the software.

In the table you can see the factory settings applying to the different vehicle numbers.

**Vehicle list factory settings**

| No. | Vehicle description | Vehicle type coded |
|---|---|---|
| 1 | Hydraulic steering, tractor, Bucher valve | 110000001 |
| 2 | Hydraulic steering, combine harvester, Bucher valve | 120000002 |
| 3 | Hydraulic steering, self-propelled field sprayer, Bucher valve | 130000003 |
| 4 | Hydraulic steering, sliding frame, Bucher valve | 170000004 |
| 5 | Steering wheel motor steering, tractor | 210000005 |

| No. | Vehicle description | Vehicle type coded |
|---|---|---|
| 6 | Steering wheel motor, CAT Challenger | 250008006 |
| 7 | JD Universal steering, tractor | 310000007 |
| 8 | ISO 11783 steering, CAT Challenger B-series | 450000008 |

When you change the settings, also the default factory settings will be overwritten.

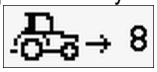
**Vehicle list – your settings**

| No. | Vehicle description | Vehicle type coded |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |

**⚠ CAUTION**

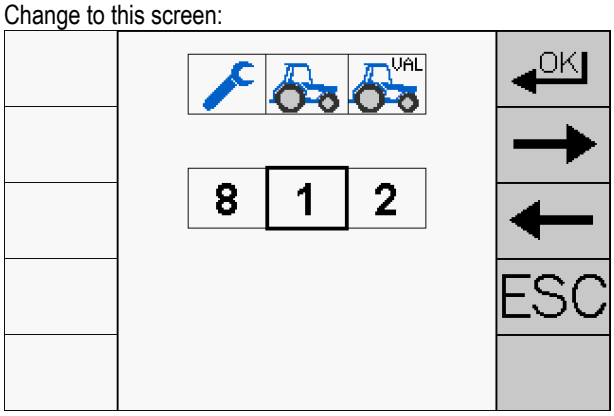
**Incorrect vehicle configuration**

In case of an incorrectly configured steering job computer the vehicle can behave in an unforeseeable manner.

- Check which vehicle number is selected prior to every commissioning. You can the vehicle number selected also in the start screen: 
- Inform the user which vehicle number you have configured for his/her vehicle.

**Procedure**

1. Change to this screen:




⇨ As the screen opens, the number which is currently set will appear.

2. Mark the number you wish to configure. In the ideal scenario the system you wish to configure can be found in the "Vehicle list factory settings" table. If this is not the case, selected a system as similar as possible to the system desired. Then you also need to "Set the vehicle type". See: Setting the vehicle type [→ 31]
3. Press 

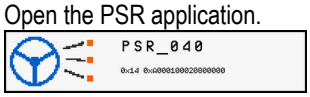
shortly.
   ⇨ The steering job computer will load the settings saved for this vehicle type.
   ⇨ If you now change something on the configuration, these changes will be saved. The factory settings cannot be restored.

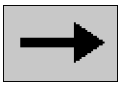
## 6.5 Locking and unlocking the steering job computer

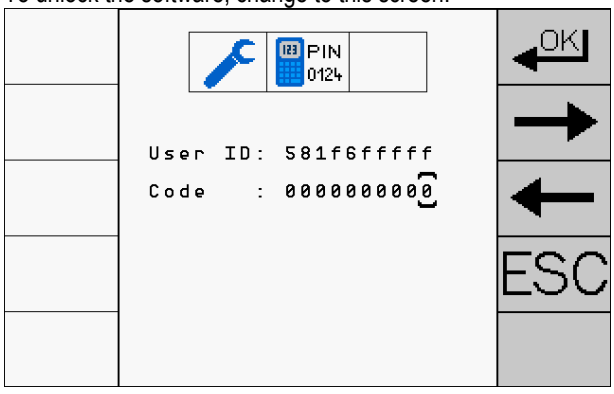
To prevent unauthorized persons from making settings to the steering job computer, you have the option to lock the software. The software only needs to be unlocked when you want to configure the steering job computer.

**Procedure**

This is how you unlock the software:

1. Open the PSR application.


2.  - Keep the key pressed for about three seconds until the main menu has appeared.
3. Press repeatedly the key  to verify if the 

icon in the selection range appears in the middle of the screen. If it does, the software is unlocked. If it does not, you can unlock the software.
4. To unlock the software, change to this screen:


5. Type in number **0000007371**.
6. To confirm this, press and hold the function key 

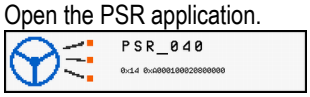
for long.
   ⇨ You have unlocked the software.
   ⇨ The 

icon will now appear in the main menu.
7. When you restart the steering job computer, it will be automatically locked.

**Procedure**

This is how you block the software:

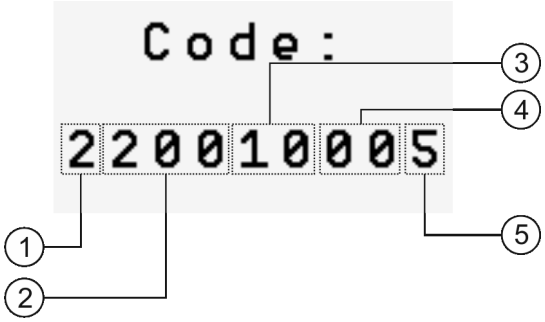
1. Open the PSR application.




2.  - Keep the key pressed for about three seconds until the main menu has appeared.
3. Use the arrows to mark icon  .
4. Press  shortly.
   ⇨ The steering job computer will be locked.
   ⇨  can no longer be seen.

## 6.6 Setting the vehicle type

The vehicle type is coded and entered as a special and unique number.

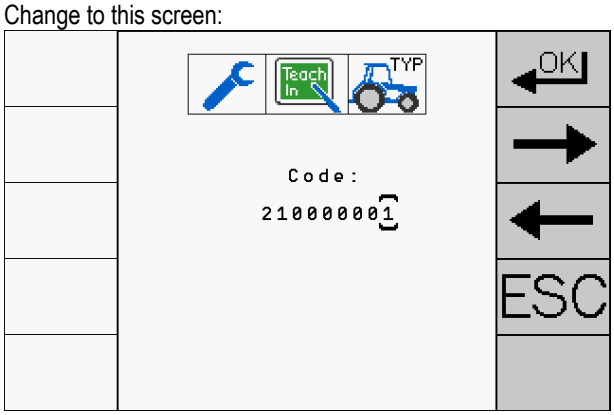



*Vehicle type: The code defines the vehicle on which the steering was mounted.*

| | | | |
|---|---|---|---|
| 1 | Type of steering:<br>1 – hydraulic steering<br>2 – steering wheel motor RDU<br>3 – JD Universal Steer<br>4 – ISOBUS 11783 | 3 | Valve and current settings:<br>00 – for hydraulic steering with Bucher valves from ME |
| 2 | Vehicle type:<br>100 – Tractor<br>200 – Combine harvester<br>300 – Self-propelled field sprayer<br>400 – Shredder<br>500 – CAT Challenger<br>550 – Articulated tractor<br>600 – Swather<br>700 – Sliding frame<br>900 – Special vehicles | 4 | Reserve:<br>00 – Always |
| | | 5 | Vehicle number under which the settings are saved.<br>See section: Selecting vehicle number [→ 28] |

**Procedure**

1. Change to this screen:




2. Enter the number which clearly identifies the vehicle type.
3. Press 

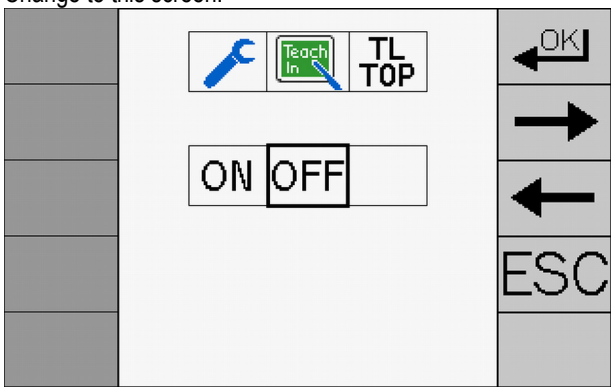
shortly.

## 6.7 Activating support for TRACK-Leader TOP

To be able to use the steering job computer together with the TRACK-Leader TOP application from Müller-Elektronik, you have to activate support for TRACK-Leader TOP on the steering job computer.

**Procedure**

1. Change to this screen:




2. Mark the icon "**ON**" to activate support for TRACK-Leader TOP. When you mark "**OFF**", deactivate support for TRACK-Leader TOP.
3. Press 

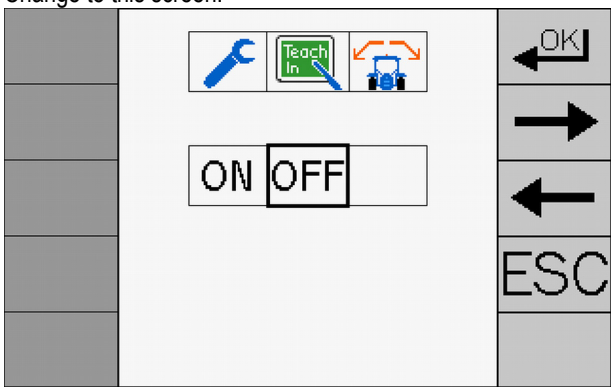
shortly.

# 6.8 Configuring the tilt sensor

## 6.8.1 Activating the tilt sensor

**Procedure**

1. Change to this screen:




2. Mark the icon "**ON**" to activate the tilt sensor. When you mark "**OFF**", you will deactivate the tilt sensor.
3. Press  shortly.

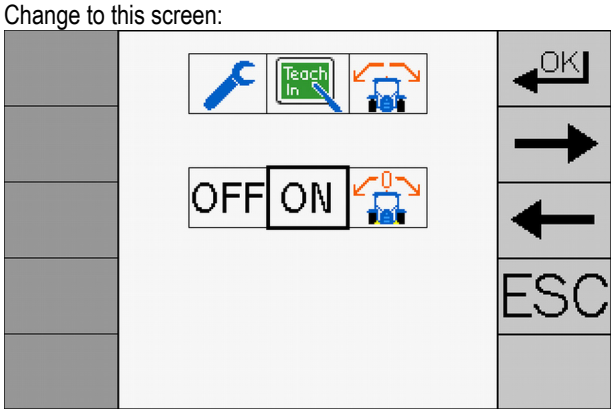
   ⇨ The  icon will appear in the middle selection screen.

## 6.8.2 Calibrating the tilt sensor

**Procedure**

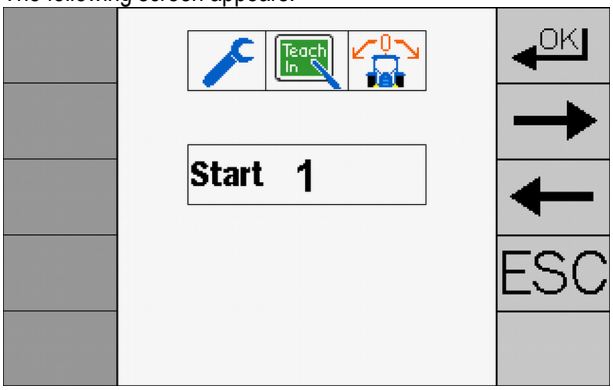
☑ You have activated the tilt sensor.

1. Place the vehicle onto an even area.
2. Mark the type position on the ground. You can use a stone for example.
3. Wait for a few seconds until the vehicle has come to a complete standstill.
4. Change to this screen:




5. Mark the icon  .
6. Press  shortly.

⇨ The following screen appears:

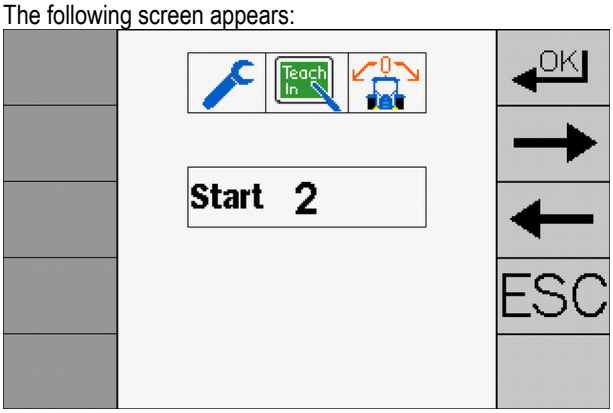



⇨ The indicator is flashing.

7. Ensure that the digit "1" will appear on the screen. If it will not, push one of the arrows.
8. Keep the 

key pressed for about 3 seconds to start calibration.

⇨ The following screen appears:




⇨ The indicator is flashing.

9. Turn the vehicle exactly by 180°.
10. Wait for a few seconds until the vehicle has come to a complete standstill.
11. Ensure that the digit "2" will appear on the screen.
12. Keep the 

key pressed for about 3 seconds to start calibration.

⇨ You have calibrated the tilt sensor.

⇨ After calibration, the digit "0" will be hidden from the  icon.

## 6.9 Setting the speed signal source

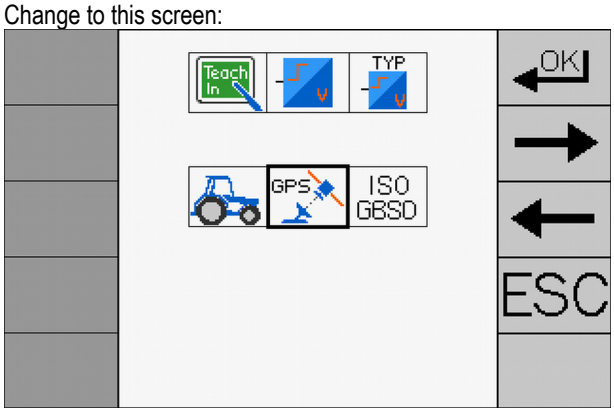
**Possible sources for speed recording**

| Icon | Sensor |
|---|---|
|  | Speed sensor (wheel sensor) connected to the steering job computer. |
|   | Speed recording via a GPS receiver. |

| Icon | Sensor |
|---|---|
| ISO GBSD | Radar sensor (ISOBUS Ground based speed). |
| ISO WBSD | Wheel sensor (ISOBUS Wheel based speed). |

**Procedure**

1. Change to this screen:




2. Choose how speed shall be recorded. Müller-Elektronik recommends recording via the GPS signal: 

3. Press 

shortly.

## 6.10 Configuring the GPS receiver

To enable communication between the steering job computer and the GPS receiver, you need to configure some settings:

1. Activate the "GPS_PSRCAN" driver.
2. Configure the GPS receiver.
3. Configure the correction signal.

In the chapters below you will learn more on this.

### 6.10.1 Configuring the "Steering" parameter

If you want to connect your existing A100 GPS receiver to the steering job computer, you have to configure the "Steering" parameter.

The "Steering" parameter is used for configuring the GPS receiver for work with automatic steering.

**Procedure**

☑ The "GPS_A100" driver must be activated.

☑ The A100 GPS receiver is connected to the terminal.

1. Open the selection menu with the  key.
2. Open the "Service" application in the selection menu.
3. Press the function key 

.

⇨ If this symbol appears, the "GPS_A100" driver must be activated.

4. Click "Steering".
   ⇨ The terminal will establish a connection with the GPS receiver and show its current configuration.
5. To configure the GPS receiver for steering, click "ON".
6. Leave the screen.
7. Activate the "GPS_PSRCAN" driver.
8. Switch off the terminal.
9. Connect the GPS receiver to the steering job computer.

## 6.10.2 Activating the driver of the GPS receiver

As the GPS receiver is connected to the steering job computer and not to the terminal from Müller-Elektronik, you need to activate another driver.

**Procedure**

1. Open the selection menu with the  key.
2. Open the "Service" application in the selection menu.
3. Click "Driver settings".
4. Click "GPS".
   ⇨ The installed drivers will appear.
5. Click on the "**GPS_PSRCAN**" driver.
6. Restart the terminal.

## 6.10.3 Configuring frequencies for automatic steering

If you purchased the automatic steering system from Müller-Elektronik, your system is configured. You no longer need to configure the GPS receiver unless you want to change something.

It is still recommended to check whether the configuration is correct.

In the next table you can see which settings you need to configure for each GPS receiver from Müller-Elektronik:

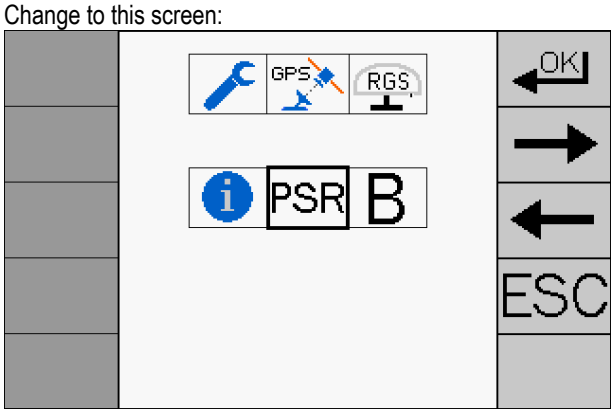
**GPS receiver settings**

| Parameter | A100 / A220 / A320 |
|---|---|
| GGA | 1.0 Hz. |
| GSA | Off |
| RMC | 10.0 Hz. |
| ZDA | Off |
| VTG | Off |
| GLL | Off |

| Parameter | A100 / A220 / A320 |
|---|---|
| GSV | Off |
| GST | Off |
| RRE | Off |

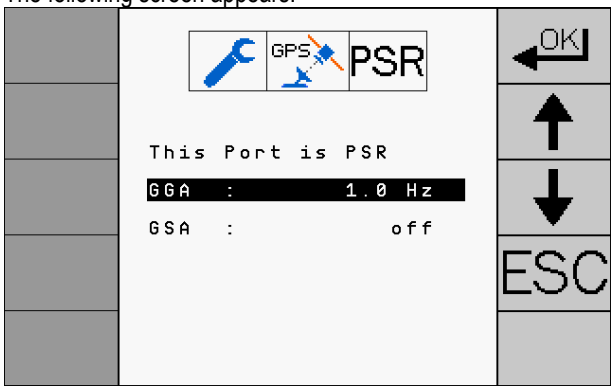
**Procedure**

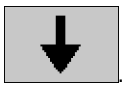
1. Change to this screen:




2. Mark "**PSR**".
3. Press  shortly.

4. The following screen appears:




5. To mark a parameter, press  or  .
6. To change the value of a parameter, press  shortly.

7. To leave the screen and reject all changes, press  .

8. To leave the screen and accept all changes, press  and hold for some time.

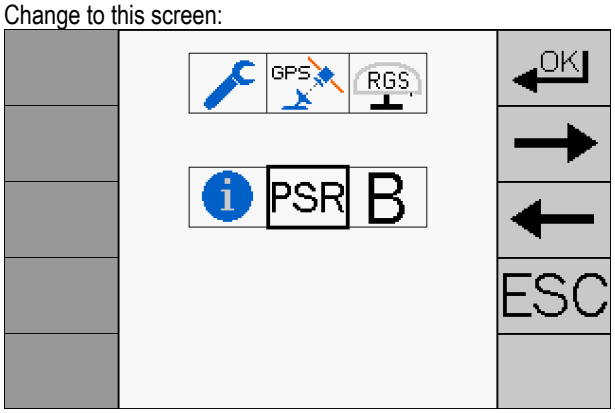

## 6.10.4 Configuring frequencies for other applications

The GPS receivers from Müller-Elektronik can be connected to another device in parallel with the steering job computer. You can then use one GPS receiver for two devices.

To do so, you have to configure under what frequency the data shall be sent to the second device.

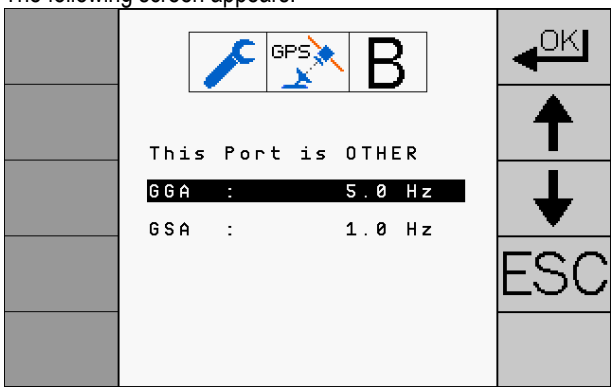
**Procedure**

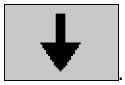
1. Change to this screen:




2. Mark "**B**".
3. Press 

shortly.
4. The following screen appears:




5. To mark a parameter, press  or  .
6. To change the value of a parameter, press 

shortly.
7. To leave the screen and reject all changes, press 

.
8. To leave the screen and accept all changes, press 

and hold for some time.

## 6.10.5 Configure the correction signal

When connecting a GPS receiver to a steering job computer, you have to take all settings in the PSR application. The settings of reference satellites and correction signals which you have otherwise made in the "Service" application will no longer work now.

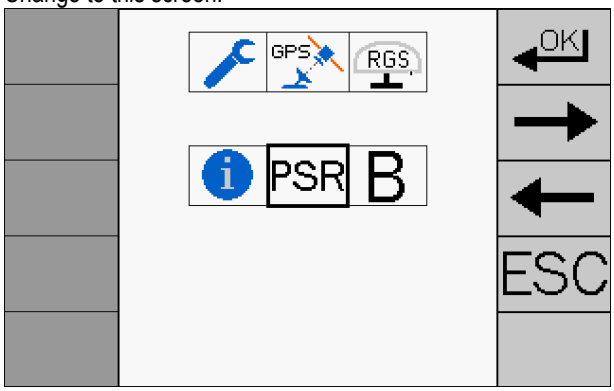
The values displayed on your screen are dependent on which GPS receiver you connect. We cannot describe them all here.

- "**NP**"
  This parameter is used to specify to how many positions after the decimal point the GPS position shall be measured. Enter "7".

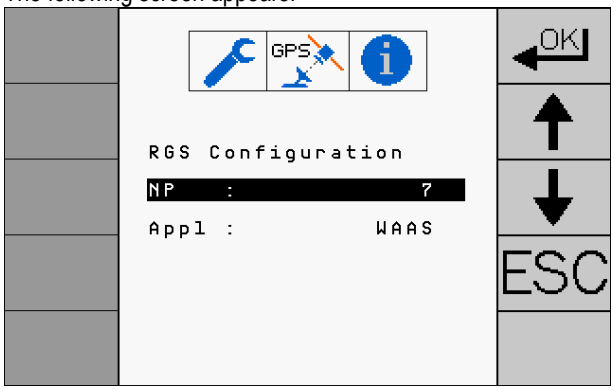
- **"Appl"**
  With this parameter you will specify which correction signal you want to use.
  You can generally chose between two accuracy degrees. The more accurate signal may be subject to a fee and the less accurate signal free of charge, depending on the provider you hired for the correction signal.
  The selection of the value depends on the signal you use.
  Example values: "WAAS", "AUTODIFF", "RTK", "SBASRTK"
- **"PRN 1"**
  Primary DGPS satellite. The DGPS receiver will connect to this satellite in the first instance.
  Your satellite selection will depend on which satellite currently has the best availability in your region.
  - Europe: 120, 124, 126
  - USA: 135, 138
- **"PRN 2"**
  Secondary DGPS satellite. The DGPS receiver will only connect to this satellite in the event that the primary satellite fails.
  Here you can select the same numbers as with PRN 1.
- **"Diff"**
  Here you can see more accurate information on the correction signal selected.
  Example values: "WAAS", "RTK", "OTHER"

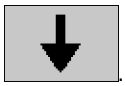
**Procedure**

1. Change to this screen:




2. Mark  .
3. Press  shortly.
4. The following screen appears:



5. To mark a parameter, press  or  .
6. To change the value of a parameter, press  shortly.
7. To leave the screen and reject all changes, press  .
8. To leave the screen and accept all changes, press  and hold for some time.

### 6.10.6 Setting the GPS receiver offset

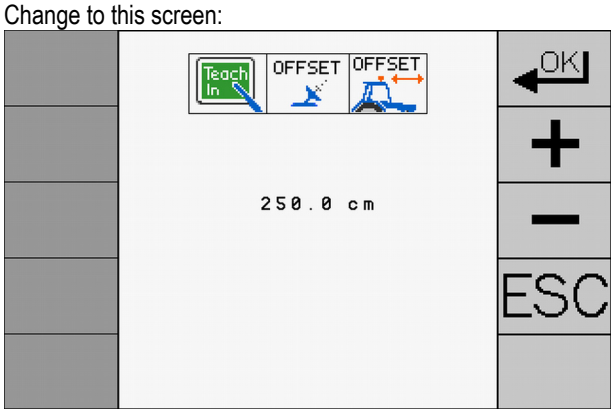
The GPS receiver offset defines a point situated virtually in front of the GPS receiver.

**Recommended values**

| Vehicle type | Value |
|---|---|
| Tractor | 250cm |
| Combine harvester | 100cm |

**Procedure**

1. Change to this screen:




2. Enter the offset.

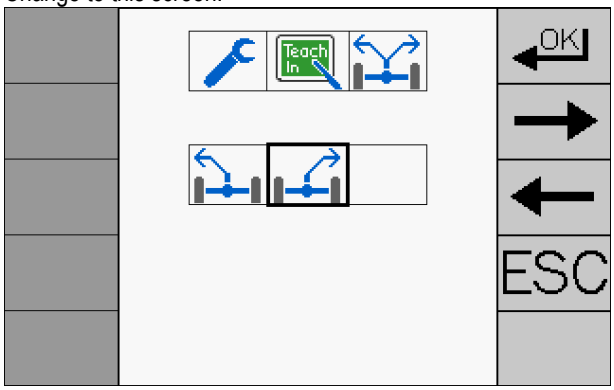
## 6.11 Entering the vehicle turning radius

You need to determine and enter the turning radius twice: for turning to the right and to the left.

**Procedure**

1. Place the vehicle onto an even ground where the type tracks are visible.
2. Drive twice in a circle: once to the left, once to the right. Always steer to the respective direction as much as possible. Drive in the manual mode – do not use automatic steering.
3. Measure the turning radius diameter in every direction. Take the measurement from the middle of the vehicle track.

4. Change to this screen:




5. Mark the  icon to enter the turning radius for a drive to the left.
6. Press  shortly.
7. Enter the measured value as the turning radius.
8. Press  shortly.
9. Mark the  icon to enter the turning radius for a drive to the right.
10. Press  shortly.
11. Enter the measured value as the turning radius.
12. Press  shortly.

## 6.12 Configuring the wheel angle sensor

You can only configure the wheel angle sensor when it is connected.

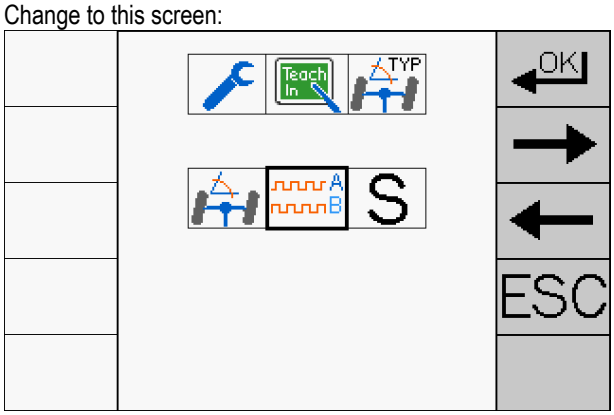
- The wheel angle sensor is optional for steering systems with a steering wheel motor. It is however recommended.
- The wheel angle sensor must be always mounted for systems with hydraulic steering.

The wheel angle sensor is mounted on the axle and records the wheel angle during steering to determine the middle position of the wheels for a straight drive.

## 6.12.1 Activating the wheel angle sensor

**Procedure**

1. Change to this screen:



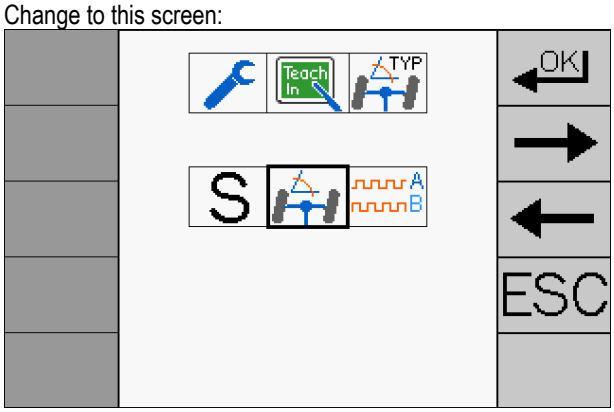

⇨ If you cannot find this screen, the reason may be that you selected a number intended for hydraulic steering when choosing the vehicle number. Then the wheel angle sensor is activated by default, you cannot activate it in this screen.

2. Mark the  icon to activate the wheel angle sensor.
3. Press  shortly.

## 6.12.2 Deactivating the wheel angle sensor

**Procedure**

1. Change to this screen:




2. Mark the  icon to deactivate the wheel angle sensor. You cannot deactivate the wheel angle sensor in systems with hydraulic steering. It must always be mounted and activated.
3. Press  shortly.

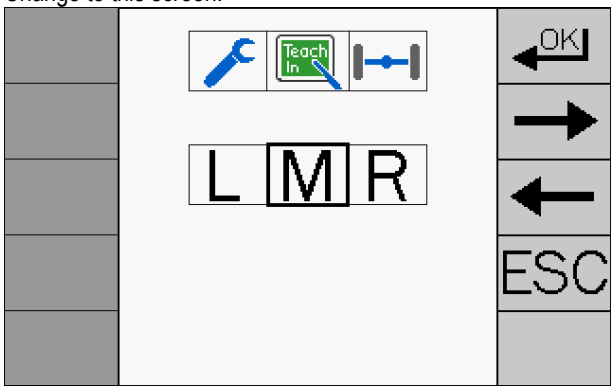
⇨ You have deactivated the wheel angle sensor and need not make any further settings for the wheel angle sensor.

## 6.12.3 Entering the amount of wheel angle sensors

**Procedure**

☑ You have activated the wheel angle sensor.

1. Change to this screen:

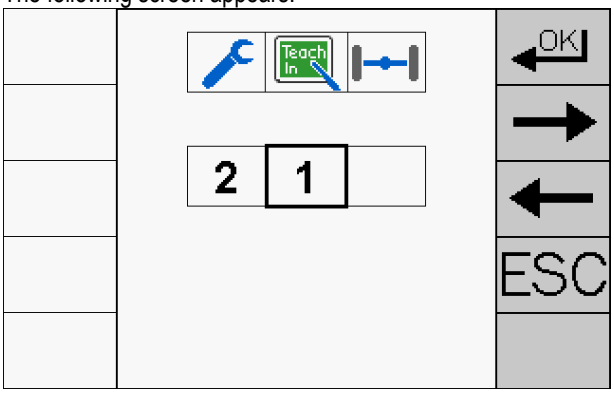



2. Mark the icon 

.

3. Press 

shortly.
   ⇨ The following screen appears:




4. Mark the amount corresponding to the amount of wheel angle sensors mounted.

5. Press 

shortly.

## 6.12.4 Selecting signal type

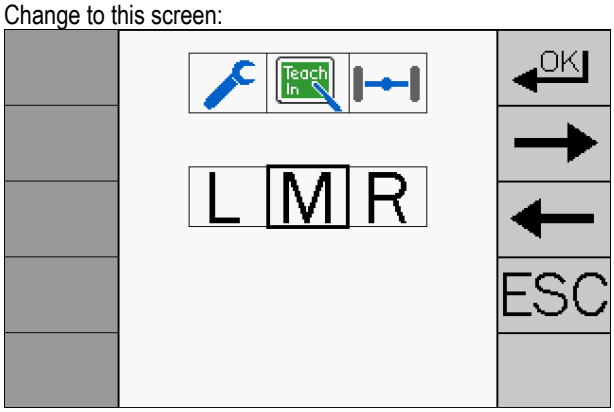
The wheel angle sensor can supply these signals:

- Current signal (ampere)
- Voltage signal (volt)

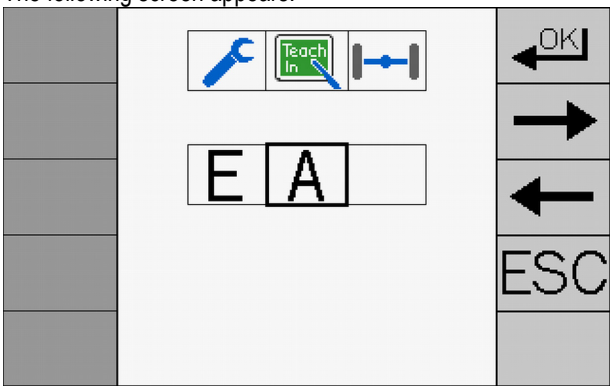
The wheel angle sensor mounted by default supplies a current signal.

**Procedure**

1. Change to this screen:



2. Mark the icon Typ.
3. Press OK shortly.
   ⇨ The following screen appears:




4. Mark the "**A**" icon when the wheel angle sensor supplies a current signal. This is how the wheel angle sensor mounted by default works. Set "**E**" when the wheel angle sensor supplies a voltage signal.

## 6.12.5 Calibrating the wheel angle sensor

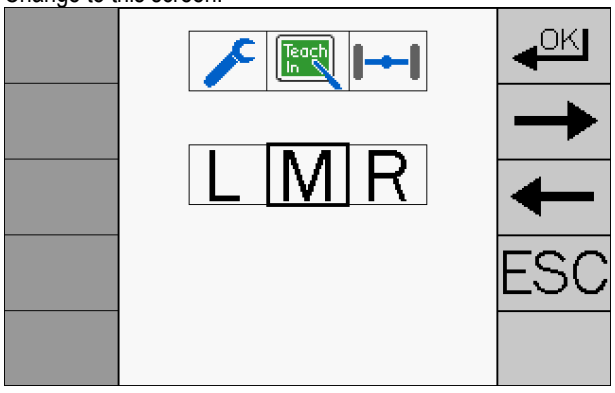
To calibrate the wheel angle sensor, you have to communicate to the steering job computer in which positions the wheel angle sensors are located when the wheels are straight and when they are steered to the right or to the left.

You need to calibrate the wheel angle sensor three times:

- First when the vehicle is still, so that the system can be started at all (this is described in this chapter).
- Second during a drive in the field, so that the system can be precisely calibrated. [→ 45]
- Third in order to precisely adjust the wheel angle sensor. [→ 46]

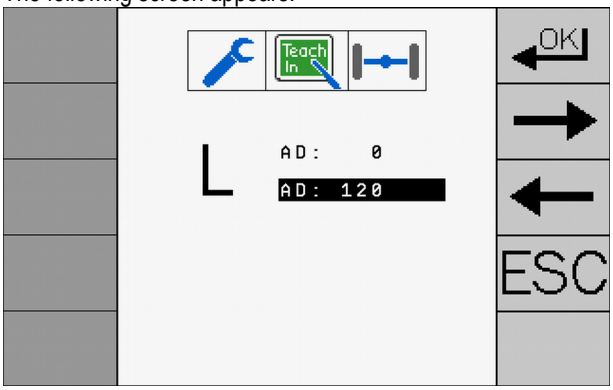
**Procedure**

1. Change to this screen:




2. Turn the steering to the left as much as possible and drive a few centimeters in this direction.
3. Mark the icon L.
4. Press OK shortly.

⇨ The following screen appears:




⇨ AD values will appear in the screen. The upper value shows the current wheel angle sensor position. The lower value shows the wheel angle sensor position as it was saved.

5. Press 

shortly to confirm that the steering wheel was turned to the left to the maximum.
   ⇨ The left limit stop was configured.
6. Repeat this procedure for the most right position. In step 2 turn the steering wheel to the right and in step 3 select the 

icon.
7. Align the wheels.
8. Drive straight on a few centimeters.
9. When the wheels are aligned, calibrate the middle position in the same way as you calibrated the left limit stop. Select the 

icon in step 3.

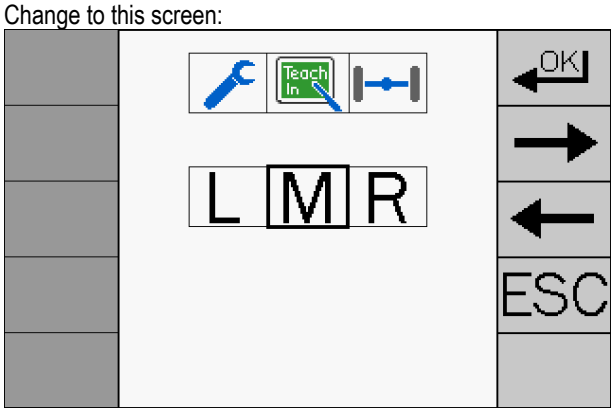
## 6.12.6 Calibrating the middle position of the wheel angle sensor during the drive

Perform this calibration only when you have configured all other systems and the first test drive was successful.

This calibration is of particular importance for correct and precise work of the steering system. Proceed with this calibration with utmost care.

**Procedure**

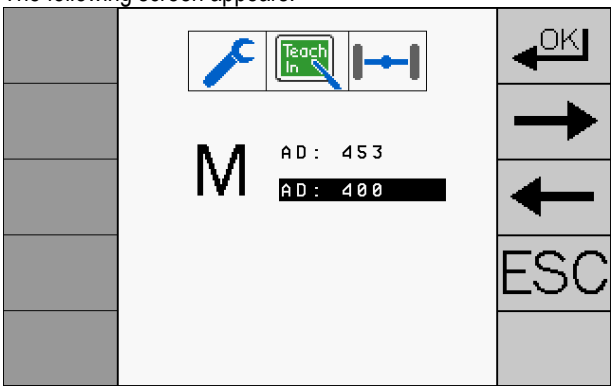
1. Change to this screen:




2. Mark the "**M**" icon.
3. Press 

shortly.

⇨ The following screen appears:




4. Now drive straight on. For better precision: search for a spot in front of the vehicle on the horizon and try to drive the vehicle in that direction. By doing so, your drive straight on will be more accurate.
5. Watch which value is displayed on the upper AD line when the vehicle is driving straight on as it shall.
6. Stop.
7. Turn the steering wheel, so that the ideal AD value is displayed.
8. Press 

shortly.
   ⇨ The current AD value will be saved.
   ⇨ You have calibrated the middle position of the wheel angle sensor.

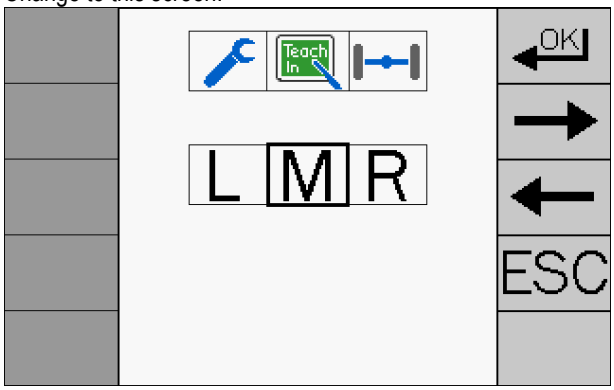
## 6.12.7 Precise adjustment of wheel angle sensor middle position

You can perform this step only after finishing all settings, after you have tested the system in the field with TRACK-Leader.

**Procedure**

☑ You have configured and tested the system in the field.

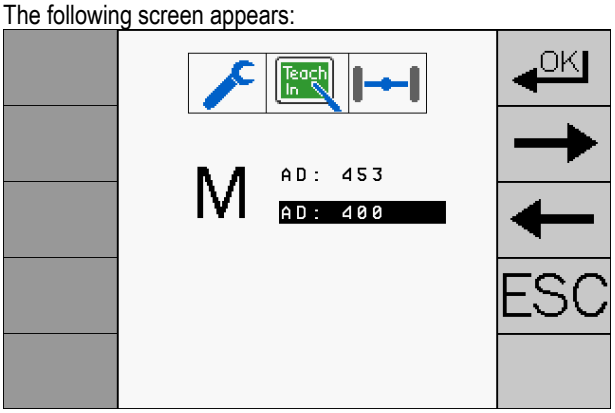
1. Place the vehicle onto the field, so that it can follow a tramline of the TRACK-Leader application.
2. Get going and activate automatic steering.
3. Watch the deviation from the tramline in the start screen of the PSR application.
4. If the deviation is a few centimeters, you can continue with the fine adjustment.
5. Stop the vehicle.
6. Change to this screen:




7. Mark the "**M**" icon.

8. Press 

shortly.
   ⇨ The following screen appears:




   ⇨ On the lower line you can see the digital value as it was saved in the steering job computer and used during the drive as the middle position.

9. Turn the steering wheel, so that the current value (upper line) is by one or two points bigger or smaller than the lower value. Remember by how many points you changed the value.

10. Press 

shortly.

11. Save the changes.

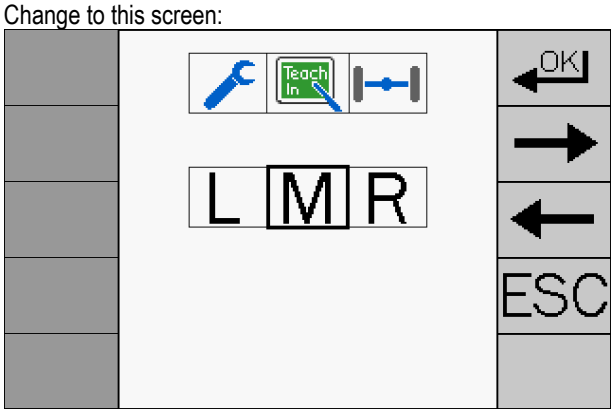
12. Change to the start screen.

13. Activate automatic steering and drive a few meters/yards.

14. Watch the deviation. Pay attention whether the deviation is now bigger or smaller.

15. Stop the vehicle.

16. Change to this screen:

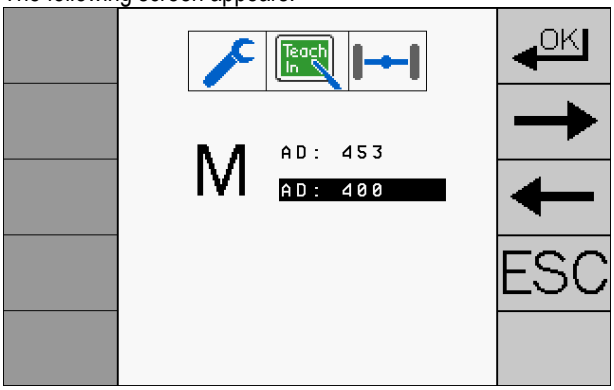



17. Mark the "**M**" icon.

18. Press 

shortly.

⇨ The following screen appears:




**19.** Repeat the settings. Try to find out the value at which the steering shows no deviation any longer.

## 6.13 Setting the driving mode

The driving mode decides from where the steering job computer shall take the input for its steering.

**Available driving modes**

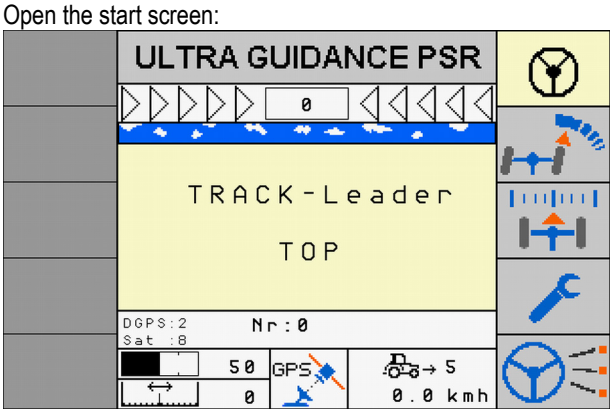
| No. | Icon | Meaning |
|---|---|---|
| 1 |  | GPS position |
| 2 |  | Track cross |
| 3 |  | Road outside |
| 4 |  | Swath middle / swath changing |
| 5 |  | Existing edge |
| 6 |  | Existing edge over cross |
| 7 |  | Existing edge with contour |
| 8 |  | Not in use |
| 9 |  | Not in use |
| 10 |  | Not in use |

For TRACK-Leader TOP with a GPS receiver you will always need the driving mode GPS position. For SONIC-Control you will need driving modes 2 to 7.

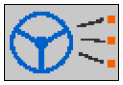
Any other driving mode is described in the operating instructions "PSR ISO TOP" of Reichhardt.

**Procedure**

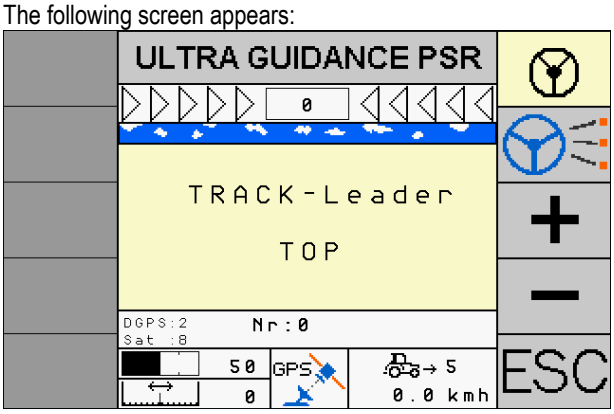
1. Open the start screen:

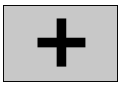


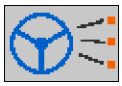

⇨ The driving mode currently selected will appear in the screen middle at the bottom.

2.  - Keep the key pressed for about 3 seconds.

⇨ The following screen appears:




3. Use  and  to set the required driving mode. For TRACK-Leader TOP it is 

4. To save the selection, press  shortly.

⇨ The start screen appears.

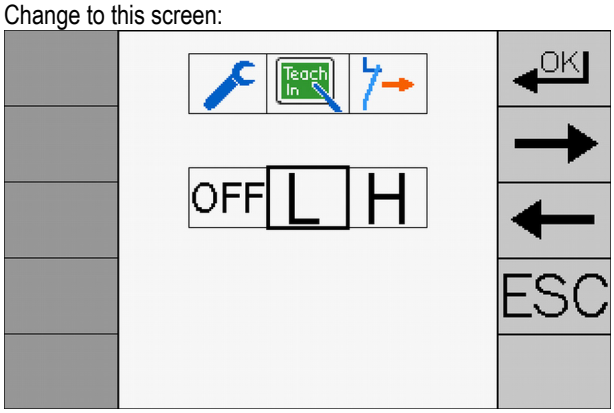
## 6.14 Activating the seat contact switch

The seat contact switch is a sensor mounted in the driver seat or the vehicle cabin door which deactivates automatic steering as soon as the driver leaves the seat or opens the cabin door.

If you have a system with hydraulic steering, you need to activate – for safety reasons – the monitoring system of the seat contact switch connected.

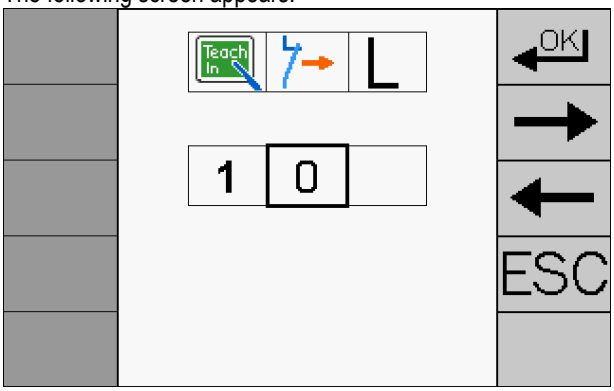
**Procedure**

1. Change to this screen:




2. When the seat contact switch is switched against earth (GND), set "**L**".
3. When the seat contact switch is switched against operating voltage (UB), set "**H**".
4. Press 

shortly.
   ⇨ The following screen appears:




5. Set "**0**" or "**1**" depending on how the seat contact switches.
6. Press 

shortly.

## 6.15 Configuring the pressure sensor

The pressure sensor is one determining the pressure in the hydraulic system. It can be mounted on different places in the hydraulic system depending on the vehicle. The pressure sensor will recognize whether the steering was moved when steering is activated. This way, the system can deactivate automatic steering when the driver wants to take over the control.

### 6.15.1 Selecting signal type

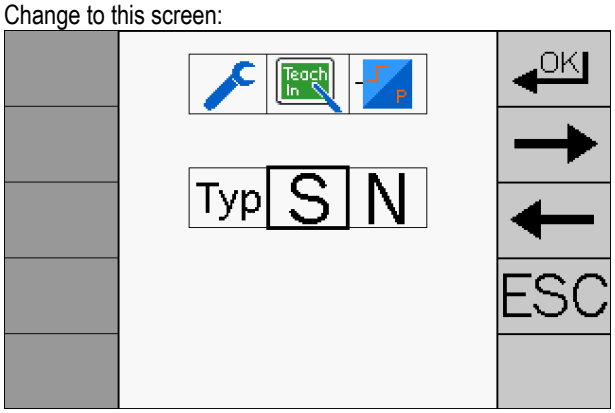
The pressure sensor can supply these signals:

- Current signal (ampere)
- Voltage signal (volt)
- Flow switch (e.g. in Tecnoma)

The pressure sensor mounted by default supplies a current signal.

**Procedure**

1. Change to this screen:

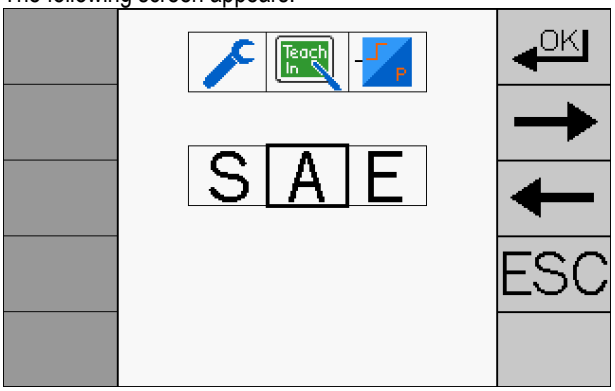



2. Mark the icon 

.

3. Press 

shortly.
   ⇨ The following screen appears:

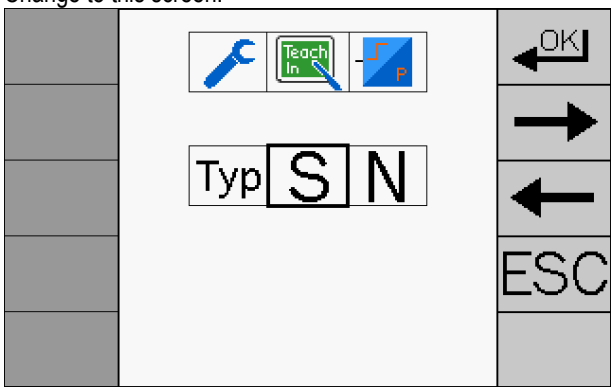



4. Mark the "**A**" icon when the pressure sensor supplies a current signal. This is how a pressure sensor mounted by default works. Set "**E**" when the pressure sensor supplies a voltage signal. Set "**S**" when it is a flow switch.

## 6.15.2 Defining the neutral position

**Procedure**

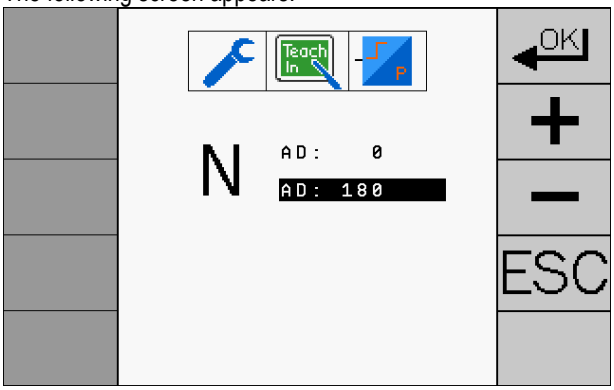
1. Start the motor of the vehicle.
2. Change to this screen:




3. Mark the "**N**" icon.
4. Press 

shortly.

⇨ The following screen appears:




⇨ AD values will appear in the screen. Up you can see the current value from the pressure sensor. Down you can see the pressure sensor value as it was saved.

5. Do not move the steering wheel.
6. Press 

shortly.

## 6.15.3 Calibrating the switch-off threshold

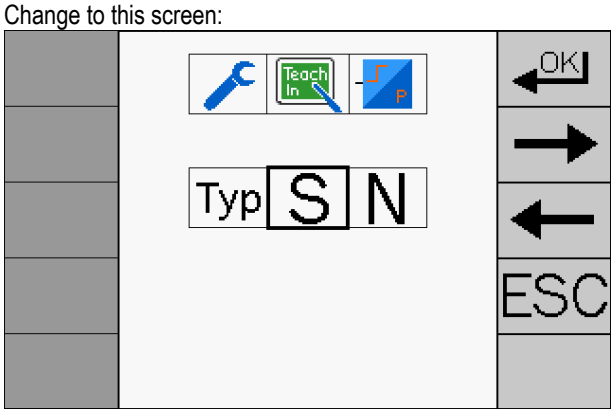
The switch-off threshold defines how strongly the steering wheel must be moved for hydraulic steering to be deactivated.

Note the following for these settings:

- When you move the steering wheel and automatic steering is not deactivated, then the parameter value is too high.
- When automatic steering deactivates by itself before you move the steering wheel, then the parameter value is too low.

**Procedure**

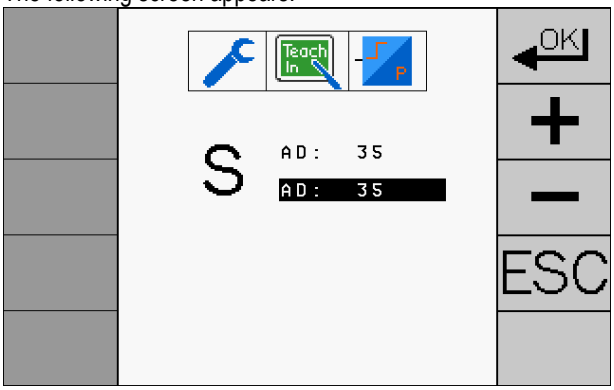
1. Start the motor of the vehicle.
2. Change to this screen:




3. Mark the "**S**" icon.
4. Press 

shortly.

⇨ The following screen appears:




⇨ The upper value represents the current value. The lower value represents the value saved.

5. Adjust the value. To do so, you need to repeat calibration during the drive.
6. Press 

shortly.

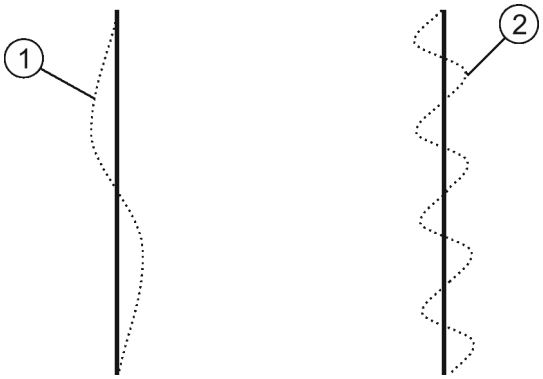
## 6.16 Setting the PSR reaction speed of hydraulic steering

You must set for every system how quickly and strongly the system shall steer.

These settings are made in two places:

- In the TRACK-Leader application by setting the "PSR reaction speed" parameter.
  This parameter is intended for the driver. It allows the driver to flexibly adjust the PSR reaction speed and so respond e.g. to specific ground conditions.
  See also:
- In the PSR application of the steering job computer.
  These settings must be made after the assembly.
  They are explained in this chapter.

The aim of these settings is to ensure that the vehicle finds the track fast enough, but still drives calmly and does not over-steer constantly.




*Examples of different PSR reaction speeds*

| | | | |
|---|---|---|---|
| 1 | The steering responds too slowly | 2 | The steering responds too rapidly |

**Parameter to be set**

| Icon | Meaning |
|---|---|
| L | Minimum current for left steering valve. |

| Icon | Meaning |
|---|---|
| | 800-2000mA |
| R | Minimum current for right steering valve.<br>800-2000mA |
| max | Maximum current for steering valve<br>Examples: 2500mA – standard value for Bucher valves; in case of small steering cylinders you can reduce the value to 1800.<br>Maximum current should be set minimum 500 to 800mA higher than minimum current. |

Configure all three parameters, so that the wheels steer slowly in required direction. You must change direction quickly and rapidly.

Repeat the configuration during a field test. This is the only way to achieve optimum settings.

**DANGER**

**Danger of crushing due to turned wheels**
Death or heavy injuries
The wheels may move from one limit stop to another in a fraction of a second.

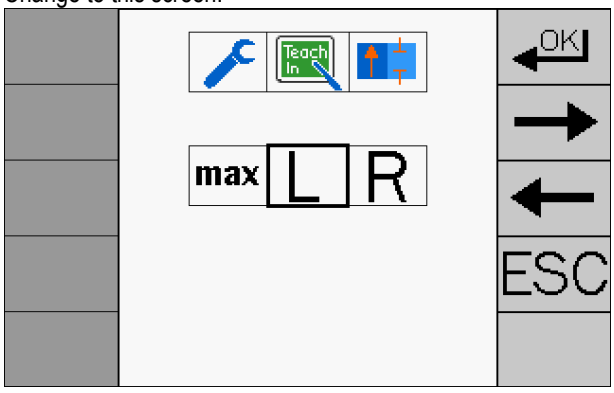
☑ There must be nobody close to the wheels being steered.

◦ Before starting this configuration, ensure that nobody is close to the wheels being steered.

**Procedure**

☑ The "PSR reaction speed" in the "TRACK-Leader" application is set to "50".

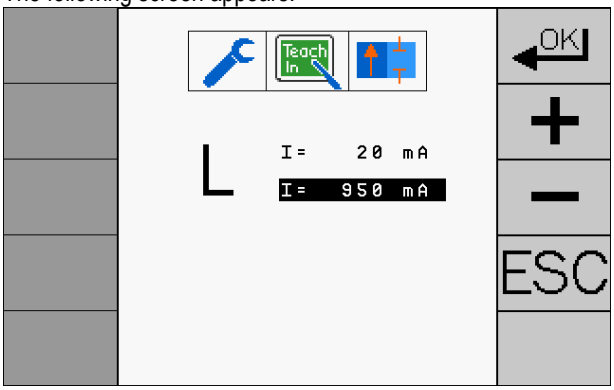
1. Change to this screen:



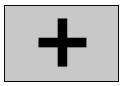

2. Mark the "**L**" icon.
3. **DANGER! Make sure that there is no-one close to the wheels.**
4. Press 

shortly.
   ⇨ The wheels will be immediately turned left.

⇨ The following screen appears:

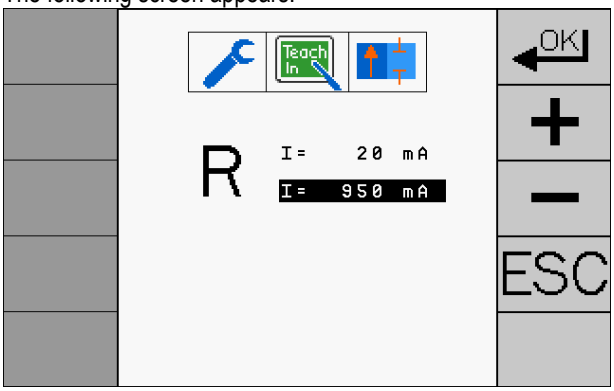



⇨ Two "I" values appear in the screen. The upper value shows the current as it is just being measured. The lower value shows the current as it was saved.

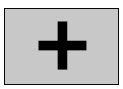
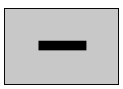
5. Press  or  to set the required value on the upper line. The value must be set as to ensure that the wheels turn slowly in selected direction.
6. Press  shortly.
7. Save the changes.
8. Mark the "**R**" icon.
9. **DANGER! Make sure that there is no-one close to the wheels.**
10. Press  shortly.

⇨ The wheels will be immediately turned right.

⇨ The following screen appears:

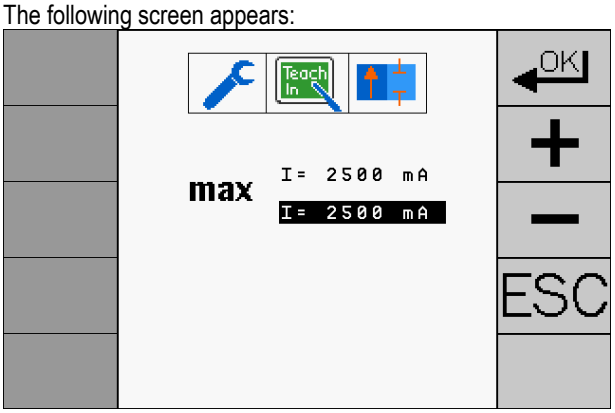



⇨ Two "I" values appear in the screen. The upper value shows the current as it is just being measured. The lower value shows the current as it was saved.

11. Press  or  to set the required value on the upper line. The value must be set as to ensure that the wheels turn slowly in selected direction.
12. Press  shortly.
13. Save the changes.
14. Mark the "**Max**" icon.

15. Press 

shortly.
    ⇨ The following screen appears:




    ⇨ Two "I" values appear in the screen. The upper value shows the current as it is just being measured. The lower value shows the current as it was saved.

16. Set the maximum current for the steering cylinders.

17. Press 

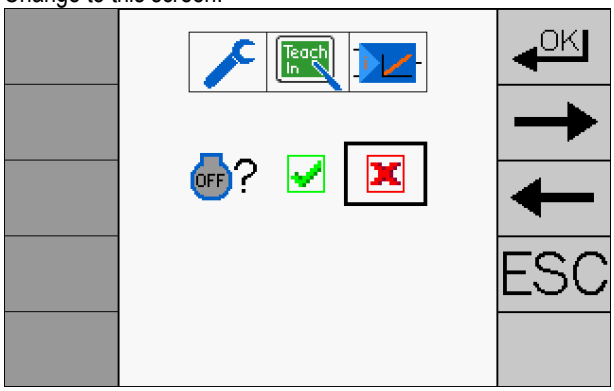
shortly.

## 6.17 Calibrating valve currents

The resistance in the Bucher valve is measured for these settings.

**Procedure**

1. Stop the engine.
2. Change to this screen:

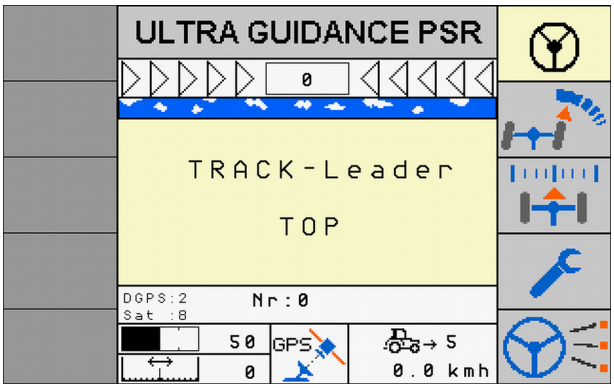



3. Mark the icon  .
4. Keep 

pushed for about 3 seconds.
    ⇨ The steering job computer will now measure the valve current for 30 seconds.
5. Wait until the procedure is finished.

## 6.18 Checking configuration

After configuring the steering job computer, the start screen in the PSR application will change.




**DANGER**

**Danger of crushing due to turned wheels**

Death or heavy injuries

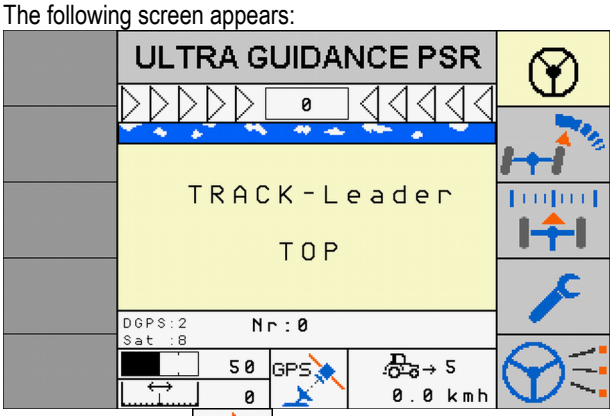
The wheels may move from one limit stop to another in a fraction of a second.

☑ There must be nobody close to the wheels being steered.

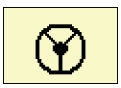
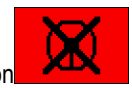
◦ Before starting this configuration, ensure that nobody is close to the wheels being steered.

**Procedure**

1. If you have a steering system with a steering wheel motor, pull the steering wheel motor from the steering.
2. Start the steering job computer and open the PSR application.
   ⇨ The following screen appears:

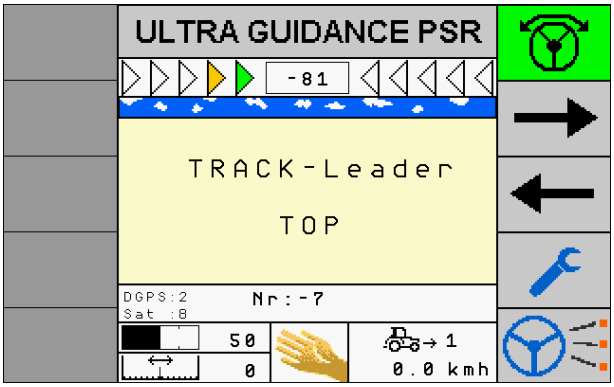



   ⇨ Check whether the  icon has appeared at the bottom. If it has not, set the driving mode GPS. See section: Setting the driving mode [→ 48]

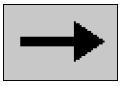
   ⇨ The function icon  will appear up on the right. When the function icon  appears, the system is not yet correctly configured. You cannot continue. You have to check the configuration and error messages instead.

3. Press the  key shortly to set the manual mode.
   ⇨ The icon  will appear in the lower section.
4. Press the  key until it has turned green.

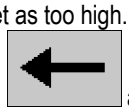
⇨ It will then look like this:




5. **DANGER! Make sure that there is no-one close to the wheels.**
6. Press one of the arrows.

⇨ When pressing the  arrow, the friction wheel will shortly turn counter-clockwise. In systems with hydraulic steering the wheels will move in the arrow direction.

⇨ You will recognize based on the PSR reaction speed whether the reaction speed has been correctly configured. If the system does not steer, then the minimum PSR reaction speed current is set as too low. If the system steers too rapidly, then the minimum PSR reaction speed current is set as too high.

⇨ When pressing the  arrow, the friction wheel will shortly turn clockwise. In systems with hydraulic steering the wheels will move in the arrow direction.

# 7 TRACK-Leader TOP in the TRACK-Leader application

TRACK-Leader TOP is a module of the TRACK-Leader application and is used for automatic steering along defined guidance lines.

After installing and configuring the steering job computer, you need to make some settings in the TRACK-Leader application.

## 7.1 Configuring TRACK-Leader TOP

**Procedure**

1. Open the "TRACK-Leader" application.
2. Change to screen:
   **Settings | TRACK-Leader TOP**
3. Configure all parameters in the screen. You will find the clarifications on the pages below.
4. Click "backward".
5. Click "TRACK-Leader II".
6. Change the value of the "Swinging angle" parameters to 85°. You will find the clarifications on the pages below.

### GPS receiver height

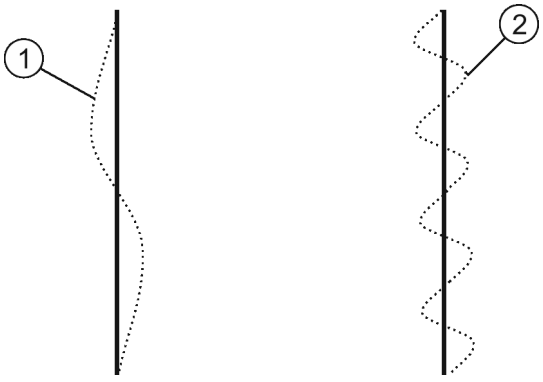
Distance between GPS receiver and the ground.

Required for: TRACK-Leader TOP

### PSR reaction speed

PSR reaction speed and aggressiveness of the automatic steering. The higher the value, the sharper the steering movements.

The aim of these settings is to ensure that the vehicle finds the track fast enough, but still drives calmly and does not over-steer constantly.



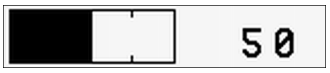

*Examples of different PSR reaction speeds*

| | | | |
|---|---|---|---|
| 1 | The steering responds too slowly | 2 | The steering responds too rapidly |

You can adjust the value to specific local conditions prior to work commencement:

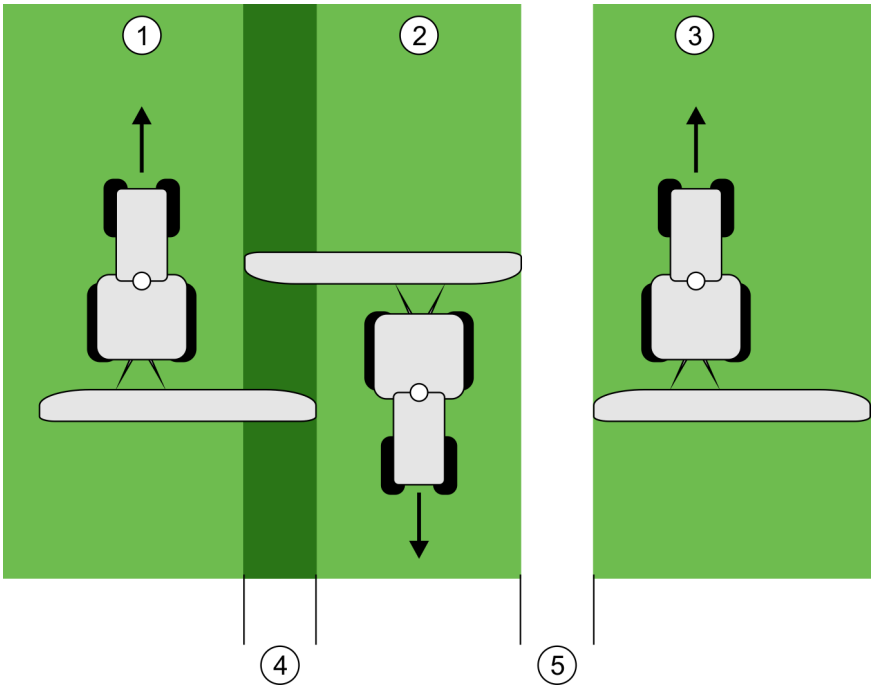
- When the ground is wet and makes steering more difficult, raise the value.
- When the ground is dry and makes steering easy, reduce the value.

The value set here will also appear in the start screen of the PSR application (steering job computer):




### Implement offset

You have to enter the machine offset when the agricultural machine, as shown in the picture, works with a offset on one side. Should this parameter be missing, some areas will be processed twice and some skipped.




*Work with machine offset, without setting the "Implement offset" parameter*

| | | | |
|---|---|---|---|
| 1 | First drive | 4 | Double-processed area |
| 2 | Second drive | 5 | Unprocessed area |
| 3 | Third drive | | |

**Mode of operation**

If this parameter is allocated any value other than 0, the following occurs:

- A red guidance line appears on the work screen. TRACK-Leader TOP will follow the red guidance line.
- The machine icon and the boom icon are shifted to the input value.

Potential values:

- Input a positive value, e.g.: **90cm**
  If the towed equipment is offset to the right.
- Input a negative value, e.g.: **-90cm**
  If the towed equipment is offset to the left.
- Input "0"
  After connecting a job computer in which the entire geometry of the towed equipment is recorded. For example the job computer of a sprayer from Müller-Elektronik.

**Procedure**

This is how you determine the right value for this parameter:

1. Ensure that the parameter is set to "0".
2. Start new navigation with TRACK-Leader.
3. Drive your tractor three lanes along the guidance lines, as shown in the image above.

4. Measure the width of the unprocessed area between the second and third drive.
5. Enter the half of the width measured as the value of this parameter.
6. With plus and minus you can set the offset direction for the agricultural machine.

### Swinging angle

The program assumes from a defined angle that the vehicle wants to swing to a guidance line. Then this guidance line will be marked in blue. If the vehicle drives with smaller angle deviation towards a guidance line, then this track will not be recognized as a new current guidance line.

- Default value: 30 degree.

## 7.2 Using TRACK-Leader TOP

**Controls**

All function icons that you need for automatic steering control are displayed directly on the screen.

| Function icon | Alternative function icon | Description |
|---|---|---|
|  |  | Automatic steering TRACK-Leader TOP is deactivated or not available at all. |
|  |  | The steering job computer is mounted and configured, but an error has occurred.<br>Read the error message in the steering job computer application. |
|  |  | Activate automatic steering.<br>Automatic steering can be activated, but is not active. |
|  |  | Deactivate automatic steering.<br>Automatic steering is active. |
|  |  | Steer the vehicle to the left.<br>The function key does not work when TRACK-Leader TOP is deactivated. |
|  |  | Steer the vehicle to the right.<br>The function key does not work when TRACK-Leader TOP is deactivated. |

| | |
|---|---|
|  | **⚠ WARNING**<br>◦ Read the enclosed "Ultra Guidance PSR ISO" directions for use before beginning to use the system. Pay particular attention to the information in the Chapter "Safety".<br>◦ Proceed with extreme care, particularly when using the automatic steering!<br>◦ Disable the automatic steering whenever anyone comes within 50 meters of the machine while it is operating. |

### 7.2.1 Driver tasks

The driver must perform the following tasks:

- The driver must pay attention to safety. The automatic steering system is blind. It cannot tell if anyone is approaching the vehicle. It cannot stop or take evasive action.
- The driver must brake and accelerate.
- The driver must perform turning.

### 7.2.2 Activating and deactivating automatic steering

| | |
|---|---|
|  | **⚠ WARNING**<br>**Risk of traffic accident**<br>If automatic steering is ON, the vehicle may drive off the road and cause an accident. This may lead to human injury, or even fatalities.<br>◦ Disable the automatic steering before traveling on public roads.<br>◦ Move the steering motor away from the steering wheel. |

**Procedure**

You can activate automatic steering as follows:

☑ You must first configure the steering job computer and TRACK-Leader TOP.

☑ You must first create the A-B guidance line.

☑ You must have positioned the vehicle on a line of travel, and enabled a guidance line.

☑ The work screen displays the function icon 


1. Position the steering motor with friction wheel on the steering wheel.
2. 

- Press.
   ⇨ The function icon is replaced with the following function icon: 

   ⇨ The automatic steering is enabled.
3. When under way in the vehicle, the steering motor controls the vehicle in such a way that it proceeds along the active guidance line.

**Procedure**

The are several ways of disabling the automatic steering:

1. Move the steering wheel.
   or:
   
   
   - Press.
   ⇨ The automatic steering will be disabled.

⇨ The function icon 

is replaced with the following function icon: 


## 7.2.3 Moving guidance lines

The automatic steering drives the vehicle along the active guidance line.

If the guidance line activated no longer matches the real position of the vehicle due to a GPS signal drift, you can manually move the guidance line.

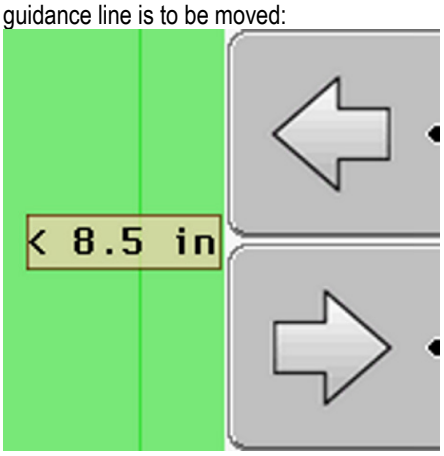
You have two options:

- You can move the guidance line for one drive over the field. After turning, the old position will be restored.
- You can move the guidance line permanently.

**Procedure**

This is how you move the guidance line for one drive:

☑ The function icon appears in the work screen 


1. Press  or  to make the vehicle drive parallel to the active guidance line.
   ⇨ Next to the function icons information is displayed about how far and in which direction the guidance line is to be moved:
   
   
   ⇨ The steering motor controls the steering wheel.
2. The vehicle will drive parallel to the guidance line until another guidance line is activated.

**Procedure**

This is how you will move the guidance line permanently:

## 7.2.4 Turning

When turning, the driver must take control of the steering and steer himself.

**Procedure**

You can make a turn as follows when automatic steering is enabled:

☑ The work screen displays the function icon: 

. The automatic steering is enabled.

1. Take hold of the steering wheel and perform the turning yourself.
   ⇨ The automatic steering is disabled automatically as soon as the steering wheel is moved.
   ⇨ The function icon 

is replaced with the following function icon: 

2. Turning.
   ⇨ The next guidance line is then activated if the angle between itself and the vehicle is smaller than the set "Swinging angle" parameter.
3. 

- Enable steering once the next guidance line is enabled.

# 8 First drive with the system

You must check these settings before the first drive:

- check if the steering works.
- Set the switch-off threshold. See also:
  - Calibrating the switch-off threshold [→ 52]
- Calibrating the wheel angle sensor. See also:
  - Calibrating the middle position of the wheel angle sensor during the drive [→ 45]
  - Precise adjustment of wheel angle sensor middle position [→ 46]
- Checking the PSR reaction speed. See also:
  - Setting the PSR reaction speed of hydraulic steering [→ 53]
  - Setting the PSR reaction speed of the steering wheel motor

**Required precision**

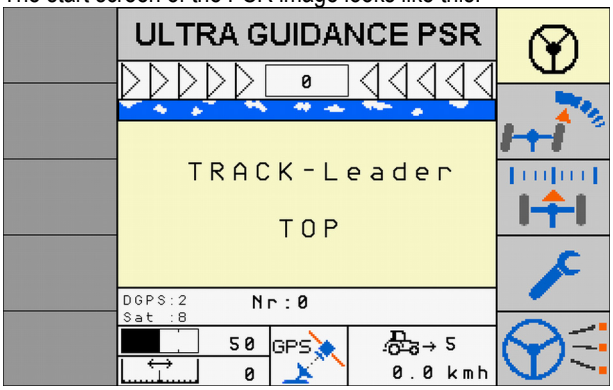
| Steering type | Area of usage | Optimum test speed | Optimum precision |
|---|---|---|---|
| Steering wheel motor | slower than 12 km/h | 6-8 km/h | +/- 3-5 cm |
| Hydraulic steering | slower than 20-25 km/h | 6-8 km/h | +/- 2cm |

**Procedure**

☑ You have configured TRACK-Leader TOP.

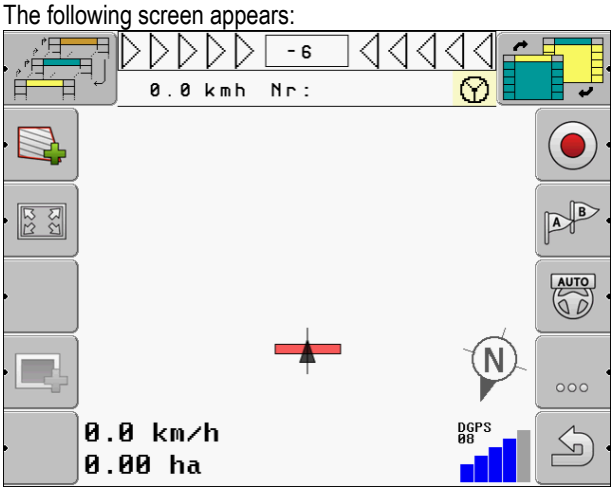
☑ You have configured the PSR steering job computer.

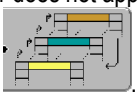
☑ The start screen of the PSR image looks like this:



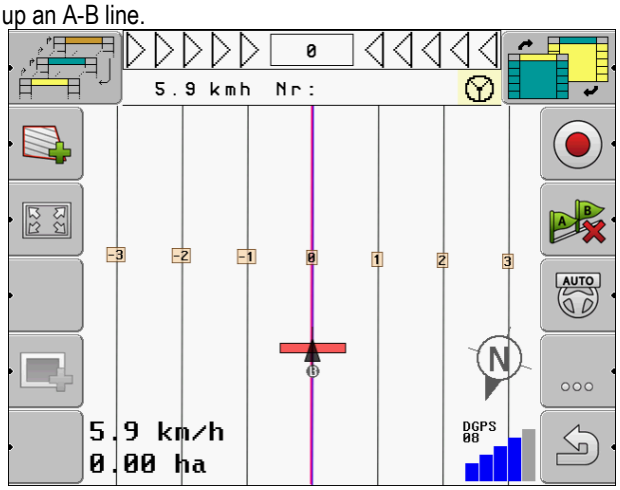

1. Start new navigation with TRACK-Leader.
2. Start new navigation in the "Parallel" driving mode.

⇨ The following screen appears:




3. If the lightbar does not appear in the header line of the PSR application, press repeatedly the function key  .

4. Set up an A-B line.

⇨ 


5. Stop the vehicle.

6. Activate automatic steering with  .

7. Start going.
   - ⇨ The system works if it steers the vehicle in the direction of the guidance line marked in blue.
   - ⇨ In the header line you can see how big is the current deviation from ideal course.
   - ⇨ The deviation is generally big during the first drive, because the sensors were calibrated at a standstill. Now you need to perform calibration during the drive. See the list at the end of this chapter.
   - ⇨ Improve the settings until the deviation is as small as the optimum precision in the table above.

8. Deactivate automatic steering for turning the vehicle.

# 9 Troubleshooting

## 9.1 Frequent issues

### The PSR application does not appear in the terminal selection menu

1. Connect the IBox Lite steering job computer to the terminal.

### Automatic steering will no longer allow you to activate it

Possible causes:
- No guidance line in TRACK-Leader
- Error in the PSR application
- Steering job computer is switched off

1. Check which errors have occurred. [➞ 68]
2. Repair the faults.

### The  icon is missing in the main menu



1. Unlock the steering job computer. [➞ 30]

### Vehicle is being steered a few centimeters next to the guidance line

If the vehicle drives continuously a few centimeters next to the guidance line, the reason may that a wheel angle sensor has not been calibrated.

1. Calibrate the middle position of the wheel angle sensor. [➞ 44]

### Vehicle steers too late or too rapidly

If the vehicle steers too late or too rapidly, the reason may be an incorrectly set PSR reaction speed.

1. Configure the parameter "PSR reaction speed" in the "TRACK-Leader" application. [➞ 59]
   ⇨ You can edit this parameter as the driver. The parameter is intended for adjusting the PSR reaction speed to current ground conditions.
2. Calibrate the "PSR reaction speed" of the steering wheel motor or hydraulic steering [➞ 53].
   ⇨ This parameter should be calibrated only by the service engineer. Drivers cannot access the area with this parameter.

### No GPS signal is available

1. Connect the GPS receiver to the steering job computer.
2. Activate the GPS driver "GPS_PSRCAN" in the "Service" menu of the terminal.

## 9.2 Error messages

| Error text or number | Description | Cause | Troubleshooting |
|---|---|---|---|
| GPS no Receiver | No GPS receiver is connected. | Broken cable between GPS receiver and PSR iBox.<br>Fuse B6.1 and/or B6.2 is faulty. | Check the cables of PSR iBox GPS receiver.<br>Check fuse in PSR iBox.<br>Check which signals shall be evaluated by the GPS receiver (NMEA 0183, NMEA 2000, J1939 GPS). |
| No GPS-Signal | No valid GPS signals are being received. | Incorrect cables were connected.<br>Incorrect baud rate. | Check if correct serial port is connected.<br>Check the GPS receiver settings. |
| GPS Warm Up Please Wait | GPS signals have already been received, but they still need to be checked. | The GPS receiver has not yet started correctly. | Wait until the GPS receiver has started correctly.<br>Drive to a place where you have an open view of the sky. |
| Low GPS-Signal | Incorrect GPS signals are being received. | There is no open view of the sky.<br>Objects (trees, houses, etc.) obstruct the reception. | Drive to a place where you have an open view of the sky. |
| GPS no A-B line | No A-B lines have been saved under this job number yet. | No A-B lines have been saved under this job number yet. | Save a new A-B line under this job number.<br>Select correct job number which has already been saved. |
| Distance to A too far away. | The distance from the A-B line saved is too great. | The A-B line saved is located too far away. | Save a new A-B line.<br>If this A-B line shall be driven, you have to drive closer to the position in which the A-B line was saved. |
| Too many GPS Lines | Position out of range. | The system can measure +-10000 lines. | Save a new A-B line.<br>Drive to the range of +-10000 lines. |
| GPS no RMC | No GPRMC message received by the GPS receiver. | The GPS receiver was incorrectly configured. | The GPS receiver must be configured again. |
| GPS no GGA | No GPGGA message received by the GPS receiver. | The GPS receiver was incorrectly configured. | The GPS receiver must be configured again. |
| GPS no VTG | No GPVTG message received by the GPS receiver. | The GPS receiver was incorrectly configured. | The GPS receiver must be configured again. |

| Error text or number | Description | Cause | Troubleshooting |
|---|---|---|---|
| GPS J1939 No VP | No J1939 VP message received by the GPS receiver. | The GPS receiver was incorrectly configured. | The GPS receiver must be configured again. |
| GPS J1939 No VDS | No J1939 VDS message received by the GPS receiver. | The GPS receiver was incorrectly configured. | The GPS receiver must be configured again. |
| NMEA 2000 No RDU | No NMEA 2000 RDU message received by the GPS receiver. | The GPS receiver was incorrectly configured. | The GPS receiver must be configured again. |
| NMEA 2000 No CSD | No NMEA 2000 CSD message received by the GPS receiver. | The GPS receiver was incorrectly configured. | The GPS receiver must be configured again. |
| NMEA 2000 No PD | No NMEA 2000 PD message received by the GPS receiver. | The GPS receiver was incorrectly configured. | The GPS receiver must be configured again. |
| Lost RTK | GPS receiver lost RTK quality. | GPS receiver is receiving lower quality as RTK. | Check reference age of base station |
| Lost DGPS | GPS receiver lost DGPS quality. | GPS receiver is receiving lower quality as DGPS. | Check reference age of correction satellites |
| Terminal version | Terminal version too old. | After a software update of the PSR iBox, it may be necessary to apply the new version also to the PSR cBox. | Perform update for PSR cBox with the version displayed on the screen. |
| PSR no license | Invalid hardware. | The hardware version is not suitable for this software. | Contact your Reichhardt client service. |
| Select Steering mode | No driving mode is selected. | No driving mode has been selected yet.<br>The activation time for the driving mode has expired. | Please select a driving mode.<br>Contact your Reichhardt client service. |
| New license not possible | You can activate more time for a driving mode again. | This driving mode has already been activated three times. | Contact your Reichhardt client service. |
| Timeout license end | The activation time for the driving mode has expired. | The activation time has expired. | Contact your Reichhardt client service. |
| Last shut | An error occurred during | Battery is not connected | Check if the battery is connected. |

| Error text or number | Description | Cause | Troubleshooting |
|---|---|---|---|
| down bad | the last shutdown. | correctly.<br>A software error has occurred. | Contact your Reichhardt client service. |
| 1000 | no signal from wheel angle sensor. | Cable has a short circuit.<br>Broken cable.<br>Faulty sensor.<br>Plug contacts have opened. | Check the plug connection of the wheel angle sensor.<br>Check the cables from PSR iBox to wheel angle sensor.<br>If all connections and wires are OK, replace the wheel angle sensor.<br>Check the plug contacts. |
| 1001 | The wheel angle sensor does not work properly. | Axle has hit the block (limit stop).<br>Mechanics or suspension of the wheel angle sensor is defective.<br>A new wheel angle sensor has been incorrectly fitted.<br>Wheels are blocked by an obstacle. | Check the wheel angle sensor mechanics.<br>A new wheel angle sensor was fitted and needs to be taught again. |
| 1010 | Wheel angle sensor out of valid range. | Broken mechanics.<br>Broken cable.<br>Faulty sensor.<br>Plug contacts have opened. | Check the sensor holder.<br>Check the cables from PSR iBox to wheel angle sensor.<br>Check the sensor.<br>Check the plug contacts. |
| 1019 | Left and right wheel angle sensors diverge. | Wheels have diverged too much.<br>Broken cable.<br>Faulty sensor.<br>Plug contacts have opened. | Steer once to the left and once to the right by hand.<br>Check the cables from PSR iBox to wheel angle sensor.<br>Check the sensor.<br>Check the plug contacts. |
| 1020 | Vehicle door is open. | Vehicle door is open.<br>Broken cable.<br>Faulty door contact switch.<br>Plug contacts have opened. | Close vehicle door.<br>Check the cables from PSR iBox to door contact switch.<br>Check the door contact switches.<br>Check the plug contacts. |
| 1040 | Broken cable of pressure | Faulty pressure sensor. | Check pressure sensor visually. |

| Error text or number | Description | Cause | Troubleshooting |
|---|---|---|---|
| | sensor. | Broken cable.<br>Pressure sensor incorrectly screwed on.<br>Plug contacts have opened. | Check the cables from PSR iBox to pressure sensor.<br>Check if pressure sensor is correctly screwed on.<br>Check the plug contacts. |
| 1041 | Short circuit of pressure sensor. | Faulty pressure sensor.<br>Short circuit.<br>Pressure sensor incorrectly screwed on.<br>Plug contacts are bridged. | Check pressure sensor visually.<br>Check the cables from PSR iBox to pressure sensor.<br>Check if pressure sensor is firmly screwed on.<br>Check the plug contacts. |
| 1080 | Broken cable of gyroscope. | Defective gyroscope.<br>Broken cable.<br>Plug contacts have opened. | Check gyroscope visually.<br>Check the cables from PSR iBox to gyroscope.<br>Check the plug contacts. |
| 1081 | Short circuit of gyroscope. | Defective gyroscope.<br>Short circuit.<br>Plug contacts are bridged. | Check gyroscope visually.<br>Check the cables from PSR iBox to gyroscope.<br>Check the plug contacts. |
| 1082 | No response from gyroscope. | Defective gyroscope. | Check gyroscope visually.<br>Check the cables from PSR iBox to gyroscope.<br>Check the plug contacts.<br>Check analog value in diagnostics menu. |
| 1084 | Gyroscope value out of valid range. | Too small a radius is driven at too high a speed. | See 1082.<br>Reduce speed.<br>Increase driving radius. |
| 1085 | Invalid middle value from gyroscope. | Speed signal is faulty.<br>Defective gyroscope. | See 1082. |
| 1086 | Constant speed cannot be used together with the gyroscope. | A constant speed was set in the system. | Ask service staff to change system settings. |
| 1100 | Tac sensor left, broken cable. | Defective Tac sensor.<br>Broken cable.<br>Plug contacts have opened. | Check Tac sensor visually.<br>Check the cables from PSR iBox to Tac sensor.<br>Check the plug contacts. |
| 1101 | Tac sensor left, short circuit. | Defective Tac sensor.<br>Short circuit. | Check Tac sensor visually.<br>Check the cables from PSR iBox to Tac sensor. |

| Error text or number | Description | Cause | Troubleshooting |
|---|---|---|---|
| | | Plug contacts are bridged. | Check the plug contacts. |
| 1102 | Tac sensor right, broken cable. | Defective Tac sensor.<br>Broken cable.<br>Plug contacts have opened. | Check Tac sensor visually.<br>Check the cables from PSR iBox to Tac sensor.<br>Check the plug contacts. |
| 1103 | Tac sensor right, short circuit. | Defective Tac sensor.<br>Short circuit.<br>Plug contacts are bridged. | Check Tac sensor visually.<br>Check the cables from PSR iBox to Tac sensor.<br>Check the plug contacts. |
| 1104 | 2. Tac sensor left, broken cable. | Defective Tac sensor.<br>Broken cable.<br>Plug contacts have opened. | Check Tac sensor visually.<br>Check the cables from PSR iBox to Tac sensor.<br>Check the plug contacts. |
| 1105 | 2. Tac sensor left, short circuit. | Defective Tac sensor.<br>Short circuit.<br>Plug contacts are bridged. | Check Tac sensor visually.<br>Check the cables from PSR iBox to Tac sensor.<br>Check the plug contacts. |
| 1106 | 2. Tac sensor right, broken cable. | Defective Tac sensor.<br>Broken cable.<br>Plug contacts have opened. | Check Tac sensor visually.<br>Check the cables from PSR iBox to Tac sensor.<br>Check the plug contacts. |
| 1107 | 2. Tac sensor right, short circuit. | Defective Tac sensor.<br>Short circuit.<br>Plug contacts are bridged. | Check Tac sensor visually.<br>Check the cables from PSR iBox to Tac sensor.<br>Check the plug contacts. |
| 1150 | Broken cable of rowfinder. | Defective rowfinder.<br>Broken cable.<br>Plug contacts have opened. | Check rowfinder visually.<br>Check the cables from PSR iBox to rowfinder.<br>Check the plug contacts. |
| 1151 | Short circuit of rowfinder. | Defective rowfinder.<br>Short circuit.<br>Plug contacts are bridged. | Check rowfinder visually.<br>Check the cables from PSR iBox to rowfinder.<br>Check the plug contacts. |
| 1200 | Camera does not respond. | Defective camera.<br>Broken cable.<br>Plug contacts have opened. | Check camera visually.<br>Check the cables from PSR iBox to camera.<br>Check the plug contacts. |
| 1210 | Camera stopped supplying signals during operation. | Defective camera.<br>Broken cable.<br>Plug contacts have opened. | Check camera visually.<br>Check the cables from PSR iBox to camera.<br>Check the plug contacts. |

| Error text or number | Description | Cause | Troubleshooting |
|---|---|---|---|
| 1220 | Camera does not supply valid signals. | Camera is incorrectly set.<br>Too small a distance between plants and camera.<br>There are too many weeds between plant rows. | Check camera installation.<br>Check camera parameters.<br>Check camera lens for contamination.<br>Too little daylight. Use additional light sources. |
| 1350 | Speed too high. | Vehicle drives too fast. | Reduce speed and re-activate steering. |
| 1351 | No GPVTG message received by the GPS receiver. | Tractor ECU does not support this ISO message of the speed. | Select another speed source |
| 1352 | No ISO WBSD message is being received. | Tractor ECU does not support this ISO message of the speed. | Select another speed source |
| 1353 | No valid ISO speed message is being received. | Tractor ECU sends invalid speed data. | Select another speed source |
| 1400 | Broken cable of ultrasonic sensor 1. | Faulty ultrasonic sensor 1.<br>Broken cable.<br>Plug contacts have opened. | Check ultrasonic sensor 1 visually.<br>Check the cables from PSR iBox to ultrasonic sensor 1.<br>Check the plug contacts. |
| 1401 | Broken cable of ultrasonic sensor 2. | Faulty ultrasonic sensor 2.<br>Broken cable.<br>Plug contacts have opened. | Check ultrasonic sensor 2 visually.<br>Check the cables from PSR iBox to ultrasonic sensor 2.<br>Check the plug contacts. |
| 1402 | Broken cable of ultrasonic sensor 3. | Faulty ultrasonic sensor 3.<br>Broken cable.<br>Plug contacts have opened. | Check ultrasonic sensor 3 visually.<br>Check the cables from PSR iBox to ultrasonic sensor 3.<br>Check the plug contacts. |
| 1403 | Broken cable of ultrasonic sensor 4. | Faulty ultrasonic sensor 4.<br>Broken cable.<br>Plug contacts have opened. | Check ultrasonic sensor 4 visually.<br>Check the cables from PSR iBox to ultrasonic sensor 4.<br>Check the plug contacts. |
| 1404 | Broken cable of all | Ultrasonic carrier plug is | Check plug on front socket visually. |

| Error text or number | Description | Cause | Troubleshooting |
|---|---|---|---|
| | ultrasonic sensors. | incorrectly inserted.<br>Broken cable on GND or start signal.<br>Plug contacts have opened. | Check the cables from PSR iBox to ultrasonic carrier.<br>Check the plug contacts. |
| 1410 | No signal from ultrasonic sensor 1. | Measured object out of measurement range. | Check ultrasonic sensor 1 visually.<br>Check sensor alignment. |
| 1411 | No signal from ultrasonic sensor 2. | Measured object out of measurement range. | Check ultrasonic sensor 2 visually.<br>Check sensor alignment. |
| 1412 | No signal from ultrasonic sensor 3. | Measured object out of measurement range. | Check ultrasonic sensor 3 visually.<br>Check sensor alignment. |
| 1413 | No signal from ultrasonic sensor 4. | Measured object out of measurement range. | Check ultrasonic sensor 4 visually.<br>Check sensor alignment. |
| 1414 | No signal from all ultrasonic sensors. | Measured object out of measurement range for all sensors. | Check sensor alignment. |
| 1500 | Shut-off valve left, broken cable. | Defective shut-off valve.<br>Broken cable.<br>Plug contacts have opened. | Check shut-off valve visually.<br>Check the cables from PSR iBox to shut-off valve.<br>Check the plug contacts. |
| 1501 | Shut-off valve left, short circuit. | Defective shut-off valve.<br>Short circuit.<br>Plug contacts are bridged. | Check shut-off valve visually.<br>Check the cables from PSR iBox to shut-off valve.<br>Check the plug contacts. |
| 1502 | Shut-off valve right, broken cable. | Defective shut-off valve.<br>Broken cable.<br>Plug contacts have opened. | Check shut-off valve visually.<br>Check the cables from PSR iBox to shut-off valve.<br>Check the plug contacts. |
| 1503 | Shut-off valve right, short circuit. | Defective shut-off valve.<br>Short circuit.<br>Plug contacts are bridged. | Check shut-off valve visually.<br>Check the cables from PSR iBox to shut-off valve.<br>Check the plug contacts. |
| 1550 | Steering valve left, broken cable. | Defective steering valve.<br>Broken cable. | Check steering valve visually.<br>Check the cables from PSR iBox to steering |

| Error text or number | Description | Cause | Troubleshooting |
|---|---|---|---|
| | | Plug contacts have opened. | valve.<br>Check the plug contacts. |
| 1551 | Steering valve left, short circuit. | Defective steering valve.<br>Short circuit.<br>Plug contacts are bridged. | Check steering valve visually.<br>Check the cables from PSR iBox to steering valve.<br>Check the plug contacts. |
| 1552 | Steering valve right, broken cable. | Defective steering valve.<br>Broken cable.<br>Plug contacts have opened. | Check steering valve visually.<br>Check the cables from PSR iBox to steering valve.<br>Check the plug contacts. |
| 1553 | Steering valve left, short circuit. | Defective steering valve.<br>Short circuit.<br>Plug contacts are bridged. | Check steering valve visually.<br>Check the cables from PSR iBox to steering valve.<br>Check the plug contacts. |
| 1700 | No supply voltage to front socket. | Outlet on PSR iBox is defective.<br>Short circuit. | Check the cables from PSR iBox to front socket. |
| 1701 | No supply voltage for ultrasound start signal. | Outlet on PSR iBox is defective.<br>Short circuit. | Check the cables from PSR iBox to front socket. |
| 1702 | No supply voltage for GPS. | Outlet on PSR iBox is defective.<br>Short circuit. | Check the cables from PSR iBox to GPS receiver. |
| 1703 | No supply voltage for sensorics. | Outlet on PSR iBox is defective.<br>Short circuit. | Check the cables from PSR iBox to all sensors. |
| 1710 | No supply voltage on input side of relay. | Defective fuse.<br>Supply voltage has not been set for the outputs yet. | Check fuse in PSR iBox and supply lines.<br>Check if supply voltages are switched on. |
| 1711 | No supply voltage on output side of relay. | Relay in iBox Lt is defective. | Contact your Reichhardt client service. |
| 2100 | Incremental encoder of axle. | Channel A supplies no signal. | Check the cables from PSR iBox to incremental encoder (e.g. RDU). |
| 2101 | Incremental encoder of | Channel B supplies no | Check the cables from PSR iBox to incremental |

| Error text or number | Description | Cause | Troubleshooting |
|---|---|---|---|
| | axle. | signal. | encoder (e.g. RDU). |
| 2102 | Incremental encoder of axle. | Channels A and B supply no signal. | Check the cables from PSR iBox to incremental encoder (e.g. RDU). |
| 2150 | John Deere AutoTrac. | no communication. | Check the cables from PSR iBox to JD AutoTrac motor. |
| 2200 | Defective foot switch. | Foot switch pressed for too long.<br>Short circuit.<br>Defective foot switch. | Check the foot switch.<br>Check the cables from PSR iBox to foot switch. |
| 2300 | ISO Cat release hydraulics. | Hydraulics have not been released by the switch yet. | Check if hydraulics are activated. |
| 2301 | ISO Cat communication error. | Incorrect CAN communication.<br>ISO level 3 has not been activated. | Check the cables between PSR iBox and CAT.<br>Activate ISO level 3 on CAT terminal. |
| 2310 | ISO Fendt communication error Can Bus 1. | No information is being received from CAN-Bus. | Contact your Reichhardt client service. |
| 2311 | ISO Fendt communication error Can Bus 2. | No information is being received from Can Bus. | Contact your Reichhardt client service. |
| 2315 | ISO AGCO combine harvester, Can Bus 1 communication error. | No information is being received from Can Bus. | Contact your Reichhardt client service. |
| 2316 | ISO AGCO combine harvester, Can Bus 2 communication error. | No information is being received from Can Bus. | Contact your Reichhardt client service. |
| 2317 | ISO AgriFac communication error | No information is being received from Can Bus. | Contact your Reichhardt client service. |
| 2320 | ISO Challenger tractor MT 675 C Can Bus 1 communication error. | Steering has not been released by the switch. | Check if the steering has been released. |
| 2321 | ISO Challenger tractor MT 675 C Can Bus 2 communication error. | No information is being received from Can Bus. | Contact your Reichhardt client service. |
| 2325 | ISO Challenger tractor | No information is being | Contact your Reichhardt client service. |

| Error text or number | Description | Cause | Troubleshooting |
|---|---|---|---|
| | MT 900 C communication error. | received from Challenger 900 C. | |
| 2330 | CLAAS XERION communication error. | No information is being received from XERION. | Check the cables between PSR iBox and the connection of 2nd CAN-Bus. |
| 2335 | CLAAS LEXION communication error. | No information is being received from LEXION. | Check the cables between PSR iBox and the connection of 2nd CAN-Bus. |
| 2340 | Krone Big X / Big M communication error. | Connection with Krone Steering Controller could not be established. | Contact your Reichhardt client service. |
| 2350 | 2. CAN-BUS communication error. | Incorrect CAN communication. | Check the cables between PSR iBox and the connection of 2nd CAN-Bus. |
| 2400 | Broken cable of tilt sensor. | Faulty sensor.<br>Broken cable.<br>Plug contacts have opened. | Check the cables from PSR iBox to tilt sensor. |
| 2401 | Short circuit of tilt sensor. | Faulty sensor.<br>Short circuit.<br>Plug contacts are bridged. | Check the cables from PSR iBox to tilt sensor. |
| 2402 | Tilt sensor not connected. | Faulty sensor.<br>Broken cable.<br>Plug contacts have opened. | Check the cables from PSR iBox to tilt sensor. |
| 2403 | No response from tilt sensor. | Faulty sensor.<br>Broken cable.<br>Plug contacts have opened. | Check the cables from PSR iBox to tilt sensor. |
| 2410 | No release by Krone. | Steering activated via terminal or foot switch | Activation must be done via joystick |
| 3001 | Vehicle code for vehicle 1 is invalid. | An invalid or still not valid vehicle code was entered. | Enter a valid vehicle code for vehicle 1. |
| 3002 | Vehicle code for vehicle 2 is invalid. | An invalid or still not valid vehicle code was entered. | Enter a valid vehicle code for vehicle 2. |
| 3003 | Vehicle code for vehicle 3 is invalid. | An invalid or still not valid vehicle code was entered. | Enter a valid vehicle code for vehicle 3. |
| 3004 | Vehicle code for vehicle 4 is invalid. | An invalid or still not valid vehicle code was entered. | Enter a valid vehicle code for vehicle 4. |

| Error text or number | Description | Cause | Troubleshooting |
|---|---|---|---|
| 3005 | Vehicle code for vehicle 5 is invalid. | An invalid or still not valid vehicle code was entered. | Enter a valid vehicle code for vehicle 5. |
| 3006 | Vehicle code for vehicle 6 is invalid. | An invalid or still not valid vehicle code was entered. | Enter a valid vehicle code for vehicle 6. |
| 3007 | Vehicle code for vehicle 7 is invalid. | An invalid or still not valid vehicle code was entered. | Enter a valid vehicle code for vehicle 7. |
| 3008 | Vehicle code for vehicle 8 is invalid. | An invalid or still not valid vehicle code was entered. | Enter a valid vehicle code for vehicle 8. |
| 3010 | Wheel angle sensor on left side is not calibrated. | Wheel angle sensor on left side was not calibrated. | Calibrate wheel angle sensor on left side. |
| 3011 | Wheel angle sensor in the center is not calibrated. | Wheel angle sensor in the center was not calibrated. | Calibrate the wheel angle sensor. |
| 3012 | Wheel angle sensor on right side is not calibrated. | Wheel angle sensor on right side was not calibrated. | Calibrate wheel angle sensor on right side. |
| 3013 | Current regulator is not calibrated. | Current regulator was not calibrated. | Calibrate current regulator. |
| 3014 | Pressure sensor is not calibrated. | Pressure sensor was not calibrated. | Calibrate pressure sensor. |
| 3015 | TAC sensor is not calibrated. | TAC sensor was not calibrated. | Calibrate TAC sensor. |
| 3016 | Row button is not calibrated. | Row button was not calibrated. | Calibrate row button. |
| 3017 | Installation height of GPS receiver is not calibrated. | Installation height of GPS receiver was not calibrated. | Enter installation height for GPS receiver. |
| 3018 | GPS receiver offset left – right is not calibrated. | GPS receiver offset left – right was not calibrated. | Set GPS receiver offset from vehicle middle. |
| 3019 | GPS receiver offset front is not calibrated. | GPS receiver offset front was not calibrated. | Set GPS receiver front perspective. |
| 4000 | No communication with TVWA. | TVWA is not receiving any messages. | Check the cables from PSR iBox to TVWA.<br>Check vehicle code. |
| 4020 | No communication with Braud. | No CAN messages are being received from Braud. | Contact the software department. |

| Error text or number | Description | Cause | Troubleshooting |
|---|---|---|---|
| 4021 | No communication with Braud. | No CAN messages are being received from Braud. | Contact the software department. |
| 4022 | No communication with Braud. | No CAN messages are being received from Braud. | Contact the software department. |
| 4023 | No communication with Braud. | No CAN messages are being received from Braud. | Contact the software department. |
| 4024 | No communication with Braud. | No CAN messages are being received from Braud. | Contact the software department. |
| 9100 | EEPROM write error. | EEPROM is defective.<br>EEPROM is busy. | Contact the software department. |
| 9101 | EEPROM read error. | EEPROM is defective.<br>EEPROM is busy. | Contact the software department. |
| 9102 | EEPROM parameters must be checked. | Older software was installed. | Check all parameters and settings. |
| 9103 | EEPROM parameters were automatically changed. | After a software update, it is necessary in some cases to set parameters to required values. | |
| 9104 | EEPROM parameters out of valid range. | After reading, at least one parameter was out of valid range and was set to required value. | Contact the software department. |
| 9991 | Task 1 runtime overflow. | Task 1 requires too much time for calculation. | Contact the software department. |
| 9992 | Task 2 runtime overflow. | Task 2 requires too much time for calculation. | Contact the software department. |
| 9993 | Task 3 runtime overflow. | Task 3 requires too much time for calculation. | Contact the software department. |
| 9994 | Task 4 runtime overflow. | Task 4 requires too much time for calculation. | Contact the software department. |
| 9997 | USER stack overflow. | USER stack size too small. | Contact the software department. |
| 9998 | Internal calculation errors. | Function has calculation problems | Contact the software department. |
| 9999 | Error ISO – Lib | An error occurred within ISO | Please note down the "Error ISO" number. You |

| Error text or number | Description | Cause | Troubleshooting |
|---|---|---|---|
| | | – Lib. | will find it in the diagnostics. Forward this number to the software department. |

## 9.3 Diagnostics

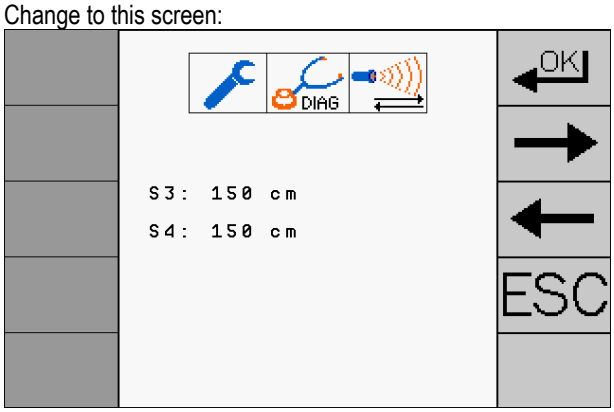
The steering job computer offers the possibility of displaying the condition of all connected sensors on the screen.

Check the condition of the sensors in these scenarios:

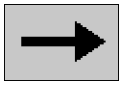
- After assembly.
- If changing the vehicle, when the you use the system on several vehicles.

**Procedure**

1. Change to this screen:




⇨ In the screen you can see the condition of the sensor.

2. Press  to display the condition of other sensors.

**Sensor overview**

| | |
|---|---|
|  | **Ultrasonic sensor**<br>Distances between sensors and the measuring object are displayed if connected with the front socket.<br>If 150 cm is displayed, the sensor is not connected with the front socket, is incorrectly set or faulty. |
|  | TAC sensor<br>Not in use for TRACK-Leader TOP. |
|  | Mechanical row key<br>Not in use for TRACK-Leader TOP. |
|  | **Gyroscope**<br>The value drops when driving to the left and rises when driving to the right. It should be about 500 when the vehicle is still. The value must not oscillate when the vehicle is still. |
|  | **Tilt sensor** |

| | |
|---|---|
| | The value should be around 450 when the vehicle is in a horizontal position and absolutely still. The value will drop if sloped to the left and rise if sloped to the right. |
|  | **Seat contact switch**<br>The seat contact switch status is displayed. When opening the vehicle cabin or actuating the seat contact switch, the value will change from 0 to 1 or vice versa. |
|  | **Feet switch**<br>"0"= switch not actuated; "1" = switch actuated. |
|  | **Wheel angle sensor**<br>The value of current axle position is shown. If the axle position is changed (via the steering wheel), this value will rise and/or drop accordingly.<br>**Danger!** Danger of life if an incorrect signal is read. If the steered axle moves with the movement of the steering wheel and the value displayed still does not change, you must immediately take automatic steering out or action. Call the authorized service and ensure that the vehicle will not be used with automatic steering until the authorized service has approved this driving mode for this vehicle again. |
|  | **Pressure sensor**<br>The value displayed should change as the steering wheel turns. At a standstill it should be between 165 and 200. |
|  | **Steering wheel motor impulse counter**<br>When the friction wheel is turned manually, both values must constantly change. |
|  | **Speed**<br>The current vehicle speed is displayed. |
|  | **GPS**<br>Current values for GPS reception are displayed in several menus.<br>▪ The "Lon" / "Lat" values are the coordinates of the GPS receiver. They should constantly change during the drive. If the vehicle is at a complete standstill, they should change slowly only behind the third decimal behind the point mark. Any stronger changes indicate a substantial satellite drift.<br>▪ "Heading": Indication of the quarter in which the vehicle is driving.<br>▪ "Sat": Amount of currently intercepted satellites.<br>▪ "Quality": Signal quality of GPS receiver.<br>▪ "HDOP": Position accuracy. The bigger the value, the worse the positioning.<br>▪ "REF ID": ID of the reference signal in use.<br>▪ "Date", "Time" – do not match the current local time, but the GPS time. |
|  | Operating hours and miles driven with automatic steering are displayed.<br>You will need the value shown under "Code" for service requests. |
|  | Drive mode indication. |

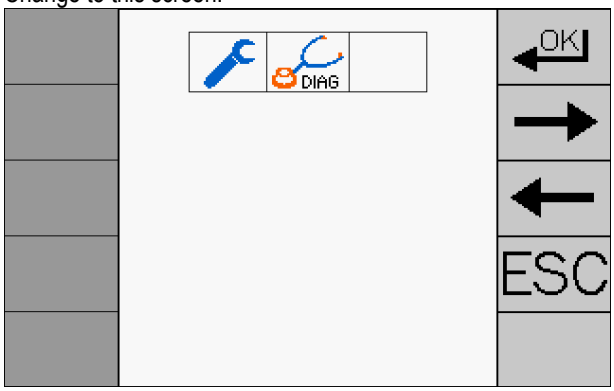
| | |
|---|---|
| | Different values such as voltage, baud rates and CPU loading including error status for the internal CPU are displayed in several menus. |

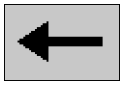
## 9.4 Show latest error

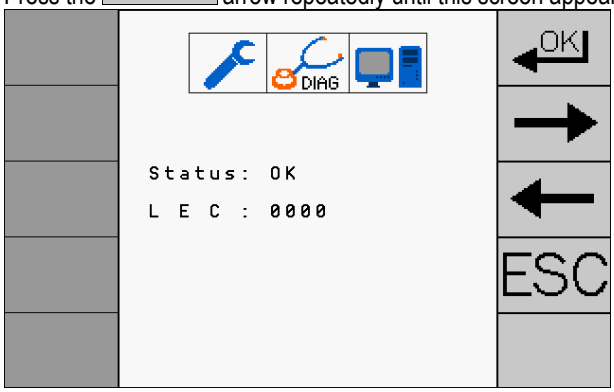
If an error occurs, it is logged by the PSR application. You can always see the latest error.

**Procedure**

1. Change to this screen:




2. Press the  arrow repeatedly until this screen appears:




3. Check in the next table what the "LEC" code means.
4. Eliminate the cause.

**Overview of Last Exit Codes**

| LEC No.: | Description | Cause |
|---|---|---|
| 0 | Ultra Guidance PSR has not been deactivated since system start. | |
| 1000 | Pressure sensor shutdown. | The driver actuated the steering wheel.<br>Pressure sensor is not calibrated. |
| 1001 | The user changed to main menu while steering when the "Handpoti" driving mode was activated. | |
| 1002 | The user requested a manual shutdown of the terminal. | |
| 1003 | Shutdown of RDU motor. | The user has manually overdriven the RDU motor. |

| LEC No.: | Description | Cause |
|---|---|---|
| | | RDU motor can turn.<br>Currents for control are set too low. |
| 1004 | Implement Steering shutdown. | A tractor-mounted device shut down the steering. |
| 1005 | No communication with the terminal. | CAN-Bus connection with the terminal was interrupted. |
| 1006 | Communication with the Hagie machine was interrupted. | |
| 1007 | The Hagie machine shut down the steering. | |
| 1008 | A new driving mode has been selected. | |
| 1009 | Track Leader Top shut down the steering. | |
| 1010 | A menu (e.g. vehicle change) was opened which is locked when steering is active. | |
| 1011 | The CAT excavator deactivated steering. | |
| 1012 | The Krone shredder shut down the steering. | |
| 1013 | The Xerion tractor shut down the steering. | |
| 1014 | Communication with the Xerion tractor was interrupted. | |
| 1015 | The autopilot of Lexion deactivated the steering. | |
| 1016 | Communication with Lexion autopilot was interrupted. | |
| 1017 | The driver of Challenger 900 moved the steering wheel. | |
| 1018 | The deactivation button on the joystick on NH T7070 was pressed. | |
| 1019 | Steering was deactivated because the foot switch was pressed. | |
| 1020 | Steering was deactivated because the JDU requested this. | |
| 1021 | TVWA is not ready for operation. | |
| 1022 | TVWA shut down the steering. | |
| 1023 | TVWA does not allow steering activation. | |
| 1024 | Registration on TVWA was not complete. | |
| 1025 | A safety switch deactivated the steering. | Cabin door was opened.<br>The driver stood up from the seat. |

| LEC No.: | Description | Cause |
|---|---|---|
| 1026 | The clutch of CAT 700,800 was pulled. | |
| 1027 | The steering wheel of CAT 700,800 was moved. | |
| 1028 | The driving direction of CAT 700,800 is not known. | |
| 1029 | The Challenger tractor set the mechanical system lock to "active". | |
| 1030 | The Challenger tractor set the system to "not ready". | |
| 1031 | The Challenger tractor set the system to "position-not-correct". | |
| 1032 | The Challenger tractor set the system to "reset required". | |
| 1033 | The Fendt tractor shut down the steering. | |
| 1034 | The Fendt axle was steered into an invalid range. | |
| 1035 | Steering cannot be activated because the axle is out of valid range. | |
| 1036 | Communication with the Fendt tractor broke down. | |
| 1037 | The front socket outlet is without voltage. | |
| 1038 | The ultrasonic sensor outlet is without voltage. | |
| 1039 | The receiver outlet is without voltage. | |
| 1040 | The sensorics outlet is without voltage. | |
| 1041 | The relay is without voltage on the input side. | |
| 1042 | The relay is without voltage on the output side. | |
| 1043 | No activation is available. | |

# 10 Notes