Instruction manual

Reference: TECU v4

Traktor ECU

17510408-EN

1 Introduction

1.1 About these operating instructions

These Operating Instructions are intended as an introduction to the operation and configuration of the Tractor ECU (TECU) software. This software is preinstalled on your ISOBUS terminal CCI 100/200 and can only be run from there. It is only with knowledge of these Operating Instructions that accidental misuse can be avoided and fault-free operation ensured.

These Operating Instructions must be read and understood to prevent problems during operation.

1.2 Reference

These Operating Instructions describe the TECU in its version TECU v4 .

In order to query the version number of the TECU installed on your terminal proceed as follows:

1. Open the Info/Diagnosis menu in the main menu of the terminal.
2. Press the "Version Information" button on the touchscreen.
   → You can see the version number in the overview that appears.

1.3 About the TECU

A vast range of electronic components are used in modern tractors. In addition to sensors for the capture of operating data these are, above all, comprised of electronic control units (ECUs) for the control of various tractor functions. The electronic components are, as a rule, interconnected via a so-called bus system and use this to exchange tractor information such as driving speed or PTO speed.

The TECU is required in order to also provide an ISOBUS machine with information regarding driving speed, PTO speed or the current position of the 3-point linkage.

On an ISOBUS tractor, the TECU establishes the connection between the tractor bus system and the ISOBUS and thus provides the machine with the aforementioned information.

New tractors are often already ISOBUS-compatible ex works and fitted with a TECU. Such TECUs are hereafter identified as Primary TECU.

The vast majority of tractors in use are, however, not ISOBUS-compatible but can be retrofitted using an upgrade cable set. However these cable sets do not usually include a TECU, i.e. the connection from ISOBUS machines is possible but access to tractor information is not.

The TECU described in these Operating Instructions closes this loophole. This refers to a retrofitting solution which is hereafter identified as Secondary TECU or TECU.

In the case of the Secondary TECU, tractor information is read out via the signal socket and transferred to the ISOBUS machine.

1.4 Active/passive mode

If only the TECU is available on the tractor, it automatically works in the active mode. In the active mode

1. The TECU reads out the signal socket signals,
2. The TECU calculates the values for speed, PTO speed and linkage and
3. The TECU sends the calculated values for speed, PTO speed and linkage position to all ISOBUS machines.

If the tractor has a Primary TECU which provides the tractor information via the ISOBUS, the Secondary TECU automatically changes to the passive mode.

In the passive mode information which is available on the ISOBUS is shown, however no settings can be made. In this case a connection to the signal socket is not required.

1.5 Hectare counter

The TECU offers a hectare counter as additional information.

The hectare counter is used to capture surface capacities, working time and the track. The capture of the surface capacity is performed by measuring the working route and multiplying the adjustable working width.

2 Safety

2.1 Identification of indications in the Operating Instructions

The safety indications in these Operating Instructions are specially identified:

Caution - General Hazards!

This occupational safety symbol identifies general safety indications the non-observance of which poses a danger for life and limb. Carefully observe the indications regarding occupational safety and exert particular caution in these cases.

Attention!

This attention symbol identifies all safety indications which refer to regulations, directives or working procedures which it is essential to observe. Non-observance can entail damage to, or the destruction of, the terminal as well as malfunctions.

Note

The note symbol highlights operation tips and other particularly useful information.

3 Commissioning

3.1 Mounting the terminal

For information about installing the terminal, please refer to the chapter **4.1 Mounting the terminal** in the **ISOBUS Terminal CCI 100/200** Operating Instructions.

3.2 Connecting the Terminal

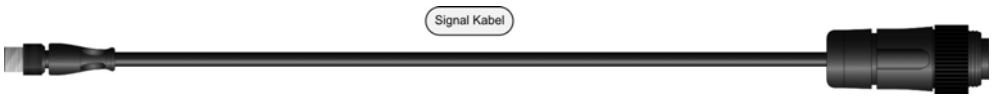
3.2.1 Connecting with ISOBUS/voltage supply

Please refer to the information in the chapter **4.2.1 Connecting with ISOBUS/voltage supply** of the **ISOBUS Terminal CCI 100/200** Operating Instructions.

3.2.2 Connecting with the signal socket

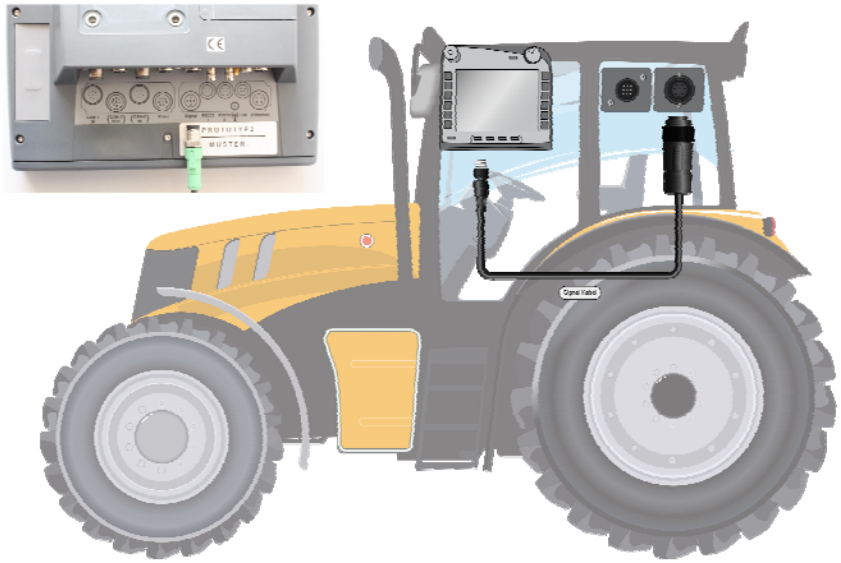
The TECU evaluates the existing tractor information on the signal socket of the tractor (speed, PTO speed, etc.) and transmits this information to all ISOBUS machines.

A signal cable is required for connecting the terminal to the signal socket and can be ordered using article number <ArtNummer Sig>.



To connect the terminal to the signal socket of the tractor, proceed as follows:

1. Connect the "Signal" interface on the terminal to the signal socket using the signal cable.



The signal socket according to ISO 11786 has the following sensor data allocated:

Wheel based speed:	It emits a specific number of electrical signals in proportion to the wheel rotation. Thus, the theoretical speed of the tractor can be calculated
Ground based speed:	It emits a specific number of electrical signals in proportion to the distance already covered. As such, the real speed can be calculated.
Power take off:	It emits a specific number of electrical impulses in proportion to the PTO speed. As such, the PTO speed can be calculated.
Linkage sensor:	It provides an output voltage which is proportional to the current position of the linkage.

Note

In the version being described, the TECU can only evaluate the signals from one of the two speed sensors (compare chapter 4.3.3.3).

3.3 Installing the software

The TECU is included in the scope of delivery of the CCI ISOBUS terminal, i.e. installation is not required.

4 Operation

4.1 Programme start

The TECU is automatically activated when the terminal is switched on.

In order to change the main view of the TECU proceed as follows:

1. Open the start menu in the main menu of the terminal and press on the button with the TECU icon or press the Workingset button on the terminal again.

The TECU is divided into 3 areas:

4.1.1 Main view

The main view is used to show the speed, PTO speed and linkage and enables direct access to all TECU functions.

4.1.2 Tractor data

Input or modification of tractor data.

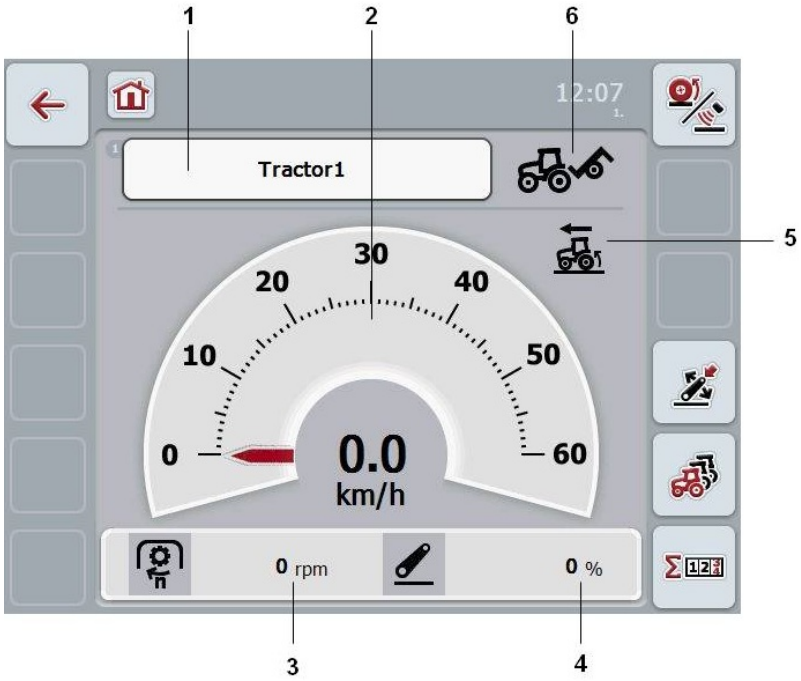
4.1.3 Hectare counter

The hectare counter shows the time since the terminal was started, the distance covered thus far and the surface area covered. Given that you yourself can reset the counter at any time the hectare counter allows you to measure the actual working time, distance covered and the surface area processed.

4.2 Main view

The following information is provided in the TECU main view:

1. Name of the current tractor,
2. Speed display,
3. PTO speed display,
4. Linkage position display,
5. Display for the selected speed sensor and
6. Working or transport position display.



Note

The speed display of the TECU does not replace the tachometer of the tractor. This speed control may not be used when driving where road traffic regulations apply.

You have the following operating options:

Change to the tractor data:

Press the "Tractor Data" button (F5) on the touchscreen.

More detailed information on the tractor data can be consulted in chapter 4.3.

Change to the hectare counter:

Press the "Hectare Counter" button (F6) on the touchscreen.

More detailed information on the hectare counter can be consulted in chapter 4.4.

Select tractor

Select speed sensor

Set working position

4.2.1 Select tractor

To select a tractor proceed as follows:

1. On the touchscreen press the button with the name of the current tractor. If the button with the tractor name is highlighted in white you can press on the scroll wheel instead.
   → A list of the stored tractors is opened.
2. Select a tractor from the list. Press the button with the name of the tractor.
3. Confirm your selection with "OK" or press on the button with the tractor name again.

4.2.2 Select speed sensor

The speed display only evaluates one of either possible sensors. You can select from between the following sensors:

- Wheel based speed
- Ground based speed

In order to select the speed sensor proceed as follows:

1. Press the "Select Speed Sensor" button (F1) on the touchscreen.
   → The icon on the right over the speed display shows which sensor is selected:

Ground based speed is selected

Wheel based speed is selected

2. Select the desired setting.

Note
Adapt the selection to the signal cable used.

4.2.3 Set working position

In order to establish the current position of the linkage as the working position proceed as follows:

1. Position the linkage in the desired working position.
2. Press the "Set Working Position" button (F4) on the touchscreen.

Note
The new value for the working position is accepted without acknowledgement.

Note

The working position must be set at the start of the activity to ensure the correct function of the hectare counter.

→ The main view displays whether the machine is in the working or transport position.

Machine in working position.

Machine in transport position.

Note

For example, when replacing an electronic hoisting gear control, the display of the linkage between working and transport position may fluctuate. To prevent this from happening, we recommend already pressing the "Set working position" button (F4) several centimetres before the linkage in the working position.

4.3 Tractor list

You will find a list of the stored tractors under the **List of Tractors** menu item.
The tractor data consists of

- the tractor name,
- a comment and
- the tractor settings.

The following processing options are available:


Add tractor


Open context menu

4.3.1 Add tractor

To add a tractor proceed as follows:

1. Press the "Add Tractor" button (F10) on the touchscreen.
   → A detailed view of a new tractor is opened.
2. In the detailed view select all tabs according to the row. To do so, press on the tab icon on the touchscreen or change using the buttons "To the left" (F8) and "To the right" (F2) between the tabs.
3. Enter the new values and execute the new settings.
   The processing options for the individual tabs can be consulted in chapter 4.3.3.

4.3.2 Open context menu

To open the context menu proceed as follows:

1. Select a tractor. To do so on the touchscreen press on the button with the tractor name or turn the scroll wheel until the button is highlighted in white and then press on the scroll wheel or on the "OK" button (F6).
   → The context menu opens:

The following processing options are available in the context menu:


Process tractor


Copy tractor


Delete tractor


Add tractor

4.3.2.1 Process tractor

To process a stored tractor proceed as follows:

1. Press on the "Process" button on the touchscreen or turn the scroll wheel until the button is highlighted in white and then press on the scroll wheel.
   → A detailed view of the tractor is opened.
2. Select all tabs to be modified in the detailed view. To do so, press on the tab icon on the touchscreen or change using the buttons "To the left" (F8) and "To the right" (F2) between the tabs.
3. Enter the new value and execute the new setting.
   The processing options for the individual tabs can be consulted in chapter 4.3.3.

4.3.2.2 Copy tractor

To copy a tractor proceed as follows:

1. Press on the "Copy" button on the touchscreen or or turn the scroll wheel until the button is highlighted in white and then press on the scroll wheel.
   → A detailed view of the copied tractor is opened.

Note
The copy is identified by "-Copy" behind the tractor name.

4.3.2.3 Delete tractor

To delete a tractor proceed as follows:

1. Press on the "Delete" button on the touchscreen or turn the scroll wheel until the button is highlighted in white and then press on the scroll wheel.
   → A warning window opens.
2. Press the "OK" button on the touchscreen.

Note
The current tractor cannot be deleted.

4.3.2.4 Add tractor

To add a tractor proceed as follows:

1. Press on the "Add" button on the touchscreen or turn the scroll wheel until the "Add" button is highlighted in white and then press on the scroll wheel.
   → A detailed view of a new tractor is opened.
2. In the detailed view select all tabs according to the row. To do so, press on the tab icon on the touchscreen or change using the buttons "To the left" (F8) and "To the right" (F2) between the tabs.
3. Enter the new values and execute the new settings.
   The processing options for the individual tabs can be consulted in chapter 4.3.3.

Note
Upon delivery there is already an unnamed tractor in the list with some default settings. Please modify the settings.

4.3.3 Detailed view

The detailed view of a tractor is divided into 6 tabs: Overview, Comment, Tractor Settings, Speed, PTO and Linkage.

Note

The speed tab is only shown if, in the tractor settings, the signal socket has been selected as the signal source for the wheel or ground based speed.

Note

The PTO tab is only shown if the signal socket has been selected as the signal source for the PTO speed in the tractor settings.

Note

The linkage tab is only shown if, in the tractor settings, the signal socket has been selected as the signal source for the linkage.

The following information is featured in the tabs:

Overview:	This shows the settings for the speed, the PTO setting and the linkage.
Comment:	This shows a comment with a maximum of 160 characters.
Tractor settings:	This shows the tractor name and the settings for wheel-based speed, ground-based speed, Power Take Off and linkage sensor.
Speed:	Shows how many impulses per 100 metres are output by the sensor.
Power take-off:	This shows how many impulses are emitted from the sensor per PTO revolution.
Linkage:	This shows the voltage values for the maximum and

minimum position.

4.3.3.1 Overview

This tab shows the settings for speed, the PTO and the linkage.

4.3.3.2 Comment

This tab shows a comment field in which notes or explanations can be inserted regarding the tractor.

Note

A comment is comprised of a maximum of 160 characters. If you exceed the text field limit the text field turns red and the input cannot be saved.

The following processing options are available:

Add comment
Process comment

Delete comment

4.3.3.2.1 Add comment

To add a comment proceed as follows:

1. Press on the empty button on the touchscreen or on the scroll wheel or on the "OK" button (F6).
2. Enter the comment on the touchscreen using the keypad.
3. Confirm your input with "OK".

4.3.3.2.2 Edit comment

To process a comment proceed as follows:

1. Press on the button on the touchscreen with the comment or on the scroll wheel or on the "OK" button (F6).
2. Modify the comment on the touchscreen using the keypad.
3. Confirm your input with "OK".

4.3.3.2.3 Delete comment

To delete a comment proceed as follows:

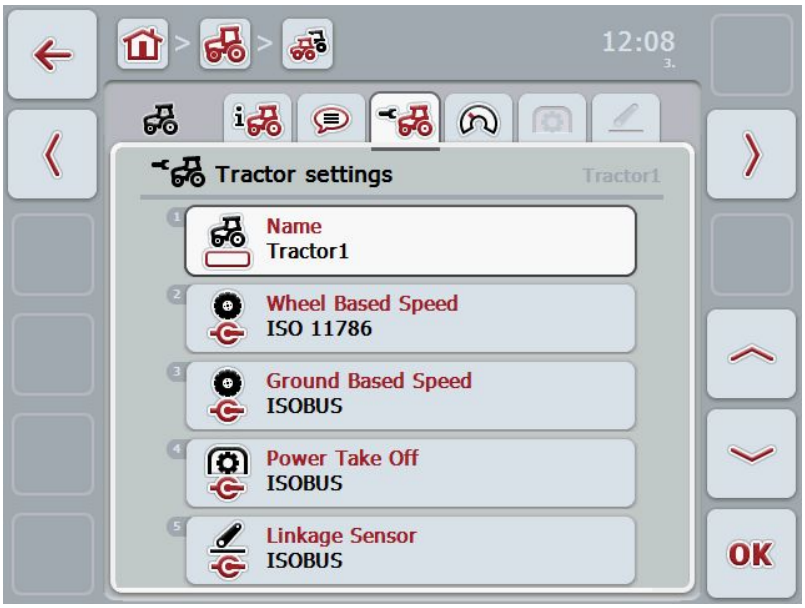
1. Press the "Delete" button (F12) on the touchscreen.

Note

The comment is immediately deleted, there is no warning message.

4.3.3.3 Tractor settings

This tab shows the tractor name and the settings for wheel-based speed, ground-based speed, Power Take Off and linkage sensor.



The following processing options are available:

Process name

Select signal source

Select between:

- Not available
- Signal Socket
- CAN 1 and
- GPS (only for the ground based speed).

Note

You can either select the wheel based speed or ground based speed as the signal source. The other sensor is automatically shown as ***Not available***. The selection is mutually exclusive.

4.3.3.3.1 Edit name

In order to process the tractor name proceed as follows:

1. Select the tractor name. To do so on the touchscreen press on the button with the tractor name or turn the scroll wheel or press the buttons "Up" (F4) and "Down" (F5) until the name is highlighted in white.

   If the name is highlighted press on the scroll wheel or on the touchscreen on the "OK" button (F6).
2. Enter the new name on the touchscreen using the keypad.
3. Confirm your input with "OK".

4.3.3.3.2 Select signal source

To select the signal source for wheel-based speed, ground-based speed, Power Take Off and linkage sensor, proceed as follows:

1. Select the sensor the signal source of which is to be set. To do so on the touchscreen press on the button with the sensor or turn the scroll wheel or press the buttons "Up" (F4) and "Down" (F5) until the sensor is highlighted in white. If the sensor is highlighted press on the scroll wheel or on the touchscreen on the "OK" button (F6).
   → The following selection list opens:

2. Select the desired signal source in the selection list. To do so, on the touchscreen press on the button with the signal source or turn the scroll wheel until the signal source is highlighted in white. The signal source then appears in the selection window.
3. Confirm your selection with "OK" or press once again on the signal source highlighted in white.

Note

If you select the signal socket as the signal source for the wheel based speed or the ground based speed you must calibrate the speed or enter the impulses per 100 metres yourself.

More detailed information on speed calibration can be consulted in chapter 4.3.3.4.

Note

If you select the signal socket as the signal source for the linkage sensor you must calibrate the linkage.

More detailed information on the linkage calibration can be consulted in chapter 4.3.3.6.

Note

If you select the signal socket as the signal source for the Power Take Off you must enter the pulses per revolution.

4.3.3.4 Speed

This tab shows the number of impulses emitted from the speed sensor over 100 metres.

The default setting for the new addition of a tractor shows a value of 200.

If the value for the number of impulses per 100 metres is known (e.g. from the sensor data sheet), this can be entered directly.

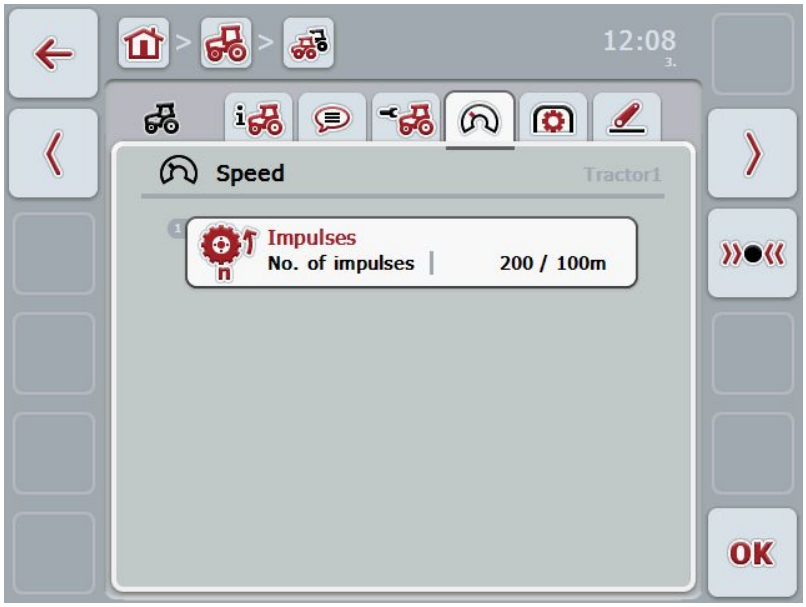
In order to obtain information which is as accurate as possible, the value should actually be obtained using a calibration.

Note

The more accurate the value is, the more precise the speed indication.

Note

The valid value range for the number of impulses lies between 200 (Min.) and 30000 (Max.).



The following processing options are available:

Enter value

Calibrate

4.3.3.4.1 Enter value

Proceed as follows to enter the value for the impulses per 100 metres:

1. Press on the "Impulses" button on the touchscreen or press on the scroll wheel or on the "OK" button (F6).
2. Enter the new value on the touchscreen using the digit field or the slider.
3. Confirm your input with "OK".

4.3.3.4.2 Calibrate

In order to calibrate the speed proceed as follows:

1. Set out a distance of 100 metres.
2. Press the "Calibrate" button (F3) on the touchscreen.
   → The calibration menu opens.
3. Go to the starting point and press the "Start Flag" button (F3) on the touchscreen.
4. Drive 100 metres and then press the "Target Flag" button (F9) on the touchscreen.
5. Confirm the values with "OK".

4.3.3.5 Power Take Off

This tab shows the number of impulses emitted from the sensor per PTO revolution.

Note

Refer to your tractor's technical information to consult the value to be entered.

Note

The valid value range for the number of impulse lies between 1 (Min.) and 40 (Max.).

A frequent value in practice is 6 impulses / revolution.

The following processing options are available:

Enter value

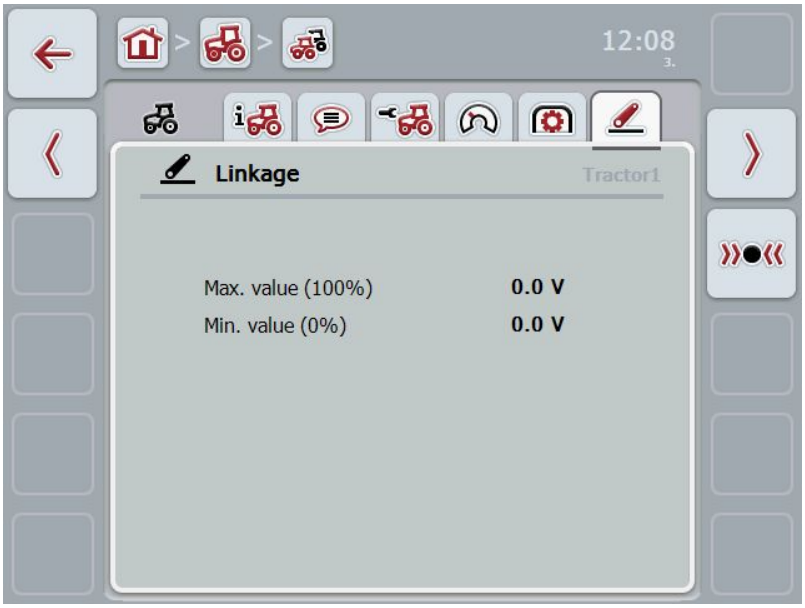
4.3.3.5.1 Enter value

Proceed as follows to enter the value for the PTO setting:

1. Press on the "PTO Setting" button on the touchscreen or press on the scroll wheel or on the "OK" button (F6).
2. Enter the new value on the touchscreen using the digit field or the slider.
3. Confirm your input with "OK".

4.3.3.6 Linkage

This tab shows the voltage values for the maximum and minimum linkage position.



The following processing options are available:

Calibrate

4.3.3.6.1 Calibrate

Proceed as follows to calibrate the voltage values for the linkage:

1. Press the "Calibrate" button (F3) on the touchscreen.
   → The calibration menu opens.
2. Lift the linkage to the maximum position and then press on the "MAX" (F3) button on the touchscreen.
3. Lower the linkage to the minimum position and then press on the "MIN" (F4) button on the touchscreen.
4. Confirm the values with "OK".

Note

A plausibility check is performed. An error message is given if, for example, the minimum value exceeds the maximum value.

4.4 Passive mode

If there is a Primary TECU in the tractor the terminal TECU changes to the passive mode automatically. The passive mode is identified by a blue frame in the main view.

In the passive mode, the connection to the signal socket is not required since all signals from the ISOBUS are read and shown.

Note

In passive mode, only the main view and the hectare counter are relevant since their settings have no effect.

4.5 Hectare counter

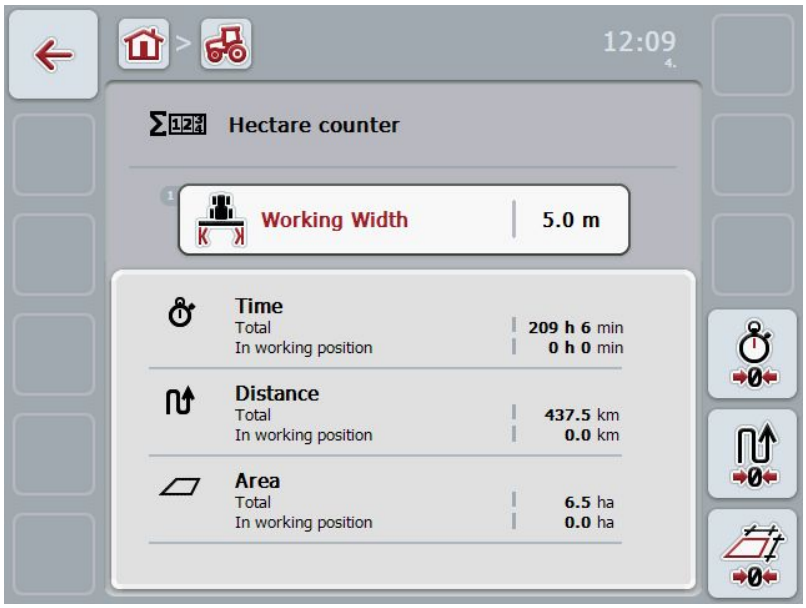
Under the menu item **Hectare Counter** there is information on

- Working width of the active machine,
- Working time,
- distance covered and
- processed area.

A total value and a value in the working position are given for the time, distance and area respectively.

Total: This shows the time, the distance covered and the area processed since the last reset of the individual counters.

In the working position: This shows the time, the distance covered and the area processed since the machine was last transferred to the working position.



The following processing options are available:

Reset time:
Press the "Reset Time" button (F4) on the touchscreen.

Reset distance:
Press the "Reset Distance" button (F5) on the touchscreen.

Reset area:
Press the "Reset Area" button (F6) on the touchscreen:

Enter working width

4.5.1 Enter working width

Proceed as follows to enter the working width of the active machine:

1. Press on the button "Working Width" on the touchscreen or press on the scroll wheel.
2. Enter the new value on the touchscreen using the digit field or the slider.
3. Confirm your input with "OK".

Note

The valid value range for the working width lies between 0.0 metres (Min.) and 20.0 metres (Max.).

Note

The value entered for the working width must be as accurate as possible to enable an exact calculation of the area processed.

5 Troubleshooting

5.1 Terminal errors

The following overview shows possible terminal errors and how to solve them:

Error	Possible cause	Solution
The terminal does not switch on	Terminal is not correctly connected	Check ISOBUS connection
Connected machine software is not displayed	• Bus terminator missing	• Check resistance
	• Software is loaded, however is not displayed	• Check whether the software can be manually started from the terminal start menu
	• Connection error when uploading the software	• Check physical connection • Contact the machine manufacturer's customer service

5.2 Diagnosis

5.2.1 Function … check

5.2.2 … test

5.3 Error messages

Note

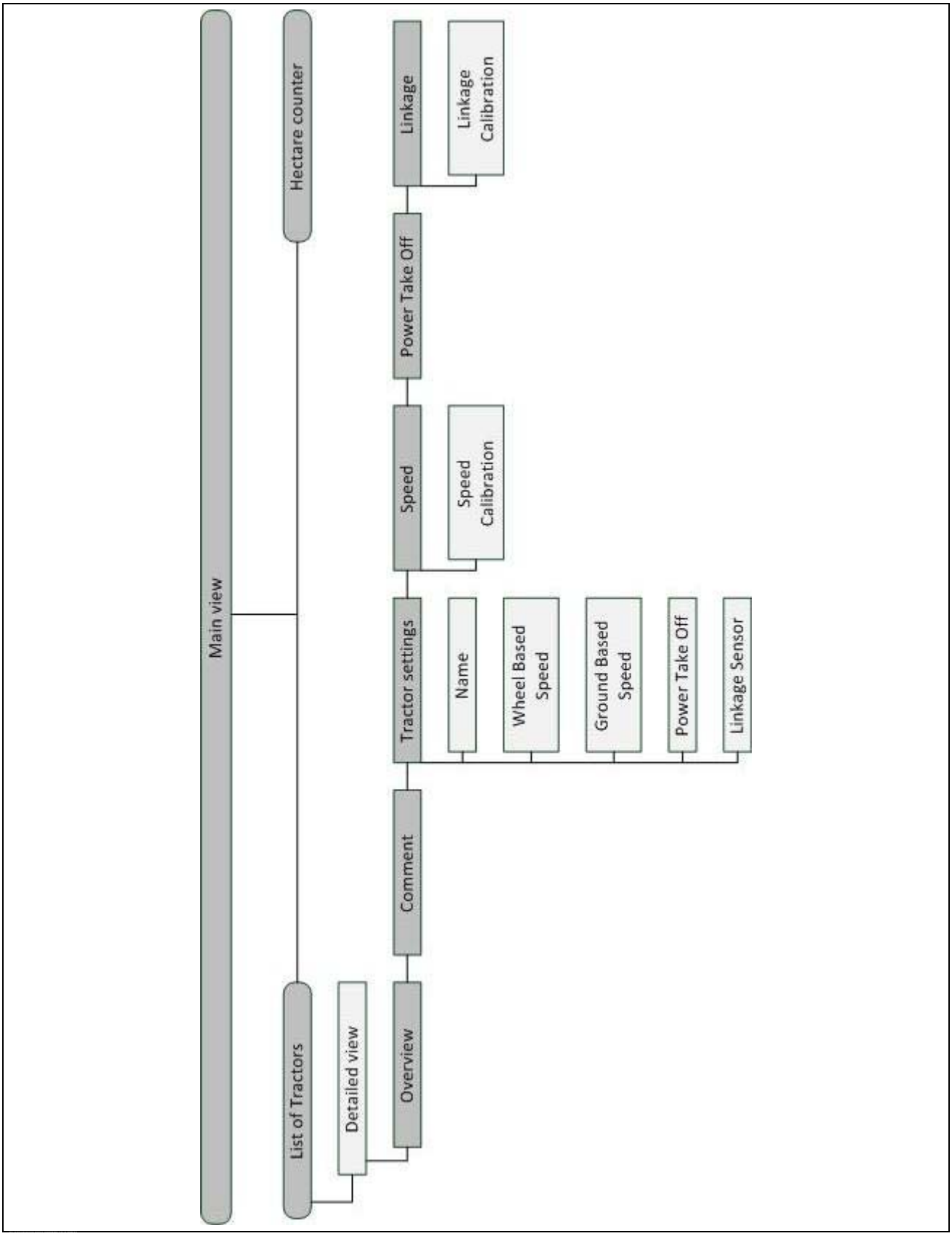
The error messages shown on the terminal depend on the connected machine.

A detailed description of the possible error messages and troubleshooting can be referred to in the machine Operating Instructions.

Note

If the machine cannot be operated, check whether the "stop switch" is pressed. The machine cannot be operated until the switch has been released.

6 Menu structure



7 Glossary

Linkage	Linkage, rear hoisting gear
Linkage sensor	Used for detecting the current position of the *Linkage*. It provides an output voltage to the *Signal socket* which is proportional to the current position of the linkage.
Operating mask	The operating mask is comprised of the values and operating elements shown on the screen. The touchscreen can be used to directly select the elements shown.
Bus system	Electronic system for the communication between control units.
CCI	**C**ompetence **C**enter **I**SOBUS e.V.
ECU	**E**lectronic **C**ontrol **U**nit Control unit, job computer
Electronic hoisting gear control	**E**lectronic **H**oisting Gea**r** Control
Speed sensor	(wheel- or ground-based) sensor for detecting the tractor speed.
GPS	**G**lobal **P**ositioning **S**ystem. GPS is a system for satellite-supported position determination.
ISOBUS	ISO11783 International standard for data transfer between farming machines and devices.
Context menu	Graphical user interface Facilitates editing, copying, deleting or added data.
Machine	Attachable device. A machine with which a task can be executed.
Passive mode	If there is a Primary TECU in the tractor the terminal TECU changes to the passive mode automatically.
Primary TECU	TECUs are already installed in tractors at the factory
Ground based speed	It emits a specific number of electrical signals in proportion to the distance already covered. As such, the real speed can be calculated. Note that under certain circumstances, radar sensors may supply inaccurate speed values depending on the surface, for example, high grass or puddles.
Wheel based speed	It emits a specific number of electrical signals in proportion to the wheel rotation. As such, the theoretical speed of the tractor can be calculated. Radar sensors may supply inaccurate speed values when slip occurs.
Secondary TECU	In the case of the Secondary TECU, tractor information is read out via the signal socket and transferred to the ISOBUS machine.
Signal cable	Cable for connecting the CCI 100/200 terminal to the signal socket in the tractor.
Signal source	Source of the sensor values such as the speed read from the terminal.
Signal Socket	Sensor connection in the tractor according to ISO 11786

TECU	**Tr**actor **ECU** On an ISOBUS tractor, the TECU establishes the connection between the tractor bus system and the ISOBUS and thus provides the machine with the tractor information such as the driving speed or the PTO speed.
Terminal	CCI 100 or CCI 200 ISOBUS Terminal
Touchscreen	Touch-sensitive screen which is used to operate the terminal.
Power take off sensor	Serves for detecing the speed of the PTO. It emits a specific number of electrical impulses in proportion to the PTO speed.

8 Buttons and icons

TECU

Hectare counter

Change between the wheel based speed and ground based speed

Linkage position

Machine in transport position

Wheel based speed is selected.

Comment

Speed

Linkage

Power take off sensor

Impulses (speed)

Start flag

Calibrate

Establish minimum linkage position

Distance

Tractor list

Set working position

PTO speed

Machine in working position

Ground based speed is selected

Overview

Tractor settings

Power take-off

Wheel based speed
Ground based speed

Linkage sensor

PTO setting

Target flag

Establish maximum linkage position

Time

Area


Working width


Reset time


Reset distance


Reset area


Process


Copy


Delete


Add


Change to the right


Change to the left


Change up


Change down

Confirm selection or entry


Select from a list

9 Index