MÜLLER ELEKTRONIK
A TRIMBLE COMPANY

Installation and Operating Instructions

SMART430®

Version: V3.20191001

30322505-02-EN

Read and follow these instructions. Keep these instructions in a safe place for later reference. Please note that there might be a more recent version of these instructions on the homepage.

Company details

Document Installation and Operating Instructions
Product: SMART430®
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 Müller-Elektronik GmbH
Franz-Kleine-Straße 18
33154 Salzkotten
Germany
Phone: ++49 (0) 5258 / 9834 - 0
Fax: ++49 (0) 5258 / 9834 - 90
Email: info@mueller-elektronik.de
Homepage: http://www.mueller-elektronik.de

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1 For your safety

1.1 Basic safety instructions

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

- Before maintaining or repairing the tractor, always disconnect the connection between the tractor and the terminal.
- Before charging the tractor battery, always disconnect the connection between the tractor and the terminal.
- Before welding on the tractor or implement, always disconnect the power supply to the terminal.
- Do not make any unauthorized modifications to the product. Unauthorized modifications or use may impair safety and reduce the service life or operability of the unit. Modifications are considered unauthorized if they are not described in the product documentation.
- Follow all recognised safety, industrial and medical rules as well as all road traffic laws.
- Do not operate the terminal while driving in road traffic. Come to a standstill in order to use the unit.
- The product does not include any user-serviceable parts. Do not open the casing. If the casing is opened, its imperviousness can be changed.
- Read the operating instructions to the agricultural device which you want to control by using the product.

1.2 Intended use

The terminal is used to operate agricultural machinery equipped with ISOBUS job computers.

Intended use also includes compliance with the conditions for operation and repairs prescribed by the manufacturer.

The manufacturer cannot be held liable for any personal injury or property damage resulting from such non-compliance. All risk arising from improper use lies 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:

⚠ WARNING

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

⚠ CAUTION

This signal word identifies hazards that could potentially cause minor or moderate physical injury or damage to property, if not avoided.

NOTICE

This signal word identifies hazards that could potentially cause damage to property, if not avoided.

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 appears 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 EU declaration of conformity

Herewith we declare that the product designated below, on the basis of its design and construction in the form brought onto the market by us, is in accordance with the relevant safety and health requirements of the EC Directive of Electromagnetic Compatibility 2014/30/EU. If alterations are made to the product without prior consultations with us, this declaration becomes invalid.

Product name:	ME_RE Terminal SMART430® ISO-UT
Item number:	31322515
Variants:	30252080
Harmonised standards applied:	EN ISO 14982:2009
	(EMC Directive 2014/30/EU)

2 Product description

2.1 Front

Front view

1	Keys on the casing
2	Function icons Depiction of an available function. The functions are executed when you press on the adjacent F key.
3	Screen content

2.2 Rear

Rear and bottom side

1	Thread for the bracket screws	A	Connection to ISOBUS
2	Pressure compensation membrane - must never be covered.	B	Connection to the 7-pin signal socket
3	Speaker		

2.3 Applications

Installed apps

The following applications are installed on the terminal:

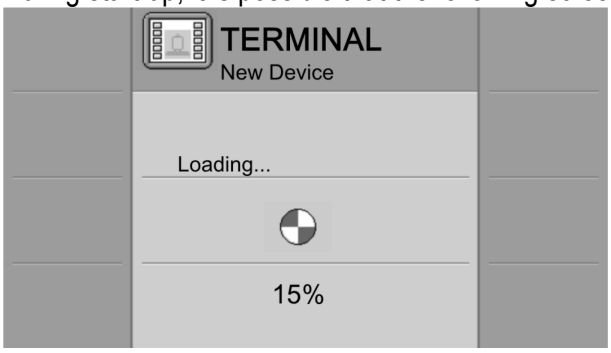
ISOBUS-UT - This application enables the operation of connected ISOBUS job computers. If no ISOBUS job computer is connected, it is invisible.

Smart430 - Overview / AUX-N - This application enables the basic configuration of the terminal. More about this in section: Configuration of the terminal [→ 19]

Tractor - This application enables the configuration of several sensors that are connected to the terminal. It can also be reached through the configuration menu. More about this in section: Tractor [→ 26]

Procedure

1. Press the key.
   ⇨ The next application will be displayed.
   ⇨ During start-up, it is possible that the following screen appears:



   ⇨ This means that the terminal is copying files from the connected job computer. Wait until the process is completed.

3 Installation

3.1 Mounting the terminal in the vehicle cab

Supplied installation accessories

1	Terminal plate	4	Pipe bracket
2	M5 bolt x10		
3	Washer 5.3x10		

Procedure

1. Screw the terminal plate onto the rear of the terminal:

2. **NOTICE! Make sure that the holes on the pressure compensation membrane are not covered. If the pressure compensation membrane is covered, the terminal can be damaged by condensation water.**

⇨

3. Unscrew the long bolt out of the pipe bracket:

4. Attach the two bracket components together:

5. Insert the long bolt through the assembled bracket.

6. Screw in the long bolt until the terminal is firmly attached.
7. You can now attach the terminal with the bracket on a round pipe (e.g. on the ME mounting bracket):

3.2 Connecting the terminal to the ISOBUS

Connection to the ISOBUS serves to:

- supply the terminal with power,

- enable communication with other ISOBUS components.

You will need a different connection cable for this, depending on the model of your tractor.

- On tractors that have been retroactively upgraded with an ISOBUS basic vehicle harness manufactured by Müller-Elektronik, connect the terminal to the basic vehicle harness using the Sub-D connector cable.

SMART430 - Connection cable with Sub-D socket. Part no.: 31322596

- On tractors that are equipped with ISOBUS as standard and have an ISOBUS in-cab socket, you will need the connection cable with a CPC socket:

SMART430 - Connection cable with CPC socket. Part no.: 31322597

Procedure

1. Plug the connection cable into port A.
2. Plug the connector cable into the ME basic vehicle harness or the ISOBUS in-cab socket.
3. Screw the plug on tight.

3.3 Connecting sensors to the terminal

The terminal can receive signals from the following sensors:

- Work position sensor
  Purpose:
  - Display of the working position on the "Overview" screen.
  - Transmission of the signal received through the signal socket to the ISOBUS.

  Possible signal sources:
  - 7-pin signal socket on port B of the terminal.
  - An ISOBUS job computer
- Speed sensor
  Purpose:
  - Display of the speed on the "Overview" screen.
  - Transmission of the signal received through the signal socket to the ISOBUS.

  Possible signal sources:
  - 7-pin signal socket on port B of the terminal.

Configuration

To configure the sensors, refer to section: Tractor [→ 26]

3.4 Using the joystick

If an AUX-2 operating device (e.g.: joystick) is detected, an overview of the configured button assignment is shown every time the terminal is started.

The terminal enables the use of max. one external AUX-2 operating device.

⚠ CAUTION

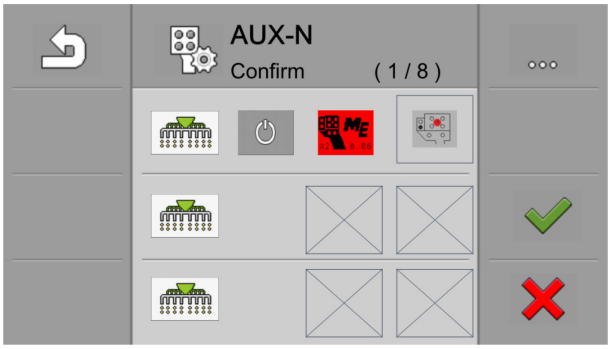
Operating errors because there are too many operating devices
If signals from more than one AUX-2 operating device are sent to the ISOBUS, they cannot be clearly assigned. In this case, the wrong function can be triggered when a button is pressed, which can result in accidents.

- Make sure that only one AUX-2 operating device is communicating through the ISOBUS.

Procedure

☑ You have started the terminal.

☑ You see the "AUX-N Confirm" menu:



1. Before you continue working, check if the button assignment is correct. More about this in section: Key assignment for AUX operating devices [→ 28]
2. **Possibility 1**: To adopt the button assignment, press  .
3. **Possibility 2**: To reject the button assignment, press  .
   ⇨ You will then be requested to confirm that the button assignment should be rejected.
4. To do so, press  .
   ⇨ In this case, the button assignment will be deleted.

You will then also be requested to confirm when the table with the button assignments is empty. For example, after a new job computer is connected, before the joystick buttons are assigned with new functions.

In this case:

1.  - Confirm that the table with the button assignments is empty.

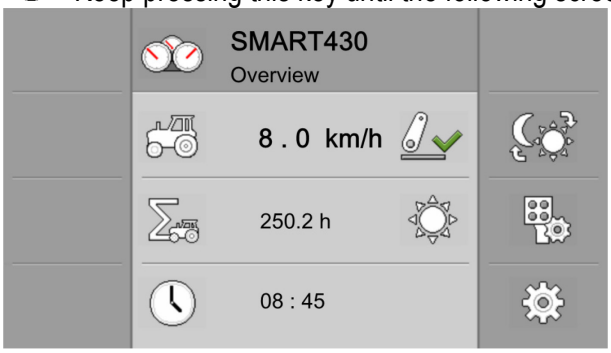
4 Basic control principles

4.1 Initial start-up

For the initial start-up, you must switch on and configure the terminal.

Procedure

1. Connect the terminal to the tractor ISOBUS.
2. Press and hold the ON button for two seconds.
   - ⇨ The terminal will boot.
   - ⇨ Each time the terminal is booted, it checks whether unknown job computers are connected to the ISOBUS. If yes, the terminal then copies the information from the job computer. This can take a few minutes. In the meantime, the message "Loading..." is displayed
   - ⇨ If a joystick or other operating device is detected, you will be requested to confirm the button assignment. [→ 13] Because there is no button assignment yet with the initial start-up, confirm the button assignment to be able to continue working.
3. - Keep pressing this key until the following screen appears:



   - ⇨ In this application, you can enter the basic settings. For example: Language [→ 16], Date, Time, System of units. See also: Configuration of the terminal [→ 19]
4. Configure the above-mentioned settings.
5. Configure the speed sensor. [→ 26]

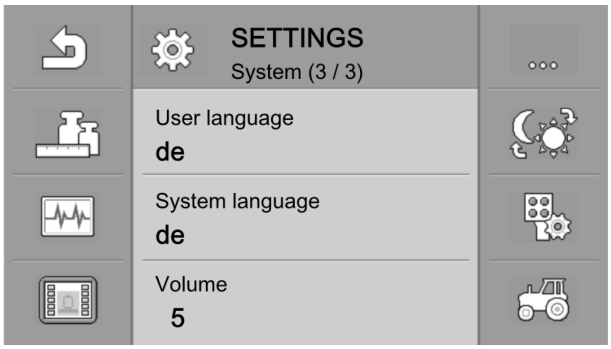
⇨ You have configured the terminal. Read the app instructions to see whether other application-specific settings are required.

4.2 Buttons on the casing

	ON button	**Switching on**: Press the button for 1 second. **Switching off**: Press the button for 2 seconds.
	Switching among the	A different application is displayed each time the button is pressed.

	apps	
+	Plus key	Moves the cursor up; Increases the value of a parameter.
−	Minus key	Moves the cursor down; Reduces the value of a parameter.
↵	Enter key	Opens an input box; Confirms the input; Acknowledges alarms.
ESC	Cancel key	Send a cancel signal to the job computer. Cancels the input of a value. The input box is exited and the previous valid value is restored. Acknowledges alarms.
F1 - F8	Function keys (softkeys)	Serve to execute the functions displayed on the screen.

4.3 Changing the language



User language	List of all of the languages that are supported by at least one connected job computer or terminal. If the terminal supports the language selected here, it will be activated in this language. Otherwise, the terminal will be activated in the language defined as the "System language".
System language	Alternative language for the terminal.
Volume	Volume of the terminal.

Procedure

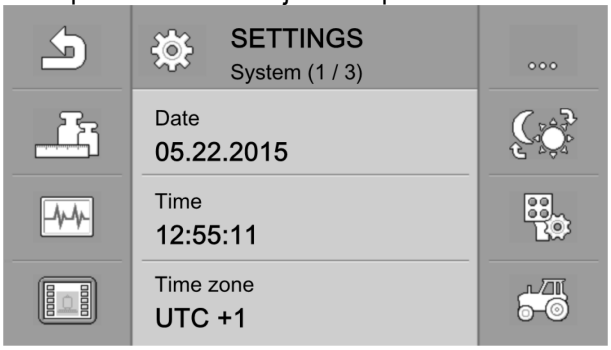
1. On the "Overview" screen, press the key beside this icon:
   
   ⇨ The "SETTINGS" screen will appear.
2. Press the key beside the  icon twice
   ⇨ The "System (3 / 3)" screen will appear.
   ⇨ The cursor marks the abbreviation for the currently selected language on the "User language" line.
3. Press the ↵ key.
   ⇨ The cursor line is now continuous.
4. With the ⊕ and ⊖ keys, select the abbreviation for the desired language.
5. Press the ↵ key.
6. Restart the terminal.
7. After restarting, all of the job computers will be loaded in the language selected under "User language", provided that this is possible.
8. If you notice that the terminal applications are not loaded in the selected language, set an alternative language on the "System language" line.

4.4 Function keys

Up to four function icons can appear on the left and right of the screen respectively. To execute the function depicted by an icon, you must press the adjacent F key.

4.5 Changing parameters

Procedure

1. Call up a screen with adjustable parameters. For example:
   

2. Using the ⊕ and ⊖ keys, move the dashed cursor to mark the parameter that you want to change.
3. Press the ↵ key to select the parameter for editing.
4. Now there are three ways to change the value:
   a) For numbers, a numerical keyboard appears.

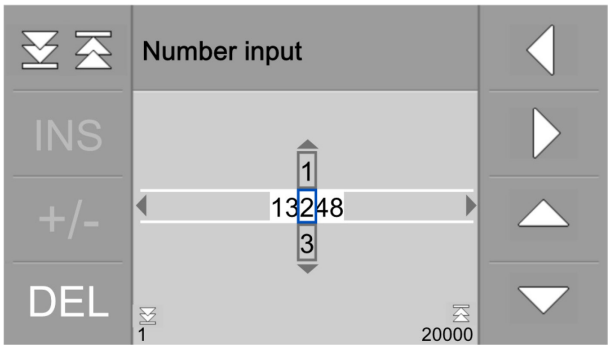
b) For text entries, a text keyboard appears.

c) For lists, the line of the cursor becomes continuous. You can then use the ⊕ and ⊖ keys to set the desired value.

5. Press the ↵ key to adopt the value.

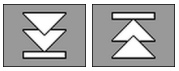
4.6 Entering numbers

When you have to enter numbers in the software, the same screen always appears. You can change the numbers as required using the individual controls. The respective minimum and maximum values are displayed in the lower area of the screen.



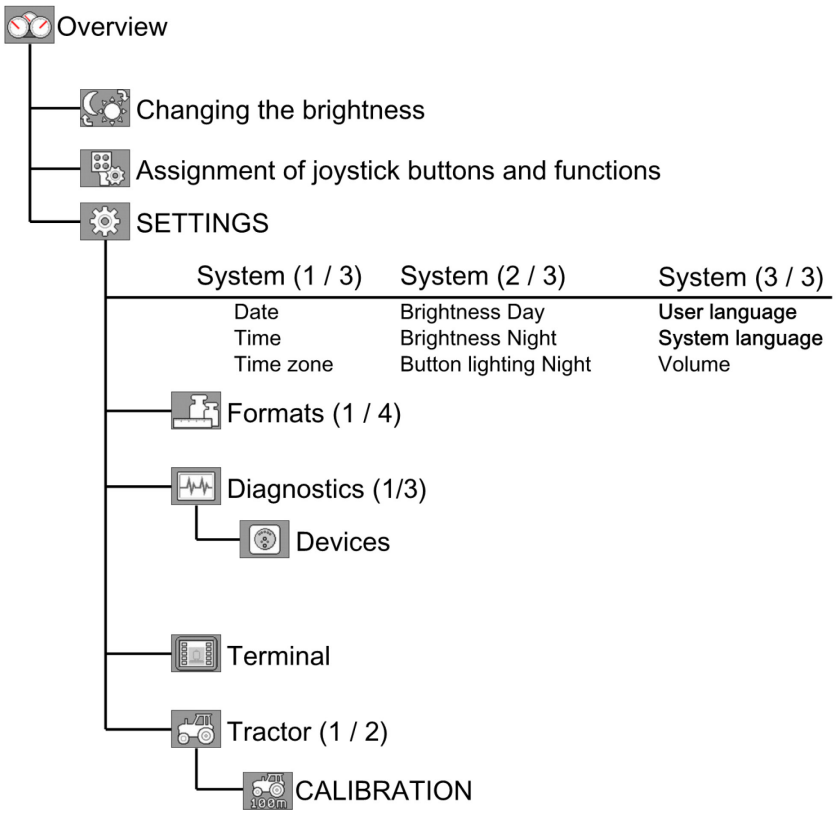
The following controls can be found on the screen:

Controls

	Changes to the lowest or highest possible value.
INS	Inserts a new digit at the position of the cursor.
+/-	Changes the sign of the value.
DEL	Deletes one digit at the position of the cursor.
	Changes to the adjacent digit on the left.
	Changes to the adjacent digit on the right.
	Replaces the current digit with the digit that is below the cursor.
	Replaces the current digit with the digit that is above the cursor.

5 Configuration of the terminal

5.1 Menu structure



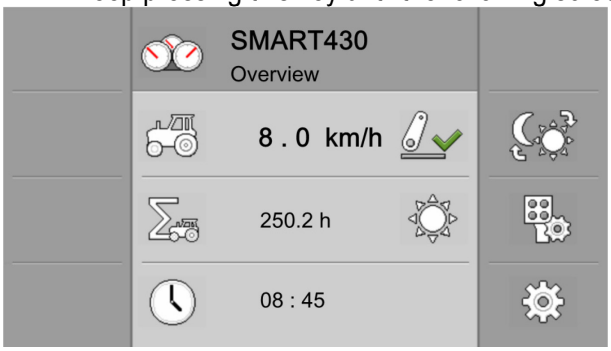
Menu structure - Beginning with the "Overview" screen

5.2 System settings

On the screens of the "System" group, you can enter several basic system settings.

Path

1. - Keep pressing this key until the following screen appears:



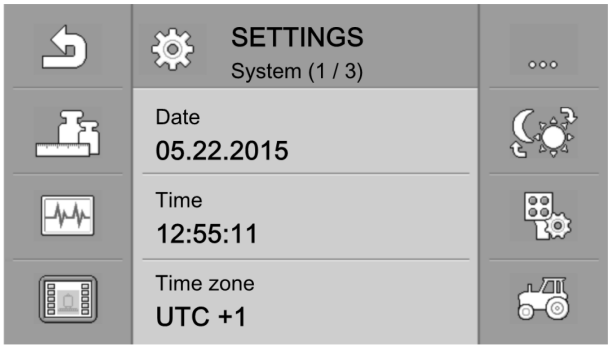
2. Press the key beside this icon:
   ⇨ The "SETTINGS" screen will appear.

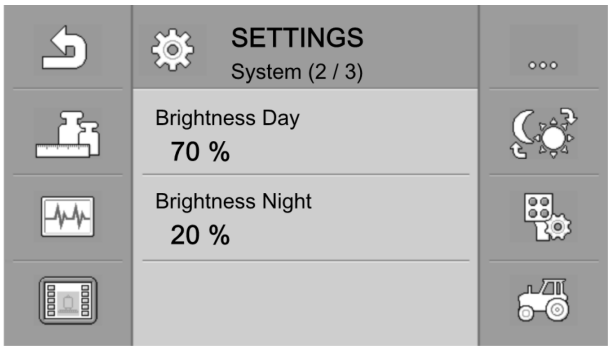
Controls

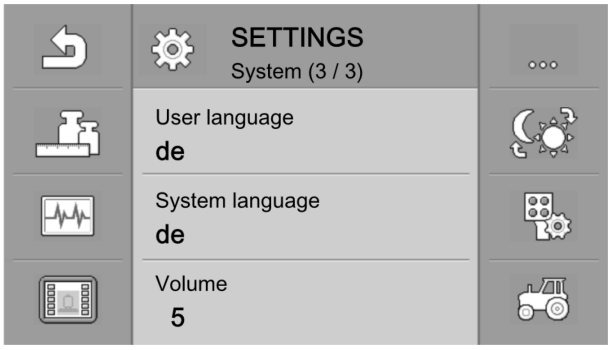
	Back to the previous screen.

	To the next screen in the screen group.
	Formats and units [→ 21]
	Diagnostic [→ 22]
	Terminal [→ 25]
	Switch the brightness between light and dark.
	Assignment of joystick buttons and functions.
	Tractor [→ 26]

Parameters in the screen group







User language	List of all of the languages that are supported by at least one connected job computer or terminal.

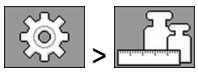
	If the terminal supports the language selected here, it will be activated in this language. Otherwise, the terminal will be activated in the language defined as the "System language".
System language	Alternative language for the terminal.
Volume	Volume of the terminal.

5.3 Formats and units

On the "Formats" screen, you can define the units used by the terminal and the connected devices.

Path

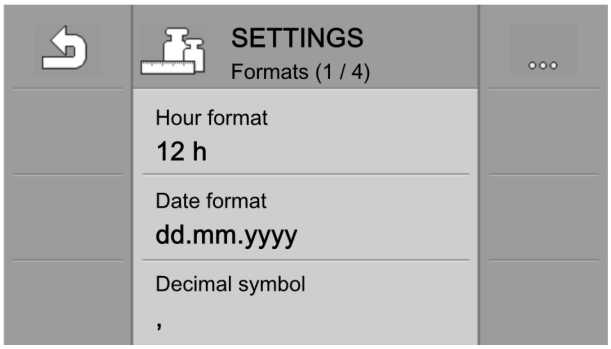
On the start screen, press the following keys successively:

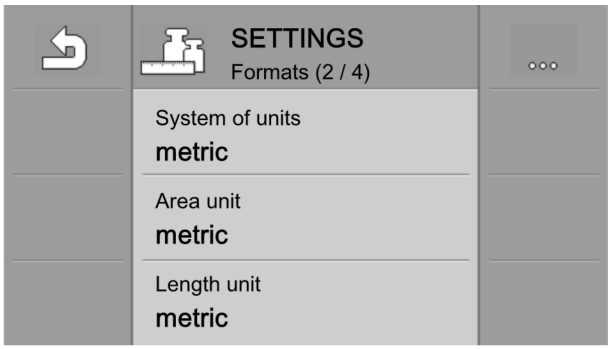


Controls

	Back to the previous screen.
	To the next screen in the screen group.

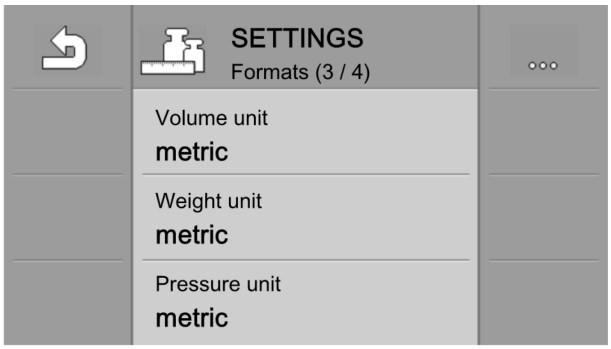
Parameters in the screen group

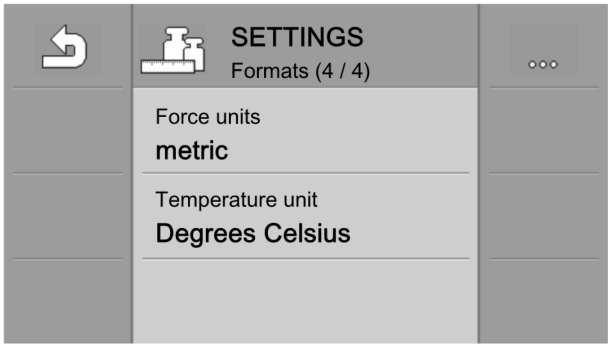




System of units	metric - Sets the units to "metric". imperial - Sets the units to the British system. US - Sets the units to the US system.

	Custom - The user can configure the units individually.





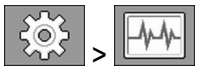
5.4 Diagnostic

On the "Diagnostic" screen, you can find detailed information about your terminal.

Moreover, you can find a screen here with detailed information on the devices connected to the bus. See: Device diagnostic [→ 24]

Path

On the start screen, press the following keys successively:

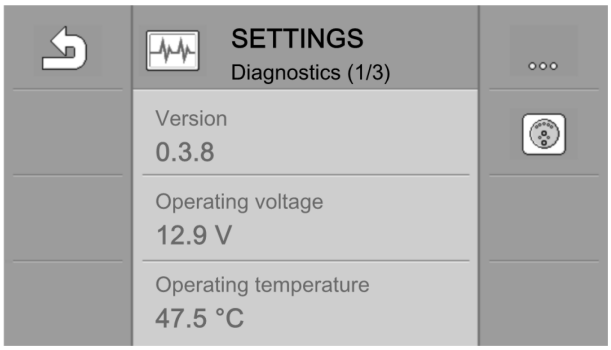


Controls

	Back to the previous screen.
	To the next screen in the screen group.
	Opens the "Devices" [→ 24] screen

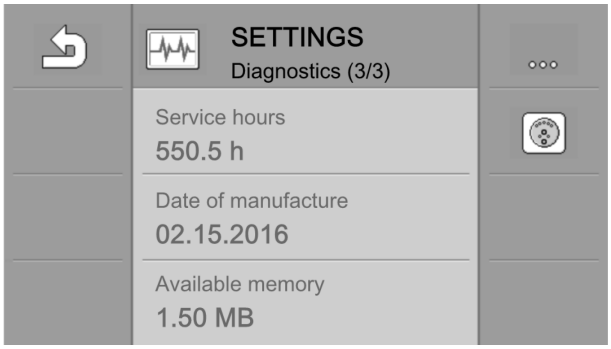
Information in the screen group

The greyed-out values cannot be changed. They only serve as a reference.



Version	Installed software version
Operating voltage	Current operating voltage
Operating temperature	Current processor temperature

Hardware item number	Part number for the terminal
Software item number	Part number for the terminal software
Serial number	Serial number for the terminal



Service hours	Hours in a switched-on state
Date of manufacture	Date of manufacture
Available memory	Available memory If there is no more available memory, you must delete one or more object pools.

	On the "Diagnostics (3/3)" screen, this key deletes all of the object pools of the job computer that is currently not connected.

5.4.1 Diagnostic of connected devices

On the "Devices" screen, you can find some detailed information on all of the devices connected to the bus.

Path

On the start screen, press the following keys successively:

Controls

	Next device.
	Previous device.
	This key deletes the object pool for the displayed job computer. This job computer must also be connected.
	This key only appears for object pools that cannot be deleted: (UT), (TECU) - Two object pools for the terminal

5.4.2 Deleting object pools

Each job computer that is connected to the ISOBUS copies the images, texts and other objects used in its software onto the terminal. These files are collectively referred to as object pool.

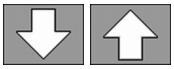
Since the memory on the terminal is limited, it is sensible to delete the object pools for job computers that are not in use.

Procedure

To delete an object pool:

☑ The job computer for which the image and text files should be deleted is connected.

1. Open the "Devices" screen:

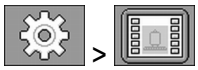
2.  - Select the device for which you want to delete files from the terminal memory.
3.  - Delete the files.

5.5 Terminal

On the "Terminal" screen, you can define how the terminal should identify itself and react on the bus.

Path

On the start screen, press the following keys successively:



Parameters in the screen group

Function ISO VT	Activates and deactivates communication through the ISOBUS interface.
VT number	If there are multiple terminals on the ISOBUS, each terminal can be assigned with a so-called instance number. The instance number serves to assign job computers to terminals.
Navig. Buttons Number	If you notice that the connected job computer is not displaying all of the function keys, change the value for this parameter to 2. If this is supported by the job computer, you then have the option of using the F4 and F8 keys to display function keys that are not shown otherwise. 1 - 7 job computer keys and one navigation key are displayed. 2 - 6 job computer keys and one navigation key are displayed. This setting improves the display when the

	keys for moving left and right in the job computer application should also be displayed on the left and right side of the terminal screen.

5.6 Tractor

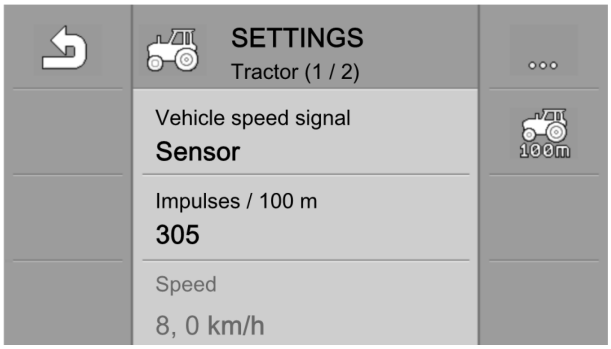
On the "Tractor" screen, you can configure the following sensors:

- Work position sensor
- Speed sensor

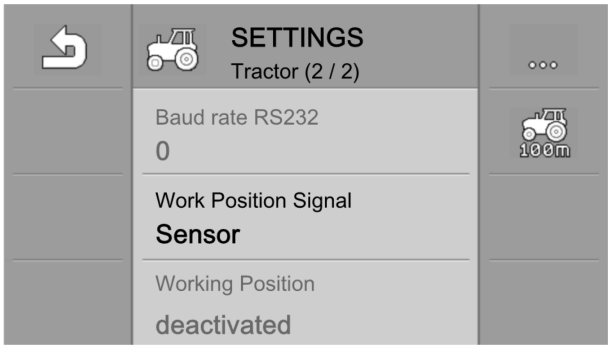
Controls

	Back to the previous screen.
	To the next screen in the screen group.
	Calls up the screen on which the speed sensor can be calibrated.

Parameters in the screen group



Vehicle speed signal	Source for the speed signal: Sensor - Connected to port B on the terminal. CAN-Bus - Is received through the CAN Bus.
Impulses / 100 m	Number of pulses sent by the speed sensor over a distance of 100m. (Only appears if you select "Sensor" as the speed signal.)
Speed	Display of the current speed.



Baud rate RS232	Currently without function.
Work Position Signal	Source for the work position signal: Sensor - Connected to port B on the terminal. CAN-Bus - Is received through the CAN Bus.
Working Position	Current working position: activated - Implement in working position On the "Overview" screen, the following icon appears in this case:  deactivated - Implement not in working position

5.6.1 Calibrating the speed sensor

When calibrating the speed sensor, you determine the number of pulses sent by the sensor over a distance of 100m.

If the number of pulses is known, the terminal can calculate the current speed and transmit it to the connected job computer.

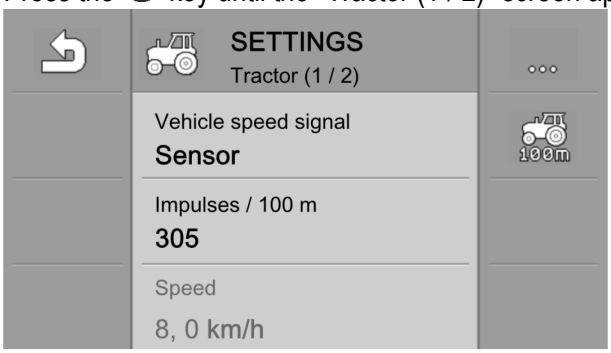
Procedure

To calibrate the speed sensor:

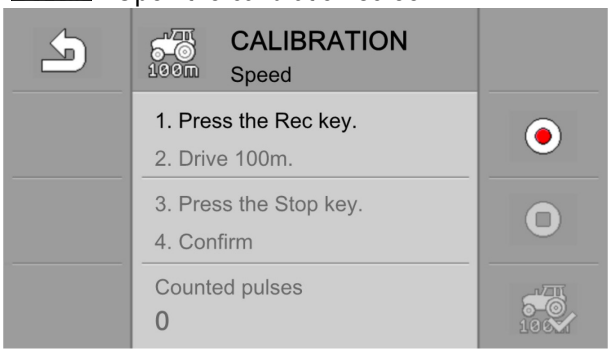
☑ The terminal is connected to the tractor signal socket.

☑ The "Vehicle speed signal" parameter is configured. Value: "Sensor"

1. Measure and mark a distance of 100m. The soil must correspond to the field conditions. The distance should therefore lead over a meadow or a field.
2. Position the tractor with connected implement at the beginning of the marked distance.
3. Press the key until the "Tractor (1 / 2)" screen appears:



4.  - Open the calibration screen:



5.  - Start the calibration.
6. Drive straight ahead over the marked distance.
7. If you must cancel the measurement, press  .
8. Stop after 100m.
9.  - Terminate the calibration.
10. The number of pulses appears on the "Counted pulses" line.
11.  - Save the results or restart the terminal.

5.7 Key assignment for AUX operating devices

The terminal offers you the possibility of assigning the functions of an ISOBUS job computer to the buttons of the joystick. To do so, the ISOBUS job computer and the joystick must fulfil the Auxiliary 2 specification requirements from the ISOBUS standard.

Steps

If you are using the AUX functionality, please note the following:

1. At the beginning, you must assign the buttons and the functions yourself.
2. After each system start, you must check if the button assignment is correct. This ensures that you always know which functions are actuated with the buttons.

The terminal enables the use of max. one external AUX-2 operating device.

⚠ CAUTION

Operating errors because there are too many operating devices

If signals from more than one AUX-2 operating device are sent to the ISOBUS, they cannot be clearly assigned. In this case, the wrong function can be triggered when a button is pressed, which can result in accidents.

- Make sure that only one AUX-2 operating device is communicating through the ISOBUS.

Procedure

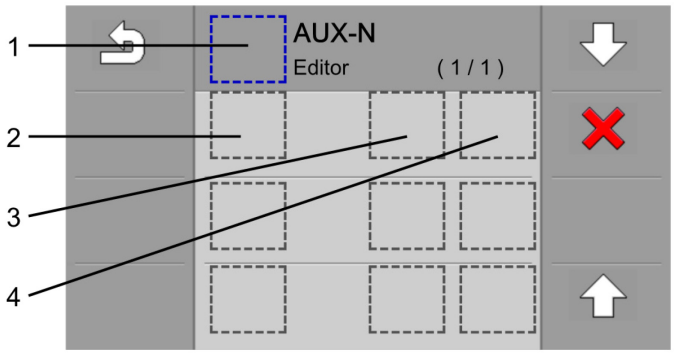
To configure the button assignment (using the example of an AUX-2 joystick):

☑ Joystick and ISOBUS job computer are connected.

1. Switch to the "AUX-N" configuration screen:

   ⇨ The following screen appears:



   1 - Selection of the job computer. **2** - Column with functions of the job computer. **3** - Selection of the joystick. **4** - Button selection.

2. Using the ⊕ and ⊖ keys, mark box number 1 at the top of the image.
3. Press the ↵ key.
4. With the ⊕ and ⊖ keys, select the icon of the job computer for which you want to assign functions to the joystick buttons.
5. Press the ↵ key.
   ⇨ The joystick functions will be loaded.
6.  - Search for a function that you want to assign to a joystick button (2 on the image above).
7. Using the ⊕ and ⊖ keys, mark the box beside this function (3 on the image above).
8. Press the ↵ key.
9. Keep pressing the ⊕ key until the icon of the joystick for which you want to assign buttons appears in the box.
10. **CAUTION! If you can select more than one AUX-2 joystick, there is a risk that the button assignment will not work properly. Disconnect one AUX-2 operating device from the system. Do not use the terminal with two AUX-2 operating devices.**
11. Press the ↵ key.
12. On the joystick, press the button to which you want to assign the function.

13. Or: Using the ⊕ and ⊖ keys, mark the box further to the right (4 on the image above) and select the function manually.
14. In this way, you can also assign other functions to the joystick buttons.
15.  - Exit the screen to save the assignments.
    ⇨ The assignments will now be copied to the job computer for approx. 5-10 seconds. Do not switch off the terminal during this time.
16. Check if all of the assignments are correct. If yes, confirm with  .

⇨ You have completed the assignments and can now operate the machine with the joystick.

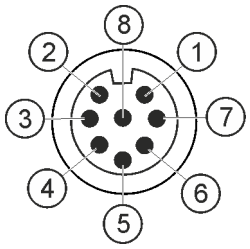
6 Technical specifications

6.1 Technical specifications of the terminal

Operating voltage	9 - 32 V
Current consumption (operation)	approx. 150mA at 13V
Power input	ca. 2W
Ambient temperature	-20°C - +70°C
Storage temperature	-30°C to +85°C
Dimensions (W x H x D)	174mm x 121mm x 49mm
Weight	370 g
Protection class	IP66
EMC	EN ISO 14982:2009
ESD protection	4kV according to ISO 15003:2006E
Environmental testing	Change of temperature and temperature shock according to ISO15003:2006E
Processor	STM32F429, 180MHz
Storage	16Mbyte flash (SPI-Flash) SD-RAM: 8Mbyte EEPROM: 64kbit
Operating system	RTX
Display	4.3" 480x272 pixels WQVGAs
Housing	Casing material: PC-ABS / UL-VO
Inputs / outputs	See Pin assignment [→ 32]

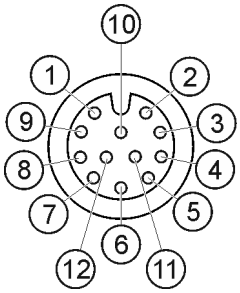
6.2 Pin assignment

Port A - 8-pin CAN Bus plug



Pin	Function	Notes
1	$+U_B$	Supply +12V In
2	CAN_1_H_out	CAN-Bus 1 In
3	$+U_{ON}$	Supply +12VE, switched for the job computer
4	CAN_1_L_out	CAN-Bus 1 In
5	CAN_1_L_in	CAN-Bus 1 Out
6	GND	GND In
7	CAN_1_H_in	CAN-Bus 1 Out
8	IGN	Ignition signal In

Port B - 12-pin sensor socket



Pin	Function	Notes
1		
2	GND	GND out
3		
4	SI_0	Signal 0 In (analog working position) (SI = Sensor input)
5		
6		
7	SI_1	Signal 1 In (pulse-transmitting speed sensor: radar sensor or wheel sensor)
8		
9		
10		
11		
12		

7 Appendix

7.1 Updating the terminal

Procedure

When you want to update the software on the terminal, proceed as follows:

☑ You have a new software version for installation.

☑ You have the Downloadmanager 2 software on your PC.

☑ You have connected the terminal to your PC.

☑ You have no other ISOBUS components connected to the ISOBUS.

1. Start Downloadmanager 2.

2. + - Press these buttons simultaneously and hold to start the download mode.

3. - Press and hold this button until the ME logo appears on the screen.

4. / - In Downloadmanager 2, select the terminal.

5. - Mark the terminal.
⇨ An "X" will appear in front of the terminal.

6. - Open the folder with update files.

7. - Navigate to the folder containing the update file.

8. / / - Select the update file.

9. - Start the update.

10. Wait until the update has been completed.

11. - Return to the list of devices.

12. - Reset the connection between the terminal and Downloadmanager 2.
⇨ The new software will be loaded.

13. Restart the terminal.

⇨ You have completed the update.

7.2 Troubleshooting

Procedure

In isolated cases, the display on the terminal can be faulty after a software update. You must then perform the following steps:

1. ESC + ⏻ - Press these buttons simultaneously and hold to reset the terminal.
2. ⏻ - Let go of the buttons.

⇨ The terminal switches off automatically.

⇨ The display problem is fixed.