

Installation and User's Guide

ECO - Terminal



February 2005

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1 Introduction

With the *ECO - Terminal* you have a terminal at hand which we have developed to comply with the latest technology. Over 10 years experience in the development of CAN-bus components has had considerable influence here. The *ECO - Terminal* is for multifunctional use on agricultural tractors and devices.

2 Safety instructions

2.1 Disclaimer:

The *ECO - Terminal* is specified exclusively for agricultural use. The manufacturer takes no responsibility for any installation or application outwith this area.

The manufacturer does not accept liability for damage to persons or property resulting from unspecified use. In such cases all risks are the responsibility of the user.

Specified implementation also includes adhering to the operation and maintenance requirements stipulated by the manufacturer.

Relevant accident prevention regulations as well as other generally recognised safety, industrial, health and road traffic rules are to be adhered to. In addition the manufacturer accepts no liability in cases where arbitrary modifications have been made to the device.

2.2 Safety measures

Warning!



Always pay attention to this symbol for references to important safety precautions.












It means attention! Become alert!

It is a question of your safety.



Read the user's guide before using the ECO Terminal for the first time.

Observe the following recommended precautions and safety instructions:

-  Do not remove any safety mechanisms or labels.
-  Before using the *ECO - Terminal* , read and understand this guide. It is of equal importance that other operators also read and understand the manual
-  During maintenance or when using a battery charger, switch off the power supply.
-  Never service or repair the device when it is switched on
-  When welding on the tractor or on an attached machine, interrupt the power supply to the *ECO - Terminal* .
-  Only use a cloth with clear water or a little glass cleaning agent to clean the *ECO - Terminal* .
-  Operate the keys with your finger tips but avoid using finger nails
-  Should any part of this guide remain incomprehensible after reading, contact your dealer or Mueller-Elektronik Service for further clarification before using the *ECO - Terminal* .
-  Read carefully all safety instructions in the manual and the safety labels on the equipment. Safety labels must always be legible. Replace missing or damaged labels. Ensure that the current safety labels can be found on all components. Your authorised dealer can supply you with spare labels.
-  Learn how to operate the *ECO - Terminal* correctly. Do not allow anyone to operate the machine without exact instructions.
-  Keep the machine and the spare parts in good condition. Unstipulated operations can impair the function and/or safety and affect the life span of the machine.

2.3 Safety instruction

For the subsequent installation of electrical and/or electronic components.

Present-day agricultural machines are equipped with electronic components and devices, whose function can be affected by electromagnetic emission from other devices. These influences can lead to endangerment for individuals when the following safety measures are not adhered to.

When subsequently installing electrical and electronic devices and/or components in a machine with a connection to the electrical system, the user must take sole responsibility for testing the installation for interference of the vehicle electronics or other components. This applies in particular to the electronic controls of:

- EHR,
- front lifting gear,
- power take-off shafts,
- motor and
- gears.

Above all it must be ensured that all subsequently installed electrical and electronic components comply with the current version of the EMC directive 89/336/EWG and carry the CE symbol.

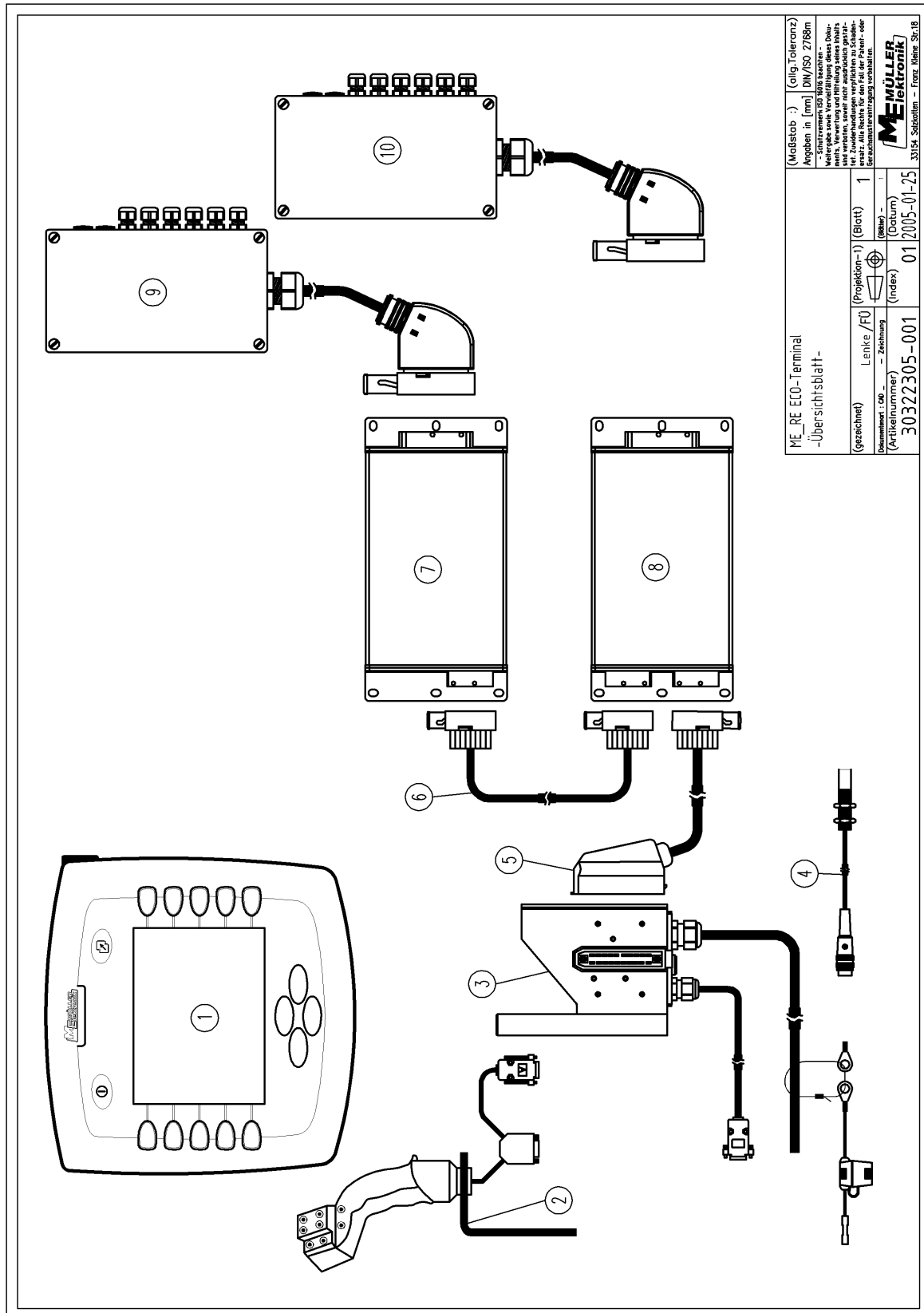
In addition the following requirements must be fulfilled when upgrading with mobile communication systems (e.g. radio, telephone):

- Only approved devices complying to national regulations (e.g. BZT approval in Germany) are to be installed;
- The device must be securely installed;
- The use of portable or mobile devices inside the vehicle is permissible only via a connection to a permanently installed outside antenna;
- The transmitting unit is to be installed in a position away from the vehicle electronics;
- An antenna should only be installed professionally ensuring that there is a good earth connection between the antenna and the vehicle chassis.

Please refer to the manufacturer's installation instructions for cabling and installation as well as the maximum current consumption.

3 Overview and initial installation

3.1 Overview



Diagr. 3-1 Overview

- (1) ECO-Terminal
- (2) Multifunction grip
- (3) Tractor basic equipment
- (4) Speed sensor
- (5) Connection cable machine-ECU
- (6) Junction cable for second ECU
- (7) Master ECU
- (8) Slave ECU
- (9) Cable loom for Master ECU
- (10) Cable loom for Slave ECU

Diagr. 3-1 gives an overview of the *ECO - Terminal* with multifunction grip, the basic equipment for tractors with speed sensor, machine ECU(s) and cable loom.

The basic equipment supplies the *ECO - Terminal* with voltage, makes the connection to the machine and gives a connection to a speed sensor.

The multifunction grip is an optional operating unit and is absolutely essential for machines with complex operation (e.g. field sprayer). It has 8 keys and a switch allowing up to 24 functions to be carried out quickly, exactly and without eye contact. The assignment of the keys is determined by the ECU and can be referred to in the ECU's User's Guide. To connect the multifunction grip, remove the plug from the *ECO - Terminal* basic equipment and connect the multifunction grip in its place. The basic equipment is then connected to the 9-pin socket on the multifunction grip (see chapter 3.2.2).

The connection cable (5), the machine ECU's (7) and (8) and the belonging cable looms (9) and (10) are part of the machine. Here are different configurations possible depending on the stage of extension. Please take further information from the User's Guide.

3.2 Initial operation

3.2.1 Mechanical installation in the cabin

First of all screw the bracket included in the delivery of the basic equipment on to the *ECO - Terminal* (Diagr. 3-3).

Subsequently attach the terminal and the bracket to the basic console on the vehicle (Diagr. 3-3) and screw the wing screw tightly in the correct position. If possible tilt the terminal upwards so that the cabin windows don't reflect.



Diagr. 3-2 *ECO - Terminal* bracket



Diagr. 3-3 *ECO - Terminal* with bracket



Diagr. 3-4 Basic console



Diagr. 3-5 *ECO - Terminal* with bracket and basic console

3.2.2 Connection *ECO - Terminal*


The connection for the basic equipment can be found at the bottom of the *ECO - Terminal* (see Diagr. 3-6).



Diagr. 3-6 Connection at the bottom of the *ECO - Terminal*



Diagr. 3-7 *ECO - Terminal* with connecting cables from the basic equipment

 **Attention:** The multifunction grip, if used, is to be connected directly to the terminal and not to the basic equipment. The basic equipment is then connected to the 2nd plug on the multifunction grip (see Diagr. 3-8).




Diagr. 3-8 *ECO - Terminal* with MFG connecting cable and connection for the basic equipment

3.3 Battery connection

Detailed assembly instructions are included with each basic equipment delivery.

3.4 Initial switch-on

Once the *ECO - Terminal* has been mechanically and electrically installed it is ready for initial operation.

The terminal is switched on and off using the  key. The connected job computers (e.g. field sprayer) are also switched on and off in this way.

4 Keyboard and monitor

The *ECO - Terminal* is operated using 16 tactile keys (6 main and 10 function keys). Diagr. 4-1 illustrates the arrangement of the keys.






Diagr. 4-1 *ECO - Terminal* operating elements



- 1) Terminal On/Off
- 2) Menu-key
- 3) Function-keys
- 4) Plus-key
- 5) Enter-key
- 6) Minus-key
- 7) Escape-key

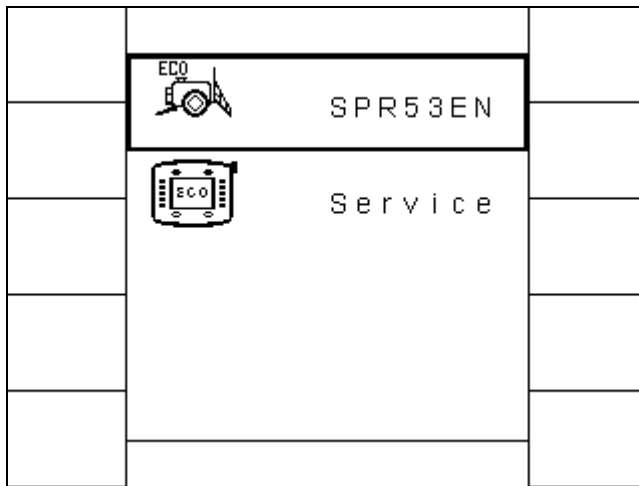
4.1 Main keys

4.1.1 "On/off" key






The key  is used to switch the *ECO – Terminal* on and off. To switch on, press the  key briefly. To switch off, the  key has to be kept pressed until the terminal switches off (about 2 seconds).

4.1.2 "Menu" and "Esc" key

By pressing  or **Esc** (both keys have exactly the same functions) the selection menu of the *ECO – Terminal* is opened. Here you can choose the service menu or one of the connected job computer. If you do not want a change you can restore the old situation by pressing  or **Esc** again.



Diagr. 4-2 Selection menu (field sprayer is selected)


The selection of individual menu points can be done with the keys  and . A black frame marks the current position. By pressing  and  you can change the position of the frame. The wanted position can be activated by pressing . The menu disappears and the chosen job computer or the service menu appears on the display.

If an alarm occurs on one of the connected job computer, an "A" is indicated within the selection menu of the concerned job computer between the symbol and the designation.


4.1.3 "Enter"-key

The key  confirms the selected value and takes it over.

4.1.4 „Plus“-key

With  key the cursor can be moved up in the configuration mask. Within the input mask you go forward to the next input position with this key.

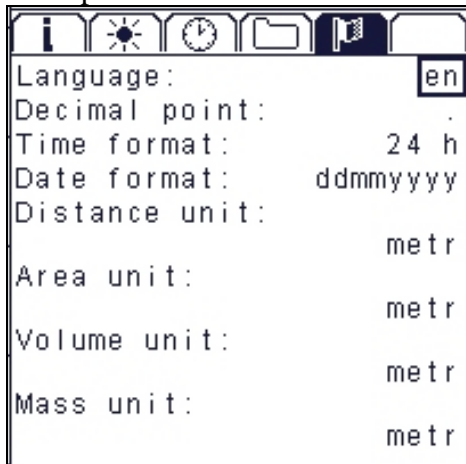
4.1.5 „Minus“-key

With  key the cursor can be moved down in the configuration mask. Within the input mask you can go back to the last input position with this key.

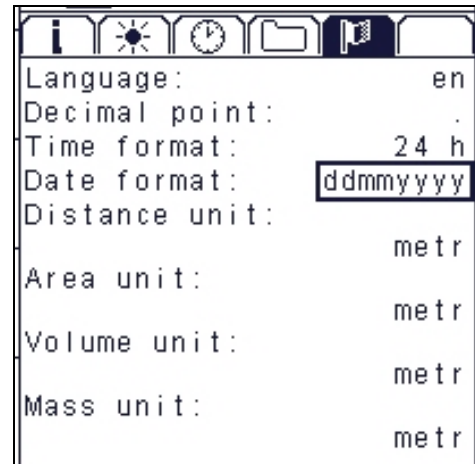
4.1.6 Navigation in menus

Within a menu (e.g. “country settings“) the cursor can be moved to the required position by pressing and . Once the cursor is in the correct position the menu option can be called up by pressing .

Example:



Diagr. 4-3 Country settings cursor in starting position (language)

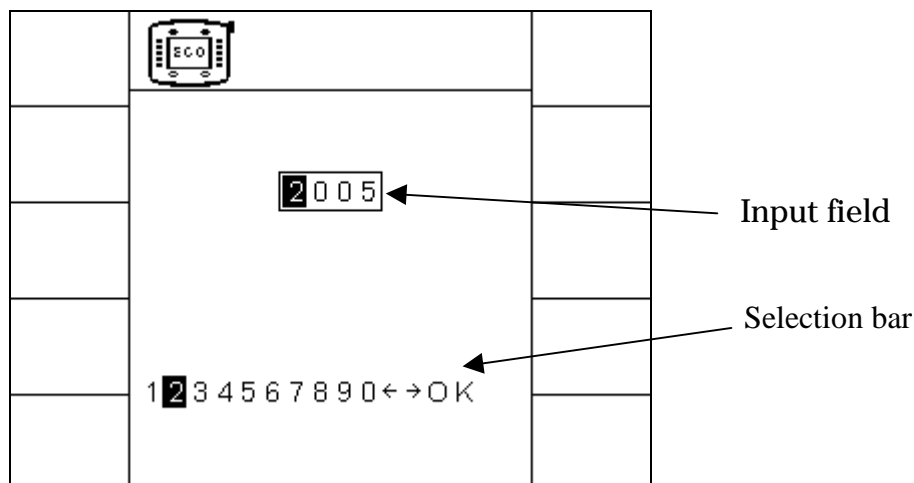


Diagr. 4-4 Country settings cursor on data format

In Diagr. 4-3 and Diagr. 4-4 you can see the country settings menu. When a menu is selected, the cursor (see Diagr. 4-3) is on the entry at the top. With every keystroke on key the cursor moves one position down. Every keystroke on moves the cursor one position up. If the cursor has the wanted position (e.g. Diagr. 4-4) you reach another selection menu or input mask by pressing . If you are within a selection menu the wanted function can be selected with and and is confirmed by pressing . In case of a data input mask go on as described in chapter 4.1.7.








4.1.7 Data input

A data input mask is readed by selecting a value within a selection menu (see chapter 4.1.6). The input mask appears on the display.






Diagr. 4-5 input mask

The input field is displayed at the top of the screen and is marked by a frame in which the maximum number of positions is shown. The first position inside the frame has a dark background. This is the cursor marking the current input position.

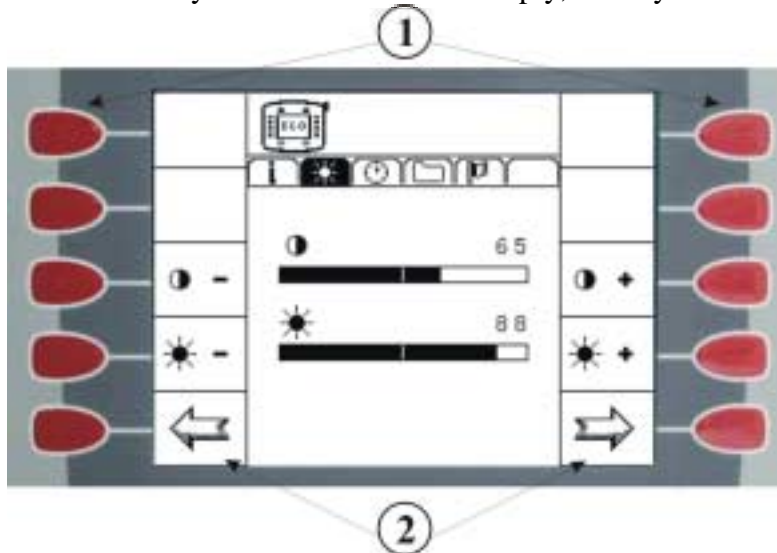
The selection line can be seen on the bottom half of the screen. The numbers and navigation symbols which can be used for the current input field are displayed. In Diagr. 4-5 e.g. the number entry is illustrated. This means that only the numbers 0 – 9, the characters <-, -> and OK are displayed. Text input is also possible. A cursor can also be found in the selection line. At the start of input both cursors display the same number (see Diagr. 4-5).  is pressed briefly if changes are not required at this position. The cursor in the input field moves one position to the right and the cursor in the selection line marks the corresponding number. To change the value here, the position of the cursor in the selection line can be changed by pressing  or . With  the cursor moves to the right and with  it moves one position to the left. By pressing  the wanted value is taken over. The cursor moves a position further to the right. Once all numbers have been entered in the input field, the cursor jumps to OK in the selection line. Input is terminated by pressing .

Both arrows can be used to move the cursor in the input field.

 **Important!** Input can be interrupted by pressing the  or  key. The original value is restored then.

4.2 Function keys

5 function keys are arranged both to the right and left of the screen. The function of these keys is determined by the menu currently displayed on the screen. It is always the function displayed in the current menu directly beside the key which is being carried out. In the illustration below, for example, brightness is being reduced using the F4 key and increased with the F9 key etc. Where a field is empty, the key has no function in this menu.



Diagr. 4-6 Example of function keys: "screen adjustment"

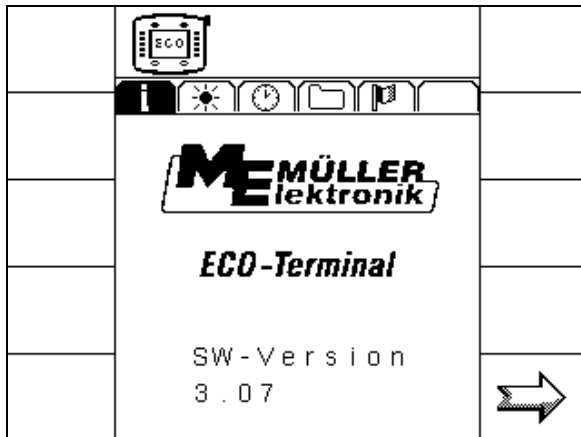
(1) Function-keys

(2) Current assignment

5 Service Menu

All *ECO - Terminal* - relevant information and settings are displayed in the service menu and if necessary altered. The sub-menus are explained in this chapter.

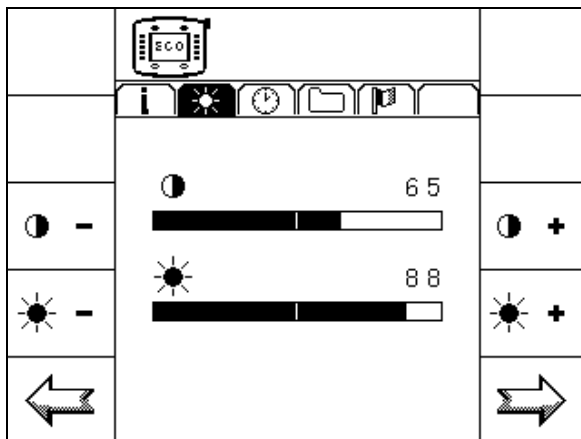
5.1 Information



Diagr. 5-1 Menu option "Information"

The version of the terminal software is displayed in this menu. Press the function key to move on to the contrast menu.

5.2 Menu option "monitor adjustment"



Diagr. 5-2 Menu option "Monitor adjustment"

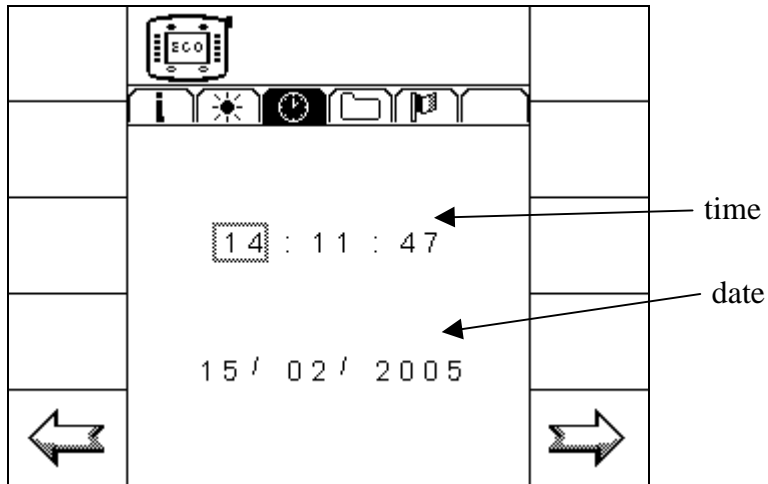
The current settings for contrast and brightness are displayed in this menu.

Contrast is reduced with the function key and increased using the function key.




Brightness is reduced with and increased with .


The key switches back to the "information" menu. The "clock setting" menu is displayed using the key.



5.3 Clock settings



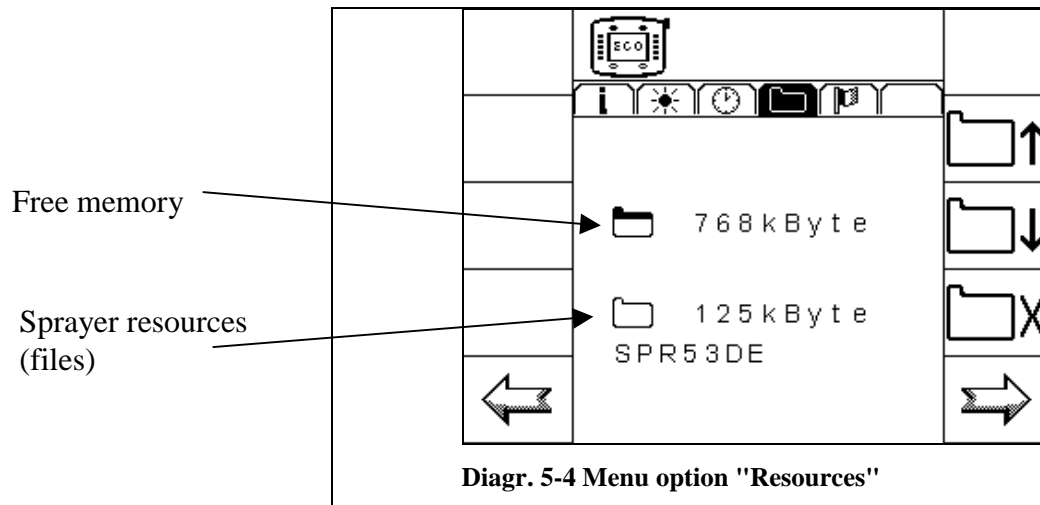
Diagr. 5-3 Menu option "Clock setting"

The black frame marks the current input position. It can be moved by pressing  or . When you reached the wanted position the input can be activated by pressing  (see chapter 4.1.6 and 4.1.7). After the input of all ciphers confirm the input with OK. The menu "clock settings" appears again with the updated time.

 **Attention:** The display format for the time and the date are set in the country setting menu.

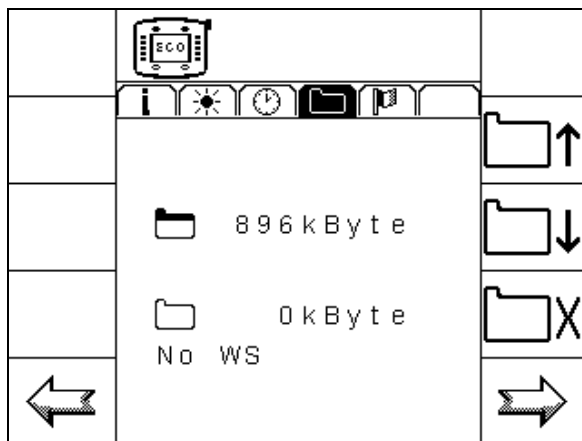
The  key switches back to the monitor adjustment menu. Press the  key for the resources menu (see chap.5.4).

5.4 Resources



The resources (files) which have been stored on the *ECO - Terminal* by the individual job computers and are no longer required can be deleted. This makes room for resources from other job computers.

The current free memory is displayed on the top half of the monitor and below it is an existing file with name and memory. Using the keys and the list of files can be leafed through. The current file displayed is deleted, when the key is pressed. If there are no files on the terminal, the following display appears as in Diagr. 5-5.










Diagr. 5-5 Resources (no memory assigned)

The key switches back to the clock setting menu. With the key the country setting menu is displayed.

5.5 Country settings

In this menu the country specific settings are entered. These settings affect the menu display format on the *ECO-Terminal*.

		
	    	
	Language: en	
	Decimal point: .	
	Time format: 24 h	
	Date format: ddmmyyy	
	Distance unit: metric	
	Area unit: metric	
	Volume unit: metric	
	Mass unit: metric	

Diagr. 5-6 Menu option „country settings“

The following settings are possible:

Language:

<i>Selection</i>	<i>Definition</i>
De	German
En	English
Fr	French
nl	Dutch

Tab. 5-1 Languages

Decimal separator:

<i>Selection</i>	<i>Definition</i>
,	Decimal separator „Comma“
.	Decimal separator „Full-stop“

Tab. 5-2 Decimal separators

Time format:

<i>Selection</i>	<i>Definition</i>
24 h	24 hour clock
12 h	12 hour clock

Tab. 5-3 Time format

Date format:

<i>Selection</i>	<i>Definition</i>
ddmmyyyy	Day 2 positions; Month 2 positions; Year 4 positions Example: 20 / 10 / 2003
ddyymm	Day 2 positions; Year 4 positions; Month 2 positions Example: 20 / 2003 / 10
mmyyydd	Month 2 positions; Year 4 positions; Day 2 positions Example: 10 / 2003 / 20
mmddyyyy	Month 2 positions; Day 2 positions; Year 4 positions Example: 10 / 20 / 2003
yyyymmdd	Year 4 positions; Month 2 positions; Day 2 positions Example: 2003 / 10 / 20
yyyymm	Year 4 positions; Day 2 positions; Month 2 positions Example: 2003 / 20 / 10

Tab. 5-4 Date format

Unit of length, unit of area:

<i>Selection</i>	<i>Definition</i>
metrical	Metrical units of measurement
imperial	Imperial units of measurement as they are used in Great Britain

Tab. 5-5 Length and area units

Volume units:


<i>Selection</i>	<i>Definition</i>
metrical	Metrical units of measurement
imperial	Imperial units of measurement as they are used in Great Britain
US	USA-specific units of measurement

Tab. 5-6 Volume units

Weight units:

<i>Selection</i>	<i>Definition</i>
metrical	Metrical units of measurement
imperial	Imperial units of measurement as they are used in Great Britain
tons/pounds	USA specific units of measurement

Tab. 5-7 Weight units

Press the  key to switch back to the resources menu.

6 Appendix

6.1 Connection

The *ECO – Terminal* has only one connection.



Diagr. 6-1 *ECO-Terminal* connection

Connection (CAN-ISO)

Pin	Signal
1	CAN_L
6	-Vin *)
2	CAN_L *)
7	CAN_H *)
3	CAN_GND *)
8	CAN_EN_out
4	CAN_H
9	+Vin
5	CAN_EN_in

Tab. 6-1 CAN connection allocation

+Vin and -Vin serve the voltage supply. The signals marked with *) correspond to CiA allocation (CAN in Automation).

The signals CAN_L and CAN_H are connected internally and are for looping through the CAN Bus.

When CAN_EN_in is put on the voltage (= +Vin), the terminal can be switched on. When switched on, the terminal delivers the distribution voltage (minus 1.2V) with maximum 140mA on CAN_EN_out for the supply of the terminator networks.

6.2 Technical data



Operating voltage:	10 V - 24 V
Operating temperature:	0 °C – 50 °C
Storage temperature:	-20°C – 60 °C
Safety class:	IP6K4
Max. current	0,5 A (< 5 W)
EMV:	According to ISO14982 /PREN55025 dejamming level 4
ESD:	According to ISO10605 level 3
Display:	¼ VGA 5,7"
Weight:	1.3 kg
Measurements (L x W x H):	220 x 210 x 95 mm

Tab. 6-2 Technical data

6.3 Glossary

Term	Definition
Bus	Bus means that different devices (terminal, job computer etc.) are generally connected to one another by a network. Only data packets (messages) which can be accessed by all participants are sent here. Each message is labelled in such a way that each BUS participant can recognise if it is intended for him. In this case he evaluates it.
CAN-Bus	Principally a network existing of two cables. CAN means “Controller Area Network” and was developed by Bosch for use in industrial plants and the motorcar industry. This form of data bus is particularly suited to use in agriculture as it has little susceptibility to faults
Function keys	Function keys are keys on the terminal set up beside the monitor. The current key function (soft key) is displayed on the terminal.
Mask	Masks are where the various job computer functions are depicted on the terminal monitor. Within the mask information from the job computer and the assignment of the function keys are displayed.
Terminal	The terminal is the output and operating unit in the tractor cabin. It makes the connection between the driver and the machine. The data of the connected machines are displayed on the terminal. By means of function keys, all functions can be carried out.
Basic equipment CAN-Bus	The basic equipment constitutes the link between the terminal and the tractor. By means of the basic equipment the voltage supply is attached to the terminal.
Soft key	The soft key is the current function of a function key. It is displayed on the monitor beside the function key.
ECU	Electronic control unit The ECU is the brain of the machine, being responsible for all functions. All control functions are carried out here and controlled. Sensor values are measured and sent for display to the terminal. Commands which are entered on the terminal by the operator are converted here to switching signals and so controlled, e.g. hydraulic valves.
Job computer	See description of ECU
Cursor	The cursor indicates the current position in a data input or selection menu. It marks the value which is being altered.
Resources	Resources are graphic objects made accessible by the job computer. Their purpose is to display the functions, input, output etc. on the terminal. The first time the terminal is connected to a new job computer, the resources are loaded and stored there. Due to storing, a reboot is not necessary. The resources remain stored on the terminal until they are deleted by the user.

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