

# User's guide

## ECO Sprayer System



July 2005

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## 1. Introduction

With the ECO Sprayer System your machine is equipped with state-of-the-art technology. Over 10 years experience in the development of CAN-bus components has had considerable influence here.

This ECO System works with ECO-Terminal of Müller-Elektronik GmbH u. Co. KG.

For any questions on the ECO-Terminal please refer to the installation and User's Guide of the ECO-Terminal.

## 2. Safety instructions

### 2.1. Disclaimer:

The ECO Sprayer System 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 System for the first time.**

Observe the following recommended precautions and safety instructions:

-  Do not remove any safety mechanisms or labels.
-  Before using the device, read and understand this guide. It is of equal importance that others operating this device also read and understand the manual.
-  During maintenance or when using a battery charger, switch off the power supply (pull out the ISOBUS plug).
-  Never service or repair the device while the job computer is switched on.
-  When welding on the equipment or on an attached machine, interrupt the power supply (pull out the ISOBUS plug).
-  Use clear water for testing. Only use chemicals once fully acquainted with the operation of all functions.
-  Keep children away from the equipment.
-  Do not expose the job computer and the sensors to the direct jet of a high pressure cleaner.
-  Do not open the job computer. Unauthorised opening leads to the loss of any warranty claims.
-  Operate the keys with your finger tips but avoid using fingernails.
-  Should any part of this guide remain incomprehensible after reading, contact the dealer or Mueller-Elektronik Service for further clarification before using the device.
-  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 new components. Your authorised dealer can supply you with spare labels.
-  Learn how to operate the machine and controls correctly. Nobody is to operate the machine without exact instructions.
-  Keep the machine and the spare parts in good condition. Unstipulated alterations can impair the function and/or safety and affect the life span of the machine.



- (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 job computer
- (8) Slave job computer
- (9) Cable loom for Master ECU
- (10) Cable loom for Slave ECU

Diagram 3-1 gives an overview of the *ECO - Terminal* with multifunction grip, the basic equipment for tractors with speed sensor, ECU 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.

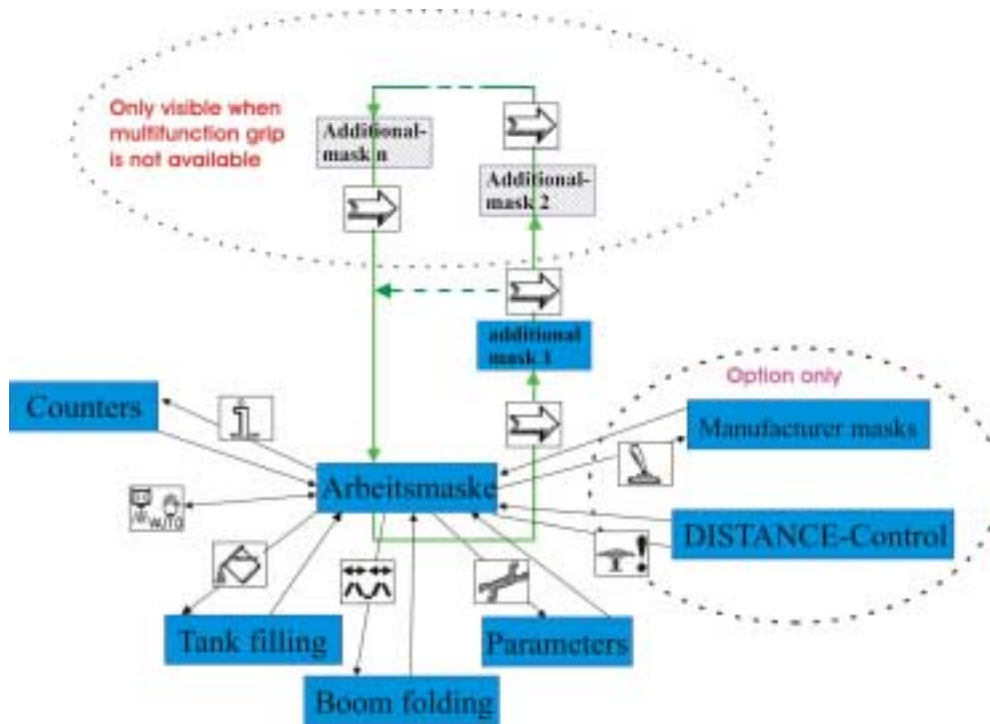
The multifunction grip is an optional operating unit and is absolutely essential for machines with complex operation (e.g. field sprayer). It has 8 keys and a switch allowing up to 24 functions to be carried out quickly, exactly and without eye contact. The assignment of the keys is determined by the job computer and can be referred to page 40. 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 free 9-pin socket on the multifunction grip cable.

The connection cable (5), the machine job computer (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.

## 4. Masks


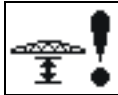
### 4.1. Mask structure


As soon as the ECU's have been switched on and selected from the terminal, a working mask appears on the monitor. From here all of the job computer's functions can be navigated. Diagram 4-1 illustrates how the individual masks are connected




**Diagram 4-1** Mask structure


As can be seen in Diagram 4-1, the masks counters, tank-filling, boom-folding, DISTANCE-Control, parameters and manufacturer masks can be called up directly from the working

mask. The soft keys  and  appear only if these options have been configured.

If the soft key  is pressed, the additional mask 1 appears. This has further functions.

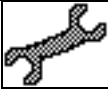








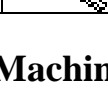
To return to the working mask, press  again.

If no multifunction grip is connected (emergency operation), further additional masks appear which have its function. These can be accessed from the working mask by pressing the soft

key  several times. The working mask is returned to after the last mask.






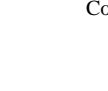
## 4.2. Soft keys in the working mask

Tab. 4-1 Soft keys in the working mask

Soft key	Description
	Calls up the machine data mask (chap. 4.3 page 10). In the machine data masks all adjustable values can be seen and altered. From here further soft keys branch out to the individual calibration masks.
	Calls up the folding masks (chap.4.6 page 24). Depending on the function range of the boom the soft keys for folding are available here in either one or two masks.
	Calls up the DISTANCE-Control mask (chap.6 page 30).
	Switches the TRAIL-Control on and off (see chap. 7 page 35). This is not displayed when the machine is also equipped with DISTANCE-Control. In this case this function is only to be found on the multi-function grip.
	Switches on to the additional mask 1 (see Diagram 4-1 page 9) which has further soft keys for other functions.
	Calls up the counters mask (chap. 4.7.2 page 27). In the counters mask the daily and total counters are displayed.
	Calls up the tank-filling mask (chap.4.7 page 26).This mask combines all tank-relevant functions.
	Switches from manual/automatic for the spraying function
	Middle position: This soft key belongs to the range of “TRAIL Control” functions. As long as the key is pressed, the steerage is in a middle position (chap.7.2.2 page 39).
	Switches the working mask mode (see chap.4.5 page 20).

## 4.3. Machine data masks

Tab. 4-2 Soft keys in the machine data mask

Soft key	Description
	Stores the pump rpm as set value
	Calls up the mask for flow meter calibration (see chap.4.3.1.1 page 14).
	Proceeds to the next machine data mask
	Returns to working mask
	Calls up the wheel sensor calibration mask (see chap.4.3.1.4 page 17)
	Calls up the boom section mask (see chap. 4.4.1.1 page 19).

Soft key	Description
	Calls up the masks DISTANCE-Control (see chap 6 page 30).
	Calls up the TRAIL-Control calibration mask (see chap. 7 page 35).
	Calls up Configuration mask

PARAMETERS	
Rate	200 l/ha
Working width	: 21.0 m
Wheel pulses	: 300 /100m
Regul. factor	: 7.0
Max. pressure	: 30.0 bar
Min. pressure	: 0.5 bar
Minimum speed	: 2.0 km/h
Min Auto speed	: 4.0 km/h
Max. wind speed	: 4.0 m/s



PARAMETERS	
Tank size	: 3500 l
Tank level alarm	: 200 l
Pulses main flow	: 200 /l
Pump RPM: current	: 470
Set value	: 540

PARAMETERS	
- Options activation -	
Sections switching	: Sequential mode.
Filling mode	: TANK-Control.
Joystick	: ME-Joystick.
Circulation type	: Non constant pressure.
SPREC02:U226	
SPREC01:U216 OP:SPRS2DE-13/12/04	


Diagram 4-2 Machine data page 1 Diagram 4-3 Machine data page 2 Diagram 4-4 Machine data page 3

Tab. 4-3 Machine data page 1



Parameter	Description
Set value	The pre-set value is sprayed, when the sprayer is working in automatic mode.
Working width	Set the working width on the field sprayer. This value must be set exactly, as it affects the area measurement and the amount sprayed.
Imp. wheel sensor	If a speed sensor is connected (attached sprayer) the pulses / 100 m are set here. If the value is not known a calibration can be carried out (see chap.4.3.1.4 page 17). This value must be set exactly, as it affects the area measurement and the amount sprayed.
Control constant	The regulating factor adapts to the speed of monitoring. Should, during travel at a constant speed, the spray rate jump around the pre-set value, the factor must be reduced. If the spray rate does not adapt quickly enough to a change in speed, the factor must be increased
Max. pressure	If a pressure sensor is installed, the maximum pressure is entered here. An alarm is set off if the pressure exceeds this value.
Min. pressure	If a pressure sensor is installed, the minimum pressure is entered here. An alarm is set off if the pressure falls below this value.
Min. operating speed	Set the minimum operating speed here. The boom section main switch on the field sprayer switches off automatically if the speed falls below this value. When this happens the icon  appears on the working mask.
Min. auto speed	“Min auto speed” determines the minimum speed for automatic fluid regulation. Regulation switches on to manual operation if the speed falls below this value. This function does not apply when the value is 0.



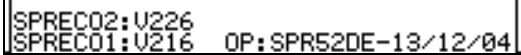
Parameter	Description
	<p>This parameter is used typically in combination with “Min. operating speed” e.g. Min. operating speed=2 km/h” and “Min auto speed = 4 km/h”. When the sprayer is switched on when not in motion, the job computer switches the icon  on to the display in order to show that spraying is not possible. Depending on the configuration of the nozzle type, the main valve remains closed and/or the by-pass open and/or the boom section valves closed. With a speed between 2 and 4 km/h the boom sections valves are closed, whilst regulation remains in manual operation and the icon  is displayed.</p> <p>Both parameters can be set separately. However it must be guaranteed that “Min. operating speed” &gt;= “Min. auto speed”, otherwise only “Min. operating speed” will be evaluated.</p>
Max. wind speed	If a wind sensor is installed the maximum wind speed is entered here. An alarm is set off if the wind speed exceeds this value.

Tab. 4-4 Machine data page 2

Parameter	Description
Tank size	Size of the tank for the spraying fluid.
Tank level alarm	An alarm is set off if the amount in the tank falls below this value.
Pulses main flow meter	<p>The number of pulses per litre for the main flow meter can be set here. If the value is not known, a calibration can take place (see chap.4.3.1.1 page 14).</p> <p> This value must be set exactly as it has a direct influence on the spray rate.</p>
Pump rpm	If a sensor for the measurement of the pump rpm is installed, the standard rpm is entered here. A warning is displayed if the value varies by a certain percentage (manufacturer-specific).

Tab. 4-5 Machine data page 3

Parameter	Description
Section switching	<p>It can be differentiated between “sequential operation” and “nest treatment”. The functions are described in chap.4.5.1.2 page 22.</p> <p> After changing the setting, the job computer must be switched off and on again. Only then is the change effective.</p>
Filling mode	<p>Depending on the configuration, the following points can be selected: “manual”, “TANK-Control”. Chap.4.7 page 26 describes the functions and handling.</p> <p> After changing the setting, the job computer must be switched off and on again. Only then the change is effective.</p>

Parameter	Description
Joystick type	<p>Change-over of the functionality of the MFG</p> <p><b>„without Joystick“</b> = For all functions the softkeys are indicated. The MFG can be used.</p> <p><b>„ME-MFG“</b> = The softkeys of all functions on the MFG are removed out of the masks. These functions can only be operated by the MFG. The number of masks is reduced because of this and the whole operation is more clearly.</p> <p><b>„disclaim ME-MFG“</b> = All pressings of the keys on the MFG are disclaimed by the ECO sprayer. The MFG has no effect on the sprayer.</p> <p> After changing the setting, the job computer must be switched off and on again. Only then the change is effective.</p>
Circulation type	<p>Here the circulation type is defined. It is differentiated between the following types:</p> <p><b>„without constant pressure“</b>: For armatures without constant pressure function</p> <p><b>„constant pressure“</b>: for armatures with constant pressure function</p> <p><b>„D-Type“</b>: by using a constant pressure membrane.</p> <p> After changing the setting, the job computer must be switched off and on again. Only then the change is effective.</p>
Software version number	<p></p> <p>At the bottom of the machine data page 3 you find the software version numbers.</p> <p><b>SPRECO1</b> is the version number of the Master-ECU which is responsible for Spraying functions and Distance Control.</p> <p><b>SPRECO2</b> is the number for the slave-ECU, responsible for TRAIL-Control and hydraulics.</p> <p><b>OP:</b> gives the version of the object pool.</p>

### 4.3.1. Calibration masks

Calibration of individual components serves the purpose of balancing out manufacturing variations and changes which have occurred in the course of time due to wear and tear etc. The individual calibration steps must be carried out as accurately as possible. Only then can the best possible results be achieved. It is recommended that all functions be examined for accuracy and if necessary calibrated again at the beginning of each season. A new calibration should be carried out immediately if inaccuracies occur during the season.

The following chapter describes the procedure for the various calibrations.

### 4.3.1.1 Flow meter

Before initial operation, the machine's flow meter must be calibrated. The number of pulses per litre can change during the life span of a flow meter. A repeat calibration at least once before the beginning of the spraying season is recommended.

**⚠ Important!** Only clear water is to be used for this purpose.

Tab. 4-6 Soft keys flow meter calibration

Soft key	Description
	Starts the main flow meter calibration using the tank method (see 4.3.1.2 page 14)
	Starts the main flow meter calibration using the nozzle method (see 4.3.1.3 page 16)
	Returns to the machine data mask

### 4.3.1.2 Tank method

1. Fill the tank with clear water.
2. Determine the total weight of the tractor and the field sprayer.
3. Switch on all boom sections.
4. Set manual control.





5. Start calibration process with the soft key. The mask as illustrated in Diagram 4-6.

	<b>CALIBRATION</b> - Main flowmeter -	<b>OK</b>
	1. Tankmethode: spray out 2. To stop : <b>OK</b> Or cancel : <b>ESC</b>	<b>ESC</b>
	3. Give exact volume	
	Counted pulses : 0	

Diagram 4-5 Calibration tank method

6. Switch on spraying with the key on the MFG and spray a few hundred litres. During this time the number of litres increases on the display.
7. Switch off the field sprayer by pressing the key once more. Counting is discontinued.
8. Stop the calibration process by pressing **OK**.

9. Determine the amount sprayed and enter (see Diagram 4-6 Calibration tank method input).

		
<b>CALIBRATION</b> - Main flowmeter -		
1. Tankmethode: spray out		
2. To stop : <b>OK</b> Or cancel : <b>ESC</b>		
3. Give exact volume		
Counted pulses : 0 Water volume : <input type="text" value="0"/> l		
		

**Diagram 4-6 Calibration tank method input**

10. The new value (pulses per litre) is calculated and displayed in the machine data mask.

The calibration process can be interrupted at any time using the soft key ESC.

### 4.3.1.3 Nozzle method

Using the nozzle method the value pulses/litre is measured with the nozzle flow meter. An approximate pulse number (pulses/l) must be entered, before a calibration on the flow meter with the nozzle method is possible.




**Attention! The tank method is more time-consuming, but more accurate than the nozzle method.**



**Do not change the current flow during the calibration!**

To ensure accurate calibration, the working width (Tab. 4-3 page 11) and the nozzles per boom section (chap.4.4 page 18) must be checked before the calibration process begins.




Procedure:

1. Fill the tank with clear water.
2. Switch on all sections.
3. Set manual control.

4. Start calibration process by pressing .

		
	<b>CALIBRATION</b> - Main flowmeter -	<b>OK</b>
	1. Nozzlemethode: spray 2. To stop : <b>OK</b> Or cancel : <b>ESC</b>	<b>ESC</b>
	3. Give real volume/min	
	Measured flow: 0.00 l/min	

**Diagram 4-7 Nozzle method**

5. Switch on spraying with the  key on the MFG.
6. Use a measuring jug to determine the current nozzle flow per minute. It is advisable to establish the average flow from several nozzles.
7. The current measured value is displayed in the calibration mask after “measured flow”. (see Diagram 4-7).
8. Stop the calibration process by pressing .
9. Switch off the MFG by pressing the  key.
10. Enter the determined value per nozzle in l/min (see Diagram 4-8).

<b>CALIBRATION</b> - Main flowmeter -		
1. Nozzlemethode: spray		
2. To stop : <b>OK</b> Or cancel : <b>ESC</b>		
3. Give real volume/min		
Measured flow: 0.68 l/min		
Real flow	<input type="text" value="0.68"/> l/min	

Diagram 4-8 Nozzle method input

#### 4.3.1.4 Wheel sensor

The calibration mask can be selected in the machine data mask. Some preparation is necessary before the calibration process can begin.




**Attention! The calibration must be carried out accurately. The speed, the area measurement and the amount sprayed are all affected by it.**






1. Measure and mark a distance of 100 m on the field (tank half full).
2. Drive the tractor to the marked line.
3. To start the calibration process, press the key. The key disappears. The  and  keys appear.
4. Drive a hundred meters and stop. During the journey the current pulses measured are displayed.
5. To confirm the pulses measured, press the  key at the end. The new value is now displayed in the machine data mask. The calibration process can be interrupted by pressing the  key instead of . The old values remain unchanged.

<b>CALIBRATION</b> - Wheel pulses -		
1. To start :		
2. Drive : 100m		
3. To stop : <b>OK</b> Or cancel : <b>ESC</b>		
Counted pulses : 0		

Diagram 4-9 Calibration of wheel sensor


#### 4.4. Simulated speed

Press the soft key  to start simulation. An input field is displayed. Enter the speed to be simulated here.

		
	<b>CALIBRATION</b> - Wheel pulses -	
	1. To start :  2. Drive : 100m	
	3. To stop : <b>OK</b> Or cancel : <b>ESC</b>	
	Counted pulses : 0	
	Simulated speed : <input type="text" value="0.0"/> km/h	

Input field for the speed to be simulated

Diagram 4-10 Speed simulation

The value is pre-set to 0 km/h. The user can enter any value up to 25.5 km/h. Simulation can be ended again by pressing the soft key once more. When the job computer is restarted simulation is always deactivated. The last value to be set can however be called up again by pressing .



**Important:**

For reasons of safety the TRAIL-Control function cannot operate with simulated speed. TRAIL-Control remains in manual operation mode.

#### 4.4.1.1 Boom sections

	<b>SECTIONS</b>	
	Total sections : <input type="text" value="5"/>	
	Section 1 : 12	
	Section 2 : 12	
	Section 3 : 12	
	Section 4 : 12	
	Section 5 : 12	
	Section 6 :	
	Total nozzles : 60	

**Diagram 4-11 Section settings**

The number of boom sections and number of nozzles per boom section can be changed in this mask by selecting the corresponding input field and entering the value.

In addition it is possible to switch the boom sections on and off permanently.

Select the required boom sections with and . The boom sections selected can be recognised by the highlighted nozzle symbol. By pressing the key, the symbol alternates between the nozzle and the scored out nozzle .

The boom section is permanently switched off when the symbol appears behind a boom section. In this case switching on in the field sprayer working mask is not possible in normal section switching mode.

## 4.5. Working masks

2 different working masks can be displayed in which all values and conditions required during operation are displayed.

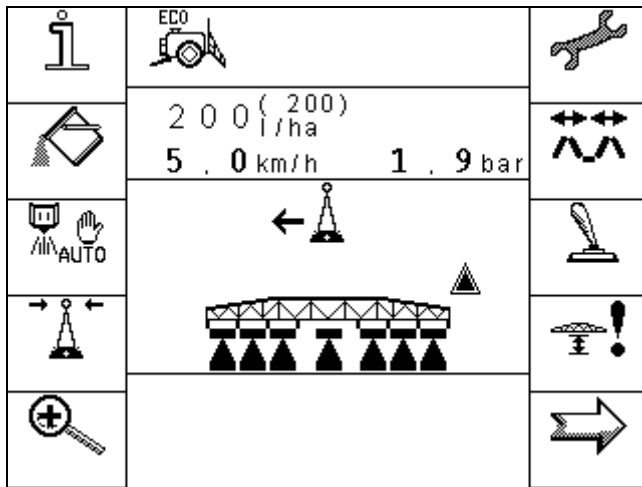


Diagram 4-12 Working mask 1

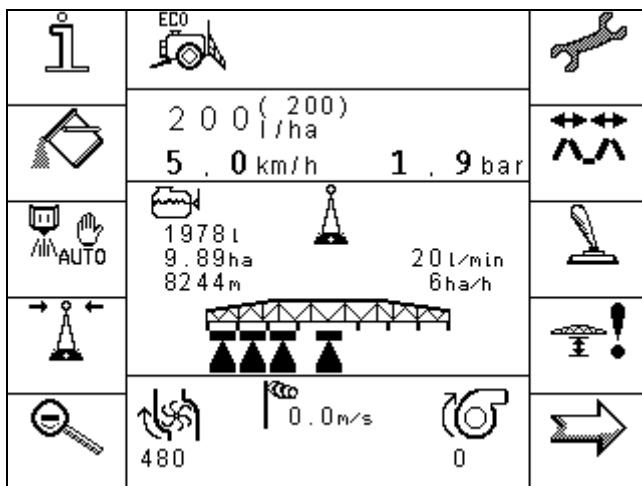


Diagram 4-13 Working mask 2

Diagram 4-12 and Diagram 4-13 illustrate the 2 working masks. These can be switched using

the soft keys and .

Comparing the 2 masks shows that only specific areas change. We differentiate here between permanent and selective display areas.

In the permanent areas the spraying data and status of the boom sections are displayed. Switching does not affect these. In the selective areas the display changes. Symbols which indicate the current status of aggregates, controllers etc. are displayed in the working mask 1. Working mask 2 displays information concerning tank level, rpm etc.

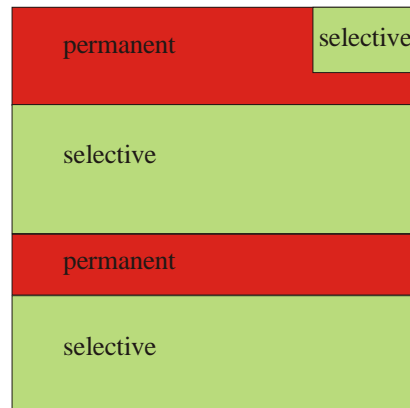


Diagram 4-14 Basic structure of the working mask

## 4.5.1. Working mask 1

The symbols displayed in this mask are described together with the corresponding functions. For this reason the permanent areas only are explained here.

### 4.5.1.1 Spraying data

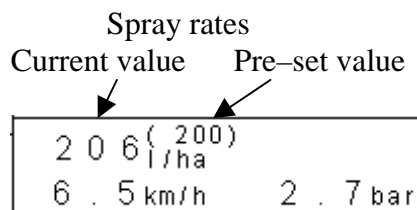


Diagram 4-15 Spraying data in the working mask

proportional adjustment of pre set value

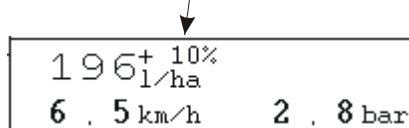


Diagram 4-16 Adjusted pre-set rate

**Pre-set value:** Spray rate in l/ha entered by operator.

**Current value:** Current spray rate in l/ha.

**Speed:** Sprayer's current speed in km/h. If there is no speed determination on the sprayer, the speed of the tractor has to be used.

**Spray pressure:** Current pressure of the spraying fluid in bar.

In automatic mode the pre-set rate can be adjusted in steps of 10%. After adjustment the percentage is displayed for about 2 seconds.

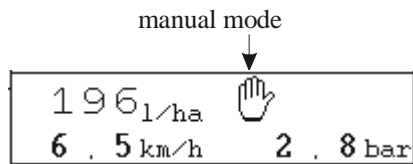


Diagram 4-17 Manual spraying mode



Diagram 4-18 Minimum working speed

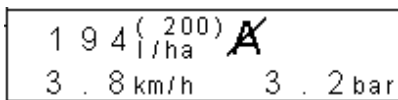


Diagram 4-19 Minimum auto speed

The symbol appears in the display, when the sprayer is switched to manual mode. Using the MFG keys (see chap. 8.1 page 40) the spray pressure can be manually adjusted.

If the symbol appears in the display, this means that a pre-set rate of 0 l/ha has been set or that the working speed has fallen below the minimum (see Tab. 4-3 Page 11). Even if the main sprayer switch is on, the sprayer can only be switched on when all conditions have been fulfilled again.

If the symbol appears in the display, this means that the current speed is lower than “Min. auto speed” and higher than “Min. operating speed.” (see Tab. 4-3 page 11)

### 4.5.1.2 Boom sections

The boom sections are illustrated by bars and triangular symbols underneath the boom. The bars correspond to pre-selected boom sections. The triangles symbolise spraying cones representing switched-on boom sections.

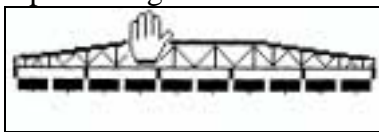


Diagram 4-20 Boom sections; main switch off; all sections are pre-selected



Diagram 4-21 Boom sections; main switch on; sections 3, 4 and 5 are in spraying mode





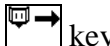


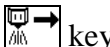


There are 2 variations for the switching of boom sections. Differentiation is between “sequential operation” and “nest treatment”. Switching between these 2 modes of operation is described in Tab. 4-5 page 12.

#### 4.5.1.2.1 Sequential operation

The working mode “sequential operation” is conceived for normal spraying operations. It is also suitable for spraying wedge-shaped areas and strips which are narrower than the working width of the sprayer.

Individual boom sections can be switched using the 4 MFG keys (see chap. 8.1 page 40). Individual boom sections can also be switched permanently in the boom section mask (chap.4.4.1.1 page 19).


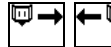
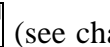
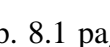
Tab. 4-7 Boom section soft keys



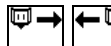
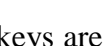
Symbol	Description
 	<p>If a boom section is already switched on, further boom sections from right to left will be switched on when the  key is pressed. If no boom sections are switched on (active), then only the boom section on the outside left will be switched on when the  key is pressed. By pressing the  key, all active boom sections from left to right are switched off.</p>
 	<p>If a boom section is already switched on, further boom sections from left to right will be switched on when the  key is pressed. If no boom sections are switched on (active), then only the boom section on the outside right will be switched on when the  key is pressed. By pressing the  key, all active boom sections from right to left are switched off.</p>

If the last boom section is switched off using the boom section key while the main boom section switch is on, then this will be automatically switched off. A pre-selection can now be carried out using the boom section keys. Switching on must be done at the main switch. If no boom sections have been pre-selected, all boom sections are switched on by the main switch.

#### 4.5.1.2.2 Nest treatment

The working mode nest treatment is conceived for the specific treatment of small patches of weeds. It is possible to switch on and off one or more boom sections in the middle of an area being processed.

Operation is also carried out using the 4 MFG keys     (see chap. 8.1 page 40).

In this working mode a cursor is displayed between the linkage and the boom sections. The cursor can be moved from left to right using the   keys. The   keys are used for switching the boom sections. Both have the same function.

Independent of the position of the main switch, the cursor can be moved on any boom section and the status of the boom section adjusted.





Boom section 4 is pre-selected. Boom section 2 can be pre-selected using the keys  or 

Diagram 4-22 Nest treatment, main switch off





Boom sections 3 and 4 switched on, boom section 1 can be switched on using the keys  or 

Diagram 4-23 Nest treatment, Main switch on

Characteristics:

When the main switch is switched off, all switched on boom sections are also switched off. If no boom sections have been pre-selected, all boom sections are switched on by the main switch.

Diagram 4-22 illustrates the allocation of the symbols for the nest treatment on the MFG, displayed on the additional mask 2.

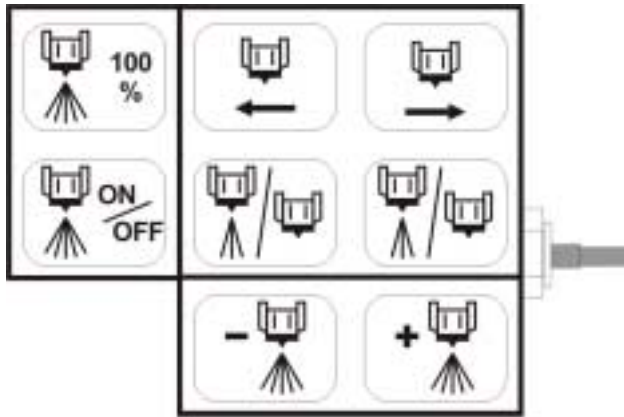


Diagram 4-24 MFG allocation for nest treatment

### 4.5.2. Working mask 2

The symbols displayed in this mask are described together with the corresponding functions. For this reason the selective areas only are explained here, as only these are affected when the working mask 2 is switched to.

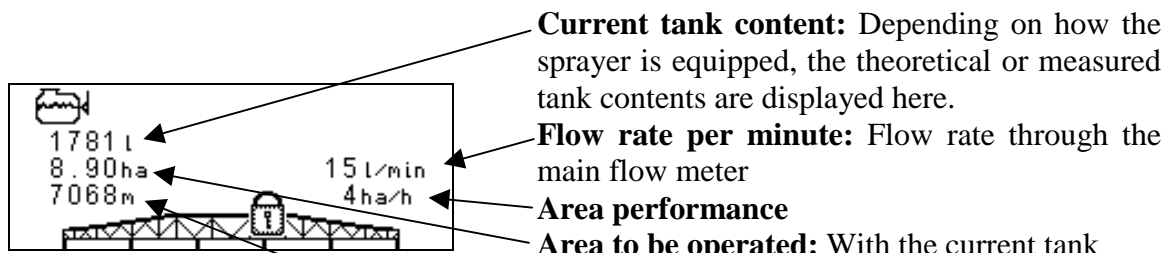


Diagram 4-25 Working mask info

**Current tank content:** Depending on how the sprayer is equipped, the theoretical or measured tank contents are displayed here.

**Flow rate per minute:** Flow rate through the main flow meter

**Area performance**

**Area to be operated:** With the current tank content and the momentary spray rate the area displayed here can still be operated.

**Distance to be operated:** Under present conditions this distance can still be covered

**Wind speed:** \*1) Current wind speed measured

**Fan rpm:** \*1) Current fan rpm measured

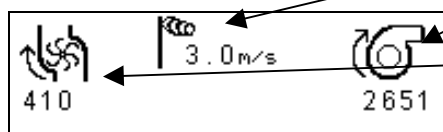


Diagram 4-26 Working mask info

**Pump rpm:** \*1) Current pump rpm measured

\*1) These values are only displayed when the corresponding sensors have been installed.

### 4.6. Folding masks

All keys needed for folding the boom can be found in the folding masks. Depending on the type of boom, a varying number of keys are available. This means that you will not find all keys described here on the terminal. Not all variations are described here.

Tab. 4-8 Soft keys Folding masks

Soft key	Description
	Unfolds right and left simultaneously
	Folds in right and left simultaneously
	Unfolds left
	Unfolds right
	Folds in left
	Folds in right
	Folds in inside left
	Unfolds inside left
	Folds in inside right
	Unfolds inside right
	Folds in outside left and right simultaneously
	Unfolds outside left and right simultaneously

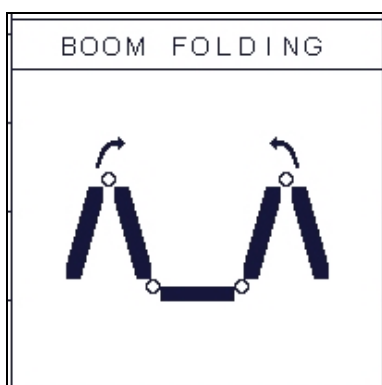


Diagram 4-27 Example 1 Folding mask

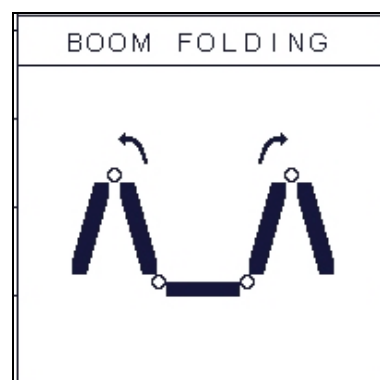






Diagram 4-28 Example 2 Folding mask




With all versions of folding masks additional keys for linkage correction are displayed as long as there is room for these keys:

- If there is only one row of soft keys (soft keys facing each other), the soft keys for raising  and lowering  the bars are displayed.
- If there is a further row not in use, these soft keys will be included for sloping correction:  and .

## 4.7. Tank mask

### 4.7.1. Manual

Tab. 4-9 Soft keys manual filling



Soft key	Description
	Tank full; the tank content is set to the value of the tank size (see Diagram 4-3 page 11)
	Tank empty; the tank content is set to 0.
	Return to working mask

The manual filling mode allows only the tank content to be set at “full” or “empty” or the manual input of a value.

## 4.7.2. TANK-Control

TANK-Control is a measurement system, which continually measures and displays the current tank content.

Tab. 4-10 Soft keys TANK-Control

Soft key	Description
	Sets filling to the maximum value (value of the tank size see Diagram 4-3 page 11).
	Returns to working mask.

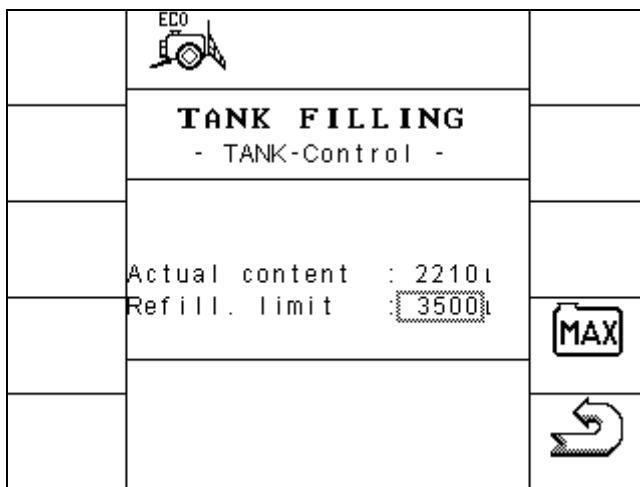








Diagram 4-29 Filling mask TANK-Control

## 4.8. Results

This mask displays all counters. There are two kinds of counters – daily counters and total counters. The daily counters can be reset by the operator at any time. The total counters cannot be reset.

Tab. 4-11 Soft keys for the results mask

Soft key	Description
	Deletes volume
	Deletes area
	Deletes distance
	Deletes work time
	Returns to working mask
	Deletes all counters

	<b>COUNTERS</b>	
	Volume : 2813 l	
	Area : 14.81 ha	
	Distance : 6.35 km	
	Work time : 1.4 h	
	Total volume : 2813 l	
	Total area : 14 ha	
	Total distance: 6 km	
	Tot. work time: 1 h	
	Service hours : 1 h	

Diagram 4-30 Counters mask

## 5. Functions

### 5.1. Foam marking

#### Variation 1:

When the sprayer is equipped with a foam marker the corresponding soft keys can be found in the additional mask 1.

Tab. 5-1 Soft keys for the foam marker

Soft key	Description
	Switches the foam marker on the left on/off
	Switches the foam marker on the right on/off

The active foam marker is displayed on the side in question beside the boom ()

There are two variations for switching foam marking.

With this variation there are only the keys. The foam marker required can be switched on and off using the corresponding key.

## Variation 2:

Tab. 5-2 Soft keys for foam marking

Soft key	Description
	Change to the foam marker on the left
	Change to the foam marker on the right
	Switch off foam marker

The active foam marker is displayed on the side in question beside the boom (




The keys and are displayed. When foam marking is switched off, the or keys are used to switch on the corresponding foam marker. Switching to the other side takes place using the key for the opposite side etc. Only a change from right to left can take place. Foam marking is switched off by pressing the key.

## 5.2. Manual pressure adjustment





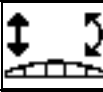




The spraying mode automatic/manual can be switched using the key. In manual mode, the symbol is displayed beside the current spray rate. The spraying pressure can be adjusted using the and keys on the terminal or the keys and on the MFG (see chapter 4.5.1.1 page 21).

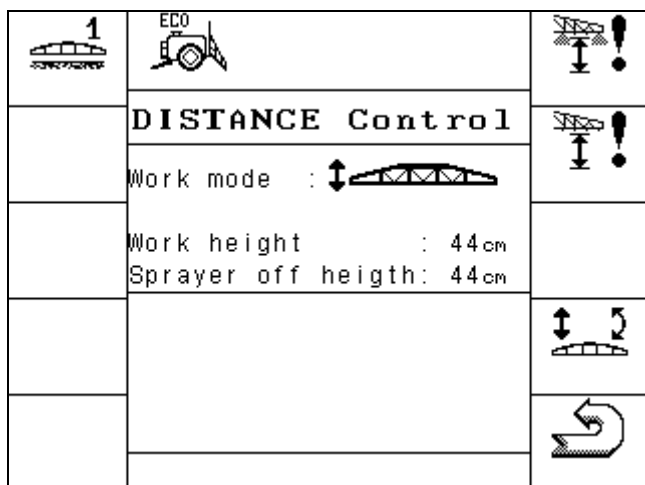
## 6. DISTANCE-Control

DISTANCE-Control automatically maintains the pre-set distance from the boom to the target surface. Two ultrasonic sensors installed near the ends of the boom constantly measure the current distance to the ground or plant surface. Further sensors provide information about deflection and inclination of the boom frame. By means of these values the job computer determines the current status and the necessary reaction to height and inclination deviations.

The current status of the DISTANCE-Control (manual / automatic) is shown in the working mask on the boom. In manual mode the symbol  appears on the boom and disappears in automatic mode. The  key on the MFG, or with emergency operation the soft key  in the additional mask 1 is used for switching.

Tab. 6-1 Soft keys DISTANCE-Control calibration

Soft key	Description
	Sets the working height when DISTANCE-Control is in manual mode.
	Sets the excavation height when DISTANCE-Control is in manual mode.
	Increases the working or raised height when DISTANCE-Control is in automatic mode.
	Reduces the working or raised height when DISTANCE-Control is in automatic mode
	Sets the control type
	Starts the 1 <sup>st</sup> calibration process
	Starts the 2 <sup>nd</sup> calibration process
	Starts the 3 <sup>rd</sup> calibration process
	Returns to the working mask



**Diagram 6-1 DISTANCE-Control mask**

Some information has to be entered before DISTANCE-Control can be used. Subsequently a calibration has to be carried out.

## 6.1. Setting the working height:

The working height is determined by DISTANCE-Control when the boom section main switch is on. In order to program this height the following steps have to be carried out:

1. Switch DISTANCE-Control to manual mode using the key on the MFG.
2. Set the boom to the required working height.
3. Press to store this information.

The working height is now stored and will be set automatically by DISTANCE-Control when it is in automatic mode and the boom section main switch is on.

The working height can also be set during operation. For this purpose the boom section switch must be on and the following steps carried out:

1. Call up DISTANCE-Control mask using the soft key in the working mask.
2. With the soft keys and set to the required height. Ready!




## 6.2. Setting the raised height:

The raised height is determined by DISTANCE-Control when the boom section main switch is off. In order to program this height the following steps have to be carried out:

1. Switch the DISTANCE-Control to manual mode using the key on the MFG.
2. Set the boom to the required working height.
3. Press to store this information.





The raised height is now stored and will be set automatically by DISTANCE-Control when it is in automatic mode and the boom section main switch is off.

If DISTANCE-Control is in automatic mode (boom section main switch off) the raised height can be set as follows:

1. Call up DISTANCE-Control mask using the soft key  in the working mask.
2. With the soft keys  and  set to the required height. Ready!

### 6.3. Selection of the control type

DISTANCE-Control operates normally with a combination of height and inclination control. The type of control in the DISTANCE-Control mask can be changed using the soft key

. Differentiation is made between height control () , inclination control () and a combination of both. Specific applications can be selected by repeatedly pressing the  key in the corresponding mode.

### 6.4. Calibration


Specific data for each boom type is determined once. These are stored as master data in the job computer and cannot be altered by the user. The user however is responsible for optimisation by carrying out calibration. All parameters which can vary due to production or can change during the life span of the machine are recorded here.



## Important:

1. **The calibration must be carried out for each sprayer with DISTANCE-Control!**
2. **Calibration should be repeated at least once a year at the beginning of the season.**
3. **The sprayer must be positioned horizontally on ground which is even and has no slope. There should be no hollows under the ultrasonic sensors. The ground surface should not be too smooth (e.g. asphalt or concrete) otherwise the ultrasonic signals can get lost.**
4. **All mobile parts of the boom suspension must be free of paint and sufficiently lubricated.**
5. **The correct working width must be entered in the machine data.**


Correct functioning of DISTANCE-Control after the calibration process is only possible if all these points are adhered to. Regular maintenance of all mobile parts is absolutely essential to ensure long-lasting and correct functioning. Changes to the manoeuvrability of the boom suspension can cause grave impairment to control performance, which even a repeat calibration may not be able to rectify.

The calibration process is carried out in three consecutive stages. The individual stages are clearly separated but should be carried out successively during one process. The machine must be stationary during this process. If problems or operating errors occur, calibration will be automatically terminated and the original parameters restored. The process can be interrupted manually at any time by pressing the  soft key.

#### **During calibration:**

The functions of the multifunction grip remain active; boom adjustment to the defaults can therefore be carried out either via the multifunction grip.

**Procedure:**

1. Press the  soft key. The calibration process begins and the following text appears:

**Horizontal calibration**

**Place boom in a horizontal position at a height of 2m**






**And press:** 

2. Now place the boom in a horizontal position at a height of 2m. In this position the boom must be able to tilt freely to the ground. If this is not the case select a lower height. To help with setting, the height of the boom on the left and right are displayed in the menu. Depending on the position the following text appears:

**Boom is now horizontal**


OR

**Boom is not horizontal**






3. When the boom is horizontal the setting is stored using the  key. Now and again wind can cause the boom to move 2-3 cm back and forth so that the display “Boom is now horizontal” wavers on the monitor. In this case press the  key several times until the input is accepted.
4. As soon as the first setting is completed the soft key  disappears and this key appears .
5. To start the second calibration step press the Soft key . This text appears :

**Manual Calibration**


**Tilt the boom to the left for 5 seconds**

6. Now press down the left side by hand ( **Attention! not** via the slope adjustment) until the ultrasonic sensor is about 40 cm above the ground. As soon as the deflection is sufficient the following text appears:



**Move back the boom to the horizontal position  
and  
Boom is now horizontal  
or  
Boom is not horizontal**


7. Hold the boom in the deflected position for about 5 seconds and then let go. The boom should now move itself back into the horizontal position. If the display does not switch to “Move back the boom to the horizontal position“ press down the boom once more, this time further than the first time.  
 The ground must not be touched.
8. Once the boom is horizontal this step can be concluded by pressing . The  key disappears and the  key appears.
9. Press  to start step 3. The following text appears:

**Automatic calibration: please wait...**

10. Now an automatic process is started. The boom will be raised first on the left and then on the right and subsequently returned to the horizontal position, during which it must not touch the ground. If, after this, the horizontal position is not set correctly this does not mean that the calibration has failed.
11. Observe the movement of the boom. If something is not correct, the process can be terminated by pressing  key. All three steps must then be carried out once again.
12. If this step has also been concluded successfully, the following text appears:

**Calibration completed. Please press ok.**

If the new calibration values are to be taken over the  key has to be pressed once more.  
With the  key the new calibration values can be rejected.

Once the calibration has been fully completed, DISTANCE-Control is ready for use and can be switched to automatic mode by pressing the  key in the additional mask 1.

## 6.5. Safety functions:

Under specific safety-relevant conditions DISTANCE-Control is switched to manual mode.

- Maximum speed of 15 km/h is exceeded
- Error messages involving DISTANCE-Control
- Activation of another function involving DISTANCE-Control (folding etc.)
- Signal from other sensors e.g. locking, lift mast sensor etc.
- Start of calibration
- Short term loss of sensors

## 7. TRAIL-Control

The function TRAIL- Control ensures that an attached field sprayer automatically stays in the trail of the tractor. The current position of the complete system is recorded via a sensor (Gyroscope) on the tractor and a sensor (Potentiometer) at the pivot of the machine's steering. The job computer uses this data to calculate the required reaction to the hydraulics so that the sprayer can follow in the trail of the tractor. An inclination sensor (optional) provides information on the slope of the ground. With this information automatic slope regulation can be carried out.

Operation of the TRAIL -Control function is integrated in the job computer. The following chapter describes the controls, their operation and calibration.

### 7.1. Initial operation

Before TRAIL Control can be used, the sensor (Gyroscope; Diagram 7-1) must be mounted to the tractor.



Diagram 7-1 Gyroscope



Diagram 7-2 Gyroscope bracket



Diagram 7-3 Gyroscope with bracket

Diagram 7-2 illustrates the mounting bracket for the gyroscope. This must be mounted **perpendicularly** and **vibration-free** on to the rear of the tractor. The gyroscope is then placed in the bracket and secured with a wing screw (see Diagram 7-3)











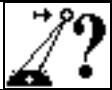



The label “TOP-OBEN” must point upwards.








**Attention! It is essential to make sure that the gyroscope is mounted perpendicularly and vibration-free to the rear of the tractor. Otherwise TRAIL Control will not function correctly**

A second bracket is mounted on the sprayer. This is to take the gyroscope when the sprayer is disconnected from the tractor.

Tab. 7-1 TRAIL Control Soft keys

Soft key	Description
	Soft key in the working mask and the key on the MFG for switching TRAIL Control on and off. The  key on the MFG has to be switched on before TRAIL Control can be used. When the function is switched on the soft key for manual/automatic mode is displayed in the working mask.
	Middle position: As long as the soft key (working mode “manual”) is pressed, steering is driven in the middle position. When the soft key is released prematurely, the hydraulics switch off.
	Manual/automatic: these soft key switches back and forth between the working modes “manual” and “automatic.
	Switches crab steering on/off. This soft key switches back and forth between the working modes “normal” and “crab steering”. The current status is displayed in the TRAIL Control mask by the symbol  .
	Sprayer to the right. As long as this soft key is pressed, the sprayer shifts to the right.
	Sprayer to the left. As long as this soft key is pressed, the sprayer shifts to the left.
	Returns to the working mask
	Calibrates the middle position: see chap.7.1.2 page 38
	Calibrates the maximum position on the left: see chap.7.1.2 page 38
	Calibrates the maximum position on the right: see chap.7.1.2 page 38
	Hydraulics calibration: see chap.7.1.2 page 38
	Confirmation key: This key is used to end the individual TRAIL Control calibration stages (see chap.7.1.2 page 38).

Tab. 7-2 TRAIL Control symbols

Symbol	Description
	TRAIL Control is switched on in “manual” mode
	TRAIL Control is switched on in “automatic mode “
	Crab steering to the right
	Crab steering to the left
	Booms folded in. TRAIL Control can not be switched on as long as this symbol appears. Operation can only be carried out with the booms folded out.

Symbol	Description
	TRAIL Control is locked. This symbol appears when the steering drawbar is locked mechanically. TRAIL Control cannot be switched on.
	Axle locked. This symbol appears when the steering axle is locked mechanically. TRAIL Control cannot be switched on.
	Normal steering
	Crab steering is activated

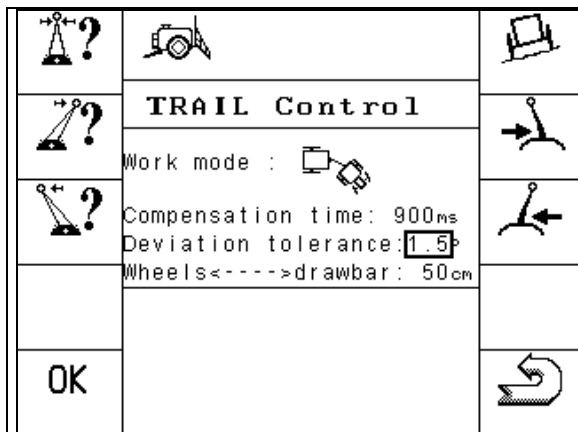


Diagram 7-4 TRAIL Control cal. mask b/w

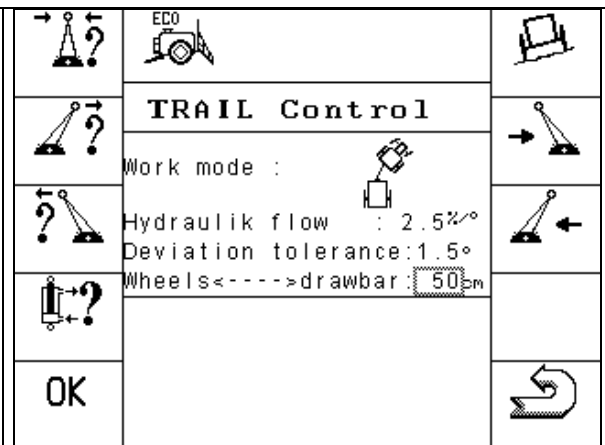


Diagram 7-5 TRAIL Control cal. mask prop.

### 7.1.1. Input of spraying-specific data:

Some parameters have to be set before a calibration of the system can be carried out.

#### Compensation time:

This value is only displayed on models equipped with hydraulic valve S/W (see Diagram 7-4). The normal value is in the range of 700 ms – 1000 ms. The lower the value, the sooner the sprayer takes curves and vice versa.

#### Hydraulic speed:

This value is only displayed on models equipped with a proportional valve (see Diagram 7-5). The hydraulic speed is a factor which can be set with the steering speed of the sprayer. The higher the value, the quicker changes are levelled out. Standard values are in the range from 1.5 %/° and 3 %/°.

#### Deviation tolerance:

The deviation tolerance affects the reaction of TRAIL Control around the middle position. The lower the tolerance, the more sensitive is the reaction of the controller to small changes. Normally this value lies between 1° and 3°.

#### Drawbar <---> wheel:

The distance between the rear axle of the tractor and the towing point is entered here. This is normally somewhere in the region of 45 cm and 90 cm.

If the tractor is changed, the parameters must be adapted to meet the new conditions.

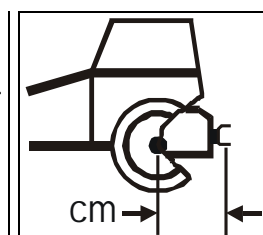



















Diagram 7-6 Length of tractor

## 7.1.2. Calibration:

### 1. Middle position

- Set the sprayer on a flat underground straight behind the tractor using the   keys on the MFG or the soft keys  .
- Call up calibration of the middle position with the soft key. At the bottom of the monitor the display appears “Ready for calibration of the middle position”.
- Press the  soft key within 3 seconds. The calibration process can now be started. The message “Middle position is running” appears. After a few seconds this message disappears again. Calibration for the middle position is now completed.




### 2. End stops

- Press the   keys on the MFG or the soft keys   to drive the sprayer to the maximum position on the left.
- Press the  soft key to activate calibration. The message “Maximum position on the left ready” appears.
- Press the  soft key within 3 seconds. The message “Maximum position on the left is running” appears. The message disappears when the new position has been stored.
- Press the   keys on the MFG or the Soft keys   to drive the sprayer to the maximum position on the right.
- Press the  soft key to activate calibration. The message “Maximum position on the right ready” appears
- Press the  soft key within 3 seconds. The message “Maximum position on the right is running” appears. The message disappears when the new position has been stored.

### 3. Proportional valve (⚠ only with machines with proportional valve)












**Attention: The sprayer is moved automatically during this calibration process. No-one is to be within reach of the control area of the machine!**

- Press the  soft key to activate calibration. The message “Hydraulic calibration ready” appears“.
- Press the  soft key within 3 seconds. The message “Hydraulic calibration is running” appears. This process lasts about 20 seconds. The process is ended when the message disappears. To interrupt the process press  key again.

## 7.2. Operation:

### 7.2.1. Automatic / Manual

When the TRAIL Control function is switched on the “manual” mode is active, signalled by the symbol  in the working mask. In this mode steering reacts to operation with the keys   and . As long as one of these keys is held down, an adjustment in the corresponding direction takes place.


If the  key is pressed the mode is switched to "automatic", signalled by the symbol . The sprayer is now steered automatically. In this mode the keys   and  have no function.

Press the  key several times to switch between manual and automatic mode.











**Important! TRAIL Control switches off automatically as soon as the maximum speed of 15 km/h is exceeded and can only be switched on again when the speed falls below the maximum.**



### 7.2.2. Middle position

The middle position of the steering is started using the  soft key. This soft key functions only in "manual" mode.


### 7.2.3. Crab steering

As well as automatic, crab steering can be activated by pressing the  key. The symbol  appears in the TRAIL Control mask. Now the keys  and  are activated. This means that the sprayer can be adjusted against the slope.

If the machine is also equipped with an inclination sensor, TRAIL Control controls the measured inclination against the slope. The intensity can be set during the journey using the  and  keys. Depending on the current position of the steering in "crab steering" mode, either the symbol  or  is displayed in the working mask.

By pressing the  key again crab steering is switched off. The symbol  disappears from the TRAIL Control mask.

### 7.2.4. Locking

 shows if the steering is locked mechanically. If the symbol is not displayed then the steering is not locked.

## 8. External extensions

### 8.1. Multifunction grip (MFG)

The multifunction grip can also be connected to the terminal and is absolutely essential for operating the field sprayer. It combines the most important functions required while working with the field sprayer, at the same time allowing them to be carried out easily, quickly and without eye contact. With the MFG the number of masks is reduced, making handling easier.

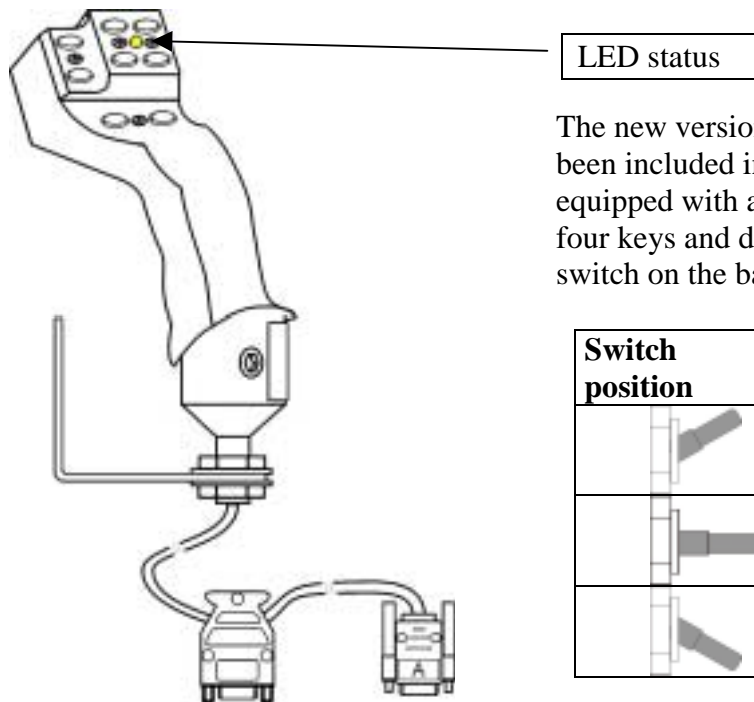


Diagram 8-1 Multifunction grip

On the rear side of the grip there is a switch which can be switched up and down from the middle position. With this each key has 3 different assignments.

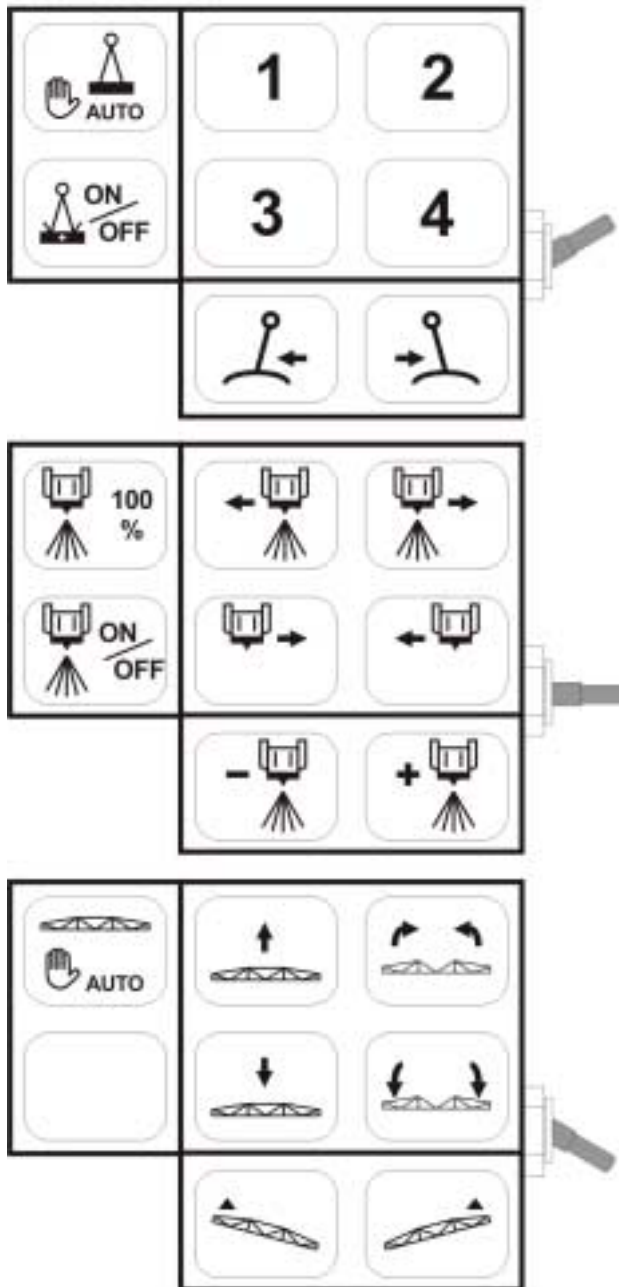
For functions carried out using the switch, please observe the following:

- First press the switch and hold.
- Subsequently press the corresponding key.

To end the function release, first the key and then the switch.

**The MFG assignment is illustrated in Diagram 8-2. This assignment can be found on a label delivered with the sprayer. Stick this label in the tractor cabin where it is visible.**

MFG - ISOBUS



31303101

Diagram 8-2 Assignment multifunction grip

## 8.2. S-Box



### 8.2.1. Introduction

The S-box is a boom section switch box with mechanical switches for the control of boom sections and the main switch on an ECO field sprayer. The switch box can be operated together with a multifunction grip (MFG) or on its own for controlling the boom sections on the sprayer. Versions with 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 and 13 boom sections are available.



#### **Important!**

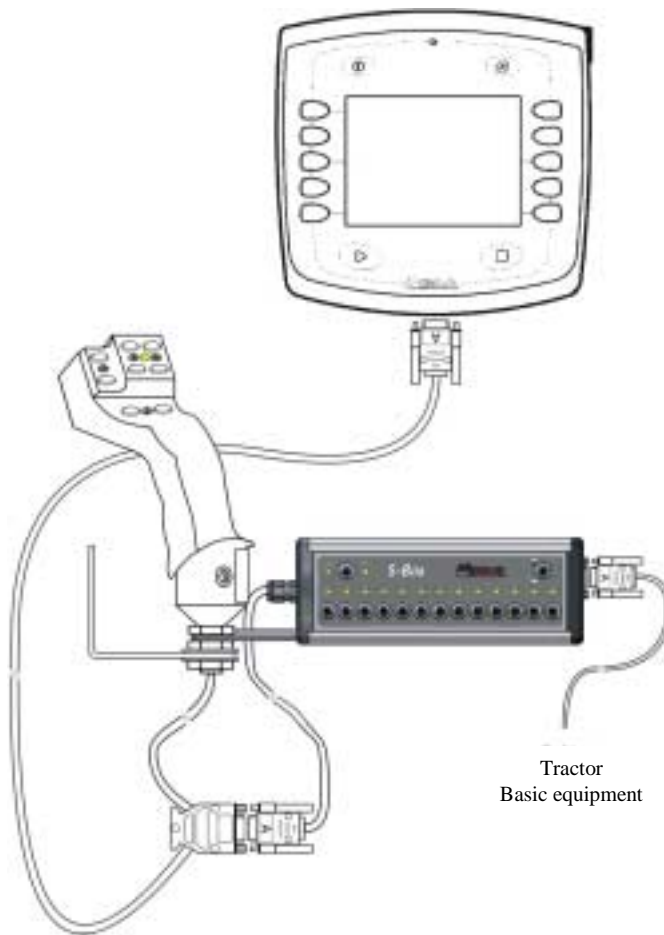
**The S-box is designed for operation only with ECO sprayer job computers from Müller-Elektronik GmbH & Co KG.**

**The software version must be V3x4 or higher.**

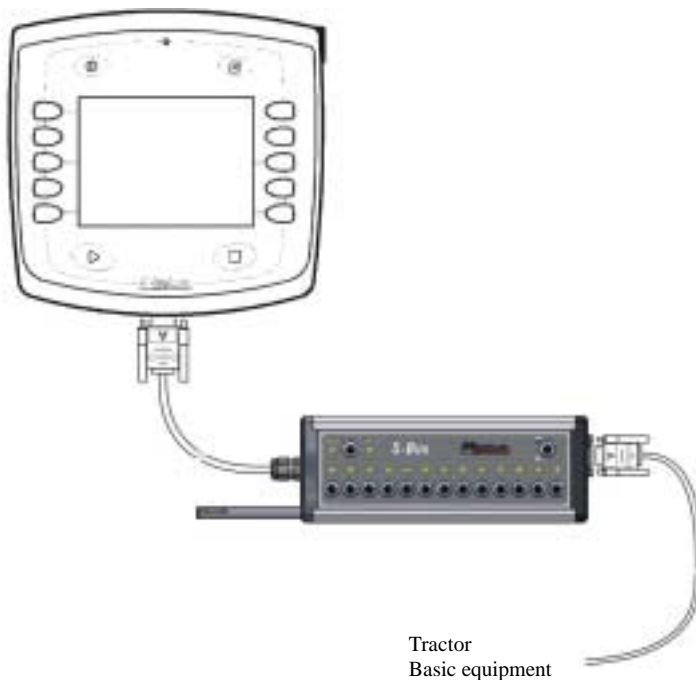
### 8.2.2. Assembly and wiring

The S-box can be mounted to the multifunction grip if both are to be operated together. The S-box is connected electrically between the multifunction grip and the basic equipment. Diagram 8-3 illustrates the assembly and wiring of the terminal, the multifunction grip and the basic equipment.

If the multifunction grip is not to be used, the S-box is connected between the terminal and the basic equipment as illustrated in Diagram 8-4.



**Diagram 8-3 Wiring with MFG**



**Diagram 8-4 Wiring without MFG**

### 8.2.3. Operating elements

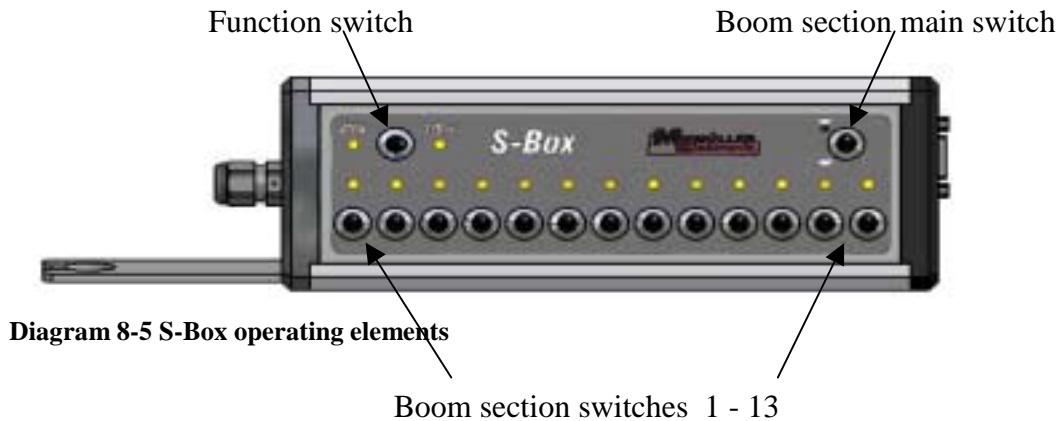








Diagram 8-5 S-Box operating elements

The S-box is activated by means of the function switch . The S-Box has no function in the position MFG. Depending on the mode selected, the boom sections can be operated using the MFG (see parameter "boom section switching" in the 3rd machine data mask on the sprayer).

The S-box is active when the function switch  is switched to S-box. This is displayed in the working mask on the sprayer with the symbol . In this position the sprayer evaluates the pre-set switch settings on the S-box for the boom sections and the boom section main switch . The boom section switches convey the current status of the boom sections. When a boom section switch is switched to "on" the boom section is either active or pre-selected depending on the position of the main boom section switch .

The main boom section switch  functions as a sprayer on/off signal transmitter. When switched to "on" all boom sections which are switched on are activated. When switched off all switched-on boom sections move into pre-selected mode.

## 9. Appendix

### 9.1. Technical data (Job computer F1)

Tab. 9-1 Technical data

<b>Connections:</b>	- Cable screw for the connecting cable to the ISOBUS plug - 2 x 42-pin plugs (plug A & B, mating connector lockable and with single wire seals for the connection of actoric/sensoric technology)
<b>Power supply:</b>	10 .. 16 V DC (incl. load-dump protection up to 80V)
<b>Current consumption (IN):</b>	400mA (at 14,4V without power output, without supply to external sensors)
<b>Quiescent current (OUT):</b>	70µA
<b>Ambient temperature:</b>	-20 .. +70 °C (acc. to IEC68-2-14-Nb, IEC68-2-30 and IEC68-2-14Na)
<b>Casing:</b>	Anodised aluminium continuous casting casing, painted aluminium cover with EPDM seal, stainless steel screws
<b>Safety class:</b>	IP66K (dust proof and protection against jet water with increased pressure in acc. with DIN40050 part 9: 1993)
<b>Environmental testing:</b>	vibration and impact test in accordance with IEC68-2
<b>Measurements:</b>	250 mm x 232 mm x 77 mm (LxBxH, without plug)
<b>Weight:</b>	5.0 kg (with 6.5m connecting cable)

### 9.2. Technical data S-Box

Tab. 9-2 Technical data S-Box

<b>Connections:</b>	- 1x 9pol. sub-D plug (for the connection to the terminal or to the MFG) - 1x 9pol. sub-D socket (for the connection to the basic equipment)
<b>Power supply:</b>	10.5 V – 16 V
<b>Current consumption:</b>	Max. 0.5 A
<b>Temperature range:</b>	-20 °C – 50 °C
<b>Casing:</b>	Aluminium continuous casing with plastic end caps
<b>Safety class:</b>	IP 42
<b>Measurements:</b>	214mm x 40mm x 18 mm (LxHxB)

### 9.3. Machine data

Please inscribe the machine data set for your field sprayer.

**Tab. 9-3 Machine data**

Parameter description	Set value
Working width	
Pulses wheel sensor	
Regulating factor	
Max. pressure	
Min. pressure	
Min. working speed	
Min auto speed	
Max. wind speed	
Size of tank	
Tank level alarm	
Pulses main flow.	
Pulses filling	
Pulses reflux	
Section switching	
Filling mode	
Joystick model	
Circulation model	

**Tab. 9-4 Sections**

<b>Number of sections</b>									
<b>Section number</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>Nozzles per section</b>									

**Tab. 9-5 Machine data TRAIL-Control**

Parameter description	Set value
Compensation time (only for b/w hyd. valves)	
Hydraulic flow (only for prop. valves)	
Deviation tolerance	
Wheels <---> drawbar	

## 9.4. Glossary

Tab. 9-6 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 industrial plants 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	The basic equipment constitutes the link between the terminal and the tractor. By means of the basic equipment the voltage supply and the data bus are 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.
Configuration	The configuration is a table of parameters, which communicates the range of machine functions to the job computer.
ECU	Electronic control unit See description of ECU
Job computer	The ECU is the brain of the machine, being responsible for all functions. All control functions (e.g. spray rate, TRAIL Control, DISTANCE-Control etc.) are carried out here and controlled. Sensor values are measured and sent for display to the terminal. Commands (raise/lower boom, folding etc.) which are entered on the terminal by the operator are converted here to switching signals and so controlled, e.g. hydraulic valves. The connecting cable machine ECU connects the job computer to the tractor. The cables on the sensors and actuators are connected (if necessary by means of a cable harness or distributor) to the job computer.
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.

## 9.5. Abbreviations

Tab. 9-7 Abbreviations

Abbreviation	Definition
MFG	Multifunction grip
ECU	Electronic control unit

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