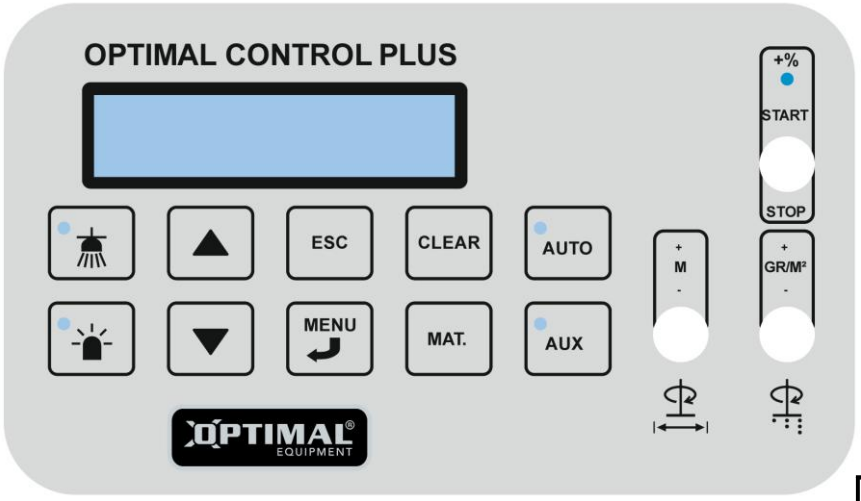
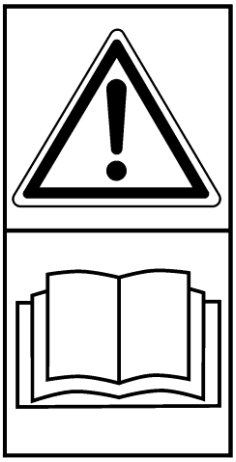
Edition 2017-01

Instructions for use and maintenance

Hand unit OPTIMAL Control Plus

Supplement to the disc spreader manual





Note!
Read instructions before use

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SAFETY SYMBOLS

Note! This warning symbol is used throughout this instruction manual to call attention to safety precautions that you, your employees or any other people that may come near the implement must read and understand. Failure to follow these instructions may result in serious injury or even death.

This symbol means:

WARNING!
CAUTION!
YOUR SAFETY IS ENDANGERED!

A word of advice

Pay special attention to the words **WARNING**!, **CAUTION**! and **NOTE**! in the safety instructions. The words have been chosen from of the following:

WARNING! This safety sign is used to identify potential hazards that can lead to serious injury or even death. These hazards include situations that may occur when the safety equipment and/or the safety shields are removed. Signal words can also be used to alert about dangerous use.

CAUTION! Failure to observe this warning sign could result in light personal injuries. The sign is also used to indicate that the disregarding of these instructions may cause damage to the implement.

Dear Customer,

You have made a good choice. We congratulate you to your selection of OPTIMAL-product that offers quality and performance with reliable service.

By reading the manual and following its recommendations you will ensure the long and effective use of the equipment.

We have produced this manual for you to get a good understanding of the functioning of the equipment and what safety and maintenance instructions to follow when working with it. If any question should arise when using the equipment or when reading this manual, you are welcome to contact us for further information.

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Honoured retailer,

In order for the guarantee to be valid and to fulfil all legal requirements, we ask you to fill out the guarantee form together with the customer and register at trejon.se

The guarantee is valid from the day the equipment is handed over to the customer.

Delivery checklist:

Check for damages caused in transporting. Inform the transporting company.	
Check that all packing material has been taken away. Dispose packing material in an environmentally friendly way	
Check if delivery is complete with help from machine order/packing list.	
Make a function test	
Having gone through and explained to the customer, with the help of the manual, the startup, use and maintenance of the equipment and it's accessories.	
Instruction manual given to the customer.	

Enter the serialnumber of the equipment to the right.	S/N:

1 General Information

This User manual contains information on how to use and set up the Optimal Control Plus controller.

The User Manual is made for the use of OPTIMAL customers.

The manual is made to give the manufacturer or dealer an overview on how to use and setup the controller.

Specification changes
The manufacturer operates a policy of continuous product development and reserve the right to vary the specification with or without notice.

Whilst every effort is made to ensure the accuracy of the particulars contained within this manual the manufacturer shall not be held liable for any inaccuracy or the consequences thereof.

2 Safety instructions

2.1 Disclaimer

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

Relevant accident prevention regulations as well as other generally recognized safety, industrial, health and read traffic rules are to be adhered to. Unauthorized alterations or modifications to the controller, deviations from intended use will relieve the manufacturer of all liabilities for any subsequent injury or damage.

2.2 Safety precautions

Read the user manual and technical manual before using the controller for the first time and always pay attention to the important safety precautions outlined.

Among other things please observe the following recommended precautions and safety measures:

- Before using this controller, read and understand this user manual. It is of equal importance that other operators also read and understand this manual. Do not allow anyone to operate the machine without exact instructions
- Keep the machine and controller in good condition. Unintended use can impair the function and/or safety and affect the life-span of the controller and machine
- Do not remove any safety mechanisms or labels
- Never service or repair the controller when it is switched on
- When using a battery charger the power supply must be disconnected

- When welding on the tractor or implement, the power supply must be disconnected
- Only use clean water (or a little cleaning agent) to clean the monitor

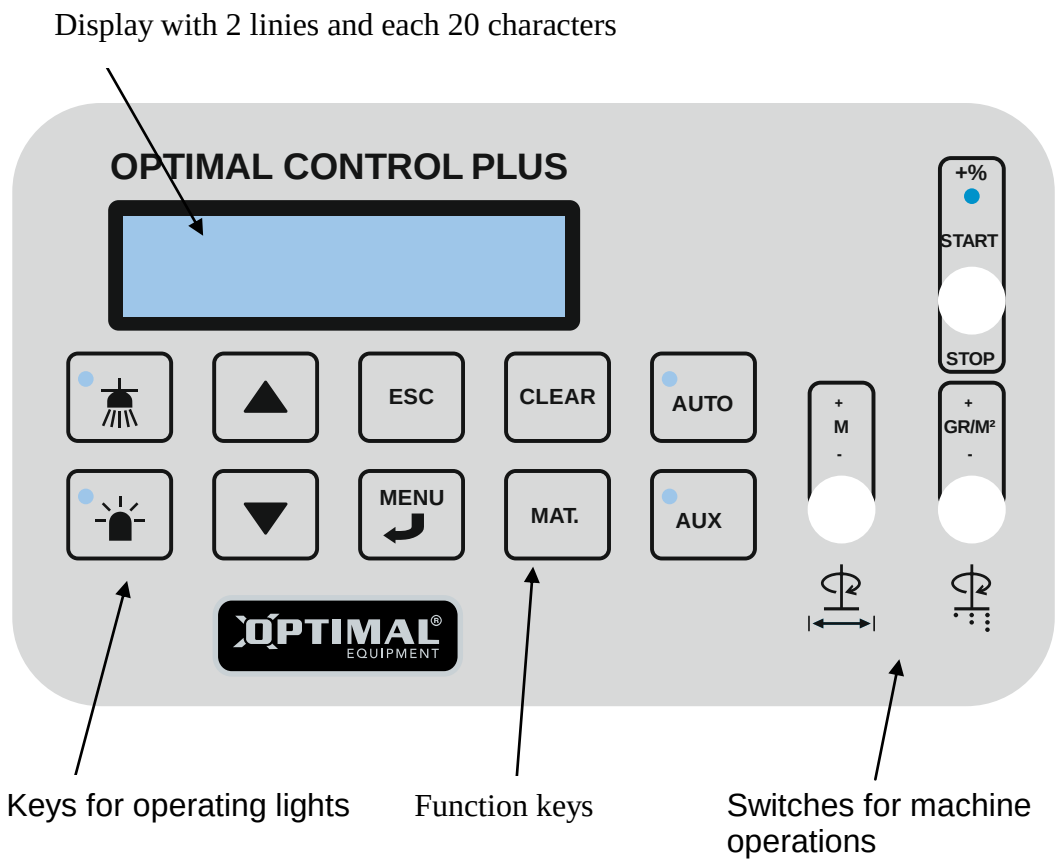
3 Brief description of controller

User sets the wanted dose rate (gr. /m2), spreading material and spreading width. Spreading disc speed (disc rpm) is found from lookup table value when spreading width is set.

1. Auto-mode
   The controller corrects the auger speed so the right amount of material (gr. /m2) is given to the spreading disc independent of the forward speed of the vehicle. Forward speed is based on a sensor input.
2. Manual-mode
   The controller corrects the auger speed so the right amount of material (gr. /m2) is given to the spreading disc. Forward speed is based on a set value changeable for the user. The user must drive the vehicle with the speed put into the set-menu in order for the spread amount to be accurate.

Both auger and spreading disc regulators use feedback sensors.

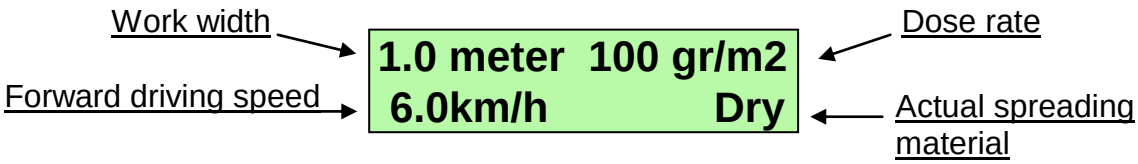
4 Description of controller user interface.



Display

Overview of displays and description of each display can be found in appendix.

4.1 Main display



When pressing key  or  new information will appear in the button line. See appendix for details about type of information.

4.2 Setting of display contrast.

Press  key combined with  key or  key to adjust contrast to the wanted level.

4.3 Keys for operating lights

Working lights.
When working lights is active the LED in the key will be on.

Beacon.
When beacon is active the LED in the key will be on.

4.4 Function keys

Change of information in standard-display, changing between displays and changing values for parameters.

MENU / ”ENTER”
Change to sub menus and approval of new set values.

ESC Used to undo new set values or to leave a display and return to the previous display.

CLEAR Used to reset trip counters to zero.
Press for 2 seconds to reset.(Total counters will not be reset)

MAT. Press for 2 seconds and use arrow keys to change between different spreading materials.

AUTO. Used to change between forward speed based on sensor (Auto) or based on entered value. (Simulated speed). Led is on in Auto mode.

AUX. Key used to pause or reverse auger. One press on key will pause the auger (Led is on), Continuously pressing the key will reverse the auger as long as the key is depressed (Led will flash).

4.5 Switches for machine operations

Start / stop of spreader.
Switch in stop position. No dosing
Switch in the start position. Dosing
NOTE! The hydraulics must be turned on before the toggle switch is folded over to the starting position, (if not followed, an error message appears, cleared by folding switch against the stop).

Boost/blast
Pressing the switch up from the start position will increase dose rate by the boost factor. (fx 50%)
To return to normal dose rate press the switch up again
Led is flashing as long as boost is active.
Boost factor can be set in user menu.

Setting spreading width
Pressing the switch up or down will increase or decrease spreading width in steps of 1 meter.
Actual spreading width is shown in display upper line.

Setting dose rate
Pressing the switch up or down will increase or decrease dose rate set point.
Holding the switch will start the auto roll function for increase/decrease of the value.
Set point value is shown in display upper line for 2 seconds after it has been changed, before it returns to showing the actual dose rate.

4.6 Setup

Overview of the controllers displays are found in Appendix 1 – Display .
Description of the displays is found in Appendix 2 - .Display description.

For access to the machines functions; navigate to this display with arrow keys and press MENU:

1.0 meter 100 gr/m2
Menu Enter?

Machine setup

Navigate to this display with arrow keys and press MENU:

Calibrate
Enter?

4.7 Calibration of wheel sensor

Description
Setting number of wheel pulses per 100 meter:

With arrow keys browse through the calibrations functions
To the following display:

Cal – Wheel sensor
Enter?

Press MENU key.

A) Manual (calibration value is known)

With arrow keys browse to the following display:

Wheel sensor
Pulses/100m 440

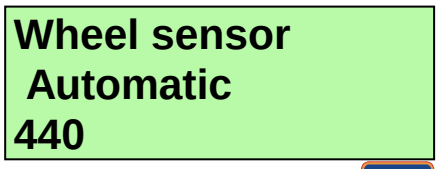
Press MENU until value starts to flash.

Enter the value with arrow keys. Press MENU key to store value.

Alternative press key ESC to leave the setup with the old value.

B) Automatic (calibration value not known)

With arrow keys browse to the following display:



To start the calibration press MENU key for 2 seconds.

Drive exactly 100 meter (display will show impulserne runtime). At the finish line for the 100meters press MENU key to store value.

Alternative press key ESC to leave the setup with the old value.

Menu for calibration of wheel sensor can now exit by pressing the ESC key.

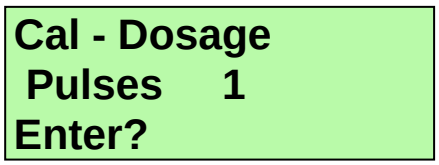
Conditions:

- Switch for dosing must be in ”Stop” position
- Minimum 200 pulser per 100 meter.

4.8 Calibration of dosage system

Description
Setting the parameters of the PWM output relative to the spread rate at a given constant auger speed. This could / should be done per material (by model)

With arrow keys browse to the following display:

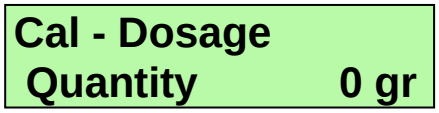


To start the calibration press MENU key for 2 seconds.

1. Upon activation of the calibration the auger is initiated with a predetermined defined speed and material sets into the outlet. Number of pulses are counted in the display

2. When enough material has run out the key is pressed and the auger stops.

Note: The calibration must run for at least 10 seconds and at least 10 pulses must be counted. If not complied with, it is not possible to enter the new amount in the next display, and the old settings are retained.



3. The spread amount collected is weighed.

   Enter spread amount in ”gram” with ▲ and ▼ keys.

   Press MENU key to store the new value.

   Alternative press key ESC to leave the setup with the old value.

4. Display for calibration of spreading system can now exit by pressing the ESC key.

Conditions:

- Switch for dosing must be in ”Stop” position

4.9 Display backlight

Description
Turns display backlight on or off.

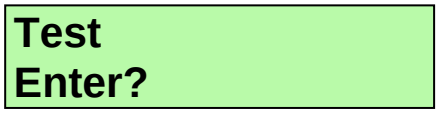
With arrow keys browse to the following display:

To activate the display backlight feature press the key 

for 2 sec until display writing changes from Off to On.

4.10 Hardware test

Description
Hardware test displays for the controllers input, output, LEDs, keys and switches. Used for troubleshooting faults on the machine.
See Appendix 1 – Display and for details.

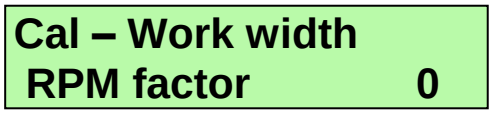


4.11 Fine calibrating spreading width

Description
Fine tuning of RPM for the spreading disc. Gives the user the possibility for adjusting the spreading width.
The adjustment affects all working widths.

The value is entered in RPM (Rounds per minute), which is then added to the standard table for spreading width.

With arrow keys browse to the following display:



To change the value press the key 

for 2 seconds until value flashes.

Enter new value with  and  keys.

Press 

key to store the new value.

Alternative press key 

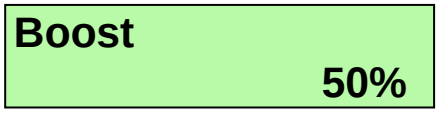
to leave the setup with the old value.

4.12 Boost/blast setup

Description
When pressing the boost switch, spread rate will automatically (i.e. without further operation of the switch) be upgraded by xx%. This function is for use in temporary services in terrain where a stronger dosage is desired, such as at intersections

The value entered indicates the amount the dose rate will be increased in percent [%]

With arrow keys browse to the following display:



To change the value press the key 

for 2 seconds until value flashes.

Enter new value with  and  keys.

Press 

key to store the new value.

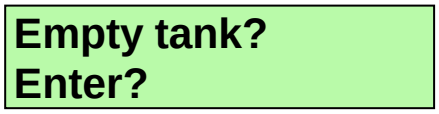
Alternative press key 

to leave the setup with the old value.

4.13 Empty tank function

Description
The function initiates the emptying of the remaining content of the tank.

With arrow keys browse to the following display:



To start the emptying press 

key for 2 seconds.
RPM for spreading disc and dosing auger is adjusted with the 2 switches below

Adjustment of speed at spreading disc

Adjustment of speed at feeding auger

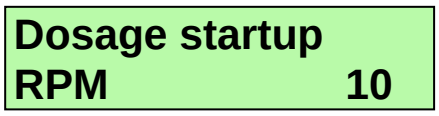
To stop the emptying process press 

or 

.

4.14 Dosage startup values

Description
When starting after the tool carrier has been stopped, for example after having stopped at a red light (but without the spread switch has been put into stop position), the dose rate should be quickly adjusted up to ensure spreading the first few seconds until the dosage will be speed dependent.
Two parameters allow you to specify the RPM for the auger at start up and the number of seconds the auger must run at this speed.
Enter the speed in RPM



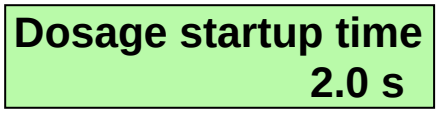
To change the value press the key MENU for 2 seconds until value flashes.

Enter new value with ▲ and ▼ keys.

Press MENU key to store the new value.

Alternative press key ESC to leave the setup with the old value.

Enter the time dose rate must run with fixed RPM before speed dependent regulation takes over.



To change the value press the key MENU for 2 seconds until value flashes.

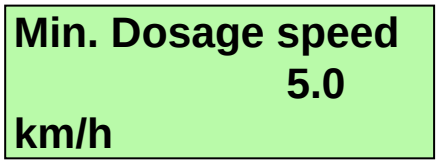
Enter new value with ▲ and ▼ keys.

Press MENU key to store the new value.

Alternative press key ESC to leave the setup with the old value.

4.15 Minimum dosage speed

Description
The controller adjusts the speed of the auger corresponding forward speed. When driving at slow speed, it may result in some materials coming out in "clumps" due to the low RPM of the auger.
This feature ensures that the dosage is not less than a dosage corresponding to a driving speed at this value, whether they run slower.



To change the value press the key MENU for 2 seconds until value flashes.

Enter new value with ▲ and ▼ keys.

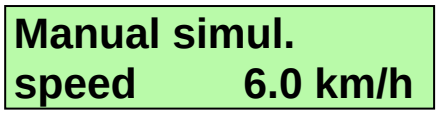
Press MENU key to store the new value.

Alternative press key ESC to leave the setup with the old value.

4.16 Manual simulated speed

Description

Sets the speed the controller must regulate after in manual mode. Used when no speed sensor signal is present. Driver must follow this encode speed in order for the spread amount to be correct.



To change the value press the key MENU for 2 seconds until value flashes.

Enter new value with ▲ and ▼ keys.

Press MENU key to store the new value.

Alternative press key ESC to leave the setup with the old value.

4.17 Alarms

When the controller detects an alarm an acoustic sound will appear and the bottom line of the display shows the type of alarm.
The text ALARM flashes.
The acoustic sound is repeated 3 times

Alarm	Description	Cause
1.0 meter 100 gr/m2 Alarm Speed too high	Driving speed too high.	Speed too high in condition to the hydraulic oil flow available. Drive slower or decrease the dose rate.

1.0 meter 100 gr/m2 Alarm Speed too low	Driving speed to low.	Hydraulic motors cannot be regulated to lower rpm. Drive faster or increase the dose rate.
1.0 meter 100 gr/m2 Alarm - Low tank	Tank alarm	Content in tank has reached its minimum.
1.0 meter 100 gr/m2 Alarm - No disc RPM	No pulses are registered from sensor to the spreading disc.	Spreading disc not turning (blocked, no hydraulic oil) or faulty sensor.
1.0 meter 100 gr/m2 Alarm - No dos RPM	No pulses are registered from sensor to the dosing auger.	Dosing Auger not turning (blocked, no hydraulic oil) or faulty sensor.
1.0 meter 100 gr/m2 Alarm - disc RPM lim	The wanted spreading disc RPM cannot be reached.	The hydraulic oil flow available is not sufficient.

4.18 Notice

Please take notice of the following, ***do not weld on the machine***, on which the controller is mounted, do check if all cables, power supply, sensors, communication etc. are disconnected from the controller, as well as to make GND connection of the welding machine in the vicinity of the welding place. Welding could damage the controller irreparable.

If magnets are used for speed sensor:
The magnets of the Hall sensor should all be mounted with the – pole towards the magnets, check if this is mounted correct – use if necessary color indication to prevent incorrect mounting.
The distance from the sensor to the magnet should lie between 2-8 mm. When the distance is more than 8 mm. the risk for incorrect values increases.
The magnet could be damaged and could give double counting.

The information in the table at the front of this manual is available from the back of the controller and used by any application to Trejon Center, together with a detailed description of the problem, in this way Trejon Center will have the best opportunities to provide quality service in connection with any troubleshooting.

5 Technical data

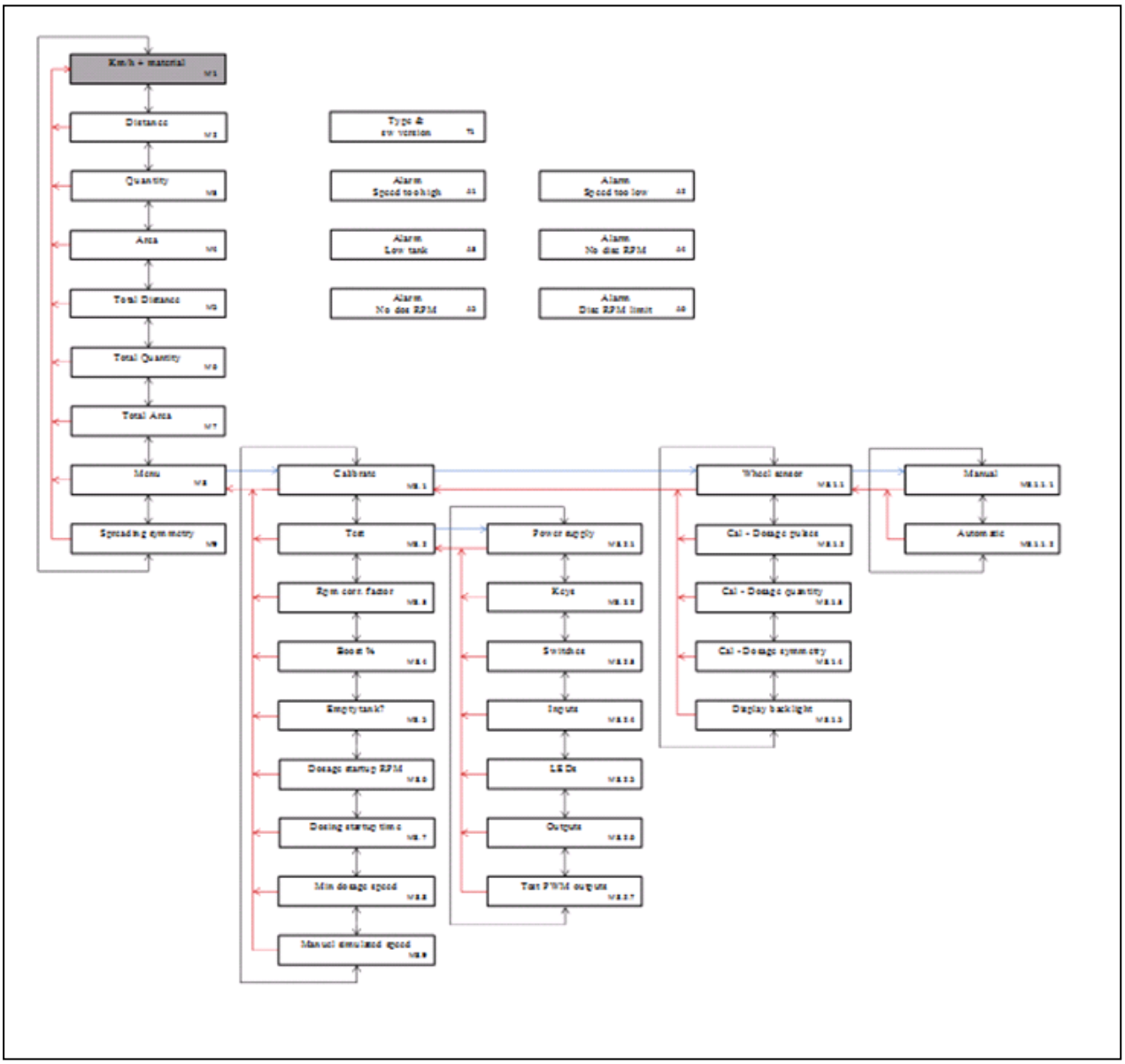
Power supply	+12V dc
Fuse	T16A/250V

5.1 Software versions

Version and date		SW version and date		Significant changes made since last version
0.05	3.Sep 2014	0.05	3.Sep 2014	First version of this manual.

6 Appendix 1 – Display overview

Figure 1 User display overview.



7 Appendix 2 - Display description

7.1 Startup display

ID	Display	Content
T1	Manufactory name sw00.5 Machine type	Information: Shows software version and active machine type

7.2 Main displays

ID	Display	Content
M1	x.x meter xx gr/m2 x.x km/h Salt	Information: Main display Actual work width in meters, actual dose rate in gr/m^2, Speed in km/t, active spreading material.
M2*	x.x meter xx gr/m2 Distance xx km	Information: Actual work width in meters, actual dose rate in gr/m^2, Distance driven i km (trip-counter) * Display only shown if ”Show distance count.” menu (C1.8) is set to “On”.
M3*	x.x meter xx gr/m2 Quantity xx kg	Information: Actual work width in meters, actual dose rate in gr/m^2, Actual spread amount in kg (trip-counter) * Display only shown if ”Show quantity count.” menu (C1.10) is set to “On”.
M4*	x.x meter xx gr/m2 Area xx ha	Information: Actual work width in meters, actual dose rate in gr/m^2, Actual covered area in ha (trip-counter) * Display only shown if ”Show area counters” menu (C1.9) is set to “On”.
M5*	x.x meter xx gr/m2 Σ Distance xx km	Information: Actual work width in meters, actual dose rate in gr/m^2, Accumulated distance driven in km (total-counter) * Display only shown if ”Show distance count.” menu (C1.8) is set to “On”.
M6*	x.x meter xx gr/m2 Σ Quantity xx kg	Information: Aktuel arbejdsbredde i meter, aktuel dose rate i gr/m^2, Accumulated spread amount in kg (total-count) * Display only shown if ”Show quantity count.” menu (C1.10) is set to “On”.

ID	Display	Content
M7*	x.x meter xx gr/m2 Area xxxxxx km	Information: Actual work width in meters, actual dose rate in gr/m^2, Accumulated covers area (total-counter) * Display only shown if ”Show area counters” menu (C1.9) is set to “On”.
M8	x.x meter xx gr/m2 Menu Enter?	Actual work width in meters, actual dose rate in gr/m^2, Access to user setup (Press ’Enter’).
M9*	x.x meter xx gr/m2 <<<<<<<<< >>>	Actual work width in meters, actual dose rate in gr/m^2, Viewing of actual spreading pattern. * Display only shown if ”Spreading symmetry” is set to “On”.

7.3 User setup displays

ID	Display	Content
M8.1	Calibrate Enter?	Access to calibrations menus (press ’Enter’)
M8.2	Test Enter?	Access to hardware test (press ’Enter’)
M8.3	Cal - Work width RPM factor - xx	Enter calibration factor for work width. This factor indicates the number of RPM the dose rate unit must be corrected. The value is of type signed.
M8.4	Boost xx %	Fill in the percentage value [%] the dose rate must be boosted when the start/stop switch is pressed into boost position.
M8.5	Empty tank? Enter?	Emptying the tank. Press ’Enter’ for 2 seconds to start the emptying process.
M8.6	Dosage startup RPM x	Sets the startup RPM for the dose rate system. Used by startup after the controller has been stopped
M8.7	Dosage startup time x.x s	Sets the time the controller must run Dosage startup RPM by startup before regulation starts. Used by startup after the controller has been stopped.
M8.8	Min Dosage speed xx.x km/h	Sets the minimum forward speed for the dosage regulations. If actual speed is below Min Dosage speed the value encode in this menu will be used for the dosage regulator.
M8.9	Man. simul speed	Sets the speed the controller must regulate after in manual mode. Used when no speed sensor signal is present. Driver must follow this encode speed in order for the spread amount to be correct.

ID	Display	Content
M8.1.1	Cal - Wheel Sensor Enter?	Access to calibration of wheel sensor (Press 'Enter')
M8.1.1.1	Wheel sensor Pulses/100m xxx	Manual encode of the wheel calibration factor. If the calibration factor is known, it can be directly encoded here instead of using the automatic calibration.
M8.1.1.2	Wheel sensor Automatic xxx	Auto wheel calibration: Press 'Enter' for 2 seconds to start the count of pulses. Drive exactly 100meter and Press 'Enter' to store the new calibration factor or 'Esc' to undo and continue with the old calibration factor.
M8.1.2	Cal - Dosage Pulses xxxx Enter?	Calibrations of dose rate system. Press 'Enter' for 2 seconds to start spreading. Press 'Enter' to stop spreading and save the amount of pulses counted, or press'Esc' to undo and continue with the old calibration factor.
M8.1.3	Cal - Dosage Quantity xxxx gr	Enter the spread amount in [g] during dosage calibration.
M8.1.4*	Cal - Dos symm xxx L:xxx C:xxx R:xxx	Calibration of Left max position, center position and Right max position for sensor in spread pattern actuator/cylinder. * Display only shown if "Spreading symmetry" is set to "On".
M8.1.5	Cal - Display Backlight On	Display backlight on/off. Press 'Enter' for 2 seconds to change from "Off" to "On" or from "On" to "Off".
M8.2.1	Test Power supply xx.x V	Information: Actual Power supply voltage in [Volt]
M8.2.2	Test keys ----------	Hardware test for keys
M8.2.3	Test switch ---------	Hardware test for switches
M8.2.4	Test inputs ----------	Hardware test for inputs
M8.2.5	Test LEDs 0 Enter	Hardware test for LED's
M8.2.6	Test outputs 0 Off	Hardware test for outputs
M8.2.7	1: 0p 0r 0c 2: 0p 0.0r 0c	Hardware test for PWM outputs. Shows actual pwm, RPM and number of counted pulser for the 2 related inputs.

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