field-operator 300

AEROMAT e-motion

Single-grain drill unit

Betriebsanleitung
Betjeningsvejledning
Service manual
Instructions de service
Manuanl de usuario

BECKER

Revisions

Rev.	Date	Changes	Name
A	21/11/2011	First edition - precision seed drill controller Version:.3.50	H. Blume F. Puder A. Rücker

Contents

List of diagrams

Safety instructions

People who do not understand this manual but are users of the controller are recommended to take an appropriate training course offered by the supplier. If this training is not included in the supplier's services, please contact the manufacturer of the controller. You will find the necessary contact details at the end of this manual.

1.1. Symbols used in the operating manual

bodily injuries or

the software.

nputer.

1.2. General safety instructions

manual and safety
them when handling

n to subsequent users

2. Instructions for use

2.1. Applications

- The controller is used to control the motors of the precision seed drill units for variably adjustable grain spacings with a flexible number of rows (from four to twenty-four).
- The controller is suitable for sowing units of different designs:
  - pneumatic sowing units (overpressure, negative pressure)
  - sowing units with mechanical separation
  - tandem units (pneumatic and mechanical)
- The controller can also operate the following additional equipment:
  - Row marker (hydraulic)
  - Tramline mechanism
  - Pre-emergence markers (hydraulic, electric)
  - Fertiliser spreaders with and without fertilizer flow control
  - Insecticide spreading device
  - Negative pressure control

2.2. Disclaimer

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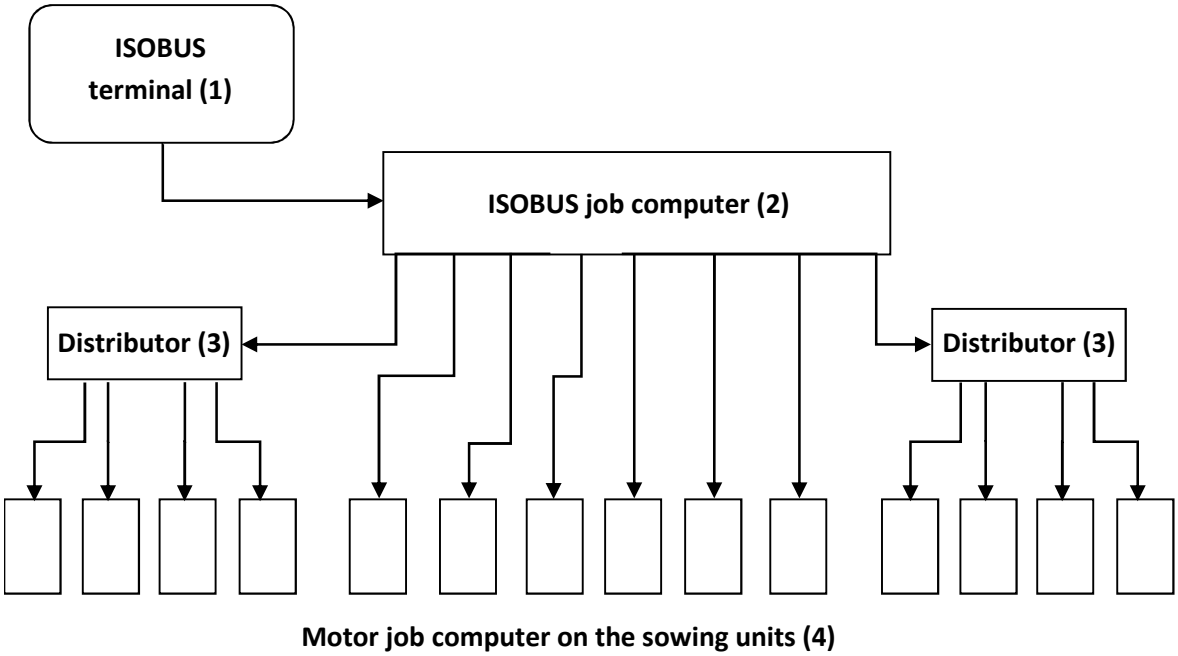
ch cases.

ller components
anufacturer.

3. General description

3.1. Controller configuration



3.2. Overview

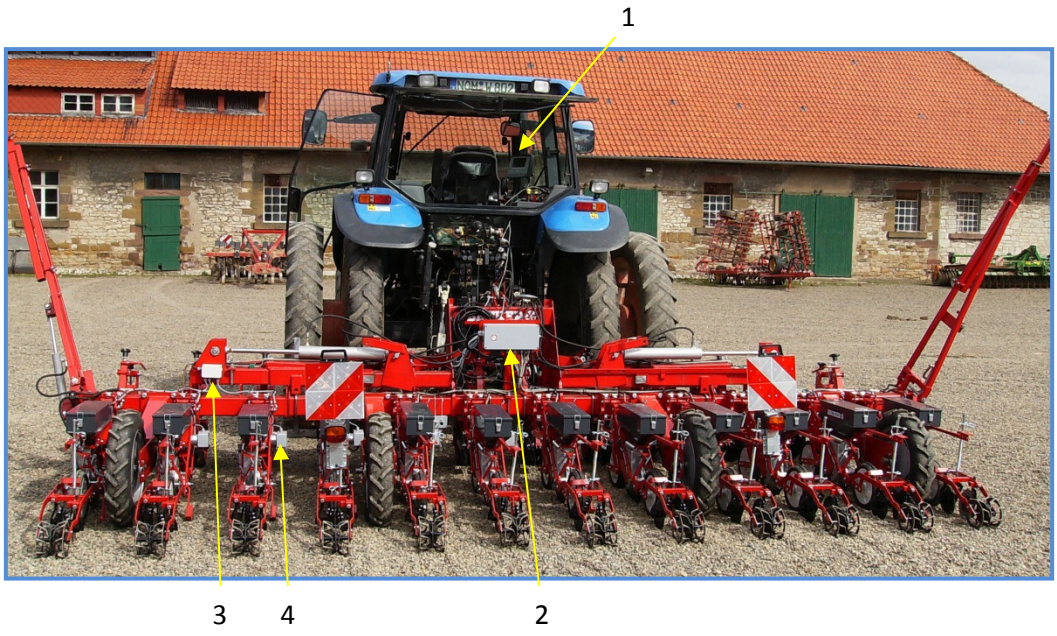


Figure 1 Precision seed drill with electrically driven seeder sowing units

1 ISOBUS terminal
2 ISOBUS job computer
3 Distributor
4 Motor job computer on the sowing units

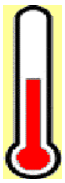
3.3. Controller technical data

- Power supply: 10.5 V to 16 V, typically 13.7 V
- Operating temperature: - 20 °C to 70 °C
- Protection class: IP 65
- Power consumption:
  - ISOBUS job computer: approximately 200 mA (complete unit without loads)
  - Motor job computer: approximately 70 mA (without motor)
- ISOBUS job computer inputs/outputs/interfaces:
  - Plug-in socket machine wiring harness
  - 24 motor job computer connections
  - Sensor working position
  - Radar sensor
  - ISOBUS
- Motor job computer inputs/outputs/interfaces:
  - Coupling computer connection
  - Motor output
  - Motor encoder input
  - Tramline marking output
  - Grain sensor input
- ISOBUS terminal hardware requirements:
  - 10 soft keys (minimum requirement)
  - Data mask size 240 x 240 pixels (minimum requirement)
- Emission of airborne noise details: The controller has no influence on Emission noise levels and emission sound pressure levels, since the precision seed drill manufacturer is responsible for the driven noise sources.

4. Instructions to follow before start-up

4.1. Requirements for the ISOBUS job computer assembly location

You should protect the components of the precision seed drill from the jets of high-pressure cleaners.



Maintain an ambient temperature of – 20°C to 70°C!

4.2. Information about training and induction for operating personnel

Operators must be trained and induced in the handling of agro-economic control technology. They should be able to master common terminology. The software manufacturer can offer appropriate training upon request.

5. Operation

5.1. Controller start-up instructions

The ISOBUS cable and, where required, the duo power cable must be installed in the tractor. The performance of the alternator in the tractor must be capable of meeting the needs of the seed drill.
To protect the controller from damage, the ISOBUS job computer must be cleaned regularly to remove coarse contaminants.
You will find the cleaning Instructions for the ISOBUS job computer in Section 6.

5.2. Workflow

1. Start control
2. Main menu
3. GRAIN SPACING menu
4. WORK menu
5. TEST menu
6. DATA menu
7. SET menu

5.2.1. Starting the job computer

The ISOBUS job computer is operated either via the terminal of the WTK-Elektronik GmbH company, the field operator 300,

Figure 2: Field operator 300

... or via a terminal that meets the minimum requirements mentioned in Section 3.3.

The **controller power** is switched on either separately or via the ignition voltage, depending on the specific tractor equipment.
Operation with the "field operator 300" ISOBUS terminal is described below.

Switching on at the terminal

Press the **START/ON key** to start the controller

Switching on the ignition

Starting the engine of the vehicle starts the controller automatically.
The start screen will appear on the terminal display.

Figure 3: Field operator 300 start menu

The symbols that are visible on the left are used to set the tractor and terminal parameters.
These symbols are explained in the terminal operating manual.

To start the program, please press the symbol:

next to the symbol.

The main menu opens.

5.2.2. Main menu

The main menu displays the home page of the precision seed drill controller. From here you can, for example, use the WORK menu to monitor the seed drill and set the tramlines.

Figure 4: Main menu

The following menus are available to you to continue:

GRAIN SPACING menu - for setting the grain spacing

WORK menu - for monitoring the seed and activating the tramlines and row marker

TEST menu - for testing the motors and sensors

DATA menu - for managing the operating values

SET menu - for setting the seed drill parameters

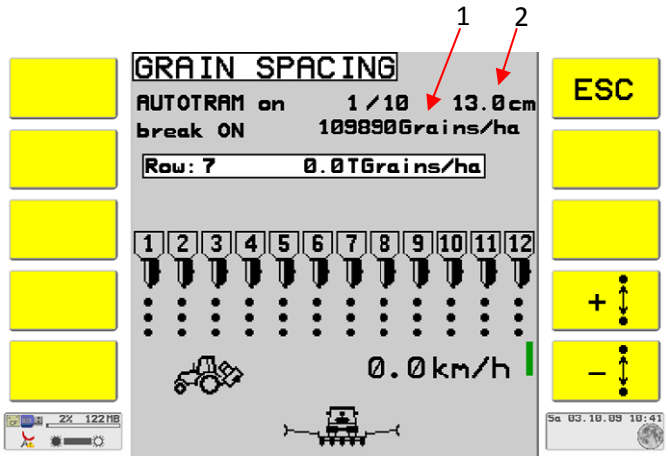
er in the symbol field.


"**Folding frame preselection – right and left**"
Assignment of this key is dependent on the machine.
Pressing this button activates the hydraulic valves for moving the folding frame


When the folding frame is activated, the key lights up in green. Activation of the folding frame switches off again automatically after 2 minutes. You can also end the active status of the folding frame by pressing the green **folding frame key** or by activating the row marker. It is not possible to activate the folding frame and the row marker simultaneously

5.2.3. Grain spacing menu

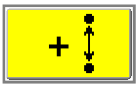
In the GRAIN SPACING menu you can, for example, change the grain spacing quickly for all units.



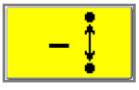
1 calculated spread rate, in grains per hectare

2 adjustable grain spacing, in cm

Figure 5: GRAIN SPACING menu



Use the **+/- keys** to change the **grain spacing.**



Press the +/- key briefly to change the spacing in steps of 0.2 cm.
Hold the +/- key down to change the spacing in steps of 1 cm.

Press the **ESC** key to exit the menu

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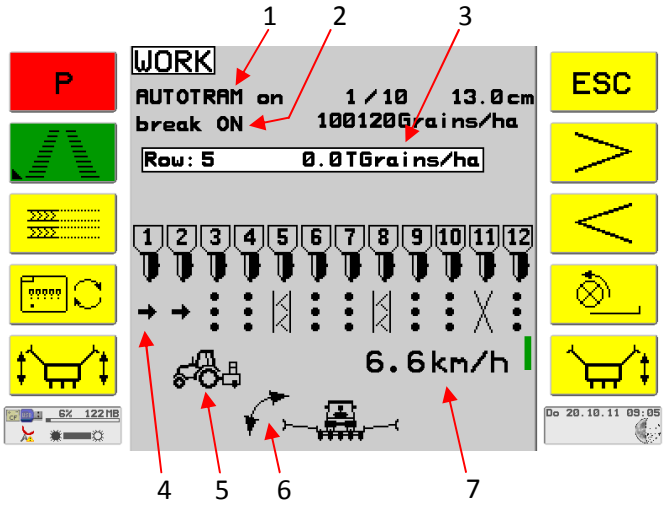
5.2.4. WORK menu



1 tramline automatic display [here: on]
2 tramline in the pause position
3 spread rate (in thousands of grains per ha, a change of one row is made every 5 seconds)
4 unit status indicator
5 machine setting: [Working position in this case]
6 row marker selection [here: left-hand side]
7 the speed at which the electric motors are set is displayed. (Source: Seed drill) radar sensor

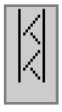
Figure 6: WORK menu

The available units are shown as symbols and are numbered. Unit 1 is in the left-hand direction of travel.

The status display is only relevant in the working position and shows the work phase for each row of the unit in question.
The status display is shown for the following cycle in working position at the transport position start.

Unit sowing.
In this row, grains are sown in the preset grain spacing.

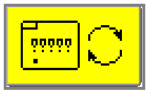
This row has been switched off by the operator (part width control).
The row will be switched on automatically the next time the operator switches from the working position to the transport position.



This row has been switched off by the automatic tramline system

The tramline was marked out at the beginning of this row.
Grains are being sown

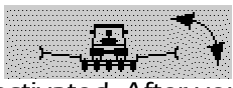
This row has been switched off manually by the operator and will remain off until the operator switches it on again. When the controller is switched off, these settings are lost.



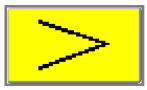
Use the **Unit group change** key to switch between sowing unit groups if the number of units is greater than twelve. If the aggregate number is less than twelve, this key is hidden.

Row marker key
Use this key to activate both **row markers**.

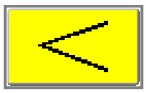
Use this key to activate the right-hand **row marker**
The following display then appears on the screen:



The arrow in the display indicates the row marker that is activated. After you press this button, the symbol switches to the key on the row marker at the other side.

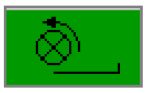


Part width control; please switch off rows starting from the left.
The rows that are switched off are switched back on again automatically after lifting.



Part width control; please switch off rows starting from the right.

Do not press the **Pre-metering key** until the seed drill is in the working position. A starting process is simulated if this function is active. The key lights up green during this process. Pressing the green key stops the starting process.



Press the **Pause key** to stop tramline cycle counting.
The key will then light up red and the following message will appear in the display: break ON

The cycle was saved during the pause and will be available again after the system is restarted. If the pause is switched off, the tramlines will be at cycle 1 after the system has been restarted.

The **TRAMLINE menu** opens

Press the **ESC** key to exit the menu.

WORK TL menu (TRAMLINES)

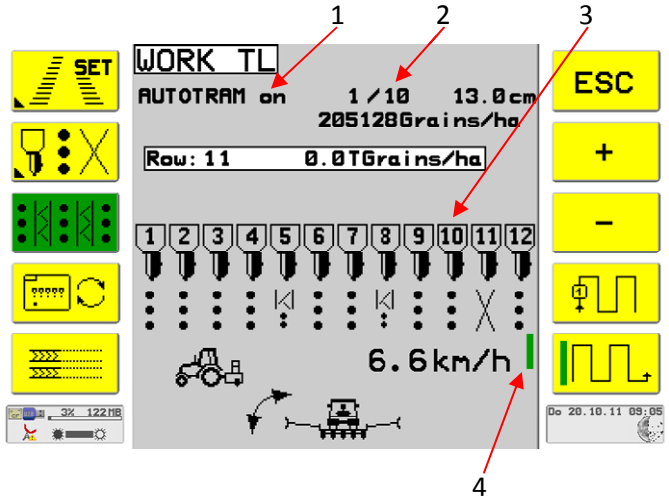
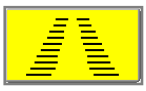


Figure 7: WORK TL submenu

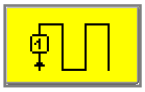
1 status of the automatic tramline system: [here: on]
2 Tramline cycle [here: 1 of 10] The tramline rhythm is repeated here after every 10 cycles.
3 Seed drill units [Number 1 to 24, from 13 units group must be switched between 2 groups; [Unit1 is in the left-hand direction of travel]
4 Field edge display [here: right]



Press the **automatic tramline system** key to switch on the automatic tramline system. The key will then light up green and "**AUTO-TL ON**" will appear on the display.

The automatic tramline system will start after the first cycle has been switched on.
The seed drill machine controller calculates the tramlines according to the parameters set in the SET-TL menu and controls the units accordingly.

Increasing/decreasing the tramline cycle
Press the **+/- keys** to increase [+] or decrease [-] the tramline cycle manually.
Preview: Press the keys several times consecutively to see a preview of the next row.



Press this key to reset the preview to **Tramline on the first cycle**.

Press the **Field edge key** to enter the side of the field on which the field edge is located. The controller will automatically continue counting in the subsequent rows. In the figure, the current field edge position is displayed as a green vertical bar.

› the transport
ycle counting
valid for the

The **SET TL menu** opens

SET TL menu

In the SET TL menu, you can set the parameters needed for automatic tramline calculation.

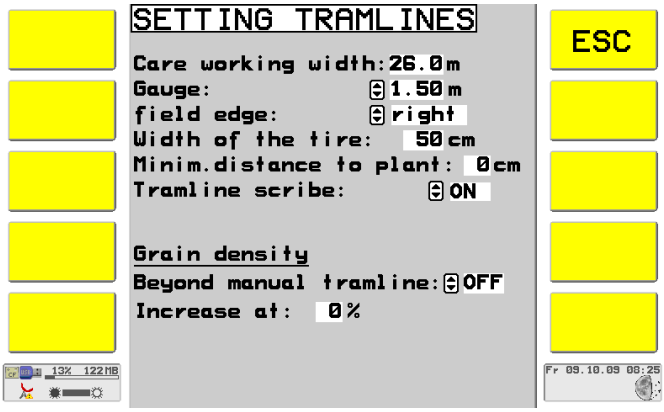


Figure 8: SET tramline parameters submenu

Numeric entry on fo300

You can use the up/down arrow keys to select entry fields, so that the frame (yellow dotted line) marks the entry field.

There are two options for making numeric entries:

a) Using the numeric keys to enter the digits directly. When you do so, the previous number will be overwritten. Alternatively, you can use the right/left arrow keys links to select a digit, with which you can then overwrite a numeric key individually. A red dotted line around the entry field indicates that entries are active.

b) Use the plus and minus keys to adjust the numerical value up or down in steps (the entry is only valid if there is no red dotted line round the entry field).

In entry fields marked with the input list character  , only the plus and minus keys can be used to make entries . A red dotted line around the entry field indicates that entries are active.

The input value (red dotted line around the entry field) must be confirmed by pressing ENTER or by using the up/down arrow keys.

The following parameters are adjustable:

Cultivation width: working width of the cultivation unit (e.g. sprays)
(adjustable from 10 to 99.9 m in steps of 0.1 m)

Track width: cultivation unit to track width
(adjustable from: 1.50 m to 2.50 m in steps of 0.05 m)

Field edge: Side on which the edge of the field is located at the start of sowing

Tyre width: Tyre width of the cultivation vehicle
(adjustable from 10 to 149 cm in steps of 1 cm)

Minimum distance to Plant: Safety distance between tyre edge and the plant
(adjustable from 00 to 18 cm in steps of 1 cm)

Mark out TL: Switches tramline marking out function on and off. When the tramline marking out function is switched on, the motors are stopped at the first 10 m after the seed drill has been lowered. At the end of the row, the driver must press the "Mark out tramline" key to stop the motors for the remaining distance.

es are calculated.
/ in the adjacent

Grain density The percentage entered in the "increase" field expresses the percentage by which the grain density in the adjacent rows of the automatically calculated or manually switched tramlines should the increased. If "Mark out TL" is in the "ON" position, the increase only applies to manually switched tramlines.

Auxiliary Manual TL For manually switched rows (WORK manual TL), the decision is made here as to whether or not the grain density in the adjacent ROWS should be increased. Use the +/- keys to switch between "ON" and "OFF".

Increase: Enter the percentage by which the grain density in the adjacent tramline rows (does not apply to marked out TL) should be increased (adjustable from 0 to 99 in steps of 1%).

is switched off
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rows. The
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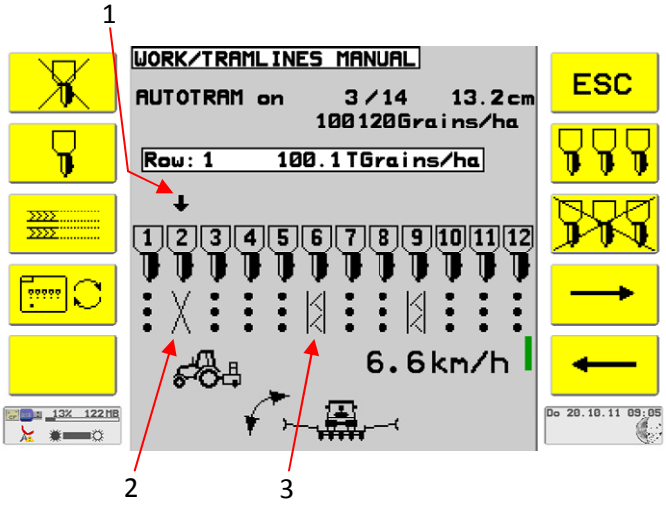
Press the **ESC** key to exit the menu. The WORK TL menu opens

The **WORK MANUAL TL** menu opens

WORK MANUAL TL menu

menu.



1 Cursor

2 switched off row,
unit has been switched off manually.

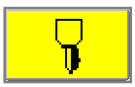
3 tramline display,
unit has been switched off by the automatic tramline system.

Figure 9: WORK MANUAL TL submenu

ndividual rows on
until they are
ncrease for the
ied off rows are

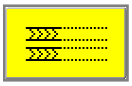
Press the **arrow keys** to flag individual units for switching on or off.

d by the



l by the

utomatically

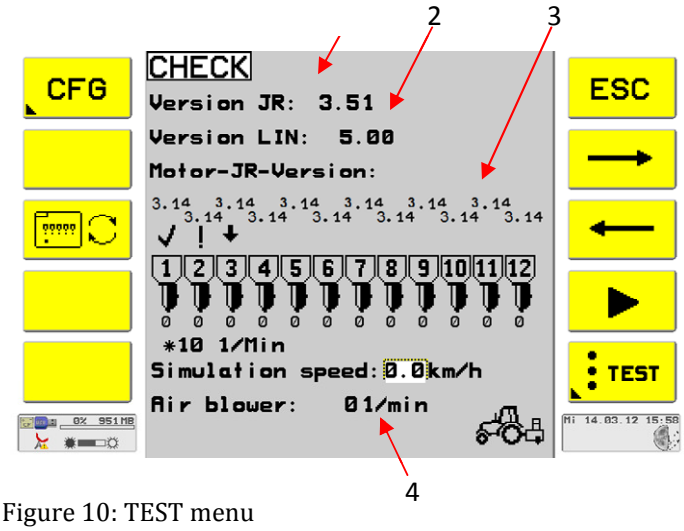


tramline
.].

units on or off

5.2.5. Test menu

In the TEST menu, you can use 2 options to test the motors and check the software version of the connected job computer. You can also test the grain sensors, blower sensor and fertilisation wave sensor.



1 ISOBUS job computer software version

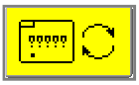
2 LIN job computer software version

3 Motor job computer software version

4 Blower speed in rpm (option)

Figure 10: TEST menu

manufacturer
lease the



units if there are

eed drill into
.
t it is running

Press the **Run key** to start automatic testing of all motors. The following menu appears:

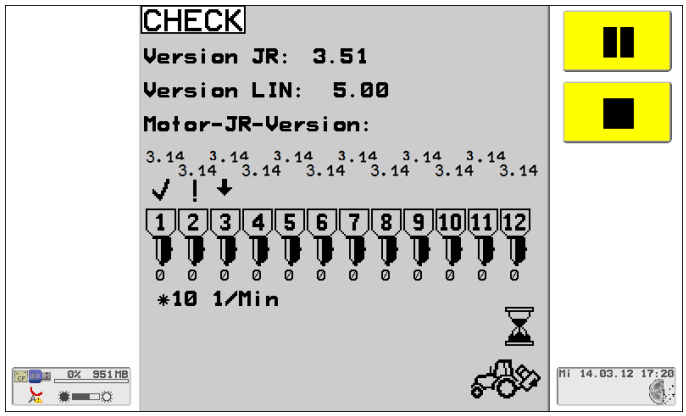
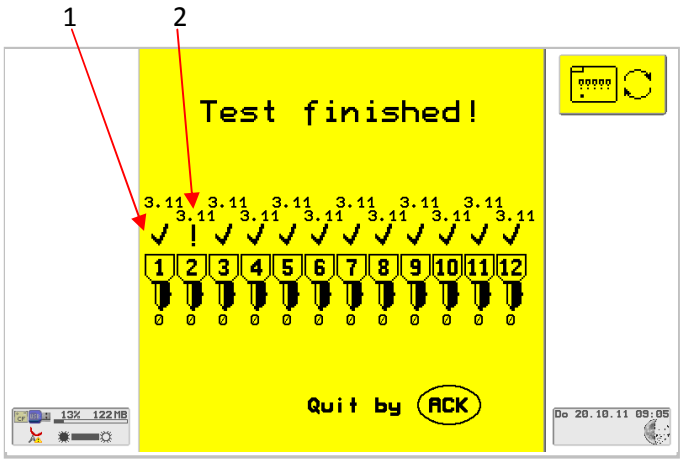


Figure 11: Display of current software versions and motor speeds

If necessary, use  to pause the sequence. Then use  to continue the sequence or  to end it early.

The following menu appears after the motor test run:



1 Motor running correctly

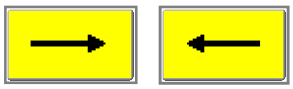
2 Error message on motor 2

Figure 12: Motor test run ends

Press the ACK key to acknowledge the results.

Both test motor variants allow you to specify the speed of each motor so that you can test its function. The information contained in the SET parameters, such as grain spacing and cell numbers, are taken into account with the motor speed. The motor speed is given under the unit as a number in 10 revolutions per minute.

The speed you at which you want to set the motor must be entered in the "Simulation speed." field (do not forget to press ENTER). The motors will then begin running as soon as the "Simulation speed." has been set using the cursor.



eed to units.

GRAIN SENSOR TEST menu

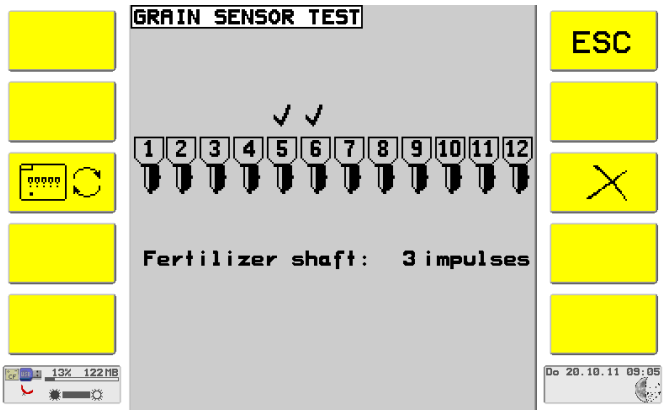


Figure 13: GRAIN SENSOR TEST submenu

eam on the grain

alling grain, a beep is
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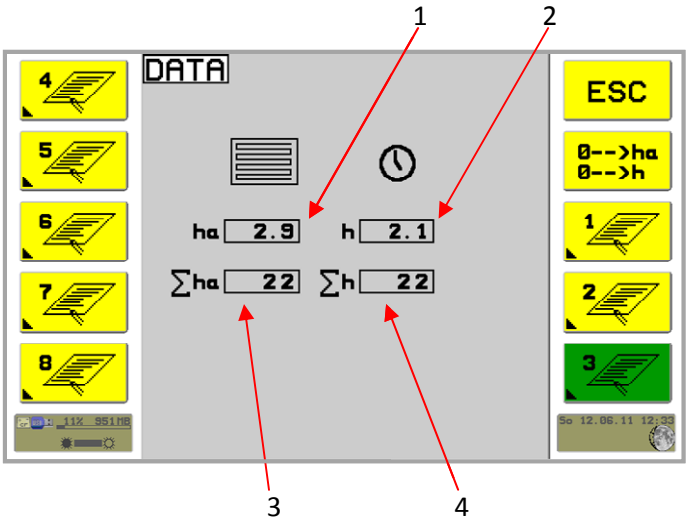
5.2.6. Data menu

In the DATA menu, you can view the operating parameters such as surface area and hours on the counter and measure them using a section counter. You can also manage the operating values in 8 accounts.



1 Surface area section counter

2 Time section counter

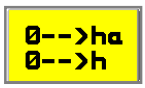
3 Surface area counter

4 Time counter

Figure 14: DATA menu

to calculate the surface

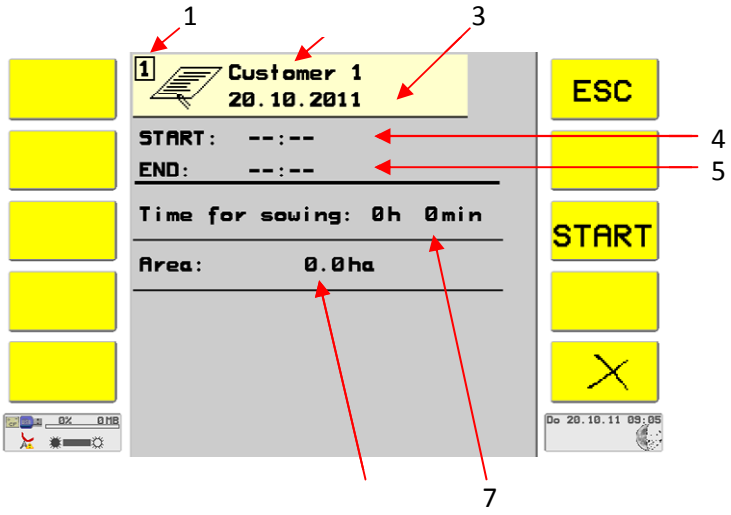
ation.
e has operated in the



e area covered

e one active account..

CONTRACT ACCOUNT menu



1 Account number [here 1 of 8]

2 - User's name

3 - Current date

4 - Start time

5 - End time

6 - Surface area worked

7 - Sowing time

Figure 15: CONTRACT ACCOUNT submenu

...ıser. Labelling is
...row keys to

...me is saved in

...e is saved in the
...and displayed.

...display will
...n.

5.2.7. SET menu

In the SET menu, you can set the machine-specific values. These values must be entered and will remain in memory until you overwrite them.

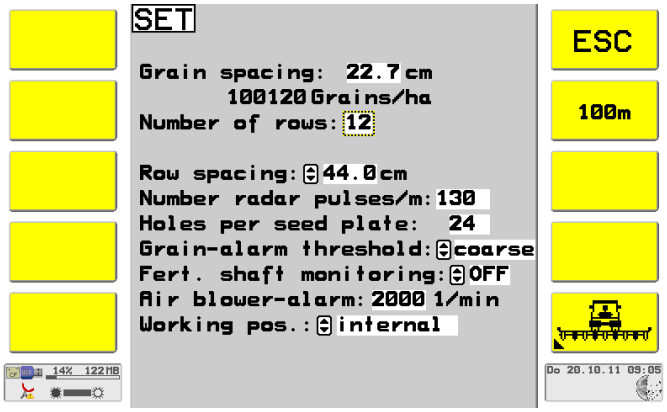


Figure 16: SET menu

The following parameters are adjustable:

Grain spacing:
Number of rows:
Number radar pulses/m:
Holes per seed plate:

se the +/- keys to adjust
until the next time
3.
terminal to move

out it can be

Row spacing:
Grain-alarm threshold:
Fert. shaft monitoring:

ues. The values will
he arrow keys on the

ne values.

els.
lease select "OFF".

Air blower-alarm:

ver monitoring on the +/-
terminal to confirm.
tivated on all models. If
it will not appear on your

Working pos.:

on about whether or
ious options are

nstalled on the seed

you can choose

TECU-digit.

delayed start: 0,1s

n be set (in steps of 0.1
emission on the
hine controller.

TECU-ana

angle representing the
nsport position of the
age).

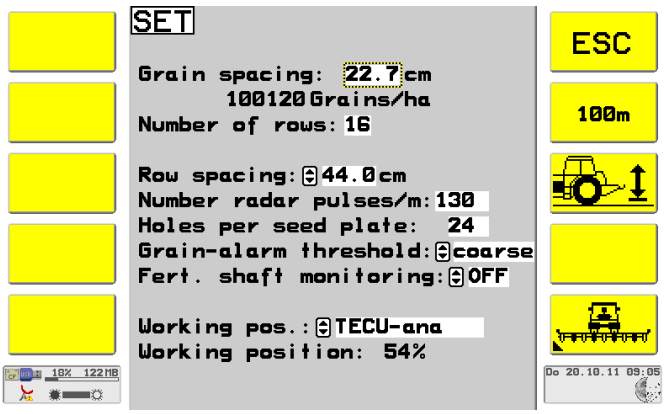
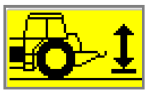
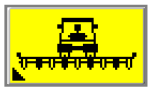


Figure 17: TECU analogue display



oint.

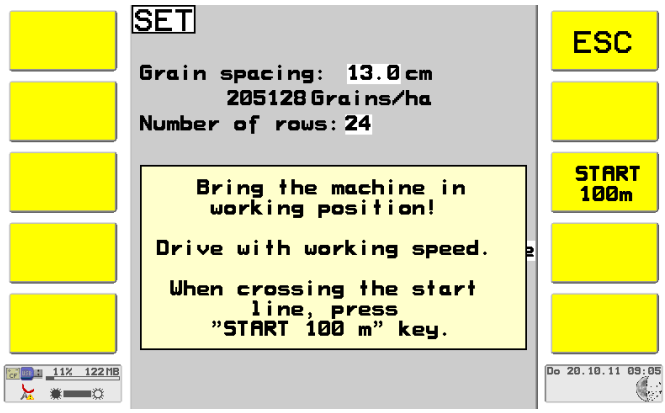


100m adjustment

d, surface area
it.

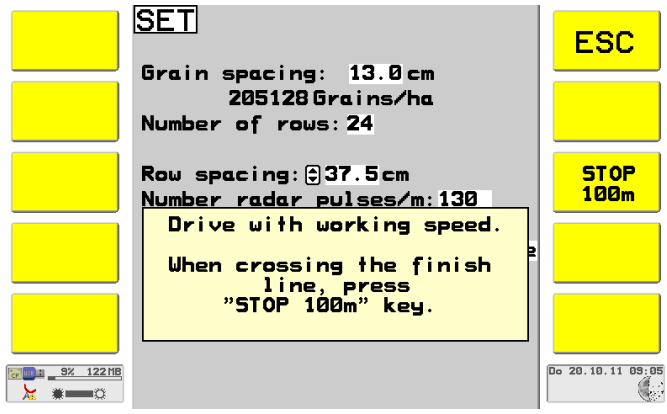
ayed speed

Procedure:



Measure a distance of 100 m in the field.
Mark the start and finish lines.
Move the seed drill into the operating position and travel in the start direction at working speed.
Press the key while you are crossing the start line.

Figure 18: 100m adjustment start screen



Press the key while you are crossing the finish line

If the test result is a meaningful value, it will appear automatically in the **radar pulse/m** field.
Manual corrections are possible (SET menu) and must be made carefully.

Figure 19: 100m adjustment trend

Permanent shutdown submenu

In the permanent shutdown submenu, you can switch off individual units or all units manually at the same time.

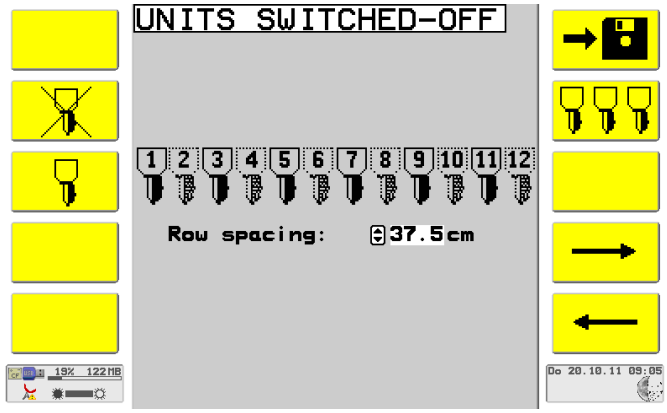
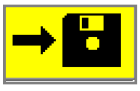


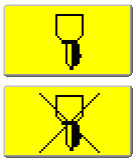
Figure 20: PERMANENT SHUTDOWN submenu



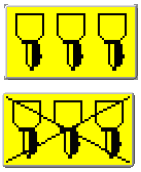
wn settings, this

vill appear.

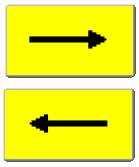
nter the row spacing.



Press the **Unit ON/OFF key** to switch off individual units permanently.



Press the **General unit ON/OFF key** to switch off all units permanently.



Use the **arrow key to move between rows.**

5.2.8. Shutting down

e start key was used
n the ignition.)

f the seed drill
ondition.

6. Maintenance and cleaning

Switch off the ISOBUS job computer whenever maintenance and repair work must carried out on the machine!
Only carry out **electrical welding work** on the machine or attachments **when the mains power supply to the terminal is switched off**.

You should protect the components of the precision seed drill from the jets of high pressure cleaners.

7. Warranty

If you have legitimate complaints about the controller, you should contact your seed drill manufacturer.
The manufacturer shall accept no liability in the event of damage owing to failure to comply with these instructions.

8. Manufacturer's declaration

WTK-Elektronik GmbH hereby declares that the
WTK precision seed drill controller complies with the essential requirements of the Electromagnetic Compatibility Act (EMVG).
The basis of this law is Directive 2004/108/EC of 15/ 12/2004.
The product standard used as for testing is:

- DIN_EN ISO14982 agricultural and forestry machinery, electromagnetic compatibility, testing procedures and assessment criteria

  with testing of:
  - Fault-free operation:
    - Conducted disturbances (test pulses 1,2,3 a, 3b, 4,5 pursuant to ISO 7637-1)
    - Immunity to the narrowband RF field pursuant to DIN EN ISO 14982
  - Interference emission:
    - Electromagnetic interference emission pursuant to DIN-EN ISO 14982.

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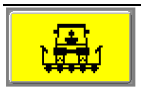
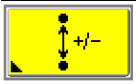
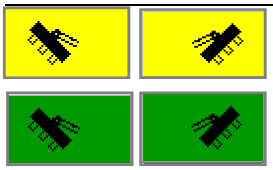
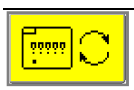
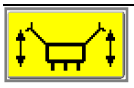
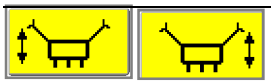
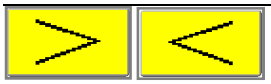
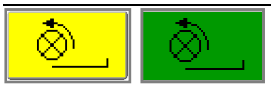
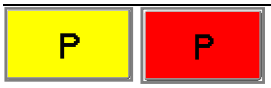
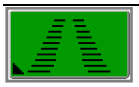
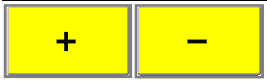
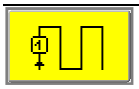
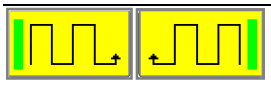
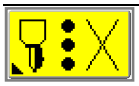
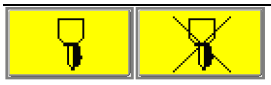
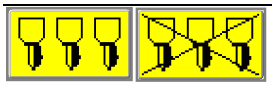
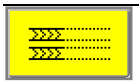
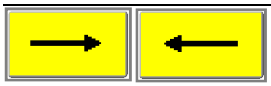
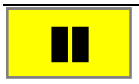
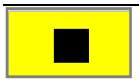
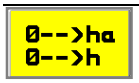
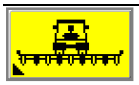
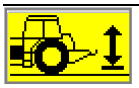
Fax +49 3596 5656-14
m.pallmer@wtk-elektronik.de

Appendices

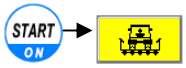
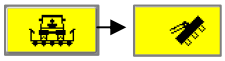
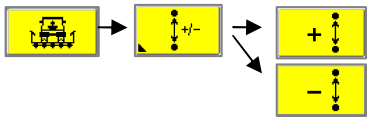
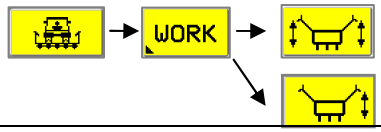
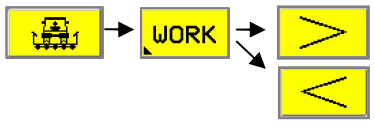
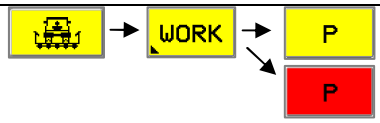
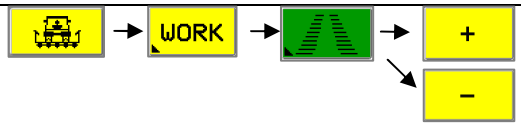
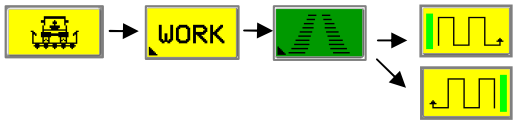
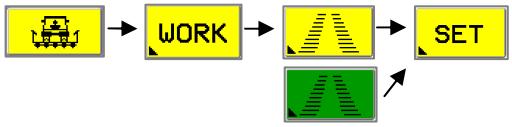
Appendix 1 – Overview of controller symbols

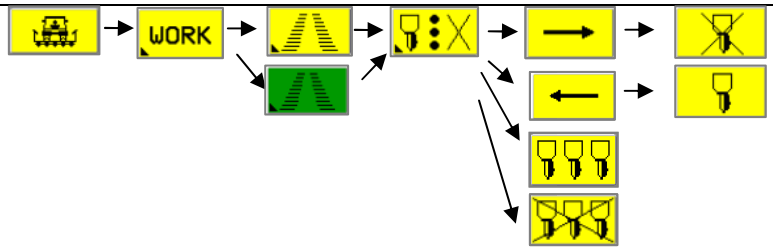
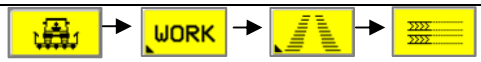
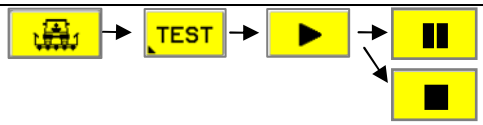
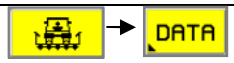
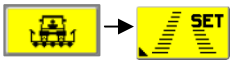
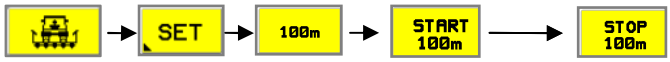
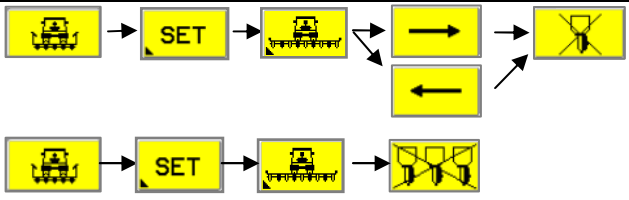
	**Start key**
	Access to the **MAIN MENU**
	Access to the **GRAIN SPACING** menu
	Access to the **WORK** menu
	Access to the **TEST** menu
	Access to the **DATA** menu
	Access to the **SET** menu
	**Folding frame key** for release the folding frame control
	**ESC** key: Exit working level
	**Shift key** for switching between the **MAIN MENU** and the application
	**Enter key**
	Adjustment key for **grain spacing**
	Key: **Unit group change**
	**Row marker key** for selecting both row markers

	**Row marker key** for selecting a row marker
	**Part width control** key
	**Pre-dosing** key
	**Tramline cycle pause** key
	Access to the **TRAMLINE** menu
	**Automatic tramline system** key
	**Increase/decrease tramline cycle** key
	**Reset preview key to 1st cycle**
	**Field edge key**
	Access to the **SET** menu for setting the tramline parameters
	Access to the **WORK MANUAL TL (row management)** menu
	**Unit ON/OFF key**
	**General unit ON/OFF key**
	**Mark out tramline** key
	**Arrow key**
	Access to the **CONFIGURATION MENU**
	**Motor test run** key

	Access to the **GRAIN SENSOR TEST menu**
	**Interrupt motor test run** key
	**Cancel/end motor test run**
	**Delete key**
	**Delete section counter** key
	Access to the **CONTRACT ACCOUNT** menu
	**Start and end key** for work tasks
	**Coordinate entry key for GPS function**
	**100m adjustment** key
	**Start/finish** key for 100m adjustment
	Access to **PERMANENT SHUTDOWN** menu
	**Working position** save key
	**OFF switch**

Appendix 2 – Quick start guide

Working cycle	Path
Switching device on/restarting software	
Releasing folding frame control	
Setting grain spacing	
Switch row marker on/off	
Part width control	
Pre-metering	
Tramline cycle: Pause	
Setting tramline cycle	
Setting edge of field	
Setting the tramline parameters: cultivation width, track width, field edge, tyre width, minimum distance to the plant, mark out tramline, grain density, auxiliary manual tramline	

Switching units on and off	
Switching tramline marking out function on	
Perform motor test run	
Grain sensor test	
Recording working time and surface area worked	
Separate customer data recording	
Setting sowing parameters: grain spacing, number of rows, row spacing, radar pulse, number of cells, grain alarm threshold, fertilisation wave monitoring working sensor and setting	
Entering coordinates for GPS function	
100m adjustment for determining values for radar pulses	
Shutting units down permanently	
Saving the working position threshold	
Going back to the main menu	
Switching the device off