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User manual
Seeder controller
Tractor Speed

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1. Device description

The *Tractor Speed* controller is a specialized device that measures many parameters during the seeder operation and controls the electric motor driving the seeding shaft in such a way as to obtain the desired seeder operation parameters. It is characterized by transparency of information presentation and ease of use.

Description of the control panel elements is on the additional side page of the manual (to be found at the end of the manual) to make it available anywhere in the manual without having to change pages continuously.

To check device's software version you have to:

1) Turn off the device,
2) Press and hold Start button (2.),
3) Turn on the device and release Start(2.) button.

There will be software version displayed, eg. **BL3.5**, **BL3.7**. To get back device to normal work just turn off and turn on the device.

2. Technical data

- Dimensions: 170 mm x 85 mm x 40 mm
- Power supply voltage: 11 V – 14,4 V DC
- Max. current consumption for controller: 500 mA
- Max. curr. consumption for motor and blower: 30 A
- Fuse installed in controller: 1 A
- Fuse for blower: 40 A
- Fuse for seeding shaft motor: 10 A
- Display size: 2”
- Mounting holes spacing: 160 mm
- Mounting screws diameter: 4 mm (M4)
- Console main cable length: ~9 m
- Power cable length: ~2 m
- Speed sensors diameter: 12 mm (M12)
- Grain sensor diameter: 18 mm (M18)

3. Device characteristics

The *Tractor Speed* seeder controller allows to:

- measure and display work speed with 0,1 km/h accuracy,
- area measurement range up to 9999 ha with accuracy:
  - 0,01 ha when area less than 100 ha,
  - 0,1 ha when area less than 1000 ha,
  - 1 ha when area less than 10000 ha

  with possibility to pause and resume measuring at any time,
- saving measured area to 5 independent fields (memory banks) with possibility to reset them at any time,
- saving total overworked area (not resettable),
- setting work width in the range from 0,1 m up to 50,0 m with accuracy 0,1 m,
- distance measuring range up to 9999 km with accuracy:
  - 1 m when distance less than 10 km,
  - 10 m when distance less than 100 km,
  - 100 m when distance less than 1000 km,
  - 1 km when distance less than 10000 km,

  with possibility to pause and resume measuring at any time,
- carrying out a calibration test to determine the expenditure of the seed concerned,
- electric (stepper) motor control enabling obtaining the desired parameters of the seeder (sowing the desired amount of seed, kg/ha),
- controlling the activation of the electric blower used to transport the seed, blower operation only during sowing,
- low grain level alarm in the seed box,
- checking the correct operation of the seeding shaft motor,
- signalling certain states of device by beeps.

All of above functions are described in section 6.: “Using of the device”.

4. Components of the device

Components of the console in standard version A are as follows:

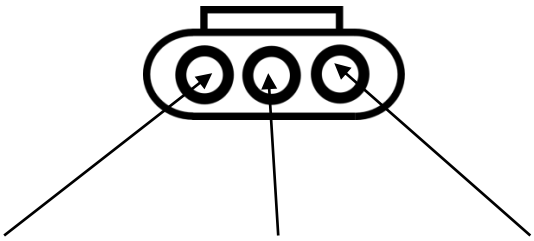
1) Controller *Tractor* Speed with 9m cable, branch with cables for connecting sensors, power supply cable with DIN 9680 connector,
2) Seeder control module,
3) Electrical motor for driving seeding shaft,
4) Electric blower for transporting seeds,
5) Speed sensor,
6) Work sensor (finger sensor).
7) Low grain level sensor,

8) User manual.

Branch has cables as follows:

- Speed sensor cable (with **green** stripe),
- Work sensor cable (with **red** stripe),
- Optional sensor cable (with **blue** stripe) for electrical motor work controlling.

Description of the pins in the speed/work/motor sensor connector is below (view of connector at the console):



Inductive sensors has yellow diodes which light when sensor is connected to console (and it is turned on) and sensor is active (any steel element is near black head of the sensor). To check inductive sensor it can be connected to external power source (eg. tractor battery, pins in sensor's connector are mirror image of pins in console's connector) and using digital multimeter the third pin should be checked, does it gives proper signal (ground signal) when it activated by any steel element.

5. Mounting of the device

Mounting is divided in 4 steps:

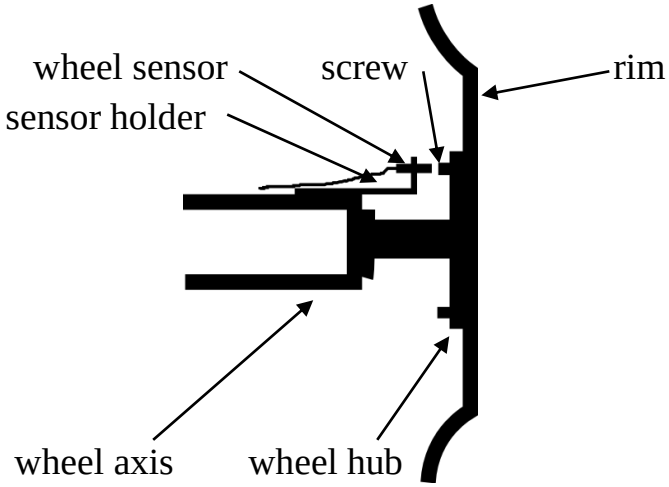
1) Mounting of the console in the cab - some kind of holder must be done (for example from flat piece of steel). Two holes (4mm diameter, 160mm between them) are needed to mount console to holder. While preparing a holder, it is necessary to make it stable, to avoid vibrations of the console. Console must be mounted near operator's seat, to allow using of the console without getting up from the seat.

2) Mounting control module one the seeder – it should be installed near the seeding shaft motor.

3) Mounting speed sensor – some kind of holder from, for example, flat piece of steel is needed. A 12mm diameter hole is needed for sensor, and additional holes to mount holder to tractor. Holder must be stable to avoid vibrations of the sensor – in that case sensor can give false signals. Sensor must be mounted around 2-3mm near wheel screws. Recommended number of screws is 4-10 (depends on the wheel diameter). All screws must be the same, to avoid destroying the sensor. Distance

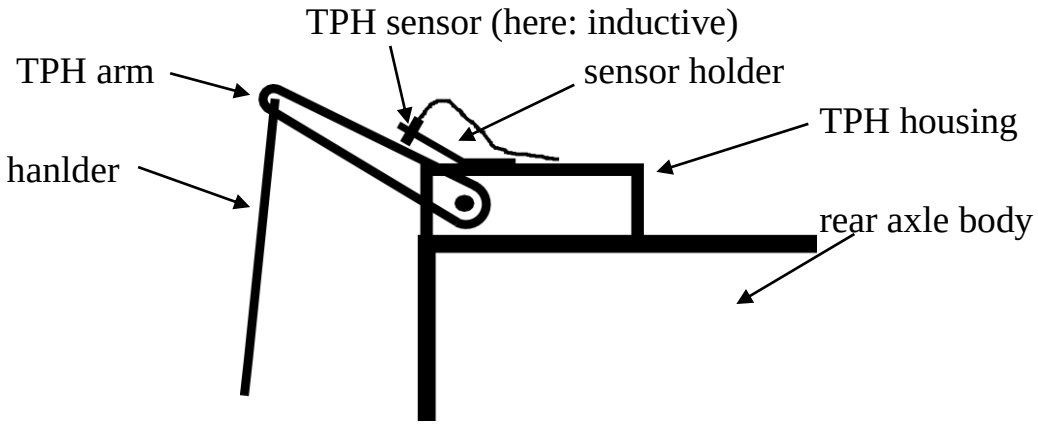
between screws needs to be the same. If not – speed may be not stable while driving with stable speed. But it has no influence to hectare counting.

Here below is example schematic of sensor mounting:



4) Mounting work (three-point-hitch) sensor – some kind of holder from, for example, flat piece of steel is needed. Holder need to have 12mm diameter hole (for inductive sensor) or 2x4mm diameter holes (for finger sensor). Sensors may be mounted to detect only upper TPH position, but also may be mounted in the way to detect TPH a little below the upper position. It is not recommended to mount sensor to cab. It is not allowed to mount sensor to cab if it has any suspension! Cab's movements may damage the sensor!

Here below is example schematic of sensor mounting:



5) Installation of a low grain level sensor - the sensor should be installed in the seed drill box at the height that is to be considered as the alarm level.

6) Installation of the optional motor control sensor - the sensor should be installed near to the motor in such a way that it gives one signal per one revolution of the motor.

7) Mounting of the cables and connecting sensors to console and power cable. Cables should be mounted to avoid damaging by crushing, abrasion, breaking or cutting.

6. Using of the device

In this chapter you can find numeric links to elements of the console, which description is located at the end of manual. This page may be unfolded and visible all the time during reading this manual.

All of the informations are shown on the display and 8 diodes next to display. On the right there are 3 buttons for controlling console. These buttons are multifunctional and their function depends on the displayed screen.

Each time you press the button, which causes some action is signaled by a short beep.

Every settings and data are saved when console is turned off. Also state of the device is saved, including displayed screen, area counter etc. You can back to work directly after turning console on.

Main screens descriptions:

1) **Speed screen** – signalized by lighting of diode 5. Displays current machine speed. Start (2.) and Stop (3.) buttons are inactive, Arrow button (3.) goes to next screen. When the wheel factor is not set, there are symbols **-.-** displayed. Speed is shown after calibrating wheel.

2) **Area screen** – signalized by lighting of diode 6. Displays current work area.
To start area counter just press shortly Start (2.) button. Counting will be started and signalized by lighting of the diode 10.
To stop counting just press Stop (3). button. Diode 10. goes out and there will be measured area displayed. It will be presented until its reset. To do it press Stop (3.) button two times – after first press all dots on the display will be lighted – it is like question “Are you sure?”. Second Stop (3.) button press will reset the counter. Pressing Start (2.) or Arrow (4.) buttons when all dots are on will cancel the question.

When area counter is stopped (but not reset) it is possible to continue counting – just press Start (2.) button.
Arrow (4.) button goes to next screen.

Note: area is measured when counter is on (diode 10. is on), but only when work sensor if in off state (by default: finger is not deflected). When finger is deflected and area counting is automatically paused, diode 10. will be blinking.

Note: area is measured only when wheel is calibrated.

Note: turning on the area counter automatically starts sowing. Similarly, turning off the area counter turns off sowing.

3) **Distance screen** – signalized by lighting of diode 7. Displays driven distance.
Usage of this screen is the same like area screen. To start area counter just press shortly Start (2.) button. Counting will be started and signalized by lighting of the diode 11.
To stop counting just press Stop (3). button. Diode 11. goes out and there will be measured area displayed. It will be presented until its reset. To do it press Stop (3.) button two times – after first press all dots on the display will be lighted – it is like question "Are you sure?". Second Stop (3.) button press will reset the counter. Pressing Start (2.) or Arrow (4.) buttons when all dots are on will cancel the question.
When area counter is stopped (but not reset) it is possible to continue counting – just press Start (2.) button.
Arrow (4.) button goes to next screen.
Note: distance will be counted only if wheel calibration procedure was made.

4) **Seeding / motor work parameters screen** - it is signaled by lighting of diode 8. The Start button (2.) enables switching on spreading (the third, last red diode and the green diode below the display will light up). After switching on, the blower transporting the seed and the motor driving the seeding shaft will start. The engine will rotate at a speed appropriate to the specified operating parameters (calibration test, its result, preset seed rate and travel speed) to obtain the preset seed rate. During operation, this screen will display engine speed in rpm.
The seeding engine operation will be stopped immediately after the signal from the work sensor is detected - i.e. after the machine has been lifted.
The Stop (3.) button stops the spreading (the above diode goes out, the blower and the seeding motor are stopped).

Note: Switching on sowing automatically activates the area counter. Similarly, turning off seeding turns the area counter off.
Arrow (4.) button goes to next screen.

5) **Sowing rate screen** - is indicated by lighting of diode 9. It displays the set sowing rate in kg/ha. The Start (2.) and Stop (3.) buttons allow you to quickly increase or decrease the dose by a certain percentage. When the dose is changed, its indication will flash - this is a signal that the dose is different from the original dose. To return to the correct one, you can use the Start (+, 2.) and Stop (-, 3.) buttons or press and hold the arrow button for about 3 seconds.
The dose can be increased to 200% of the original or reduced to 20% of the original.

   Start (2.) and Stop (3.) buttons are inactive, Arrow button (4.) goes to first screen (speed).

Settings screens allows to change certain console parameters. To go into settings menu press and hold Start (2.) button while displaying one of main screens. After approx. 2 seconds one of settings screens will be displayed.
To differ from main screens, settings screens are signalized by lighting all of diodes and only one current displayed screen diode is off.
To go out of the settings screens do the same thing as while going in – press and hold Start (2.) button. Displayed settings screen will be saved and shown again when going back into settings screens.

Settings screens descriptions:

6) **Wheel calibration screen** – is signalized by going out diode 5. Displays current wheel factor (impulses for 100m).
   To start calibration process, it is necessary to prepare marked 100m distance, go with the machine at the beginning mark and press Start (2.) button. Calibration will now start. Then you have to go with the machine to end mark. Console will count impulses while driving. When you are at the end mark press Start (2.) button again to save displayed wheel factor.
   It is also possible to cancel calibration, just press Stop (3.) button – previous wheel calibration factor will be displayed.

   Note: it is important to do the calibration in the environment in which the machine most often works. So it is not a good idea to calibrate wheel on the asphalt road.

When you do the calibration on the paved road and will work on more “soft” ground like field – the area counter will overestimate the result (wheel will round to many times).
And vice-versa, when you do the calibration on the “soft” field (like after plowing) and go to work on some harder field – the area counter will underestimate the result (wheel will round too little times)

You have to do the calibration at least one time on each machine, which you plan to work with. Then you can write down wheel factors and entry them manually to the console. To do this, right after starting the calibration, when there is still 0 displaying, press Start (2.) button again. Manual entry mode will be activated.
There will be shown current wheel factor on the display, and first digit will be blinking. It can be set by pressing Arrow (4.) button. Number will change in descending order (9,8,...,1,0, 0->9, etc.). To accept digit press Start (2.). Next digit will blink. After accepting last digit, new wheel factor will be saved (signalized by beep).
To cancel entering, press Stop (3.) button.

When wheel factor is les than 1000, you must entry 0 as first digit. For example for factor 246 you must entry 0246.

When you notice, that displayed speed is too high, it is possible to manually change wheel factor by increasing it by 1 or 2 and check if the measurement error decreased.
Similarly, when displayed speed is too low, try to manually change wheel factor by decreasing it by 1 or 2.

Arrow (4.) button goes to next settings screen.

7) **Work width setting screen** (base work width) – is signalized by going out diode 6. Displays current set work width (meters).
To change value press Start/**+** (2.) or Stop/**-** (3.) buttons as many times as it is necessary.

Arrow (4.) button goes to next settings screen.

8) **Field selecting screen** – is signalized by going out diode 7. Allows to choose field (memory bank) to saving overworked area. It is saved always, when area counter is on. Field can be changed at any time. There is one of the symbols displayed: **P1**, **P2**, **P3**, **P4**, **P5**, which correspond to the following fiels. To change choosen field press Start/**+** (2.) or Stop/**-** (3.) buttons.

Arrow (4.) button goes to next settings screen.

9) **Engine calibration screen** - is indicated by the diode 8 going off. It allows you to specify the number of motor steps per one complete motor revolution. This is the motor parameter provided by the manufacturer. Do not change the default value.
The value on the display can be changed by pressing the Start (2.) button, which will start entering the value. The value is entered in the same way as the manual calibration factor of the speed sensor. If you make a mistake, you can press the Stop (3.) button at any time to stop entering the value.

   Arrow (4.) button goes to next settings screen.

10) **Percentage change of dose change stroke / activation of the motor sensor screen** - it is indicated by the diode 9 going off. It allows setting the percentage stroke of quick dose change (on work screen no. 4 - seeding and engine work parameters).
The value shown on the display can be changed in the range of 1 - 20%.
To increase the value, simply press the Start / + (2.) button the required number of times. To decrease the value, just press the Stop / - (3.) button the required number of times.

   To turn on the engine sensor (and thus the alarm in case of incorrect engine operation), press and hold the arrow button for about 3 seconds. Then the symbol **SH** (shaft) will appear on the display. To turn off the engine sensor, press and hold the arrow button again.

   Arrow (4.) button goes to next settings screen.

11) **Calibration test/activation of the low grain level sensor screen** - is indicated by the diode 10 going off. It allows determining the number of engine revolutions (seeding shaft) during the calibration test and starting the calibration test. In addition, it enables or disables the low grain sensor.
The number of engine revolutions shown on the display can be changed in the range of 1 - 200.
To increase the value, simply press the Start / + (2.) button the required number of times. To decrease the value, just press the Stop / - button (3.) the required number of times.

   Arrow (4.) button goes to next settings screen.

   To start the calibration test:

   1. Remove the seed transport pipes.
   2. Mount the calibration container.

3. Start the test: press and hold for about 3 seconds. Start button (2.). The controller will then turn on the motor driving the shaft (but without switching on the blower) and make the set number of revolutions.
4. Wait for the motor driving the shaft to stop.
5. If it is necessary to end the test (e.g. because the container has overfilled), press the Stop button (3.). Then change the test parameters (fewer revolutions) or use a larger container and restart the calibration test.
6. Weigh the seed obtained during the test and record the net weight.
7. Enter the test result on the next setting screen.

Note: the calibration test will not start if sowing is on. Switch off the seeding first and then carry out the calibration test.

Note: the higher set number of seeding shaft rotations, the more accurate is the test.

To activate the low grain sensor (and thus the alarm in the event of a low level), press and hold the arrow button for about 3 seconds. Then the symbol E (empty) will appear on the display. To turn off the grain sensor, press and hold the arrow button again

12) **Input screen for the calibration test result** - the diode 11. goes out. Allows you to enter in [xx.xx kg] the weight of the material that was fed by the sowing shaft during the calibration test. The given material should be weighed in full. During the test, the material should fly out with all the cameras that will be used during work.

The value on the display can be changed by pressing the Start button (2.), which will start entering the value. The value is entered in the same way as the manual calibration factor of the speed sensor. If you make a mistake, you can press the Stop button (3) at any time to stop entering the value

Arrow (4.) button goes to next settings screen.

13) **Entering the preset spread rate (dose) screen** - is indicated by the diode 12. going out. It allows you to specify the desired spread rate. The dose is determined in [xxx.x kg/ha].
The value on the display can be changed by pressing the Start button (2.), which will start entering the value. The value is entered in the same way as the manual calibration factor of the speed sensor. If you make a mistake, you can press the Stop button (3) at any time to stop entering the value..

Arrow (4.) button goes to first settings screen (Wheel calibration screen).

Statistics screens allows to look at measured area values saved in all of 5 fields (memory banks) and total overworked area.

To go into statistics screens you need to press and hold Stop (3.) button during displaying one of main screens. After approx. 2 seconds one of statistics screen will be displayed.
To differ statistics screens from main screens, statistic screens are signalized by blinking one, current diode, and rest of them is off. During displaying total measured area all 3 red leds are blinking.
To go out of the statistics screens do the same thins as during doing in – press and hold Stop (3.) button for at least 2 seconds. Last seen main screen will be displayed

Statistics screens descriptions:

14) **Field 1 statistics** – is signalized by blinking diode 5. Allows to look at area saved in field 1 (**P1**).
Saved area can be reset at any time, just press Stop (3.) button two times – as in the main area counter (main screen 2).

Arrow button (4.) goes to next field (memory bank).

15) **Field 2 statistics** – is signalized by blinking diode 6. Allows to look at area saved in field 2 (**P2**).
Saved area can be reset at any time, just press Stop (3.) button two times – as in the main area counter (main screen 2).

Arrow button (4.) goes to next field (memory bank).

16) **Field 3 statistics** – is signalized by blinking diode 6. Allows to look at area saved in field 2 (**P3**).
Saved area can be reset at any time, just press Stop (3.) button two times – as in the main area counter (main screen 2).

Arrow button (4.) goes to next field (memory bank).

17) **Field 4 statistics** – is signalized by blinking diode 6. Allows to look at area saved in field 2 (**P4**).
Saved area can be reset at any time, just press Stop (3.) button two times – as in the main area counter (main screen 2).

Arrow button (4.) goes to next field (memory bank).

18) **Field 5 statistics** – is signalized by blinking diode 6. Allows to look at area saved in field 2 (**P5**).
Saved area can be reset at any time, just press Stop (3.) button two times – as in the main area counter (main screen 2).

Arrow button (4.) goes to next field (memory bank).

19) **Total overworked area statistic** – is signalized by blinking diodes 10., 11., 12. simultaneously. Shows total overworked area and cannot be reset.

Arrow (4.) button goes to first statistics screen.

7. Detecting defects and ways to remove them

In case of failure please lok at table below. It contains descriptions of the most common defects and ways to solve them (if it is possible). Otherwise please contact to producer.

Observations	Possible cause	How to resolve
Device do not turn on.	No power.	Check connection to power.
		Check fuse in the device and fuses in the machine.
Speed is not measured/distance is not measured.	Too big distance between sensor head and detected element.	Check mounting of the sensor (distance from the sensor head and element should be around 2mm).
	Sensor defect.	Check sensor: device is on, sensor is connected, move some piece of steel close to sensor head - diode at the back of sensor should light on.
	Calibration is not done.	Do the calibration.
	Speed sensor not connected.	Check connection of the speed sensor.
Area is not measured.	Too big distance between speed sensor and wheel element.	Check mounting of the sensor (distance between the sensor head and element should be around 2mm).
	Speed sensor defect.	Check sensor: device is on, sensor is connected, move some piece of steel close to sensor head - diode at the back of sensor should light on.
	Sensor do not detect work mode.	Check mounting of the finger sensor or inductive sensor.
	Calibration is not done.	Do the calibration.
	Work sensor is not connected.	Check connection of the work sensor.
Area is measured during driving with machine in upper position.	Sensor do not detect work pause mode.	Check mounting of the finger sensor and the sensor.
	Work sensor defect.	Check if sensor of working properly.
SH error appears on the display.	Seeding shaft motor is rotating too slow or it is	Check why seeding motor is not rotating, if seeding shaft is not

	not rotating.	blocked.
Seeding motor is not rotating.	Seeding shaft blocked.	Unblock the seeding shaft.
	Main wire harness is not connected.	Connect main wire harness to the control module on the seeder.
	Seeding motor fuse (10A) inside control module broken..	Change fuse.
	Seeding motor wires broken.	Check seeding motor wires.
SH alarm i not showing despite seeding motor is not rotating.	Seeding motor work control sensor is not enabled.	Enable seeding motor work control sensor.
Device do not inform about low grain level.	Grain sensor is not enabled.	Enable grain sensor in settings menu.
Low grain level alarm (**E**) appears despite full seeder's hopper.	No signal from grain sensor or sensor damage.	Check connection of the sensor.
		Check whether sensor is working properly.
Electrical blower is not turning on	Blower rotor blocked.	Unlock the blower rotor.
	Main wire harness is not connected.	Connect main wire harness to the control module on the seeder.
	Blower fuse (40A) inside control module broken.	Change fuse.
	Blower power wires broken.	Check blower power wires.

8. Storage

When the console is not being used, it is recommended to disassemble device from the machine and store it in dry and warm (above 0^{o}C) place. It is important to protect device from contacting to the water (putting it into the water, exposing to rain) – this also applies to mounting place on the machine.

9. Utilization

After use, the device must be put into recycling in a special plant which recycles such an equipment (for example computers and tvs). In any case, do not put it in the bin with ordinary waste!!

10. Guarantee

The manufacturer provides a 12-month warranty for the correct operation of the measuring console Hectare counter Tractor Speed. The time to repair the console entrusted by the customer the manufacturer is a maximum of 14 working days from the date of delivery to the manufacturer. In exceptional cases the repair time can be extended, which the manufacturer will inform the customer immediately after finding the need to extend the deadline.

The warranty does not cover:

- mechanical damage to the console and all sensors and wires,
- damage caused by improper handling of the device (eg. allowing to contact device with water),
- damage resulting from improper installation (eg. supply voltage too high, falling console from the machine and crushing by the wheel).

To obtain recognition of the guarantee are:

- undamaged warranty seals,
- undamaged guarantee card,
- proof of purchase,
- undamaged console housing (allowed small scratches resulting from the assembly / disassembly of the tractor) as well as all.

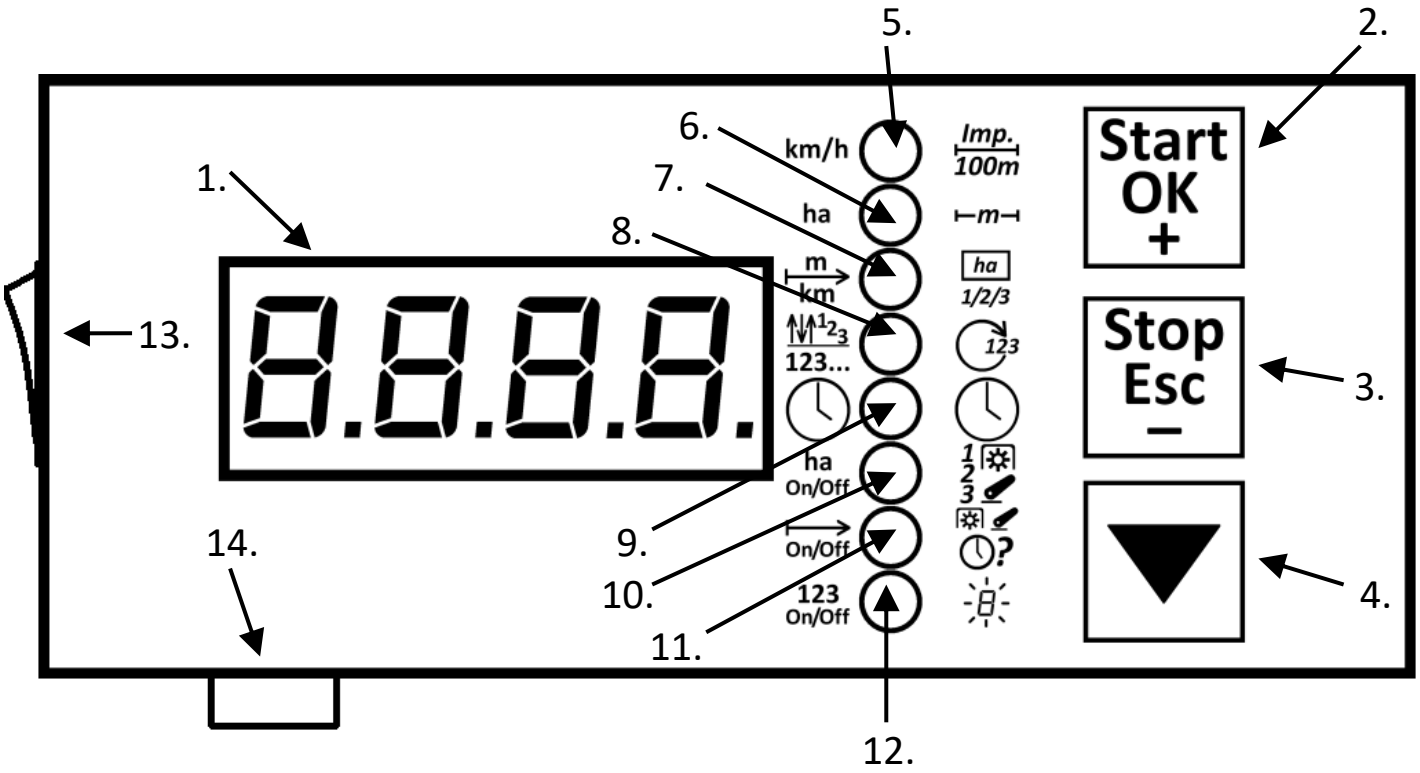
The manufacturer is not responsible for damages resulting from improper handling of the device.

Device serial number (filled by producer):

Date of sales (filled by dealer):

Receipt/invoice number (filled by dealer):

Dealer’s stamp and signature: Customer’s signature:



Description of the elements:

1. Four digits display with four dots.
2. Start button (to begin) / OK (to accept) / + (to increase value) / entry to settings – its function depends on that, what is displayed.
3. Stop button (to stop, to reset) / Esc (cancel) / - (decrease value) / entry to statistics - its function depends on that, what is displayed.
4. Button for moving to next screen.

LED diodes description (and symbols with them)

	Main screen	Settings screen	Statistics screen
5.	Speed	Wheel calibration	Field 1
6.	Area counter	Work width	Field 2
7.	Distance counter	Field selection	Field 3
8.	Seeding (seeding motor speed)	Seeding motor calibration	Field 4
9.	Seeding rate (kg/ha)	% step of quick rate change, motor sensor enabling	Field 5
10.	Area measuring ON/OFF	Starting manual seeding trial, enabling low grain level sensor	Total area
11.	Distance measuring ON/OFF	Result of manual seeding trial [xx.xx kg]	
12.	Seeding ON/OFF	Set seeding dose [xxx.x kg/ha]	

13. Power switch
14. Fuse