// ORIGINAL OPERATING INSTRUCTIONS

K-TRONIC 2

Control system

Art.Nr.: 10046693 **11/15/2016 | Version 1.2 | EN**

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Kugelmann Maschinenbau is a family-run Allgäu business with its main emphasis and tradition in municipal technology. With passion, we manufacture reliable and pioneering machines - we love what we do.

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We are constantly developing our products to offer our customers maximum convenience. Therefore, we ask for your understanding that the manual can deviate from the product in some regards.

2 Content

3 General information

This chapter gives you information on the following:

- Chapter *3.1 "Service information", page 7*
- Chapter *3.2 "EC Declaration of Conformity", page 8*

3.1 Service information

Customer service:

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3.2 EC Declaration of Conformity

in terms of the EC Machinery Directive 2006/42/EC and

the EMC Directive 2014/30/EU

We herewith declare that the control system designated below complies with the relevant essential health and safety requirements of the respective EC Machine Directives and the EMC Directive due to its design and construction, and in the version supplied by us.

If the control system is modified without our consent, this declaration shall cease to apply.

Designation: Control system K-Tronic 2

Relevant EC machinery directives:

DIN EN ISO 15431 / 16330/292-1 / 292-2 / 60204-1 / 12100 / 13849-1 / 13849-2

Rettenbach a.A., October 2016 Josef Kugelmann

4 Operating instructions

This chapter gives you information on the following:

4.1 Target group

These operating instructions are intended for skilled persons who are responsible for the following work at the control system:

- Commissioning
- Control system
- Operation
- Use

At least once a year, all personnel must be trained in the operation of the control system in accordance with the guidelines of the business liability insurance. The use of the control system by untrained or unauthorized persons is prohibited.

4.2 Use

These operating instructions contain all necessary data and information for safe operation and commissioning of the spreader.

Make sure that all persons responsible for the operation of the control system or persons working in the immediate environment of the control system are familiar with the operating instructions as well as the safety information in this manual.

These operating instructions are part of the product and have to be kept in a safe place. In case of resale or transfer of the control system to third parties, these operating instructions have to be included.

All information, illustrations and technical data correspond to the technical state at the time of printing. Subject to technical modifications.

4.3 Conventions used

This manual uses the following typographic conventions:

Symbol	Signal word	Meaning
	Danger	Indicates an imminent dangerous situation, which - in case of non-observance of the safety instructions - will entail death or grievous bodily harm.
	Warning	Indicates a possibly dangerous situation, which - in case of non-observance of the safety instructions - may entail death or grievous bodily harm.
	Caution	Indicates a possibly dangerous situation, which - in case of non-observance of the safety instructions - may result in minor injuries or damage to property.
	Notice	Contains useful information with respect to proper handling of the machine.

4.4 Change history

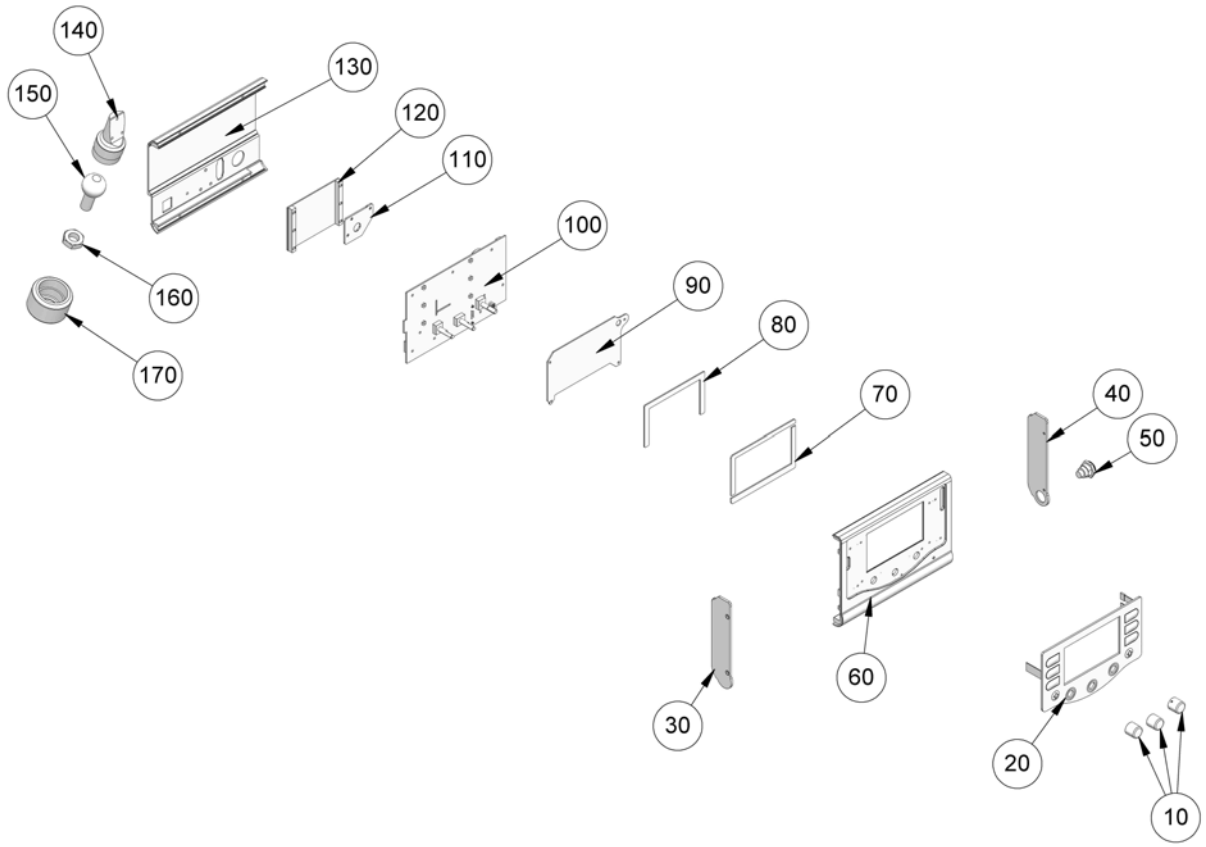
Date	Version	Modification
10/14/2016	1.1	First edition
11/15/2016	1.2	Error and warning codes added

5 General description

This chapter gives you information on the following:

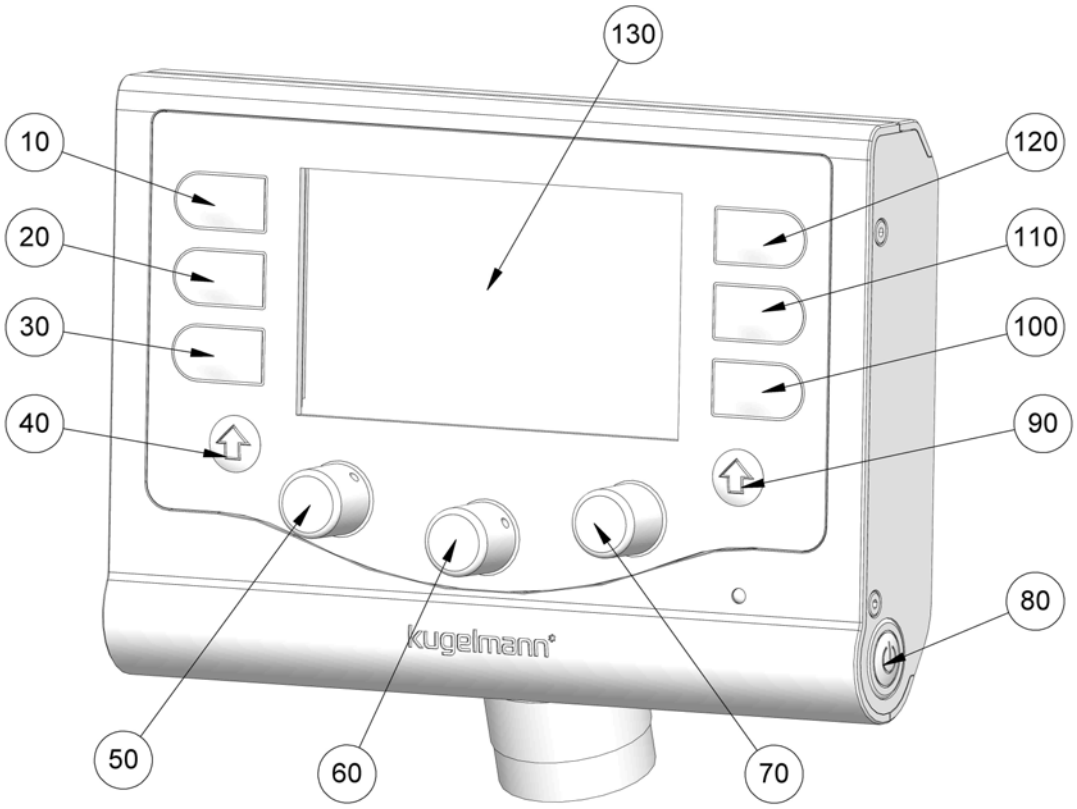
5.1 Components of the control system

Please see the following illustration for components of the control system:

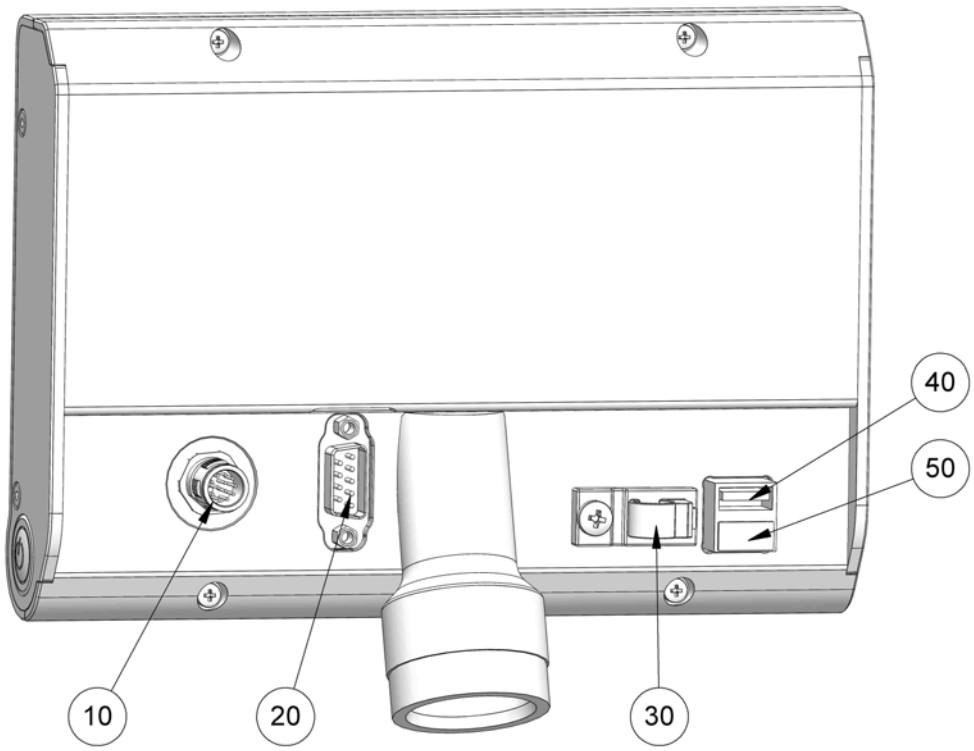


Pos. No.	Part
10	Turning knobs
20	Membrane keyboard
30	Side plate (lh)
40	Side plate (rh)
50	ON / OFF push-button
60	Housing front shell
70	Distance frame front
80	Distance frame rear
90	Clamping sheet
100	Circuit board
110	Plug connector plate
120	EXM board
130	Housing rear shell
140	Fixture
150	Spherical head
160	Counternut
170	Locking nut

5.2 User interface



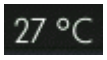
Pos. No.	Function
10	Rotating beacon / Flasher
20	Working headlight
30	Function key 1
40	Actual value button
50	Turning knob spreading material left
60	Turning knob for setting the spreading width
70	Turning knob spreading material right
80	ON / OFF
90	Button for spreading material
100	Function key 2
110	Function key 3
120	Spreading operation / Pause
130	Display



Pos. No.	Function
10	Socket master - connecting cable
20	Serial interface RS232
30	Cable support
40	USB port 1
50	USB port 2 (not occupied)

5.3 Display view

Rotating beacon ON / OFF		see Chapter *8.2 "Switch on/off rotating beacon", page 63*
Working headlight ON / OFF		see Chapter *8.1 "Switch on/ off working headlights", page 62*
Double spreading density ON / OFF		see Chapter *8.4 "Double spreading density", page 66*
SPREADING / PAUSE		see Chapter *7.11 "Spreading operation", page 55*
Operator level LEVEL1 / LEVEL2		see Chapter *8.6 "Operator level 1 and 2", page 70*
Maximum spreading rate ON / OFF		see Chapter *8.5 "Maximum spreading rate", page 67*
Teach in ON / OFF		
Motor unit ON / OFF		see Chapter *9.5 "Motor unit", page 141*

	Electrical monitoring of spreading process ON / OFF	see Chapter *9.3 "Electrical monitoring of spreading process", page 131*
	Brine spreading ON / OFF	see Chapter *9.4.2 "Switch on/off brine spreading", page 136*
	Spreader works path-dependent / manually	see Chapter *8.7 "Path-dependence and manual operation", page 71*
	Electrical adjustment of spread pattern	see Chapter *9.1 "Electrical adjustment of spread pattern", page 114*
	Outside temperature display	
	Percentage of pre-wetted salt during brine spreading [%]	see Chapter *9.4.3 "Changing the brine proportion", page 138*
	Driving speed	
	Output counter left chamber	see Chapter *8.9 "Output counter", page 76*
	Output counter brine reservoir	see Chapter *8.9 "Output counter", page 76*
	Output counter right chamber	see Chapter *8.9 "Output counter", page 76*
	Spreading material and spreading rate [g/m²] left chamber	see Chapter *7.10 "Output rates", page 53*
	Spreading material and spreading rate [g/m²] right chamber	see Chapter *7.10 "Output rates", page 53*
	Spreading width [m]	see Chapter *7.12 "Setting of spreading width", page 56*

5.4 Meaning of buttons

Button	Meaning
	Function key 1 • Confirm and continue to next menu mask
	Spreading / Pause button • Previous menu mask
	Turning knob left/middle/right: • Turning respective turning knob to continue to the next/previous menu option. • Turning respective turning knob to confirm the respective menu option. • Pressing and turning the turning knob to skip whole numbers for settings • Turning the turning knob to skip in steps of 0.01 for settings
	Rotating beacon / Flasher button • Exit menu
	Turning knob left/right • Start / Confirm
	Function key 3 • Switching on respective option
	Function key 3 • Switching off respective option
	Function key 1 • Information on respective menu option
	Function key 2 • Settings
	Working headlight button • Save

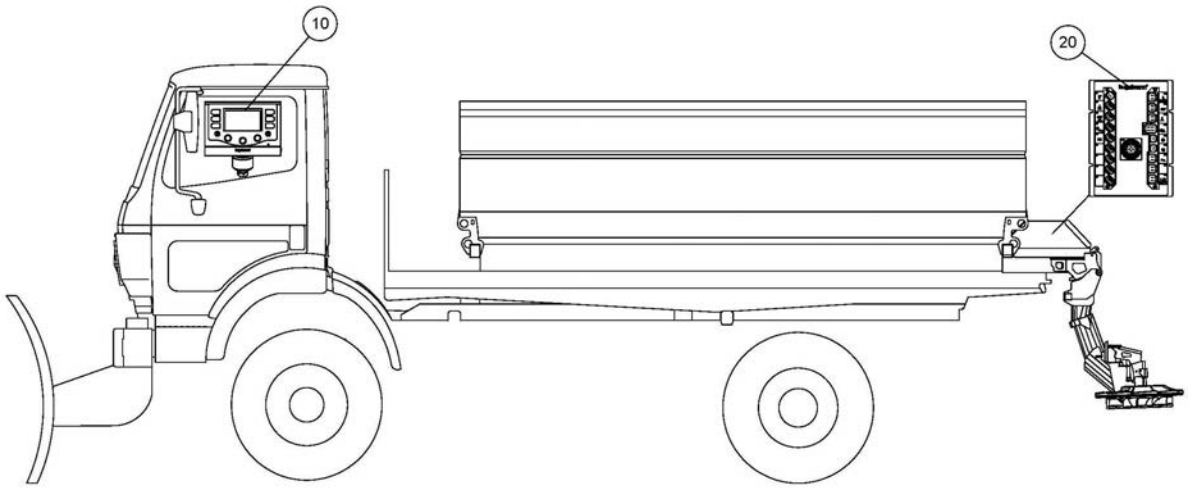
Rotating beacon / Flasher button
- Reset output counter right chamber

Working headlight button
- Reset output counter brine

Function key 1
- Reset output counter left chamber

5.5 Overview

The control system K-Tronic 2 consists of two major electronic components:



Pos. No.	Part	Function
10	Master	Operating unit in the driver's cab
20	Slave	Switching electronics at the rear of the spreader

5.6 Designated use

Use the control system only for spreaders manufactured by Kugelmann Maschinenbau e.K.

Use the control system only with the plug-and-socket connections provided for this purpose and with the respective original cables.

Any kind of use that deviates from the procedure set forth herein is considered contrary to its designated use. The operator of the control system is liable for any damages arising from such action.

Use and reconditioning of the control system may only be carried out by trained and competent personnel.

To operate the equipment within the limits of its designated use, please note the following:

- These operating instructions as well as all other enclosed documentation.
- The relevant accident prevention regulations.
- The generally recognized rules relating to technical safety requirements and occupational health.
- The operating instructions of the carrier vehicle.

5.7 Obvious misuse

It is not allowed to operate machines with the control system which were not designed and manufactured by Kugelmann Maschinenbau e.K.

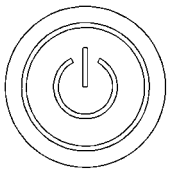
Do not use or store the control system outside or uncovered.

The control system shall not be used as handle.

5.8 Wear parts

Hinweis

Wear parts are:

- Membrane keyboard
- ON/OFF push-button 
- All turning knobs
- Lighting
  - Rotating beacon
  - Working headlight
- Electrical spreading pattern displacement motor
- Electrical monitoring of spreading process
- Connectors

6 Safety instructions

This chapter gives you information on the following:

6.1 General safety instructions

Warning

Use of the control system by untrained persons.

Risk of serious injury.

- Make sure that all persons responsible for the operation of the control system are trained in the operation of the device and are familiar with the operating instructions as well as the safety information in this manual!
- Insist on compliance with the applicable safety regulations!

Warning

Non-observance of guidelines.

Risk of serious injury or death.

- Please observe the regulations relating to accident prevention!
- Please observe the generally applicable safety regulations, industrial standards and medical guidelines!
- Please observe the road transport guidelines!
- Please pay attention to the general advice in these operating instructions!

Caution

Changes at the control system.

Impairment of functionality and danger of property damage.

- Do not make any changes at the control system!

6.2 Commissioning

Caution

First commissioning without instruction.

Risk of injury or property damage.

- First commissioning of the control system must be accomplished by employees of the dealer, the manufacturer or a representative of our works!

Caution

Wrong polarity.

Danger of property damage.

- Check the polarity prior to commissioning.

Caution

Connecting power supply cable.

Danger of property damage.

- Please make sure that, in the positive cable, a fuse is attached as close to the battery as possible (max. 15 A)!
-

Caution

Laying of BUS cable.

Danger of property damage.

- Lay the BUS cable over the pivot of the cabin in order to allow the cabin to tilt.

Caution

Damaged power lines.

Risk of injury or property damage.

- Damaged power lines have to be replaced immediately!

Caution

Commissioning without making sure that the machine is in perfect technical condition.

Risk of injury or property damage.

- Check all important parts before commissioning!
- Check all safety-related protection devices before commissioning!
- If applicable, please change damaged parts!

Caution

Improper fixing of control system.

Danger of property damage.

- Make sure that the control system is fixed at an appropriate place designated for this purpose!

6.3 Use

Caution

Operating the spreader in the event of malfunctions.

Risk of injury or property damage.

- In the event of malfunction, switch off the control system immediately!
- Resolve the error immediately or ask a workshop.

6.4 Maintenance

Warning

Electric shocks during maintenance work.

Risk of serious injury or death.

- Interrupt power supply before executing work at an electrical device!

Caution

Non-observance of safety regulations.

Risk of injury or property damage.

- Comply with the safety regulations during all maintenance work!

Caution

Use of wrong spare parts.

Risk of injury or property damage.

- Do only use original parts for repair work!

Caution

Maintenance work without necessary technical knowledge or appropriate tooling.

Risk of injury or property damage.

- Only carry out maintenance work if you have the necessary expertise as well as suitable tools!

Caution

Cleaning of metallic surfaces.

Risk of material damage due to detergents.

- Do not use aggressive detergents!

Caution

Loose cable / screw connections.

Danger of property damage.

- Retighten loose bolted connections and screw connections after repair and maintenance work!

6.5 Designations

Marking	Explanation
CE	Basis for Declaration of Conformity

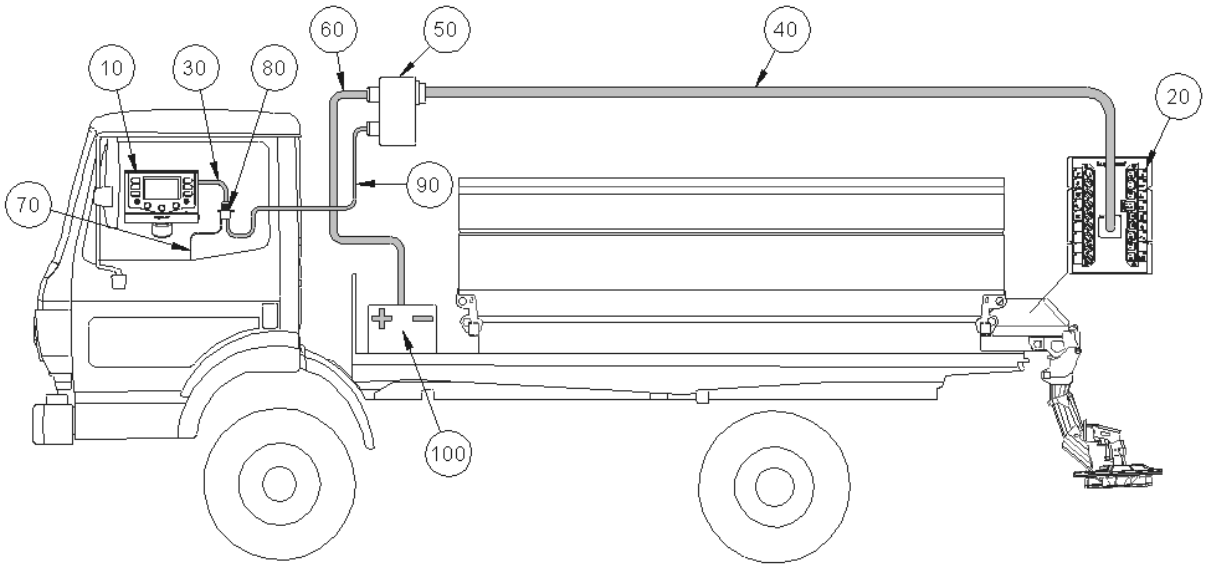
7 Commissioning

This chapter gives you information on the following:

7.1 Wiring diagram

This chapter gives you information on the following:

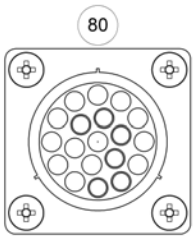
7.1.1 Cable harness fixed installation



Pos. No.	Function
10	Master of control system K-Tronic 2
20	Slave of control system K-Tronic 2
30	Master connecting cable
40	Connecting cable from connection box (Pos. 50) to slave (Pos. 20).
50	Connection box
60	Power supply cable to connection box (Pos. 50)
70	Drive signal
80	19 pin joint between master and cabin
90	Permanently installed BUS cable in carrier vehicle
100	Battery of carrier vehicle

1 Fit master (Pos. 10) at appropriate place in the carrier vehicle.
2 Fit connection box (Pos. 50) at an appropriate place outside the cabin (ideally close to the hydraulic connectors).

3 Fix the 19 pin joint (Pos. 80) at an appropriate place in the cabin of the carrier vehicle (ideally next to the master (Pos. 10)).



4 Lay BUS cable (Pos. 90) in the carrier vehicle to the connection box (Pos. 50) and connect it.

Caution

Laying of BUS cable.

Danger of property damage.

- Lay the BUS cable over the pivot of the cabin in order to allow the cabin to tilt.

Hinweis

The terminal diagram is located in the connection box (Pos. 50).

5 Connect white-red drive signal cable (Pos. 70) with the carrier vehicle.
6 Connect power supply cable (Pos. 60) with the battery (Pos. 100) of the carrier vehicle.

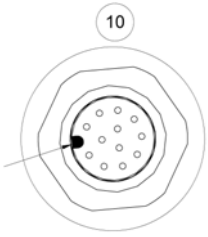
Caution

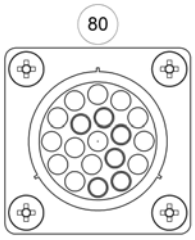
Connecting power supply cable.

Danger of property damage.

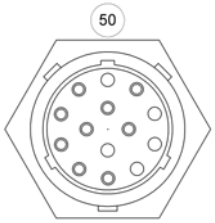
- Please make sure that, in the positive cable, a fuse is attached as close to the battery as possible (max. 15 A)!

7 Plug in the master cable (Pos. 30) at the rear of the master (Pos. 10) and at the 19 pin joint (Pos. 80).
Pay attention to the marked protrusion!

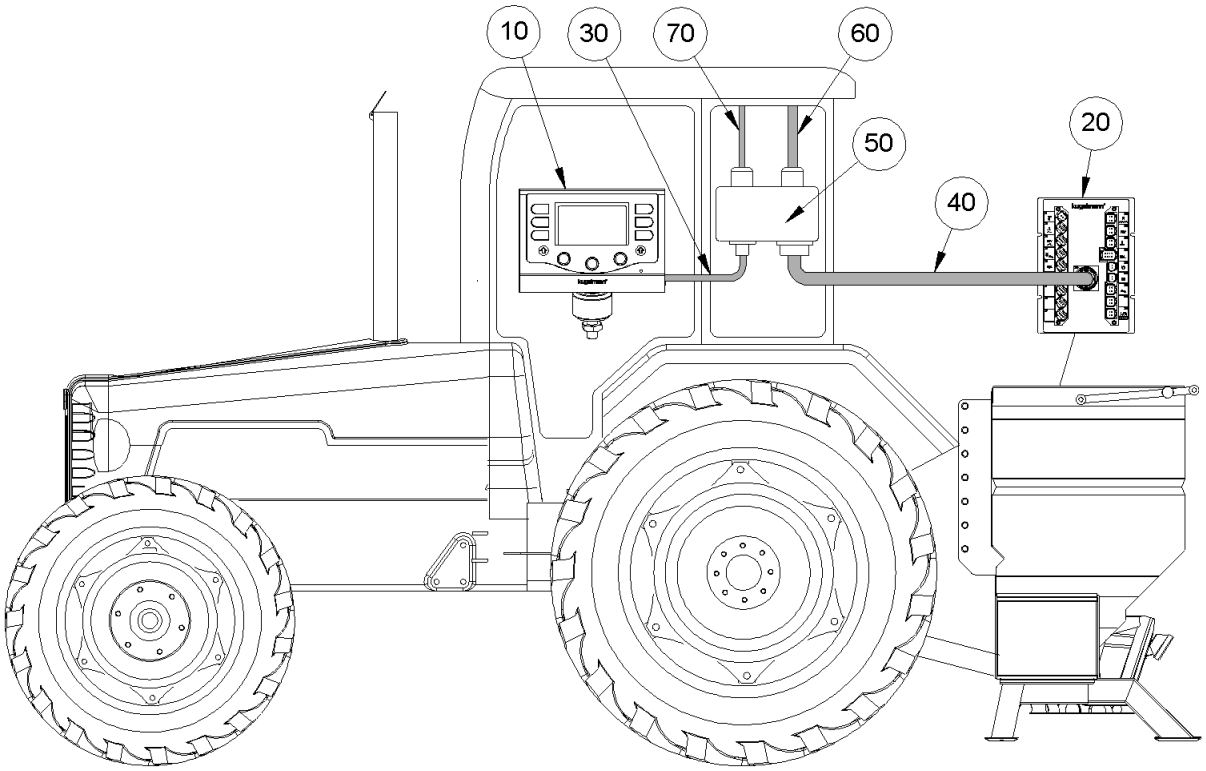




8 Connect connecting cable (Pos. 40) at the connection box (Pos. 50).



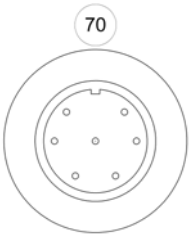
7.1.2 Cable harness overhung installation



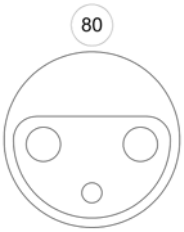
Pos. No.	Function
10	Master of control system K-Tronic 2
20	Slave of control system K-Tronic 2
30	Master connecting cable
40	Connecting cable from connection box (Pos. 50) to slave (Pos. 20).
50	Connection box
60	Power supply cable to connection box (Pos. 50)
70	Drive signal

1 Fit master (Pos. 10) at appropriate place in the carrier vehicle.
2 Install connection box (Pos. 50) at an appropriate place **within** the cabin.

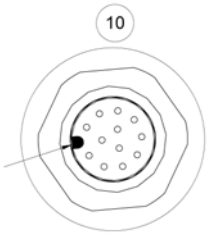
3 Take drive signal (Pos. 70) from the carrier vehicle.

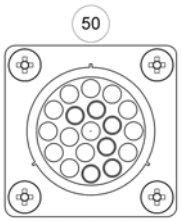


4 Connect power supply cable (Pos. 60) with the carrier vehicle.

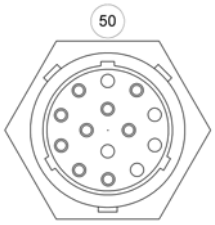


5 Plug in the master cable (Pos. 30) at the rear of the master (Pos. 10) and at the 19 pin joint (Pos. 80) at the connection box (Pos. 50). Pay attention to the marked protrusion!





6 Connect connecting cable (Pos. 40) at the connection box (Pos. 50).



Caution

First commissioning without instruction.

Risk of injury or property damage.

- First commissioning of the control system must be accomplished by employees of the dealer, the manufacturer or a representative of our works!

Caution

Wrong polarity.

Danger of property damage.

- Check the polarity prior to commissioning.

Caution

Damaged power lines.

Risk of injury or property damage.

- Damaged power lines have to be replaced immediately!

Caution

Commissioning without making sure that the machine is in perfect technical condition.

Risk of injury or property damage.

- Check all important parts before commissioning!
- Check all safety-related protection devices before commissioning!
- If applicable, please replace damaged parts!

Caution

Improper fixing of control system.

Danger of property damage.

- Make sure that the control system is fixed at an appropriate place designated for this purpose!

7.2 Switch on / off control system

Switch on control system:

1  Switch on control system

⇨ 

Switch off control system:

1  Switch off control system

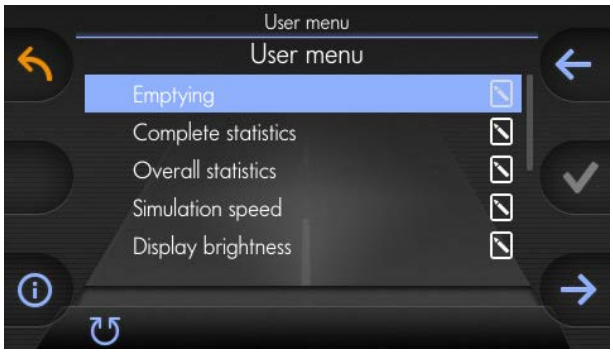
7.3 Select user menu

1  Switch on control system

2  left Hold down actual value button

3  Press briefly

4  left Release actual value button



7.4 Open detail menu

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2  Turn left turning knob

⇨ 

3  Confirm

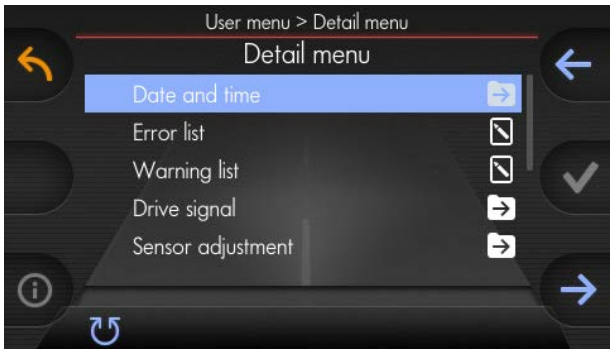
⇨ 

4  Hold down middle turning knob and turn until code entry “**1000**“ is displayed

⇨ 

5  Confirm

⇨


User menu > Detail menu
Detail menu
Date and time
Error list
Warning list
Drive signal
Sensor adjustment

7.5 Setting of date and time

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3  Confirm

⇨

4  Confirm

⇨

5  Set date

6  Save

7  Back

8  Turn left turning knob

⇨

9  Confirm

⇨

10  Set time

11  Save

7.6 Configuration of drive signal

The drive signal has to be configured before the control system is put into operation:

Hinweis

For the correct configuration of the drive signal, the carrier vehicle must fulfill the following conditions:

- Square wave signal
- Pulse-Pause max. 20%
- min. 4 imp/m
- Voltage swing min. 4 V
- max. 1 kHz

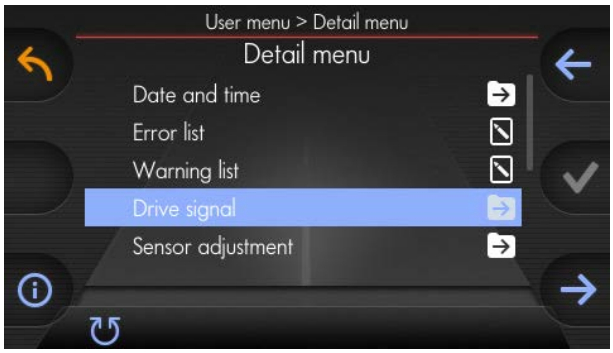
Various possibilities for configuration:

- Chapter *7.6.1 "Drive signal teach in", page 40*
- Chapter *7.6.2 "Manual entry of drive signal ", page 41*
- Chapter *7.6.3 "Drive signal over certain distance", page 42*

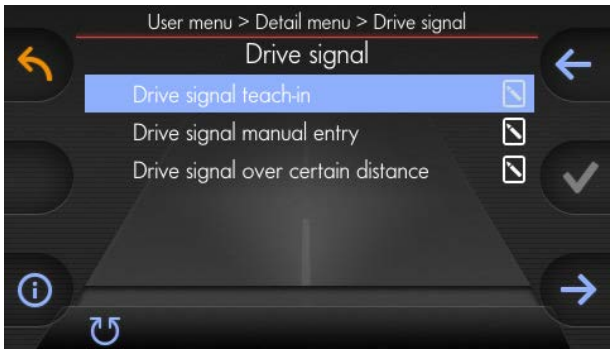
1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3  Turn left turning knob

⇨ 

4  Confirm



7.6.1 Drive signal teach in

1 Open speed signal menu (see Chapter *7.6 "Configuration of drive signal", page 39*)

2  Confirm

3

Maximum speed of carrier vehicle			
1	> 30 km/h	1	< 30 km/h
2	drive 30 km/h	2	drive 15 km/h
3	Teach in 30 km/h	3	Teach in 15 km/h

4  As soon as speed is reached

7.6.2 Manual entry of drive signal

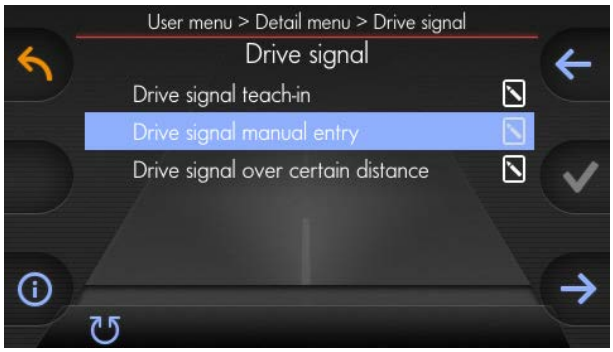
Hinweis

Only possible if information (imp/m) of the carrier vehicle documentation is available!

1 Open speed signal menu (see Chapter *7.6 "Configuration of drive signal", page 39*)

2 Turn left turning knob

⇨



3 Confirm

⇨

4
- Press middle button and turn it to adjust by whole numbers
- Turn middle button to adjust in steps of 0.01

5 Confirm

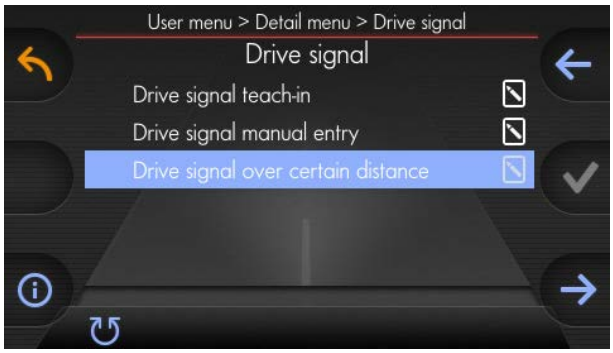
7.6.3 Drive signal over certain distance

In advance, an exact distance has to be measured and marked (100 m or 1000 m) or the trip meter has to be set to 0.

1 Open speed signal menu (see Chapter *7.6 "Configuration of drive signal", page 39*)

2  Turn left turning knob

⇨



3  Confirm

Hinweis

Path measurement starts!

Path measurement			
1	100 m	1	1000 m
2	Drive to the end	2	Drive to the end
3	Teach in 100 m	3	Teach in 1000 m

⇨

1  After reaching 100 m or 1000 m

7.7 Check and setting of sensors

Prerequisites:

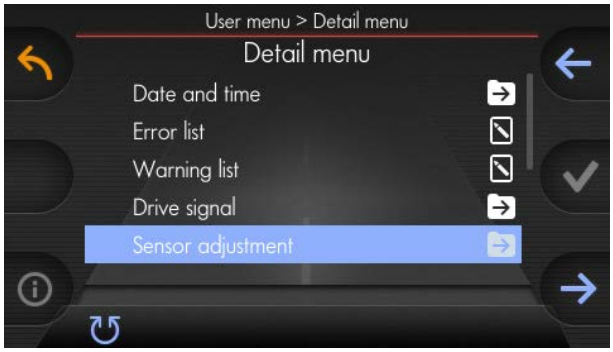
- Spreader and carrier vehicle shall be in operation
- Make sure that oil pressure is sufficient

Proceed as follows:

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3  Turn left turning knob

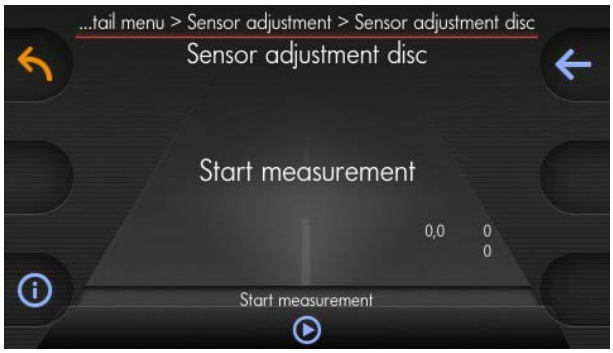
⇨ 

4  Confirm

⇨ 

5  Choose respective sensor

⇨



6 

Start measuring by pressing and holding button down

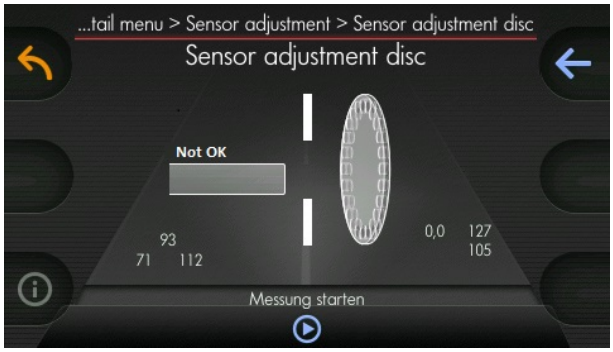
⇨

7 

Release

Sensor too far away:

⇨ Turn sensor in direction of disc.



Sensor too close:

⇨ Turn sensor away from the sensor disc.

7.8 Configuration of characteristic curves

All characteristic curves have to be configured before the control system is put into operation:

- Characteristic curve disc
- Characteristic curve left screw
- Characteristic curve right screw
- Characteristic curve brine pump (optional)

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

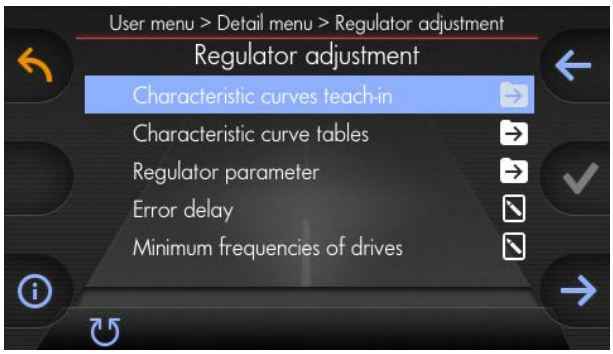
2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3  Turn left turning knob

⇨

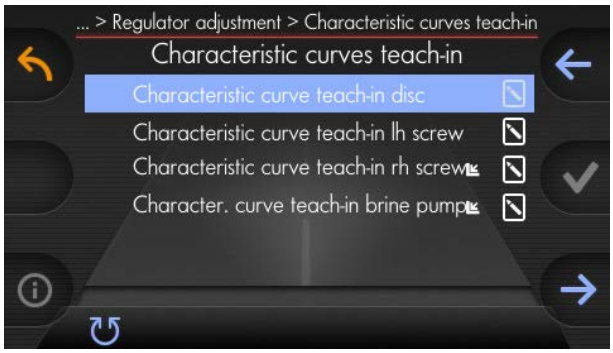
4  Confirm

⇨



5  Confirm

⇨



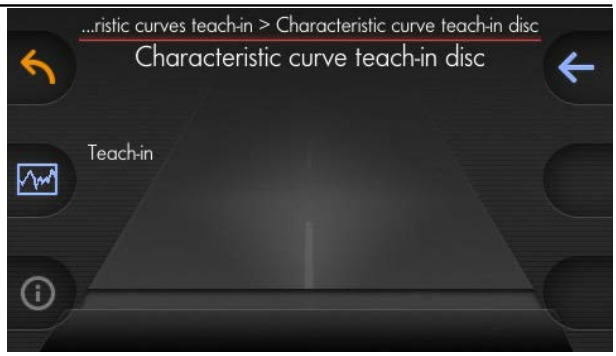
6 → Confirm

Hinweis

Hydraulic oil performance must be consistently high!

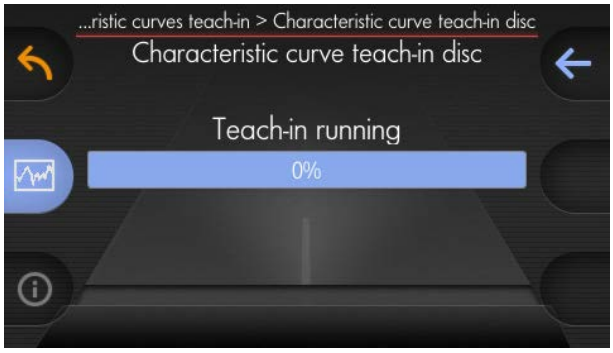
⇨ Motor speed approx. 2000 1/min

⇨

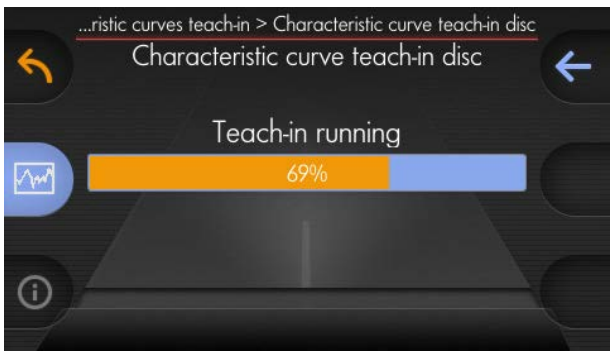


7 → Start teach in

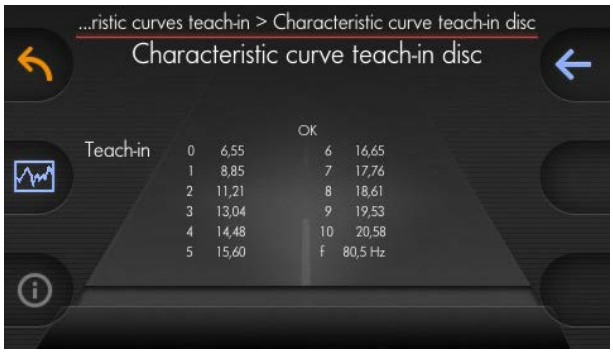
⇨



⇨



8 ⇨



9

Perform the same operation for:

- Characteristic curve teach in right screw
- Characteristic curve teach in left screw
- Characteristic curve teach in brine pump (optional with brine equipment)

7.9 Configuration of spreading material

This chapter gives you information on the following:

- Chapter *7.9.1 "Setting of possible spreading materials", page 48*
- Chapter *7.9.2 "Teach in spreading materials", page 49*
- Chapter *7.9.3 "Choice of spreading materials to be used during operation.", page 52*

Different spreading materials can be chosen:

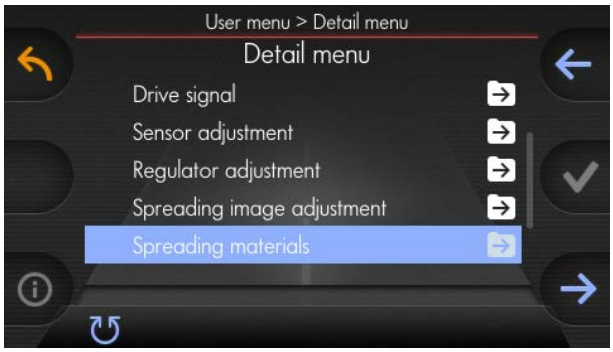
- Salt
- Refined salt
- Grit
- Sawdust
- Special 1
- Special 2

7.9.1 Setting of possible spreading materials

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3  Turn left turning knob

⇨ 

4  Confirm

⇨

5   Select/deselect spreading material

The spreading materials selected here can be chosen later during operation (see Chapter *7.9.3 "Choice of spreading materials to be used during operation.", page 52*

7.9.2 Teach in spreading materials

After the spreading material to be spread has been activated, a teach in must be effected.
Proceed as follows:

1  Choose desired spreading material

⇨

2  Choose chamber where the respective spreading agent is located

3  Confirm

4 Fill in spreading material into the spreader and put a reservoir that is appropriately large under the screw conveyor outlet.

5  Hold down start button

6 As soon as at least 300 impulses are reached, “OK” appears at the right bottom corner of the monitor.
Now, the “START” button can be released.
For an exact setting, let out approx. 20 kg.

7 Now, weigh the collected spreading material and compare it with the middle value (here: 20 kg).

8 

By turning the middle turning knob, correct the result with the difference compared to the real weight.

- Pressing and turning 1,0 kg steps.
- Turning 0,1 kg steps.

In this example, the difference amounts to 0,50 kg. ⇨

9 OK

Confirm and save by pressing the right turning knob.

⇨

10 Repeat this procedure for all spreading materials available in the spreader. Left and right screw respectively.

7.9.3 Choice of spreading materials to be used during operation.

1 Start screen

2 right

Press and hold down spreading material button

⇨

3 By turning the right or left turning knob, the spreading materials chosen before in the details menu, (see Chapter *7.9.1 "Setting of possible spreading materials", page 48*) can be chosen and activated for the respective chamber.

4 right

Release spreading material button

⇨

7.10 Output rates

The output rates for the left and right spreading chamber can be set to different values. If different spreading materials exist in the chambers, it is possible to set any desired mixing ratio of both spreading materials.

Example for basic setting (right chamber = 50 g/m², left chamber = 50 g/m²).

Turn right turning knob to change output rate of right chamber (Example: 57 g/m²) ⇨

Turn left turning knob to change output rate of left chamber (Example: 58 g/m²) ⇨

If the spreading button is pressed, the sum of the output rates is shown in the middle.

In this example (50 g/m² + 50 g/m² = 100 g/m²) ⇨

Hinweis

Part of brine of pre-wetted salt equipment (here FS35) indicates the percentage of brine (if switched on) based on the total output:

- Brine spreading (in this example FS35) is attributed to the percentage of salt, i.e. the proportion of salt (50 g/m²) contains 35% of brine.
  - ⇨ Example: 32.5 g/m² salt + 17.5 g/m² brine = 50 g/m² (combined)
  - ⇨ Brine proportion (in this example 35 %) is only attributed to salt or refined salt.

7.11 Spreading operation

Start spreading:

Control system and spreader are set to “PAUSE” ⇨

Push spreading / pause button

“PAUSE” changes to output rates: right chamber (50 g/m²) + left chamber (50 g/m²) = Total (100 g/m²) ⇨

Pause:

Push spreading / pause button

Control system and spreader are set to “PAUSE” again ⇨

7.12 Setting of spreading width

This chapter gives you information on the following:

- Chapter *7.12.1 "Configuration of spreading width", page 56*

The spreading width is infinitely variable.

Example for basic setting (5,0 m)

Turn middle turning knob to set spreading width (4,5 m) ⇨

7.12.1 Configuration of spreading width

1 Setting of spreading width for regular operation (in this example: 6,0 m).

2  Start spreading

3 After a clear spreading image can be seen on the ground, finish the spreading operation and measure spreading width.

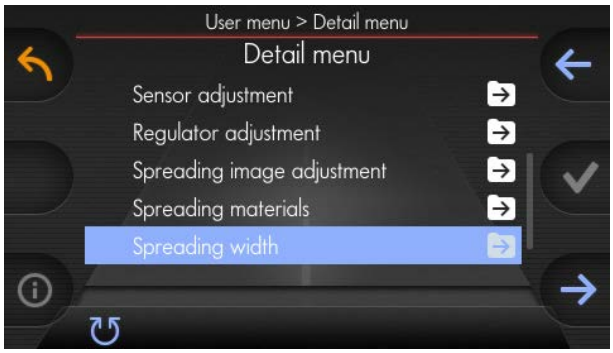
If there is a difference compared to the set spreading width (in this example: 6,0 m), this difference shall be corrected as follows:

4 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

5 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

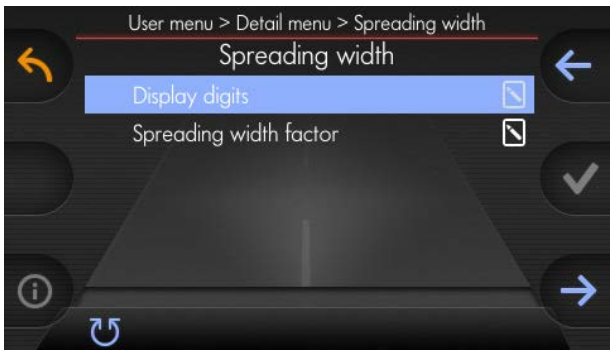
6  Turn left turning knob

⇨



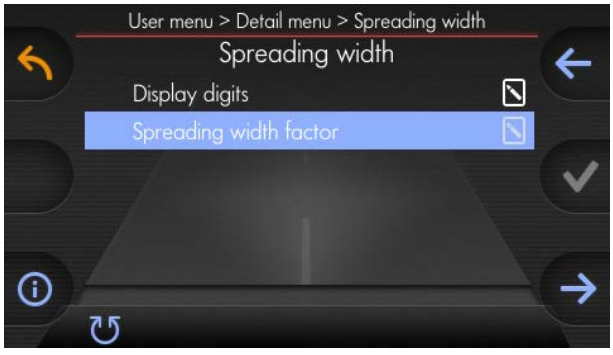
7  Confirm

⇨



8  Turn left turning knob

⇨



9  Confirm

⇨ 

10 

Set depending on deviation:

- > 6,5 imp/m -> wider spreading image
- > 6,5 imp/m -> narrower spreading image

7.13 Recommissioning

1 Recommissioning at **the same carrier vehicle**where the control system was mounted before:

⇨ In case of recommissioning at the same carrier vehicle after storage in summer, repair work or maintenance work, it is not necessary to carry out new settings.

⇨ If a hydraulic component has been repaired or replaced, the sensors (see Chapter *7.7 "Check and setting of sensors", page 43*) and the characteristic curves (see Chapter *7.8 "Configuration of characteristic curves", page 45*) must be recorded again.

⇨ The operating unit has to be reassembled in the carrier vehicle and all cables have to be connected (see Chapter *7.1 "Wiring diagram", page 27*).

2 Recommissioning at **a new or different carrier vehicle**:

⇨ The operating unit has to be remounted in the carrier vehicle and all cables have to be connected (see Chapter *7.1 "Wiring diagram", page 27*).

⇨ The drive signal and the characteristic curves must be reconfigured (see Chapter *7.6 "Configuration of drive signal", page 39* and Chapter *7.8 "Configuration of characteristic curves", page 45*).

Caution

Damaged power lines.

Risk of injury.

- Damaged power lines have to be replaced immediately!

Caution

Maintenance work without necessary technical knowledge or appropriate tooling.

Risk of injury or property damage.

- Only carry out maintenance work if you have the necessary expertise as well as suitable tools!

Caution

Loose cable / screw connections.

Danger of property damage.

- Retighten loose bolted connections and screw connections after repair and maintenance work!

8 Operating instructions

This chapter gives you information on the following:

8.1 Switch on/off working headlights

Working headlights switched on

Working headlights switched off

Error

Press briefly

Working headlights on ⇨

Press briefly

Working headlights off ⇨

8.2 Switch on/off rotating beacon

Rotating beacon switched on

Rotating beacon switched off

Error

Press briefly

Rotating beacon on ⇨

Press briefly

Rotating beacon off ⇨

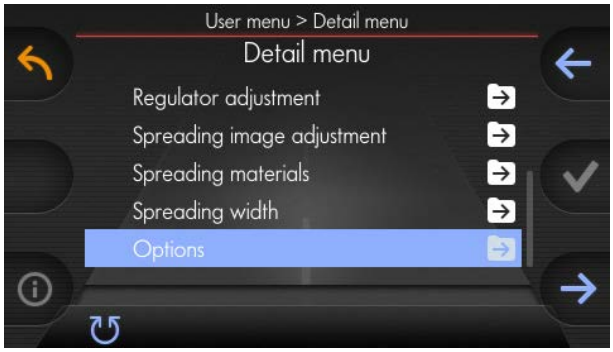
8.3 Function key setting

The assignment of function keys (see Chapter *5.2 "User interface", page 14*) can be modified as follows:

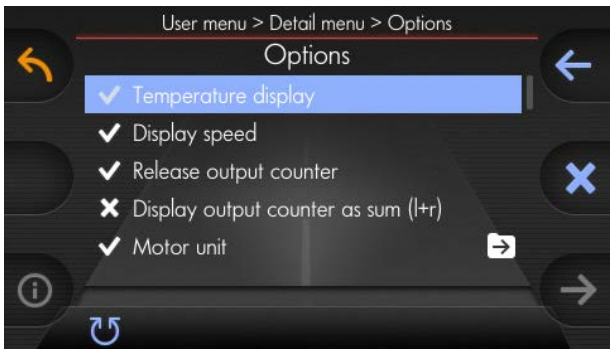
1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3  Turn left turning knob

⇨ 

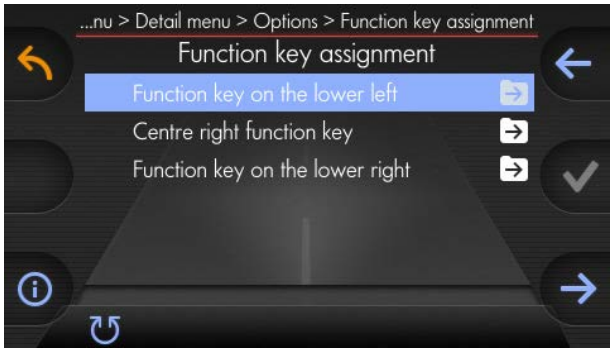
4  Confirm

⇨ 

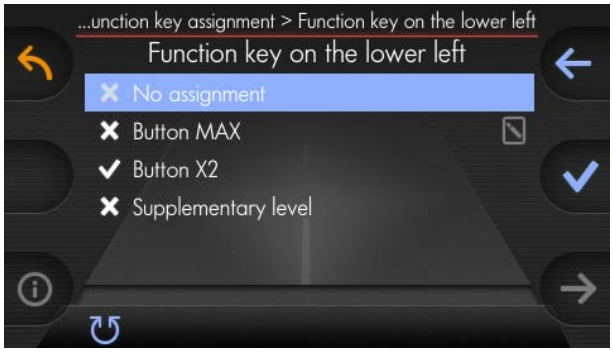
5  Turn left turning knob

⇨

6 → Confirm



⇨



7 →

8 → Each function key can be assigned with any function.

8.4 Double spreading density

The double quantity of spreading material is put out.

Simple mode, no double output

Example:

Simple mode ⇨

Hold down

Double spreading density ⇨

Hinweis

The double quantity of spreading material is spread as long as the button is pushed down.

8.5 Maximum spreading rate

Maximum spreading rate switched on

Maximum spreading rate switched off

The quantity for the maximum spreading rate is stored in the menu.

Setting of quantity as follows:

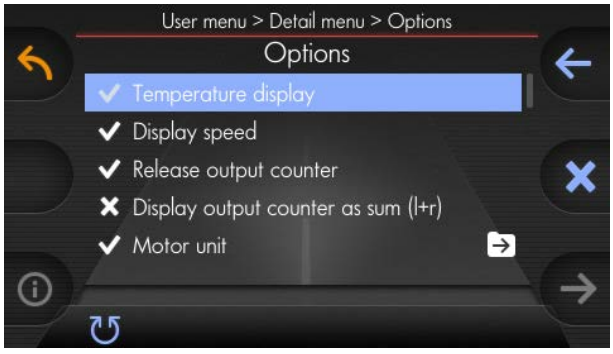
1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3  Turn left turning knob

⇨ 

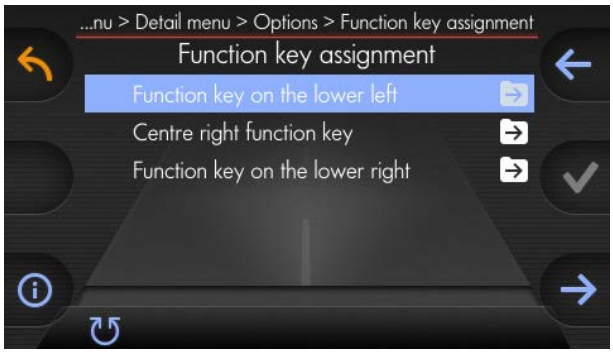
4  Confirm

⇨ 

5  Turn left turning knob

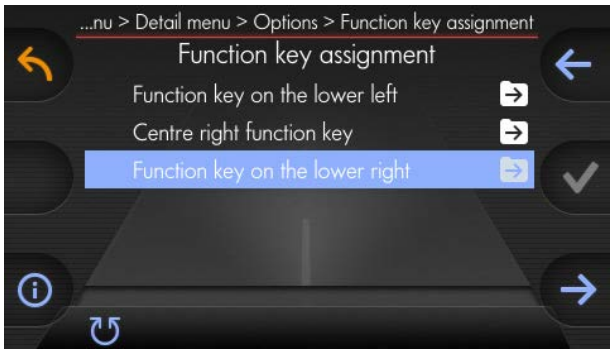
⇨

6 → Confirm



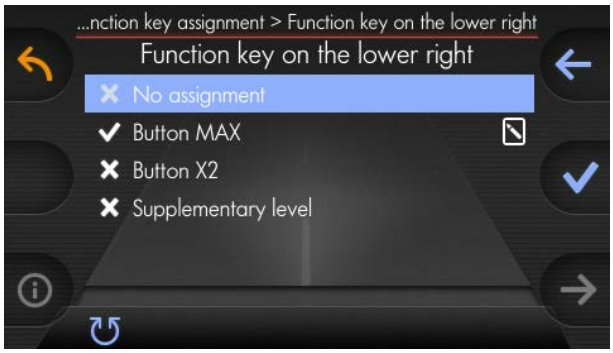
⇨

7 ↺ Turn left turning knob



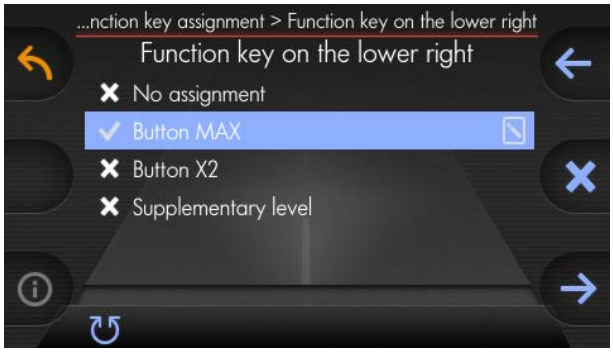
⇨

8 → Confirm



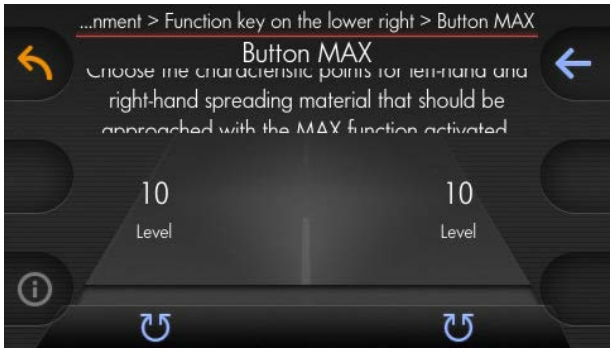
⇨

8 ↺ Turn left turning knob



⇨

10 → Confirm



⇨

11 ↺ Now, the value can be set as desired by turning the left or right turning knob.

Hinweis

The basic value is set to level 10. This is the maximum value and means 100 % of the possible output.

8.6 Operator level 1 and 2

You have the possibility to store two different data sets for the two operator levels.

Operator level 1

Operator level 2

Example:

Operator level 1 ⇨

Push

Operator level 2 ⇨

Hinweis

After switching on, you always start at operator level 1.

8.7 Path-dependence and manual operation

Difference path-dependence and manual operation:

Path-dependent spreading
The control system calculates the quantity of spreading material for the spreading operation on the basis of the vehicle speed.

Manual operation
During manual operation, the control system calculates the quantity of spreading material for the spreading operation by means of the set simulation speed (see Chapter *8.12 "Simulation speed", page 87*), regardless of the actual vehicle speed.

Change from **path-dependence to manual operation**:

1 Start screen

2  left

Press and hold down actual value button

3 

Press manual operation button

⇨

4  left

Release actual value button

⇨

Change from **manual operation to path-dependence**:

1

2  left — Press and hold down actual value button

⇨

3  — Press path-dependence button

⇨

4  left — Release actual value button

⇨

Hinweis

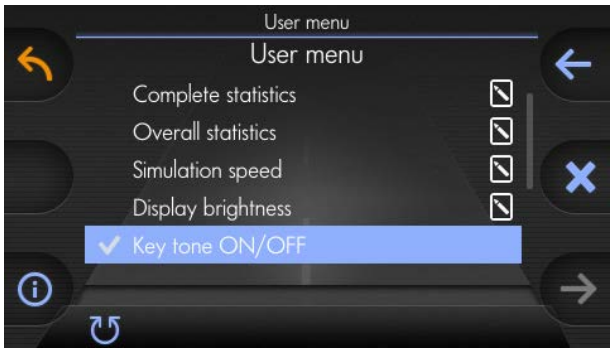
After each restart, the control system works path-dependent!

8.8 Key tone

Switch on/off the key tone as follows:

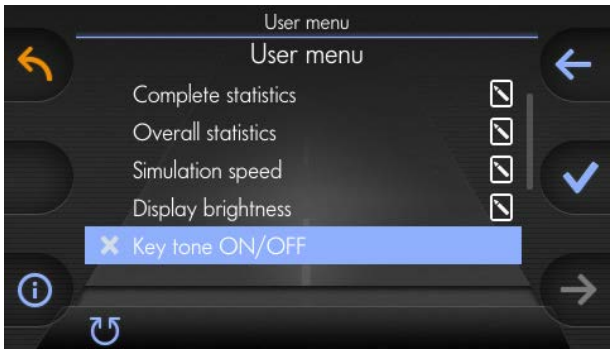
1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2  Turn left turning knob



 Key tone on ⇨

3



 Key tone off ⇨

8.9 Output counter

This chapter gives you information on the following:

- Chapter *8.9.1 "Configuration of output counter", page 77*
- Chapter *8.9.2 "Reset output counter", page 80*

The output rate of spreading material is counted for each chamber of the spreader.

This ensures an exact overview on the quantity of spread material.

The measuring unit can be adopted depending on the spreading material.

Example:

Left chamber:

- Spreading agent: Grit
- Spreading rate: 4 kg

Brine reservoir (optional):

- Spreading rate: 5 l

Right chamber:

- Spreading agent: Salt
- Spreading rate: 7 kg

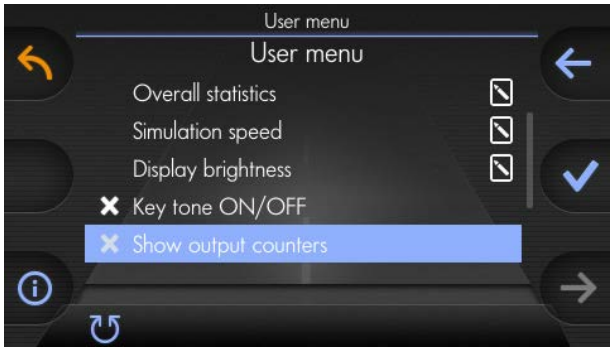
8.9.1 Configuration of output counter

Activate output counter:

Example for start screen without output counter

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2  Turn left turning knob



3  Choose

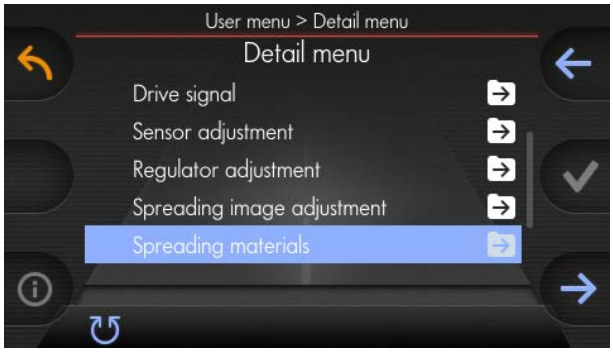
Output counter active ⇨

Configuration of measuring unit for output counter:

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3  Turn left turning knob

⇨ 

4  Confirm

⇨ 

5  Confirm

⇨ 

6 Turn left turning knob

7 Confirm

8

Turn the left turning knob
- Modification of factor

Turn the right turning knob
- Modifying measuring unit:
  - without unit
  - kilograms [kg]
  - liter [l]

9 Repeat this procedure for all spreading materials chosen

8.9.2 Reset output counter

1  right

Press and hold down spreading material button

⇨

2 

Press briefly to set output counter of right chamber to “0”

⇨

3 

Press briefly to set output counter of brine tank to “0”

⇨

4 

Press briefly to set output counter of left chamber to “0”

⇨

5	right	Release spreading material button

Hinweis

In this example, all output counters are reset.

If you would like to reset individual output counters, carry out this process for the respective output counter.

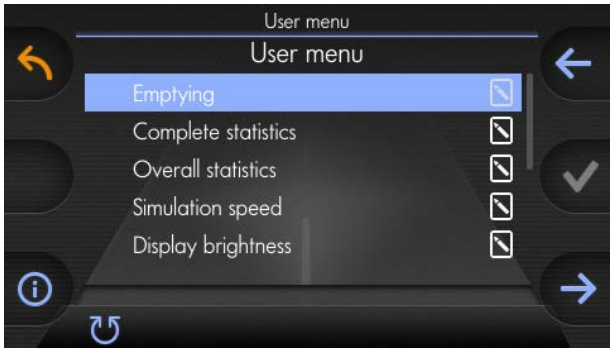
8.10 Emptying the spreader

The spreader can be emptied by means of the following function:

Proceed as follows:

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

⇨



2  Confirm

⇨

3  Set the desired level for the output rate by means of the turning knobs

For example ⇨

4  As soon as the chambers and the brine tank (optional) are empty.

During emptying, the spreading disc can be moved to the side in order to empty the spreader without touching the spreading disc:

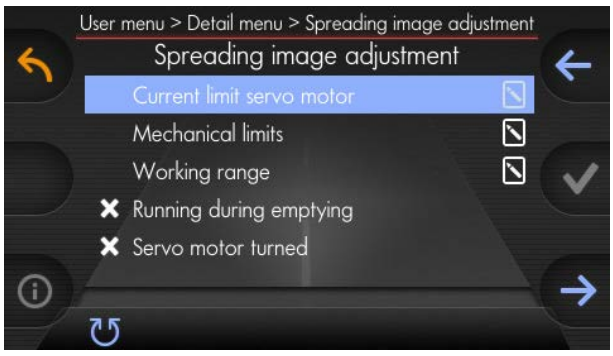
1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3  Turn left turning knob

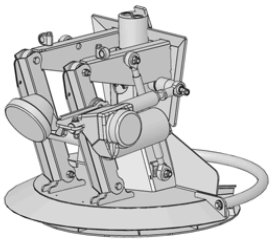
⇨ 

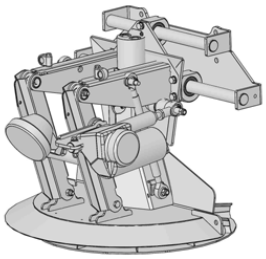
4  Confirm

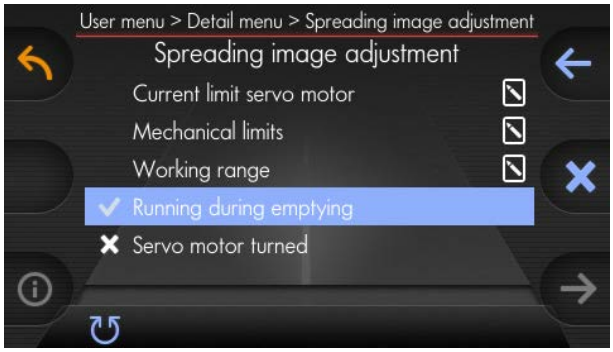
⇨ 

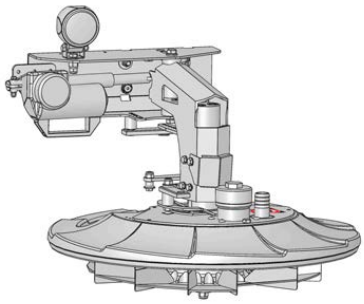
5  Turn left turning knob

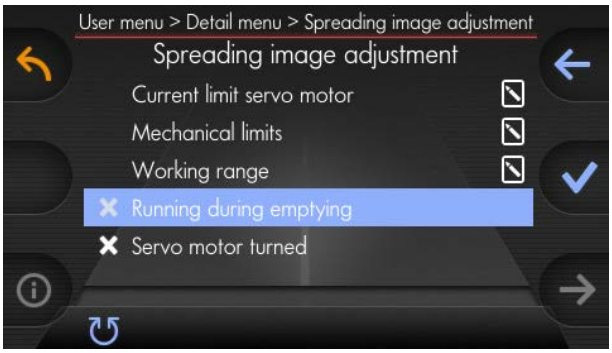
6






User menu > Detail menu > Spreading image adjustment
Spreading image adjustment
Current limit servo motor
Mechanical limits
Working range
Running during emptying
Servo motor turned




User menu > Detail menu > Spreading image adjustment
Spreading image adjustment
Current limit servo motor
Mechanical limits
Working range
Running during emptying
Servo motor turned

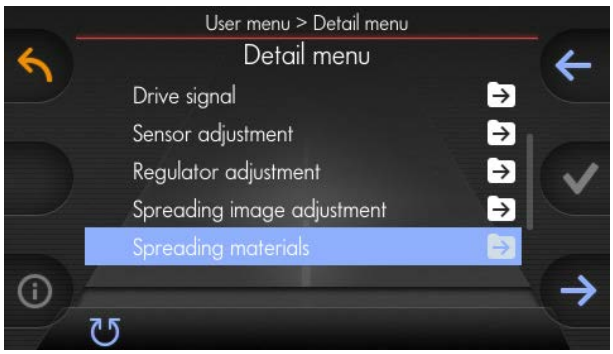
8.11 Display increments of output rates

You can define the display increments, the maximum and minimum value for the output rate as follows:

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3  Turn left turning knob

⇨ 

4  Confirm

⇨ 

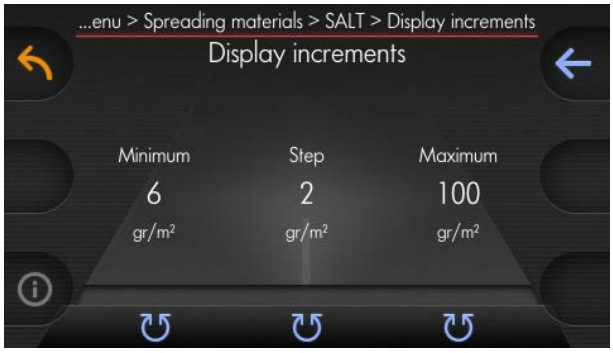
5  Choose desired spreading material

⇨

6 ↺ Turn left turning knob

⇨

→ Confirm



⇨

7 ↺ Set the maximum and minimum output rate and the steps by turning the turning knobs

8.12 Simulation speed

The simulation speed serves for stationary spreading tests and for manual operation.

Change the simulation speed as follows:

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2  Turn left turning knob

⇨ 

3  Confirm

⇨ 

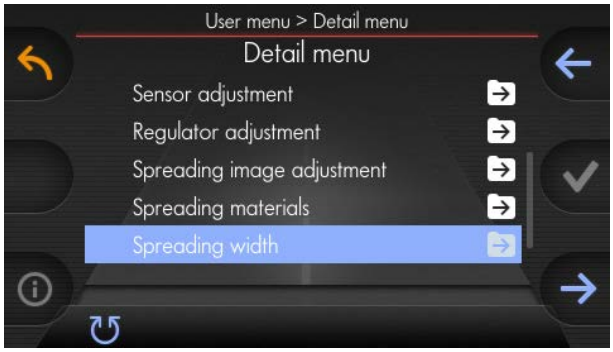
4  Turn middle turning knob to set simulation speed

8.13 Configuration of spreading width parameters

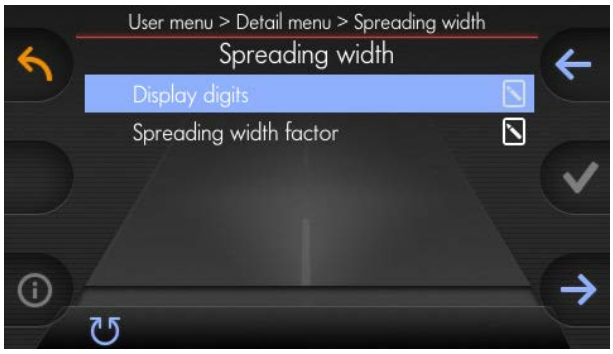
1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

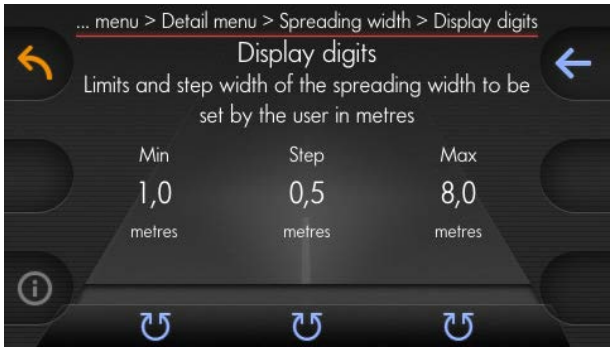
3  Turn left turning knob

⇨ 

4  Confirm

⇨ 

5  Confirm

⇨ 

6		Setting of limits for spreading width and step width

Hinweis

These spreading width parameters are now applied on the main screen.

8.14 Warning list

Current warnings (highlighted yellow) are shown directly in the main display. ⇨

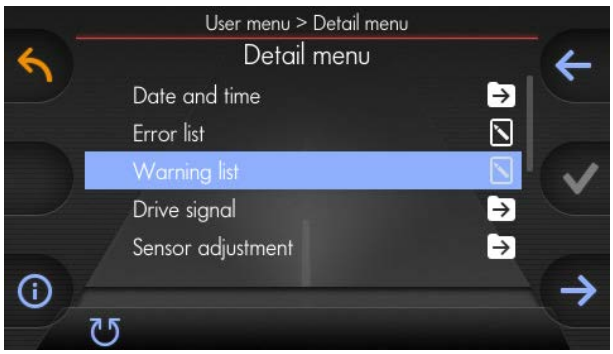
You will find the internal warning list which also contains older messages, as follows:

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3  Turn left turning knob

⇨



4  Confirm

Examples of warnings ⇨

5 

By pressing the middle turning knob, saved warnings will be deleted

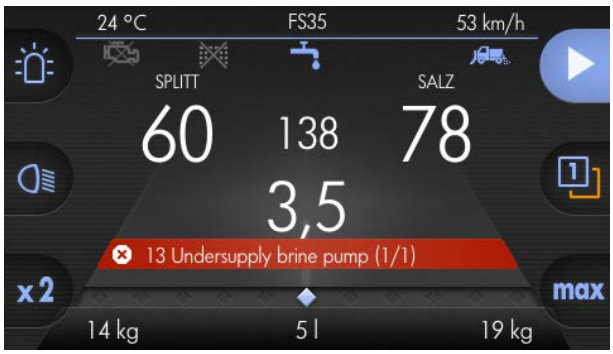
⇨ 

Warning codes:

Warning code in main display (warning group)	Warning text	Internal warning list	Mobidat warning list	Warning text
18	Error servo motor	4368		Max. performance of setting motor exceeded
		4369		Max. duty cycle of setting motor exceeded
24	Pause because of chute	4353		Pause because of chute
25	Error electrical spreading pattern control	4384	4	Warning electrical spreading pattern control
26	Dry run brine	4400	3	Brine dry run
27	Fuel tank of unit empty	4416	1	Fuel tank of unit empty
28	Oil tank of unit empty	4417	1	Oil tank of unit empty
29	Maintenance of unit necessary	4418		Maintenance of unit necessary
31	Date / time not correctly set	600		Date / time not correctly set
32	Speed too high	4432		Speed too high
33	No speed signal	4433		No speed signal
40	Error temperature sensor	464		Short circuit temperature sensor
		465		Cable break temperature sensor

8.15 Error list

Current errors (highlighted red) are shown directly in the main display.

⇨ 

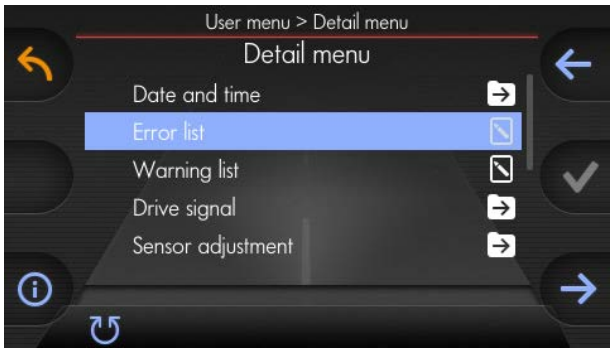
You will find the internal error list which also contains older errors, as follows:

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3  Turn left turning knob

⇨



4  Confirm

Example of errors: ⇨

5  By pressing the middle turning knob, saved errors will be deleted

⇨

Error codes:

Error code in main display (error group)	Error text	Internal error list	Mobidat error list	Error text
1	Loss of connection to spreader	601		Loss of connection to spreader
2	Error power supply	252	1	Voltage of spreader insufficient
		253	1	Input voltage too low
		254	1	Vehicle voltage below 8.2 V
		255	1	Vehicle voltage over 12 V
		251	1	Power supply overheating
		256	1	Vehicle voltage too low
3	Unit error	480		Start error motor unit
		481		Motor unit has stopped
		482		Motor unit could not be stopped
4	Chute above	257	16	Chute above
5	Reversing during spreading operation	276	16	Reversing short circuit
		292	16	Reversing cable break
		308	16	Reversing sensor short circuit
		324	16	Reversing sensor cable break
6	Disc error	272	4	Disc valve short circuit
		288	4	Disc valve cable break
		304	4	Disc sensor short circuit
		320	4	Disc sensor cable break
		352	16	Disc standstill
7	Error left screw	273	6	Lh screw valve short circuit
		289	6	Lh screw valve cable break
		305	6	Lh screw sensor short circuit
		321	6	Lh screw sensor cable break
		353	16	Lh screw standstill
8	Error right screw	274	5	Rh screw valve short circuit
		290	5	Rh screw valve cable break
		306	5	Rh screw sensor short circuit
		322	5	Rh screw sensor cable break
		354	16	Rh screw standstill
9	Error brine pump	275	7	Brine pump valve short circuit
		291	7	Brine pump valve cable break
		307	7	Brine pump sensor short circuit
		323	7	Brine pump sensor cable break
		355	16	Brine pump standstill
10	Undersupply left screw	337	13	Undersupply left screw
11	Undersupply right screw	338	12	Undersupply right screw
12	Undersupply disc	336	14	Undersupply disc
13	Undersupply brine pump	339	11	Undersupply brine pump
14	Oversupply brine pump	371	10	Oversupply brine pump
15	Oversupply left screw	369	8	Oversupply left screw

Error code in main display (error group)	Error text	Internal error list	Mobidat error list	Error text
16	Oversupply right screw	370	8	Oversupply right screw
17	Oversupply disc	368	9	Oversupply disc
18	Error servo motor	416	15	Short circuit spreading pattern setting motor
		417	15	Cable break spreading pattern setting motor
		418	15	Spreading pattern setting motor blocked
		419	15	Spreading pattern setting motor - error potentiometer
19	Sensor error chute	432		Short circuit chute sensor
		448		Cable break chute sensor
20	Sensor error dry run brine	434		Short circuit dry run sensor
		450		Cable break dry run sensor
21	Sensor error spreading control	435		Short circuit sensor for electrical spreading pattern control
		451		Cable break sensor for electrical spreading pattern control
22	Error rotating beacon	384	16	Short circuit rotating beacon
		400	16	Cable break rotating beacon
23	Error working headlights	385	16	Working headlights short circuit
		401	16	Working headlights cable break
30	No message for key: 1% defined	1		No message for key: 1% defined
50	Error Load Sense	277	16	Load Sensing valve short circuit
		293	16	Load Sensing valve cable break
		309	16	Load Sensing sensor short circuit
		325	16	Load Sensing sensor cable break

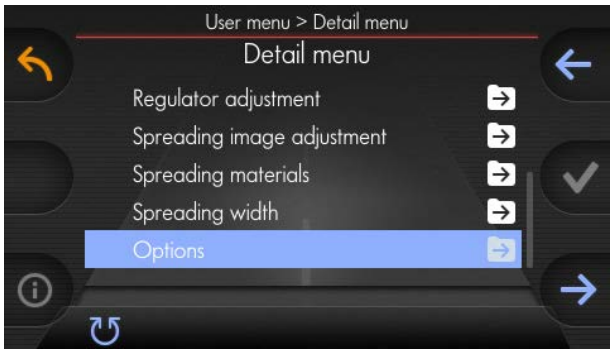
8.16 Options

Find options as follows:

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3  Turn left turning knob

⇨ 

4  Confirm

The following options are available and can be selected or deselected:

- Temperature display:
  - Outside temperature display is shown on main display.
  - In case of failure 59°C.
- Show speed:
  - The driving speed of the carrier vehicle is shown in the main display.
  - With manual operation (see Chapter *8.7 "Path-dependence and manual operation", page 71*), the set simulation speed (see Chapter *8.12 "Simulation speed", page 87*) is shown in the main display.
- Activate output counter:

  - Activation in user menu (see Chapter *8.9.1 "Configuration of output counter", page 77*).
  - Output counter is shown in the main display (see Chapter *8.9 "Output counter", page 76*).
- Show output counter as a sum (left+right):
  - The output counters of the right and left chamber are added and shown in the middle of the main display.
- Motor unit:
  - Optional - diesel or petrol engine (see Chapter *9.5 "Motor unit", page 141*).
- Brine equipment:
  - At carrier vehicles with optional pre-wetted salt equipment (see Chapter *9.4.1 "Configuration of brine equipment", page 132*).
- Adjustment of spread pattern available:
  - At spreaders with electrical adjustment of spreading pattern (see Chapter *9.1 "Electrical adjustment of spread pattern", page 114*).
- Disc stop at pause:
  - Spreading disc will stop as soon as the PAUSE button is pressed.
- Disc stop at vehicle standstill:
  - The spreading disc will stop as soon as the carrier vehicle stands still and no speed signal is passed on the control system.
- Speed when spreader stops:
  - See Chapter *8.18 "Speed when spreader stops", page 100*
- Function key setting:
  - See Chapter *8.3 "Function key setting", page 64*
- Electrical monitoring of spreading process:
  - See Chapter *9.3 "Electrical monitoring of spreading process", page 131*
- Log:
  - With this log, a spreading protocol can be retrieved via the serial interface RS232.
- Speed message:
  - Warning if set speed is exceeded.
- Standstill message:
  - Warning in case of speed signal failure.
- Input functions:

  - External inputs are configured here.
- Show names for spreading material permanently:
  - The names of the spreading materials are permanently shown over the output rate of the chambers for spreading material.
- Automatic locking:
  - If this option is selected, the left and right chamber is merged (only in case of identical spreading agents!).

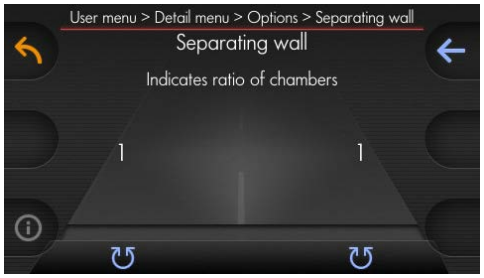
⇨ 

- Partition wall:
  - Configuration of the proportions of the chambers in case of asymmetric partition wall.

Example:
- Left chamber: 2/3
- Right chamber: 1/3

⇨ 

In case of same size of chambers

⇨ 

- Double dosing:
  - Select in case of two-chamber operation.
- Thermography:
  - Select in case of installed infra-red camera for temperature monitoring of the road.
- Automatic spreading image:

  - Automatic spreading image (see Chapter *9.2 "Automatic spreading image", page 124*).
- Animation active:
  - For setting smooth transitions of the menu fields.
- Wallpaper active:
  - For showing the graphical road in the background.
- Reset to factory settings:
  - Reset settings to original factory settings (see Chapter *8.23 "Reset to factory settings", page 109*)

8.17 Serial numbers

Go to the following menu to find the serial numbers:

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2  Turn left turning knob

⇨

3  Confirm

⇨

8.18 Speed when spreader stops

Definition of minimum speed under which spreading will be stopped.

You can add this function as follows:

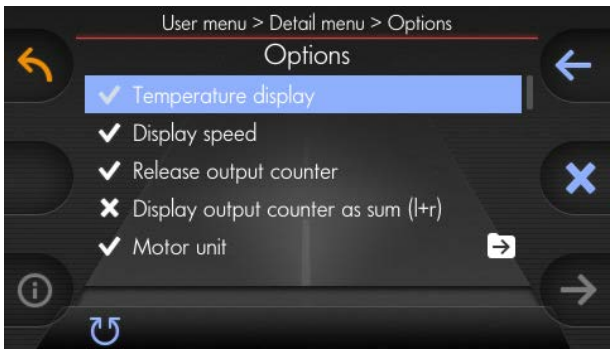
1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3  Turn left turning knob

⇨ 

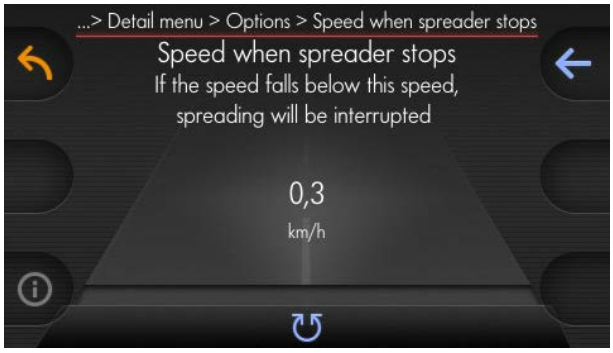
4  Confirm

⇨ 

5  Turn left turning knob

⇨

6  Confirm



⇨

7  Setting of speed when the spreader should stop at the middle turning knob

8.19 Daily statistics

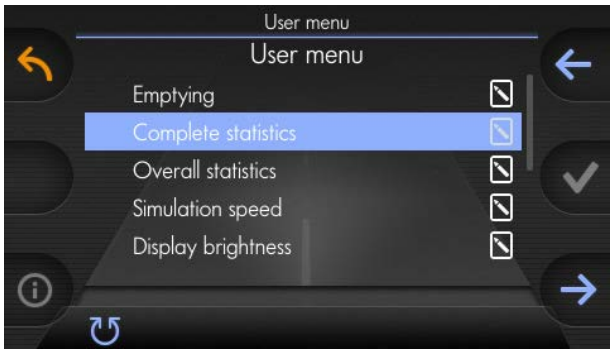
Indication of output rates based on a day in tonnes [t].

You can reach this menu item as follows:

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

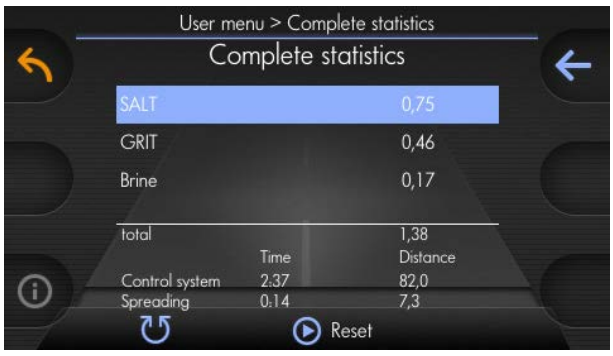
2  Turn left turning knob

⇨



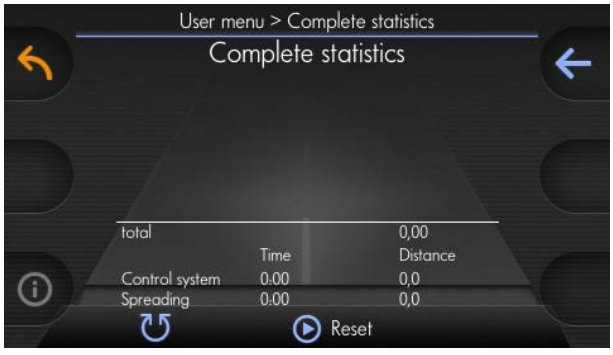
3  Confirm

For example ⇨



4  Press middle turning knob to reset the daily statistics

⇨



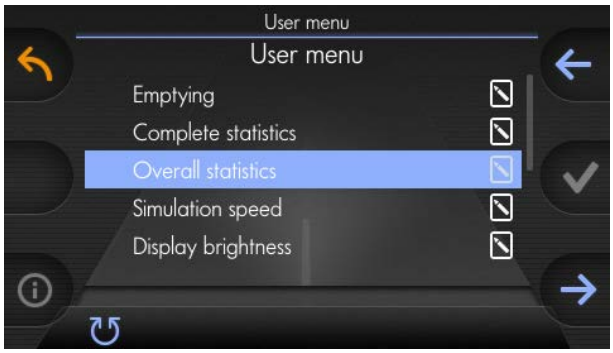
8.20 Complete statistics

Indication of output rates based on the total running time in tonnes [t].

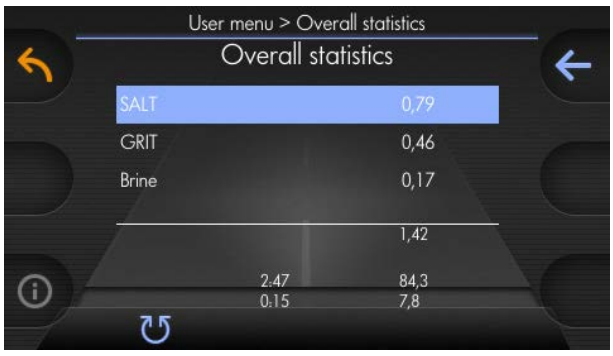
You can reach this menu item as follows:

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2  Turn left turning knob

⇨ 

3  Confirm

For example ⇨ 

8.21 Boost function

When the machine stops, some spreading material is lost. This spreading material lacks during starting and can be compensated by the boost function.

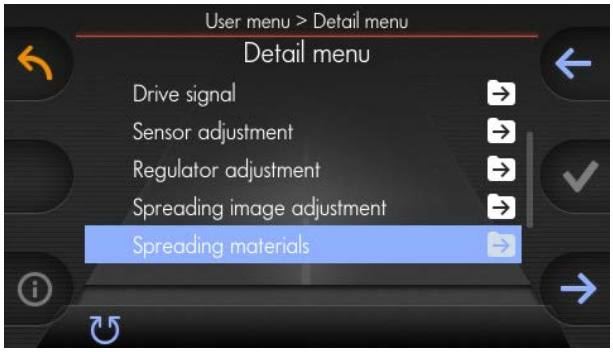
This function is responsible for spreading the set amount of spreading material.

You can add this function as follows:

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3  Turn left turning knob

⇨ 

4  Confirm

⇨ 

5  Choose spreading material and confirm

⇨

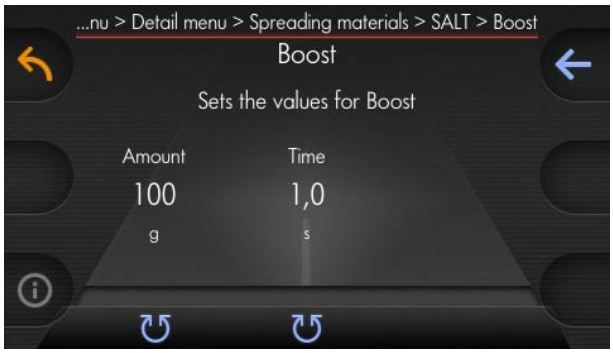
6  Turn left turning knob

⇨

7  Choose

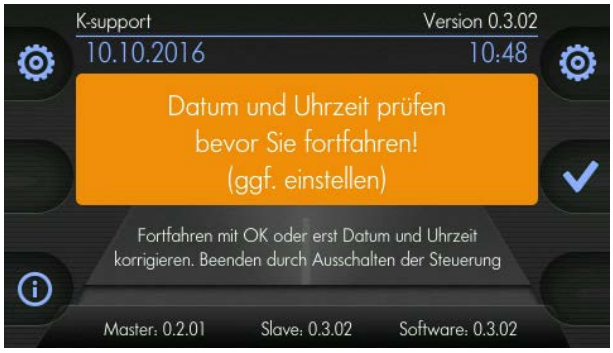
⇨

8  Confirm



9 ↺ Set desired values

8.22 Update

1		+	 left	Hold down actual value button
2				Release
		⇨		
3	 left			Release actual value button
4				Setting of date and time, if necessary
5				Start procedure
		⇨		

Current settings will be saved on the USB stick

6  Confirm

Choose update version ⇨

7  Confirm

⇨

8  Confirm

⇨ Update starts (this will take some time!)

9 Update finished successfully.

8.23 Reset to factory settings

Hinweis

This functions resets all spreader settings to the standard settings!

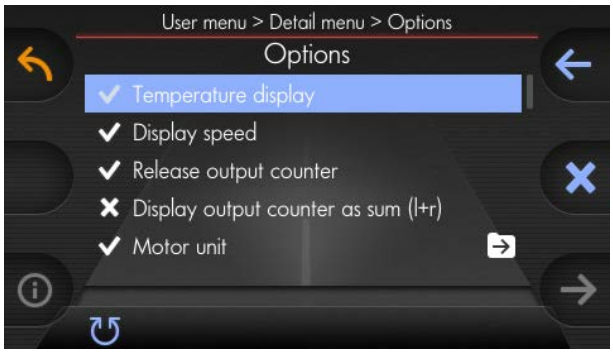
1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

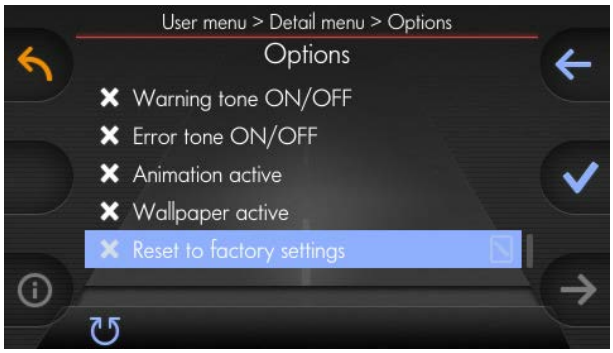
3  Turn left turning knob

⇨ 

4  Confirm

⇨ 

5  Turn left turning knob



⇨

⇨ 

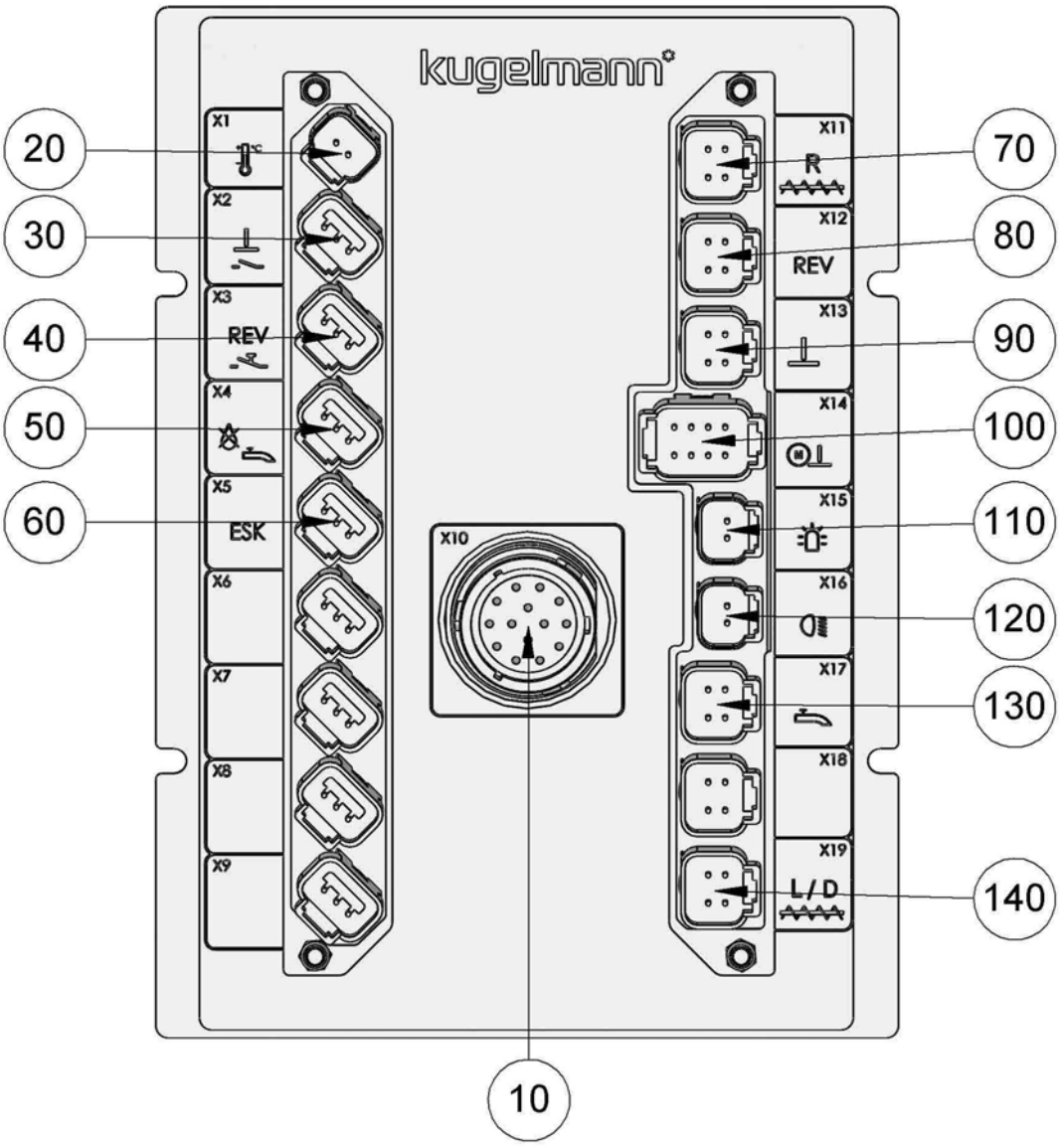
Choose

⇨

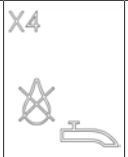
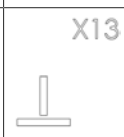
⇨

Press middle turning knob to reset the control system to factory settings

8.24 Slave



Pos.	Symbol	Explanation
10	X10	Connecting cable operating unit - Slave
20	X1 °C	Temperature sensor
30	X2	Chute sensor

Pos.	Symbol	Explanation
40		Push-button reversing
50		Sensor for brine dry run
60		Electrical monitoring of spreading process
70		Rh screw
80		Reversing valve
90		Spreading disc valve
100		Electrical adjustment of spread pattern
110		Rotating beacon
120		Working headlight
130		Brine valve
140		Lh screw / dosage (one screw)

8.25 Requirements for carrier vehicle

This chapter gives you information on the requirements for the carrier vehicle for optimum functionality of the control system:

Supply voltage	10 - 30 V
Speed signal *	5 - 200 Imp/m
Air humidity	20 - 80 %

* If no speed signal or an insufficient speed signal is available at the carrier vehicle, it is possible to fix a sensor disc provided by us at the carrier vehicle.

9 Operating instructions - Options

This chapter gives you information on the following:

9.1 Electrical adjustment of spread pattern

This chapter gives you information on the following:

The spreading image can be shifted to the left or right side.

1 Press and turn the middle turning knob to shift the spreading pattern to the left or to the right.

Position of spreading pattern

Example: Spreading pattern to the far left ⇨

Example: Spreading pattern to the far right ⇨

Hinweis

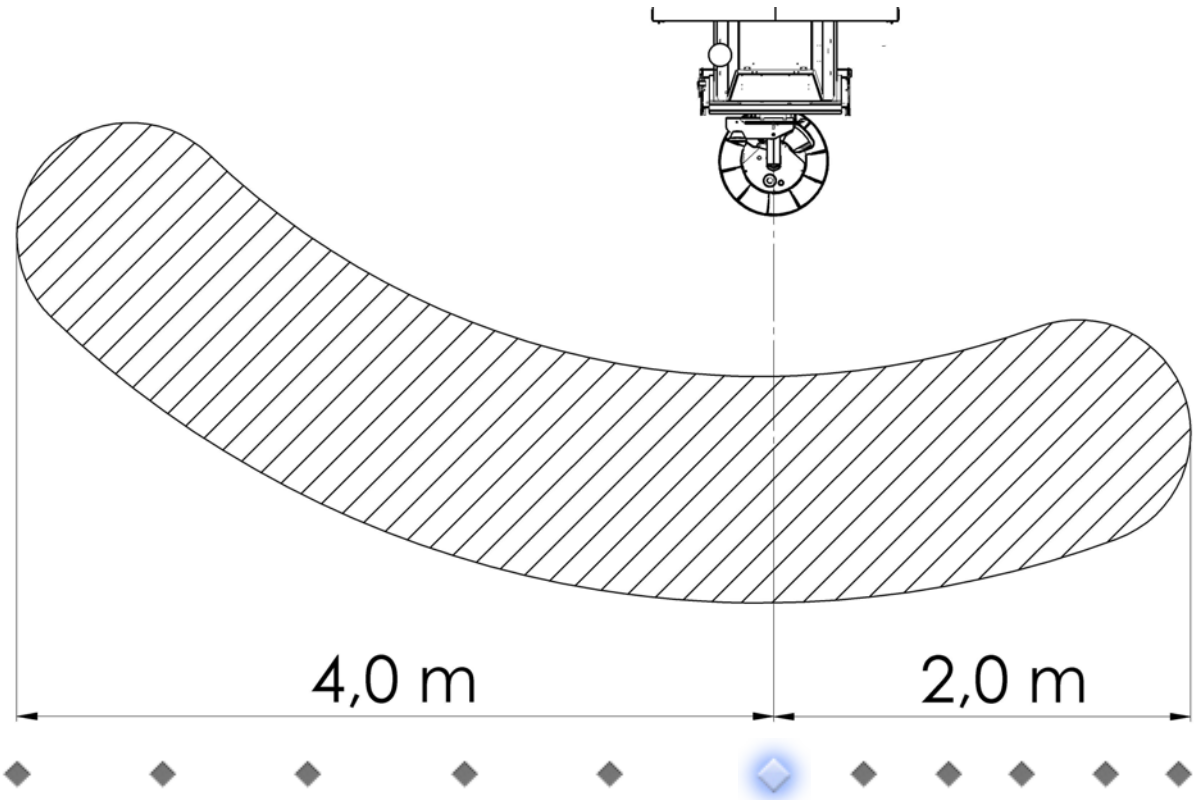
For each operator level, it is possible to set a different position for the electrical adjustment of the spreading pattern.

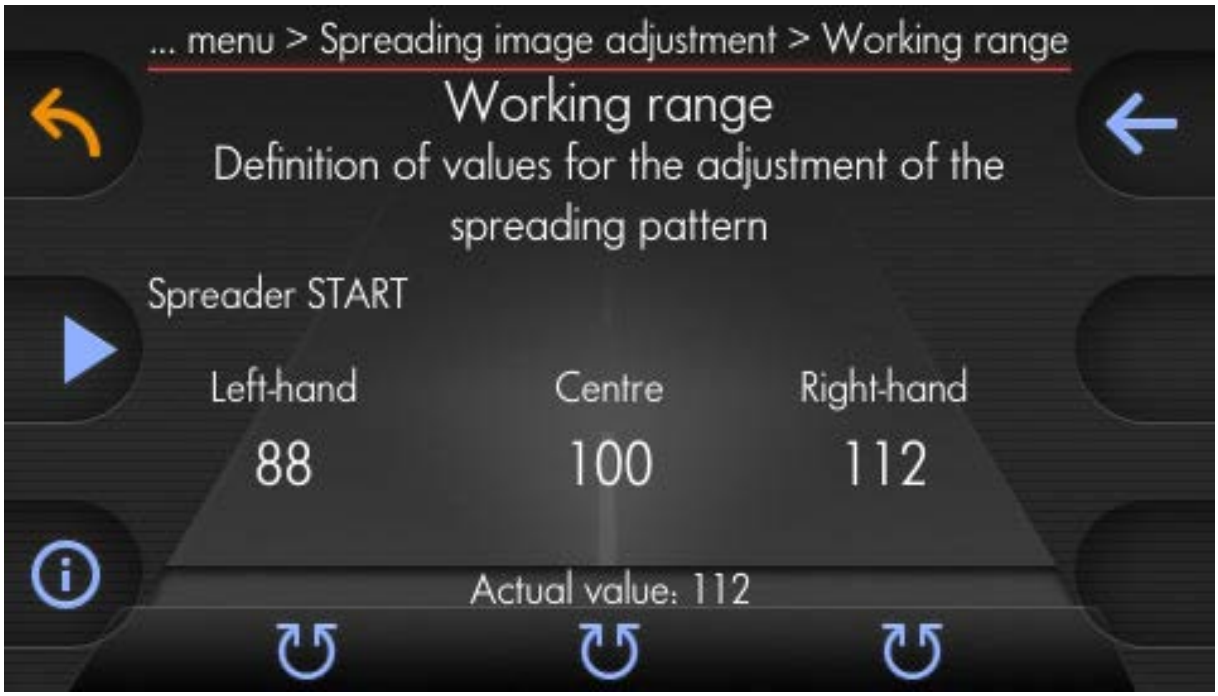
9.1.1 Configuration of electrical adjustment of spreading pattern

Setting of the values for the far left and the far right border of the spreading pattern in the field “Work area”.

This allows for example a larger displacement to the left.

Example for a desired spreading pattern:





Spreading image at the far left border | Spreading image in the middle | Spreading image at the far right border

Configuration of adjustment of spreading image:

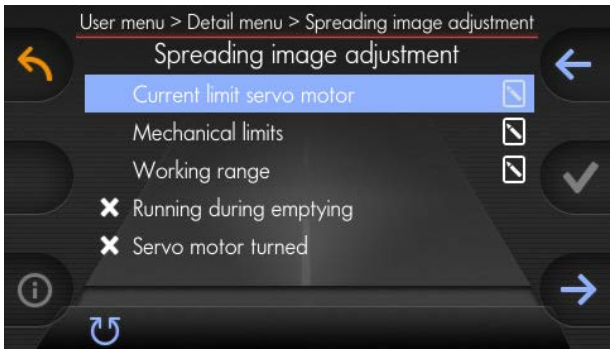
1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3  Turn left turning knob

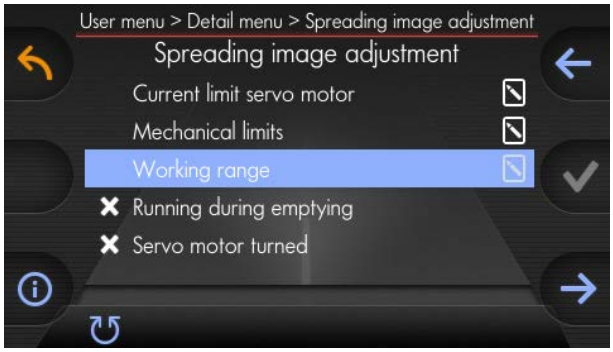
⇨ 

4  Confirm



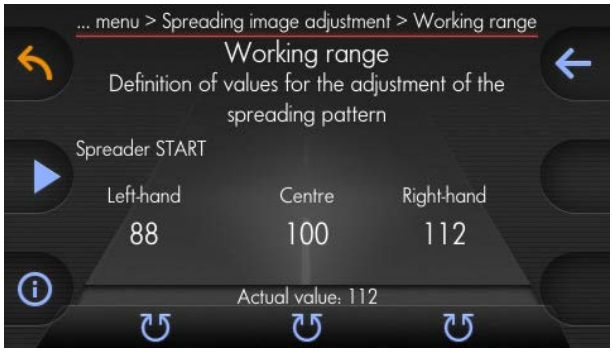
⇨

5  Turn left turning knob



⇨

6  Confirm



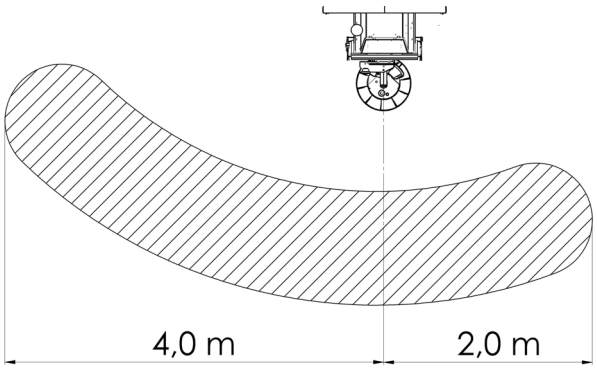
⇨

7  Turn the left turning knob and set any desired value.

8  Start the spreading operation by pressing and holding down the start button and hold down the button as soon as a clear spreading image can be seen on the ground.

9 Measure the spreading image from the middle of the spreader to the left border of the spreading image (in this example 4,0m).

⇨



10 ↺ Turn the left turning knob and adjust the set value.

- A value smaller than the value set before means the spreading image shifts more to the left.
- A value larger than the value set before means the spreading image shifts more to the right.

11 Repeat this procedure for the right side.

12 Repeat this procedure for the middle value.
The spreading image should be adjusted symmetrically to the center of the spreading machine.

9.1.2 Servo motor turned

Depending on the spreading disc unit with servo motor, the menu point “Servo motor turned” must be selected or deselected differently:

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

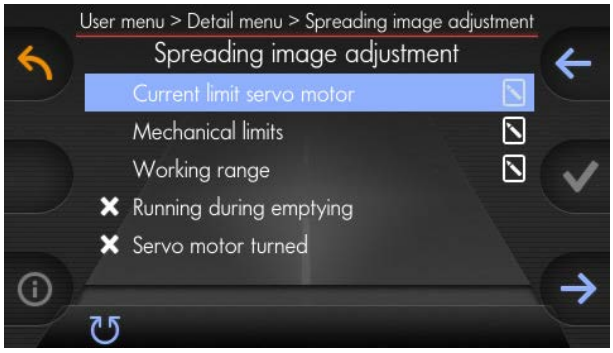
2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3 ↺ Turn left turning knob

⇨

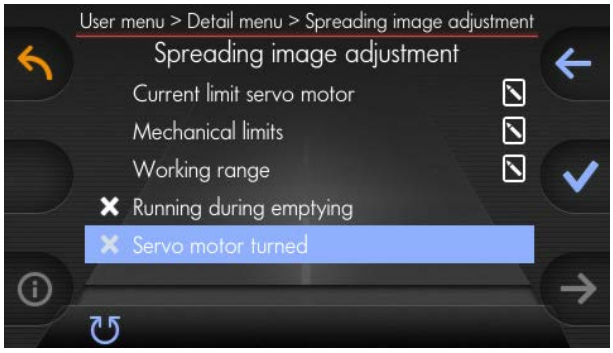
4  Confirm

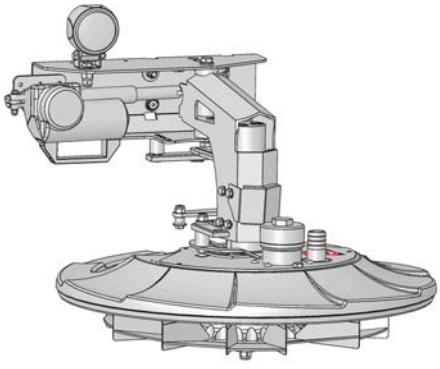
⇨



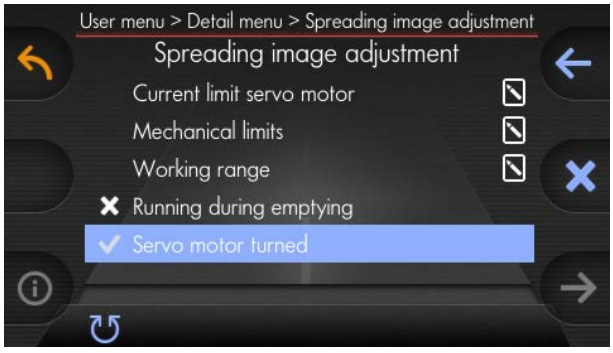
5  Turn left turning knob

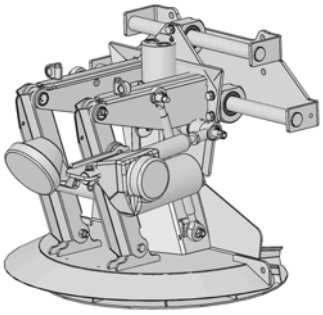
⇨



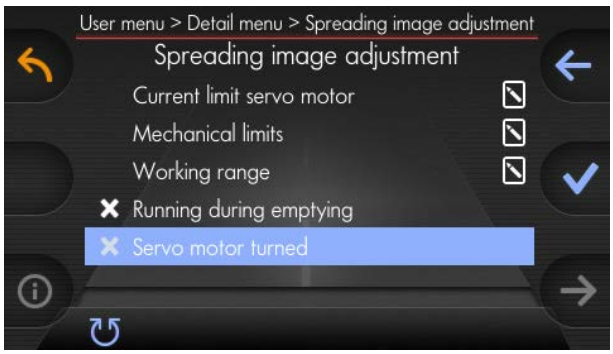


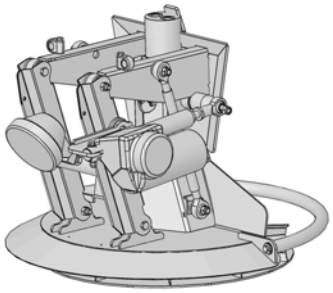
⇨



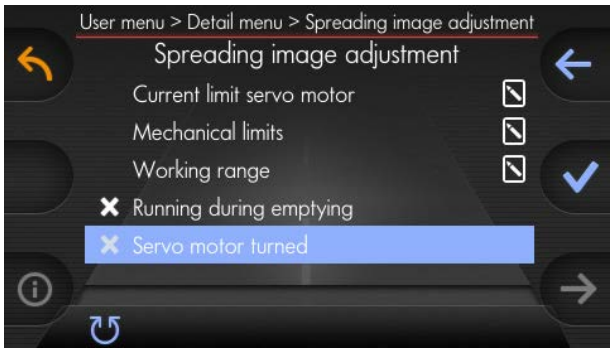


⇨


User menu > Detail menu > Spreading image adjustment
Spreading image adjustment
Current limit servo motor
Mechanical limits
Working range
Running during emptying
Servo motor turned



⇨


User menu > Detail menu > Spreading image adjustment
Spreading image adjustment
Current limit servo motor
Mechanical limits
Working range
Running during emptying
Servo motor turned

9.1.3 Mechanical limits

Hinweis

The **mechanical limits** are set at the factory.

Only necessary in case of new assembly or an exchange of spare parts of the servo motor.

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

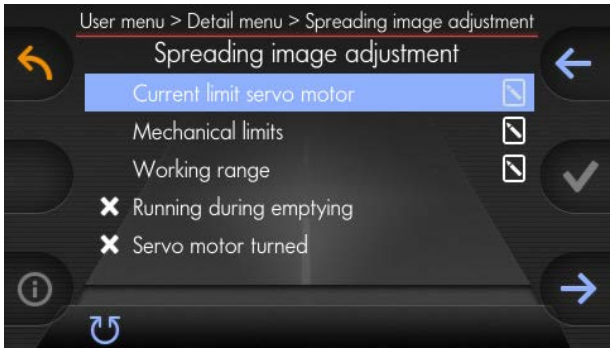
2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3 Turn left turning knob

⇨

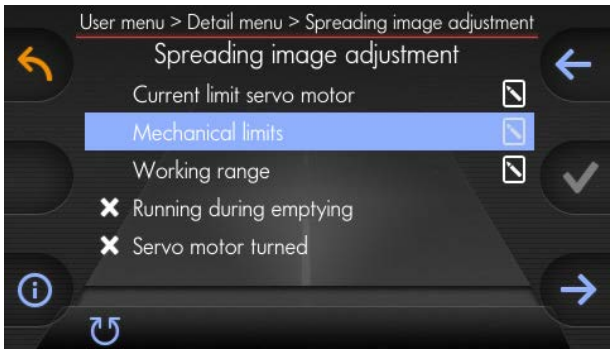
4 Confirm

⇨



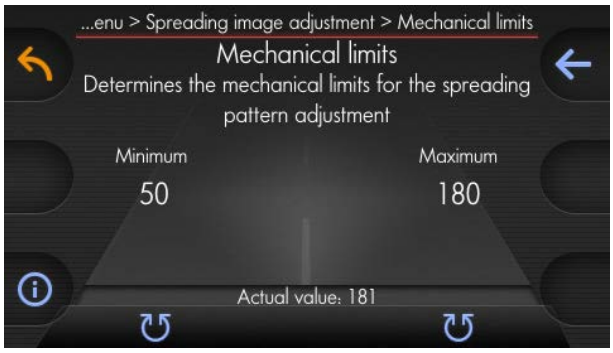
5 Turn left turning knob

⇨



6 → Confirm

⇨



7 →

- Setting of minimum position of servo motor by means of left turning knob.
- Setting of maximum position of servo motor by means of right turning knob.

Hinweis

Minimum and maximum position of the spreading disc can be determined in a number of ways:

- At some spreaders, an error tone will sound as soon as the end positions are reached.
- At some spreaders, this must be set visually.

9.2 Automatic spreading image

This chapter gives you information on the following:

- Chapter *9.2.1 "Configuration of automatic spreading image", page 126*
- Chapter *9.2.2 "Setting of automatic spreading image", page 130*

The adjustment of the spreading image may be converted to “Automatic spreading image”.

This means that exactly the area set at the control system will be covered by spreading material.

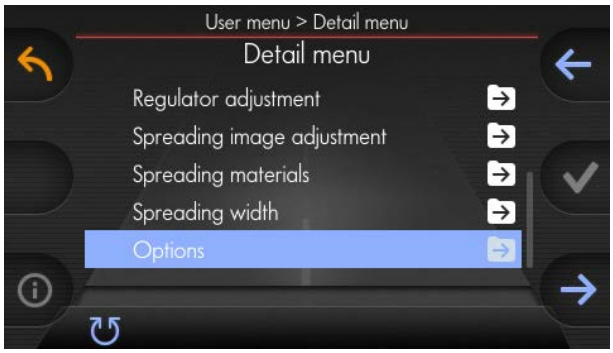
Example:

- Spreading width right side: 2,0 m (right number)
- Spreading width left side: 4,0 m (left number)
- Total spreading width: 6,0 m (middle number)

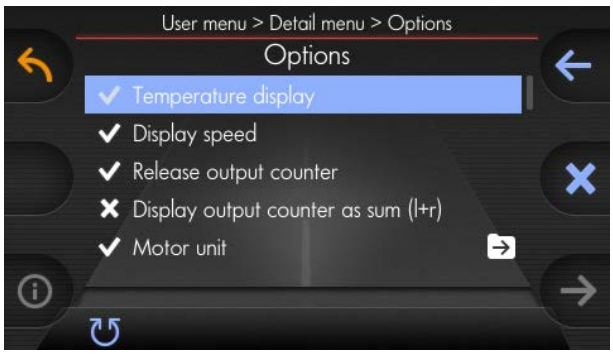
Configuration of this option as follows:

1	Open user menu (see Chapter *7.3 "Select user menu", page 34*)
2	Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

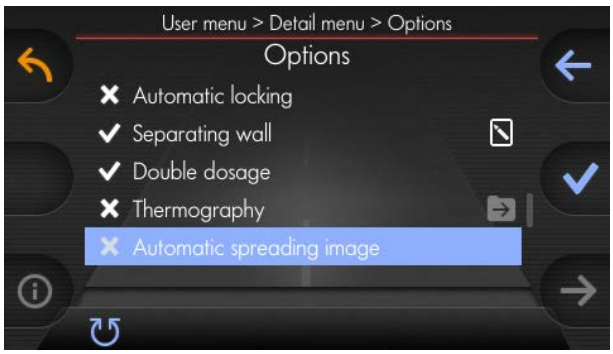
3  Turn left turning knob

⇨ 

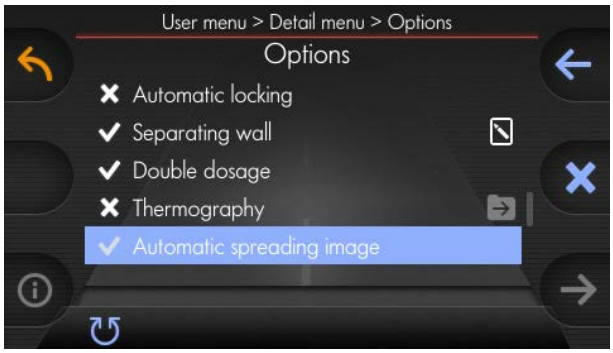
4  Confirm

⇨ 

5  Turn left turning knob

⇨ 

6  Select



⇨

9.2.1 Configuration of automatic spreading image

In order to get an optimum, symmetrical or asymmetrical spreading image, configure this at the control system.

Example:

1 Setting of any width of the spreading image (in this example: 5,0 m)

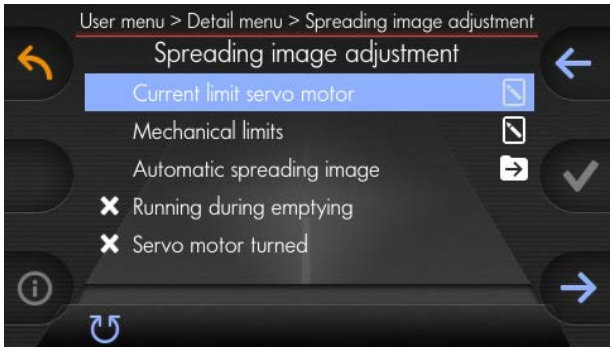
2 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

3 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

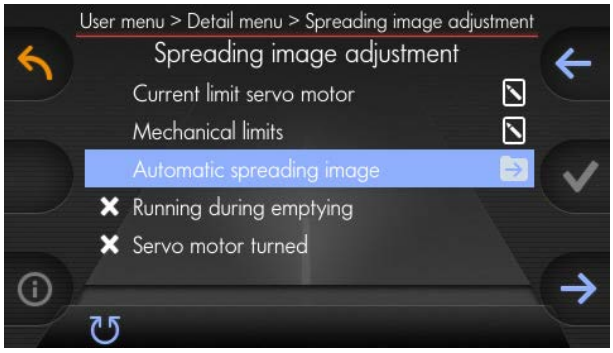
4  Turn left turning knob

⇨

5  Confirm

⇨ 

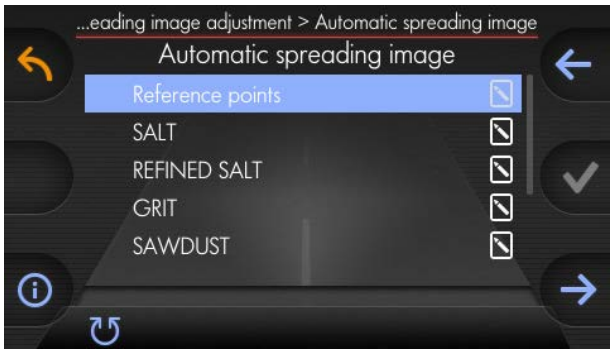
6  Turn left turning knob

⇨ 

Hinweis

This menu point will only be shown if “Automatic spreading image” is selected in the menu before (see Chapter *9.2 "Automatic spreading image", page 124*)!

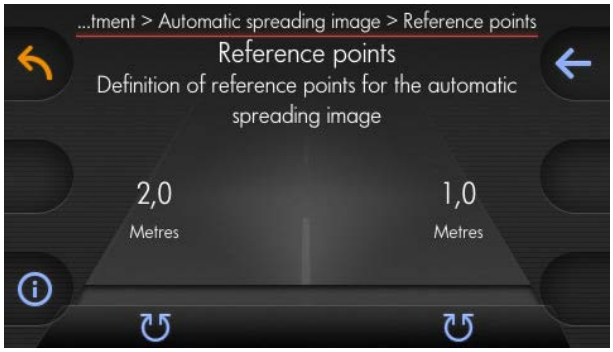
7  Confirm

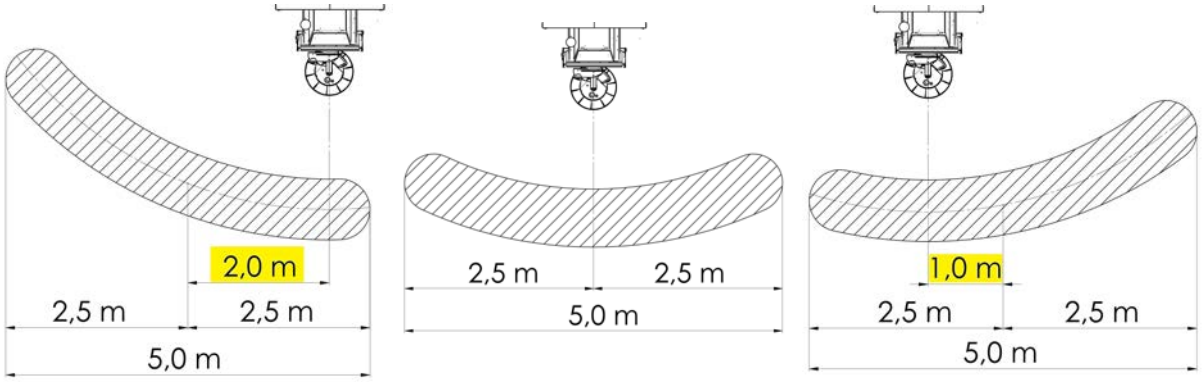
⇨ 

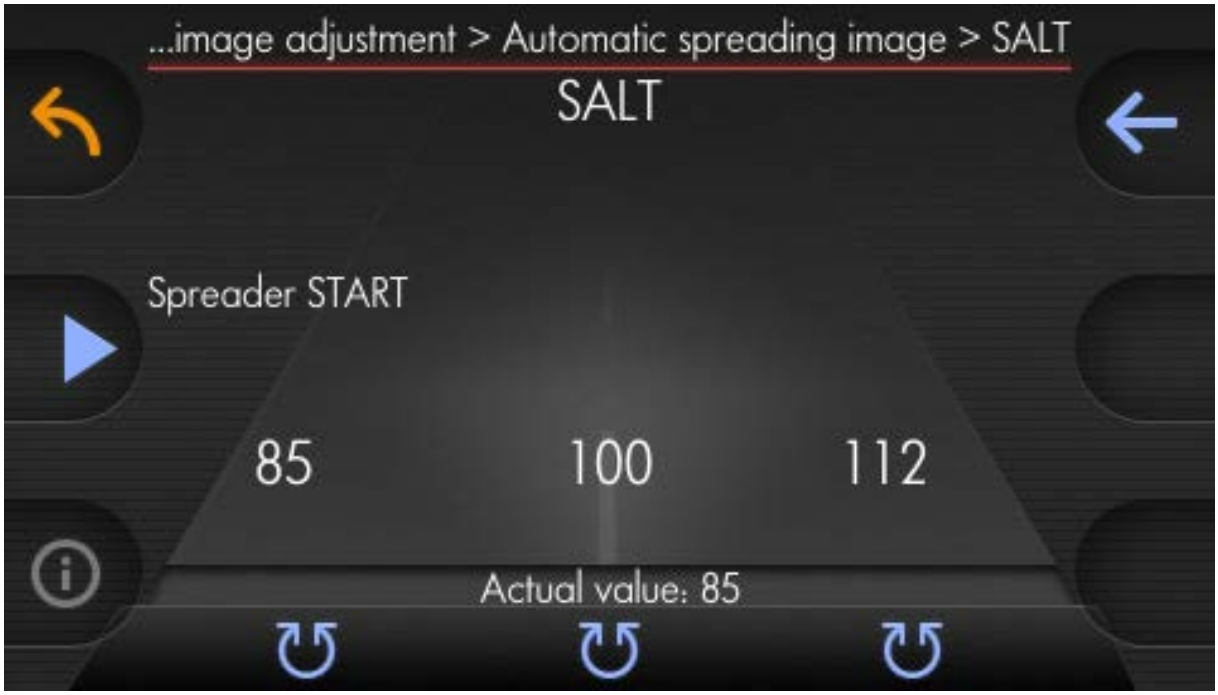
8  Confirm

Example for reference points:
The symmetry axes (middle axes) shifted 2,0 m to the left and 1,0 m to the right serve for the configuration of the spreading image.

⇨







In this example, the spreading width is 5,0 m (set above).

9 ↻ By selecting the middle turning knob (Value 100), the middle spreading image will be chosen.

10 

The spreading operation will start by pressing and holding down the spreading button.
Spreading may be effected as long as required.

11 After releasing the spreading button, spreading will finish.

12 Now, the produced spreading image can be measured and compared with the values (in this example symmetrically 2,5 m (right) and 2,5 m (left)).

13 

By turning the respective rotary control, the result can be influenced.

- If the number is turned larger (in this example: >100) the spreading image is shifted to the right
- If the number is turned smaller (in this example: >100) the spreading image is shifted to the left

14 Repeat this procedure for **the left and the right side and all used spreading materials.** wiederholen.

- In this example, the symmetry axis (middle axis) is shifted by 2,0 m to the left and 1,0 m to the right respectively.

15 “Automatic spreading image” is configured according to these settings and can be used.

9.2.2 Setting of automatic spreading image

1 Turn middle turning knob to the right to set the automatic spreading image to the right.

2 Press middle turning knob and turn it to the left to set the automatic spreading image to the left.

9.3 Electrical monitoring of spreading process

The electrical spreading control monitors whether spreading material is put out or not.

Spreading material leaves rotating spreading disc

No spreading material is spread

9.4 Spreaders with pre-wetted salt equipment

This chapter gives you information on the following:

- Chapter *9.4.1 "Configuration of brine equipment", page 132*
- Chapter *9.4.2 "Switch on/off brine spreading", page 136*
- Chapter *9.4.3 "Changing the brine proportion", page 138*
- Chapter *9.4.4 "Brine calculation", page 138*

Hinweis

Part of brine / pre-wetted salt equipment (here FS35) indicates the percentage of brine (if switched on) based on the total output:

- Brine spreading (in this example FS35) is attributed to the percentage of salt, i.e. the proportion of salt (60 g/m²) contains 35% of brine.
  - ⇨ Example: 39 g/m² salt + 21 g/m² brine = 60 g/m² (combined)
  - ⇨ Brine proportion (in this example 35 %) is only attributed to salt or refined salt.

9.4.1 Configuration of brine equipment

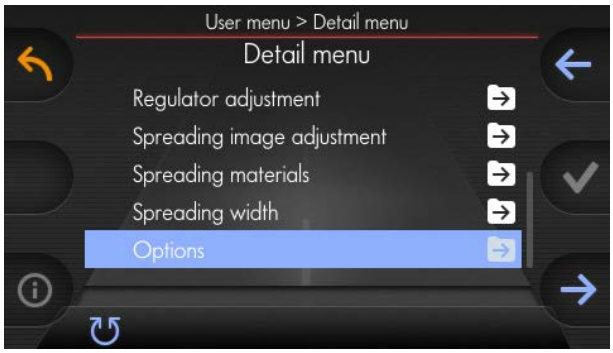
If your spreader is equipped with pre-wetted salt equipment, please configure this as follows:

1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

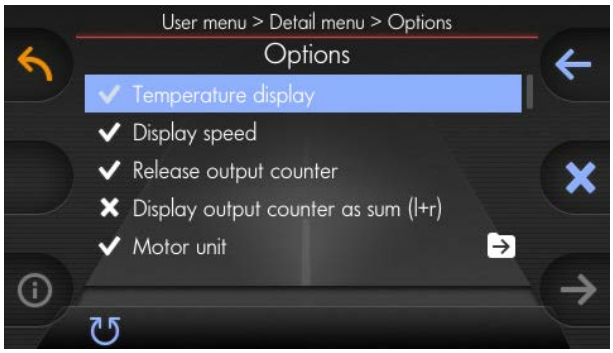
3  Turn left turning knob

⇨



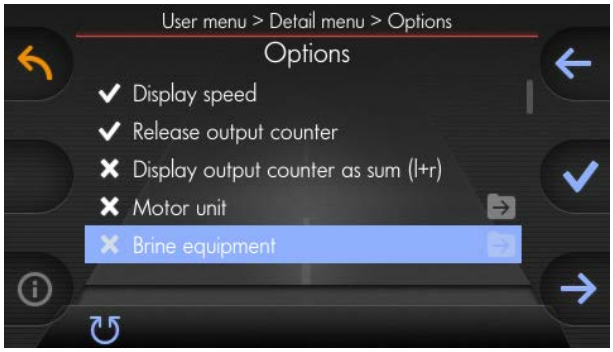
4  Confirm

1



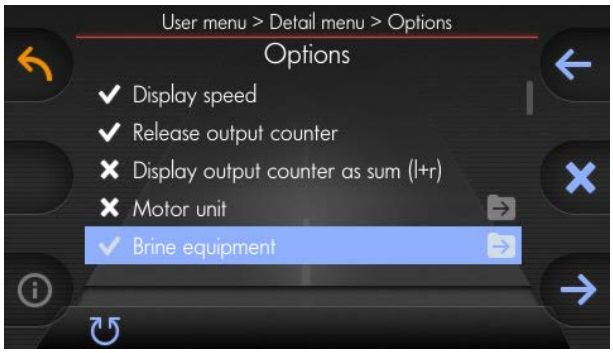
5  Turn left turning knob

⇨



6  Select

⇨



Further options for brine equipment:

Dry run warning times:

1  Confirm

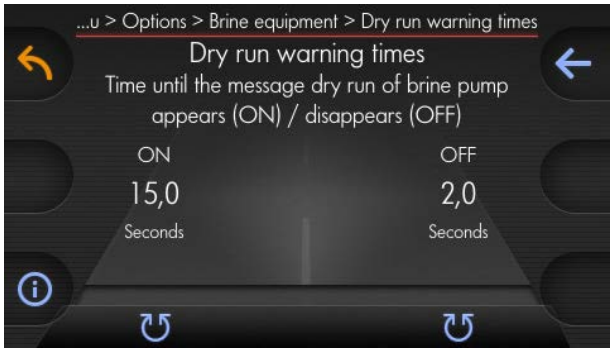
Setting of dry run warning times in this menu.
This means the period of time the control system waits starting from ⇨ dry run of the brine pump up to the moment a warning message is displayed at the main screen.

2  Select

 Deselect

3  Confirm

⇨



4 

Setting by turning knobs:

- Dry run warning time until warning message appears
- Duration of warning message

Position on the surface (main screen):

1

2 → Confirm

⇨

3 → Choose desired position

Brine is displayed on the main screen as FS..... or in .....g/m²:

✕ FS.....

✓ g/m²

9.4.2 Switch on/off brine spreading

Switch on brine spreading:

1  right

Press and hold down spreading material button

⇨

2 

Press briefly

⇨

3  right

Release spreading material button

⇨

Switch off brine spreading:

1  right

Press and hold down spreading material button

⇨

2 

Press briefly

⇨

3  right

Release spreading material button

⇨

9.4.3 Changing the brine proportion

Follow the steps below to change the brine proportion:

1	 right	Press and hold down spreading material button
	⇨	
2		Turn middle turning knob
	⇨	
3	FS20	Change the brine proportion to FS20, for example
4	 right	Release spreading material button

9.4.4 Brine calculation

The calculation of pre-wetted salt can be executed with different spreading materials.

Normally, this calculation is executed with salt or refined salt.

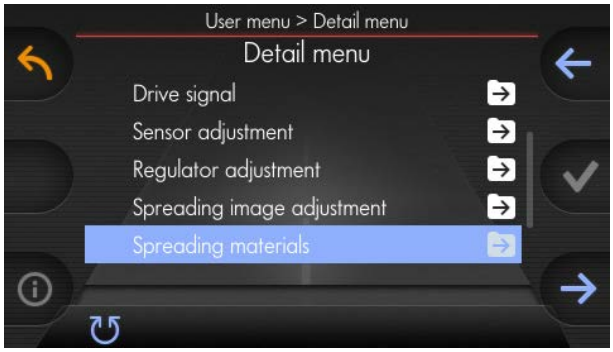
The spreading materials used for the calculation must be activated in the menu.

1	Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3 Turn left turning knob

⇨



4 Confirm

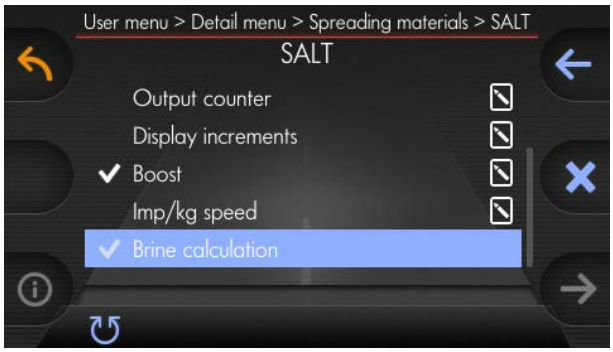
⇨

5 Choose corresponding spreading material (salt or refined salt)

⇨

6 Turn left turning knob

7  Choose respective spreading material



9.5 Motor unit

This chapter gives you information on the following:

- Chapter *9.5.1 "Configuration of motor unit", page 141*
- Chapter *9.5.2 "Start motor unit ", page 143*
- Chapter *9.5.3 "Switch off motor unit", page 144*

 Motor unit is running

 Motor unit not running

 Preheating and warming up of the motor unit

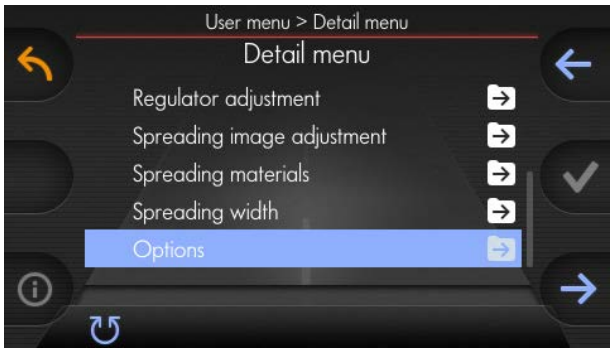
9.5.1 Configuration of motor unit

Follow the steps below to activate the motor unit:

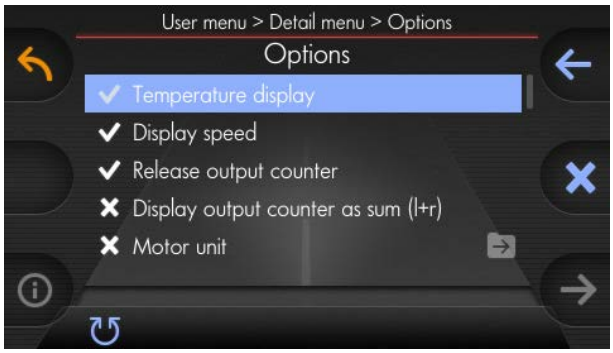
1 Open user menu (see Chapter *7.3 "Select user menu", page 34*)

2 Open detail menu (see Chapter *7.4 "Open detail menu", page 35*)

3  Turn left turning knob

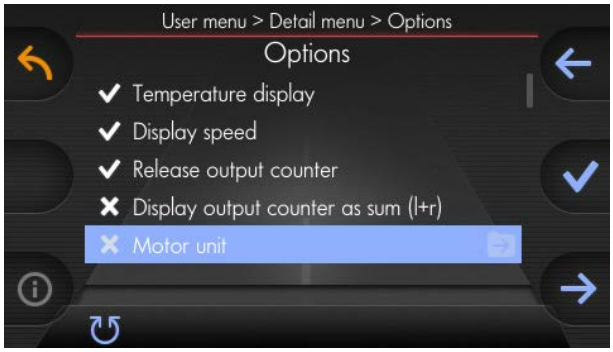
⇨ 

4  Confirm



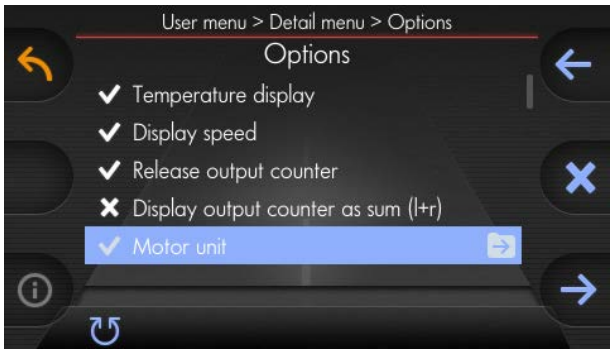
⇨

5  Turn left turning knob



⇨

6  Switch on



⇨

7  Confirm

8		Depending on the spreader version, choose diesel or petrol engine	⇨	

9.5.2 Start motor unit

Hinweis

In case of motor units with petrol version, it may be necessary to switch on the ignition at the motor unit.

The ignition has to be switched off after operation.

1		Start screen	⇨	
2		left		Press and hold down actual value button
			⇨	
3				Press briefly

Warm-up period, no operating state (only with diesel engine!) ⇨

4  left — Release actual value button

After approx. 2 minutes, the motor unit switches to the operating state (only with diesel engine!) ⇨

9.5.3 Switch off motor unit

1  left — Press and hold down actual value button

⇨

2  — Press briefly

Motor unit stops. ⇨

3  left Release actual value button

10 Storage

This chapter informs you on necessary precautions that have to be taken when putting the control system into stock.

Hinweis

- Always store the control system in a dry, covered, frost-free and salt-free area.
- Protect the control system against direct sunlight.
- Store the control system at a dust-protected place, if necessary, in an appropriate bag.

11 Technical Data

Supply voltage	10 - 30 V
Internal operating voltage	12 V
Power input	max. 10 A

12 Disconnecting the system

The control system must be disposed of in accordance with local or state regulations. Dispose of electrical and electronic waste at the collection points provided for this purpose. Kugelmann also takes care of the disposal.

Warranty

Kugelmann Maschinenbau e.K., 87675 Rettenbach a.A., warrants its machines to be free from defects in material and workmanship and undertakes to replace free of charge all parts ex works which have been purchased by relevant Kugelmann dealers and have been acknowledged as defective after having been checked by Kugelmann. The warranty expressly given shall be limited to a period of 12 months from the date of delivery of the machine to purchaser. All further claims by the customer shall be excluded.

All wear parts are excluded from warranty.

The manufacturer takes no responsibility for third-party products not produced at the works of Kugelmann. Our liability shall be limited to the assignment of claims that we are entitled against the supplier. No warranty will be given for machines purchased second-hand or used and modified or converted machines.

Hinweis

Please make sure that you fill in your warranty card and send it back to the manufacturer immediately. Claims have to be notified with a warranty claim in writing after their occurrence without undue delay (after 30 days at the latest).

Company
Kugelmann Maschinenbau e.K.
Gewerbepark 1-5
87675 Rettenbach a.A.
Germany

Device type: .....
Serial number: .....
Number of control system: .....

Address of dealer:
.....
.....
.....

Address of user/owner:
.....
.....
.....

I have read the operating instructions.
Signature of user: .....
The warranty card has to be sent directly to the manufacturer.
ATTENTION: Warranty claims are only accepted with the warranty card of Kugelmann Maschinenbau e.K.

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