

# K-TRONIC

Control system



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## Explanations

### User interface

Display appearing after switching on the control system k-tronic.

### Turning knob

The control system k-tronic disposes of 3 turning knobs in the lower area. The turning knobs have no internal/mechanical stop, they can be rotated continuously.

In addition, the turning knobs feature a push-button function. To actuate this button, the turning knob must be pressed in the direction of the rotation axis.

The turning knobs have partly different functions within the different menu options. During turning the turning knob, the value of the setup screens changes at the last digit. At many setup screens, the values can be modified with the turning knob pressed; the setting value changes by factor 100 per detent.

At particular setup screens, the push-button of the turning knob triggers actions.

### Button 1 to button 6

The control system k-tronic has 6 buttons.

The buttons have partly different functions within the different menu options. If a

button with a small symbol is displayed (e.g. button ) , the button closest to the displayed symbol is meant.

In certain cases, a different button must be pressed for a function (e.g. right and left shift key).

### Button ON

The button ON at the control system k-tronic switches on and off the supply voltage of the spreader.

When switching on by means of the ON button, the spreader always starts at level 1 with operating mode **PAUSE**

The spreader starts also at level 1 even if the control system has been switched off at level 2.

When switching off by means of the ON button, all drive units will be stopped and all connected consumers will be switched off.

## Menu

A menu consists of one or several menu lines. A further menu or a setup screen can be attached to a menu line. Depending on the equipment of the spreader, individual menus may feature a lower number of menu items as described here.

Go to a subjacent menu or setup screen by means of button 6 .

Leave the menu or screen by means of button 4. .

## Choose menu line

Skip from one menu line to the next by turning the left turning knob . The menu line highlighted in dark color is selected. By turning the turning knob clockwise, the menu line below will be selected; by turning anti-clockwise, the menu line above will be selected. If a menu consists of more than 5 menu points, the whole menu will be built up on several pages. It is possible to browse within the menu in blocks of a maximum of 5 pages. To control where you are currently navigating, a small rectangle is shown on the right side that moves up or down depending on the menu line.

## Soft switch

There are menu lines offering a 0/1 possibility to select. In such cases, the respective menu line is equipped with a so-called soft switch. The setting is limited to "ON" (  ) or "OFF" (  ). The current switching status of the soft switch is displayed in the respective menu line for review. With the menu line selected, the alternative switching status is displayed at button 5.

## Setup screen

A setup screen may be attached to the menu line. A setup screen is split into three columns, whereby values must not be stored in all three columns. Always use the turning knob below to change values within a column. The modified values of the setup screens are adopted and stored immediately.

With a menu line selected, go to the setup screen by means of button 6 .

Use button 4  to leave the setup screen.

**If a large value range can be set in a column of the setup screen, the value may be changed by factor 100 per detent by turning the pressed turning knob.**

## The details menu

During the first assembly of the spreader onto the carrier vehicle, settings, which are necessary for the correct operation of the spreader, are made in the details menu. Also the individual options of the spreader are selected and deselected here.

Find the details menu as follows

**For safety reasons, the spreader must be in operating mode **PAUSE** before entering the user menu.**

Keep the left shift key  pressed.

Press the button 6 for a short time  to go back to the user menu.

Now, release button 3.

Choose the line "Details menu" by means of the left turning knob , the line will be highlighted in dark color. Then, press button 6 .

You are now prompted to enter the access code.

The same screen also shows the current software version of master and slave. The access code for the details menu is calculated as follows:

$$999 + 3 \text{ times master version} - 1 \text{ time slave version}$$

z.B.: With master version number 2 and slave version number 4 you have to set  $999 + 3 \times 2 - 1 \times 4 = 1001$  by means of the middle turning knob.

Use button 6 to go to the details menu.

## Contents of details menu

### Error list

Display of last errors with a frequency counter.

### Warning list

Display of last warnings with a frequency counter.

### Speed signal

Adjustment of spreader to the speed signal of the carrier vehicle.

### Sensor adjustment

Setting of sensors at the individual drives of the spreader.

### Regulator adjustment

Presetting of regulation parameters for the operation of the spreader.

### Adjustment of spreading image

Only for spreaders with electrical adjustment of the spreading pattern. The values for the electrical adjustment of the spreading pattern are set here.

### Spreading materials

Setting of pulses per kilogram for the left and right screw at the corresponding spreading materials.

## Spreading width

Setting of spreading width at the mounted spreading disc.

## Options

Possibility to carry out additional settings for operation.

**Depending on the equipment of the spreader, it is also possible that less menu points are available in this menu. For example, the menu point “adjustment of spreading pattern” is not available at all spreaders.**

## Error list

Up to 15 errors with frequency and order of appearance may be displayed in the error list. The latest error is displayed on top of the list.

## Frequency counter

If the same error occurs several times, the frequency counter is increased at each occurrence of the error. As soon as another error occurs, the list will be extended by a new entry.

The display may be deleted by button 1. This means that errors which have occurred before deletion of the display can no longer be shown by means of the control system. If no new errors occur until the next selection of the error list, an empty list will be displayed.

Use button 4  to leave the error list - no entries will be deleted. If more than 15 errors have occurred in different order, the older errors can no longer be displayed by the control system.

## Warning list

Up to 15 warnings with frequency and order of appearance may be displayed in the warning list. The latest warning is displayed on top of the list.

## Frequency counter

If the same warning occurs several times, the frequency counter is increased at each occurrence of the warning. As soon as another warning occurs, the list will be extended by a new warning.

Use button 1 to delete the warning display. This means that warnings which have occurred before deletion of the display can no longer be shown by means of the control system. If no new warnings occur until the next selection of the warning list, an empty list will be displayed.

Use button 4  to leave the warning list - no entries will be deleted. If more than 15 warnings have occurred in different order, the older warnings can no longer be displayed by the control system.

If no new warnings have occurred since the last reset of the warning list, an empty list will be displayed.

## Error and warning list

Error	Designation	Possible cause	Troubleshooting
1	Vehicle voltage too low	<ul style="list-style-type: none"> <li>The supply voltage was or is below 10.0 V, e.g. because of starter or short circuit in the electrical system</li> </ul>	<ul style="list-style-type: none"> <li>Elimination of cause for the voltage drop</li> <li>Confirm the error message by activating the pause button</li> </ul>
2	Unit off	<ul style="list-style-type: none"> <li>The oil unit has been switched off manually</li> <li>The unit has run out of fuel (tank empty)</li> </ul>	<ul style="list-style-type: none"> <li>Eliminate cause for standstill</li> <li>Restart unit</li> </ul>
3	Error reversing	<ul style="list-style-type: none"> <li>reversed</li> </ul>	<ul style="list-style-type: none"> <li>reversed</li> </ul>
4	Sensor disc defective	<ul style="list-style-type: none"> <li>The sensor does not recognize a change</li> <li>No oil supply for spreader</li> <li>Drive jammed or stuck</li> <li>Sensor incorrectly set</li> </ul>	<ul style="list-style-type: none"> <li>Eliminate blockades or false positions</li> <li>Ensure oil supply</li> <li>Set sensors correctly</li> </ul>
5	Right sensor defective		
6	Left sensor defective		
7	Sensor brine pump defective		
8	Undersupply screws	<ul style="list-style-type: none"> <li>The spreading quantity can not be reached with the current oil capacity</li> <li>Oil capacity too low</li> <li>Speed too high</li> <li>Characteristic curve wrong</li> </ul>	<ul style="list-style-type: none"> <li>Reduce speed</li> <li>Correct characteristic curve</li> </ul>
9	Undersupply disc		
10	Undersupply brine pump		
11	Oversupply brine pump	<ul style="list-style-type: none"> <li>The current quantity of spread material is much too high</li> <li>Handwheel open</li> <li>Characteristic curve wrong</li> </ul>	<ul style="list-style-type: none"> <li>Close handwheel</li> <li>Correct characteristic curve</li> </ul>
12	Oversupply right side		
13	Oversupply left side		
14	Oversupply disc		
15	Setting motor blocked	<ul style="list-style-type: none"> <li>Setting motor oxidized</li> <li>Settings min/max wrong</li> <li>Disc unit bent</li> </ul>	<ul style="list-style-type: none"> <li>Clean setting motor, make it running again or replace it</li> <li>Correct settings</li> <li>Adjust or replace disc unit</li> </ul>
16	Pause because of chute		
17	Error thermography	<ul style="list-style-type: none"> <li>Connection to sensor defective</li> <li>No thermography connected</li> </ul>	<ul style="list-style-type: none"> <li>Check socket connections and cables</li> <li>Connect sensor or select in menu</li> </ul>

Warning	Designation	Possible cause	Eliminate warning
1	Unit does not start	<ul style="list-style-type: none"> <li>• Unit - battery empty</li> <li>• Ignition not switched on</li> <li>• Fuel tank of unit empty</li> </ul>	– with Pause button
2	Unit does not stop	<ul style="list-style-type: none"> <li>• Cable break/short-circuit</li> </ul>	– with Pause button
3	Dry run brine pump	<ul style="list-style-type: none"> <li>• Brine reservoir empty</li> <li>• Sensor dry run maladjusted</li> </ul>	<ul style="list-style-type: none"> <li>– Fill brine reservoir</li> <li>– Confirm with Pause button</li> </ul>
4	Electrical monitoring of spreading process	<ul style="list-style-type: none"> <li>• no spreading material left in spreader</li> <li>• Electrical monitoring of spreading process incorrectly set</li> <li>• Incorrect position of sensor flag</li> </ul>	<ul style="list-style-type: none"> <li>– Refill spreading material</li> <li>– Set or readjust sensor</li> </ul>
5	Pause because of chute	<ul style="list-style-type: none"> <li>• Chute standstill or folded up in manual mode</li> <li>• Vehicle voltage below operating voltage for sensor</li> </ul>	<ul style="list-style-type: none"> <li>– Fold down chute</li> <li>– Sensor control chute</li> <li>– Control vehicle voltage</li> </ul>
6	Unit tank nearly empty	<ul style="list-style-type: none"> <li>• Fuel tank nearly empty</li> </ul>	– Fill up fuel
7	Unit error	<ul style="list-style-type: none"> <li>• Generator does not operate correctly</li> <li>• Pressure switch motor oil responding</li> <li>• Overtemperature motor</li> <li>• General error motor</li> </ul>	– carry out maintenance of motor (see instructions)
8	Unit - hydraulic oil empty	<ul style="list-style-type: none"> <li>• Hydraulic oil sensor responding</li> </ul>	– fill up hydraulic oil or control sensor

## Speed signal

In order to guarantee correct operation of the spreader with path dependence, the speed signal of the spreader must be adjusted to the respective vehicle. You have three different entry possibilities:

- Teach-in
- manual entry
- via distance

### Teach-in

Teach-in is a simple method to adjust the speed signal to the respective vehicle. Drive the vehicle with one of the two preset speeds (15 km/h or 30 km/h) and press the turning knob with the respective indication “Teach-in 15 km/h “ or “Teach-in 30 km/h”. The value for the speed signal will be determined and saved for displaying the speed at the control system k-tronic.

For controlling purposes, the current speed is displayed in the upper right corner. The display is calculated via the value which is stored in the control system for impulses per driven meters.

The impulses per driven meter currently stored in the control system are displayed in the middle column. In case of minor deviations between the display at the control system k-tronic and the speedometer, the value for the impulses per driven meter can be corrected by means of the middle turning knob. When exiting the setup screen by means of button 4



, the last value displayed is maintained for the calculation of the speed display and thus for the calculation of path dependence.

In case of minor deviations between the display at the control system k-tronic and the speedometer, you can of course press the respective turning knob anew as soon as the indicated speed of 15 km/h or 30 km/h has been reached. This can be repeated until the result is satisfactory. When exiting the setup screen, the last determined value for the speed signal is saved and will be used for the operation of the spreader in case of path-dependence.

### Manual entry (speed signal)

In many cases, the value for the speed signal is indicated in the instruction manual of the vehicle on which the spreader is mounted. If the value for the speed signal of your carrier vehicle is known, you can directly set this value in the setup screen “manual entry”.

Setting range: 0.50 to 650.00 impulses/meter

If your vehicle supplies a higher value than 650 impulses per meter, please interpose our speed signal divider. By means of this signal divider, the speed signal from the vehicle is divided down by the factor 10 and fed to the control system k-tronic. Thus, values up to 6500.0 impulses per driven meter may be recorded.

## Via distance

You can also determine the speed signal for the spreader via an exactly calculated distance. You drive up to the starting point of the measuring distance, press the start button, cover the measuring distance directly without stopping and press the stop button at the end. All impulses between pressing the start and stop button are counted and calculated together with the entered distance.

**It is important to cover the distance directly, each change of direction leads to a wrong measuring result.**

**If there is a deviation between the speed signal at the vehicle and the display at the control system k-tronic, this may have different causes:**

- change of direction during driving the measuring distance
- start or end point not exactly reached
- worn tyres of vehicle
- driving with snow chains etc.

## Sensor adjustment

The sensors of the individual drives are set at the manufacturer's works. If, contrary to expectations, a sensor does not function, the function of the individual sensors can be controlled at this setup screen. If a defective sensor has been replaced, the new sensor is set to the correct distance with respect to the sensor disc or the motor shaft by means of this setup screen.

To move the respective drive, the hydraulic system has to be switched on; then, you press the middle turning knob. At the lower right corner, 2 small numbers appear.

The upper number indicates the current distance from the sensor to the punched disc or motor disc. If the individual values are smaller than 70, this can lead to a failure during teach-in of the regulator adjustment. In case of values above 210, the sensor may be destroyed.

The lower number shows the identified impulses. If this number does not change, the sensor may be too far away, connected incorrectly, the sensor line may be interrupted or the sensor may be defective.

It is important to carry out the setting of the spreading disc sensors and the brine pump with greatest caution, because it is not possible to see the distance between sensor and the toothed shaft. It is recommended to turn in the sensor only in small steps and check at regular intervals in between. If the sensor is advanced too far at the beginning, it may be destroyed by the turning shaft.

# Regulator adjustment

The control system k-tronic determines own regulator parameters for each hydraulic drive. These regulator parameters are necessary so that the drive units reach the correct speeds after a spreading pause or a change of settings.

**The basic setting of the individual regulators must be carried out at each spreader with the corresponding hydraulic oil supply.**

## Parameters

At the control system k-tronic, one set of parameters is part of each hydraulic drive. These 2 parameters are necessary for the control behavior of the relevant drives. These parameters are determined by means of numerous tests and must usually not be corrected. The damping stands for the reaction time of the regulation and the ramp stands for the amount of change.

**If a drive should overshoot or undershoot in case other values are regulated, it is wrong to increase damping in order to faster reach a value. Overshoot or undershoot may only be avoided by reducing the values.**

## Teach-in

To reach a correct working result of the spreader, a teach-in of the individual hydraulic motors of the drives is necessary during first assembly of the spreading unit. This is done via teach-in.

Observe the following rules for teach-in:

- The sensors must be set exactly
- The hydraulic unit must supply a sufficient quantity of oil. Set the vehicle speed to the upper limit of the green area.
- The speed must be constant during the whole teach-in procedure.

**Tip button 1 to start the teach-in. The drive starts to rotate slowly and is getting faster until the maximum speed has been reached. This procedure is run through 2 times. In case of danger, it can be stopped by pressing button 4.**

**The progress of teach-in is displayed at the appearing bar. At the end of the teach-in, values are shown and the result whether the attempt was successful or not.**

If the teach-in has failed, it has to be determined by means of the displayed values why the error has occurred.

The determined values for 0 to 10 must be in ascending order. If one value is higher than the value that follows, the teach-in has to be carried out once again because there may be some air bubbles left in the oil circuit.

If several values are out of sequence, the sensor of the respective drive should be checked once again. During sensor adjustment, no single value of the smaller number must be below 70!

If a value above 1900 exists for one parameter, all values are rejected although a uniform increase of values would be present. Maybe the oil supply has collapsed or the speed was not constant until the end.

If 0 is present at value "0", this may mean that the drive rotates without external intervention. Check whether the handwheels at the hydraulic block are closed, start teach-in again.

## Characteristic curve

**Caution! In this setup screen, wrong operation may cause the greatest damage. Incorrect operation may lead to maladjustment of the characteristic curves, this means that the drives may turn very slowly or not at all. Incorrect operation may also lead to the setting of a characteristic curve which is not "OK".**

In this setup screen, the desired parameter is set at the left side: 0 - 10

In the middle, the numerical value for the parameter set at the left side is displayed: 0.00 to 20.00 W

At the right column, the determined frequency for this drive is displayed: 0.00 to 300.00 Hz

## Error delay

As a continuing oil flow can not be guaranteed at some oil supply systems, e.g. in case of PTO pumps, the individual errors can be delayed in such cases. For example, the delay of speed monitoring (sensor defective) can be delayed for the period of one switching operation.

Delayable:

- Oversupply (0 - 25.0 seconds)
- Sensor defective (0 - 25.0 seconds)
- Undersupply (0 - 25.0 seconds)

# Adjustment of spreading image

Only for spreaders with “Electrical adjustment of spreading pattern”.

**Increased danger of contusions. During the adjustment of the spreading pattern, do not reach into the displacement range of the spreading disc suspension.**

**Setting ranges of the spreading image values: from 0 to 255**

**MINIMUM:** from 0 to “working range - LEFT”

**LEFT:** from “mechanical limits - MINIMUM” to “Working range - CENTER”

**CENTER:** from “working range - LEFT” to “Working range - RIGHT”

**RIGHT:** from “Working range - CENTER” to “mechanical limits - MAXIMUM”

**MAXIMUM:** from “working range - RIGHT” to 255

## Current limit

The motor current is monitored to recognize blocking of the servo motor. As the motors may have different sizes, the current limit for the respective motor size has to be set here.

Example: Linak Type 121P00 -> 1.8 ampere or,  
Linak Type M301P1 -> 4.0 ampere

## Mechanical limits

The mechanical limits are determined during first commissioning of the spreader and indicate the maximum displacement travel of the electrical adjustment of the spreading pattern. These settings are made at the manufacturer's works. If the motor should be replaced, these mechanical limits have to be determined again.

If a new value is entered in the setup screen for min. or max., this new value will be reached immediately. For controlling purposes, a small number appears at the center of the display showing where the servo motor is located at the moment.

If, in a column, the value cannot be modified in a certain direction, this is limited by the setting ranges mentioned above.

If the motor should block, an error tone will sound and the control number at the center does not change anymore. If the error tone sounds when setting the minimum limit, the value for minimal must be set slightly higher than the displayed control number. Example: If the control number remains at 23, the value for MIN. is set to 25.

When setting the maximum limit, the value for MAX. must be set slightly lower than the reached control number.

**In case of danger, the movement of the servo motor may be stopped immediately by pushing a button or a turning knob.**

## Working range

The setup screen “Spreading pattern control values” is attached to the menu point “Working range”. The set values may be retrieved by the pressed down middle turning knob in the user interface.

The value LEFT for the working range indicates the setting the servo motor takes for the left spreading image position. Always indicated in the direction of travel.

The value RIGHT for the working range indicates the setting the servo motor takes for the right spreading image position.

The value CENTER for the working range indicates the setting the servo motor takes for the middle spreading image position.

The positions in between are calculated by means of the 2 enclosed values.

If the value of working range LEFT can no longer be reduced although the mechanical system has not yet reached its limits, this is due to the fact that at the mechanical limit MINIMUM and the column LEFT the same number is indicated.

In this case, you can adjust the value at the mechanical limit LEFT.

The same applies for the setting value at the working range RIGHT.  
The mutual limitations are visible at the page at the side.

## Button 1 - Spreader START

A short spreading attempt may be started for a quick check of the set values. For this spreading attempt, the spreading data are used which were set when entering the user menu at the user interface. As the adjustment of the spreading pattern is mostly executed at vehicle standstill, it makes sense to switch to manual mode/simulation speed at the user interface.

## Movement during emptying

If this option is activated, the servo motor drives to MAX. when entering the mask “Emptying”. This option is mainly used for three-point spreaders as the screw units may clog during emptying.

# Spreading materials

In this menu, the individual spreading materials are approved for the user. The following spreading materials can be selected:

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

The spreading material brine does only figure in the list if the spreader is equipped with the option brine equipment.

If the line with the corresponding spreading material is selected, it is possible to change between active ✓ and not active ✗ by means of button 5.

The spreading materials provided with a ✓ at the corresponding menu line are listed at spreading material selection at the user interface.

Spreading materials which are set at the user levels can not be deactivated here. It is not possible to deactivate the last spreading material left on the list.

For „MAX“ or „X2“, level 2 must also be observed.

**If a spreader should be converted from one single spreading material to another, proceed as follows:**

- **The new spreading material must be approved in menu “Spreading material”.**
- **Replace the old spreading material at all levels of the user interface by the new one.**
- **Now, deactivate the old spreading material in menu “Spreading material”.**

## Spreading material menu

For each spreading material, a sub-menu for settings is attached. You can branch into the attached menu as soon as the respective spreading material is activated.

The values deposited here are decisive for the exact dosing during the spreading procedure.

The menus of the individual spreading materials contain the following points:

### Imp/kg (manually)

The impulses per kilogram of the respective spreading material are indicated in this setup screen. Possibility to control and correct the value here, if necessary. The value must be entered for each drive.

Setting range: from 2.00 to 450.00 impulses/kg

Subject to modifications

## Imp/kg (teach-in)

The simplest way to determine the imp/kg is effected via teach-in.

The selected chamber must be filled with the respective spreading material. The screw channel must be filled before measuring, so that the measuring result may not be distorted.

For the measuring, use a reservoir of an appropriate size (approx. 60 l). In case of a truck-mounted spreader, place the reservoir below the corresponding screw outlet (with chute folded up). In case of a three-point spreader, place the spreading disc as far back as possible.

Then, fill the reservoir via "teach". Hold the left rotary encoder pressed. The drive starts running; the counted impulses of the drive are shown for controlling purposes.

The fed weight is calculated by means of the impulses/kilogram currently set and displayed in the middle of the setup screen. Fill the reservoir until the required impulses are counted.

As soon as the required number of impulses has been reached, determine the weight of the supplied spreading material. Consider the net weight of the used reservoir. If the weighted weight deviates from the display value at the control system, set the weighted weight by means of the middle turning knob.

To save the values, press the right turning knob "OK". Only now the new indicated imp/kg are adopted for further calculation.

If you exit the setup screen without pressing the right turning knob, the value will be rejected and the old imp/kg remain valid.

When exiting the setup screen, the impulses counted up to this moment will be deleted.

## Leakage brine pump at spreading material brine

To avoid formation of drops, a non-return valve is installed after the pump. To open this valve, the pump must reach a certain speed. As this speed would be missing later during dosage, this speed must be set.

If all hoses are evacuated up to the non-return valve, the setting of the leakage speed can be started. Keep the button 1 (start of pump) pressed and set the speed with the middle turning knob in a way that a constant minimum brine flow is visible at the nozzle. Values between 2.0 and 5.0 Hz are typical values.

## Imp/kg teach-in with spreading material brine

Before you begin with the teach-in for brine, the leakage of the brine pump must be set (see above). No air must be inside the hoses for brine dosage.

Before you begin measuring, place a reservoir (approx. 60 l) below the brine nozzle. Then, fill the reservoir via "teach". Hold the left rotary encoder pressed. The brine pump starts running;

the counted impulses of the pump are displayed for control purposes.

The supplied volume is calculated by means of the impulses/kilogram currently set and displayed in the middle of the setup screen. Fill the reservoir until the required impulses are counted.

As soon as the required number of impulses has been reached, determine the weight of the supplied brine. Consider the net weight of the used reservoir. If the brine weight deviates from the display value at the control system, set the weighted value by means of the middle turning knob.

To save the values, press the right turning knob "OK". Only now the new indicated imp/kg are adopted for further calculation.

If you exit the setup screen without pressing the right turning knob, the value will be rejected and the old imp/kg remain valid.

When exiting the setup screen, the impulses counted up to this moment will be deleted.

## Output counter

The output counter is a counting mechanism at the user interface. If the output counter is approved at options, the values set here are used for the calculation of the display. The operator can decide at the user menu whether the output counters should be shown.

## Unit

The display unit is set in the middle of the setup screen. The values for the output counter can be set at the display in "kg", "l" or without unit. The unit is set separately for each spreading material.

## Factor

Setting of ratio between set "imp/kg" and display of output counter in the column "Factor". If "kg" is selected for the unit, the factor must be set to 1.00. For unit "l", the specific density of the spreading material is set.

Setting range: from 0.10 to 2.50

The output counter does not influence the statistics; it serves only for the driver to assess the filling level of the individual chambers of the spreader.

## Display increments

It is possible to set individual values for minimum and maximum output rates as well as for the step width per turning knob detent.

### Minimum output rate

The minimum output rate is the value below which the output rate can not be set by the operator.

Setting range: from 0 to “value - maximum output rate” gr/m<sup>2</sup>

### Maximum output rate

The operator cannot set an output rate per chamber which is higher than this value.

Setting range: from “value - minimum output rate” to 250 gr/m<sup>2</sup>

**If the user should not be able to change the set spreading density, the minimum and maximum output rate must be set to the same value.**

### Step width

Indicates the value of output rate change per turning knob detent. The values are always calculated starting from value 0, i.e. the last steps up to the minimum or maximum output rate may have a deviating step width.

Setting range: from 1 to 10. Modification in gr/m<sup>2</sup> per turning knob detent.

# Spreading width

Different spreading disc types are available for different spreading materials and applications. As each type of spreading disc has a different influence on the spreading width, the pulses per meter of spreading width have to be set anew in case the spreading disc is replaced.

The values indicated for the individual types of spreading discs are guide values and must be checked during spreading. The check can be carried out with simulation speed during standstill.

## Setup screen: Display increments

### Minimum spreading width

Minimum spreading width that can be set. This value is valid for all operating levels at the same time.

Setting range: from 0.8 to 2.5 meters

### Maximum spreading width

The maximum spreading width that can be set by the operator

Setting range: from "MINIMUM spreading width" to 25.0 meters

### Spreading width - step

Indicates the value for the modification of the spreading width in meters per turning knob detent. The values are always calculated starting from value 0, i.e. the last steps up to the minimum or maximum spreading width may have a deviating step width.

Setting range: from 0.1 to 1.0 meters. Modification in  $\text{gr/m}^2$  per turning knob detent.

## Sub-menu item: spreading width

At the control system, set the spreader to manual mode. Then, set the most used width at spreading width. Now, start spreading for a certain time (normally, 5 seconds are sufficient) and then, assess the spreading result on the ground.

If the spreading width is too wide, the impulses per meter of spreading width must be reduced. If the spreading width is too narrow, the impulses per meter of spreading width must be increased.

If a new value has been entered for impulses per meter of spreading width, you have to check this new setting with a new spreading attempt.

# Options

## Temperature display

If a temperature sensor is connected at the slave of the spreader, this soft switch makes the evaluation visible at the user interface. If the supply to the temperature sensor is interrupted or if no temperature sensor is connected, 81°C are displayed.

## Display km/h

Setting whether the determined speed of the vehicle should be displayed at the user interface. If the spreader is operated in manual mode (not path-dependent), the set simulation speed is displayed independently of the setting of this soft switch.

## Approval of output counter

Approval of output counter. At the user menu, the menu point “Show output counter” appears after the approval. This new soft switch has to be activated so that the output counter can be displayed at the user interface. The operator may decide for himself whether he wants to see this information or not.

## Motor unit

If the carrier vehicle does not dispose of a sufficient hydraulic supply, the spreader must be supplied with hydraulic oil by means of a separate motor unit. Two different motor units are available - one diesel unit and one petrol unit. The diesel unit is also available with dual-circuit equipment for an additional snow plough.

### Sub-menu item: Petrol

If the spreader is operated by means of a petrol unit, this soft switch must be set. The petrol unit may be started or switched off by means of the control system k-tronic.

**The ignition of the unit must be switched on in order to operate the petrol unit. If the control system k-tronic is switched off, the running petrol unit will not be switched off automatically.**

## Sub-menu item: Diesel

If the spreader is operated by means of a diesel unit, this soft switch must be set. The diesel unit may be started and switched off conveniently from the control system k-tronic. In addition, you can reach the following sub-menu items of the diesel unit.

## Setup screen: Speeds

The idle speed during spreading pause and the working speed during spreading are set at this setup screen.

Setting range:	Idle speed	from 700 to 3000 1/min	typically 1300 1/min
	Working speed	from 700 to 3000 1/min	typically 1700 1/min

## Oil cooler

The diesel hydraulic units are equipped with an additional oil cooler for the hydraulic fluid.

In the attached setup screen “Oil cooler”, the switch-on and switch-off temperatures of the oil cooler are set.

Setting range:	Switch-off	from 0 to 250°C	typically 60°C
	Switch-on	from 0 to 250°C	typically 70°C

**If the diesel unit has been started with the control system k-tronic, it will be switched off as soon as the control system is switched off.**

**If the diesel unit is started via the key switch at the unit, it is not possible to switch it off via the control system k-tronic.**

## Brine equipment

If the spreader is equipped with brine equipment for pre-wetted salt spreading, this soft switch must be set. Then, proceed with button 6 to reach the sub-menu “Brine equipment” for further settings. Additional entries and setting possibilities for brine appear at the different menu points:

- the spreading material brine appears at the list of spreading materials
- at sensor adjustment, there is an additional line with brine pump
- at the regulator adjustment, the lines of the brine pump are shown in the sub-menu points parameters, teach-in and characteristic curve

The sub-menu item “Warning time for dry run” is directly attached

### Sub-menu item: Warning time dry run

The spreader is equipped with a sensor recognizing whether brine is available for spreading. If an interruption of brine spreading is detected, this will be evaluated and displayed acoustically and optically with a settable delay time. The brine pump will not be switched off automatically if a dry run has been detected; the driver must decide himself whether he stops or not.

The time in the column ON indicates the delay until the warning appears. If a brine flow is detected before this time has elapsed, the time begins to count anew as soon as brine stops.

If the warning is shown at the display, the column OFF predefines the time, when brine must flow without interruption in order to withdraw the warning.

Setting ranges:	ON	0.0 to 25.0 seconds
	OFF	0.0 to 25.0 seconds

## Spreading pattern adjustment

If the spreader is equipped with an electrical adjustment of the spreading pattern, this soft switch must be set. The menu point “Adjustment of spreading pattern” is inserted in the details menu.

## Disc stop Pause

This soft switch indicates whether the spreading disc should stop during a spreading pause **PAUSE** or whether it should continue to turn. If X is indicated, the disc starts turning as soon as spreading is switched on for the first time. In case of PAUSE, the disc continues to turn.

The spreading disc does not stop until the operator changes to the user menu, the control system is switched off or the chute is folded up.

## Disc stop at stop

This soft switch indicates whether the spreading disc should stop during spreading (but with the vehicle at standstill) or whether it should continue to turn. Vehicle standstill is if the speed falls below the minimum settable speed for spreading. The minimum speed may be set in the options of the details menu in menu point “Km/h when spreader stops”.

## Disc stop km/h

At this menu point, you get to the setup screen “Speed when spreader stops”. Definition of minimum speed under which spreading will be stopped.

### Sub-menu item: speed when spreader stops

Indication of speed limit, under which the spreader does not spread during automatic operation.  
Setting range: 0.1 to 4.0 km/h

## Additional level

The function of the level button (Button 5) at the user interface is determined at this menu point. The following functions are possible.

- Button MAX
- Button X2
- Level 2

**If a check mark exists in several lines, the function is assigned to the top line with check mark. If none of the three points has a check mark at the end of the line, button 5 at the user interface is without function and the settings of LEVEL1 are valid. This applies to the three values of the following display increments: minimum setting value, step width and maximum setting value.**

## Sub-menu item: Button MAX

At the setup screen “Setting MAX value”, the specifications for the opening angle of the hydraulic valves are set. The settable values from 1 to 10 correspond to the values in the characteristic curves of the respective drives.

If the spreader is operating, the valves are controlled by pressing the MAX button corresponding to the values set here. The opening of valves is also carried out during vehicle standstill. The spreading width remains unchanged. At “disc stop - pause” and vehicle standstill, the disc speed is set to the preset spreading width.

If the spreader is in operating mode “PAUSE”, no spreading material is spread if the MAX button is pressed.

**If the button MAX is set as additional level, the values of LEVEL1 are valid for normal operation. This applies for locking and the three display increment values: minimum setting value, step width and maximum setting value. After approval of the MAX button, the control system k-tronic should be switched on again via the 0/1 button.**

## Sub-menu item: Button X2

When pressing the button “X2” at the user interface, the double quantity of spreading material will be spread for the length of pressing the button. The spreading width remains unchanged.

**If the button X2 is set as additional level, the values of LEVEL1 are valid for operation. This applies for locking and the three display increment values: minimum setting value, step width and maximum setting value. After approval of the X2 button, the control system k-tronic should be switched on again via the 0/1 button.**

## Sub-menu item: Level 2

The 2 operating levels - LEVEL1 and LEVEL2 - at the control system k-tronic allow 2 completely different spreading distance values. By means of the level buttons at the user interface, it is possible to switch quickly between the two presettings by just pressing a button.

## Spreading control

### Function of spreading control

A contact microphone is installed at the spreading disc protection. If, during spreading, this contact microphone vibrates due to the spreading material, the downstream electronics evaluates this and signalizes to the control system k-tronic that spreading material leaves the spreading disc.

**The spreading control does not recognize from which chamber the spreading material is spread. The spreading control can not check whether one of the two spreading chambers is empty.**

The spreading control can be activated at the options of the details menu.

### Evaluation of spreading control at the k-tronic

First, the result of the evaluation electronics is displayed directly at the user interface in the upper area. Second, the signal at the control system k-tronic will be evaluated further and adopted to the warning list as warning 4.

### Setting of delay of electrical monitoring of spreading process

When starting the spreading operation, a certain time elapses until spreading material leaves the disc. In order to avoid that a warning is emitted after each spreading start or each start-up of the vehicle, delay times can be entered for the issue of warnings. ON stands for the time until a warning is issued if no spreading material puts the contact microphone into vibration. OFF stands for the delay time between recognition of spreading material until the warning is cleared.

### Setting of evaluation electronics

The spreading control must be set to the correct sensitivity via the potentiometer in the evaluation electronics. The spreading device is operated by means of simulation speed with a spreading width and spreading density normal for operation and the potentiometer will be turned until the evaluation electronics recognizes the spreading material. The LED display on the circuit board of the evaluation electronics serves for monitoring.

Afterwards, carry out a check during a spreading pause whether the sensitivity of the contact microphone is set correctly. The spreading material symbol at the user interface must be crossed out.

## Protocol

At the control system k-tronic, you can record the spreading data during driving.

Switch on the protocol at "Options" - a check mark must be placed at the end of the line.

**After activation of the protocol, the control system k-tronic must be switched OFF and ON again.**

Currently, only the transmission protocol of the company Mobiwork Telematik GmbH, Rosenheimer Strasse 44, 83064 Raubling ([www.mobiworx.de](http://www.mobiworx.de)) is supported. Transmission protocols of other recording devices upon request.

The data cable of the recording device is connected at the back of the master of the control system k-tronic.

**If an update is made at the control system k-tronic, the protocol has to be switched off for the period of the update. Switch OFF and ON the control system after locking of protocol output.**

## Speed reporting

At the control system k-tronic, you can monitor the speed during the spreading operation.

For this purpose, activate the line with the entry “Speed reporting” in the options. Set the speed limit in the attached setup screen. Values from 10 to 90 km/h can be set.

If the set speed is exceeded during spreading, a signal tone is emitted. In addition, a message in clear text will appear at the user interface.

## Standstill message

During the spreading operation, the control system k-tronic monitors the speed signal for incoming impulses of the speed sensor. If these impulses are missing or if there are too few, a message can be issued.

For this purpose, approve the respective line in “Options”. Set the speed limit for the emission of the message at the attached setup screen.

Setting range: from 0.1 to 4.0 km/h.

If the vehicle speed should fall below this speed limit during spreading, the standstill message will be issued. If the speed signal should fail during driving, the standstill message appears, too.

The message is emitted in clear text at the user interface; in addition, a signal tone is issued. The message remains active until the next speed signal will be received or if spreading is terminated.

# Input functions

## Activation of input functions

You get to the menu line “Input functions” via options in the details menu. The possible entries 1 to 6 are listed in the attached sub-menu “Input functions”.

The soft switch must be set in the respective menu line “Input .. Function”. If the input is activated via the soft switch, it is possible to skip to the attached setup screen.

## Assignment of function to activated input

A preset function can be selected from the list by means of the middle turning knob at the setup screen “Input 1..6 function”.

## Functions of inputs

Only one of the functions described below may be assigned to each input.

**Please make sure that the same function is not set for 2 inputs. This may lead to significant disturbances at the control system.**

**The voltage of the input signals may not exceed the operating voltage of the k-tronic. The current consumption of an input is max. 100 mA. With an operating voltage of 12 V, the current consumption is approx. 40 mA, with an operating voltage of 24 V, it is approx. 80 mA. If these loads are too high for the carrier vehicle, please consult us.**

### Function 0: Pause (momentary)

If this function is assigned to an input in the master, the button “Spreading operation/spreading pause” (known from the user interface) may be reproduced by means of an external button.

## Function 1: Speed 0 km/h (latching)

If this function is assigned to one of the inputs, the speed of the determined speed signal is calculated with 0 km/h in case of a signal connected to the positive supply voltage. The actual speed of the vehicle is not important.

If the spreading operation should be interrupted, for example during return movement, function 1 may assume this task. A reversing signal from the carrier vehicle is required for this.

## Function 2: Additional function (momentary)

The function of the right middle button (button 5) at the user level is reproduced. It is decisive which function is set for the additional level.

If button 5 of the user level is the MAX button, this MAX operating mode is also reached by means of the input assigned here in the master. The same conditions apply as with direct operation via the control system, the MAX values are reached only during spreading and not during PAUSE.

If the X2 state is assigned to button 5 at the user level, the spreading quantity doubles if the button connected here is pressed.

If button 5 is responsible for level change at the operator level, change the levels by means of the button connected here.

## Function 3: Switch on/off brine (momentary)

If the spreader is equipped with brine equipment, the external button (optional connection) switches on/off brine. The evaluation of the button is assigned to the operator level 1 or 2 set at the display.

## Function 4: Switch on/off unit (momentary)

If the spreader is operated with an additional hydraulic unit, it can be started/switched off with this function assignment by an external button.

## Function 5: Rotating beacon (latching)

If an input of the master is assigned with function 5, the rotating beacon mounted at the spreader is switched on/off by means of the external button. The rotating beacon only works if the control system is switched on. If the external signal is present, the rotating beacon may not be switched off by button 1 of the user interface in the control system.

## Function 6: Headlights (latching)

By selecting function 6, the working headlight can be switched on/off by means of an external button at the input. To be able to switch on the working headlight by the external button, the control system must be switched on. If a signal is present at the external button (vehicle voltage), the working headlight may not be switched off by button 2 of the user interface in the control system.

## Function 7: Spreading image left-hand side (momentary)

At this function, the electrical spreading pattern adjustment adjusts the spreading image to the left side by one increment by means of an external button.

## Function 8: Spreading image right-hand side (momentary)

At this function, the electrical spreading pattern adjustment adjusts the spreading image to the right side by one increment by means of an external button.

## Reaching spreading image positions via function keys

Fixed positions of the spreading pattern adjustment may be reached by external buttons. These positions correspond to the individual values which can be set via the middle turning knob at the user interface. For this purpose, the spreader must be equipped with the electrical spreading pattern adjustment.

**In order to reach the spreading image positions via the functions 9 to 15, a short push of a button is sufficient. The former position of the electrical spreading pattern adjustment is not important. The new spreading image position is assigned to the currently set operator level; an automatic transfer to the other operator level will not be effected.**

## Function 9: Spreading image at Pos -3 (momentary) Left-hand side

With the external button, the spreading pattern adjustment may be set to the far-left position.

## Function 10: Spreading image at Pos -2 (momentary)

With the external button, the electrical spreading pattern adjustment may be set to the first increment seen from the left.

### Function 11: Spreading image at Pos -1 (momentary)

With the external button, the electrical spreading pattern adjustment may be set to the first increment left from the middle.

### Function 12: Spreading image at Pos 0 (momentary) Center

The electrical spreading pattern adjustment may be set to the center position with the external button.

### Function 13: Spreading image at Pos 1 (momentary)

With the external button, the electrical spreading pattern adjustment may be set to the first increment right from the middle.

### Function 14: Spreading image at Pos 2 (momentary)

With the external button, the electrical spreading pattern adjustment may be set to the first increment seen from the right.

### Function 15: Spreading image at Pos 3 (momentary) Right-hand side

With the external button, the spreading pattern adjustment may be set to the far-right position.

## Rotating beacon at board net

The control system k-tronic controls the battery voltage of the vehicle for the rotating beacon installed at the spreader to 12 Volt.

If this is not desired, the rotating beacon can also be supplied directly by the board voltage. Set the menu line to active.

Starting from now, the rotating beacon is directly connected to the available vehicle voltage.

**For all rotating beacons supplied with the spreader, an X must be at the end of the menu line so that the input voltage can be controlled to the necessary 12 Volt. If the rotating beacon with 12 Volt is accidentally operated with 24 Volt, it will be destroyed.**

## Working headlights at board net

The control system k-tronic controls the battery voltage of the carrier vehicle to 12 Volt. This is important for the operation with the supplied working headlights.

If a light bulb with 24 Volt should be installed at a spreader supplied with 24 Volt, the board voltage can be connected to the working headlight by means of this menu line.

**For all working headlights supplied with the spreader, X must be at the end of the menu line so that the input voltage can be controlled to the necessary 12 Volt. If the working headlight with 12 Volt is accidentally operated with 24 Volt, it will be destroyed.**

## Display of name of spreading material

If this soft switch is active, the names of the set spreading materials are permanently displayed at the user interface.

## Automatic locking

If the same spreading material is set for both chambers, the spreading quantities are coupled in case of automatic locking. That means that the sum of the spreading quantities is adjusted.

The setting values - i.e. minimum spreading density, display increments, maximum spreading density - now refer to the sum of the spreading quantities and no longer to the respective chambers.

At spreaders with separate chambers, the spreading quantities are split according to the ratio.

## Chamber partition wall

If the spreader is equipped with a partition wall within the chamber, the soft switch must be activated.

The ratio of the separated chambers is set in the sub-menu "Chamber ratio". This influences the locking (see above) and the setting of the spreading material.

With separated chambers, the spreading material can be set for each chamber separately. With the chambers not separated, the spreading materials are coupled at the main display.

## Double dosing

If the drives of the screws are coupled mechanically or hydraulically, double dosing must be deactivated.

If double dosing is switched off, the two screws are no longer controlled separately, but by a joint control loop.

With double dosing switched off, the appearance of the superordinate menu changes significantly. The function of the respective menu points remains unchanged.







