

Daily use TX:

Sowing:

- Press the operation/menu button.
- Move the indicator up to App. Rate setting and press enter.
- Select Kg/ha and press enter.
- Enter the amount to be spread and press enter.
- Select width and press enter.
- Enter working width and press enter.
- Press the operation/menu button to return to the operation display.
- Enter flow factor if known.

Weighing:

- You can choose between automatic and manual weighing:

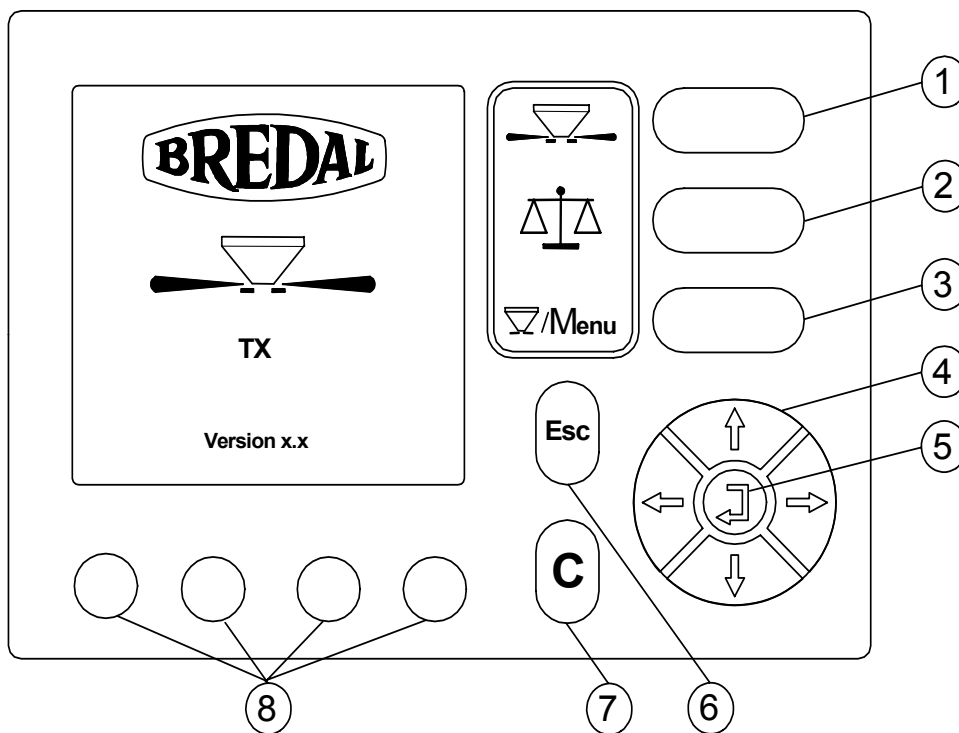
Stirrer:

- Remember to oil stirrer

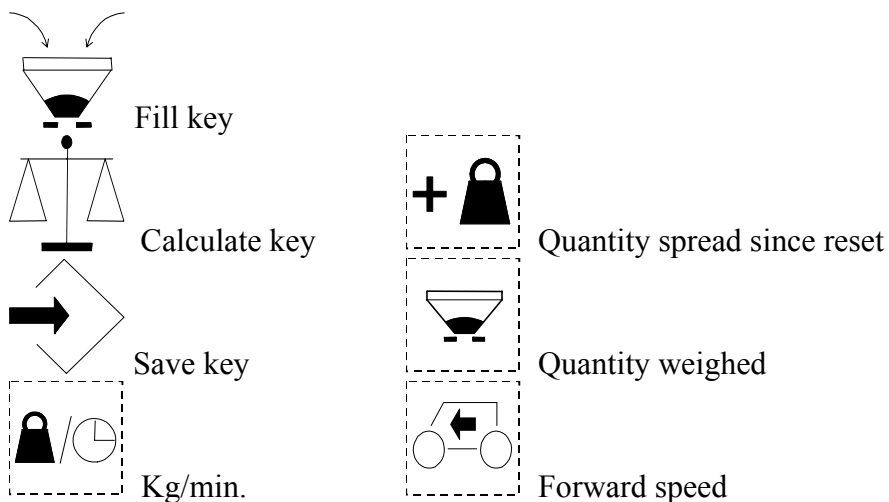
Headland spreading:

- Switch headland spreading on and off using a double-action hydraulic outlet.
- When headland spreading is active, a symbol appears in the operation display on the computer.
- It is not possible to switch between headland and normal spreading while the discs are rotating.

OVERVIEW



Pos.	Description
1	Start/Stop key, starts and stops spreading
2	App. Rate key, selects weight menu
3	Menu key, switches between operation and menu
4	Arrow keys, to move the cursor and input numerical values
5	Return key, selects the highlighted option or accepts keyed-in numerical values
6	Escape key, returns to previous menu without making changes
7	Clear key, acknowledges alarms or deletes numerical values
8	Program keys, selects the function shown above each individual key



Bredal type TX1500 - 4500



Bredal A/S

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Type TX
English
No.

EU Declaration of Conformity

(Directive 89/392/EEC, Annex II, suppl. A)

Manufacturer: BREDAL A/S
Overgårdsvej 19, DK 7120 Vejle, Denmark

Hereby declares that

BREDAL type _____ **Serial no.** _____

Cal. figure _____

Computer no. _____

has been manufactured in accordance with the Machinery Directive
(Directive 89/392/EEC) with amendments, and with national regulations.

BREDAL A/S

Bredal 14-03-2005


Anders Buhl

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Start-up

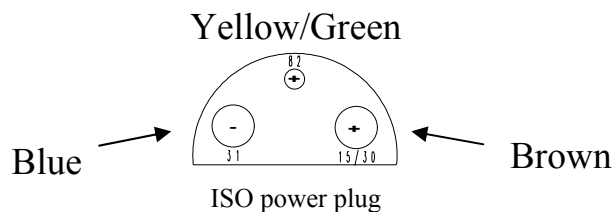
Installing a speed sensor

Some tractors have a socket in the driver's cab that takes the Bredal computer 7-pin ISO plug. In such instances, it is not necessary to fit a sensor. If there is no such socket, the enclosed sensor must be installed in the tractor. The simplest way to do this is to attach the magnet for the sensor to the drive shaft for the four-wheel drive, then fit the sensor so that it is approx. 2-5 mm from the magnet. Use the enclosed bracket if required.

It is also possible to use the tractor computer and receive the signal from there. Information on which wires to use can be obtained from your tractor dealer/importer.

Power supply to the computer

Most tractors have a socket that can take the computer's three-pin ISO power plug. If the tractor has no such socket, it is possible to purchase a power box from Bredal that can be mounted on the tractor. First install the connector in the driver's cab, then run the wire down to the tractor battery, and attach the wire marked + to the positive terminal of the battery (red) and the wire marked - to the negative terminal (blue). Remember to switch the power box off when the computer is not in use.



Installing the computer

Install the computer so that it can be easily operated from the driver's seat. Insert the 7-pin ISO plug from the computer into the corresponding socket in the tractor, or the socket for the accompanying sensor. Insert the 3-pin ISO power plug into the tractor's power socket, or the power box. Join the connector from the spreader with the 3-pin plug from the computer.

Encoding forward speed

Press the *operation/menu* button and move the indicator using the *arrow keys* until *encode* is highlighted. Press *enter* and move the indicator down to *speed sensor* and press *enter*. Choose between *radar* and *wheel sensor* using the *soft key* buttons beneath the screen, and press the *drive 100 metres* button. Drive 100 metres forward, and press *enter* to save the counted number of pulses. There should be a minimum of 3-400 pulses.

It is also possible to input directly the number of pulses per metre.

Calibration of weight

The weighing cells are weighed at the factory. It will not normally be necessary to calibrate the system again unless it becomes apparent that the scales are not recording the correct weight. Please follow the instructions below if it becomes necessary to calibrate the weighing system.

Press the *operation/menu* key and use the *arrow keys* to move the indicator until *weighing* is highlighted. Press *enter*. A warning message appears on the display. Press *enter* to continue. The spreader must now be level, with the hopper empty and the PTO shaft stationary. Press *enter*, fill the hopper with a known weight, state the weight in kg using the *arrow keys* and press *enter*. The weighing cells are now calibrated.

It is also possible to enter the calibration figure directly, if it is already known. Press the *operation/menu* key, move the indicator until *weighing* is highlighted and press *enter*. Move the indicator down to *cal. figure* and press *enter*, key in the *calibration figure* in kg and press *enter*. The calibration figure has now been altered.

It is also possible to calculate a new calibration figure if the weight is not correct. First tare the weight, then put a known weight into the spreader. Calculate what percentage of the weight is incorrect. For example, if it weighs 10% too much, deduct 10% **from** the calibration figure.

Connection

The spreading discs must be approximately 85-90 cm above the earth when driving in the field. The spreader must be level or slightly projecting towards the tractor.

Fit the two hoses for activating/deactivating headland spreading plus the two stirrer hoses.

Connect the power transmission from the spreading box to the tractor's power takeoff.

Join the electrical connector from the spreader to that of the computer.


Chute setting

The chutes adjust themselves automatically to the selected working width, but it is possible to alter the setting if a spreading test shows that a different setting would be preferable.

To alter the setting, follow the procedure described below. Press the *menu* button, select *app. rate setting*, select *chute*, enter the chute setting you require and press *enter*. It will now run using this setting until auto is reselected, or until the working width is altered.

The table below shows the standard settings for the various working widths.

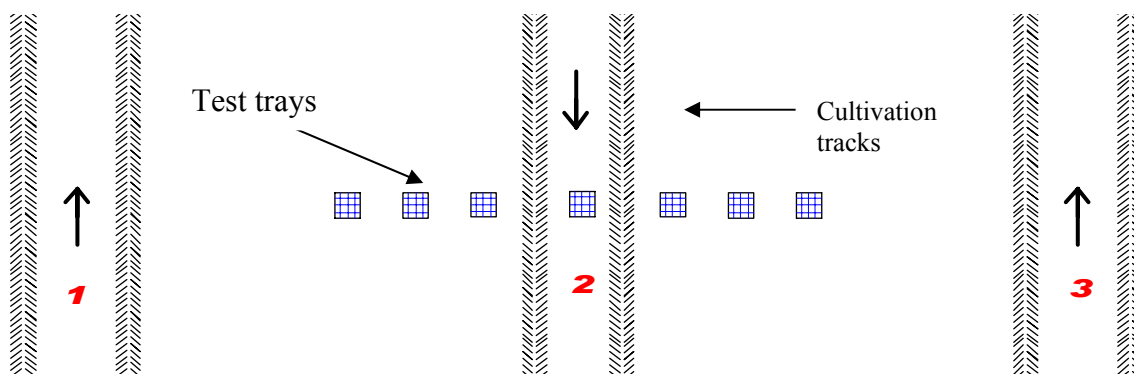
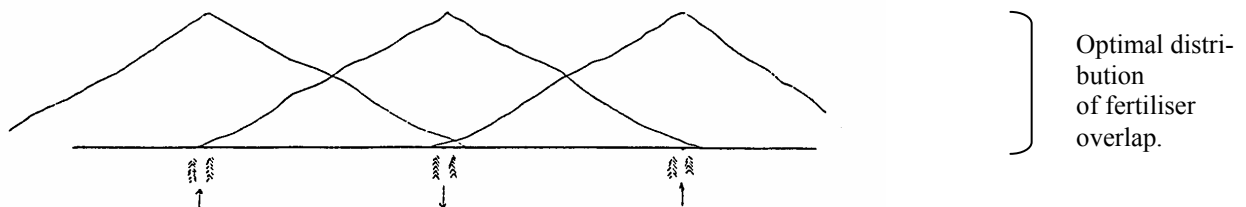


A	
18 m	750
20 m	750
24 m	900
28 m	1000
30 m	1000
32 m	1000
36 m	1000
40 m	1100
42 m	1100
48 m	1200

Spreading test

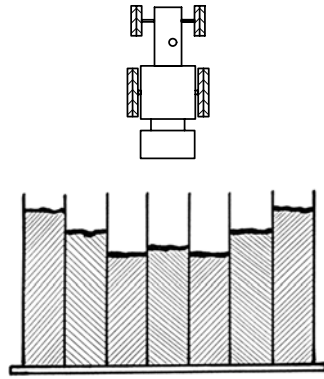
If you suspect that the machine is not spreading correctly, or if you have purchased a fertiliser with unusual properties, it makes sense to carry out a spreading test. When carrying out the test, it is important to bear in mind the following points:

- A. The test must be performed in dry conditions (field/machine)
- B. The test must be carried out in a field covered with a good crop – approx. 10 cm dense plant cover, to avoid problems with rebound.
- C. Make sure you carry out the test on a flat section of the field, and adjust the trays so that they are all as level as possible.
- D. The test must be performed at the forward speed normally used for spreading (12-15 km/h is best as long as the terrain allows it).
- E. Make sure you run approx. 100–200 kg of fertiliser through the spreader before carrying out the test. There will always be a layer of old fertiliser, verdigris and rust on the spreader discs and blades, which must be removed for the spreader to display a constant spreading pattern.
- F. The simplest way to carry out the test is to set the trays to half the working width on both sides of the middle of the three tracks. Drive forward in the first, back in the second, and forward again in the third. In order to ensure sufficient quantities are contained in the trays for assessment purposes, it is necessary to spread approx. 400 kg/ha or perhaps drive over the tray several times.
- G. Make sure you drive well forward before disconnecting the applicator, as the spreader casts the fertiliser approximately one working width backwards.

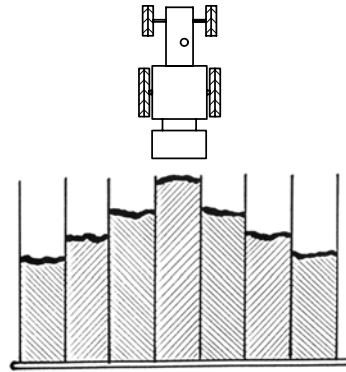


BREDAL recommends using at least seven trays for the test.

Correction of spreading



Too much fertiliser between the tracks



Too much fertiliser behind the tracks

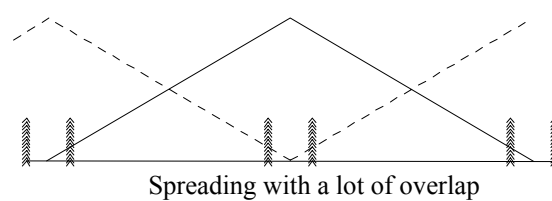
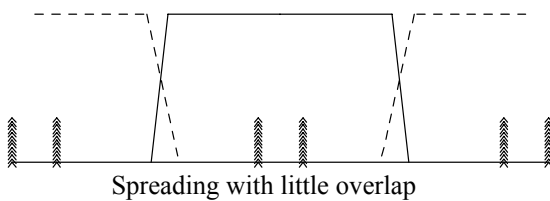
If there is too much fertiliser between the tracks

- A. **18-48 m:** Move the chute scale towards 0 by 1-2 scales at a time, depending on the result of the first test.

If there is too much fertiliser behind the spreader

- A. **18-48 m:** If the fertiliser complies with the requirements for grain strength and size, move the scale towards 9 by 1-2 scales at a time, depending on the results of the test.

If the grain strength and/or grain size does not comply with the requirements (see page 19), the combination of the PTO speed and chute scale settings can be changed. As shown below: Reduce the speed by about 20%. The spreader will then automatically save fertiliser (the grain strength requirement is less) and distribute the fertiliser earlier, thus applying more fertiliser between the tracks. If this is not sufficient, move the chute scale towards 9 by one full scale at a time. Please be aware that this form of spreading is considerably more sensitive to fluctuations in fertiliser quality, in track distances and to variations in speed than the standard recommendations, as the overlap is reduced owing to a box-shaped spreading curve being achieved without a lot of overlap.

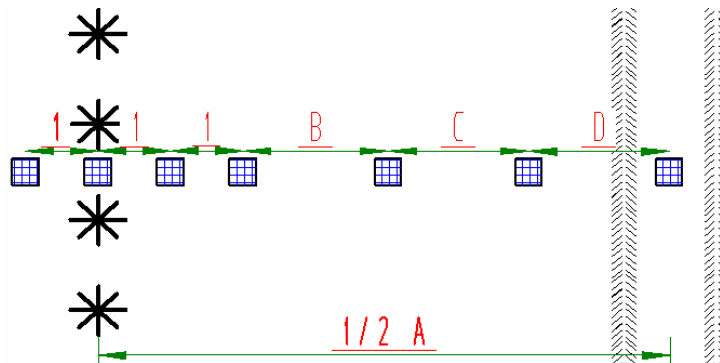


Spreading test with headland device

The test must be performed at the forward speed normally used for spreading. (12–15 km/h is best as long as the terrain allows it).

Set out the trays as indicated below. Set the machine as indicated under headland spreading. If the machine spreads more fertiliser than required beyond the boundary, reduce the speed by 50-100 rpm for each test until the spreading is acceptable.

Conversely, increase the speed by 50-100 rpm if an insufficient amount is spread out to the boundary. If there is too much fertiliser behind the spreader, and too little fertiliser out by the boundary, set the chutes 1-2 scale intervals higher than the standard setting. Conversely, the chutes should be set 1-2 scale intervals lower than the standard setting if there is too much fertiliser at the boundary and in the first 5-6 metres of the field.



Arranging test trays for headland spreading

The figures shown are in metres. Distances B, C and D are distributed over the remaining distance.

Connection/disconnection for headland areas

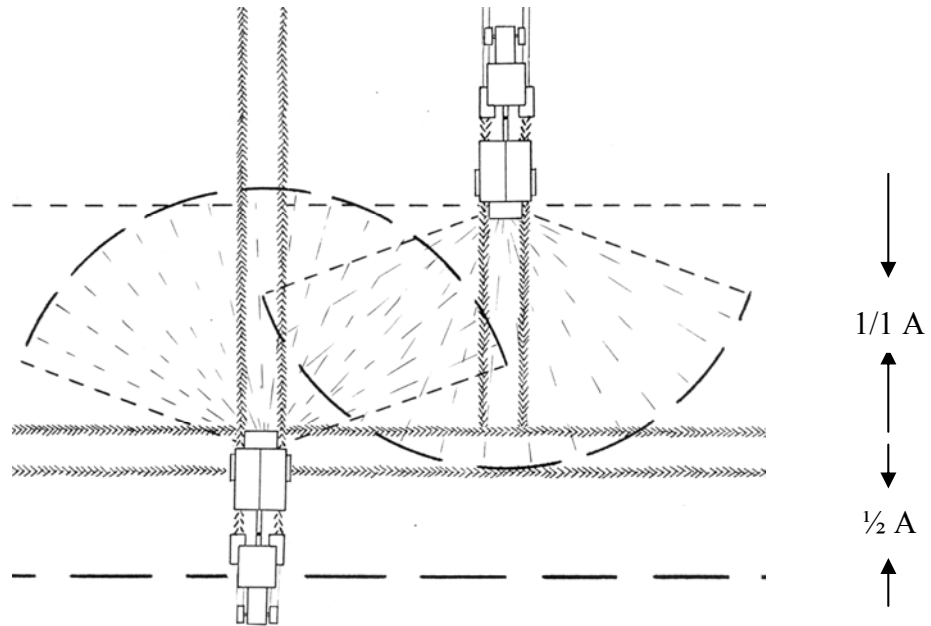
The fertiliser is cast far behind the spreader. Therefore you should drive well forward towards the headland boundary before disconnecting the spreader. Drive a long way into the field before reconnecting.

A general rule is:

When the discs pass the tracks in the headland, they are disconnected. *Approx. 5-10 metres before application is switched off, decelerate the tractor in order to gather the spread pattern in behind the machine.*

Switch on again once the discs are one working width from the tracks in the headland.

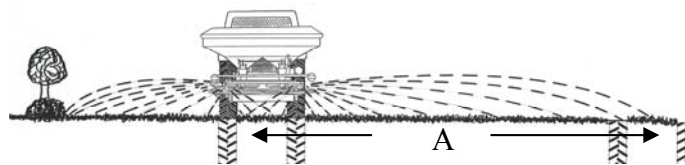
If you do this, you can achieve a neat finish in the headland.



Headland spreading

Drive with the left side towards the boundary. Use the speeds shown in the tables below (see also page 28 onwards for controlling headland spreading).

(The PTO shaft must be disconnected for headland spreading to be switched on and off).



A



18 m

540

20 m

600

24 m

800

28 m

850

30 m

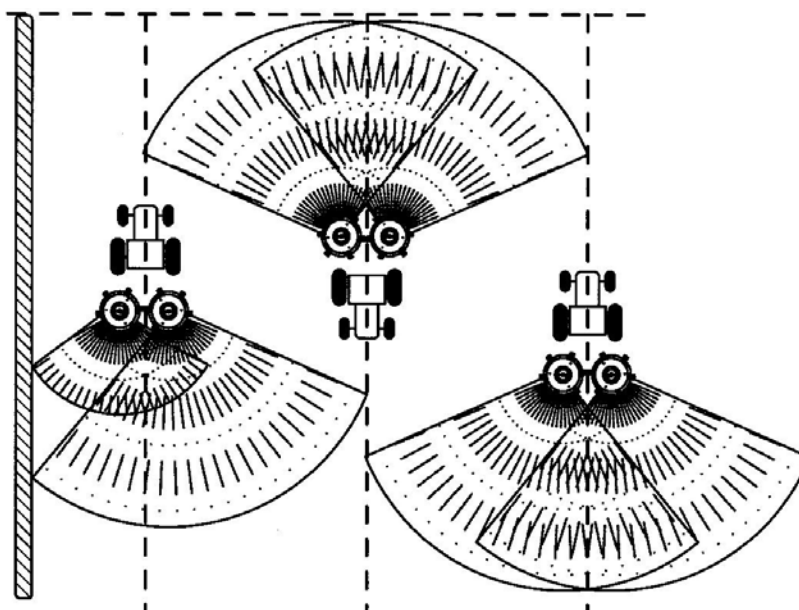
900

32 m

1000

36 m

1100

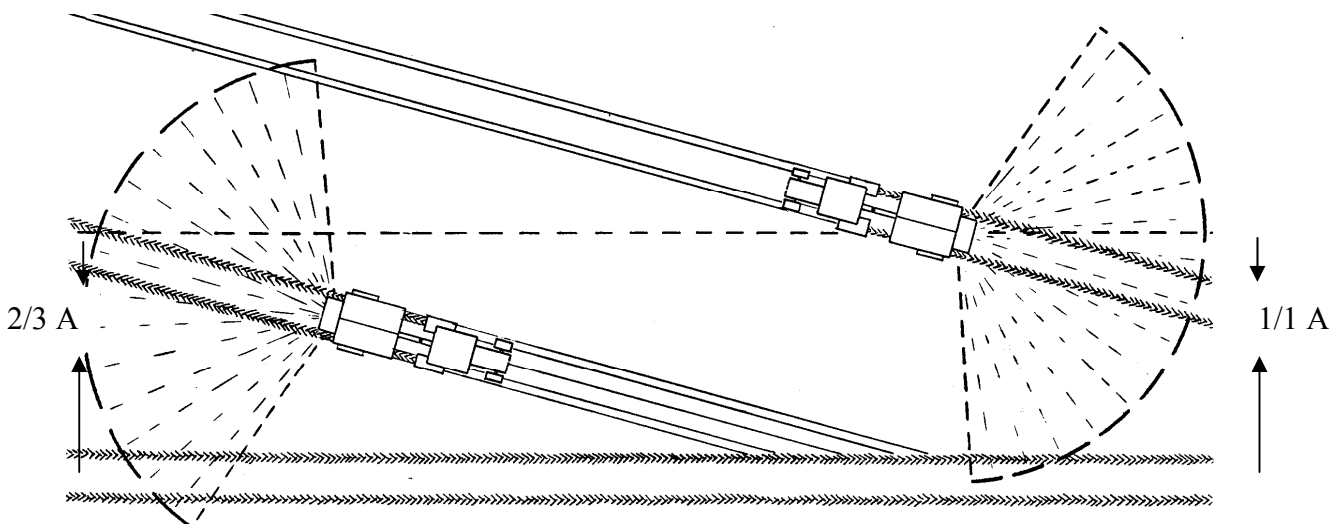


Headland spreading 18-36 m working width

If a spreading test shows that there:

- A) is too much fertiliser between the tracks, move the chute settings towards 0 by 1–2 scale intervals per spreading test.
- B) is too little fertiliser between the tracks, move the scale settings towards 9 by 1–2 scale intervals per spreading test.

Wedges in headland



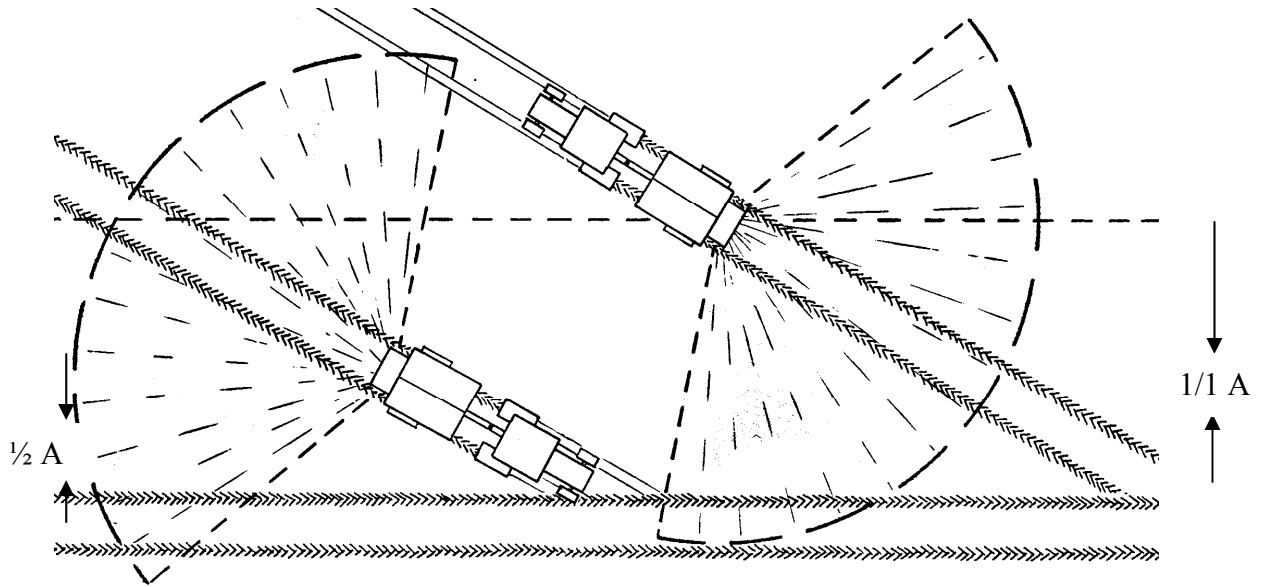
Connecting and disconnecting for a 15° headland

Towards headland:

Stop spreading at a distance of two thirds of the working width from the headland. Slowly reduce the engine speed before switching off the PTO shaft.

Away from headland:

Start spreading one working width from the tracks in the headland.



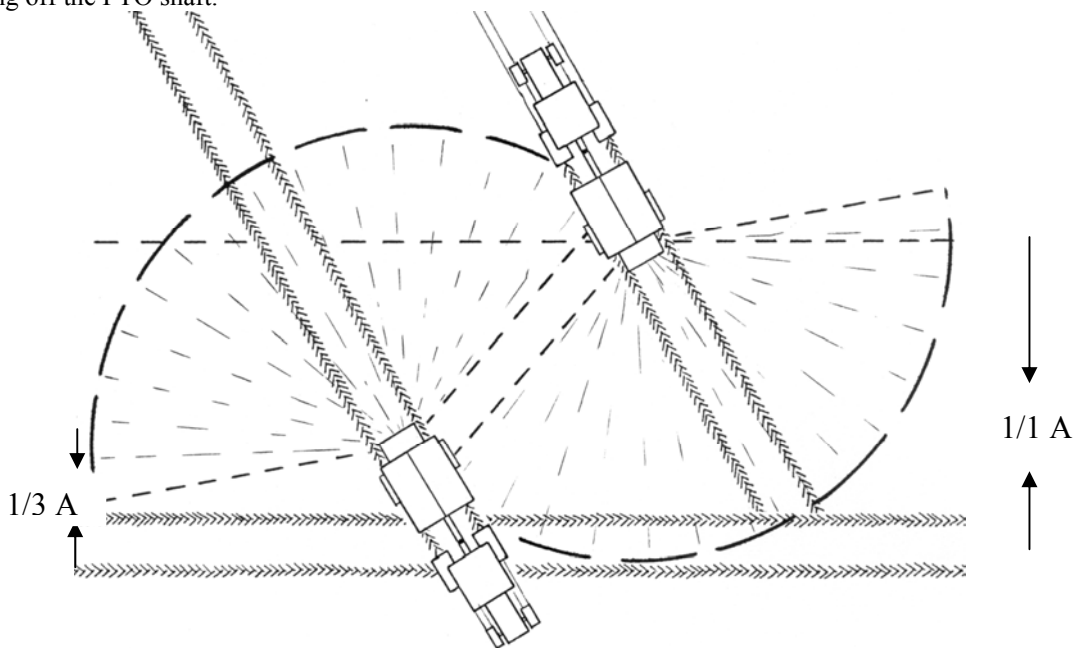
Connecting and disconnecting for a 30° headland

Towards headland:

Stop spreading at a distance of half of the working width from the headland. Slowly reduce the engine speed before switching off the PTO shaft.

Away from headland:

Start spreading one working width from the tracks in the headland.



Connecting and disconnecting for a 60° headland

Towards headland:

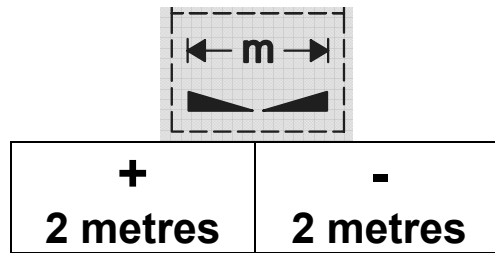
Stop spreading at a distance of one third of the working width from the headland. Slowly reduce the engine speed before switching off the PTO shaft.

Away from headland:

Start spreading one working width from the tracks in the headland.

Residual widths

The spreader works with a large overlap. It is therefore very easy to use in awkward areas. Via the “broad reduction” function on the computer, the working width can be reduced or increased using the + and – keys (**REMEMBER to change the speed of the spreading discs**).



If you exit the screen image “broad reduction”, the spreading width automatically changes back to the standard setting.

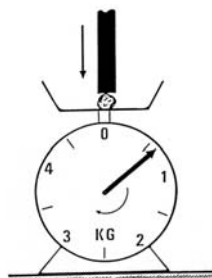
Fertiliser quality

The quality of the fertiliser is crucial if the spreader is to work properly.

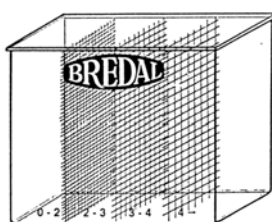
Gauging fertiliser quality

When a normative fertiliser quality is to be gauged, the most important elements you need to determine spreadability are:

- A) Grain strength** can be measured by placing one grain of fertiliser on an ordinary kitchen scale, and then applying increasing pressure to the grain, e.g. with the flat end of a pencil, while watching the scale's display indicator. The weight that is displayed when the grain is crushed is an expression of the grain strength of the fertiliser. Make sure you test several grains (both large and small) and then calculate the average grain strength.

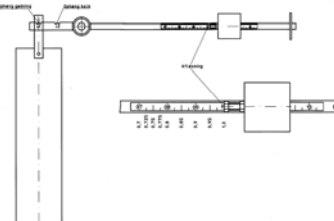


- B) Grain size** can be measured using BREDAL's vibration box. Fill the space above the sieve with the largest grains. Put the lid on and shake until there are no more changes in distribution. Turn the box so the lid is again on top. Measure using a ruler or tape measure. Measure the number of mm in each space. Use normal proportional calculations to work out the average grain diameter.



Vibration box for grain size.

- C) Litre weight** can be measured using an ordinary litre measure or a 10-litre bucket. The greater the quantity, the more accurate the measurement. BREDAL can supply a beam scale for mounting on the spreader. This provides an immediate indication of the litre weight (instructions page 16).



Beam scale for litre weight.

- D) The shape of the grains** can be assessed visually. The smoother and rounder a grain is, the better it flies through the air. A sharp grain (broken) or a grain with a lot of nodules on its surface has poor flying properties, and will therefore have difficulty covering wider working widths.
- E) A high dust content** can be assessed when calculating the grain size by there being a relatively large proportion of the fertiliser beneath the finest sieve in the vibration box. Dust content can often also be assessed visually.

The effect of fertiliser quality on spreading properties

1. **Low grain strength** means that the fertiliser has a tendency to get crushed during transport and spreading. There is often a close correlation between low grain strength and dust content, as fertilisers with low strength values are crushed during transport and storage. The grain strength of a batch of fertiliser is often satisfactory when it leaves the factory. If the fertiliser is exposed to high atmospheric humidity or direct water penetration during transport or storage, it loses its original grain strength.

This cannot be recovered even if the fertiliser batch is dried out. The fertiliser must therefore always be covered with plastic during storage. Certain types of fertiliser always have low grain strength, particularly prilled urea and certain types of ammonium nitrate (N34). There are large fluctuations in grain strength between the various makes of urea and ammonium nitrate (N34). These fluctuations occur when fertilisers are sensitive to crushing by the spreading discs.

Normal co-granulated fertiliser has a grain strength of 3-8 kg. *Ammonium nitrate (N34)* has a grain strength of 0.5-3 kg. *Urea* has a grain strength of 0.5-2 kg, while individually granulated types of urea have a grain strength of approx. 3 kg. **(To be able to withstand the load of a BREDAL spreader with a power takeoff of 540 rpm, the minimum requirement is 0.5-1 kg. At a power takeoff of 800 rpm, the minimum requirement is approx. 2 kg, and at 1000 rpm it is 3-4 kg.)**

2. **Grain size** is significant for how far the fertiliser can be thrown. Large fertiliser grains can be thrown further than small ones, so a minimum grain size requirement is necessary for application over large working widths. BREDAL sets a lower limit for average grain size of between 2.8 mm (20-28 m) and 3.1 mm (30-36 m). Using BREDAL's sieve box, there must therefore be more than approx. 40%-45% of the fertiliser above the 3 mm sieve (20-28 m) and approx. 55% or more above the 3 mm sieve (30-36 m).

Normal prilled and granulated fertilisers have average grain sizes of around 2.9-3.3 mm. Ammonium nitrate (N34) has an average grain size of approx. 2.0-2.8 mm.

Prilled urea has an average grain size of 1.5-2.5 mm, while certain makes of granulated urea can be 3-3.5 mm. *A 12 m working width* does not impose any special requirements on grain size, although large quantities of dust in the fertiliser should be avoided, and the fertiliser must not resemble salt or sugar.

3. **Heavy fertiliser grains** can be thrown further than light ones. A minimum requirement is therefore necessary for the fertiliser's specific weight for larger working widths. BREDAL sets a lower limit of 0.9-1.0 kg per litre for spreading over larger working widths. Normal granulated and prilled fertilisers, incl. ammonium nitrate (N34), have a litre weight of 0.9-1.2 kg per litre. Urea has a litre weight of 0.7-0.75 kg per litre. A large grain and a smooth surface can, however, compensate for lower litre weight (see "spreading urea", sect. 15.3).

4. **Broken or crushed fertiliser** has poor aerodynamic properties and cannot fly very far through the air. Large working widths require a fertiliser with good flying properties. These properties are difficult to measure in practice, but a visual assessment is sufficient, and not difficult to undertake, as it is primarily a smooth surface and rounded grains that provide good flying properties.

The dust content increases in relation to the amount of handling (reloading, transportation etc.) the fertiliser is subjected to. In addition, fertiliser that becomes damp but then dries out again will lose its grain strength, and its dust content will increase considerably with increased handling. If the dusty fertiliser is stored on a stationary conveyor, the dust will collect in a cone just under the conveyor. This can significantly alter the quality of the batch when the store is eventually emptied. A conveyor often has to be moved if it is being used for putting fertiliser into storage.

Special fertilisers

There are special fertilisers on the market for specific purposes. Some have the appearance of fine salt or sugar, and a litre weight of 1 kg/litre or over. It is usually possible to apply these at a PTO shaft speed of 540 rpm and a working width of 6 m using chute setting 1.

Over the years a great deal of material concerning other types of fertiliser has been collected. Please contact us if you will be applying an unfamiliar type of fertiliser.

When you buy fertiliser, remember that every time you save the value of one drum of fertiliser, the effects of poor spreading and inefficient usage can add up to several drums' worth.

Recommendations for spreading N34 ammonium nitrate

BREDAL A/S has carried out spreading tests on this type of fertiliser.

There are several different qualities on the market. As it is usually the larger working widths that can give rise to spreading quality problems, we have concentrated on testing ammonium nitrate with medium to good spreading properties.

Ammonium nitrate must not be compared with normal quality fertiliser, as it often does not have the same grain strength and size. A grain strength of 1-2 kg is not uncommon, while a normal quality fertiliser has a strength of 4-6 kg. Grain size is also often smaller than that of normal quality fertiliser. An average grain size of around 2.2 mm is not uncommon, while normal quality fertiliser has an average grain size of around 3 mm or more.

These factors have a crucial impact on the spreadability of the fertiliser. BREDAL has performed test applications using a number of different types of ammonium nitrate with the properties described above.

The recommendations given below are for guidance. As described above, fertiliser varies in quality. Therefore BREDAL cannot take responsibility for any spreading that is undertaken. For the same reason, we strongly recommend carrying out a spreading test in the field before starting the work.

For 24 m, we recommend using only good quality ammonium nitrate.

Pure potash and ammonium sulphate

As these fertiliser types run rather sluggishly over the blades of the spreading discs, it may be useful to adjust the chutes 1-3 scale intervals higher than the recommended setting:

Potash:

18 m	+ 2 scale intervals
20 m	+ 2 scale intervals
24 m	+ 3 scale intervals

Ammonium sulphate

18-24 m 1 scale interval higher than standard setting – max. 24 m working width.

Adjust application rate using a spreading test as described on page 9.

Urea

This fertiliser is available in two versions: one prilled and one granulated. These two versions, however, differ greatly. Often urea is less effective in terms of spreading, as it has three significant properties against it.

- 1) *Urea is usually very fine-grained (prilled variety).*
- 2) *The urea grains have a low grain strength.*
- 3) *Urea has a low litre weight.*

Spreading over large working widths with a good prilled variety:

The three properties listed above mean that the grains cannot be thrown very far. It is therefore necessary to alter the way in which urea is spread over larger working widths: **from** the common and flexible triangular spreading curve with double overlap **to** a square spreading curve with limited overlap.

It is possible to achieve acceptable spreading using standard blades and discs over average working widths (chute scale - setting 5, speed (rpm) to suit working width and urea type).

Fine-grain prilled urea requires a higher speed than large-grain varieties. It is not possible to achieve a working width of 18 m and above with all types of urea.

If you want to be certain that the urea can be spread over 18 m, the average grain size must be 2 mm or above. If you want to be able to spread the urea over 24 m, it must have an average grain size of 2.5 mm or above.

Grain strength must be approx. 2 kg for 18, 20 and 24 m spreading

Due to the special spreading pattern (square shape), you must be certain that the urea batch is consistent throughout.

As the instructions given above are for guidance only, we strongly recommend that you always carry out a spreading test using the particular urea type you have purchased. The speed (rpm) that results in even spreading should be kept constant, provided it corresponds to the working width and urea type you are using.

Granulated urea

Granulated urea has a coarser surface than prilled urea. It normally has an average grain size of 3.0–3.5 mm and a grain strength of 2-3 kg.

Standard spreader settings can be used for working widths of up to 24 m, though you must not use a PTO speed higher than 800 rpm for 2 kg grain strength and 900 rpm for 3 kg grain strength.

To compensate for the lower speeds for the largest working widths, the spreader can be raised up as high as possible (disc height approx. 110 cm).

Always carry out a spreading test before spreading urea.

Other factors concerning urea

When purchasing urea you should bear the following factors in mind, in addition to the increased spreading risks:

1. 100% exploitation of the nitrogen in the urea can only be achieved if it is ploughed in.
2. The urea must be converted by two different strains of bacteria in the earth before the plants can make use of the nitrogen it contains. From the point when one type of bacteria has released the urea's nitrogen until the other one takes over the process, the urea's nitrogen is gaseous and can easily evaporate.
3. The ground temperature must be above 5 degrees for conversion to occur. If the ground temperature is above 8 degrees, conversion will occur so rapidly that there will be a considerable risk of evaporation.
4. Rain immediately after the urea has been spread is advantageous, as it reduces the risk of evaporation.

Maintenance

Bolts must be checked and tightened at regular intervals. Ensure that this is done shortly after the spreader is used for the first time. Check frequently that the spreading system is clean and in good order. Inadequate cleaning or worn spreading discs and dischargers can result in spreading errors.

Check regularly that the belt in the spreading box is taut – see separate instructions.

Take care when cleaning using high-pressure cleaners. Never spray directly onto seals and waterproofing near bearings, etc. from close range. Lubricate with oil immediately after washing, as water penetration is the most frequent cause of broken bearings.

Before the machine is put into storage at the end of the season, it should be washed thoroughly and sprayed with a thin coat of oil.

The dischargers are made of stainless steel, with an internal coating of tungsten carbide as a wearing surface. Although this ensures a long service life, the dischargers will still be subject to wear and will need replacing at some point. There must not be any holes worn in the dischargers.

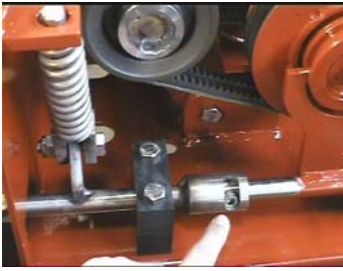
Places to lubricate

Seals on discs, Bearing housing on rollers, Coasting on PTO shaft, Input shaft on spreading box, Down gearing on spreading box.

Checking the V-belts

Check the V-belts regularly, particularly immediately after replacement. Check tautness by pressing the belt between the two pulleys beneath the discs. At a pressure of about 10 kg, the belts should give about 5-10 mm

Replacing a V-belt



1. First unscrew the locking bolt between the transmission shaft and the fork shaft.



2. Loosen the spring and spring control and the bolts for the left and middle plastic bearing of the headland device.



3. Remove the headland device shaft.

4. Remove the fork holding the headland device in the right-hand plastic bearing.

5. Remove the right-hand plastic bearing.



4. Loosen the belt tightener of the headland device.



6. Remove the two lower V-belts on the headland device.

7. Remove the two upper V-belts on the headland device.

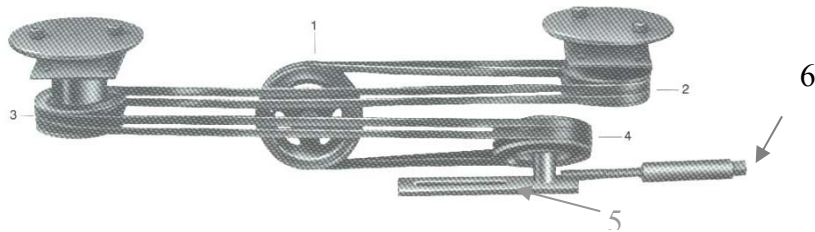


8. Loosen belt tightener and remove the V-belt.

Fitting a new V-belt in reverse order

Remove the belt tightener (pulley 4 with bracket) before starting to fit the belt. On spreaders with two belts, these must be fitted at the same time (K35-K125 only).

1. Fit the belt on pulley 1 – the end must turn to the right.
2. Thread the upper part of the belt on pulley 1 behind pulley 2.
3. Twist the belt a half turn – thread it from pulley 2 to the rear disc of pulley 3.
4. Thread pulley 4 (the belt tightener) into the loose end of the belt between pulleys 1 and 3. Then attach the bracket to pulley 4 and tighten the belt using the belt tightener.
5. Fit the two upper V-belts on the headland device.
6. Fit the two lower V-belts on the headland device.
7. Tighten these using the headland device belt tightener.
8. Fit the fork that holds the headland device in its plastic bearing.
9. Push the headland device transmission shaft in over the fork shaft.
10. Fit the two other plastic bearings.
11. Fit spring and spring control.
12. Finally, screw the locking bolt between the transmission shaft and the fork shaft.

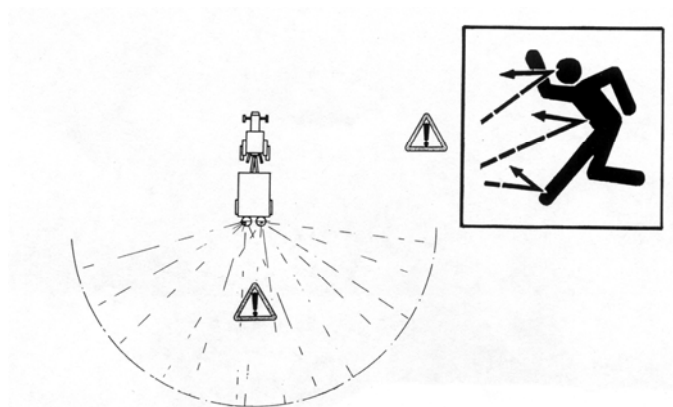


Fitting and tightening V-belt.

Technical data

Type	Capacity	Net weight	Loading height	Width/length
TX1500	1500 l.	550 kg	133 cm	240 / 152 cm
TX2500	2500 l.	600 kg	160 cm	240 / 152 cm
TX3000	3000 l.	625 kg	173 cm	240 / 152 cm
TX4500	4500 l.	660 kg	193 cm	300 / 152 cm

Safety



Never stand in the vicinity of the machine's spreading discs when they are rotating.

The tractor's power takeoff must be disconnected if there are people or animals within a radius of **30 metres** from the machine's spreading discs, when the power take-off is running at **1000 rpm**, and **20 metres** at a PTO rate of **540 rpm**.



Screens on and near the PTO shafts must be undamaged and correctly fitted.

Never stand on the screen over the machine's discs or on the safety strap near the discs while they are rotating.

Riding on the machine while it is in operation or being transported is not permitted.

Prevent foreign bodies such as metal parts and stones from entering the machine's hopper, as they can cause damage to the spreader and constitute a risk for the environment.

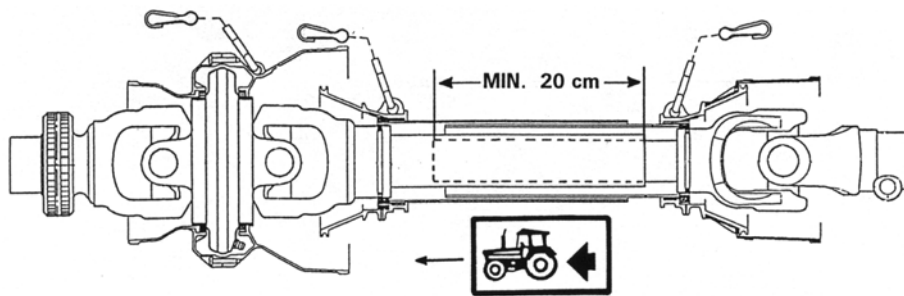
- **During servicing** of type A2 and A2X, the tractor's lifting arms must always be lowered, or the machine must be supported.
- The working position of **the top bar** between tractor and spreader when using type A2 and A2X must be within the following range: parallel with the lifting arms <-> horizontal. If the top bar is at too steep an angle, this considerably increases the risk of breaking due to overloading.
- **When connecting type A2 and A2X:** Never work between tractor and spreader while there are people in the tractor cab. Make sure that the tractor hand brake is on and that it works properly.

PTO shaft:

The PTO shaft must be the right length. There must be a minimum overlap of 20 cm.

Remember to lock the safety cover with chains at both ends of the shaft.

On A2 and A2X, under no circumstances must the shaft be pressed home completely with the machine lifted in the working position. Remember that if the PTO shaft is shortened, the ends must be rounded off to avoid friction.



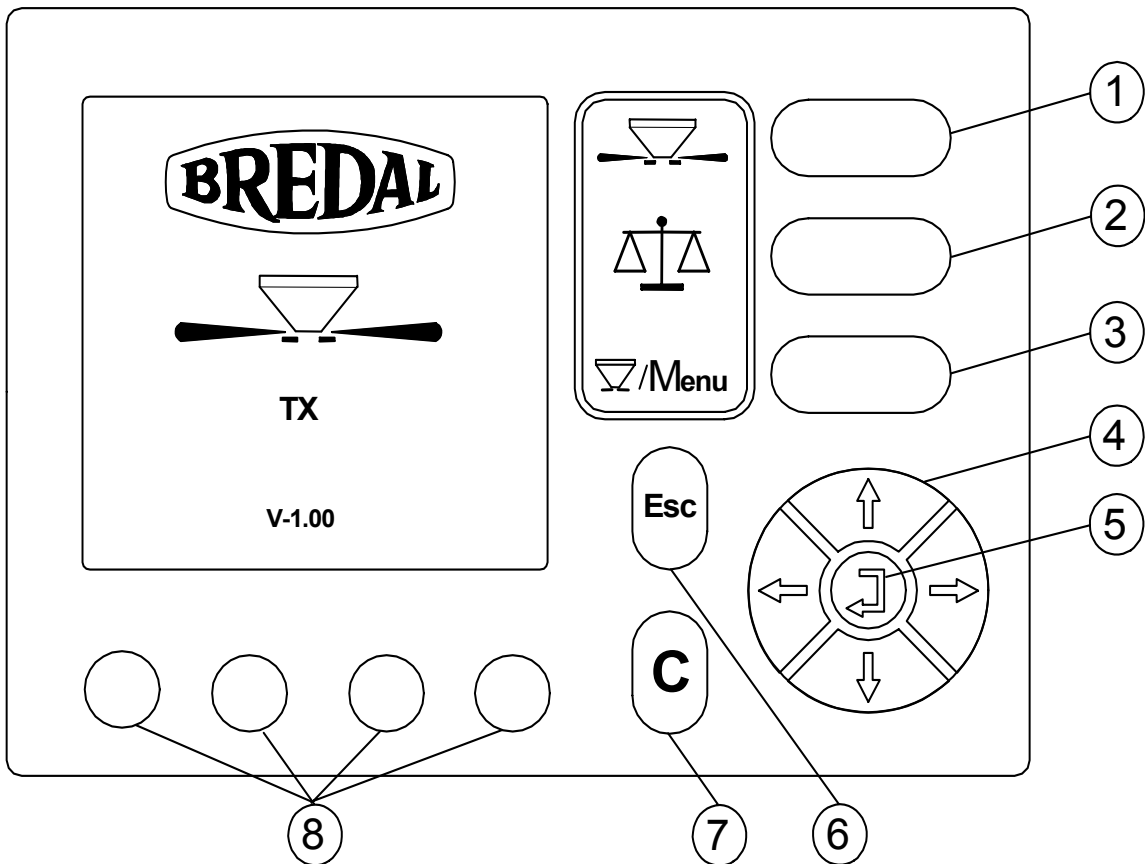
Road safety:

It is essential to ensure that all road safety features are in good working order. Ensure that:

1. The lights are visible and have been connected to the tractor's lights socket when driving on the road, and that they have been cleaned after spreading fertiliser.
2. The warning triangle is visible and clean, so that other road-users can see that there is a slow-moving vehicle ahead.
3. The A-frame is always locked
4. When connecting to the tractor, ensure that the pegs are a reasonable size (diameter), and that they are locked using a cotter pin.
5. There is no pressure on the spreader's hydraulics.








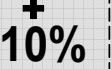


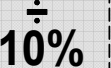



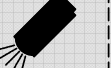
















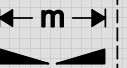

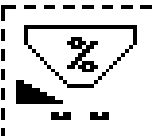
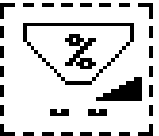
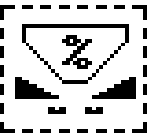
Operation of Bredal 500 computer

An explanation of the keys

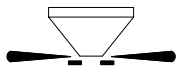


Pos.	Description
1	Start/Stop key
2	Application rate key
3	Menu key
4	Arrow keys
5	Return key
6	Escape key
7	Clear key
8	Program keys

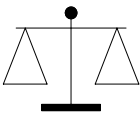
Symbol overview

	Km/h		Time		Alarm OFF
	Area		Kg left		Alarm ON
	RPM PTO		+10%		Wheel tractor
	Kg		-10%		Not in use
	Calibrate		Scroll right		Radar
	Fill		Scroll left		Speed autocalibr.
	Kg/min.		Light on when 1st key pressed		Reg. Down
	Save		Light on		Reg. Up
	Kg/ha		Contrast -		Next page
	RPM Cell wheel		Contrast +		Previous page
	Ton		Width reduction		Headland spreading
	Reduce ap- plication rate on left side		Reduce ap- plication rate on right side		Reduce appli- cation rate on both sides


START/STOP KEY (POS. 1)

Key	Description
	Press this key to start or stop the spreading process. If spreading is in progress, this is shown on the screen to the left of the key.

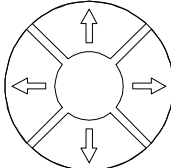
APPLICATION RATE KEY (POS. 2)

Key	Description
	Press this key to calculate kg/ha based on the actual amount spread and the area covered. This function can only be used when the vehicle is stationary, as the calculation requires the weighing system to be motionless.

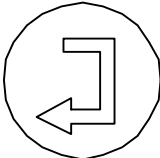
MENU KEY (POS. 3)

Key	Description
	Press the MENU key to switch between operation display and main menu. This key has a "toggle" function, i.e. if the operation display is showing and the key is pressed, the main menu will appear. If the key is pressed while encoding, for example, the screen will switch to the operation display.

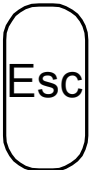
ARROW KEYS (POS. 4)

Key	Description
	The arrow keys are used to select and change settings. When encoding, the arrow keys are used to select and adjust the digits to be changed. Each digit can be adjusted between 0 and 9 using the UP and DOWN arrow keys. To select the digit to be changed, use the LEFT and RIGHT arrow keys.

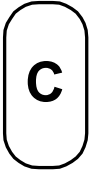
RETURN KEY (POS. 5)

Key	Description
	The return key is used for accepting encoding values, etc. and to return to the previous screen image.


ESCAPE KEY (POS. 6)

Key	Description
	This key is used to return to the previous menu without saving.

CLEAR KEY (POS. 7)

Key	Description
	The clear key is used to reset settings/counters and to acknowledge alarms.

PROGRAM KEYS (POS. 8)

Key	Description
 keys 1-4	The functions of the program keys are shown in the operation display. The function is shown on the screen immediately above the actual key.

Operation

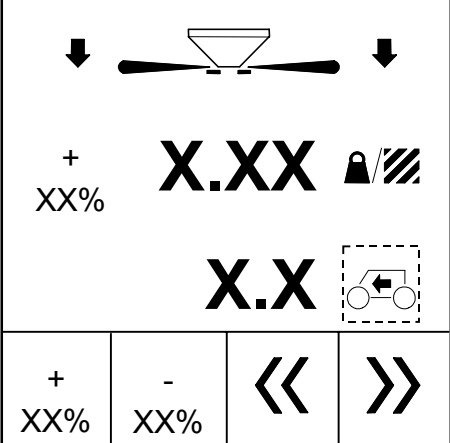
To view the operation display, just press the MENU key at any point in the program.

The operation display always appears automatically when the apparatus is switched on.

One prerequisite is that all encoding/calibrations must be undertaken in order to achieve correct operation.

THE OPERATION DISPLAY

The operation display can be divided into the following “sections”. Below are descriptions of these screen sections:

Displays spreader's status.		<i>The arrows show whether application is to be increased (up arrow) or decreased (down arrow)</i>
Displays step application status.		Application is shown in kg/ha
		Operating function 2 (optional)
Step application: + = increase - = decrease		Switch between options for operating function 2.

THE SPREADER'S STATUS

This shows whether application is switched on or off.

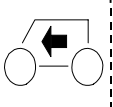
STEP APPLICATION


Application can be modified in line with the percentage selected during encoding. If +/- step application has been activated, this is shown on the screen along with the percentage change in application. The size of the steps is identical for both + and – step application.

OPERATING FUNCTION 2

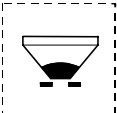
This operating function is optional, i.e. the function shown on the screen can be selected by pressing the PROGRAM keys. Pressing PROGRAM key 3 or 4 allows you to select from all available operating functions. Each individual operating function is described below:

SPEED

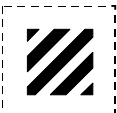
Key	Description
	Current speed shown in kilometres per hour.

Key	Description
	When this image is displayed, it is possible to alter the working width by two metres each time you press the key. When you leave this function, the computer automatically switches back to the working width encoded in app. rate setting.

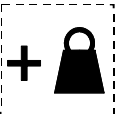
KG LEFT

Key	Description
	Quantity remaining in the spreader, shown in kg, i.e. the current weight left in the spreader calculated by the weighing system.

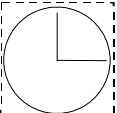
AREA

Key	Description
	Area covered, since last reset, shown as ha. The area size is shown to two decimal places up to 99.99 ha. Larger areas up to 999.9 ha are shown to one decimal place. Areas in excess of 999.9 ha are shown as whole numbers.


KG COUNT

Key	Description
	Quantity spread since last reset. Counts up to 9999 kg, then switches to displaying in tons (99.99, 999.9, 9999). Once the display switches to counting in tons, a "T" is displayed in the kg symbol.

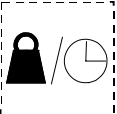
TIME

Key	Description
	The current time.

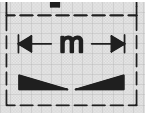
SPREADING DISC SPEED

Key	Description
	Speed of the PTO shaft shown in revolutions per minute.


KG/HOUR

Key	Description
	The quantity being spread, shown as kg/min.


Working width reduction

Key	Description
	The working width can be reduced or increased using the + and – keys – remember to change spreading disc speed. When you exit this screen, the spreading width returns to the standard setting.


Application rate reduction – right side

Key	Description
	The application rate on the right side can be reduced or increased using the + and – keys.

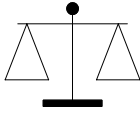


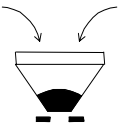
Application rate reduction – left side

Key	Description
	The application rate on the left side can be reduced or increased using the + and – keys.

Application rate reduction – both sides

Key	Description
	The application rate on both sides can be reduced or increased using the + and – keys.

CALCULATION OF AVERAGE APPLICATION RATE - Auto

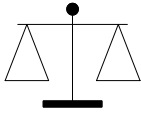




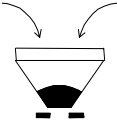
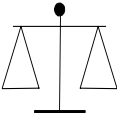
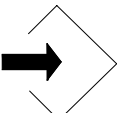

Step/Key	Description						
<p>1</p> 	<p>Press the APP. RATE key and the following screen is displayed:</p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;">Application rate kg/ha</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Calculated</td> <td style="text-align: right; padding: 5px;">XXXX</td> </tr> <tr> <td style="padding: 5px;">Weighed</td> <td style="text-align: right; padding: 5px;">XXX</td> </tr> <tr> <td style="padding: 5px;">Current flow factor</td> <td style="text-align: right; padding: 5px;">X.XX</td> </tr> </table> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">  </div> <div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> <div style="border: 1px solid black; padding: 5px; text-align: center;">  </div> <div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div> </div> </div> <p>When the box with the tractor is highlighted – weighing is automatic</p>	Calculated	XXXX	Weighed	XXX	Current flow factor	X.XX
Calculated	XXXX						
Weighed	XXX						
Current flow factor	X.XX						
<p>2</p> 	<p>Press the “Fill” PROGRAM key and the calculation is reset. This is done ONLY when filling.</p>						
<p>3.</p>	<p>Start spreading.</p>						

CALCULATION OF AVERAGE APPLICATION RATE – Manual

Pressing the APP. RATE key enables you to calculate the average application rate for the quantity spread since the last calculation.

The average application rate is determined using the calculated amount spread and the weighed amount spread if the system is fitted with weighing cells. The average application rate is calculated as follows:

CALCULATION WITH WEIGHING CELLS

Step/Key	Description								
<p>1</p> 	<p>Press the APP. RATE key and the following screen is displayed:</p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;">Application rate kg/ha</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Calculated</td> <td style="text-align: right; padding: 5px;">XXXX</td> </tr> <tr> <td style="padding: 5px;">Weighed</td> <td style="text-align: right; padding: 5px;">XXX</td> </tr> <tr> <td style="padding: 5px;">Current flow factor</td> <td style="text-align: right; padding: 5px;">X.XX</td> </tr> <tr> <td style="padding: 5px;">New flow factor</td> <td style="text-align: right; padding: 5px;">X.XX</td> </tr> </table> <div style="display: flex; justify-content: space-around; margin-top: 5px;">     </div> </div>	Calculated	XXXX	Weighed	XXX	Current flow factor	X.XX	New flow factor	X.XX
Calculated	XXXX								
Weighed	XXX								
Current flow factor	X.XX								
New flow factor	X.XX								
<p>2</p> 	<p>Press the “Fill” PROGRAM key and the calculation is reset. This is done when filling and if the flow factor has been changed.</p>								
<p>3.</p>	<p>Spread a suitable (depends on the required application) amount, e.g. 600 kg.</p>								
<p>3</p> 	<p>Press the “Weigh” PROGRAM key to calculate the average application rate, and a suggestion for a new flow factor will appear on the screen.</p>								
<p>4</p> 	<p>If the new flow factor is acceptable: Press the “Save” PROGRAM key and the new flow factor is saved. The contents of the spreader are weighed automatically, and spreading can continue.</p>								
<p>5.</p>  /Menu	<p>If the new flow factor is not acceptable: Press the MENU key and continue spreading until a larger amount has been spread.</p>								

Application rate/setting

Select the Application Rate/Setting menu from the main menu by pressing the MENU key; use the ARROW UP and DOWN keys to select “**App. Rate/Setting**”, then press the RETURN key.

KG/HA

Select “**Kg/Ha**” to encode the required application rate in kg/ha.

WIDTH

Select “**Width (m)**” to encode the spreader’s working width in metres.

STEP %

To encode the size of the steps by which the application rate is to be changed as a percentage, select “**Step %**”.

FLOW FACTOR

The spreader always calculates the current flow factor. The flow factor, if known, can be encoded by selecting “**Flow factor**”.

Default value =1.00

Max. = 1.30

Min. = 0.70

Example:

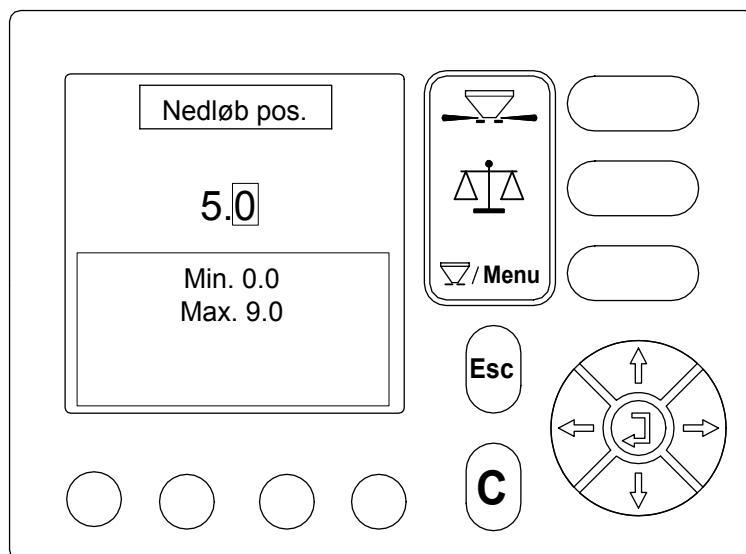
1.03 signifies that the application rate is increased by 3%.

0.97 signifies that the application rate is reduced by 3%.

Chute

Chute shows the default setting on the chutes for the particular working width encoded. This setting can be changed by entering another value between 0.1 and 9.0.

If the working width is subsequently changed, the computer switches back to auto setting of its own accord. It is also possible to press the auto button to return to the default setting.



Weighing

Weighing

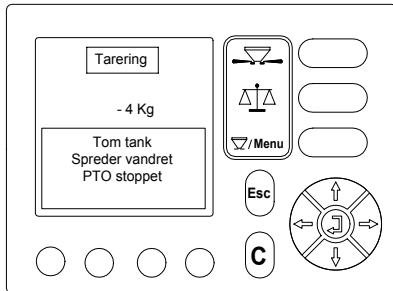
Tare	
Calibration	
Calibration figure	xxxxxx
Weighing Off	<input type="checkbox"/>
Static weighing	<input type="checkbox"/>
Dynamic weighing	<input type="checkbox"/>

Only the top three points are to be used.

TARE

The spreader must be empty and the PTO switched off when the weighing system is tared.

To tare (reset) the weighing system, select “**Tare**” from the “Weighing” menu, then press the RETURN key twice and the weighing system will be tared.


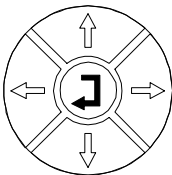


Example:

The spreader is empty, but the weight shows -4 kg. The weight must be tared before the spreader is filled with fertiliser.

Calibration of the weighing system

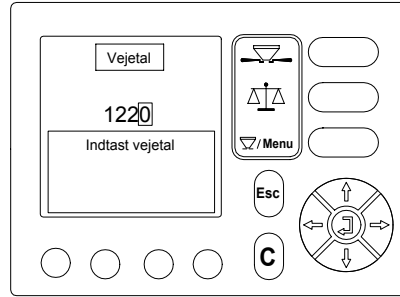
The weighing system is calibrated at the factory; it is not normally necessary to do this again. However, if there are problems, it may be necessary to repeat the calibration procedure. This may be done as follows:

Step/Key	Description
1  /Menu	With the spreader empty , press the MENU key.
2	Move the cursor using the ARROW UP and DOWN keys and highlight " Weighing ".
3	Press the RETURN key.
4	Move the cursor using the ARROW UP and DOWN keys and highlight " Calibration ".
5. 	<p>Press the RETURN key and the following warning message will appear:</p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> <div style="border: 1px solid black; padding: 2px; text-align: center; margin-bottom: 5px;">Calibration</div> <div style="border: 2px solid black; padding: 5px; text-align: center; margin-bottom: 5px;">Warning</div> <p style="text-align: center;">Do you want to continue with calibration? ESC = Undo</p> </div> <p>If you wish to calibrate the weighing system, press the RETURN key again.</p>
6.	With the spreader empty and 0 rpm on the PTO shaft, press the RETURN key to reset the system.
7.	Fill the spreader with a known weight and encode this weight in kg. Then press the RETURN key. A new calibration figure will be calculated and the calibration is complete.

Remember to make a note of the calibration figure calculated in case it is accidentally deleted or altered.

CALIBRATION FIGURE

If the calibration figure is known, this can be encoded by selecting “**Calibration figure**” from the “Weighing” menu and then encoding the figure. Press the RETURN key to save the calibration figure and return to the previous menu.



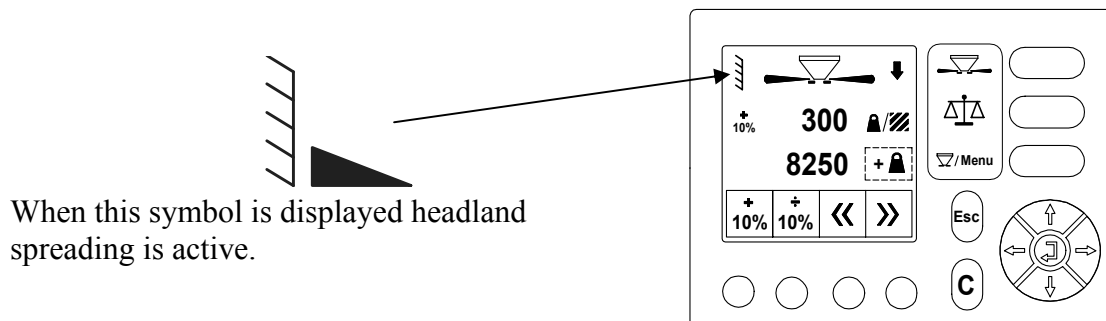
Emptying

The spreader can be emptied when not in use, as follows:

Step/Key	Description
1 ☒ / Menu	Press the MENU key.
2	Move the cursor using the ARROW UP and DOWN keys and highlight “ Emptying ”.
3	Press the RETURN key.
4 ☒ ☒	The spreader can now be emptied by highlighting either the right or left side and then pressing the START/STOP key.

Headland spreading

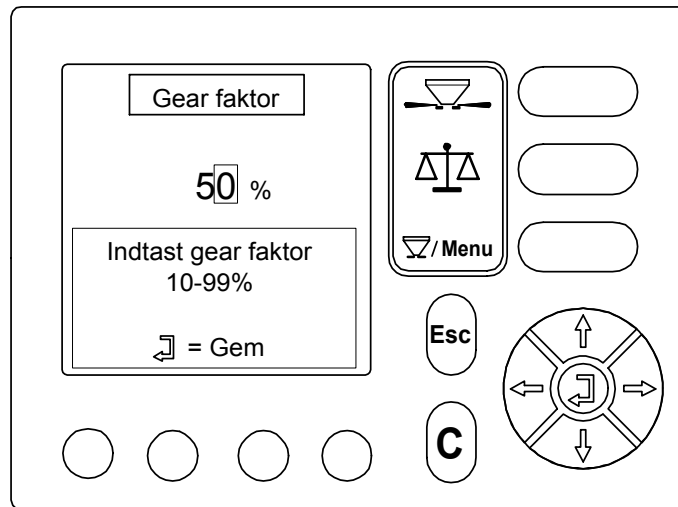
Headland spreading is activated and deactivated using a double-action hydraulic outlet from the tractor. When headland spreading is active, a symbol appears in the top left corner of the operation display. The PTO shaft **must** be switched off in order to switch between headland spreading and normal spreading.



Gear factor

In the image shown, the “downgearing percentage” for the headland spreading device has been entered.

- For 18 -36 m headland spreading, the value is: **52%**.



Manual adjustment

Using this function the application rate actuator can be operated manually. Enter actuator pulse and press either the right or left actuator, following which the actuator will move.

Correction factor

If it is confirmed that one side is applying more or less than the other side, the correction factor can be adjusted percentage wise using the + or – keys.

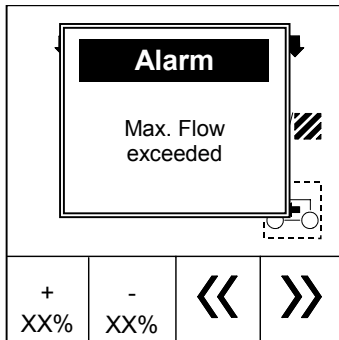
Operating alarms

During operation, situations may arise that trigger alarms. To acknowledge the various alarms, press the C key.

Thoroughly investigate the cause of any alarm before acknowledging it.

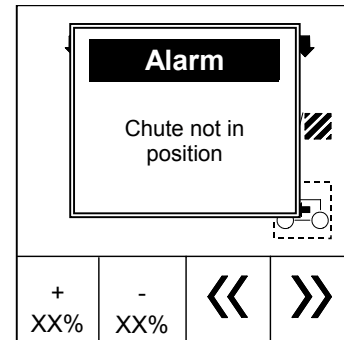
Below is an explanation of the “established” alarms that may occur during operation:

Maximum flow (kg/min) for the spreader has been exceeded.



Reduce speed or change the encoded application rate.

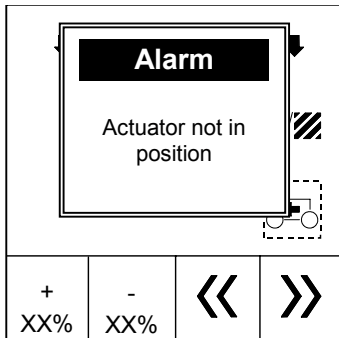
The chutes have not reached the required position.



Check that chutes and tow-bars can move freely.

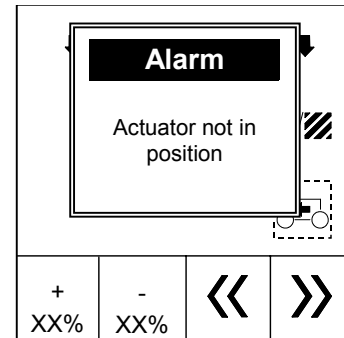
A description and the procedure for encoding the optional alarms can be seen on page 39.

The actuator for the left side has not reached the required position.



Check for foreign bodies in the outlet.

The actuator for the right side has not reached the required position.



Check for foreign bodies in the outlet.



Alarms

ENCODE

Select the “Encode” menu from the main menu by pressing the MENU key; use the ARROW UP and DOWN keys to select “**Encode**”, then press the RETURN key.

Select encode alarms from the encode menu by highlighting “**Alarms**” using the ARROW UP and DOWN keys, then press the RETURN key.

The alarms available can be turned on and off using the following PROGRAM keys. Once an alarm is activated, it should be acknowledged using the C key.

Key	Description
	Alarm on.
	Alarm off.

KG LEFT ALARM

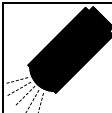
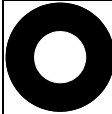
Alarm ON/OFF and the number of kg left in the spreader required to trigger the alarm.

RPM DISCS ALARM

Alarm ON/OFF and minimum disc speed, in rpm, required to trigger the alarm.

Speed sensor

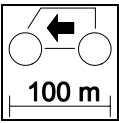
Choice of speed sensor and calibration figure for speed sensor is encoded here. It is also possible to calibrate the speed sensor. Select this menu from the encoding menu by highlighting “**Speed sensor**” using the ARROW UP and DOWN keys, then press the RETURN key.

Key	Description
	Press this key (program key 1) to select radar as speed sensor (via the 7-pin DIN/ISO plug). <i>If the number of pulses per 100 m is known, this figure can be encoded direct.</i>
	Press this key (program key 2) to select a wheel sensor mounted on the tractor as a speed sensor (via the 7-pin DIN/ISO plug). <i>If the number of pulses per 100 m is known, this figure can be encoded direct.</i>

Disc pulse/revolution

Here it is possible to determine how many pulses there should be per turn of the spreading discs. As standard there is one pulse/revolution as the discs rotate.

AUTOMATIC SPEED CALIBRATION

Step/Key	Description
1	Measure out a 100-metre stretch and drive to the start position.
2	Select a speed sensor as described above.
3	 <p>Press this key and drive the measured 100 m stretch. Stop exactly at the stop position. <i>The computer will count pulses during driving.</i></p>
4	Press the RETURN key to complete calibration of the speed sensor.

There should be a minimum of 3-400 pulses per 100 metres. There must be 100 impulses per 100 metres to enable calibration of the speed sensor.

Weighing

Select the Weighing menu from the main menu by pressing the MENU key; use the ARROW UP and DOWN keys to select “**Weighing**”, then press the RETURN key.

Select whether the system includes weighing cells or not by highlighting “**Weighing**” (in the “Weighing” menu), then press the RETURN key. The system switches between Weighing = ON and Weighing = OFF each time the RETURN key is pressed.

Info

The information menu shows a summary of different encoding values and can be selected from the main menu (press the MENU key). Then use the ARROW UP and DOWN keys to highlight “**Info**”. Then press the RETURN key.

Info	
App. rate (kg/ha)	XXX
Width (m)	XX
Step %	XX
Flow factor	X.XX

Data/clear (task)

It is possible to have up to ten different trip counter sets (tasks) that can be started and stopped when changing field, etc.

Select the “Task” menu from the main menu (press the MENU key). Then use the ARROW UP and DOWN keys to highlight “**Data/clear**”. Then press the RETURN key.

Reset all counters before starting a new task. If you switch to a different task before subsequently switching back to the original task, all counters continue from the value recorded when the original task was abandoned.

The tasks can be reset one by one.

THE COUNTERS FOR ONE TASK

Trip counter 1/10	
New counter	
Clear counter	
Kg	X
Area	X.XX
Time	X:XX

The screen image on the left appears when the “**Data/clear**” menu is selected. Below is a description of each individual counter:

Kg:

The total number of kg since the task was started or the last reset.

Area:

The area counted since the start of the task or since the last reset. The area corresponds to the operative area, i.e. only the area that has been covered.

Time:

The total operative time since the start of the task or the last reset.

START/CONTINUATION OF A TASK

Selecting the “**Data/clear**” menu retrieves the last task performed. If no task has been started, task 1 will open.

Trip counter	
Counter no	1
Counter no	2
Counter no	3
Counter no	4
Counter no	5
Counter no	6
↓	↓
↓	↓

To start or continue a task, you must press the “**New counter**” key. You can then select task 1–10 by using the ARROW UP and DOWN keys to highlight the required number; then press the RETURN key.

To return to operation, press the MENU key.

The individual sets of trip counters are identified by means of a number.

It is not possible to encode names, telephone numbers or similar.

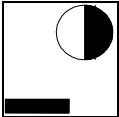
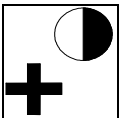

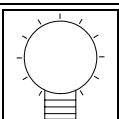
RESETTING A TASK

If you wish to reset the counters for a task, select a task as described above and then highlight “**Clear counter**” and press the RETURN key.

System

Select the “System” menu from the main menu (press the MENU key). Then use the ARROW UP and DOWN keys to highlight “**System**”. Then press the RETURN key.

CONTRAST/LIGHT (if the screen is completely blank – press and hold the C key for approximately 10 seconds).

Key	Description
	Press this program key to make the screen brighter.
	Press this program key to make the screen darker.
	Press this program key to activate the autolight function. The screen light switches off until any key is pressed, whereupon the light comes on automatically.
	This program key turns the screen light on and off.

LANGUAGE

The language for the Bredal LH500 is selected here.

Test

TEST INPUT

Use test input if, for example, you suspect a sensor is defective.

Under each input designation there is a counter on the right side of the screen that registers the number of times the input concerned has been activated (the counter is automatically reset when leaving “Test input”, or by pressing the C key). The current status of the input (**Hi/Lo**) is shown on the left side.

Scroll through the various inputs by pressing the ARROW UP and DOWN keys (two pages in total). The various input designations relate to the following:

Input	Description
Wheel DIN/ISO	Speed signal from wheel sensors mounted on the tractor (via the 7-pin DIN/ISO plug in the tractor).
Radar DIN/ISO	Speed signal from radar mounted on the tractor (via the 7-pin DIN/ISO plug in the tractor).
Press the DOWN ARROW key to view the next inputs:	
RPM disc	Rpm signal from rpm sensor mounted on the discs.
Weighing	Signal from the weighing system.
Press the DOWN ARROW key to view the first inputs:	

SIMULATE SPEED

It is possible to simulate a particular speed for troubleshooting or if spreading is required independent of driving speed. Encode the required simulated speed in km/h to one decimal place; switch speed simulation on and off using Program keys 1 & 2.

TOTAL COUNTERS

The System menu includes total counters for the following:

Kg: The total quantity spread since the last reset, shown in kg.

Area: The total area spread since last reset.

Time: The total time the spreader has been in operation.

To reset the total counters, highlight the counter to be reset and then press the C key.

Manual adjustment

Using this function the application rate actuator can be operated manually. Enter actuator pulse and press either the right or left actuator, following which the actuator will move.

Correction factor

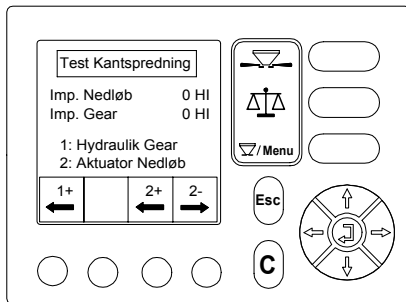
If it is confirmed that one side is applying more or less than the other side, the correction factor can be adjusted percentage-wise using the + or – keys.

Software information

Here you will find information concerning the software version.

TEST HEADLAND SPREADING

It is possible to test the chutes and the cylinder that change the spreading box device here.



In the image shown the actuator for control of chutes and the device's hydraulic valve can be tested.

At the top it shows whether or not the built-in pulse sensor in the actuator and the sensor for the device are registering pulses when the function is activated.

****When testing headland spreading, hold key 1+ down while changing the headland device****

System drawings

