

Athene Spreader Control Operator's Manual



Athene Spreader Controller Operator Manual

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Athene Software Version 3.13

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Preface

This manual provides information about operating and maintaining this Topcon Precision Agriculture product. Correct use and servicing is important for safe and reliable operation of the product.

It is very important that you take the time to read this manual before using the product.

Information in this manual is current at the time of publication. A system may vary slightly. The manufacturer reserves the right to redesign and change the system as necessary without notification.

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Note: Please read these Terms and Conditions carefully.

General

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Service Information

Service assistance can be provided by contacting your local TPA Authorized Dealer.

Communications Regulation Information

FCC Compliance Statement (USA)

This equipment has been tested and found to comply with the limits for a Class 'A' digital device, pursuant to Part 15 of the FCC Rules. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's expense.



FCC Compliance Statement (Canada)

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulation.



CE EMC Statement (European Community)

Warning: This is a class 'A' product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.



'C' Tick EMC Statement (Australia & New Zealand)

This product meets the applicable requirements of the Australia and New Zealand EMC Framework.

Type Approval and Safety Regulations

Type approval may be required in some countries to license the use of transmitters on certain band frequencies. Check with local authorities and your dealer.

Unauthorized modification of the equipment may void that approval, the warranty and the license to use the equipment.

The receiver contains an internal radio-modem. This can potentially send signals. Regulations vary between countries, so check with the dealer and local regulators for information on licensed and unlicensed frequencies. Some may involve subscriptions.

Radio and Television Interference

This computer equipment generates, uses, and can radiate radio-frequency energy. If it is not installed and used correctly in strict accordance with TOPCON Precision Agriculture instructions, it may cause interference with radio communication.

You can check if interference is being caused by this equipment by turning the Topcon equipment off to see if the interference stops. If the equipment is causing interference to a radio or other electronic device, try:

- Turning the radio antenna until the interference stops
- Moving the equipment to either side of the radio or other electronic device
- Moving the equipment farther away from the radio or other electronic device
- Connecting the equipment to another circuit that is not linked to the radio.

To reduce potential interference operate the equipment at the lowest gain level that will allow successful communication.

If necessary contact your nearest Topcon Precision Agriculture dealer for assistance.

Note: Changes or modifications to this product not authorized by TOPCON Precision Agriculture could void the EMC compliance and negate authority to operate the product.

This product was tested for EMC compliance using Topcon Precision Agriculture peripheral devices, shielded cables and connectors. It is important to use Topcon Precision Agriculture devices between system components to reduce the possibility of interference with other devices

General Safety



DANGER: It is essential that the following information and the product specific safety information is read and understood.

Most incidents arising during operation, maintenance and repair are caused by a failure to observe basic safety rules or precautions. Always be alert to potential hazards and hazardous situations.

Always follow the instructions that accompany a Warning or Caution. The information these provide aims to minimize risk of injury and/or damage to property. In particular follow instructions presented as Safety Messages.

Safety Messages and Warnings

The safety symbol is used with the relevant word: DANGER, WARNING or CAUTION.

Messages marked in this way recommend safety precautions and practices. LEARN and apply them.



DANGER: Indicates an imminently hazardous situation that, if not avoided, could result in **DEATH OR VERY SERIOUS INJURY**.



WARNING: Indicates a potentially hazardous situation that, if not avoided, could result in **DEATH OR SERIOUS INJURY**.



CAUTION: Indicates a potentially hazardous situation that, if not avoided, may result in **MINOR INJURY**.

Safety Signs



WARNING: DO NOT remove or obscure safety signs. Replace any safety signs that are not readable or are missing. Replacement signs are available from your dealer in the event of loss or damage.

If a used vehicle has been purchased, make sure all safety signs are in the correct location and can be read. Replace any safety signs that cannot be read or are missing. Replacement safety signs are available from your dealer.

Operator Safety



WARNING: It is **YOUR** responsibility to read and understand the safety sections in this book before operating this vehicle. Remember that **YOU** are the key to safety.

Good safety practices not only protect you, but also the people around you. Study this manual as part of your safety program. This safety information only relates to Topcon equipment and does not replace other usual safe work practices.



WARNING: Ensure power is removed from the Topcon equipment prior to maintenance or repair of the vehicle or implements.



WARNING: Ensure appropriate precautions are taken prior to handling any hazardous substances. Always read the Material Safety Data Sheet prior to commencing work.



WARNING: In some of the illustrations or photos used in this manual, panels or guards may have been removed for demonstration purposes. Never operate the vehicle with any panels or guards removed. If the removal of panels or guards is necessary to make a repair, these **MUST** be replaced before operation.



WARNING: Always check that any suspended vehicle attachments are lowered to the ground before beginning repair or maintenance work on a vehicle.



WARNING: Vehicle and implement parts can become hot during operation and may be under pressure. Refer to vehicle manuals.



WARNING: Wear appropriate protective clothing for the task being undertaken and conditions.



WARNING: Do not operate equipment around explosive equipment or supplies.



WARNING: Topcon is committed to good environmental performance and minimizes the use of any potentially harmful substances in its products. However, it is always advisable not to handle damaged electronic equipment. This Topcon product may contain a sealed lithium battery. Always dispose of any electronic equipment thoughtfully and responsibly.

Exposure to Radio Frequency

Exposure to energy from radio frequencies is an important safety issue. Keep a distance of at least 20 cm (7.8 inches) between people and any radiating antenna. Keep a distance of at least 20 cm between transmitting antennas.



WARNING: Products using cellular modem or an RTK base station can transmit radio frequency energy. Check with your dealer.

This device is designed to operate with TPA approved antennas. Discuss with your dealer.

Preparation for Operation

- Read and understand this manual and learn all of the controls before you use the equipment.
- Keep the manual with the equipment.
- If the equipment is moved to another vehicle, move the manual as well.
- Read the manual for the vehicle with which the equipment will be used and check that the vehicle has the correct equipment required by local regulations.

- Make sure you understand the speed, brakes, steering, stability, and load characteristics of the vehicle before you start.
- Check all controls in an area clear of people and obstacles before starting work.
- Identify possible hazards.



WARNING: Topcon equipment must not be used by an operator affected by alcohol or drugs. Seek medical advice if using prescription or over-the-counter medication.

Disclaimer

Topcon accepts no responsibility or liability for damages to property, personal injuries, or death resulting from the misuse or abuse of any of its products.

Further, Topcon accepts no responsibility for the use of Topcon equipment or the GNSS signal for any purpose other than the intended purpose.

Topcon cannot guarantee the accuracy, integrity, continuity, or availability of the GNSS signal.

The operator must ensure that the equipment is correctly turned off when not in use.

Before operating any vehicle equipped with Topcon products, read and understand the following product specific safety precautions.

Important Safety Information

Operator Alertness and Responsibility

The console helps the operator to steer the vehicle, but the operator remains in charge and must be alert and in complete control of the vehicle at all times. The operator is ultimately responsible for safe operation of this equipment.

It is essential that safety requirements are met when operating the console and any of its components. All operators and other relevant personnel must be advised of safety requirements.

Electrical Safety



WARNING: Incorrectly connected power can cause severe injury and damage to people or the equipment.

When working with electrical components, you must do the following:

- Make sure the negative terminal of the battery is disconnected before doing any welding on the vehicle.
- Check that all power cables to system components are connected to the correct polarity as marked. Please refer to the vehicle manual for safety information.
- Check that equipment is grounded in accordance with installation instructions.

Operation and Risk of Obstacles

The following list is not exhaustive or limited. To use the console for assisted steering along a defined wayline, the operator must ensure that it is used:

- Away from people and obstacles
- Away from high voltage power lines or other overhead obstructions (identify any clearance problems before activating the console)
- On private property without public access
- Within cleared fields
- Off public roads or access ways.

Note that:

- The operator needs to know the vehicle's position and the field conditions at all times.
- The operator will need to respond if the GNSS satellite or differential correction signal is lost momentarily.
- The console cannot detect obstacles (people, livestock or other).
- Only use the console in areas that are clear of obstacles and keep a proper distance.
- Steering needs to be disengaged for manual control if an obstacle appears in the path or the vehicle moves away from the wayline.

On/Off and Manual Control



WARNING: Ensure the steering switch is Off to prevent unintentional engagement of the assisted steering. When repairing or maintaining the vehicle/implement, ensure the vehicle CANNOT be moved. Disengage steering, apply brakes and remove keys.

The operator must ensure that the steering switch is Off (*all* LED indicators are off) when assisted steering is not being used.

The operator must disengage assisted steering and use manual control if an obstacle is in the line of travel or moves into the line of travel, or if the vehicle steers away from the desired wayline.

To disengage assisted steering:

- Turn the steering wheel a few degrees OR
- Select the Disengage Auto Steering button on the console AND/OR
- If using an external steering switch, disengage using the switch if the above actions do not disengage assisted steering.

Vehicle Shut Down Safety

Before leaving the vehicle, disengage assisted steering, disengage external steering switch if this is being used, and remove the key from the key switch.

Using a Reference (Base) Station



WARNING: Do not move a reference station while in operation. Moving an operating reference station can interfere with the controlled steering of a system using the reference station. This could result in personal injury or damage to property.

Operators and other affected personnel must be advised of the following safety precautions.

- Do not erect the reference station under or within the vicinity of high voltage power lines.
- When using the portable reference station, make sure that the tripod is securely mounted.

To Get the Best Out of the Product

Back up data regularly. The console has large, but limited storage capacity. Use the Diagnostics Mini-view to view capacity available. A warning screen displays if storage is reaching its limit.

Be aware of file format compatibility. Discuss compatible formats with the dealer. Topcon Agricultural Products are hardy and designed to work in tough conditions. However, if equipment is unused for a length of time, store away from water and direct heat sources.

Alert Symbols

In this manual two alert symbols are used:

Note: This offers additional information.



WARNING: A warning signal appears on safety signs and in this manual to show that this information is very important to your safety. LEARN these and APPLY them.

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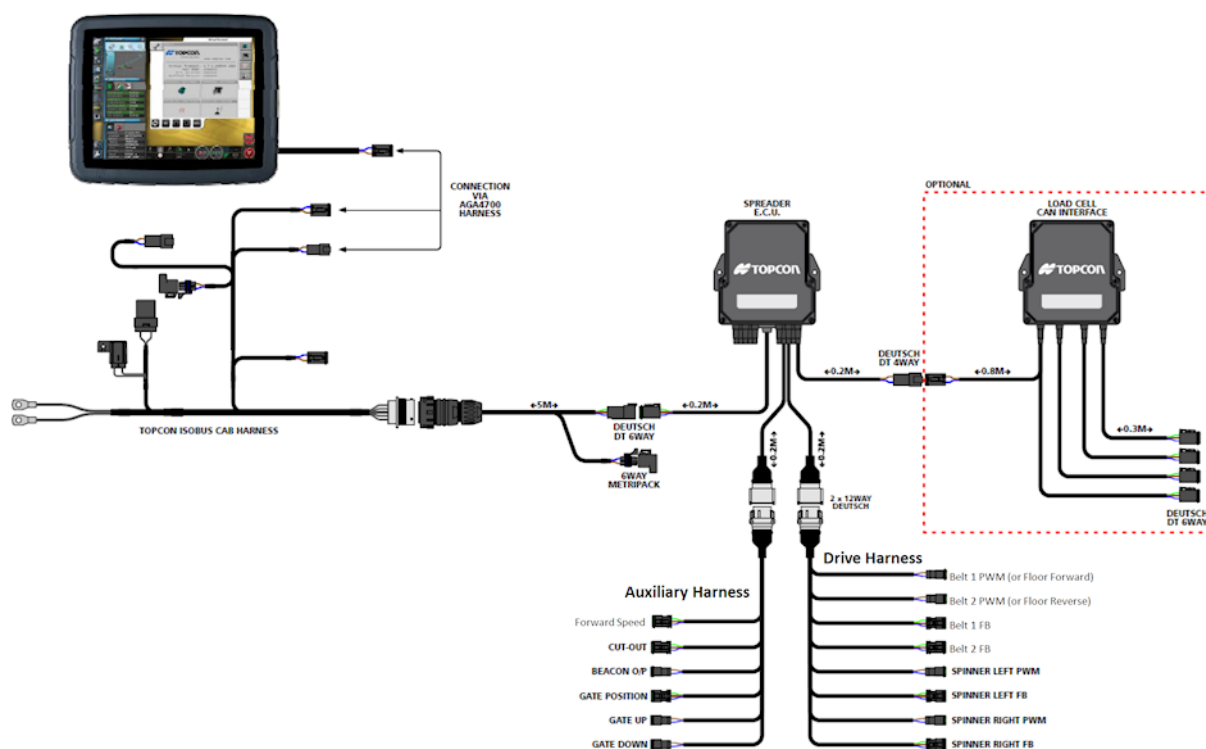
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Chapter 1 – Introduction

The Athene spreader controller is an ISOBUS UT-compliant monitoring and application control system for self-propelled / trailed belt spreaders spreading lime / granular materials. Forward speed measurement and cutout sensing enables full proportional control, to maintain (within limits) a set application irrespective of changes in forward speed.

Shown is a typical retrofitted system (that is independent from the tractor ISOBUS), utilizing a Topcon X-Console. In this scenario, refer to Topcon X-Console Implement Setup, page 3 for console setup instructions.



Some installations will have minor variations, but the key components are the console, spreader ECU, load cell ECU and load cells. The system is compatible with an ISOBUS UT compliant tractor terminal. If using a non-Topcon terminal through ISOBUS, refer to the manufacturer's manual for setup of the terminal and go to Athene Setup, page 17 for instructions.

Forward speed sensing may be performed via GPS, or optionally by a magnetic sensor measuring wheel or propshaft rotation (fitted to the tractor / self-propelled spreader or trailed spreader). The master on/off switch is ‘virtual’ (a softkey on the Athene operation screen), or optionally via an external switch mounted next to the operator.

The system may be fitted with or without load cells.

Machines without load cells: The system relies on volumetric calculation from the known gate height and width, and a known product density. It works best with relatively free-flowing material of consistent density.

Machines with load cells: Load cells enable fully-automatic, continuous calibration. They are advantageous for controlling the rate of material with more variable density at higher rates. By constantly measuring the weight of product in the spreader, the floor (belt) speed is continuously adjusted to achieve the correct target application rate. The system quickly reacts to changes in product characteristics or spreading conditions without having to adjust or re-calibrate the machine. This works best with higher rates where weight changes are significant.

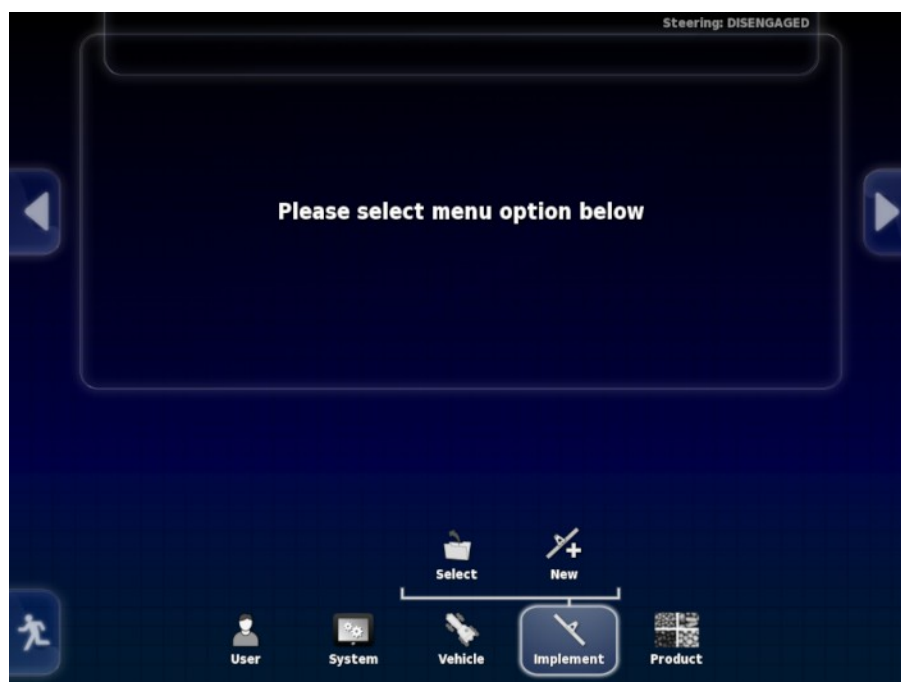
Other spreader functions, such as spinner speed, can also be monitored or controlled, with warnings being triggered if they are not operating correctly.

Chapter 2 – Topcon X-Console Implement Setup

This chapter explains how to setup and configure the Topcon console for use with the Spreader Controller features.

Note: If you are using a non-Topcon ISOBUS terminal, go to Athene Setup, page 17 for instructions.

Note: When the system is new, the following Setup screen displays.

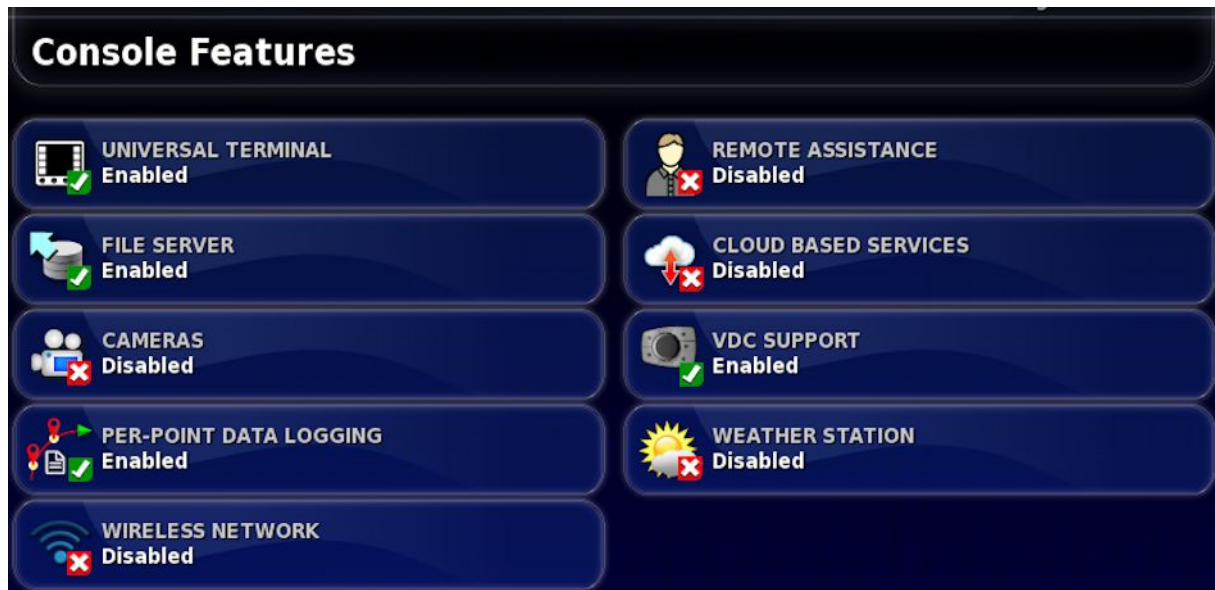


2.1. Enabling ISOBUS

Enables the ISOBUS Universal Terminal server that allows interaction with the Athene ISOBUS compliant ECU.

To enable ISOBUS / Universal Terminal:

1. Select **System**  / **Features**  / **Console** .

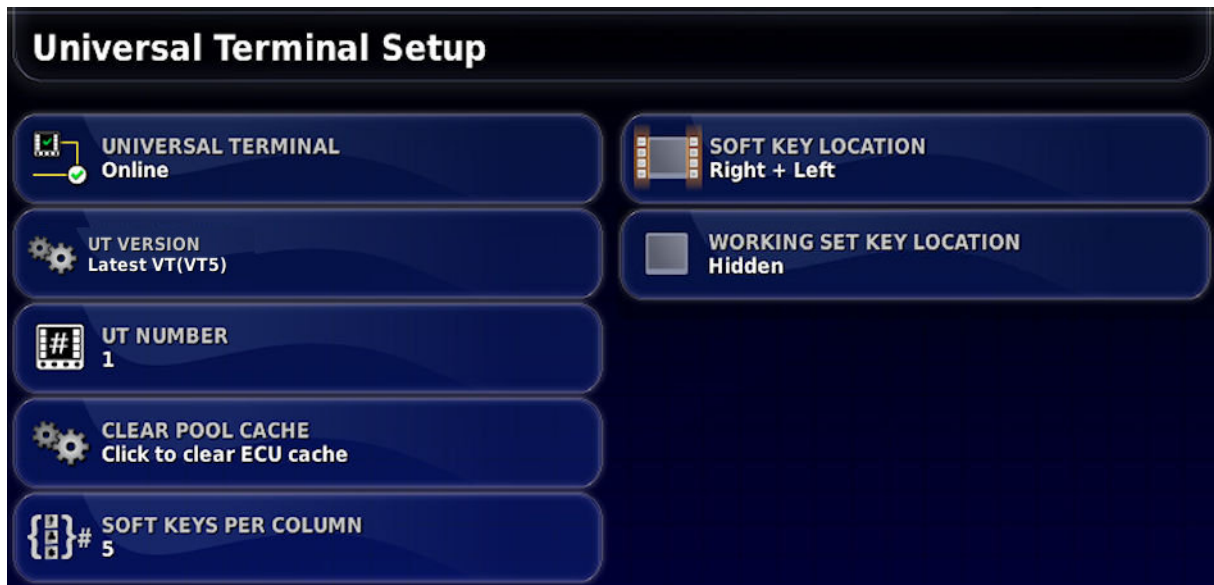


2. Select **FILE SERVER** and select **Enabled**.
3. Select **UNIVERSAL TERMINAL** and select **Enabled**.

4. Select **System**  / **ISOBUS**  / **UT** .



The Universal Terminal setup page is displayed.



- **Universal terminal:** Controls whether the UT server is actively receiving connections from other devices.
This may be useful if there are multiple UTs on the bus and multiple UTs claim to be the primary UT (in which case the UT will go offline automatically and require the **UT Number** to be changed before it will go online again), or to temporarily deactivate the UT on the console.
- **UT version:** Controls which version of the ISO-11783-6 UT specification the UT server supports. It is recommended to leave it at **Latest** unless problems are encountered in the UT.
- **UT number:** Sets the UT number for the console. If there are multiple UTs on the bus, use this setting to assign a unique number to this UT to avoid conflicts. The UT with number 1 will be the default UT. If the UT client doesn't appear on the correct UT you may need to reconfigure its UT number appropriately. If there is a conflict, the following message will appear:
'The UT Number of this UT conflicts with another UT on the bus, and this UT has been disabled. Please make sure that this UT has a unique UT Number.'
- **Clear pool cache:** Clears the contents of the UT pool cache. Should only be used if a UT error is displayed.

2.1. Enabling ISOBUS

- **Soft keys per column:** Sets the number of available softkeys on the UT interface on the Operation screen. **Note:** This should be set to 5 (or 6 if the option to select 5 is not available).
- **Soft key location:** Sets the location of the softkeys on the UT interface and the number of columns (1 or 2). **Note:** **Right + Left** should be selected.
- **Working set key location:** Sets the visibility and location of the keys that switch the interface between ECUs (if more than one ISOBUS compliant ECU is connected). **Note:** This should be set to **Hidden**.

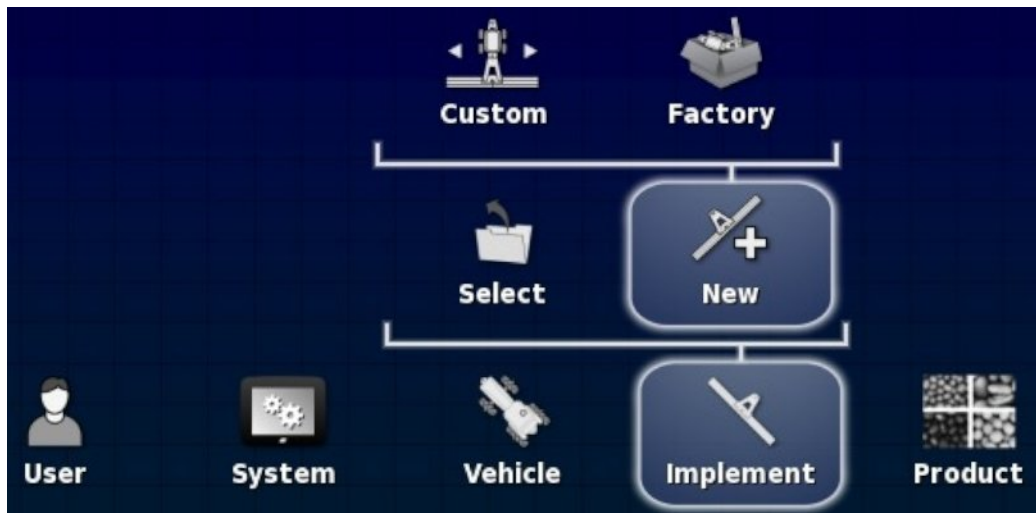
2.2. Setting up a new implement

Creates a new implement profile for the attached implement.

Note: Existing implement files can be imported from a USB. Refer to the Guidance and Auto Steering manual.

To create a new implement:

1. On the Setup screen, select **Implement**  / **New**  .



- **Custom:** Create a new implement profile.
 - **Factory:** Select an implement template from a pre-defined list.
2. If the required implement is not available in the **Factory** templates, select **Custom**.
 3. Use the arrows to select the implement **Type** and confirm.



rigid



pivoted (tow behind)

2.2. Setting up a new implement



front mount



double pivoted (tow between)

A message displays stating that the console will restart once the implement has been created.

A default name for the implement is displayed.

Note: It is highly recommended that items are named in a thoughtful and structured way to allow easy use in future seasons.

4. To change the default name, select **IMPLEMENT NAME** and enter the new name, then confirm.

The New Implement Setup wizard displays.

5. Select **IMPLEMENT CONTROL**, select **Section Control and Rate Control**, confirm and select next..
6. Select **ECU TYPE**, select **ISOBUS**, confirm and select next.
7. Select **IMPLEMENT FUNCTION**, select **Spreader**, confirm and select next.
8. Select **ECU ASSIGNMENT**, select **SM-1** and select next, then



to confirm.

Note: If the ECU list does not show **SM-1**, and only shows **Any ECU**, close the list and wait 30 seconds before trying again.

The ECU Setup screen is displayed.

9. The ECU name **SM-1** should be displayed in the table. If not, press **REFRESH ECU SETTINGS** to trigger the ECU to communicate with the console.

2.3. Setting implement geometry

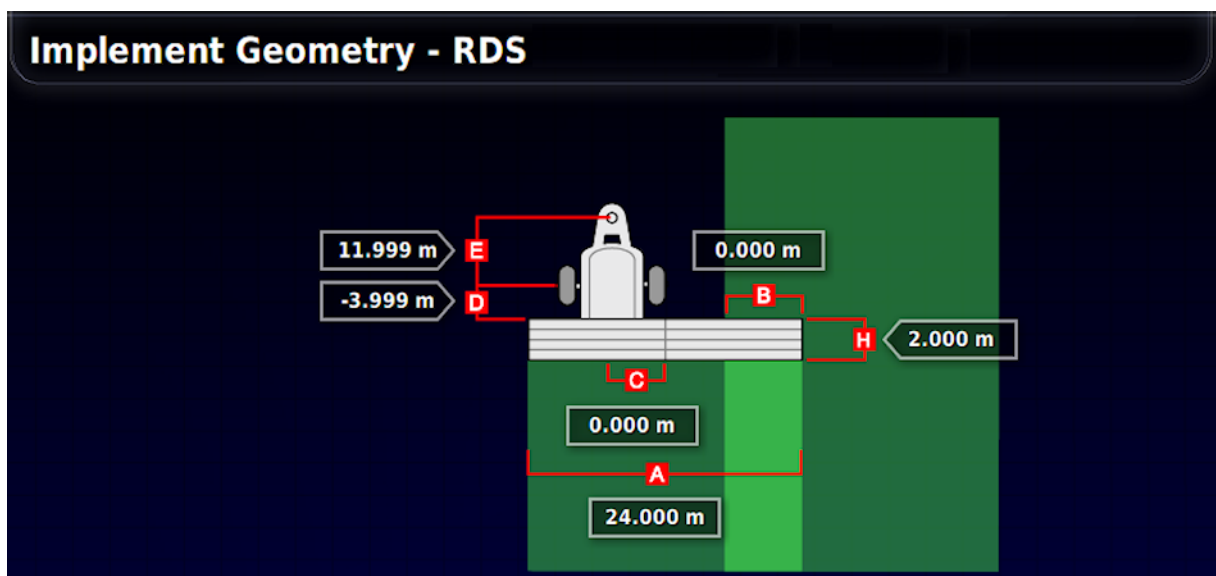
Sets the implement measurements so that guidance can work accurately.

Note: Measure the implement dimensions as accurately as possible.
The recommended tolerance is +/- 5 cm.

When an ISOBUS implement is connected, some of the geometry items are provided by the implement and cannot be altered in the console user interface. Any changes to these must be made in the Athene ISOBUS UT control screen (see Setting up working width, page 46).

To set the implement geometry:

1. Select **Implement**  / **Geometry** .



2. Select an implement dimension. The name of the dimension appears in the title bar.

Dimensions requested vary according to the type of implement selected.

3. Add or adjust dimensions where needed and confirm.

Measurements used are as follows:

- **Swath Width:** Measures the working width of the implement (that is, the width of the area that is treated during one pass of the implement).

2.3. Setting implement geometry

- **Working Length:** Length from the start to the finish of the working area of the boom. Together with swath width, it defines the 'Working Area', which is the region that product is applied over for that boom.
- **Overlap:** Measures the width of the overlap between two adjacent passes.
- **Implement Offset:** Measures the distance between the hitch point and the wheels of the implement.
- **Implement Wheels Offset:** Measures the distance between the wheels and the working area of the implement.
- **Inline Offset:** Measures the off-center offset of the implement relative to the hitch point. Enter a positive number if the implement is shifted to the right and a negative number if it is shifted to the left.
- **Trailer Offset:** Measures the distance between the trailer hitch point and the trailer wheels.
- **Trailer Wheels Offset:** Measures the distance between the implement hitch point and the trailer wheels.

2.4. Setting up section control

Follow these steps to set up section control for the implement.

2.4.1. Enabling section control

To use Auto Section Control, this must be enabled.

1. Select **System**  / **Features**  / **Implement**  and set **AUTO SECTION CONTROL** to **Enabled**.



2. If using VRC prescription maps, select **VARIABLE RATE CONTROL**, choose **Enabled** and confirm.
3. Repeat for each feature you wish to enable or disable.

2.4.2. Setting timing

These settings set the response times for the sections when switched on or off. It is important to accurately calculate the response times to avoid overlaps or gaps in product application. This also applies to automatically switching the master on or off.

To calculate the response times:

1. Ensure the implement is ready to begin product application and that the product calibration has been performed (refer to Calibration, page 59).

2.4. Setting up section control

2. Use a stop watch to time the delay between switching a section on and the application of product. This is the **ON TIME**.
3. When the section is switched off, time the delay between switching it off and the product ceasing to flow. This is the **OFF TIME**.

To set the response times:

1. Select **Implement**  / **Section Control**  / **Timing**  .
2. Select **ON TIME** to set how many seconds delay there is between switching a section on and the application of product, then confirm.
3. Repeat for **OFF TIME** and confirm. This will set how many seconds delay there is between switching a section off and stopping product flow.

2.4.3. Setting up the section switch

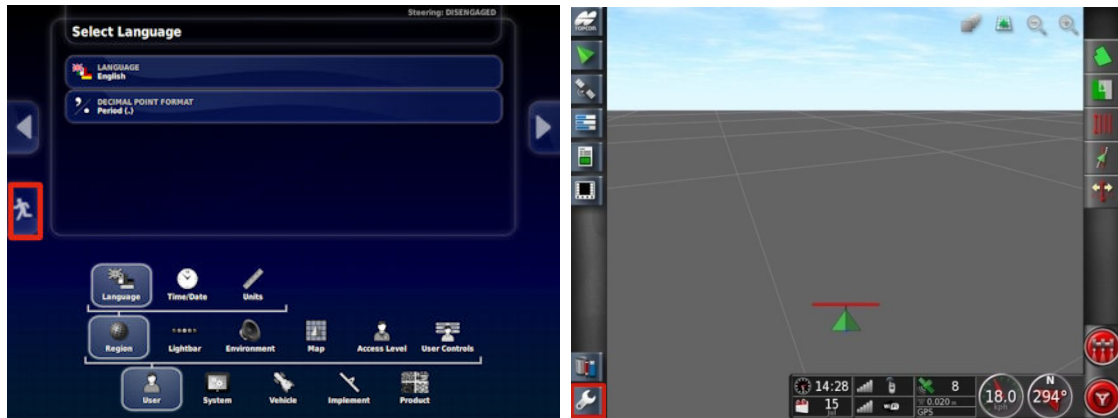
The section switch option is not functional when using spreader implements.

2.5. Setting up master switch and speed

1. Select **Implement**  / **Master Switch**  .
2. Set **MASTER SWITCH** to **Virtual**.
3. Select **Implement**  / **Speed & Position**  .
4. Set **ISO GROUND SPEED** to **Enabled**.
5. Set **GPS NMEA2000 SPEED** to **Enabled**.

2.6. Switching between setup and operation screen

The console has two main screens; the Setup screen and the Operation screen.

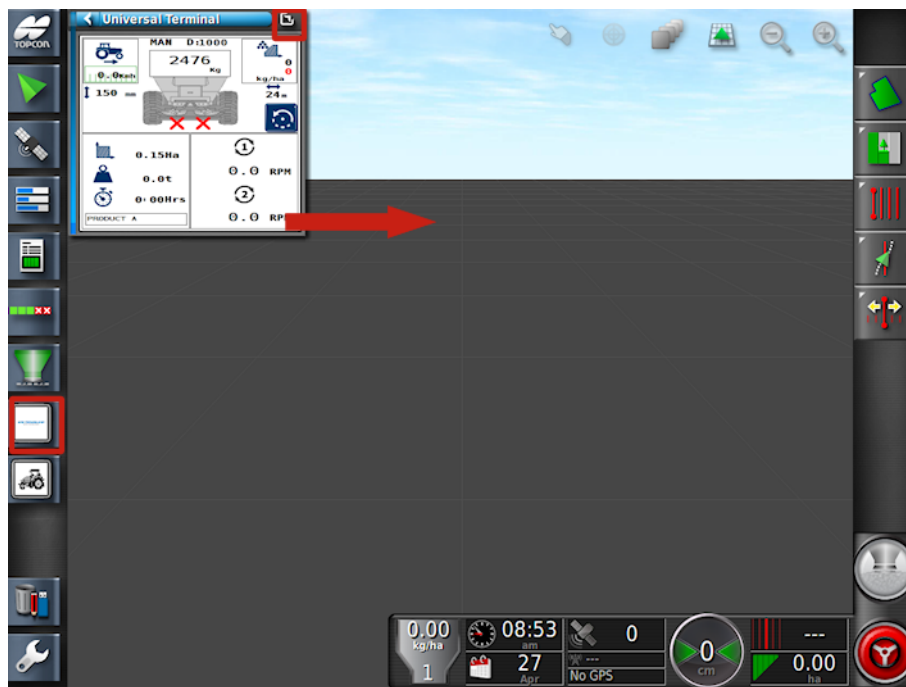


Use the highlighted buttons to switch between the screens.

2.7. Opening the Athene UT window

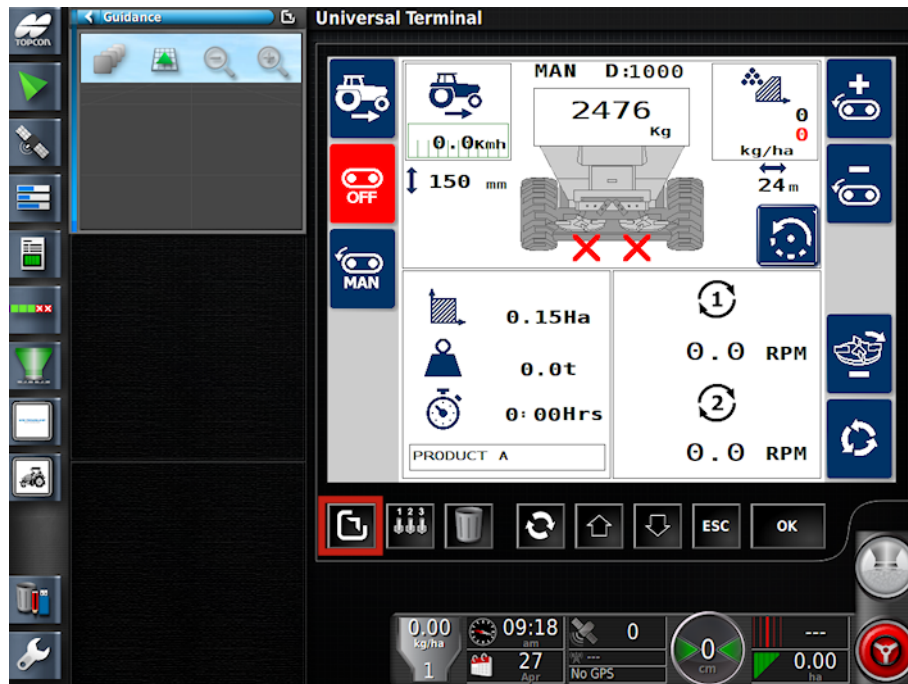
To view the Athene UT window:

1. Select the Athene UT icon on the left of the operation screen.
2. Expand the mini-view by selecting the arrow in the top right corner, or by swiping left to right across the mini-view (ending the swipe to the right of the mini-view screen).



3. To open the Athene UT window in full screen, select the UT maximise button.

2.7. Opening the Athene UT window



Chapter 3 – Athene Setup

3.1. Athene primary screens

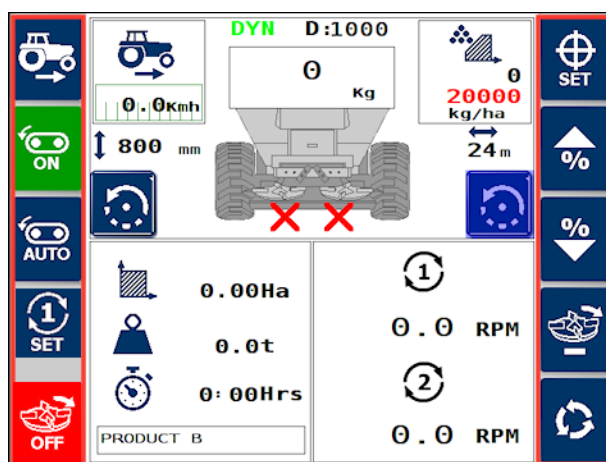
Athene has three primary screens: Main, Totals and Spreader Settings.

1. Press  to cycle between the primary screens.

3.1.1. Main screen

The main screen displays job information. The buttons and information displayed varies depending which settings are selected / enabled.

Main screen buttons



Pre-start. Starts the floor (belt) moving when there is no forward speed to ensure good coverage at the beginning of a run (see Setting up pre-start, page 48).



Master on / off. **Note:** This does not simultaneously activate / deactivate coverage as indicated on the guidance screen. Coverage is independently activated / deactivated using the

console master switch  / .



Rate control mode.

Note: Press and hold the button for two seconds to switch between AUTO and MAN mode.

3.1. Athene primary screens



Full automatic mode proportional to forward speed. The target rate is entered on the main screen. The floor (belt) speed is automatically adjusted to maintain the correct rate based on the forward speed and working width.



The floor speed is manually controlled using  and



. This mode is commonly used to run the floor belt while the spreader is stationary (for example; to empty remaining contents). Pressing and holding these buttons will increase/decrease the belt drive PWM. When the button is released, the PWM signal will hold at that point, even when switching the master on and off. Power-cycling the Athene will reset the manual speed to zero.



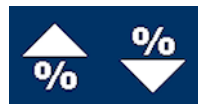
Spinners auto speed control setting. In AUTO mode, press to set the spinner speed.



Spinners on / off (when Spinner channel is enabled).



Set the target application rate.

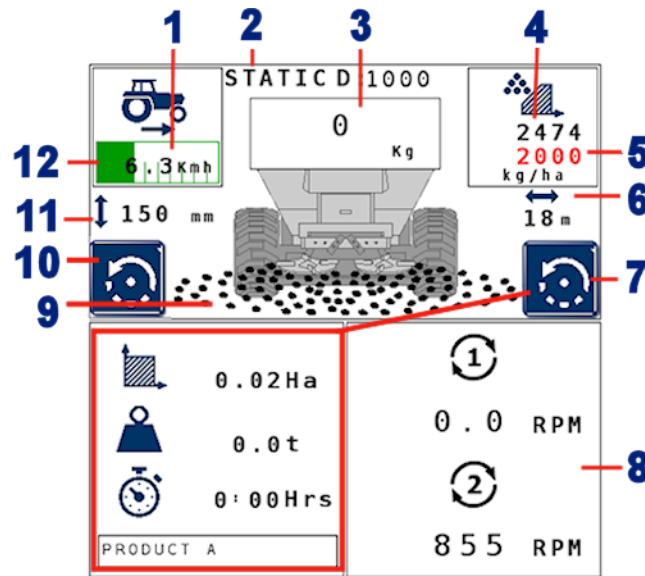


Vary application rate ($\pm$ % increments).



Boundary reduction. The left-hand spinner RPM second spinner channel RPM can be slowed down to reduce the spread width when traversing the field boundary (see Setting up spinner reduction, page 50).

Main screen fields



- 1** Forward speed.
- 2** Calibration mode (see Product calibration modes, page 59).
- 3** Product remaining (actual weight measurement from load cells for dynamic calibration, or a theoretical calculation otherwise).
- 4** Live, current application rate.
- 5** Target application rate.
- 6** Working width (see Setting up working width, page 46).
- 7** Job information. Touch to toggle between job information and spinner speed control (see Variable screen display, page 20).
- 8** Spinner speed.
- 9** Work status. Red crosses are shown when the spreader is not operating.
- 10** Touch to toggle the bottom left of the display between gate height and auxiliary function. This button is only present if additional hydraulic functions have been enabled via **Factory menu / Machine Options / Gate Control** and **Aux Function**. Default is OFF (see Variable screen display, page 20).

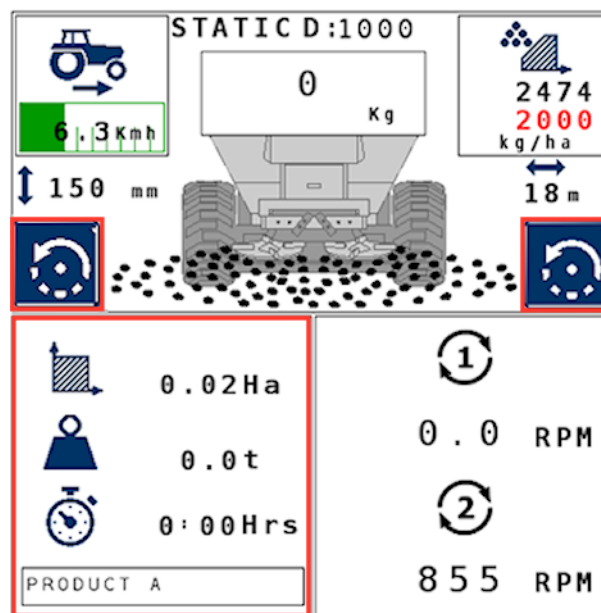
3.1. Athene primary screens

11 Gate height.

12 Belt speed (% of max).

Variable screen display

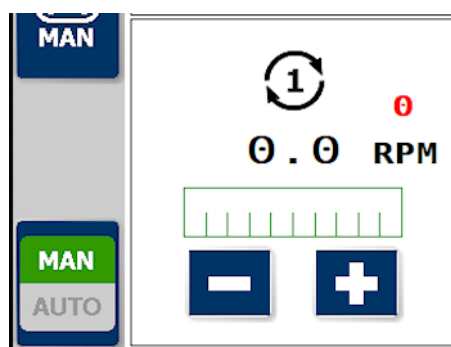
The bottom left area of the screen can toggle between job information and spinner speed by pressing the right button, and gate height and auxiliary function by pressing the left button.



Job information

Displays the area, weight and time for the current job.

Spinner speed



Manual / auto spinner speed control. Press  to toggle between

AUTO and MAN mode. In AUTO mode, press  to set the spinner

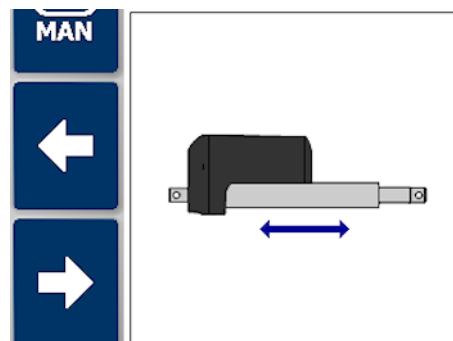
speed. Spinners will automatically run at the set speed. In manual mode, they can be adjusted on-the-go. Switching the spinners off in manual mode will reset the speed to zero. **Note:** Please refer to the machinery manufacturer's manual to establish the correct spinner RPM for the product / desired spread width.

Gate height



Displays the gate height control option if the function is enabled. Use the plus and minus buttons to adjust the height.

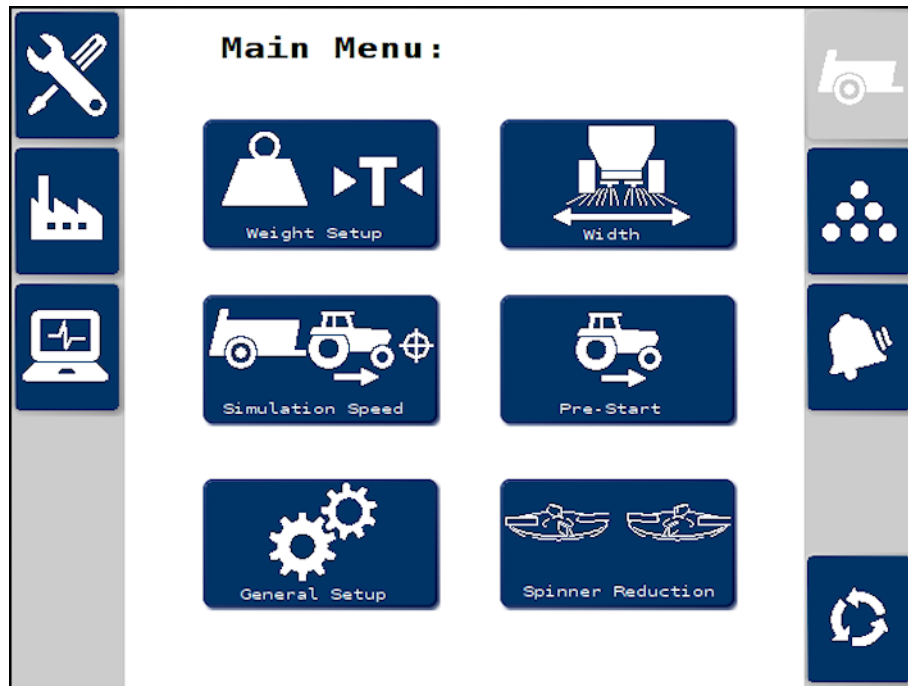
Auxiliary function



Displays the auxiliary hydraulic function if the function is enabled. Use the arrow buttons to activate the function.

3.1. Athene primary screens

3.1.2. Spreader settings screen



Technician, factory and diagnostics menu should not need to be used during normal use.



Technician menu. Requires a password for access. See Technician menu, page 23.



Factory menu. Requires a password for access. See Factory menu, page 25.



Diagnostics menu. Requires a password for access. See Diagnostics menu, page 34.



Return to main menu.



Product setup. See Setting up products, page 52.



Alarm setup. See Setting up alarms, page 54.



Cycle between primary screens.



Select calibration mode (see page 59), add weight / tare (see page 57).



Set full working width. See Setting up working width, page 46.



Used to test the machine in the factory or if there is a problem with the normal forward speed signal. See Simulated speed, page 56.



Start floor moving while spreader is stationary. See Setting up pre-start, page 48.



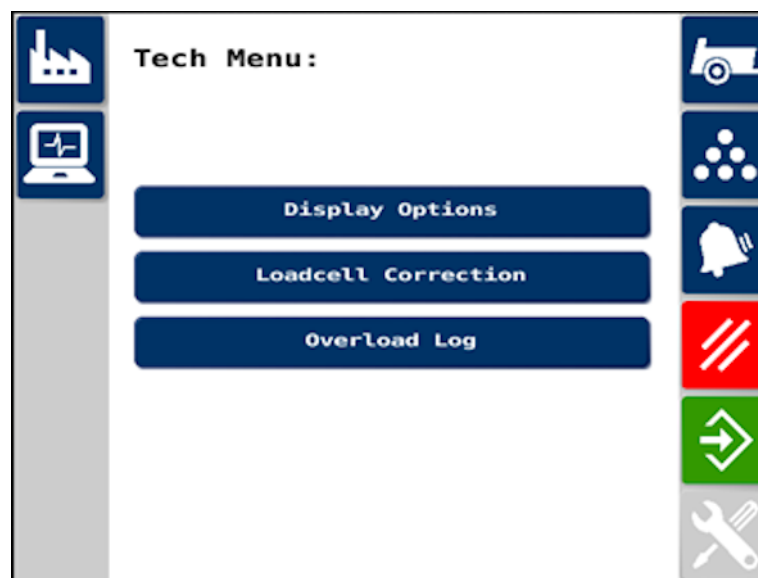
Configure units (see Setting up units, page 40) and forward speed input options (see Setting up forward speed, page 55).



Reduce spinner RPM on boundary. See Setting up spinner reduction, page 50.

Press  to return to the previous screen or  to confirm an entry.

Technician menu



The Technician menu provides the following settings.

Display options

- **Speed smoothing:** Damping of forward speed displayed. Higher number gives more damping.
- **Rate lock on %:** If the actual rate is within this % of the target, then the target rate will be displayed on the main screen.
- **Rate smoothing:** Damping of application rate display. Higher number gives more damping.
- **Off target alarm:** If the actual rate is outside this % of the target then the 'Over/Under Application' alarm is shown.
- **Average weight:** Sets whether the average weight is visible on the INFO screen.
- **Info mode:** Selects whether the INFO page is based on theoretical weight (rotations of floor), the weight reduction from the load cells or manual weight accumulation (see Manual weight accumulation, page 37).

Loadcell correction

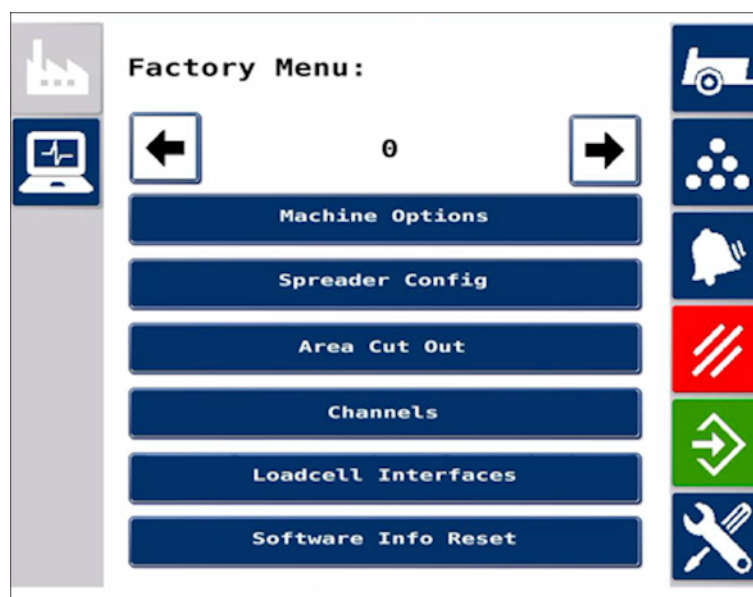
- **Correction span:** Amount the calibration factor can change by after each dynamic calibration. If this figure is too large, a false weight spike may allow a large calibration factor change. Default is 2%.
- **Min static weight:** Weight of product that must be spread during a static test.
- **Dynamic time:** How often a dynamic calibration is made.
- **Dynamic weight:** Weight of product that must be spread during each dynamic calibration.
- **Start delay:** Delay at the start of each new load before dynamic corrections are made. This is required to allow product to fill the gate and reach the spinners.
- **Steady weight:** % change that is allowed per each second before weight reading is considered unstable.

- **Headland delay:** Delay when the machine is switched in to work before dynamic corrections are made, to give the belt time to reach its required speed.
- **Cal factor delay:** Pause time between the previous dynamic correction being made and the new correction starting.
- **Dynamic fill weight:** When the hopper weight increases by this value it is considered re-filled.
- **Correction span fast:** Amount the calibration factor can change by if weight is below 'Fast empty point'. (Not used on Athene.)

Overload log

A list showing each time the weight in the spreader went over the maximum permissible load.

Factory menu



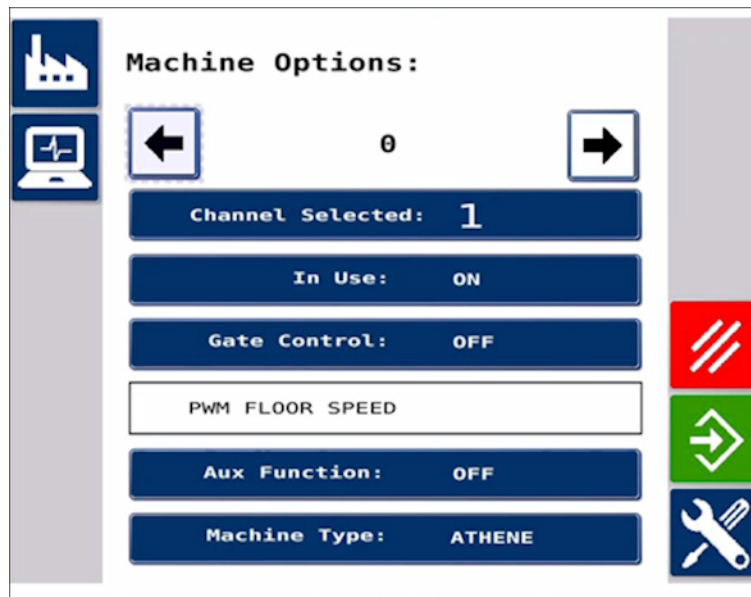
Note: Password is 1234

To select a menu, press the menu to highlight green and press .

The factory menu provides the following settings.

Machine options:

3.1. Athene primary screens



- **Channel select:** Scrolls through channels 1-3, using the  and  buttons. Press  to lock in the selection.

Channel 1: PWM floor speed.

Channel 2: PWM first spinner.

Channel 3: PWM independent 2nd spinner.

- **In use yes/no:** Nominates whether the selected channel is in use.

Note: Channel 1 = default **ON**, Channel 2 and 3 = default **OFF**.

- **Gate control:** Enables the gate height control function.
- **Aux function:** Enables the auxiliary hydraulic function.

Note: The gate control and aux hydraulic control require the auxiliary harness (1012956-01) for outputs.

- **Machine type:** Select the type of machine:

Apollo: Suitable for manure type spreaders:

- One control channel (floor/belt speed) plus two other RPMs can be monitored.
- Calibration factor is weight per revolution of the drive sprocket, for example kg/rev.
- Load cells must be fitted.

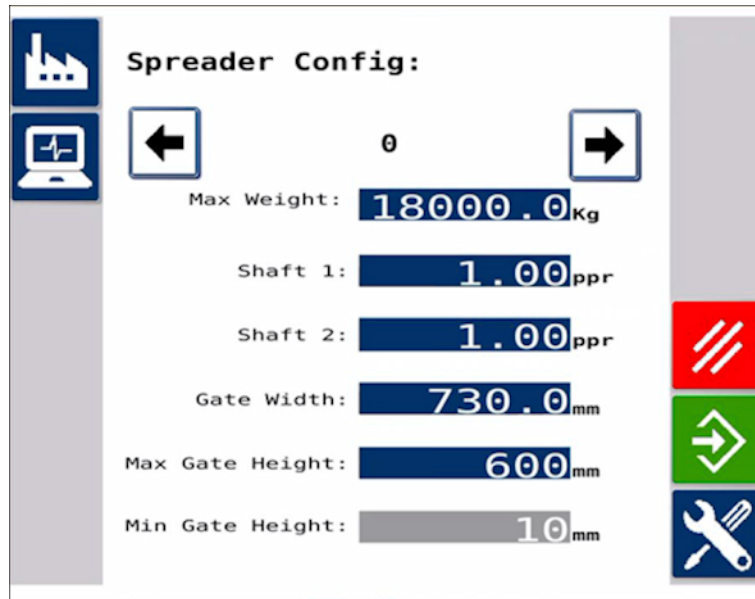
Apollo (Volumetric): Suitable for manure type spreaders:

- One control channel (floor/belt speed) plus two other RPMs can be monitored.
- Calibration factor is product density, for example kg/m^3 .
- Gate height and product density must be entered.
- Gate width and sprocket diameter must be entered in **Factory menu / Spreader config**.
- Can be used without load cells (although not recommended).
- Can use live gate height reading if relevant gate height sensor is fitted (see Gate height, page 21).

Athene: Suitable for fertiliser and granular spreaders:

- Up to three control channels; floor/belt, left spinner, right spinner.
- Calibration factor is product density, for example kg/m^3 .
- Gate height and product density must be entered.
- Gate width and sprocket diameter must be entered in **Factory menu / Spreader config**.
- Can be used without load cells (although not recommended).
- **Floor reverse** (cycle page): Enables the floor reverse function.
- **Speed reverse:** Controls the speed of reverse (in %).
- **Custom setup:** Different pin codes can be entered here to switch into customer specific modes.

Spreader config:



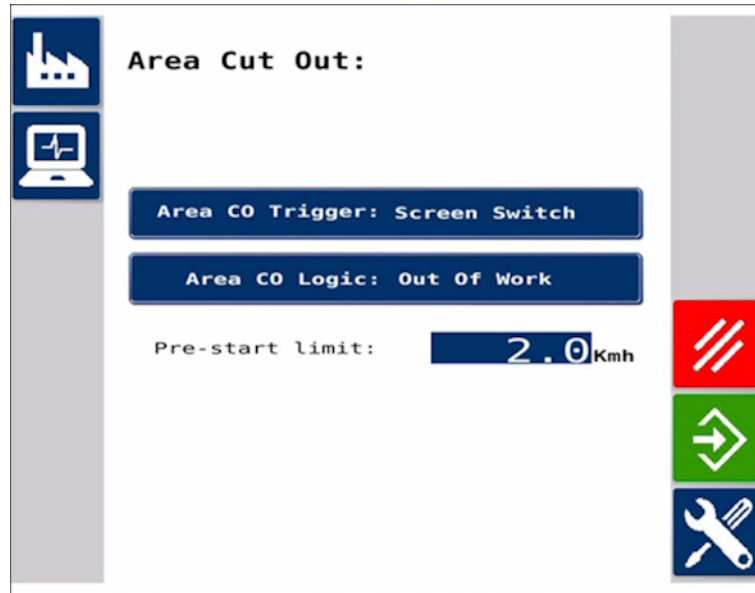
The screenshot shows the 'Spreader Config' screen. On the left is a vertical sidebar with icons for a factory, a monitor, and a list. The main area has a title 'Spreader Config:' followed by a left arrow, a '0' value, and a right arrow. Below this are several input fields: 'Max Weight: 18000.0 Kg', 'Shaft 1: 1.00 ppr', 'Shaft 2: 1.00 ppr', 'Gate Width: 730.0 mm', 'Max Gate Height: 600 mm', and 'Min Gate Height: 10 mm'. On the right side of the main area are three stacked buttons: a red one with diagonal lines, a green one with a right arrow, and a blue one with a wrench and screwdriver icon.

Parameter	Value	Unit
Max Weight	18000.0	Kg
Shaft 1	1.00	ppr
Shaft 2	1.00	ppr
Gate Width	730.0	mm
Max Gate Height	600	mm
Min Gate Height	10	mm

- **Max weight:** Maximum weight capacity of the spreader.
- **Shaft 1 PPR:** Sets the Pulses Per Revolution for spinner 1 monitoring only. This is overridden by feedback in the Channel Setup menu if channel 2 is being used to control spinner speed.
- **Shaft 2 PPR:** Sets the pulses per revolution for spinner 2 monitoring only. This is overridden by feedback in the Channel Setup menu if channel 3 is being used to control 2nd spinner speed.
- **Gate width:** Physical width of the gate.
- **Max gate height:** Maximum height gate can physically open. This becomes a limit when using gate height control.
- **Min gate height:** Minimum height gate can physically open. This becomes a limit when using gate height control.
- **Drive roller diameter** (cycle page): Diameter of rear roller.
- **Pressure zero:** Set the signal on AnIP2 when there is no hydraulic pressure.
- **Pressure max:** Set the maximum hydraulic pressure of the sensor being used.
- **Pressure alarm:** The pressure threshold above which the hydraulic pressure warning will be triggered.

- **Pressure alarm time:** The hydraulic pressure must exceed **Pressure Alarm** threshold for this time before the warning is triggered.

Area cut out:



- **Area cut out trigger:** Where the master switch is being controlled from.

Screen switch (default): The on/off button  on the main run page.

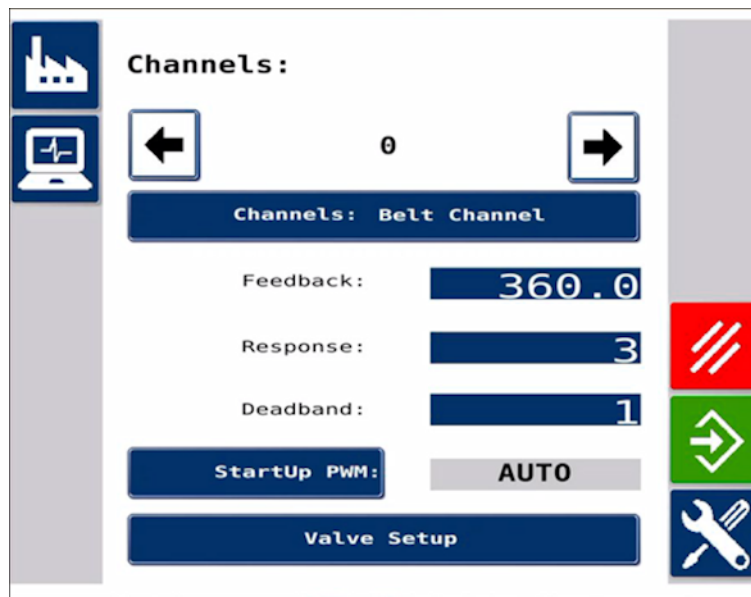
iSOCAN input: not used.

RPM: Used when Athene is not controlling the belt. Will automatically switch on when the belt is engaged.

ECU input: External master switch connected to the Athene auxiliary harness.

- **Area cut out logic:** When using the ECU input option, 0V In Work (when the switch is ON, the master will be enabled). Out of Work (when the switch is ON, the master will be disabled). Greyed out if cut out trigger is set to RPM.

Channels:



- **Channel select:** Selects which channel you wish to configure.
Note: If the channel was not selected as **In Use** in the Machine Options menu, it will not appear in **Channels**.
- **Feedback:** Pulses per revolution. **Note:** When setting the **Belt Channel**, ensure this is per revolution of the belt roller.
- **Response:** The speed at which the control loop responds.
- **Deadband:** How far the speed will deviate from the target before corrections are made.
- **Start up PWM:** Sets the %PWM used when the instrument is switched in to work.

Auto: The valve will start in the position it was last stopped in. If, for example, you are driving slower than when the belt turned off, it will start too fast and have to correct by reducing in speed.

40: A fixed % for the valve to start at every time. This can be changed.

T-Store: The valve position approximately halfway through the load. Similar results to **Auto**.

- **Valve setup:** Set valve parameters. See Valve calibration, page 69.

- **Control delay** (on next page / screen): When the floor / spinner output is switched on, this is the time in seconds it waits before making any adjustments to the %PWM.

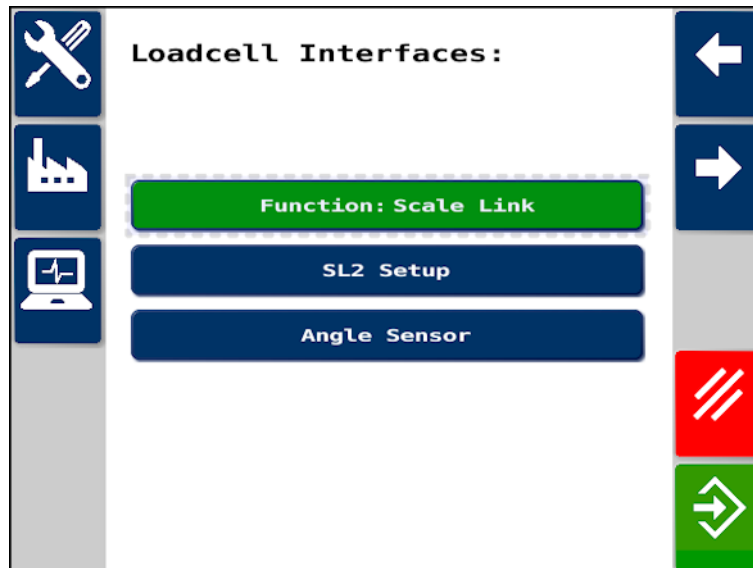
Loadcell interfaces:

- **Function:** Selects how many load cell interfaces are fitted.
Not used: No load cells fitted.
Can module 1: Atlas load cell module fitted.
Can module 2/3/4: Not used.
Scale Link: SL2 weighing module fitted. See new options displayed below under **Scale Link SL2 options** if this option is selected.
- **Load zero:** Voltage from LCI when weight is 0. **Note:** This is automatically set when load cells are calibrated.
- **Load gain:** Gain value from LCI. **Note:** This is automatically set when load cells are calibrated.
- **Loadcell calibration:** Starts the routine to calibrate the load cells with a known weight. See Load cell configuration, page 41.
- **Angle sensor:** Starts the routine to calibrate the angle sensor. See Load cell configuration, page 41.

3.1. Athene primary screens

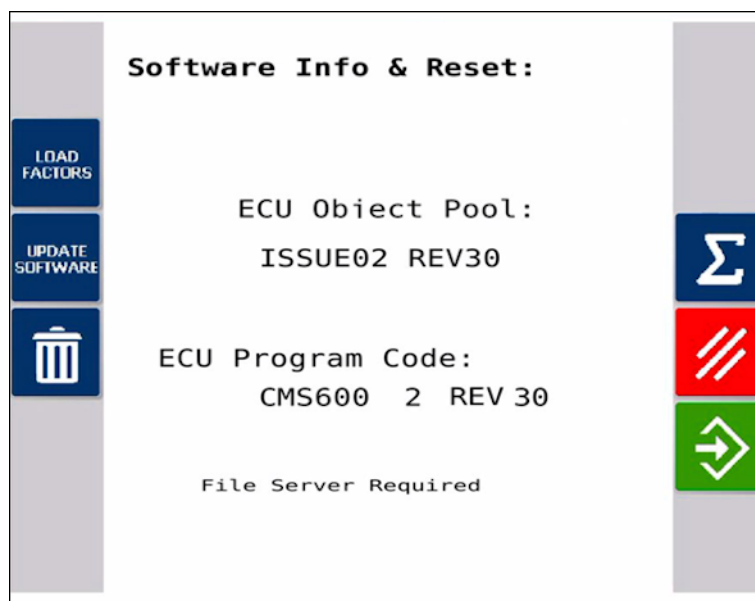
- **Loadcell type:** Should be left at default setting of **Loadcell Type 0.0**.

Scale Link SL2 options



- **SL2 setup:** Enters the setup/calibration page for the SL2 module. See Scale Link configuration, page 43.
- **Angle sensor:** Starts the routine to calibrate the angle sensor. See Load cell configuration, page 41.

Software info reset:

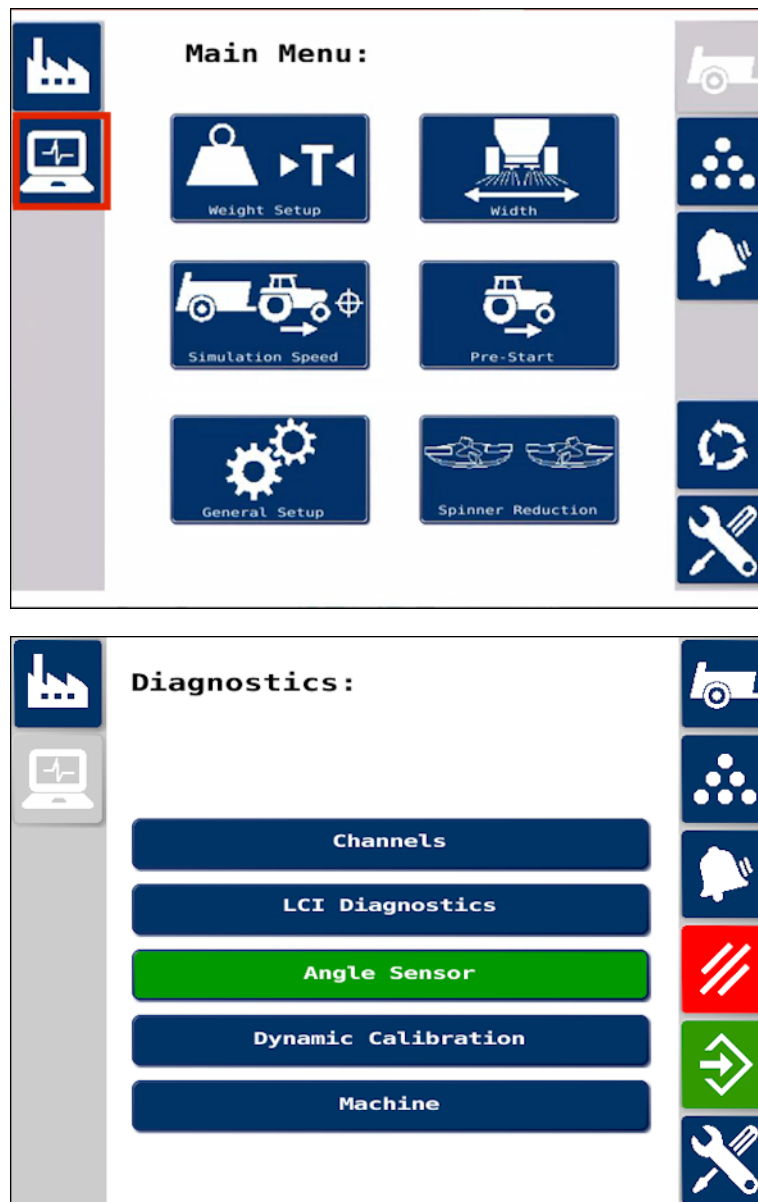


- **ECU object pool:** Shows the object pool software version.
- **ECU program code:** Shows the current firmware version loaded on the Athene.
- **Gate height setup** (settings used if adjustable gate height is fitted).

Gate height setup:

- **Min. gate position:** Voltage on AnIP1 when the gate is fully closed.
- **Min. gate height:** Gate opening when fully closed.
- **Max. gate position:** Voltage on AnIP1 when the gate is fully open.
- **Max. gate height:** Gate opening when the gate is fully open.
- **Gate height sensor:**
 - **OFF:** Gate height sensor is not used.
 - **INFO:** Live gate height from sensor is displayed on main screen for information only.
 - **VOL:** Live gate height from sensor is displayed on main screen and used to control floor speed. I.e. lowering the gate height will cause the floor speed to increase to maintain the correct output.

Diagnostics menu



The Diagnostics menu provides a method to view the following:

- **Channels:** Shows the current forward speed, target floor speed and current/ actual belt floor speeds, belt duty cycle, spinners target / actual speeds and duty cycle..
- **LCI diagnostics:** Voltage and weight from the load cell interface (if fitted). This is also where the firmware version of the Atlas module is found. If the SL2 weighing module is fitted, this page

shows the individual weighing channel weights, a total weight and the SL2 software version. There is also the option to switch the SL2 object pool on for advanced diagnostics.

- **Angle sensor:** View the current machine angle.
- **Dynamic calibration:** View the actual weight vs. theory weight during each dynamic calibration.
- **Machine:** View other miscellaneous input status.

There are no user settable options.

3.1.3. Totals screen

Records the grand total and part totals 1 and 2 of area, weight and the number of loads. This is found by cycling the page button.

	Total	Part1	Part2
	0.1	0.1	0.1
	0.0	0.0	0.0
#	0	0	0

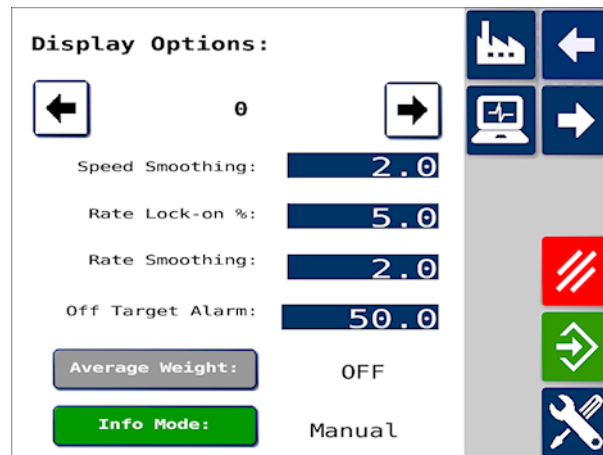
Note: The Reset  button is used to reset the selected total.

The figures displayed on this page are based on theoretical weight (rotations of floor), the weight reduction from the load cells, or manual weight accumulation. To select the required mode:

1. From the Spreader Settings screen (see page 22), select

Technician menu  / **Display Options** (password = 1234), and select the required **Info Mode**:

- **Theory:** Theoretical weight (rotations of floor).
- **Loadcell:** Weight reduction from the loadcells.
- **Manual:** Manual weight accumulation. See below.



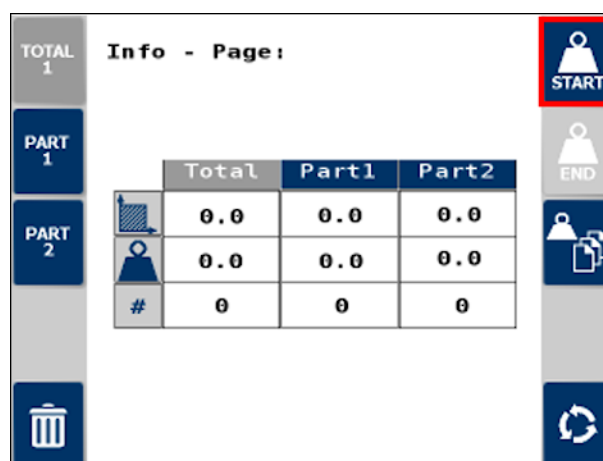
Manual weight accumulation

This option logs the amount of product spread for each load and provides accurate totals for customers who need to know exactly how much product has been spread.

The operator confirms the weight within the spreader when it has been loaded, spreads the load, and then confirms the weight remaining in the spreader at the end of that job. The software takes the difference between these two values, and adds it to the accumulating info weight.

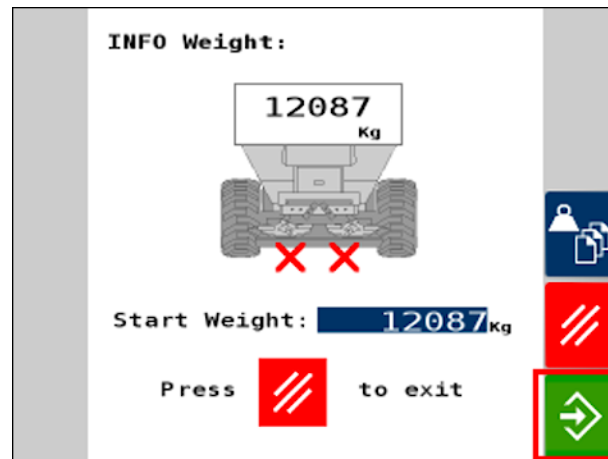
Note: Load cells must be fitted for this option to function.

1. Once the spreader has been loaded, press the **Start** button on the **Info** page to set the starting weight.



The following screen is displayed, showing the current weight in the spreader. The weight can be manually adjusted if required.

3.1. Athene primary screens

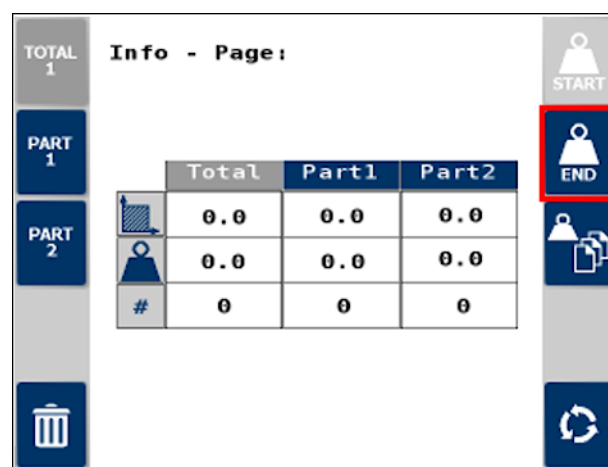


2. Press the green button when the displayed weight is correct.

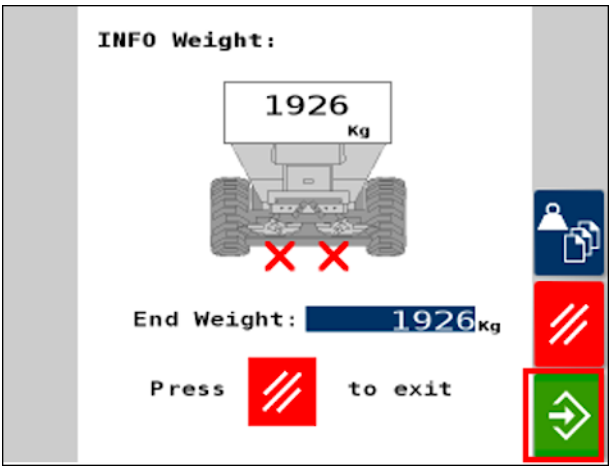
To indicate that the start weight has been logged, a red circle is shown on the main screen.



3. Once the load has been spread, press the **End** button on the **Info** page.



The following screen is displayed, showing the remaining weight in the spreader.



4. Press the green button to confirm the weight spread for that job.

5. To view the load / weight summary, press the summary button  on the **Info** page.

A table showing the weight of each load, plus the cumulative total is displayed.

INFO Weight Log:

← 0 →

Load	Kg Weight	Kg TOTAL
1	10161	10161
2	11186	21347
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0

[red button with diagonal lines]

[green button with right arrow]

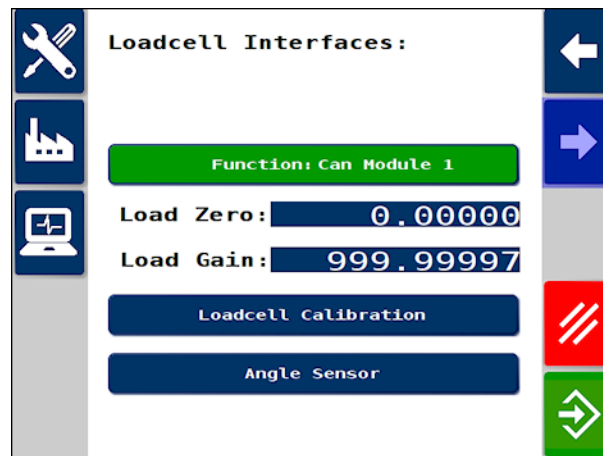
3.2. Setting up units

1. From the Spreader Settings screen, select **General Setup**  / **Sub Units**.
2. Select the required units and press  to confirm.

3.3. Load cell configuration

3.3.1. Can Module 1 configuration

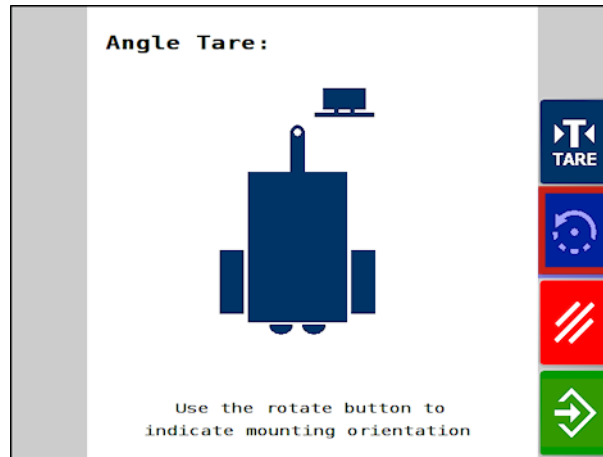
1. To ensure the software is set to communicate with the load cell interface, from the Spreader Settings screen select **Factory**  / **Loadcell Interfaces**.
2. If the machine is not fitted with load cells, set **Function** to **NOT USED**.
3. If the machine is fitted with load cells, set **Function** to **CAN module 1**.



To calculate the correct weight, the load cell interface contains an angle sensor. The orientation of the load cell interface must be entered.

4. Select **Factory**  / **Loadcell Interfaces** / **Angle Sensor**.
5. Press the cycle button to rotate the icon of the ECU around the spreader until it matches the orientation on which it is mounted.

3.3. Load cell configuration

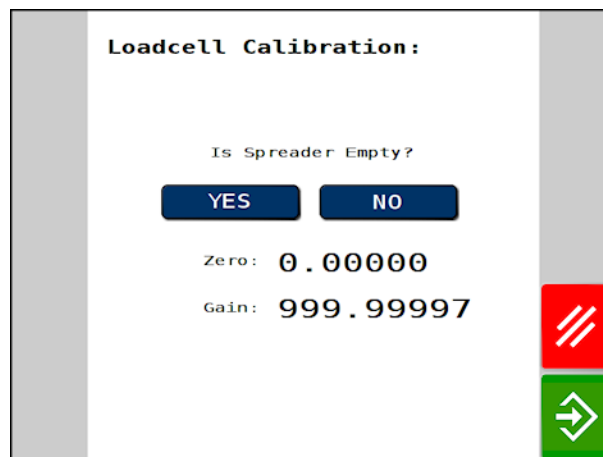


6. With the spreader parked on flat ground, press the **TARE** button and this will zero the angle sensor.

7. To set the zero point for the load cell, with the spreader empty

select **Factory**  / **Loadcell Interfaces** / **Loadcell Calibration**.

8. When prompted 'Is spreader empty?' select **YES** and then select  again to confirm the spreader is empty. This sets the zero point.



The load cell gain value must be set. This tells the software that a load of xx kg causes an increase of 1 volt from the load cell interface.

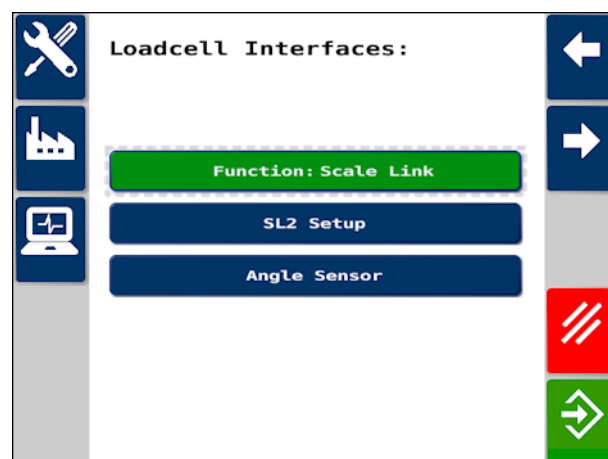
9. Place a known weight of product in the spreader. **Note:** This process is more accurate if using a bigger known weight.

10. Select **Factory**  / **Loadcell Interfaces** / **Loadcell Calibration**.
11. When prompted ‘Is spreader empty?’ select **NO** and enter the actual weight in the spreader.

3.3.2. Scale Link configuration

Note: SL2 firmware should be 190625 or higher.

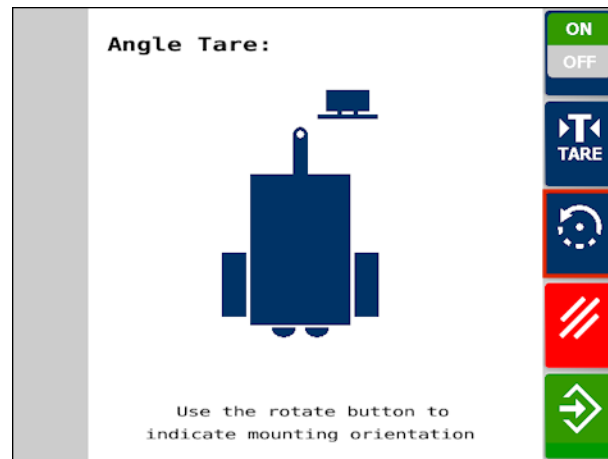
1. To ensure the software is set to communicate with the load cell interface, from the Spreader Settings screen select **Factory**  / **Loadcell Interfaces**.
2. If the machine is not fitted with load cells, set **Function** to **NOT USED**.
3. If the machine is fitted with load cells, set **Function** to **Scale Link**.



To calculate the correct weight, the load cell interface contains an angle sensor. The orientation of the load cell interface must be entered.

4. Select **Factory**  / **Loadcell Interfaces** / **Angle Sensor**.
5. Press the cycle button to rotate the icon of the ECU around the spreader until it matches the orientation on which it is mounted.

3.3. Load cell configuration



Note: The **ON/OFF** button  switches the angle compensation on/off. Always recommended to be **ON**.

6. With the spreader parked on flat ground, press the **TARE** button and this will zero the angle sensor.

7. Select **Factory**  / **Loadcell Interfaces** and press the **SL2 Setup** button to enter the SL2 setup page.



If a single channel SL2 is fitted, the parameters for Scale A will be available for setup.

If a 4 channel SL2 is fitted, the parameters for channels A, B, C & D will be available for setup.

8. If a 4 channel SL2 is fitted, highlight the **Scale Selected** tab, and use the left/right arrows to scroll between channels.

The fastest way to setup the system is to directly enter the calibration and setup numbers for each scale channel. These can both be calculated using the SL2 setup documents. Alternatively, if the setup number is not known, the weigh method, scale capacity and scale gain can be entered individually. These three parameters are constituents of the setup number, thus the setup number will change as the individual parameters are updated.

Note: If the console is set to use imperial units, both the Athene and the SL2 module will be working in imperial. Care must be taken to ensure that the relevant parameters (scale capacity and setup number) are calculated using the correct units.

If using a 4 channel SL2 where the same parameters are required for multiple channels, there is a copy and paste function to allow fast data entry. For example: enter the correct parameters for scale A, press copy, scroll to Scale B, press paste.

Note: After completing the setup, remember to zero the scale. See Adding product / tare, page 57.

3.3.3. Load cell calibration

Load cells may drift out of calibration after an initial period of 'bedding in' on a new machine.

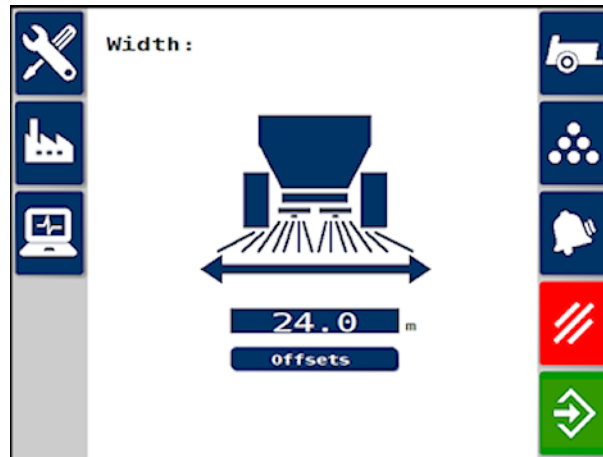
To recalibrate, repeat the applicable procedure detailed above from step 6.

3.4. Setting up working width

This sets the full working width of the spreader.

Note: Please refer to the machinery operators manual to establish the correct spinner RPM for the product / desired spread width.

1. From the Spreader Settings screen, select **Width** .

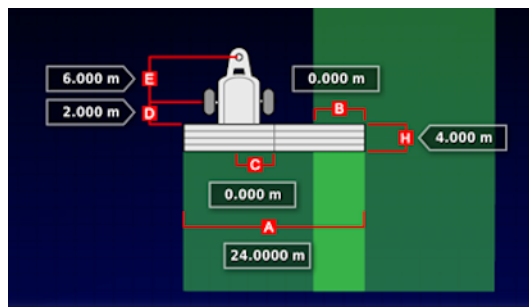
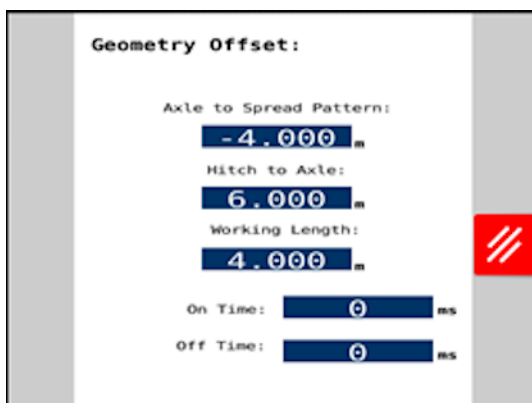


2. Enter the implement working width. (The width of the area that is treated during one pass of the implement.)

The **Offsets** are the dimensions from the GPS receiver location to where the product is applied, as part of guidance setup. This is also where the auto-section control timings are entered. These settings will flow through to the console's geometry page. See below.

3.4.1. Offsets explanation

The Offsets on the Athene screen may appear differently to a console's geometry page.



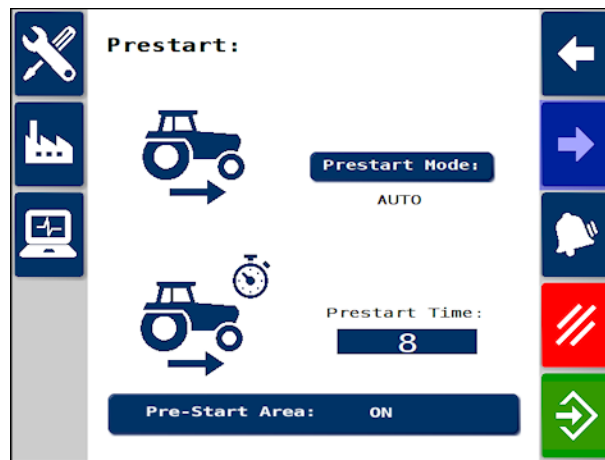
In the above example, there are three geometry settings identified on the Athene page:

- **Axle to spread pattern:** This is the distance from the axle of the trailing implement, to the **center** of the spread pattern. This is shown as a negative figure on the Athene, as the ISO standard states that it is behind the axle. Shown as the D measurement on the console screen. (In this example -4 equals 4 m rearward from the axle to the **center** of the spread pattern.)
- **Hitch to axle:** The distance from the drawbar pin to the axle of the implement. Shown as E above.
- **Working length:** The depth of the spread pattern. Shown as H above.

3.5. Setting up pre-start

Pre-start is used to start the floor moving when there is no forward speed. This ensures that there is good coverage at the start of each run, and that irrespective of how the product has been loaded, the spreader does not have to start moving until a suitable amount of product has reached the spinners.

1. From the Spreader Settings screen, select **Pre-Start** .



Pre-start mode

AUTO mode: Pre-start is automatically triggered when the spreader is switched into work. This removes the need to push the button at the start of each load.

MAN mode: Pre-start is activated manually by pressing  on the main screen.

Default = **MAN**

Pre-start time

The duration pre-start will run before stopping the floor if there is no forward speed movement. This should be long enough to ensure that product is being spread but also so that there is a smooth transition between pre-start and starting to move forward. An average pre-start time is 8-10 seconds.

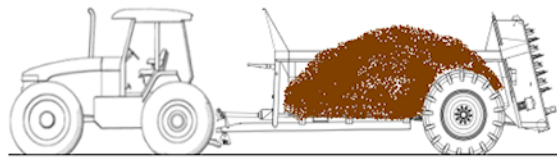
Default = 8 sec

Pre-start area

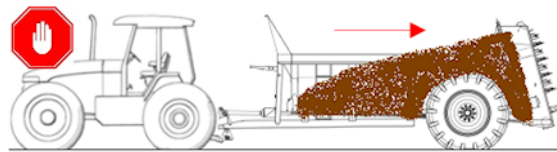
If set to **ON**, the area will accumulate whilst the pre-start time is running. If set to **OFF**, the area will not accumulate during the pre-start time.

3.5.1. Operating pre-start

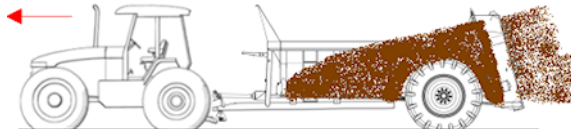
1. Engage hydraulics and/or press  on the main screen.



Product automatically moves towards spinners.



2. Once the spread pattern is observed, start to drive forward.

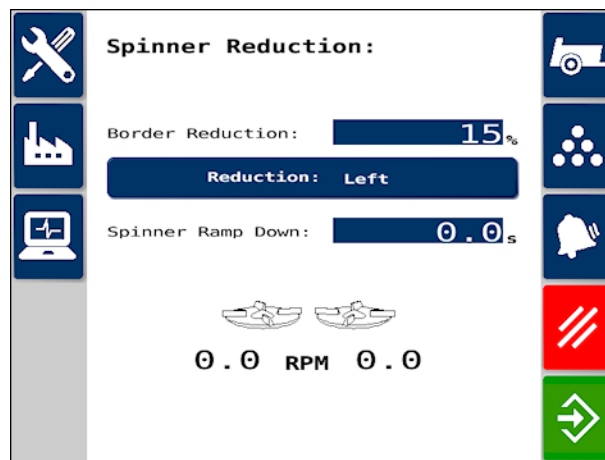


3.6. Setting up spinner reduction

The RPM of a selected spinner can be slowed down, if being independently controlled, to reduce the spread width when traversing the field boundary.

Note: The boundary should be driven clockwise if the left spinner is selected and anticlockwise if right spinner is selected.

1. From the Spreader Settings screen, select **Spinner Reduction**



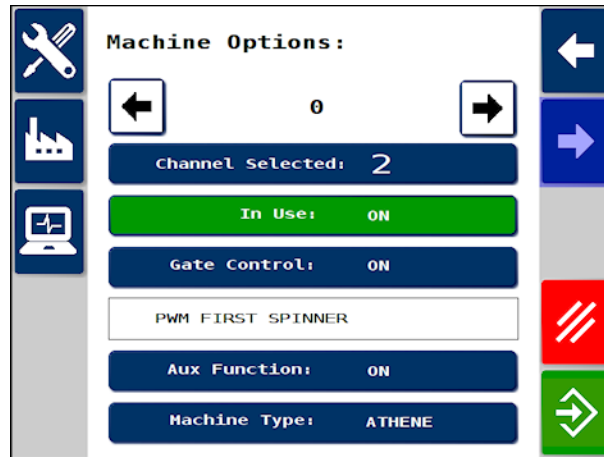
Border Reduction: The reduced boundary speed is set as a proportion (percentage) of the spinner speed. The reduction must be established by trial and error to establish the desired spread pattern.

Reduction: Left / right. This changes which spinner icon on the run screen will show reduction. **Note:** This will not change which actual spinner is reducing, it will always be the Spinner 2 output channel.

Spinner Ramp Down: Adjusts the time taken for the spinner to ramp down to stationary when switched off. Gradually reducing the spinner speed places less strain on the hydraulics.

If the Spinner Reduction option is not visible, enable spinner reduction as follows:

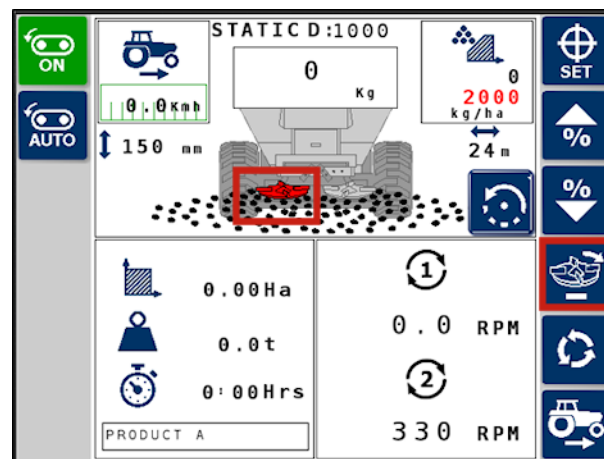
1. From the **Main Menu** select **Factory**  / **Machine Options**.
2. Change **Channel Selected** to **2** and **In Use** to **ON**.



3.6.1. Operating border reduction

1. Select the border reduction icon  to activate.

The border reduction indicator displays in red below the spreader image when operating.



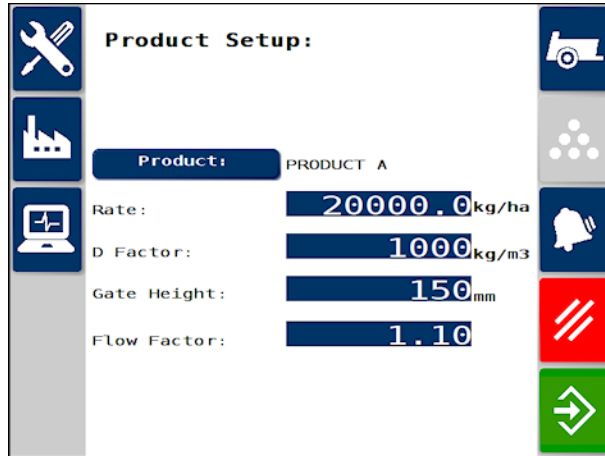
The instrument will beep every 15 seconds to remind the operator that this function is enabled.

Note: The border reduction is always applied to the Spinner 2 output channel, regardless of which picture is shown on the display.

3.7. Setting up products

The system can store 10 different products with customizable names.

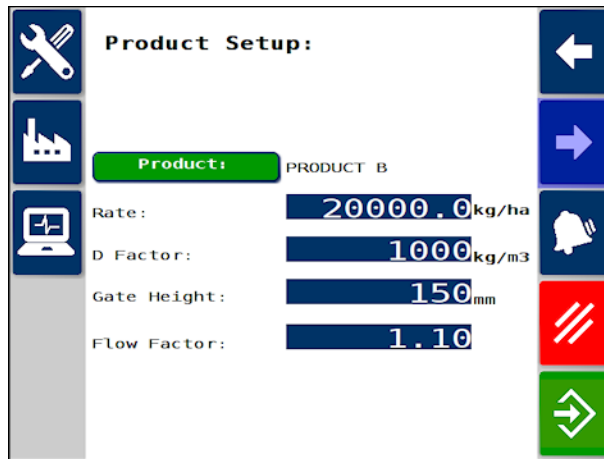
1. From the Spreader Settings screen, select **Products** .



The screenshot shows the 'Product Setup' screen. On the left is a vertical toolbar with icons for a wrench, a factory, a laptop, and a green arrow. On the right is another vertical toolbar with icons for a truck, a crosshair, a bell, a red diagonal line, and a green arrow. The main area contains the following fields:

Product Setup:	
Product:	PRODUCT A
Rate:	20000.0 kg/ha
D Factor:	1000 kg/m3
Gate Height:	150 mm
Flow Factor:	1.10

2. Select the **Product** button and the left / right arrows to change the selected product.
3. Select the product name to edit the name.



This screenshot is similar to the previous one but shows 'PRODUCT B' selected. The 'Product' button is highlighted in green. The right-hand toolbar now includes a blue left arrow and a blue right arrow at the top, in addition to the other icons.

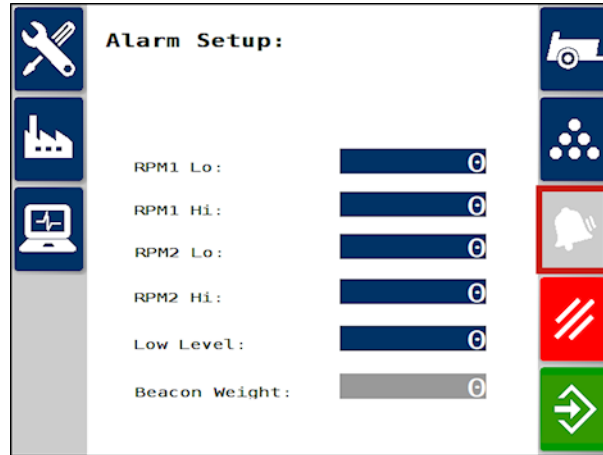
Product Setup:	
Product:	PRODUCT B
Rate:	20000.0 kg/ha
D Factor:	1000 kg/m3
Gate Height:	150 mm
Flow Factor:	1.10

- **Rate:** The rate at which the product is applied.
- **D Factor:** The product density. Take note of the units when entering this figure. This can be obtained by performing a manual density test, or from the product supplier.
- **Gate Height:** The height of the opening that the product passes through from the belt.

- **Flow Factor:** This accounts for any product flow inconsistencies that may come from pelletized (prilled) or low friction products. It can be established either by carrying out a calibration nudge after spreading a certain amount of product (see Nudge calibration, page 68) or by following the check calibration routine (see Product flow factor – check calibration routine, page 65).

3.8. Setting up alarms

1. From the Spreader Settings screen, select **Alarms** .



The image shows the 'Alarm Setup' screen. It has a title bar with a wrench icon on the left and a truck icon on the right. Below the title bar, there are six rows of settings, each with a label and a numeric input field set to 0. The labels are: RPM1 Lo:, RPM1 Hi:, RPM2 Lo:, RPM2 Hi:, Low Level:, and Beacon Weight:. To the right of the input fields is a vertical sidebar with five icons: a truck, a cluster of dots, a bell (highlighted with a red border), a red square with white diagonal lines, and a green square with a white right-pointing arrow.

Field	Value
RPM1 Lo:	0
RPM1 Hi:	0
RPM2 Lo:	0
RPM2 Hi:	0
Low Level:	0
Beacon Weight:	0

2. Select the alarm field to enter the value beyond which the alarm should sound.

The system can be set to show an alarm in the following conditions:

- **RPM Lo / High:** Spinners 1 and 2 RPM too slow / too fast.
- **Low Level:** Hopper level low.
- **Beacon Weight:** This can be used to operate an external flashing light when the weight entered is reached. For example, when filling to a known reduced quantity.

Note: Alarms are disabled when set to zero.

3.9. Setting up forward speed

1. From the Spreader Settings screen, select **General Setup**  / **Speed Factor**.

There are four preset options for the forward speed signal:

- (0): Magnetic sensor (default setting 1 meter per rev)
- (1): Magnetic sensor (default setting 2 meters per rev)
- (2): Radar sensor (0.00778 metres per pulse)
- (3): GPS (NMEA VTG message)

With the exception of option (3), the factors can be manually edited if required. However if options (0), (1) or (2) are selected, it is recommended to perform an ‘Autocal’ routine.

3.9.1. SSF Autocal

The Speed Sensor Factor (SSF) is the distance traveled forward in the time between two pulses from the forward speed sensor. In the case of magnetic sensor options (1) and (2), this could be calculated based on the nominal tire diameter or rolling distance and then entered manually. However this does not take into account wheel slip, compaction, or tire deformation under practical operating conditions.

1. Mark a set distance of 100 metres by suitable means. The surface should be representative of the average field conditions (i.e. not a paved surface).
2. Position the vehicle with the first marker level with a suitable reference point on the vehicle.
3. From the Spreader Settings screen, select **General Setup**  / **SSF Auto Cal** and then follow the screen instructions.
4. Stop the vehicle when the second marker lines up with the pre-determined reference point on the vehicle and press to end the Auto Cal procedure. The Speed Sensor Factor is automatically re-calculated and stored in memory.

3.9. Setting up forward speed

Note: If you overrun the marker, do not reverse - repeat the Auto Cal procedure from the beginning.

3.9.2. Simulated speed

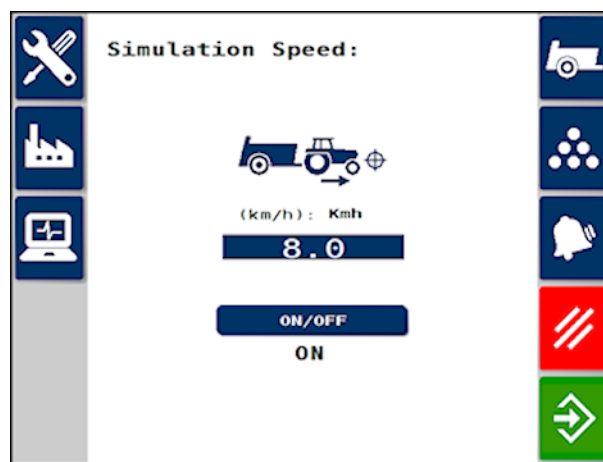
If the speed sensor is not providing a signal, or for diagnostic reasons, a simulated speed can be set to continue operation.

1. From the Spreader Settings screen, select **Simulation Speed**



/ **Speed Factor.**

2. Enter the desired speed and switch the simulation ON.



3. Press  to start the simulation.

Note: Actual forward speed must be matched to the simulated speed as closely as possible. Otherwise the system will under-apply if you travel too quickly, or over-apply if you travel too slowly.

Note: The simulated speed will be cancelled if movement is detected via the speed source selected (GPS / wheel speed / radar). You may need to disconnect the primary speed source to stop this from happening during a speed simulation.

3.10. Adding product / tare

The main screen displays the current weight remaining in the hopper (a theoretical calculation if volumetric calibration is in effect, or the actual weight measurement from load cells). The weight setup screen varies, depending on whether the system has load cells fitted or not (see Load cell configuration, page 41).

3.10.1. With load cells

The hopper contents display refreshes automatically to show the current weight as product is loaded.

The weight can be tared either when the hopper is empty, or if it contains a known weight. To maintain correct angle compensation, only perform the tare with the spreader on level ground.

Note: When an SL2 is fitted, the weight can only be tared if the spreader is empty. A calibration change to align the displayed weight with a known weight in the spreader must be done by adjusting the calibration number in the SL2 setup menu.

Caution: Where multiple scale channels are being used, the distribution of the weight in the hopper across each scale must be known before making any adjustments.

1. From the Spreader Settings screen, select **Weight Setup**  / **Tare Calibration.**
2. Follow the screen prompts.

3.10.2. Without load cells

1. Refill the hopper with the desired load.
2. From the Spreader Settings screen, select **Weight Setup**  / **Add Weight / Tare.**

3.10. Adding product / tare

The screenshot shows a control panel interface for adding weight or tare. It features three input fields: 'MAX:' with a value of 2500, 'NOW:' with a value of 2500, and 'TO ADD:' with a value of 0. Below these fields is a text prompt 'Press Enter to RESET to FULL'. To the right of the text are two buttons: a red button with a white diagonal line (likely a cancel or stop button) and a green button with a white right-pointing arrow (likely an OK or next button).

- **Max:** The full hopper weight. Confirm that **MAX** corresponds to the hopper maximum capacity, and adjust if necessary. If loading the hopper to capacity, then press **OK** to reset to full.
- **Now:** The current (theoretical) weight remaining in the hopper.
- **To add:** The weight required to replenish the hopper (**MAX** – **NOW**). When this weight has been added to the hopper, press **OK** to confirm it has been loaded. The **TO ADD** value is added to the **NOW** total, and **TO ADD** is recalculated.

Chapter 4 – Calibration

4.1. Product calibration modes

If using load cells, there are two calibration modes:

- **Dynamic:** Constant, automatic re-calibration on-the-move. This is used when applying higher rates over relatively smooth ground. See Dynamic mode calibration, page 63. For more detail about how dynamic mode works, refer to How Dynamic Calibration Works, page 81.
- **Static:** Calibration with a known weight, either stationary or whilst moving. This mode may be useful if spreading at low application rates or if the product is not flowing freely. See Static mode calibration.

Note: Selecting **MAN** is the equivalent to selecting MAN on the main screen . The floor speed is then manually controlled using + and – arrows and is not proportional to forward speed. MAN mode is normally only used for emptying the spreader or for checking that the valve and encoder are working correctly.

If not using load cells, during operation the product weight shown is theoretical based on the floor (belt) speed and gate height. To perform a calibration without load cells, see Volumetric calibration (machines without load cells), page 61.

To select the calibration mode:

1. From the Spreader Settings screen, select **Weight Setup**  / **Mode** and use the left / right arrows to select the mode.

If the required mode is not available, ensure the software has been configured for load cells (see Load cell configuration, page 41).

4.1. Product calibration modes

Product calibration table

Cal mode	Machines with load cells		Without load cells
	Dynamic calibration	Static calibration	Volumetric calibration
	The target rate is entered on the main screen. Full automatic mode proportional to forward speed.		
	The floor speed is automatically adjusted to maintain the correct rate based on the forward speed and working width.		
	Continuous, automatic calibration corrections are taking place.	The calibration factor is that established by the last static calibration.	The calibration factor is that established by the last volumetric calibration.
	The rate shown is a live value based on the current floor speed and 'T' factor.		
	Weight shown is the live weight measured by the load cells.		Weight shown is theoretical based on the floor speed and gate height.
	The floor speed is manually controlled using  and  . The floor speed is not proportional to forward speed. Therefore, to keep matching a target rate, you must manually adjust the floor speed in tandem with changing forward speed. Manual mode is commonly used to run the floor belt while the spreader is stationary (for example to clear out the remaining contents).		
	The calibration factor is that established by the last dynamic correction.	The calibration factor is that established by the last static calibration.	The calibration factor is that established by the last volumetric calibration.
	Load cell signals are not being used for calibration.		N/A
	Weight shown is the live weight measured by the load cells.		Weight shown is theoretical based on the floor speed and gate height.

4.2. Volumetric calibration (machines without load cells)

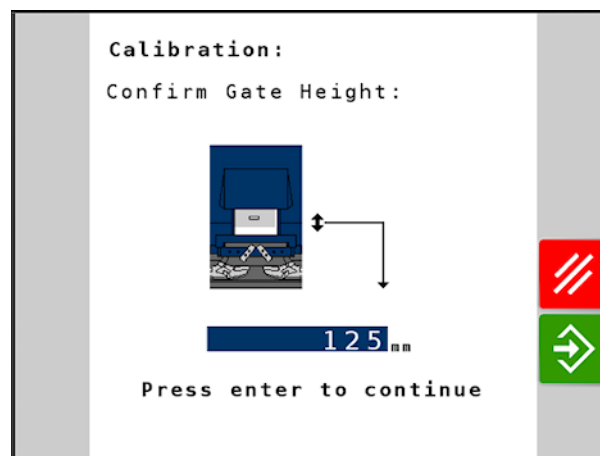
This procedure is applicable if not using load cells.

The calibration factor is called the ‘T’ factor. It is the volume of product dispensed per revolution of the floor belt roller. It is calculated as: gate height (mm) x gate width (mm) x belt travel per revolution of the belt roller (mm).

The product density is then used to convert the volume to weight.

1. Select the required product (see Setting up products, page 52).
2. From the Spreader Settings screen, select **Weight Setup**  / **Calibration**.
3. Follow the screen prompts to enter the:
 - Required application rate
 - Working width
 - Density
 - Average working speed

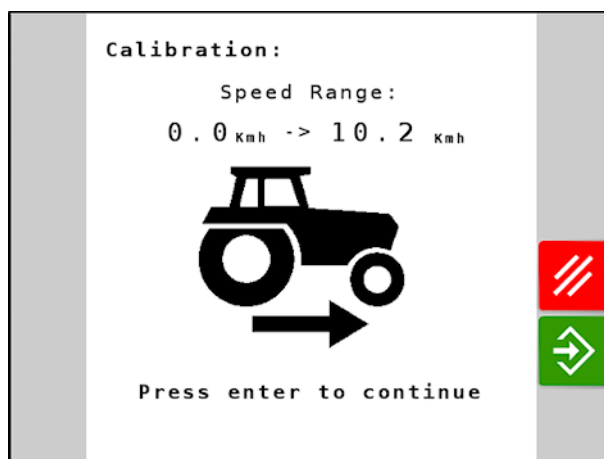
Based on the information entered, the software recommends a gate height setting. This takes account of the minimum and maximum RPM of the belt roller. The recommended gate height is based on the roller rotating in the middle of its RPM range, so that it allows maximum flexibility to forward speed.



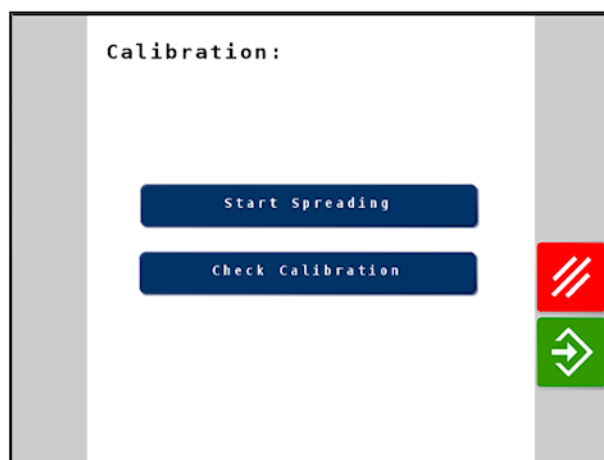
4.2. Volumetric calibration (machines without load cells)

4. Confirm the recommended gate height or enter a different gate height if desired.

The operating speed range is displayed based on the above calculations.



5. Select **Start Spreading** to end the calibration sequence and return to the main operating screen.



4.3. Dynamic mode calibration

This procedure is applicable if using load cells. See Static mode calibration for calibration in Static mode.

This method of calibration is particularly suited for products with more variable density, being applied at higher rates.

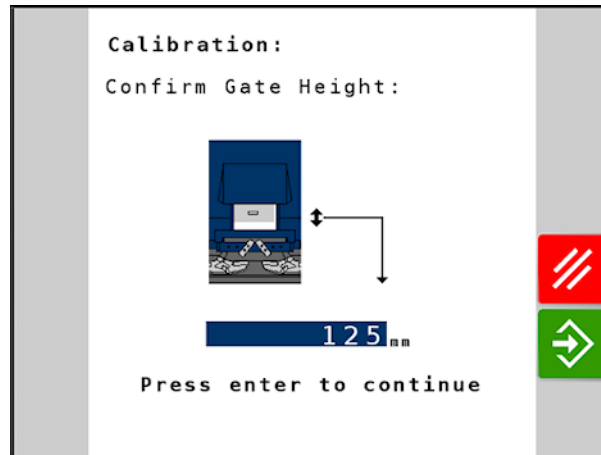
The weight of the product is constantly measured by the load cells. The amount the actual weight has decreased is compared to the theoretical weight decrease. The calibration factor is then adjusted to speed up or slow down the floor (belt) speed accordingly. The operator should only have to enter the target rate and working width and all other factors are adjusted in the background to ensure the correct rate is applied.

As dynamic calibration is constantly self-correcting, the calibration routine is there to assist in determining the appropriate gate height and to calculate the forward speed range for applying a new product.

1. Select the required product (see Setting up products, page 52).
2. From the Spreader Settings screen, select **Weight Setup**  / **Calibration**.
3. Follow the screen prompts to enter the:
 - Required application rate
 - Working width
 - Density
 - Average working speed

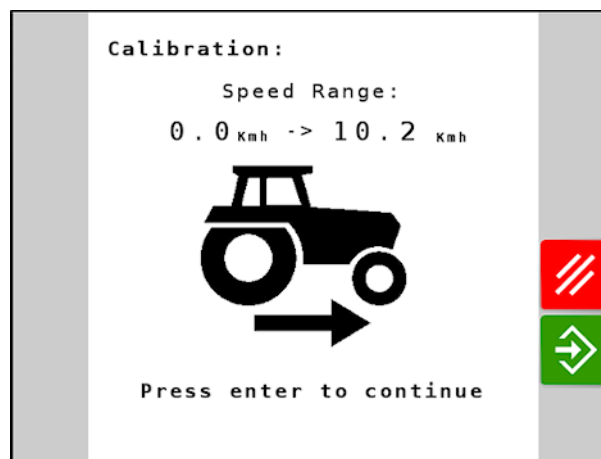
Based on the information entered, the software recommends a gate height setting. This takes account of the minimum and maximum RPM of the belt roller. The recommended gate height is based on the roller rotating in the middle of its RPM range, so that it allows maximum flexibility to forward speed.

4.3. Dynamic mode calibration

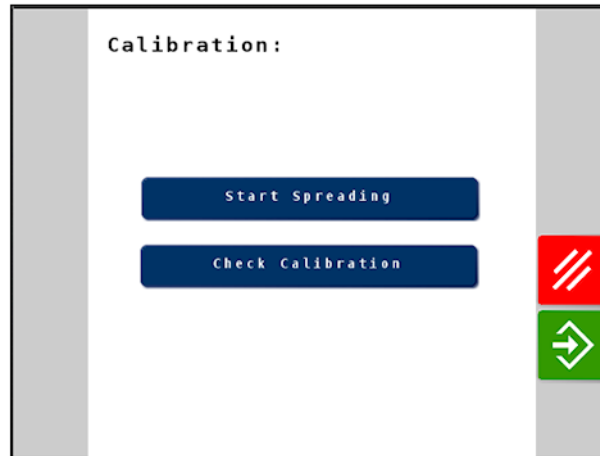


4. Confirm the recommended gate height or enter a different gate height if desired.

The operating speed range is displayed based on the above calculations.



5. If you have not previously done so, select **Check Calibration** to determine the 'flow factor' for the product (continue to the next section). **Note:** This procedure is only applicable if load cells are fitted.



6. Otherwise select **Start Spreading** to end the calibration sequence and return to the main operating screen.

4.3.1. Product flow factor – check calibration routine

The flow factor accounts for any product flow inconsistencies that may come from pelletized (prilled) or low friction products. To achieve accuracy across a complete product range, each product should be tested to enable the system to learn the flow characteristics of that material.

Note: This procedure is applicable if load cells are fitted, in Dynamic or Static mode.

The flow factor can be established by:

- Following this routine, which involves running the floor for a set time period, catching and then weighing the product that is dispensed from the spreader, or
- Carrying out a calibration nudge after spreading a certain amount of product (see Nudge calibration, page 68).

1. From the Spreader Settings screen, select **Weight Setup**  / **Calibration**.
2. Follow the product calibration procedure through and then select **Check Calibration**.
3. Enter the weight of product to be caught and weighed for the test.

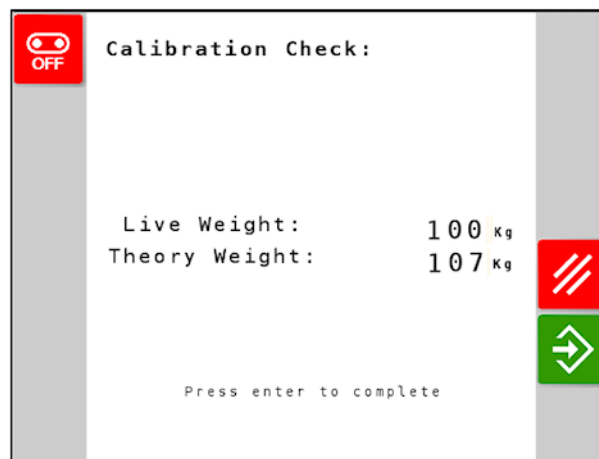
Note: If catching the product to be weighed, it is advisable to select enough product for a minimum of 5 Ha depending upon target rate.

4.3. Dynamic mode calibration

The system will run the belt for that much product and can then be calibrated once this has been weighed. The greater the volume of product dispensed for calibration, the greater the accuracy.

4. Press  to switch the spreader on.
5. Press  to start the calibration. The belt will start running, based on the Average Working Speed entered during the calibration procedure.

The display then counts up the theory weight (the weight the Athene has calculated based on the calibration factors entered in step 3), and the live weight (the weight as measured by the load cells).



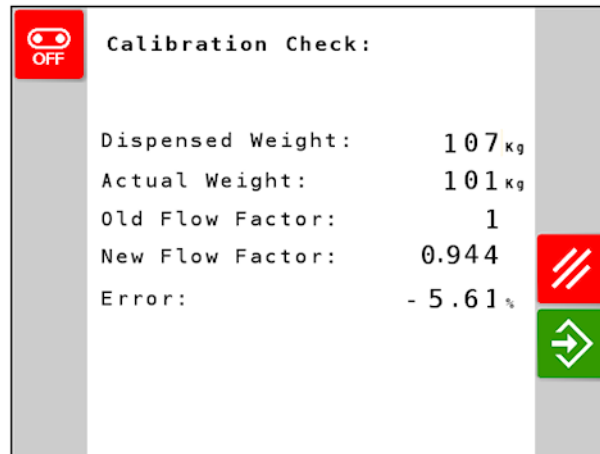
The belt will automatically stop when the theory weight is reached.

6. Press  to switch the spreader off.
7. Press  to continue.
8. Enter the **Live Kg** that is shown from the load cells.

Note: To check application rate accuracy, dispense the TOTAL amount of product that is shown in the hopper.

9. Press  to continue.

The flow factor is recalculated and displayed.



Note: Increasing the flow factor has the effect of slowing the belt speed compared to the programmed density. Decreasing the flow factor has the effect of increasing the belt speed compared to the programmed density.

'Dispensed weight' = 'Theory weight'.

10. Press  to finish the calibration routine.

4.4. Nudge calibration

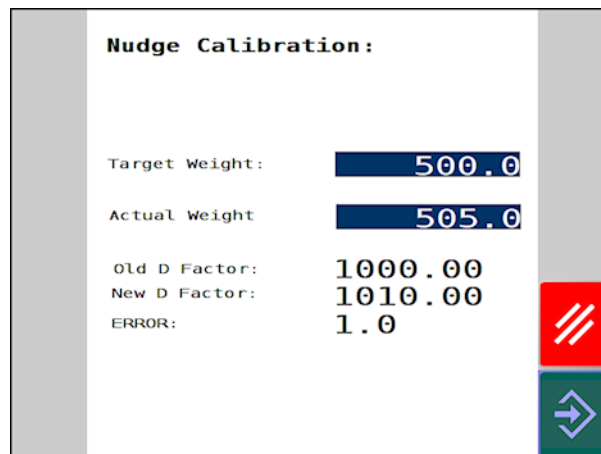
Some discrepancy between the target weight and the actual weight can occur, often due to variations in the actual density of the product from the theoretical density programmed. The calibration factor can be fine tuned to account for any discrepancy.

1. From the Spreader Setting screen, select **Weight Setup**  / **Nudge Calibration**.

2. Enter the **Target Weight** then press enter .

3. Enter the **Actual Weight** applied and press enter  again. The % error is calculated and displayed.

4. Press enter  to make the correction.



The screenshot shows the 'Nudge Calibration' screen with the following data:

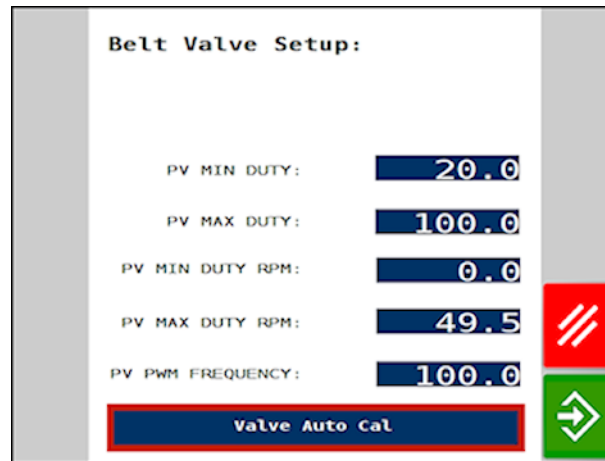
Nudge Calibration:	
Target Weight:	500.0
Actual Weight:	505.0
Old D Factor:	1000.00
New D Factor:	1010.00
ERROR:	1.0

On the right side of the screen, there are two buttons: a red button with three white diagonal lines and a green button with a white right-pointing arrow.

4.5. Valve calibration

This procedure sets the minimum and maximum PWM to move the spreader belt. **Note:** If you enter this area you **MUST** complete the full calibration to exit and retain the settings.

1. From the **Main Menu** select **Factory**  / **Channels** / **Valve Setup**. The Belt Valve Setup screen summarizes the current valve settings.
2. Select **Valve Auto Cal**, set the engine to normal operating rpm and press  to start the calibration procedure.

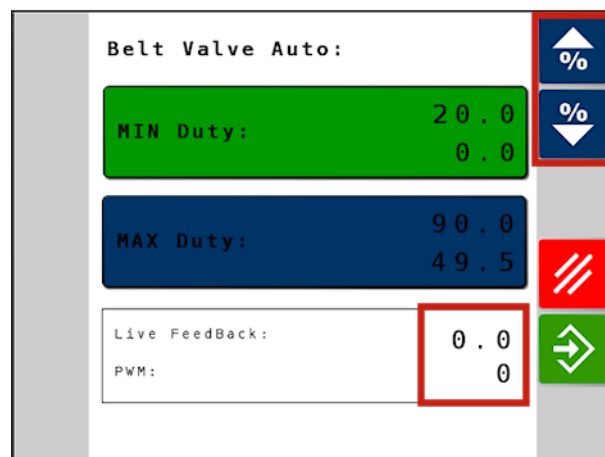


Belt Valve Setup:

PV MIN DUTY:	20.0
PV MAX DUTY:	100.0
PV MIN DUTY RPM:	0.0
PV MAX DUTY RPM:	49.5
PV PWM FREQUENCY:	100.0

Valve Auto Cal 

3. With **Min Duty** selected, by observing the **Live Feedback** rpm value, adjust the belt until it is on the threshold of moving.
4. Press  to set the minimum PWM output.

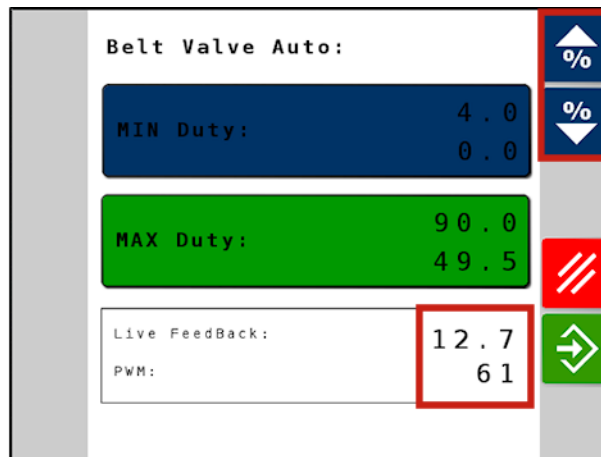


Belt Valve Auto:

MIN Duty:	20.0	 
	0.0	
MAX Duty:	90.0	 
	49.5	
Live FeedBack:	0.0	
PWM:	0	

4.5. Valve calibration

5. With **Max Duty** selected, increase the belt speed to the maximum it can go.
6. Press  to set the maximum PWM output.



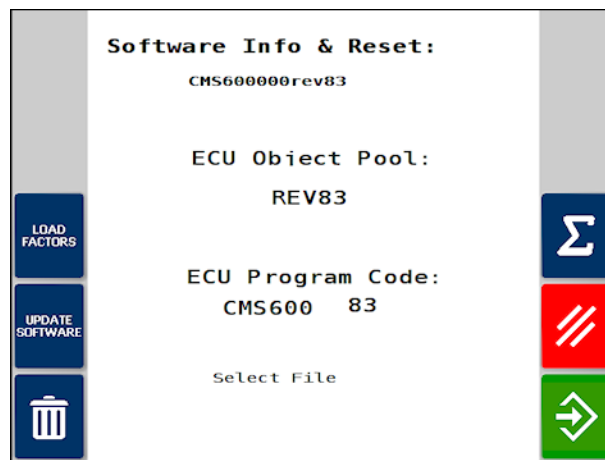
The Belt Valve Setup screen displays a summary of the new settings.

Chapter 5 – Updating Athene Software

Note: Athene software can only be updated on an ISOBUS compliant console that is file server capable.

1. Copy the folder named 'Apollo' onto the root directory of a USB memory stick, and insert at the rear of the console.

2. From the **Main Menu** select **Factory**  / **Software Info & Reset** and confirm.



ECU Object Pool and **ECU Program Code** show the version of software that is currently installed. The new software number that is found on the USB stick is shown at the top of the screen. In this case CMS600-000rev83.

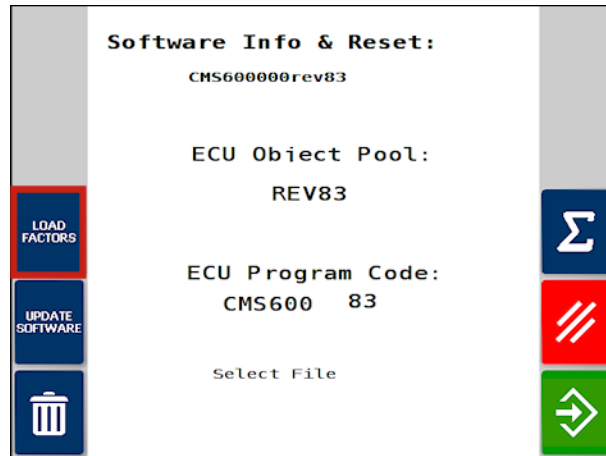
3. Press the top part of the display to display a drop-down menu showing a list of software versions found on the USB. Ordinarily there will only be one valid software version – CMS600000revxx.



4. Press  to select.
5. Press the **Update Software** button to save the current settings to the USB.

Once this has finished it will move onto 'Loading Software', followed by 'Loading Object Pool'.

6. Once this process has finished, the screen will appear white.
Without removing the USB, switch the console off and back on to trigger the new software to be reset.
7. When the console has restarted and the Athene UT screen is available, select the **Load Factors** button to restore the previous settings from the USB.



8. When 'Loading Factors' is complete, switch the console off and back on for the restored settings to take effect.

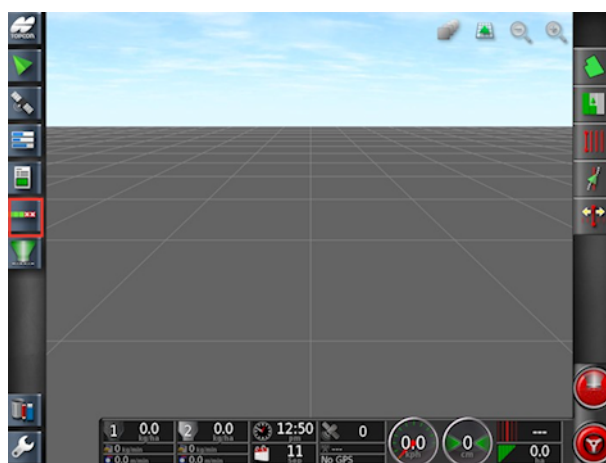
Note: The Athene will automatically download the programmed settings onto the USB as part of the updating process in a file named FACTEXP.xml. This is the file used upon pressing **Load Factors**. After the update, the file will remain on the USB, and can be saved elsewhere as a backup of the settings.

Chapter 6 – Operation with Topcon Console

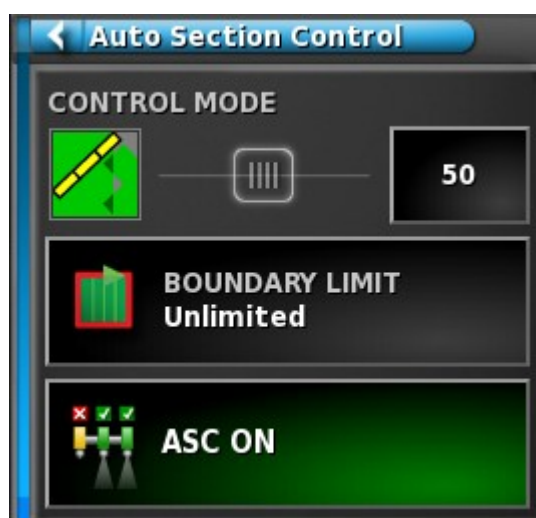
6.1. Opening auto section control

Auto section control is available when an implement and ECU have been set up and Auto Section Control has been enabled in the Setup

screen (System  / Features  / Implement ).



1. Select **Auto Section Control**. The Auto Section Control mini-view opens.



- **Control mode:** Use the slider or number keypad to set to avoid overlap (0) or avoid gaps (100). If avoid overlap is chosen, there may be some spaces where product is not applied. If avoid gaps is

6.1. Opening auto section control

chosen, some overlap of application is likely near boundaries. The default (50) is a compromise.

- **Boundary limit:** Sets which type of boundary limit will turn off spraying when using auto section control.

Field Boundary and **Headland** are defined using the Field menu on the Operation screen. Refer to the Guidance and Auto Steering Operator Manual for more information on these.

Safety Zone reduces width of spreading by half a swath width from the boundary to prevent over application.

- **ASC on/off:** Turn auto section control on/off.

6.2. Using the master switch

When Virtual has been selected in the Setup screen (**Implement / Master Switch**), the Spreader Master Switch on the Operation screen turns the coverage system on. **Note:** This switch does NOT operate the master button on the Athene page.

The switch also indicates the readiness of the system:



Green

Spreader coverage is on and working. Select the master switch to turn the coverage off.



White

Spreader coverage is ready to use. Select the master switch to turn the coverage on.



Red

Spreader coverage is off and cannot be used. Select the Master Switch to see possible causes of the problem. See the example below.



Green indicates that the system is ready. Red indicates that the system is

not ready. Select  to return to the main screen and complete the necessary action.

The alarm bell button shows the number of active alarms.

6.3. Variable rate control

Before use, Variable Rate Control (VRC) must be set up with a controller and must be enabled on the Setup screen (**System**  / **Features**   / **Implement** ).

Select  to enable or disable the VRC Map display on the guidance screen.

6.3.1. If using VRC maps

There are three ways to perform VRC:

- Importing prescription maps (shapefiles and ISO XML files) into created jobs using the VRC import wizard.
- Using real-time sensor data from nitrogen sensors mounted on the tractor (for example: Topcon CropSpec).
- Using Task Data based prescription maps.

The following instructions describe the first two methods. If using task data, refer to the Guidance and Auto Steering Operators Manual.

Both shapefiles (.shp) and ISO XML files (.xml) may be imported into created jobs. Note that only the prescription map portion of the data is used if .xml files are imported.

1. Select a client / farm / field.
2. Create a new job.

3. Select **Job Menu**  / **Configure Variable Rate Control**



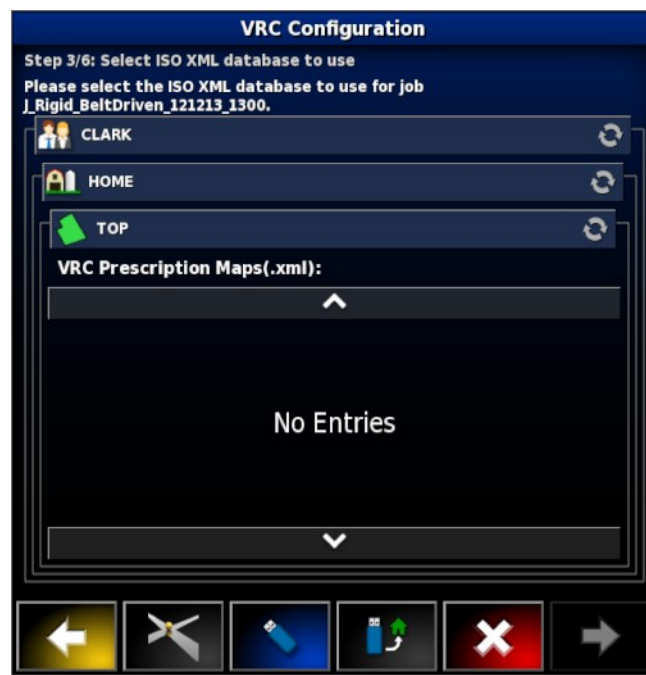
4. Select next at step 1 of the VRC Configuration wizard.
5. Select the rate source(s) for the VRC and select next. The possible options are:

- Shapefiles
- ISO XML
- CropSpec (if enabled)

Note that shapefiles and ISO XML cannot be used at the same time. However CropSpec can be used in conjunction with shapefiles or ISO XML

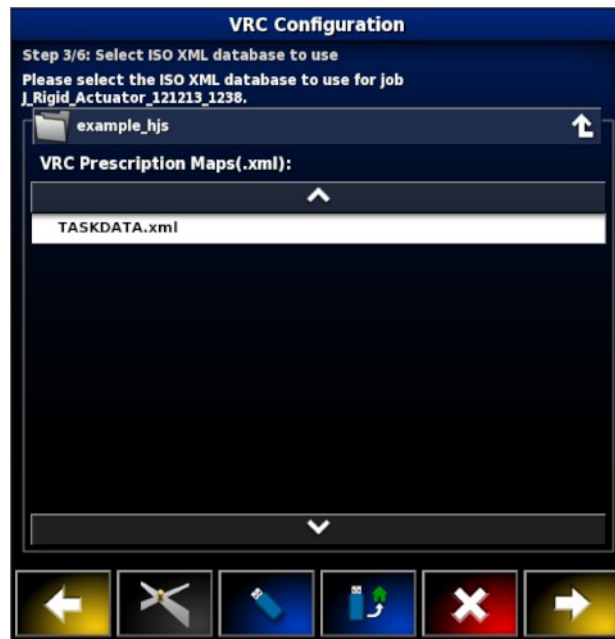
If **Shapefiles** or **ISO XML** are selected at step 2, all maps previously imported to the current field are displayed so that previously used maps can be recalled.

- If the desired maps are not already on the console, insert a USB with prescription maps.
- Select the USB icon at base of the screen . The window background turns blue to indicate you are viewing the USB file list.



- Select the USB home icon  to view the root of the USB file structure. Files and folders on the USB root are displayed.
- Select a folder to open it. Find the required file and select it. It will display as white and next is now enabled. Note that multiple files may be selected.

6.3. Variable rate control



- Select next.
- 6. If ISO XML was selected in step 2, select the task that you wish to run. The file may have several tasks listed. Select the task that matches the implement that is hooked up.
- 7. Select next.

Source and Attributes must now be assigned to channels.

- **Channel:** The tank or bin that is being controlled.
- **Source:** The source of the prescription map for that channel. The list of files that were selected earlier on will appear here or you can also select a live source like CropSpec.
- **Attribute:** One of the properties in the shape file or ISOXML file or the sensor output from CropSpec. The same shape file may have multiple attributes to define the rates for more than one tank so this allows the operator to map the prescription to the appropriate tank.
- **Rescale:** This column defaults to 1, which means that the prescription defined in the source will be used directly. However, depending on weather conditions, the operator may choose to increase or decrease the rate of application. This allows a uniform increase for all defined rates.

For example, a rescale of 1.1 will apply 110 percent of the rate defined in the source.

- **Default:** Defines the rate to use if the source doesn't specify a rate for that region of the paddock.

VRC Configuration

Step 5/6: Map Rates to Channels

For each channel select the file and attribute which will be used to control the rate on that channel and specify the type of units used in the selected file.

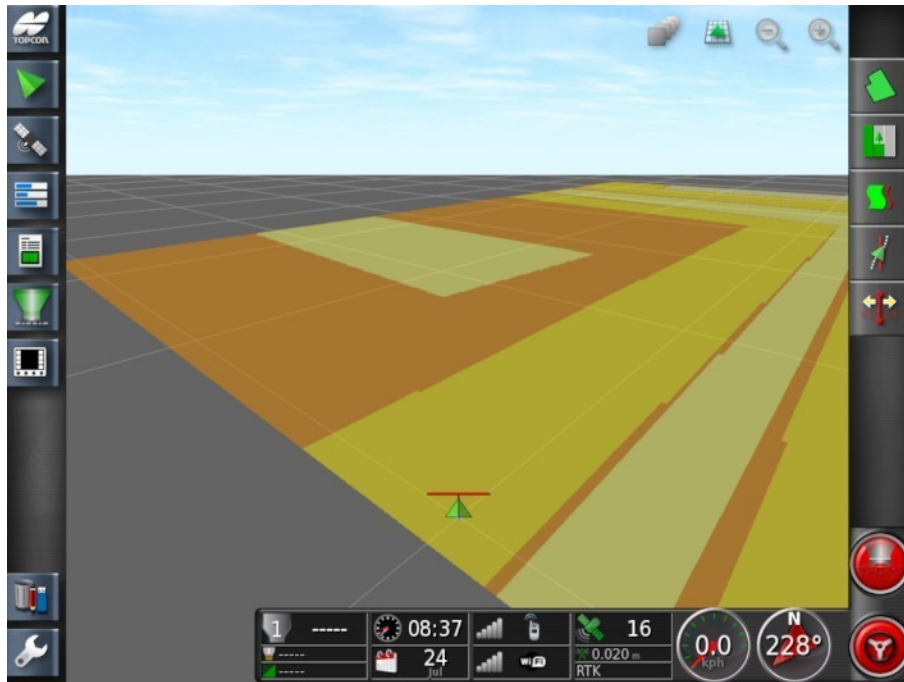
Channel	Source	Attribute	Rescale	Default
1: 0-0-60	TSK6 :ADL	PDT10: Starter - 6	1.00	0.0

Navigation buttons: Back (left arrow), Cancel (X), Next (right arrow)

8. Select next.
9. On the final step, you must confirm the setup. This cannot be changed for the job, so ensure it is correct before continuing. Select Back to change the configuration or OK to confirm.

The map is displayed. If it does not display, ensure you are in close proximity geographically to the map's location.

6.3. Variable rate control



Chapter 7 – How Dynamic Calibration Works

Note: See Loadcell correction, page 24 for definitions of each setting in the Loadcell correction screens.

The empty spreader is loaded and switched into work. Auto pre-start begins and the floor starts to move based on the simulated forward speed. See Setting up pre-start, page 48 to enter the **Pre-start time**. Pre-start ensures good coverage at the start of each run, and that the spreader does not have to start moving until a suitable amount of product has reached the spinners.



Pre-start time has expired, the tractor has started moving forwards and the **Start delay** begins. This is the delay at the start of each new load before dynamic corrections are made.



Loadcell Correction:

← 0 →

Correction Span: 2.0

Min. Static Weight: 200 kg

Dynamic Time: 5.0

Dynamic Weight: 100.000 kg

Start Delay: 25

Steady Weight: 8.0 kg

Start delay time expires, **Dynamic time** and **Dynamic weight** begins.

Then, **Dynamic time** expires. The weight has reduced by > **Dynamic weight**. A new 'T' factor is calculated.



Loadcell Correction:

← 0 →

Correction Span: 2.0

Min. Static Weight: 200 kg

Dynamic Time: 5.0

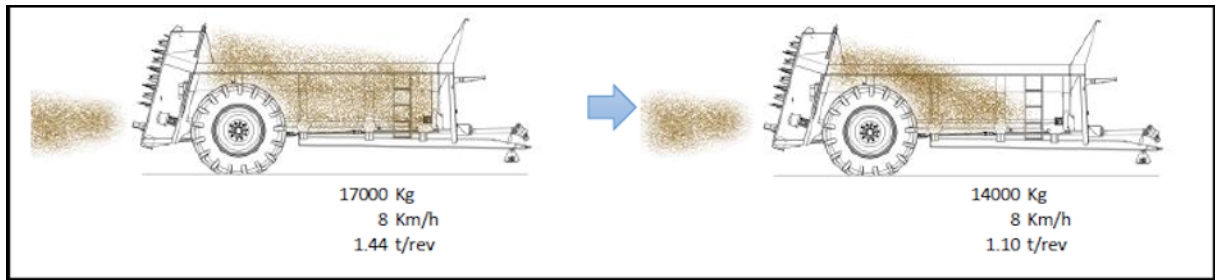
Dynamic Weight: 100.000 kg

Start Delay: 25

Steady Weight: 8.0 kg

Cal factor delay time expires, **Dynamic time** and **Dynamic weight** begins.

Then, **Dynamic time** expires. The weight has reduced by > **Dynamic weight**. A new 'T' factor is calculated.



Loadcell Correction:

← 1 →

Headland Delay: 10

Cal Factor Delay: 2.0

Dyn. Fill Weight: 1000.00 Kg

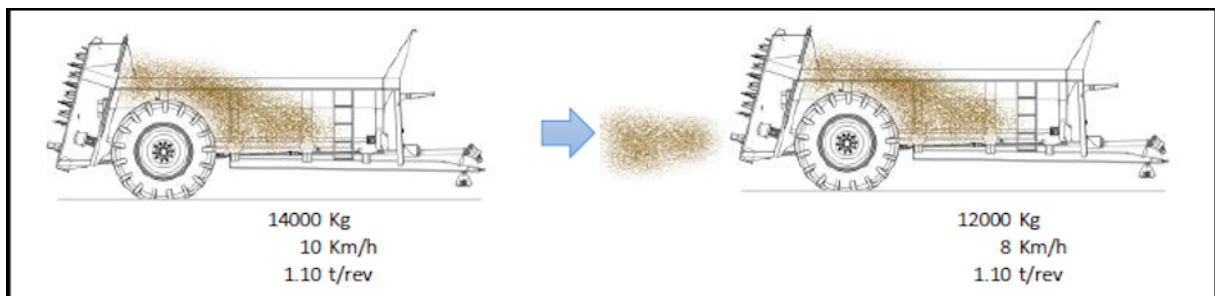
Correct. Span Fast: 80.0

Weight Smooth: 20

ZGain: 0.0

Spreader is switched out of work.

Then, spreader is switched back in to work. Since speed is >2km/h, pre-start is not applicable. The **Headland delay** starts. Weight has not increased by >**Dyn fill weight** so spreader has not been refilled.



Loadcell Correction:

← 1 →

Headland Delay: 10

Cal Factor Delay: 2.0

Dyn. Fill Weight: 1000.00 Kg

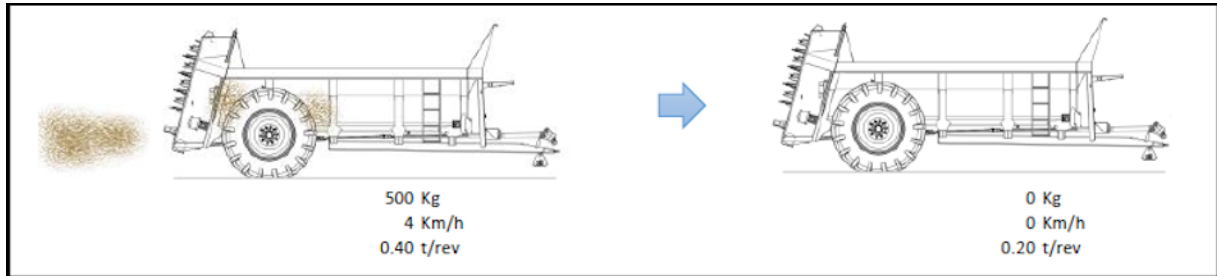
Correct. Span Fast: 80.0

Weight Smooth: 20

ZGain: 0.0

Spreader is almost empty. Application alarm will be seen as the floor cannot go fast enough to reach target.

Then, spreader empty and switched out of work.



Spreader is refilled. Weight has increased by **>Dyn fill weight** so considered refilled.

Spreader is switched in to work. Actual weight is added to grand total spread. Auto pre-start begins.



Problems/limitations of dynamic weighing

- Low application rates: Below ~250kg/Ha the change in weight is too small and can cause erratic changes to the 'T' factor.
- If the initial 'T' factor is unrealistic, it will take numerous tests before it settles down to the correct value. This can result in the application rate being incorrect for several Ha.

Chapter 8 – Machine Setup Checklist

- Machine options (see page 25)
 - Machine type = Athene
 - Enable channel 1 = Belt
 - Enable channel 2 = Spinners (if controlling spinners)
- Spreader configuration (see page 28)
 - Set max capacity
 - Shaft 1 PPR = Spinner RPM sensor setting if not controlling spinners through channel 2
 - Gate width
 - Roller diameter
- Channels (see page 30)
 - Belt feedback, response and calibration
 - Spinners feedback, response and calibration (if controlling)
 - Control delay
- Loadcell interfaces (see page 31)
- Calibrate loadcells (see page 45)
- Width setup (see page 46)
- Product setup (see page 52)
- Weight setup (see page 57)
- Calibration flow factors (see page 59)

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