SmartAGSystems

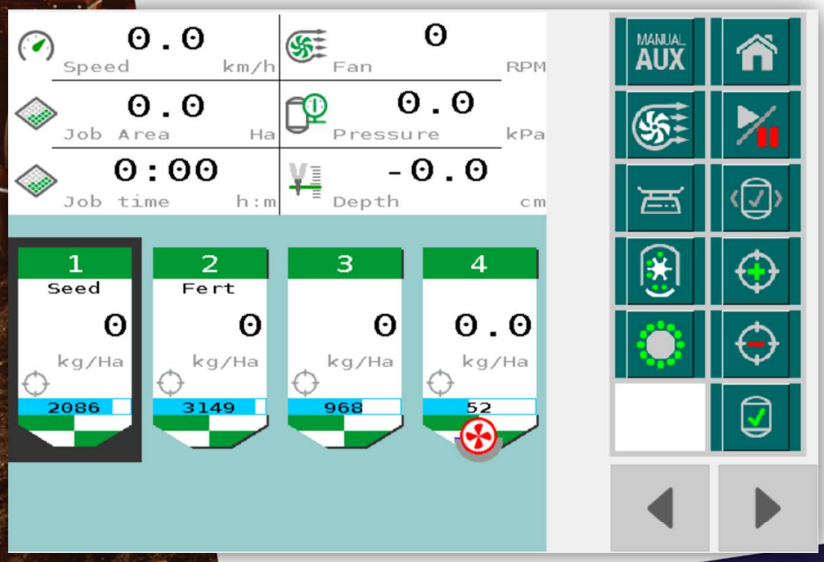
www.smartAGsys.com

Operators Manual

ISO SEEDER CONTROLLER

This guide is to be printed and kept with the ISO Seeder Controller to ensure optimal setup and use for your machinery and safety.

PLEASE NOTE Parts and specifications are subject to change. Part numbers may differ if supplied directly from an OEM or retrofit.



DRIVING CONTROL EFFICIENCY
IN AGRICULTURE

ISOBUS Seeder Operations Manual

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WARNING!
Moving Machinery Hazard

This system controls electrical and hydraulic functions that may cause components to move automatically or without warning.

Moving parts on seed drills and associated implements can cause serious injury or death.

Before installing, operating, servicing, or calibrating this system:

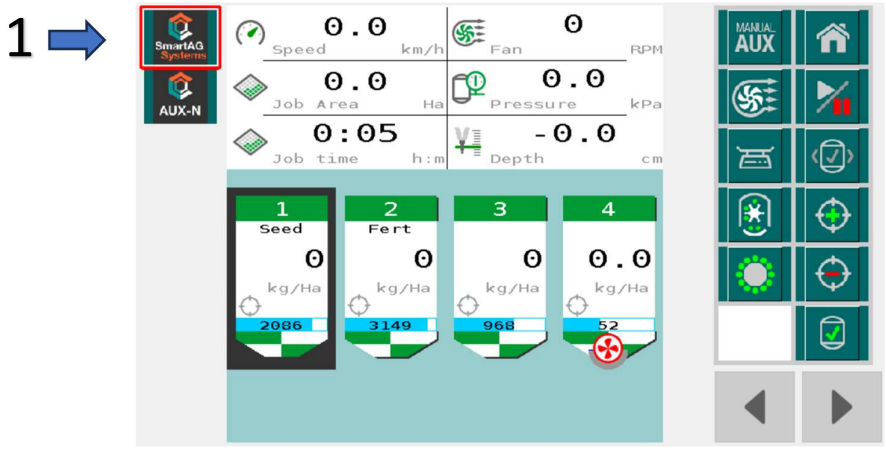
- Ensure all persons are clear of the machine
- Follow all safety instructions provided by the machine manufacturer
- Isolate and secure hydraulic, pneumatic, and electrical power where required

Safe operation of the complete machine is the responsibility of the operator and machine owner.

Failure to follow proper safety procedures may result in injury or damage to equipment.

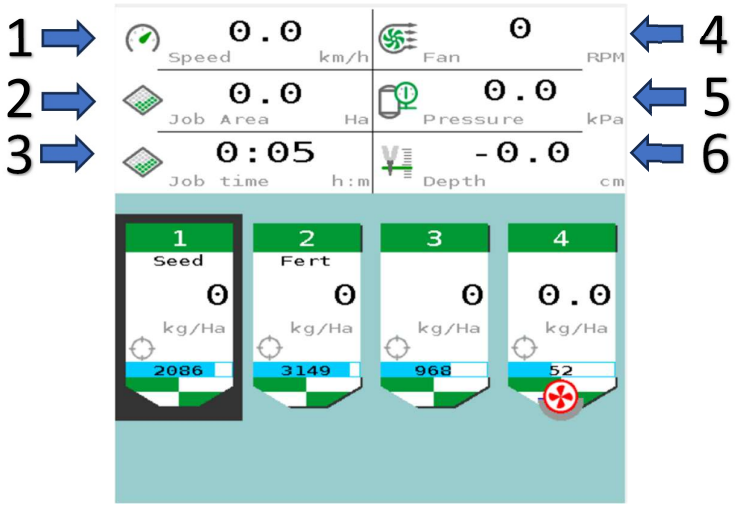
Overview

This manual is a guide for the operation of the Smart AG Systems ISOBUS Controller on a seeder.



To view the main screen – select the SmartAGSystems UT (1).

Main Operation Screen

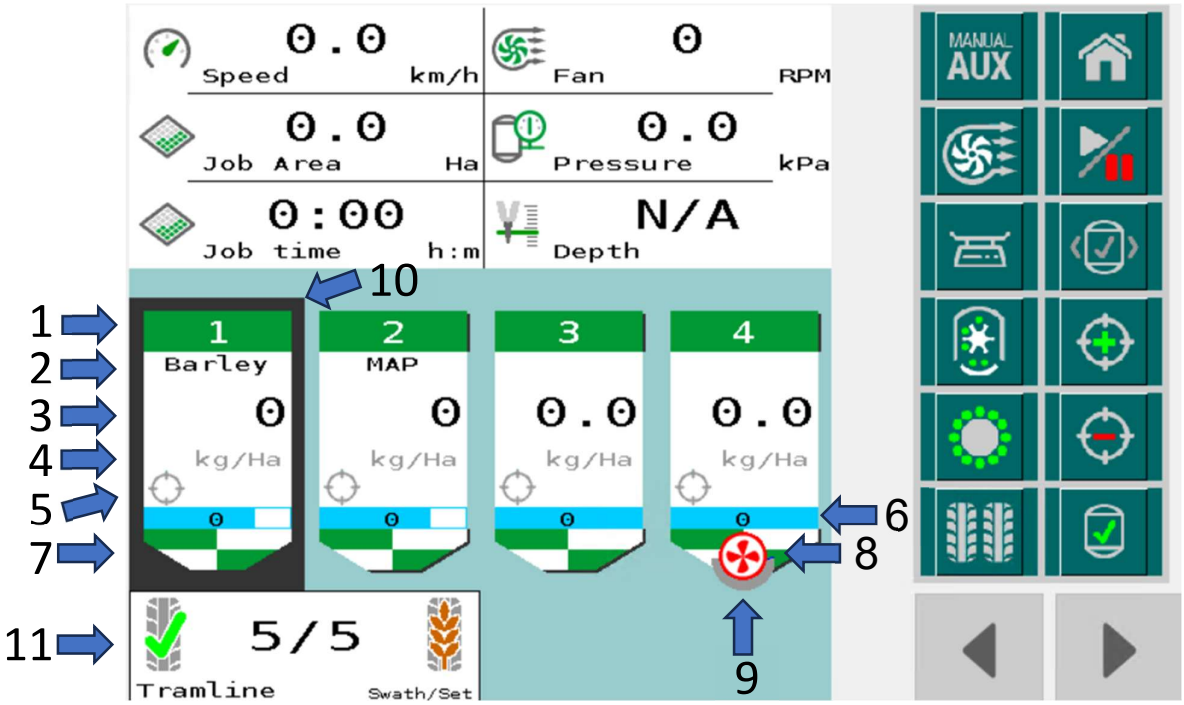


(1) Ground speed
(2) Job Area
(3) Job Time
(4) Fan Speed
(5) Fan Pressure
(6) Depth

Note in versions 0.8 of software and later these tiles can be configured to display other information (see page 32).

If Prime mode has been enabled, the Speed tile will display the following letters beside the icon

1) P km/h Prime mode – simulated speed
2) S km/h Slow mode – minimum speed is limited
3) H km/h Hold mode – speed is stopped



1) Bin Number or Name

2) Product name

3) Rate (Live or Target)

4) Rate Units

5) Target Indicator. (Indicates if the rate is above, below or within 10% of target rate)

6) Bin Level %

7) Flashes when Bin active

8) Fan Status (On=green/Off=red)

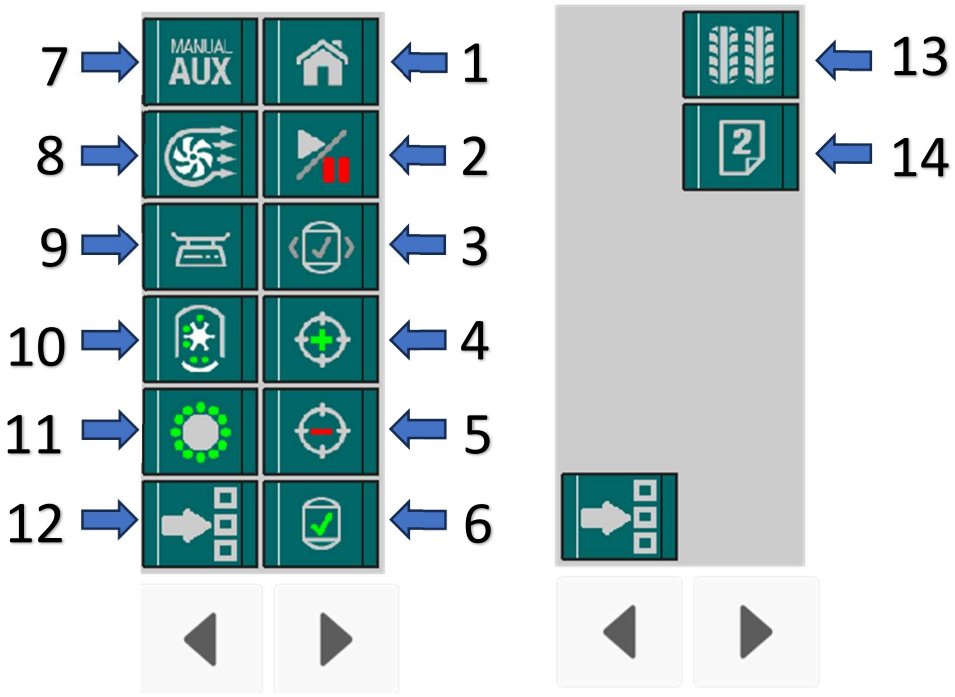
9) Fan output % icon

10) Selected Bin

11) Tramline widget

Soft Keys

The on-screen position and size of Soft Keys will vary by manufacturer design. The number and position of Soft Keys may be different based on user configuration.



1) Home – Setup Menu's
2) Run/ Hold button (green = run, red = hold)
3) Change Bin Selection
4) Rate Increase
5) Rate Decrease
6) Bin On/Off
7) Lights and Hydraulics Control (Optional)
8) Fan Control Menu (Optional)
9) Load Cells Menu (Optional)
10) Quick Calibrate (Optional)
11) Blockage Page (Optional)
12) View more Soft Keys
13) Tramline Menu (Optional)
14) 2nd Main Page

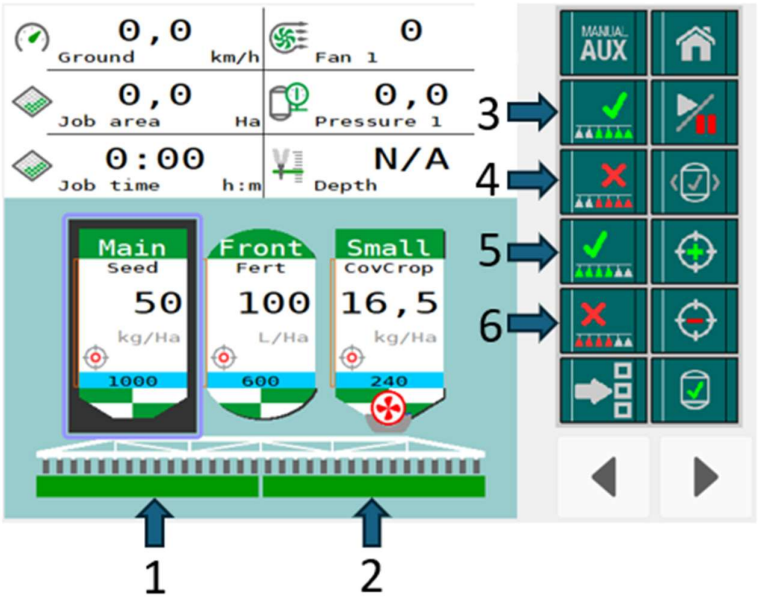
Touch Screen Functions

The following touch screen shortcuts are available on the Main Page.

1. Press a bin icon to select it (and show demand rate)
2. Press and hold a bin icon to access its operational settings
3. Press a section icon to turn it on/off

Section Control

The section control widget will show below the bin icons (if enabled).



Note: The widget will show the current sections based on the selected bin's applicator. It will update automatically when changing selected bins to the relevant section.

1) Toggle Section (On/off)

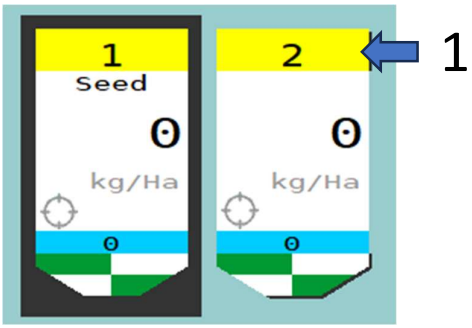
2) Toggle Section (On/off)

3) Right Section On

4) Right Section Off

5) Left Section On

6) Left Section Off



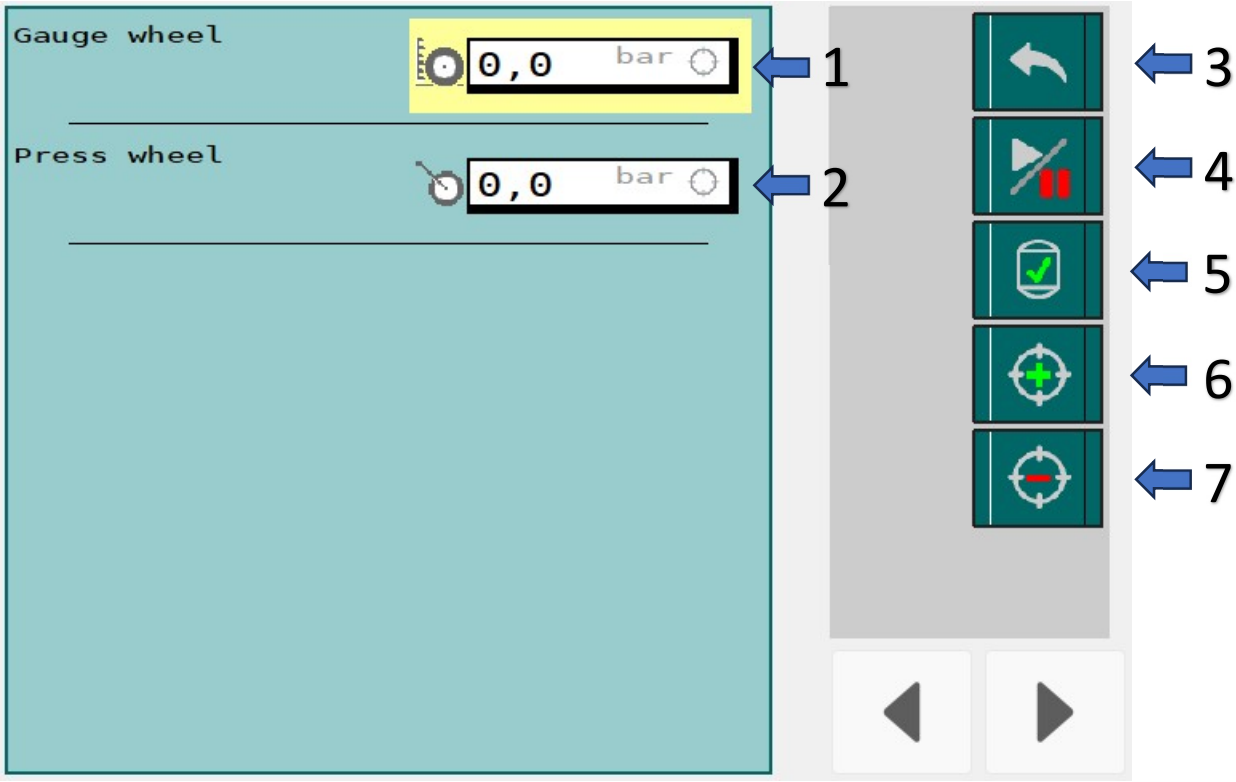
1. When section control is connected to a Task Controller, the top of the bin will turn Yellow.

2nd Main Page

Gauge wheel (row unit/coulter) pressure and Press wheel (closing wheel) pressure can be controlled on the 2nd operation screen.

The system will normally show the current Pressure reading (1). When changing demand, it will show the following based on configuration:

1. (Manual) Demand "... %": Manually set 0-100% of possible output.
2. (Automatic) Demand " ... Bar": Automatically adjust the pressure.



The current selected feature is highlighted (1), Soft Keys (3,4,5…) will control the selected feature.

1) Gauge wheel control (Selected)

2) Press wheel control (Unselected)

3) Exit

4) Run/ Hold

5) On/Off

6) Increase

7) Decrease

Alarms

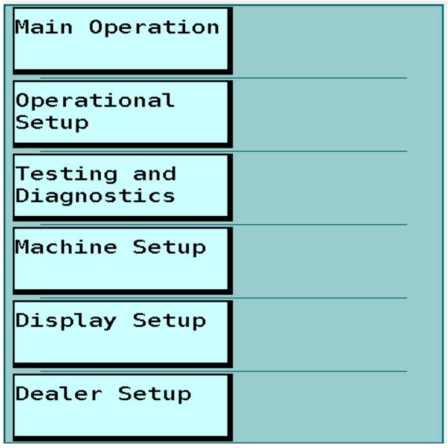
If an alarm triggers, the pop-up screen below will be shown.

The machine may stop operation if the alarm is set to Critical.

1) Acknowledge – Acknowledge the alarm until it triggers again
2) Mute – Mute the alarm for 15 minutes
3) Reset – Reset the alarm if its cause has been removed

System Setup

Press the **Home** Soft Key for all setup and system configurations.



1) **Main Operation** returns to the main operating screen
2) **Operational Setup** for all bin/product related configurations
3) **Testing and Diagnostics** for all motor testing and diagnostic information
4) **Machine Setup** Alarms, Control Speed Setup, Task Controller and File Server
5) **Display Setup** Move to next UT and change parts of the main operation screen
6) **Dealer Setup** this is only available to the commissioning dealers

Operational Setup

This area is where all day-to-day setup is done, product details and all bin associated management is controlled.

Jobs - Information and management of jobs.

Product Management - Addition, removal, setup and information about products.

Bin/Tank # Operations - Bin Levels, Application Rates, Application Step size, VRA Nudge Step size. Individual **Bin/Tank Operations** tiles will be displayed for all bins setup on the system.

> **Bin# Product -** Product Selection, Manual Calibration input, Product Calibration, Advanced Calibration setup and Calibration units.

Tramline - Enabling and setting of the tramline configuration.

Depth Sensor - Enabling and setting of depth sensor.

TECU Hitch Position - Enable access to the tractor three-point linkage sensor for seeder control.

TECU Working State - When enabled will switch the implement into and out of Run Mode.

Jobs

From the Operational Setup screen, press the **Jobs** tile.

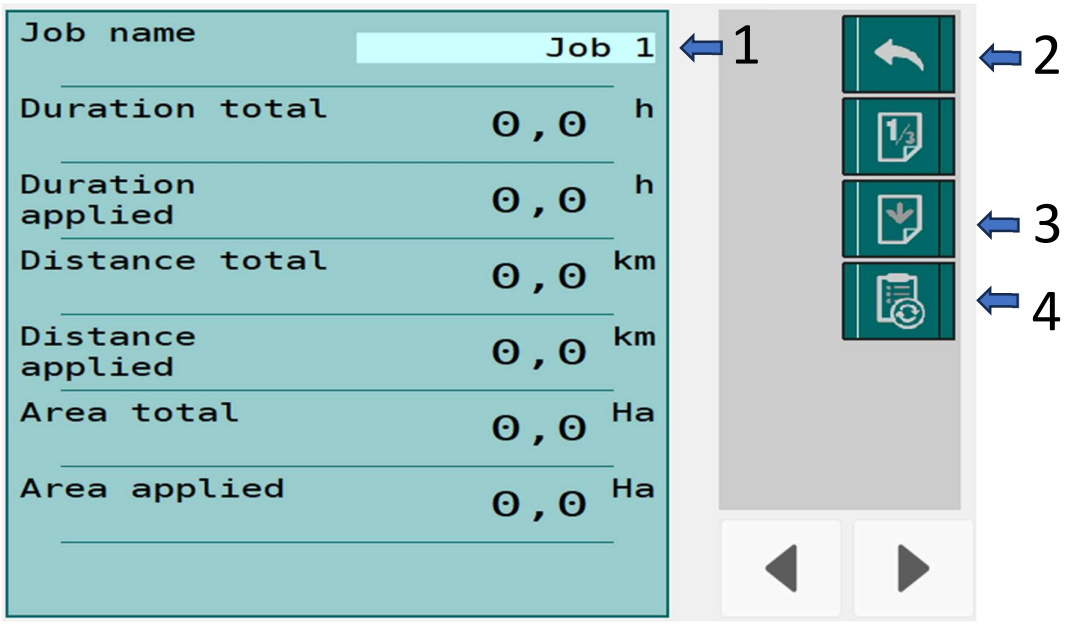
Master Job provides the history of the machine and cannot be reset.

Job 1 – Job 7

Place a tick in the required box to select the active job. Only one job can be active at a time.

Press the Job tile you would like to view or edit.

NOTE – only 7 jobs are available on the UT/VT screen. It is recommended to manage jobs through the Task Control screen (if available).



1) Change Name
2) Exit
3) Cycle Page
4) Reset Job Data

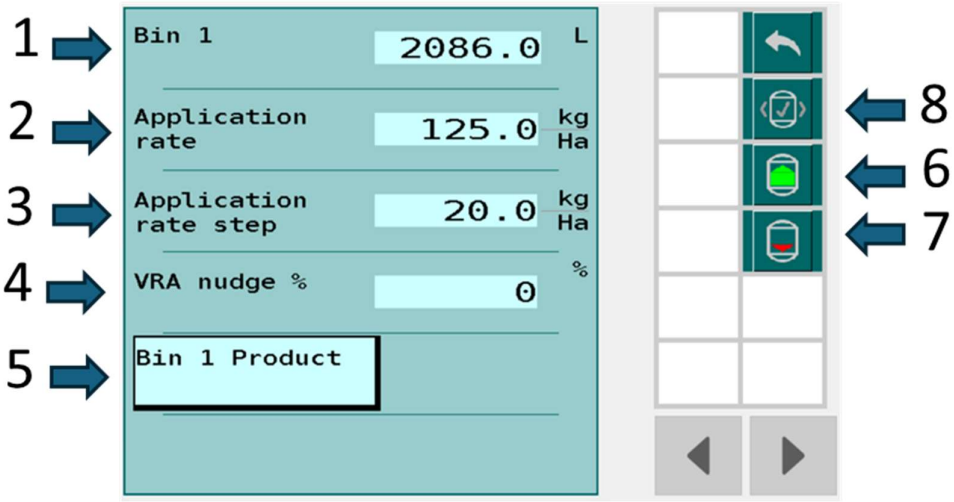
Product Management

Press the **Products** tile from the Operational Setup screen.

1) Change Product Details
2) Exit
3) Adds Product

Bin # Operations

Press the **Bin # Operations** tile from the Operational Setup screen.

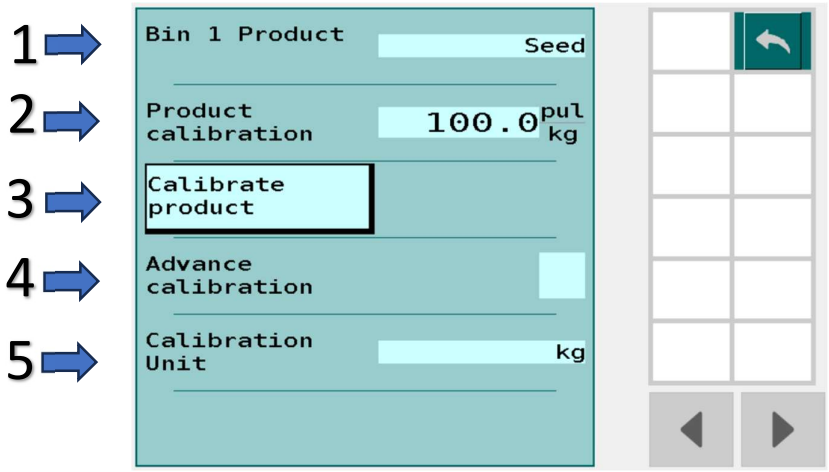


1) Current bin weight (automatic when using load cells)
2) Application rate
3) Application rate step size
4) VRA rate step size (if used)
5) **Set** and **Calibrate** the product for this bin
6) Quick Fill Button
7) Quick Empty Button
8) Move to next Bin

Please note Quick Fill Button (6), the bin weight will not be added to the bin tally if the bin and product have not been configured correctly.

Bin# Product (Calibration)

Press the **Bin# Product** tile from the Bin # Operations screen.

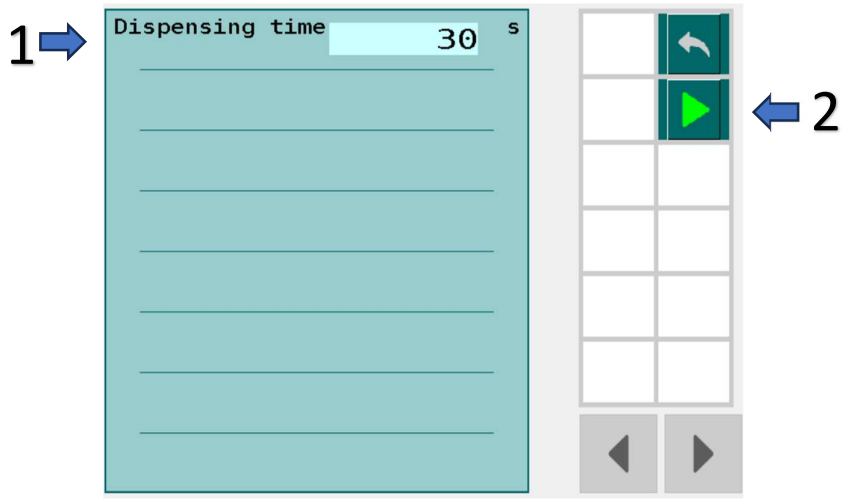


1) Select **Product** (See “Product Management”)
2) Manually set calibration
3) Start calibration process
4) Enable Advance calibration
5) Calibration Unit (eg. Kg, g)

NOTE – If Quick Calibration button is configured on the front screen, calibration type will revert to the last calibration type used.

Basic Calibration

Press **Calibrate Product** from the Bin# Product screen.

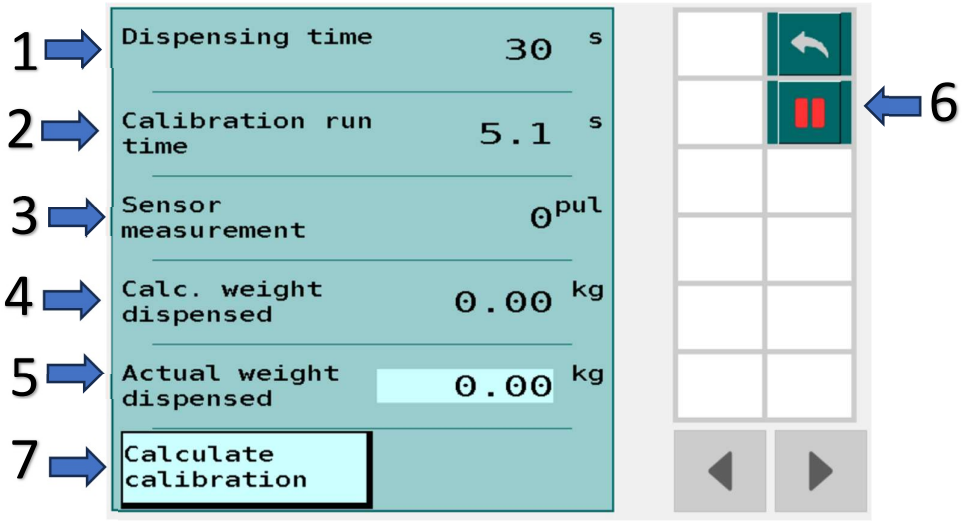


1) Dispensing Time
2) Start Calibration Button

Running a Calibration

WARNING!
This will turn the motors on - ensure the environment is safe before continuing

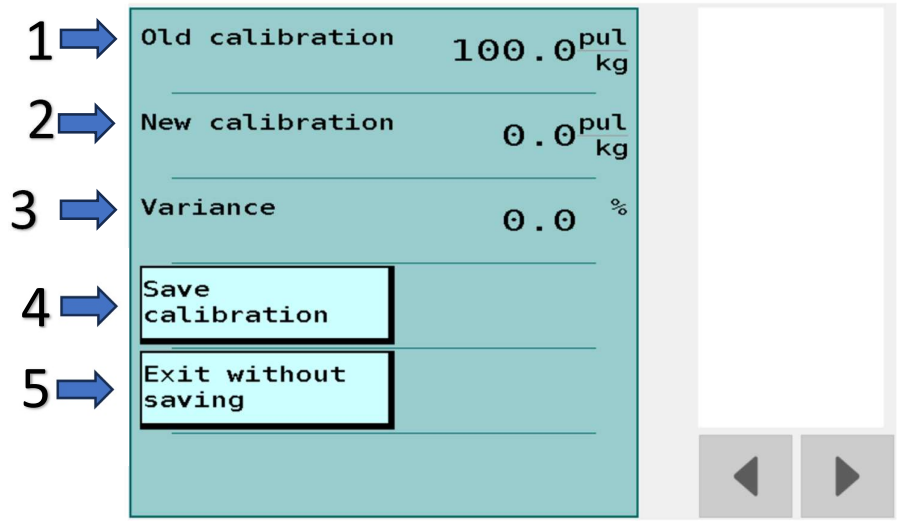
1. To Start the calibration, Press (2)
2. The system will run for the target time and then stop. To stop the calibration process, press the **Pause** button **(6)**
3. Once stopped, measure the weight of the product and enter the value in **(5)**
4. Use **(7)** when finished



1) Dispensing Time (Target)
2) Current Calibration Time
3) The number of pulses
4) Theoretical weight
5) Actual Weight Dispensed (user entered)
6) Pause Calibration
7) Calculate Calibration

Calibration Variance Page

Ensure the variance percentage is acceptable for seeding conditions. Then Save or Exit the Calibration.



1) Previous Calibration
2) Current Calibration
3) Variance
4) Save (use new)
5) Exit (use previous)

Advanced Calibration

This relies on enabling Advanced Calibration from **Bin# Product (Calibration)** Page.

The feature allows you to perform a more advanced calibration by:

1) Selecting a % of maximum motor speed OR
2) Simulating the ground speed and product rate of normal planting conditions

Then Press the **Calibrate product** Button.

Calibration Mode (Weight or Time)

Target Weight to Dispense (Target Weight or Time)

1. **Calibration Control Mode Simulated**

   Simulated Speed (Set to actual planting speed)

   Simulated Rate (Set to required planting rate)

2. **Calibration Control Mode Fixed Output**

   Static cal. rate (Set fixed motor output)

Slow Start (Limits starting speed to reduce current draw. 100% is 10 seconds of ramp. Recommended: 0% Hydraulic, 20% Electric)

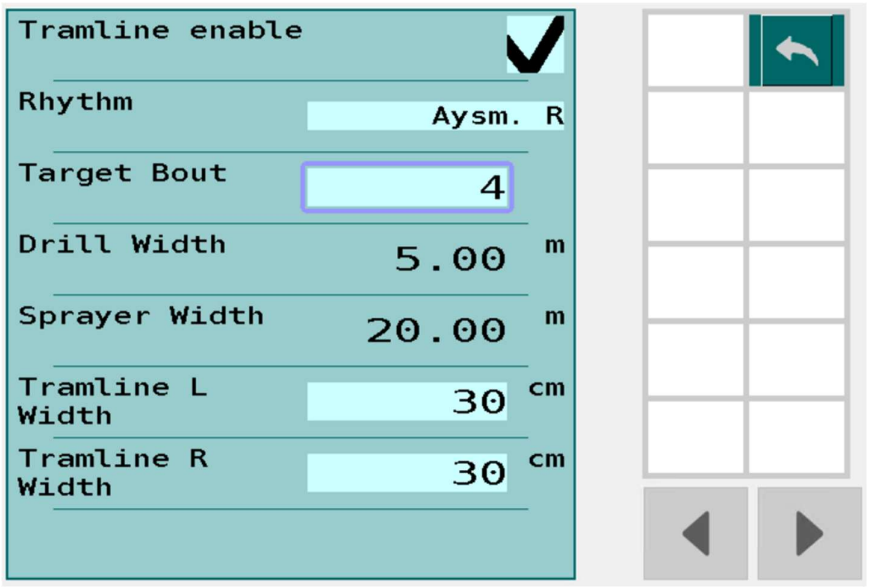
For the Calibration process – see "**Running a Calibration**"

Tramline

Press the **Tramlines** tile from the Operations Setup screen.

Configure tramlines based on your machine's configuration. Contact your dealer or manufacturer for detailed information. See "Tramline Guidance" manual supplied separately for detailed description of bout setup.

Note: Blockage sensors should not alarm whilst on a tramline bout.



1) Tramline On/Off
2) Rhythm – Choose between Asymmetrical Left (Aysm. L), Asymmetrical Right, (Aysm. R) and Symmetrical
3) Target Bout – Number of target bouts
4) Drill Width – Imported from implement width
5) Sprayer Width - Target Bout x Drill Width
6) Tramline L Width – Width of unplanted area in left wheeling
7) Tramline R Width – Width of unplanted area in right wheeling

Note: Seed rate is reduced by the Tramline Width when Tramlining for seed rate to remain accurate.

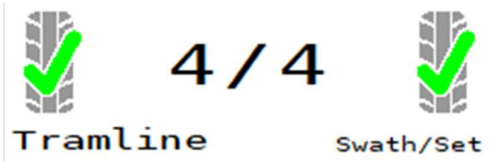
Tramline Soft Key functions

- Exit
- Run/Hold
- Pause tramlining
- Increases bout
- Decreases bout

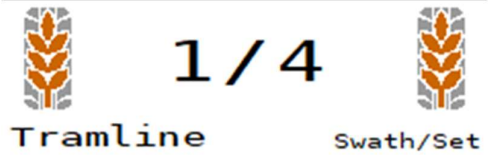
Tramline Main Operation Widget

The widget displays the number of swaths in the tramline sequence and the current swath number.

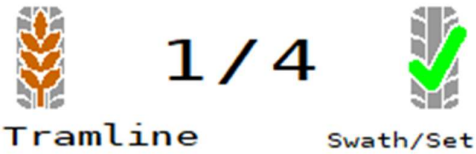
The Tramlines are active when wheels are ticked.



For Symmetrical tramlining both sides indicate together



When not active a plant is shown indicating seed



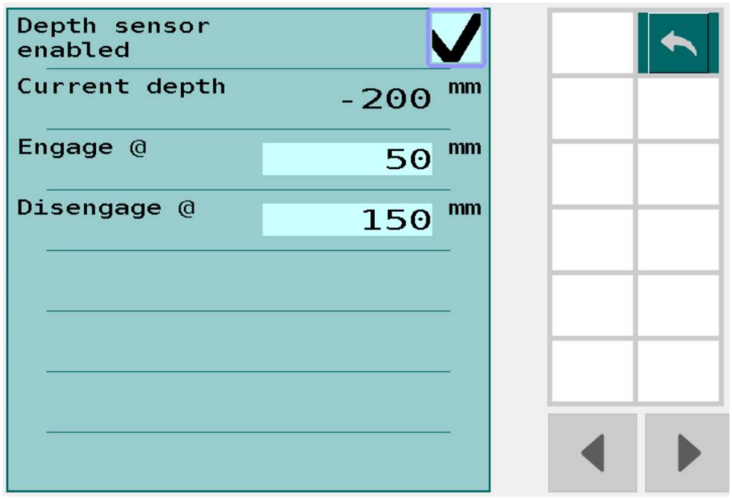
For asymmetric the side configured will show as active

Depth Sensor

The depth sensor is used to control the Run/Hold status of the seeder based on the actual implement depth. Users can set individual engage and disengage depths. This requires a installing a physical sensor on the implement.

Negative values represent distance above the ground ie. The implement is raised.

1. Engage @: Start seeding at this depth (recommended slightly higher than seeding depth)
2. Disengage @: Stop seeding depth (recommended immediately as the drill is raised)



TECU Hitch Position

ISOBUS based implementation of the Depth Sensor. Uses the tractor 3-point linkage position sensor instead of an installed sensor (compatibility depends on manufacturer).

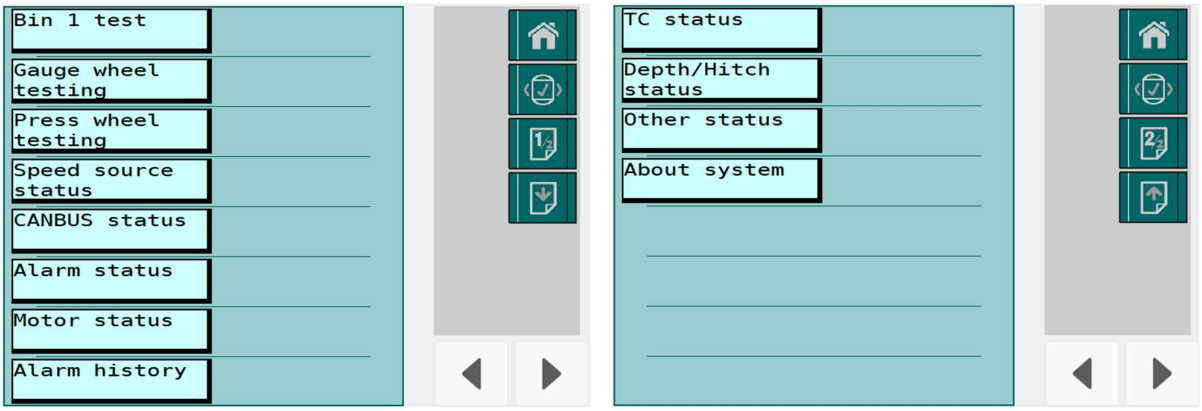
TECU Working State

ISOBUS based implementation of Run/Hold. Uses a signal from the tractor to start/stop seeding (compatibility depends on manufacturer).

Testing and Diagnostics

Provides diagnostics information, output testing, ISOBUS information and alarm details.

Press the Home button from the front screen and select **Testing and Diagnostics.**



Bin # test – Manually test and review the motor output

Gauge wheel testing – Manually test the Gauge wheel

Press wheel testing – Manually test the Press wheel

Speed Source Status – Shows the raw data from the speed sensor

CANBus Status – Check the voltage and timeout status of all connected modules

Alarm Status – Shows all alarms available and status

Motor Status – Shows live motor power statistics (% output, voltage and amps)

Alarm History – See the history of tripped alarms

TC Status – Shows if the TC controller is available and capabilities

Depth/Hitch status – Shows enabled/disabled status, and run / hold status

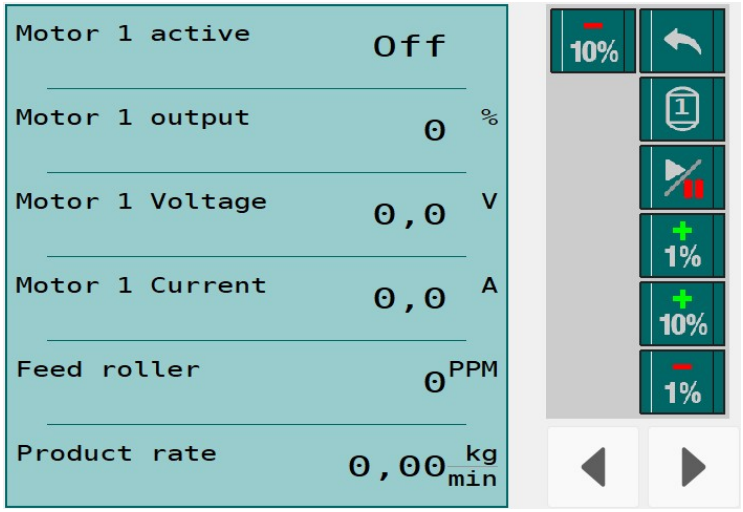
Other status – Shows load sense status

About system – Shows Software version, hardware ID, unlocks current on the POD and the ability to add an Unlock Code for extra features

Bin Motor Test

WARNING!
This will turn the motors on - ensure the environment is safe before continuing

The Bin # test allows direct output of power to the motor. This removes any control algorithm from the output and supplies the full range of output power to verify the motor is working.



The soft keys allow the operator to set the power to test on the motor drive. Pressing Run/Hold will start the motor running. This enables the operator to check power being used by the motor and check feedback status of the feed roller encoder.

Use the Soft Key above run/hold to cycle through motors on the seeder.

Gauge wheel testing

WARNING!
This will turn the gauge wheels on - ensure the environment is safe before continuing

A allows direct output of power to the Gauge wheel control system. This removes any control algorithm from the output and supplies the full range of output power to verify the output is working.

Use the same Soft Key controls as Bin Motor Test to operate Gauge wheel testing.

Press wheel testing

WARNING!
This will turn the press wheels on - ensure the environment is safe before continuing

A allows direct output of power to the Press wheel control system. This removes any control algorithm from the output and supplies the full range of output power to verify the output is working.

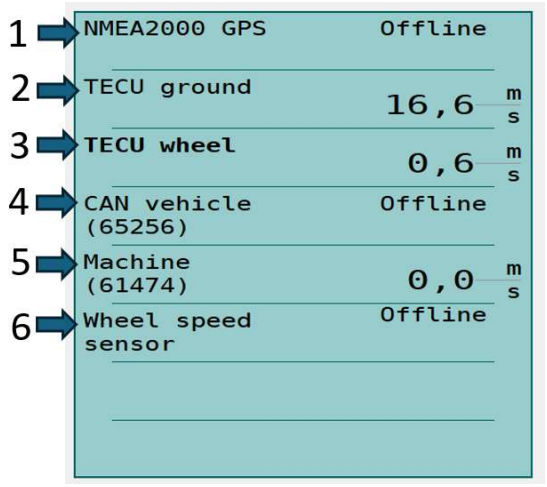
Use the same Soft Key controls as Bin Motor Test to operate Press wheel testing.

Speed Source Status

This page shows the type of speed source selected and any live data on each speed input.

The current selected source is shown in **BOLD.**

Each option will show the current speed reading or Offline if not available.

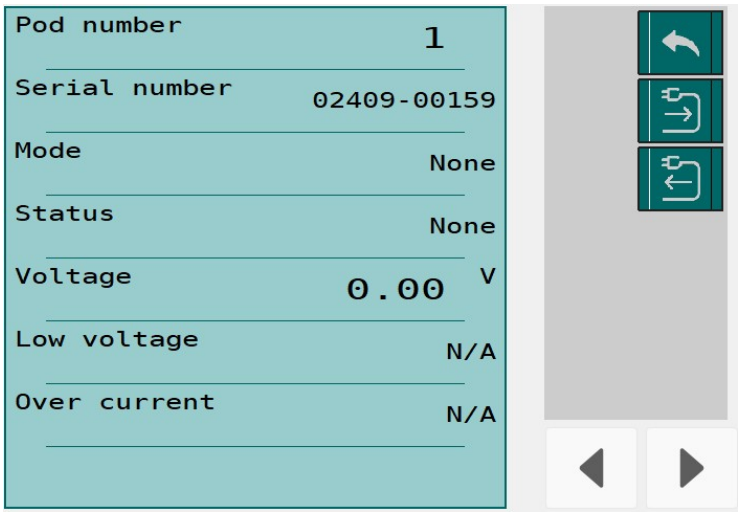


1) ISOBUS GPS
2) Tractor ECU ground speed (radar)
3) Tractor ECU wheel speed
4) CANbus message used in some GPS (eg. JD Starfire) / Implement ECU's
5) CANbus message used in some GPS / Implement ECU's
6) User installed radar or wheel speed sensor

CANBus Status

These pages show the following information for:

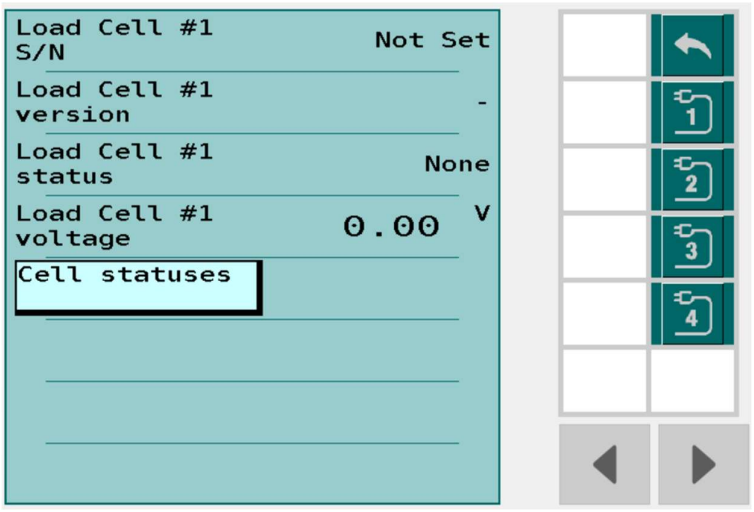
1) **Pods** – This displays the information to show the pod is connected correctly.



If more than one Pod is connected, the Soft Keys allow quick access to the other pods.

- Serial Number – Corresponds to physical label on device
- Mode – Corresponds to physical label on device
- Status – Timeout / OK
- Voltage – Live reading
- Low Current – resettable internal fuse status
- Over Current – resettable internal fuse status

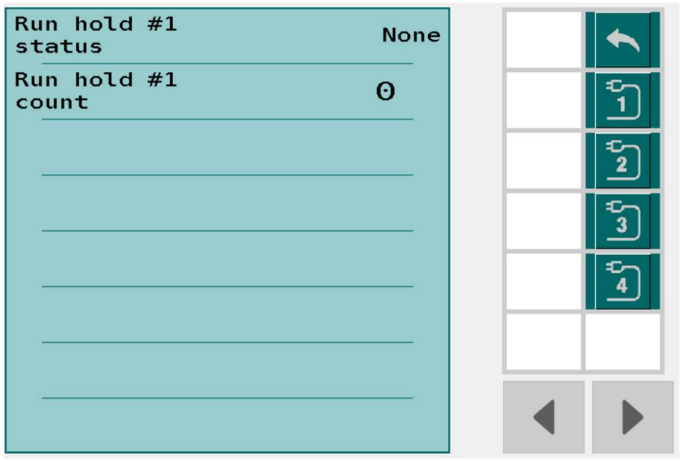
2) **Load cell** – This displays information to show the load cell is connected correctly and individual cell readings when, **Cell statuses** is pressed.



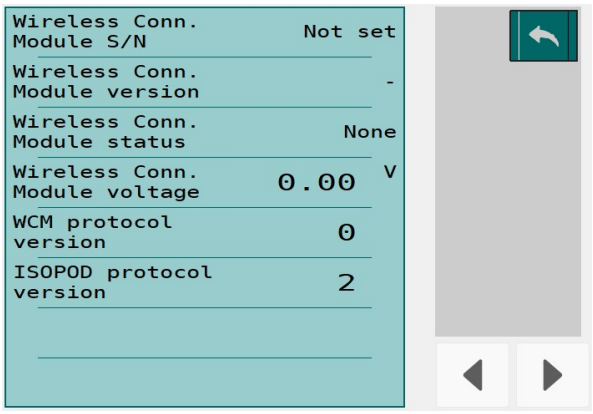
If more than one load cell is connected, the Soft Key allows quick access to the other load cell settings.

- Serial Number – Corresponds to physical label on device
- Version – Software version
- Status – Timeout / OK
- Voltage – Live reading
- Statuses – Individual cell information

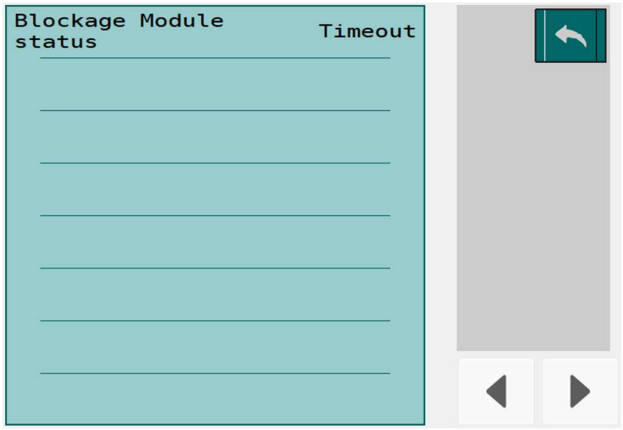
3) **Run/Hold** This page displays how many switches are connected and if they are in OK or Timeout.



4) **Wireless Conn. Module -** This displays information to if show the Wireless Control Module is connected correctly and current software version.



5) **Blockage Module -** This displays the status of a connected blockage module.



Alarm Status

These pages show all alarms configured and their status; OK, Tripped or Disabled.

Press the I (Info) Soft Key to view the raw sensor reading for each alarm.

Motor Status

This page is available when the machine is in run mode and allows the operator to see how the motor is operating to determine optimal speed range.

Alarm History

View a log of historic alarms and when they were last tripped.

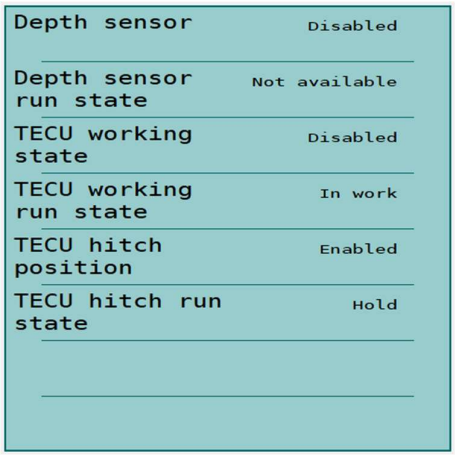
TC Status

This page shows if the Task Controller is availability and if connected.

Applicator on/off times can also be configured here. See the Task Controller section for more information.

Depth Hitch Status

This page displays the state of the following:



Depth sensor - Implement depth sensor (analogue) **Enabled/Disabled**
Depth sensor run state – status (**on / off** based on the calibration set points)
TECU working state – status if **Enabled/Disabled**
TECU working run state – Tractor's run state **In Work** (run) / **Out of Work** (hold)
TECU hitch position – status if **Enabled/Disabled**
TECU hitch run state – options of **Run/Hold/Not Available**

Other status

Displays load sense status

About System

This page shows the following information:

1) Software version
2) Build Version
3) Controller Model
4) Site ID
5) Hardware ID
6) View Unlocked Features - This allows the operator to see which software features are enabled. Also enables the operator to enter new unlock codes to enable new features

Machine Setup

Press **Machine setup** button for all non bin related machine configuration.

Alarm setup – View and edit existing alarms and add new ones.

Control setup – Configure control speeds and speed source

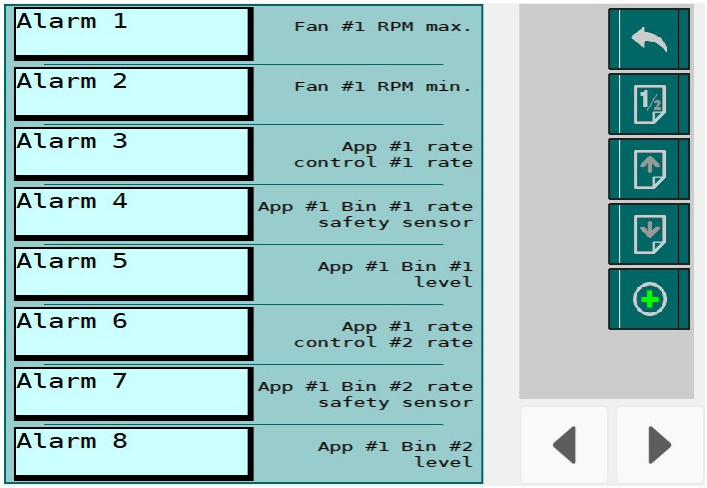
Task Controller – Enable task controller and its different functionalities

File Server – Update software and Import/export settings and log files

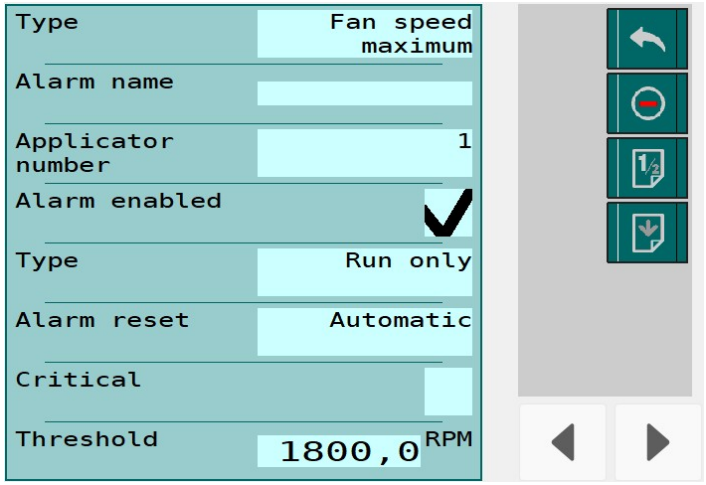
Alarm Setup

Alarms are automatically populated for the number of bins available and preconfigured by your supplier. This area allows you to tailor the alarms to your settings.

Soft Keys will allow you to add a new alarm, and cycle through pages of alarms. To delete an alarm, enter the alarm directly by selecting it.



Press any of the Alarm tiles and it will display the setup page where you can remove or modify the settings.



1) **Type:** configure what the alarm is for
2) **Alarm name:** configure a custom name for the alarm
3) **Applicator number:** select which applicator the alarm is for
4) **Bin/Tank number:** select which bin the alarm is for
5) **Alarm Enable:** enable and disable the alarm. (disabling alarms without deleting them is useful during fault finding)
6) **Type:** configure when the alarm will trip
    a. Always – alarm will always trip
    b. Run Only – system must be in run to trip
    c. Run Control Channel – system in run, and the bin must be enabled to trip

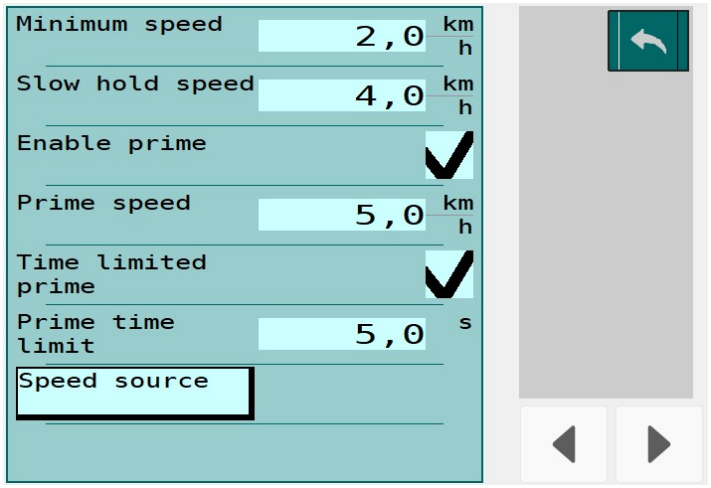
d. Control channel only – bin must be enabled to trip
e. Run and applicator – applicator must be enabled (at least 1 bin is enabled) and system is in run to trip
f. Applicator only – applicator must be enabled (at least 1 bin is enabled) to trip

7) **Alarm reset**: select if the alarm requires manual reset or is automatic
8) **Critical**: if the alarm is tripped the system will go into hold mode until the alarm is cleared
9) **Threshold**: the point the alarm will trip at
10) **Grace Period**: alarm must be in the tripped state for this period before registering to the user

Use the Red minus Soft Key if you wish to remove any alarms completely (this is not reversible).

Control Setup (Speeds)

This is where speed related machine control is configured.

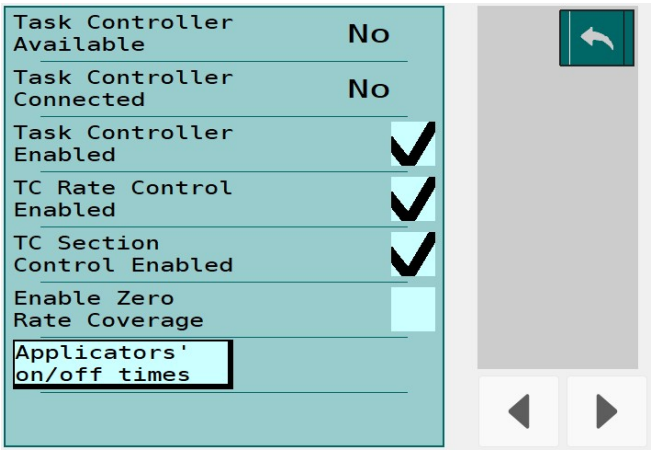


1) **Minimum speed:** the slowest operating speed for the machine. Below this speed the machine will go into **Hold** mode
2) **Slow Hold speed:** maintains the set speed whilst operating between it and the minimum speed. Once operating above the set speed the machine will operate using the actual speed
3) **Enable Prime:** allows the system to output a simulated speed. This is used to smooth operation by starting system close to target operating speed
4) **Prime Speed:** a simulated speed that the system will run at, when the **Run** button is pressed. Assumes that Enable Prime (above) has been selected
5) **Time Limited prime**: allows the system to run in prime mode for a designated time. When not ticked and prime mode is selected, this will override the actual speed signal. This can be used as a speed source if a speed sensor has failed
6) **Prime time limit:** this is duration the system will run in Prime when the **Run** button is pressed
7) **Speed source:** within this menu select speed source and view available Speed source status

Note: If at any time the Prime Speed or the Prime time are exceeded, normal control will be resumed.

Task Controller

This is where the operator can see if the Task Controller is available and select functions that are unlocked.



The user can manually disable the system from receiving Task Control messages for testing and diagnostics.

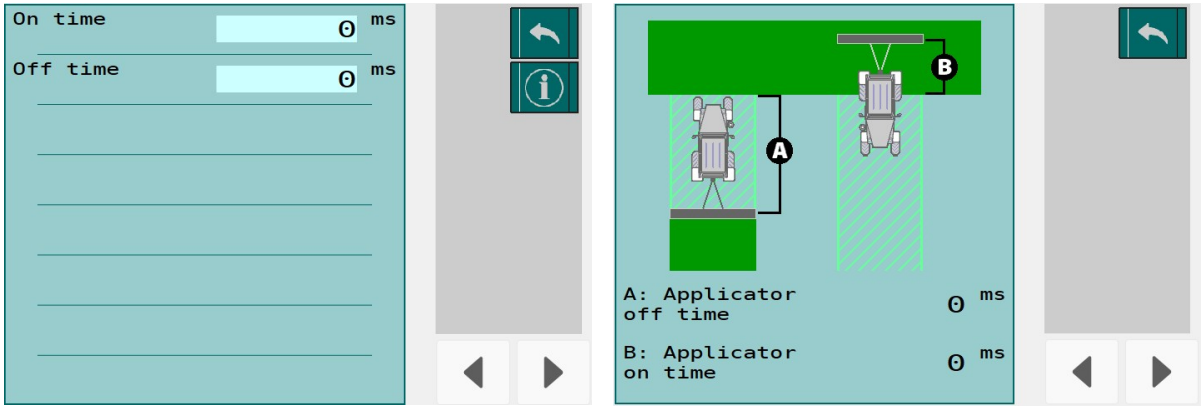
Enable Zero Rate Coverage may be required depending on manufacturer implementation. If mapping should be occurring at 0 rate, enable this feature. This can also be used for diagnosing system faults.

Applicators' on/off times

On/off times are used to account for delays between the start and stop of a product metering and it physically reaching the ground or to stop flowing.

Select an applicator to configure and then enter on and off times for more accurate product placement. Use the I (info) soft key to display the diagram to help whilst configuring.

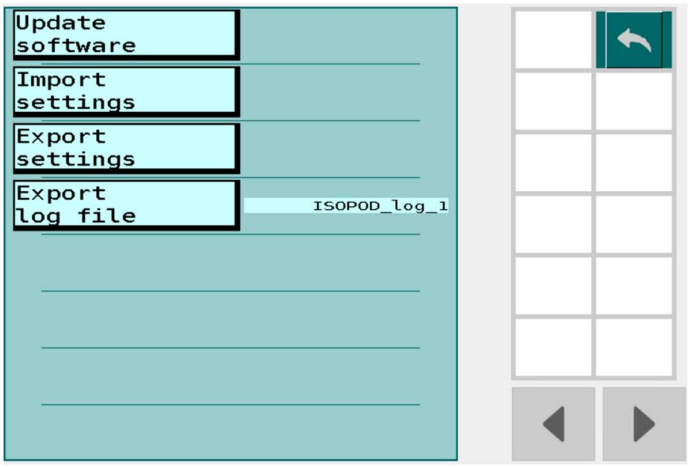
Times are saved in Milliseconds. If using seconds, multiply the value by 1000. EG. 3s would be 3000ms.



FileServer

FileServer (FS) is an ISOBUS feature used to update and provide access to USB options in terminals.

Note: Not all manufacturers support FileServer.

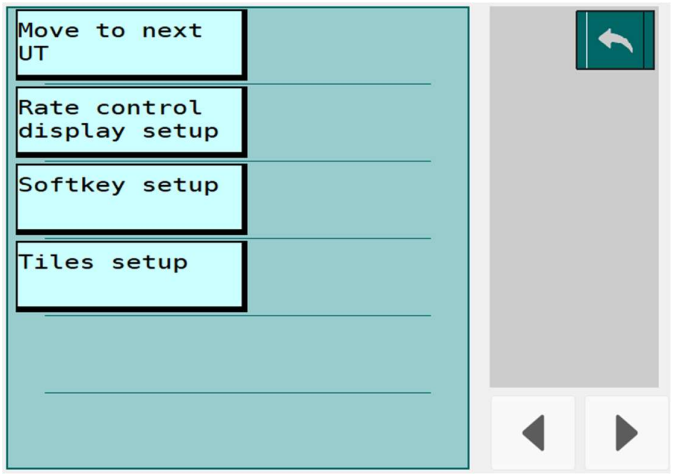


This is where you can:

1) **Update software**: by inserting USB stick (containing latest Software) into tractor screen and pressing Update Software will start the updating process
2) **Import settings**: if you have saved your setting to a USB stick, you can import them to reset the machine
3) **Export settings**: once you have setup the machine it is possible to save the settings, by exporting them to a USB stick. This is a valuable backup enabling the operator to reimport the original saved settings and regain operating status
4) **Export log file:** This is used to export files for diagnostic purposes

Display Setup

Press **Display Setup** for all the Main Operation screen configuration and to choose which VT terminal to use.



Move to next UT

Pressing the tile will move the system on to the next available UT screen (if more than 1 is available).

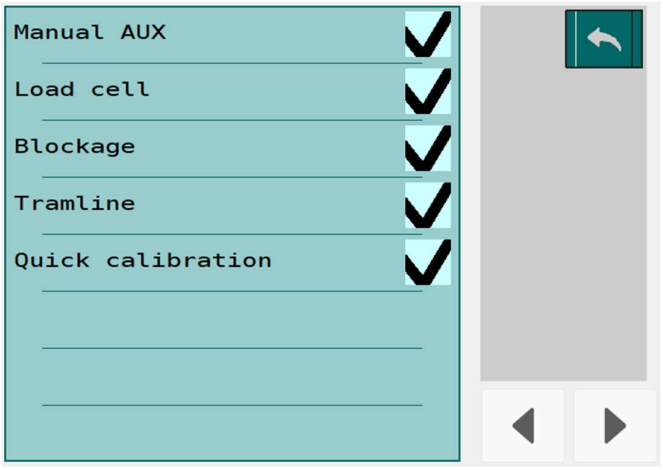
Rate control display setup

Output percentage - displays an output bar graph next to the associated bin/tank on the front screen. The graph shows how 'hard' the motor is currently working. If the bar is close to full or empty, adjustments should be made to the metering system to ensure accurate application rates.

Show demand on hold – Displays the target rate for each bin whilst in hold.

Soft Key setup

This button allows for the selection of what Soft Keys you wish to display on the main operations page. Any Soft Keys not in use can be removed here.

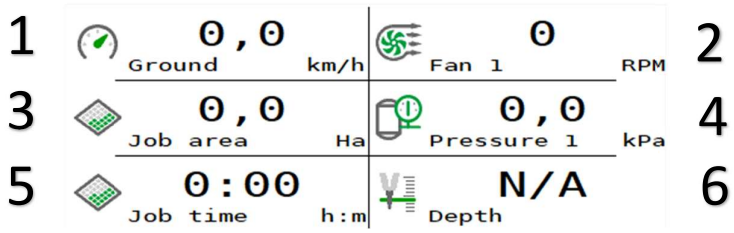


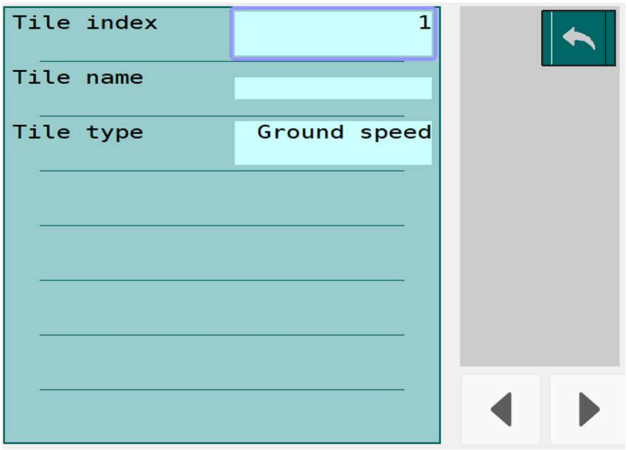
1) **Manual Aux:** ticking this option will display the Manual AUX button allowing manual hydraulic or electrical functions that you can control

2) **Load cell:** ticking this option will display the Load Cell button
3) **Blockage:** ticking this option will display the Blockage button
4) **Tramline:** ticking this option will display the Tramline button
5) **Quick Calibration:** ticking this option will display the Quick Calibration button

Tiles setup

Allows for the configuration of the 6 tiles on the Main Operation screen.





Select the tile number you wish to change using **Tile Index** then select the **Tile type** required. To rename it, select **Tile Name** and enter desired name (limit of 8 characters).

Dealer Setup

This area is for use by the commissioning dealer only and is password protected.