

# Apollo Seeder Control Operator's Manual





# **Seeder Controller Operator Manual**

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For use with Software Version 4.04

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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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# Chapter 1 – Introduction

The Seeder Controller is used with the X35, X30 or X25 console. Refer also to the Guidance and Auto Steering Operator Manual supplied with the console.

**Note:** The X35 and X30 console can control a maximum of eight tanks, and the X25 console a maximum of four.

The Seeder Controller allows better control of the amount of product being applied to a field. Once set up, it adjusts the discharge rate according to vehicle speed and the section being covered to maintain the preset application rate. This provides more accurate use of a product over the specified areas.

Auto Section Control minimizes wastage, turning sections of the seeder on and off and varying rates as the equipment passes through the defined areas. The system turns sections on when it detects areas that have not been covered and it turns sections off when it detects areas that have already been covered.

Variable Rate Control presets the different application rates for particular fields, using a VRC prescription map (Shapefile or ISOXML file format). It automatically adjusts the application rate for different zones as the implement moves through the mapped areas.

Once set up, Seeder Control, Auto Section Control and Variable Rate Control can be enabled and disabled through the console.

**Note:** Regional information such as time and product measurement

units can be set by selecting **User**  / **Region**  from the Setup screen. Refer to the Guidance and Auto Steering Manual.

## 1.1. Switching between setup and operation screen

# 1.1. Switching between setup and operation screen

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



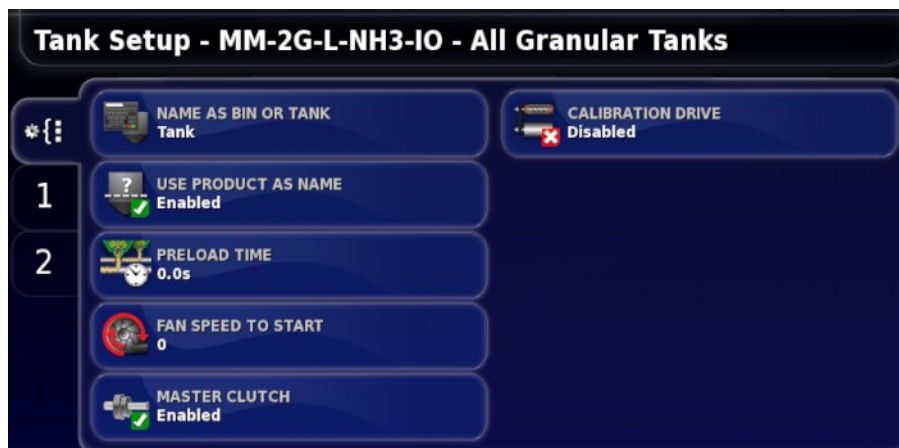
Use the highlighted buttons to switch between the screens.

## 1.2. Using setup screen features

### 1.2.1. Setup screens with multiple booms/tanks

Where setup screens show a number of tabs on the left side, the top tab generally displays settings that are relevant for all booms or tanks/bins. The tabs below that display settings for individual booms or tanks/bins.

Select one of the numbered tabs on the left hand side of the screen to change individual boom or tank/bin settings.



## 1.2. Using setup screen features

### 1.2.2. Select column in tables

A number of setup screens contain tables with a column labeled **Select** on the right hand side.



The screenshot shows a software interface titled "Sensor Setup - BSEEDER". On the left, there is a panel for "IO ECU" with the value "Apollo EM-24 1". To the right is a table with the following columns: "Sensor", "Type", and "Select". The "Select" column contains green checkmarks for all rows. The table data is as follows:

IO ECU	Sensor	Type	Select
Apollo EM-24 1	----	40/40	✓
	Sensor 1	Granular Section Sense	✓
	Sensor 2	Granular Section Sense	✓
	Sensor 3	Granular Section Sense	✓
	Sensor 4	Granular Section Sense	✓
	Sensor 5	Blocked Head Sense	✓
	Sensor 6	Blocked Head Sense	✓
	Sensor 7	Blocked Head Sense	✓
	Sensor 8	Blocked Head Sense	✓
	Sensor 9	Blocked Head Sense	✓

This column may be used to enter the same value into multiple rows of the table without having to enter the value multiple times.

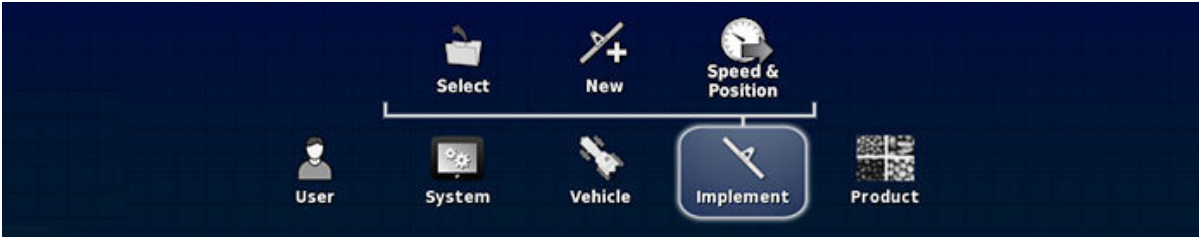
1. Select the **Select** column cells to ensure that all rows to have the same value are shown with a green tick enabled.
2. Select the cell in the top row of the column for which the value is being set and enter the required value.

All rows that were ticked will now have that value entered.

# Chapter 2 – Implement Setup

This chapter explains how to setup and load profile information for the seeder implement.

The Implement menu option displays the following menu items when no implements have been created.



- **Select:** Select to import a previously created implement profile from a USB.
- **New:** Create a new implement profile using a custom profile or a pre-installed manufacturer’s profile.
- **Speed & Position:** Sends vehicle speed information to the ISOBUS implement for performing rate control or other functions. It outputs speed information on ISO and/or NMEA2000 bus to the ECU.

If a seeder implement has previously been created, the following menu is displayed.



## 2.1. Selecting a saved implement

Selects an implement from a previously defined list of implement profiles. This is blank when the console is first used.

Once an implement is selected, the console will restart.

To select an existing implement:

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



The currently selected implement is shown with a green tick.

2. Highlight the required implement and confirm, or:






Select to import an implement profile from a USB.



Select to create a copy of the highlighted implement. This profile may then be edited.

## 2.2. Creating a factory implement

Selects an implement template from a pre-defined list.

1. Select **Implement**  / **New**  / **Factory**  .
2. Select **Seeders** and confirm.
3. Select the implement manufacturer.
4. Select the implement model.
5. Select the required implement profile and confirm.  
A message displays stating that the ECU type and drill template must be selected.
6. Select the **ECU Type** from the drop down list and confirm the message.
7. Select the drill manufacturer or **Other** if the drill manufacturer is not shown and confirm. If **Other** is selected, go to step 10.
8. Select the drill model number and confirm.
9. Select the required drill profile and confirm.
10. Select **IMPLEMENT NAME** to change the default name, if required, and confirm.

The console will restart. After restarting, the ECU settings display. The settings displayed will vary depending on the implement that has been selected. **Note:** If an Apollo ECU is installed, refer to Add/replace ECU, page 16 for the next step.




## 2.3. Creating a custom implement

Creates a new custom implement profile for the attached implement.

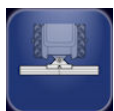
**Note:** Select **Custom** if your exact implement is not listed in the factory templates.

### 2.3.1. IB-1 ISO Bridge

To create a new implement profile using the IB-1:

1. Select **Implement**  / **New**  / **Custom** .
2. Use the arrows to select new implement type and confirm.

Type can be:



rigid



pivoted (tow behind)



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.

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

The New Implement Setup wizard displays.

4. Select **IMPLEMENT CONTROL**.

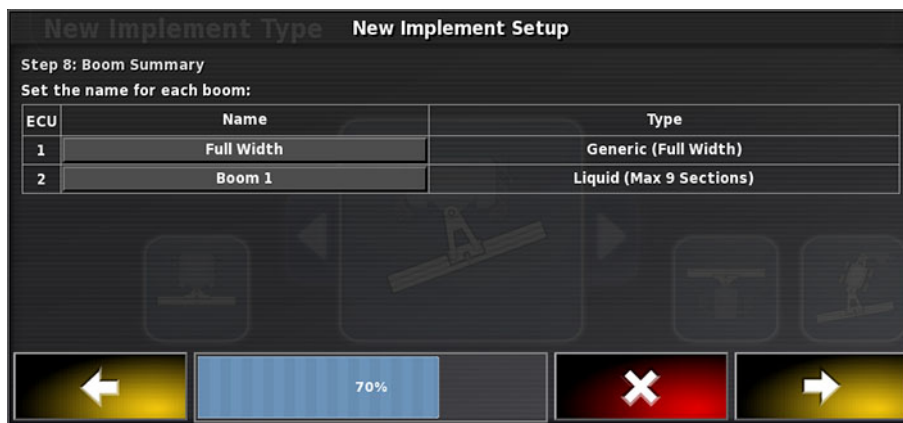
Implement control options:



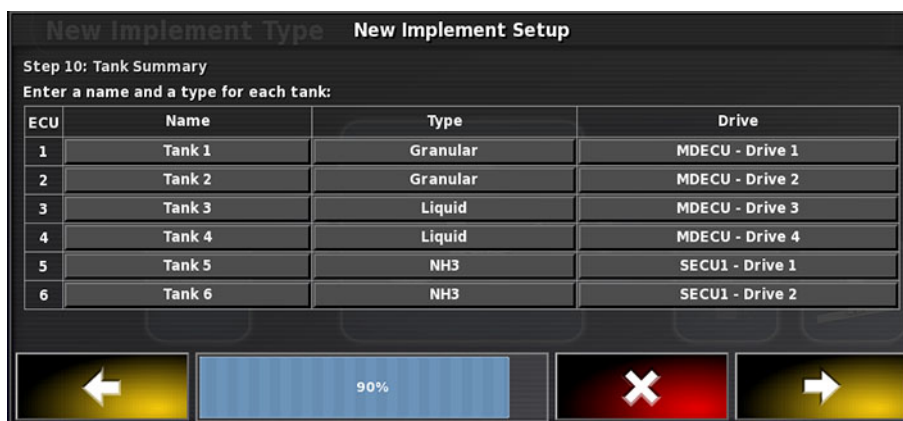
- **None:** No implement at all.
  - **Section Control Only:** For controlling auto section only, no rate control.
  - **Section Control and Rate Control:** For controlling both auto section controls and rate control.
  - **Rate Control Only:** For controlling rate only, no multi section control. Full width can still be controlled.
  - **Scraper Control:** Not applicable for seeder.
5. Select **Section Control and Rate Control** or **Rate Control Only**, confirm and select next.
  6. Select **ECU TYPE** and select **IB-1**, confirm and select next.
  7. **Seeder** is the only option for **IMPLEMENT FUNCTION**, select next.
  8. Select **ECU CONFIGURATION**.  
ECU configuration options:
    - **One MDECU:** Supports up to 4 control channels.
    - **Two MDECUs:** Supports up to 8 control channels.
    - **One MDECU and one SECU:** Supports up to 6 control channels and allows sectional control up to 9 granular and 9 liquid sections.
    - **One MDECU and two SECUs:** Supports up to 8 control channels and allows sectional control up to 2 granular and 2 liquid booms of 9 sections each.
    - **One MDECU and one 30S ECU:** Supports up to 6 control channels and allows sectional control up to 9 granular and 9 liquid sections.
  9. Select the required ECU configuration, confirm and select next.
  10. Select **SEEDER MANUFACTURER** and select the manufacturer from the list. If your manufacturer is not listed, select **Other**, confirm and select next.

## 2.3. Creating a custom implement

11. Set **NUMBER OF GRANULAR BOOMS**. Set to 0 if not using granular section control.
12. Set **NUMBER OF LIQUID/NH3 BOOMS**. Set to 0 if not using liquid or NH3 section control, select next.
13. Set **NUMBER OF FANS** and select next.
14. Rename the boom, if required, by selecting the boom under **Name**, then select next.



15. Set **NUMBER OF TANKS**, then select next.



16. Rename tank, if required, by selecting the tank under **Name**.
17. Select the product type for each tank by selecting **Type**.
  - **Granular** (default)
  - **Liquid**
  - **NH3**
18. Select the ECU drive for each tank by selecting **Drive**.
  - The first four tanks are controlled by MDECU, and others

depend on the ECU configuration.

- Select **No Drive** for the tanks where no metering is installed.

The available ECUs are dependent on the ECUs that have been configured.

19. Select next.



20. Select confirm to save the configuration.




The console restarts and the ECU setup screen is displayed.

The screenshot shows a screen titled 'ECU Setup (IB-1) - IB1-2 (Seeder)'. It has two main buttons: 'REFRESH ECU SETTINGS' (with a refresh icon) and 'EDIT IMPLEMENT SETUP' (with a gear icon). Below these is a table with the following data:

Tank	Name	Type	ECU Name	Firmware Version
1	Tank 1	Granular	MDECU - Drive 1	1.01.01
2	Tank 2	Granular	MDECU - Drive 2	1.01.01
3	Tank 3	Liquid	MDECU - Drive 3	1.01.01
4	Tank 4	Liquid	MDECU - Drive 4	1.01.01
5	Tank 5	NH3	SECU1 - Drive 1	1.01.01
6	Tank 6	NH3	SECU1 - Drive 2	1.01.01

### 2.3.2. Apollo ECU

To create a new implement using the Apollo ECU:

1. Select **Implement**  / **New**  / **Custom** .
2. Use the arrows to select new implement type and confirm.

Type can be:

## 2.3. Creating a custom implement



rigid



pivoted (tow behind)



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.

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

The New Implement Setup wizard displays.

4. Select **IMPLEMENT CONTROL**.

Implement control options:

- **None:** No implement at all.
- **Section Control Only:** For controlling auto section only, no rate control.
- **Section Control and Rate Control:** For controlling both auto sectional controls and performing rate control.
- **Rate Control Only:** For controlling rate only, no multi section control. Full width can still be controlled.
- **Scraper Control:** Not applicable for seeder.

5. Select **Section Control and Rate Control** or **Rate Control Only**, confirm and select next.

6. Select **ECU TYPE**, select **Apollo**, confirm and select next.

7. Select **IMPLEMENT FUNCTION** and select **Seeder**, then select next.

Each Apollo CM-40 (master) ECU can control up to 4 tanks, and the EM-24 (IO) ECU can control up to 24 one wire, or 12 two wire sections. Each boom can have a maximum of 12 sections.

8. Ensure that only the Apollo CM-40 ECU is connected to the CAN bus and all other ECUs are disconnected, then select next.

**Note:** The ECUs can be disconnected by removing the ECU Power or Comms connector.


The system will try to detect a connected Apollo CM-40 ECU. If not successful, check that the Apollo CM-40 ECU is connected and that no other ECUs are connected.



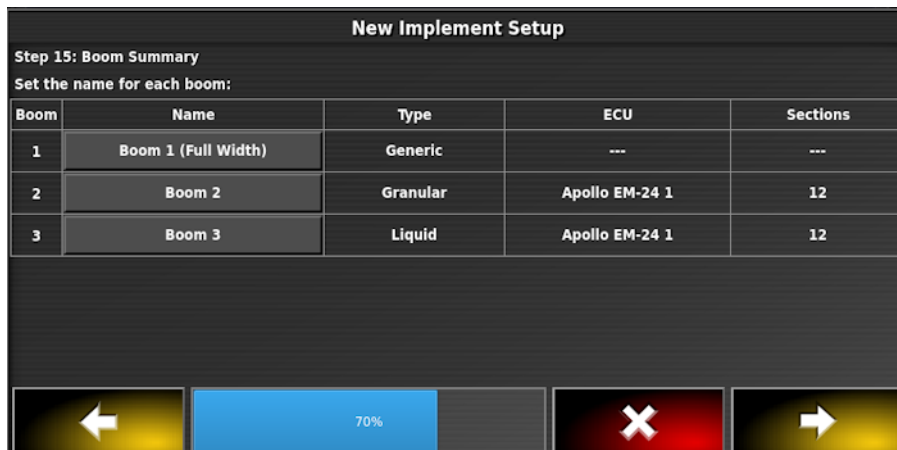
9. Once the Apollo CM-40 ECU is detected, select next.  
A summary of detected ECUs is displayed.



### 2.3. Creating a custom implement

To add secondary ECUs, select **Add another ECU**  and follow the steps as prompted. Note that it is not necessary to disconnect ECUs that have already been detected when adding extra ECUs.

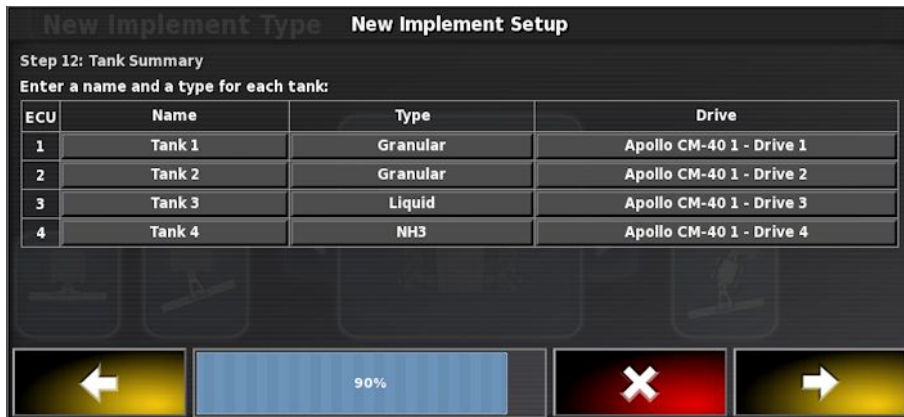
10. When all secondary ECUs are detected, select next.
11. Select **SEEDER MANUFACTURER** and select the manufacturer from the list. If your manufacturer is not listed, select **Other**, confirm and select next.
12. Set **NUMBER OF GRANULAR BOOMS**. Set to 0 if not using granular section control.
13. Set **NUMBER OF LIQUID/NH3 BOOMS**. Set to 0 if not using liquid or NH3 section control, select next.
14. Set **GRANULAR SECTION RELAY MODE**.  
Defines whether a single output or two outputs are being used to turn a section on.
15. Set **2 WIRE MODE**:
  - **Opposing**: One wire is at 12 V and the other is at 0 V to turn a section on, the voltages are flipped to turn a section off.
  - **Ganged**: Both wires are at 12 V or 0 V.
16. Set **NUMBER OF FANS** and select next.
17. Rename the boom, if required, by selecting the boom under **Name**, then select the ECU that will be used to operate the sections for each boom under **ECU**, then select next.



New Implement Setup				
Step 15: Boom Summary				
Set the name for each boom:				
Boom	Name	Type	ECU	Sections
1	Boom 1 (Full Width)	Generic	---	---
2	Boom 2	Granular	Apollo EM-24 1	12
3	Boom 3	Liquid	Apollo EM-24 1	12

Navigation buttons: Left arrow, 70% progress bar, Cancel (X), Right arrow.

18. Set **NUMBER OF TANKS**, then select next.



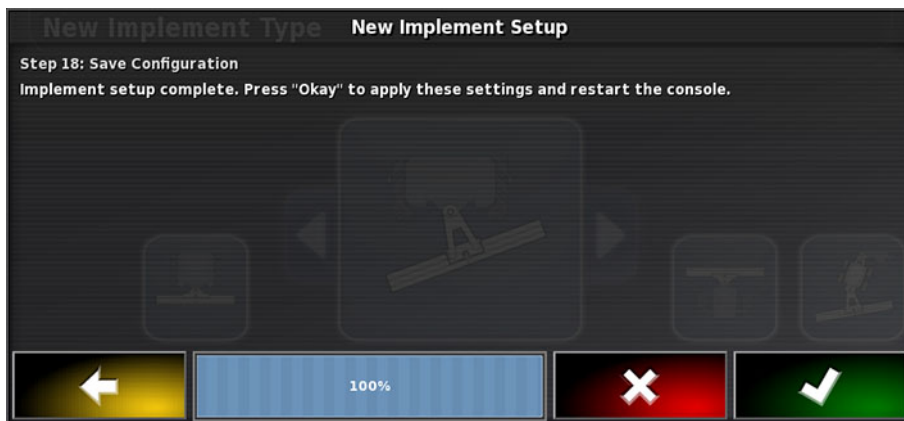
19. Rename the tanks, if required, by selecting the tank under **Name**.

20. Select product type for each tank by selecting **Type**.

- **Granular** (default)
- **Liquid**
- **NH3**

21. Select ECU drive for each tank by selecting **Drive**.

22. Select next.



23. Select confirm to save the configuration.

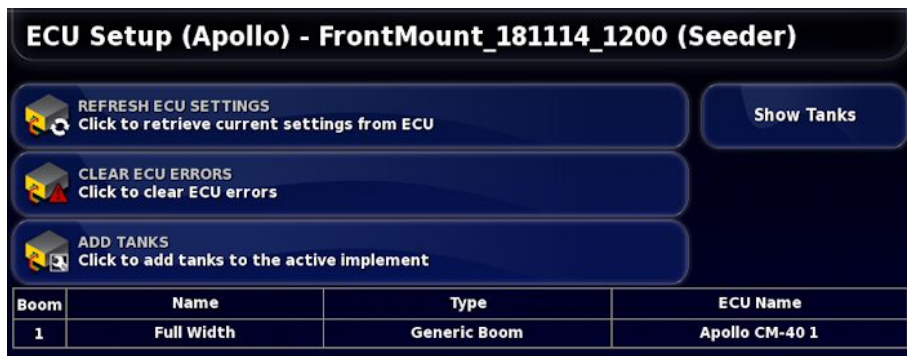
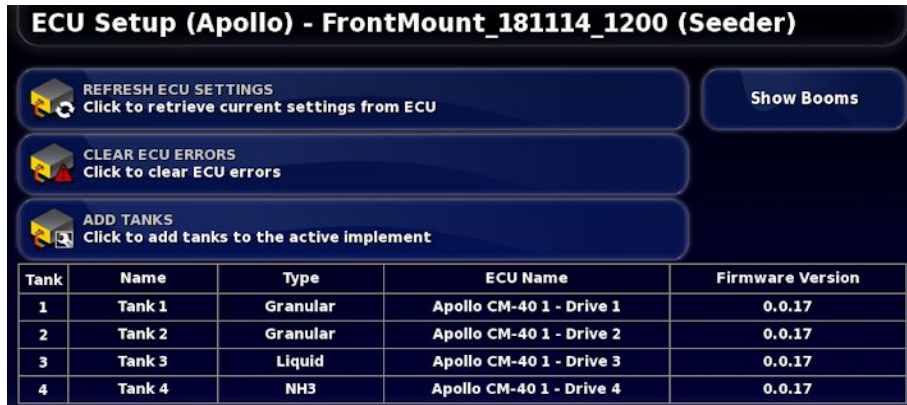
The console restarts and the ECU setup screen is displayed.

### 2.3.3. ECU setup

**Note:** The following ECU setup screens are only displayed for an Apollo ECU installation.

1. Select **Implement**  / **ECU**  / **Setup**  .

### 2.3. Creating a custom implement



- **Refresh ECU Settings:** Used to reload task controller / resynchronize ECU. This option should only be used if instructed to do so by a service technician.
- **Clear ECU Errors:** Used to clear the error if an ECU error displays.
- **Add tanks:** Used to add tanks to the selected implement.
- **Show Booms / Show Tanks** button: Used to switch between the tanks and booms display.

**Note:** On the booms display, if the boom **Type** is shown as **Generic Boom**, this is a full width boom (section control is not possible). The product type may be granular, liquid or NH3.

#### 2.3.4. Add/replace ECU

1. Select **Implement**  / **ECU**  / **Manage**  .



Add/Replace ECU (Apollo) - FrontMount_181114_1200					
 ADD NEW ECUS Click to add new ECUs					
ECU	ECU Name	ECU Type	ECU ISO Name	Firmware version	Status
1	Apollo CM-40 1	Apollo CM-40	a00880081cf87ee5	2.11-r3,0.0.17	Aux CPU Enabled




- **Add New ECUs:** Used to add a new slave or EM-24 ECU after the implement has been created. Selecting this option starts the Add New ECUs wizard.

**Note:** If an implement has been created using the Factory option (refer to Creating a factory implement, page 7), ECUs must be detected to assign the correct ECU ISO Name.

To detect ECUs:

1. Select the button in the **Status** column for the CM-40 ECU and select **Replace CM-40**.  
The console will restart after going through the detection wizard.
2. Select the button in the **Status** column for all other ECUs and select **Replace**. The console will not restart for EM-24 ECUs.

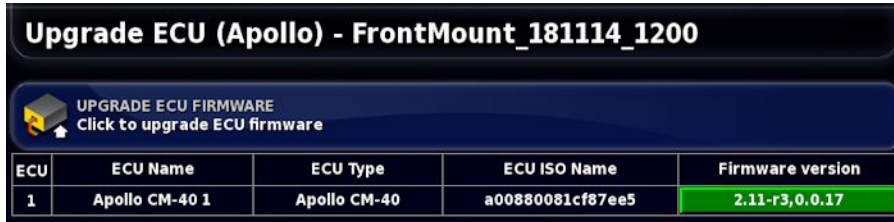
### 2.3.5. Disable / Replace / Unassign / Remove ECUs

1. Select **Implement**  / **ECU**  / **Manage**  .
2. Select the button in the **Status** column.
  - **Disable:** Useful if the ECU is not currently required, or if it has failed (to prevent alarms being triggered).
  - **Replace:** Assign an ECU to a newly created implement profile.
  - **Unassign:** Unassign an ECU from an implement profile. The console will restart if the Apollo master (CM-40 1) is unassigned. The ECU can now be 'replaced'.
  - **Remove:** Completely remove the ECU from the implement profile. The Apollo master (CM-40 1) cannot be removed.

## 2.3. Creating a custom implement

### 2.3.6. Upgrade ECUs

1. Select **Implement**  / **ECU**  / **Upgrade**  .



ECU	ECU Name	ECU Type	ECU ISO Name	Firmware version
1	Apollo CM-40 1	Apollo CM-40	a00880081cf87ee5	2.11-r3,0.0.17

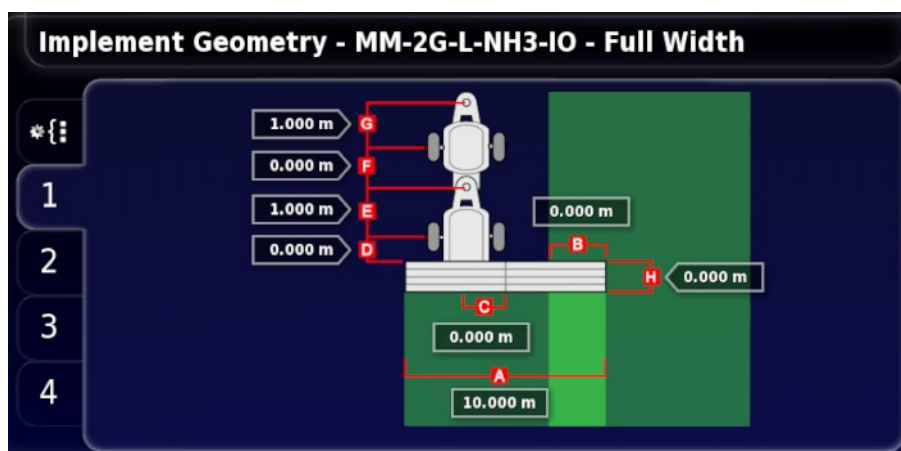
This screen is used to update firmware on the ECUs. It should only be used if instructed to do so by a service technician. Refer to Updating Apollo ECU firmware, page 143 for details.

## 2.4. Setting the implement geometry

To set the implement geometry:

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

**Note:** If the implement has multiple booms, the boom that is to be used for guidance must be selected from the **BOOM FOR GUIDANCE** selection list (on the top tab) and the implement geometry must be set for each boom on the numbered tabs.



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

**Note:** Measure the implement dimensions as accurately as possible as these measurements will affect the modelling, mapping and GPS based product placement. The recommended tolerance is +/- 5 cm.

3. Add or adjust dimensions where required and confirm.

The following dimensions are used in the system. The dimensions displayed vary, depending on the type of implement:

- **Swath width (A):** Measures the working width of the implement (that is, the width of the area that is treated during one pass of the implement).
- **Overlap (B):** Measures the width of the overlap between two adjacent rows.

## 2.4. Setting the implement geometry

- **Inline offset (C):** 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.
- **Implement wheels offset (D):** Measures the distance from the back of the bar/drill to the front of the bar/drill. **Note:** For correct product placement, please ensure this is entered as a negative number.
- **Implement offset (E):** Measures the distance from the hitch point to the back of the bar/drill.
- **Trailer wheels offset (F):** Measures the distance between the implement hitch point and the trailer wheels. (For dual axle air carts, F and G should be measured to the center point between the two axles.) **Note:** This dimension is only shown for double pivot implements.
- **Trailer offset (G):** Measures the distance between the trailer hitch point on the vehicle and the trailer wheels. **Note:** This dimension is only shown for double pivot implements.
- **Working length (H):** Distance from the back of the bar/drill to the front of the bar/drill. **Note:** This must be a positive number.

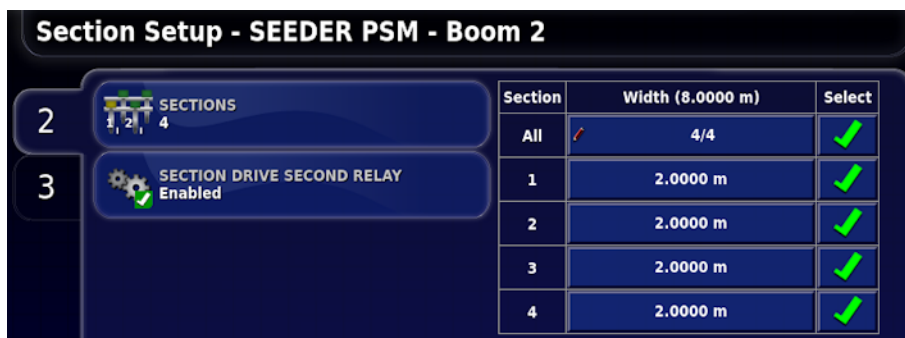
## 2.5. Setting up section control

Section control settings are only available if using multiple section control.

### 2.5.1. Setting sections

To set the sections:

1. Select **Implement**  / **Section Control**  / **Sections** .



2. Select **SECTIONS** and use plus or minus to set the number of sections, then confirm.
3. To set the section width for all sections, select **Width** next to **All**. Alternatively, different widths may be set for each section.
4. To set different widths for sections, select **Width** next to a section, enter the width and confirm.

**Note:** The **Select** column may be used to select a number of sections with the same width and then enter that width by selecting **Width** next to **All**.

5. For liquid booms, enter the number of nozzles for each section.
6. Repeat this procedure for each boom displayed.

**Note:** **SECTION DRIVE SECOND RELAY** is used to disable the second output in a pair if **GRANULAR SECTION RELAY MODE** was set to **2 WIRE** when creating the implement. See **Set GRANULAR SECTION RELAY MODE.**, page 14.

### 2.5.2. 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.

The tabs on the left correspond to the order of any multi-section booms created.

**Note:** Response time for liquids will generally be the same for all sections. Response times for granular products may vary by approximately one to two seconds (as product for the inner sections has less distance to travel). Response times for granular sections should be calculated individually to ensure correct product application.

To calculate the response times:

1. Ensure the implement is ready to begin product application and that the calibration factor for the product has been calculated (refer to Calibration, page 103).
2. Turn off the section to have the time calculated, turn all other sections on.
3. Turn the master on and ensure product is being dispensed.
4. Use a stop watch to time the delay between switching the section on and the application of product through that section. This is the **On Time** for that section.
5. 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 enter the response times:

1. Select **Implement**  / **Section Control**  / **Timing**  .



- **Custom Settings:** All booms are setup individually.
- **Use Settings from Boom 2:** All booms are set using settings from boom 2. Settings can only be changed via boom 2 (note the number of booms will vary depending on initial implement setup).

Section	On Time	Off Time	Select
All	2/2	2/2	✓
1	0.1 s	0.1 s	✓
2	0.1 s	0.1 s	✓

- **On Time:** Select to set how many seconds delay there is between switching a section on and the application of product.
- **Off Time:** Select to set how many seconds delay there is between switching a section off and product flow stopping.

### 2.5.3. Setting up the section switch

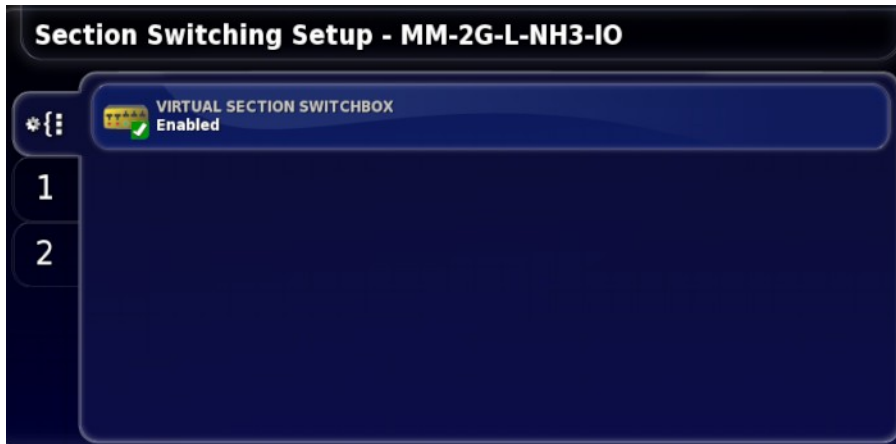
The virtual section switchbox is displayed on the operation screen and enables manual control of sections. Refer to Status monitoring panel, page 94.

To setup the section switch:

1. Select **Implement**  / **Section Control**  / **Section Switch**



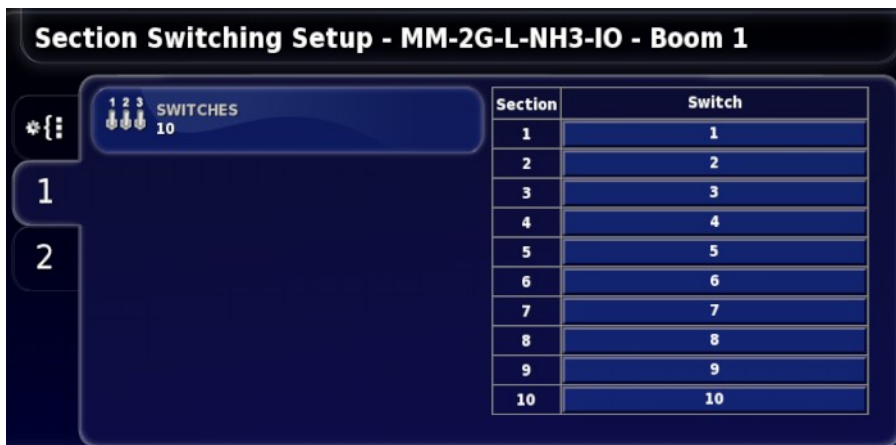
## 2.5. Setting up section control



2. Select **VIRTUAL SECTION SWITCHBOX** and enable to allow the configuration of a virtual switchbox.

**Note:** Disabling the virtual section switchbox changes it from a control to an indicator of section status, but does not remove it from the operation screen.

The following settings appear for each boom.



**SWITCHES** on the left is used to set how many section switches are available. This may be a different number to the total sections entered in **Implement / Section Control / Sections**, but cannot be greater than the number of sections.

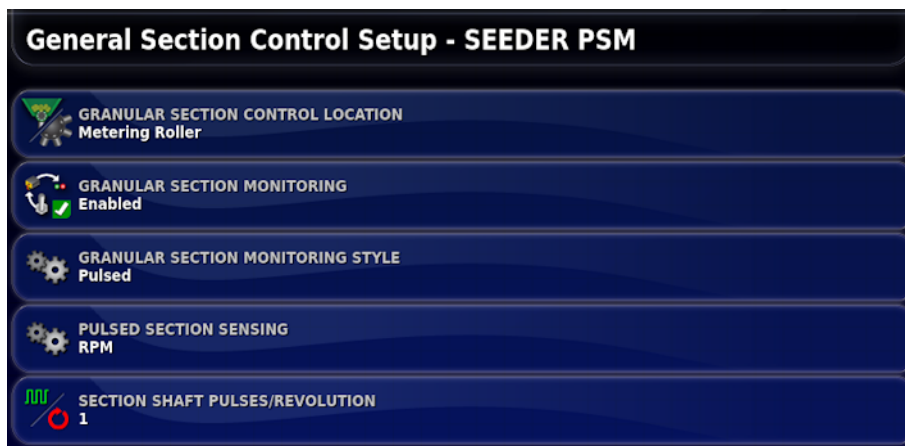
The table on the right is used to determine which switch controls which section. Assign the required switch to each section.

### 2.5.4. Setting general settings

To setup the general settings:



1. Select **Implement**  / **Section Control**  / **General**  .



The following options are available:

- **Granular section control location:**
  - **Metering Roller:** Use when granular section control is controlled by individual metering rollers being turned off and on.
  - **Distribution Head:** Use when granular section control is controlled by a system that uses individual distribution heads being opened and closed. Select this option if using a Bourgault seeder.
- **Granular section monitoring:** This provides a sensor to check that when a section is supposed to be on, that it is physically mechanically engaged. The sensors may be switched or pulse type sensors. An alarm is triggered if a section is not active when it should be.
- **Granular section monitoring style:** Selects the type of sensor used for monitoring section state.
  - **Switched:** An on / off limit switch.
  - **Pulsed:** Monitors rotating gears for each section.
- **Pulsed section sensing:**
  - **RPM:** Section shaft must rotate at the correct RPM for the section to be considered on.
  - **Movement:** Any movement of the section shaft indicates the section is on.

## 2.5. Setting up section control

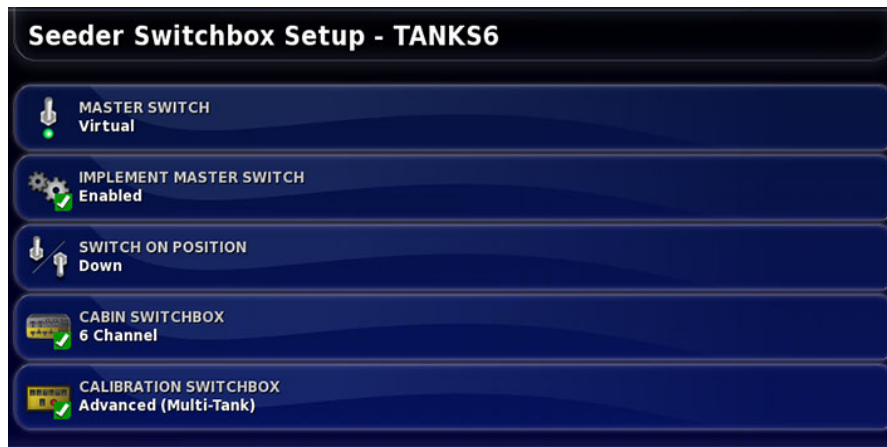
- **Section shaft pulses / revolution:** The number of pulses detected by the sensor for each revolution of the section shaft

## 2.6. Setting up the operator inputs

### 2.6.1. IB-1 ISO Bridge switchbox setup

To set up the switchbox:

1. Select **Implement**  / **Operator Inputs**  .



The following options are available:

- **Master switch:**
  - **Virtual:** Master switch to be controlled from the console screen.
  - **External Console Input:** Enables the master switch to be operated via an external switch (a physical switch box / master switch connected to the console).
  - **IB -1:** Use if an IB-1 switch is in use and connected to IB-1 harness.
  - **Cabin switchbox:** Use this selection if a cabin switchbox is connected, and you want to use the master switch on the switchbox. This option is only available if cabin switchbox is enabled below.
  - **Implement:** Use this selection if you want the implement to turn on the master switch when lowered (for example; whisker switch).
- **Implement master switch:** Enable if a tillage/whisker switch fitted. This option is not available if **Implement** is selected as the **Master Switch**. Note that this option requires the primary master to be on AND the implement to be lowered to start the seeding process.

## 2.6. Setting up the operator inputs

- **Switch on position:** Set up or down to select which position represents product ON for the cabin switchbox.
- **Cabin switchbox:** Enable to allow an alternative means of controlling seeder, where fitted. Select the switchbox type. When enabled, the cabin switchbox will control tanks and master switch.



6 channel switchbox (AGA4823)



4 channel switchbox (A1267)

- **Calibration switchbox:** Enable to use a calibration switchbox to calibrate granular tanks. Select the switchbox type.



Run/Stop switchbox (A1771)

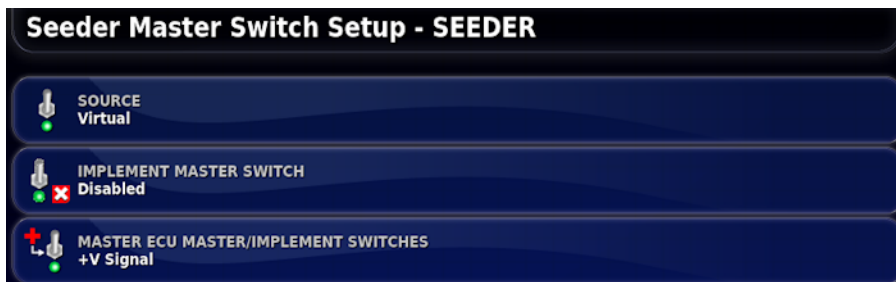


Multi-Tank switchbox (AGA4719)

### 2.6.2. Apollo master switch setup

To set up the master switch:

1. Select **Implement** / **Operator Inputs** / **Master Switch**



The following options are available:

- **Source:**
  - **Virtual:** Master switch to be controlled from the console screen.
  - **External Console Input:** Use if an external console switch is in use and connected to the console harness.
  - **Apollo CM-40:** Use if Apollo CM-40 ECU switch is in use and connected to the Apollo harness.
  - **Implement:** Use this selection if you want the implement to turn on the master switch when lowered (for example; whisker switch).
  - **Keypad:** Master switch to be controlled via an external keypad. (This option is only visible if a keypad is connected.)
  - **Keypad and virtual:** Master switch to be controlled from the console screen and an external keypad. (This option is only visible if a keypad is connected.)
- **Implement master switch:** Enable if a tillage/wisker switch fitted. This option is not available if **Implement** is selected as the **Master Switch**.
- **Master ECU master/implement switches:** Indicates whether the master switch input is activated by positive or zero volts. Refer to manufacturer's documentation.

### 2.6.3. Keypad setup

The keypad is an external device that may be used in the cabin and/or on the seeder frame to control selected functions. This option is only available with Apollo ECU. Refer to External keypad operation, page 97 for more information.

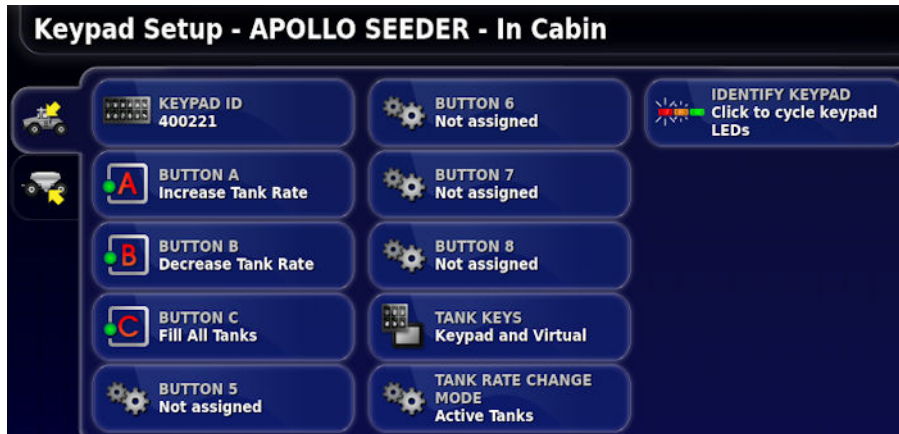


To setup the keypad:

## 2.6. Setting up the operator inputs




### 1. Select **Implement** / **Operator inputs** / **Keypad**

The tabs on the left switch between the 'in cabin' and 'on frame' keypads setup screens.








- **Keypad ID:** If more than one keypad is installed, this selects which keypad is installed in the cabin and which is on the frame (the screen title displays which keypad is being currently setup).
- **Identify keypad:** This setting is used to identify which keypad is installed in the cabin and which is installed on the seeder frame. When selected, the LEDs on that keypad flash.

#### In cabin

- **Button A to C and unused numbered buttons:**
  - **Lift control:**  If drill control is fitted and enabled, this option lifts or lowers the drill (see Drill control, page 76).
  - **Drill liftrack master:** Enable to make the drill master follow the state of the master switch (master off will raise the drill).
  - **Increase pack control value:**  If pack force sensor is fitted and enabled, this option performs the same function as pressing the plus button on the pack control mini-view or Status Monitoring panel (see Drill control, page 76).
  - **Decrease pack control value:**  If pack force sensor is fitted and enabled, this option performs the same function as pressing

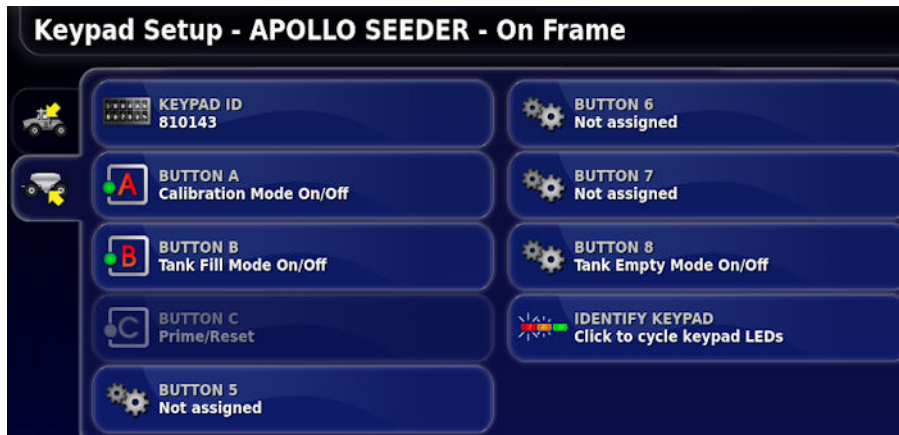
the minus button on the pack control mini-view or Status Monitoring panel (see Drill control, page 76).


- **Increase tank rate:**  Performs same function as the increase tank application rate button on the tank panel (see Tank display panel, page 79).
- **Decrease tank rate:**  Performs same function as the decrease tank application rate button on the tank panel (see Tank display panel, page 79).
- **Pack control on/off:**  If pack force sensor fitted and enabled, same as pressing on/off button (see Drill control, page 76).
- **Liquid/NH3 manual override:**  Select VRC, Auto control or Manual Control (see Tank display panel, page 79).
- **Fill all tanks:**  Fill all tanks to capacity entered on the setup screen (see Filling tanks, page 84). Button must be pressed and held.
- **Auxiliary relay on/off:** An auxiliary control can be assigned to spare ECU outputs. This option turns that output on and off. The relay output is assigned in Implement / Seeder / Accessories / General Outputs / AUXILIARY RELAY.
- **Prime:** Runs granular product to the openers for the time period entered in Implement / Seeder / Granular / Tank / PRELOAD TIME. (Prime is only available for proportional drive tank types. It is not available for linear actuator, regulator valve and monitoring only tank types.) Pressing and holding this button primes the implement until the button is released. This overrides the time entered in Implement / Seeder / Granular / Tank / PRELOAD TIME.
- **Tank keys:**
  - **Virtual:** Tanks to be controlled from the console screen.
  - **Keypad:** Tanks to be controlled via the keypad.

## 2.6. Setting up the operator inputs

- **Keypad and virtual:** Tanks may be controlled via the keypad and the console screen.

### On frame



- **Button A:**
  - **Calibration mode on/off:** Starts the calibration wizard (see Granular tank calibration, page 103).
- **Button B:**
  - **Lift control:**  If drill control is fitted and enabled, this option lifts or lowers the drill (see Drill control, page 76).
  - **Tank fill:** Button B opens the tank fill wizard if tank fill is not disabled (see Tank fill wizard, page 86).
- **Button C:**
  - Granular product calibration prime/reset button (see Granular tank calibration, page 103).
- **Unassigned number buttons:**
  - Tank empty (see Tank empty, page 89).





# Chapter 3 – Seeder Controller Setup

This chapter explains how to set up the seeder controller.



**Note:** The Seeder menu options displayed are dependent on the type of seeder defined in the implement setup process.

The following table lists all possible settings for the Seeder menu in alphabetical order. Not all settings are required or displayed for each seeder type.

All options displayed when **Implement**  / **Seeder**  is selected must have the required settings entered, using the descriptions provided in the following table.

### 3.1. Seeder menu settings

**Note:** The path (or paths) to the settings are shown at the top of each setting description. All paths are preceded with **Implement / Seeder**.

The seeder controller has functions and settings that are hidden when they are disabled, or only displayed when a related setting is enabled. Text in brackets details conditions to display each setting if they are hidden by default.

Setting	Description
Actuator style	Granular / Drive Setup (Only available if Linear Actuator selected as Drive Type.) Sets Actuator Style to Zeromax, Bourgault or generic.
Add dither	Granular / Control Setup, Liquid / Control Valve, NH3 / Control Valve, Drill Control / Control Settings (Granular / Control Setup: only available if Proportional Valve selected as Drive Type.) (Liquid/NH3 / Control Setup: only available if Proportional Valve selected as Controller Type.) Used to vary the signal to a PWM valve to prevent magnetism or sticking in the valve. Varies the PWM +/- of the set point.
Auto close valve time	NH3 / Flow If flow is detected after a user settable time (in seconds) when the tank should be off, the regulator valve will be driven shut. This is a safety precaution for NH3 systems using a dump valve to turn the tank off. If the dump valve fails, this provides a back up to ensure that no gas is discharged.

Setting	Description
Auxiliary relay	<p>Accessories / General Outputs</p> <p>An auxiliary control can be assigned to spare ECU outputs.</p>
Auxiliary RPM	<p>Accessories / General Inputs</p> <p>Seeder / Implement / Accessories / Encoders / <b>Auxiliary RPM</b> can be used to assign functionality to an input on the ECU (to monitor an external device with RPM measurement available). If this has been done, this setting displays the output on the dashboard fan section <b>Auxiliary RPM Speed</b>.</p>
Auxiliary RPM pulses / revolution	<p>Accessories / General Inputs</p> <p>(Only available if Auxiliary RPM is enabled.)</p> <p>Sets the number of pulses per revolution for external device being monitored by Auxiliary RPM setting above.</p>
Balanced valves	<p>Liquid / Flow, NH3 / Flow</p> <p>The seeder software is capable of controlling systems that use balanced valves. These valves, when closed, bypass the flow from the boom section back to the tank. This bypass flow is adjustable. This enables the system to maintain seeder pressure when turning the sections off or on. In a normal system, when a section is turned off, the seeder is working with a lesser width, and the regulator reduces the pressure to maintain the flow rate for the remaining seeder width. This can affect the nozzle performance and thus the effectiveness of the seeder. With a balanced valve system, the pressure is maintained and thus the spray pattern will always be optimal.</p>

### 3.1. Seeder menu settings

Setting	Description
Blocked head monitor	Accessories / Blocked Head Enable if a blockage system is installed.
Blocked head sensor type	Accessories / Blocked Head Standard should be selected unless using Dickey-john or Digitroll sensors.
Calibration drive	Granular / Tank (Only available if Linear Actuator selected as Drive Type.) Enable if calibration drive fitted to linear actuator drive.
Calibration factor	Liquid / Flow, NH3 / Flow The number of pulses from the flow meter per liter of liquid or weight. Check the calibration factor on the tag on the flow meter of the seeder. <b>Liquid products:</b> Note that manually specifying the calibration factor on this screen should only be performed if the flow factor is already known or has previously been calculated via Liquid tank calibration, page 109. If the <b>Calibration Factor</b> is not known, this field should be left blank and the Auto Flow Calibration wizard followed, refer to Liquid tank calibration, page 109. <b>NH3 products:</b> NH3 systems are pre-calibrated manually, specifying the calibration factor is the only option. This value can be entered on this screen, or NH3 tank calibration, page 112.

Setting	Description
Calibration mode	Drill Control / Pack Control (Only displayed if Pack Force Sensor enabled.) Enable if system is fitted with sensors to control the pack force on the press wheel. Adds a button to the drill control display to allow the calibration of the sensors.
Capacity	Granular / Tank, Liquid / Tank, NH3 / Tank Enter the tank capacity.
Case drain sensor	Fan Enable if a case drain sensor is fitted to the selected fan.
Close valve when off	Liquid / Control Valve, NH3 / Control Valve (Only available if Regulator Valve selected as Controller Type.) Ensures that the valve is closed when the tank is not in use. This closes the valve when the Master Switch is off and/or when all sections are turned off.
Control settings	Drill Control / Control Settings (Only available when Pack Control is enabled.) Enables pack control settings to be configured.
Control to RPM	Granular / Drive Setup Enable to control tank output using RPM.
Control type	Drill Control / Pack Control <b>Hydraulic pressure:</b> Control the tynes to a preset hydraulic pressure. <b>Pack force:</b> Control the press wheel packing force to a preset value.

### 3.1. Seeder menu settings

Setting	Description
Controller mode	<p>Liquid / Control Valve, NH3 / Control Valve (Only available if Regulator Valve selected as Controller Type.)</p> <p>Choose from Standard, Micro-Trak, DICKEY-john or Raven. Most liquid systems use the standard option. When a controller mode is selected, the minimum on time, maximum on time, gain setting and PWM setting are automatically set. These settings can be adjusted if required.</p>
Controller response	<p>Granular / Control Setup, Liquid / Control Valve, NH3 / Control Valve, Drill Control / Control Settings (Granular / Control Setup: only available if Proportional Valve selected as Drive Type.) (Liquid/NH3 / Control Setup: only available if Proportional Valve selected as Controller Type.)</p> <p>This sets how quickly the controller will try to achieve the required rate. If set too high, the seeder may pass the target rate and take time to adjust, searching for the right level. If set too low, the valve will take a long time to move to the desired rate and control will be slow to respond. Find the best setting for the equipment being used.</p>

Setting	Description
Controller type	<p>Liquid / Control Valve, NH3 / Control Valve</p> <p><b>Regulator valve:</b> This valve uses a motor to open or close the valve depending on the flow requirements. Positive or negative power is applied to run the motor. The tank output to the regulator valve stays constant. The regulator valve either restricts or diverts excess product.</p> <p><b>Proportional valve:</b> This valve controls the hydraulic oil flow to the pump and changes the output of the pump so that the pump is only delivering what is required. It uses a solenoid to open a hydraulic valve to drive a hydraulic pump. The opening of the valve varies with the current applied to the solenoid.</p>
Custom settings	<p>Granular / Drive Setup / SETTINGS FOR ALL TANKS</p> <p>All tanks are setup individually. See Settings for all tanks.</p>
Drill control	<p>Drill Control / Lift Control</p> <p>Enable if seeder is fitted with an ECU to control the lift/lower, or hydraulic pressure using the console.</p>
Drive	<p>Drill Control / Pack Control</p> <p>Defines which slave ECU connector has pack control drive outputs.</p>

### 3.1. Seeder menu settings

Setting	Description
Drive type	<p>Granular / Drive Setup</p> <p><b>Proportional valve:</b> Usually a hydraulic motor turning a metering or product discharge unit. Rate is controlled by controlling the RPM of the metering unit by varying the PWM signal applied.</p> <p><b>Linear actuator:</b> A linear actuator controls the lever to adjust a gearbox speed from a ground drive shaft. The output shaft from the gearbox drives the metering unit. Rate is controlled by controlling the ratio of the gearbox via the position of the actuator.</p> <p><b>Electric motor:</b> An electric motor electrically drives the metering or discharge unit. Rate is controlled by controlling the RPM of the unit via varying the PWM or current supplied to the motor.</p>
Dump valve	<p>Granular / Control Setup, Liquid / Control Valve, NH3 / Control Valve</p> <p>(Granular / Control Setup: only available if Proportional Valve selected as Drive Type.)</p> <p>Used to apply 12 volt power to a dump valve, or a proportional valve coil where fitted.</p> <p><b>Disabled:</b> 12 volts not applied at any time.</p> <p><b>Enabled:</b> Applies 12 volts to a relay when tank needs to be off.</p> <p><b>Reversed:</b> Applies 12 volts to a relay when tank needs to be on.</p>
Electric motor	<p>Granular / Drive Setup / DRIVE TYPE</p> <p>An electric motor electrically drives the metering or discharge unit. Rate is controlled by controlling the RPM of the unit via varying the PWM or current supplied to the motor. See Drive type.</p>



Setting	Description
EM-24 relay mode	<p>Drill Control / Lift Control</p> <p>Lift/lower solenoids may require more current than a single output can supply. Selecting ganged pair doubles the available current. The manual supplied with the seeder implement should indicate if this is required.</p>
Enabled head system	<p>Accessories / Blocked Head (Displayed if Double Shoot was selected for Head Monitoring, via Dealer mode.)</p> <p>These settings can be used to disable sensors that are not in use to avoid false alarms.</p> <p>Seed and fertilizer Seed only Fertilizer only</p>
Encoder pulses / revolution	<p>Granular / Drive Setup</p> <p>Set number of pulses/revolutions for each revolution of the metering shaft.</p>
Fallback type	<p>Speed Source</p> <p>Select speed source used if GPS is selected and the signal is lost.</p>
Fan speed	<p>Fan</p> <p>Enable to monitor the fan speed input of the ECU.</p>
Flow confirmation sensor	<p>Liquid / Flow, NH<sub>3</sub> / Flow</p> <p>Enable if a flow confirmation sensor is fitted to your liquid or NH<sub>3</sub> system and it is being monitored by the ECU.</p>

### 3.1. Seeder menu settings

Setting	Description
Flow meter sampling	Liquid / Control Valve, NH3 / Control Valve Sets how frequently sampling is done. Standard sampling is recommended. Reduced is recommended only if flow may be highly irregular (for example, on worn equipment).
Gain setting	Liquid / Control Valve, NH3 / Control Valve (Only available if Regulator Valve selected as Controller Type.) This sets how quickly the controller will try to achieve the required rate. If set too high, the seeder may pass the target rate and take time to adjust, searching for the right level. If set too low, the valve will take a long time to move to the desired rate and control will be slow to respond. Find the best gain percentage for the equipment being used.
Gear ratio	Granular / Drive Setup Gear ratio between the drive motor and the metering unit.
Granular section monitoring	Accessories / Granular Section If using granular section control, this setting triggers an alarm if a section is not active when it should be.
Increment	Drill Control / Pack Control Used during operation to increase/decrease down force by a preset increment.
Injection mode flow	Liquid / Flow (Only available if Flow Confirmation Sensor is enabled.) This drops the liquid flow alarm detection by a factor of 10 for special injection mode case.

Setting	Description
Lift control relay	Drill Control / Lift Control Assigns an ECU relay to control the lift/lower function.
Linear actuator	Granular / Drive Setup / DRIVE TYPE A linear actuator controls the lever to adjust a gearbox speed from a ground drive shaft. The output shaft from the gearbox drives the metering unit. Rate is controlled by controlling the ratio of the gearbox via the position of the actuator. See Drive type.
Lower time	Drill Control / Lift Control Set lower time in seconds.
Map value	Drill Control / Pack Control Displays down force value of selected controller on map.
Master clutch	Granular / Tank (Only available if Linear Actuator selected as Drive Type.) Enable master clutch.
Max calibration value	Drill Control / Pack Control The maximum 'calibration value' displayed during pack force sensor calibration.
Maximum on time	Liquid / Control Valve, NH3 / Control Valve (Only available if Regulator Valve selected as Controller Type.) Sets the maximum amount of time that the controller will pulse the control valve before checking the rate. It is used to make a large correction for the rate.

### 3.1. Seeder menu settings

Setting	Description
Maximum PWM	<p>Granular / Control Setup, Liquid / Control Valve, NH3 / Control Valve, Drill Control / Control Settings            (Granular / Control Setup: only available if Proportional Valve selected as Drive Type.)            (Liquid/NH3 / Control Setup: only available if Proportional Valve selected as Controller Type.)</p> <p>Sets the maximum amount of PWM power that can be provide to the valve running the metering unit before maximum possible speed is achieved.</p> <p>The time that the Pulse Width Modulation (PWM) is active. Higher values set the pulse of power for longer during a pulse cycle. Anything over this figure the implement (motor, valve actuator) will not respond.</p> <p>Sets the maximum amount of PWM or power required to allow the down force.</p>
Maximum RPM	<p>Granular / Control Setup            (Only available if Electric Motor selected as Drive Type and Motor Selection set to Other.)</p> <p>Sets maximum shaft RPM.</p>
Maximum sensor load	<p>Drill Control / Pack Control</p> <p>The maximum sensor load measured during pack force sensor calibration.</p>
Maximum shaft RPM	<p>Granular / Drive Setup            (Only available if Proportional Valve or Linear Actuator selected as Drive Type.)</p> <p>Set maximum shaft speed.</p>

Setting	Description
Metering Auger	<p>Granular / Drive Setup</p> <p>Select the metering auger type (the part that draws product from the tank) that is fitted. Changing the metering auger affects the calibration factor. Each metering auger has an associated calibration factor that will be loaded.</p> <p>Refer to the relevant Bourgault manual for more detail.</p>
Min calibration value	<p>Drill Control / Pack Control</p> <p>The minimum 'calibration value' displayed during pack force sensor calibration.</p>
Minimum on time	<p>Liquid / Control Valve, NH3 / Control Valve (Only available if Regulator Valve selected as Controller Type.)</p> <p>The minimum time that power needs to be applied to move the valve.</p>
Minimum operating fan speed	<p>Granular / Tank</p> <p>Enter minimum fan speed at which metering system will operate. This prevents the possibility of running metering system without fans engaged and subsequent plugging of the distribution pipes.</p>

### 3.1. Seeder menu settings

Setting	Description
Minimum PWM	<p>Granular / Control Setup, Liquid / Control Valve, NH3 / Control Valve, Drill Control / Control Settings            (Granular / Control Setup: only available if Proportional Valve selected as Drive Type.)            (Liquid/NH3 / Control Setup: only available if Proportional Valve selected as Controller Type.)</p> <p>Sets the minimum amount of PWM or power required to allow the metering unit to rotate or discharge product.</p> <p>The time that the Pulse Width Modulation (PWM) is active. Higher values set the pulse of power for longer during a pulse cycle. Minimum PWM is used to locate at what point a valve or motor will respond to the power provided. Anything under this figure the implement (motor, valve actuator) will not respond.</p> <p>Sets the minimum amount of PWM or power required to allow the down force.</p>
Minimum RPM	<p>Granular / Control Setup            (Only available if Electric Motor selected as Drive Type and Motor Selection set to Other.)</p> <p>Sets minimum shaft RPM.</p>
Minimum sensor load	<p>Drill Control / Pack Control</p> <p>The minimum sensor load measured during pack force sensor calibration.</p>
Minimum shaft RPM	<p>Granular / Drive Setup            (Only available if Proportional Valve or Linear Actuator selected as Drive Type.)</p> <p>Set minimum shaft speed.</p>

Setting	Description
Monitoring only	<p>Granular / Drive Setup / DRIVE TYPE</p> <p>Used to monitor operations for the seeder without application rate control. The application rate must be set by physically changing the drive settings on the metering unit for each tank.</p>
Motor selection	<p>Granular / Control Setup (Only available if Electric Motor is selected as Drive Type.)</p> <p>Sets the number of pulses per motor revolution for the motor.</p> <p>If <b>Other</b> is selected for <b>Motor Selection</b> the following options are displayed:</p> <p><b>Pulses / Revolution:</b> Set the number of pulses / revolutions for each revolution of the metering shaft.</p> <p><b>Minimum RPM:</b> Sets minimum shaft RPM.</p> <p><b>Maximum RPM:</b> Sets maximum shaft RPM.</p>
Name	<p>Granular / Tank, Liquid / Tank, NH3 / Tank</p> <p>Change the default tank name. This name will be used if <b>USE PRODUCT AS NAME</b> is disabled.</p>
Name as bin or tank	<p>Granular / Tank</p> <p>Select bin or tank to determine the term used for the air seeder compartments.</p>
Number of distribution heads	<p>Accessories / Blocked Head</p> <p>Enter the number of distribution heads. Up to 10 for single shoot and 20 for double shoot.</p>

### 3.1. Seeder menu settings

Setting	Description
Number of nozzles	<p>Liquid / Tank, NH3 / Tank</p> <p>(Only available if section control is set to Full width for selected tank.)</p> <p>Enter the number of output nozzles for the system to use in the flow per nozzles calculation. The flow per nozzle value is displayed on the seeder operation screen and the seeder dashboard.</p>
Off time to ground	<p>Granular / Tank, Liquid / Tank, NH3 / Tank</p> <p>Set time in seconds for remaining product to run out of lines to the ground once a tank is switched off.</p>
Off time to SC location	<p>Granular / Tank, Liquid / Tank, NH3 / Tank</p> <p>Set time in seconds for remaining product to run out of lines to the section control location once a tank is switched off.</p> <p>If the SC location is at the meter, then this time should be set to zero. If the location is at the head, then the time from the meter to the head must be measured.</p>
On time to ground	<p>Granular / Tank, Liquid / Tank, NH3 / Tank</p> <p>Time for product to get to the ground once the tank is switched on. A reasonable initial setting for most configurations is 6 seconds.</p> <p>To fine tune this setting, it is best to seed a strip one way and then another strip at 90 degrees to that. Then get out and dig in the dirt to find where the seed starts and stops and adjust times to compensate for overlap and under-lap.</p>



Setting	Description
On time to SC location	<p>Granular / Tank, Liquid / Tank, NH3 / Tank</p> <p>Time for product to get to the outermost section control openers once the tank is switched on.</p> <p>If the SC location is at the meter, then this time should be set to zero. If the location is at the head, then the time from the meter to the head must be measured.</p>
Pack control	<p>Drill Control / Pack Control</p> <p>Enable if seeder is fitted with pack control.</p> <p>Enables pack control configuration. See Pack control calibration, page 116.</p>
Pack force sensor	<p>Drill Control / Pack Control</p> <p>Enable if a sensor is fitted that enables the force of the press wheel on the ground to be measured during down force control.</p>
Preload time	<p>Granular / Tank</p> <p>When starting a seeding pass when stationary, preload time allows for product to be at the openers before moving to avoid gaps in product application. It is the time in seconds that the seeder needs to run before moving off and starting to seed after the master switch is engaged. (Not applicable to tanks with linear actuator drive types.)</p> <p>This is triggered when the master switch is turned on while stationary. During preload time, the meters run at the rate based on the manual speed that has been set. Once preload time has expired, the system reverts to the selected speed source.</p>
Preset 1	<p>Drill Control / Pack Control</p> <p>Used during operation to adjust requested down force to a preset value.</p>

### 3.1. Seeder menu settings

Setting	Description
Preset 2	<p>Drill Control / Pack Control</p> <p>Used during operation to adjust requested down force to a preset value.</p>
Pressure boost	<p>Liquid / Control Valve</p> <p>(Only available if Controller Type is Regulator Valve and Close Valve When Off is Enabled)</p> <p>Used for regulator valve controlled liquid systems to improve the starting pressure when a tank has been switched off then gets switched back on again (for example; when entering untreated region after being in a headland).</p> <p>This feature can only be enabled for systems that close the regulator valve to stop flow to the boom (using the regulator valve as a dump valve). With these systems, the regulator valve is opened to increase flow for the operator defined time before the application rate is controlled. This is used to quickly boost the pressure to get it close to the required pressure.</p>
Pressure input	<p>Fan</p> <p>Selects the ECU input that will be used for the fan pressure sensor.</p>

Setting	Description
Pressure sensor	<p>Fan</p> <p>If a fan pressure sensor is fitted to the seeder, select one of the listed pressure sensor types:</p> <ul style="list-style-type: none"> <li>• <b>Standard</b></li> <li>• <b>Voltage</b></li> </ul> <p>If Voltage is selected as pressure sensor type, the following options are displayed:</p> <p><b>Maximum pressure:</b> Set pressure in kPa.</p> <p><b>Minimum voltage:</b> Set the minimum output voltage at zero pressure. This value is read from the pressure transducer.</p> <p><b>Maximum voltage:</b> Set the maximum output voltage at maximum pressure. This value is read from the pressure transducer.</p>
Proportional valve	<p>Granular / Drive Setup / DRIVE TYPE</p> <p>Usually a hydraulic motor turning a metering or product discharge unit. Rate is controlled by controlling the RPM of the metering unit by varying the PWM signal applied. See Drive type.</p> <p>This valve controls the hydraulic oil flow to the motor to vary the speed of the motor so that the metering unit is only delivering what is required. It uses a solenoid to open a hydraulic valve to drive a hydraulic motor. The opening of the valve varies with the current applied to the solenoid.</p>

### 3.1. Seeder menu settings

Setting	Description
Pulses / revolution	<p>Granular / Control Setup, Fan, Pumps            (Granular / Control Setup: only available if Electric Motor selected as Drive Type.)            (Fans: only available if Fan Speed enabled.)            (Pumps: only available if Pump Speed enabled.)            If set at 1, the sensor picks up from a target bolt, one pulse per revolution.            Set to the number of pulses the sensor picks up per revolution.</p>
Pump speed	<p>Liquid / Tank, NH3 / Tank, Pumps            Select pump number to monitor. Number of pumps is dependent on initial ECU setup. The pump speed value is displayed on the seeder operation screen, and the seeder dashboard.            Enable to monitor the speed of the liquid/NH3 system where a pump speed sensor is fitted.</p>
PWM setting	<p>Liquid / Control Valve, NH3 / Control Valve            (Only available if Regulator Valve selected as Controller Type.)            Sets the pulse width modulation. Lowering this number reduces the voltage supplied to the valve, slowing it down.</p>
Quick depth adjustment drive	<p>Drill Control / Lift Control            This option allows the drill to be raised to make a depth adjustment, then lowered again. Assign a relay to control this functionality if required.</p>

Setting	Description
Regulator valve	<p>Liquid / Control Valve / CONTROLLER TYPE, NH3 / Control Valve / CONTROLLER TYPE</p> <p>This valve uses a motor to open or close the valve depending on the flow requirements. Positive or negative power is applied to run the motor. The tank output to the regulator valve stays constant. The regulator valve either restricts or diverts excess product.</p>
Reverse valve	<p>Liquid / Control Valve, NH3 / Control Valve (Only available if Regulator Valve is selected as Controller Type.)</p> <p>Allows for the polarity of the regulating motor to be reversed if it was wired incorrectly.</p>
Second display value	<p>Drill Control / Pack Control</p> <p>When set displays pack force value in drill control display.</p>
Section control	<p>Granular / Tank, Liquid / Tank, NH3 / Tank</p> <p>This option allows you to assign the tank to be controlled by full width implement (no multi section control), or assign to multi section liquid boom if one has been created.</p>

### 3.1. Seeder menu settings

Setting	Description
Sensor	<p>Liquid / Pressure, NH3 / Pressure, Granular / Pressure</p> <p>Enable if there is an electronic pressure sensor fitted to the liquid/NH3 tank.</p> <p>If the pressure sensor is enabled, the following options are displayed:</p> <p><b>Maximum pressure:</b> Set pressure in kPa.</p> <p><b>Minimum voltage:</b> Set the minimum output voltage at zero pressure. This value is read from the pressure transducer.</p> <p><b>Maximum voltage:</b> Set the maximum output voltage at maximum pressure. This value is read from the pressure transducer.</p>
Sensor maximum pressure	<p>Liquid / Pressure, NH3 / Pressure, Granular / Pressure, Drill Control / Control Settings, Fan, Accessories / Brake control</p> <p>(Fans option only available when Pressure Sensor set to Voltage.)</p> <p>Set sensor maximum pressure.</p>
Sensor maximum voltage	<p>Liquid / Pressure, NH3 / Pressure, Granular / Pressure, Drill Control / Control Settings, Fan, Accessories / Brake control</p> <p>(Fans option only available when Pressure Sensor set to Voltage.)</p> <p>Set the maximum output voltage at maximum pressure. This value is read from the pressure transducer.</p>

Setting	Description
Sensor minimum voltage	Liquid / Pressure, NH3 / Pressure, Granular / Pressure, Drill Control / Control Settings, Fan, Accessories / Brake control (Fans option only available when Pressure Sensor set to Voltage.) Set the minimum output voltage at zero pressure. This value is read from the pressure transducer.
Settings for all tanks	Granular / Drive Setup, Granular / Control Setup <b>Custom settings:</b> All tanks are setup individually. <b>Use settings from tank 1:</b> All tanks are set using settings from tank 1. Settings can only be changed via tank 1 (note the number of tanks will vary depending on initial implement setup).
Shaft pulses / revolution	Granular / Drive Setup Sets how many pulses the stop shaft sensor provides per revolution.
Soft start	Granular / Control Setup, Liquid / Control Valve, NH3 / Control Valve (Granular / Control Setup: only available if Proportional Valve or Electric Motor selected as Drive Type.) (Liquid/NH3 / Control Setup: only available if Proportional Valve selected as Controller Type.) Allows a gradual increase in the valve signal when the valve is activated. This is used to prevent mechanical damage from sudden starts. Provides a soft start for the metering unit to prevent possible mechanical damage.

### 3.1. Seeder menu settings

Setting	Description
Soft stop	<p>Granular / Control Setup, Liquid / Control Valve, NH3 / Control Valve</p> <p>(Granular / Control Setup: only available if Proportional Valve or Electric Motor selected as Drive Type.)</p> <p>(Liquid/NH3 / Control Setup: only available if Proportional Valve selected as Controller Type.)</p> <p>Allows a gradual decrease in the valve signal when the valve is deactivated. This is used to prevent mechanical damage from sudden stops.</p>
Speed source	<p>Speed Source</p> <p>The speed source used to determine the required application rate from the seeder.</p>
Status	<p>Granular / Tank, Liquid / Tank, NH3 / Tank</p> <p>If enabled, the tank will be used for seeder operations. If disabled, the tank will not be used for seeder operations. A disabled tank will not be displayed on the seeder operation screen and does not need to be calibrated.</p>
Tank clutch	<p>Granular / Drive Setup</p> <p>(Only available if Proportional Valve or Linear Actuator selected as Drive Type.)</p> <p>Enable to allow control of tank clutch.</p>



Setting	Description
Tank fill	<p>Granular / Tank</p> <p><b>Disabled:</b> (Not available when one or more weigh scales have been assigned to a tank.) The tank fill wizard is not accessible.</p> <p><b>Manual:</b> (Only available when one or more weigh scales have been assigned to a tank). Weigh scales are used to fill tanks to correct weight via tank fill wizard.</p> <p><b>Auto (sensors):</b> Fill sensors mounted in air cart are used in combination with Equalizer air cart to automatically fill tank to capacity.</p> <p><b>Auto (scales):</b> (Only available when one or more weigh scales have been assigned to a tank.) Weigh scales are used in combination with Equalizer air cart to automatically fill tank to preset weight.</p> <p><b>Auto (sensors and scales):</b> (Only available when one or more weigh scales have been assigned to a tank.) Weigh scales and fill sensors are used in combination with Equalizer air cart to fill tank to preset weight or capacity.</p> <p>See Tank fill wizard, page 86.</p>
Tank grouping	<p>Granular / Tank Grouping</p> <p>(Only available if Bourgault seeder implement is created.)</p> <p>Create/sets the required tank grouping.</p>
Use product as name	<p>Granular / Tank, Liquid / Tank, NH3 / Tank</p> <p>On the Operation screen bin/tank panel the product is displayed as the tank name if this is enabled. If no product is assigned to the tank, the tank name is 'Empty'. If disabled, the tank name entered for the individual tank is used.</p>

### 3.1. Seeder menu settings

Setting	Description
Use settings from tank 1	<p>Granular / Drive Setup / SETTINGS FOR ALL TANKS</p> <p>All tanks are set using settings from tank 1. Settings can only be changed via tank 1 (note the number of tanks will vary depending on initial implement setup). See Settings for all tanks.</p>
Use shaft sensor	<p>Granular / Drive Setup</p> <p>(Only available if Electric Motor selected as Drive Type.)</p> <p>When enabled sets alarm for incorrect gear ratio and shaft not moving.</p>
Using case drain sensor	<p>Fans</p> <p>Enable if the seeder has a case drain sensor fitted to the fan motor.</p>
Using ladder down alarm	<p>Accessories / General Inputs</p> <p>Enables the ladder down alarm input, if available.</p>
Wheel factor	<p>Speed Source</p> <p>The wheel factor defines how far the implement travels per pulse from the wheel sensor. A wheel fitted with four magnets, with a circumference of one meter, will travel 0.25 meters per pulse.</p> <p>If Wheel Sensor is selected as the Speed Source, the wheel speed calibration factor must be calculated (or entered here if known). The wheel factor cannot be set to zero. To carry out a calibration enter a value of one, then proceed with the calibration. Refer to Wheel sensor calibration, page 118.</p>

## 3.2. Setting up accessories

This section describes the process for setting up accessories.

**Note:** Only the blocked head option is available for the IB-1. All other options are applicable to the Apollo ECU.

### 3.2.1. Sensors setup

1. Select **Implement**  / **Seeder**  / **Accessories**  / **Sensor Setup**  .





Sensor Setup - BSEEDER			
IO ECU	Sensor	Type	Select
Apollo EM-24 1	----	40/40	✓
	Sensor 1	Granular Section Sense	✓
	Sensor 2	Granular Section Sense	✓
	Sensor 3	Granular Section Sense	✓
	Sensor 4	Granular Section Sense	✓
	Sensor 5	Blocked Head Sense	✓
	Sensor 6	Blocked Head Sense	✓
	Sensor 7	Blocked Head Sense	✓
	Sensor 8	Blocked Head Sense	✓
	Sensor 9	Blocked Head Sense	✓

This table assigns blocked head or granular section to each sensor on the EM-24 ECU.

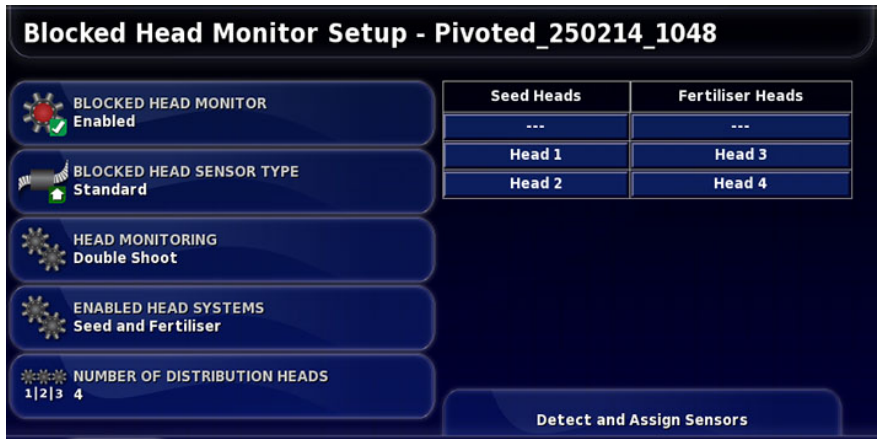
**Note:** This option is hidden if no EM-24 ECUs are installed, or if EM-24 ECUs are disabled in **Implement / ECU / Add/Replace ECU**.

The settings in this table determine how many granular sections are displayed in **Implement / Seeder / Accessories / Granular Section**.

### 3.2.2. Blocked head monitor setup

1. Select **Implement**  / **Seeder**  / **Accessories**  / **Blocked Head**  .

### 3.2. Setting up accessories



2. Enter the settings on the left of the screen. Refer to the table in the previous section for more information.

**Note:** If sensor type is DICKEY-John, see below for setup instructions. Sensors must be assigned manually.

3. Select **Detect and Assign Sensors**.

4. Select **Detect Sensors**.

5. On the implement, connect a sensor to its applicable distribution head.

6. When the sensor is detected by the console, assign it to its applicable distribution head by selecting the head and the sensor on the console screen and renaming them. Example: LS1 LH1 (left sensor 1 on left head 1).

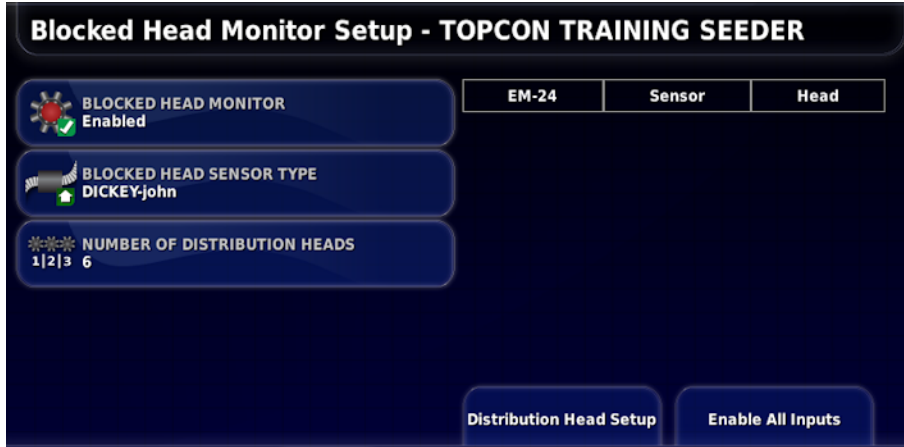
7. Repeat steps 5 and 6 for all remaining sensors.

#### DICKEY-John sensor setup

1. Connect sensors to the harnessing in a way that makes it easy to manually assign the sensors. For example, if adding one sensor per head, then have head 1 connected to sensor input 1 on the harness, head 2 on sensor input 2 etc.



**Note:** Physically connecting the sensors can be done before or after assigning the sensors in the software.

2. Select **Enable All Inputs**. All available inputs are populated.



3. Manually assign sensors to heads using the drop down lists, leaving the remaining pre-populated sensors as **Unassigned**.

### 3.2.3. Granular section setup

1. Select **Implement**  / **Seeder**  / **Accessories**  / **Granular Section**  .

If **Switched** is selected as the **Granular monitoring style** under **Implement / Section Control / General**:

Sensor	Sensor name	Section	Status	Select
All	---	80/80	80/80	✓
1	Sensor 1	Unassigned	0V Signal	✓
2	Sensor 2	Unassigned	0V Signal	✓
3	Sensor 3	Unassigned	0V Signal	✓
4	Sensor 4	Unassigned	0V Signal	✓
5	Sensor 5	Unassigned	+V Signal	✓
6	Sensor 6	Unassigned	+V Signal	✓

The table is used to setup which sensor is assigned to each section and whether a 12 V signal (active high) or 0 V signal (active low) turns each section on (status).

If **Pulsed** is selected as the **Granular monitoring style** under **Implement / Section Control / General**:

### 3.2. Setting up accessories





**Granular Section Monitor Setup - SEEDER PSM**

ASSIGN SENSORS  
Click to assign Section Monitoring Sensors


Sensor	Sensor name	Section	Select
All	----	80/80	✓
1	Sensor 1	Tank 1: 1	✓
2	Sensor 2	Tank 1: 1	✓
3	Sensor 3	Tank 1: 2	✓
4	Sensor 4	Tank 1: 2	✓

- **Assign sensors:** Selecting this option automatically assigns the sensors in order to each tank / section.

#### 3.2.4. General inputs setup

1. Select **Implement**  / **Seeder**  / **Accessories**  / **General Inputs**  .

**General Input Setup - SEEDER**





 USING LADDER DOWN ALARM  
Enabled

 AUXILIARY RPM  
Enabled

 AUXILIARY RPM PULSES/REVOLUTION  
1

Refer to Seeder menu settings, page 34 for details of these settings.

#### 3.2.5. Encoders setup





1. Select **Implement**  / **Seeder**  / **Accessories**  / **Encoders**  .

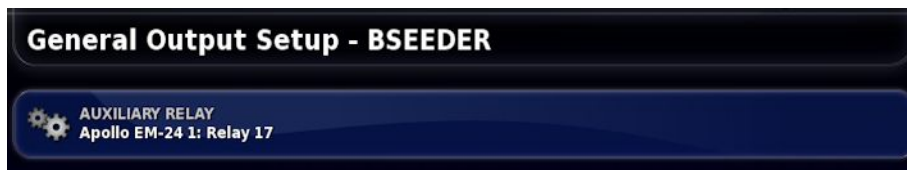
**Encoder Setup - BSEEDER**

Source	ECU Connection
Fan 1	Drive 2(7)
Fan 2	Drive 3(7)
Auxiliary RPM	None
Wheel sensor	Drive 1(7)

This table displays functions assigned to ECU inputs. Values cannot be changed by operators.

### 3.2.6. General outputs setup

1. Select **Implement**  / **Seeder**  / **Accessories**  / **General Outputs**  .






- **Auxiliary relay:** An auxiliary control can be assigned to spare ECU outputs.





### 3.3. Setting up weigh scales

The weigh scales option enables the Horizon software to display measured weight readings from Scale Link ECUs.

**Note:** If weigh scales are enabled, the tank fill wizard is added to the tank fill panel. See Tank fill wizard, page 86.





1. To enable weigh scales, select **System**  / **Features**  / **Implement**  and enable the **Weigh Scales** option.

#### 3.3.1. Manage ECUs

1. Select **Implement**  / **Seeder**  / **Weigh Scales**  / **ECU**  .
2. Select **Detect New ECUs** to detect Scale Link ECUs in the system. More than one ECU may be connected.
  - **ID:** The ID number of the ECU.
  - **Scales:** The number of scales connected to the ECU (1 - 4).
  - **Remove?:** Remove the Scale Link ECU from the implement profile.

#### 3.3.2. Configure scales

Some systems are configured so that a scale is reading the weight of more than one tank. In this situation, if both of those tanks have a scale connected, this screen defines the relationship between the two scales.

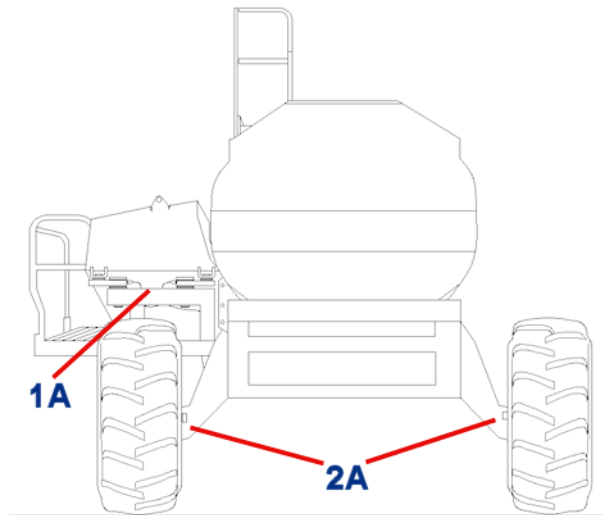
1. Select **Implement**  / **Seeder**  / **Weigh Scales**  / **Scales**  .
  - **Scale:** Scale attached to a tank that is adding weight to another scale.



- **Affects Scale:** Scale that is having weight added to it by a separate tank and scale.
- **Setup Number:** The Scale Link utilizes a shorthand 'Setup' number that determines how the scale displays the weight.
- **Calibration Number:** The Scale Link utilizes a 'Calibration' number for each scale system that matches the load cells to the Scale Link and determines the weight value that is displayed.

If the setup number or calibration number is 0, Horizon does not transmit these values to the Scale Link.

For example, in the following screenshot, scale 2 -A will have the weight of scale 1-A subtracted before the measured weight is displayed.






Configure Scales - SEEDER				
	Scale	Affects Scale	Setup Number	Calibration Number
1	A	Scale 2 - A	147110	58843
2				

### 3.3.3. Scale assignment

This screen enables scales to be assigned to tanks and to select measured or calculated weight to be displayed.

### 3.3. Setting up weigh scales

1. Select **Implement**  / **Seeder**  / **Weigh Scales**  / **Assignment** .

- **Tank:** Tank number.
- **Name:** Name of product in the tank.
- **Scale:** Select the scale connected to this tank.
- **Weight Remaining:**
  - **Calculated:** Displays the tank weight calculated by the system. This is displayed on the tank panel and on the dashboard, if required (**Calculated Weight Remaining**).
  - **Measured:** Displays the tank weight measured by the scale. This is displayed in place of the calculated weight on the tank panel. It can also be displayed on the dashboard, if required (**Measured Weight Remaining**).







**Note:** Measured weight can not be used if a scale has more than one tank assigned to it. A tank must have its own scale to measure remaining weight.

#### 3.3.4. Pressure compensation

This screen enables a weight compensation value to be adjusted if a pressurized tank is being used. This may be required if an altered weight reading is displayed once the fans are turned on and the tank is pressurized.

**Note:** This screen is only shown for tanks that have the **Weight Remaining** set to **Measured** on the **Assignment** screen.

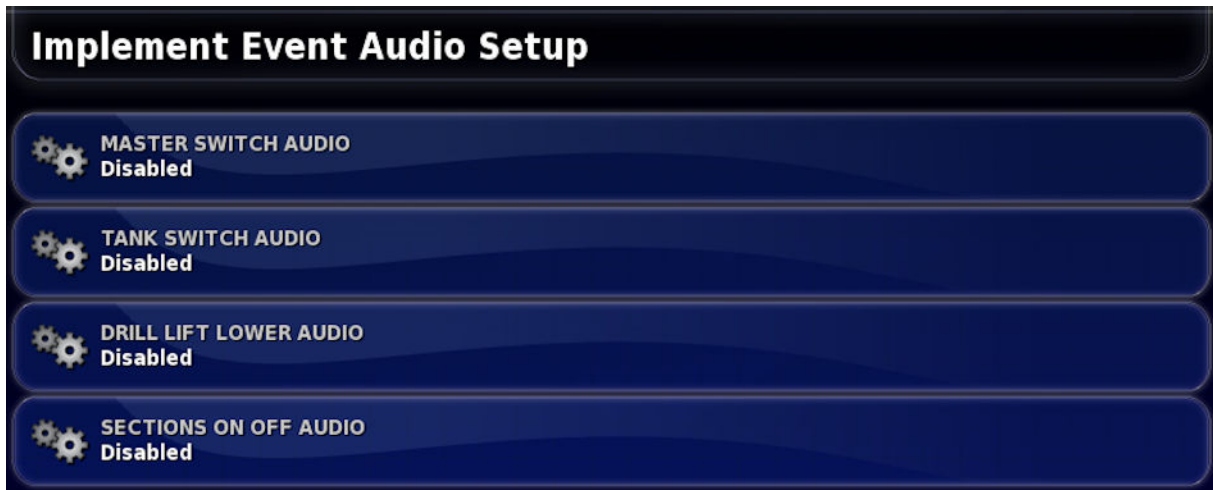
1. Select **Implement**  / **Seeder**  / **Weigh Scales**  /  
**Pressure Compensation**  .

- **Weigh scale pressure compensation value:** Value used to compensate for the weight discrepancy introduced by pressurizing a tank. The default value may be adjusted.

## 3.4. Setting up implement audio

Sets the sound feedback for implement operations.

1. Select **Implement**  / **Seeder**  / **Audio**  .



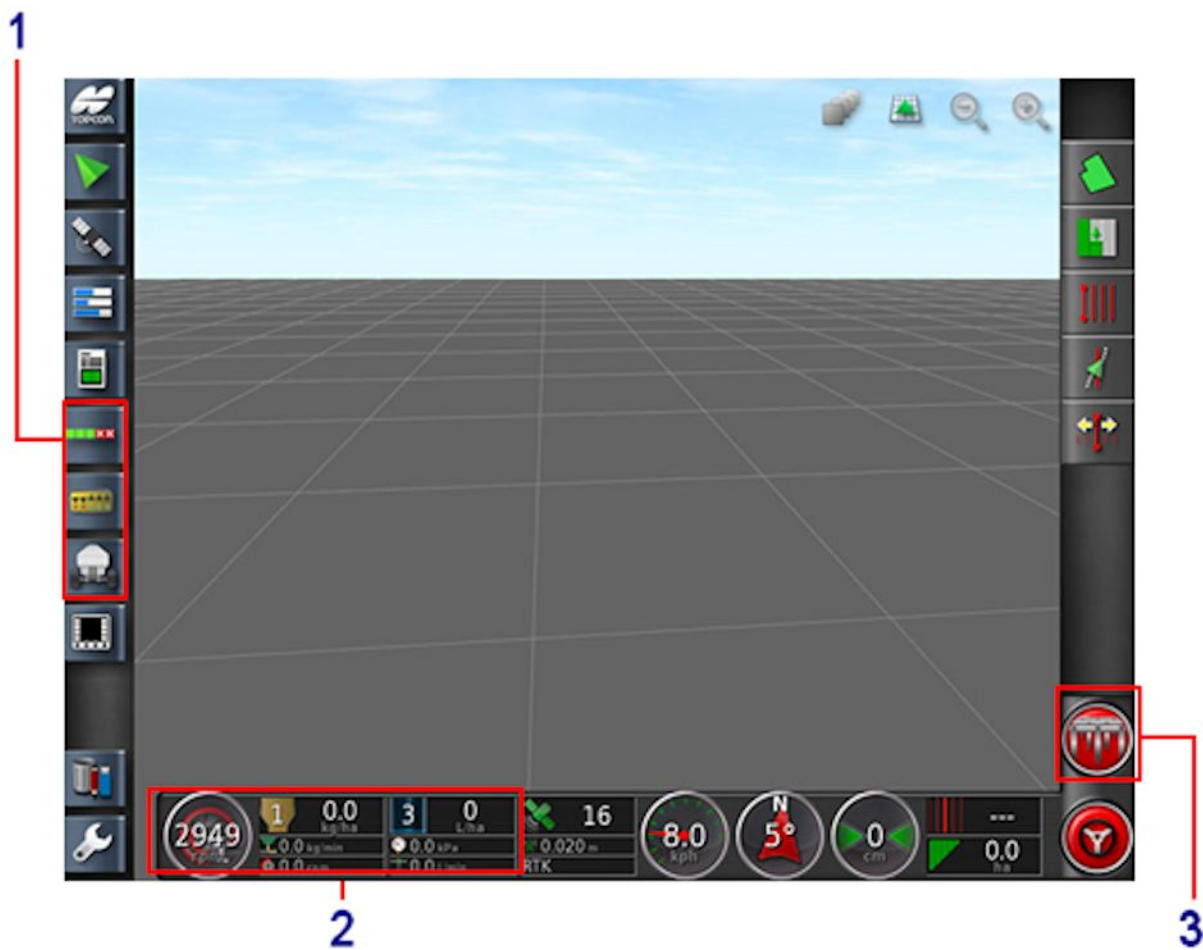
Sound can be enabled for the following operations: turning the master switch on and off, turning a tank on and off, raising and lowering the drill and turning a section on and off. Each sound is unique.

# Chapter 4 – Operation

Once setup is complete, the Auto Section Control (if enabled), Virtual switchbox (if enabled), and Seeder Controller icons appear on the Navigation Bar. These icons open mini-views.

Seeder Controller information is added to the dashboard.

The Seeder Master Switch appears in the lower right corner.



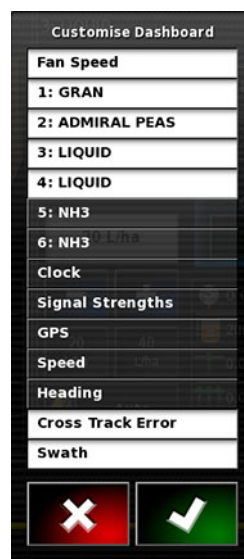
- 1 Auto section control, virtual switchbox, seeder controller icons
- 2 Seeder dashboard
- 3 Seeder master switch

## 4.1. Using the seeder dashboard

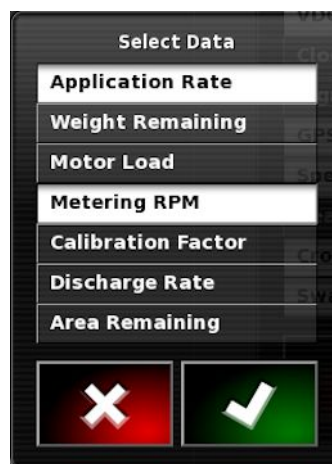
Seeder information is added to the dashboard. The example below shows the display for a seeder with 4 bins and fan speed.



1. Select any part of the dashboard to customize the information it displays.



2. Select and deselect options as required (information to display shown in white).
3. Select the individual tank to customize the information it displays.



4. Confirm.

## 4.2. Seeder master switch

When virtual master switch has been chosen in the setup options (**Implement / Operator Inputs / (Switch Box) / MASTER SWITCH**), the seeder master switch turns the seeder system on.

The switch also indicates the readiness of the system.



Yellow

Auto section control has the master switch turned off.



Yellow / white

Seeder controller is in preload mode (for granular products). The seeder will turn on when the countdown timer reaches zero.



Green

Seeder controller is on and working. Select the master switch to turn the seeder off.



White

Seeder controller is in standby. Select the master switch to turn the seeder on.



Red

Seeder controller is off and cannot be used.

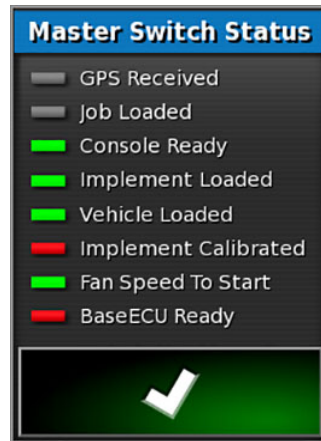


Blue

Virtual or keypad master switch is on. Implement master switch is off (see Setting up the operator inputs, page 27).

If the master switch is red, selecting the switch displays the status window.

## 4.2. Seeder master switch



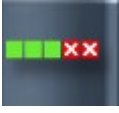
Green indicates that the system feature is ready. Red indicates that the system feature is not ready.

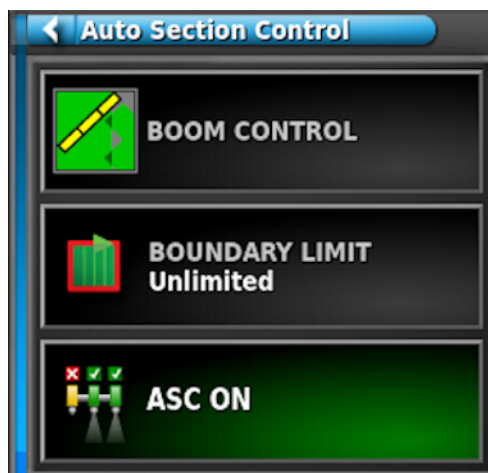


## 4.3. Opening auto section control

Auto Section Control (ASC) 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**).

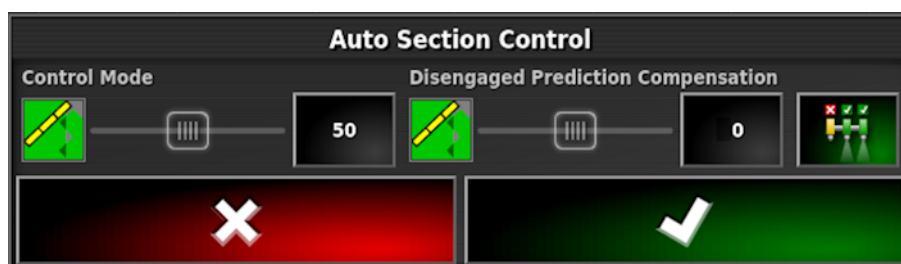
### 4.3.1. Single boom

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



- **Boundary limit:** Sets which type of boundary limit will turn off seeding 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.
- **ASC on/off:** Turn auto section control on/off on all booms.

### Boom control



- **Control mode:** Use the slider or number keypad to set to avoid overlap (0) or avoid gaps (100). If avoid overlap is chosen, there

### 4.3. Opening auto section control


may be some spaces where product is not applied. If avoid gaps is chosen, some overlap of application is likely near boundaries. The default (50) is a compromise.

- **Disengaged prediction compensation:** When auto steering is disengaged, this setting biases the section control timing towards avoiding overlaps (-50) or avoiding gaps (+50). This enables the system to compensate for the temporary lack of direction information caused by manual steering.

#### 4.3.2. Multiple booms

If the implement has multiple booms, the control mode and disengaged prediction compensation may be adjusted separately for each boom. Auto section control may also be turned on/off for each boom.

## 4.4. Mini-view windows

To display the seeder controller mini-view, select the seeder icon  from the left hand menu.

The Seeder controller mini-view window has a number of tabs at the top that display information for different air seeder features. Only enabled features and tanks are displayed.

The following options are available:



Fans



Drill Lift Control/ Pack Control



Blocked Head Monitor



Granular Tank

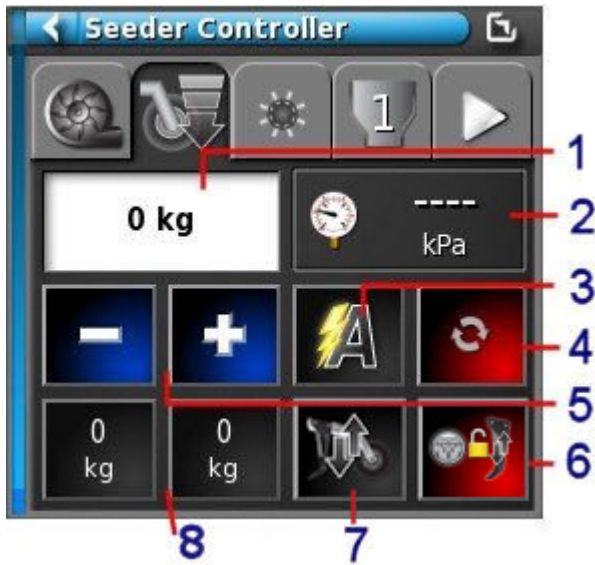


NH3/Liquid tank

### 4.4.1. Fans



### 4.4.2. Drill control



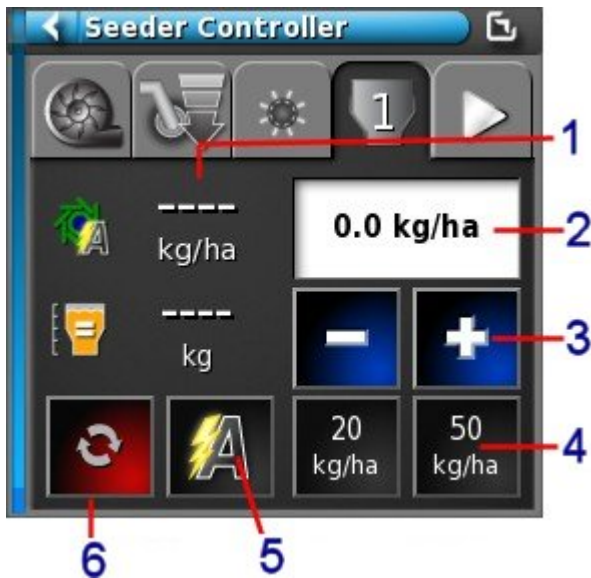
- 1** Requested pack control
- 2** Hydraulic pressure
- 3** Set rate control mode
- 4** Pack control on/off
- 5** Adjust pack control rate
- 6** Drill lift control track master (Control lift control using the master switch. When the master switch gets turned off, the drill will automatically lift.)
- 7** Lift control drill
- 8** Rate presets

### 4.4.3. Blocked head



Scroll left and right to select heads to click on. Heads are shown as grey if no sensors assigned, green if no blockages and red if any of the sensors assigned to that head has a blockage. Click on a red blocked head button to display blocked sensor information.

#### 4.4.4. Tank



- 1 Tank parameters (select to customise displayed data)
- 2 Requested rate
- 3 Adjust application rate
- 4 Application rate presets
- 5 Rate control mode (only displayed for granular tanks if VRC enabled)
- 6 Tank on/off

## 4.5. Operation screen

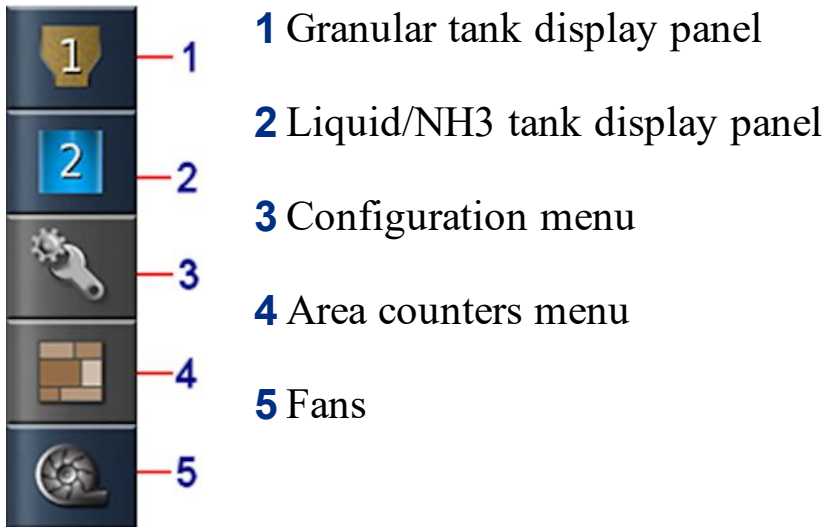
To display full screen mode, select the expand button on the mini-view window or swipe it from left to right.





- 1 Expand
- 2 Granular tank panel
- 3 Liquid/NH3 tank panel
- 4 Toolbar
- 5 Status monitoring panel
- 6 Fans

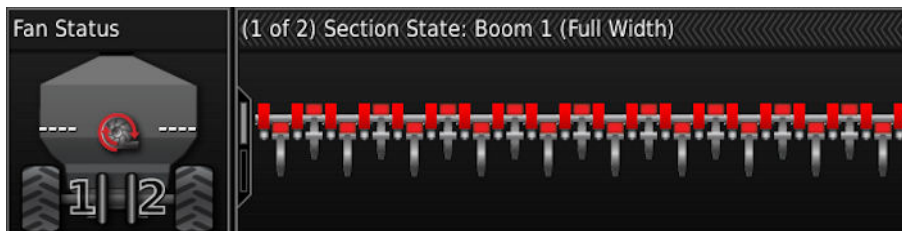
### 4.5.1. Toolbar

Used to select/deselect options on the seeder operation screen.



**Note:** The X35/X25 consoles display two extra icons on the toolbar:

Drill details  and Fan status . These are used to display/hide the options shown below.



### 4.5.2. Tank display panel

The tank display panel shows tank settings and status for a specific tank. It is displayed by selecting a bin number from the toolbar on the right hand side of the seeder controller window.

## 4.5. Operation screen



- 1** Displays up to two parameters related to the specific tank. Selecting opens a customize data window with a list of available parameters to be displayed. Refer to Tank parameters, page 81.
- 2** Requested application rate. Used to enter and display the application rate. The control system will use the calibration factor to adjust the metered application rate for the given product.
- 3** Increase/decrease requested application rate by preset rate increment (increment is set by selecting button shown at 6).
- 4** Requested application rate presets. These are the user-defined default application rates (set by selecting button shown at 6). Selecting one of these icons adjusts the application rate to that value.
- 5** Rate control mode selector. Allows you to select VRC, Auto control or Manual Control for specific tanks or all tanks. Manual control only available for liquid tank with regulator valve. Only shown if VRC is enabled.
- 6** Product Configuration. Opens the product selection window for the tank. Refer to Selecting / adding a product, page 82.
- 7** Tank Fill. Opens the tank fill window to add weight/volume of the

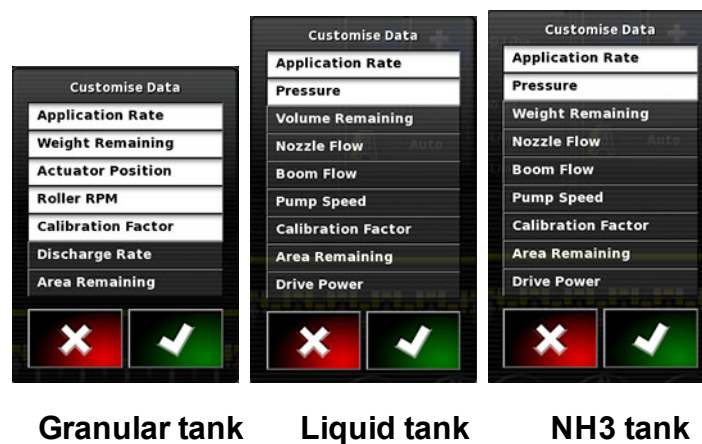


product being used. Refer to Filling tanks, page 84.

- 8 Tank metering on/off toggle. Green when tank is on (metering running), red when tank is off (metering stopped).
- 9 Displays up to five parameters related to the specific tank. Opens a customize data window with a list of available parameters to be displayed. Refer to Tank parameters, page 81.

## Tank parameters

The tank parameters are set by tapping the display area. One of the following menus is displayed; this is dependent on tank/bin setup. Select the required parameters from the list.



**Application rate:** The current application rate for the product in the specific tank. The control system will use the calibration factor to adjust the metered application rate for the given product.



**Calculated Weight/Volume remaining:** The calculated weight of product remaining in the tank. It is based on the initial entry when the tank was filled and calculates down from the initial value depending on the tank output.



**Actuator position:** Current linear actuator position (shown if linear actuator drive type is selected in setup).



**Motor load / Drive power:** Granular metering motor load output or liquid/NH3 drive power output.

## 4.5. Operation screen



**Metering RPM:** RPM output of metering roller.



**Calibration factor:** The calibration factor for the specific product in the specific tank in unit weight per revolution of metering RPM. Used to determine application rate.



**Discharge rate:** Displays amount of product being applied per minute.



**Area remaining:** The calculated area that can be treated based on the product remaining in the tank and the current application rate.



**Pressure:** The pressure in the liquid/NH<sub>3</sub> product line. An electric pressure sensor must be installed and pressure sensing feature must be enabled (**Implement / Seeder / NH<sub>3</sub>/Liquid / Pressure / SENSOR**).



**Nozzle flow:** Displays amount of NH<sub>3</sub>/liquid being applied through each nozzle per minute.



**Boom flow:** Displays amount of NH<sub>3</sub>/liquid being applied through entire boom per minute.



**Pump speed:** The speed of the pump. For this value to be displayed, pump speed sensor must be installed and pump speed sensing enabled (**Implement / Seeder / Pumps**).



**Metering Auger Type:** Type of metering auger selected in the tank drive setup.

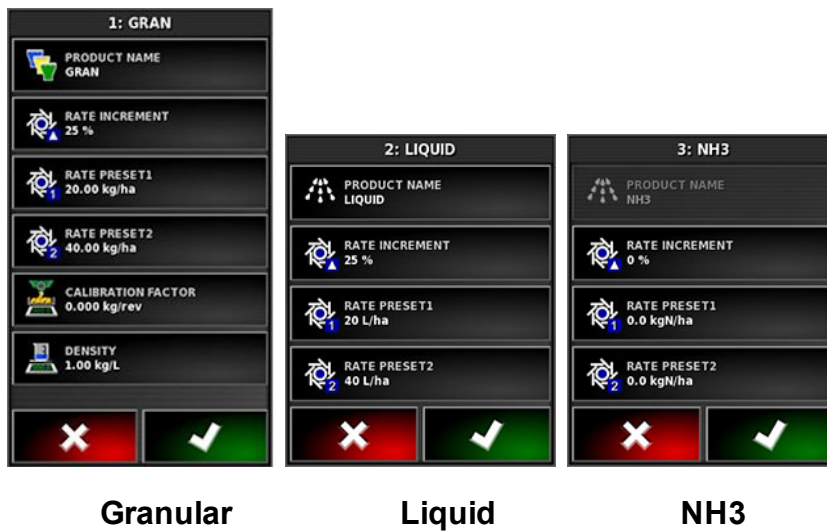
### 4.5.3. Selecting / adding a product

To select or add a new product:

1. Select the Product Configuration button.



One of the following menus displays, depending on tank type:



2. Select **PRODUCT NAME** to select a product from the list, or to add a new product. The product cannot be changed for NH3 tanks.



Selecting **New Product** opens the New Product Setup wizard.

Follow the wizard to add a new product. **Custom Product** may be selected to create a new product from scratch, or a product template may be selected from the list.

#### 4.5. Operation screen

- **Rate increment:** Defines how much the application rate will change when the operator presses the application rate up/down button. The rate can be changed by a fixed rate or by a percentage of the rate set for **Rate Preset 1**. To change the rate increment type:
  1. On the Setup screen, select **User / Region / Units**. The **APPLICATION RATE INCREMENT TYPE** may be set to **Fixed rate** or **Percentage of Rate 1**.
- **Rate preset 1 / Rate preset 2:** Defines preset application rates.

#### Granular tank settings

- **Calibration factor:** A figure is displayed if the selected product has been calibrated for the tank you are setting up. If a new product has been selected, or calibration was not performed, calibration will show zero. Refer to Granular tank calibration, page 103.
- **Density:** The product density.

#### 4.5.4. Filling tanks

1. Select the tank that you would like to enter weight for and expand the panel for that tank.
2. Select the tank fill button to display the tank fill menu.



3. Fill the tank using the following options:



**Set weight/volume:** Set the weight/volume of product in the tank (may be set to a higher figure than tank capacity).



**Weight/volume increment:** Set the weight/volume value to be used when increasing weight/volume in the tank by increments.



**Fill tank to capacity:** Fill the tank to the capacity entered on the Setup screen (**Implement / Seeder / Granular/Liquid / Tank**).



**Set tank weight to measured weight:** Set the weight of the tank to the net weight measured by the scale. (Only available if the tank has a dedicated scale.)



**Increase weight/volume by increment:** Adds product by the weight/volume set for **weight/volume increment**.



**Fill all tanks to capacity:** Fill all tanks to capacity entered on the setup screen (**Implement / Seeder / Granular/Liquid / Tank**), and set the weight of all tanks with a dedicated scale to the measured net weight.

### Adjust calibration

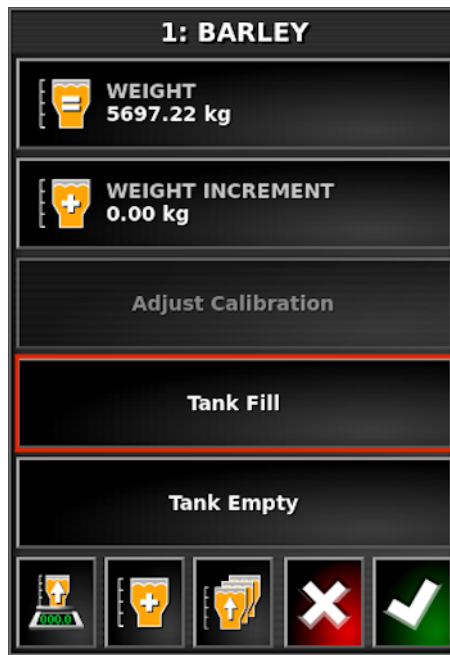
This option is used to adjust the calibration factor when there is a known starting volume and a known error in the finishing volume. It allows the calibration factor to be automatically recalculated based on the percentage difference between the calculated and actual volume remaining. This may be useful when there is an inconsistency between the displayed and known product remaining.

1. Select **Adjust Calibration**.
2. Select **Actual Volume Remaining**.
3. Enter the volume of product remaining in the tank and confirm.

The Calibration Adjustment percentage is automatically calculated.

### Tank fill wizard

If weigh scales are enabled (see Setting up weigh scales, page 64), or **Fill Tank** is not set to **Disabled** under **Implement / Seeder / Granular / Tank**, a tank fill wizard is added to the granular fill tank menu.



The tank fill wizard enables tanks to be reset (zeroed), if required and then filled to a measured amount.

**Note:** The options available in the wizard vary depending on the selection made for **Tank Fill** under **Implement / Seeder / Granular / Tank**:

- **Disabled:** (Not available when one or more weigh scales have been assigned to a tank.) The tank fill wizard is not accessible.
- **Manual:** (Only available when one or more weigh scales have been assigned to a tank). Weigh scales are used to fill tanks to correct weight via tank fill wizard.
- **Auto (sensors):** Fill sensors mounted in air cart are used in combination with Equalizer air cart to automatically fill tank to capacity.

- **Auto (scales):** (Only available when one or more weigh scales have been assigned to a tank.) Weigh scales are used in combination with Equalizer air cart to automatically fill tank to preset weight.
- **Auto (sensors and scales):** (Only available when one or more weigh scales have been assigned to a tank.) Weigh scales and fill sensors are used in combination with Equalizer air cart to fill tank to preset weight or capacity.

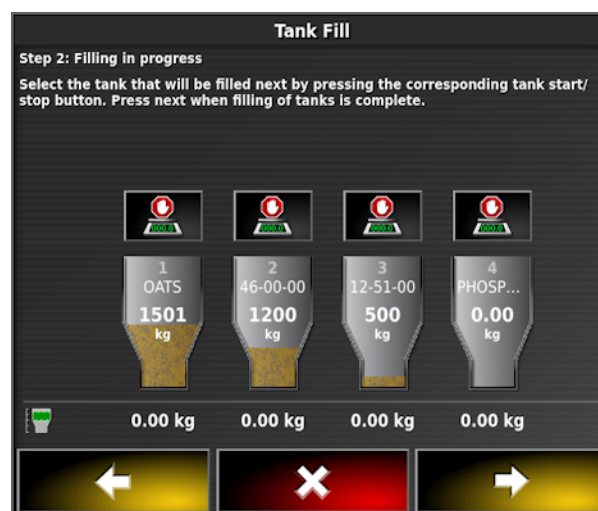
Some options listed below may not be available.

### Page one


- **Tank:** Tank number.
- **Current weight:** The calculated or measured current weight of product in the tank.
- **Reset:** Reset the tank weight to zero if required (not available for auto fill with tanks that have a dedicated scale).
- **Target:** Select to fill the tank to capacity or a partial fill (if using weigh scales).
- **Target weight:** Defaults to tank capacity if **Capacity** is selected for **Target**. Enter the target weight if **Partial Fill** is selected.

### Page two

For manual tank fill:



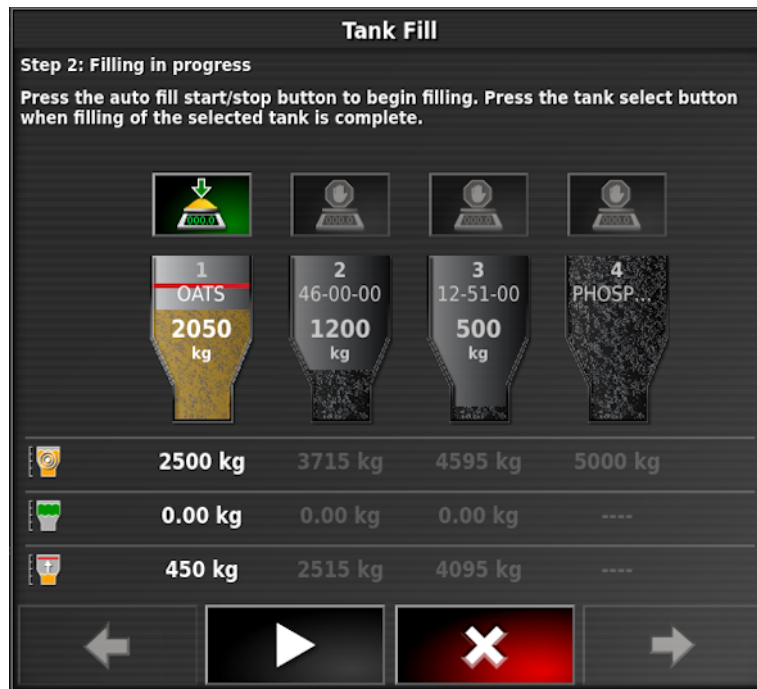
#### 4.5. Operation screen

1. Select the start/stop  button of the tank to be filled, add the required product, then press the start/stop button again.

The top figure displays the current weight and the figure at the base of the screen displays weight added.

2. Press next when product has been added to all required tanks.

For auto tank fill:



The red line indicates a partial fill amount specified.

**2050** Current weight





Target weight



Weight added




Weight to be added


1. Select the  button of the tank to be filled.
2. Select the  button to start the fill process.



If weigh scales are being used, the tank graphic displays the status of the fill process and the figures dynamically change.

Once the tank weight has reached capacity or is about to reach the defined partial fill weight, a ten second warning is sounded before the fill augers stops.

3. Shut off the flow from the truck supplying the product at the same time that the augers stop.
4. Press and hold the  button to manually operate the tank fill augers (e.g to empty the fill auger into the tank). The augers will continue to operate as long as the button is held down and the overfull sensor has not been reached.

5. Select the  button of the tank being filled to deselect it.
6. Press next when product has been added to all required tanks.

**Page three** (not available for auto fill with sensors only)

The table shows the added weight and the new total weight for each tank and all tanks totalled together.

When performing manual fill or auto fill with multiple tanks sharing a single scale, if the calculated added weight being displayed is incorrect, the figure may be manually adjusted.

**Note:** Selecting the cancel button on this screen will delete any record of tanks being reset, or product being added to tanks. This may result in inaccurate tank weights displayed. The confirmation button must be selected to save tank weight changes to the console.

### Tank empty

This option enables the external tank fill auger to be used to empty product out of a tank.

#### 4.5.5. Setting area counters

Area counters are used with spreaders, sprayers and seeders to record data such as treated area, product used, operating time, average rate and

## 4.5. Operation screen

productivity rate. Area counters are not available when using ISO implements.

To enable area counters:

1. On the Setup screen, select **System / Features / Implement**.



2. Select **AREA COUNTERS** and select one of the following:

- **Enabled (Stored per job):** Area counters are stored separately for each job, (if a job is started and coverage laid, then another job is selected and coverage laid, going back to the first job displays the area counters from the first job).
- **Enabled (Stored per implement):** Area counters continue across jobs, but loading a new implement displays new area counters. Reloading the first implement displays the area counters as they were when that implement was last used.
- **Enabled (Stored per job and implement):** Separate area counters are available for jobs and implements.

### Reset job area counters

This option is only applicable if area counters per job is enabled.

- **Never:** The area counter must be reset manually, or they will continue to accumulate data.
- **Prompt:** When a job is erased you will be asked if area counters should be reset.

- **Auto:** Creating a new job or erasing a job automatically resets the area counters.

To use area counters:

1. Select Area Counters on the toolbar to the right of the screen.



- 1 Set active area counter number
- 2 Reset area counter window
- 3 Treated area
- 4 Product used
- 5 Operating time
- 6 Average rate (area)
- 7 Productivity time

## 4.5. Operation screen

- To select the area counter against which the data will be stored, select **Set Active Area Counter Number** and select the required counter.

The same area counter must be selected each time data on the same topic is to be stored.

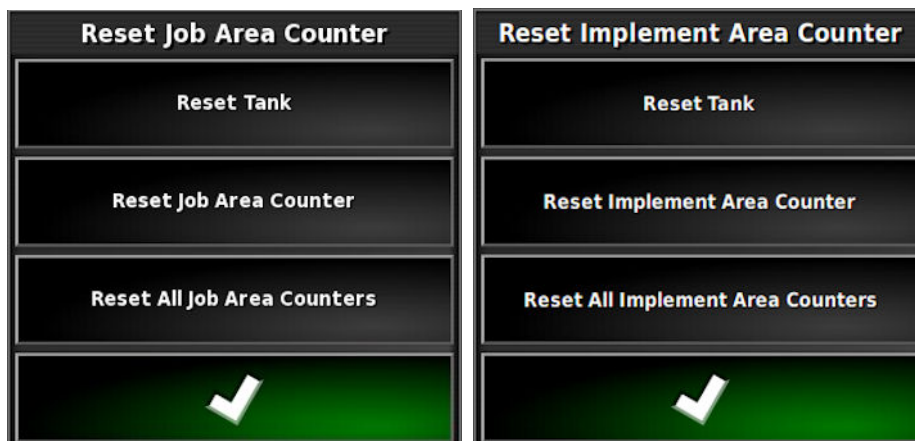


Data stored against the area counter is displayed in the lower half of the window.

- Use the arrows or select the middle **Area** button to view data stored against each area counter.
- Use the arrows or select the middle **Bin** button to view data stored against each bin.

### Reset area counter window

Select this option to reset data for a tank, the currently selected job or implement area counter, or all job or implement area counters.



### 4.5.6. Configuration panel

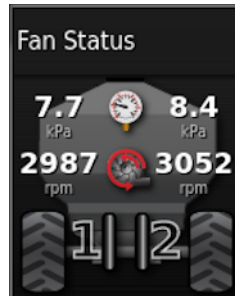


- **Manual Speed:** Allows the user to select manual speed and override the selection made in the Setup screen **Implement / Seeder / Speed Source**. This is only possible if the vehicle is stationary, or if GPS is selected and the signal drops out. The speed is used to calculate application rates.
- **Manual Speed display:** Enables the manual speed to be entered. This indicator changes to **Wheel Sensor** if that is selected as the speed source in the Setup screen **Implement / Seeder / Speed Source**. Refer to Wheel sensor calibration, page 118.
- **Multi-Tank Calibration:** Refer to Calibration, page 103.
- **Tank selection:** Select the tank to be calibrated for single tank calibration.
- **Single Tank Calibration:** Refer to Calibration, page 103.
- **Gear Ratio:** Set gear ratio for granular tanks.

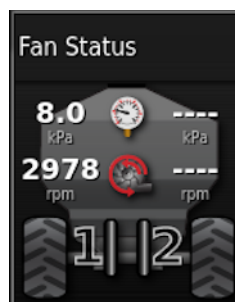
## 4.5. Operation screen

### 4.5.7. Fan status

The fan status panel displays the fan speed and pressure / velocity for enabled fans.



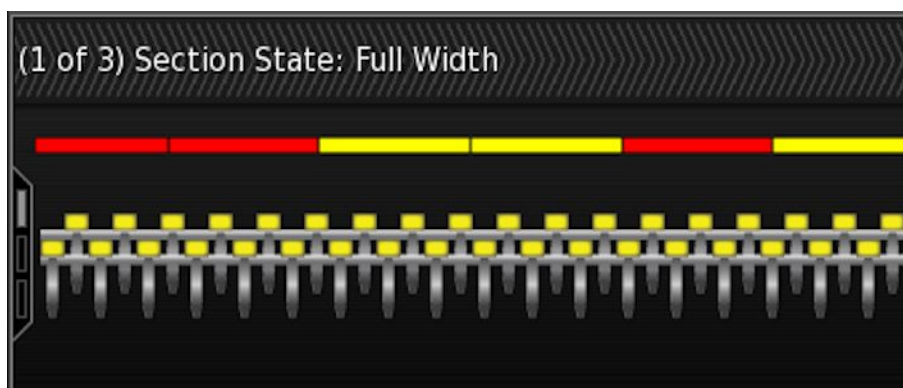
If one of the fans is disabled, the following screen is displayed.



### 4.5.8. Status monitoring panel

The status monitoring panel displays the status of the virtual switchbox, full width booms, blocked head monitor or drill control. To change between the screens, swipe the panel up or down.

#### Section control virtual switchbox



## Full width boom



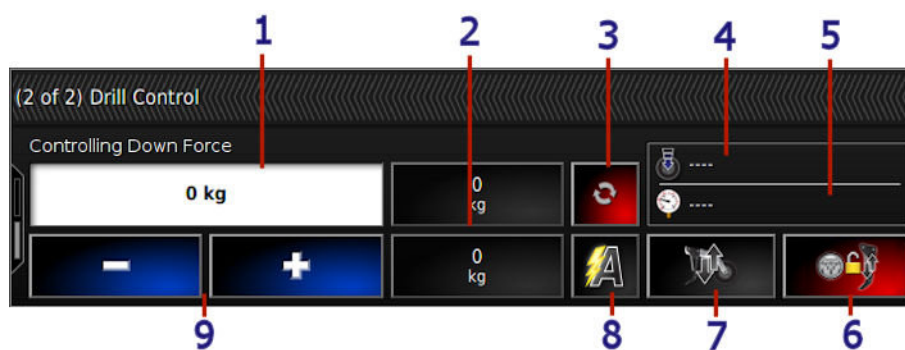
Scrolling up on this option shows different booms if more than one enabled.

## Blocked head monitor



Heads are shown as grey if no sensors assigned, green if no blockages and red if any of the sensors assigned to that head has a blockage. Click on a red blocked head button to display blocked sensor information.

## Drill control (with pack control)

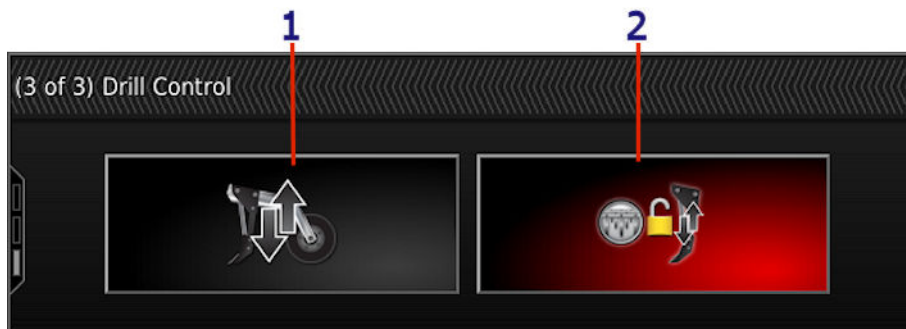


**1** Requested pack control

#### 4.5. Operation screen

- 2** Requested pack control presets
- 3** Turn pack control on/off
- 4** Pack force value
- 5** Hydraulic pressure
- 6** Drill lift control track master (Control lift control using the master switch. When the master switch gets turned off, the drill will automatically lift.)
- 7** Lift control drill
- 8** Set rate control mode
- 9** Decrement/increment pack control value

#### Drill control (without pack control)



- 1** Lift control drill
- 2** Drill lift control track master (Control lift control using the master switch. When the master switch gets turned off, the drill will automatically lift.)





## 4.6. External keypad operation

The keypad is an external device that may be used in the cabin and/or on the seeder frame to control selected functions. This option is only available with Apollo ECU. Refer to Keypad setup, page 29 for setup information.



The keypad is supplied with twelve keys:

- Keys marked 1 - 8 turn tanks on and off. Keys that do not have a corresponding tank (e.g. keys 5-8 in a four tank system) can be assigned to other functions using the Button 2 – Button 8 options on the setup screen if available.
- Keys marked A, B and /C: May be assigned to a range of functions using the Button A - Button C options on the setup screen. Note that the button marked /C is the granular product calibration prime/reset button for the ‘on frame’ keypad (refer to Granular tank calibration, page 103).
- Master switch :  Performs the same function as the master switch on the operation screen, except when auto tank fill or tank empty is in progress.

### 4.6.1. LED behavior

Tank keys:

Normal or calibration mode:

- Tank disabled (buttons 3 and above on a 2 tank implement): all LEDs are dark

## 4.6. External keypad operation

- Tank is on: Green LED (Tank and master switch is on. Product is flowing.)
- Tank is off but active: Amber LED (it is selected and ready to run but master is off and not doing prime/preload).
- Otherwise: Red LED

Special case one: During calibration, the tanks that have green or amber LEDs on also have the red LED flash in sequence. On a single tank system the red LED of tank 1 would flash, on a 2 tank system the red LEDs on tanks 1 and 2 would flash alternately and on a 3+ tank system the red LEDs would flash on keys 1, 2, 3, ... 1, 2, etc. While this is happening the amber or green LED indicate the state of the tank.

Special case two: The Cabin keypad will not have the flashing LEDs described above if the master switch is not controlled by the keypad. (See Apollo master switch setup, page 28.)

### Tank fill mode:

- Tank disabled or not a type that can be filled: all LEDs are dark
- Tank is being filled: Green LED
- Tank is not being filled but can be: Amber LED
- Tank cannot be filled (does not have a scale assigned or overfull sensor triggered): Red LED

### Lift control:

- Drill control disabled: Red LED
- Drill control enabled, drill is lifted (not a normal seeding state): Amber LED
- Drill control enabled, drill is lowered (normal seeding state): Green LED

### Drill lift tracks master:

- Drill control disabled: Red LED
- Drill control enabled, master switch does not affect drill lift: Amber LED

- Drill control enabled, drill is lifted when master is turned off: Green LED

#### Fill all tanks:

- All tanks are full: Red LED
- Not all tanks are full, button is released: Amber LED
- Not all tanks are full, button is pressed and held: First just the red LED is on, then red and amber, then all LEDs turn on and the function is executed.

**Note:** This button does not work on press only, the user must press and hold the button and the LEDs simulate a progress bar moving right.

#### Aux relay:

- Relay not configured: Red LED
- Relay configured, relay is on: Green LED
- Relay configured, relay is off: Amber LED

#### Master switch:

Normal mode (i.e. not calibration mode or tank fill/empty mode):

- Master switch is on: Green LED
- Cabin keypad and master switch is not controlled by the keypad: All LEDs are dark
- Master switch is off, can be turned on: Amber LED
- Master switch is off, can't be turned on: Red LED

Calibration mode:

- Master switch is on: Green LED
- Cabin keypad and master switch is not controlled by the keypad: All LEDs are dark
- Master switch is off, any tank is active (selected): Amber LED
- Master switch is off, no tank is active (selected): Red LED

Auto tank fill/tank empty mode:

## 4.6. External keypad operation

- Tank fill/empty augers are active: Green LED
- Tank fill/empty augers can be activated: Amber LED
- Tank fill/empty augers cannot be activated: Red LED
- Special case: If an auto tank fill mode has been selected and the augers are being manually operated (by pressing and holding the run/stop button), both the Green and Amber LEDs will be on.

### Prime/preload:

- Preload is enabled and preload is in progress: Green LED
- Preload is enabled but preload is not running: Amber LED
- Preload is not enabled: Red LED

Preload is enabled when all of these are true:

- Manual speed is configured
- System is operational (TC is alive)
- Calibration is not in progress
- Master switch is off
- Fan speed is good
- There is at least one tank which satisfies all of these conditions:
  - Is active (has been selected)
  - Has a product assigned
  - Is a granular tank
  - Has a non-zero application rate
  - Is enabled
  - Is proportional drive

**Note:** Pressing and holding this button primes the implement until the button is released. This overrides the time entered in Implement / Seeder / Granular / Tank / PRELOAD TIME, which defines the default time for priming. Prime is only available for proportional drive tank types. It is not available for linear actuator, regulator valve and monitoring only tank types.

## Reset:

The reset function resets the Calculated Weight figures on the calibration wizard, ready for calibration to start over.

The Prime/Preload/C key acts as a reset during calibration mode.

Pressing it during calibration will reset the pulse counts, but only if the master is off or all tanks are off.

It displays a red LED, but when the reset happens the green LED flashes to confirm the action.

## Calibration mode:

- If the calibration is in progress: Green LED
- If the calibration is not in progress, but is allowed: Amber LED
- If calibration is not allowed: Red LED

Calibration is allowed if:

- Master switch is off
- Not preloading
- All granular and enabled tanks with a product assigned have some remaining volume of their products.

If not in calibration mode, pressing the button will immediately switch the system to calibration mode.

If in calibration mode, the button must be pressed and held for a while to cancel calibration mode. While the button is down, the LEDs change from Red to Red + Amber to Red + Amber + Green (like a progress bar moving right) and only after that the system goes out of calibration mode.

## Tank fill mode:

- If tank fill is in progress: Green LED
- If tank fill is not in progress, but is allowed: Amber LED
- If tank fill is not allowed: Red LED

Tank fill is allowed if:

## 4.6. External keypad operation

- Tank fill is not set to disabled
- The Seeder Controller full view operation screen is being displayed on the console
- Calibration and tank empty modes are not active

If not in tank fill mode, pressing the button will immediately switch the system to tank fill mode.

If in tank fill mode, the button must be pressed and held for a while to cancel tank fill mode. While the button is down, the LEDs change from Red to Red + Amber to Red + Amber + Green (like a progress bar moving right) and only after that the system goes out of tank fill mode.

### Tank empty mode:

- If tank empty is in progress: Green LED
- If tank empty is not in progress, but is allowed: Amber LED
- If tank empty is not allowed: Red LED

Tank empty is allowed if:

- Tank fill is set to an Auto mode
- The Seeder Controller full view operation screen is being displayed on the console
- Calibration and tank fill modes are not active

If not in tank empty mode, pressing the button will immediately switch the system to tank empty mode.

If in tank empty mode, pressing the button will immediately cause the system to leave tank empty mode.

# Chapter 5 – Calibration

Tanks/bins must be calibrated when setting up a seeder for the first time, or adding a new product.

Correctly calibrating tanks/bins ensures that seeding is carried out at the proper rate to obtain maximum yield and crop. The size of seed and supplement product will vary between batches and even the size of seed of the same variety from one year to the next. This requires that the seeder metering system be calibrated so that the correct amount of seed is dispensed.

## 5.1. Granular tank calibration

There are two methods of calibrating granular tanks; manual and automatic.

Manual can only be used if the calibration factor for the selected product is known. The granular calibration wizard, accessed via Automatic Calibration must be used if the calibration factor is not known.

To access the calibration menu to calibrate a single tank, select the **Calibration** option on the Configuration panel, or select **Calibration Factor** on the product calibration page.

To access the calibration menu to calibrate multiple tanks, select the **Multi-Tank Calibration** option in the configuration menu.

## 5.1. Granular tank calibration

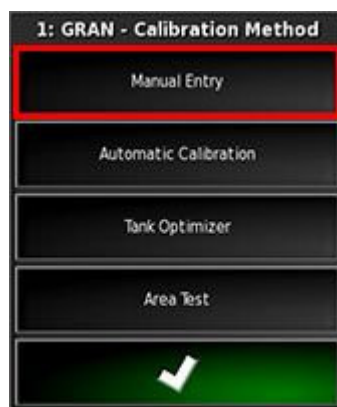


### 5.1.1. Manual entry of calibration factor

1. Use the left and right arrows to select the required granular tank from the Configuration panel.



2. Select **Calibration**.
3. Select **Manual Entry** from the calibration method menu.



4. Enter the calibration factor in weight to revolutions and confirm.

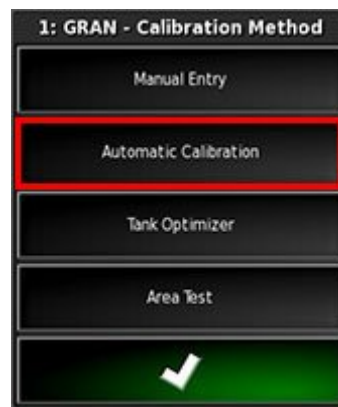


### 5.1.2. Automatic calibration

1. Ensure a value is set for manual speed by selecting **MANUAL SPEED** from the Configuration panel and entering a speed to match seeding operations.



2. If using a switchbox or keypad for calibration, ensure it is enabled on the Setup screen (**Implement / Operator Inputs**).
3. Select **Multi-tank Calibration** or **Calibration** from the Configuration panel.
4. Select **Automatic Calibration** from the calibration method menu.



5. The granular calibration wizard displays.



## 5.1. Granular tank calibration

If **Linear Actuator** is selected as the tank **Drive Type (Implement / Seeder / Granular / Drive Setup)**, the Calibration and Style options are displayed:

- Calibration:
  - **Stationary:** Product must be dispensed for calibration using a hand crank.
  - **Rolling:** Product is dispensed for calibration automatically while the vehicle is rolling.
- Style:
  - **Control to rate:** Actuator opens to accommodate rate requested on next screen.
  - **Control to extension:** Actuator opens to percentage extension requested. Selecting this option displays an **Extension** option. Use this to enter the percentage the actuator should open to dispense product.

6. Select next.

7. If using a multi-tank switchbox or a keypad, turn on the tanks to be calibrated. The state indicator status of the tanks on the console calibration screen will change to green.

Or, if using the console or a run/stop switchbox, turn on the tanks to be calibrated by selecting the status indicators on the console calibration screen.

8. Place calibration buckets under the metering roller of the tanks being calibrated.

If this is the first calibration for these products, you should first ensure the metering system is primed. Note that this is not applicable to tanks with linear actuator drive types.

To prime the metering system:

- On the calibration switchbox or keypad, turn on the master/run switch. Or, if using the console, select the implement master switch. It will turn green.

- Run the metering system until all the product is running freely. Then on the calibration switchbox or keypad, turn the master/run switch off. Or, if using the console, select the implement master switch. It will turn white.
  - On the calibration switchbox or keypad, press and hold the prime/reset button until the indicator light goes out. Or, if using the console, select the reset button next to each tank on the calibration screen. This will reset shaft revolutions and calculated weight on the console calibration screen.
  - Empty the calibration buckets and return to the original position under the metering rollers.
9. On the calibration switchbox or keypad, turn on the master/run switch.  
Or, if using the console, select the implement master switch. It will turn green.
  10. Run the metering system until you have sufficient product to weigh. Then on the calibration switchbox or keypad, turn the master/run switch off.  
Or, if using the console, select the implement master switch. It will turn white.  
  
The calibration screen will show accumulated pulses, and calculated weight.
  11. If any of the bins/tanks are highlighted red, this indicates that the meter motor values are at a PWM <15% or >95%. If this occurs, select a different final drive range and recalibrate that tank. Refer to seeder manufacturer for final drive range settings.
  12. Select next.
  13. Weigh each calibration bucket sample and note values in kilograms/pounds for entry into the calibration wizard.
  14. Enter noted weight values of each tank sample in to the **Actual Weight** column then select next.

## 5.1. Granular tank calibration

15. Confirm the calibration values and set the **save** option to **Saved** and confirm.

## 5.2. Liquid tank calibration

There are two methods of calibrating liquid tanks; manual and automatic.

Manual can only be used if the calibration factor for the selected product is known. The liquid calibration wizard, accessed via Automatic Calibration, must be used if the calibration factor is not known.

To access the calibration menu to calibrate a single tank, select the **Calibration** option on the Configuration panel. Note that multi-tank automatic calibration is not an option for liquid tanks.



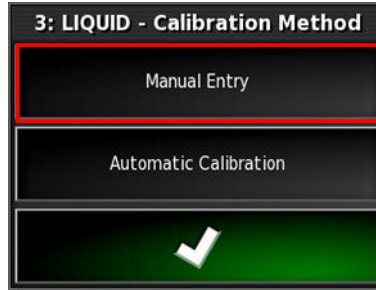
### 5.2.1. Manual entry of calibration factor

1. Use the left and right arrows to select the required liquid tank from the Configuration panel.



2. Select **Calibration**.
3. Select **Manual Entry** from the calibration method menu.

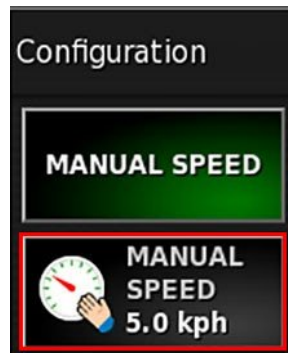
## 5.2. Liquid tank calibration



4. Enter the calibration factor and confirm.

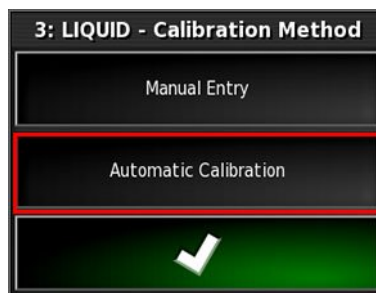
### 5.2.2. Automatic calibration

1. Ensure a value is set for manual speed by selecting **MANUAL SPEED** from the Configuration panel and entering a speed to match seeding operations.



2. Select **Calibration**.

3. Select **Automatic Calibration** from the calibration method menu.

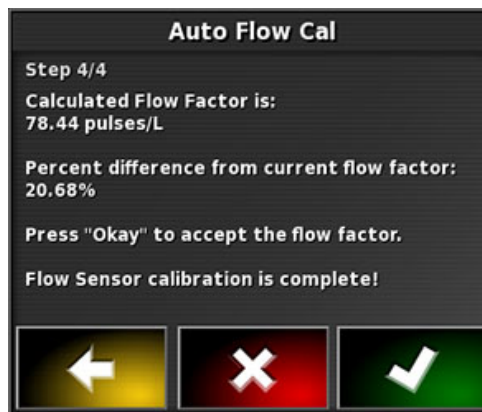


The Auto Flow calibration wizard displays.

4. Place the calibration bucket under the tank to be calibrated.

5. Select the master switch on the console. The next arrow on step 1 of the calibration wizard will now be active. Select next.

6. Run the liquid drive until sufficient liquid product has been obtained (the larger the volume measured, the more accurate the flow meter calibration will be). Select the master switch on the console to turn off the liquid drive and select next.
7. Measure the volume of product in the calibration bucket.
8. Select **Volume Captured** on the calibration wizard, and enter the amount of liquid measured in calibration bucket, then select next.
9. Confirm the displayed calculated flow factor.



## 5.3. NH3 tank calibration

NH3 tanks have a preset calibration value. This figure is entered manually. Check the calibration factor on the tag on the flow meter of the NH3 system.

To access the calibration menu to calibrate a single tank, select the **Calibration** option on the Configuration panel.



If the **Multi-Tank Calibration** option is selected from the configuration screen, the calibration method menu will be displayed. Note that automatic calibration is not an option for NH3 tanks.

### 5.3.1. Manual entry of calibration factor

1. Use the left and right arrows to select the required NH3 tank from the Configuration panel.



2. Select **Calibration**.
3. Enter the calibration factor pulses per weight and confirm.



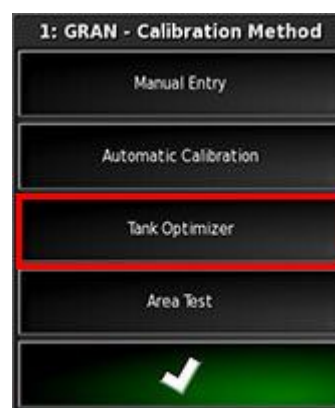
## 5.4. Tank optimizer

The console provides a tank optimizer tool to determine product allocation across granular tanks. This minimizes tank filling requirements in the field. This is done by optimizing the application rates across multiple tanks.

To access the calibration menu to run the tank optimizer, select the **Calibration** or **Multi-tank calibration** option in the Configuration panel, or select **Calibration Factor** on the granular product information page.



1. Select **Tank Optimizer** from the Calibration Method window. The Tank Optimizer Wizard will start.









2. Select  to add a product to the table.


## 5.4. Tank optimizer

**Tank Optimizer**

Step 1/2:  
Enter Product, rate of application, number of tanks and choose to split rate across tanks.

Product	Rate	Assigned to	Split rate	Remove?
0-0-60	0.00 kg/ha	Multiple Meters	Yes	
Please Select	0.00 kg/ha	Multiple Meters	No	

3. Select **Rate** and enter the required application rate using the keypad.
4. Select **Assigned To** from the list and select the required option:
  - **Any Single Meter:** Optimizer will assign any tank to the product.
  - **Multiple Meters:** Optimizer will assign several tanks to the product.
  - **Tank #:** Select required tank number. The number of tanks shown is dependent on tanks specified during implement setup.
5. Select **Split rate** (only displayed if multi-tank assigned):
  - **Yes:** Will set the rates for each tank so they all run out at the same time.
  - **No:** This will use the requested application for the product for each tank, and you will have to manually switch tanks as they run out.
6. Select  to add another product if required, then repeat steps 3 to 5 or select next.

The tank optimization settings are displayed.



7. Select confirm to save settings.

## 5.5. Pack control calibration

If **Pack Control** is enabled in the setup screen **Implement / Seeder / Drill Control / Pack Control**, the pack control must be calibrated.

Before the Pack Control (down force) feature can accurately measure the amount of packing force being applied by the opener, the load sensing packer spindle must be calibrated.

**Note:** To ensure accurate calibration, the opener tip (or disc) on the load sensing opener must not contact the ground.

1. Place a set of scales under the packer wheel to allow you to measure the weight on the wheel at all times.
2. Engage the opener hydraulics and put the openers in the down position, ensuring you have met the requirements listed below to generate packing force:
  - Set a manual speed.
  - Turn off Automatic Section Control (ASC).
  - Engage fan or temporarily set the fan speed to start at "0".
  - If GPS is connected, start a job.
  - Engage Pack Control and Master (indicators must be green).
3. Select **Pack Control Calibration** and follow the wizard.



To set the minimum standard operating pressure, the wizard displays the drive power, hydraulic pressure and minimum calculated calibration value.

4. Adjust the drive power slightly higher if desired.
5. Once steady, take note of the weight reading on the scales and select next.
6. Enter that weight into the **Sensor Load** field and select next.

To set the maximum standard operating pressure, the wizard displays the drive power, hydraulic pressure and maximum calculated calibration value.

7. Increase the drive power until desired pressure is reached.
8. Once steady, take note of the weight reading on the scales and select next.
9. Enter that weight into the **Sensor Load** field and select next.
10. Select next and the calibration is now complete.

**Note:** It is recommended to record the calibration results. This removes the need to repeat the pack control calibration if a new implement profile is created. To view and record the results, select **Implement / Seeder / Drill Control / Pack Control** and record the following figures:

**Minimum sensor load, Maximum sensor load, Minimum ADC and Maximum ADC.** These figures can be manually re-entered for a new implement profile.

## 5.6. Wheel sensor calibration

If **Wheel Sensor** is selected in the Setup screen **Implement / Seeder / Speed Source**, the wheel factor must be calibrated.

Wheel factor defines how many meters per pulse are received from the wheel speed sensor.

To calibrate the wheel factor:

1. Select **Wheel Sensor** from the seeder configuration screen.



The Auto Speed Cal wizard displays.

2. Follow the wizard prompts to calibrate the wheel sensor.

## 5.7. Performing an area test

Area test is used to verify whether the tank and wheel calibrations are accurate. It simulates the seeder function according to the tank calibration factor and wheel calibration settings over a user definable distance. This ensures that the amount of product metered out is correct and as expected.

For example; applying product at 80 kg/Ha and selecting to cover 0.25 Ha, operating at the entered manual speed is simulated over that distance. Once complete, you can verify that the machine has metered out 20 kg.

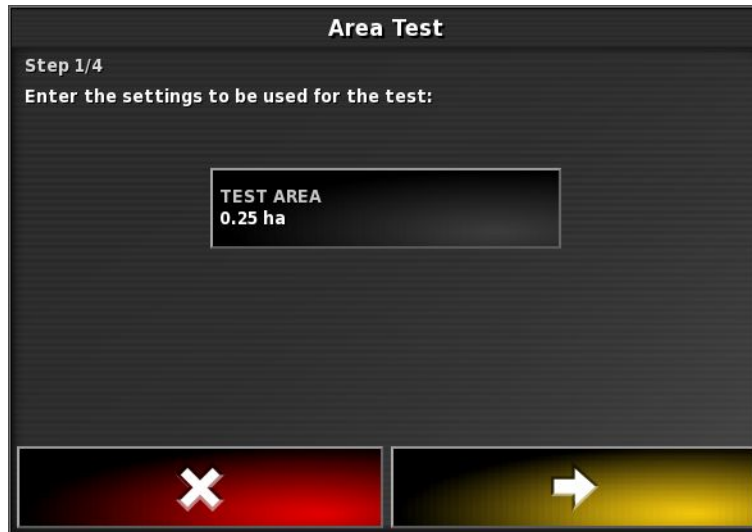
To access the area test option, select the **Calibration** or **Multi-tank calibration** option in the Configuration panel, or select **Calibration Factor** on the granular product information page.



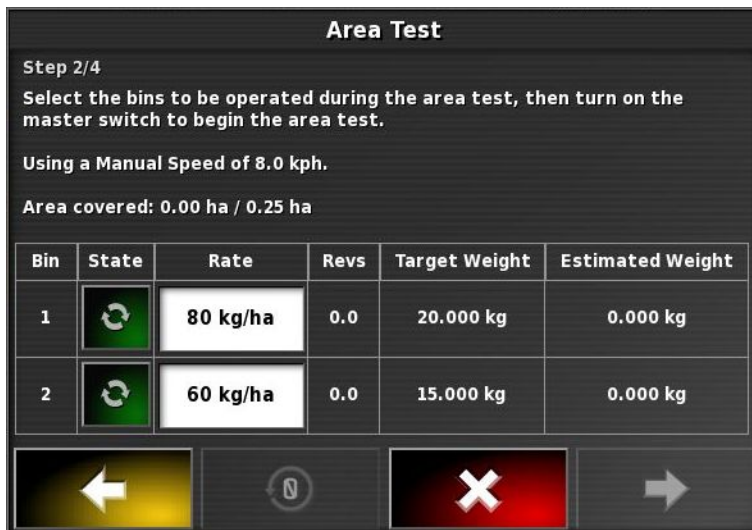
1. Select **Area Test** from the Calibration Method window. The area test wizard displays.
2. Enter the required **Test Area** and select next.

**Note:** If **Use Calibration Drive** is displayed, select it to automatically expel product (no hand cranking), for a ground drive system.

## 5.7. Performing an area test



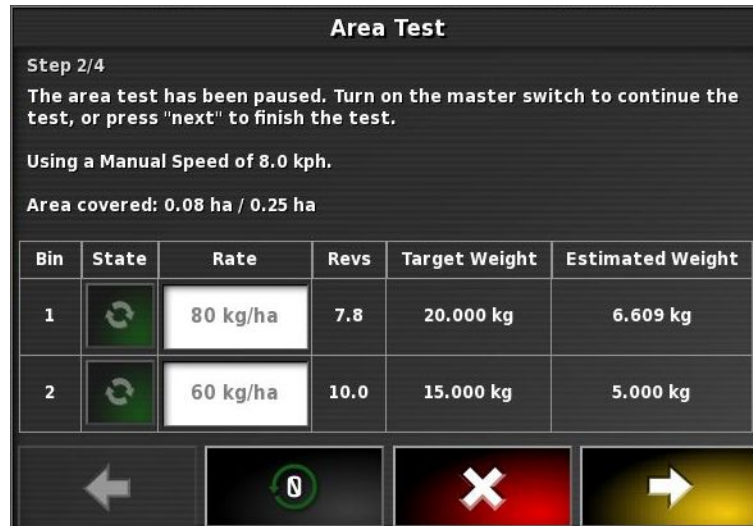
3. Use the **State** buttons to select the required bins/tanks.
4. Place calibration buckets under the dispensers of the selected tanks.
5. Start the calibration process by turning on the master switch.



**Note:** Once the master switch is activated, individual tanks can not be turned off. To pause calibration, the master switch must be used.

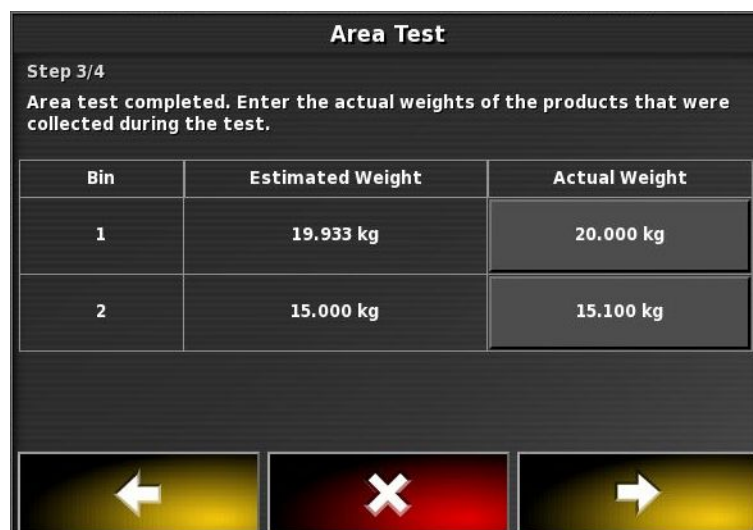
Pressing reset allows the calibration process to be restarted, allowing bins to be turned off if required.





Once the defined area has been covered, the calibration stops.

6. Turn the master switch off and press next to proceed.
7. Weigh each calibration bucket sample and enter the measured weight in the **Actual Weight** column, then press next.



8. Confirm the calibration values and set the Save option to **Saved** and confirm.

## 5.7. Performing an area test

**Area Test**

Step 4/4  
Select the calibration factors that will be updated, then press "Okay" to accept these values.

Bin	Old Factor	New Factor	Difference	Save
1	0.853 kg/rev	0.856 kg/rev	0.34%	<input checked="" type="checkbox"/> Saved
2	0.500 kg/rev	0.503 kg/rev	0.67%	<input checked="" type="checkbox"/> Saved

← [X] [Y] [Z] ✓

## Chapter 6 – Seeder Alarms

Alarms are provided for warning if any functions of the seeding system are not functioning properly.

To access seeder alarms on the setup menu:

1. Select **System / Alarms / Seeder**.

All the seeder alarms are displayed on the left side of the setup screen in a scroll down list.



The status of the alarms is indicated by:

 Enabled,  Disabled

All the alarms can be enabled or disabled using the **All Seeder Alarms** setting.

The following alarms can be set for the seeder system.

- **Incorrect rate:** Application rate is higher or lower than acceptable set application rate range.
- **No comms:** No communication between the seeder ECUs.
- **Tank empty (sensor):** There is no product in front of the tanks bin level sensor.
- **Tank low (calculated):** The theoretical weight of product remaining in the tank is low.
- **Blocked distribution head:** If equipped, sensors detect one or more blocked runs.


- **Product variation:** There is at least one distribution head with product flowing out of it at an incorrect rate. It is outside the expected range of the other distribution heads in the system.
- **Shaft moving tank off:** Signals that a meter is still turning even though the respective tank switch, the master, or both are off.
- **No ground speed:** No ground speed detected.
- **Case drain:** Fan motor case drain pressure is too high (>65psi).
- **Ladder down:** Air cart access ladder is down.
- **Section switching problem:** For granular section control only, signals if a section valve actuator is not in the correct position.
- **Section off, flow detected:** Signals if there is product flow when there shouldn't be.
- **Section turned off:** A section has been turned off for an extended period of time.
- **Gear ratio:** Computed gear ratio incorrect.
- **Stopped shaft:** Metering shaft has stopped while the tank switch and master switch are still both on.
- **Tank active, no rate:** Tank is on but no application rate has been set.
- **Tank off:** Master switch switched to on but tank switches are off.
- **High auxiliary RPM speed:** Only used if Aux RPM enabled.
- **Low auxiliary RPM speed:** Only used if Aux RPM enabled.
- **Pack control off:** Master switch switched to on but pack control is off.
- **Drill raised, master on:** Master is on, vehicle is moving, but drill is still in the raised position.
- **Hydraulic pressure low:** Down force hydraulic pressure is lower than minimum hydraulic pressure set point.
- **Flow sensor failure:** Liquid flow sensor not reading pulses.
- **Pressure high:** Liquid pressure is higher than high pressure set point.

- **Pressure low:** Liquid pressure is lower than low pressure set point.
- **High pump speed:** Pump speed is higher than the maximum RPM set point. This alarm is for liquid/NH<sub>3</sub> systems with pump speed sensor installed.
- **Low pump speed:** Pump speed is lower than the minimum RPM set point. This alarm is for liquid/NH<sub>3</sub> systems with pump speed sensor installed.
- **No liquid flow:** In-line flow meter is not registering a signal when the tank and master switches are on.
- **Granular pressure low:** Granular tank pressure is lower than low pressure set point.
- **Granular pressure high:** Granular tank pressure is higher than high pressure set point.
- **High fan speed:** Fan RPM is more than the high RPM set point.
- **Low fan speed:** Fan RPM is less than the low RPM set point.
- **High fan pressure:** Fan pressure more than the high pressure set point.
- **Low fan pressure:** Fan pressure less than the low pressure set point.
- **Speed source fallback:** GPS signal has dropped out, speed source fallback being used for speed.
- **Cabin keypad not communicating:** This may occur if an implement profile is imported onto a different console and the cabin keypad is not also transferred.
- **Frame keypad not communicating:** This may occur if an implement profile is imported onto a different console and the frame keypad is not also transferred.
- **Moving with QDA raised:** Implement is moving with drill lifted. QDA = Quick Depth Adjust.
- **Implement raised:** Product is being applied while the implement is raised.

- **Fluctuating RPM:** Triggered if the tank metering shaft is fluctuating by more than a user specified percentage. Only applicable to pulsed section monitoring.
- **Pack control incorrect rate:** The actual pack force does not match the requested pack force.
- **Scale weight difference:** Measured weight differs from calculated weight after defined 'delay' time.
- **Scale average weight difference:** The average weight differs from the calculated weight within a defined window of time.
- **Scale setup number mismatch:** The scale setup number on the SL2 does not match the one configured by Horizon.
- **Scale calibration number mismatch:** The scale calibration number on the SL2 does not match the one configured by Horizon.
- **Brake on:** The speed has been above a set threshold with the forward brakes engaged for a specified period.
- **Brake disengaged:** The speed has been above a set threshold with the reverse brakes disengaged for a set period.
- **Low fan air velocity:** Fan air velocity is below minimum air velocity.
- **High fan air velocity:** Fan air velocity is above maximum air velocity.
- **Air velocity sensor fault:** A fault has been detected with the air velocity sensor. The system should be power cycled.
- **ECU series mismatch:** The ECU series that has been configured is not compatible with the connected ECU.
- **Auto fill emergency stop:** The auto fill emergency stop has been activated.

# Chapter 7 – 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.

## 7.1. If using VRC maps

There are three ways to perform VRC:

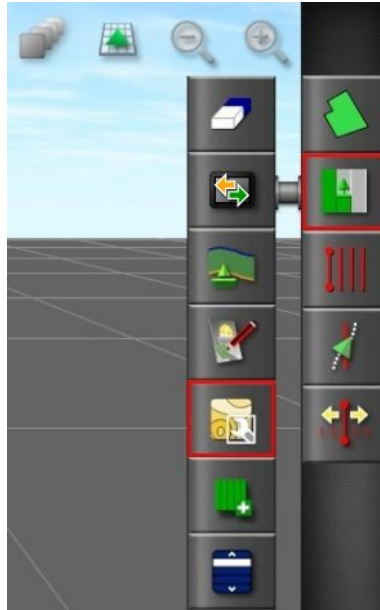
- Importing prescription maps (shapefiles and ISO XML files) into created jobs using the VRC import wizard.
- Using real-time sensor data from nitrogen sensors mounted on the tractor (for example: Topcon CropSpec).
- Using Task Data based prescription maps.

The following instructions describe the first two methods. If using task data, refer to the Task Data section in the Guidance and Auto Steering Operator 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 VRC for this job**.


## 7.1. If using VRC maps



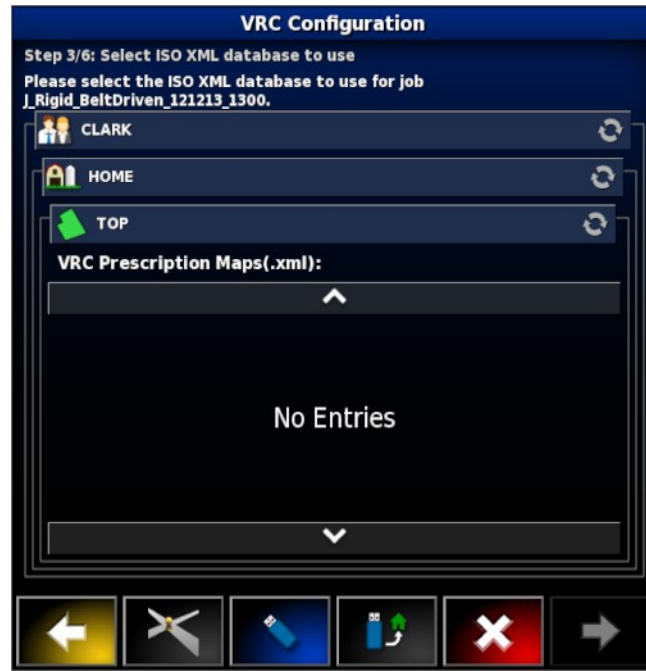
4. Select next at step 1 of the VRC Configuration wizard.
5. Select the rate source(s) for the VRC and select next. The possible options are:
  - Shapefiles
  - ISO XML
  - CropSpec or Yara (if enabled)


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

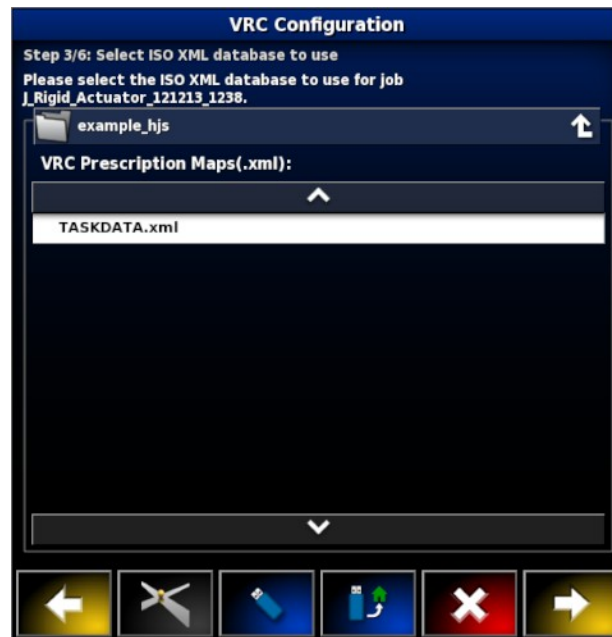
If **Shapefiles** or **ISO XML** are selected at step 2, all maps previously imported to the current field are displayed so that previously used maps can be recalled.

- If the desired maps are not already on the console, insert a USB with prescription maps.
- Select the USB icon at the 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.



- Select next.

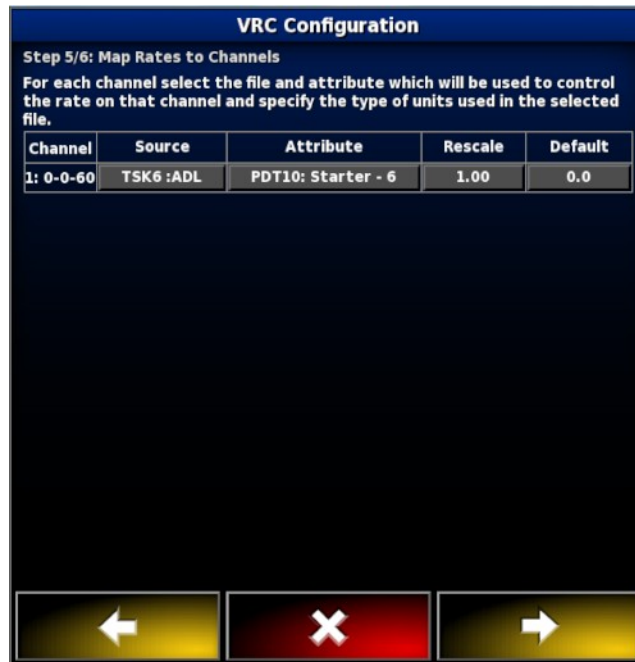
## 7.1. If using VRC maps

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 seeder implement.

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 will appear here or you can also select a live source like CropSpec or Yara.
- **Attribute:** One of the properties in the shape file or ISO XML 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 or if the GPS signal drops out.



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.



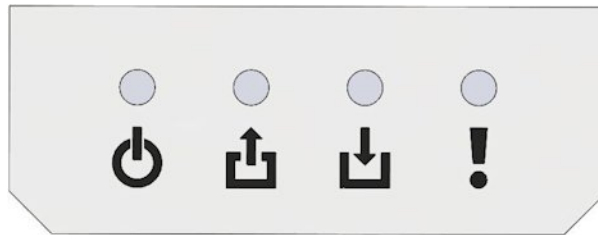
## 7.1. If using VRC maps





# Chapter 8 – Apollo ECU Information

There are two types of Apollo ECUs available:

- The CM-40 is the main control module.
- The EM-24 is the Input/Output expansion module.

## 8.1. Interpreting Apollo ECU LEDs



-  Power LED
-  Transmit LED
-  Receive LED
-  ECU Status LED

**Note:** If a fault occurs in the ECU, an error code may be displayed. Refer to Apollo ECU error codes, page 137.

### 8.1.1. Power LEDs

The power LEDs display different behavior on the CM-40 and EM-24 ECUs.

The following types of 12V power are applied to the Apollo ECUs:

- **ECU power:** Powers the internal logic and sensor power supplies.
- **solenoid power:** Powers the relays and H-bridges.
- **VCB solenoid power:** (Vertical Connector Board) power supplied on the ECU connectors.

## 8.1. Interpreting Apollo ECU LEDs

### CM-40 Power LED

LED state	Power state
Green	ECU power on solenoid power on VCB solenoid power on
Amber	ECU power on Either solenoid or VCB solenoid power on
Flashing amber	ECU power on solenoid power off VCB solenoid power off
Red	ECU, solenoid, VCB solenoid or sensor power fault solenoid and VCB solenoid power off affected sensor supplies off an alarm is triggered
Off	ECU, solenoid, VCB solenoid and sensor power off

Sensor power is on when the ECU is on, unless the sensor power supplies experience a fault.

### EM-24 Power LED

LED state	Power state
Green	ECU power on solenoid power on VCB solenoid power on sensor power (5V, 8V and 12V) on
Amber	ECU power on solenoid power on VCB solenoid power on some or all sensor power off

LED state	Power state
Flashing amber	ECU power on solenoid power off VCB solenoid power off sensor power off
Red	ECU, solenoid, VCB solenoid or sensor power fault solenoid and VCB solenoid power off affected sensor supplies off an alarm is triggered

### 8.1.2. Transmit LED

LED state	Communication state
Flashing green	This indicates that the control processor is executing the application firmware.
Flashing red	If the LED is OFF, this indicates that the boot loader is running.

### 8.1.3. Receive LED

LED state	Communication state
Flashing green	Communicating with master. No CAN faults.
Amber	No communication with master. No CAN faults.
Flashing amber	Communicating with master. CAN is operating in error active mode.
Red	No communication with master. CAN bus fault (bus off).
Flashing red	Communicating with master. CAN is operating in error passive mode.

### 8.1.4. ECU status LED

LED state	ECU state
Green	Control output (PWM and relay) allowed. No Power, communication or ECU configuration faults.

## 8.1. Interpreting Apollo ECU LEDs

LED state	ECU state
Amber	Control output is inhibited. No faults are active. For example: 'drive enable'.
Flashing amber	Control output is allowed for unaffected sub-systems. A warning level fault is active. An alarm will be shown. For example: 'relay over current'.
Red	Control output is inhibited. Fault/error state. An alarm will be raised.
Off	The boot loader is running.



## 8.2. Apollo ECU error codes

### 8.2.1. Error levels

There are three different severity levels for errors and faults.

Severity level	Description
Error/fault	All control output will be stopped. Relays will turn off and actuators will power down.
Warning	Control output will continue for subsystems not affected by the fault. For example, if a sensor power supply experiences over current, the relays will not power down.
Information	Control output is not affected.

### 8.2.2. Error code signature

The error codes displayed in Sunrise or on the Universal Terminal will have the following signature:

**IOGGPPDDEE**

The meaning of each pair of digits is covered in the following sections.

**Note:** This is a hexadecimal number, base 16 arithmetic should be used.

### 8.2.3. CM-40 ECU error codes

#### EE - ECU error state

These two digits give an indication of which ECU subsystems have high severity errors/faults.

The specific error(s) in each subsystem, specified by EE, can be found by decoding the preceding digits (IOGGPPDD).

Not all high severity errors are included in the preceding digits, in this case faulty subsystems are only identified. IOGGPPDD can be zero (not displayed) in this case and only EE will have a value.

## 8.2. Apollo ECU error codes

If any of the preceding digits are not zero, but the error state digits (EE) are zero, the fault identified by the preceding digits is only a warning or informational.

EE Value Subsystem	
01	Communication (CAN)
02	Drive (H-Bridges or relays)
04	Power
08	General
10	ECU input/output

### DD - Drive errors

These digits identify individual faults in the drive subsystem.

DD Value Subsystem	
01	H-Bridge A (channel 1 and 2) over temperature warning
02	H-Bridge B (channel 3 and 4) over temperature warning
04	Hardware over current shutdown
08	Software over current shutdown
20	Drive shutdown
40	Relay over current fault

### PP - Power error flags

These digits identify faults in the power subsystems.

PP Value Subsystem	
01	Solenoid power under voltage
02	Solenoid power over voltage or over current
04	Connector board solenoid power over voltage or over current
08	ECU power over voltage or over current
10	12V sensor power over current

PP Value Subsystem	
20	5V sensor power over current
40	Solenoid power MOSFET off
80	ECU power MOSFET off

## GG - General flags

These digits give information or identify faults that affect the ECU but do not fit in any other subsystem or category.

GG Value Subsystem	
01	Transport/disabled mode active
02	ECU sleep active
04	Outputs disabled and software configuration cleared
08	ECU software configuration error

## IO - ECU input/output flags

These digits identify faults in the ECU inputs and outputs.

IO Value Subsystem	
01	Input capture over frequency

## 8.2.4. EM-24 ECU error codes

### EE - ECU error state

These digits have the same meaning as for the CM-40 ECU. If not zero, EE identifies subsystems with high severity faults. If zero the fault given by the preceding digits is only a warning or informational.

EE Value Subsystem	
01	Communication (CAN or SPI)
02	Drive output (relays)
04	Power
08	General

## 8.2. Apollo ECU error codes

EE Value Subsystem	
10	ECU input/output

### DD - Drive errors

These digits identify individual components with faults in the drive subsystem.

DD Value Subsystem	
40	Relay over current

### PP - Power error flags

These digits identify faults in the power subsystems.

PP Value Subsystem	
01	Solenoid power under voltage
02	Solenoid power over voltage or over current
04	Connector board solenoid power over voltage or over current
08	ECU power over voltage or over current
10	5V sensor power over current
20	8V sensor power over current
40	12V sensor power over current
80	Solenoid power MOSFET off

### GG - General flags

These digits give information or identify faults that affect the ECU but do not fit in any other subsystem or category.

GG Value	Subsystem
01	Transport/disabled mode active
04	Outputs disabled and software configuration cleared
08	ECU software configuration error

GG Value	Subsystem
10	No communication with auxiliary CPU (auxiliary CPU in boot loader mode)
20	Main and auxiliary CPU firmware mismatch

## IO - ECU input/output flags

These digits identify faults in the ECU inputs and outputs.

IO Value	Subsystem
01	Input capture over frequency

### 8.2.5. Decoding error codes

These examples show how to decode the error codes using the signature.

#### Example 1

This example applies to both the CM-40 and EM-24.

**IOGGPPDDEE** = Error signature

**0000010004** = Error displayed (**10004** is displayed in Sunrise)

The displayed error is split across three values in Universal Terminal mode, these should be joined.

Align the last digit of the displayed error with the last digit of the signature.

Note that leading zeros (blue) are not displayed when using Sunrise and should be added.

Signature digits	Decoded error
EE = 04	The power subsystem has a high severity fault
DD = 00	The drive subsystem does not have any errors
PP = 01	Specific fault in this case is: Solenoid power under voltage
GG = 00	There are no general errors

## 8.2. Apollo ECU error codes

Signature digits	Decoded error
IO = 00	There are no input or output errors

### Example 2

This example applies to the CM-40 ECU only.

**DDEE** = Error signature (shortened for brevity).

**0502** = Error displayed

Signature digits	Decoded error
EE = 02	The drive subsystem has a high severity error(s)
DD = 05 (= 01 + 04)	<p>In this case there are multiple errors active, this is because the value 05 is not listed in the drive error table.</p> <p>The errors can be found by determining which numbers add up to the value displayed</p> <p>In this case 01 and 04 add up to 05</p> <p>The errors are:</p> <p>01 = H-Bridge A (channel 1 and 2) over temperature warning</p> <p>04 = Hardware over current shutdown</p>

## 8.3. Updating Apollo ECU firmware

### For a single CM-40 ECU

1. On a Windows machine, unzip the firmware ZIP file onto a USB flash drive.
2. On the setup screen, select **System / Features / Console** and ensure that **FILE SERVER** is enabled.
3. Select **Implement / ECU / Upgrade ECU**.
4. Open the README.html file that is supplied in the zipped files to check the supplied firmware versions.
5. Check the versions displayed in the **Firmware version** column against the supplied firmware. Any that do not match must be updated.



The first part of the displayed firmware versions (**2.11-r3** in the example above) refers to the Main CPU version. The second part (**0.0.17**) refers to the Auxiliary (Aux) CPU version.

6. Click in the **Firmware version** column on the ECUs to be updated and select from the following:
  - **Upgrade Main CPU:** Select if the first part of the displayed firmware version does not match the supplied firmware.
  - **Upgrade Aux CPU:** Select if the second part of the displayed firmware version does not match the supplied firmware.
  - **Upgrade both:** Select if both parts of the displayed firmware version do not match the supplied firmware.
7. Once all required selections have been made, select **UPGRADE ECU FIRMWARE** at the top of the screen.
8. Confirm the warning message and select the next arrow.
9. Insert the USB flash drive containing the firmware into the console and select next once the USB is recognised.

### 8.3. Updating Apollo ECU firmware

10. The USB contents are displayed. Navigate to the firmware files and select the next arrow.
11. Confirm the message to start the update. **Note:** If **Upgrade both** is selected, during the upgrade process the messages 'Configuring ECU' and 'Synchronising ECU' are displayed. DO NOT press the green confirmation tick until these have completed.
12. **Upgrade Complete** is displayed once the process has finished. Confirm to restart the console.

**Note:** If the displayed firmware versions are not correct after the restart, power down and restart the tractor.

#### For multiple CM-40 ECUs

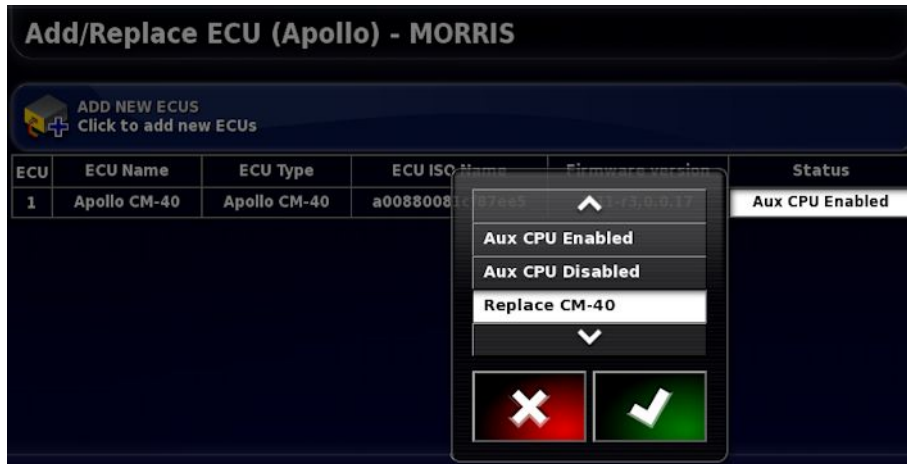
If the system has more than one CM-40 ECU installed, a dummy implement profile must be created to update the Aux CPU firmware for the secondary CM-40 ECU.

1. Follow the steps detailed above for a single CM-40 ECU.
2. Select **Implement / New / Factory** and confirm the **Seeder** selection.
3. Create an implement by selecting the top items on the displayed lists for either manufacturer (for both the implement and drill template).

**Note:** Select **Apollo** for **ECU Type** and name the profile **UPGRADE**.

4. Remove the Comms connectors from all ECUs except the one that will be updated.
5. Select **Implement / ECU / Add/Replace ECU**.
6. Select the button in the **Status** column for the CM-40 ECU and select **Replace CM-40**.





The console will restart.

**Note:** If the ECU is not detected, try unplugging the Comms connector on the ECU and reinserting it.

7. Repeat steps 6 to 12 from the steps detailed for a single CM-40 ECU.

8. Select **Implement / Select** to select the original implement profile.

9. Replace the Comms connectors that were removed in step 4.

**Note:** It may be necessary to restart the system to load all the required settings.

### For EM-24 ECUs

1. On a Windows machine, unzip the firmware ZIP file onto a USB flash drive.

2. On the setup screen, select **System / Features / Console** and ensure that **FILE SERVER** is enabled.

3. Select **Implement / ECU / Upgrade ECU**.

4. Open the README.html file that is supplied in the zipped files to check the supplied firmware versions.

5. Check the versions displayed in the **Firmware version** column against the supplied firmware. Any that do not match must be updated.

6. Click in the **Firmware version** column on the ECUs to be updated and select **Upgrade both**.

### 8.3. Updating Apollo ECU firmware

7. Select **UPGRADE ECU FIRMWARE** at the top of the screen.
8. Confirm the warning message and select the next arrow.
9. Insert the USB flash drive containing the firmware into the console and select next once the USB is recognised.
10. The USB contents are displayed. Navigate to the firmware files and select the next arrow.
11. Confirm the message to start the update.
12. **Upgrade Complete** is displayed once the process has finished. Confirm to restart the console.

**Note:** If the displayed firmware versions are not correct after the restart, power down and restart the tractor.

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