

# **User Guide**

**Stocks AG 'i-CON'**  
**Applicator Control System**  
Operation





## **Electro-Magnetic Compatibility (EMC)**

This product complies with Council Directive 2004/108/EC when installed and used in accordance with the relevant instructions.

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Check that the software reference matches that displayed by the instrument.

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## 1. Overview

The Stocks AG 'i-CON' *Applicator Control System* is a sophisticated, CAN-based control system that provides complete monitoring and control of a Seed Applicator unit. Its primary function is to automatically maintain a preset target application rate as the forward speed varies, with on-the-move spot adjustment of the rate as required.

### 1.1 System Components

All control system components integral to the Seed Applicator Unit are factory fitted. The remaining components need to be installed in the field,

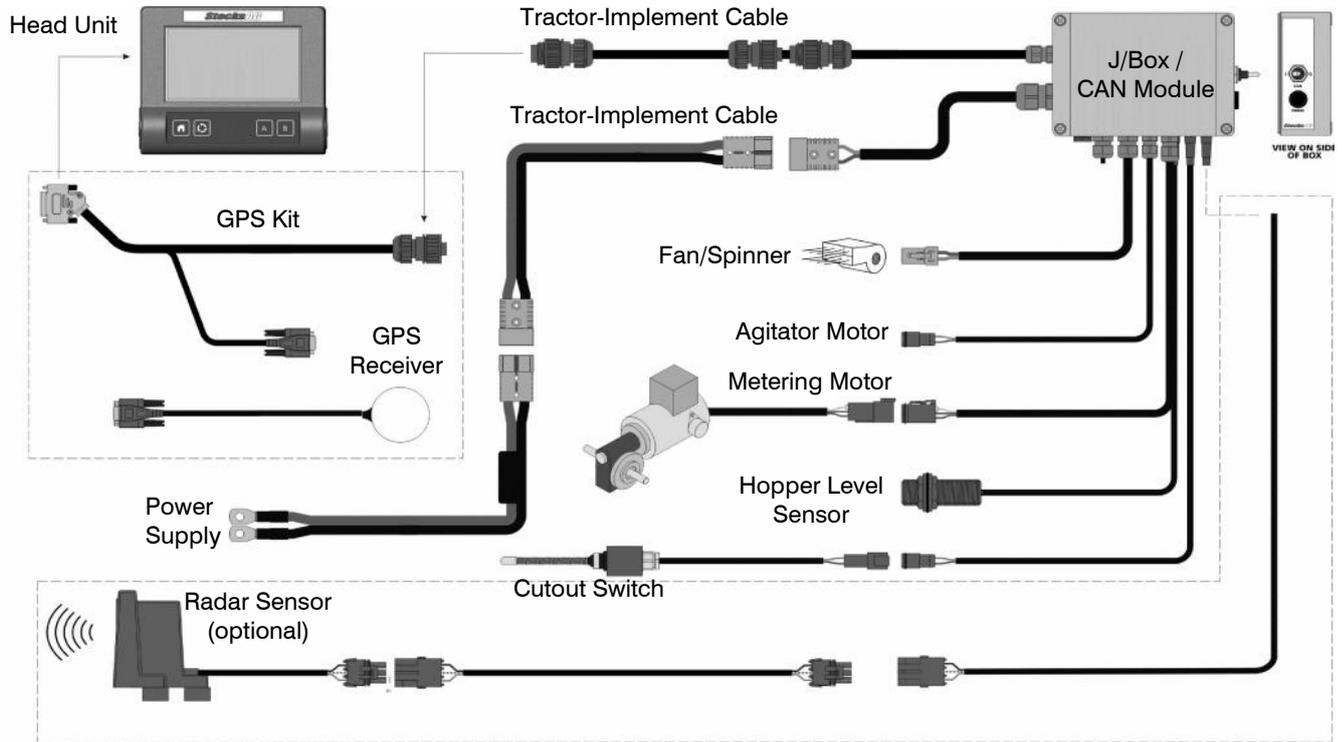
- Head Unit.
- Power cable from battery.
- Forward Speed Sensor (GPS Receiver / Radar Sensor) onto the drill.
- Cutout Switch onto the drill.

Separate heavy-duty power cable and head unit leads interconnect the tractor and the Seed Applicator Unit. 4m and 10m versions are also available to suit the length of the implement train.

**NOTE:** *The recommended maximum combined length of power cabling from battery to the junction box is 30m.*

**NOTE:** *The system software is designed to cater for a range of drill hardware configurations, namely electric or hydraulic fan, or electric spinner operation. This manual describes the requisite display functions or operating procedures for all configurations.*

## 1.2 System Schematic



### 1.3 Calibration

The system must be initially calibrated for the seed being applied. Seed calibration is very simple to undertake. Dispensing the seed for weighing, is controlled either from the on-screen menu, or via a Remote Priming Switch provided on the junction box fitted on the drill. The junction box also has an on-off switch to switch the fans off during calibration.

### 1.4 Head Unit

The head unit has a 4.3" Colour Touch Screen plus 4 basic menu keys, and includes the following display functions, including audible alarms,

- Seed Application Rate (kg/ha or Seeds/m<sup>2</sup>).
- Forward Speed (km/hr).
- Minimum/Maximum Forward Speed indicator with alarms, (beyond which the programmed seed rate cannot be maintained).
- Metering Unit Status (On/Off) and Alarm.
- Fan (or Spinner - depending on installation) Status (On/Off) and Alarm.
- Hopper contents (kg) and Low Level Alarm.
- Part and Full (Job) Totals for Area (ha), Product dispensed (kg) and hours worked.
- Grand Total for Area (ha), Product dispensed (kg) and hours worked.

Other features include,

- Simple and intuitive touchscreen menus for Forward Speed / Product calibration and adjustment.
- 'Pre-start' - ensures seed delivery begins immediately the drill enters work (user-programmable).
- Rate 'Nudge' – on-the-move rate adjustment in preset increments (user-programmable).
- Alarm codes and diagnostic displays in the event of system malfunction.

## 1.5 Touch Screen



The instrument has a 4-wire resistive touchscreen utilising a thin, flexible film overlay. **Do not operate the touchscreen using a sharp-pointed object otherwise the screen may be damaged beyond repair !**

A screen protector film is supplied that will prevent wear and tear, and can be easily replaced if required. Note however, that the touchscreen sensitivity will be slightly reduced with the screen protector in place.

## 1.6 Power-On

Press and hold the left-hand rubber end cap of the instrument for approximately 2 seconds, then release. Allow several seconds for the instrument to self-test, after which the startup screen with logo is displayed.

Following this, the software reference is displayed, e.g. 'GC105-xxx revxx' whilst the application software is loaded.

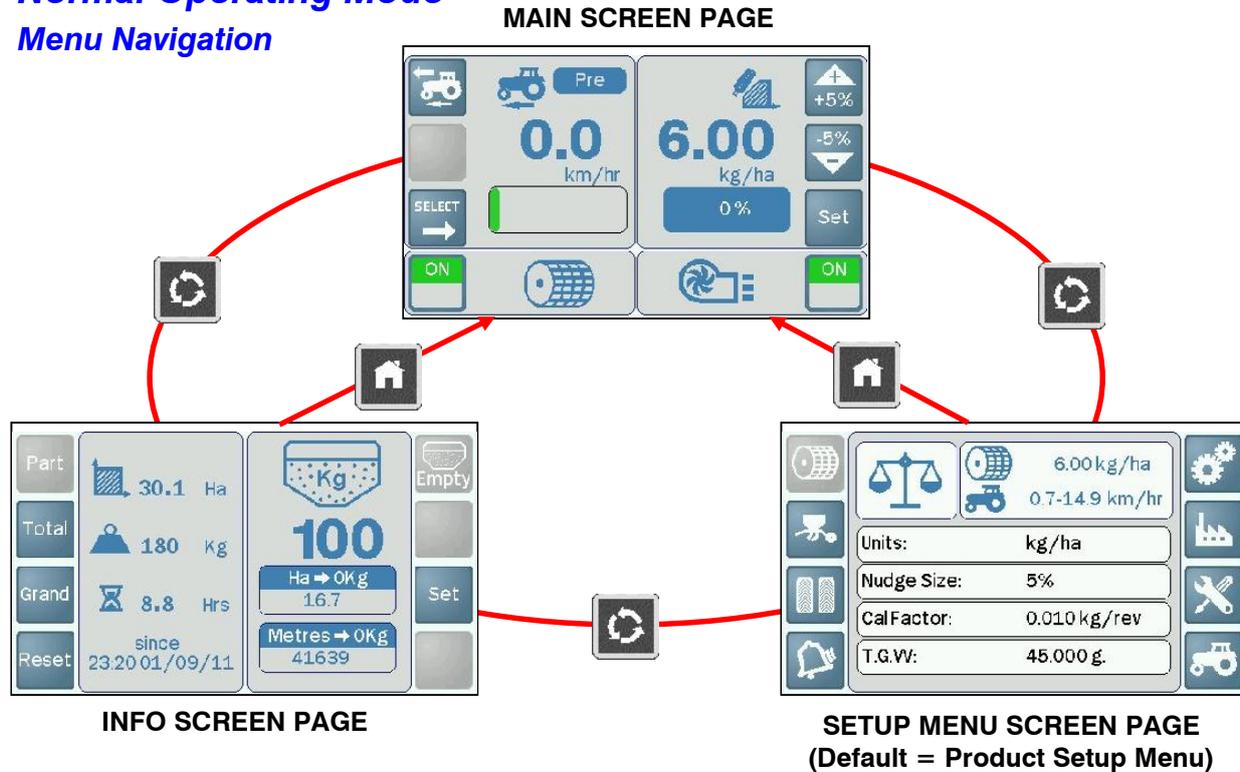
**NOTE:** Switching the head unit on, simultaneously powers up the CAN module. If the CAN module for whatever reason fails to establish communication with the head unit, then the instrument will alarm with the error code '**H4C** – **CAN FAILURE**' displayed. In this event, switch off the instrument and check the head unit connector / junction box cable is secure and undamaged. If the error persists, then please contact your service representative for further advice.

## 1.7 Power-Off

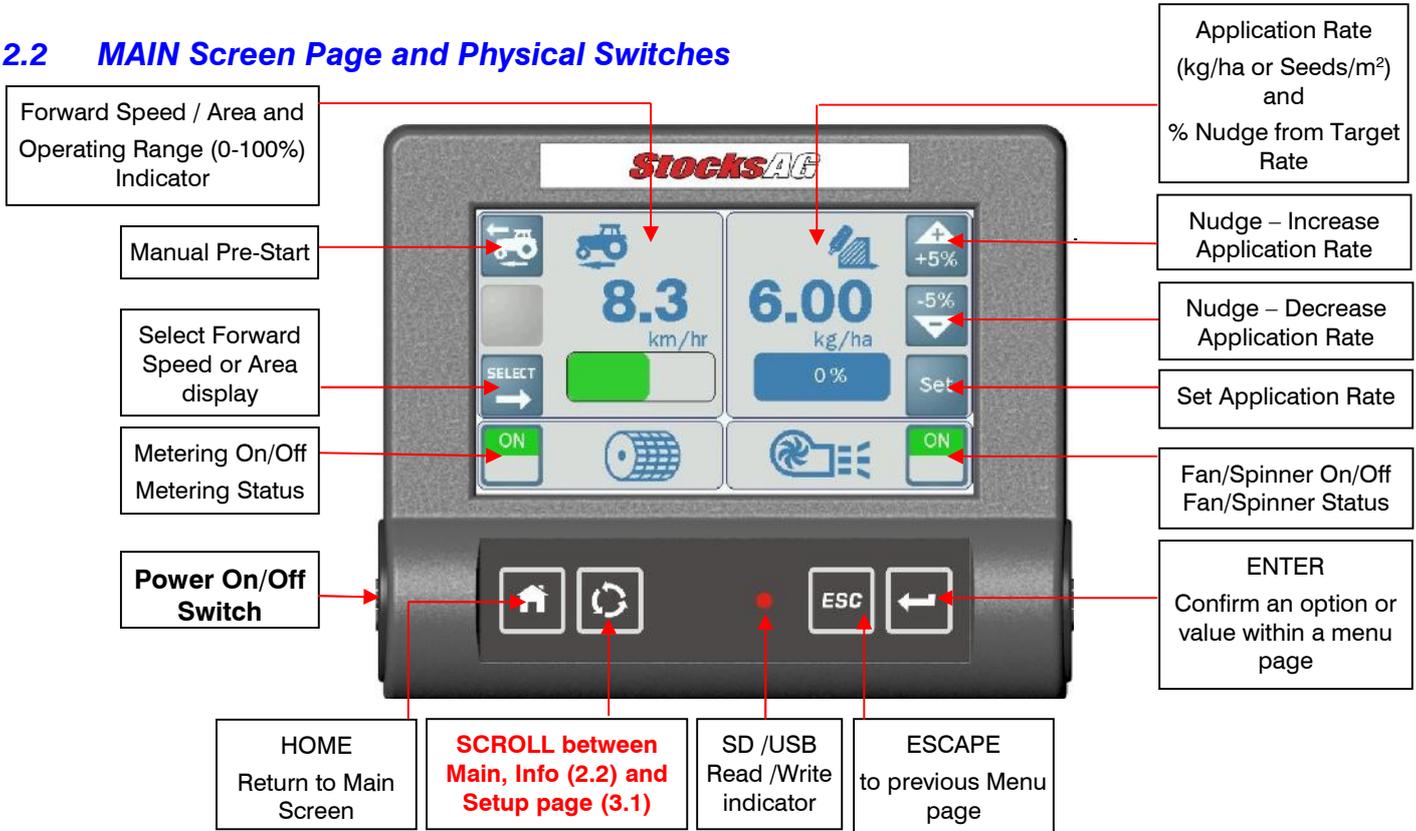
Press and hold the left-hand rubber end cap of the instrument for approximately 2 seconds, then release to power off. All current settings and job totals are saved to the memory.

## 2 Normal Operating Mode

### 2.1 Menu Navigation



## 2.2 MAIN Screen Page and Physical Switches



### Starting and Stopping the Seeder

The drill is fitted with a cutout switch so that the metering motor starts and stops automatically when the drill is lowered and raised, e.g. when turning on the headlands.

*NOTE: If sowing grass, an agitator motor can be enabled, which operates automatically in tandem with the metering motor, to ensure even flow of product onto the metering roll.*

### Metering Motor Status

AUTO: Drill in work – metering motor running

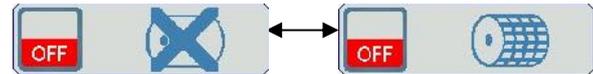


AUTO: Drill out of work. Metering motor stopped + beeps



MANUAL OVERRIDE: Press to manually switch the metering motor off (with the drill in or out of work).

The status indicator will alternate as shown + beeps.

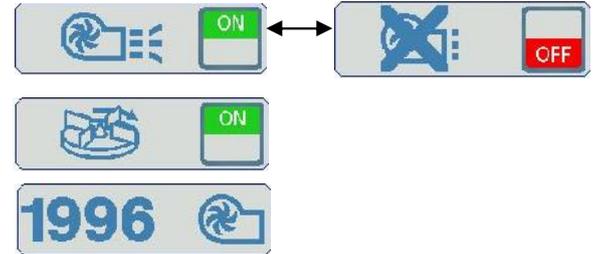


*NOTE: When enabled (for sowing grass), the agitator motor operates simultaneously with the metering motor.*

### Fan / Spinner Status

Depending on the installation, the system may be configured for either electric fan, hydraulic fan, electric spinner, or none of these (i.e.gravity feed) operation.

In the case of an electric fan or spinner setup, the Fan /Spinner defaults to 'Off' every time the instrument is powered off and on again. Therefore you must manually switch the fan/spinner on after powering up the instrument.



**NOTE:** The metering motor will not run when the fan / spinner is switched off.

In the case of a hydraulically powered fan, the instrument simply monitors and displays the fan speed via a shaft speed sensor.

### Area Display

In the case of a gravity-fed seeder, the area worked is displayed here instead of fan/spinner status.

**NOTE:** For fan / spinner fed systems, select the INFO screen page to view the accumulated area (2.3).



### Pre-Start

Without using the pre-start function on commencing a bout, the seed motor only starts as you begin moving off, in proportion to your forward speed. However, it takes a short period for the seed to traverse the pipe to the couler. The result is an unseeded area at the beginning of a bout.

You can configure the instrument so that you either manually engage pre-start as and when necessary, or for it to occur automatically when the drill is lowered into work.

### Automatic Pre-Start

The pre-start function is initiated automatically via the (top) cut out switch, i.e. as the drill is lowered into work. The motor starts and runs at a preset speed for a preset time, enabling the seed to reach the couler just as you begin moving off, thus avoiding unseeded patches due to the delay in seed delivery. The system then reverts to normal proportional control for the seed rate set. If the drill remains stationary for longer than the pre-start time, the motor stops. It will however start again as soon as you move off, with normal proportional control for the seed rate set.

*NOTE: The default pre-start time is 3 seconds, however it can be changed if required via the 'Applicator Setup' menu (3.3).*

### Manual Pre-Start

If configured for manual pre-start operation, then touch the pre-start key, as you lower the drill into work.

The motor will start immediately and run at the set speed for the preset time, etc as described for Auto Pre-Start.



### Setting the Application Rate

**NOTE:** The units can be set either in kg/ha or seeds/m<sup>2</sup> via the 'Product Setup' screen page (3.1).

Touch  and enter the desired target rate.

To ensure the actual application rate will match the target rate, check via the SETUP screen page, that the following settings are correct,

- Drill width
- Product Calibration factor (kg/rev)
- T.G.W. (if units are seeds/m<sup>2</sup>)



### Nudging the Application Rate

The application rate can be adjusted up or down from the target rate while seeding, using the   keys. The % off-target rate is then displayed.

**NOTE:** The default increment is  $\pm 5\%$ , however this can be changed via the 'Product Setup' screen page (section 3.1).

Touch the  key to return to the target rate (  ).

### Simulated Speed

The instrument uses a simulated speed during the product calibration routine. However, you can if necessary, set a simulated speed, if for example there is a problem with the forward speed sensor, or for testing purposes.

If you wish to drill using a simulated speed setting, so long as the actual forward speed matches the simulated speed, then the application rate will be correct.

**NOTE:** The simulated speed is programmed via the  key on the 'Forward Speed Setup' screen page (ref. section 3.6).



### Forward Speed Range Indicator

This indicates the current forward speed in relation to the calculated minimum and maximum speed. The speed range is calculated from the programmed application rate, width and calibration factor (kg/rev).

The forward speed limits are also displayed in km/h on the 'Product Setup' screen page (ref. section 3.1).

**NOTE:** The Forward Speed range represents the RPM limits of the metering motor. Outside these limits the system will not be able to maintain the target application rate.

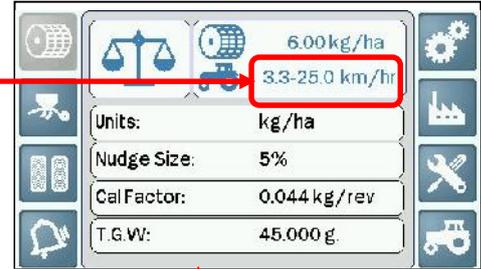
### Alarm Display

If during normal operation, the instrument alarms and defaults to the alarm screen, then please note the error code displayed and refer to Section 4 for a fuller description of the error, the possible causes and checks to make that may clear the fault.

### Forward Speed Alarms

If the forward speed goes above or below the limits indicated on the Setup screen page, then the Main Operating screen page will display a flashing arrow symbol, and beep.

**NOTE:** The target application rate cannot be maintained under these conditions.



### Forward Speed too Low

**NOTE:** Currently, if the GPS forward speed signal is lost due to poor reception, the forward speed display will simply go to zero without an alarm display.



### Forward Speed too high



## 2.3 INFO Screen Page

Additional monitoring functions are displayed on the INFO screen page.



Touch to cycle to the INFO Screen Page

Displays total Area (ha), Quantity applied (kg), and Hours in work since last reset.



### Part Totals

Typically for an individual field total.



### Total Totals

Typically for a longer job, e.g. a daily or contract total.



### Grand Totals

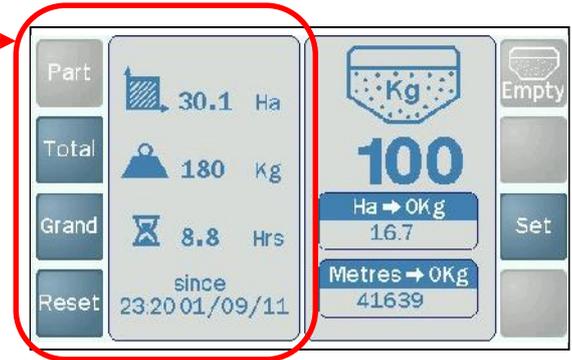
Totals since the instrument has been in service.



### Reset Totals

Select the total register to reset.

**NOTE:** *The Grand total cannot be reset in normal operation.*





Touch to cycle to INFO Screen Page

### Hopper Contents

As work progresses, the quantity remaining in the tank counts down.

### Seeding Area/Distance Display

Indicates what remaining area / distance can be seeded, based on the current application rate width and hopper contents.

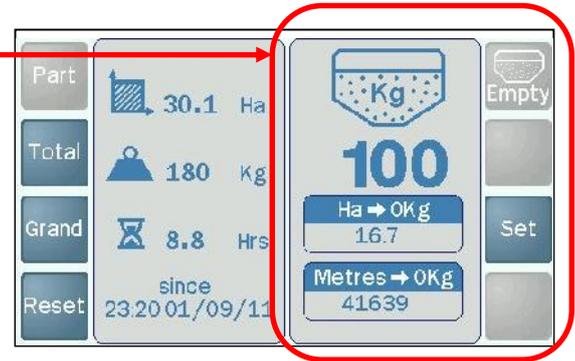
### Hopper Low Level Alarm

An alarm is triggered when the hopper contents drops below a preset quantity. This quantity is determined by the position of a sensor fitted in the side of the hopper. A second (final warning) alarm can be enabled by also programming a "Low Tank Quantity" threshold.

Typically, a "**HOPPER LEVEL**" alarm will be triggered first by the level sensor. If you have programmed the 'Low Tank Quantity' at less than this level, a further "**LOW TANK VOLUME**" alarm will be triggered when the instrument has counted down to that quantity.

**NOTE:** The "HOPPER LEVEL" alarm always indicates a definite quantity remaining. The "LOW TANK VOLUME" alarm however, may not be an exact indicator, since it is calculated from a number of factors including the full tank volume programmed when the hopper is replenished. The calculated low volume may therefore, be slightly different to the actual volume remaining in the hopper.

The level sensor is enabled/disabled and the 'Low Tank Quantity' threshold set, from the 'Alarms Setup' menu (3.5).



Set

### Set Hopper Contents

After replenishing the hopper, touch  and enter the new quantity (kg). You cannot enter a figure greater than the hopper maximum capacity figure programmed from the 'Applicator Setup' page (3.3)

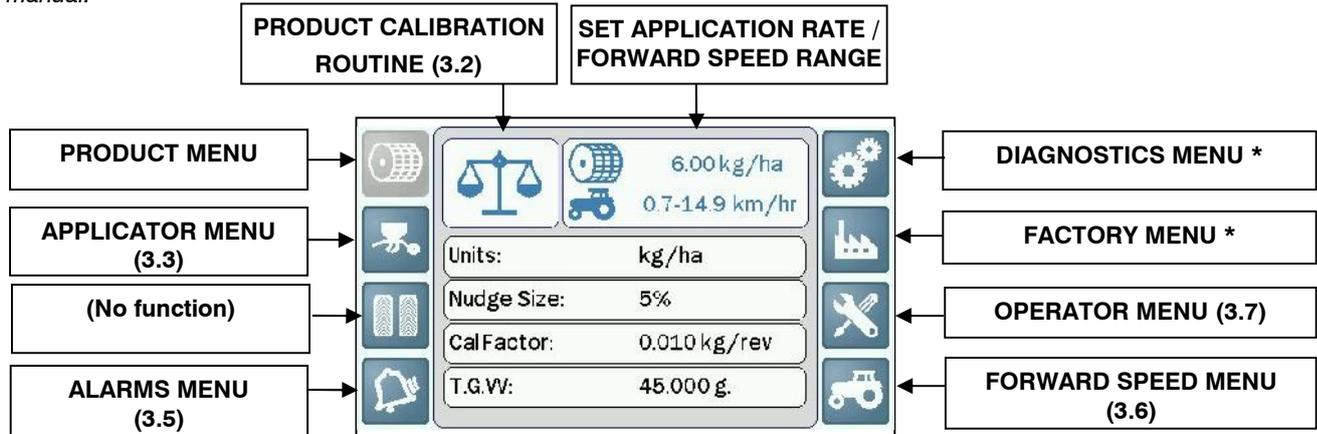
E.g. If the display indicates 5kg remaining and you add 25kg, then enter 30kg. The seeding area/distance display is automatically re-calculated and displayed.

### 3 SETUP Menu

#### 3.1 Product Setup

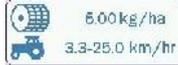
The SETUP menu includes user-programmable settings accessible to the operator, as well as Diagnostics and Factory level menu settings.

**NOTE:** The Factory menu  require a PIN code to access. Once the system is commissioned, further access to these settings is not required during normal operation. Both these settings and the diagnostics functions are not covered in this manual.



\* Please contact a Service Representative if required – Ref.  – ‘Helpline’ screen page (3.7).

### Application Rate / Forward Speed Limits



Touch  to enter the required application rate. The operating speed range is displayed here in km/hr, and also as a bar indicator on the main operating screen page. It is automatically calculated from the application rate, width and calibration factor settings.

**NOTE:** *The system will not be able to maintain proportional rate control outside these limits.*

### Units

Select between Kg/ha and Seeds/m<sup>2</sup>. *Default = kg/ha.*

### Nudge Size

Sets the % increment to nudge the application rate on the main operating screen.

*Minimum = 2%, Maximum = 50%*

### Calibration Factor

The no. of kilograms dispensed for one revolution of the metering unit. This is updated either as a result of a calibration test, or can be manually edited if the calibration factor is already known.

*Default = 0.010 kg/rev*

### Thousand Grain Weight (T.G.W.)

The T.G.W. must be set in grammes, in order to enable the instrument to both apply and display a drilling rate in Seeds/m<sup>2</sup> correctly. *Default = 45 g*



### 3.2 Product Calibration

The calibration routine is the core routine that the operator will carry out every time the seed/product is changed, or before commencing operation at the start of the day. It requires running the motor for a set period, then measuring the quantity of product that has been metered out. The number of motor pulses are counted, and so the number of metering unit revolutions can be calculated.

$$\text{Calibration factor (kg/rev)} = \frac{\text{Dispensed weight (kg)}}{\text{Metering unit revolutions}}$$

*NOTE 1: Ensure the feed roll setup is appropriate for the intended seed type, application rate and forward speed range for application.*

*NOTE 2: Ensure that if sowing grass, the agitator motor function is enabled via the 'Applicator Setup' menu (3.3).*

*NOTE 3: The instrument calculates the calibration factor from the working width, target application rate, and the metered weight delivered whilst calibrating. If however as a result of the calibration routine, you find that you cannot achieve your desired field speed, then re-configure the feed roll assembly and repeat the calibration procedure.*

**STEP 1** From the Product Setup page, touch



Touch  and enter the quantity that you wish to dispense for calibration purposes.

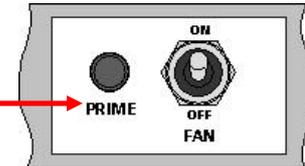
*NOTE: You can enter the quantity in grams if preferred. The CAL factor will however, still be calculated in kg/rev.*



**STEP 2** There are two options to initiate the routine,

Touch  on the screen page or,  
Press and hold the PRIME button on the junction box.

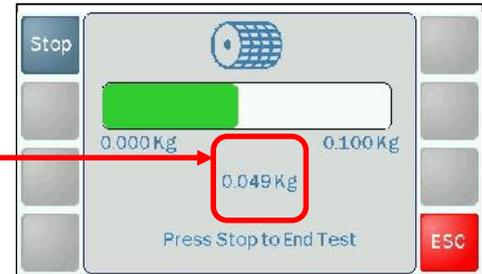
*NOTE: First switch the 'FAN' switch to the off ('O') position on the junction box.*



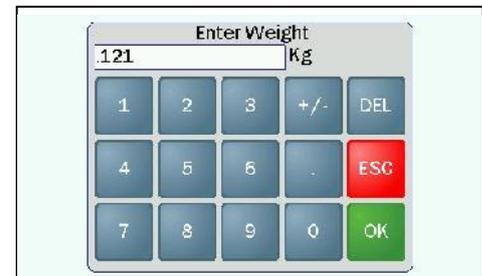
After the  key (or the Prime button) is pressed, the motor runs at the calibration speed (calculated from the Simulated Forward Speed, Width, Application Rate and current calibration factor).

The dispensed weight (based on the current calibration factor) is displayed.

Touch  (or release the PRIME button) when the desired weight is reached.



**STEP 3** Weigh the product dispensed and then enter the measured weight, and press OK.



**STEP 4** A new calibration factor is then re-calculated and displayed.

Touch  to save the new factor and return to the 'Product Setup' screen page.

Switch the junction box 'FAN' switch back on.



### 3.3 Applicator Setup

#### Width

The working width of the drill. Used for calculating the Application rate and the Area (ha) totals.

*Default = 4m*

#### Tank Max. Weight

This is the maximum capacity of the hopper.

When resetting the hopper contents via the  key on the INFO page, you cannot enter a weight greater than this.

Used for calculating the amount of product left in the hopper and displayed on the INFO page.

*Default = 100kg*

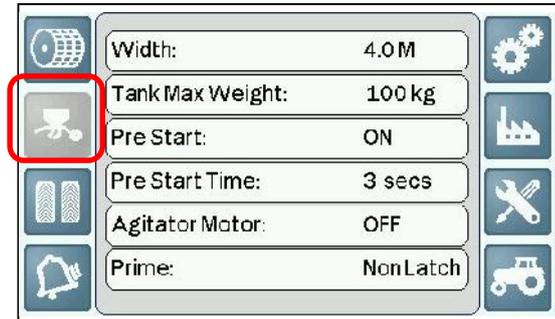
#### Pre-Start

Pre-start runs the metering motor at a set speed (based upon the Simulated Speed, Working Width, Application Rate and Calibration Factor) for a preset time. This primes the seed pipes with seed prior to moving off, thus avoiding unseeded patches due to the delay in seed delivery.

**'ON'** Using the pre-start function is optional, and can be initiated manually via the  key on the main operating screen.

**'AUTO'** The pre-start function is initiated automatically (via the top cut out switch), i.e. as the drill is lowered into work.

**'OFF'** Function disabled.



### **Pre-Start Time**

The preset time is the time elapsing between the cutout switch operating and the drill lowered into work. When set correctly, the distributed seed will reach the coulters just as you begin moving off, thus avoiding unseeded patches due to the delay in seed delivery.

*Default = 3 seconds*

### **Agitator Motor**

Set to 'ON' when sowing grass seed. The agitator motor will then operate simultaneously with the metering motor.

*Default = 'OFF'*

### **Prime (Priming Switch)**

This is set according to whether the priming switch fitted to the junction box is latching or non-latching (i.e. press and hold) operation.

*Default = Non-latching*

### 3.5 Alarms Setup

#### Hopper Level Sensor

Enable / Disable Hopper Level sensor input. *Default = 'ON'.*

When enabled, the instrument will alarm and display "**HOPPER LEVEL**" when the seed drops below the level sensor.

#### Low Tank Quantity

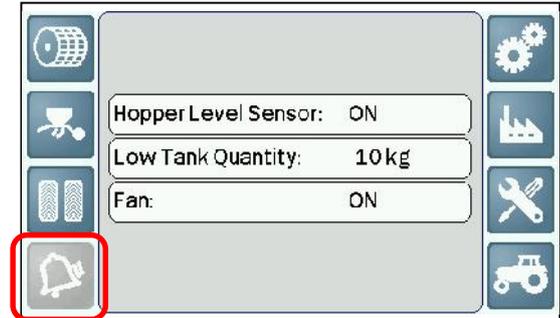
Set the quantity (kg) remaining in the hopper, below which the "**LOW TANK VOLUME**" alarm is triggered.

Typically, this is set to act as a final warning alarm after the "HOPPER LEVEL" alarm.

#### Fan

If set to 'ON', the system monitors fan operation when the metering motor is running. If the fan does not draw any current, (e.g. it is inadvertently left switched off by the operator, or there is a fault condition), then the instrument will alarm "**FAN FAILURE**" to indicate that attention is required.

*Default = 'ON'*



### 3.6 Forward Speed Setup

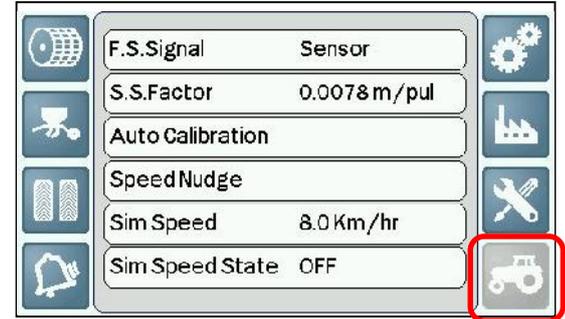
#### F.S. Signal

Sets the origin of the forward speed signal. *Default = 'GPS'*

**'GPS'** A GPS Receiver is connected to the RS232 'D' plug on the head unit cable. The forward speed signal is derived from the NMEA VTG message.

**'Sensor'** An RDS Radar sensor is connected into the junction box.

**'Head Unit'** A sensor inputs directly into the head unit (only applicable for systems that include a 'Terminator' junction box).



#### Speed Sensor Factor (S.S.F.)

With the default setup where the speed sensor signal is from a GPS receiver, no setup is required.

If the signal comes from an RDS Radar sensor, the default setting is 0.0078 metres travelled per pulse. This factor is correct assuming that the sensor is mounted at an angle of  $37^\circ \pm 1^\circ$ .

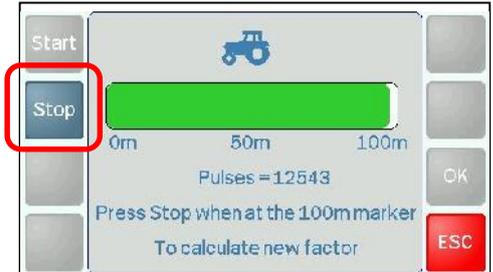
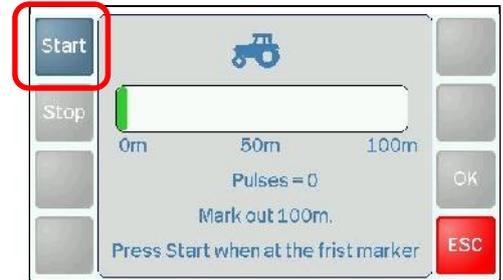
#### S.S.F. Adjustment

If for any reason the radar sensor mounting angle is incorrect, then speed measurement will also be incorrect. It is recommended to use the auto-calibration procedure (see below) to confirm (or otherwise adjust) the default S.S.F. to ensure accurate speed measurement.

Alternatively, the speed calibration can be simply 'nudged' via the **'Speed Nudge'** function, so that the forward speed display matches that of the tractor speedometer.

### Speed Sensor Auto-calibration

1. Place two markers 100 metres apart. Position the tractor adjacent to the first marker using a suitable reference point e.g. the cab step.
2. Touch 'Auto Calibration' and then  .
3. Touch  , then drive and stop adjacent to the second marker.
4. Touch  . The S.S.F is then re-calculated and displayed.
5. Touch  to confirm and store the new S.S.F.



### Speed Nudge

1. Touch '**Speed Nudge**' and then  .  
While travelling forward, the current speed is displayed, and the current S.S.F.
2. Use the nudge keys to adjust the forward speed reading up or down as required (to match the tractor speedometer).  
The new S.S.F is then re-calculated and displayed.
3. Touch  to confirm and store the new S.S.F.



### Sim Speed

Programmes a simulated speed value. For product calibration purposes, or if there is a sensor fault or testing is required, this function gives the ability to simulate the machine moving while remaining stationary.

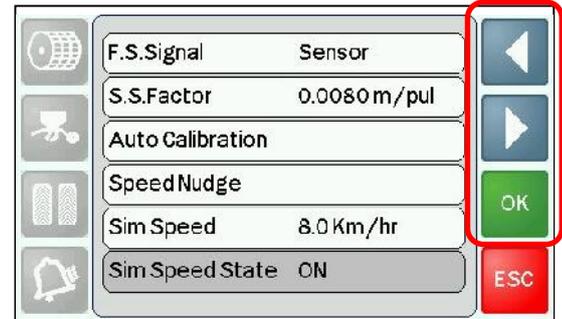
*Default = 8 km/hr*

### Simulated Speed State ON / OFF

Touch  and  to switch on the simulated speed function.

The  icon will be displayed on the main operating screen.

**NOTE:** As soon as an actual forward speed is detected, the simulated speed function is automatically switched OFF, and the main operating screen displays the actual forward speed.



### 3.7 General Instrument Setup

Time / Date

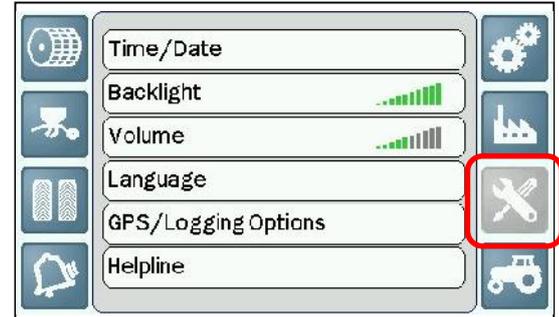
Backlight

Volume

Language

Helpline

These menu items are self-explanatory, with the exception of the 'GPS / Logging options'.



#### GPS / Logging Options

'Port 1' A GPS receiver is normally connected to Port 1.

*Default = GPS'*

'Port 2' This port is not normally used.

*Default = 'Not used'.*

'Port 1 Baud' Set as required by the GPS receiver.

1200 / 2400 / 4800 / 9600 / 19200

*Default = '19200'.*

'Port 2 Baud' This port is not normally used.

## 4 Alarm Codes

When a system failure occurs, the instrument defaults to the alarm screen, displaying an error code.

Touch  to view the associated help text, to assist in identifying and resolving the problem. This text is also included for reference in the table below.



Error Code	Error Message	Help
H.1.F	“FAN FAILURE”	The fan remains switched off. Check that the ‘FAN’ switch on the junction box is switched on after product calibration. There is a fault with one or both fan drives. Check the wiring connections. If the fans are running, check the connections between the instrument and junction box to ensure there is no cable damage.
H.2.M	“MOTOR FAILURE”	The metering unit is not functioning. Check the wiring connections. Switch the instrument off and back on again to clear the fault.

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<b>H.3.S</b>	<b>“MOTOR STALL”</b>	The metering motor has stalled. It is automatically stopped to prevent further damage. Investigate the metering unit for signs of blockage.
<b>H.4.C</b>	<b>“CAN FAILURE”</b>	CAN communication with the junction box has been lost. Check the wiring between the instrument and the junction box for damage.
<b>H.5.L.F</b>	<b>“FAN LOW”</b>	The fan speed is too low. Check the hydraulic output to ensure the fan is spinning at the correct speed. Check the wiring to the sensor to ensure there is no damage.
<b>H.6.S.F</b>	<b>“SPINNER FAILURE”</b>	The spinner remains switched off. Check the ‘SPINNER” switch on the junction box is switched on. There is a fault with the spinner drive.. Check the wiring connections. If the spinner is running, check the connections between the instrument and junction box to ensure there is no cable damage.
<b>L.1.F</b>	<b>“FAN SWITCH”</b>	The ‘FAN’ switch is fan is switched off on the junction box.
<b>L.2.H</b>	<b>“HOPPER LEVEL”</b>	The hopper level is low. Refill the hopper, and reset the hopper contents on the INFO screen page.
<b>L.3.Q</b>	<b>“LOW TANK VOLUME”</b>	The tank volume is low. Refill the hopper with product, or reset the tank volume.
<b>L.4.F.H</b>	<b>“FAN HIGH”</b>	The fan speed is too high. Adjust the hydraulic output, or adjust the fan speed alarm setting if the output is correct.
<b>L.5.S.O</b>	<b>“SPINNER SWITCH”</b>	The spinner switch on the junction box is switched off.





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