



Isocan Artemis

Seed Drill Controller

Calibration and Operation

RDS Part No.:	S/DC/500-10-805
Document Issue:	2.0 : 8.7.16

Electromagnetic Compatibility (EMC)

This product complies with European Council Directive 2014/30/EU when installed and used in accordance with the relevant instructions.

IMPORTANT, READ THIS BEFORE USING THE ARTEMIS SYSTEM

The Isocan Artemis installation is a part of the Precision Farming System ("the System"). It is very important that you follow the described calibration procedures before operating the Isocan Artemis instrument. Calibration and operation of the Isocan Artemis must be in accordance with these instructions. Use of the System is subject to the following disclaimer;

1. So far as is legally permissible RDS Technology ("RDS"), or its distributors, shall not be liable, whatever the cause, for any increased costs, loss of profits, business, contracts, income, or anticipate savings or for any special, indirect or inconsequential damage whatsoever (death or personal injury excluded).
2. The capabilities and functions of the Precision Farming System ("the System") are limited as set out in the specification of the System, details of which are contained in the Help files and product literature and which must be read before using the System.
3. Without prejudice to the generality of the above it is hereby acknowledged that the System is not designed nor intended to a) originate variable treatment plans or b) achieve or avoid any application rate outside application parameters, which in both cases shall be the responsibility of the operator.
4. The standard terms and conditions of RDS (except clause 7), a copy of which is available on request, apply to the supply and operation of this System.

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Our policy is one of continuous improvement and the information in this document is subject to change without notice. Check that the software reference matches that displayed by the instrument.

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Software Reference: IS105002rev42

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1 Introduction

This manual provides operator instructions for both single-channel and multi-channel generic Isocan “Artemis” Seed Drill Controller application. It also includes settings in the “Drill Setup” menu accessible by the operator. Information on Technician and Factory level settings are not included in this manual.

1.1 System Overview

The Isocan Artemis is an ISOBUS-compatible, monitoring and application control system for seed drills. It may be configured with up to 4 control channels. Forward speed measurement and cutout sensing enables full proportional control, to maintain (within limits) a set application of one or more products irrespective of changes in forward speed.

In its simplest application, the Artemis may be setup in a single-channel configuration to control a single motor as shown in figure 1. Additional CAN modules enable multi-channel configurations for combined seed/fertiliser/pellet application (including electro-hydraulic control), to suit a wide range of drill makes and models.

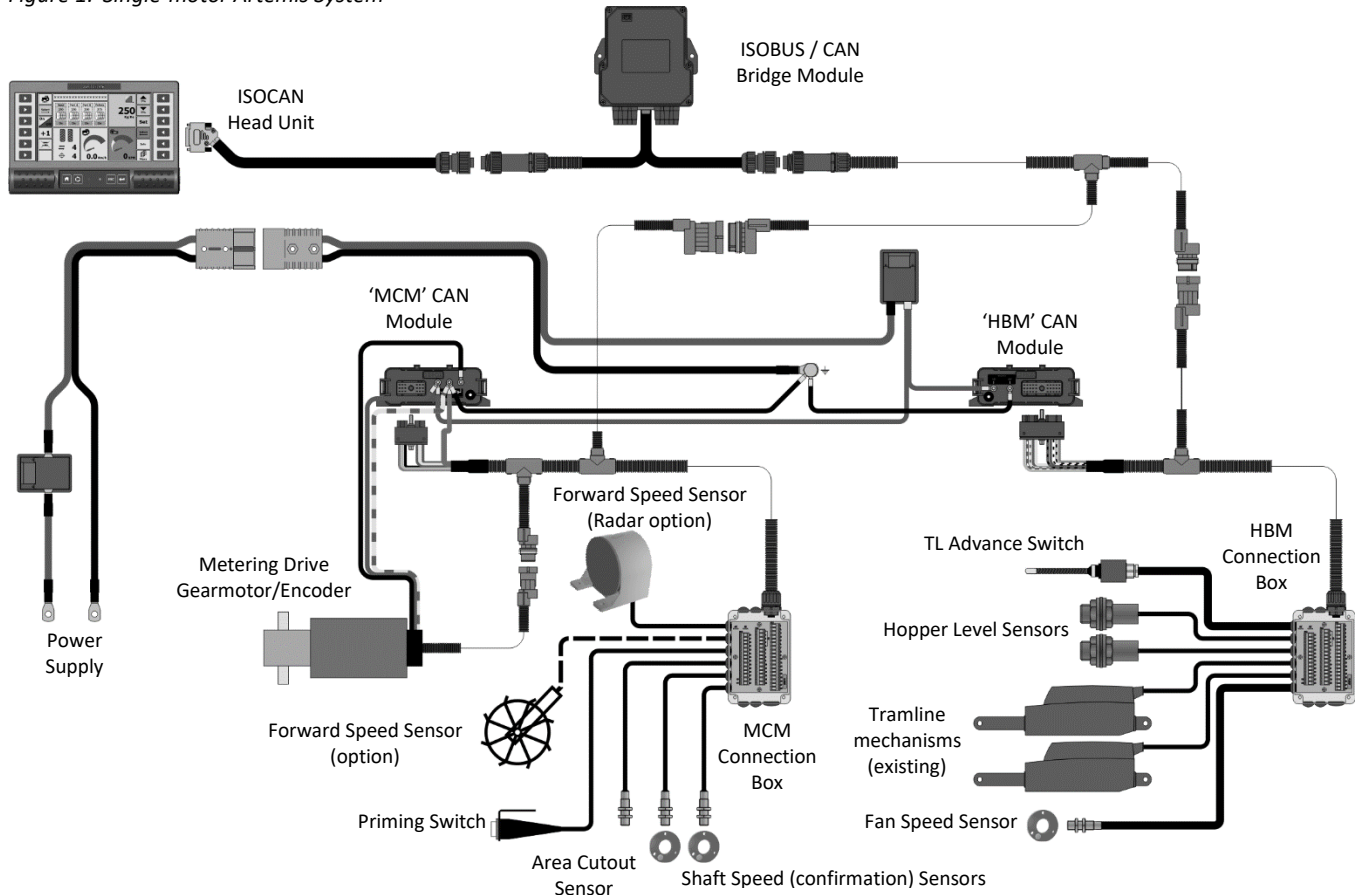
1.1.1 System Components

The system will vary depending on the drill make and model, but will be some combination of one or more of the following,

The main electronic components are,

- **RDS ‘Isocan’ Head unit** – intuitive, colour touchscreen Graphical User Interface (GUI).
- **ISOBUS/CAN Bridge Module** – the “brains” of the system, containing the control software. It also contains the graphics (the ‘Object Pool’), for the GUI to be displayed on any ISOBUS-compliant terminal.
- **Motor Control (MCM) CAN Module** – CANBUS interface for a gearmotor and sensors.
- **Applicator Control (APM) CAN Module** – CANBUS interface for an Applicator system (optional).
- **I/O (HBM) CAN Module** – CANBUS interface for other switches, sensors and actuators.
Connected via the Motor Control Module (‘MCM’)
- **Gearmotor** – driving either single or multiple metering units.
- **Shaft Speed Confirmation sensor** – a magnetic sensor that confirms that the motor is driving the metering unit.
- **Forward Speed Sensor** – either a TGSS Radar sensor or an RDS “Satspeed” module (converts GPS NMEA VTG message to a radar-compatible pulse output).
- **Area Cutout Switch(s)** - one or two magnetic sensors or finger switch positioned to detect when the drill is lowered/raised into or out of work. It can be configured to also provide the tramline advance signal.
- **Priming Switch** – manually operates the metering motor to dispense product for calibration purposes.
Connected via the Tramline Control Module (‘HBM’)
- **Fan Speed Sensor(s)** - a magnetic sensor on the fan drive.
- **Hopper Level Sensor(s)** – An upper “pre-level” sensor provides an early-warning alarm, giving the operator advance notice to refill. A lower sensor provides a second warning when the hopper is about to run out.
- **Tramline Advance Switch** - provides the tramline advance signal (if not a function of the Area Cutout Switch).
- **Tramline mechanism (existing)** – the solenoid or motor-type mechanisms are rewired into the HBM connection box to be controlled by the Artemis.
- **Pre-emergence Markers (existing)** – re-wired into the HBM connection box to be controlled by the Artemis.
- **Bout Marker Sensors (optional)** – magnetic sensors detect when the Marker arms are lifted/lowered.

Figure 1: Single-motor Artemis System



1.2 Artemis Main Functions

The Artemis is designed to allow automatic, variable rate control of any drill. Also it can control an auxilliary Applicator system e.g. for Slug Pellets etc. You can at any time manually override the predetermined rate as field conditions require.

The basic functions are:

- Variable Rate Control
- Tramline Control
- Forward Speed Alarms
- Hopper Level alarm
- Fan Speed & alarm
- Information totals

The instrument has a special software routine that makes calibration of the metering unit(s) very easy. In the calibration mode each metering unit is controlled via a 'priming switch' to dispense the product. During normal operation the control system is started and stopped automatically via magnetic sensor(s) as the drill is put into and taken out of work.

1.2.1 Optional Functions

The additional Precision Farming software module (e.g. application from treatment plan, receiving a rate from a 3rd party controller), can be activated from the "Dashboard" screen (3.1). The activation code for the above can be purchased via the RDS website.

NOTE: A suitably accurate GPS receiver with a minimum 10Hz update rate is recommended.

1.3 Control Modes and Data Logging

1.3.1 Automatic Control Mode

The motor speed is automatically regulated as forward speed varies, to ensure that the actual application rate constantly matches a preset target rate. The application rate can be manually nudged up and down from the target rate as required.

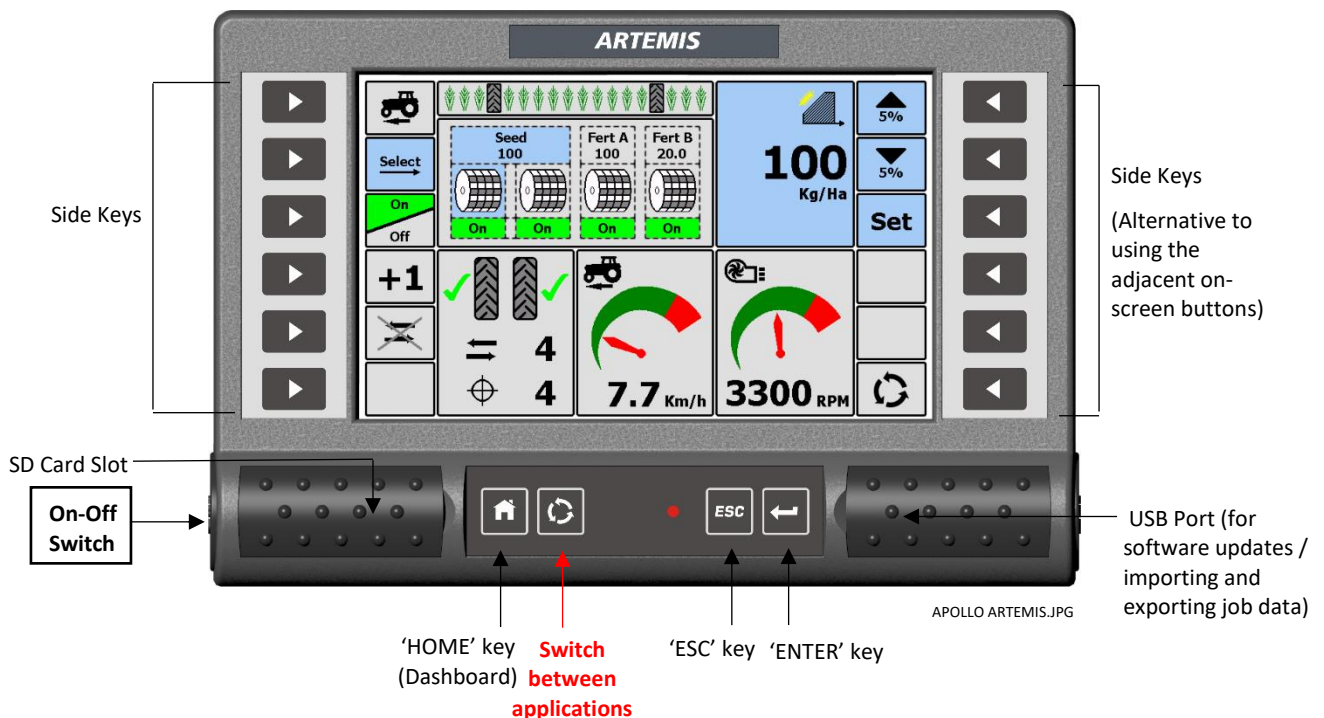
Field data ("job summaries") can be logged and are stored on the SD card. With a GPS receiver and SD data card, as well as creating a job summary, you can also log the vehicle route and application data to a "dynamic log" file on the SD card. The job summary data is also appended to this file.

1.3.2 VRT (Variable-rate treatment) Control Mode

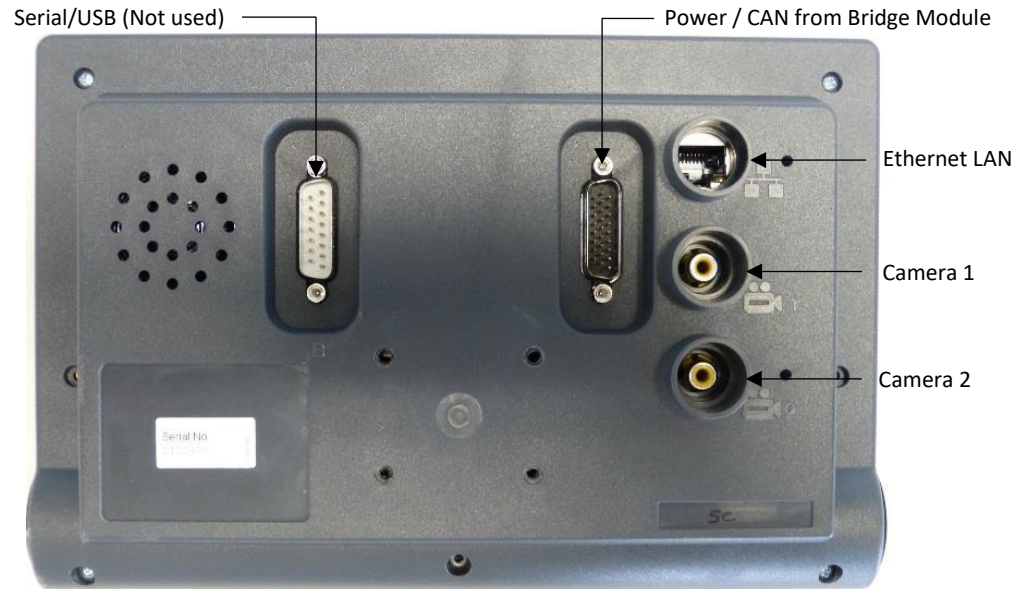
This enables the system to be controlled via treatment instructions prepared using Precision Farming software in conjunction with DGPS position data. To enable fully automatic variable-rate treatment for Precision Farming applications, the *Artemis* requires a suitable DGPS receiver and a formatted SD data card to implement treatment plans generated in the Precision Farming software. Shape files (.SHP) can be also imported and will automatically be converted to the RDS file format. A work record file is automatically created on the card to log data confirming the actual treatment. The job summary data is also appended to this file, which can be viewed in the Precision Farming software.

Please refer to section 7 – "Data Logging and Variable-rate Treatment"

1.4 ISOCAN Terminal - Features and Controls



NOTE: When in the Artemis app, pressing **ESC** will return you to the app 'Home' screen.



1.4.1 Touchscreen

The instrument has a 5-wire resistive touch screen. 5-wire technology offers superior life and reliability without requiring re-calibration. However, it consists of a polyester film outer layer that must be treated with respect, compared to a non-touch display with toughened instrument glass. Therefore, please observe the following,



DO NOT use a sharp-pointed object - the screen will be damaged beyond repair!

Do NOT wipe or otherwise attempt to clean using any kind of solvent cleaner!.




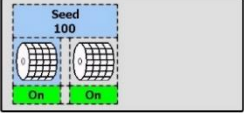


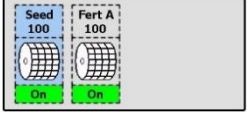


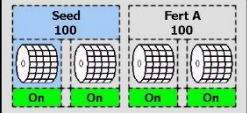


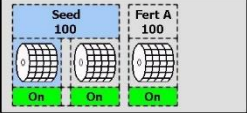



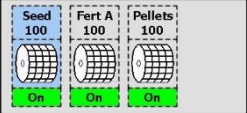



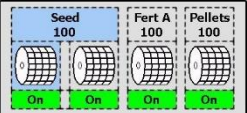
Do NOT wipe using a dirty cloth or gloves. Use only computer screen wipes designed for the purpose!.

You may use a blunt, smooth-ended plastic object (e.g. a pen body / cap) as a stylus, if found necessary!

2. Multiple Channels / Products

The Artemis has 4 control channels. Each motor / MCM or APM requires a control channel, therefore the number of channels used depends on the particular drill configuration.

Here are some examples.

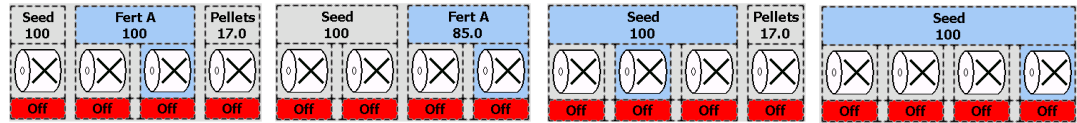
PRODUCT	CHANNELS	PRODUCT /MOTOR / METERING UNIT CONFIGURATION	SCREEN DISPLAY
SEED	1	1 PRODUCT SINGLE MOTOR / METERING 	
	1+2	1 PRODUCT 2 x SINGLE MOTOR / METERING 	
	1 2	2 PRODUCTS SINGLE MOTOR / METERING (SEED)  SINGLE MOTOR / METERING (FERT A) 	
SEED + FERTILISER	1+2 3+4	2 PRODUCTS 2 x SINGLE MOTOR / METERING (SEED)  2 x SINGLE MOTOR / METERING (FERT) 	
SEED + FERTILISER	1+2 3	2 PRODUCTS 2 x SINGLE MOTOR / METERING (SEED)  SINGLE MOTOR / METERING (FERT A) 	
	1 2 3	3 PRODUCTS SINGLE MOTOR / METERING (SEED)  SINGLE MOTOR / METERING (FERT)  SINGLE MOTOR / METERING (APPLICATOR) 	
	1+2 3 4	3 PRODUCTS 2 x SINGLE MOTOR / METERING (SEED)  SINGLE MOTOR / METERING (FERT)  SINGLE MOTOR / METERING (APPLICATOR) 	

2.1 Linked Channels

When a configuration requires multiple hoppers / metering units to dispense a single product, then the control channels are linked (via the “Factory Setup” menu).

Two, three or four single, adjacent control channels may be linked in this way, and assigned a product type “Seed”, “Fert A”, “Fert B” or “Pellets”.

Examples:



NOTE: Linked channels are not currently recognized as linked by other software modules outside of the Artemis application. So for example, if 4 channels are in active use but all are linked for single product application, they will be recognized as 4 channels instead of effectively one channel.

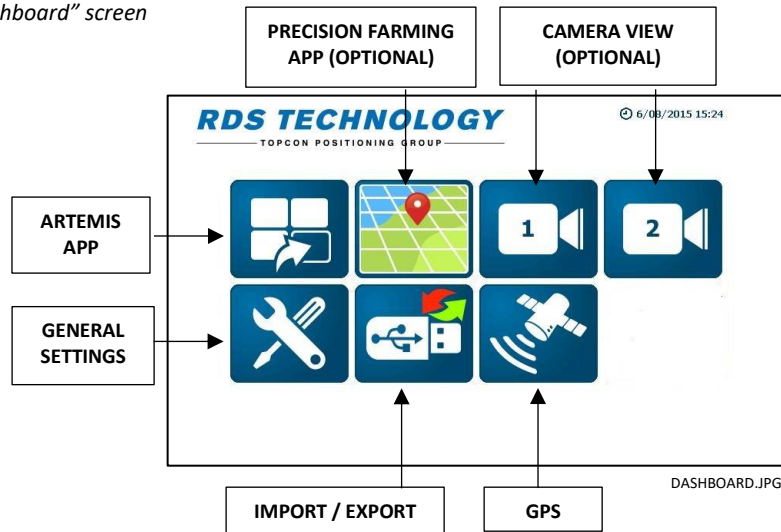
If starting a Precision Farming job, the VRT (rate instructions) source is uniform across linked channels (ref. section 7.3).


3. Operation

3.1 Startup


1. Press the rubber endcap on the left-hand side of the ISOCAN to switch it on. After a short period loading the individual apps, the "Dashboard" screen is displayed.

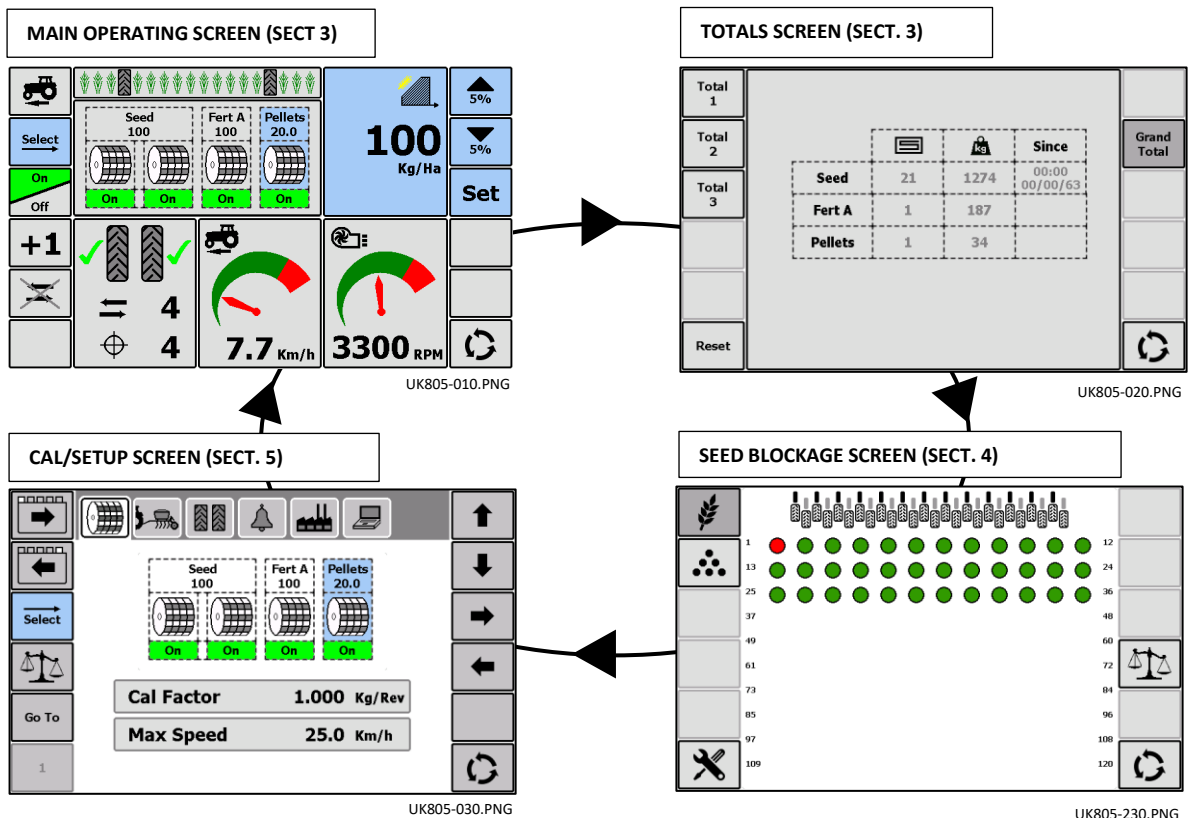
Figure 2 The "Dashboard" screen



2. Press the  key to go to the Artemis application. On initial startup, the main operating screen is displayed.


3.2 Artemis Primary Screen Pages

There are 5 primary screen pages. Press  to cycle between the primary screen pages – Main, Totals, Seed Blockage, Hydraulic Functions (see Note 1) and Settings.

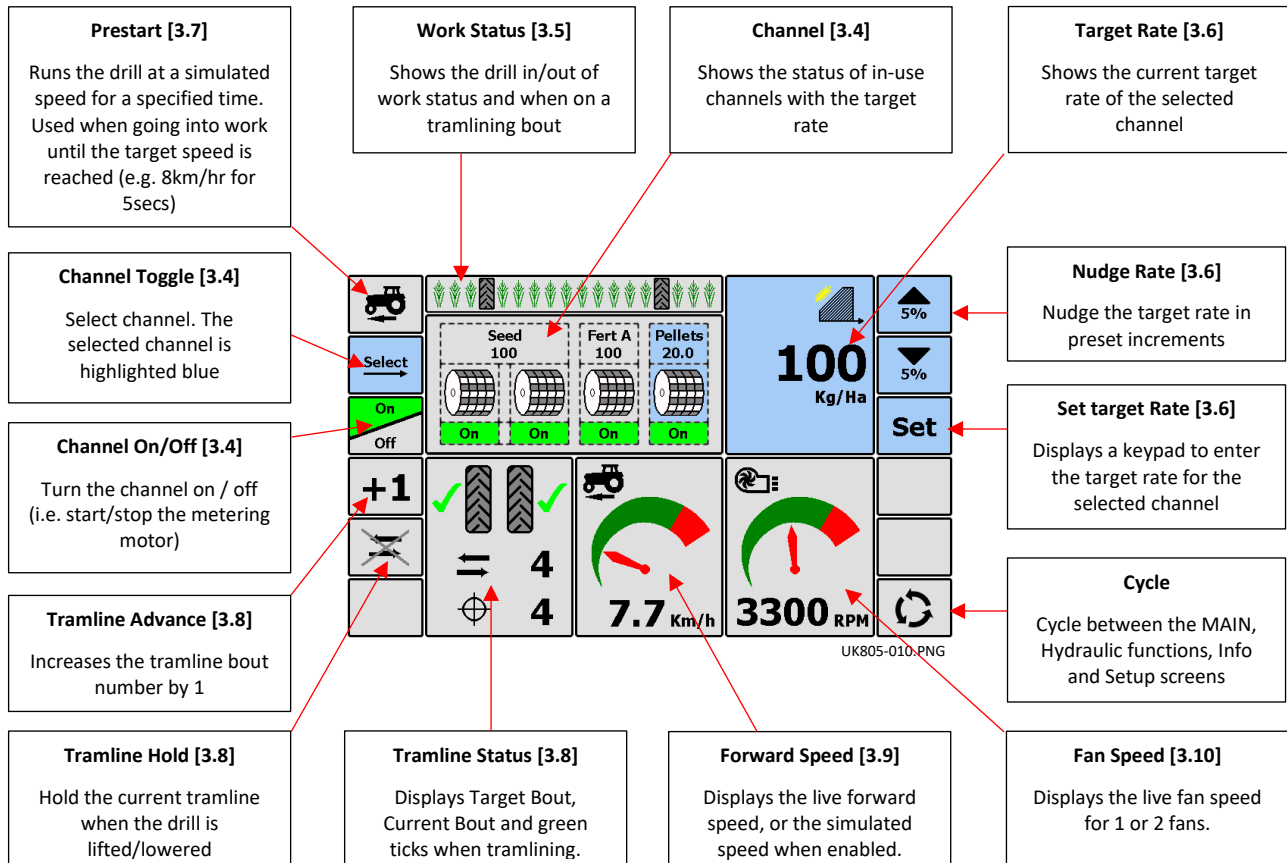


NOTE 1: The hydraulic functions screen is specific to particular drills and is not present unless enabled in the "Factory Setup" menu.

Pressing the  key returns to the dashboard. Pressing the  key again, will revert to the primary screen page or sub-menu that was last displayed.


From within the Artemis app and displaying a primary screen page or sub-menu other than the main operating screen, pressing  will return you to the main operating screen.


3.3 The Main Operating screen - Summary



3.4 Channel Selection and Status

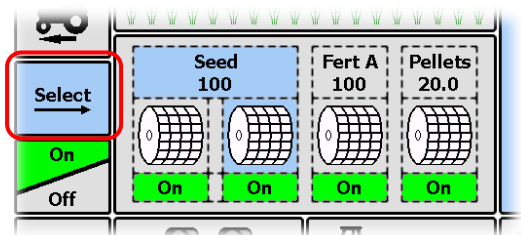
The currently selected channel is highlighted blue.

Either press , or touch a channel icon to select another channel.

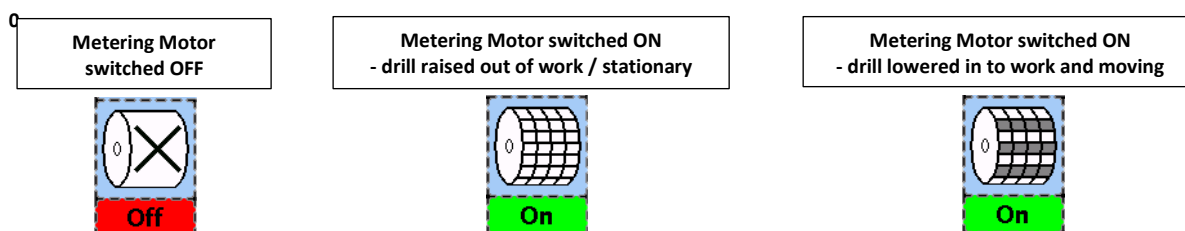
Repeatedly pressing  cycles through the channels.

The channel icon indicates the product and the target application rate.

The target rate can be then set or nudged for the selected channel.



The channel icon also indicates the status of the metering motor. The motor speed is proportional to forward speed, and so when the drill is in work, the icon automatically becomes animated as the metering unit starts to turn. It also is animated when you select the Prestart sequence, or if you have a simulated forward speed activated.





3.4.1 Switching Metering motor(s) On-Off / Manual Override / Half-Width Drilling

The metering motor(s) can be stopped manually as desired, eg:

- (i) An area of field needs further cultivation before seeding.
- (ii) In the case of a front-mounted hopper, the metering motor is switched off just before the end of the bout to clear the seed through (the opposite of the 'pre-start function').
- (ii) You want to drill at half-width.

The currently selected channel is highlighted blue.

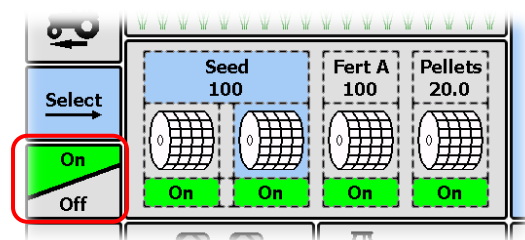
To switch an individual channel:

Briefly press  /  to switch the currently selected channel On/Off.

Alternatively, briefly touch a channel icon to switch it On/Off.

To switch all channels:

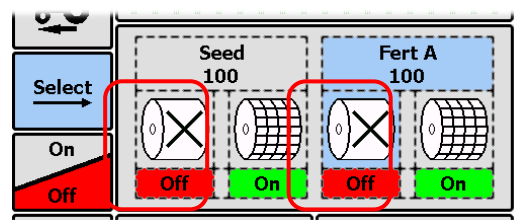
Press and hold  /  for 3 seconds.



Half-width Drilling:

Applicable for drills configured with 2 linked channels, where normally for full-width drilling the motors are controlled in tandem (indicated by channel icons 1+2 and/or 3+4 being linked across the top as shown).

When half-width application is required, either left or right metering motor may be switched off by briefly touching the appropriate channel icon(s).



3.5 Work Status

Sensor(s) detect when the drill is raised out of work or lowered into work, and the work status is displayed at the top of the screen.

Drill is out of work / Metering is stopped / Area totals accumulation is stopped.



Drill is in work / Normal metering is in progress (unless being manually overridden – ref. section 3.4) / Area totals are accumulating.



As above and also indicating a tramlining bout (ref. section 3.8).



3.6 Setting the Application Rate

3.6.1 Seed and fertiliser

The drilling rate is metric units only i.e. kgs/ha.

To set the Target rate for a selected channel:

First select the channel that you want to set the rate for.


Press **Set**, enter the required rate then touch "OK".

The maximum speed to maintain the application is calculated and displayed. Press "OK" to return to the main screen.

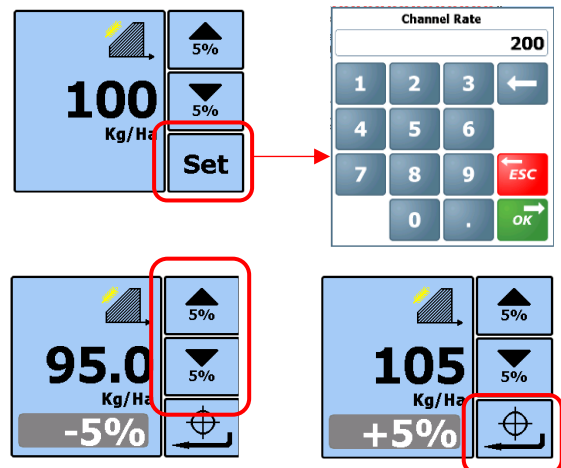
The system will then automatically maintain this rate irrespective of forward speed (within limits).

To manually override the Rate for a selected channel:



For the selected channel, at any time you can adjust the rate up or down in 5% increments to suit field conditions, up to a maximum $\pm 50\%$ from the target rate.

Press  to return to the target rate.

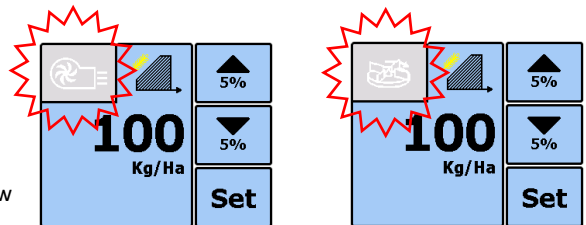
NOTE: The main screen page will not display or otherwise remind you of an off-target rate set for a channel, unless that channel remains selected.



3.6.2 Pellet/ Small seed Applicator


Where fitted, a pellet / small seed applicator will be factory-configured for either of two modes of operation – 'Fan' or 'Spinner'. The mode is indicated by the  or  icon in the rate window.

When the Applicator channel on the main operating screen is selected, due to its different mode of operation, the rate window appears slightly differently to that for normal seed / fertiliser channels.

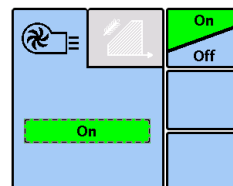


Applicator in Fan configuration

Set / manually override the target rate as for other seed / fertiliser channels (3.6.1)

Touch the rate window to toggle to the fan On/Off control. The fan is normally left on but should you need to, press  to switch it off as required.

NOTE: The fan on/off control operates independently of the metering motor on/off control.




Applicator in Spinner configuration

Set / manually override the target rate as for other seed / fertiliser channels (3.6.1)

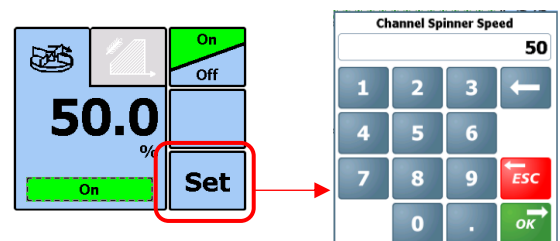
Touch the rate window to toggle to the spinner speed control and on/off control.

The spinner speed may be set between 0 -100% (PWM). It is a matter of trial and error to establish the % setting to achieve the desired spread width.

Press **Set**, enter the required % speed then touch "OK".

The spinner(s) are normally left on but should you need to, press  to switch them off as required.

NOTE: The spinner on/off control operates independently of the metering motor on/off control.




3.7 Pre-start Sequence

Particularly useful in the case of a front-mounted hopper, the pre-start function helps to avoid an un-seeded area on entering work. It starts the metering unit at the calibration speed while the drill is still stationary, and 'primes' the drill so that the seed reaches the coulters just as the drill enters work.

User Settings:



Cycle to the 'Drill Setup' screen and touch the  tab to view the 'Pre-start Duration' and 'Pre-start Mode'.

Pre-start Duration:

The pre-start duration is established by trial and error tests when the system is first set up. The duration can be set from zero to 9.9 seconds.

Pre-start Mode:

'AUTO' mode – the Pre-start function is automatically triggered when the drill is switched into work.

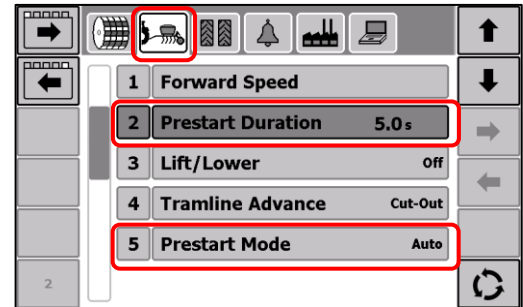
'Man' mode - the pre-start sequence is optional.

As required, simply press the  key before moving off.

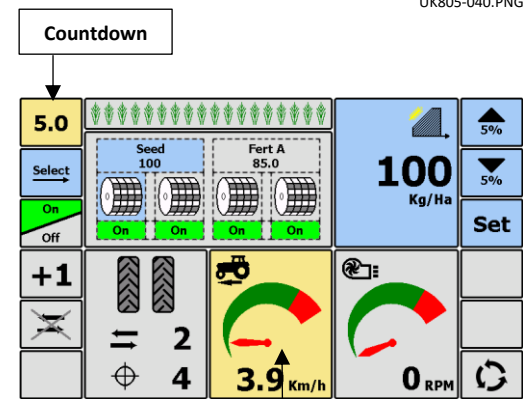
The metering motor will run at the calibration speed for the set duration, or until the forward speed exceeds the simulation speed, when full proportional control then takes over.

While the pre-start duration is active and the forward speed remains below the simulation speed, the duration counts down and the Forward Speed display is highlighted yellow.

Once the simulation speed is reached, pre-start is cancelled and the screen returns to the normal forward speed display.



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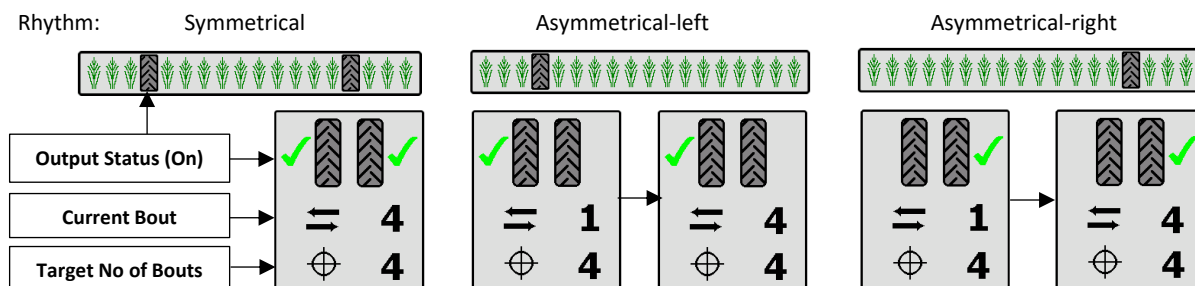


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Yellow = Pre-start active

3.8 Tramlining

The main screen shows the current status of tramlining e.g.



The target no. of bouts can be selected up to 99, with symmetrical, asymmetrical-left or asymmetrical-right rhythm selectable. A number of special asymmetric rhythms can also be selected to suit the following drill/sprayer width combinations.

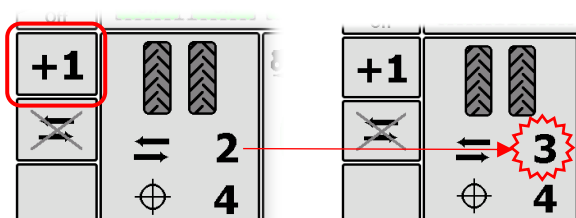
The special tramline sequences ('L' – Left, 'R' – Right) are as follows:

Bout	8-pass	10-pass	10-pass (2)	14-pass	16-pass	18-pass	22-pass
1							
2	R	R	L				
3				L	R	L	
4	L	L					L
5	L		R				
6			R				
7	R	L		R		R	
8				R	L		
9		R	L		L		
10							
11							R
12				L		R	R
13							
14					R		
15							
16						L	
17							
18							
19							L
20							
21							
22							

3.8.1 Advancing the Bout Number

On starting up the instrument the tramline sequence always starts at '1'.


If entering work on a bout other than bout 1 of the tramline sequence, then you can press the "+1" key to select the correct, current bout number.




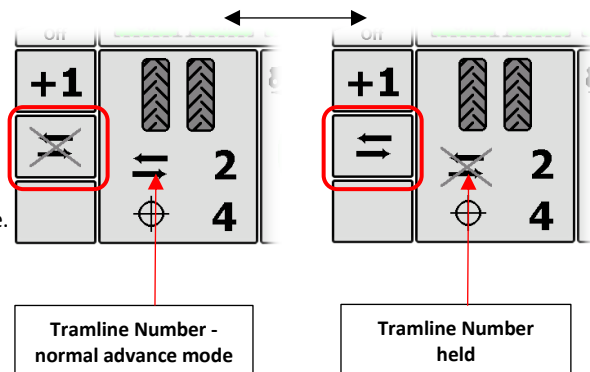
3.8.2 Holding the Bout Number

If it is necessary to take the drill out of work other than the normal headland turn, or depending on the drill setup - lift a marker to negotiate a field feature, the bout number will still automatically increment by 1.

You can however, press the  key to hold the current bout number (e.g. to prevent the bout no. advancing).


The  icon indicates that the bout no. is held.

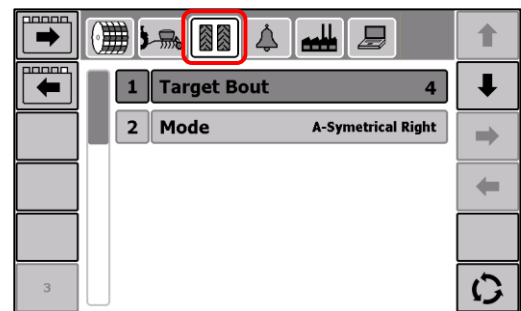
Press the  key again to resume normal bout advance.



3.8.3 Setting the Tramline Rhythm



Cycle to the 'Drill Setup' screen and touch the  tab to view/edit the 'Target Bout' and 'Mode' (rhythm) settings.



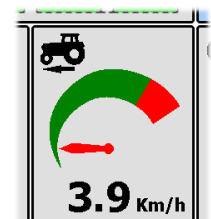
UK805-060.PNG

3.9 Forward Speed Display

The drilling rate is metric units only i.e. km/hr.

The forward speed signal is sourced from either,

- RDS Satspeed 2 (converts a GPS NMEA VTG message to a radar-compatible speed pulse).
- Radar Sensor



3.9.1 Forward Speed Alarm

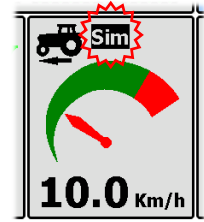
If while the drill is switched into work and the indicated forward speed is below 0.2 km/hr, the display will flash continuously and the metering units are stopped.

This is intended to alert the operator in the event that the forward speed signal input has been lost for whatever reason. In this event however, you can activate a simulated forward speed so that you are able to continue drilling.

3.9.2 Simulated Forward Speed

When the forward speed is simulated, the “Sim” icon appears on the display. Speed simulation is activated either,

- Automatically during product calibration (in order to dispense product while the drill is stationary).
- Manually in the event of losing the forward speed signal input (in order to continue drilling). Remember though that your actual forward speed should match the simulated speed as close as possible, otherwise the drilling rate will not be correct. Drive faster than the simulated speed and you will under-apply, and vice-versa.




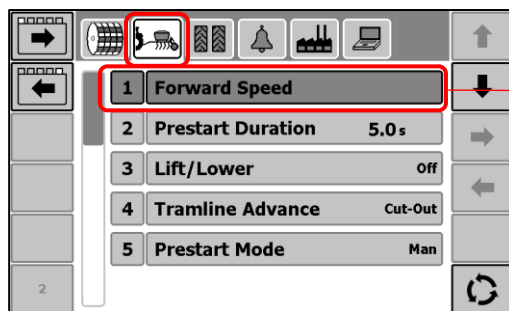
NOTE: The Pre-start mode also uses the simulated speed setting. Pre-start will be de-activated when the actual forward speed exceeds the simulated speed.

The simulated speed is set and manually activated via the “Drill Setup” menu as follows,

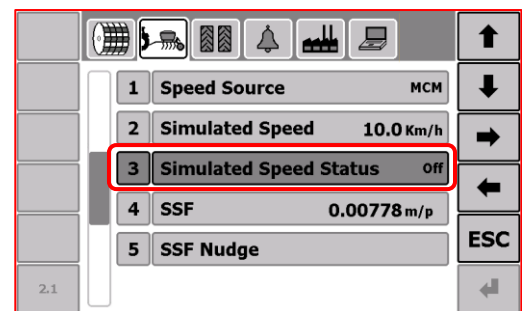
User Settings:



Cycle to the ‘Drill Setup’ screen and touch the  tab, then select “1. Forward Speed”.



UK805-070.PNG



UK805-080.PNG

Set Simulated Speed:

Go to “2. Simulated Speed” The factory default simulated forward speed is 10 km/hr, however this can be changed to match your typical forward speed for drilling.

Start / Stop simulated Speed:

Go to “3. Simulated Speed” and toggle ‘On’/’Off’.

NOTE: Speed simulation can only be activated when the drill is switched out of work.

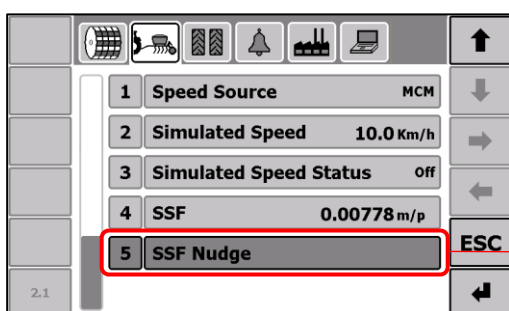
3.9.3 Forward Speed Calibration Adjustment

Forward speed calibration is not required if the source is a GPS signal. However, it may be necessary if for example, a radar sensor is not at the correct angle with the ground.

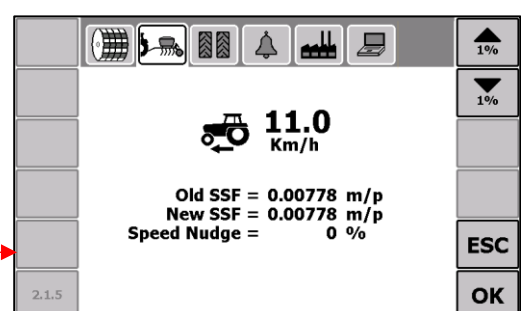
NOTE: The factory default Speed Sensor Factor (“SSF”) is 0.00778 metres/pulse, as specified for the RDS “Satspeed” and TGSS Radar sensor.

The Speed Sensor Factor can be edited directly by selecting “4. SSF”, and entering a different value. However, the best way to adjust it is via the “SSF Nudge” routine until the Artemis display matches the tractor speedometer reading.

From the “Forward Speed” screen, select “5. SSF Nudge”.



UK805-090.PNG



UK805-100.PNG

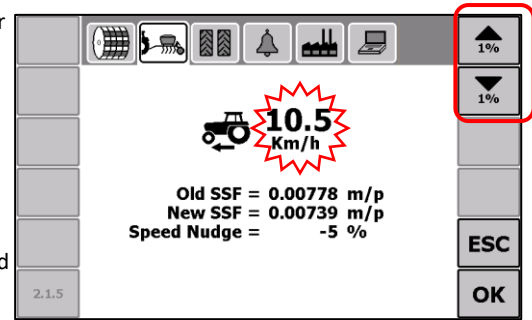
Drive at the normal operating speed, noting the tractor speedometer reading.

For example the tractor speedometer shows 10.5 km/hr.

The Artemis display however, shows 11.0 km/hr.

Use the % keys to adjust the displayed speed until it matches the tractor speed.

The Speed Sensor Factor is automatically re-calculated, and displayed as "New SSF", along with the % adjustment made.

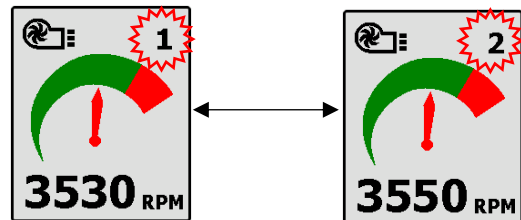


UK805-110.PNG

3.10 Fan Speed Display

The Artemis can monitor and display the speed of either 1 or 2 fans depending on the drill configuration.


If monitoring two fans, the display will alternate every 6 seconds between fan "1" and fan "2".

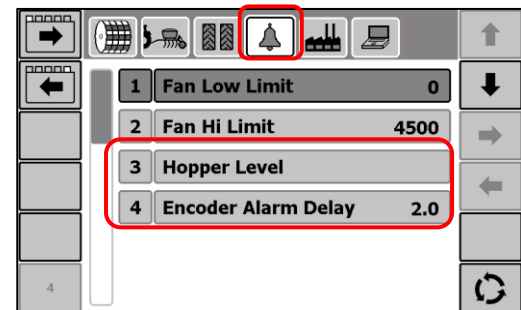


3.10.1 Set Fan Speed Alarms

There are both low speed and high speed programmable alarms. The low and high alarm speed thresholds can be set via the "Drill Setup" menu as follows,



Cycle to the 'Drill Setup' screen and touch the  tab to view/edit the 'Fan Low Limit' and 'Fan Hi Limit' settings.




UK805-120.PNG

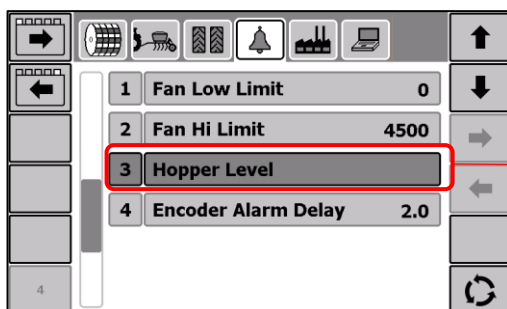
3.11 Hopper Level Alarms

Hopper level alarms will alert the operator when the product is running low and/or has nearly run out. Depending on the drill configuration, for each hopper there is either,

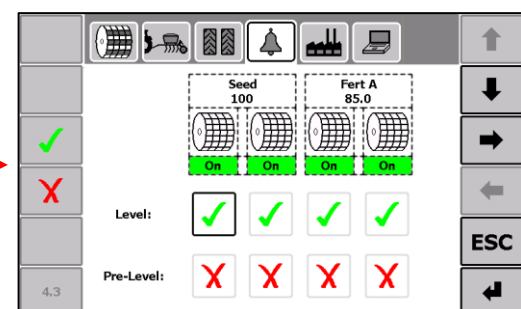
- (i) a single low-level sensor.
- (ii) Both a low-level sensor and an upper "Pre-Level" level sensor. The additional "pre-level" sensor is positioned higher up in the hopper to provide the operator a more advanced warning. This can avoid a possible disruption to drilling a long bout or unnecessary delay in replenishment.



To view the level sensor configuration applicable to each metering unit, cycle to the 'Drill Setup' screen and touch the  tab. Select "3. Hopper Level".



UK805-130.PNG




UK805-140.PNG


3.12 Totals



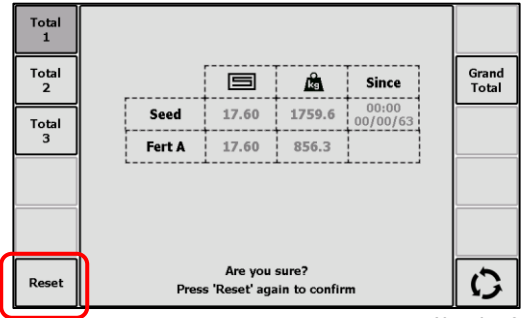
The total Area and Weight of each product accumulates to the previously selected memory register, “Total 1”, “Total 2” or “Total 3” as shown.

The total is the total since last reset.

To reset any of the total registers, first select it and touch 

You must then touch  again to zero.

The Grand Total memory register cannot be reset.



UK805-150.PNG

4. Blockage Monitoring (optional)



Blockage monitoring is an optional feature. When enabled, this screen page appears after the 'Totals' screen page.

In the instance of a dual-product setup, select,



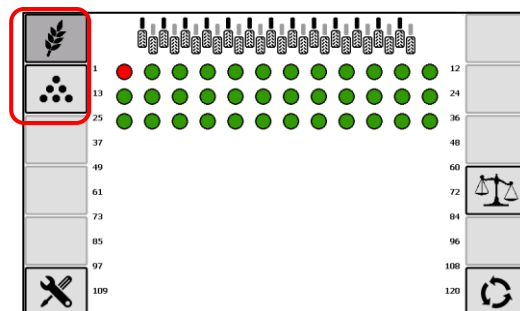
to view the sensor status for seed,



to view the sensor status for fertiliser.

The sensors are identified by the row number being monitored.

NOTE: On a dual-metering setup (e.g. Seed Left / Seed Right), when a channel is switched off, the sensor indicators will turn red, but there will not be an alarm.



UK805-230.PNG





4.1 Blockage sensor status and alarms

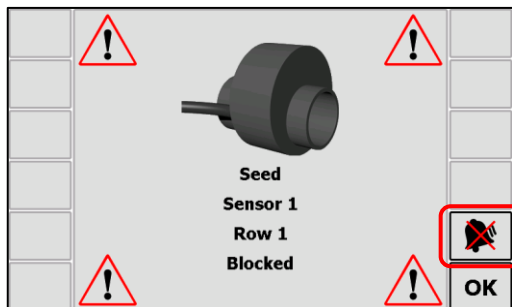
NOTE: Lifting the drill out of work cancels all alarms.

Indication	Status
GREEN	The sensor is operating normally. The required seed flow is detected through the sensor.
RED	Sensor blocked, either at the coulter or at the distribution head. The alarm message " Seed Sensor [xx] Row [xx] Blocked " or " Fert Sensor [xx] Row [xx] Blocked " will appear. Remove the blockage. <i>Note: The Sensor No. relates to its position on the distribution head. The Row No. that the sensor is monitoring may not necessarily be the same as the Sensor No.</i>
ORANGE (FLASHING)	The sensor is detected on the CAN bus, however there is a break in communication with an adjacent sensor. The alarm message " Seed Communication Error " or " Fert Communication Error " will appear. Check the sensor connectors.
BLACK	A sensor is not being detected on the CANbus, and is breaking communication with the adjacent sensors. The alarm message " Seed Communication Error " or " Fert Communication Error " will appear. Check the sensor connectors, otherwise the sensor may be faulty and need to be replaced. <i>Note: A replacement sensor must be configured with the same ID No.</i>

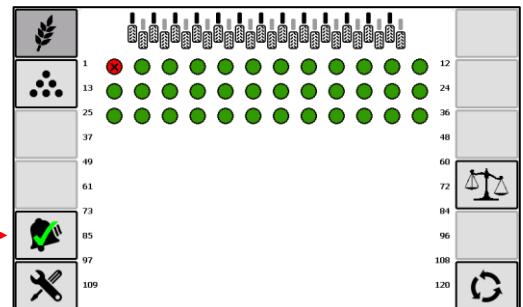
4.2 Blockage sensor alarm override

When a blockage occurs, after a pre-defined delay time, the alarm screen appears. You can choose to either,

- (i) press  to temporarily cancel the alarm. Until the blockage is cleared, the alarm will re-activate after 30 seconds.
- (ii) press  to ignore the alarm. The sensor icon changes to . Press  to revert to the normal alarm function.




UK805-260.PNG



UK805-250.PNG

4.3 Sensor Calibration

It is recommended to calibrate the sensors at the start of each drilling day. Start drilling and make sure everything is up to full speed and at normal operating condition.

Cycle to the Seed Sensor screen page. If all sensor indicators are showing green, then simply press  to automatically calibrate all the sensors.

Once calibrated, the sensitivity of the sensors is adjusted automatically for varying forward speed / application, e.g for Variable Rate Treatment from a plan.


5. Product Calibration


There are two ways of running the calibration test,

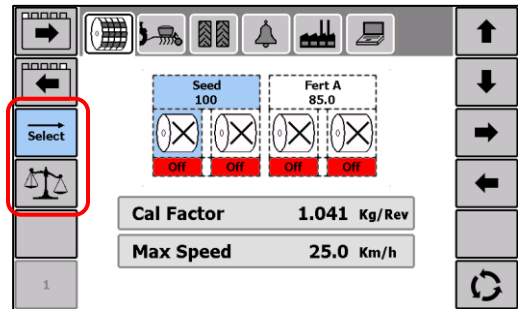
- from the head unit.
- via the relevant priming switch on on the drill.

5.1 Running the test from the Cab



1. From the main drilling screen, set the target rate for the channel(s) to be calibrated.
2. Setup the drill in the usual way for a bucket test on the appropriate metering unit.
3. Cycle to the 'Drill Setup' screen.

The screen displays the channel configuration as shown on the main operating screen. If multiple channels are configured, the calibration routine must be repeated for each channel including linked channels ().


4. Press  to select the channel to calibrate, then press .

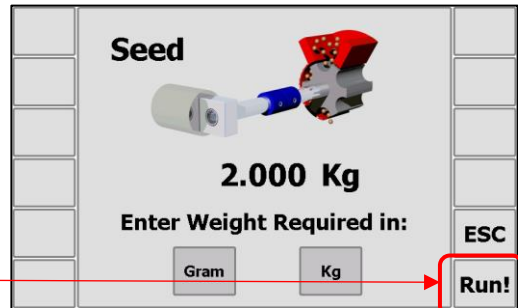


UK805-160.PNG

5. Press  or , (your preference) and enter the weight that you wish to meter out for the bucket test.




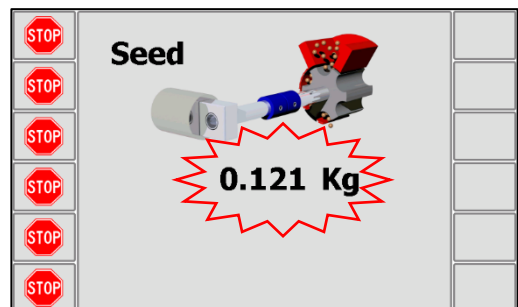
6. Press .



UK805-175.PNG


The metering unit will then operate (based on the simulation speed) to dispense the programmed amount of product, then stops.


NOTE: At any time you can touch  to curtail the test.

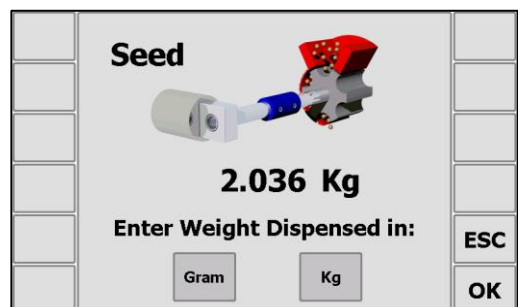


UK805-180.PNG

The instrument then displays a weight figure based on the existing, programmed product calibration factor.

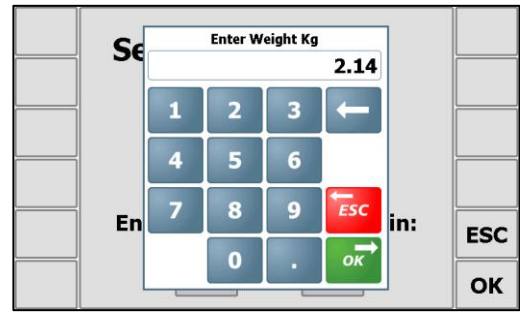
NOTE: In the case of a single motor / dual metering configuration () the product collected, weighed and programmed is that from BOTH metering units.

So in this case, before going to step 7, press  and repeat steps 5 and 6 for the second metering unit, then total both weights.



UK805-190.PNG

7. Weigh the contents of the container. Press **Gram** or **Kg**, (your preference) and enter the weight THAT WAS DISPENSED.

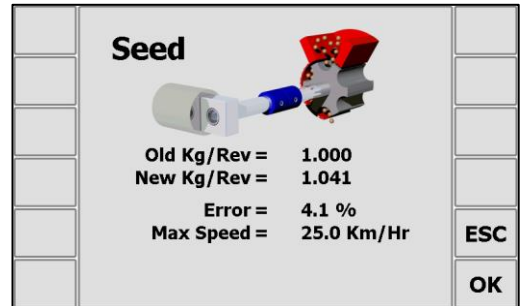


UK805-210.PNG

8. Press **OK**.

The new calibration factor (kg/rev), % error and the maximum forward speed that is permissible based on the application rate set for the channel.

9. Press **OK** to return to the "Drill Setup" screen.



UK805-200.PNG

5.2 Running the test using the Priming Switch

- From the main drilling screen, first set the target rate for the channel(s) to be calibrated.
- Setup the drill in the usual way for a bucket test on the appropriate metering unit.
- Press the priming switch to meter out the desired amount of product.


NOTE: Depending on your particular drill configuration, the priming switch(es) will be setup for either momentary or latching operation.

If set to latching, then press and release the switch to start metering, then press and release again to stop.

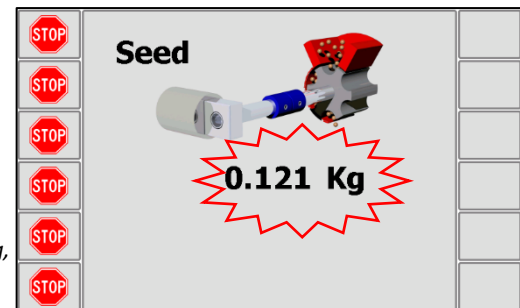
If set to momentary, then press and hold the switch to start metering, and release to stop.

The displays switches automatically to the calibration screen once the priming switch is pressed.

When the metering unit is stopped, the instrument then displays a weight figure based on the existing programmed product calibration factor.

NOTE: In the case of a single motor / dual metering configuration () the product collected, weighed and programmed is that from BOTH metering units.

So at this point, press **ESC** and repeat steps 2 and 3 for the second metering unit, and total the dispensed weights.



UK805-180.PNG



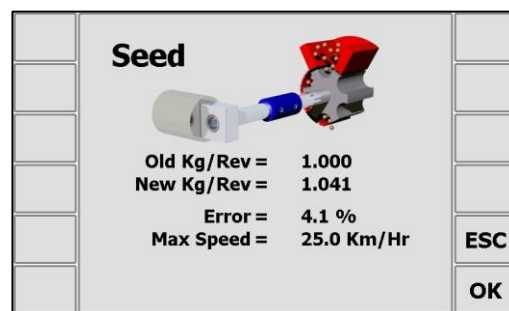
UK805-190.PNG

4. Weigh the contents of the container. Press **Gram** or **Kg**, (your preference) and enter the weight THAT WAS DISPENSED.



UK805-210.PNG

5. Press **OK** .
The new calibration factor (kg/rev), % error and the maximum forward speed that is permissible based on the application rate set for the channel.
6. Press **OK** to return to the main operating screen.



UK805-200.PNG

5.3 Calibrating systems with 'Accord' type metering mechanisms.

When changing from a low rate to a high rate i.e. 3kg/ha to 100kg/ha

For each channel,

1. Move the metering slide to a position for the higher rate.
2. Perform the calibration test and enter the weight dispensed (as in 5.1 / 5.2).
3. The error will be considerable, but press **OK** to accept the error and continue.
4. From the main drilling screen, set the required target rate for the channel.
5. Perform the product calibration routine again.
6. The error this time will be marginal.
7. Press **OK** to accept the error, and begin drilling.

When changing from a high rate to a low rate i.e. 100kg/ha to 3kg/ha :

For each channel,

1. Move the metering slide to a position for the lower rate.
2. Perform the calibration test and enter the weight dispensed (as in 5.1 / 5.2).

NOTE: *If using the priming switch simply dispense a small amount of product and enter the weight.*

3. The error will be considerable, but press **OK** to accept the error and continue.
4. From the main drilling screen, set the required target rate for the channel.
5. Perform the product calibration routine again, this time dispensing a suitable amount of product.
6. The error this time will be marginal.
7. Press **OK** to accept the error, and begin drilling.

6. General settings

General settings are accessed from the “Dashboard.”

These are settings other than those for electro-hydraulic functionality and system calibration, which are accessed from within the Artemis app.



Settings summary:

Menu Level 1	Menu Level 2	Menu Level 3	Menu Level 4
Global Settings	Country	UK, France, Germany, USA	
	Language	English, French, Dutch, German	
	Time and Date	Time and Date	
		24hr format	
		Date Format	M/dd/yyyy, dd/M/yyyy, yyyy/M/dd
	Units	Metric	
		Imperial	
		Other	
	Brightness		
	Contrast		
	Volume		
	Software Activation Code	(Required for PF app)	
	Home Screen Function Setup	(Sets appearance of “dashboard” screen)	
	LAN TCP/IP	Enable DHCP	
		IP Address	
		Subnet mask	
		Default gateway	
		DNS Server	
	Touchscreen calibration		
	About System	(Shows S/W versions)	
GPS Settings	Source	None, COM 1, COM2	
	Baud Rate	4800, 9600, 19200, 38400	
	Left/right Offset		
	Front/Back Offset		
	Height from ground		
Implement configuration settings	Number of channels	1,2,3 or 4	
	Channel # (max of 4 channels)	Width	
		Number of Sections	
		Section #	Width
			X Offset
			Y Offset
			Z Offset

7. Data Logging and Variable-Rate Treatment (VRT)

Data logging options are not included within the basic application software. You must first obtain an activation code (purchased via the RDS website) to enable the extended features and functionality provided by the PF software module.

7.1 Job Options

7.1.1 APPLY FROM A PLAN (Variable-Rate Treatment or 'VRT')

- The Isocan receives the rate from a treatment plan stored on the SD card, and controls the application via the RDS control system. An "as applied" work record of the *actual* application is generated and saved on the SD card.
- The Isocan receives the rate from a third-party controller and controls the application via the RDS control system. The Isocan sends back the actual application rate to the other controller. For a treatment plan generated by RDS Plot/Plan, an "as applied" work record of the *actual* application is saved on the SD card.

Both setups allow the operator to commence a full VRT application. The associated "as applied" work record file can be viewed in mapping/treatment plan software. Job summary data (7.1.3) is also appended to the work record file.

7.1.2 LOG TREATMENT (Dynamic Data Logging)

A full application record is generated, logging rate and other parameters (e.g. "tags") in real time, attributing this data to a specific location. The associated "Dynamic Logging" file is viewed in the mapping/treatment plan software. The data generated by dynamic logging is saved onto the SD card. Job summary data (7.1.3) is also appended to the dynamic logging file.

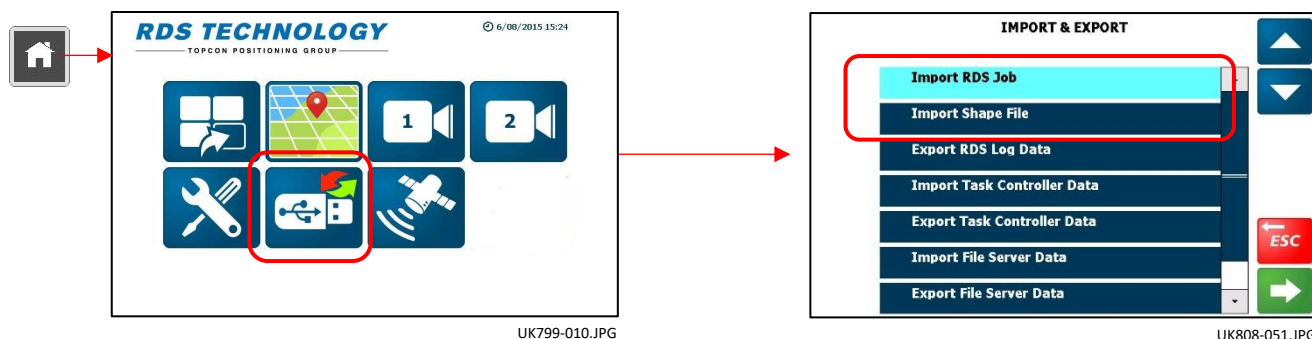
7.1.3 LOG SUMMARY ONLY (Field Data Logging)

For simple farm record keeping and traceability purposes, you can record a summary of each job or work session on the SD card.

7.2 Importing / Exporting PF Data

PF data is read from and written to the SD card by the PF app, and the SD card should always be left in the instrument.

Data is transferred between the Isocan SD card and the office via a USB stick utilizing the Import / Export app on the 'Dashboard'.



NOTE: If importing a shape file, it is automatically converted and saved onto the SD card in the RDS format.

7.2.1 Importing RDS treatment files

To upload RDS treatment plans to the SD card, insert the USB stick and from the Dashboard, select 'Import RDS Job' > 'OK'.

If necessary, navigate to the appropriate directory using the   keys. Select the 'RDS_DATA.XXX' folder containing the file(s) and press .

Existing files with the same filename in the RDS_DATA.XXX folder on the SD card will be overwritten.

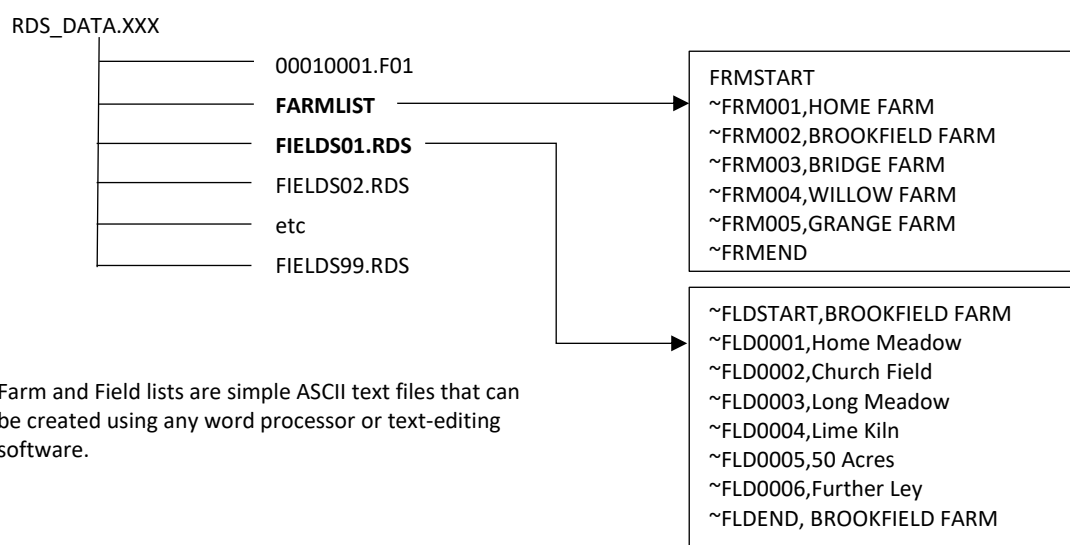
7.2.2 RDS filenames, Farm and Field lists

To enable farm and field lists to be displayed and to search for a related plan, two text files are created in the RDS_DATA.XXX folder,

- A Farm No / Farm Name text file <FARMLIST.RDS> listing all farms.
- A Field No. / Field Name text file <FIELDSxx.RDS> for each farm, where 'xx' is the farm no.

NOTE: In the absence of the above text files on the SD card, the Isocan initially creates default files <FARMLIST.RDS> and <FIELDS00.RDS> automatically for farm no. 00 "UNKNOWN" and field no. 00 "UNKNOWN"

Farm and field lists

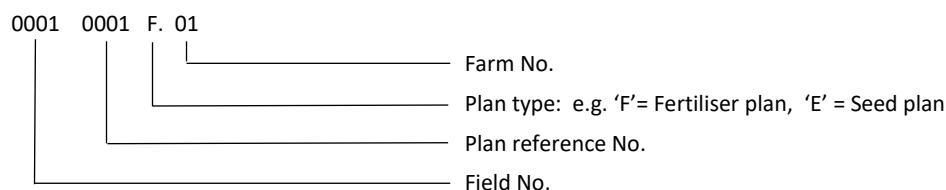


Farm and Field lists are simple ASCII text files that can be created using any word processor or text-editing software.

RDS filename

When creating a plan, the filename should adhere to the following convention, so that the Isocan can search and select the plan relating to a given farm and field during the plan selection process.




E.g. 00010001.F01

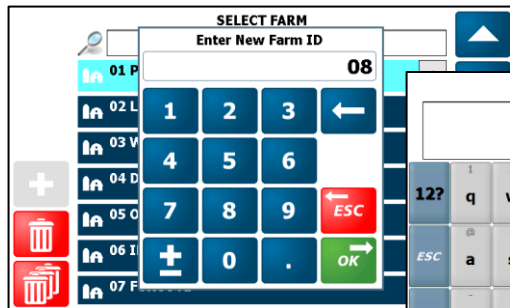


7.2.3 Adding a new farm / field reference

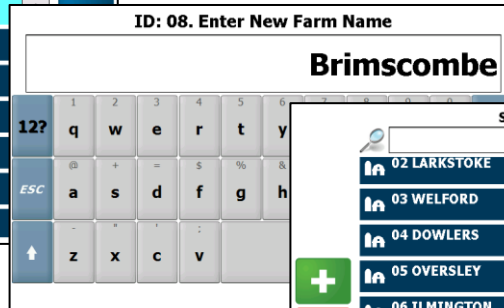
If a plan is imported where the farm / field reference no. does not correspond to an existing entry in the farm / field list, then you can create a new farm and field reference for that file from the 'SELECT FARM' screen.

Take for example, a seed plan with the filename 00150001.E08. Farm no.08 is not on the current list.

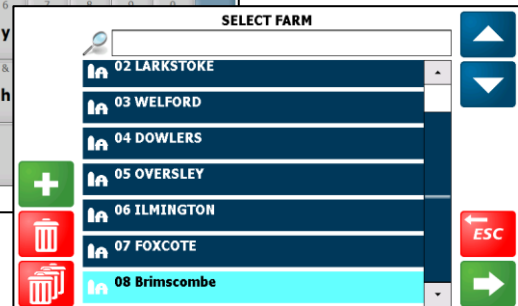
1. From the 'SELECT FARM' page, press .
2. Enter the farm no. (e.g. '08') and press .
3. Enter a farm name (e.g. "Brimscombe") and press .






UK808-300.PNG

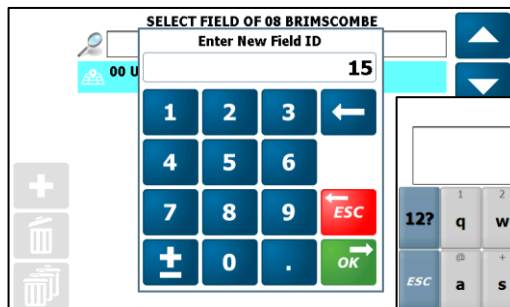


UK808-310.PNG



UK808-320.PNG

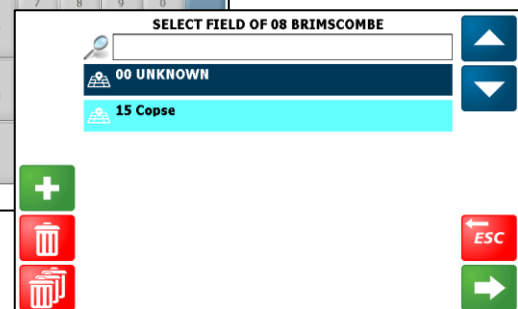
4. The farm name is then added to the list. Press .
5. Enter the field no. (e.g. '15') and press .
6. Enter a field name (e.g. "Copse") and press .




UK808-300.PNG



UK808-310.PNG





UK808-320.PNG

7. The farm name is then added to the list. Press .

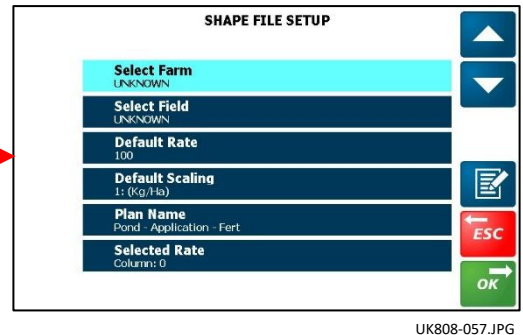
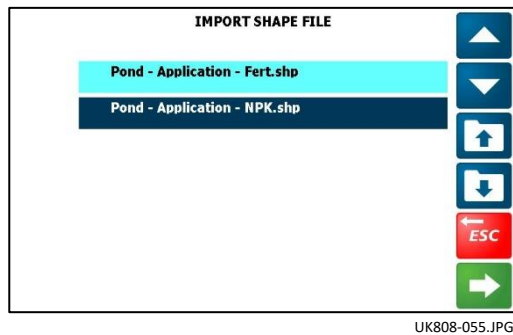
The farm reference is then appended to the existing 'FARMLIST.RDS' file, and a new file 'FIELDS08.RDS' added to the RDS_DATA.XXX folder on the SD card.

7.2.4 Importing Shape files

To upload shape files to the SD card, insert the USB stick and from the Dashboard, select 'Import Shape File' > 'OK'.


If necessary, navigate to the appropriate directory using the  keys. Select the file and press .





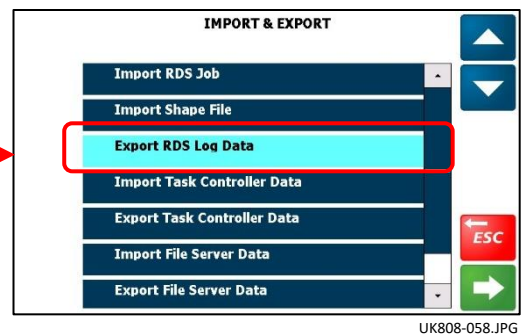
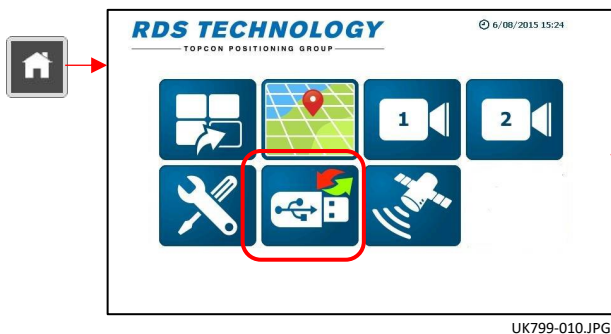
You then have the option to edit the shape file settings,

- Select Farm
- Select Field
- **Default rate** This is the base rate that the plan is based on and to which the system will apply, for example in the absence of GPS data, when outside the field boundary etc.
- **“Default scaling”** (the units - e.g. kg/ha etc)
- Plan name
- **“Selected Rate”** This specifies which data column in the associated shape file database (.DBF) file the system will interpret as the rate instructions.

Press  to import the file. The shape file (.SHP) will be automatically converted to the RDS file format upon transfer.

7.2.5 Export Job Data


To download application records / job summaries, insert the USB stick and from the Dashboard, select **‘Export RDS Log Data’** > **‘OK’**.

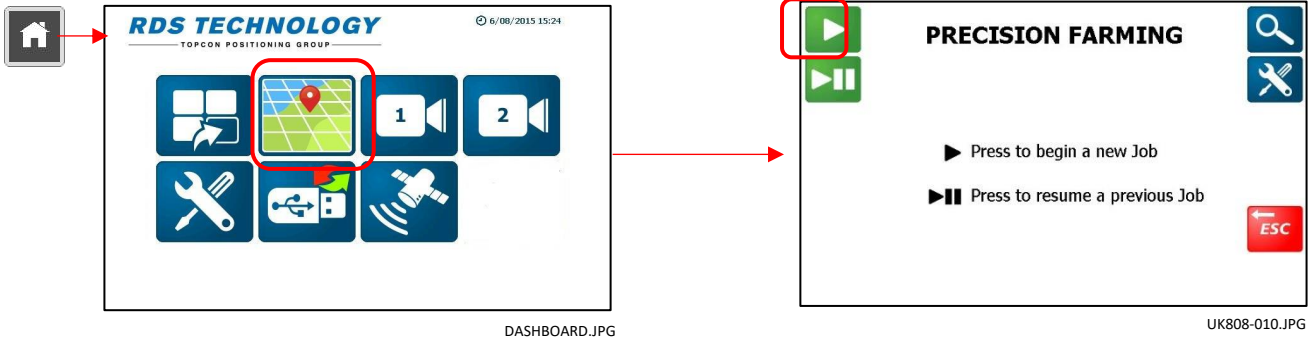


7.3 Starting a VRT job

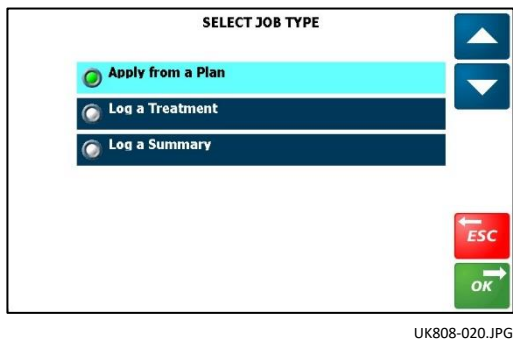
NOTE: In the case of multiple control channels in use, the VRT source and VRT plan must be individually set for each channel.




(i) Select the farm and field


1. If not already done, upload the required treatment plan(s) to the SD card (7.2).
2. Start the PF software via the 'Dashboard', then press  to begin the job setup process.

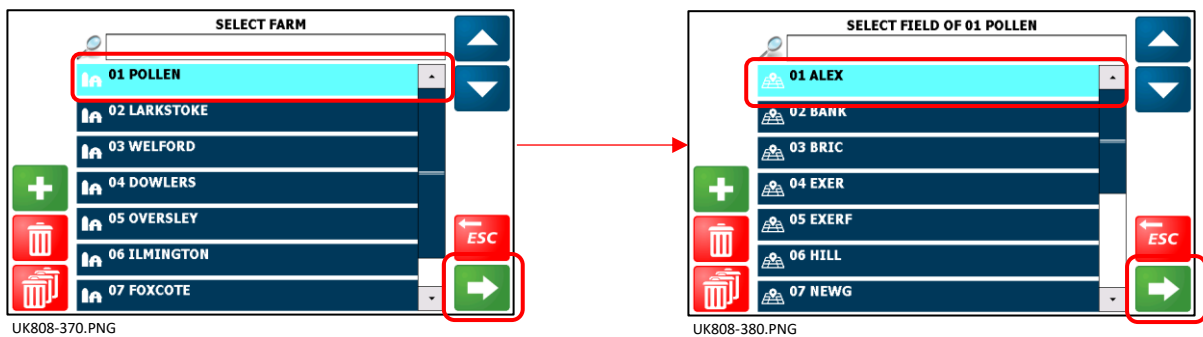


3. Choose the job option ("Apply from a Plan" being the default, so just press 'OK').



4. Select the required FARM reference and press  (or press  to add a new farm and reference – ref. 7.2.3).
5. Select the FIELD reference and press .

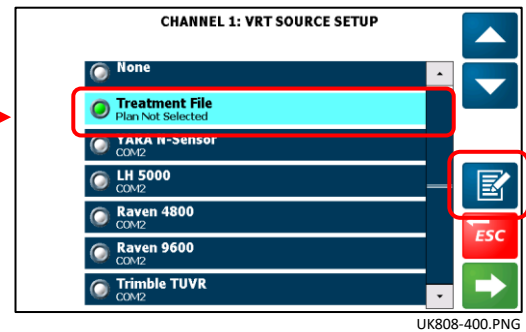
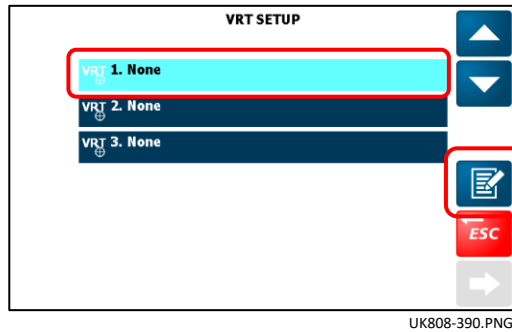
NOTE: You can also select the farm / field using the search function () by entering a search term.




(ii) Select VRT source



6. In the case of multiple control channels, if not already set by default (ref. 7.7.2), select the source of the rate instructions to be applied as “Treatment File” for each channel in use.

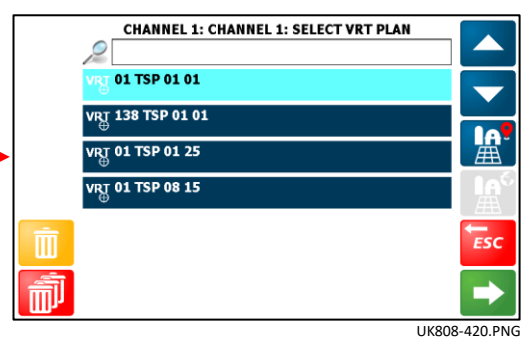
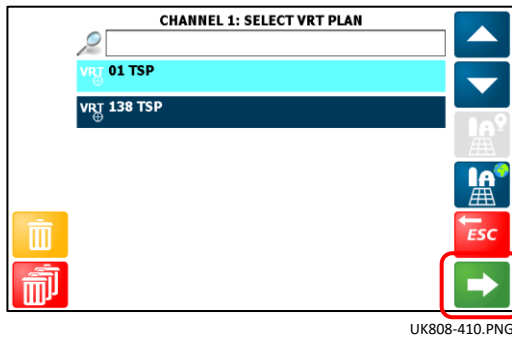
NOTE: If receiving rate instructions from a third-party controller, unless the instrument is already configured to default to that controller, then select it from the list.

**(iii) Select plan(s)**

7. For the selected channel, press  to select a plan stored on the SD card.

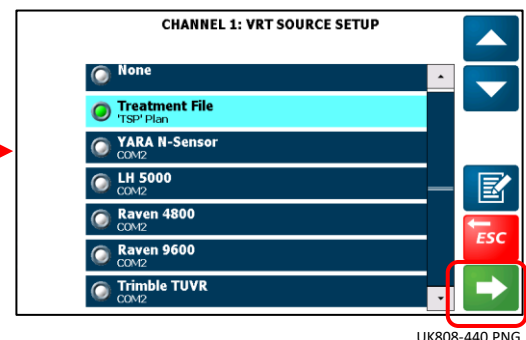
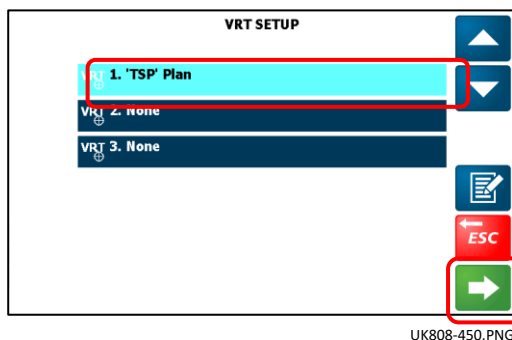
By default, the instrument lists all treatment plans that are associated with the selected farm and field ().
e.g. “01 TSP 01 01” indicates [Plan ref. no.]_[Product]_[Farm no.]_[Field no.]



NOTE: Pressing  displays ALL treatment plans on the SD card. If desired you can also select a plan using the search function () by entering a search term.

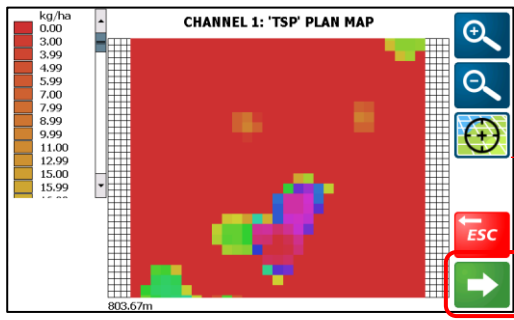


8. Select the plan and press  to confirm the selection.

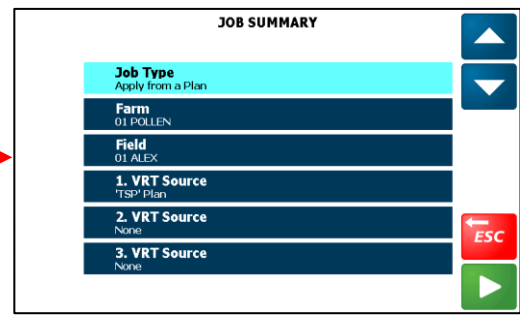
NOTE: At this point, if you have a multiple channel setup, then select the next channel (e.g. “VRT 2”) and repeat the plan selection process (steps 6, 7 and 8).




9. When you have finished selecting the treatment plan(s), then press  to view the treatment map.
10. Press  again to view the job summary.

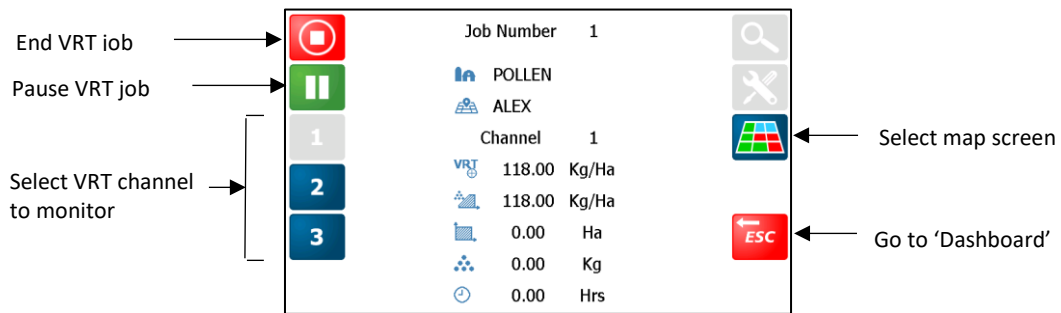


UK808-460.PNG



UK808-470.PNG


11. Press  to start the treatment plan. The VRT information screen is then displayed.

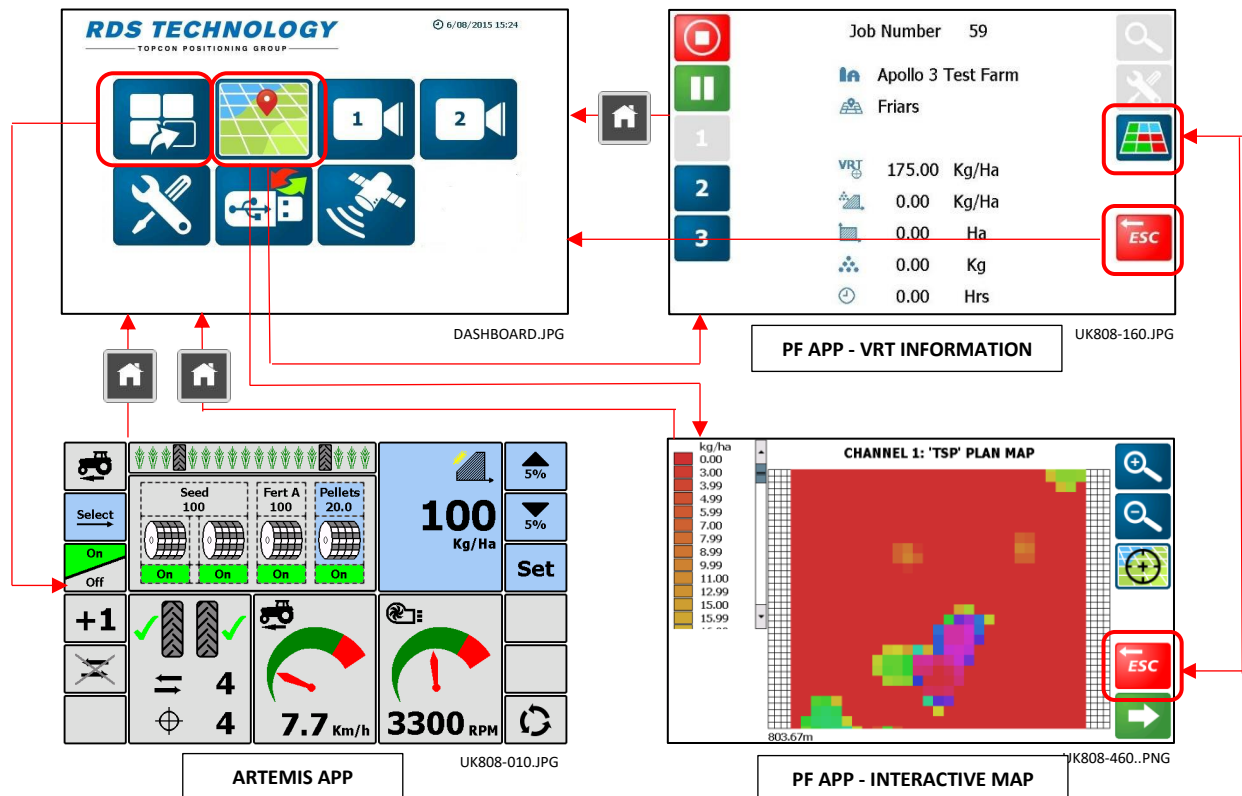


UK808-480.PNG

7.4 Viewing an active VRT job


At any time you can switch between the main operating screen, the interactive map view and the VRT information screen as shown below.

NOTE: Pressing  returns you to the "Dashboard" from any other screen. Re-selecting the app returns you to the app screen previously displayed.

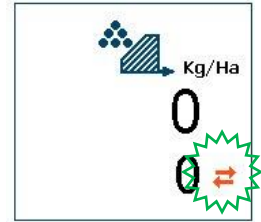


7.4.1 Variable-Rate Treatment Status

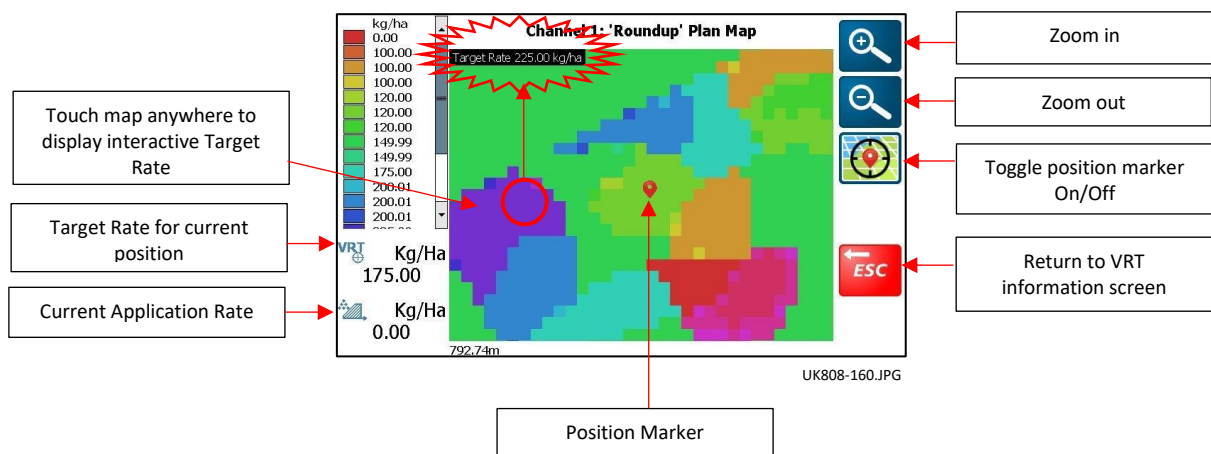
The target rate on the main screen now becomes the application rate according to the treatment plan data (Base rate x Multiplier), and the position in the field. The treatment cell size is defined in the treatment plan software.

While VRT mode is in operation, the symbol  is displayed alongside the Target Rate on the MAIN screen.

- If you lose the DGPS signal the treatment rate will revert to the 'Base Rate' specified in the plan.
- If you go outside the field boundary but are still within a treatment cell, the application rate will still apply for that cell.
- If you are outside of the treatment plan area, then the application rate goes to zero.



7.4.2 The interactive map display



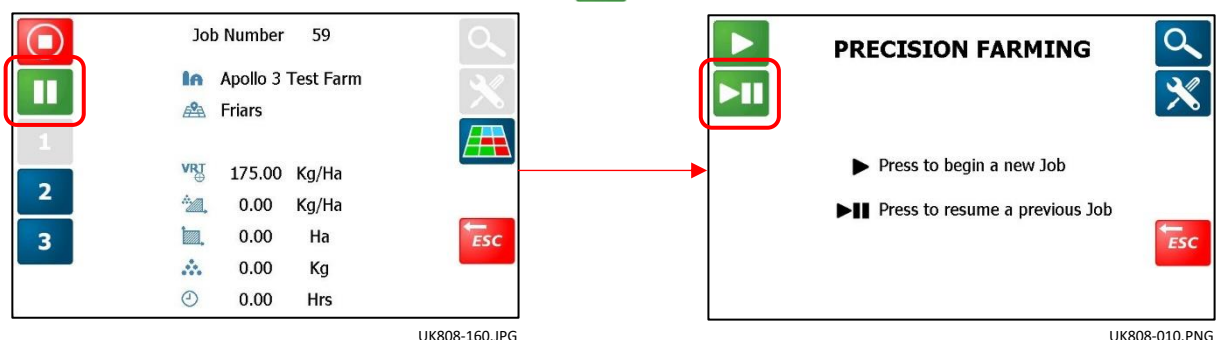
7.5 Pause / End data logging

This applies to all Job options,


- Apply from a Plan
- Log a Treatment
- Log a Summary


7.5.1 Pause / Resume data logging

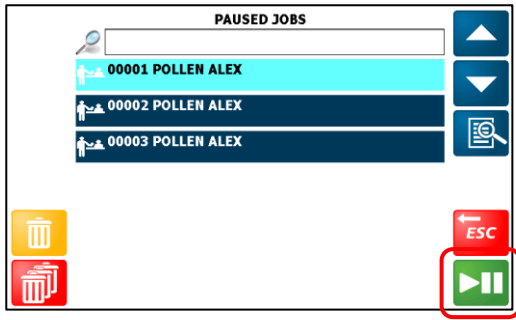
Return to the VRT information screen (ref. 7.3) and press to pause.



The associated work record file will be closed and saved on the SD card.

To return to a previously paused job, from the PRECISION FARMING screen, press .

If more than one job has been previously paused and saved, then select the job to resume from the list, and press .




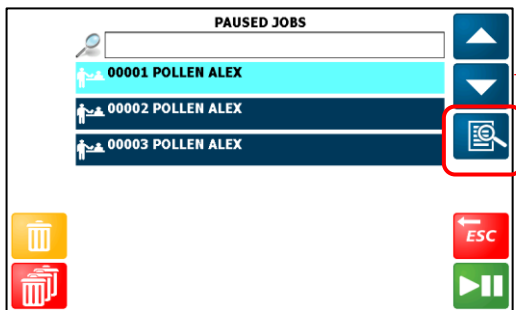
UK808-490.PNG

The job will now be resumed. The associated work record file is re-opened and subsequent logging data will be appended to it.

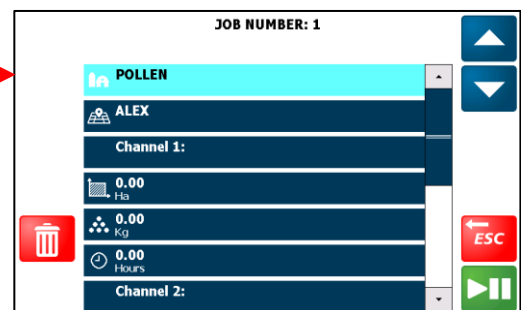
7.5.2 View summary / delete paused jobs

From the PRECISION FARMING screen, press .

Press  to see view a summary of a paused job.



UK808-490.PNG




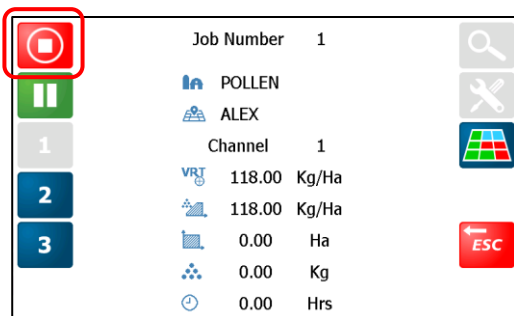
UK808-500.PNG

Press  to delete the selected job.

Press  to delete ALL paused jobs

7.5.3 End a job

Return to the VRT information screen (ref. 7.3) and press  to to end a job.




UK808-480.PNG


7.6 Search / View / Delete Summary Data

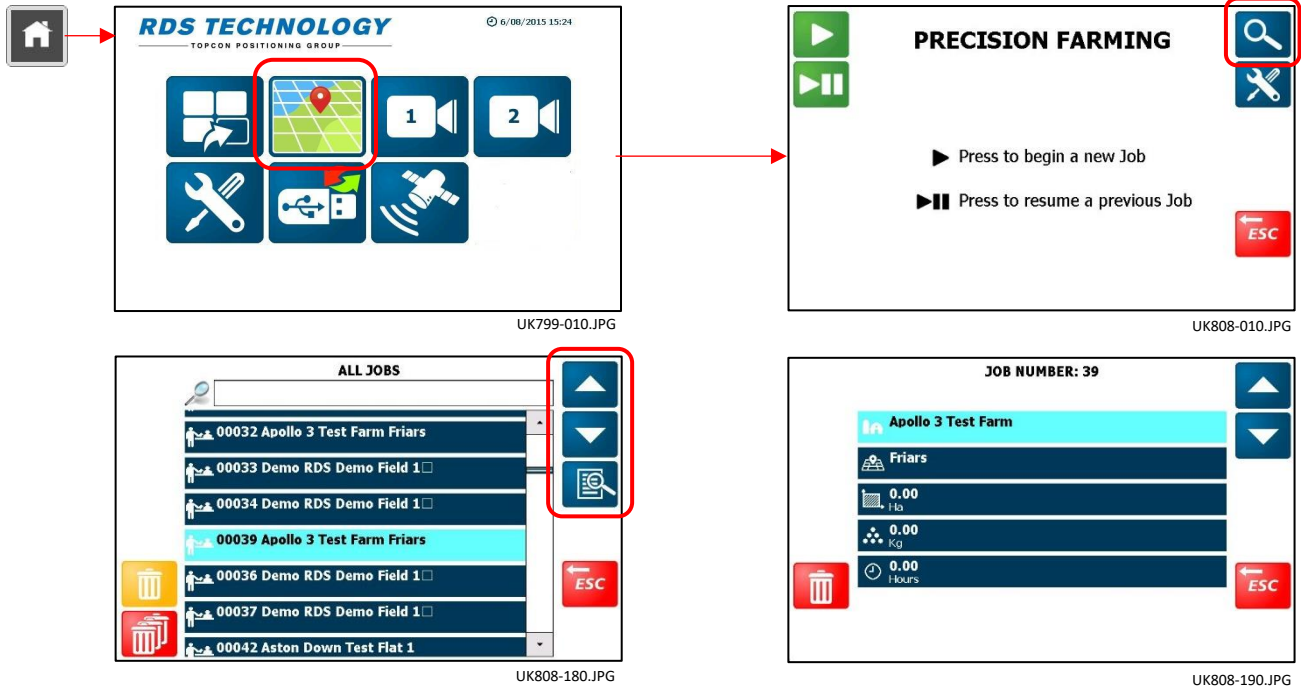
Summary data is recorded to the SD card for every PF job including,

- VRT
- Dynamic Data Logging
- Field Data Logging

Every PF job started is given a reference number which is assigned sequentially by the software.

Press  to view the completed jobs list.

Press  to select the job to view / delete.



Press  to delete the selected job.

Press  to delete ALL paused jobs.

7.7 PF settings

From the PRECISION FARMING screen, press .

7.7.1 Logging interval

Select "Logging Setup" and press .

You can set the logging interval by time or by distance.

It is recommended that you use the default time interval setting of 2 seconds. This should be adequate for variable-rate treatment (and yield mapping). To ensure correct application from treatment plans with a smaller cell size however, may require a shorter logging interval to be set.

Decreasing the logging interval may affect the responsiveness of the control system and generate larger log files. An exception is when you are boundary mapping (where less data is being generated), you can reduce the logging interval to get better definition of the field boundary.

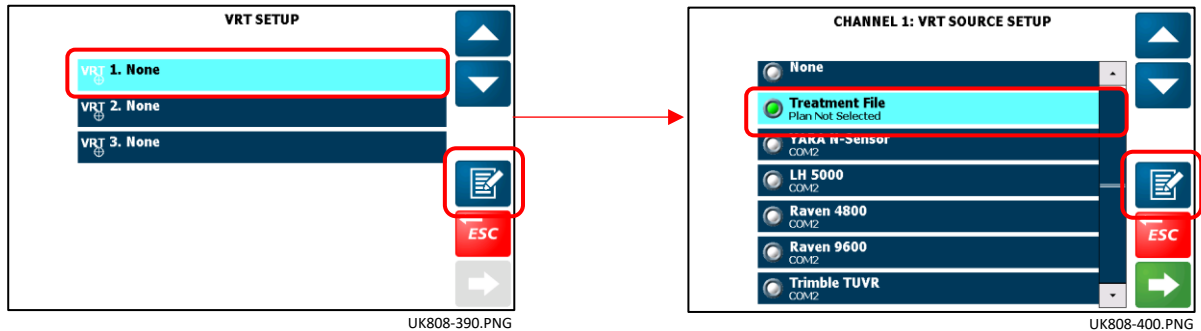
NOTE: *Logging interval by distance is an option. If you choose to log by distance, data points are logged only when moving, and it enables a fixed cell size (area) for the field map.*

7.7.2 VRT Setup / Third-party controllers


In the case of multiple control channels, select the source of the rate instructions to be applied for each channel in use.

For the RDS controller, select **"Treatment File"**. All VRT plans and subsequent work record files will be read/written from/to the SD card.

If receiving rate instructions from a third-party controller, then select it from the list.




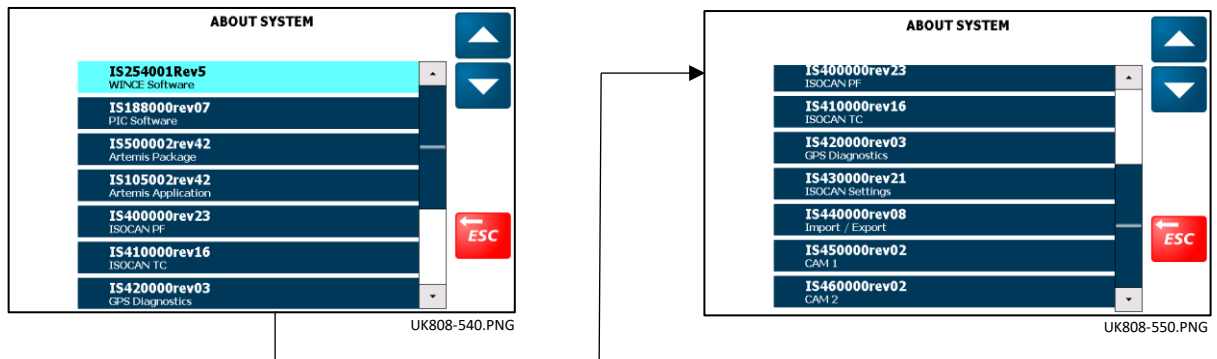
These settings become the default when you start a VRT job (ref. 7.2). The VRT source can of course still be changed as part of the PF job setup process if required.

NOTE: Other settings relating to PF functions (e.g. GPS settings) are setup directly from the dashboard "Settings" icon ().

8 Software upload



8.1 Checking current software versions

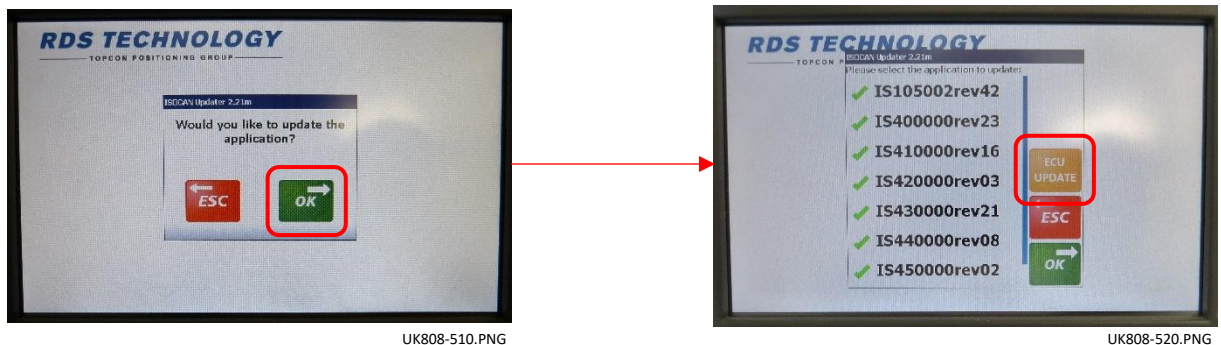
To check what software is currently installed in the head unit and the implement ECU, select the “Settings” icon (). Select “Global Settings” > “About System” listing all the installed software modules, with a description of what they relate too.





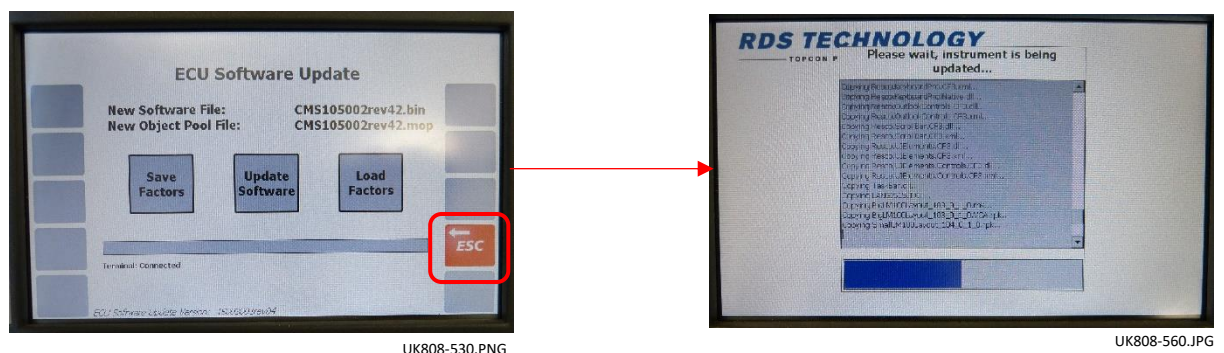
8.2 Software upload

Plug-in the USB stick with the software on the root directory, and switch the instrument on.

1. The “Isocan Updater” utility requests “**Would like to update the application?**”. Press  to continue. Isocan Updater lists the .exe.files found on the USB stick.
2. Press  to continue. The screen should display the message “**Terminal Connected**”

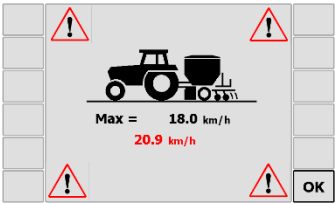
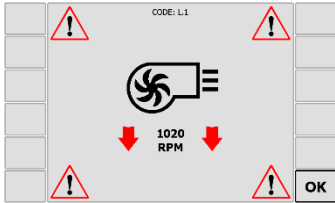
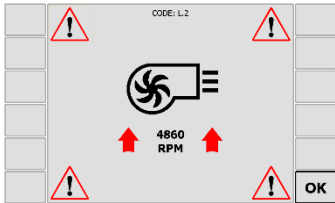
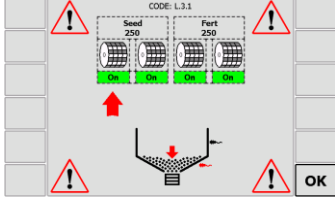
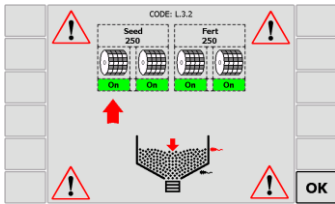
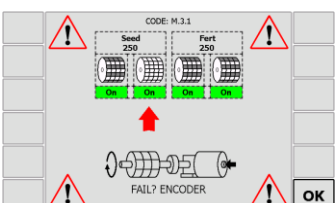
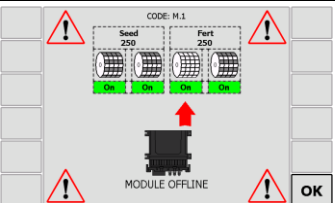


3. Press “**Save Factors**”. Calibration factors and settings are saved to an XML file on the USB stick.
4. Press “**Update Software**”. The program code is sent to the ECU, followed by the Object Pool.
5. Press “**Load Factors**”. The saved factors are uploaded to the ECU from the XML file on the USB stick.
6. Press  to return to the “Isocan Updater screen. Then press  to update the head unit software .

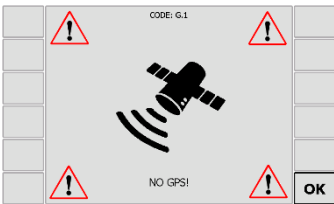
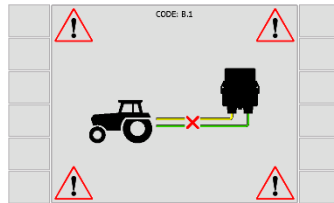
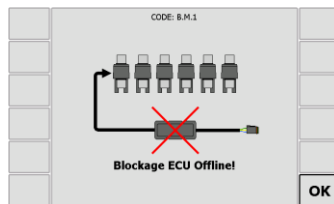
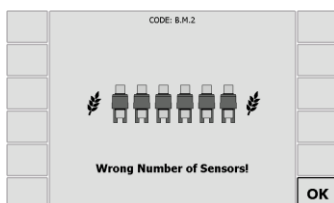
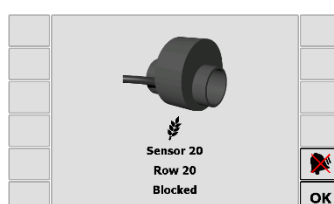
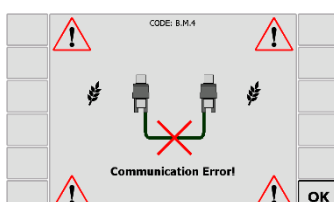
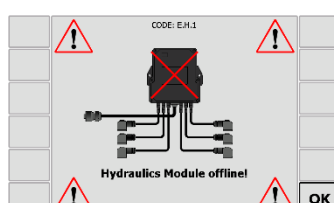


7. The software upload now complete and the instrument is automatically rebooted.


9. Alarm Codes

No.	Code	Screen	Reason	Check?
1	N/A		High forward speed <ul style="list-style-type: none"> Forward speed exceeds the maximum calculated and displayed on the RATE screen 	<ul style="list-style-type: none"> Target application rate is as required Calibration factor is realistic Adjust metering unit and recalibrate which will increase kg/rev factor and therefore increase maximum achievable forward speed
2	L.1		Low fan speed <ul style="list-style-type: none"> Fan speed below the low alarm value programmed 	<ul style="list-style-type: none"> Fan is actually operating Sensor & target functioning and correct PPR value programmed correctly
3	L.2		High fan speed <ul style="list-style-type: none"> Fan speed is above the high alarm value programmed 	<ul style="list-style-type: none"> Sensor & target functioning and correct PPR value programmed correctly
4	L.3.1		Low hopper level alarm <ul style="list-style-type: none"> Channel with low level highlighted 	<ul style="list-style-type: none"> Level is actually low Sensor is functioning correctly Wiring between sensor and connection box is correct Wiring between connection box and CAN module is correct
5	L.3.2		Pre-Level hopper alarm <ul style="list-style-type: none"> Channel with low pre level highlighted 	<ul style="list-style-type: none"> Level is actually low Sensor is functioning correctly Wiring between sensor and connection box is correct Wiring between connection box and CAN module is correct
11	M.3.1		Motor speed signal from motor not being received <ul style="list-style-type: none"> Motor being operated and pulses received from shaft confirmation sensors but no motor speed signal 	<ul style="list-style-type: none"> Signs of mechanical damage to encoder or cabling on motor 3way connector between motor and harness is correct Wiring between 3way connector and module connector is correct
12	M.1		MCM or APM is offline'	<ul style="list-style-type: none"> Check wiring between 6way connector and module connector on MCM harness

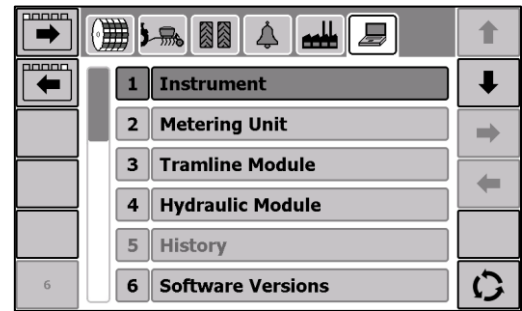
No.	Code	Screen	Reason	Check?
13	M.1.2		Module overload shutdown <ul style="list-style-type: none"> Motor current requirement exceeded, so the module is shutdown and motor operation is inhibited 	The Motor is stalled. <ul style="list-style-type: none"> Excessive drag on the metering unit, requiring motor high current.
14	M.1.3		Motor module temperature shutdown <ul style="list-style-type: none"> Module temperature has exceeded the value programmed 	The Motor speed is very low. Excessive load applied to motor which for a prolonged time, causing the module high temperature and shutdown. Check metering unit for damage / obstruction. <ul style="list-style-type: none"> Re-calibrate to get motor turning faster.
15	M.2.L		Motor speed low <ul style="list-style-type: none"> Error between actual motor speed and target motor speed is greater than 10% 	<ul style="list-style-type: none"> Target motor speed to high Erratic forward speed signal Erratic loading on motor via metering unit
16	M.2.H		Motor speed high <ul style="list-style-type: none"> Error between actual motor speed and target motor speed is greater than 10% 	<ul style="list-style-type: none"> Target motor speed to high Erratic forward speed signal Erratic loading on motor via metering unit
17	M.3		Metering unit is not going around	<ul style="list-style-type: none"> Is metering unit rotating when motor rotates Sensor & target functioning and correct PPR value programmed correctly Wiring between sensor and connection box is correct Wiring between connection box and CAN module is correct
18	-		-	-
19	H.1		Tramline module is 'offline'	<ul style="list-style-type: none"> Check module has got power from main battery power cable Check wiring between 4way connector and module connector on HBM harness

No.	Code	Screen	Reason	Check?
20	G.1		GPS signal lost.	<ul style="list-style-type: none"> Check connections to GPS antenna. Check GPS coverage for Area
21	B.1		Bridge Module is 'offline'	
22	B.M.1		Blockage monitoring ECU is 'offline'	<ul style="list-style-type: none"> Check power supply to blockage ECU Check wiring between power harness and blockage ECU Check LEDs are lit and flashing on blockage ECU
23	B.M.2		Wrong number of blockage sensors is detected	<ul style="list-style-type: none"> The correct number of sensors is programmed in blockage ECU setup All sensors are wired correctly and connected
24	B.M.3		Blocked sensor/row	<ul style="list-style-type: none"> Row or pipe is actually blocked
25	B.M.4		Communication break between blockage sensors	<ul style="list-style-type: none"> Wiring between blockage sensors The correct number of sensors is programmed
26	E.H.1		Electro hydraulic module offline	<ul style="list-style-type: none"> Check wiring between 4way superseal and connection to the main loom.

10. Diagnostics

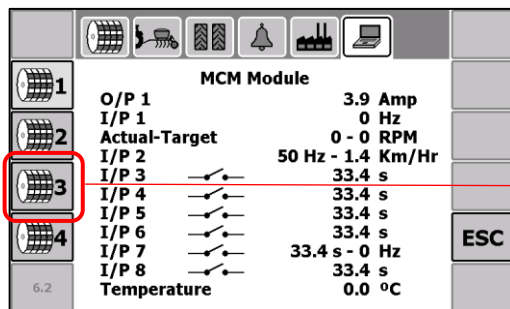
Press  to cycle to the Settings screen.

“1. Instrument” simply indicates the supply voltage.

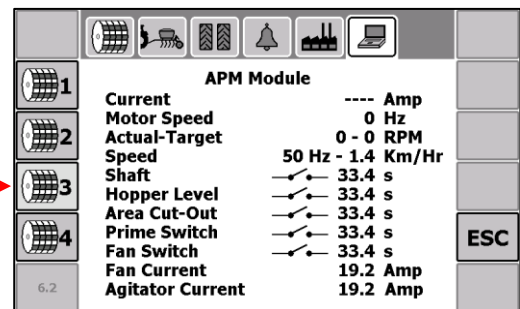


UK805-270.PNG



“2. Metering Unit” indicates the status of each Motor Control Module (MCM) and if applicable, the Applicator Control Module (APM). MCM I/O functions are not defined as they can vary depending on the drill, but are typically as follows, I/P 1=Encoder, I/P 2=Forward speed, I/P 3 and 4= Metering confirmation shaft(s), I/P 5=Priming switch, I/P 6=Cutout status, I/P 7 and 8=Hopper Level (sometimes these may be Cutout status).



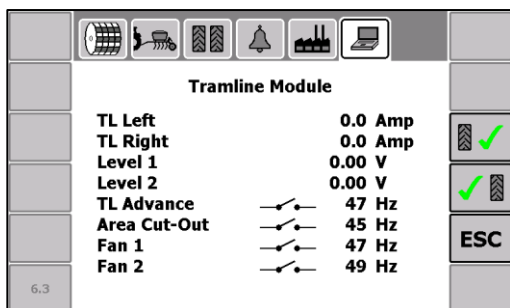
UK805-280.PNG



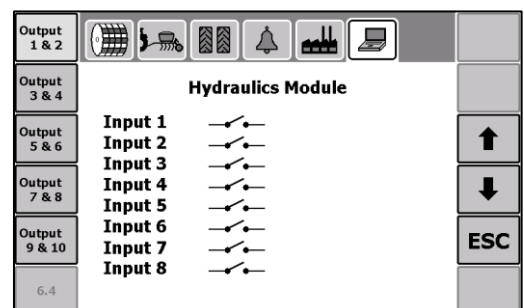
UK805-310.PNG

“3. Tramline Module” indicates the status of the H-bridge Module (HBM). Press  or  to test the tramline mechanisms “TL Left” and “TL Right”. If operational, a current draw is indicated.

“4. Hydraulic Module”. Output functions 1 to 8 are not defined as they are dependent on the make and model of drill. Please refer to the drill manufacturer for further information on hydraulic functionality.




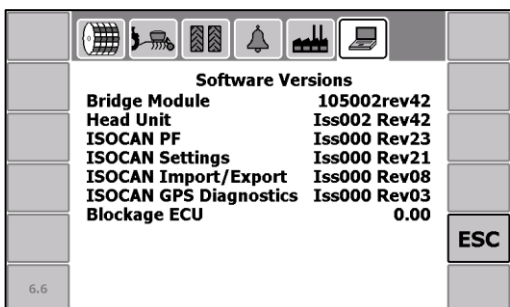
UK805-290.PNG



UK805-300.PNG

“6. Software versions”.

NOTE: Software versions can also be viewed via the “Dashboard” ( “Global Settings” > “About System”).

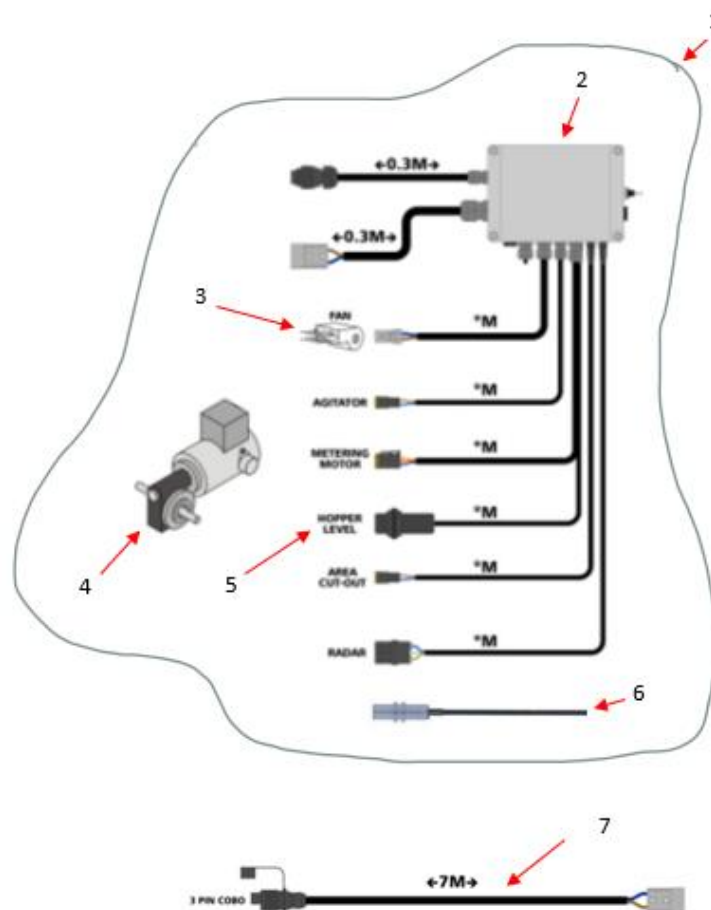


UK805-320.PNG

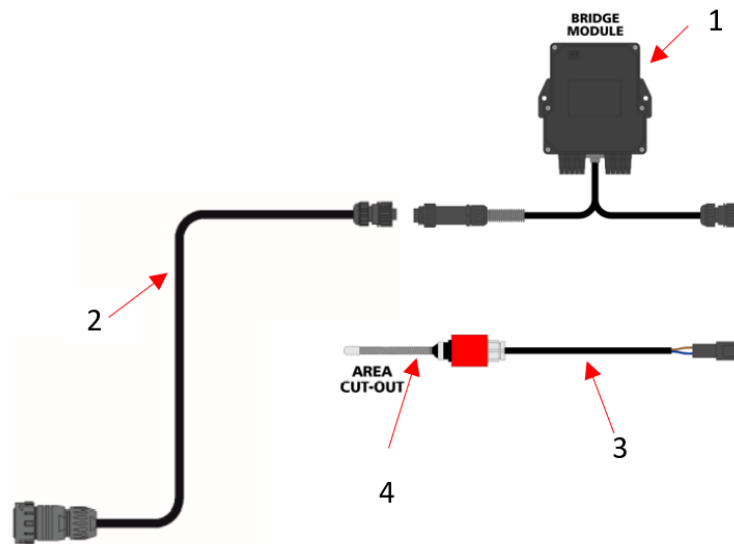
Issue Ref.	Date	Notes
A	02.12.15	1 st Draft
B	10.12.15	2 nd Draft
C	15.1.16	3 rd Draft
1.0	16.2.16	Added section 4 – “Seed Blockage Monitoring”
2.0	8.7.16	General update for S/W ver. 42 including alarm codes and diagnostics.

11 Spare part list

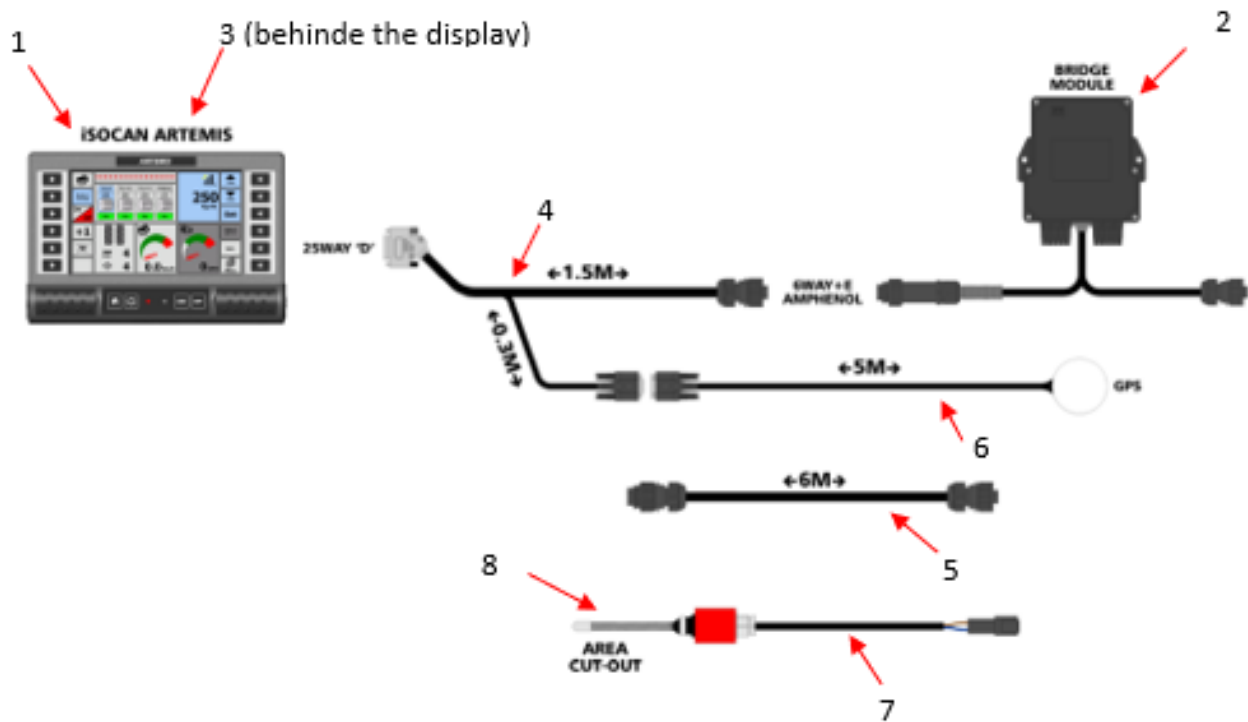
Base Kit



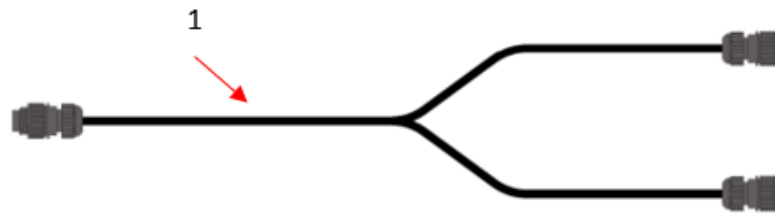
Pos	Item no.	Designation
1	0520002	Base Kit
2	0520010	Junction box for ISOBUS/ISOCAN
3	0539042	Fan (el)
4	0520474	Motor
5	332052778	Sensor f/tank capacity
6	332052777	Sensor f/metering roller
7	0520015	Light Duty Power Cable (only for lite Machines)

ISOBUS ECU Kit

Pos	Item no.	Designation
	0520000	ISOBUS Kit
1	0520011	Bridge Module
2	0520018	Cable ISOBUS
3	0520021	Cable f/finger Switch
4	0520464	Finger Switch

ISOCAN Display Kit

Pos	Item no.	Designation
	0520001	ISOCAN Kit
1	0520372	ISOCAN display
2	0520011	Bridge Module
3	0520006	Mount Kit for ISOCAN display
4	0520019	Headunit Cable
5	0520017	Extension Cable 6m
	0520016	Extension Cable 10m
6	0520030	GPS 16 D9
7	0520021	Cable f/finger Switch
8	0520464	Finger Switch

Additional Seeder Kit

Pos	Item no.	Designation
1	0520040	Seeder T Piece

