Mounts Machinery Field IQ Manual for CFX/FM-750 Display (ver 2.0)

Setup, Calibration & Operation of Trimbles Field IQ Sprayer Control System, when used on the CFX-750 Display for Automatic Rate and Section Control.

Compatible Firmware: CFX-750 – v2.00, v2.03 and v2.05

FIQ Master Switch Box – v2.06

FIQ 12 Section Switch Box – v2.06

FIQ RSCM Module – v2.14

Contents

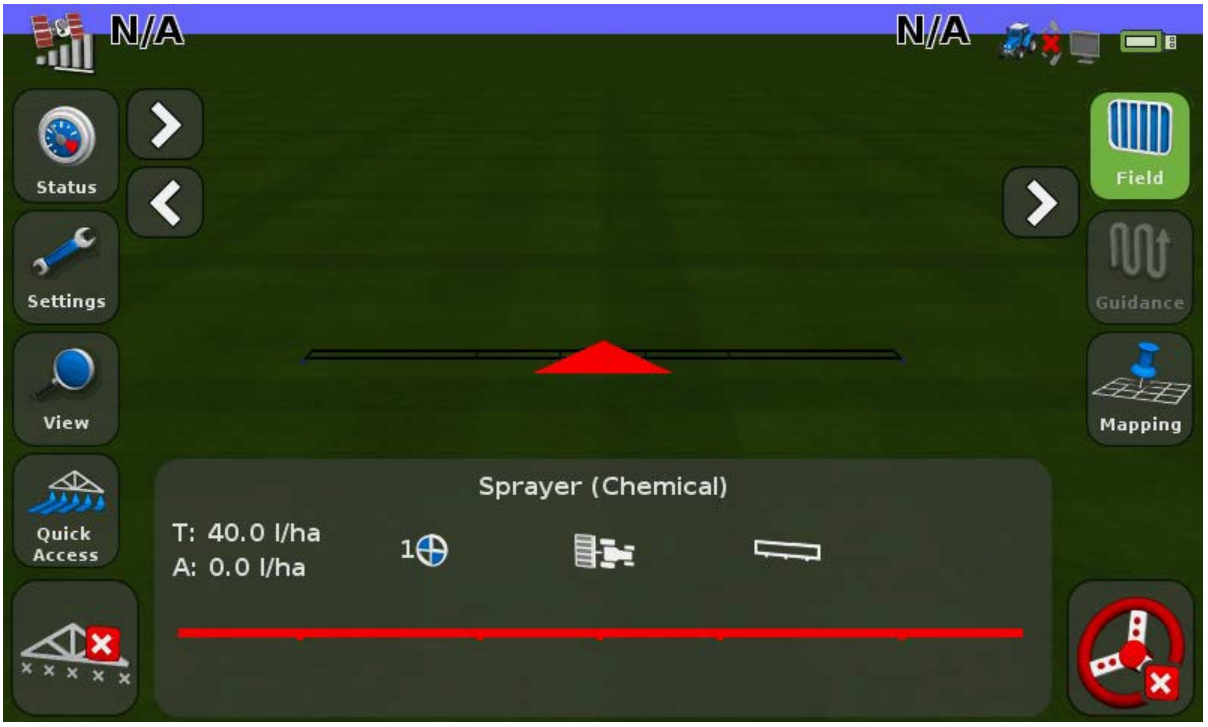
*Please note: Advanced & Quick Access sections to be added at a later date.

Introduction

Make sure you have current firmware in all units, including the Display, Master Switchbox, Section Switchbox and RSCM Module. This Guide was created with v2.00 in the CFX, v2.06 in the Master Switchbox and Section Switchbox and v2.14 in the RSCM Module. Earlier systems running v1.9 in the CFX, with v2.06 in the RSCM Module had totally different setup screens, as they were only compatible with single product control. The difference can be seen on the Run Screen. The Picture below is on a version 2.0, whereas the Picture on the Front Page is of a version 1.9 Display.

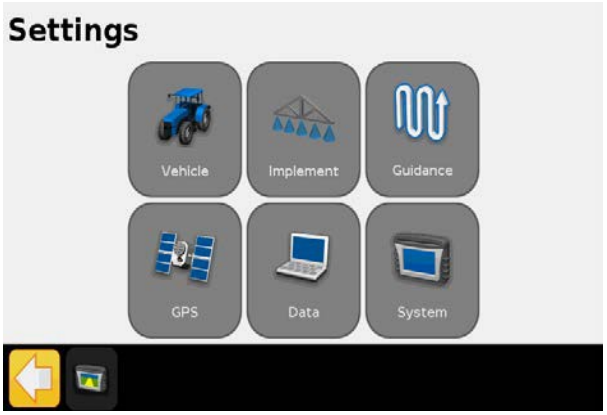
Prior to carrying out this setup, you will need to write down the Serial Number off the RSCM Module, as well as the Flow Meter Cal number & min/max flows.

Turn the display on, with everything connected. The Run Screen should come up.

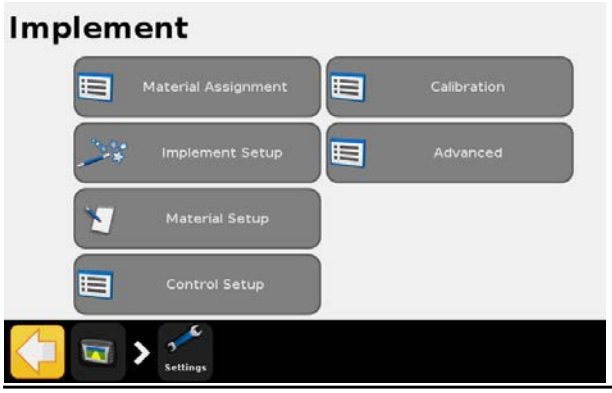


Press the **Settings** Icon on the Left Hand side of the display.

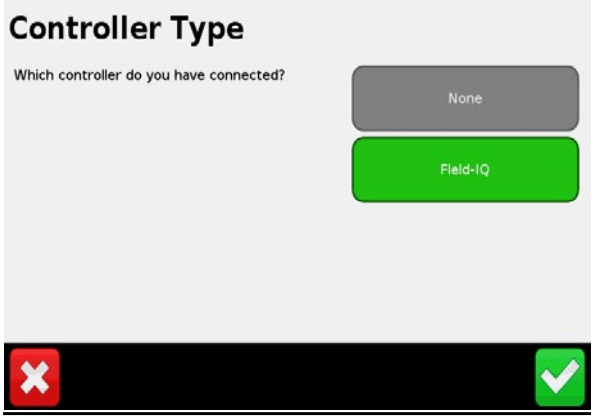
The **Settings** screen will appear, as follows:



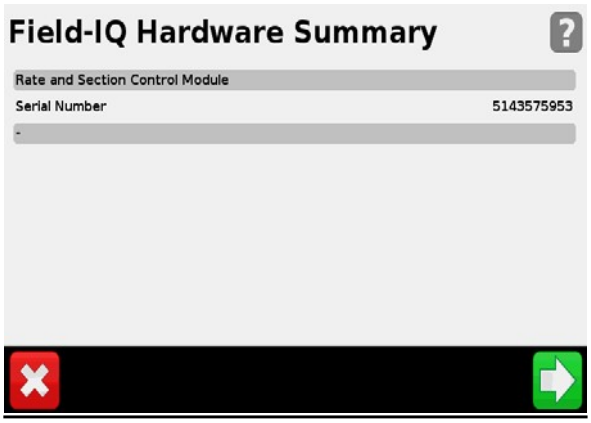
Select **Implement.**



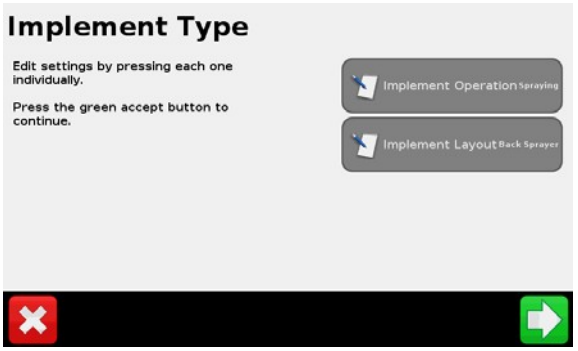
*Do not start with **Material Assignment**. Select **Implement Setup.**



Select **Field IQ**, then press the Green Tick.

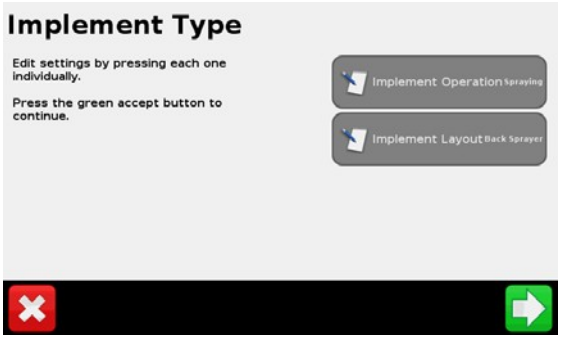


A **Field IQ Summary** page will come up, so you can verify what's connected. (normally, there would be a Master & Section Switchbox displayed as well. Press the Green Arrow.

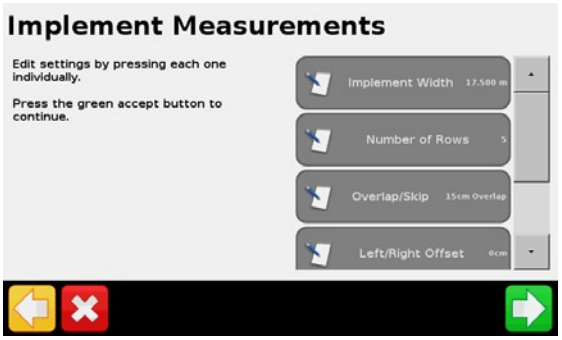


The **Implement Type** screen will come up. Select **Implement Operation.**

Select **Spraying**, then Press the Green Tick.



You will be returned back the **Implement Type** screen. Select **Implement Layout**, where you will select what type of sprayer it is. Press the Green Arrow and the **Implement Measurements** screen will appear.



Always measure the width from the end nozzle, to the other end nozzle, then add one nozzle spacing to get the exact Implement Width.

Rows are not too important – Enter the number of Nozzles used here.

Enter the amount of Overlap you want, keeping in mind that you will need at least 20cm if doing Contours or Curves.

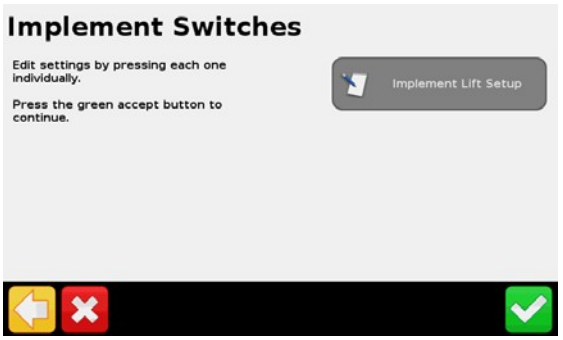
Most Sprayers will have 0 Left/Right Offset.

Important- The Forward back Offset is measured from the GPS Antenna Position to the Spray Bar on an Ez-Guide or Ez-Pilot system, or from the Fixed Axle to the Spray Bar on an AutoPilot System. A Behind measurement indicates that the Implement is behind the Antenna, or Axle.

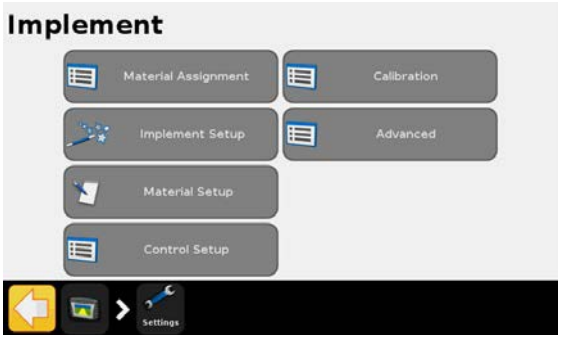
Only enter an Implement Draft setting, if you know the Implement has a tendency to pull off to one side.

If a Trailing Sprayer was selected, Hitch to Ground Contact Point may also come up. This is the distance from the Drawbar Pin to the Axle, where the sprayer pivots around when turning, etc.

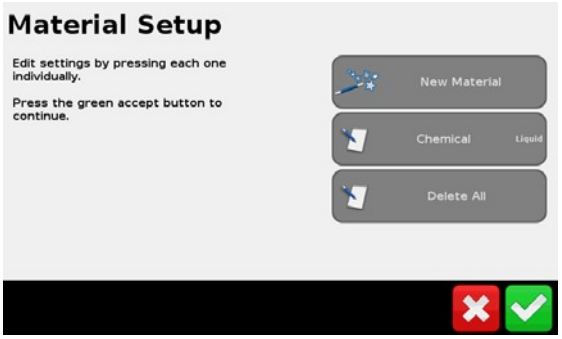
Press the Green Arrow.



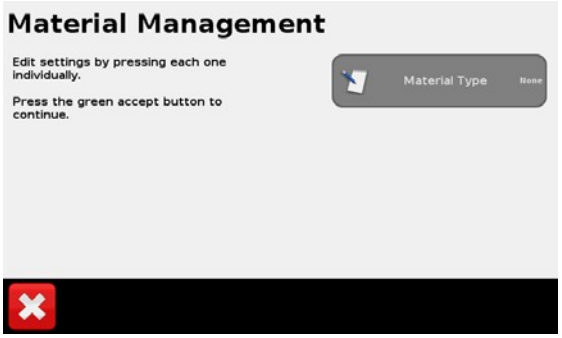
The **Implement Switches** screen will appear. We don't use these, so press the Green Tick. You will be returned to the **Implement Screen**.



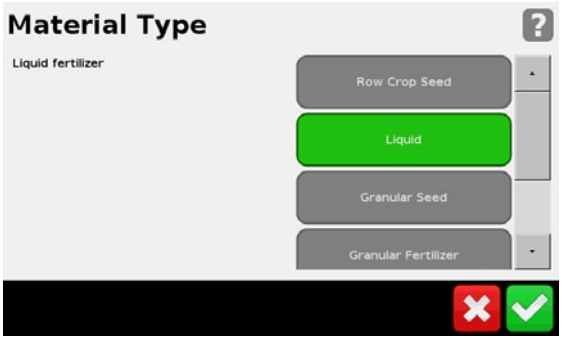
Select **Material Setup**.



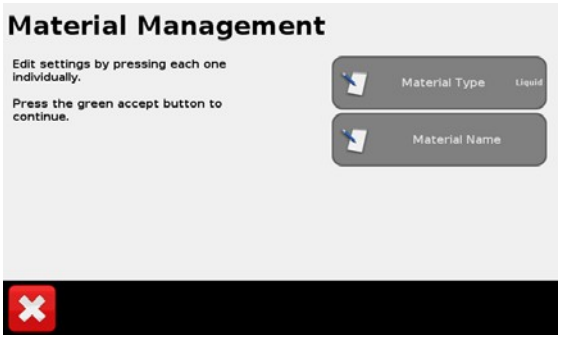
Select **New Material**, or you can select an existing material, if one has been previously setup. The **Material Management** screen will appear.



Select Material Type.

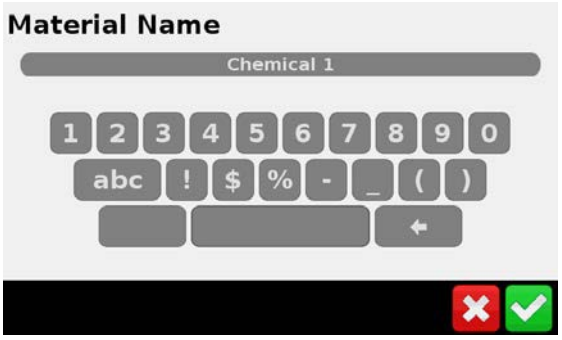


Always select **Liquid** for sprayer applications. Press the Green Tick.

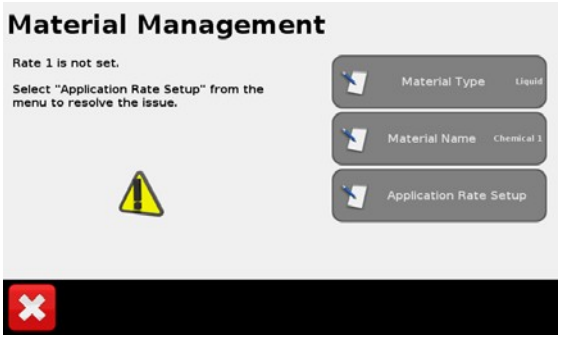


You will be returned back to the **Material Management** screen. Select **Material Name**.

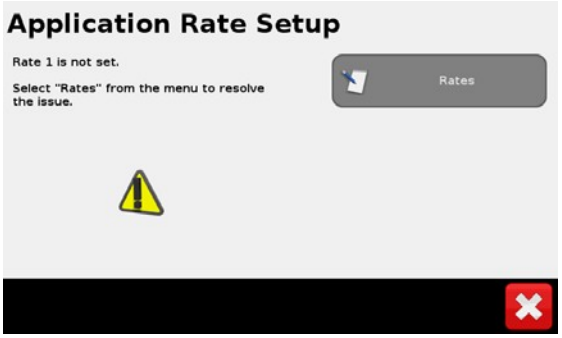
Enter a name for your material. Normally, this would be either Chemical, or Spray.



Press the Green Tick. You will be returned back to the **Material Management** Screen.

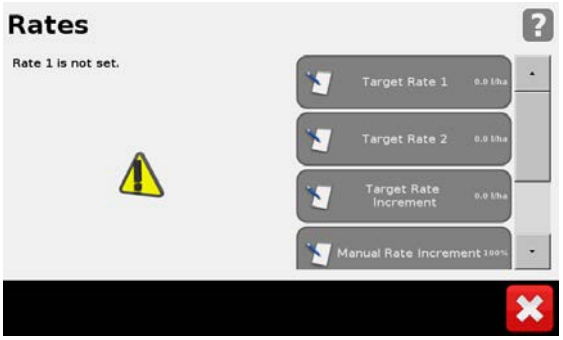


You will notice that there is now a Config warning. Select **Application Rate Setup.**



The **Application Rate Setup** screen will appear. Select **Rates**.

*Please Note: Version 2.05 will have a 2nd icon in this screen- "Units", which gives a Cu/Metre or Default Units (Litres) option. This is used when setting up Seed Carts & Spreaders, so leave this as "Default".



*This Rates Screen is also available from the **Quick Access Tab** on the Run Screen.

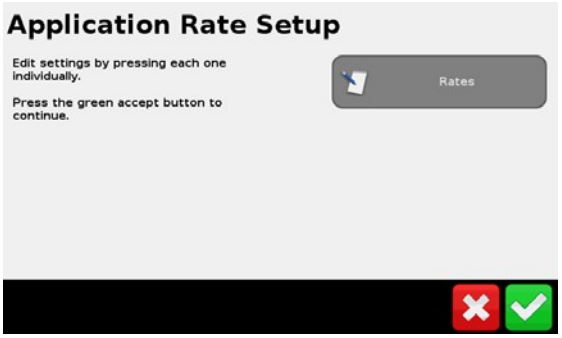
Enter your target Rates for **Rate 1 & 2.**

Target Rate Increment is the amount the rates will increase or decrease by, each time the Inc/Dec key is pressed. (Normally 5 or 10L/Ha)

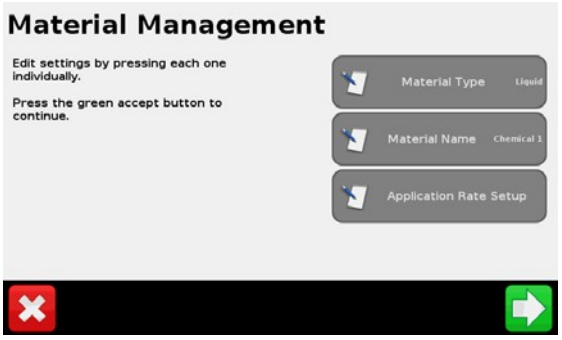
Manual Rate Increment is the amount of change that will occur each time the Inc/Dec key is pressed when the Rate Switch is in Manual(ie Litres per minute) Each Sprayer will respond differently to this, so leave it at 100% to start off with and adjust it later, once the Sprayer is operating.

Enter an amount for **Minimum & Maximum Rates**. This will set a barrier to prevent the Rates being toggled too far outside the expected operating range of the Sprayer. Press the Green Tick when done.

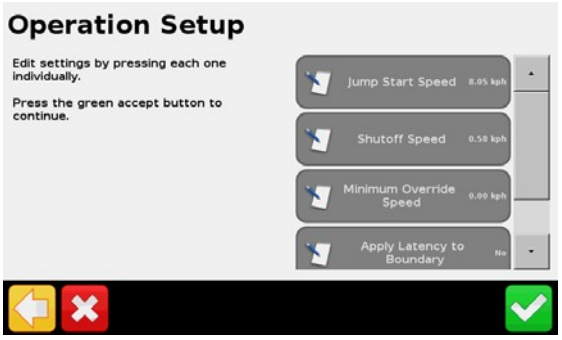
You will be returned to the **Rates** Screen.



Press the Green Tick and you will be returned back to the **Material Management** Screen.



Press the green Arrow and you will go to the **Operation Setup** screen.



This Operation Setup Screen has:

Jump Start Speed
Shutoff Speed
Minimum Override Speed
Apply Latency to Boundary
Rate Snapping

JumpStart Speed – This is used to Prime the system and start it spraying before you start moving, or entering a field. It can also be used to simulate a speed when GPS signal is lost. This is the Spring-Loaded position on the Master Switch.

Shut-Off Speed – This is the speed at which the Sprayer will stop spraying at, when "Off When Stopped" is set to "Yes" (see page)

Minimum Override Speed – This is the minimum speed at which the system will hold the hold the Rate at, as the sprayer slows down, to maintain an adequate Spray Pattern.*

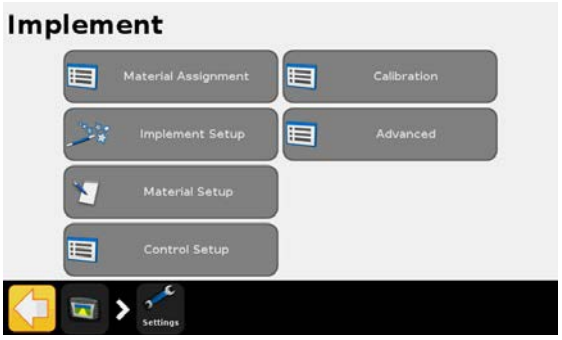
Apply Latency to Boundary – Yes / No. When set to Yes, the system will time its Boom Switching when switching at boundaries, the same as when normally switching. Set to Yes.

Rate Snap – Set to yes. This will make the Applied Rate display as the closest Whole Number, when it is within 10% of it. (Smooths the display out.)

Press the Green Tick when done.

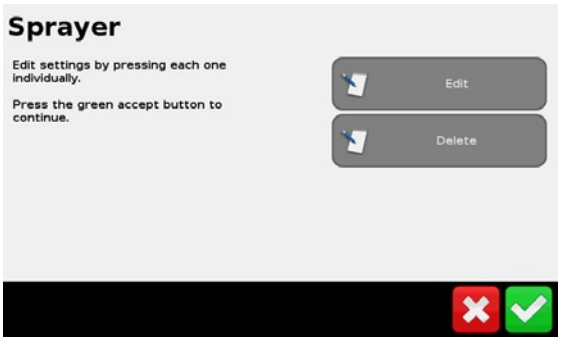
You will be returned to the **Material Setup** screen. Press the Green Tick.

You will be returned to the **Implement** Screen.

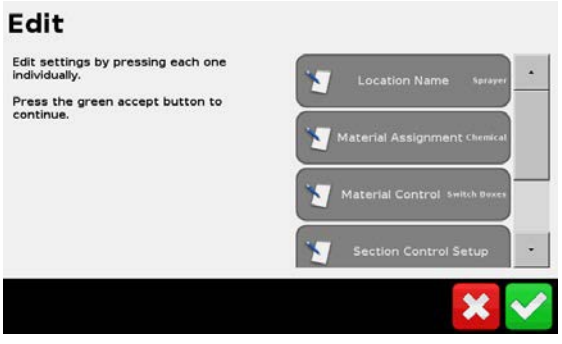


Select **Control Setup.**

Select **Sprayer**. If this is not shown, select **Unassigned**, then select **Sprayer** from there.



Once the **Sprayer** screen appears, select **Edit.**



The Edit screen has the following:

Location Name

Material Assignment

Material Control

Section Control Setup

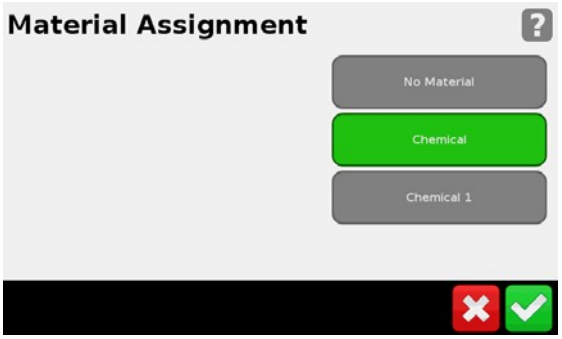
Rate Control Setup

Sensor Setup

Location Name – Enter a name for the location you are controlling. In this case it will be a Sprayer. (Keep in mind that this system is designed to control multiple products on different types of machines)

Press the Green Tick.

Material Assignment – Select the material you previously set up.



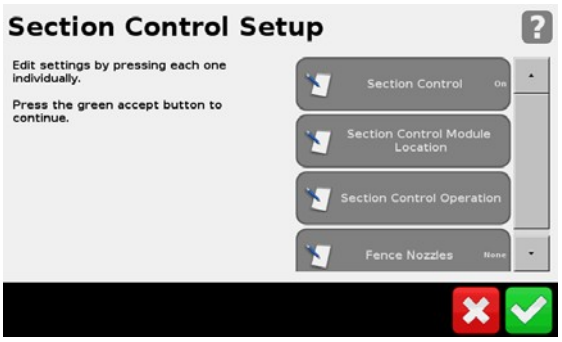
Press the Green Tick.

Material Control – Select how the product will be controlled. If you

are only running a single product, then it should always be controlled by the Switchboxes.

Press the Green Tick.

Section Control Set-up

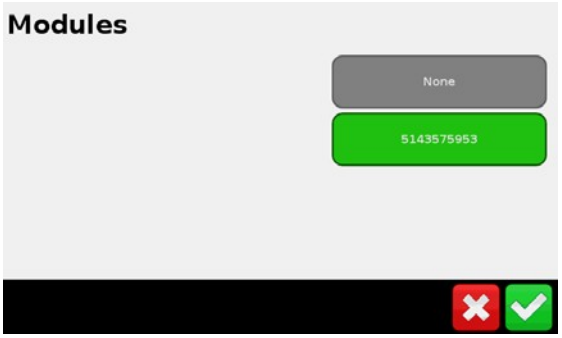


This includes the following:
Section Control (on/off)
Section Control Module Location
Section Control Operation
Fence Nozzles

Section Control - Options include: On, Off or Rate as Section. Select **On**.

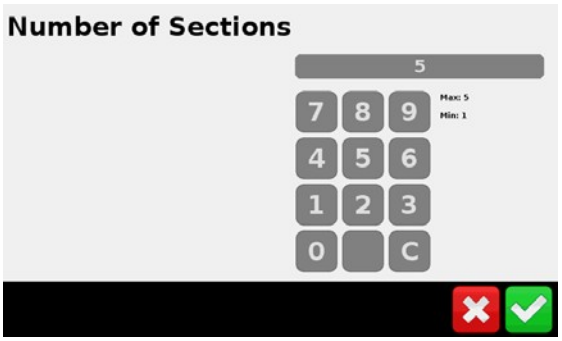
Press the Green Tick.

Section Control Module location -



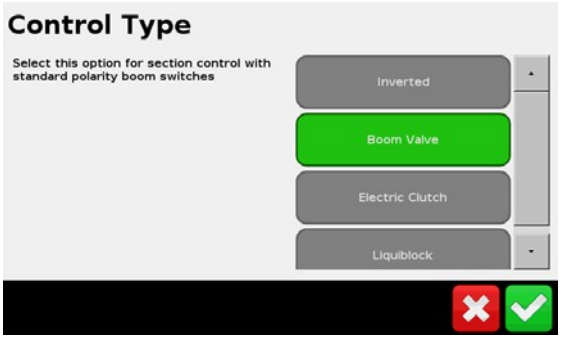
The Modules Screen will display. Any connected, or previously set-up modules will be displayed. Make sure you select the same serial number that is printed on your RSCM Module. Press the matching Icon.

Number of Modules will appear – Select "1" Press the Green Tick, then you will be returned back to the Section Controller screen. Verify the modules Serial Number, then select **Number of Sections**.



Enter how many Sections (Boom Valves) you are controlling. Press the Green tick.

Control Type – Most Sprayers would use the Boom Valve option. This provides a 12v Signal to turn the Boom Valves on & 0v to turn them off.



Press the Green Tick when done.

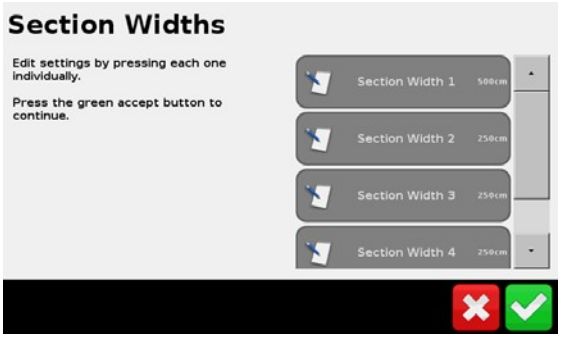
Turn Off When Stopped – Select **Yes**, when you want the Sprayer to stop spraying when you stop moving.

Press the green Tick when done.

You will be returned back to the Section Controller screen. Press the Green Tick.

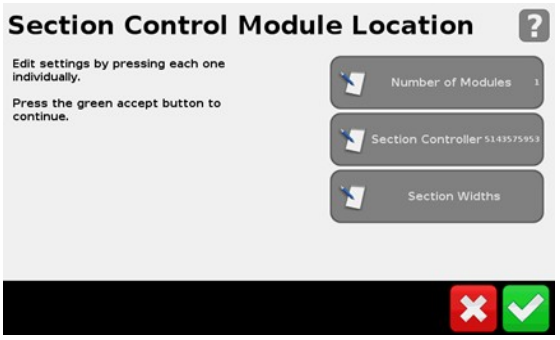
You will be returned back to the **Section Control Module Location** screen.

Verify that only 1 Module is selected and that the correct Serial Number is selected. **Select Section Widths**.



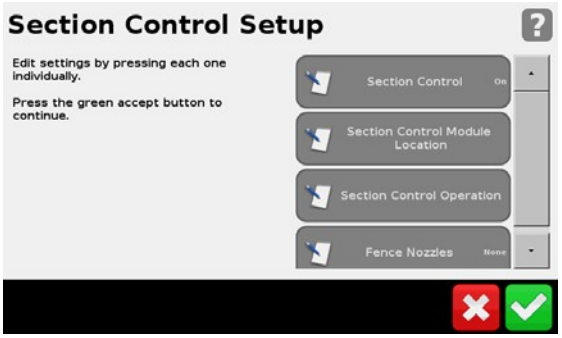
Enter your individual **Section Widths**. The last section will fill itself in, depending upon the total Implement Width you entered and the Individual Section Widths you have also just entered. Press the Green Tick when done.

You will be returned back to **Section Control Module Location.**

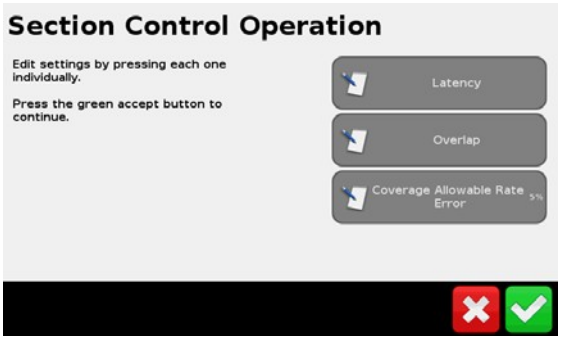


Press the Green Tick.

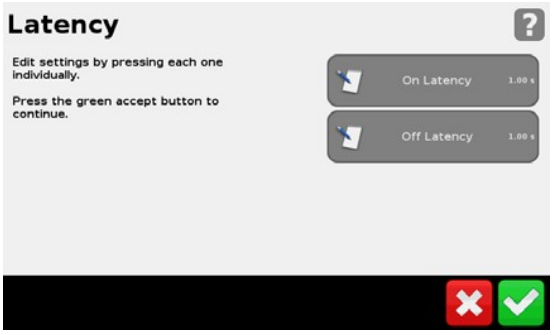
You will be returned back to the **Section Control Setup screen**.



Select **Section Control Operation**.

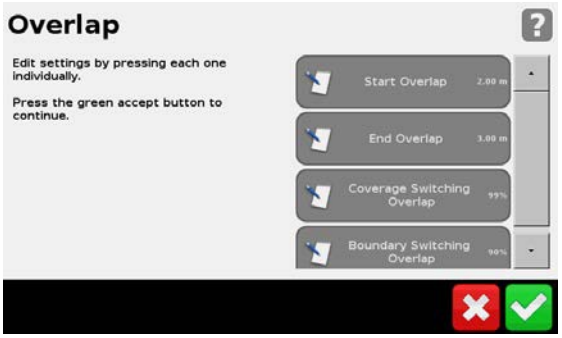


Latency – Use this to tell the controller how long it takes for Spray to come out after the command is given, as well as turning off again. (normally 0.5 to 2 secs)



Press the Green Tick when done.

Overlap – Use this screen to adjust the Start, End, Coverage Switching Overlap and Boundary Switching Overlap.



Start Overlap- How far before entering an unsprayed area, it will begin spraying.

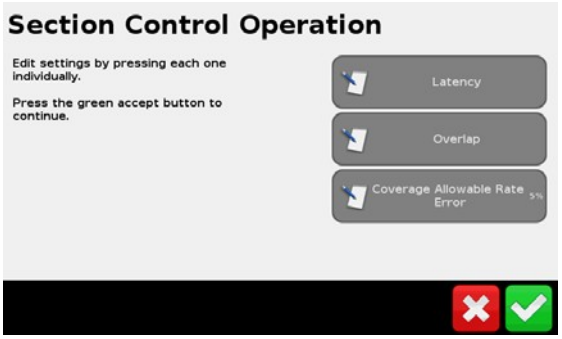
End Overlap- How far after entering a sprayed area, it will stop spraying.

Coverage Switching Overlap- How much each section has covered before switching On or Off. The higher the %, the better the coverage. Normally set at 99%.

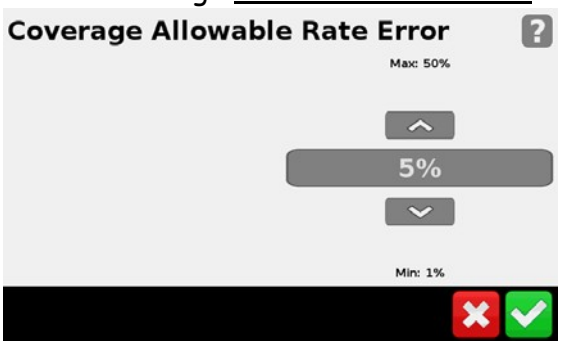
Boundary Switching Overlap- Same as above, but used for switching when entering or leaving a boundary. Lower the number to reduce the area sprayed outside the Boundary.

Press the Green Tick when done.

You will be returned back to the **Section Control Setup** screen.



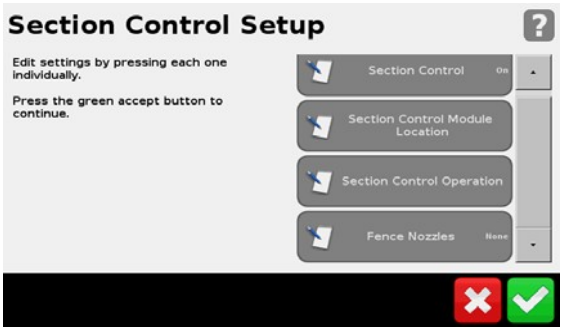
Select Coverage **Allowable Rate Error**.



Leave **Coverage Allowable Rate Error** at 5%. – This is entirely used for Coverage mapping. As the number is reduced, it adds more polygons, making maps more accurate, but also takes up more memory storage.

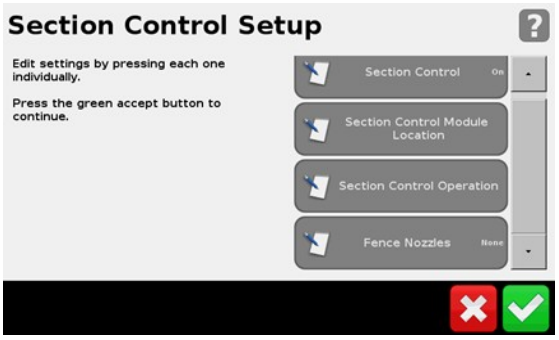
Press the Green Tick twice.

You will be returned back to the **Section Control Setup** screen.

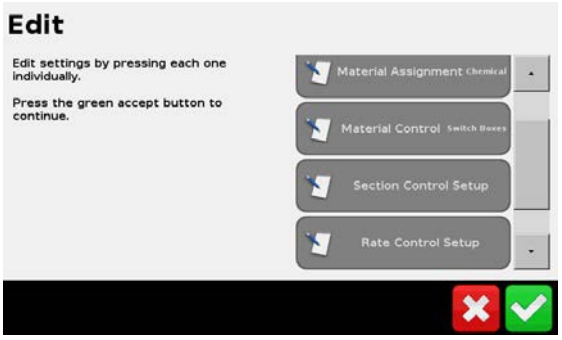


If Fence Nozzles are fitted, you have 4 options: None, Left, Right and Both.
Select whatever is applicable, then press the Green Tick.

You will be returned back to the **Section Control Setup** screen.

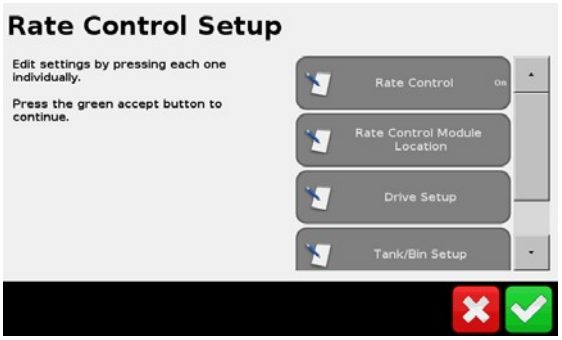


Press the Green Tick. You will be returned back to the **Edit** screen.

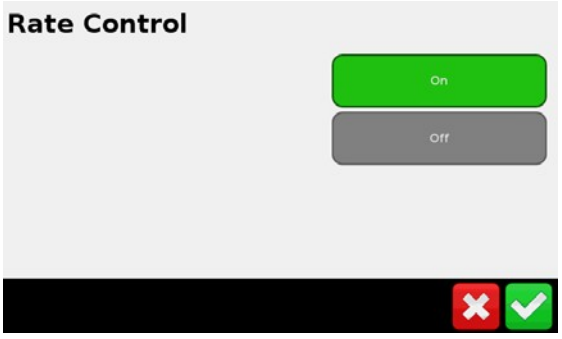


Select **Rate Control Setup**.

The **Rate Control Setup** screen will appear.

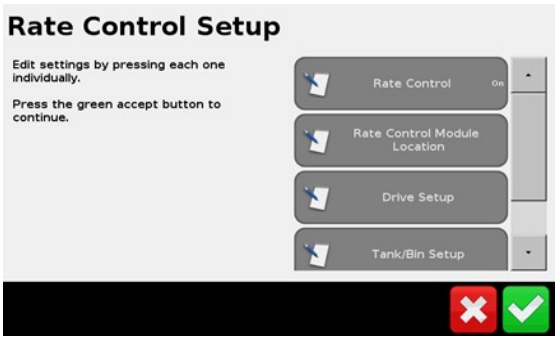


Select **Rate Control**. You will be given 2 options – On or Off. Select On.

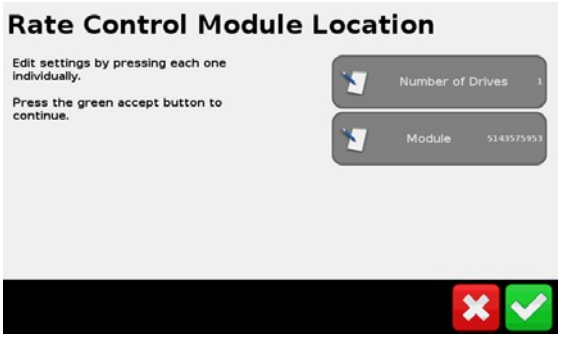


Press the green Tick.

You will be returned back to the **Rate Control Setup** screen.



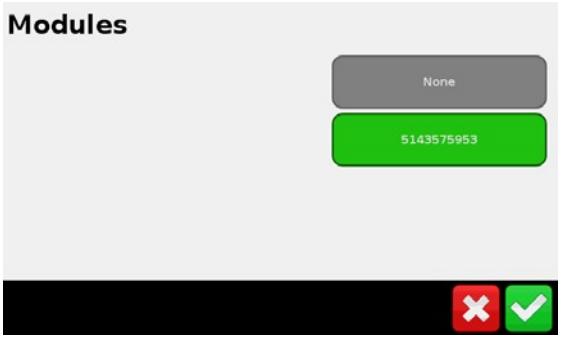
Select **Rate Control Module Location**.



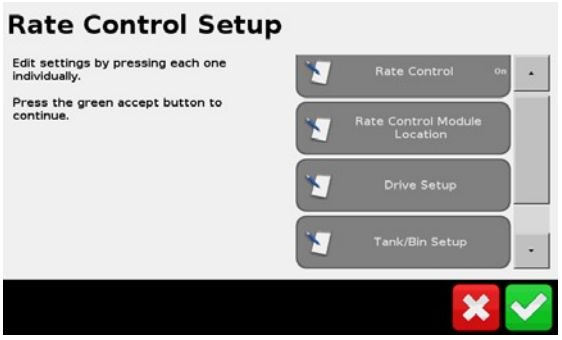
Change Number of Drives to 1, then select the Serial Number of the Module you are using.

Select Module S/N……

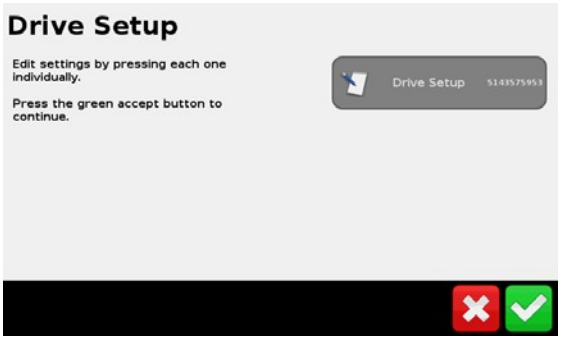
*When using an RSCM (Rate and Section Control Module), this serial number will be the same as what was used to set up the Section Control.



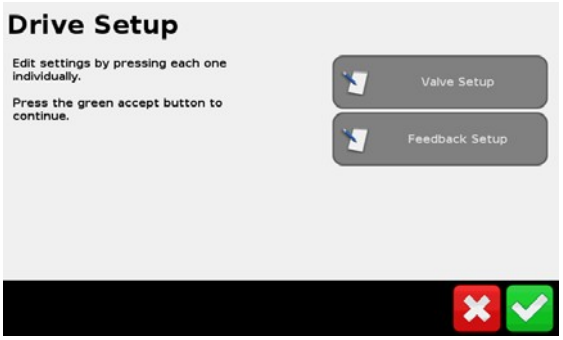
Press the Green Tick. You will be returned back to the Rate Control Setup screen.



Select **Drive Setup.**

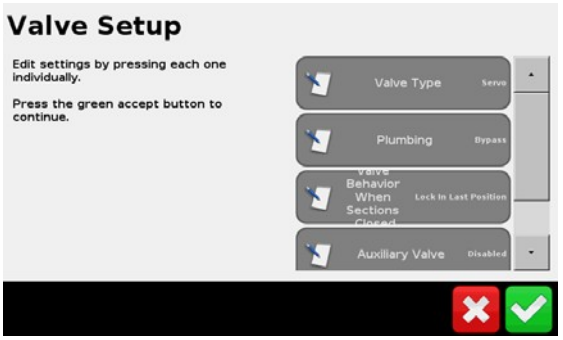


Verify that the correct Serial Number Module is displayed, then select **Drive Setup**.



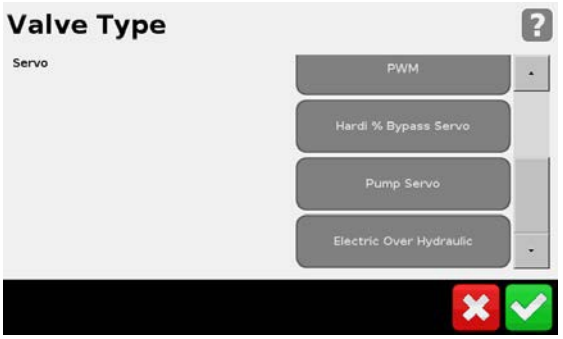
Two options will appear – **Valve Setup** and **Feedback Setup**.

Select **Valve Setup**.



Five Options will appear**: Valve type, Plumbing, Valve Behaviour when Sections Closed, Auxiliary Valve and Pump Disarming Switch.**

Select **Valve Type**.



Seven options will appear:

None

Servo – Most common type of valve used with most applications

Fast Servo – Not so common Raven Valve, also known as 4 wire valve. 12volts is supplied to the valve on 2 of the wires, then a signal is sent on the other 2, to either Increase or Decrease.

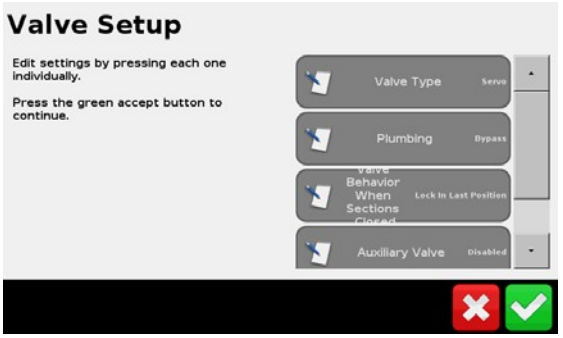
PWM – Used where Pulse Width Modulation Solenoids are used to control the Rate Valve.

Hardi % Bypass – This is mainly used on Hardi Sprayers, but also has to be used on any other setup with 3-way boom valves, where the the liquid is returned back to the tank when each section is turned off. This keeps a more controllable flow through the Flow Meter and Rate Control Valve. Since the Flow Meter is still measuring flow that may be returned back to the tank, the applicable amount of Flow is subtracted from the calculated flow, as each section is shut off. When this is selected as the valve type, the Valve Plumbing setting will default back to Inline, even though the Rate Valves on these machines is usually also a Bypass Type valve.

Pump Servo – Used where a PWM Solenoid valve is used to control Hydraulic Oil flow to a product pump, to adjust flow.

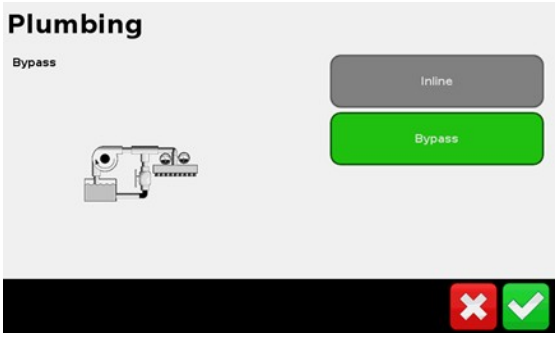
Electric Over Hydraulic – Sililar to above (New setting to v2.0, with no further info available yet).

Press the Green Tick and you returned back to the **Valve Setup** screen.



Select **Plumbing**.

There will be 2 options appear:



Inline – Where the Valve is "In-Line" with the Flow Meter and chokes the flow going to the boom. Commonly used on systems with Centrifugal Pumps, as Inline Valves can Deadhead the flow.

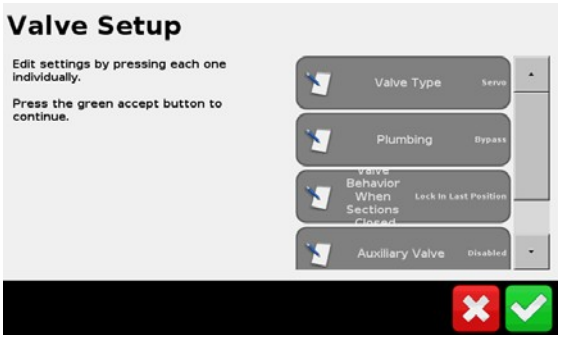
Bypass – Can either be used with a 3-way valve or a normal Valve Tee'd

in between the Pressure Line and the return to tank. This reduces the flow to the Flow Meter by returning more flow back to the tank.

If a Hardi % Bypass Control type was previously selected, then this will have to be set as Inline, even though Hardi use a Bypass Type 3 Way Valve.

*The only difference between these 2 Plumbing Types is the Polarity of the voltage sent to the Valve – Bypass opens to reduce the flow to the Manifold and Inline closes.

Press the Green Tick and you will be returned back to the **Valve Setup** screen.



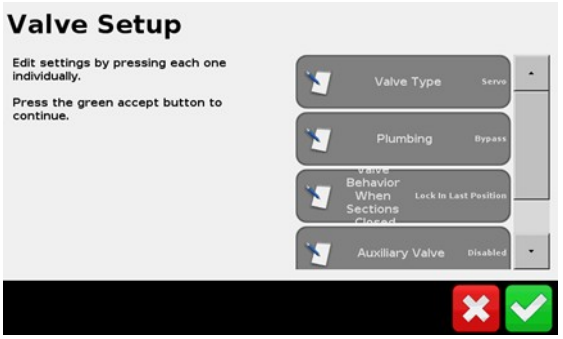
Select **Valve Behavior on Sections Closed**. Two options will appear – Close & Lock in Last Position.

Close – This will place the Rate control valve in the Zero Flow position when all of the Valve Sections are shut off.

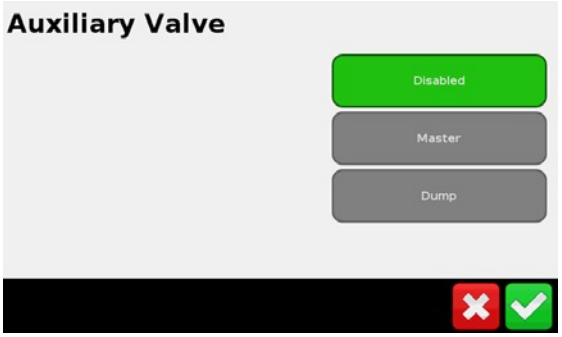
Lock in Last Position – This will keep the Valve in the position it was in when just before the last Section was shut off. This will help the system return to operating pressure quickly, but may result in Manifold pressure spikes as the sections are all shut off.

Normally **select Lock in Last Position**, unless pressure spikes are observed.

Press the Green Tick when done and you will be returned back to the **Valve Setup** screen.



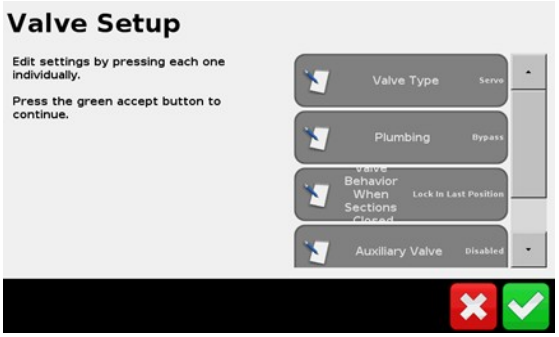
If your system is fitted with an Auxiliary valve, it can be enabled here.



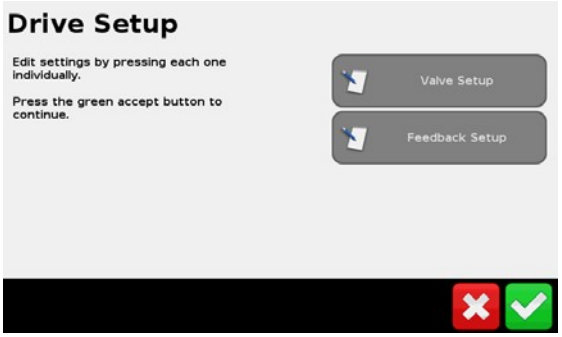
Master - Switches off when all of the sections are switched off.

Dump - Switches on when all of the sections are switched off, so it can dump the flow back to the tank.

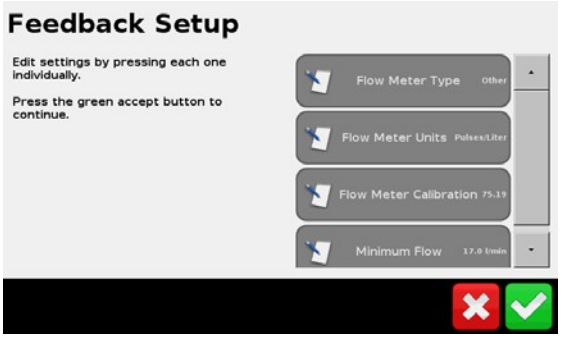
Press the Green Tick and you will be returned back to the **Valve Setup** screen.



The bottom option on this screen is the **Pump Disarming Switch**. Some systems are wired with the Main Pump switch to be controlled by the Field IQ System. This requires a system with a SIM (Signal Input Module) connected. If your system has this, then it can be enabled here, otherwise, press the Green Tick and you will be returned back to the **Drive Setup** screen.

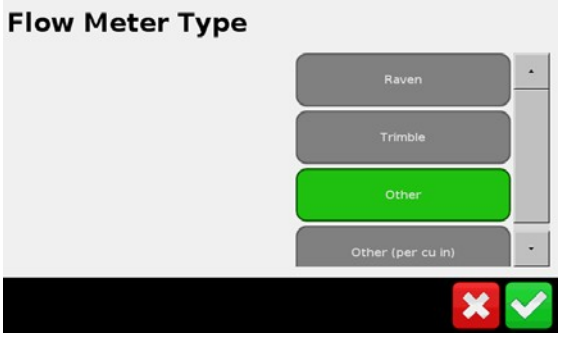


Select **Feedback Setup** and the Feedback Setup screen will appear.

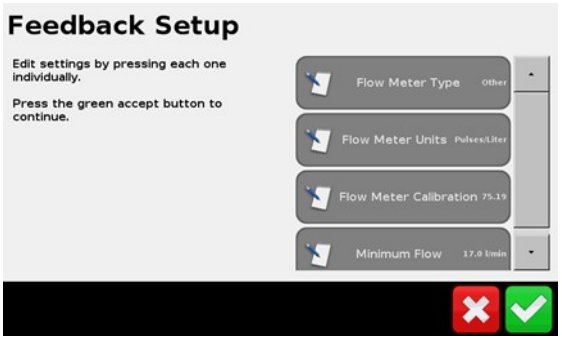


The following options will appear: **Flow Meter Type, Flow Meter Units, Flow Meter Calibration and Minimum Flow.**

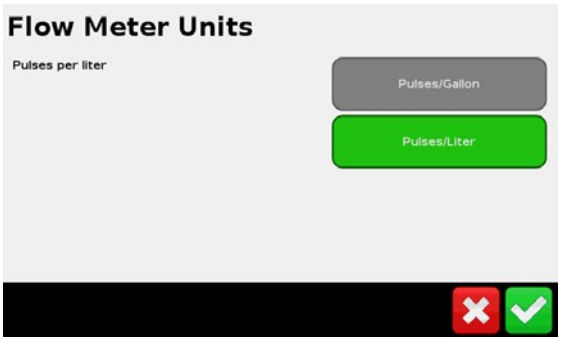
Select **Flow Meter Type** and the following screen will appear.



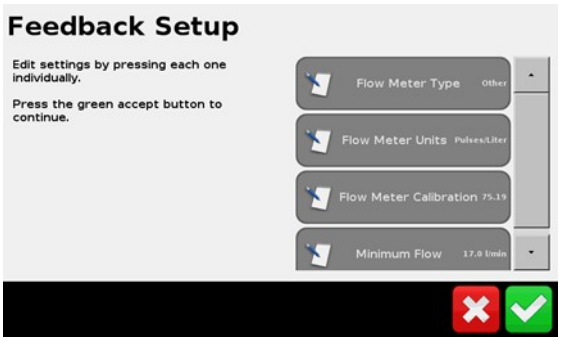
Select the brand of Flow Meter you have. (Use **Other** for Teejet), then press the Green Tick to return back to the **Feedback Setup** screen.



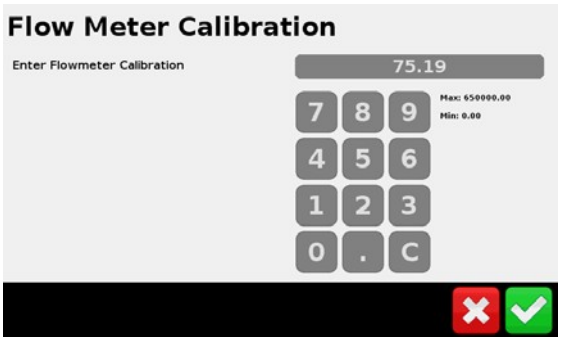
Select **Flow Meter Units**.



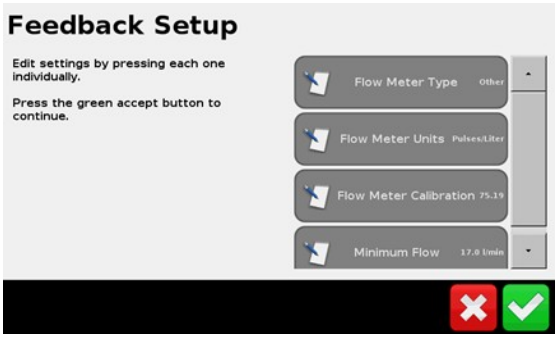
Select the applicable value for the reading on Flow Meter Calibration tag. Raven are normally Pulses per Gallon. Teejet, Midtech and Hardi are Pulses per Litre. Press the Green tick when done and you will be returned back to the **Feedback Setup** screen.



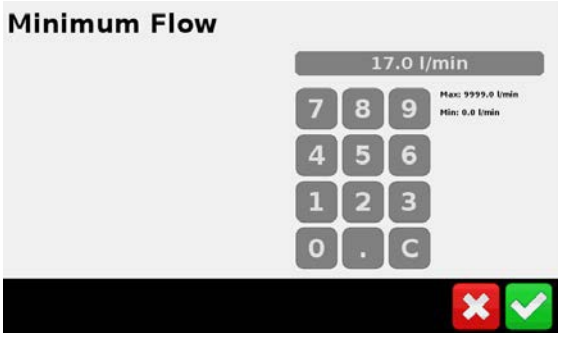
Select Flow Meter Calibration.



Enter the number off the tag on your Flow Meter. It can also be found in your manufacturers documentation. Press the Green Tick and you will be returned back to the Feedback Setup screen.



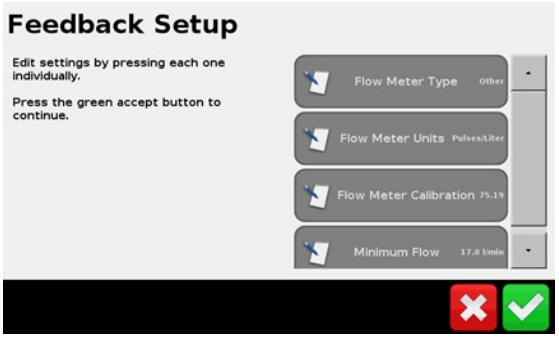
Select Minimum Flow.



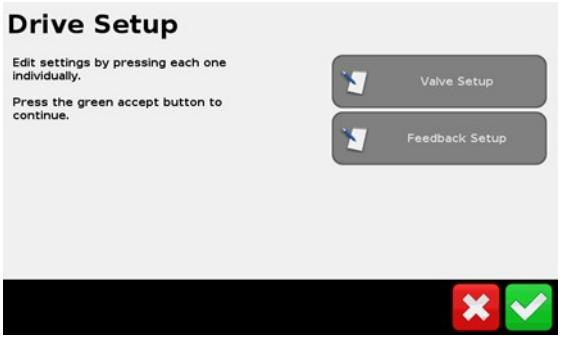
* Some Field IQ Info states that this should be entered as the Minimum Flow that the Flow Meter is capable of reading, which would explain why this setting is under Feedback Setup. I have verified

that this is not the case. The Minimum Override Speed setting still doesn't work, so you will have to enter a Minimum Flow rate in here, to keep your nozzles from going back to a dribble as you slow down. ie: 02AIXR Nozzles = 0.46lpm @ 1bar. Times this by the number of nozzles on your machine and you will have a LPM reading, which will keep your minimum Boom Pressure at 1Bar.

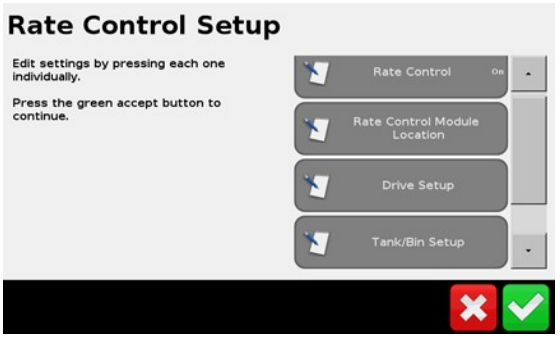
Press the Green Tick and you will be returned back to the **Feedback Setup** screen.



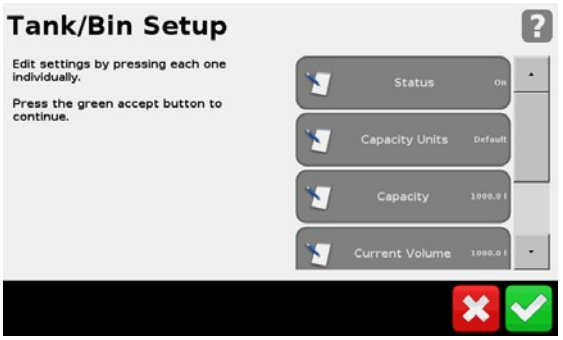
Press the Green Tick and you will be returned back to the **Drive Setup Screen**.



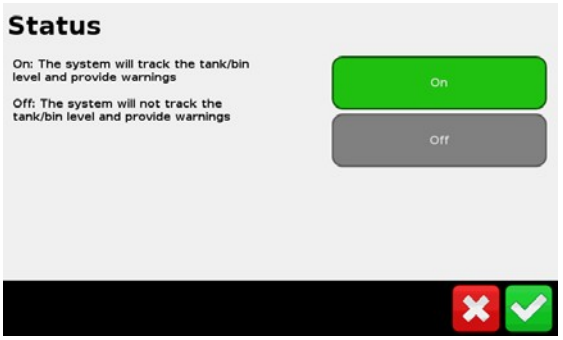
Press the Green Tick and you will be returned back to the **Rate Control Setup** screen.



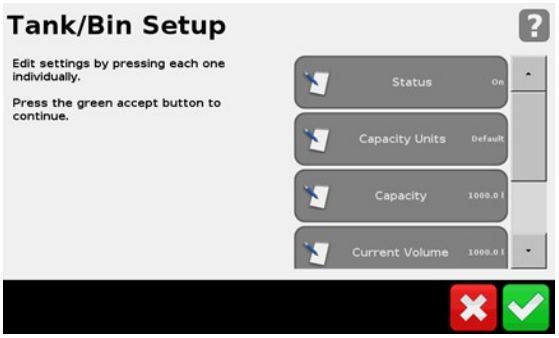
Select **Tank/Bin Setup**.



If you want to monitor the level of your tank, then select **Status**.

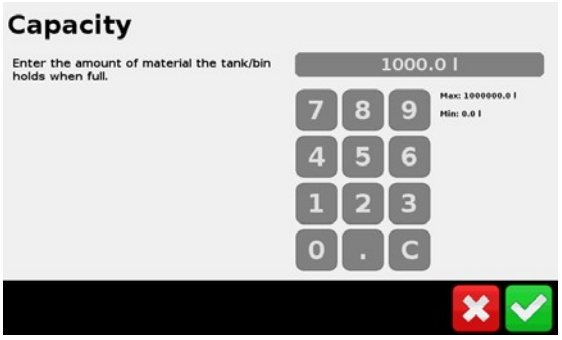


Select On to enable, then press the Green Tick and you will be returned back to the Tank/Bin Setup screen.

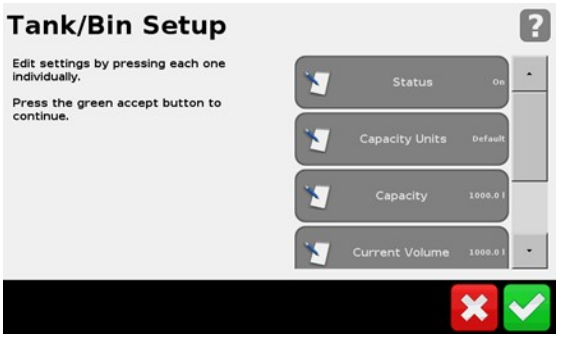


Capacity Units has only one setting of Default. If your system defaults are set to Metric, then it will read in Litres. In version 2.05, there is an option to select gallons.

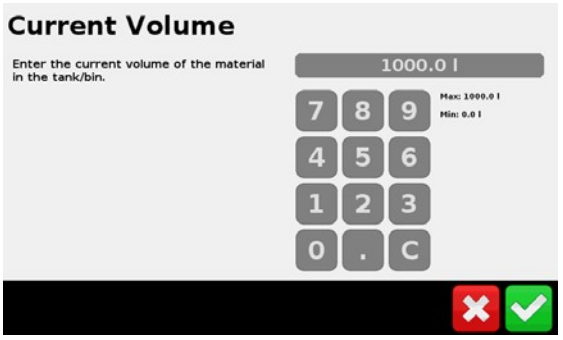
Select **Capacity**.



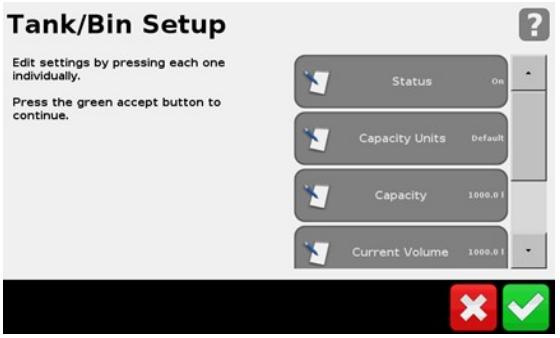
Enter your Tanks Capacity. If you fill it past its recommended capacity, then enter this full amount, as this affects the Low Tank level alarm, etc. Press the Green Tick when done. You will be returned back to the Tank/Bin Setup.



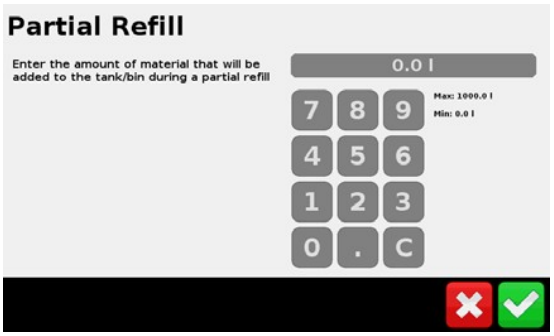
Select **Current Volume**.



Enter the amount that is currnetly in the Tank, then press the Green Tick. You will be returned back to the **Tank/Bin Setup** screen.

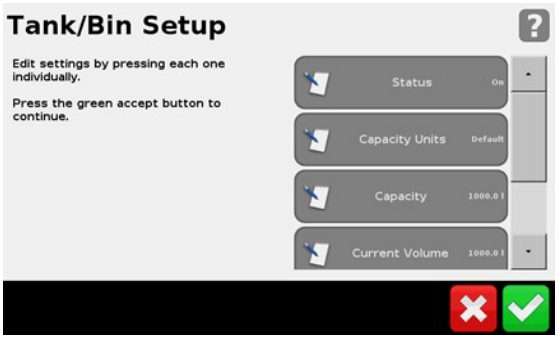


Select **Partial Refill**.

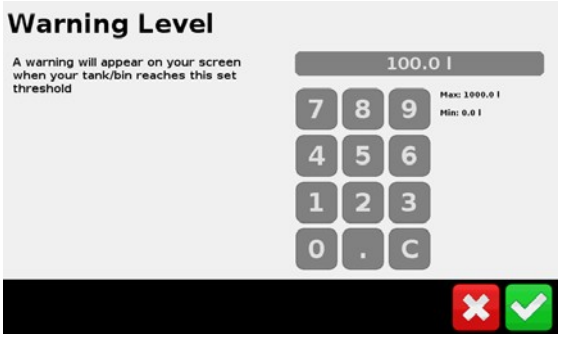


Enter the amount that will be added to the Tank if you are doing a **Partial Refill**. When this function is used, it will add this amount to the current volume in the tank. It will not just change the current volume to the amount entered here. If you are wanting to only refill a 4500L Tank to 3000L, then just adjust the Tank Capacity to 3000L.

Press the Green Tick and you will be returned back to the **Tank/Bin Setup**.



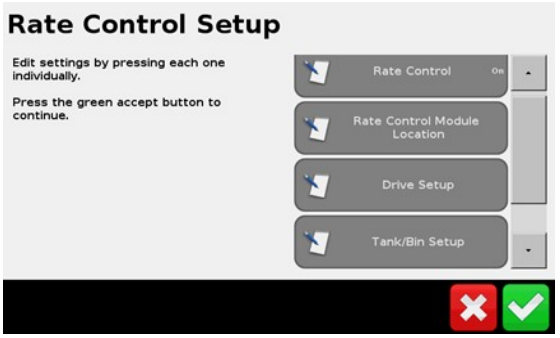
Select **Warning Level**.



Enter an amount where you want a Low Tank **Warning Level** to appear on the screen. If an external Sonalert or Ez-Remote is connected, then this will also beep. The Sonalert on a connected Autopilot System will not function for this.

Press the Green Tick and you will be returned back to the **Tank/Bin Setup** screen.

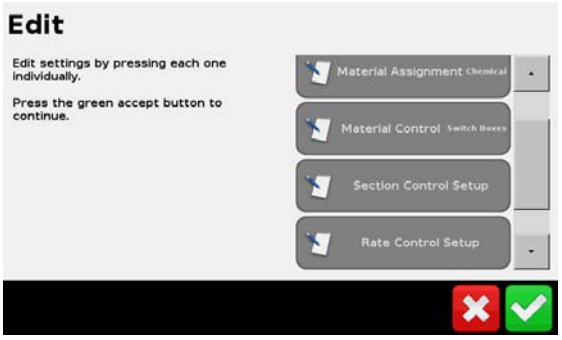
Press the Green Tick and you will be returned back to the **Rate Controller Setup screen**.



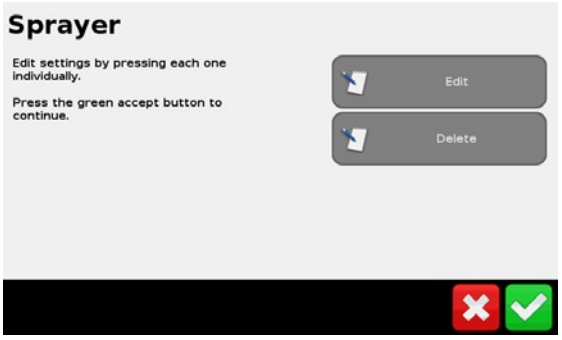
Select the last option – **Number of Nozzles**.

Enter the total **Number of Nozzles** on your boom. This includes extra nozzles fitted behind your wheels, etc. (make sure these are turned on as well). Press the Green Tick to return back to the **Rate Control Setup** screen.

Press the Green Tick and you will be returned back to the **Edit** screen.

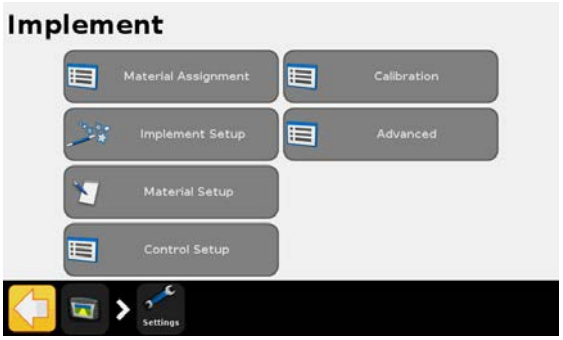


Press the Green Tick and you will be returned back to the **Sprayer** screen.



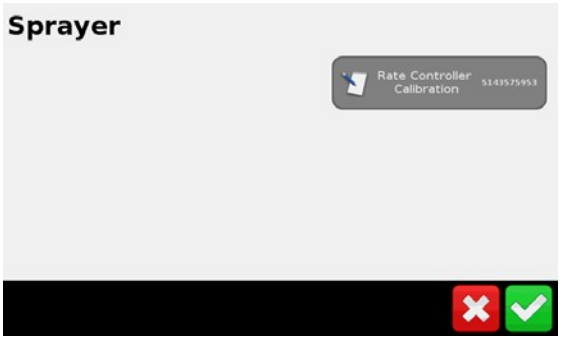
Press the Green Tick and you will be returned back to the **Control Setup** screen.

Press the **Implement Icon** on the Bottom Line and you will be returned back to the **Implement** screen.



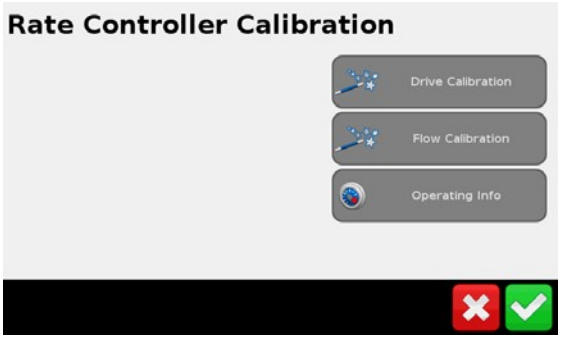
Press the **Calibration** icon.

Select **Sprayer (Chemical).** Remember that this system is capable of controlling 2 different products, but we still have to select which product we want to calibrate for, even if our setup is only using one product.

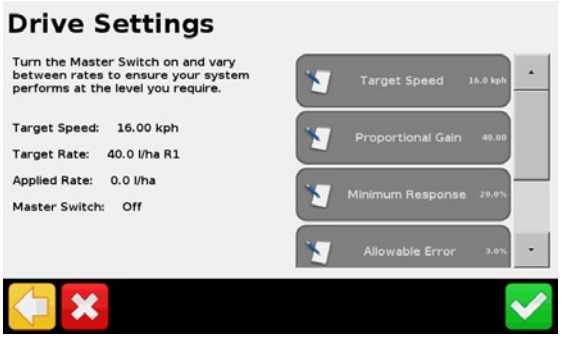


Verify that this is the correct serial number for the Module you are calibrating. Press the **Rate Controller Calibration** Icon – not the Green Tick.

The **Rate Controller Calibration** screen will appear with 3 options available: **Drive Calibration**, **Flow Calibration** and **Operating Info**.



Select **Drive Calibration**. A Drive Limits screen will appear. This is mainly used to control Maximum Spinner speed on Spreaders, but can also be used to control Maximum Pump speed on Electric over Hydraulic setups. It doesn't do much on standard systems, as the pump speed is normally controlled by a different source than the Field IQ System. Just enter the **Maximum Flow** reading your Flow Meter is capable of, unless there is some other component in your system, which may restrict your maximum flow. Press the Green Tick and the Drive Settings screen will appear.



The **Drive Settings** screen will have the following options: **Target Speed**, **Proportional Gain**, **Minimum Response**, **Allowable Error**, **Boost (Feed Forward)** and **Advanced**.

Target Speed: This is what your average working speed is expected to be during normal spraying operations.

Proportional Gain: This is how quick the Valve responds to any changes. If it is too high, then it may tend to "Overshoot" its target and cause the pressure to oscilate up & down. If it is too low, it will be slow to adjust its rate as you speed up or slow down.

Minimum Response: This is the amount of current that is needed to start the valve moving. This setting is more critical in PWM setups.

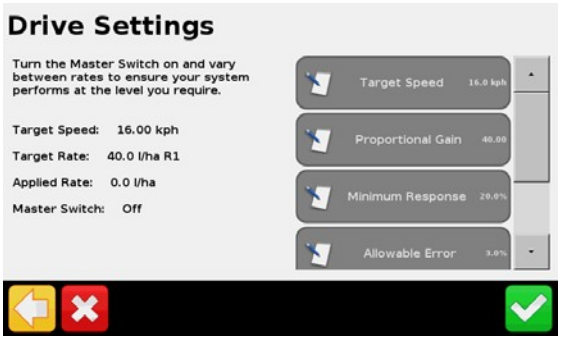
Allowable Error: This is the amount of Rate error which is allowed, before the valve will respond to adjust it. If it is too low, the valve will be constantly moving, even for small changes. This may result in Oscilations. If it is too high, you may not apply the exact rate.

Boost (Feed Forward): When enabled, this makes the Valve respond quicker than normal, to get the system up the the correct rate

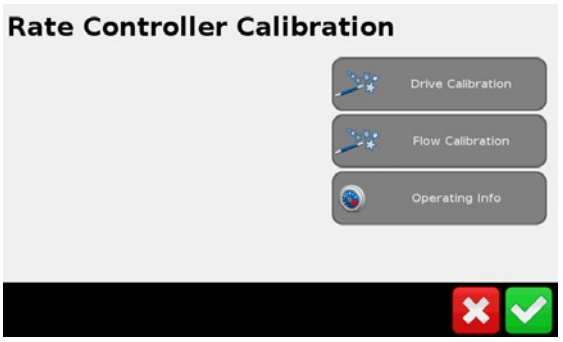
as soon as possible, when it is first turned on from zero flow.

Advanced: When this is selected, it adds the following to this Drive Settings screen to allow for Fine Tuning. : **Upper PWM Limit, Lower PWM Limit, Comparator Limit and Ramp Limit.**

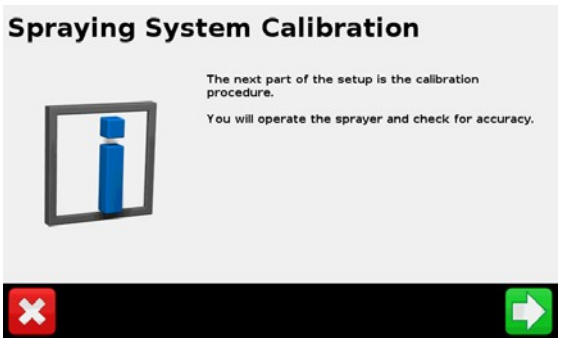
* Definitions of these & other settings can be found at the rear of this manual.



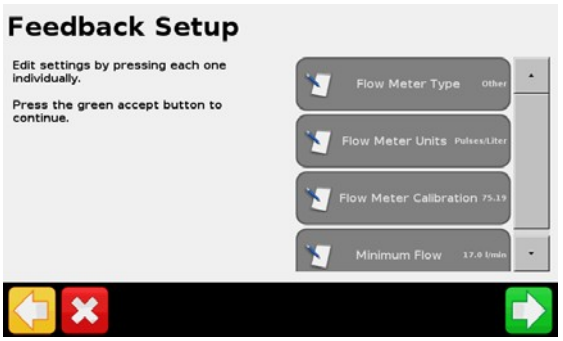
The right hand side of the screen displays current sprayer info, so you can operate while in this screen, to make these fine tuning adjustments. It is recommended to have a pressure gauge in your system, to observe for pressure oscilations while tuning. Press the Green Tick when done and you will be returned back to the **Rate Controller Calibration** screen.



Select Flow Calibration.

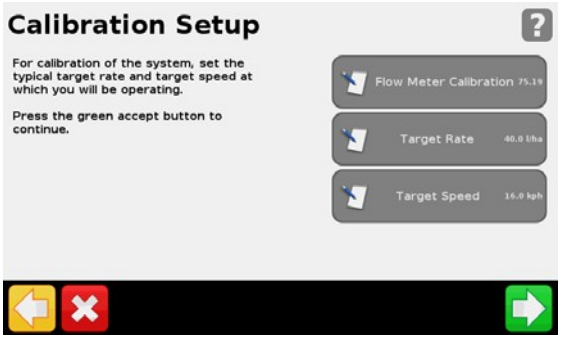


This Information screen will appear. Press the Green Tick to continue.

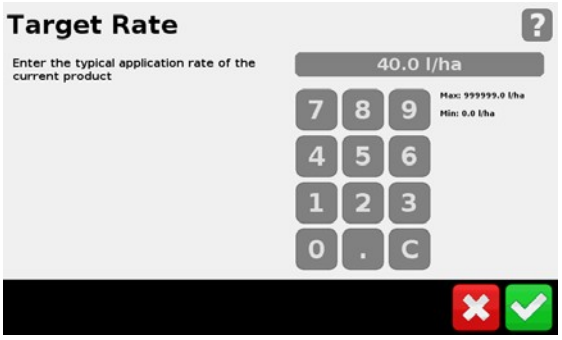


The above Feedback Setup screen will appear again. Verify that the info here, is the same as you had previously entered, then press the Green Tick.

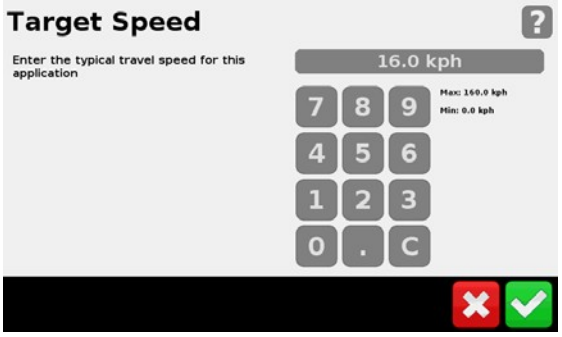
The **Calibration Setup** screen will appear.



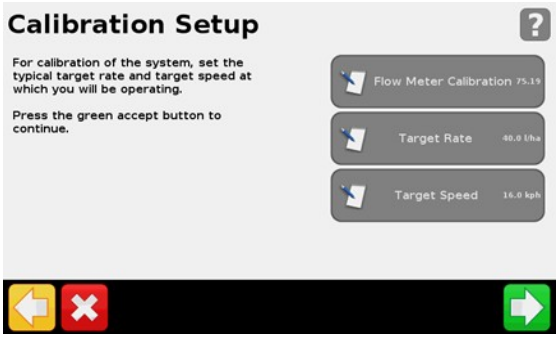
Verify the **Flow Meter Calibration** number is the same as the tag on your Flow Meter.



Enter the most common **Target Rate** you will be spraying at, then press the Green Tick.



Enter the expected **Target Speed** you would be spraying at most of the time, then press the Green Tick when done. You will be returned back to the **Calibration Setup** screen.

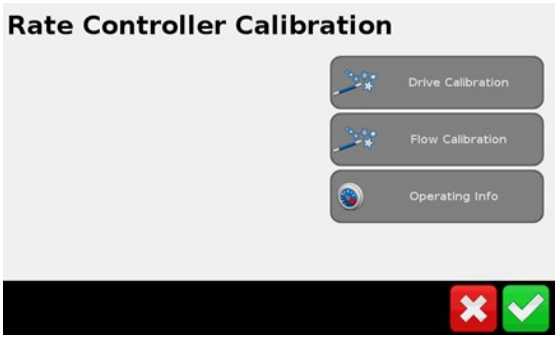


Press the Green Tick and the **Flow Calibration** screen will appear as below.

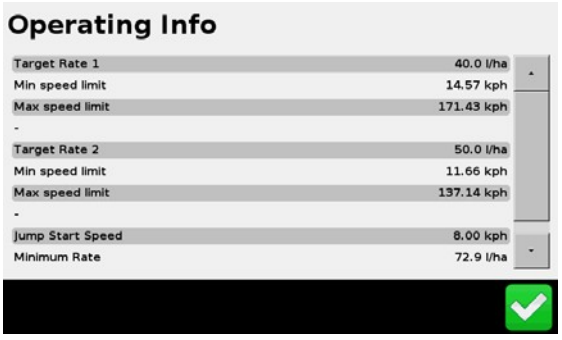
Turn the Master Switch on and wait until the Flow (lpm) stabilises. Place a Calibration Jug under at least 3 different Nozzles for exactly 60 seconds each and write down the average of these readings. Turn the Master Switch off. The display will then bring up what it thinks you should have measured out of each nozzle over this 60 second period. Adjust this amount to what you measured, then press the Green Tick. It will then bring up a new Flow Meter Calibration Number and ask if you want to accept this new Constant. Select Yes.

Repeat the calibration at least one more time – more if you have changed the Constant by more than a couple of places. *if the constant is changed, it will affect the readings on the next calibration.

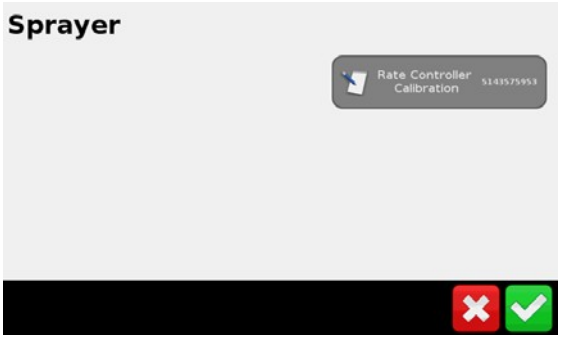
Press the Green Tick when finished and you will be returned to the Rate Controller Calibration screen.



The 3rd option on this page is the **Operating Info** screen. Based on the information you have entered and calibrations you have carried out, this screen displays the basic operating parameters of your system.

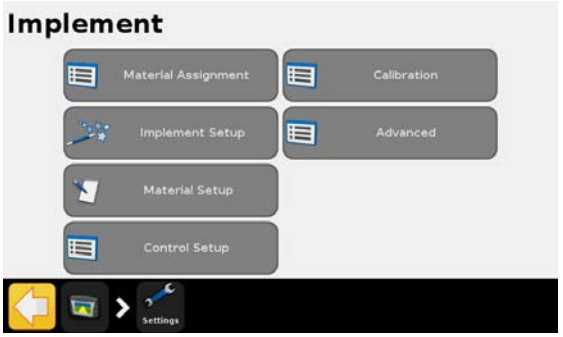


Press the Green Tick to return back to the **Sprayer (Module s/n)** screen.



Press the Green Tick and you will be returned back to the **Calibration** screen.

Press the **Implement Icon** and you will be returned back to the **Implement** screen.



The Sprayer is now ready for a test run.