

agXcel 12HP

REVOLUTION

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Quick Start Instructions for AgXcel's GX12HP Revolution

Disclaimer

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AgXcel shall not be responsible or liable for accompanying or significant reparations or a loss of expected benefits or profits, loss or delay of work, or inaccuracies of data arising out of the use, or inability to use, this system or any of its components. AgXcel shall not be held responsible for any modifications or repairs made outside our facilities, nor damages resulting from inadequate maintenance of this system.



CAUTION

Read this document carefully before installing, testing and using the AgXcel GX12HP Revolution injection system.

- Follow all safety information presented within this document.
- Keep safety labels in good condition. Replace missing or damaged safety labels as necessary and verify labels are included on replacement parts or new equipment components.
- If you require assistance with any portion of the installation or service of this solution contact your local AgXcel Dealer or contact AgXcel directly.

Chemical Handling and Safety

Chemicals used in agricultural applications may be harmful to your health or the environment if not used responsibly. Review the safe, effective, and legal use and disposal of agricultural chemicals with the chemical supplier.

- Always follow safety labels and instructions provided by the chemical manufacturer or supplier.



Quick Start Instructions for AgXcel's GX12HP Revolution

GX12HP Installation Requirements

CAUTION – The GX12HP is capable of injecting up to 280 PSI

The installation of the GX12HP unit is very versatile however for the best performance please follow the best practices below.

A. **Mounting the Unit** – The GX12HP may be mounted in any location on the tool bar or implement. However, the unit must be secured, and must be mounted level. Ensure that it is not in a location where rock, mud, or debris will directly hit the unit as these could damage the outer casing of the pump or flow sensor.

B. **Tank Feed** – When installing the GX12HP unit on the implement ensure that the distance between the chemical tank and the GX12HP is no longer than 10ft. This will ensure that the unit does not have to work harder to draw the chemical from the tank. This will allow for easier flushing of the unit. Less chemical will be in the tank to pump line.

C. **Injection Feed** – when deciding on an injection point, ensure that the distance from the GX12HP unit to the injection point is no longer than 8ft. This regulated distance allows for less pressure drop and strain on the pump unit itself.

a. **Check Valve**- it is also critical to install a check valve on the injection feed line at the injection point. This will prevent feedback into the pump.

Check Valve



D. **Chemical Mixer** – a standard chemical mixer in the line

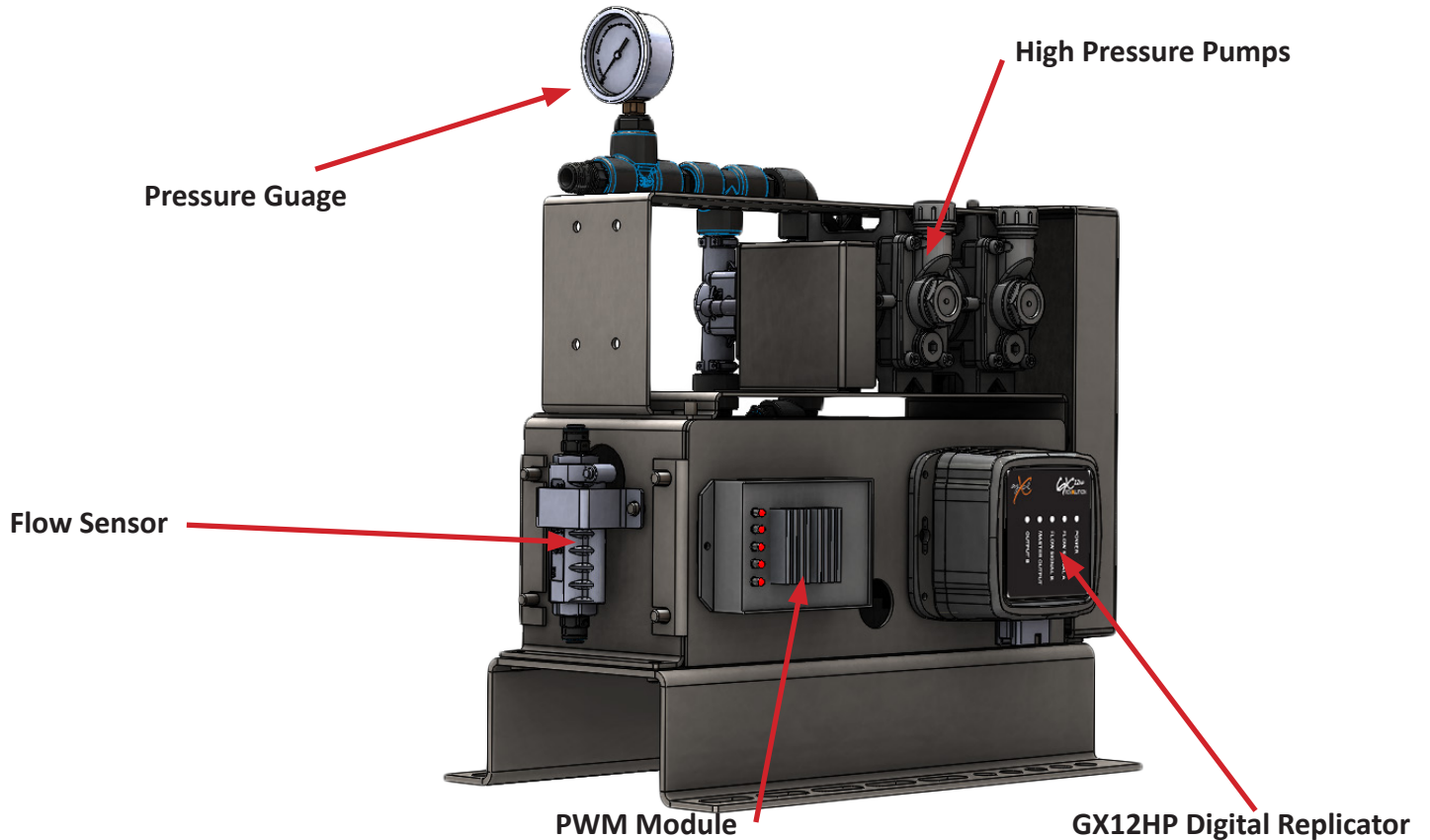
E. **High Pressure** – The GX12HP is a high-pressure injection unit with the ability to inject up to 280 PSI. However, AgXcel highly recommends the following precautions

- a. Pressure Sensor
- b. Pressure Spike Valve
- c. Manual Pressure Guage








Quick Start Instructions for AgXcel's GX12HP Revolution

GX12HP Unit Breakdown



GX12HP Digital Replicator



-  **POWER**
-  **FLOW SIGNAL A**
-  **FLOW SIGNAL B**
-  **MASTER OUTPUT**
-  **OUTPUT B**



Quick Start Setup Instructions for Trimble's FM 750, FM1000, FMX Rate Controller

PLEASE NOTE: *Your setup may vary.* Not all screens are shown. See Trimble's Operator's Manual for safety information and additional setup/operating information. **Please ensure you have the latest firmware installed!**

MENU STRUCTURE FOR LIQUID RATE CONTROLLER



Home

- Support
- System Information
- Camera



Configuration

- Setup
- Calibrate
- Diagnostics



Config Selection

- Display
- Vehicle
- Implement

FM-1000™ Integrated Display

Support	System Information	Camera
Version: 9.25.900253 (Jul 1 2015 14:31) Install: gemini_abs_0016/FS_0067 HW Ver G Serial Number: 5231592891 Part Number: 93110-20-00 Internal temperature: 86.9 °F Internal Storage: 1520MB available USB: 3.8GB available Operational Hours: 608.7 since Apr 2015	GPS Receiver: Internal Version: 8.01.008.4 hw:H FW Build date: Mon Jun 15 2015 Unknown Omni* ID: 120-0032966 Field-IQ Rate & Section Controllers: 1 RSCM sn [5104505873]	

System Information

From the home screen, you can select 3 tabs; Support, System Information and Camera. The System Information tab is shown above. This will show what Trimble components are properly connected to your display. If your fertilizer system quits functioning, first check that the Control Module is still recognized on the display. If not, inspect the Trimble wiring harness connections or consult your Trimble dealer.

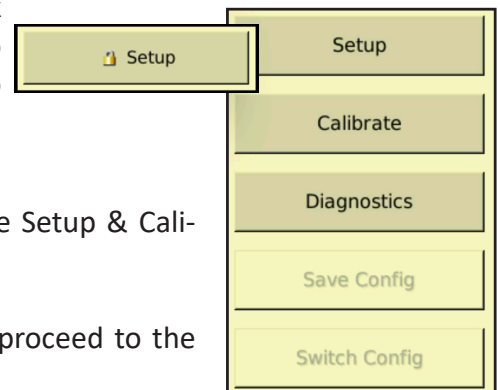
CFX-750 and FM750 Users

Information in this manual is applicable to the 750 except for screen shots shown in the Setup & Operation. The calibration and setup values in this section DO apply to the 750. However, the 750 has a completely different screen layout and menu structure that is not shown in this manual. Use your Trimble manual to navigate, then enter the appropriate numbers from the AgXcel manual.

Configuration – Setup & Calibrate

In the Setup & Calibrate menus, you will set the Trimble Field-IQ to work properly with the AgXcel Fertilizer System. Carefully follow these steps to first make sure you have the proper settings. Then, run the tests shown to verify your fertilizer system is ready to go to the field.

- From the home screen, choose **Setup & Diagnostics**.
- The Configuration screen below will appear. Choose **Field-IQ**. The Setup & Calibrate buttons will be locked, shown by a padlock next to them.
- Push **Setup**, then enter “2009”
- After entering the code, the locks will disappear. Push **Setup** to proceed to the next steps.





Quick Start Setup Instructions for Trimble's FM 750, FM1000, FMX Rate Controller

Configuration – Setup cont.

- Select **Field-IQ** and press the **Setup** button.
- The next page will display 3 selections, press the “**Material Setup**” button.
- Select one of the available material profiles or press **Add** to add a new material. Press **Edit** to change any of the parameters of the material selected.
- **Material Type** will need to be set to **Liquid**.
- Give the material a name that makes sense.
- Set **Target Rate 1 & Target Rate 2** as desired.
- Rate Increment increases or decreases your **Target Rates** by this amount each time you press the rate **Adjustment Switch** on the **Master Switch Box**.
- **Manual Rate Increments** work when the **Rate Switch** is in the **Manual Position**. This number controls the speed at which the valve increases or decreases when you press the **Rate Adjustment Switch** on the **Master Switch Box**.
- **Minimum Rate** is always set at **0**.
- **Maximum Rate** is set at something higher than the maximum rate that will be applied.

These parameters may be adjusted as desired.

- **Jump Start Speed** is the speed the system will ramp up to when the operator pushes the **Jump Start** button on the **Master Switch Box**. **3.0 – 5.0 mph** is a good setting for this.
- **Jump Start Timeout** allows the **Jump Start Speed** to run for a specific amount of time.
- **Apply Latency to Boundary**: set as needed so the system begins applying when needed.

AgXcel recommends setting the **Rate Snapping** to **On**. This will smooth out the rate fluctuation seen on the screen. If you are within the rate smoothing range, the applied rate will just show your target rate and not small deviations from target rate.

NOTE Ensure that you enter your target rate in ounces. For example, if you need to apply 32 ounces per acre, enter the rate as 32 gal/acre not as .25 gal/acre. Also keep in mind that the controller will say it is reading in gallons, but the Flow Calibration number that will be set will have the controller read on ounces

Configuration screen showing the following options and buttons:

- System [System] (Setup)
- Manual Guidance [display stand] (Calibrate)
- GPS Receiver (Diagnostics)
- Implement [New Implement] (Save Config)
- Field-IQ (Switch Config)

Material Setup screen showing the following options and buttons:

- Available Materials: Nitrogen, Row Crop Seed, Liquid, Granular Seed, Granular Fertilizer, Anhydrous
- Target Rate 2: 10.00 gal/a
- Jump Start Speed: 5.00 mph
- Shutoff Speed: 0.36 mph
- Minimum Override Speed: 0.00 mph
- Calibration Constant: 3.79 pul/gal
- Buttons: Add, Edit, Delete, Cancel, OK

Material Details: Liquid screen showing the following options and buttons:

- Material Type: Liquid
- Material Name: Liquid
- Target Rate 1: 10.00 gal/a
- Target Rate 2: 15.00 gal/a
- Rate Increment: 1.00 gal/a
- Manual Rate Increment: 100 %
- Minimum Rate: 0.00 gal/a
- Maximum Rate: 30.00 gal/a
- Buttons: Cancel, OK

Material Details: Liquid screen showing the following options and buttons:

- Jump Start Speed: 5.00 mph
- Jump Start Timeout: 0.00 s
- Shutoff Speed: 0.36 mph
- Minimum Override Speed: 0.00 mph
- Apply Latency to Boundary: No
- Rate Snapping: On
- Buttons: Cancel, OK



Quick Start Setup Instructions for Trimble's FM 750, FM1000, FMX Rate Controller

Setup - Control

If this is your first time setting up the **Trimble Control**, there will be **no Locations** entered. In that case, press **Add** and enter the information for a location. If there is a location and material that has been created already, you can select and/or edit.

Material

- Select your desired material from the **Available Materials**

Layout

- From the Layout screen, you can enter a **Location Name** such as **Front Tank**, **Rear Tank**, etc. If desired, you can set up the **Bin/Tank Setup** to allow the system to track how much material is left in the tank.
- **(OPTIONAL)** If you would like to let your controller monitor how much material is left and set alarms when the material is getting low, set your values in the **Bin/Tank Setup**.



Quick Start Setup Instructions for Trimble's FM 750, FM1000, FMX Rate Controller

Section Control

- If you have section control set up on your liquid fertilizer system, enable it by having the Section Control set to **On**
- Press **Setup** next to **Section Control Module Location**

- On the **Section Control Module Setup** Screen, set the **Number of Modules** in your system.
- Select the **Module's Serial Number**.
- Set the number of **Sections** for your system.
- Press **Section Widths**.
- Set the **widths** of your sections

- Press the **Setup** button next to Section Control to take you to the Section Control Setup screen
- Set Section Control Type to: **“Boom Valve”**
- Set **Off When Stopped** to: **“Yes”**
- Press **“Latency”** button to setup latency.
- **On Latency: 0.50 s**
- **Off Latency: 0.00 s**

***Adjust these latency settings as necessary in the field.**



Quick Start Setup Instructions for Trimble's FM 750, FM1000, FMX Rate Controller

Rate Control

- Select the **Rate Control** tab at the top of the screen.
- Set **Rate Control** to **ON**
- Set **Number of Nozzles** (number of rows)
- Set **No/Low Flow Timeout** to 45 s for troubleshooting so the system does not shut off too quickly.
- Press **Setup** next to **Rate Control Module Location**.
- Set the correct information on the **Rate Control Module Setup** screen.
- Press **OK**

- Trimble will take you back to the screen you see above. On **Drive Setup**, press **Setup**.
- **Rate Control** (Continued)
- Set up the **Valve Setup** as shown:
- Valve Type: **PWM**
- Valve Behavior When Sections Closed: **Close**
- Auxiliary Valve: **Disabled**

(**OPTIONAL:** If using an **Aux/Dump** valve to keep the pump running when application stops so the system will resume applying at the **Target Rate** immediately upon restart, set **Auxiliary Valve to Dump**, then set **Valve Behavior** when **Sections Closed** to either **Lock in Last Position** or **Lock at Minimum**. This setup requires section valves with an additional dump valve plumbed to return flow to the tank when application stops.)

Press **Feedback Setup** button on the **Drive Setup** page.

Set the Feedback Setup as shown:

- **Flow Meter Type:** Other
- **Flowmeter Calibration:** See AgXcel Flow Meter Guide on the next page
- **Minimum Flow:** 0.0 GPM



Quick Start Setup Instructions for Trimble's FM 750, FM1000, FMX Rate Controller

Flow Meter Chart

Number of Pumps	Flow Calibration Number
1 Pump	84
2 Pumps	42
3 Pumps	28
4 Pumps	21

NOTE Even though the Flowmeter Units is set to read in gallons, AgXcel has manipulated the controller to really read in ounces with the Flowmeter Calibration number that has been set. For example, if you enter the rate 32 Gal/Acre, your controller will really be applying 32 Oz/Acre.

Pressure Sensor Setup

Select the Sensor tab

Set up the Sensor setup as shown

Sensor Type: Liquid Pressure

Name: Transducer (or other name)

Alarm: Enabled

Suggested Alarms:

Warn if Below:

GX5 (hydraulic).....0

GX2 (electric).....0

Synergist.....0

GX12HP.....0

Warn if Above:

GX5 (hydraulic).....80

GX2 (electric).....25

Synergist.....35

GX12HP.....100

Sensor Setup will take you to a screen where you can select the Field-IQ Module that is controlling this sensor.

REMINDER: The pressure sensor is for informational purposes only and does not control the system in any way.

To finish the Pressure Sensor setup, it will be necessary to go to **Field-IQ Calibration** and select **Pressure Calibration** and the name of the pressure sensor you set up.

Set the following as shown

Calibrate Type: Point/Slope

Slope: 50 mv/PSI

Add Sensor

Sensor Type	Liquid Pressure
Name	New Sensor
Alarm	Enabled
Warn if below	0.00 psi
Warn if above	0.00 psi
Warn after	3.0 s
Sensor Setup	

Field-IQ Calibration

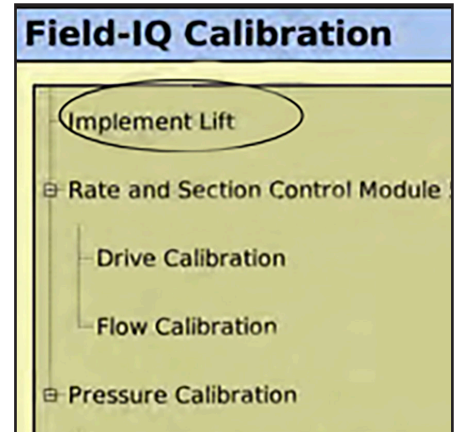
[-] Rate and Section Control Module 5104505873
Drive Calibration
Flow Calibration
[-] Pressure Calibration
New Sensor - Module 5104505873



Quick Start Setup Instructions for Trimble's FM 750, FM1000, FMX Rate Controller

Implement Lift Switch Calibration

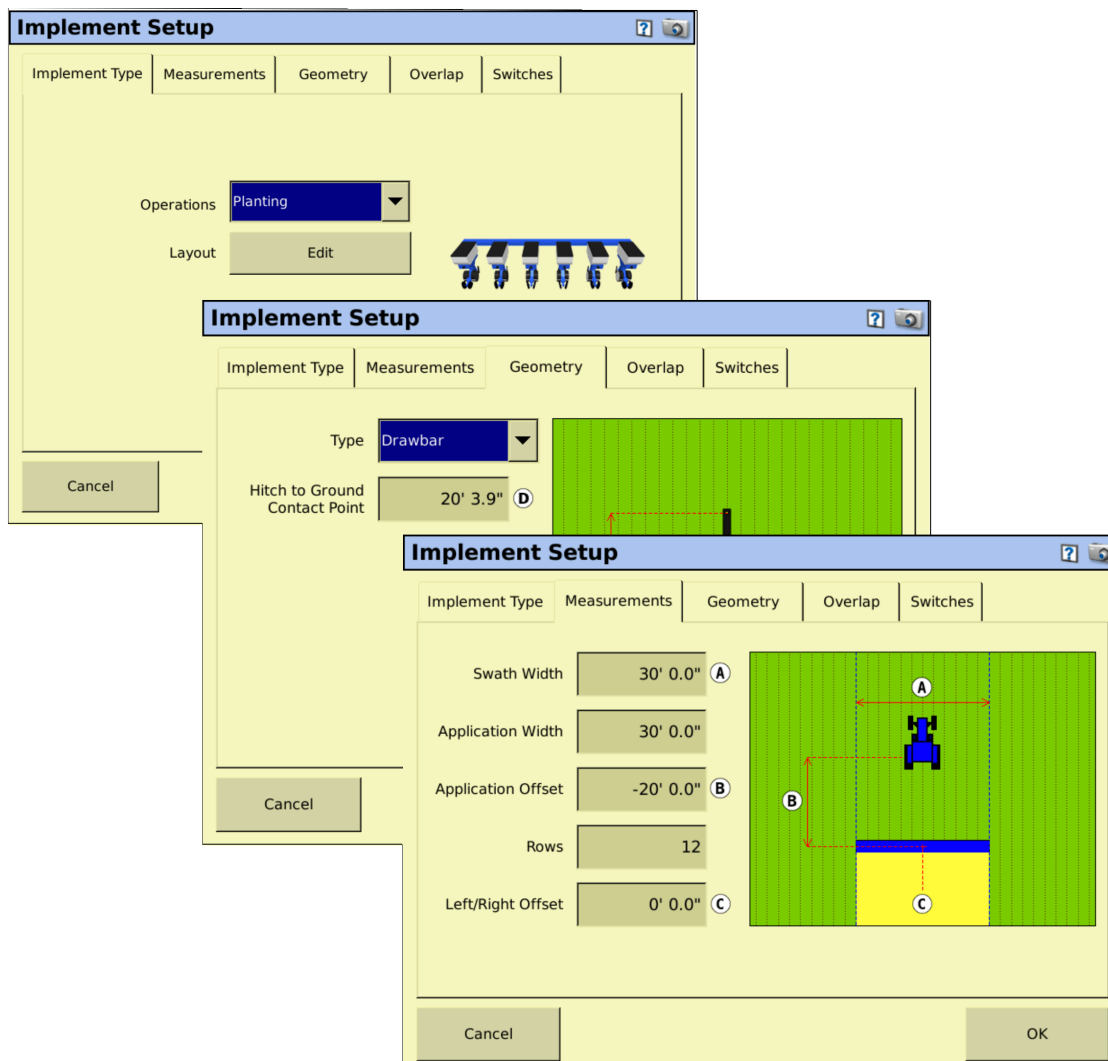
- From the **Field-IQ Calibration** screen, select the **Implement Lift** option
- Raise the implement and then tap **Next**
- Lower the implement and then tap **Next**
- Tap OK to return to the **Field-IQ Calibration** screen



Implement Setup

Implement Setup is where you set the information for the implement you are using. Mainly these settings affect the guidance control. However, if using auto section shutoff, these settings will determine when each section valve shuts off.

Measure your implement carefully and consult with your Trimble dealer for additional assistance with the Implement Setup section.





Quick Start Setup Instructions for Trimble's FM 750, FM1000, FMX Rate Controller

Field IQ Calibration

- On the Calibration page, select **Field-IQ** then press Calibrate button
- This will bring you to the Field-IQ Configuration screen
- Select **Drive Calibration**
- You can leave **Maximum Flow** set to 0 or enter the **Maximum Flow** rate of your pump in Gal/Min. Then press Next
- Follow the screen instructions to run **Auto Tuning** procedure.
- Press **Next** at the bottom of the screen to go to the **Drive Settings**.
- The settings on the **Drive Settings** screen are all duplicated on the **Advanced Parameters** screen. Press the **Advanced Parameters** button to go to the next screen.
- On the **Advance Tuning** page, set the settings as shown:
- **Upper PWM Limit:** 100

Lower PWM Limit:

GX5 (hydraulic).....28
GX2 (electric).....0
Synergist.....0
GX12HP.....0

Integral Gain: (Adjust as needed)

GX5 (hydraulic).....10
GX2 (electric).....15
Synergist.....100
GX12HP.....15

Minimum Response: (Adjust as needed)

GX5 (hydraulic).....20%
GX2.....0%
Synergist.....5%
GX12HP.....30

Allowable Error:

GX5 (hydraulic).....1%-3%
GX2.....3%
Synergist.....5%
GX12HP.....1

Smoothing Factor:

GX5 (hydraulic).....1%-3%
GX2.....3%
Synergist.....1%
GX12HP.....10

NOTE: The TMX-2050 will use Proportional Gain instead of the Integral Gain. This is the opposite of the FmX. The Auto Tuning process should set this. If not, start with Proportional Gain at 20-30.

Field-IQ Drive Calibration

Drive Limits | Auto-Tuning | Drive Settings | Info

This step of the Auto-calibration allows you to set the maximum flow on your system so it doesn't operate outside its capability.

If the maximum limit of the system is unknown, please leave this setting set to zero to ensure accurate auto tune limits are calibrated.

Maximum Flow: 0.00 gal/min

Cancel Next

Field-IQ Drive Calibration

Drive Limits | Auto-Tuning | Drive Settings | Info

Turn the Master Switch on and vary between rates to ensure your system performs at the level you require.

Target Speed	5.00 mph	Integral Gain	75.00
Target Rate	32.00 gal/a R1	Minimum Response	10.0 %
Applied Rate	0.00 gal/a	Minimum Position	10.4 %
Master Switch	Off	Allowable Error	10.0 %
		Boost (Feed Forward)	Off

Advanced Parameters

Back Next

Field-IQ Drive Calibration

Advanced Tuning | Advanced PWM

Turn the Master Switch on and vary between rates to ensure your system performs at the level you require.

Target Speed	5.00 mph	Proportional Gain	0.0000
Target Rate	32.00 gal/a R1	Integral Gain	75.00
Applied Rate	0.00 gal/a	Differential Gain	0.0000
Master Switch	Off	Minimum Response	10.0 %
Upper PWM Limit	100.00 Hz	Allowable Error	10.0 %
Lower PWM Limit	0.00 Hz	Process Gain	0.010000
Comparator Limit	100.00 Hz	Smoothing Factor (Flow Filter Time Constant)	10.00 %
Ramp Limit	655.00 Hz	Pre Position Open	0.00
Boost (Feed Forward)	Off	Pre Position Stop	0.00

Cancel Accept



Quick Start Setup Instructions for Trimble's FM 750, FM1000, FMX Rate Controller

Advance PWM Tab

1. Press the Advance PWM tab On the Field-IQ Drive Calibration. Set the settings as shown:

Base PWM Frequency..... 100
Dither Frequency 0
Dither Amplitude..... 0
Dither Control:..... Absolute

Field-IQ Drive Calibration			
Advanced Tuning		Advanced PWM	
Target Speed	5.00 mph	Base PWM Frequency	100 Hz
Target Rate	32.00 gal/a R1	Dither Frequency	0 Hz
Applied Rate	0.00 gal/a	Dither Amplitude	0 %
Master Switch	Off	Dither Control	Absolute
Accept			

Flow Calibration

2. Select **Field-IQ – Calibrate** on the Calibration screen. This brings up the screen where you can select **Flow Calibration**.
3. The **Flow Calibration** numbers may have already been set in the **Drive Setup**. You can verify or update the settings here.
4. After pressing “**Run Calibration**”, a screen that will allow you to input your **Target Rate and Speed**. Enter your typical application rate and field speed. During calibration, the system will run at the correct flow for this rate speed.
5. You will need a **stop watch** to measure time. AgXcel recommends running the test for some duration in minutes for simple math. When your containers are in position under multiple fertilizer outlets, press the Start Flow, then turn on the Field IQ master switch and start your timer. The system will begin to run. When your containers are near full, push Stop Flow.
6. Now you will need to measure the amount of liquid caught. The number you enter must be in gallons per minute per row.
 - Find total amount caught in ounces.
 - Divide total ounces by number of rows caught.
 - Divide ounces / row by 128 to convert to gallons / row
7. After entering the amount caught, the Flow Calibration number will automatically change. If it has changed more than 5%, review your catch test and repeat.

Field-IQ Calibration	
Rate and Section Control Module 5104505873	
Drive Calibration	
Flow Calibration	

Run Calibration
OK

Target Rate	0.25 gal/a
Speed	10.00 mph

Rate and Section Control Flow Calibration Result		
Measured Flow/Nozzle	1.50 oz/min	
Cancel	Arm Pump	OK

NOTE: AgXcel recommends running this procedure to verify set up is completed correctly. We recommend changing the flow calibration back to the standard ion flow meter calibration shown on the flow calibration on page 6.

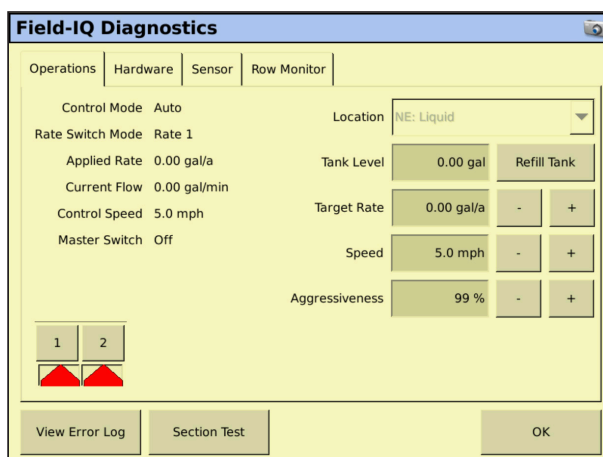
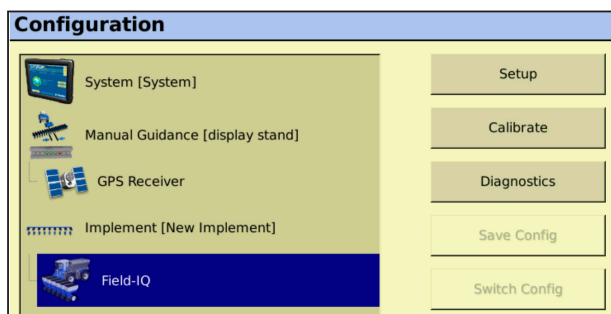


Quick Start Setup Instructions for Trimble's FM 750, FM1000, FMX Rate Controller

Initial Operation Instructions

AgXcel highly recommends you perform these exact steps with water to verify system is correctly installed and ready for field use.

- From the **Configuration Screen**, select **Field-IQ**, then **Diagnostics**. (If the Diagnostics tab is grayed out, you probably need to close a Field)
- Make sure that your pump is ready to be tested. Raise the implement and then tap **Next**
- Press the + next to **Speed** to simulate a **Speed** signal.
- Turn the **Field-IQ** master switch (#5) **On**.
- Push each section valve button and verify each valve is working.
- Turn **Switch #2** to **Manual** and open the section valves. Use **Switch #1** to increase flow. Does "**Current Flow**" display a flow rate? Is it stable after the system is primed? Do the increase & decrease buttons increase & decrease flow?
- Move **Switch #2** to **rate 1** and set speed to your typical field speed.
- The system should begin to pump liquid now in automatic control mode. ***Is the flow in GPM stable? Is it applying the correct rate? (applied rate = target rate?)***
- Change rate using screen buttons or switch #1 to increase/decrease rate or switch #2 to go to rate 2. ***Does applied rate change to equal target?***
- ***Close 1 section valve, does flow decrease? Does applied rate still equal target rate?***
- Change speed and target rate to minimum and maximum values. ***Does the system perform at these values? Does the system pressure seem reasonable (remember fertilizer will increase pressure over water)?*** Use "Sensor" tab at the top of the page to read pressure sensor value (if equipped).



Running the System with water will create much lower pressure than fertilizer.



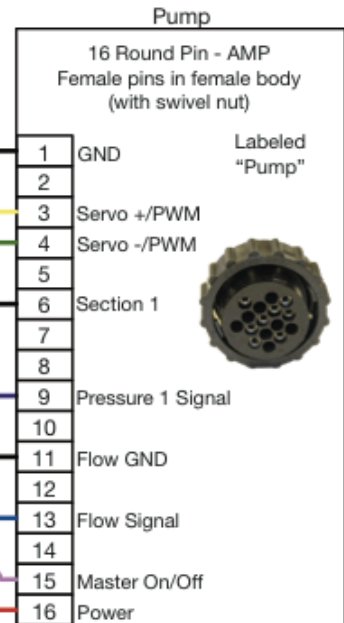
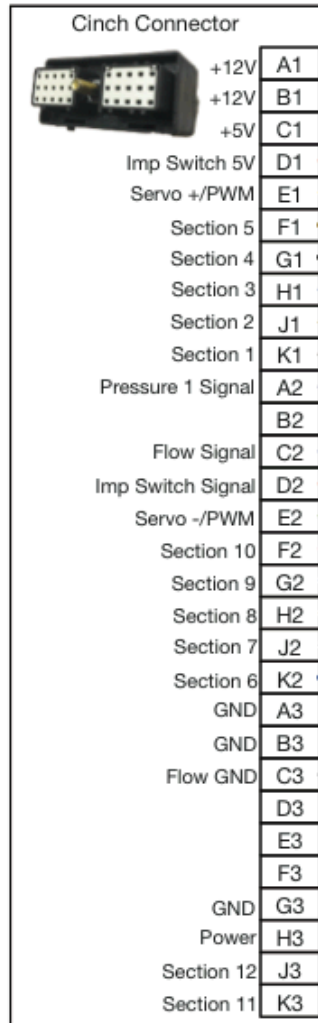


AgXcel Trimble Pinout Diagrams

PINOUT DIAGRAMS

Wire Size: 18 AWG
unless otherwise specified

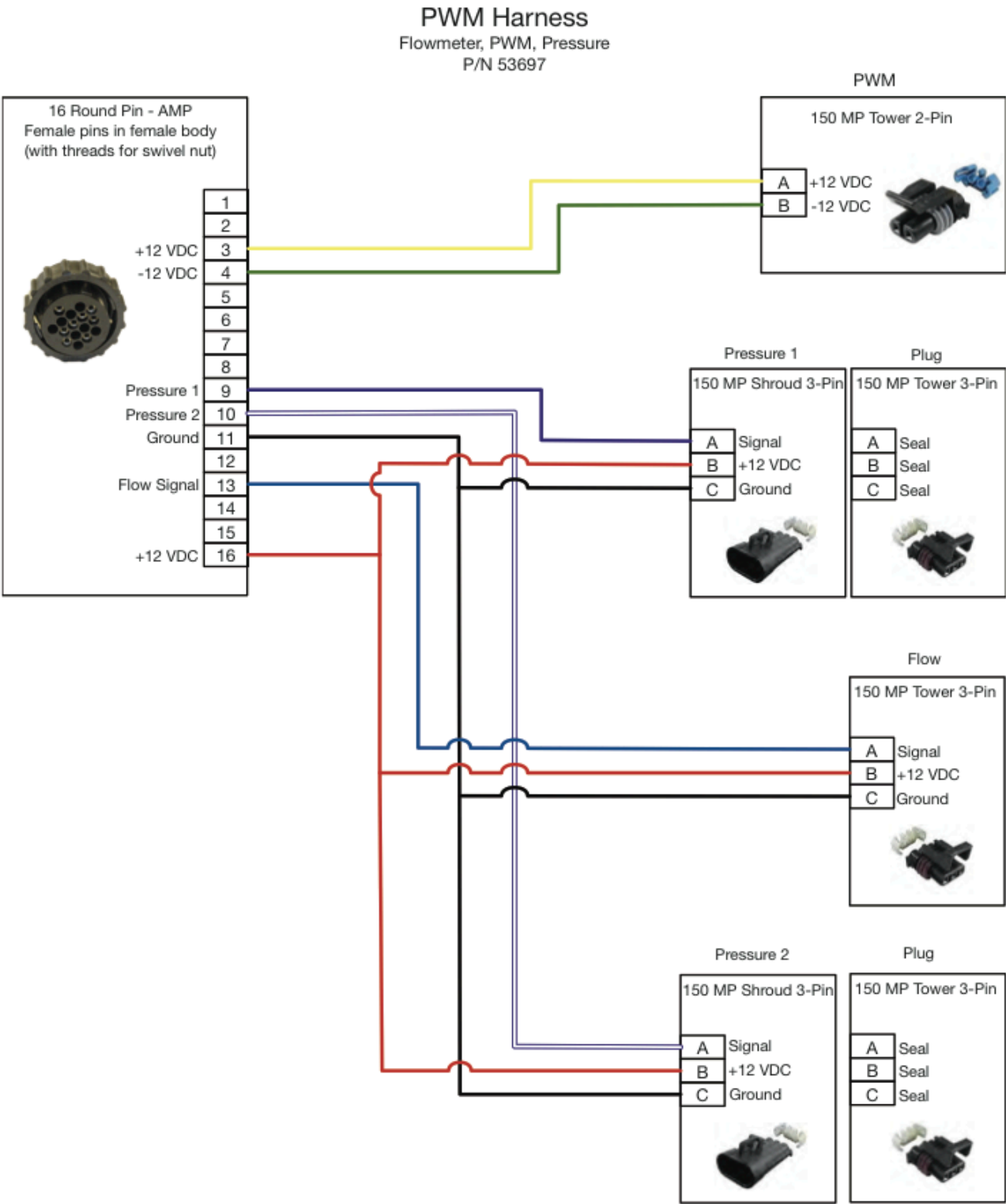
Trimble Field IQ Adapter Harness P/N 53519





AgXcel Trimble Pinout Diagrams

PINOUT DIAGRAMS





Quick Start Instructions for AgXcel's GX12HP Revolution

AgXcel's PWM Motor Driver

AgXcel has developed a state of the art driver that can handle even the harshest demands and environments in controlling its line of precision liquid application solutions. The on-board circuit technology can intelligently manage system resources which enables high demanding performance when controlling 12v electric pumps.

- GREEN – Power indicator that can alert when 12v is present or when voltage has dropped below superior performance levels
- BLUE – Complete monitoring of EMD PWM signal. Informs the user or proper signal strength and appropriate duty cycle
- YELLOW – Temperature control module that protects the unit from current spikes or high current heat
- RED – complete management and monitoring of motor current. This enhancement allows for the proper circuit current for electric motors
- ORANGE – intelligently monitors the appropriate voltage to electric pumps and closely monitors pumps performance





Quick Start Instructions for AgXcel's GX12HP Revolution

GX12HP Revolution Digital Replicator

The GX12HP system is designed to regulate the flow of chemical into a stream of a carrier line. The GX12HP has the ability to measure chemical using system technology and software programming with the use of a proximity sensor in which signals are captured and used to calculate flow of chemical from a positive displacement pump. In order to ensure that there is a constant flow of liquid, a sensor is used to detect pressure/flow.

There are 4 LED's on the GX12HP processor

● **GREEN** – When ON determines that the unit is receiving 12v

● **YELLOW** – Flow Signal A-B

1. When ON solid, shows that the processor is detecting flow

2. When OFF the processor is NOT detecting flow or flow has dropped below 0.03 gpm

3. When flashing – Rate is fluctuating between the lowest detectable range

● **BLUE** – Master Output

1. When OFF – signal on the proximity sensor is not being detected

2. When Flashing – signals are being detected and managed

○ **WHITE** – When Flow Sensor is Flashing then signals are being processed. This LED is used when the flow sensor is disconnected

When the system is functioning correctly, the GREEN LED will be in the ON SOLID state, the YELLOW LED will be in the SOLID ON state and the BLUE LED will be flashing ON/OFF continuously demonstrating that there is flow.

