



ISOBUS LIQUID ECU

Installation and Configuration Guide

Version A
Revision 1.01
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Product Limited Warranty

Trimble warrants that this Trimble product and its internal components (the "Product") shall be free from defects in materials and workmanship and will substantially conform to Trimble's applicable published specifications for the Product for a period of two (2) years, starting from the earlier of (i) the

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- (1) "Fix(es)" means an error correction or other update created to fix a previous software version that does not substantially conform to its Trimble specifications;
- (2) "Minor Update" occurs when enhancements are made to current features in a software program; and
- (3) "Major Upgrade" occurs when significant new features are added to software, or when a new product containing new features replaces the further development of a current product line.

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Official Language

THE OFFICIAL LANGUAGE OF THESE TERMS AND CONDITIONS IS ENGLISH. IN THE EVENT OF A CONFLICT BETWEEN ENGLISH AND OTHER LANGUAGE VERSIONS, THE ENGLISH LANGUAGE SHALL CONTROL.

Registration

To receive information regarding updates and new products, please contact your local dealer or visit the Trimble website at www.trimble.com/register. Upon registration you may select the newsletter, upgrade or new product information you desire.

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Safety and Compliance Information

Always follow the instructions that accompany a Warning or Caution. The information it provides is intended to minimize the risk of personal injury and/or damage to property. In particular, observe safety instructions that are presented in the following format:



WARNING – This alert warns of a potential hazard which, if not avoided, could result in severe injury or even death.



CAUTION – This alert warns of a potential hazard or unsafe practice which, if not avoided, could result in injury or property damage or irretrievable data loss.

***NOTE** – An absence of specific alerts does not mean that there are no safety risks involved.*

Warnings

Auto Guidance



WARNING - Auto guidance systems cannot avoid items in the field such as obstacles. Make sure you are adequately trained to operate the auto guidance system.



WARNING - Many large and sudden changes in satellite geometry caused by blocked satellites can cause significant position shifts. If operating under these conditions, auto-guidance systems can react abruptly. To avoid possible personal injury or damage to property under these conditions, disable the auto-guidance system and take manual control of the vehicle until conditions have cleared.

Articulated Tractors



WARNING - Articulated tractors pivot in the middle. Avoid putting yourself in a position where you could be injured by the pivoting rear section of the vehicle.

Satellite Geometry



WARNING - Many large and sudden changes in satellite geometry caused by blocked satellites can cause significant position shifts. If operating under these conditions, auto guidance systems can react abruptly. To avoid possible personal injury or damage to property under these conditions, disable the auto guidance system and take manual control of the vehicle until conditions have cleared.

Display



WARNING - When the temperature of the display case reaches 65° C (149 ° F) the display

shows the following: **WARNING! HOT SURFACE, DO NOT TOUCH.** The display will dim the screen until the temperature returns to normal. Use caution when touching the display when this warning is visible.



WARNING - The display may contain a single-use, lithium-sulfide LiSO₂ battery. Do not expose the battery to temperatures greater than 85 °C (185° F) as the battery may vent poisonous gases.

NH₃, Anhydrous Ammonia



WARNING - Anhydrous valve and flow calibrations require the vehicle and implement to be moving and the implement must be in the ground (the implement lift switch must be down). Take all necessary precautions to ensure user safety. Failure to do so may result in serious injury or death.



WARNING - NH₃ is an irritant and corrosive to the skin, eyes, respiratory tract and mucous membranes, and is dangerous if not handled properly. It may cause severe burns to the eyes, lungs, and skin. Skin, and respiratory-related diseases could be aggravated by exposure. It is recommended that protective gloves, boots, slicker and/or pants and jacket, and chemical-splash goggles that are impervious to anhydrous ammonia are worn at all times. See [Working with Anhydrous Ammonia \(NH₃\)](#).

Implement Master Switch



WARNING - When the implement is down and the master switch or section master is in the On position, the machine is fully operational. Take all necessary precautions to ensure user safety. Failure to do so could result in injury or death.

Calibration



WARNING - Incorrect adjustment of *Manual Override Sensitivity* could cause this critical safety feature to fail, resulting in personal injury or damage to the vehicle. Do not choose a setting that is either too sensitive or not sensitive enough. It is vital to avoid setting the sensitivity so low that the system will not detect any steering wheel motion.



WARNING - During the Implement Automatic Deadzone calibration, the system moves the vehicle's steering wheel. To avoid injury, be prepared for sudden vehicle movement.

Steering



WARNING - The automated assisted steering system is solely intended for Agricultural use in an open field environment with agricultural vehicles approved by the manufacturer for use with the automated system, and should not be used with any other type of vehicle or for any other purpose.

Contact your local Trimble-authorized dealer or check www.trimble.com to confirm that the automated steering system has been tested and approved by the manufacturer for use with your vehicle make and model.

The automated steering system should not be installed on a vehicle not approved by the manufacturer for such use. Installation of the automated steering system on an unapproved vehicle will invalidate the product warranty.



WARNING - The steering coulters can move abruptly during the Proportional Steering Gain procedure while the TrueTracker system tests the hydraulic response to the steering commands. These sudden movements can cause collisions with nearby obstacles or cause injury. Be prepared for sudden steering coulters movements.



WARNING - When you tap the liquid flow, control valve, or fill disk calibration Start button, the machine will become operational. Take all necessary precautions to ensure user safety. Failure to do so may result in serious injury or death.



WARNING - Material will be dispensed during calibration. Make sure that the implement is safe to operate.

Vehicle Safety



WARNING - When you are working on the vehicle's hydraulic systems, vehicle attachments that are suspended can drop. If you are working around the vehicle, you could suffer serious injury if an attachment dropped on you. To avoid this risk, lower all vehicle attachments to the ground before you begin work.



WARNING - The operator must remain in the driver's seat at all times when the vehicle is in motion and the auto-steering system is engaged.



WARNING - If someone else attempts to drive the vehicle while you are working on or under it, you can suffer serious or fatal injuries. To avoid this possibility, install a lockout box on the battery terminal to prevent the battery from being reconnected, remove the key from the vehicle's ignition switch, and attach a "Do not operate" tag in the cab.



WARNING - Vehicle cabs can be quite high in the air. To avoid potentially serious injury through falling from this height, always use the steps and handrails, and face the vehicle, when you enter or exit it.



WARNING - Agricultural chemicals can pose serious health risks. If the vehicle has been used to apply agricultural chemicals, steam clean the vehicle to remove any chemical residue from the areas of the vehicle where you will be working.



WARNING - The vehicle will need to move during the Hydraulic Tracked Pump Knees calibration procedure. To avoid injury, be prepared for vehicle movement.



WARNING - The wheels can move abruptly during the Deadzone calibration or Proportional Steering Gain procedure while the Autopilot system tests the hydraulic response to the steering commands. These sudden movements can cause collisions with nearby obstacles or cause injury to occupants of the vehicle. To avoid injury, be prepared for sudden vehicle movement.

Cautions

Batteries



CAUTION - Battery posts, terminals, and related accessories contain lead and lead compounds, which can cause serious illness. To avoid ingesting lead, wash your hands thoroughly after touching the battery.

Also take care not to short circuit battery with tools and/or by the incorrect fitting of cables as fire, burns, and damage can occur.

Calibration



CAUTION - Obstacles in the field can cause collisions, which may injure you and damage the vehicle. If an obstacle in the field makes it unsafe to continue the Automated Deadzone calibration, stop the vehicle and turn the steering wheel to disengage the system.

1. Wait until ISOBUS Liquid ECU prompts you that the phase is ready to begin.
2. Look at the screen to determine whether the next phase will require a left or right turn.
3. Reposition the vehicle so that the turn will use the space that you have available.
4. Tap the button to begin the next phase.



CAUTION - The wheels can move abruptly during the Steering Proportional Gain procedure while the Autopilot system tests the hydraulic response to its steering commands. To avoid injury, be prepared for vehicle movement.

Chemical Safety



CAUTION - The system installation may bring you into contact with chemical substances, such as oil, which can cause poisoning. Wash your hands thoroughly after you finish working on the system.

Antennas



CAUTION - The GNSS antenna may experience interference if you operate the vehicle within 100 m (300 ft) of any power line, radar dish, or cell phone tower.



CAUTION - Wireless, cellular, radio, and GNSS signals can interfere with each other. For best performance, mount antennas at least 1 meter away from each other.

Display



CAUTION - Take the following precautions to preserve the integrity of the display.

- If you leave the display powered on after shutting off the vehicle's ignition, the display power can drain the battery.
- Do not attempt to power the display without an appropriate guidance controller module.

- Do not press on the screen with a sharp item, such as a pencil. You may damage the surface of the screen.
- Do not apply glass cleaner directly to the touchscreen.

Cabling



CAUTION - Connecting the Port Replicator of the NavController cable to the P4 or P12 connector of the NavController harness will result in damage to the equipment, and will void the warranty.

Pressurized Water



CAUTION - Do not direct pressurized water at:

- Electronic or electrical components or connectors.
- Bearings.
- Hydraulic seals.
- Fuel injection pumps.
- Any other sensitive parts or components.



Set the hose pressure as low as practicable, and spray at a 45° to 90° angle. Keep the nozzle of the power washer away from the machine at the distance recommended by the manufacturer.

Modems



CAUTION - Do not mount the modem in direct sunlight or in areas of high heat. This will cause degraded performance.

Protective Gear



CAUTION - Always wear protective equipment appropriate to the job conditions and the nature of the vehicle. This includes wearing protective glasses when you use pressurized air or water, and correct protective welder's clothing when welding. Avoid wearing loose clothing or jewelry that can catch on machine parts or tools.

USB Drive



CAUTION - Take the following precautions to protect your USB drive:

- Do not remove the USB drive while the display is writing to or from the drive. This will corrupt the data.
- Do not use a USB drive in each USB socket at the same time. If you are attempting to upgrade firmware using a USB drive and another USB drive is already in one of the sockets, the firmware upgrade will fail.

Vehicle Setup



CAUTION - Take the following precautions when setting up your vehicle:

- If you select a Vehicle Profile that is not suitable for your vehicle, you may experience degraded system performance.
- If you delete a vehicle, all information about the vehicle will be erased.



CAUTION - When the vehicle has been running, parts of the vehicle, including the engine and exhaust, can become extremely hot and can cause serious burns. To avoid burns, allow hot machine parts to cool before you begin working on them.



CAUTION - Always hold the steering wheel while you adjust the column tilt. Otherwise, the weight of the motor may cause the steering wheel to drop suddenly and cause damage to the steering column or dash.



CAUTION - If the vehicle has a master electrical disconnect, make sure the power cable ground connections are not directly attached to the battery terminal.

Attach the ground connects of the power cable to the chassis side of the main disconnect so that it is as close as possible to the battery, but still gets disconnected when the master disconnect is turned off. Failure to connect the power cable ground will cause damage to the display.



CAUTION - Parts of the vehicle may be under pressure. To avoid injury from pressurized parts, relieve all pressure in oil, air, and water systems before you disconnect any lines, fittings, or related items. To avoid being sprayed by pressurized liquids, hold a rag over fill caps, breathers, or hose connections when you remove them. Do not use your bare hands to check for hydraulic leaks. Use a board or cardboard instead.



CAUTION - To prevent damage to the system, make sure that no wires or hoses interfere with or catch on any mechanical linkages, or contact any machine parts that get hot.



CAUTION - Make sure the vehicle power is off when you are connecting system components.

Working with Anhydrous Ammonia (NH₃)

Contact your NH₃ supplier to review all safety requirements associated with anhydrous ammonia (NH₃).

Always wear correct personal protective equipment. This includes, but is not limited to:

- Goggles or face shield
- Protective suit and gloves
- Respirator

Do not allow anyone to operate the system without proper instruction and training.

Stand up-wind when working around NH₃ and related equipment.

Always keep NH₃ equipment away from buildings, livestock, and other people.

Never work on NH₃ equipment in confined spaces.

Before you attempt to transport the implement, discharge the system of all NH₃ and completely shut down the system. See [Discharging the System](#).

If symptoms of illness occur during or shortly after use of NH₃ products, seek immediate medical attention.

Keep a source of clean water (at least five gallons) readily available. In case of exposure, flush exposed skin or eyes immediately with large quantities of water and seek immediate medical attention.

NH₃ can be harmful to the environment if not used correctly. Follow all local, state, and federal regulations regarding proper handling of this chemical.

Servicing the Equipment

1. Remove the system from operation before performing any maintenance.
2. Thoroughly bleed all system lines and disconnect the nurse tank hose. See [Discharging the System](#).
3. Make sure that the gauge pressure is at zero before you open the system.
4. Use extreme caution when opening a previously pressurized system.

Discharging the System

1. Turn off the console or vehicle master switch.
2. Completely close the main shut-off valve on the supply or nurse tank.
3. Resume field application until the pressure gauge shows zero pressure.
4. Check again that the console and/or vehicle master switch, and all section switches, are turned off.
5. Completely close the emergency shut-off valve the cooling tower.
6. Bleed and disconnect the nurse tank supply hose from the system.
7. Turn on the console master switch and all section switches.
8. Stand up-wind from the implement and then slowly open the bleed valve(s) until fully open.
9. Allow at least one (1) hour for the system to fully discharge.
10. Before you open the system, make sure that the pressure gauge on the manifold reads zero and that the cooling tower is not cold to the touch. This ensures that all liquid NH₃ has evaporated and that the pressure is discharged.

NOTE – Frost on any component is a positive indication of trapped NH_3 at low pressure. Lack of frost does not always indicate a lack of NH_3 .

COMPLIANCE INFORMATION

Federal Communications Commission (FCC) Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or service provider for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

Contains FCC ID: TLZ-NM230NF and Z642564N

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Industry Canada Interference Statement

This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:

1. This device may not cause interference; and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme aux CNR exemptes de licence d'Industrie Canada. Son fonctionnement est soumis aux deux conditions suivantes:

1. Ce dispositif ne peut causer d'interférences; et
2. Ce dispositif doit accepter toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement de l'appareil.

Radiation Exposure Statement

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

Déclaration d'Exposition aux Radiations

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

Contains IC: 6100A-NM230NF and 451I-2564N

INTERNATIONAL COMPLIANCE

Australia and New Zealand

This product conforms with the regulatory requirements of the Australian Communications and Media Authority (ACMA) EMC framework, thus satisfying the requirements for RCM Marking and sale within Australia and New Zealand.

Canada

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme ICES-003 du Canada.

This apparatus complies with Canadian RSS-GEN.

Cet appareil est conforme à la norme CNR-GEN du Canada.

Europe

This product has been tested and found to comply with the requirements for Class B device according to Radio Equipment Directive 2014/53/EU, thereby satisfying the requirements for CE Marking and sale within the European Economic Area (EEA). Contains a radio module. These requirements are designed to provide reasonable protection

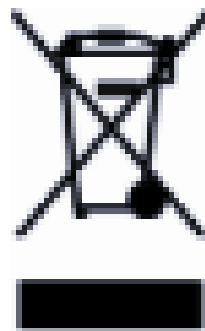
against harmful interference when the equipment is operated in a residential or commercial environment.

RECYCLING WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)

For product recycling instructions and more information, please go to www.trimble.com/Corporate/Environmental_Compliance.

Recycling in Europe: To recycle Trimble WEEE (Waste Electrical and Electronic Equipment, products that run on electrical power.), call +31 497 53 24 30, and ask for the “WEEE Associate”. Or, mail a request for recycling instructions to:

Trimble Europe B.V. WEEE Recycling
C/O Menlo Logistics
Gate 19 to 26
Meerheide 43
5521 DZ
Eersel
The Netherlands



Introduction to the ISOBUS Liquid ECU

- ▶ ISOBUS Liquid ECU General Functions
- ▶ Installation Summary
- ▶ Information on the Identification Label
- ▶ Powering Up the Liquid ISOBUS ECU
- ▶ Powering Down the ISOBUS Liquid ECU
- ▶ ISOBUS Liquid ECU Symbol on a Display

ISOBUS Liquid ECU General Functions

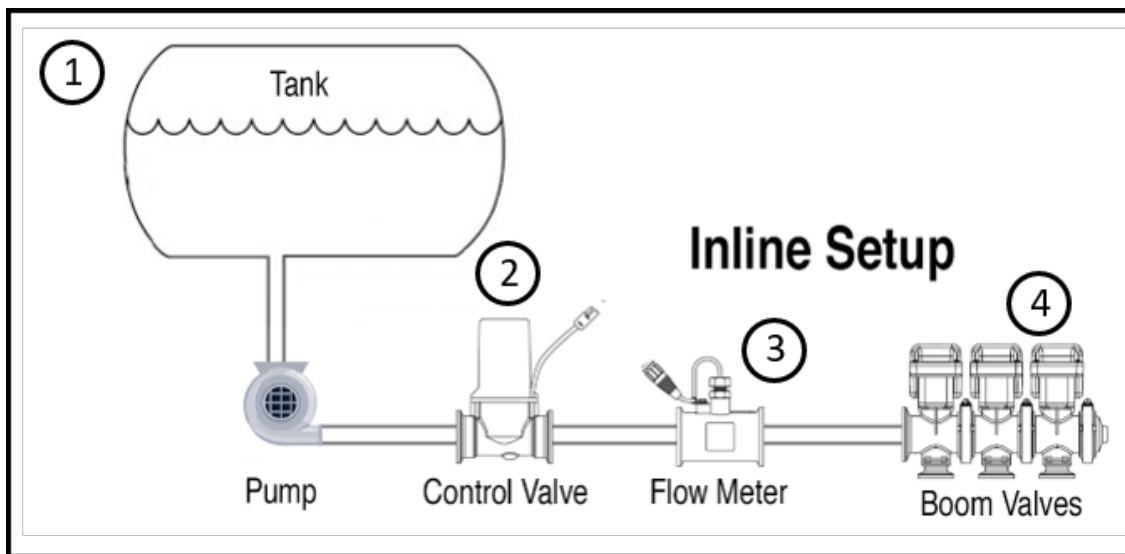
The ISOBUS Liquid ECU is used to control the precise application of liquid or anhydrous ammonia.

The system is provided with the following functions:

- Determination and display of speed.
- Control of the application amount based on the speed and working width of the implement.
- Display of the current tank content.
- Automatic Section Control with an ISO Task Controller system. This function enables the automatic opening and closing of section valves in order to prevent overlapping.
- Transfer of target rates from prescription maps.
- Closure of all valves when the vehicle slows below a defined speed.

Product Regulation

In order for the ISOBUS ECU to regulate the flow of a product, a number of components must be connected and configured.



Description

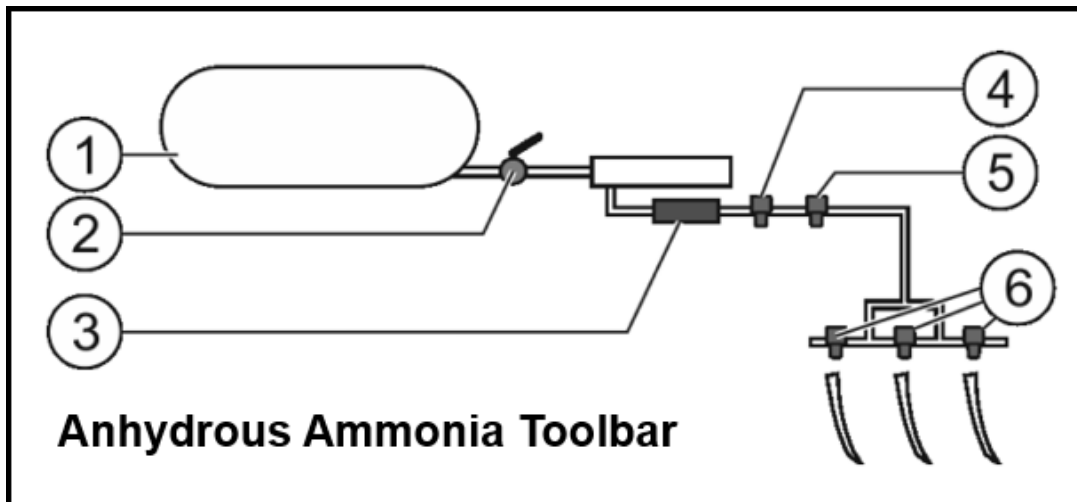
1 Tank with liquid

2 Servo - an electronically controlled valve used to directly regulate flow of product.

PWM - an Electronic Solenoid valve that controls the hydraulic flow to a hydraulic motor.

Description

- 3 **Flow Meter** - A sensor that measures flow of the product.
- 4 **Boom Valves** (*optional*) if a master or dump valve is present - Electrically controlled valves that can be open or closed to control flow to individual sections.



Description

- 1 Tank with ammonia
- 2 **Safety Valve** - This valve is not controlled by the ECU. This is a manually-operated safety valve that is used as a secondary shutoff if the system needs to be closed manually.
- 3 **Flow Meter** - A sensor that measures flow of the product.
- 4 **Servo** - an electronically controlled valve used to directly regulate flow of product. PWM, an Electronic Solenoid valve that controls the hydraulic flow to a hydraulic motor.
- 5 **Master Valve** (*recomened for all NH_3 systems*) - Valve, electrically controlled. This can be opened and closed very rapidly. This is used to close the line quickly.
- 6 **Section Valve** (*optional*) - Valves, electrically controlled. These can be open or closed. These are used to open and close the feed to individual sections.

Installation Summary

Installation Consists of the following components:

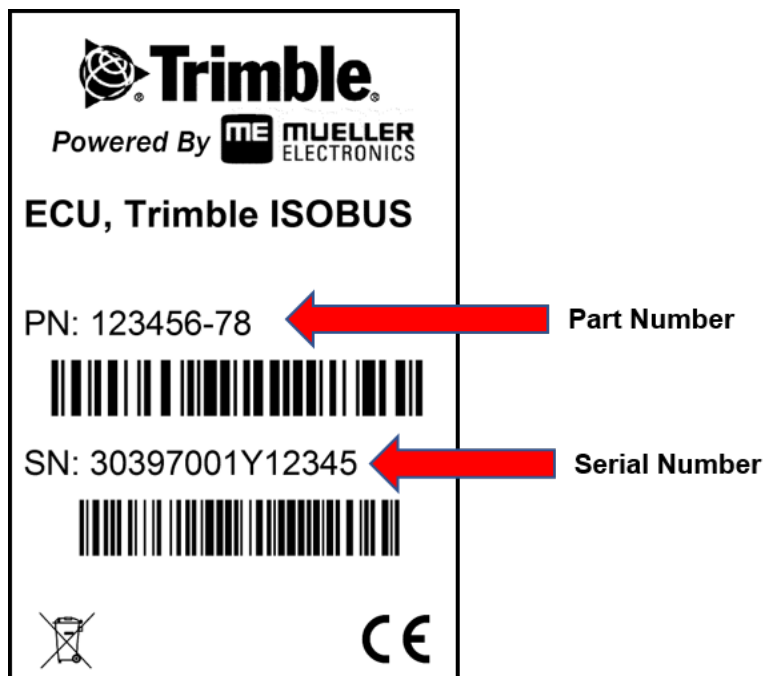
1. Vehicle-to-ECU ISOBUS harness
2. Control ECU installation
3. Implement adapter harness installation

Before beginning installation confirm all components shown in the following figure are in the kit. For safety and protection of electronic components disconnect the ground cable from the battery.

Information on the Identification Label

On the ISOBUS Liquid ECU, you will find an identification label. This label provides all the information you need to clearly identify the product.

Have these details ready when you contact your dealer.



Powering Up the Liquid ISOBUS ECU

You can switch on the ISOBUS ECU as follows:

1. Supply the ECU with power. This can be done in the following ways:
 - a. For ISOBUS tractors: Switch the tractor on using the ignition key.
 - b. For non-ISOBUS tractors: Switch on the display.
2. You have switched on the ECU.

ISOBUS Liquid ECU Symbol on a Display

You can recognize the ISOBUS ECU existence on your display by the following icon:



Powering Down the ISOBUS Liquid ECU

Always switch off the ISOBUS Liquid ECU in the following situations:

- When you have finished work.
- Before you leave the field.
- When someone approaches the implement.

You can switch off the ECU as follows:

1. Stop the tractor. The ISOBUS ECU closes all the valves.
2. To stop the application, tap the **Master Switch - ON** icon. The icon will change state to be **Master Switch - OFF**:



The application indicators beneath the icon of the implement are faded out.

NOTE – Tapping the **Road** icon will disable the application:



Alarm message appears: *Caution! Road mode is active!*

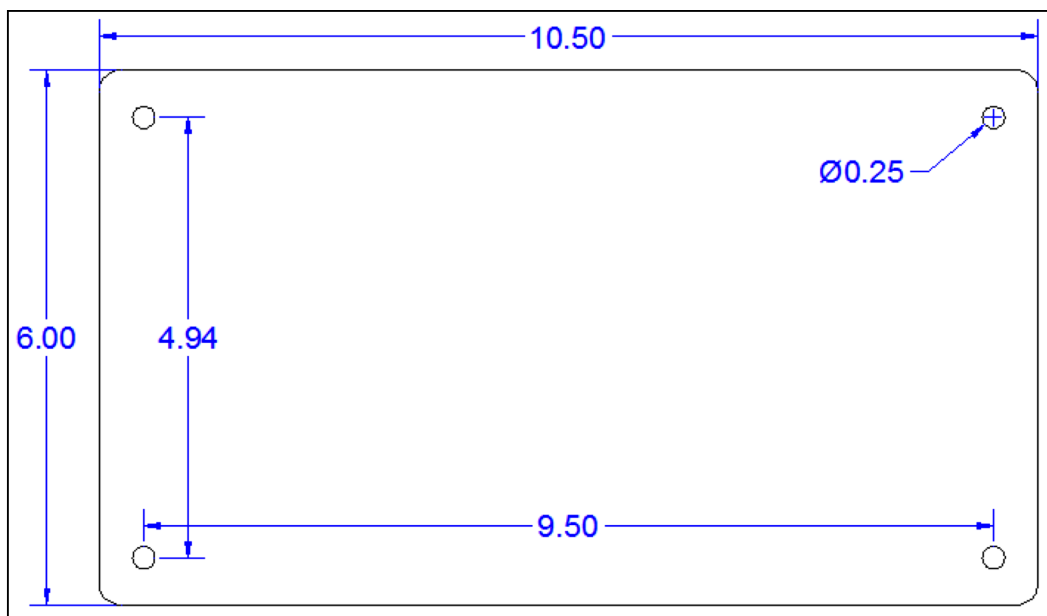
3. Switch off the tractor at the ignition switch, and ensure that the display is switched off.
You have switched off the job computer.

ISOBUS Liquid ECU Installation

- ▶ Mounting Location for ECU
- ▶ ECU Harnessing to Tractor ISO Connector
- ▶ Complete Harness with Field-IQ
- ▶ Raven Implement Adapter Harnesses
- ▶ Downloadbox Cabling Diagram

Mounting Location for ECU

1. Locate a stable and flat area of the implement approximately 8 by 16 inches. The area should be protected from flying debris and dirt. The ECU can be mounted in any orientation. Front toolbar frames often are suitable.
2. A mounting plate can be fabricated from 1/8" plate and bolted to the toolbar with the following dimensions if a suitable location cannot be found.

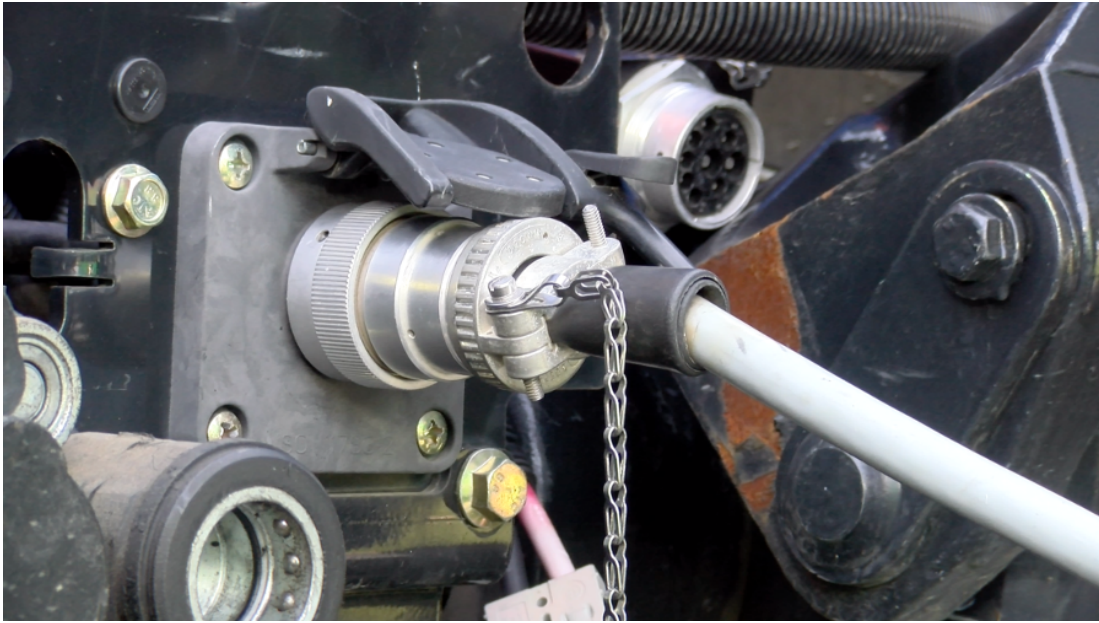


NOTICE! Do not over tighten mounting bolts. Doing so may damage ECU housing.

3. Using four 1/4" x 3/4" length (or another length required) bolts and nylon locking nuts, bolt the ECU to the toolbar.

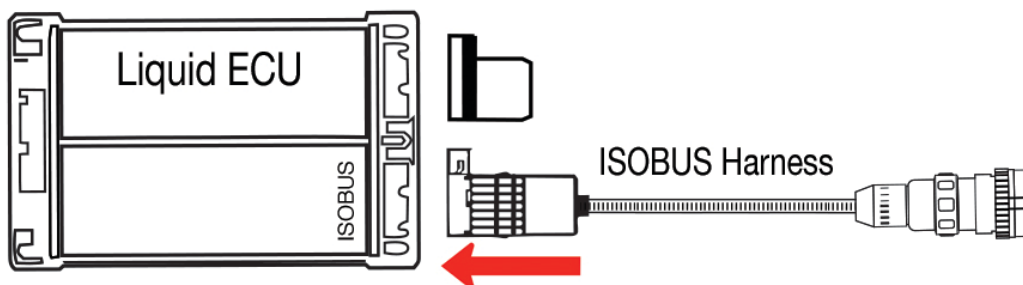
ECU Harnessing to Tractor ISO Connector

1. Route the ISO Implement Cable from the ECU to the implement hitch point. This cable will mate with the Tractor ISOBUS connector.

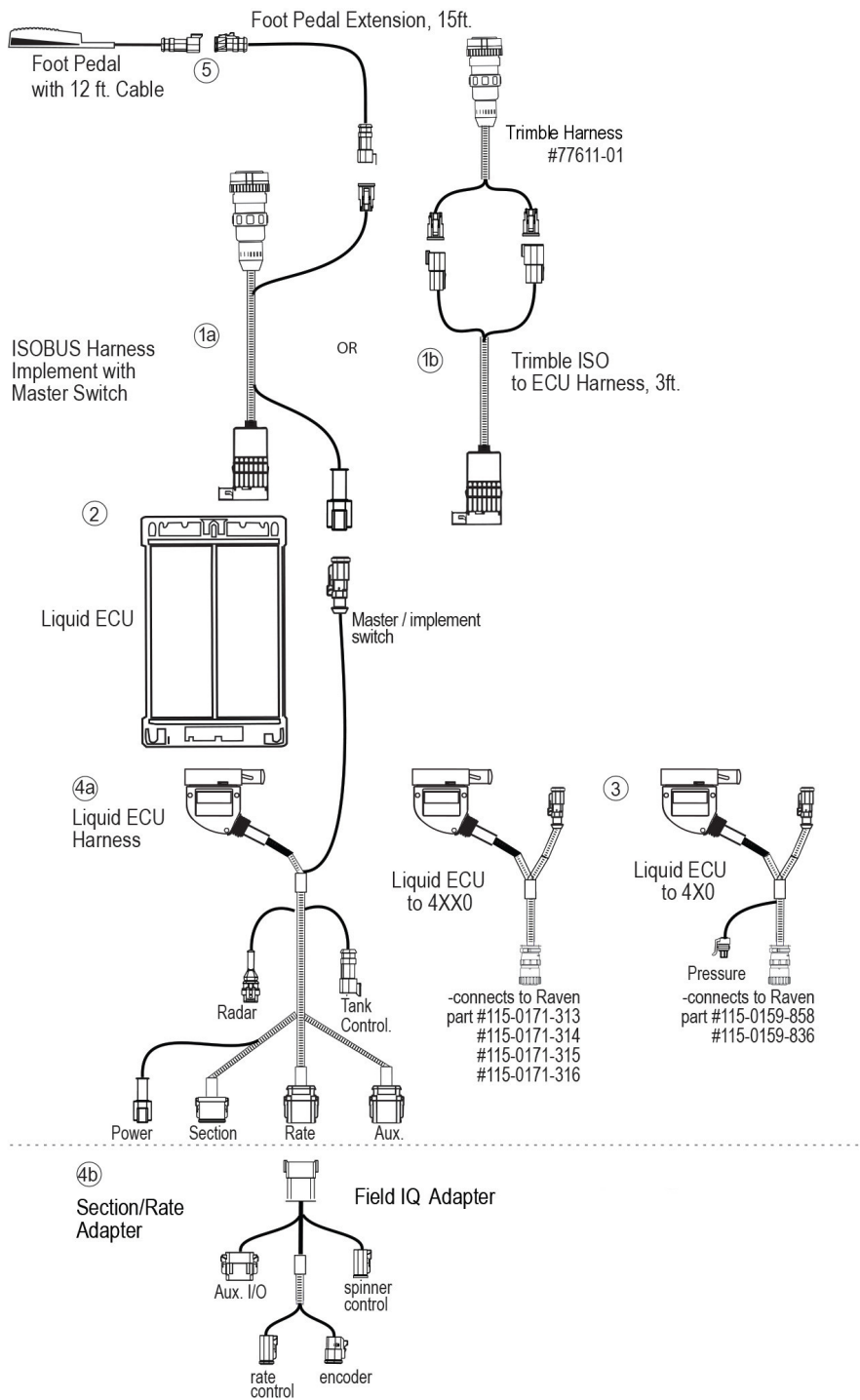


NOTICE! Isolate the harness from pinch points and sharp edges that may damage the harness. Secure any excess cabling with included cable ties.

2. With the ECU facing with the labels up and the two 16-pin connectors facing you, plug in the ISO Implement Cable harness to the ISOBUS connection on the left hand 16-pin connector of the ECU. ECU. If the harness is connected incorrectly, the system will not power up.



Complete Installation Cabling Diagram



ISOBUS Liquid ECU System - Complete Installation Cabling Description

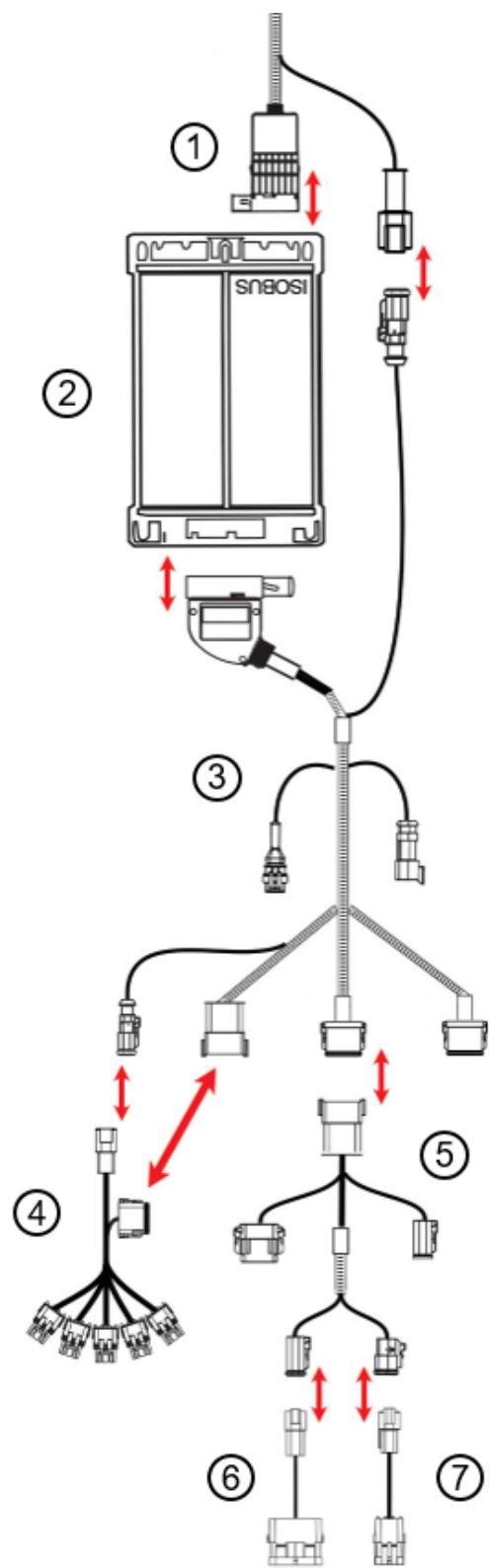
Item	Description	Part Number	Part Number Description
1a	ISOBUS Harness	ME0502001-03	Implement with Master Switch - 3 ft.
		ME0502001-08	Implement with Master Switch - 8 ft.
		ME0502001-13	Implement with Master Switch - 13 ft.
		ME0502001-21	Implement with Master Switch - 21 ft.
		ME0502001-28	Implement with Master Switch - 28 ft.
		ME0502001-36	Implement with Master Switch - 36 ft.
		ME0502001-43	Implement with Master Switch - 43 ft.
1b	ISOBUS Harness	ME0502036	Trimble ISO to ECU Harness - 3 ft.
	CAN-PWR Extension	75528-02	CAN-PWR Extension 2 ft
		75528-05	CAN-PWR Extension 5 ft
		75528-10	CAN-PWR Extension 10 ft
		75528-20	CAN-PWR Extension 15 ft
		75528-30	CAN-PWR Extension 30 ft
		75528-40	CAN-PWR Extension 40 ft
		75528-50	CAN-PWR Extension 50 ft
2	Liquid ECU	75774-20	
3	Liquid ECU to Raven Harness	ME0512008	Liquid ECU to Raven 4X0 Harness
		ME0512009	Liquid ECU to Raven 4XX0 Harness
4a	Liquid ECU Harness	ME0502050	Liquid ECU Harness
4b	Section/Rate Adapter	ME0502052	Field IQ Adapter
5	Accessories	ME0520000	Foot Pedal with 12 ft. cable
		ME0520001	Foot Pedal Extension - 15 ft.
		ME3032259206	Downloadbox Kit
		ME0501009	Diagnostic ISOBUS T-Adapter DT 4-pin
		ME0501005	IBIC ISOBUS T-Adapter DT 4-pin
		ME0501004	DT 4-pin to DB9 Downloadbox Adapter Harness

Complete Harness with Field-IQ

If you are using Field-IQ, then you will need to add a harness adapter to the complete harness. Connect the adapter to the rate connector on the complete harness.

Plug in the Aux. I/O, rate control, encoder, and spinner control to the existing connectors on your bar.

Single-Product Harness with Field-IQ Cabling Diagram

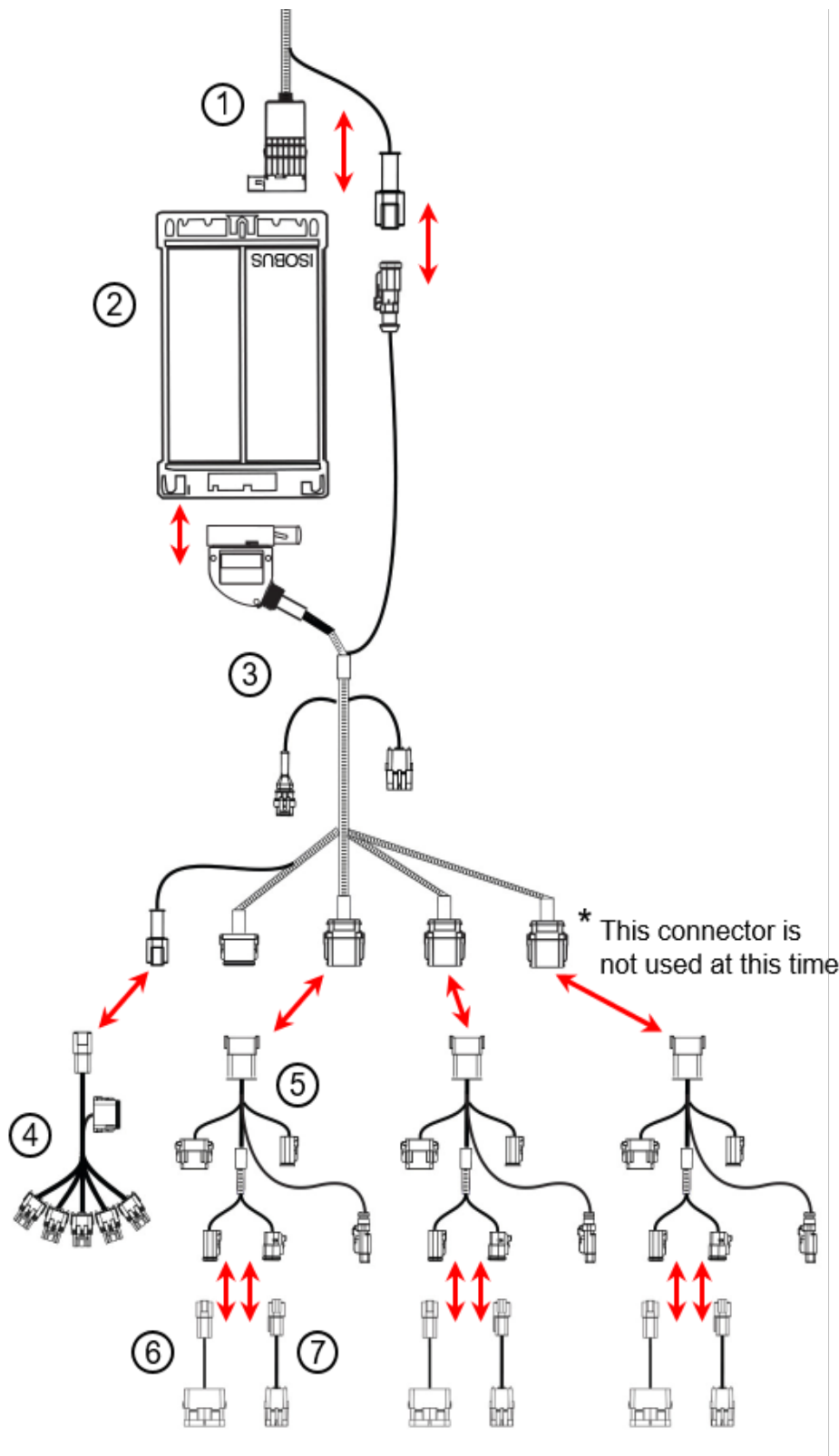


Single-Product Harness with Field-IQ Description

Item	Description	Part Number	Part Number Description
1a	ISOBUS Harness	ME0502001-03	Implement with Master Switch - 3 ft.
		ME0502001-08	Implement with Master Switch - 8 ft.
		ME0502001-13	Implement with Master Switch - 13 ft.
		ME0502001-21	Implement with Master Switch - 21 ft.
		ME0502001-28	Implement with Master Switch - 28 ft.
		ME0502001-36	Implement with Master Switch - 36 ft.
		ME0502001-43	Implement with Master Switch - 43 ft.
1b	ISOBUS Harness	ME0502036	Trimble ISO to ECU Harness - 3 ft.
	CAN-PWR Extension	75528-02	CAN-PWR Extension 2 ft
		75528-05	CAN-PWR Extension 5 ft
		75528-10	CAN-PWR Extension 10 ft
		75528-20	CAN-PWR Extension 15 ft
		75528-30	CAN-PWR Extension 30 ft
		75528-40	CAN-PWR Extension 40 ft
		75528-50	CAN-PWR Extension 50 ft
2	Liquid Fertilizer ECU	75774-20	
3	Liquid Fertilizer ECU Complete Harness	ME0502050	
	Master/Implement Switch		
	Radar input connection		
	Tank control connection		
	Power connection		
	Section connection		
	Rate connection		
	Aux. connection		

Item	Description	Part Number	Part Number Description
4	Section Valve Adapter Cable	80587	Field-IQ 5 boom adapter
		80961	Field-IQ 10 boom adapter
		77541	Raven 7 boom adapter
		78225	Raven 10 boom adapter
5	Field-IQ Adapter Harness	ME0502052	
	Aux. I/O		
	Spinner control/master and dump valve	81552	Raven (old style)
		81553	Raven (new style connection)
	Rate Control Adapters	80531	Dickey John servo
		80534	Raven 4 wire servo (new style)
		80586	Raven 2 wire servo (old style)
		80960	Dickey John PWM
		81554	Raven 4 wire servo (old Style)
		81614	KZ servo
		81970	Raven 2 wire servo (new style)
6	Flow Meter Cable		
7	Flow Control Adapter Cable	80539	Dickey John Encoder/ Flowmeter
		80584	Raven Flowmeter Adapter
		82192	Hiniker Flowmeter

Multiproduct Harness with Field-IQ Cabling Diagram



Multiproduct Harness with Field-IQ Cabling Description

Multiproduct Field-IQ Liquid Harness - ME050249			
Item	Description	Part Number	Part Number Description
1a	ISOBUS Harness	ME0502001-03	Implement with Master Switch - 3 ft.
		ME0502001-08	Implement with Master Switch - 8 ft.
		ME0502001-13	Implement with Master Switch - 13 ft.
		ME0502001-21	Implement with Master Switch - 21 ft.
		ME0502001-28	Implement with Master Switch - 28 ft.
		ME0502001-36	Implement with Master Switch - 36 ft.
		ME0502001-43	Implement with Master Switch - 43 ft.
1b	ISOBUS Harness	ME0502036	Trimble ISO to ECU Harness - 3 ft.
	CAN-PWR Extension	75528-02	CAN-PWR Extension 2 ft
		75528-05	CAN-PWR Extension 5 ft
		75528-10	CAN-PWR Extension 10 ft
		75528-20	CAN-PWR Extension 15 ft
		75528-30	CAN-PWR Extension 30 ft
		75528-40	CAN-PWR Extension 40 ft
		75528-50	CAN-PWR Extension 50 ft
2	Liquid Fertilizer ECU	75774-20	
3	Liquid Multi-Product Harness	ME0502049	
	Master/Implement Switch		
	Radar Input Connection		
	Tank control connection		
	Power Connection		
	Section Connection		
	Rate Connection Product 1		
	Rate Connection Product 2		
	Rate Connection Product 3 *Injection support output requires ME0502016 Rev.2		

Multiproduct Field-IQ Liquid Harness - ME050249			
Item	Description	Part Number	Part Number Description
4	Section Valve Adapter Cable	80587	Field-IQ 5 boom adapter
		80961	Field-IQ 10 boom adapter
		77541	Raven 7 boom adapter
		78225	Raven 10 boom adapter
5	Field-IQ Adapter Harness	ME0502052	
	Aux. I/O		
	Spinner control/Master Valve		
	Regulation Connection	80534	Field-IQ to Raven Fast Valve
		80586	Field-IQ to Raven control valve adapter
		80531	Field-IQ to Dickey-john control valve
		80960	Dickey-John PWM control valve adapter
		81970	Raven Standard valve 063-0172-977 (round 4-pin lock ring connector)
		81554	Raven Fast valve (flat 2-pin connector)
	Pressure Sensor		
6	Flow Meter Cable		
7	Flow Control Adapter Cable	80584	Field-IQ to Raven flowmeter adapter
		80539	Field-IQ to Dickey-john encoder/flowmeter

Raven Implement Adapter Harnesses

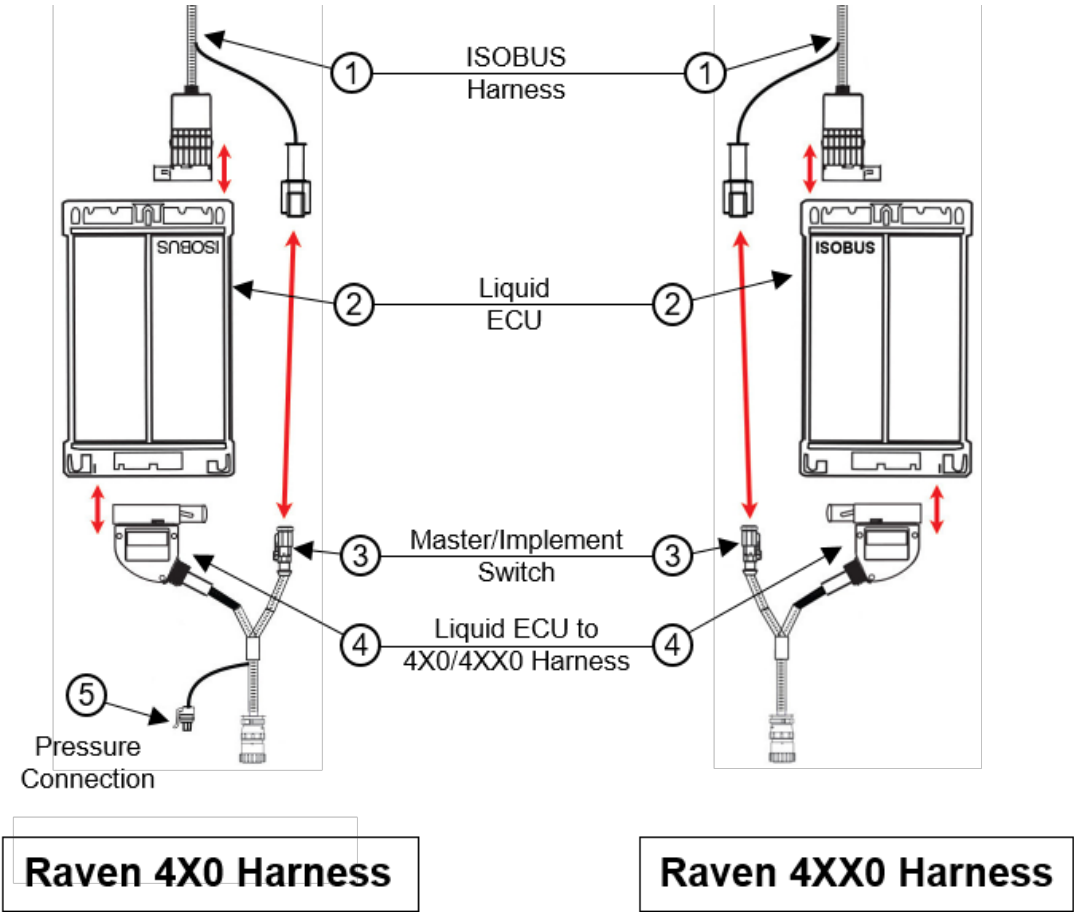
Connect the existing Raven 4X0/4XX0 implement harness to the 42-pin connector on the ECU.

Raven 4X0 series

Raven 4XX0 series



Raven 4X0 and 4XX0 Harness



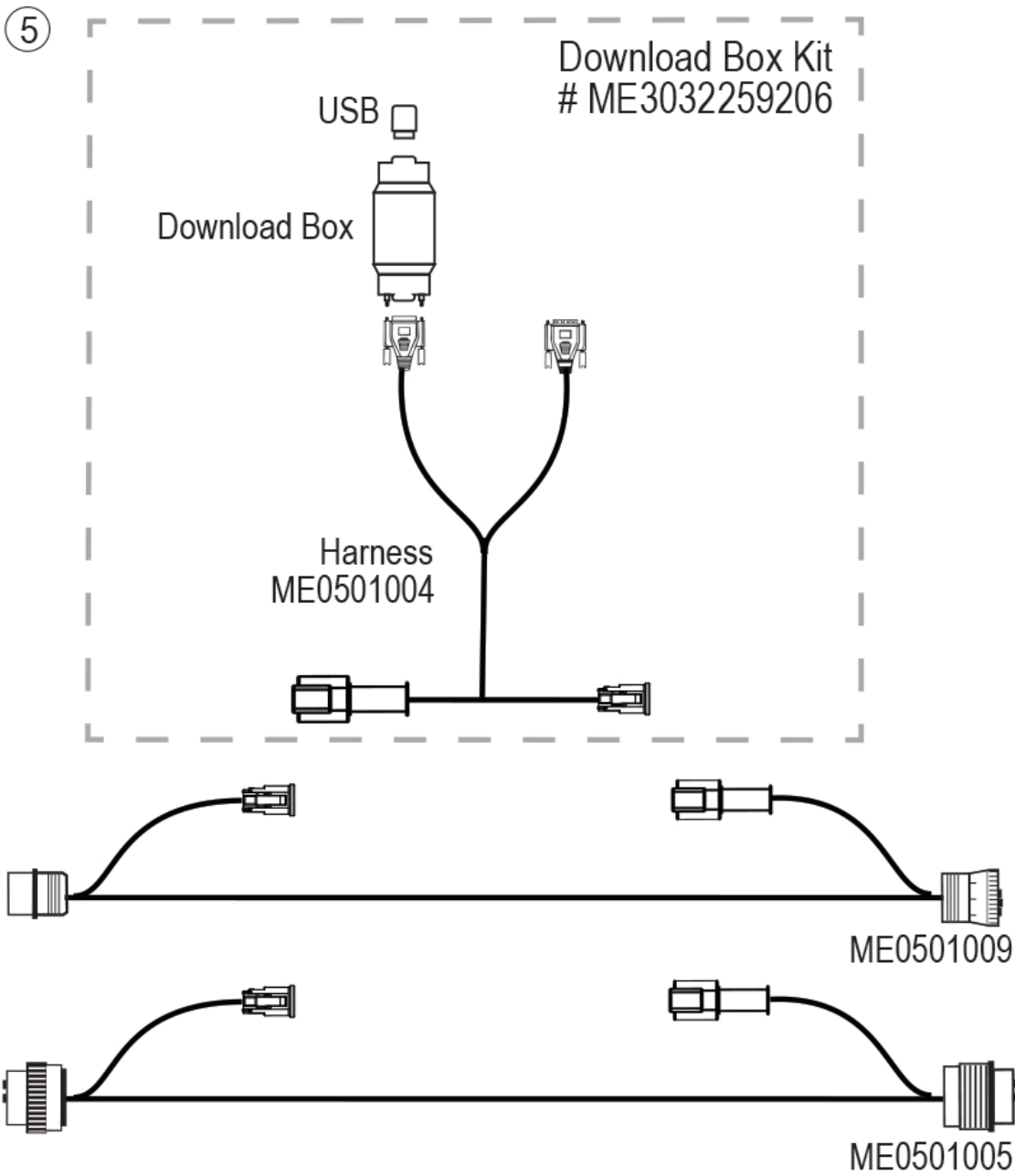
Single Product Harness with Raven 4X0 Cabling Description

Item	Description	Part Number	Part Number Description
1a	ISOBUS Harness	ME0502001-03	Implement with Master Switch - 3 ft.
		ME0502001-08	Implement with Master Switch - 8 ft.
		ME0502001-13	Implement with Master Switch - 13 ft.
		ME0502001-21	Implement with Master Switch - 21 ft.
		ME0502001-28	Implement with Master Switch - 28 ft.
		ME0502001-36	Implement with Master Switch - 36 ft.
		ME0502001-43	Implement with Master Switch - 43 ft.
1b	ISOBUS Harness	ME0502036	Trimble ISO to ECU Harness - 3 ft.
	CAN-PWR Extension	75528-02	CAN-PWR Extension 2 ft
		75528-05	CAN-PWR Extension 5 ft
		75528-10	CAN-PWR Extension 10 ft
		75528-20	CAN-PWR Extension 15 ft
		75528-30	CAN-PWR Extension 30 ft
		75528-40	CAN-PWR Extension 40 ft
		75528-50	CAN-PWR Extension 50 ft
2	Liquid ECU	75774-20	
3	Liquid ECU to 4X0 Harness	ME0512008	
4	Master/Implement Switch		
5	Pressure connection		

Raven 4XX0 Series Adapter Harness Description

Item	Description	Part Number	Part Number Description
1a	ISOBUS Harness	ME0502001-03	Implement with Master Switch - 3 ft.
		ME0502001-08	Implement with Master Switch - 8 ft.
		ME0502001-13	Implement with Master Switch - 13 ft.
		ME0502001-21	Implement with Master Switch - 21 ft.
		ME0502001-28	Implement with Master Switch - 28 ft.
		ME0502001-36	Implement with Master Switch - 36 ft.
		ME0502001-43	Implement with Master Switch - 43 ft.
1b	ISOBUS Harness	ME0502036	Trimble ISO to ECU Harness - 3 ft.
	CAN-PWR Extension	75528-02	CAN-PWR Extension 2 ft
		75528-05	CAN-PWR Extension 5 ft
		75528-10	CAN-PWR Extension 10 ft
		75528-20	CAN-PWR Extension 15 ft
		75528-30	CAN-PWR Extension 30 ft
		75528-40	CAN-PWR Extension 40 ft
		75528-50	CAN-PWR Extension 50 ft
2	Liquid ECU	75774-20	
3	Liquid ECU to 4XX0Harness	ME0512009	
4	Master/Implement Switch		

Downloadbox Cabling Diagram



Configuring the ISOBUS Liquid ECU

- ▶ Implement Configuration
- ▶ Speed Signal
- ▶ Configuring Sections
- ▶ Calibrating the Flow Meter - Field Run
- ▶ Calibrating the Flow Meter - Simple Catch
- ▶ Pressure Sensor Settings
- ▶ Manual Configuration
- ▶ Verification of Installation and Setup

Implement Configuration

Configuration parameters are used to define the implement's application width, speed source, and allow the setup a calibration of flow-control hardware.

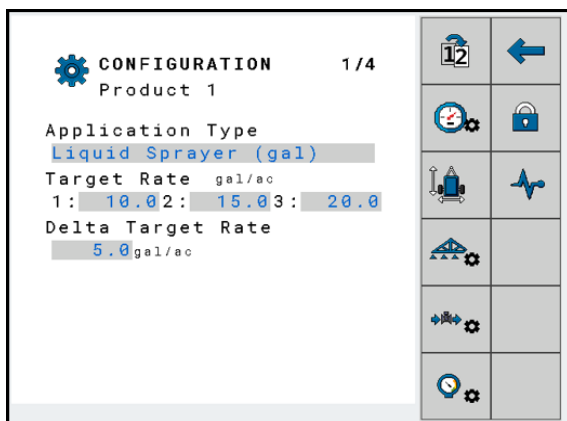
The following instructions and screen shots are for a one product setup. It contains four configuration screens. If the system is setup for two products, there will be six configuration screens. Configuration 3 and 5 are added for the Product 2 options.

Tap a field to set the value of the parameter. When the data input screen appears, enter the new value. The new value appears on the display:

1. To begin, tap the **Configuration** icon:



The **Configuration 1** screen (1 of 4 screens) appears:



On this screen, configure the following parameters that can appear on the screen. The parameters which appear on your display are dependent on the type and configuration of your implement:

Application Type

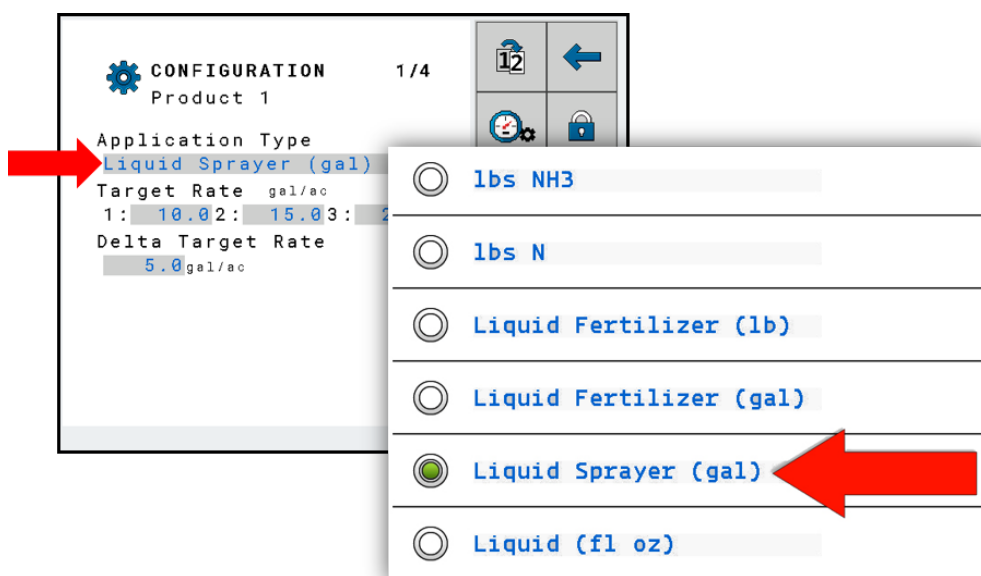
Use this parameter to input what product should be taken into account when calculating the application amount. Available application types include:

- Lbs NH₃ or Kg NH₃
- Lbs N or Kg N
- Liquid Fertilizer (Lbs or Kg)
- Liquid Fertilizer (Gallon or Litre)

- Liquid Sprayer (Gallon or Litre)
- Liquid (fl oz or ml)
- Injection (fl oz or ml), which is limited to Product 2 only

NOTE – The system must be restarted for changes to take effect.

Tap the **Application Type** field and choose one of the options:



Target Rate

You can use this parameter to set the amount of product to be applied. Three different Target Rates can be setup and quickly changed with the Rate Selection icon on the [Run Screen](#). If you are working with a prescription map or a console running Task Controller (TC), the value input here will be ignored. The ECU will get the target from the value on the prescription map.

Delta Target Rate

This number reflects the amount of change to the rate each time the rate increment or decrement icon is tapped. This option is also referred to as *Target Rate Increment*.

Estimated Tank Pressure (*anhydrous only*)

Inputs the Tank Pressure value used for display only.

NH₃ Density (*anhydrous only*)

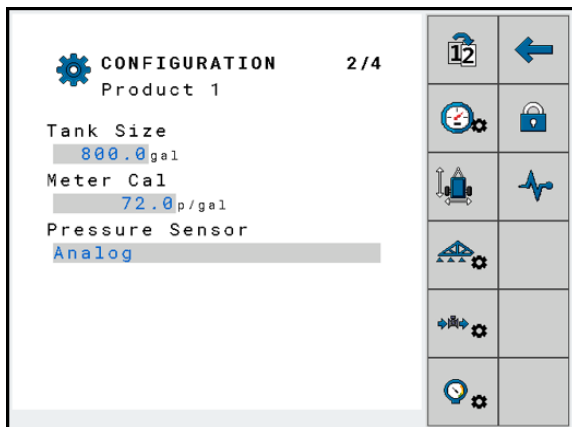
This field is not a parameter, but is rather displayed as a value. This displays the density of the ammonia. The density is dependent on the pressure that you set in the

Estimated Tank Pressure parameter. If the density of the ammonia changes, the value of the Rate parameter also changes.

Tap the **Next Screen** icon to proceed:



- The **Configuration 2** screen (2 of 4 screens) appears:



On this screen, configure the following parameters:

Tank Size

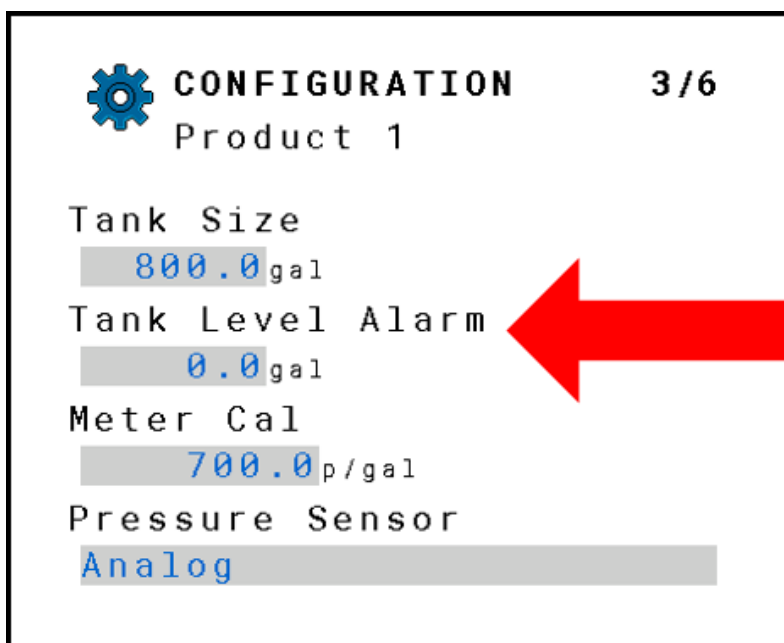
This value is the total volume of the tank in gallons for product indicated in the screen title area.

Tank Level Alarm

If the amount of the product in the tank is below this value, an alarm message appears on the display screen: **Low tank content**.

NOTE – This alarm requires that the Alarms be enabled for the display. Tap the **Alarms Settings** icon:





CONFIGURATION 3/6
Product 1

Tank Size
800.0 gal

Tank Level Alarm
0.0 gal

Meter Cal
700.0 p/gal

Pressure Sensor
Analog

Meter Cal

Number of pulses the flow meter sends to the job computer per one gallon of liquid. Used to calculate the application rate. Take the value for initial setup from the flow meter data sheet. The exact number of pulses will be determined when calibrating the flow meter.

Pressure Sensor

This will enable the system pressure to be displayed on the home screen.

This also allows you to configure the pressure sensor type: **None** or **Analog**.

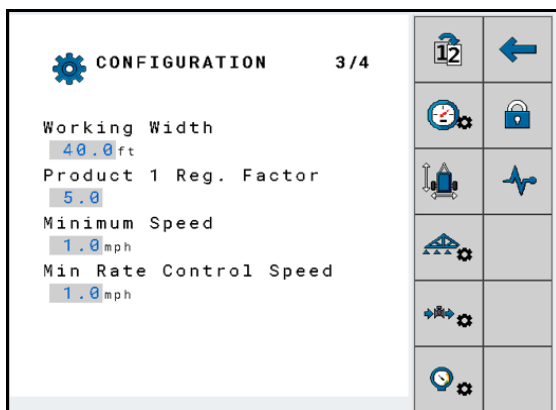
Boost Pump *(anhydrous only)*

If the system has a boost pump system installed, it can be enabled and pressure set in this section. Additional setup is required in the Password Protection area to enable the feature and set PID control settings.

Tap the **Next Screen** icon to proceed:



3. The **Configuration 3** screen (3 of 4 screens) appears:



On this screen, configure the following parameters:

Working Width

Enter the working width of the implement in feet.

Regulation Factor

This value will adjust the rate the control valve reacts to changes. If the valve is too slow to react you will need to increase the Regulation Factor. If the valve is too fast to react then you will need to decrease the Regulation Factor.

Minimum Speed (*Shut Off Speed*)

This value represents the slowest speed that control of the application can occur. If the vehicle falls below this, then it is the speed of the system to stop applying and close all valves.

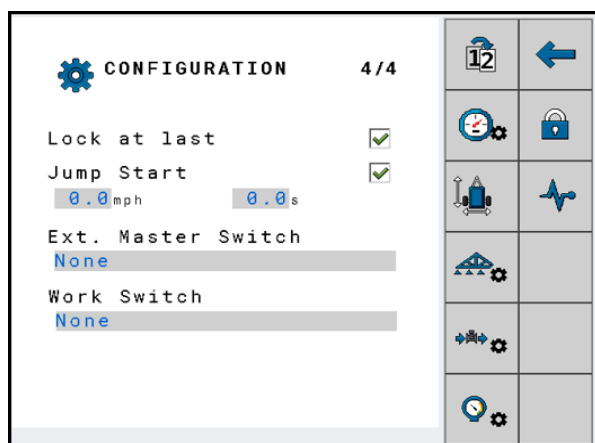
Minimum Rate Control Speed (*Minimum Override Speed*)

This value represents the lowest speed that the system will make flow command changes. The valve will lock in position if the vehicle speed is below this value.

Tap the **Next Screen** icon to proceed:



4. The **Configuration 4** screen (4 of 4 screens) appears:



On this screen, configure the following parameters:

Lock at Last

Lock at Last setting should be checked if you want to keep the valve open for servos or keep the pump running for a PWM setup. This allows for a quicker return to the Target Rate when you start applying again. Lock at last should only be used when there is a master valve in the system or with systems that have section valves.



WARNING! If Lock at Last is enabled when no master valve or section valves are present, flow will not be able to be stopped. The Master Switch will not have the ability to turn off product flow.

Jump Start

Check the Jump Start feature if you want to start applying before the implement is up to speed. Enter the speed that corresponds to the rate you want to apply at when pressing the Jump Start button. Enter amount of time in seconds you want Jump Start to control application rate while tractor achieves the desired speed. This option allows operator to start applying from a stop position and allow tractor to get up to operating speed.

Ext Master Switch

If an External Master Switch is selected, the onscreen master softkey will be removed. Choose the option for your setup from the pop-up screen. Tap the checkmark to save your selection.

- Momentary: For use with momentary contact switches.
- Latching (Low=in work): Used for *on/off* switches that close the circuit to start work.
- Latching (Hi=in work): Used for *on/off* switches that open the circuit to start work.

Work Switch

To setup the Work Switch, press the selectable area. Choose the option for your setup from the pop-up screen. Tap the checkmark to save your selection.

- Latching (Low=in work): For work switches that close the circuit when the implement is in work.
- Latching (Hi=in work): For work switches that open the circuit when the implement is in work.
- ISOBUS Tractor (Work State reported by tractor TECU).
- Case IH Planter Status): Used when interfacing with CASE IH planter work position sensor (CAN Connection).

Tap the **Alarms Settings** icon if you need to set an alarm:



The Alarm Configuration screen appears:

ALARM	
Product 1	
Rate Alarm	<input checked="" type="checkbox"/>
Allowable Error	0 %
Tank Level Alarm	<input checked="" type="checkbox"/>
No/Low Flow Alarm	<input checked="" type="checkbox"/>
Time Limit	15 s

On this screen, configure the following parameters:

Product Rate Alarm

Checking this value will activate an alarm to alert the operator if application is outside of the specified Target Rate.

Allowable Error

Adjusting this value sets the percentage of Target Rate error before the operator receives a warning.

Tank Level

Checking this value will activate an alarm to alert the operator when the tank level is low.

Speed Signal

The speed of the vehicle must be known so that the ECU can calculate the application amount.

Selecting the speed signal source:

Parameter Value	Description
Tractor Speed	Speed messaged provided over the ISOBUS. These may be sourced from the tractor or the Universal Terminal (UT) console.
Radar	The speed signal will come from a Radar mounted either on the Tractor or Implement. A wheel speed impulse sensor input can also be used.
Simulated (Demo) Speed	The speed is a simulated speed that you enter.

Tractor Speed

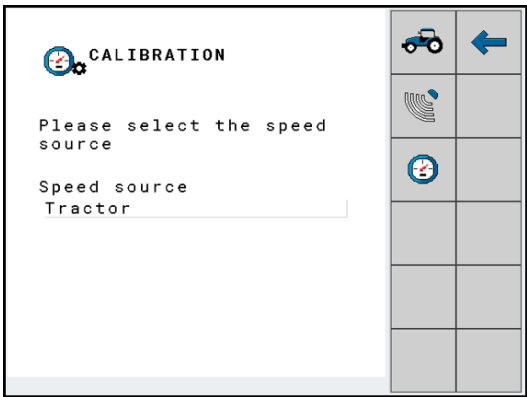
1. From the Run Screen, tap the **Configuration** icon:



2. Tap the **Speed Configuration** icon:



The Speed Calibration screen appears:



3. Tap the **Tractor** icon and confirm that Tractor is the Speed Source:



4. Press the check mark to save.

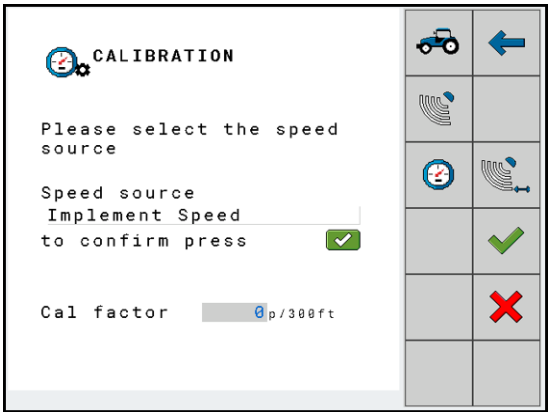
Radar

The Radar Calibration supports implement wheel pulse sensor calibration as well as radar. You can change the value to match the known speed source if desired.

1. From the Speed Calibration screen, tap the **Radar** icon:



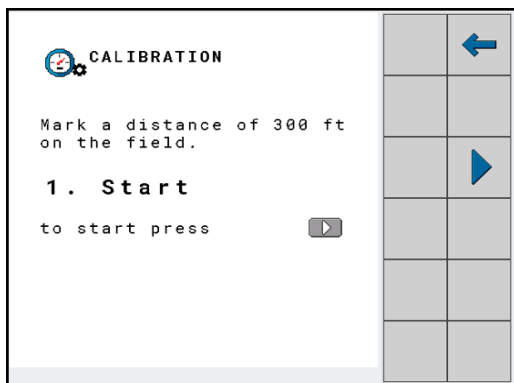
The following screen appears:



2. Tap the **Radar Calibration** icon to start the Radar calibration:



The following screen will appear:



3. Tap the **Start** icon to start the calibration:



4. Drive 300 ft.
5. Once you have driven the 300 ft, tap the check mark to stop the calibration and accept the pulse count indicated. Tap X to return to calibration start and run the 300 ft. again.

Simulated (Demo) Speed

1. From the Speed Calibration screen, tap the **Speed** icon:



2. Enter your desired speed.
3. Tap the check mark icon to confirm.

Configuring Sections

A *section* refers to a part of the implement in which all of the nozzles are supplied with liquid from a section valve. Closing the section valve switches off the section.

The implement has as many sections as it has section valves which can be switched off. The first section is always on the left in the direction of travel. The second is on its right, etc.

Enter the Number of Sections

1. From the Run Screen, tap the **Configuration** icon:



Then tap the **Sections Configuration** icon:



The Sections screen appears:

NOZZLES PER SECTION	
Total Sections	7
<input checked="" type="checkbox"/> Section 1	8
<input checked="" type="checkbox"/> Section 2	5
<input checked="" type="checkbox"/> Section 3	5
<input checked="" type="checkbox"/> Section 4	8
<input checked="" type="checkbox"/> Section 5	5
<input checked="" type="checkbox"/> Section 6	8
<input checked="" type="checkbox"/> Section 7	8
Total Nozzles	47
Fence Row Nozzles	left and right

If the section number is unchecked, the system will disable the specific section, and it cannot be turned on from the Run Screen. This feature allows the operator to disable the sections that are not going to be used.

2. Enter the number of sections in the "Total sections" line.

If you are using fence row nozzles, then select left, right, or left and right from the drop-down list.

3. Enable "Activating sections" - Use the check box left of the section name to activate it.
4. Tap the **Back Arrow** icon the screen to return:



5. The ECU will indicate it needs to be restarted. You can restart the system now or at the conclusion of the setup process.

Enter the Number of Nozzles per Section

You must enter how many nozzles are connected with each section valve at the following times:

- Prior to initial startup.
- If you change the number of nozzles on a section.

1. Enter the number of nozzles per section.
2. The total number of nozzles will appear at the bottom of the screen.
3. Tap the **Back Arrow** icon the screen to return:



4. Repeat this process for all sections.

The ECU will indicate that it needs to be restarted. You can restart the system now or at the conclusion of the setup process.

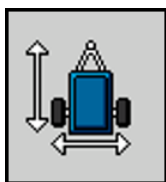
Enter the Implement Geometry

The geometry is the number of parameters which describe the dimensions of your implement. Inputting the geometry enables the system to know the exact length and width of the machine and the position of the individual sections.

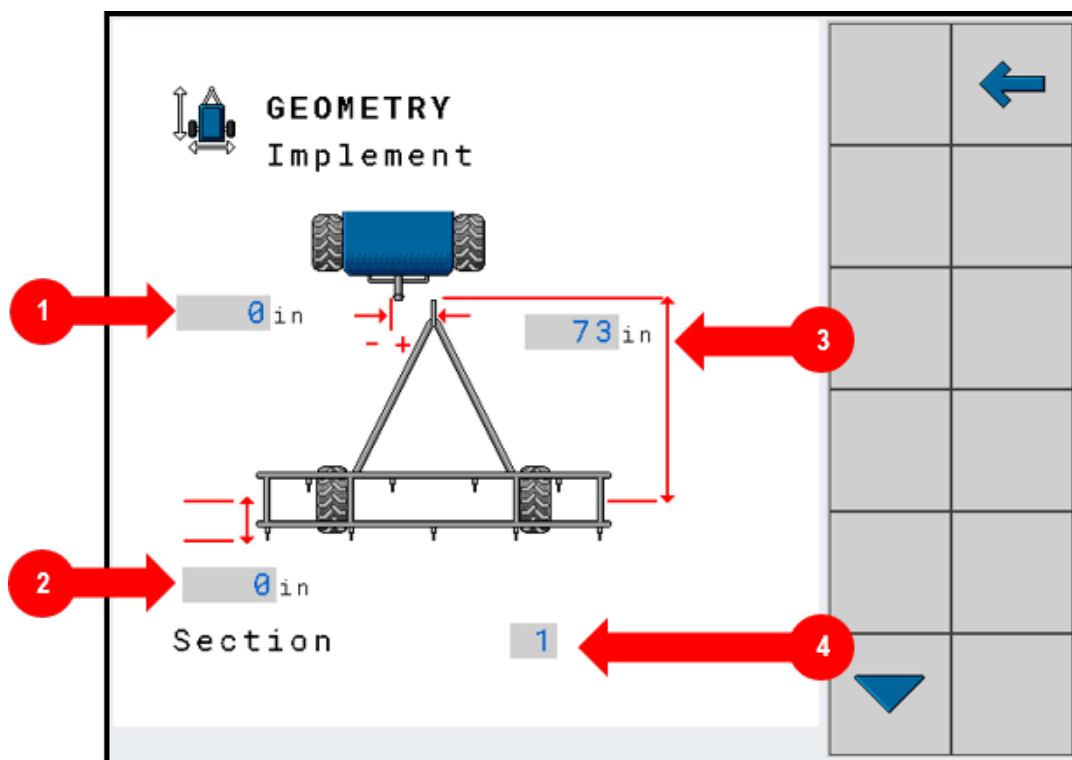
1. From the Run Screen, tap the **Configuration** icon:



2. Then tap the **Geometry Configuration** icon:



3. The Implement Geometry screen appears:



Measure the following distances on the implement and enter the measurements:

1. The left or right boom offset from the hitch.
2. The application offset from the ground contact point of the implement. The offset can be set individually for each section if the distances are different.
3. The distance in inches from the hitch to the implement axle or ground contact point.
4. Enter the section number. Tap the arrow icon to cycle through your sections. The nozzle offset can be set individually for each section if the distances are different. If they are the same measurement you still have to cycle through all the sections and set them accordingly.

Calibrating the Flow Meter - Field Run

NOTE – If *lbs of NH₃* or *lbs of N* are the product application type, then the Field Run Calibration is only calibration method available.

The flow meter is used to measure the amount of applied liquid. Because the number of pulses per gallon can change during the lifespan of a flow meter, calibration must be carried out in the following cases:

- Prior to initial startup.
- At the start of each season.

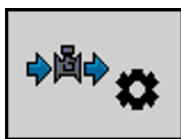
- If you notice that there are deviations between the actual applied amount and the displayed amount.
- When you have exchanged or repaired the flow meter.

Calibration must be performed during normal field work. This means you can only calibrate the flow meter once the other system parameters have been configured.

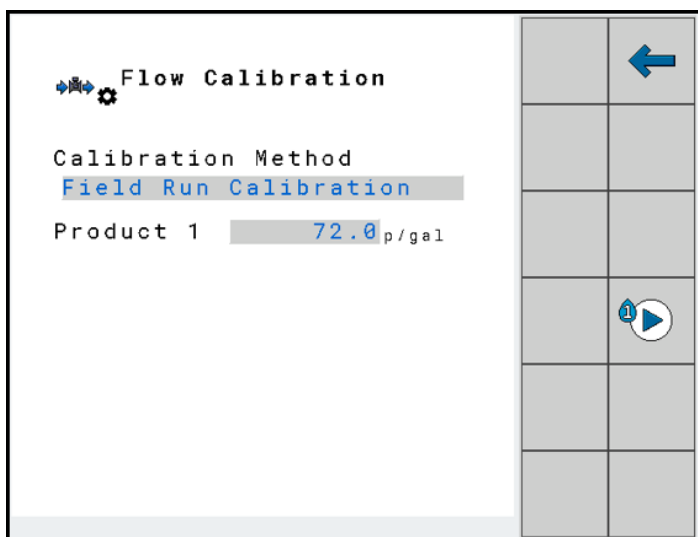
1. Make a note of the gallons of liquid in your tank. (Weight can also be used for calibration if the density of the liquid is known.)
2. Drive to a field which is at least 10 acres in size.
3. Prepare the implement for work.
4. To select the “Flow Calibration” screen, tap the **Configuration** icon:

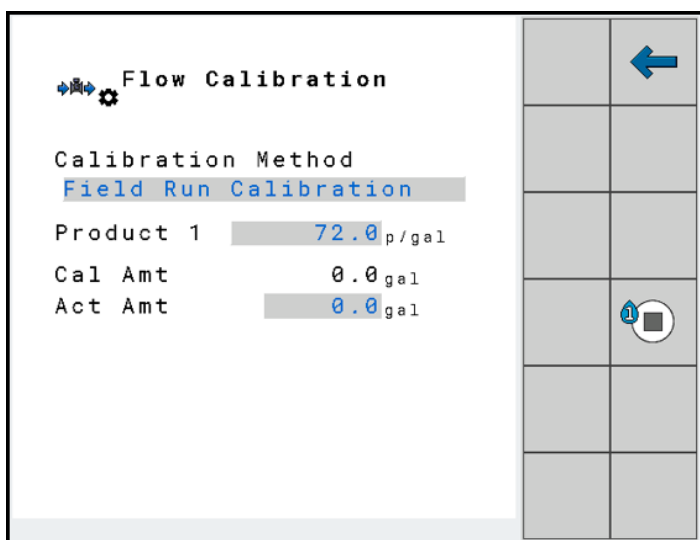


Then tap the **Flow Cal** icon:



The Flow Calibration screen appears:





5. Confirm the Calibration Method is set to **Field Run Calibration**.

6. Tap the **Play** icon:



7. Use the back arrow to return to the Run Screen and start applying product.
During application, the number of gallons will be counted in the screen "Flow Calibration."

8. Work a test route on the field until you have applied a few hundred gallons.
During application, the number of gallons will be displayed.

9. Stop application. Go to Flow Cal screen and tap the **Stop** icon:



- The application will be stopped.
- The number of gallons or lbs the system thought it used is displayed.

10. Check the gallon content of the tank once again.

11. Subtract this the current number of gallons from the number of gallons prior to application.

NOTE – If you are calibrating based on weight, subtract this mass from the mass measured prior to application. Next, divide this number by the liquid density to get the number of gallons applied.

12. Enter the applied amount in gallons in the Actual Amount line. Once this amount is entered the Meter Cal value will be updated. The user can accept the new pulses/gal. value with by tapping the check mark or tap **X** to return to calibration start screen without updating the Meter Cal Value.

You have now calibrated the flow meter.

Calibrating the Flow Meter - Simple Catch

The Simple Catch Calibration method allows the user to calibrate the flow meter without moving the vehicle. For safety reasons, this method cannot be used when the product type is anhydrous. The simple catch test is completed in calibration screens and done statically. The user starts application and catches flow from a single nozzle for 1 minute or a measured time interval. The system converts the catch amount to a gal/min value and enters it in the calibration screens.

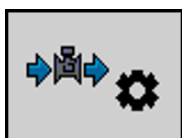
Because the number of pulses per gallon can change during the lifespan of a flow meter, calibration must be carried out in the following cases:

- Prior to initial startup.
- At the start of each season.
- If you notice that there are deviations between the actual applied amount and the displayed amount.
- When you have exchanged or repaired the flow meter.

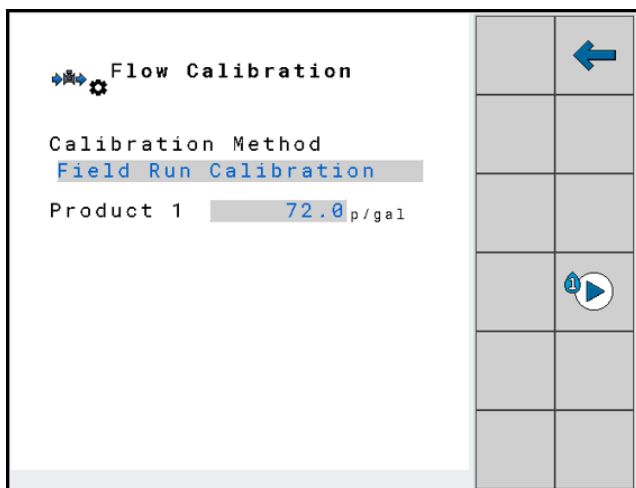
1. Select the Flow Calibration screen by tapping the **Configuration** icon:



Then tap the **Flow Cal** icon:



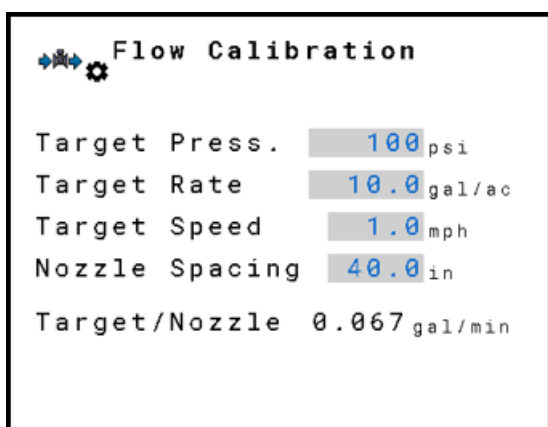
The Flow Calibration screen appears:



2. Confirm the Calibration Method is set to **Simple Catch Calibration**.
3. Tap the **Play** icon to begin the calibration for Product 1 or Product 2:

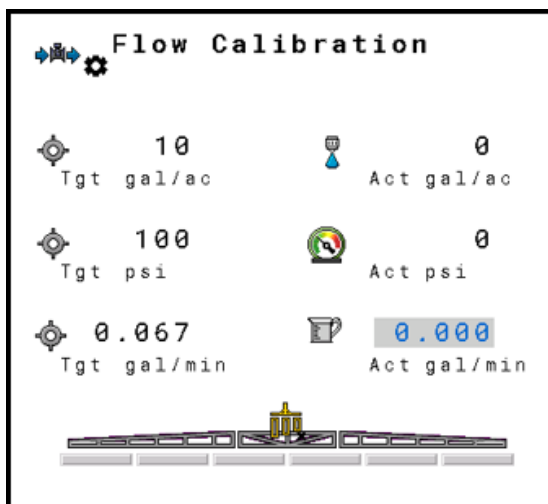


The Flow Calibration screen appears:



4. Enter the values for Target Pressure, Target Rate, Target Speed, & Nozzle Spacing. Tap the **Play** icon to proceed.

The Flow Calibration Control screen appears:



5. Set up a container(s) on the implement to catch the product that will be applied during the calibration. Activate/Deactivate the sections you want to apply during the catch test with the section control icons.
6. Tap the **Master ON/OFF** icon to start application



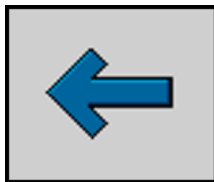
Apply product for 1 minute.

7. Tap the **Master ON/OFF** icon to stop application:



8. Enter the applied amount in gallons in the Actual Amount line. Once this amount is entered the Meter Cal value will be updated. The user can accept the updated value with by tapping the check mark or tap X to return to calibration start screen without updating the Meter Cal Value.

9. Tap the **Back Arrow** to exit the screen:



You have now calibrated the flow meter.

Pressure Sensor Settings

To adjust the pressure sensor settings, tap the **Configuration Icon**:

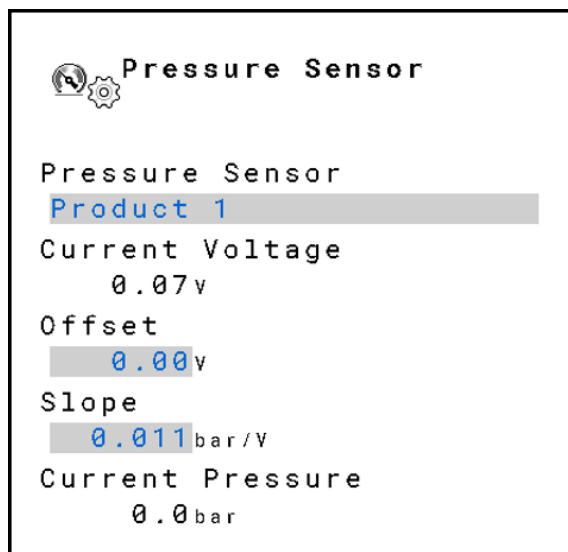


Then tap the **Pressure Cal** button:



Be sure to use an accurate pressure gauge to compare system against the pressure sensor. Pressure sensor settings are not available until the Pressure Sensor Analog option is selected in the product setup ([Implement Configuration](#)).

The Pressure Sensor screen appears:



Pressure Sensor

Select name of the product for the Pressure Sensor.

Offset

The settings allow adjustment to the voltage range. The range can increased or decreased.

Slope

The slope value shows psi/V for the pressure sensor. 1 volt = 20 psi.

Current Pressure

This value is the current pressure reading from the Pressure Sensor with the current pressure sensor setting.

Manual Configuration

Manual Configuration is mandatory for a Bypass Setup and/or use of a Momentary External Master Switch setup.

The steps in this section should only be taken if the ECU Configurations weren't able to be loaded as described in Section 5. The user shouldn't access this area unless instructed by a trained professional.



WARNING: Changing parameters in the password protected area may result in unexpected behavior. Contact dealer before making any changes. The operator accepts full responsibility for the changes made within the password protected screen.

Entering the Unlock Password

The Manual Configuration access is Password Protected.

1. Tap the **Configuration** icon:



2. Tap the **Password Protected** icon:



3. Enter **46573**.

After the password is entered correctly the configuration pages will be available.

Common Scenarios and Settings

Use the chart below to identify a common scenario and use the recommended settings for manual configuration.

Sprayer Flow Control Valves

		Time-Based Settings								PWM Settings			
Common Scenarios	Control Type	Snap to Rate	P	I	D	DB	Min Time	Max Time	Lock at Last	P	I	D	DB
DICKEY-John Servo Inline Controller 1-10 boom sections	Time based	5	18	0		0.1	5	1000	no				
DICKEY-John Servo Bypass Controller 1-10 boom sections	Time based	5	18	0		0.1	5	1000	no				
KZ Fast Valve Inline Controller 1-10 boom sections	Time based	5	3	0.15		0.1	9	1000	no				
KZ Fast Valve Bypass Controller 1-10 boom sections	Time based	5	3	0.15		0.1	9	1000	no				
Standard Servo Inline w/ master valve and/or sections	Time based	5	7	0.4		0.2	7	1000	yes				
Standard Servo Bypass w/ master valve and/or sections	Time based	5	7	0.4		0.2	7	1000	no				
Standard Servo Inline Controller 1-10 boom sections	Time based	5	7	0.4		0.2	7	1000	no				
Fast Servo Bypass Controller 1-10 boom sections	Time based	5	3	0.15		0.1	9	1000	no				
Fast Servo Inline Controller 1-10 boom sections	Time based	5	3	0.15		0.1	9	1000	no				
PWM Pump Control 1-10 boom sections	PWM									0.5	0.5	0	0.2

Liquid Fertilizer Control Valves

		Time-Based Settings								PWM Settings			
Common Scenarios	Control Type	Snap to Rate	P	I	D	DB	Min Time	Max Time	Lock at Last	P	I	D	DB
DICKEY-John Servo Inline Controller 1-10 boom sections	Time based	5	18	0		0.1	5	1000	no				
DICKEY-John Servo Bypass Controller w/ master valve and/or sections	Time based	5	18	0		0.1	5	1000	yes				
Standard Servo Inline w/ master valve and/or sections	Time based	5	7	0.4		0.2	7	1000	yes				
Standard Servo Bypass w/ master valve and/or sections	Time based	5	7	0.4		0.2	7	1000	yes				
Standard Servo Inline Controller 1-10 boom sections	Time based	5	7	0.4		0.2	7	1000	no				
Fast Servo Inline Controller 1-10 boom sections	Time based	5	3	0.15		0.1	9	1000	no				
Fast Servo Bypass Controller w/ master valve and/or sections	Time based	5	3	0.15		0.1	9	1000	yes				


		Time-Based Settings									PWM Settings			
Common Scenarios	Control Type	Snap to Rate	P	I	D	DB	Min Time	Max Time	Lock at Last		P	I	D	DB
PWM Pump Control 1-10 boom sections	PWM										0.5	0.5	0	0.2

N and NH₃ Control Valves

		Time-Based Settings									PWM Settings			
Common Scenarios	Control Type	Snap to Rate	P	I	D	DB	Min Time	Max Time	Lock at Last		P	I	D	DB
Fast Valve	Time based	10	3	.015		0.1	9	1000	no					
Standard Valve	Time based	10	7	0.4		0.2	7	1000	no					
Standard Valve w/ Master Valve	Time based	10	7	0.4		0.2	7	1000	yes					
DICKEY-john standard servo	Time based	10	18	0		0.2	5	1000	no					
SureFire Injection	PWM										0.5			

Features Page 1

This page is where you will select the control type for the machine.


Features

No. of products

No. of booms

Product 1 control type
 PWM

Bypass ☐

Tank Control ☐

No. of Products

Insert 1 or 2 for the number of products the system will be running.

No. of Booms

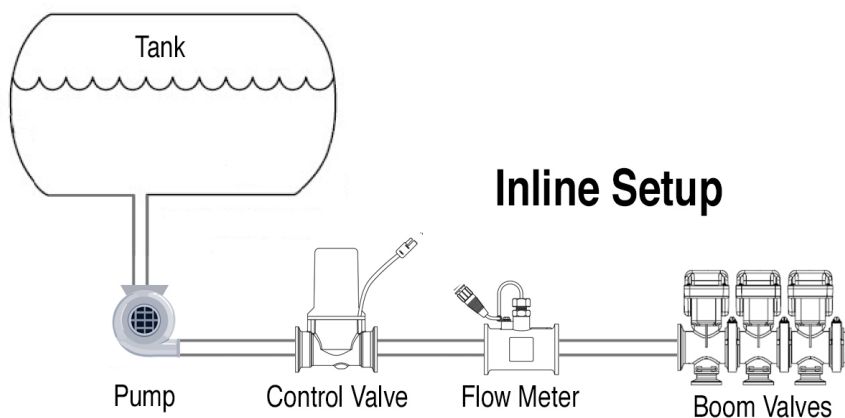
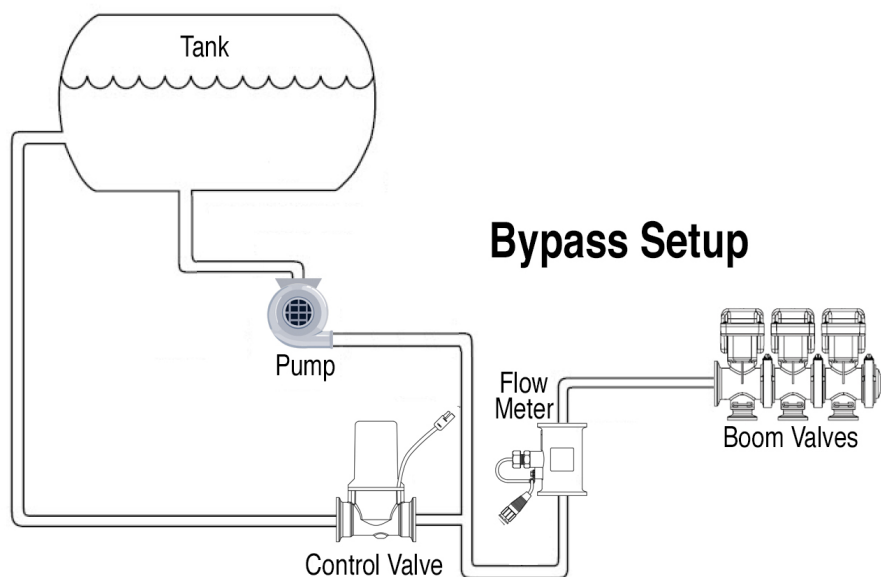
Insert 1 or 2 for the number of booms the system will be running.

Product Control Type

Choose the Control Type between Time based, PWM (servo), and PWM.

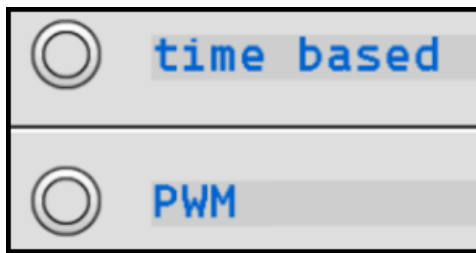
- If you are running a fast valve or a standard servo controller (Raven, DICKEY-john, KZ) select [time base].
- If you are running a PWM controller, select [PWM].

Bypass Option – Make sure the Bypass option is checked if you are running a Bypass System instead of an inline system. See the images below and on the next page for differences between a Bypass System and an Inline System.

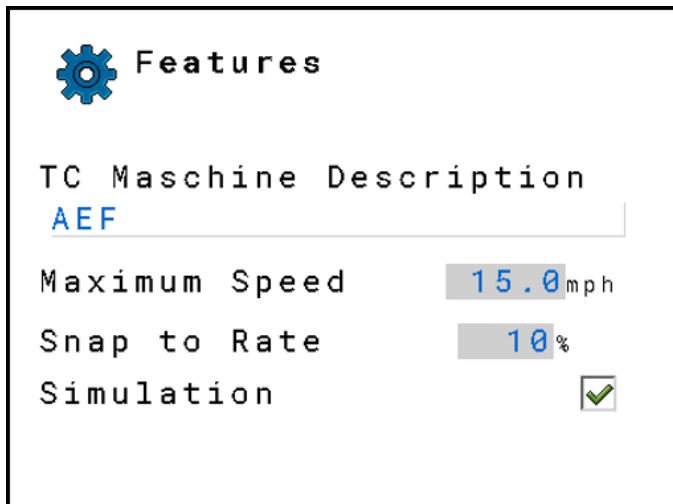


Below are the options to select in the ECU:

- If you are running a fast valve or a standard servo controller (Raven, DICKEY-john, KZ) select [time base].
- If you are running a PWM controller, select [PWM].



Features Page 2



TC Machine Description

Set to Auto, AEF, or John Deere. If unsure, leave it set to default Auto.

Maximum Speed

This value is the maximum speed that the control system will operate and will trigger Road Mode if you exceed the maximum speed.

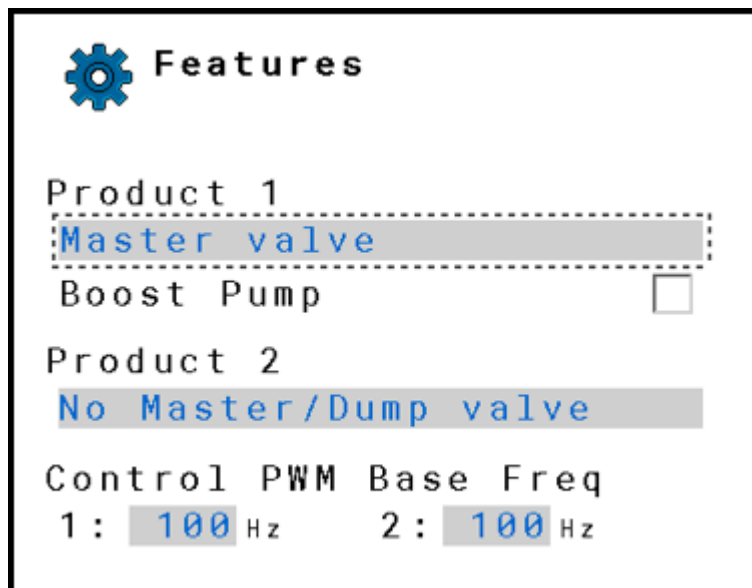
Snap to Rate


This value will adjust the applied rate that the operator will see. When the actual rate is with the set snap to rate value, the target rate will be displayed.

Simulation

Placing a checkmark on Simulation puts the ECU for demo purposes. When in Simulation mode, normal operations will not output as expected.

Features Page 3



 **Features**

Product 1
 Master valve
 Boost Pump ☐

Product 2
 No Master/Dump valve

Control PWM Base Freq
 1 : 100 Hz 2 : 100 Hz

Product Shut-Off

Choose the type of auxiliary shut-off valve. Available settings are:

- **No Master/ Dump Valve:** Used when no auxiliary valve is connected.
- **Master:** Output to open the valve is sent when one or all sections are open.
- **Dump Valve:** Output to open the valve is sent when all the sections are off. These valves are generally plumbed to bypass excess flow back to the tank.

Boost Pump

Put a checkmark in this section if the system is setup for use a boost pump.

Control PWM Base Freq

This value sets the base frequency output for the PWM controller.

Checks Before Changing Calibration Settings

PID tuning is done in steps to isolate the effect of each change. Unless you are very familiar with a system and have a plot of feedback and control do not change more than one parameter at a time when tuning.

On a new system or one that is giving problems, operate the system manually at several operating points and observe that the feedback is stable and consistent. This may be driving the system at a constant PWM or manually opening and closing a servo valve. If the feedback is varying by more than 10 - 15% when given a constant output, there may be a problem with the feedback sensor or system.

Pick a set point that is approximately midway between the maximum and minimum operating points. This is when a simulated speed is useful.

Controller Settings (Time Based)

When the control type is set to time-based, the following calibration values will be available to adjust.

Controller Settings
Product 1

P dead band gal/min

I

D

PWMmin

PWMmax

Test PWM Man. Step

target flow: 0000.0 gal/min
current flow: 0000.0 gal/min
deviation: 0.0 gal/min
output: 0

NOTE – Values in the boxes above are the factory default settings. Available settings will differ between control types.

Below are the descriptions of the different values to change, and how to adjust them based off of the feedback.

Starts at the min ms rate, then it will look at the error and will get added to it, until it gets to saturation. The integrator will add to it.

P: This is a portion of the loop that is proportional to the amount of time the error is present.

I: This is a portion of the loop that accumulates previous errors. It is the “memory” of the control loop. For each loop cycle, the integrator adds the current error to the previous integrator value.

Dead band: the allowable value that NO controlling/corrections will be made to the control valve. A low number may result in oscillation around the target rate. High number may result in not achieving the target rate.

Minimum/maximum time: min/ms is the value the output will start from no matter how much correction is needed. Max/ms is the max value the output will reach once saturation of the output has been reached.

On the bottom of the screen is all the information the technician will need in order to fine tune control valve.






Target flow: the gal/min value the system is attempting to achieve.

Current flow: the gal/min value the system is reading from the flow meter

Deviation: the difference between the target and current flow

Output: the value of the output being sent to the control valve

Controller Settings (PWM)

 Controller Settings Product 1			
P	<input type="text" value="5.0"/> dead band		
I	<input type="text" value="0.50"/> <input type="text" value="0.2"/> gal/min		
D	<input type="text" value="0.0"/>		
PWMmin	<input type="text" value="20%"/>		
PWMmax	<input type="text" value="80%"/>		
Test PWM	<input type="text" value="0"/>		TEST
Man. Step	<input type="text" value="100"/>		
target flow: 0000.0 gal/min current flow: 0000.0 gal/min deviation: 0.0 gal/min output: 0			

NOTE – Values in the boxes above are the default settings.

Debug

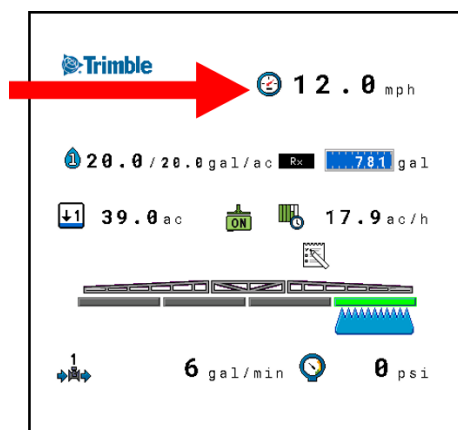
Debug	
<input type="checkbox"/>	Product 1 rate
<input type="checkbox"/>	Product 1 flow
<input type="checkbox"/>	Product 1 pressure
<input type="checkbox"/>	Product 1 control
<input type="checkbox"/>	Product 2 rate
<input type="checkbox"/>	Product 2 flow
<input type="checkbox"/>	Product 2 pressure
<input type="checkbox"/>	Product 2 control

Used for diagnostics purposes only. DO NOT checkmark any parameters unless instructed by a certified technician.

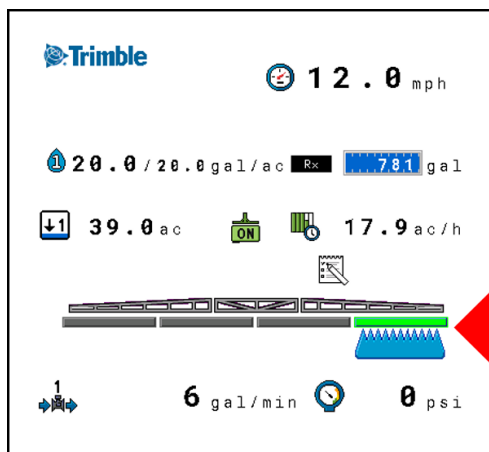
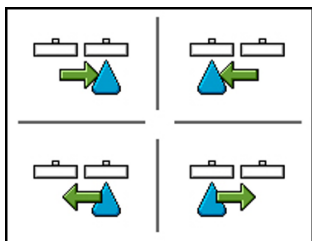
Verification of Installation and Setup

The final step of the installation process is to go through the checklist below to confirm and double-check that your system is ready for operation.

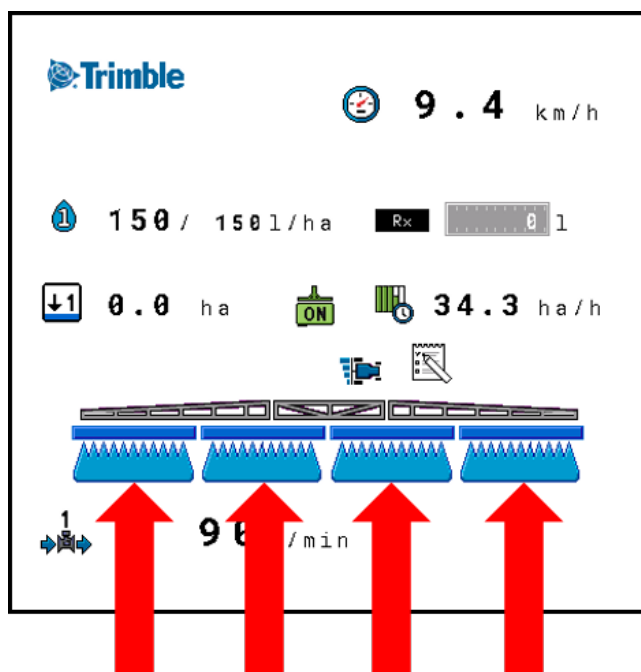
1. The first step is to test drive the tractor and verify that the ground speed is functioning and accurate. Depending on the speed source selection, confirm that the tractor display or tractor A-post speed matches the speed displayed in the Universal Terminal.



2. Verify that you have the correct number of sections by counting the bars on the Universal Terminal. The example below has four boom valve sections set up:



3. Double-check that your valves are in the correct order and are opening and closing correctly. Use the soft key buttons on Universal Terminal to verify this.



4. Make sure that you have the correct flow calibration number entered into the display. If the flow meter calibration number is incorrect, the system will not apply an accurate amount of product.

Liquid Fertilizer & Sprayer

Raven flow meters for liquid fertilizer measure pulses per 10 gallons. The ISOBUS System measures pulses per gallon. For the correct calibration number, you must take the number on the flow meter tag and divide it by 10.



$$1750 \text{ (flow meter tag)} \div 10 \text{ (pulses/10 gallons)} = 175$$

175 is your flow meter calibration number. Enter this number into the Meter Cal on your display.

Anhydrous Ammonia

Raven flow meters for Anhydrous Ammonia pulses of ammonia lbs. per unit of 10. For the correct calibration number, you must take the number on the flow meter tag and divide it by 10, multiply it by 0.82, and multiply it by your NH₃ density.

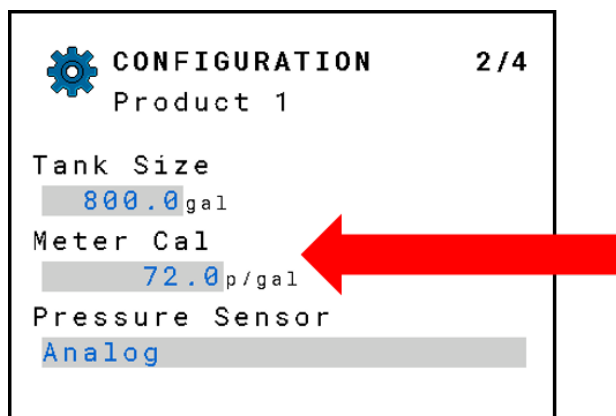


$170 \text{ (flow meter tag)} \div 10 \text{ (Raven pulses/unit)} = 17$

$17 \text{ (pulses/NH}_3\text{)} \times 0.82 \text{ (lbs. of N)} = 13.94 \text{ (pulses/N)}$

$13.94 \times 5.2 \text{ (NH}_3\text{ density per Raven)} = 72.488$

Rounding to the nearest tenth, 72.5 is your flow meter calibration number. Enter this number into the Meter Cal on your display.

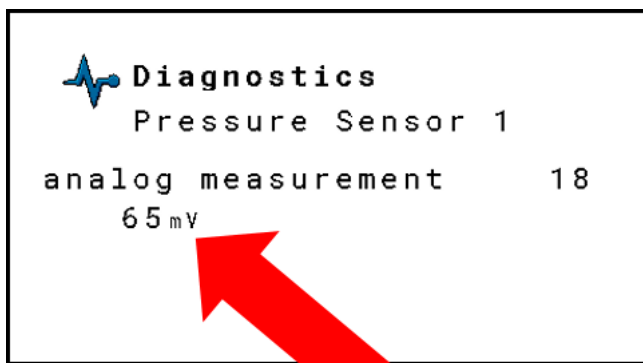


5. If a pressure sensor is installed, run a pressure sensor check in Diagnostics. Tap the Configuration icon:

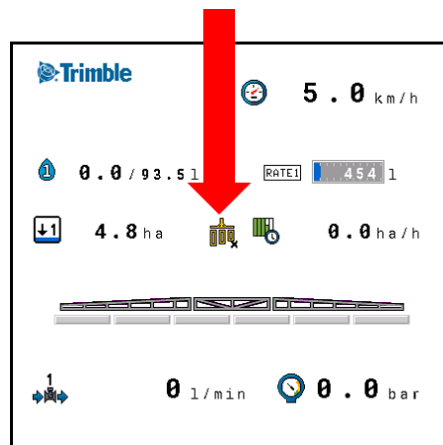
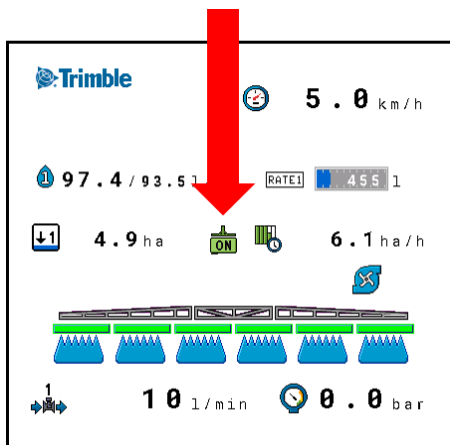


Then tap the Diagnostics icon:





6. If a foot switch or external work switch is installed, verify that the switch is validating correctly on Universal Terminal. The screenshot below on the left shows the sections turned off. The screenshot below on the right shows the sections turned on.



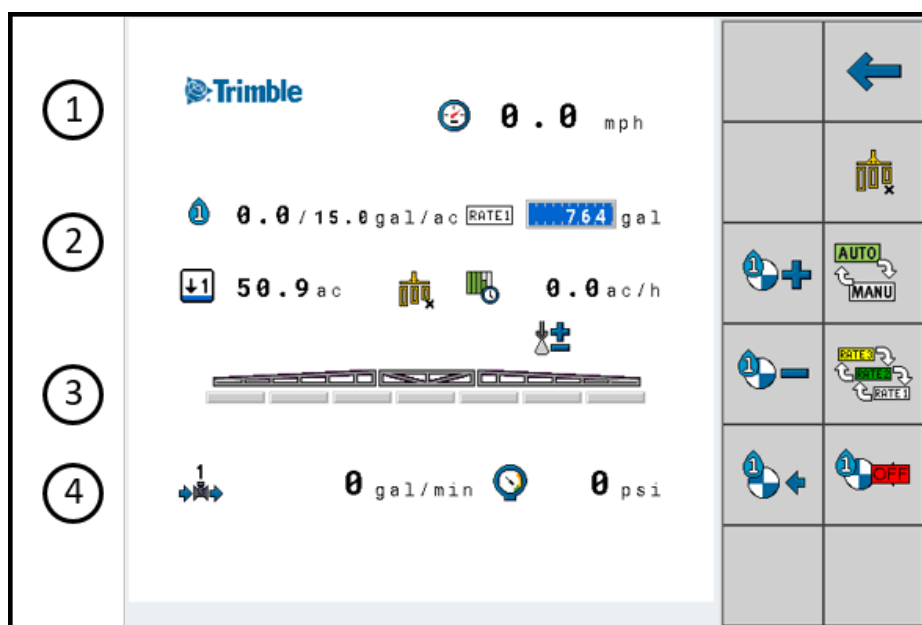
Run Screen

- ▶ [Run Screen Overview](#)
- ▶ [Function Icons on the Run Screen](#)
- ▶ [Tank and Rate Display Area](#)
- ▶ [Implement Display Area](#)
- ▶ [Operating the Valves](#)

Run Screen Overview

The work screen displays the most important information pertaining to the operation of the toolbar.






The Run screen is divided into four areas:



Description	
1	Speed Indicator Information on speed
2	Application Display Area Information on regulation & tank content
3	Implement Display Area Information on sections & performance
4	Product Display Area Information on flow and pressure

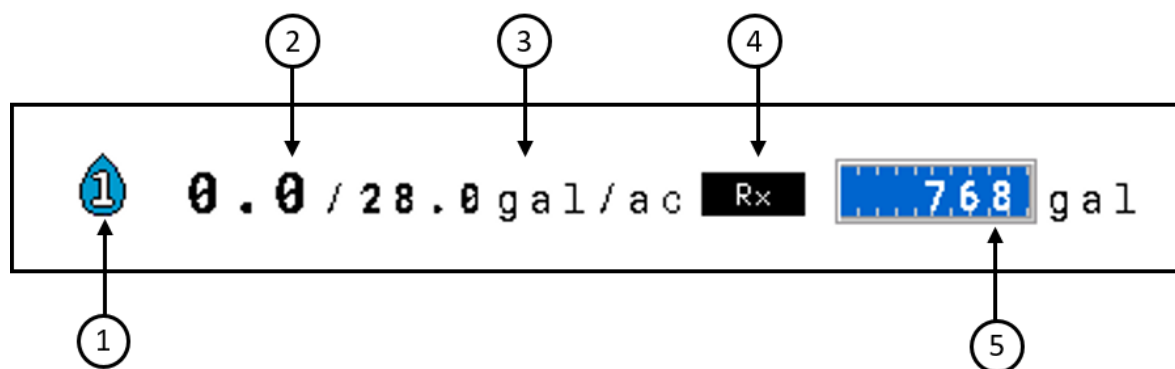
Function Icons on the Run Screen

Function icons are shown on the sides of the display. You can touch these (on a touch-screen) or press a function key beside the icon (on a non-touch display) to perform a function.

Function Icon	Description
	This icon opens a screen with counters.
	This icon opens a screen into which you can enter the tank content. See Enter the Fill Level in the Tank .
	This icon opens screens in which you can configure the system. See Configuring the ISOBUS Liquid ECU
	This icon activates Road Mode. See Road Mode .
	This displays further function icons.

Tank and Rate Display Area

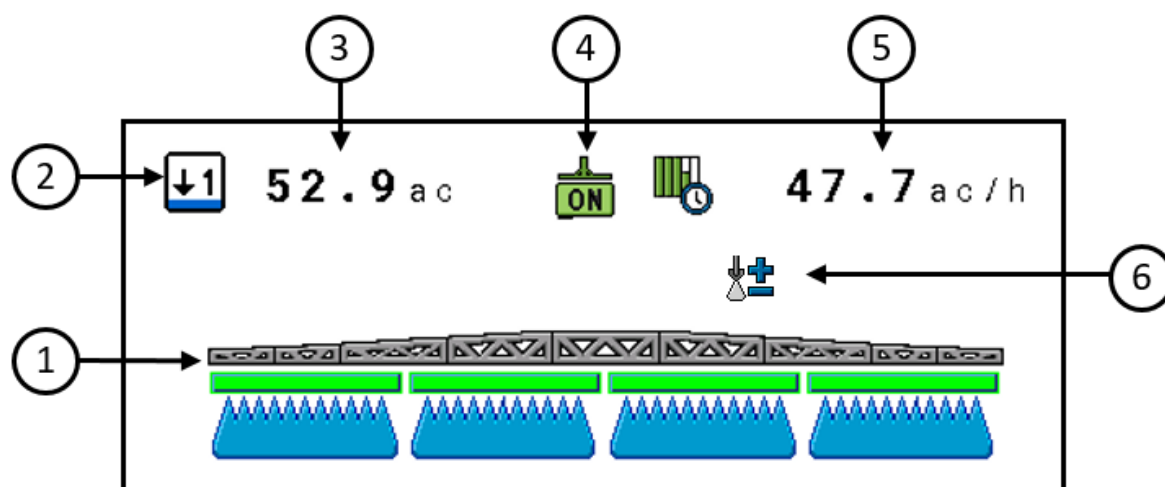
This area displays information on the tank content and the flow. Certain calculated predictions regarding areas and distances still to be worked are also displayed here.



Description	
1	Control Channel Indicator

Description
This icon indicates the control channel used for the product control and product form. In example above Control 1 and liquid form.
2 Actual Rate This displays the actual As Applied rate
3 Target Rate This area will display the current Target Rate as set by operator.
4 Tank Level This area indicates the number of units of product remaining in the product tank.
5 Target Rate Source Preset rates (1, 2, 3) and prescription (Rx) or Task Controller target rate.

Implement Display Area







Description
1 Section indicators, which sections are applying.
2 Tank number indicator.
3 Area remaining based on tank level.
4 Master ON/OFF indicator.
5 Performance in area/hour.

Description

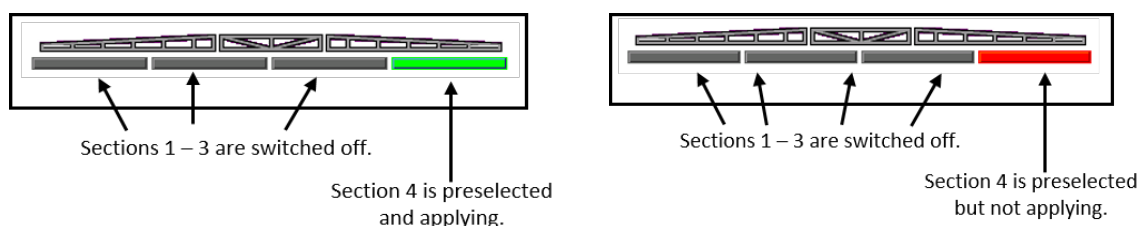
- 6 Rate has been adjusted from Default Rate. This icon also appears briefly when you tap the **Increase Rate** or **Decrease Rate** icons in Manual Mode.

Possible Section States

The sections can be in four states. You can see the state of a section on the work screen in the implement display area.











Display	Section State
	Section is switched off.
	Section is manually switched off while the SECTION-Control application is working in automatic mode. As long as SECTION-Control is working in automatic mode, this section cannot be switched on or off automatically.
	Section is turned off via Task Controller due to overlap or outside the boundary. Section is preselected. Section is ready for application. Section is in Overlap.
	Section is preselected and the main section switch is switched on. Section is applying.

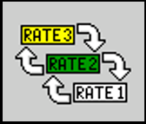


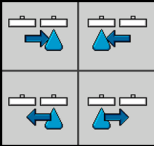
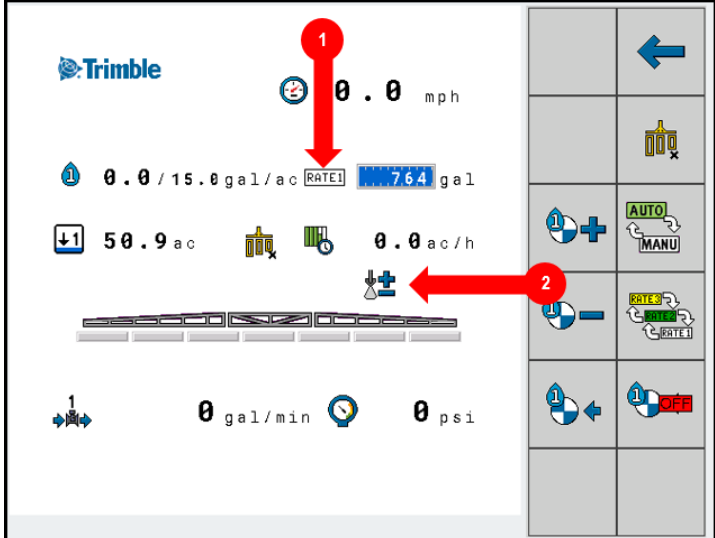
The following illustrations show how the sections in the implement display area can appear:



Operating the Valves

You can operate the valves directly using the display function keys. Work Screen will default with icons for Master Control, Section Control and Rate control.

Function Icon	Function
	Master Switch - Turns the system ON/OFF. If a master valve is installed, it is also opened and closed.
	Rate 1 Control Selection - This softkey accesses Product 1 rate control options and includes product shutoff.
	Rate 2 Control Selection - This softkey accesses Product 2 rate control options and includes product shutoff.
	Rate Control Selection - Selects control for both Product 1 and 2 for Delta Rate and Manual Rate Control options for both products at once.
	Rate Decrease - Decreases the rate with every button push by the preset amount which was determined and set during the configuration setup.
	Rate Increase - Increases the rate with every button push by the preset amount which was determined and set during the configuration setup.
	Return to Target - Returns the target rate to Rate 1 .
	Boost Pump - Tapping this icon initiates the boost pump. See the Configuration 2/4 screen (Implement Configuration) to set up the boost pump.
	Jump Start - Pressing this icon initiates the Jump Start feature. See the Configuration 2/4 screen (Implement Configuration) to set up the Jump Start.
	Product Shut-Off - Tapping this icon will shut-off the product. The actual rate will turn grey and read zero.


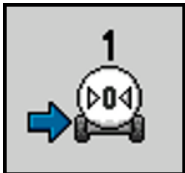
Function Icon	Function
	Rate Selection - Tapping the icon switches between Rate 1, Rate 2, and Rate 3. A visual indication of the chosen rate will appear on the Tank & Rate Display section on the Run Screen.
	Auto/Manual - When tapped, this button puts the system in manual mode. This allows you to press the rate increase or rate decrease icons to manually open or close the valve. Tap the Auto/Manual icon again to return the system to Automatic Mode. (see screen shot below)
	Section Control - Open or close valves if you have 4 or less sections.
	Section Control - Turns sections ON/OFF sequentially.
	<p>Arrow 1 indicates that Manual Mode has been activated.</p> <p>Arrow 2 shows the Rate Increase icon appearing when pressed.</p>

Using the ISOBUS Liquid ECU in the Field

- ▶ Enter the Fill Level in the Tank
- ▶ Setting the Rate
- ▶ Starting Application
- ▶ Stopping Application
- ▶ Documenting Results
- ▶ Road Mode

Enter the Fill Level in the Tank

In order for the system to correctly display tank content, you must input the amount of product in the tank prior to starting to operate

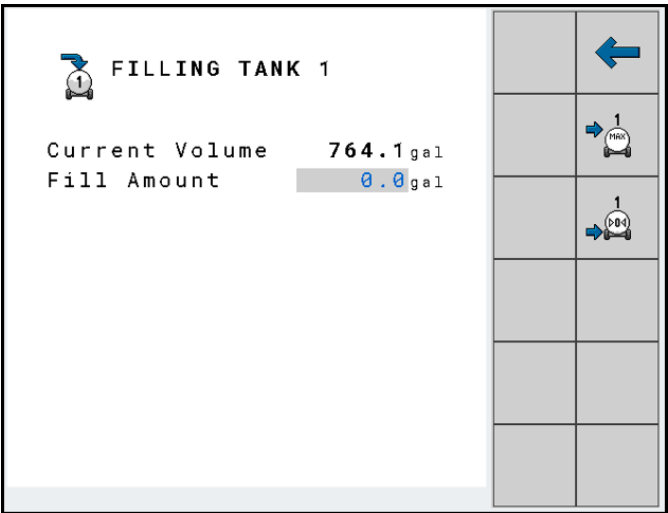
Function Icon	Function
	Press when the tank is completely full.
	Press when tank is completely empty

Input the new tank content by following these steps:

1. Tap the **Tank Fill** icon to open the Filling Tank screen:



The Filling Tank screen appears:



2. Tap the **Max Tank** icon if the tank is full:



If the tank is empty, tap the **0 Tank** icon:



3. If the tank is not completely empty, enter the number of gallons in the Fill Amount field to be added to the current level of the tank. For example, if **500** gallons is in the tank and **1000** gallons is added to the in Fill Amount, the Current Volume will be updated to read **1500** gallons.

The new tank content appears on the Run Screen in the Tank display area.

Setting the Rate

The rate is the amount which you can apply per acre. The ECU will attempt to operate the control valve so that the rate is maintained during work.

There are several ways to specify the rate:

- Enter the rate on the Configuration screen ([Implement Configuration](#)).
- Transfer the rate from a shape-prescription maps.
- Take the rate from a task in ISO-XML format.

Enter the rate on the Parameters screen as follows:

1. Tap the **Configuration** icon:



2. Enter the rate in the “Target Rate” line on the Configuration 1 screen.

Starting Application



Exposure to Ammonia - Death or heavy injuries

Do not rely on the minimum speed to keep the system off. Close the master valve if the machine will be stopped for servicing the implement.

Start application as follows:

- The tractor with the implement must be in a field.
 - The ECU is completely configured.
1. Ensure that all of these preconditions have been met!
 2. Tap the **Master Switch - OFF** icon to open the control valve:



Sprayer

The Master Switch will turn off in 10 seconds without movement of the vehicle.

The control valve will be prepared for opening, but cannot yet be opened as the implement is still stationary.

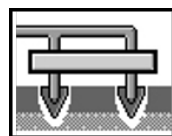
As long as the implement is not moving, the **Section Off** icon will appear on the work screen and the control valve will remain closed:



Liquid Toolbar

The control valve will be prepared for opening, but cannot yet be opened as the implement is still stationary.

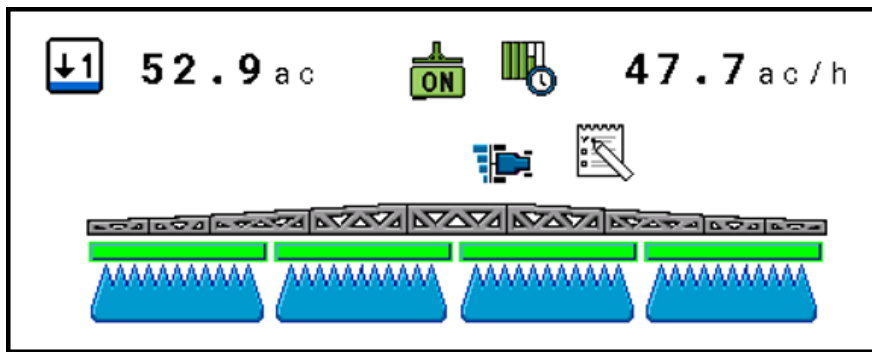
As long as the implement is not moving, the **Section Off** icon will appear on the work screen and the control valve will remain closed:



3. Drive off, and exceed the minimum speed (Parameter: "Min Auto speed").

As soon as the implement exceeds the minimum speed, the implement will begin the application.

Application indicators appear under the implement icon:

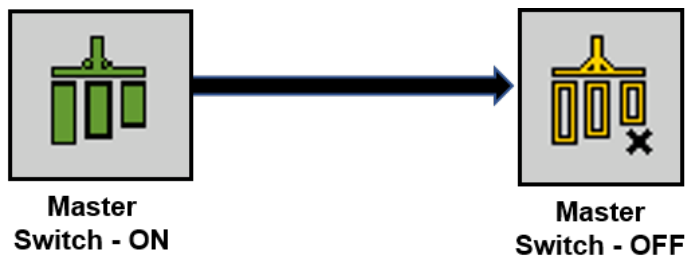


You have started the application.

Stopping Application

You can stop application in the following ways:

- Close the master valve. Tap the **Master Switch - ON** icon:



- Close all section valves. Tap the **Sections Close** icons:



- Move slower than the set minimum working speed.
- Activate road mode. Tap the **Road** icon:



Documenting Results

You can document your work on the Counters screen. Tap the **Next Screen** icon:



Then tap the **Counters** icon:



In the Counters screen there are two types of counters:


- **Trip counter** – Documents your work until it is deleted. This applies to the four upper counters.
- **Lifetime counters** – Documents the accumulated work since first start-up and cannot be reset to zero.

The Counters screen has the following information:

- **Volume** – applied volume.
- **Area** – area processed.
- **Distance** – distance driven during the application.
- **Work time** – Total duration of the application.

Use the following function keys to operate the function:

Function Icon	Function
	Clear "Volume" counter
	Clear "Area" counter
	Clear "Distance" counter
	Clear "Time" counter
	Back to work screen

Function Icon	Function
	Clear content of all trip counters

Road Mode



DANGER! Exposure to Ammonia - Death or heavy injuries

Close the tank valves before transporting the implement.

The “Road mode” function is used to close the valves for safe transport on public roads.

When road mode is activated, the following happens:

- An icon appears on the work screen.
- The control valve and the section valves are closed. Application is thus interrupted.
- None of the valves can be opened as long as road mode is activated.

Road mode can be activated using the following methods:

- You can activate the function manually.
- If the vehicle exceeds the speed set in the “Maximum speed” parameter for three seconds.

To activate road mode manually in this way, tap the **Road** icon from the Home screen:



The control valve and the section valves are closed.

The Road Mode function icon appears on the Run Screen as seen below:



You have now activated Road Mode.

Troubleshooting and Technical Data

- ▶ [Diagnostics](#)
- ▶ [Problem and Resolution](#)

Diagnostics

The diagnostic features provide the user feedback to confirm components are working properly and help with troubleshooting.

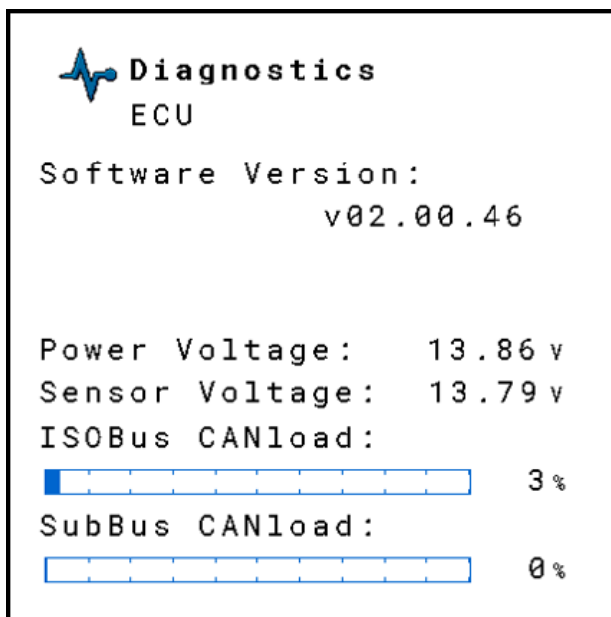
Diagnostics can be accessed from the Run Screen by first tapping the **Configuration** icon:



Then tap the **Diagnostics** icon:



The Diagnostics screen appears:







Tap the magnifying glass icon to show additional diagnostic options:







Pressing the **Cycle** icon reset the readings for each diagnostic page:



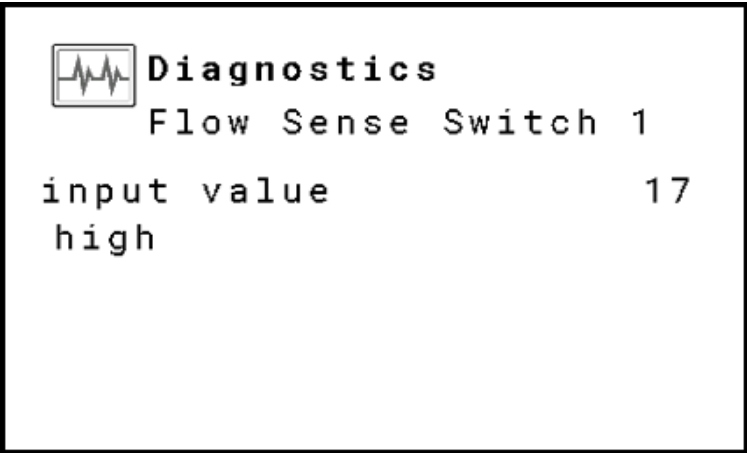
Diagnostics: Speed Sensor - While the tractor is moving, you should see a Frequency Input reading of 1-100 Hz. If you are using the tractor as your speed source, your frequency reading will be zero. The pulses (or impulses) should be increasing with forward motion. The number 35 corresponds to the pin number on the 42-pin ECU harness.

 Diagnostics			
Speed Sensor			
frequency input	35		
0 Hz			
impulses	35		
0			

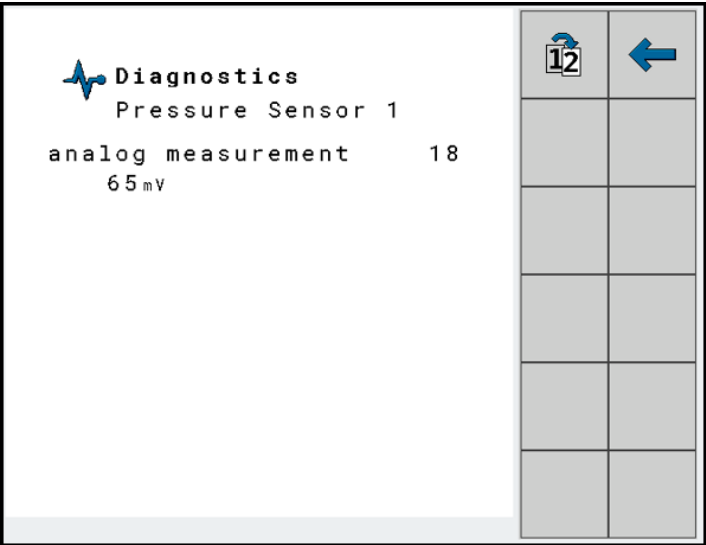
Diagnostics: Flow Meter - The screen will show you if you are getting a frequency input from your flow meter. The pulses (or impulses) should increase as more product is applied. The number 34 corresponds to the pin number on the 42-pin ECU harness.

 Diagnostics			
Flow Meter 1			
frequency input	34		
0 Hz			
impulses	34		
0			

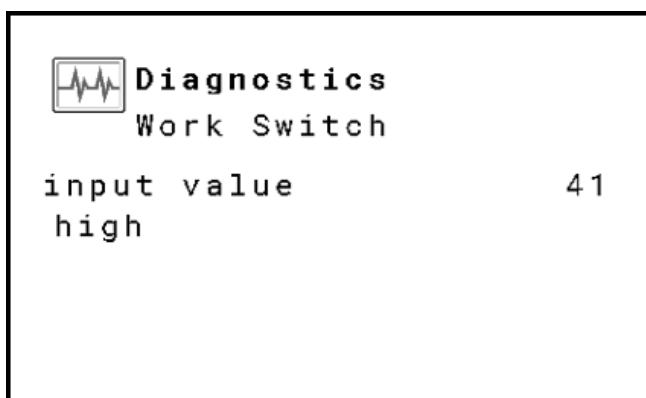
Diagnostics: Flow Sense Switch - This screen shows the flow sensing switch on Surefire Injection Pump system Pin 17.



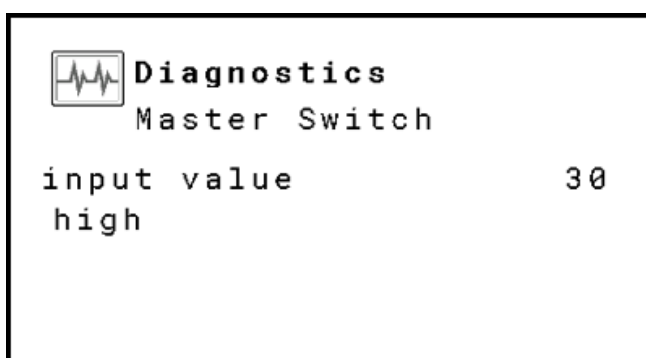
Diagnostics: Pressure Sensor - If a pressure sensor is installed, this screen will help you confirm that you are getting voltage from the pressure sensor. The number 18 corresponds to the pin number on the 42-pin ECU harness.



Diagnostics: Work Switch - This screens refers to the pin that supports the Implement switch.



Diagnostics: Master Switch - This screen refers to External Master Switch options.



Problem and Resolution

Issue	Possible Causes	Possible Solution
Section valve does not open or close.	<ul style="list-style-type: none"> Valve Motor failure Broken wire or open connector Section configuration incorrect Minimum speed set too high 	<ul style="list-style-type: none"> Inspect harness for damage and open connectors Confirm number of sections matches implement Confirm the entered minimum speed is lower than operating speed. Replace valve motor of the section valve
Control valve does not open or close.	<ul style="list-style-type: none"> Valve Motor failure Broken wire or open connector Minimum speed set too high 	<ul style="list-style-type: none"> Inspect harness for damage and open connectors Confirm number of sections matches implement Confirm the entered minimum speed is lower than operating speed. Replace valve motor of the control valve
No flow detected.	<ul style="list-style-type: none"> Encoder failure Broken wire or open connector Flow meter turbine failure 	<ul style="list-style-type: none"> Inspect harness for damage and open connectors Confirm flow calibration is non-zero Confirm flow meter turbine spins freely. Replace flow meter encoder

Issue	Possible Causes	Possible Solution
No ground speed detected.	<ul style="list-style-type: none"> • Incorrect ground speed source selected • Broken wire or open connector 	<ul style="list-style-type: none"> • If using ISO speed (GPS Speed) confirm that the tractor has a tractor ECU and is calibrated. • If using radar or wheel sensor confirm speed calibration is non-zero.
Incorrect ground speed detected.	<ul style="list-style-type: none"> • Incorrect ground speed calibration • Radar sensor vibrating 	<ul style="list-style-type: none"> • Calibrate the wheel sensor • Ensure correct radar sensor mounting
Target Rate cannot be achieved.	<ul style="list-style-type: none"> • Ground speed too high • Insufficient flow capacity • Ambient temperature too low (low tank pressure) 	<ul style="list-style-type: none"> • Slow Down • Wait until ambient temperature increases
Rate control unstable.	<ul style="list-style-type: none"> • Tank near empty • Ground speed too low • Reg. Factor too high (see Implement Configuration) 	<ul style="list-style-type: none"> • Confirm tank is not empty or near empty. • Lower Reg. Factor (see Implement Configuration)
System is slow to achieve target rate.	<ul style="list-style-type: none"> • Reg. Factor too low (see Implement Configuration) 	<ul style="list-style-type: none"> • Increase Reg. Factor (see Implement Configuration)