



Dual ISOmod[™]

Auto Rate Controller

System Manual

Dual ISOmod™

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The Dual ISOmod™ is a full-featured ISOBUS-ready automatic rate controller system. It is designed to connect to systems using ISOBUS, a standardized protocol for electronic communication between implements, tractors and computers (ISO 11783). The installation of the Dual ISOmod™ system will vary depending on your equipment. Please take time to familiarize yourself with this manual and the actual components before beginning installation. Following the procedures described in this manual will help ensure proper performance and avoid problems or questions once you are in the field. Read the manual carefully and follow the instructions that apply to your usage. If you do encounter a problem that cannot be corrected by reviewing this manual, consult your dealer or distributor, or contact a Micro-Trak® technician for assistance.

At Micro-Trak® Systems, we believe a product that delivers quality and performance at a low cost is what is needed to help today's operator and the operator of the future compete in the world market. It is our goal to provide operators with a line of electronic equipment that will help build and maintain an efficient and profitable operation that can be passed on to future generations.

We thank you for your purchase and hope that we can be of service to you in the future.

WARNING!!

The Dual ISOmod™ can be used to control and apply hazardous chemicals. Exposure to hazardous chemicals can result in illness, severe injury, or death. Hazardous chemicals include insecticides, pesticides, herbicides, fungicides, and fertilizers. Safety Data Sheets (SDS) provide specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques.

Ammonia is an irritant and corrosive to the skin, eyes, respiratory tract and mucous membranes. Exposure to liquid or rapidly expanding gases may cause severe chemical burns and frostbite to the eyes, lungs and skin. Skin and respiratory related diseases could be aggravated by exposure. Follow special protection and procedure methods for hazardous materials, including protective equipment, eye protection, respiratory protection, and ventilation.



800.328.9613

Toll-Free Sales and Service - U.S.A. and Canada

Phone 507.257.3600

www.micro-trak.com

trakmail@micro-trak.com

1305 Stadium Road

Mankato, MN 56001-5355

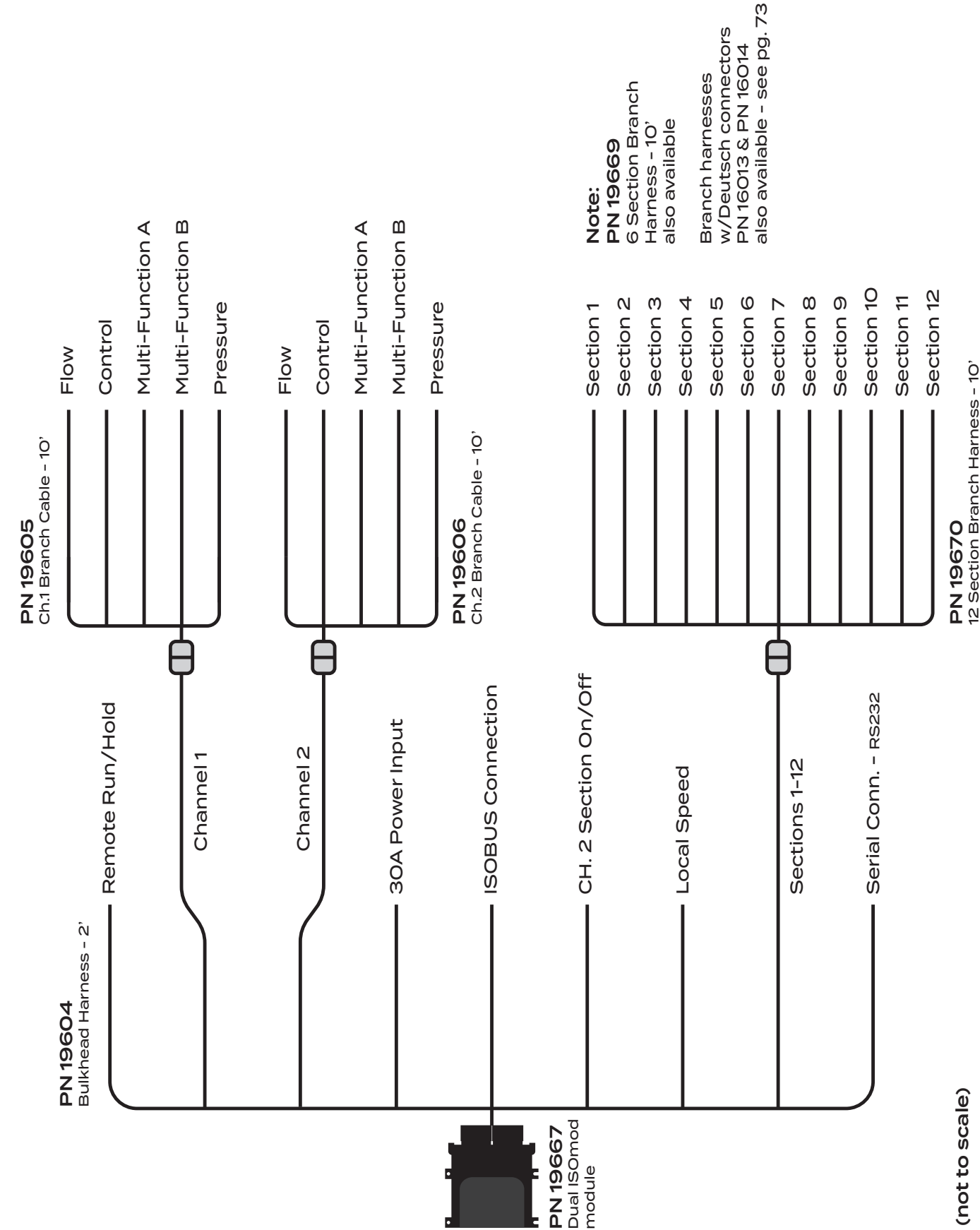
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LIQUID APPLICATION SYSTEMS

System Overview

(2 Channel - 12 Section System shown)

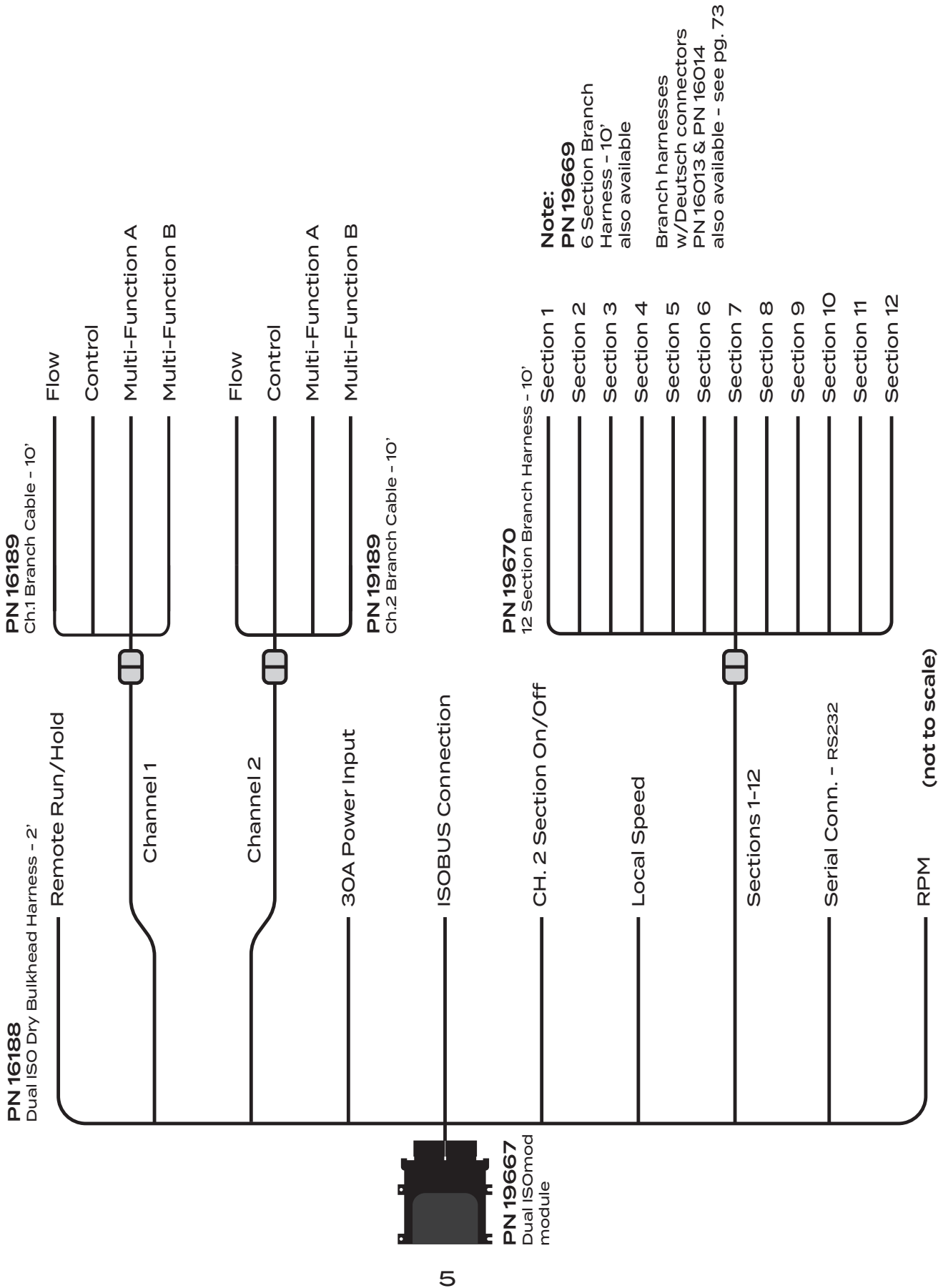


(not to scale)

GRANULAR APPLICATION SYSTEMS

System Overview

(2 Channel - 12 Section System shown)



Installation

Overview

Install the Dual ISOmod™ and system components by following the recommended sequence of steps. Your installation may not include some of these steps; some equipment is optional and some components may already be installed. It is highly recommended that the user navigates through all the screens prior to in-field use to ensure that all settings are correct for the desired application.

All installations **must** follow Calibration and Pre-Field System Checkout steps (6,7) to ensure safe and accurate operation of system.

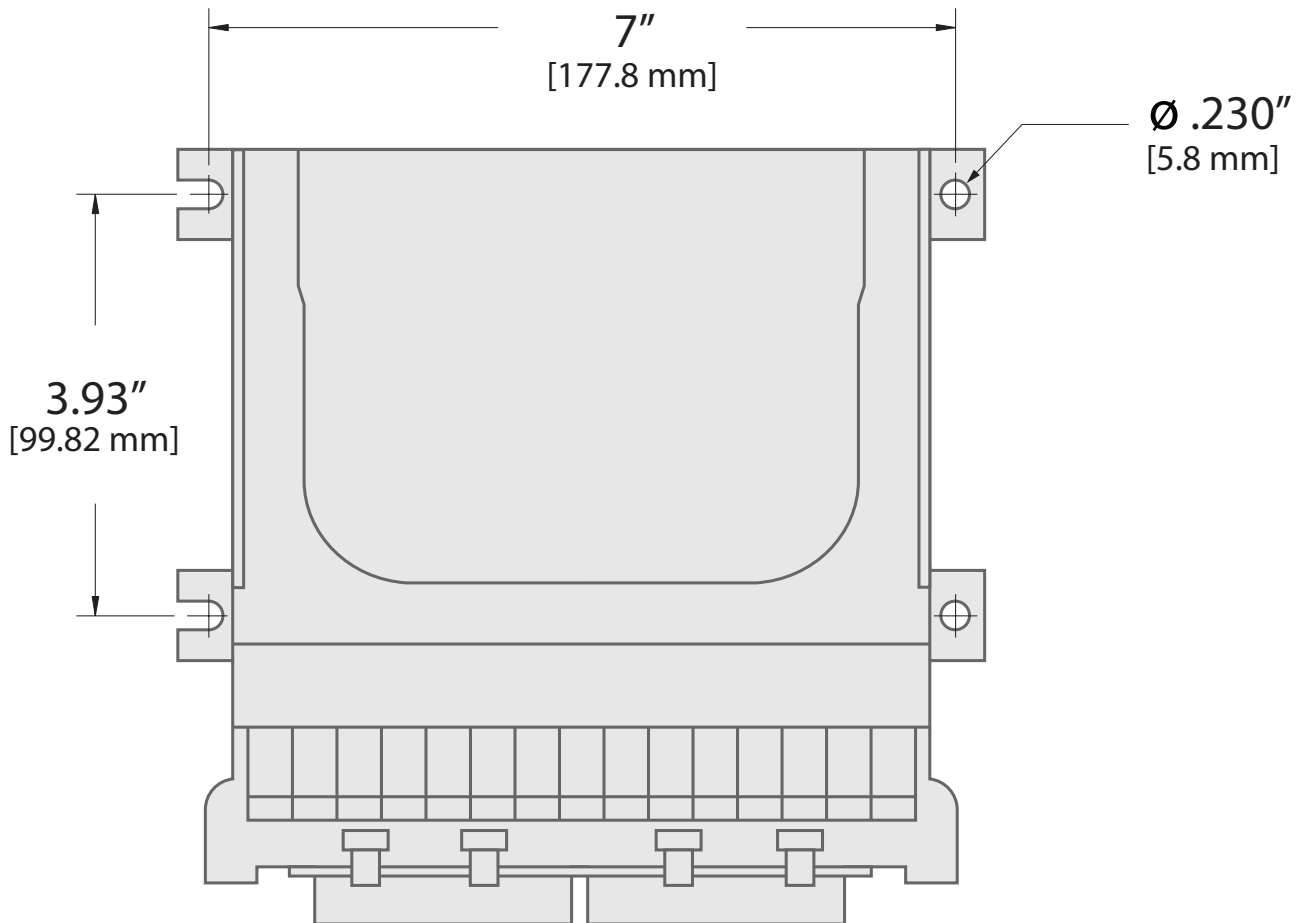
Installation Steps

1. Mount the Dual ISOmod™.
See page 7.
2. Route wiring to appropriate locations on vehicle and/or implement.
Connect wiring harness to 12VDC power, and connect wiring harness to Section Shutoff valves.
See page 8.
3. (Optional) Mount Speed Sensor and connect to system.
See page 9.
4. (Optional) Mount Proximity Sensor and connect to system.
See page 9.
5. (Optional) Mount Implement Switch and connect to system.
See page 10.
6. (Optional) Mount Flowmeter and join to system.
See page 13.
7. (Optional) Mount Pressure Sensor and connect to system.
See page 13.
8. Calibrate Dual ISOmod™ system.
See pages 22-43.
9. Perform Pre-Field System Checkout Procedure.
See page 47.

Installation

ISOmod™ Mounting

1. Select a location that is near the ISOBUS tap cable.
2. Place the ISOmod™ enclosure in location, mark holes, drill, and secure with fasteners (not included). Mounting hole centers are shown below.



Installation

Electrical Installation

This section explains how to connect your Dual ISOmod™ to 12VDC power connection. The Dual ISOmod™ must be connected to a 12VDC negative ground electrical system.

ROUTING HARNESS AND CABLING

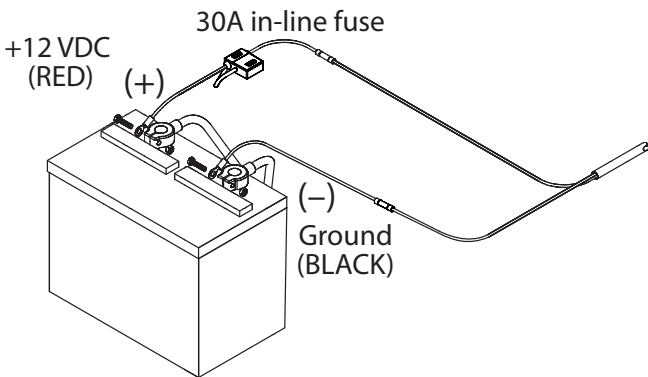
Avoid areas where the cable may be subjected to abrasion or excessive heat.

BATTERY POWER CONNECTION - PNs 19170 & 19295

- 1. Locate the power cable harness PN 19295 and route to the battery.
- 2. Insert the stripped wire ends into the corresponding wire connectors on Adapter/Fuse harness PN 19170 and crimp firmly.
- 3. Attach Adapter/Fuse BLACK wire ring terminal to ground, making sure there is a good metal-to-metal contact.
- 4. Connect Adapter/Fuse RED wire to the positive battery terminal.

Connect the power to the Dual ISOmod™ by plugging the 2-pin M/P 480 tower on the power cable into the 2-pin M/P shroud on the PN 19604 Liquid Bulkhead Harness or PN 16188 Dry Bulkhead Harness.

PN 19170



Power/Battery Connection

SECTION SHUT-OFF CONNECTIONS

The Dual ISOmod™ branch harnesses PN 19670 (12-section) and PN 19669 (6-section) have connections for sections. The wiring to each Weather Pack tower connector consists of constant +12VDC, Ground, and switched +12VDC. **See diagram.** For solenoid type valves, use connections **B** and **C** only. An adapter is also available from Micro-Trak® to connect a 2 wire, grounds and switched +12VDC, solenoid valves directly to the harness - PN 14469.

Verify the wiring layout of your sections **before** connecting them to the Dual ISOmod™ system. Please refer to original valve documentation or contact the manufacturer if you are unsure of the correct wiring configuration.

RED	A	3-Pin Weather Pack Tower Connector	Constant +12VDC
BLACK	B		Ground
WHITE	C		Switched +12VDC (Signal)

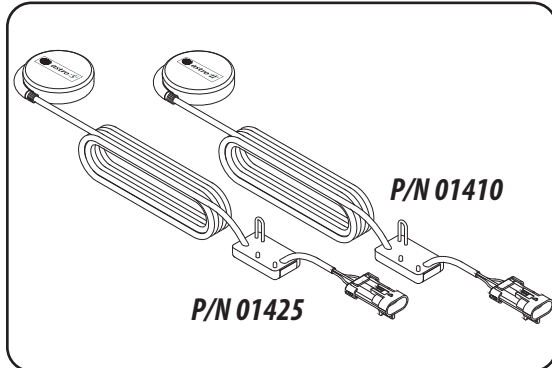
Example Section Valve Connection

Installation Optional Equipment

Speed Sensors

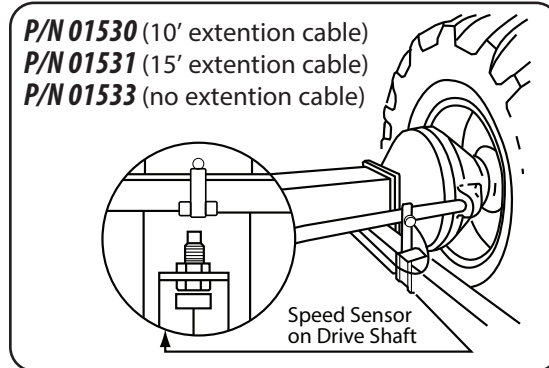
The Dual ISOmod™ must have access to a speed signal to utilize its calculating function. In most instances, the Dual ISOmod™ will read speed information from the ISOBUS. The system default setting is **Remote** - ISOBUS speed signal. Select **Local** to use a speed sensor connected directly to the Dual ISOmod™ wiring harness. **Source** sends local signal onto the ISO CAN to be read by other devices.

Some possible options for **Local** speed signal are below:



Astro Series Speed Sensors

The Dual ISOmod™ is designed to connect to the Micro-Trak® Astro™ series speed sensors, Astro II or Astro 5. Other brand GPS speed sensors that output a pulsed signal may also work with the system. (An adapter cable may be required.)

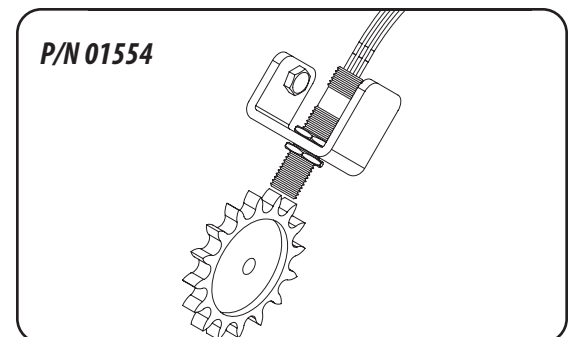


Magnetic Wheel Sensor

This system uses magnets attached to a wheel hub or drive shaft and a hall-effect sensor. The movement of the magnets near the sensor creates an electrical pulse which the console uses as a speed input. The system must be carefully calibrated to ensure accurate readings.

Proximity Sensor Gear Tooth Sensor Kit

The Micro-Trak® Gear Tooth Sensor kit is useful when applying a granular material. It can also serve as a Speed sensor. The Gear Tooth Sensor responds to the close presence of ferrous metals and sends a signal to the module via the Flow or Speed connection. The recommended air gap between sensor and moving part is 1/16" (tip: use a U.S. dime as a gauge).



Contact a Micro-Trak® dealer or distributor for more information on optional accessories.

A Dealer Locator can be found online at

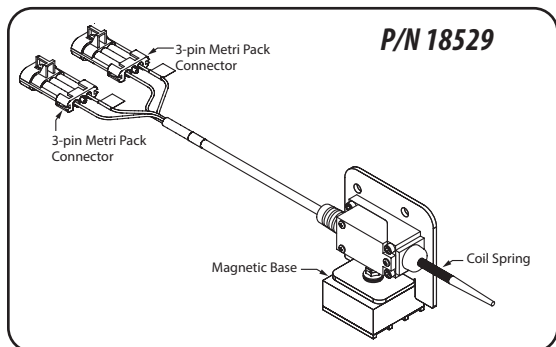
<http://www.micro-trak.com/where-to-buy/dealer-locator>.

Installation

Optional Equipment

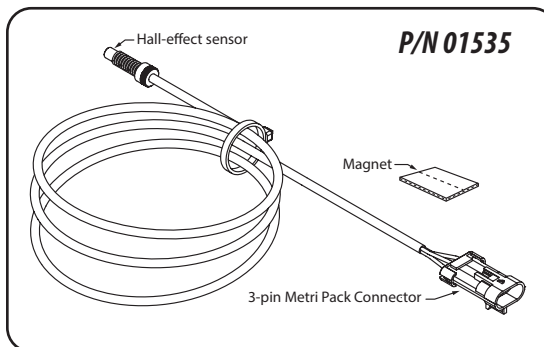
Implement Switches

Micro-Trak® offers two options for automatically controlling the operation of the Dual ISOmod™ system. Both solutions mount directly to your implement and control run/hold as the machine is operated. Installation locations vary by the type of machinery used. Both types of Implement Switch join to the Remote Run/Hold connection on the Bulkhead Harness.



Whisker Switch Assembly

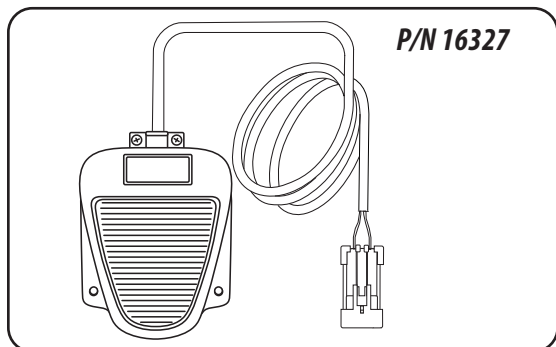
Simply mount the Whisker Switch Assembly near a moving part of an operating mechanism on your implement (additional extension cables may be needed). The switch is wired Normally Open; the default polarity for the Dual ISOmod™ circuit is preset to “Closed”. Pressure on the switch tip causes the system to “Hold”. **See illustration.** The polarity setting can be accessed in the Implement Switch section in Configuration B - Run=Switch.



Remote Run/Hold Sensor Kit

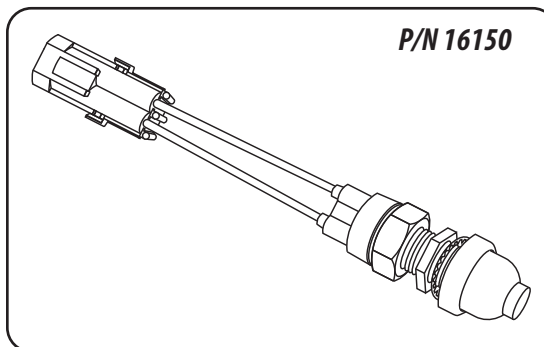
The Remote Run/Hold Sensor consists of a Hall-effect proximity sensor and a magnet. Mount the sensor near a moving part of an operating mechanism on your implement; mount the magnet on the moving part (additional extension cables may be needed). The sensor is wired Normally Open; the default polarity for the Dual ISOmod™ Run/Hold circuit is preset to “Closed”. Moving the magnet close to the sensor tip causes the system to “Hold”. **See illustration.** The polarity setting can be accessed in the Implement Switch section in Configuration B - Run=Switch. .

Other Switches



Foot Pedal Assembly

The foot pedal assembly can be used to manually control the Run/Hold status of the console like an implement. Once connected to a Run/Hold input, pressing the foot pedal will change the status of the Run/Hold state. The standard connection for this foot pedal is a 3 Pin Metro-Pak Shroud.



Push Button

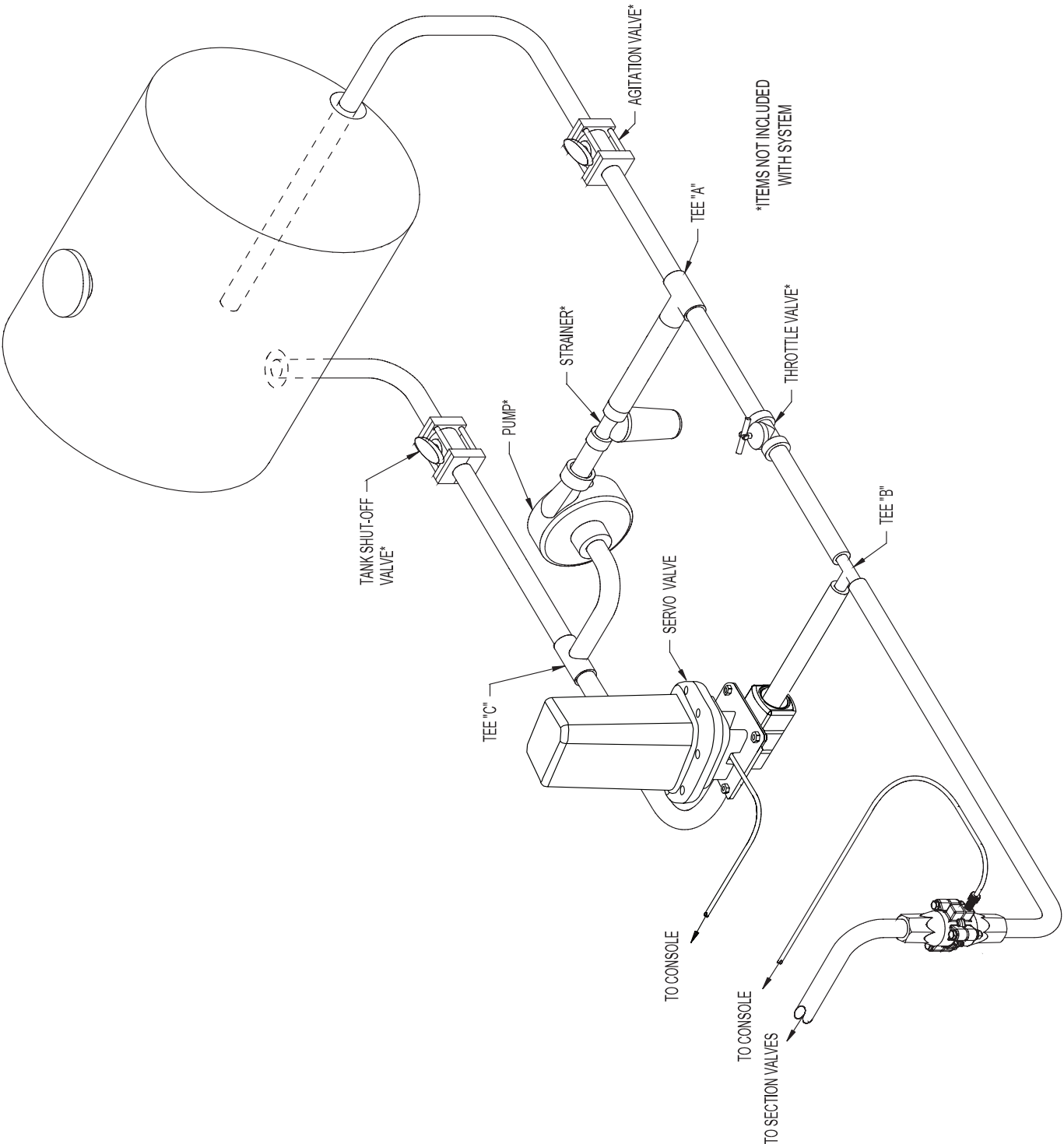
The push button can be used to manually control the Run/Hold status of the console like an implement. Once connected to a Run/Hold input, pressing the push button will change the status of the Run/Hold state. The standard connection for this push button is a 2 Pin Metro-Pak Shroud. P/N 16140 John Deere mounting bracket, P/N 18541 magnetic mount and P/N 16151 10' extension cable are also available.

LIQUID APPLICATION SYSTEMS

Installation

Dual ISOmod™ Plumbing Overview

Bypass Configuration - Flow through servo bypasses flowmeter

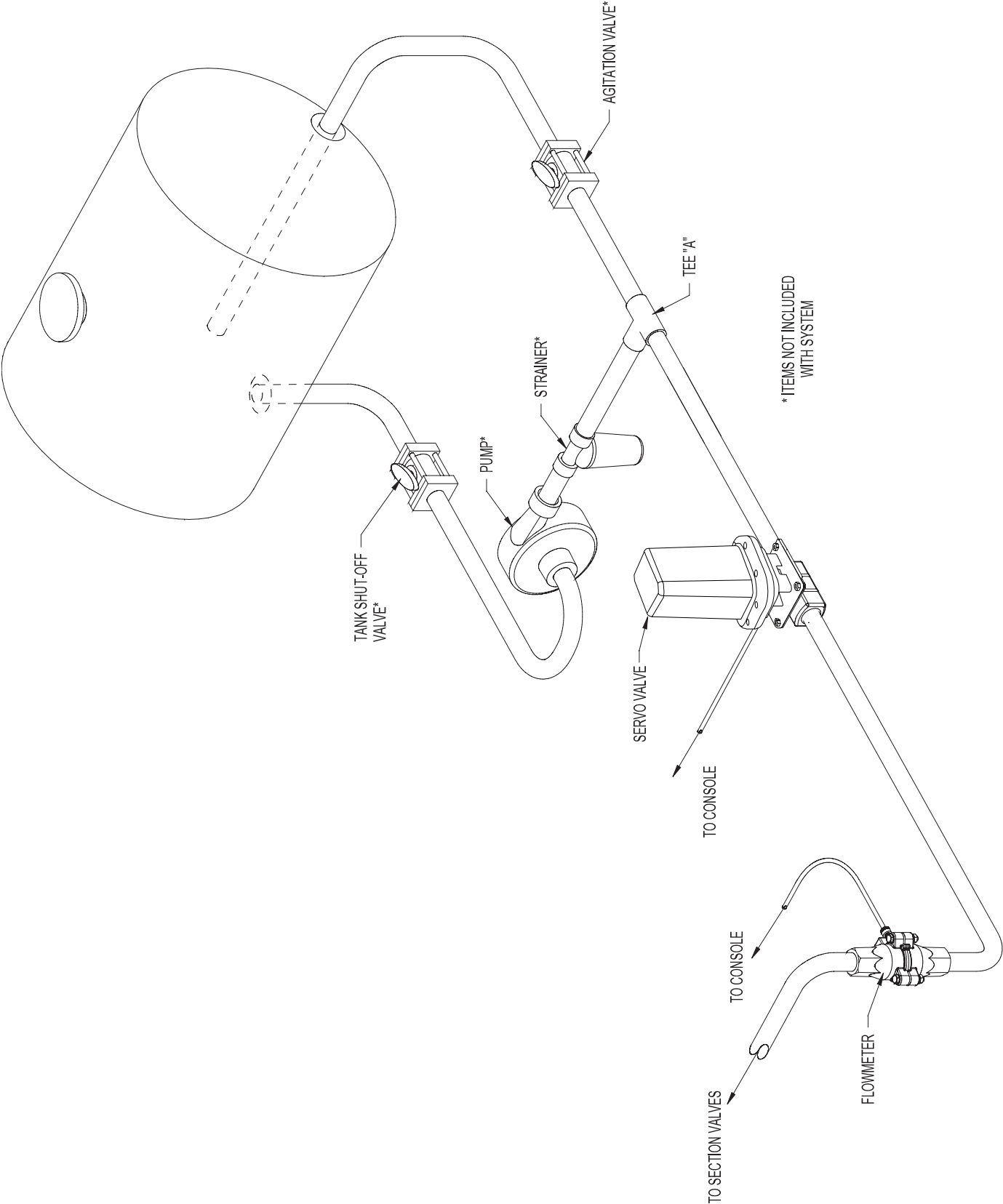


LIQUID APPLICATION SYSTEMS

Installation

Dual ISOmod™ Plumbing Overview

In-Line Configuration - Flow through servo is inline with flowmeter



LIQUID APPLICATION SYSTEMS

Installation

System Components

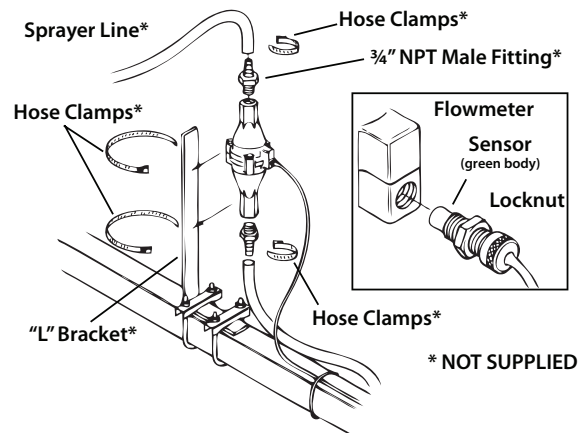
Installing Flowmeter

The flowmeter must be installed in the main line after any strainers, return lines, or valves. Securely mount flowmeter in an area away from intense vibration. A vertical installation with flow entering the bottom is preferred, especially at rates below 5 gallons per minute. *See illustration.* Other orientations are sufficient providing the flowmeter remains full of fluid. To avoid erratic flow readings allow a minimum of 6" of straight tubing at the flowmeter input and output. If installation constraints don't allow this keep bends as gentle as possible. Micro-Trak® flow meters are bidirectional (exception: green plastic turbine and mag flowmeters are one direction only). Flipping the flowmeter periodically (black nylon and stainless steel Micro-Trak® manufactured models) to reverse the flow will greatly extend the life of the flowmeter by evening out bearing wear.

Care and Maintenance

At end of application season, thoroughly flush Flowmeter with clean water, and drain completely.

- The input pressure on the glass-filled nylon flowmeter FM750 GFN should not exceed 100 PSI (689 kpa).
- Do not expose the flowmeter to liquid temperatures exceeding 130 degrees F (55 degrees C).
- Some chemicals may damage the turbine material - Noryl GTX. If you are in doubt, contact the chemical manufacturer.

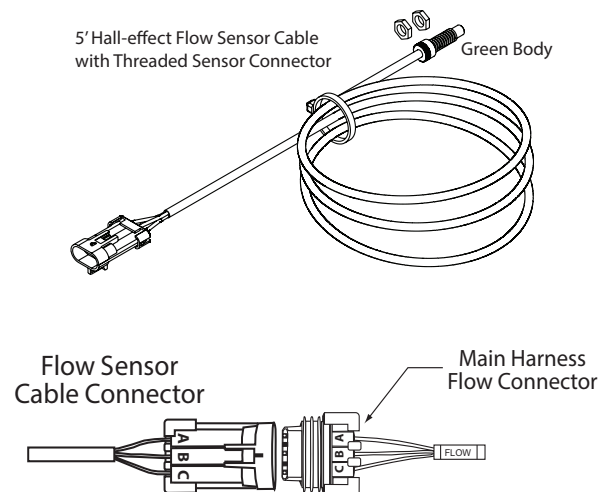


Installing Flow Sensor Cable

The flow sensor cable has a GREEN sensor body and joins the 3-pin connector on the wiring harness marked FLOW.

See illustrations.

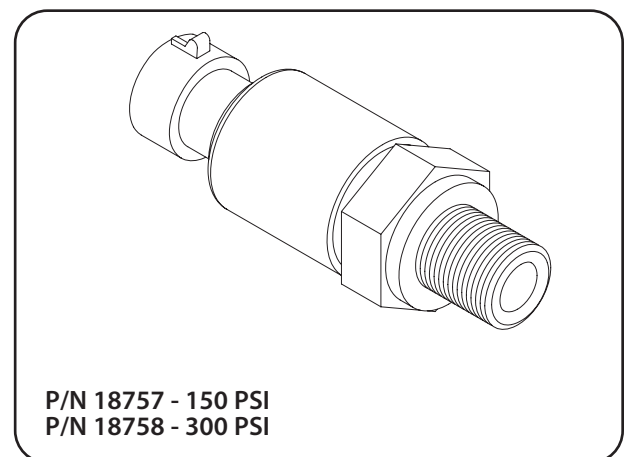
1. Screw threaded sensor into hole of flowmeter until seated.
2. Gently tighten 3/8" jam nut to secure sensor in place.
3. Uncoil flow sensor cable and route it to wiring harness.
4. Align connectors and press firmly together until locking tab clicks into place.
5. Secure cable with plastic ties provided.



Installing Pressure Sensor (Optional)

The pressure sensor should be installed in the main line of flow as close to the section shut-off valves as possible. The sensor requires a 1/4" - 18 NPT fitting.

1. Install the sensor in the plumbing line.
2. Join the cable to the 3-pin Packard™ connector on the sensor.
3. Route the cable (and extension cables, if needed) to the console location - avoid sharp surfaces and heat sources.
4. Join the cable to the **PRESSURE** connection on the wiring harness - align connectors and press firmly together until locking tab clicks into place.



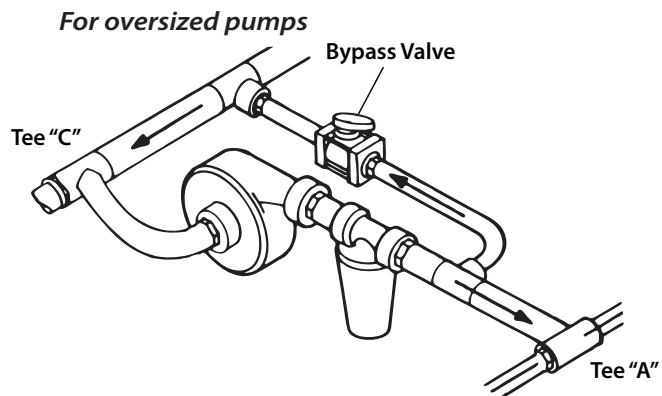
LIQUID APPLICATION SYSTEMS

Installation

System Components

Bypass Valve

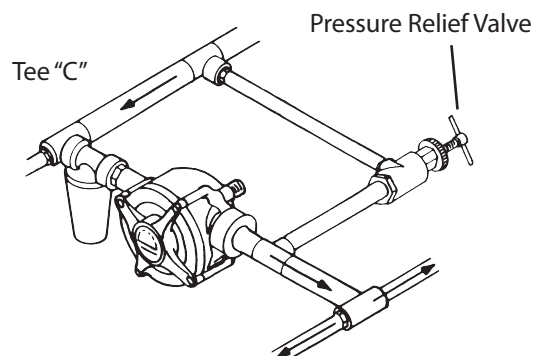
With oversized pumps, it may be necessary to install a bypass valve. This valve allows excess flow to return to the tank. This in turn reduces the pump output to the rest of the system. *See illustration.* Adjustment of this valve is covered in the Pre-Field System Checkout, page 47.



Manual Pressure Relief Valve

If you have a positive displacement pump or a centrifugal pump capable of generating excessive pressure, you must install a pressure relief valve and adjust it to a safe maximum pressure. If a positive displacement pump is operated without a pressure relief valve, pump or other plumbing components may be damaged. *See illustration.*

For positive displacement pumps



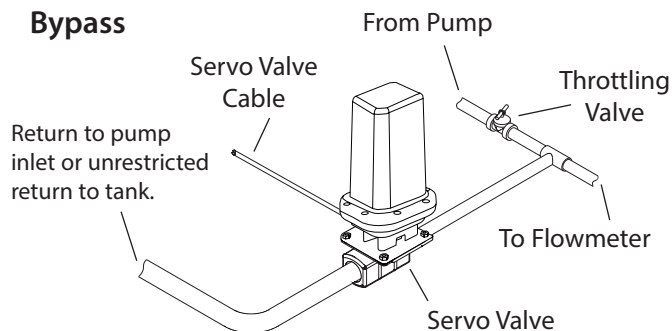
Servo, Throttling Valves

For BYPASS installations, the servo valve installs in an unrestricted return line to the inlet of the pump or directly into the tank. The console must be calibrated for bypass operation, *see DC valves (p. 31)*. **DO NOT install the servo valve closer than 12" to the flowmeter.** The servo valve has a flow direction decal on it. Make certain that the actual flow direction matches the decal on the servo valve. **DO NOT** install the servo valve in the agitation line. Slow response time and marginal operation may result. The return line should tee from the main line just after the throttling valve. *See illustration.* The throttling valve is used to limit the output (set maximum output) of the pump to the flowmeter and servo valve. The throttling valve is adjusted to put the servo valve in its optimal operating range. *Please refer to Pre-Field System Checkout on page 47 for proper valve adjustment procedure.*

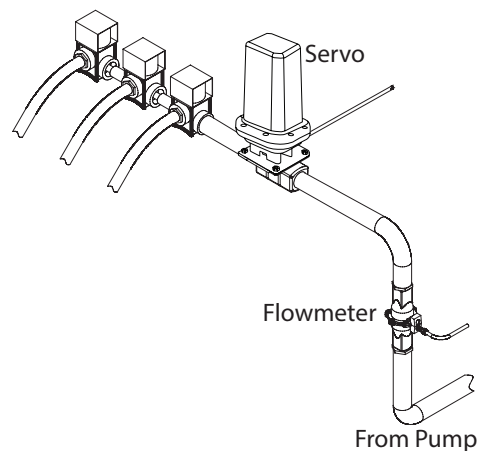
The servo valve connects directly to the 3-pin connector on the main harness. If more length is required, use a 3-pin W/P extension cable of the appropriate length.

NOTE: For Inline operation, the servo valve is installed in the main spray line as shown in illustration.

Bypass



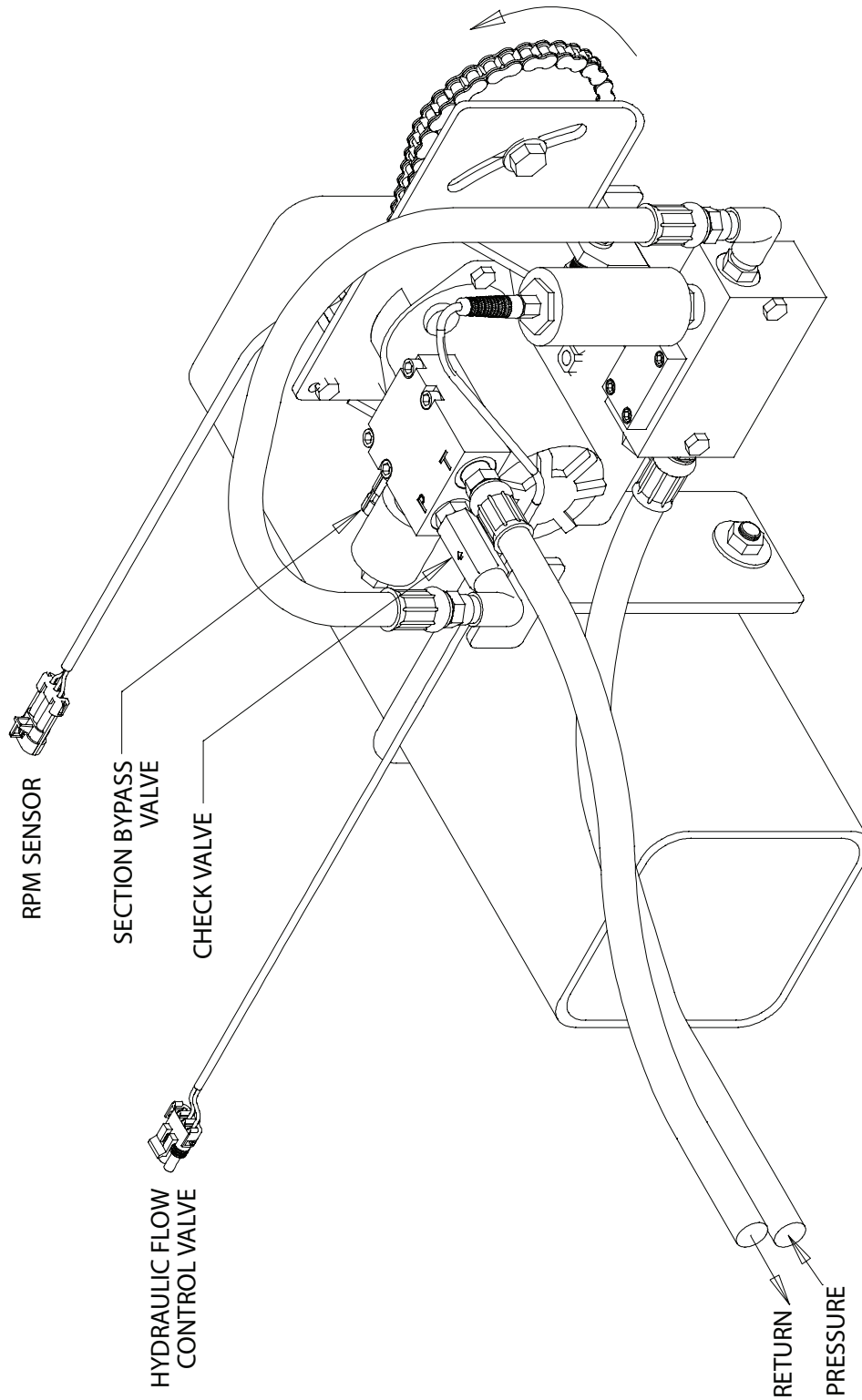
Inline



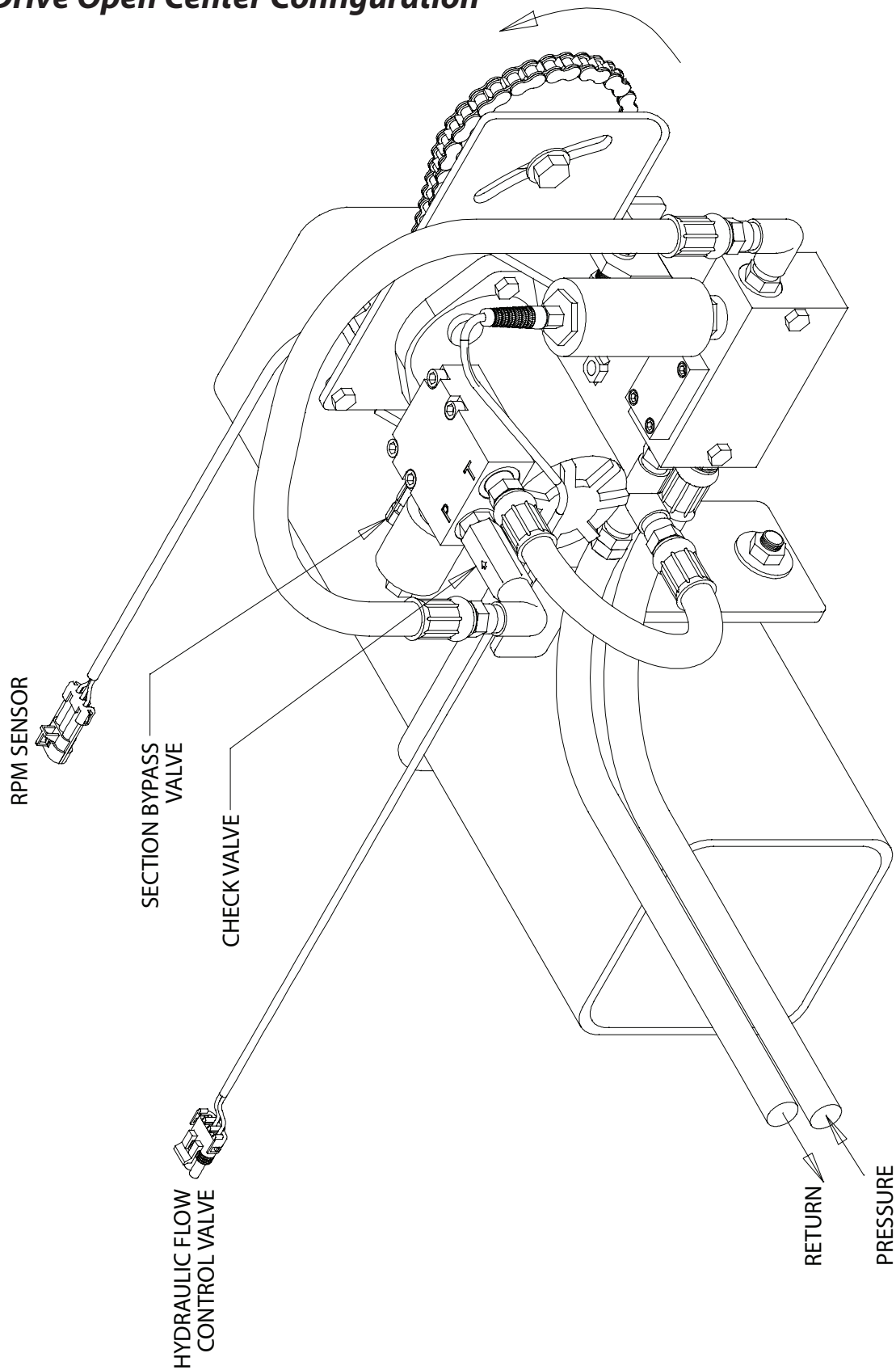
GRANULAR APPLICATION SYSTEMS

Installation

Single Drive Closed Center Configuration



GRANULAR APPLICATION SYSTEMS
Installation
Single Drive Open Center Configuration



GRANULAR APPLICATION SYSTEMS

Installation

Installing Product Rate Sensor

There are several methods for measuring feedback from the floor chain. Using the gear tooth sensor shown in **Figure A below**, feedback from the sensor would be 60 pulses per revolution of the head pulley. If the head pulley is 4.6 inches in diameter, the floor chain would move approximately 14.4 inches per revolution of the head pulley. If the floor chain is 10 inches wide then for each revolution of the head pulley, the floor chain would drag approximately 144 cubic inches of product out for each inch of gate opening, and after 12 revolutions the floor chain would drag out approximately 1728 cubic inches or 1 cubic foot. The approximate Spreader Constant for the aforementioned Rate Sensor installation is 720, 12 revolution times 60 pulses per revolutions equals 720 pulses per cubic foot.

It is important that the Spreader Constant value be 100 or greater to maintain good resolution.

Figure A.

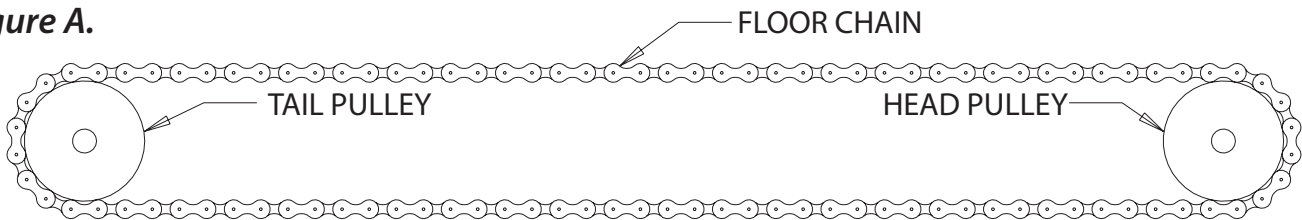
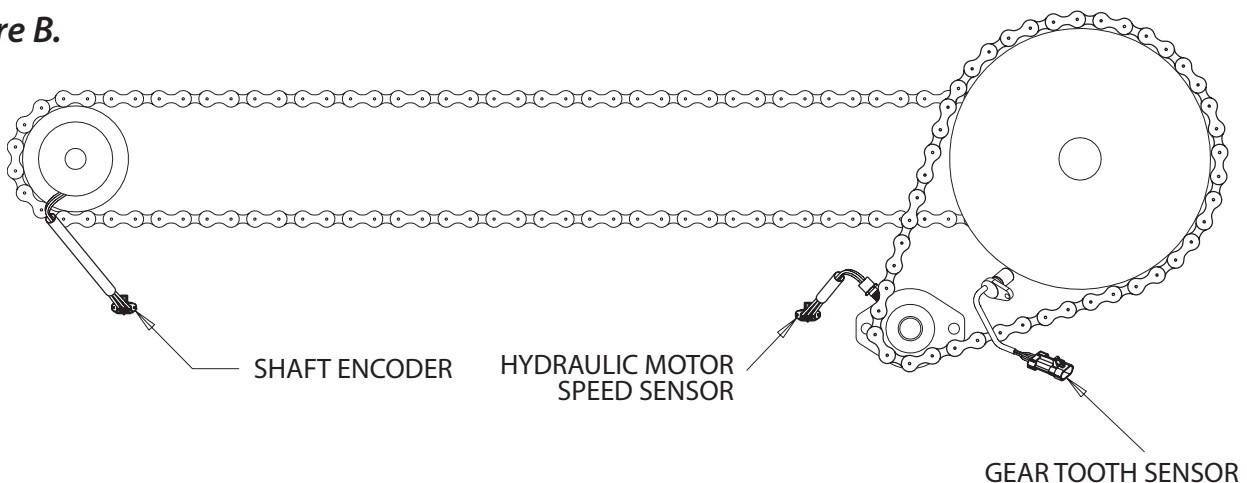


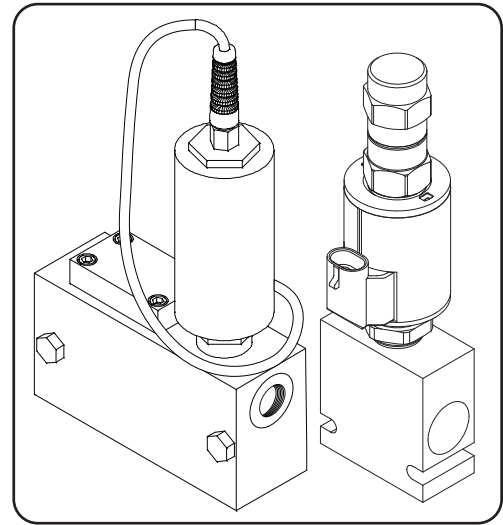
Figure B.



LIQUID OR GRANULAR APPLICATION SYSTEMS

Hydraulic Control Methods

Pulse width modulation (PWM) and Standard (STD) Servo Control Valves both control the hydraulic flow to the pump. The console will send a signal to the valve which will increase or decrease the hydraulic oil flow to the controlled motor. The STD valve is sent +/- 12V and the PWM is sent as a pulsed signal. The directional polarity of the valve can be changed in the Controller for use in INLINE and BYPASS configurations.”



Control Overview

Control Summary

The following is an overview of the Dual ISOmod™ control system. The Dual ISOmod™ is a multi-section, single or dual channel controller. The controller is pre-programmed with generic default settings and needs to be setup and calibrated prior to in-field use.

On Screen Display

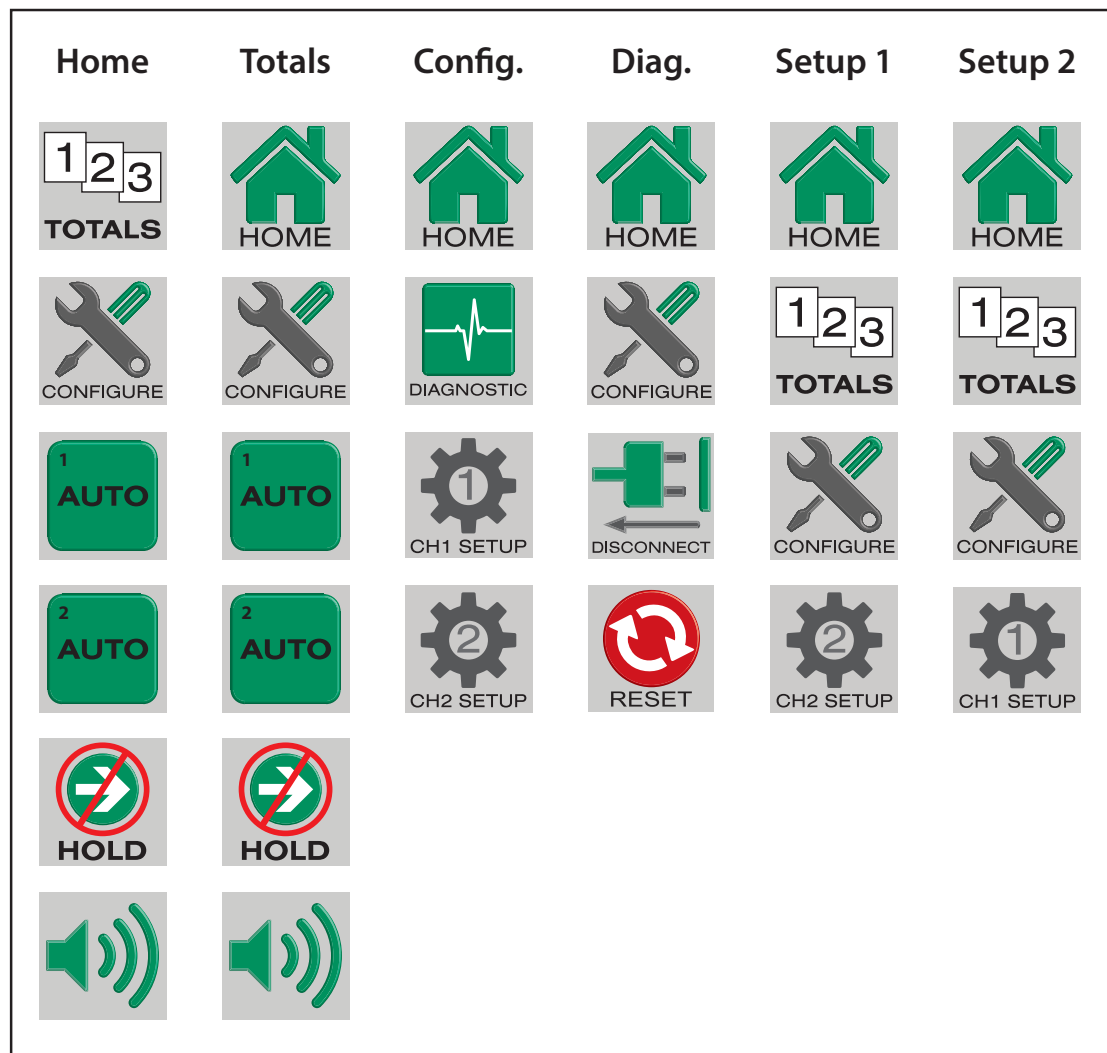
The Dual ISOmod™ is designed to integrate into serial networks that use ISOBUS standards - ISO 11783. The appearance of the on-screen display will vary depending on the brand of Virtual Terminal that is used.

The system is also designed to run along side, and in the background, with other programs on the VT. When an alarm situation happens, the Dual ISOmod™ screen will pop-up to the front to allow the user to assess the situation.

Navigation Choices

The diagram below shows navigation through the control screens via keys displayed on the Virtual Terminal.

Operating the Dual ISOmod™ system is only possible from the Home or Totals screens (the controls on the Totals screen are limited to switching from Automatic to Manual to Off, engaging Run/Hold switch, and controlling audible alarm volume).



Controls

VT Softkeys

Example:



Virtual terminal controls are displayed along the right side or bottom of the screen, in accordance with ISO standards. Depending on their function, VT softkeys navigate from screen to screen, or activate functions - Run/Hold etc.

On-screen keys

Example:



On-screen keys are controls that activate functions, directly affect numerical values, or navigate to specific setup routines.

Drop down boxes

Example:



Drop down boxes are rectangular and allow the user to choose options from a provided list.

Input Boxes

Example:



Input boxes are rectangular and allow the user to input alphanumeric values from a pop-up keypad on screen.

Check Boxes

Example:

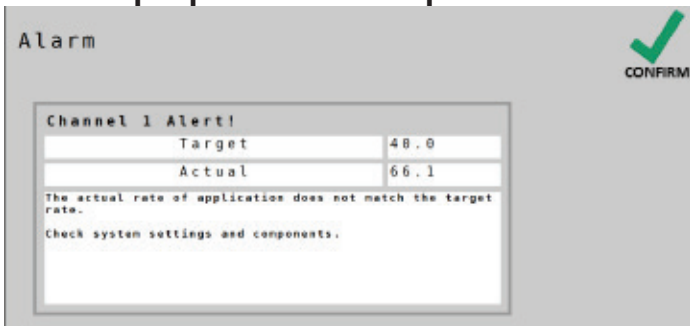


Square check boxes allow the user to activate a function. The function will remain in that state until the box is pressed again.

Alarms

If a parameter on the Dual ISOmod™ system significantly exceeds, or falls short of established limits, an Alert Message similar to the one shown will appear in front. The Alert Message explains the alarm situation, gives critical information, and lists possible fixes or next steps. To clear alert message, press confirm. It is possible to return to alert message later by pressing on the flashing alarm icon.

Alert Pop-up Screen example:



Alarm Icon:



Application Modes

(setting in Config. A)

Normal Mode:

In Normal Mode, Channels 1 and 2 operate independently. Channel 1 has 12 section control switches and Channel 2 has 1 section output with switch. Both channels are controlled by the Run/Hold switch. The working parameters for Width Cal (section width) are independent of each other.

Parallel Mode:

In Parallel mode, Channels 1 and 2 operate independently but Channel 2 uses section widths defined by Channel 1. Both channels are controlled by the Run/Hold switch. See **Appendix E** for wiring diagram showing parallel mode cable connections.

Injection Mode:

Injection Mode links Channel 1 and 2 together with Channel 1 in control. It is ideal for applications where a chemical in Channel 2 is injected into a carrier (water) in Channel 1. In this mode, Channel 1 section switches control product delivery. The Width Calibration of both channels is also set by Channel 1.

Multifunction Outputs

Each channel has two electrical outputs (**A & B**) with selectable functions. The outputs are found on the Channel Setup Page/Outputs. Outputs can be named for reference.

Definitions:

Not Used - always off.

Aux Power - always on (when ISOmod is ON).

Master - off in hold.

Run/Hold Only - on in Run - unaffected by sections.

Relief - on in hold.

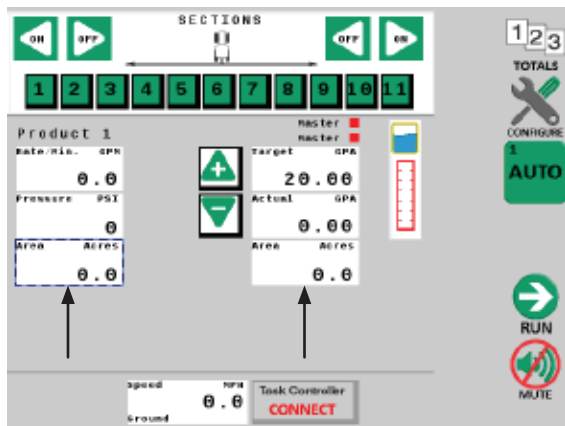
Fixed Flow (Fixed Flow Trigger) - on when the flow per minute reaches a specified fixed total flow rate.

Flush - on when Hold is detected and remains on for a specified time period.

Proportional Flow (Proportional Flow Trigger) - on when the flow per minute reaches a specified flow rate, proportional to active sections.

Channel Selection

Individual channels are enabled in **Setup/Operation**. If one of the 2 channels is disabled, controls for that channel are removed from the **Home** screen. In addition, the remaining active channel will expand on the Home screen, adding 2 more Information Display windows - see below. These windows can be reconfigured by selecting the window and choosing display data.



Control Overview

Material/Units

Liquid:

When the Material / Units option is set to "Liquid / Gallon" or "Liquid / Ounce", the system is configured for liquid application. This configurations enables features that make the system easier to use when applying a liquid product.

Dry/Granular:

When the Material / Units is set to "Dry / Pounds" the system is configured for dry application. This configurations enables features that make the system easier to use when applying a granular product.

RPM Control

When the Material / Units is set to "RPM" the system is configured for RPM control. This mode does not automatically adjust the rate of application when speed or the target width are changed. This feature is adjusting based only on the flow input for the channel.

Automatic

If the AUTO icon is displayed, the system will adjust the Rate/Min according to the speed and active with in order to achieve the target rate.



Manual

If the MAN icon is displayed, the system will not try to control the system and will maintain the same servo control position (Standard) or Duty Cycle % (PWM) the system was set to when the system was switched to MAN.



Off

If the OFF icon is displayed, the channel will remain in a state similar to the hold position. This gives the user the ability to turn off an individual channel and leave the other still operating.



Run/Hold Modes:

The Dual ISOMod™ can respond to Run/Hold or Implement Switch signals from a variety of sources:

Manual Hold:

If the Run/Hold softkey is manually activated on-screen, only the red Hold symbol will be displayed.



Connected Implement Switch:

If an Implement Switch is connected directly to the Dual ISOMod™ wiring harness, when activated the yellow Hold symbol will also display a letter "I". This indicates harness Implement Switch signal is present.



Master Implement Switch:

If Implement Switch signal is present on the ISObus network, when activated the yellow Hold symbol will also display a letter "M". This indicates that a master Implement Switch signal is present.



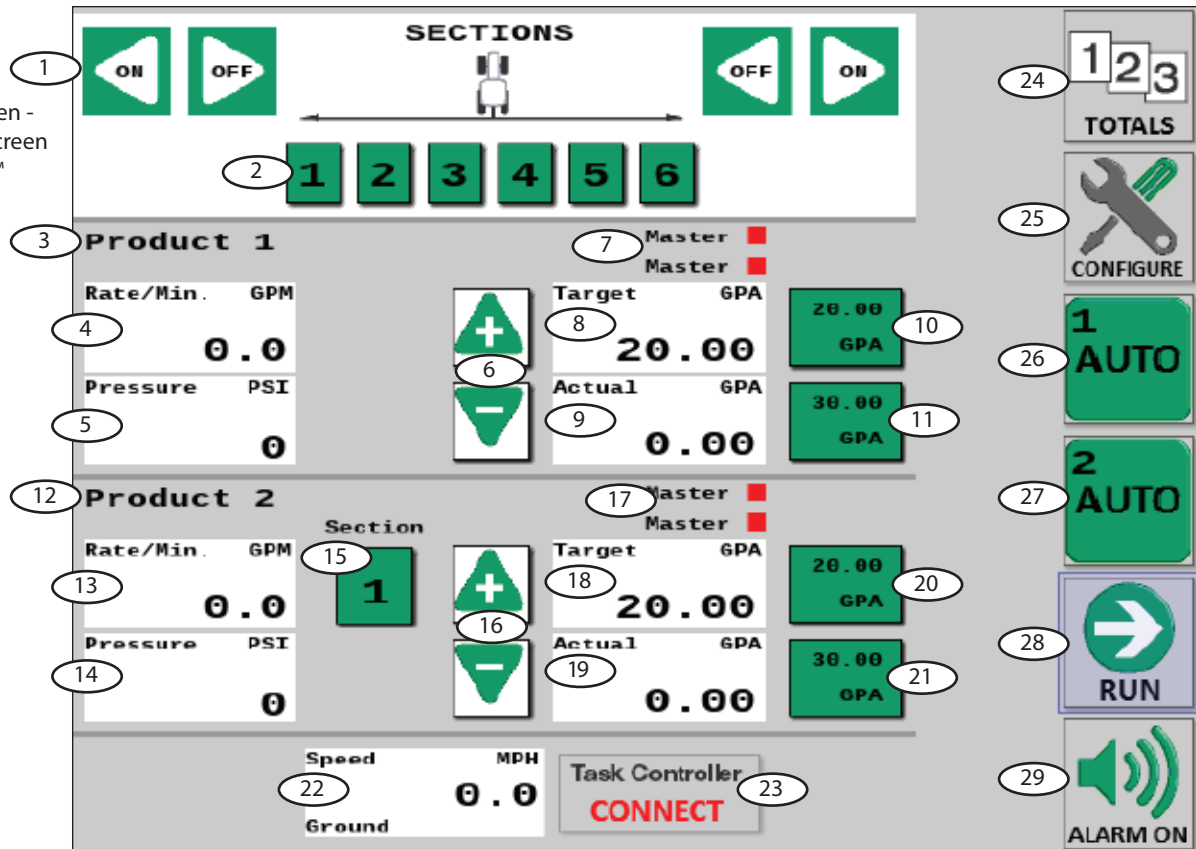
Run:

If the RUN icon shown here is displayed, the system is in RUN.



Home

This is the Home screen - the main operating screen for the Dual ISOmod™ system.



1 Ch.1 Section On/Off buttons

These are the controls for Ch.1 sections activation. The sections can be toggled on/off from either direction using the on/off buttons.

2 Ch.1 Section Indicators

Sections can also be toggled by pressing directly on the numbered rectangular section indicators below the tractor image. The number of sections (and corresponding widths) is specified in **Ch. 1 Setup/Implement**. (p.39)

3 Ch.1 Product Name

Ch.1 Product name (default shown). This label can be customized in **Ch. 1 Setup/Operation**. (p.29, liquid; p.34, granular)

4 Ch.1 Information Display

This display shows Channel 1 Rate/Minute as default. The units shown at upper right corner reflect the default unit of measure. This window can also be reconfigured by selecting the window and choosing from Rate/Minute, Volume Applied, Volume Remaining, Area Covered, Acres Per Hour (APH), Active Width, PWM Duty Cycle and Acres Remaining, Pressure (Liquid Only), Spinner RPM (Dry/Granular Only).

5 Ch.1 Information Display

This display shows Pressure as default. The units shown at upper right corner reflect the default unit of measure. This window can also be reconfigured by selecting the window and choosing from Rate/Minute, Volume Applied, Volume Remaining, Area Covered, Acres Per Hour (APH), Active Width, PWM Duty Cycle and Acres Remaining, Pressure (Liquid Only), Spinner RPM (Dry/Granular Only).

6 Ch.1 Increase/Decrease

These on-screen keys increase (+) or decrease (-) the overall Rate of application. If channel is set to Automatic, the Increase/Decrease buttons will affect the Target Rate in preset increments. The increment of change per key press is defined in **Ch.1 Setup/Operation tab** (p.29, liquid; p.34, granular) Default value =1. When channel is set to Manual, the Increase/Decrease buttons change the Actual rate of application based on the length of time the button is held down.

7 Ch.1 Multifunction Outputs - A & B

These indicators show when the system Multifunction Outputs are active. The default setting for both outputs is Master. This setting can be accessed, and outputs renamed, in **Ch.1 Setup/Outputs** (p.42).

8 Ch.1 Target Rate

This display shows the programmed Target Rate of the system. The target rate can be incrementally adjusted using Increase/Decrease on-screen keys. The setting for Target Rate is located in **Ch.1 Setup/Operation**. (p.29, liquid; p.34, granular)

9 Ch. 1 Actual Applied Rate

This display shows the actual applied Rate of the system. If the Actual Applied Rate is different than the Target Rate, an alarm will pop-up to notify the operator. The Rate Alarm Threshold setting is located in **Ch.1 Setup/Alarms** tab. (p.33, liquid; p.38, granular)

10 Ch. 1 Target Rate Change 1

This button will change the target rate to the value that is displayed on the button when pressed. The target rate value is set on the Operations tab of channel 1.

11 Ch. 1 Target Rate Change 2

This button will change the target rate to the value that is displayed on the button when pressed. The target rate value is set on the Operations tab of channel 1.

12 Ch.2 Product Name

Ch.2 Product name (default shown). This label can be customized in **Ch. 2 Setup/Operation**. (p.29, liquid; p.34, granular)

13 Ch.2 Information Display

This display shows Channel 2 Rate/Minute as default. The units shown at upper right corner reflect the default unit of measure. This window can also be reconfigured by selecting the window and choosing from Rate/Minute, Volume Applied, Volume Remaining, Area Covered, Acres Per Hour (APH), Active Width, PWM Duty Cycle and Acres Remaining, Pressure (Liquid Only), Spinner RPM (Dry/Granular Only).

Home

14 Ch.2 Information Display

This display shows Pressure as default. The units shown at upper right corner reflect the default unit of measure. This window can also be reconfigured by selecting the window and choosing from Rate/Minute, Volume Applied, Volume Remaining, Area Covered, Acres Per Hour (APH), Active Width, PWM Duty Cycle and Acres Remaining, Pressure (Liquid Only), Spinner RPM (Dry/Granular Only).

15 Ch.2 Section Indicator

Ch.2 Section can be toggled by pressing directly on the numbered rectangular section indicator. The Ch.2 section width is specified in **Ch. 2 Setup/Implement**.

16 Ch. 2 Increase/Decrease

These on-screen keys increase (+) or decrease (-) the overall Rate of application. If channel is set to Automatic, the Increase/Decrease buttons will affect the Target Rate in preset increments. The increment of change per key press is defined in **Ch.2 Setup/Operation tab** (default=1). When channel is set to Manual, the Increase/Decrease buttons change the Actual rate of application based on the length of time the button is held down.

17 Ch.2 Multifunction Outputs - A & B

These indicators show when the system Multifunction Outputs are active. The default setting for both outputs is Master. This setting can be accessed, and outputs renamed, in **Ch.2 Setup/Outputs** (p.42).

18 Ch. 2 Target Rate

This display shows the programmed Target Rate of the system. The target rate can be incrementally adjusted using Increase/Decrease on-screen keys. The setting for Target Rate is located in **Ch.2 Setup/Operation**.

19 Ch. 2 Actual Applied Rate

This display shows the actual applied Rate of the system. If the Actual Applied Rate is different than the Target Rate, an alarm will pop-up to notify the operator. The Rate Alarm Threshold setting is located in **Ch.2 Setup/Alarms** tab.

20 Ch. 2 Target Rate Change 1

This button will change the target rate to the value that is displayed on the button when pressed. The target rate value is set on the Operations tab of channel 2.

21 Ch. 2 Target Rate Change 2

This button will change the target rate to the value that is displayed on the button when pressed. The target rate value is set on the Operations tab of channel 2.

22 Speed

This displays vehicle speed. The speed source for the system is defaulted to **Remote** to access speed information from the ISOBUS network. The label on the Speed window shows the source of the speed signal - Blended, GPS, Wheel, Ground (radar), or Simulated (Test Speed). To enter a simulated test speed, tap the speed input box and enter a value. The test speed will be overrode once the control system receives a speed signal from the speed source selected in Configuration/Tab A unless the Test Speed box is checked. The Test Speed check box is also located in Configuration/Tab A.

23 Task Controller Connect/Disconnect

This button will connect the Dual ISOmod™ system to available Task Controller on the network. Task Controller parameters in Configuration-tab B, and Channel Setup-Implement tab **MUST** be measured and entered before connection. Changing those parameters is **NOT** possible once connected. When under Prescription Control, this button reads "Section Control" and flashes in **HOLD**.

24 Totals

This VT Softkey directly navigates to the Totals screen.

25 Configure

This VT Softkey directly navigates to the Configure screen.

26 Ch. 1 Auto/Manual/Off

This VT Softkey selects Automatic or Manual control of application.

27 Ch. 2 Auto/Manual/Off

This VT Softkey selects Automatic or Manual control of application.

28 Run/Hold

This VT Softkey controls Run/Hold (application on/off) for entire system. It also shows the source of the Run/Hold signal - see below.

29 Alarm Mute

This VT Softkey controls the audible alarm mute. When engaged, audible alarms are turned off.

Totals

This is the Totals screen for the Dual ISOmod™ system. It can also be used as an operating screen.

The screenshot shows the 'Totals' screen with the following elements:

- Totals Tab:** Located at the top right, with sub-tabs 1, 2, and 3. Tab 1 is highlighted.
- Product 1 Section:**
 - Applied:** 0.0 G (6)
 - Area:** 0.0 Acres (3)
 - Distance:** 0.0 Feet (4)
 - Op. Time:** 0.0 Hours (5)
 - RESET Button:** (6)
- Product 2 Section:**
 - Applied:** 0.0 G (7)
 - Area:** 0.0 Acres (8)
 - Distance:** 0.0 Feet (9)
 - Op. Time:** 0.0 Hours (10)
 - RESET Button:** (11)
- Tank Refill Section:**
 - Product 1:**
 - Current:** 0.0 G (13)
 - Capacity:** 500.0 G (14)
 - Fill Button:** (12)
 - Product 2:**
 - Current:** 0.0 G (16)
 - Capacity:** 30.0 G (17)
 - Fill Button:** (15)
- Right Side Buttons:**
 - HOME:** (18)
 - CONFIGURE:** (19)
 - 1 AUTO:** (20)
 - 2 AUTO:** (21)
 - RUN:** (22)
 - ALARM ON:** (23)

1 Totals Tabs

There are 3 independent sets of Totals counters separated into the 2 channels. The highlighted tab indicates which counter set is shown. Counters do not accumulate data when system is in HOLD or when sections are turned off.

2 Ch. 1 Volume Counter

Displays the total volume of product applied in gallons (l). The current default unit of measure is shown at right side. This changes to a Weight Counter that displays in pounds (kg) when the system is in a granular mode.

3 Ch. 1 Area Counter

Displays the running total of total area worked in acres (hectares). The current default unit of measure is shown at right side.

4 Ch. 1 Distance Counter

Displays cumulative distance traveled in feet or Meters.

5 Ch. 1 Operating Time

Displays the cumulative running time of the system.

6 Ch. 1 Totals Reset

Clears the counter of information (after the confirmation screen). Reset only applies to the Tab that is currently shown.

7 Ch. 2 Volume Counter

Displays the total volume of product applied in gallons (l). The current default unit of measure is shown at right side. This changes to a Weight Counter that displays in pounds (kg) when the system is in a granular mode.

8 Ch. 2 Area Counter

Displays the running total of total area worked in acres (hectares). The current default unit of measure is shown at right side.

9 Ch. 2 Distance Counter

Displays cumulative distance traveled in feet or Meters.

10 Ch. 2 Operating Time

Displays the cumulative running time of the system.

11 Ch. 2 Totals Reset

Clears the counter of information (after the confirmation screen). Reset only applies to the Tab that is currently shown.

12 Fill

This button will set the "Current" level of the system to match the "Capacity" level.

13 Ch. 1 Tank Refill - Current

Enter current amount of water in tank. The default capacity of Ch. 1 tank is 500 gal (1893 liters). Tap on the displayed value and edit to match the implement tank. This display changes to pounds (kg) when the system is in a granular mode.

14 Ch. 1 Tank Refill - Capacity

The default capacity of Ch. 1 tank is 500 gal (1893 liters). Tap on the displayed value to edit. This display changes to pounds (kg) when the system is in a granular mode.

15 Fill

This button will set the **Current** level of the system to match the **Capacity** level.

16 Ch. 2 Tank Refill - Current

Enter current amount of water in tank. The default capacity of Ch. 2 tank is 30 gal (114 liters). Tap on the displayed value and edit to match the implement tank. This display changes to pounds (kg) when the system is in a granular mode.

17 Ch. 2 Tank Refill - Capacity

The capacity of Ch. 2 tank is 30 gal (114 liters). Tap on the displayed value to edit. This display changes to pounds (kg) when the system is in a granular mode.

Totals

18 Home

This VT Softkey directly navigates to the Home screen.

19 Configure

This VT Softkey directly navigates to the Configure screen.

20 Ch. 1 Auto/Manual/Off

This VT Softkey selects Automatic control, Manual control or Off.

21 Ch. 2 Auto/Manual/Off

This VT Softkey selects Automat control, Manual control or Off.

22 Run/Hold

This VT Softkey controls Run/Hold (application on/off).

23 Alarm Mute

This VT Softkey controls the audible alarm mute. When engaged, audible alarms are turned off.

Configuration

A

Note:

When connected to **Task Controller**, these fields are disabled.

The Configuration screen displays the following settings:

- Speed Source:** Source
- Speed Cal:** 0.189 in
- Minimum Alarm Speed:** 0.0 MPH
- Area Units:** Acres
- MTSI Width Source:** Disabled
- Quick Start Time:** 0 S
- Quick Start Speed:** 0.0 MPH
- Test Speed:** ☐ 5.0 MPH

Navigation icons on the right sidebar:

- 9 HOME
- 10 DIAGNOSTIC
- 11 CH1 SETUP
- 12 CH2 SETUP

1 Speed Source

Select Speed Source for the system. Default is **Remote** - ISOBUS speed signal. Select **Local** to use a speed sensor connected directly to the Bulkhead Harness. **Source** sends local signal onto the ISO CAN to be read by other devices.

2 Speed Cal

Speed calibration number for Local speed - automatically defaulted to .189 for Micro-Trak® Astro™ II and 5 GPS speed sensors. (Data entry is disabled unless **Local** or **Source** are chosen in Speed Source.)

3 Minimum Alarm Speed

Enables and adjusts a minimum speed threshold for the audible alarm - this prevents unneeded warnings while stopping and starting. This can be set to OFF (0) or from 0.1 to 99.9 mph (km/h). Affected alarms are Application Rate Error and Minimum Flow.

4 Area Units

Select preference for Area Units for calculations and display. Default unit is **Acres** - other choices are **1000 sq. ft.**, or **Sq. Yards**. Exercise caution when changing Area Units, the controller software will not automatically re-calculate rate of application etc.

5 MTSI Width Source

Choose **Enabled** or **Disabled**. See Appendix H for MTSI Width sharing between Dual ISOMods™.

6 Quick Start Time

Enables Quick Start Time feature (0=off). This sends a timed simulated speed signal to the control system to cause an instant transition from Hold to Run. The duration range is from 0 (off) to 6 seconds.

7 Quick Start Speed

Assigns a Speed value in MPH (km/h) for Quick Start feature (see previous).

8 Test Speed

Check here to send a simulated speed signal to the control system for system checkout or diagnostics while implement is parked. (Speed value data entry is disabled until box is checked.) A simulated test speed may also be entered on the Home page by tapping the speed input box and entering a value. The simulated test speed will be override once the control system receives a speed signal from the speed source unless this Test Speed box is checked.

9 Home

VT Softkey - directly navigates to the Home screen.

10 Diagnostic

VT Softkey - directly navigates to the Diagnostic screen.

11 Ch. 1 Setup

VT softkey - directly navigates to Ch. 1 Setup.

12 Ch. 2 Setup

VT softkey - directly navigates to Ch. 2 Setup.

Configuration B

Configuration

1 **Implement Switch**
Run = Switch **Open**

2 **External Source** **Local only**

3 **ISObus Master** **Disabled**

4 **Auto Attach Task Controller** ☐

5 **Enable Section Control** ☒

6 **Hitch to Reference Distance**

7 **Forward(+) / Backward(-)** **0.0** in

8 **Right(+) / Left(-)** **0.0** in

9 **Hitch Type** **Unknown**

Note:
When connected to Task Controller, these fields are disabled.

10 **HOME**

11 **DIAGNOSTIC**

12 **CH1 SETUP**

13 **CH2 SETUP**

1 Implement Switch - Run=Switch

Selects polarity for remote Implement Switch connection - reverses circuit function. The default setting is closed, meaning that the system will be in Hold when the circuit is closed.

2 Implement Switch - External Source

The default setting for External Source is Local Only. If an Implement Switch signal is available from another Dual ISOmod™, the input box will be accessible. Choose the appropriate ID (serial number).

3 ISObus Master

Controls the transmission of Implement Switch signal from Dual ISOmod™.

Disabled: No signals sent.

Implement Switch: Only Implement Switch signal is sent (on-screen softkey Run/Hold not transmitted).

Enabled: Transmits (or re-transmits) any signal affecting Run/Hold status, including on-screen softkey Run/Hold button.

4 Auto Attach Task Controller

This check box tells the system to automatically connect to the available Task Controller. The Task Controller parameters in Configuration-tab B, and Channel Setup-Implement tab **MUST** be measured and entered before attachment. Changing those parameters is **NOT** possible once the system is connected.

5 Enable Section Control

This allows the Task Controller to control section on/off. Default setting is ON.

6 Reference to Hitch Distance

These parameters establish a Reference Point for the Task Controller to measure from for accurate position calculations. Choose a reference point that is convenient, preferably the center of the axle (or toolbar). The remaining distance from this reference point to the first point of application will be entered in Channel 1 setup.

See illustration at right.

7 Forward (+) / Backward (-)

Measure the forward or backward distance from the Task Controller Reference Point to the hitch.

8 Right (+) / Left (-)

Measure the right or left distance from the Task Controller Reference Point to the hitch. If the implement has no offset, leave value at 0.

9 Hitch Type

Choose your hitch type. This choice allows the system to process in-field calculations more accurately.

10 Home

VT Softkey - directly navigates to the Home screen.

11 Diagnostic

VT Softkey - directly navigates to the Diagnostic screen.

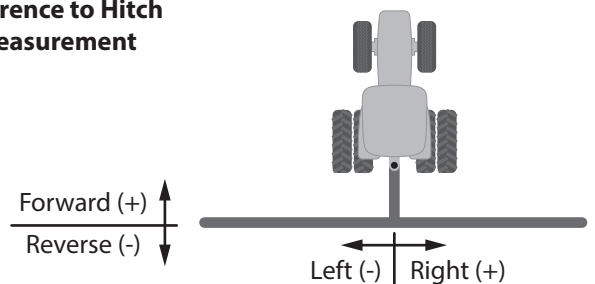
12 Channel 1 Setup

VT softkey - directly navigates to Ch. 1 Setup.

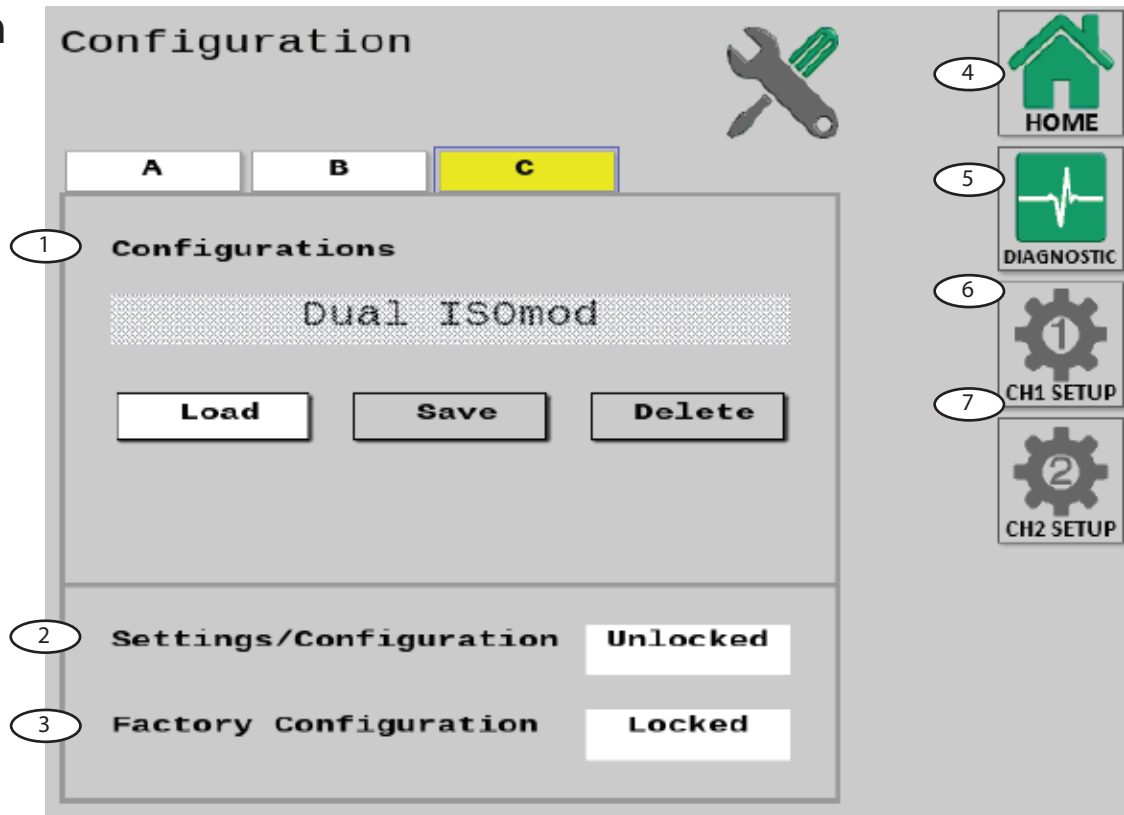
13 Channel 2 Setup

VT softkey - directly navigates to Ch. 2 Setup.

Reference to Hitch Measurement



Configuration C



1 Configurations

The **Load** button will reset all parameters to factory defaults, including erasing all Totals data.

2 Settings/Configuration

This feature locks both **Configuration Defaults** and **Factory Configuration** on this page. To lock these, press "Unlocked" and enter code 1320. To unlock, enter the same 1320 code.

3 Factory Configuration

This button unlocks access to system software configuration parameters. Access to this configuration is locked by default. Should access become necessary, a code will be provided by a qualified service technician.

4 Home

VT Softkey - directly navigates to the Home screen.

5 Diagnostic

VT Softkey - directly navigates to the Diagnostic screen.

6 Channel 1 Setup

VT softkey - directly navigates to Ch. 1 Setup.

7 Channel 2 Setup

VT softkey - directly navigates to Ch. 2 Setup.

LIQUID Channel Setup - Operation

Note:
When connected
to **Task Controller**,
these fields are
disabled.

1 Channel Name

Enter the name of the product being applied by channel. This name can be entered from any of the Channel Setup pages.

2 Enable Channel

This checkbox enables shown Channel for normal operation. The default position is "enabled". If left unchecked, the channel will no longer be visible on the home screen.

3 Material Units

This setting defines the system unit of measure. It is preset for Gallons. Choices are shown below.

(Liquid) Gal. / L
(Liquid) Oz. / mL
(NH3) lbs.
(Dry) lbs. / kg

4 Target Rate 1

Enter desired overall Target Rate for application in gallons per acre (liters per hectare) or lbs. of N per acre (kgs of N per hectare). This is the application rate that the console will lock onto when operating in AUTO.

5 Target Rate 2

Enter desired overall Target Rate for application in gallons per acre (liters per hectare) or lbs. of N per acre (kgs of N per hectare). This is the application rate that the console will lock onto when operating in AUTO.

6 Rate Step

This setting defines the increment step of change per key press for the Increase/Decrease buttons on the Home Screen. Default unit is 1 Gal/Acre.

7 Nozzle Number

This setting defines the nozzle number being used for application. The **Nozzle Number** is the flow rate at which 1 nozzle flows at 40 PSI. E.g. 01 = 0.1 Gal/Min @ 40 PSI. Choices are shown.

8 1 Nozzle @ 40 PSI

This setting defines what flow rate 1 nozzle produces at 40 psi.

9 Application Mode

Choose Normal Mode, Parallel Mode or Injection Mode. See page 20.

10 Home

VT Softkey - directly navigates to the Home screen.

11 Totals

VT Softkey - directly navigates to the Totals screen.

12 Configure

VT softkey - directly navigates to Configure screen.

13 Channel 2 Setup

VT softkey - directly navigates to Ch. 2 Setup.

LIQUID Channel Setup - Control

Note:
When connected
to **Task Controller**,
these fields are
disabled.

1 Control Speed

This value optimizes valve response time to fine-tune the system. The default setting is -1.

2 Automatic Delay Time

Enables and adjusts value for Auto Delay feature. When transitioning from HOLD to RUN, it provides time for motorized valves to operate and allows the flow to stabilize before AUTO control begins.

The range for this feature is 1- 4 seconds.

3 Fixed Minimum Rate

This value sets an absolute minimum flow for the system.

4 Minimum Pressure

(Liquid only). This value sets an absolute minimum pressure for the system.

5 Enable Manual Control

Enables Manual Control for the system.

6 Enable Quick Start

This setting enables Quick Start feature - Providing an instant Speed (simulated) whenever the system goes from HOLD to RUN. This is useful in eliminating time delay associated with acquiring enough Speed signal pulses to provide the system with speed information. See Configuration/A page 26 for entering Quick Start Time and Speed parameters. (Make sure Automatic Delay Time is disabled.)

7 Enable Pressure Control

(Liquid only). Enables Pressure Control for the system.

8 Enable Hybrid Control

(Liquid only). Enables Hybrid Control for the system. Hybrid control is a combination of both Pressure and Flow Rate Control. Flow Rate Control is used until the flow falls below the Fixed Minimum Rate and then Pressure Based Control is used.

9 Home

VT Softkey - directly navigates to the Home screen.

10 Totals

VT Softkey - directly navigates to the Totals screen.

11 Configure

VT Softkey - directly navigates to Configure screen.

12 Channel 2 Setup

VT Softkey - directly navigates to Ch. 2 Setup.

LIQUID Channel Setup - System

1 Flowmeter Units & Value

This position defines the flow pulse units and calibrates the system to the flowmeter factory setting. This default value is calculated specifically for Micro-Trak® flowmeters. If necessary, fine tune this value using the Fine Tune Flowmeter procedure.

Flow Units
MTS Liq. - GAL
Pulses Per GAL
Pulses Per 10 GAL
MT Liquid - Oz.
Pulses Per Oz.
Pulses Per L

2 Fullscale Pressure

Displays and adjusts **Full Scale** (max.) value for Pressure Sensor. Default is 150 PSI. Hidden if there is no PSI Transducer connected to the system.

3 Pressure Offset

Adjusts the system to calculate pressure reading when using an Absolute style pressure sensor. Input absolute atmospheric pressure in PSI (bar) for your location. Hidden if there is no PSI Transducer connected to the system.

4 Control Valve - DC

Enables DC (reversing polarity DC) for Servo-type flow control valves. The parameters shown, Valve Polarity and Auto Shutoff are specific for DC control (visible if checked).

- **Valve Polarity** - Choose Inline or Bypass Operation
- **Auto Shutoff** - Enables runs the control valve towards minimum flow each time HOLD is selected, or when all (non-zero width) sections are turned off, or when in AUTO and ground speed goes to zero. Duration of Auto Shutoff feature is 18 seconds.

Valve Polarity	In Line
Auto Shutoff	

5 Control Valve - PWM

Enables Pulse Width Modulation valve control.

6 Operating Frequency

Operating Frequency for PWM valve control default is 200 Hz.

7 Agitation Duty Cycle

Sets a PWM Duty Cycle that the system will operate at in **Hold**. This feature enables the user continue circulating flow when the system is in hold.

8 Minimum Duty Cycle

This setting is the PWM duty cycle low limit for the PWM controlled pump. If necessary, fine tune this value using the Set PWM Limits procedure described in **Channel Setup - Operation**.

9 Maximum Duty Cycle

This setting is the PWM duty cycle high limit for the PWM controlled pump. If necessary, fine tune this value using the Set PWM Limits procedure described in **Channel Setup - Operation**.

10 Set PWM Limits

This button opens another screen that allows the operator to adjust PWM duty cycle limits. See page 41.

11 Fine Tune Meter

This button opens another screen that allows the operator to fine tune flowmeter calibration settings. See following page.

12 Home

VT Softkey - directly navigates to the Home screen.

13 Totals

VT Softkey - directly navigates to the Totals screen.

14 Configure

VT Softkey - directly navigates to Configure screen.

15 Channel 2 Setup

VT Softkey - directly navigates to Ch. 2 Setup.

LIQUID

Channel Setup -

Fine Tune Meter Procedure

This procedure is used to verify and fine-tune the flow calibration by catch test. The catch test result is then compared with the system calculated volume, and the system is then adjusted to match actual flow. The larger the sample of water, the more precise the test and adjustment will be.

The most accurate method to measure the volume of water run is to place a container under EVERY nozzle and add together the amount from each nozzle. This assures that 100 percent of the water is collected and that all nozzles are spraying equally. It is also possible to disconnect the main boom line and run it to a large measuring container but a valve must be installed and properly adjusted to simulate actual field conditions.

Note: the Fine Tune Meter test is automatically preset to run at simulated speed of 6 mph, using the current Target Rate and Active Width.

Test Procedure:

1. Fill sprayer tank with water - preferably 100 gallons or more. The larger the volume of water used, the more accurate the calibration.
2. Place catch test container(s) to collect the water.
3. Press Run/Hold softkey. At least one section must be active.



4. Run test until intended volume is reached.
5. Press Run/Hold softkey to stop flow.



6. Measure collected liquid and enter total Volume Measured in box on screen. Press on the number to enter the number.

Volume Measured	oz
0.0	

7. The new value is automatically calculated, and then displayed in the Meter Cal Calculated box.

Meter Cal Calculated
0.00

8. To save value, press Confirm softkey - the new Meter Cal is automatically saved.



<div> <div>ON OFF</div> <div>SECTIONS</div> <div>OFF ON</div> </div> <div>1 2 3 4 5 6</div>				<div>CONFIRM</div> <div>CANCEL</div> <div>RESET</div> <div>HOLD</div>
<div>Product 1</div> <div> <div>Applied 6</div> <div>Rate/Min. GPM</div> <div>Meter Cal</div> </div> <div> <div>0.0</div> <div>0.0</div> <div>145.00</div> </div>				
<div> <div>Measured 6</div> <div>Meter Cal Calculated</div> </div> <div> <div>0.0</div> <div>0.00</div> </div>				

LIQUID Channel Setup - Alarms

Product 1

System Outputs **Alarms** ISObus

Operation Control Implement

1 Rate Alarm Threshold 10 %

2 Low Pressure Alarm ☐ 0 PSI

3 High Pressure Alarm ☐ 50 PSI

4 Nozzle Check Alarm ☐ 10 %

5 Tank Level Alarm ☐ 50.0 G

6 HOME

7 TOTALS

8 CONFIGURE

9 CH2 SETUP

1 Rate Alarm Threshold

Adjusts threshold value for the Rate Alarm - can be set from 10-30%. This value is the percentage of difference between the actual rate of application and the intended (target) rate. Default setting is 10%.

2 Low Pressure Alarm

Enables and adjusts value for Pressure Alarm - set value to notify operator when low level is reached. Range: 0 to 50% of FULL SCALE setting.

3 High Pressure Alarm

Enables and adjusts value for Pressure Alarm - set value to notify operator when high level is reached. This can be set to OFF (0) or up to 100% of FULL SCALE setting.

4 Nozzle Check Alarm

Enables and specifies a value for the Nozzle Check Alarm. When enabled if the actual flow differs from the calculated flow from pressure by the set percentage, the alarm will notify the operator.

5 Tank Level Alarm

This enables and specifies a value for the Tank Alarm.

6 Home

VT Softkey - directly navigates to the Home screen.

7 Totals

VT Softkey - directly navigates to the Totals screen.

8 Configure

VT Softkey - directly navigates to Configure screen.

9 Channel 2 Setup

VT Softkey - directly navigates to Ch. 2 Setup.

GRANULAR Channel Setup - Operation

Note:

When connected to Task Controller, these fields are disabled.

The screenshot shows the 'Product 1' setup screen. At the top, there's a 'Product 1' label (1) and a gear icon. Below it are tabs for 'System', 'Outputs', 'Alarms', and 'ISObus'. Under 'Outputs', there are sub-tabs: 'Operation' (highlighted), 'Control', and 'Implement'. The main area contains several fields: 'Enable Channel' (checkbox, 2), 'Material / Units' (text, 3) set to 'Dry / Pound', 'Target Rate 1' (text, 4) set to '100.0 lb/A', 'Target Rate 2' (text, 5) set to '150.0 lb/A', 'Rate Step' (text, 6) set to '10.0 lb/A', 'Gate Height' (text, 7) set to '2.5 in', 'Product Density' (text, 8) set to '55.0 lb/Ft^3', and 'Application Mode' (text, 9) set to 'Normal'. On the right side, there are navigation buttons: 'HOME' (10), 'TOTALS' (11), 'CONFIGURE' (12), and 'CH2 SETUP' (13).

1 Channel Name

Enter the name of the product being applied by channel. This name can be entered from any of the Channel Setup pages.

2 Enable Channel

This checkbox enables shown Channel for normal operation. The default position is "enabled". If left unchecked, the channel will no longer be visible on the home screen.

3 Material/Units

This setting configures the control system for material. It is preset for Liquid application. Choices shown below.

Liquid
NH3
Dry

3 Material Units

This setting defines the system unit of measure. It is preset for Gallons. Choices are shown below.

(Liquid) Gal. / L
(Liquid) Oz. / mL
(NH3) lbs.
(Dry) lbs. / kg

4 Target Rate 1

Enter desired overall Target Rate for application in pounds (kgs) per acre. This is the application rate that the console will lock onto when operating in AUTO.

5 Target Rate 2

Enter desired overall Target Rate for application in pounds (kgs) per acre. This is the application rate that the console will lock onto when operating in AUTO.

6 Rate Step

This setting defines the increment step of change per key press for the Increase/Decrease buttons on the Home Screen.

7 Gate Height

Enter the gate height of the granular spreader system.

8 Product Density

Enter the density of product being applied by the granular spreader system.

9 Application Mode

Choose Normal Mode, Parallel Mode or Injection Mode. See page 20.

10 Home

VT Softkey - directly navigates to the Home screen.

11 Totals

VT Softkey - directly navigates to the Totals screen.

12 Configure

VT softkey - directly navigates to Configure screen.

13 Channel 2 Setup

VT softkey - directly navigates to Ch. 2 Setup.

GRANULAR Channel Setup - Control

Note:
When connected
to **Task Controller**,
these fields are
disabled.

1 Control Speed

This value optimizes valve response time to fine-tune the system. The default setting is -1.

2 Automatic Delay Time

Enables and adjusts value for Auto Delay feature. When transitioning from HOLD to RUN, it provides time for motorized valves to operate and allows the flow to stabilize before AUTO control begins.

The range for this feature is 1- 4 seconds.

4 Enable Manual Control

Enables Manual Control for the system.

5 Enable Quick Start

This setting enables Quick Start feature - Providing an instant Speed (simulated) whenever the system goes from HOLD to RUN. This is useful in eliminating time delay associated with acquiring enough Speed signal pulses to provide the system with speed information. See Configuration/A page 26 for entering Quick Start Time and Speed parameters. (Make sure Automatic Delay Time is disabled.)

6 Home

VT Softkey - directly navigates to the Home screen.

7 Totals

VT Softkey - directly navigates to the Totals screen.

8 Configure

VT Softkey - directly navigates to Configure screen.

9 Channel 2 Setup

VT Softkey - directly navigates to Ch. 2 Setup.

GRANULAR Channel Setup - System

Product 1

System Outputs Alarms ISObus

Operation Control Implement

1 Pulses per foot^3 5426.00

2 Spinner Pulses/Rev 120

Control Valve 3 DC ☐ PWM ☒ 4

5 Operating Frequency 200 Hz

6 Minimum Duty Cycle 8 %

7 Maximum Duty Cycle 100 %

8 Set PWM Limits 9 Fine Tune Meter

10 HOME

11 1 2 3 TOTALS

12 CONFIGURE

13 CH2 SETUP

1 Spreader Constant Units & Value

This position defines the flow pulse units and calibrates the system to the factory setting. If necessary, fine tune this value using the Fine Tune Meter procedure.

Flow Units
Edges Per Foot^3
Pulses Per Foot^3
Pulses Per 10 Feet^3
Edges Per Meter^3
Pulses Per Meter^3
Pulses Per 10 Meter^3

2 Spinner Pulses/Rev

This Calibration value equals the number of pulses in one revolution of the spinner spreader on the back of a granular spinner applicator.

3 Control Valve - DC

Enables DC (reversing polarity DC) for Servo-type flow control valves. The parameters shown, Valve Polarity and Auto Shutoff are specific for DC control (visible if checked).

- **Valve Polarity** - Choose Inline or Bypass Operation
- **Auto Shutoff** - Enables runs the control valve towards minimum flow each time HOLD is selected, or when all (non-zero width) sections are turned off, or when in AUTO and ground speed goes to zero. Duration of Auto Shutoff feature is 18 seconds.

Valve Polarity	In Line
Auto Shutoff	<input type="checkbox"/>

4 Control Valve - PWM

Enables Pulse Width Modulation valve control.

5 Operating Frequency

Operating Frequency for PWM valve control default is 200 Hz.

6 Minimum Duty Cycle

This setting is the PWM duty cycle low limit for the PWM controlled pump. If necessary, fine tune this value using the Set PWM Limits procedure described in **Channel Setup - Operation**.

7 Maximum Duty Cycle

This setting is the PWM duty cycle high limit for the PWM controlled pump. If necessary, fine tune this value using the Set PWM Limits procedure described in **Channel Setup - Operation**.

8 Set PWM Limits

This button opens another screen that allows the operator to adjust PWM duty cycle limits. See page 41.

9 Fine Tune Meter

This button opens another screen that allows the operator to fine tune meter calibration settings. See following page.

10 Home

VT Softkey - directly navigates to the Home screen.

11 Totals

VT Softkey - directly navigates to the Totals screen.

12 Configure

VT Softkey - directly navigates to Configure screen.

13 Channel 2 Setup

VT Softkey - directly navigates to Ch. 2 Setup.

GRANULAR

Channel Setup - Fine Tune Meter Procedure

Spreader Constant Calibration

Use the formula below to approximate your Spreader Constant. All dimensions used in equations below are in inches. To fine tune your Spreader Constant:

1. Head Pulley Diameter (HPD) times pi equals linear drag chain movement per revolution (**HPD X 3.14159**).
2. The result from above times Drag Chain Width (DCW) to find cubic inches per revolution (assume 1" gate opening).
3. Cubic inches in a cubic foot (1728) divided by the result from line 2 to find revolutions per cubic foot.
4. Result from line 3 times the number of pulses per revolution of the head pulley to find pulses per cubic foot.

EXAMPLE

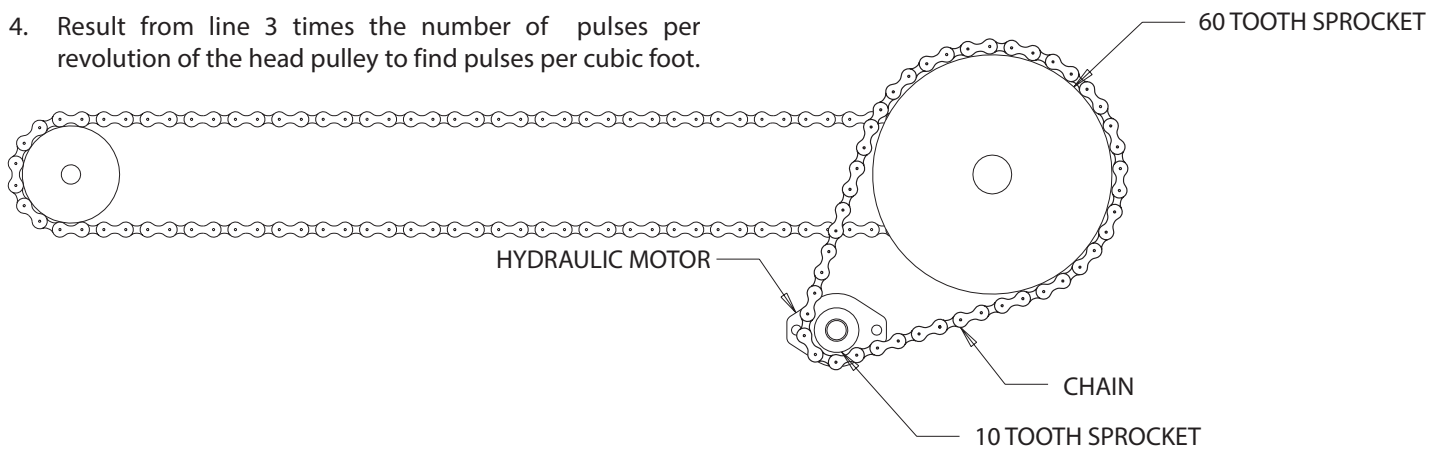
5" Head Pulley Diameter
18" Drag Chain Width
20 Pulses per Revolution

1. $5 \times 3.14159 = 15.70$

2. $15.70795 \times 18 = 282.74$

3. $1728 \div 282.7431 = 6.11$

4. $6.11 \times 20 = 122.23$



GRANULAR Channel Setup - Alarms

Product 1

System Outputs **Alarms** ISObus

Operation Control Implement

1 Rate Alarm Threshold 10 %

2 Low Spinner Speed ☐ 0 RPM

3 High Spinner Speed ☐ 500 RPM

4 Tank Level Alarm ☐ 50.0 lb

5 Tank Level Sensor ☐

6 HOME

7 TOTALS

8 CONFIGURE

9 CH2 SETUP

1 Rate Alarm Threshold

Adjusts threshold value for the Rate Alarm - can be set from 10-30%. This value is the percentage of difference between the actual rate of application and the intended (target) rate. Default setting is 10%.

2 Low Spinner Speed

Gives an alert when the spinner's speed is less than the set value.

3 High Spinner Speed

Gives an alert when the spinner's speed is more than the set value.

4 Tank Level Alarm

This enables and specifies a value for the Tank Alarm.

5 Tank Level Sensor

The tank level sensor will give an alert when the tank level alarm is activated. This feature is only available when a bin level sensor is installed.

5 Home

VT Softkey - directly navigates to the Home screen.

6 Totals

VT Softkey - directly navigates to the Totals screen.

7 Configure

VT Softkey - directly navigates to Configure screen.

8 Channel 2 Setup

VT Softkey - directly navigates to Ch. 2 Setup.

Channel Setup - Implement: Nozzles

Note:
When connected to **Task Controller**, these fields are disabled.

1 Section Valve Type

Select 2-Way or 3-Way valve type for the system.

2 Section Width Definition

Enter the number of nozzles per section.

3 Nozzle/Row Spacing (in)

Enter the distance between the nozzles (in inches).

4 Total Sections

Enter the total number of sections installed on the system.

5 Section Configuration

VT softkey - directly navigates to Section Nozzles screen. Enter the number of nozzles in each section, Figure A.

6 Home

VT Softkey - directly navigates to the Home screen.

7 Totals

VT Softkey - directly navigates to the Totals screen.

8 Configure

VT Softkey - directly navigates to Configure screen.

9 Channel 2 Setup

VT Softkey - directly navigates to Ch. 2 Setup.

Figure A.

Section	Nozzles
1	6
2	6
3	6
4	6
5	6
6	6

Note:
When connected to **Task Controller**, Section Nozzles screen is disabled.

Channel Setup - Implement: Widths

Note:
When connected to **Task Controller**, these fields are disabled.

- 1 Section Valve Type**
Select 2-Way or 3-Way valve type for the system.
- 2 Section Width Definition**
Enter the widths of sections.
- 3 Total Sections**
Enter the total number of sections installed on the system.
- 4 Section Configuration**
VT softkey - directly navigates to Section Width screen. Enter the section width in inches, Figure B.
- 5 Home**
VT Softkey - directly navigates to the Home screen.
- 6 Totals**
VT Softkey - directly navigates to the Totals screen.
- 7 Configure**
VT Softkey - directly navigates to Configure screen.
- 8 Channel 2 Setup**
VT Softkey - directly navigates to Ch. 2 Setup.

Figure B.

Note:
When connected to **Task Controller**, Section Width screen is disabled.

Channel Setup - Operation

Set PWM Limits

This setup routine establishes low and high PWM duty cycle limits for a PWM controlled device.

Procedure:

Set Minimum Limit

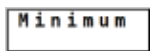
1. With at least one section turned on, press the Run/Hold softkey.



2. Press the Increase button until the pump shows steady minimum Rate/Min. Data window on the right shows real-time duty cycle %.



3. To save this value as the new minimum duty cycle %, press the Minimum button onscreen.

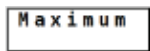


Set Maximum Limit

4. Press the Increase button until maximum Rate/Min. is reached. Data window on the right shows real-time duty cycle %.



5. To save this value as the new maximum duty cycle %, press the Maximum button onscreen.



Save Changes, and Exit

6. Press Run/Hold softkey to stop pump.



7. Press Confirm softkey to save changes and exit back to Channel Setup.



The screenshot displays the 'Set PWM Limits' interface. At the top, there are 'ON' and 'OFF' buttons for sections 1 through 6. Below this is a 'Product 1' section with a table showing 'Pressure PSI', 'Rate/Min. GPM', and 'Duty Cycle %'. The 'Duty Cycle %' is currently at 0.0. To the right of the table are '+' and '-' buttons. Below the table, there are two sections: 'Duty Cycle Saved' and 'Duty Cycle Measured'. The 'Duty Cycle Saved' section has a 'Minimum' button and a 'Maximum' button. The 'Duty Cycle Measured' section has a '0 %' value. On the right side of the screen, there are 'CONFIRM' and 'CANCEL' buttons, and a 'HOLD' button at the bottom right.

Channel Setup - Outputs

Each channel on the Dual ISOmod™ has two assignable multifunction outputs, A & B. These are preset to Master.

(1) Name of Output A
Enter a name for Output A (shown on Home Screen).

(2) Function - Output A
Select a function for Output A. Default function of this output is Master.

(3) Name of Output B
Enter a name for Output B (shown on Home Screen).

(4) Function - Output B
Select a function for Output B. Default function of this output is Master.

(5) Home
VT Softkey - directly navigates to the Home screen.

(6) Totals
VT Softkey - directly navigates to the Totals screen.

(7) Configure
VT Softkey - directly navigates to Configure screen.

(8) Channel 2 Setup
VT Softkey - directly navigates to Ch. 2 Setup.

Output Definitions

Definitions:

Not Used - always off.

Aux Power - always on.

Master - off in hold.

Run/Hold Only - on in Run - unaffected by sections.

Relief - on in hold.

Fixed Flow (Fixed Flow Trigger) - on when the flow per minute reaches a specified fixed total flow rate.

Proportional Flow (Proportional Flow Trigger) - on when the flow per minute reaches a specified flow rate, proportional to active sections.

Flush - on when Hold is detected and remains on for a specified time period.

Additional Parameters

Fixed Flow and **Proportional Flow** Outputs require a Threshold value input. The data entry box will appear when feature is chosen from Function list.

Threshold	0.0 GPM
-----------	---------

Flush Output requires value inputs for Flush Time and Flush Delay. The data entry boxes will appear when feature is chosen from Function list.

Flush Time - duration of Flush cycle

Flush Delay - adjusts a time delay from the RUN/HOLD transition to the start of the Flush cycle.

Flush Time	5 S
Flush Delay	3 S

Channel Setup - ISOBUS

Product 1

System Outputs Alarms **ISObus**

Operation Control **Implement**

1 **Enable Prescription Control** ☒

2 **Look-Ahead Times**

3 **Rate Change** 0.000 S

4 **Section Turn On** 0.200 S

5 **Section Turn Off** 0.200 S

6 **Reference to Center Distance**

7 **Forward(+) / Backward(-)** 0.0 in

8 **Right(+) / Left(-)** 0.0 in

9 **Activity** Unknown

10 **HOME**

11 **TOTALS**

12 **CONFIGURE**

13 **CH2 SETUP**

1 Enable Prescription Control

Enables Prescription Control for system.

2 Look-Ahead Times

These controls allow the system to anticipate section valve activity when under Task Controller control. This effectively accounts for the time it takes for the valve to fully open or close.

3 Rate Change

Allows the system to anticipate application rate control activity when under Task Controller control. This accounts for the time it takes for the Task Controller to send, and the Dual ISOMod™ to respond to rate change commands.

4 Section Turn On

This setting is the number of seconds that the system will anticipate when turning section valves on. Default is .2 seconds.

5 Section Turn Off

This setting is the number of seconds that the system will anticipate when turning section valves off. Default is .2 seconds.

6 Reference to Center Distance

This measurement defines the distance from the Reference Point as specified in Configuration B to the center of the implement itself. If the center of the toolbar was specified as the Reference Point, then these values may remain at 0.

7 Forward (+) / Backward (-)

Measure the forward or backward distance from the Task Controller Reference Point to the center of the implement.

8 Right (+) / Left (-)

Measure the right or left distance from the Task Controller Reference Point to the center of the implement. If the implement has no offset, leave value at 0.

9 Activity

Choose your implement activity from the given choices. This selection describes the controlled implement activity to the ISOBUS network. The default selection is "Unknown".

Unknown
Fertilizing
Sowing/Planting
Crop Protection
Tillage
Baling
Mowing
Wrapping
Harvesting
Forage Harvesting

10 Home

VT Softkey - directly navigates to the Home screen.

11 Totals

VT Softkey - directly navigates to the Totals screen.

12 Configure

VT Softkey - directly navigates to Configure screen.

13 Channel 2 Setup

VT softkey - directly navigates to Ch. 2 Setup.

Diagnostic 1

This tab contains a variety of information that is specific to the Electronic Control Unit (ECU) - Serial Number, Hours etc.

User editable parameters are shown below.

Diagnostic

1

2

Manufacturer: Micro-Trak Systems, Inc.
Manufacturer Code: 565
Part Number: 19667
Serial Number: 1154850301
Hours: 342.4
Current VT #: 1

1

ECU Instance:

2

Device Class: (6) Sprayers

3

Device Class Instance:

Device Function: (128) Spray Rate Control

3

Device Function Instance:

ISO Name: 0xA00C800046ACF97D

Firmware ID / Version
45195-C
VTC OP 2206102
45166-B
OBLT 1.02.01
Foundation 2.4.0
VTCClient 2.4.1
TCCClient 2.0.beta5b

4

HOME

5

CONFIGURE

6

DISCONNECT

7

RESET

1 Ecu Instance:

Leave this value at 0 unless there are multiple ECUs of the same Device Class and Device Function on the bus. Set ECU Instance to 1, if there is a conflict.

2 Device Class Instance:

Leave this value at 0 unless there are multiple ECUs of the same Device Class on the bus. Set Device Class Instance to 1, if there is a conflict.

3 Device Function Instance:

Leave this value at 0 unless there are multiple ECUs of the same Device Function on the bus. Set Device Function Instance to 1, if there is a conflict.

4 Home

VT Softkey - directly navigates to the Home screen.

5 Configure

VT Softkey - directly navigates to the Configure screen.

6 Disconnect

VT Softkey - disconnects the Dual ISOmod™ from the ISOBUS network.

7 Reset

The Reset button disconnects and reconnects the controller, resetting it.

Diagnostic 2


Diagnostic tab 2 shows the raw data that is processed by the Electronic Control Unit to control the system. It is displayed as a troubleshooting reference only.


Diagnostic


1


2

Product 1		Product 2	
% Error	0	% Error	0
Target Rate/Area	20.00	Target Rate/Area	20.00
Actual Rate/Area	0.00	Actual Rate/Area	0.00
Average Rate/Min.	0.00	Average Rate/Min.	0.00
Meter Rate/Min.	0.00	Meter Rate/Min.	0.00
Nozzle Rate/Min.	0.00	Nozzle Rate/Min.	0.00
Control Rate/Min.	0.00	Control Rate/Min.	0.00
Control Frequency	0.0	Control Frequency	0.0
Active Width	0	Active Width	0
Area Per Hour	0.00	Area Per Hour	0.00
Pressure	0	Pressure	0
Nozzle Delta	1.00	Nozzle Delta	1.00
PWM % Duty Cycle	0.0	PWM % Duty Cycle	0.0

1
HOME

2
CONFIGURE

3
DISCONNECT


RESET

1 Home

VT Softkey - directly navigates to the Home screen.

2 Configure

VT Softkey - directly navigates to the Configure screen.

3 Disconnect

VT Softkey - disconnects the Dual ISOmod™ from the ISOBUS network.

Make sure your system is properly calibrated before beginning to apply product. *We also recommend completion of the Pre-Field System Checkout described on page 47 prior to beginning any operations.*

Manual Operation

This mode sets and maintains a steady rate (GPM or LB/M) **not** affected by changes in vehicle speed. The overall application rate (GPA or LB/M) will vary depending on speed (slow vehicle speed = increased application rate, fast speed = lower application rate.) Manual mode is most useful for system set up, spot applications, etc.

1. Press the AUTO/MAN button to select Manual mode ("MAN" icon will be displayed).
2. Adjust the flow rate by using the Increase/Decrease buttons to adjust the servo valve. The longer the buttons are held, the faster the valve will move to allow both rapid movement and fine adjustments.

Note: Manual control can be disabled by changing the ENABLE MANUAL CONTROL setting in Channel Setup/Control.

Automatic Operation

This mode sets and maintains a steady application rate (GPA or LB/M) - unaffected by changes in speed or section switching.

1. Press the AUTO/MAN softkey to select Automatic mode ("AUTO" icon will be displayed).
2. Switch on the desired number of sections.
3. Switch the RUN/HOLD switch to RUN.
4. Drive vehicle. (Speed signal will activate system.)

Use the Section switches, the RUN/HOLD switch or remote RUN/HOLD sensor to Start or Stop application at any time.

ON-THE-GO RATE ADJUSTMENTS

To adjust the application rate, press the **Increase/Decrease** buttons. The increment of this change is set in RATE STEP in Channel Setup/Operation. For example, if the calibrated TARGET RATE = 20.0 GPA and RATE STEP = 1.0 GPA, pressing the **Increase** key once will increase the target rate from 20.0 to 21.0. The display will momentarily show the new TARGET (21.0) for two seconds before it resumes showing the ACTUAL application rate. The "adjusted" target rate is maintained until console power is turned off. NOTE: The target rate may also be adjusted while in HOLD.

Pre-Field System Checkout

LIQUID

Before beginning actual spraying, perform the following “Pre-Field” procedure to ensure that your valve settings, nozzle selection and desired speed range will allow the Dual ISOmod™ to provide the required application control. This procedure should be repeated for each new nozzle selection and/or application rate. (Most nozzles will maintain an adequate spray pattern over a maximum speed range of two to one. - for example, 12 mph max./6 mph min.)

OPTIMIZING LIQUID FLOW RATE

For best performance the flow rate should be adjusted so the control valve is operating mid-position. If the valve is forced to operate almost fully open or fully closed, erratic flow control will result. This procedure will balance the liquid flow to provide smooth, accurate flow control.

1. Fill your sprayer tank with clean water - **DO NOT** use chemicals until the entire system is completely checked out and operating properly.
2. Start pump; bring up to normal operating RPM. Do NOT exceed safe system pressure.
3. Power up Dual ISOmod™ and switch system to **HOLD**.
4. Enable TEST SPEED in Configuration/A.
5. Enter the fastest application speed in data entry field.
6. Select Manual control using **Auto/Man** softkey.
7. Turn all section switches on.
8. Press and hold **Increase** button to maximize flow. (May take 10+ seconds depending on valve)
9. If installed, adjust agitation valve for desired agitation amount.
10. If the rate displayed is more than 15% over your desired application rate, reduce liquid flow by one or more of the following:
 - a. Slow down pump RPM
 - b. Open a return or agitation valve to reduce flow through the flowmeter.
 - c. Close a throttling valve (controls output to the sections) to choke down pump output.
11. If the rate displayed is less than your desired application rate, increase liquid flow by one or more of the following:
 - a. Increase pump RPM
 - b. Close a return or agitation valve to increase flow through flowmeter.
 - c. Open a throttling valve (controls output to sections) to increase pump output.
12. Return to Configuration/A and disable TEST SPEED.

GRANULAR

Before beginning actual spreading, perform the following “Pre-field” procedure to ensure that your gate setting, oil flow and desired speed range will allow the Dual ISOmod™ to provide the required application control. This procedure should be repeated for each new gate setting and/or application rate. By performing all of the steps listed below, you set up your system to allow the Dual ISOmod™ to perform at optimum level.

1. Fill your hopper with test material - **DO NOT** use unrecoverable material until the entire system is completely checked out and operating properly.
2. Start pump; bring up to normal operating RPM. **DO NOT** exceed safe system pressure.
3. Power up Dual ISOmod™ and switch system to **HOLD**.
4. Enable TEST SPEED in Configuration/A.
5. Enter the fastest application speed in data entry field.
6. Select Manual control using **Auto/Man** softkey.
7. Turn all section switches on.
8. Press and hold Increase button to maximize flow. (May take 10+ seconds depending on valve)
9. If installed, adjust flow from tractor for desired agitation amount.
10. If the rate displayed is more than 15% over your desired application rate, reduce hydraulic flow by one or more of the following:
 - a. Slow down pump RPM
 - b. Open a return or agitation valve to reduce flow through to the control valve.
11. If the rate displayed is less than your desired application rate, increase hydraulic flow by one or more of the following:
 - a. Increase pump RPM
 - b. Adjust from the tractor to increase flow through control valve.
12. Return to Configuration/A and disable TEST SPEED.

PN19604

Dual ISOmod™ Bulkhead Harness

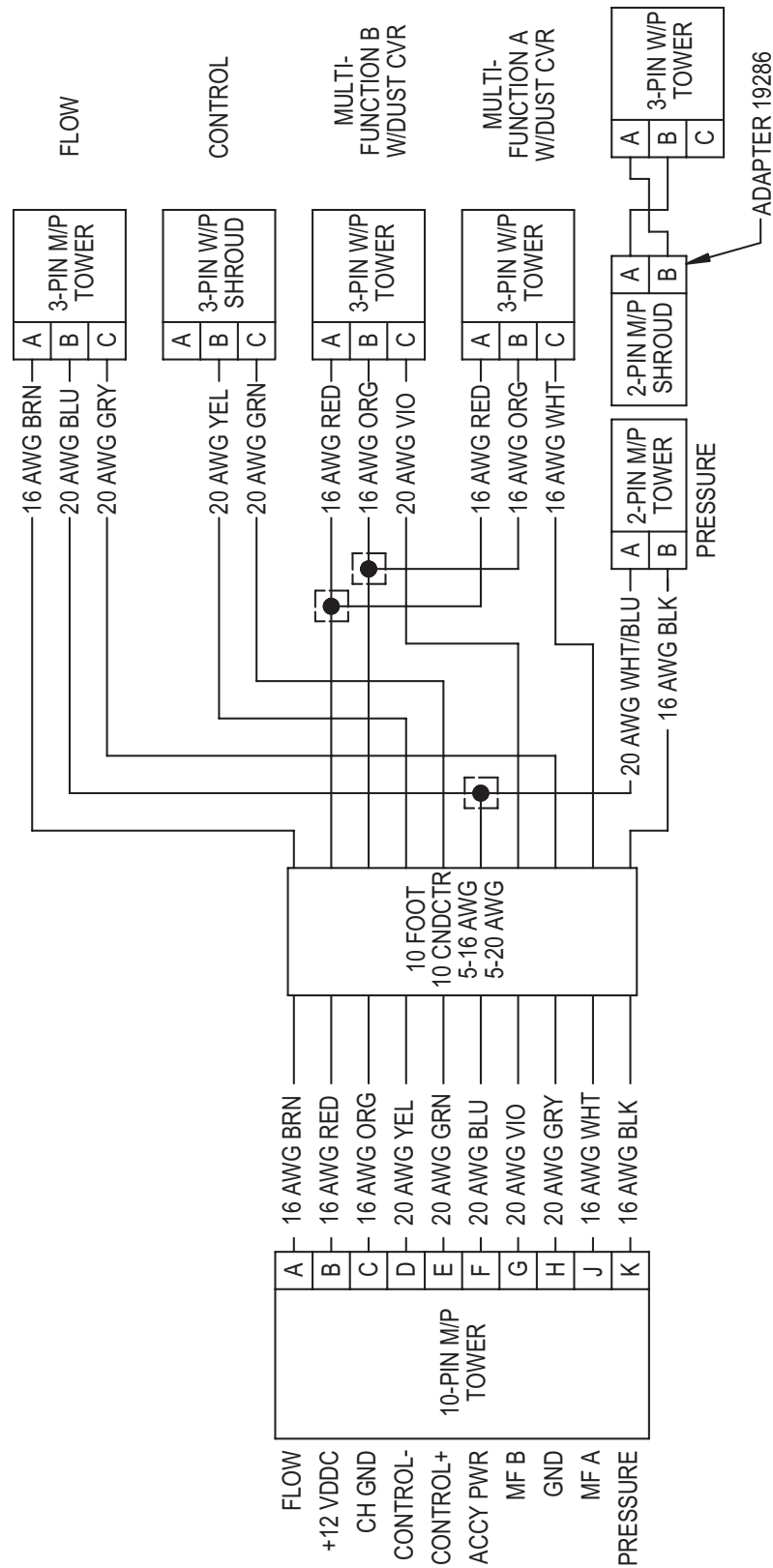


LIQUID APPLICATION SYSTEMS

Wiring Diagrams

PN19605

Ch. 1 Branch Cable

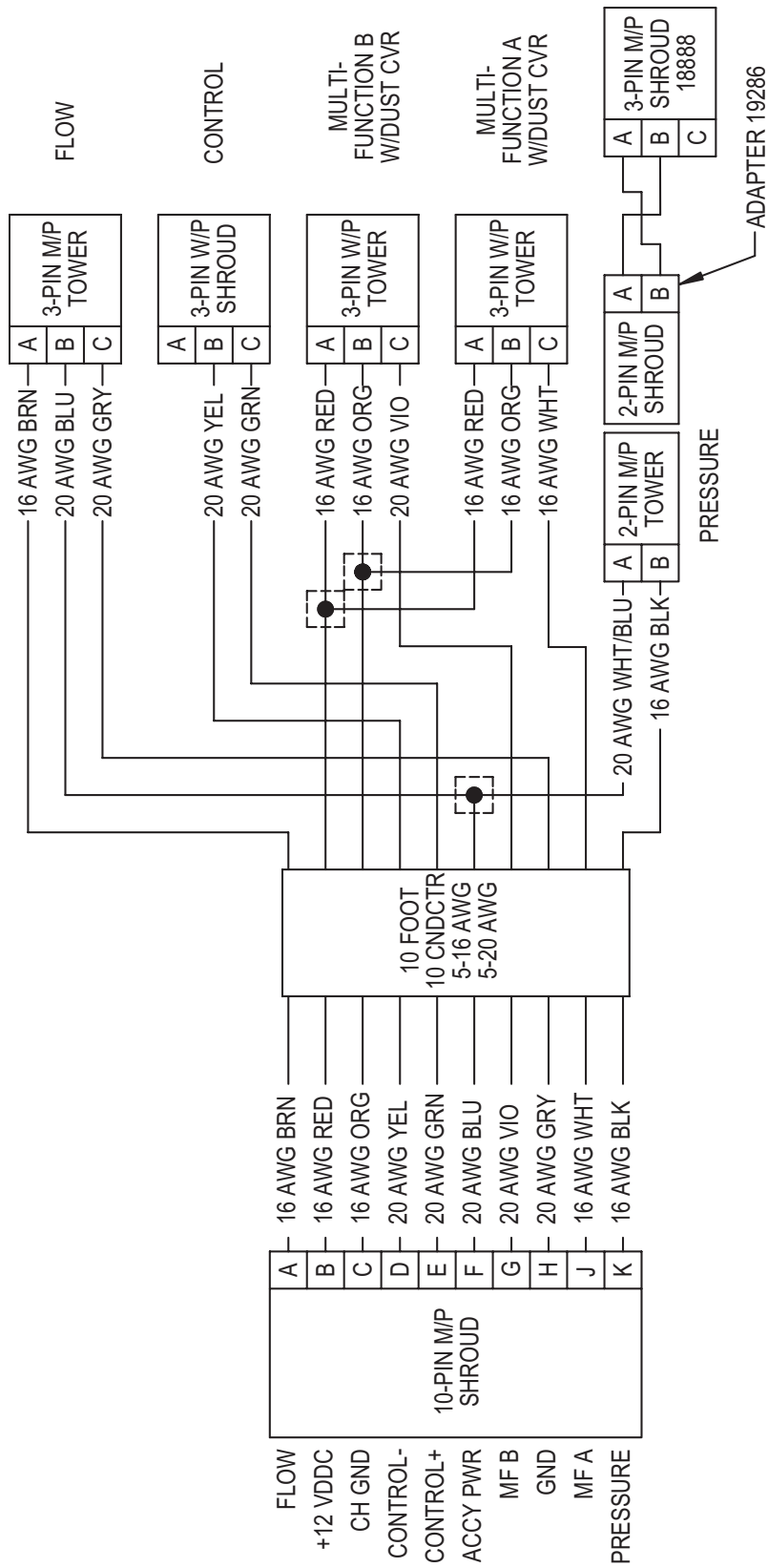


LIQUID APPLICATION SYSTEMS

Wiring Diagrams

PN19606

Ch. 2 Branch Cable

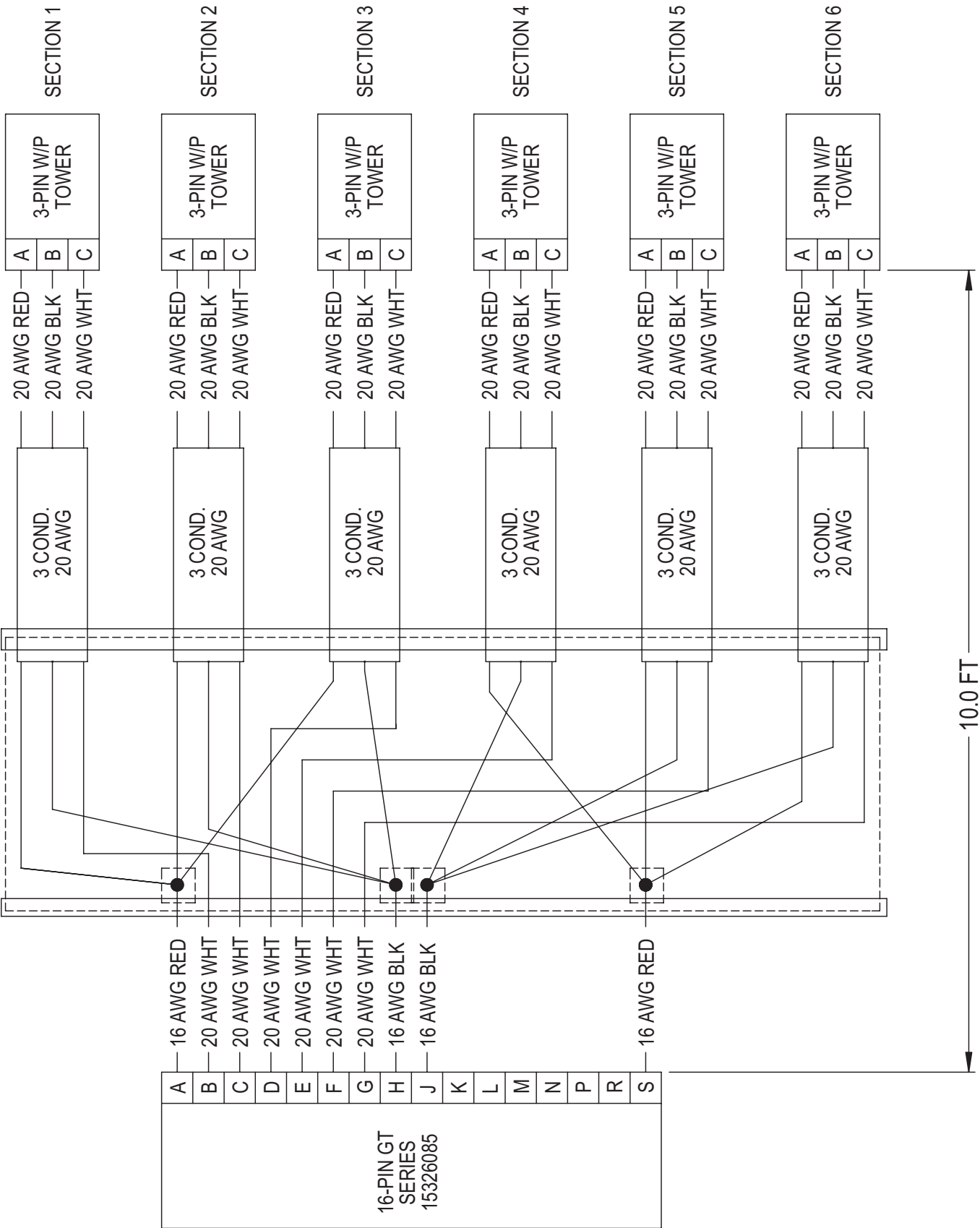


LIQUID AND GRANULAR APPLICATION SYSTEMS

Wiring Diagrams

PN19669

6 Section Branch Cable

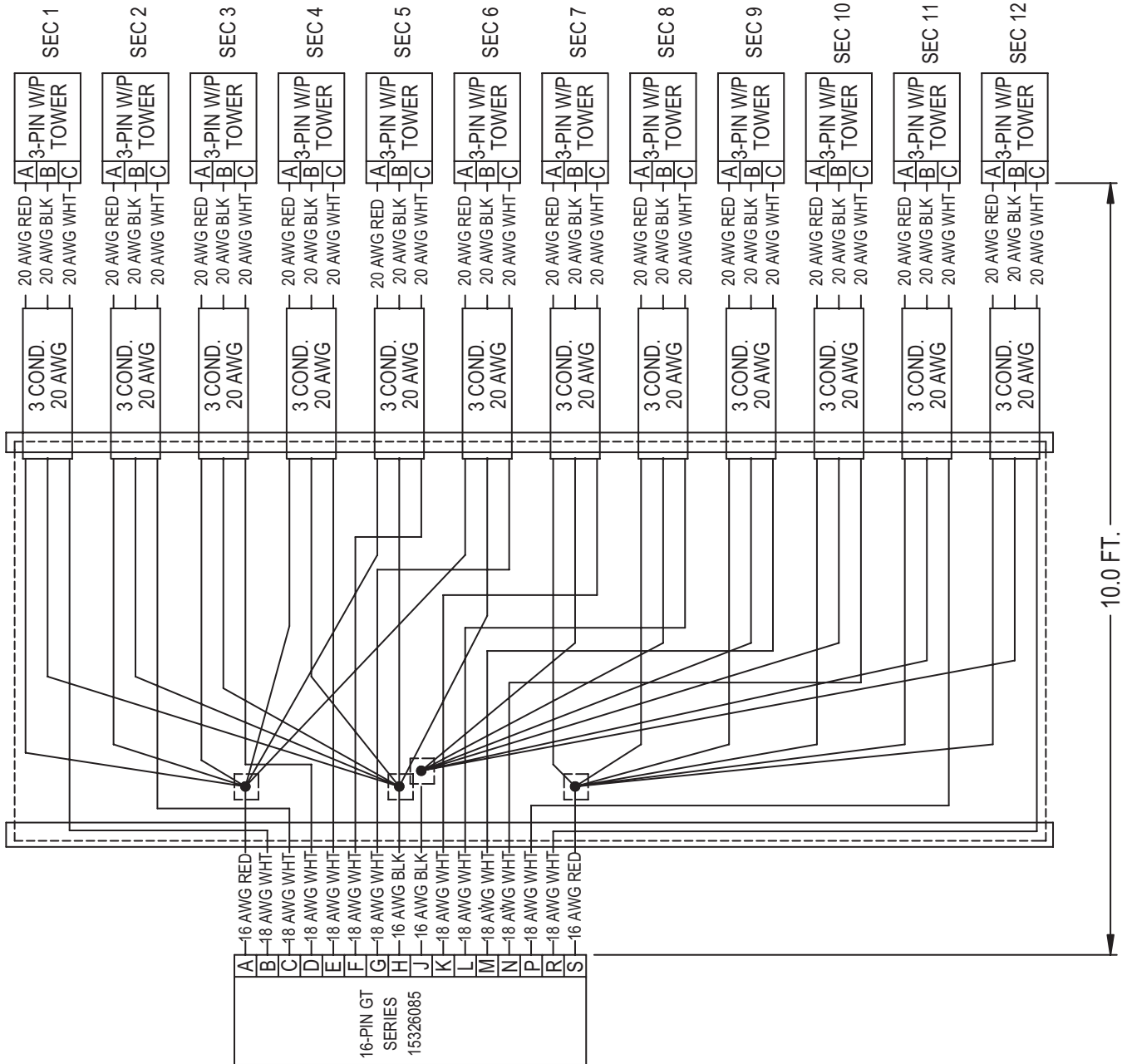


LIQUID AND GRANULAR APPLICATION SYSTEMS

Wiring Diagrams

PN19670

12 Section Branch Cable



Dual ISOmod™ Bulkhead Harness



PN16189
Ch. 1 Branch Cable



Troubleshooting

General

All Micro-Trak® products are tested prior to packaging, so unless there has been damage in shipment, you can be confident that everything will be operational when you receive it.

Your system is protected by a warranty, and Micro-Trak® will gladly correct any manufacturing defect.

Many problems are the result of mistakes in installation or operation. Before returning any parts for service, carefully check your installation and review the operating instructions.

LOCAL SPEED IS ALWAYS ZERO OR ERRATIC

Check for properly calibrated Speed Cal.

Review Astro GPS speed sensor installation. Also, check cabling for breaks or incomplete connections.

AREA COUNT IS INACCURATE

Implement width or Speed Cal was measured or programmed incorrectly. Go back through the original procedures, make changes, and test for acre (hectare) count again. (**Make sure no width is entered for unused boom sections.**) Verify accuracy with formula:

Acres = Distance x Width in feet/43560

Hectares = Distance x Width in meters/10,000

NO READOUT OF GALLONS (LITERS), OR GALLONS (LITERS) PER MINUTE

Check that the sprayer pump and equipment are operating properly. If liquid is moving through the line, check the flow sensor to be sure it is screwed all the way into the flowmeter. Verify that a Flowmeter Unit number has been entered correctly. Also check cable for breaks or incomplete connection.

If the flowmeter is new or has not been used for a long period of time, the turbine may be sticky. Flushing the system out with water should make the turbine spin freely.

Flow rate may be too low to register a reading, or foreign material may be lodged in the flowmeter.

TOTAL LIQUID USED IS INACCURATE

This may result from an incorrectly-entered Flowmeter Unit type and value. Check the number stamped on the flowmeter tag, and be sure this is entered correctly. If the meter has been used for some time, wear may have changed the calibration value. *See Fine Tune Meter on page 21.*

Check the mounting position of the flowmeter. With lower flow rates, the meter should be mounted vertically. Also check to that the flow sensor is screwed all the way into the flowmeter. Other causes may be inaccurate sprayer tank markings, a flow rate too low to register, or foreign material lodged in the flowmeter.

CONSOLE IS ERRATIC IN OPERATION

Check the CONTROL SPEED calibration number in Channel Setup/Control. If the RATE tends to overshoot or oscillate, the CONTROL SPEED setting may be too high for the control valve being used; reduce the CONTROL SPEED setting by 1 (range is -12 to +3).

DISPLAYED MEASUREMENTS DO NOT MAKE SENSE

The console may be in the incorrect measurement mode (English or metric).

SYSTEM OPERATION (CONTROL) IS SLUGGISH IN AUTOMATIC MODE

Check the CONTROL SPEED setting in Channel Setup/Control. If using a slow valve (4 seconds or more, close to open) increase the CONTROL SPEED setting.

ELECTRICAL INTERFERENCE

Erratic operation of the system may be the result of electrical interference from ignition wires or inductive loads (electrical clutch, fan, solenoid, etc.). Always try to route wires as far away from suspect areas as possible. If problems occur, you may need to relocate the console and/or wiring harness, or install a noise suppressor.

POWER

Check power source with an electrical meter or test light. If there is no power, trace cable toward battery looking for breaks. Also check any fuses or circuit breakers that supply power to the console.

ACCESSORY POWER

The flow and run/hold cables all have an accessory power wire. Check for 12 volts between B and C of these connectors. If power is not present, make sure the accessory power wire is not open or shorted to ground or to another wire. If this wire has a problem, the console may exhibit erratic behavior or not function at all.

REMOTE RUN/HOLD HALL-EFFECT SENSOR

Caution: Improper connection or voltage could damage the Hall-Effect sensor.

Ground pin C (black) and connect clean 12 volts to pin B (white) of the Hall-effect sensor cable. Connect the positive lead (red) of an ohmmeter or continuity tester to pin A (red) and the negative lead (black) of the ohmmeter or continuity tester to pin C (black) of the Hall-effect sensor cable. Holding the tip of the sensor up to the south pole of a magnet should result in a very low resistance (around 300 ohms). Taking the sensor away from the magnet should result in a very high resistance (infinite).

MAGNETIC HALL-EFFECT FLOW SENSOR

Caution: Improper connection or voltage could damage the Hall-effect sensor.

Ground pin C (black) and connect clean 12 volts to pin B (white) of the Hall-effect sensor cable. Connect the positive lead (red) of an ohmmeter or continuity tester to pin A (red) and the negative lead (black) of the ohmmeter or continuity tester to pin C of the Hall-effect sensor cable. Holding the tip of the sensor up to the north pole of a magnet should result in a very high resistance (infinite), while holding the tip of the sensor up to the south pole of a magnet should result in a very low resistance (around 300 ohms).

Troubleshooting

Checking Console Inputs

SENSOR INPUTS

If there is no response from any of the following tests, refer to the main wiring diagram to locate the next connector in line toward the console and repeat the test at that connector. If there is a response at that connector, the problem may be in the cable between the two connectors (or the connectors themselves).

LOCAL SPEED INPUT

Disconnect the speed sensor cable from the speed connection. Use a meter to check for voltage. It should read 12V between pins B and C and 9V between pins A and C.

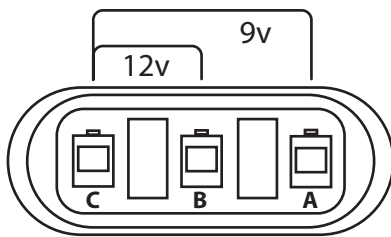
FLOW INPUT

Disconnect the flow sensor cable from the main harness flow connection. Use a meter to check for voltage. It should read 12V between pins B and C and 9V between pins A and C.

REMOTE RUN/HOLD INPUT

Disconnect the remote run/hold sensor from the main harness Remote Run/Hold connection. Use a meter to check for voltage. It should read 12V between pins B and C and 9V between pins A and C.

See illustration for layout.



Three-Pin Connector Testing

Note: If a multi-meter is not available, find a small piece of wire to use as a jumper. Short across pins A and C several times quickly to send a signal to the console. If the cable is functional, the console should respond with a reading.

FLOWMETER

Shaking the Flowmeter end to end should produce a "rattling" sound (shaft end play). Blowing in the meter from either end should spin the turbine freely. If the turbine spins freely but the meter will not register flow with a known working sensor, the turbine may be defective.

SERVO VALVE CONTROL SIGNAL

With the console turned ON, put the console in MANUAL mode, place the remote Run/Hold switch in the RUN position and turn at least one section switch to ON. Using a voltmeter or simple test light, check from a good frame ground to each of the servo wires on the main harness connector. You should get 0 volts on each wire. Holding the **Increase** button should cause the RED wire to pulse toward 12 volts (light will pulse). Holding the **Decrease** button should cause the BLACK wire to pulse toward 12 volts (light will pulse).

SERVO VALVE

The best way to test the servo valve is with a known working console. Select MANUAL mode, place the Run/Hold in the RUN position, and turn at least one section switch to ON. With the servo valve connected to the servo valve lead on the main harness, holding the **Increase** button should close the servo valve and holding the **Decrease** button should open the servo valve (if plumbing is configured for Bypass operation). The servo valve should operate smoothly in both directions, from fully open to fully closed.

You may also test a servo valve with a 9V battery. Connecting the battery to each terminal on the servo valve should cause the servo valve to run in one direction. Reversing the battery connections should cause the servo valve to run the other direction. The servo valve should operate smoothly in both directions, from fully open to fully closed.

PLUMBING

System plumbing is a critical factor in obtaining optimal performance from your Micro-Trak® system. The chart on the next page may help you determine what area of the plumbing is causing your problem. It is assumed that your plumbing functionally matches the system diagram and that the servo valve and flowmeter are installed correctly and functioning. In addition, make certain that you have selected and installed the correct spray tips for the application, speed and spray rate that you intend to maintain. Do not overlook leaky fittings and hoses, pinched hoses and plugged or worn nozzles.

Plumbing Troubleshooting Chart

SYMPTOM	POSSIBLE CAUSE	POSSIBLE SOLUTION
System loses pressure in MANUAL	Pump Air-lock	<ul style="list-style-type: none"> • Clean strainer • Install larger hoses
Insufficient pressure adjustment in MANUAL	Too much flow restriction in servo loop	<ul style="list-style-type: none"> • Install larger hoses and fittings • Remove sharp bends in plumbing
System pressure too low in MANUAL	<ul style="list-style-type: none"> • Pump starved or too small • Excessive tank agitation • Incorrectly positioned throttle, range adjust, or pressure relief valves 	<ul style="list-style-type: none"> • Install larger hoses/replace pump. • Reduce tank agitation • Adjust valves
Pressure, Speed and Spray Rate don't correspond to charts	<ul style="list-style-type: none"> • Inaccurate pressure reading • Dirty or worn spray tips 	<ul style="list-style-type: none"> • Use a different gauge and check each boom. • Clean or replace spray tips
Pressure excessive in AUTO	<ul style="list-style-type: none"> • Minimum flow rate is set too high • Incorrect Inline/Bypass setting 	<ul style="list-style-type: none"> • Re-calibrate system • Change Inline/Bypass setting
Pressure fluctuates in AUTO	<ul style="list-style-type: none"> • Sagging or kinked hoses • Throttle or range valve restricting flow • Pump starved or too small • Control Speed calibration number too high - making the valve react excessively 	<ul style="list-style-type: none"> • Support or replace hoses • Adjust throttle and range valves • Install larger hoses • Install larger pump • Clean strainer • Reduce Control Speed setting

Table 2

Plumbing Guidelines

This section details important factors for ideal system performance. The system diagrams (*See pages 11-12*) show optimal plumbing configurations for the Dual ISOmod™.

PRESSURE DROPS

All hose, valves and fittings (especially elbows) can cause undesirable pressure losses. Here are a few points:

1. Use hoses as large in diameter as practical.
2. Avoid excessive hose length.
3. Avoid sharp bends in hose whenever possible.
4. Use minimum number of fittings.
5. Use full port valves or the next larger size valve.
6. Support and fasten hose runs to avoid sagging and kinking.

HOSE DIAMETER

Hose diameter must be suitably large to maximize flow between system components - this includes connecting lines joining the flowmeter, servo valve, and agitation line. Undersized plumbing can prevent reaching target application rate and also contribute to system instability.

RANGE ADJUST VALVE

The range adjust valve is required when the pump is much larger than necessary. When the range valve is opened, some of the liquid will be bypassed around the pump to avoid "overloading" the rest of the system. The setting of the range adjust valve is determined by the throttle valve. **Start with the range valve fully closed and perform the Pre-Field System Checkout on page 47.** If the throttle valve needs to be more than two thirds closed, open the Range valve slightly and perform the Pre-Field System Checkout again.

THROTTLE VALVE

The throttle valve limits your high end to maximize servo performance. Start with throttle valve fully open and perform the **Pre-Field System Checkout on page 47.**

Appendices

Appendix A

LIQUID APPLICATION SYSTEMS

Default Settings

	Applies to both Ch. 1 & 2	
Configuration	English	Metric
Speed Source	Remote	Remote
Speed Cal (inches/cm)	0.189	0.48
Alarm Minimum Speed (mph/km/h)	0.0	0.0
Area Units	Acres	Hectares
Mode	Normal	Normal
Quick Start Speed (mph/km/h)	Blank (0.0)	Blank (0.0)
Quick Start Time (seconds)	Blank (0)	Blank (0)
Test Speed (mph/km/h)	5.0	8.0
Implement Switch Polarity (Run =)	Close	Close
Implement Switch External Source	Local (None)	Local (None)
Automatically attach Task Controller	Disabled	Disabled
Enable Section Control	Enabled	Enabled
Hitch to Reference (In./mm) Forward/Backward	0.0	0
Hitch to Reference (In./mm) Right/Left	0.0	0
Hitch Type	Unknown	Unknown
Configuration Lock	Unlocked	Unlocked

	Channel 1		Channel 2	
Operation	English	Metric	English	Metric
Product Name	Product 1	Product 1	Product 2	Product 2
Enable channel	Enabled	Enabled	Enabled	Enabled
Material (H2O/NH3)	H2O	H2O	H2O	H2O
Material Units (oz, gallons/ ml, liters)	Gal	L	Gal	L
Target Rate (oz/acre / ml/ha, etc)	20	100	20	100
Rate Step (oz/acre / ml/ha, etc)	1	10	1	10
Activity	Unknown	Unknown	Unknown	Unknown
Control				
Minimum Flow Enable (Proportional)	Disabled	Disabled	Disabled	Disabled
Minimum flow (oz, gallon, etc.)	0	0	0	0
Minimum Pressure Enable	Disabled	Disabled	Disabled	Disabled
Minimum Pressure (PSI/Bar)	15	1.00	15	1.00
Control Speed (-12 to 3)	-1	-1	-1	-1
Rate Change Time (seconds)	0.000	0.000	0.000	0.000
Automatic Delay Enable	Disabled	Disabled	Disabled	Disabled
Automatic Delay Time (seconds)	1	1	1	1
Enable Manual Control	Enabled	Enabled	Enabled	Enabled
Enable Prescription Control	Enabled	Enabled	Enabled	Enabled
Enable Pressure Control	Disabled	Disabled	Disabled	Disabled
Enable Quick Start	Disabled	Disabled	Disabled	Disabled

Appendix A

LIQUID APPLICATION SYSTEMS

Default Settings

Alarms				
Rate Alarm Threshold (%)	10	10	10	10
Low Pressure Alarm Enable	Disabled	Disabled	Disabled	Disabled
Low Pressure Alarm (psi/Bar)	0	0	0	0
High Pressure Alarm Enable`	Disabled	Disabled	Disabled	Disabled
High Pressure Alarm (psi/bar)	50	3.40	50	3.40
Tank Alarm Enable	Disabled	Disabled	Disabled	Disabled
Tank Alarm Level (Gallons/liters)	50	200	0	0
Tank Fill Level (Gallons/liters)	500	1900	30	1000
Outputs				
Output A Name	-	-	-	-
Output A Function	Master	Master	Master	Master
Output A Threshold (oz/m,ml/m,etc.)	0	0	0	0
Output A Flush Time (seconds)	5	5	5	5
Output A Flush Delay (seconds)	3	3	3	3
Output B Name	-	-	-	-
Output B Function	Master	Master	Master	Master
Output B Threshold (oz/m,ml/m,etc.)	0	0	0	0
Output B Flush Time (seconds)	5	5	5	5
Output B Flush Delay (seconds)	3	3	3	3
System				
Flow Calibration Units	MTS Gallons	MTS Gallons	MTS Gallons	MTS Gallons
Flow Calibration	145	145	145	145
Fixed Minimum Flow Enable	Disabled	Disabled	Disabled	Disabled
Fixed Minimum Flow (oz/ml/etc.)	0	0	0	0
Full Scale Pressure (PSI/Bar)	150	10.4	150	10.3
Pressure Offset (PSI/Bar)	0.0	0.00	0.0	0.00
Control Valve (DC/PWM)	PWM	PWM	PWM	PWM
Frequency (Hz)	200	200	200	200
Agitation (%)	0	0	0	0
Minimum Pulse Width (%)	8	8	8	8
Maximum Pulse Width (%)	100	100	100	100
Valve Polarity	In Line	In Line	In Line	In Line
Auto Shutoff	Disabled	Disabled	Disabled	Disabled

Appendix A

LIQUID APPLICATION SYSTEMS

Default Settings

Implement				
Enable 3-Way Valves	Disabled	Disabled	Disabled	Disabled
Total Sections	6	6	1	1
Section 1 Width (inches/Meters)	120	3.048	720	18.288
Section 2 Width (inches/Meters)	120	3.048	N/A	N/A
Section 3 Width (inches/Meters)	120	3.048	N/A	N/A
Section 4 Width (inches/Meters)	120	3.048	N/A	N/A
Section 5 Width (inches/Meters)	120	3.048	N/A	N/A
Section 6 Width (inches/Meters)	120	3.048	N/A	N/A
Section 7 Width (inches/Meters)	120	3.048	N/A	N/A
Section 8 Width (inches/Meters)	120	3.048	N/A	N/A
Section 9 Width (inches/Meters)	120	3.048	N/A	N/A
Section 10 Width (inches/Meters)	120	3.048	N/A	N/A
Section 11 Width (inches/Meters)	120	3.048	N/A	N/A
Section 12 Width (inches/Meters)	120	3.048	N/A	N/A
Turn On Time (seconds)	0.200	0.200	0.200	0.200
Turn Off Time (seconds)	0.200	0.200	0.200	0.200
Ref to Center - Forward/Backward (in/mm)	0.0	0	0.0	0
Ref to Center - Right/Left (in/mm)	0.0	0	0.0	0

Appendix B

GRANULAR APPLICATION SYSTEMS

Default Settings

	Applies to both Ch. 1 & 2	
Configuration	English	Metric
Speed Source	Remote	Remote
Speed Cal (inches/cm)	0.189	0.48
Alarm Minimum Speed (mph/km/h)	0.0	0.0
Area Units	Acres	Hectares
MTS Width Source	Disabled	Disabled
Quick Start Speed (mph/km/h)	Blank (0.0)	Blank (0.0)
Quick Start Time (seconds)	Blank (0)	Blank (0)
Test Speed (mph/km/h)	5.0	8.0
Implement Switch Polarity (Run =)	Open	Open
Implement Switch External Source	Local (None)	Local (None)
ISObus Master	Disabled	Disabled
Automatically attach Task Controller	Disabled	Disabled
Enable Section Control	Enabled	Enabled
Hitch to Reference (In./mm) Forward/Backward	0.0	0
Hitch to Reference (In./mm) Right/Left	0.0	0
Hitch Type	Unknown	Unknow
Configuration	Dual ISOmod	Dual ISOmod
Settings/Configuration	Unlocked	Unlocked
Factory Configuration	Locked	Locked

	Channel 1		Channel 2	
Operation	English	Metric	English	Metric
Product Name	Product 1	Product 1	Product 2	Product 2
Enable channel	Enabled	Enabled	Enabled	Enabled
Material Units (Dry)	lb	kg	lb	kg
Target Rate 1 (lb/acre / /ha, etc)	20 lb/A	22 kg/H	20 lb/A	22 kg/H
Target Rate 2 (lb/acre / /ha, etc)	30 lb/A	34 kg/H	30 lb/A	34 kg/H
Rate Step (lb/acre / kg/ha, etc)	1 lb/A	10 kg/H	1 lb/A	10 kg/H
Gate Height (in/cm)	0.0	0.0	0.0	0.0
Product Density	10.0 lb/ft^3	10.0 kg/m^3	10.0 lb/ft^3	10.0 kg/m^3
Application Mode	Normal	Normal	Normal	Normal
Control		0	0	0
Control Speed (-12 to 3)	-1	-1	-1	-1
Automatic Delay Time (seconds)	1	1	1	1
Fixed Minium Rate	0.0 lb/min	0.0 kg/min	0.0 lb/min	0.0 kg/min
Enable Manual Control	Enabled	Enabled	Enabled	Enabled
Enable Manual Control	Enabled	Enabled	Enabled	Enabled
Enable Quick Start	Disabled	Disabled	Disabled	Disabled

Appendix B

GRANULAR APPLICATION SYSTEMS

Default Settings

Alarms				
Rate Alarm Threshold (%)	10	10	10	10
Low Spinner Speed	0 RPM	0 RPM	0 RPM	0 RPM
High Spinner Speed	500 RPM	500 RPM	500 RPM	500 RPM
Tank Level Alarm	50 lb	50 kg	50 lb	50 kg
Tank Level Sensor	Disabled	Disabled	Disabled	Disabled
Outputs				
Output A Name	-	-	-	-
Output A Function	Master	Master	Master	Master
Output B Name	-	-	-	-
Output B Function	Master	Master	Master	Master
System				
Drive Chain Calibration Number (Edges/Ft^3)	145	145	145	145
Spinner Calibration Number (Pulses/Rev)	0	0	0	0
Control Valve	PWM	PWM	PWM	PWM
Operating Frequency Control Valve: PWM	200 hz	200 hz	200 hz	200 hz
Minimum Duty Cycle Control Valve: PWM	8%	8%	8%	8%
Maximum Duty Cycle Control Valve: PWM	100%	100%	100%	100%
Valve Polarity Control Valve: DC In-Line	Locked	Locked	Locked	Locked
Auto Shutoff	Disabled	Disabled	Disabled	Disabled
ISOBUS Configuration				
Enable Prescription Control	Disabled	Disabled	Disabled	Disabled
Look-Ahead Times: Rate Change (seconds)	0	0	0	0
Look-Ahead Times: Section Turn On (seconds)	0	0	0	0
Look-Ahead Times: Section Turn Off (seconds)	0	0	0	0
Reference to Center Distance: Forward/Back	0 in	0 cm	0 in	0 cm
Reference to Center Distance: Left/Right	0 in	0 cm	0 in	0 cm
Activity	Unknown	Unknown	Unknown	Unknown
Implement				
Section Valve Type	2-Way	2-Way	2-Way	2-Way
Section Width Definition	Nozzles/Row	Nozzles/Row	Nozzles/Row	Nozzles/Row
Nozzles/Row Spacing	20 in	50 cm	20 in	50 cm
Total Sections	6	6	6	6
Section Configuration: Nozzles/Row	6, 6, 6, 6, 6, 6	6, 6, 6, 6, 6, 6	6, 6, 6, 6, 6, 6	6, 6, 6, 6, 6, 6
Section Configuration: Widths	0, 0, 0, 0, 0, 0	0, 0, 0, 0, 0, 0	0, 0, 0, 0, 0, 0	0, 0, 0, 0, 0, 0

Appendix C - Remote Run/Hold Kit Installation

The Remote Run/Hold Sensor has a black body and joins to the branch harness cable labeled "Remote R/H". It is used as an implement switch and automatically activates the Run/Hold function as implement is raised and lowered. The Remote Run/Hold sensor only responds to the south pole side of the magnets - marked with a dashed line.

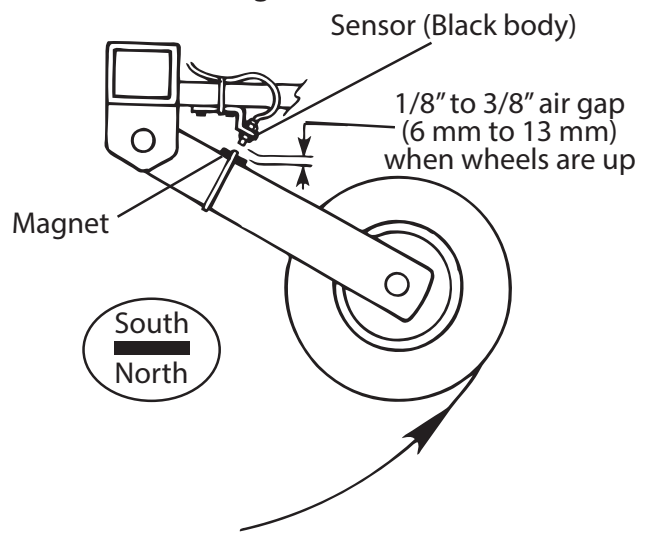
Installation

1. Choose magnet location on lever or some part of the equipment that moves when the implement is raised and lowered - be sure location will not interfere with any moving parts. See *illustrations* at right.
2. Clean area of all dirt and oil residue.
3. Fasten included magnet(s) by peeling off protective paper and pressing firmly in place.
4. Attach mounting bracket to a stationary part of the implement, centered over the magnet area. (It may be necessary to modify the bracket to fit.)
5. Mount sensor to bracket, leaving a 1/8" to 3/8" air gap between tip of sensor and magnet.
6. Route cabling to console avoiding areas of abrasion or excessive heat. Fasten wires using included ties.

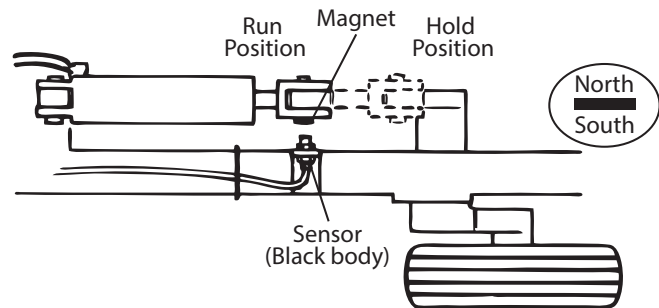
NOTE: Additional extension cables which are available in 5 ft. (1.5 m), 10 ft. (3 m), 15 ft. (4.5 m), 20 ft. (6 m) and 25 ft. (7.6 m) lengths.

NOTE: Run/Hold input polarity is reversible.
See page 27 - 'Run=Switch' in Configuration/B.

Lift Wheel Mounting



Hydraulic Cylinder Mounting



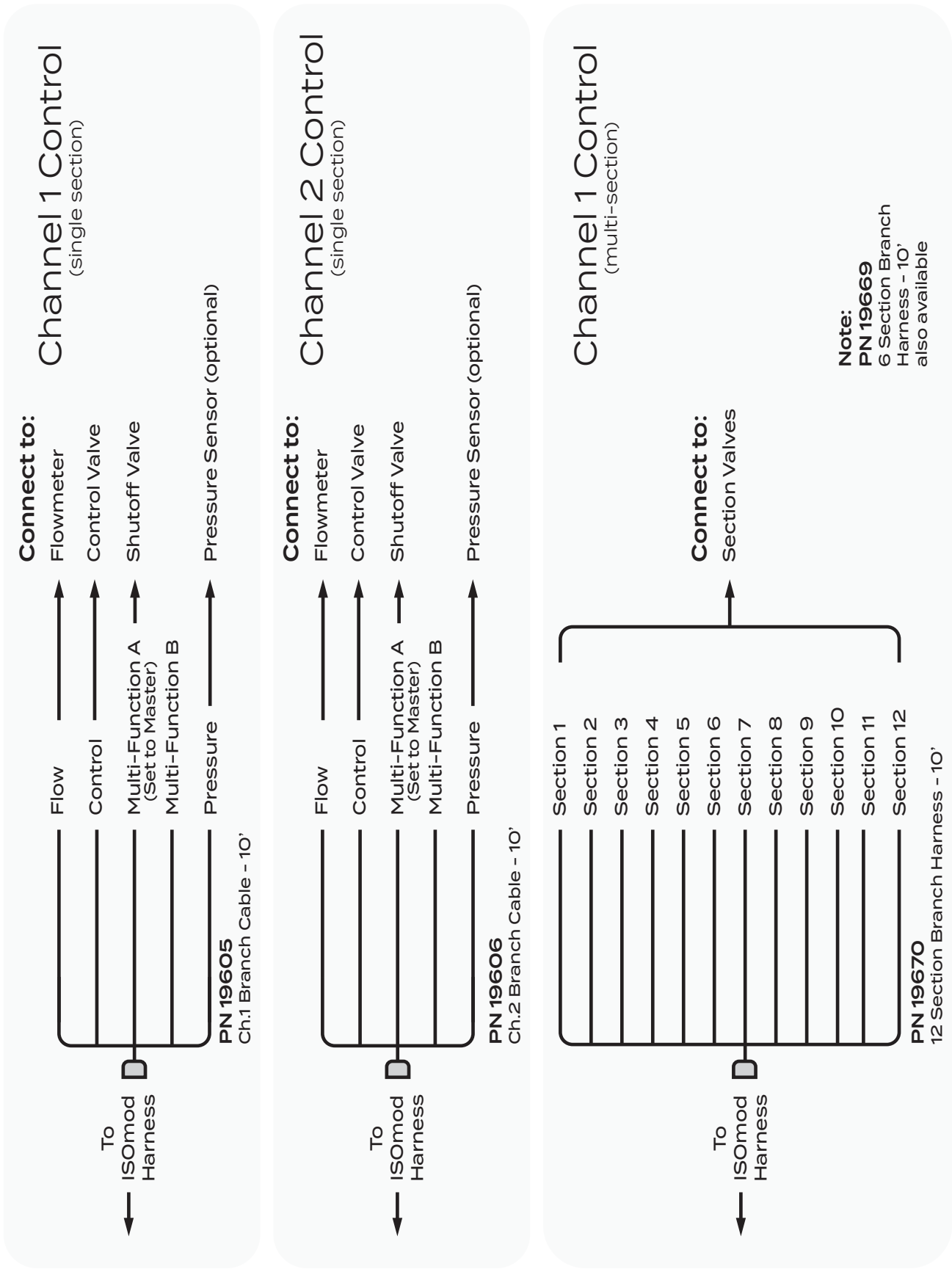
Remote Run sensor on hydraulic cylinder. Magnet and sensor are aligned when equipment is lowered and operating.

Remote Run/Hold Kit - P/N 01535

Includes:

- Run/Hold Sensor w/ 3-pin Metri Pack conn.
- 10' extension cable
- 2 magnets w/foam adhesive tape
- Mounting bracket
- (2) 1/4"-20 machine screws + nuts
- (2) 1/4" lock washers
- (2) 1/4" threaded hex screws

Appendix D - NH3 Control
System Diagram - NH3



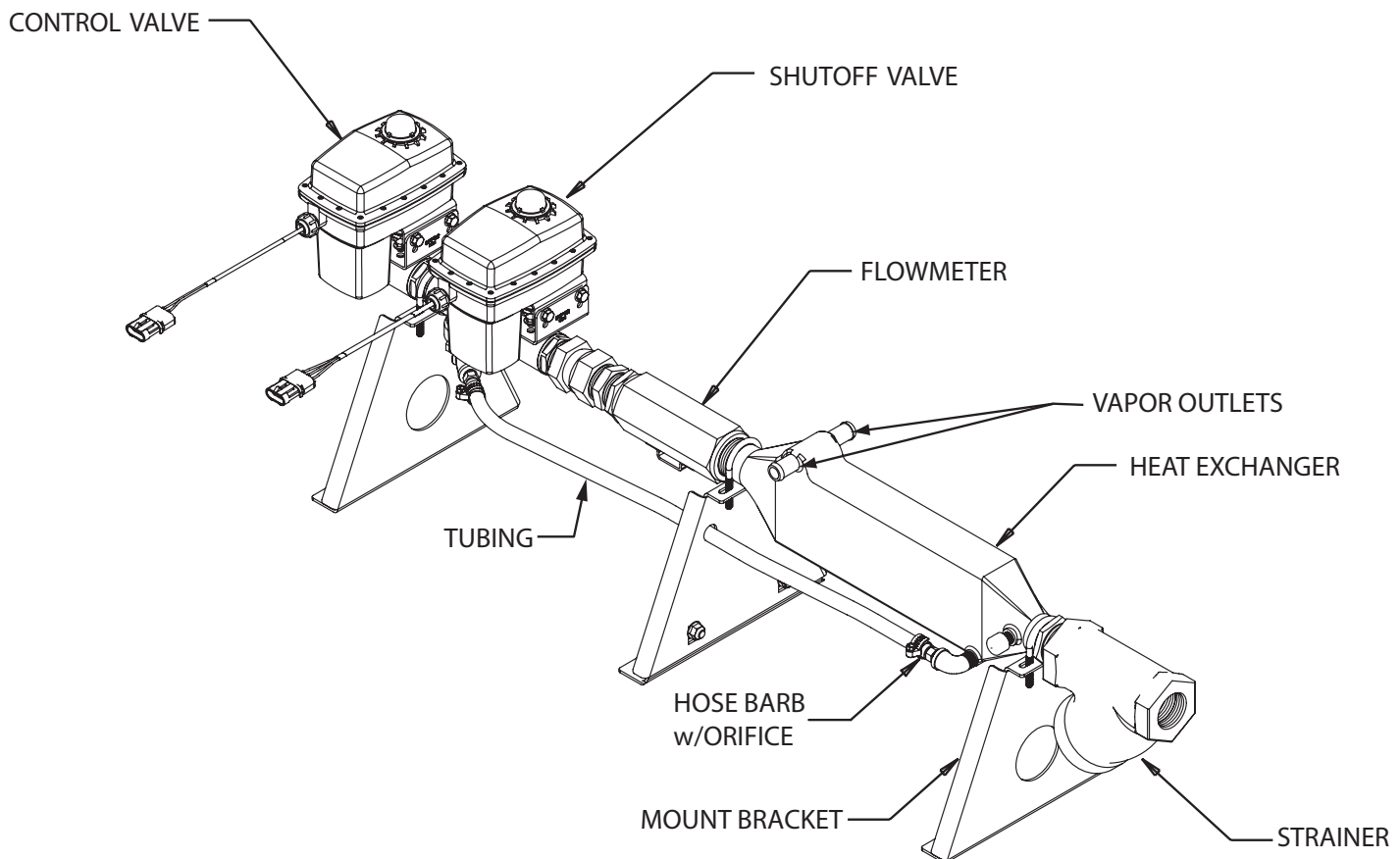
Appendix D - NH3 Control

Liquifier Installation

LIQUIFIER KIT INSTALLATION

Remove any existing metering valves. If the old metering valve has a built-in manifold, it is recommended to install a separate new manifold for the Liquifier™ kit. Another option, although not recommended, is to use the existing manifold, making certain the old metering valve is in the maximum open position to allow for minimal restriction of flow through the plumbing. There should not be any positive shut-off valves installed in the plumbing between the Liquifier kit shut-off valve and the knives.

Install the plumbing panel on the tool bar frame using the carriage bolts and flange lock nuts through the top and bottom brackets of the system. Trim any excess length off the bolts if required. Attach the hose from the breakaway coupler to the strainer inlet. Check for proper hose length for operation of the disconnect mechanism of the breakaway coupler. Connect the manifold hose to the servo valve outlet. Check for proper hose length to avoid kinking at the hinge points.



INSTALLATION NOTE: It is recommended to use an NH3 compatible thread sealing compound on all pipe thread fittings.

Appendix D - NH3 Control

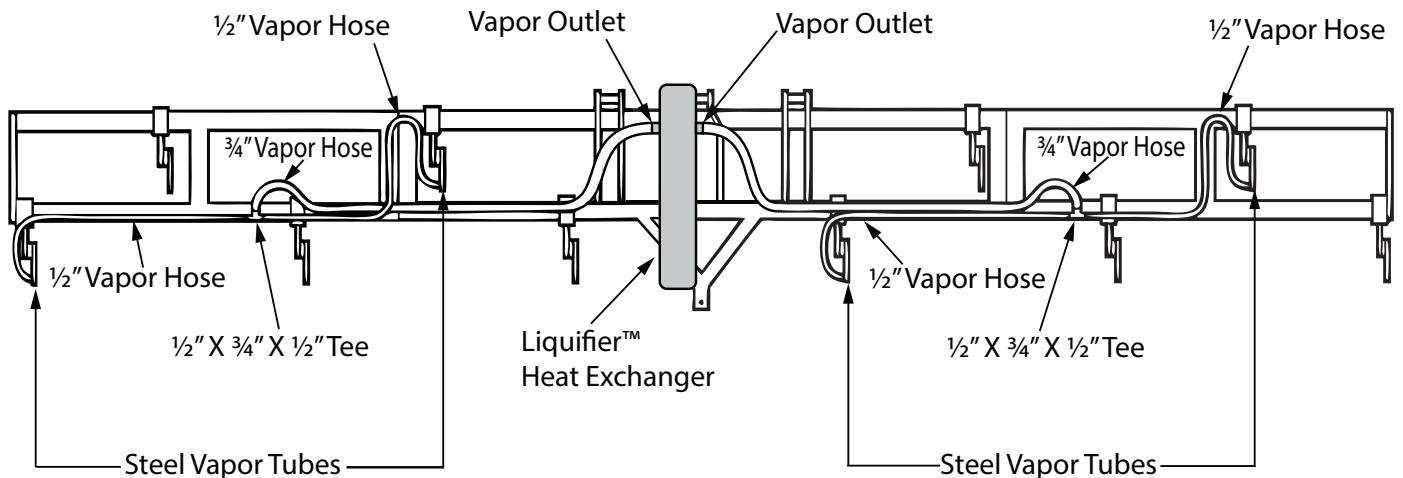
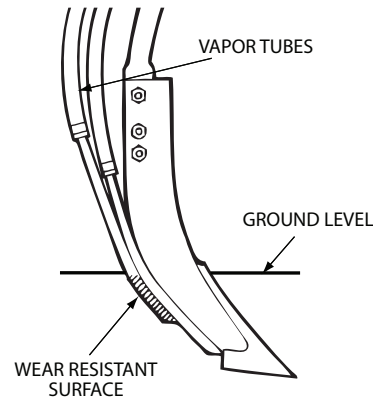
Liquifier™ Series - Vapor Line Installation

Locate the 1/2" EVA vapor hose supplied with the kit. Starting on one half of the tool bar, connect the 1/2" hose to the outside steel vapor tube. Route the hose up the shank and along the tool bar frame to the inside steel vapor tube. Allow enough extra hose to avoid kinking at hinge points. Cut the hose to length and attach to the inside steel vapor tube. Install a 1/2" x 3/4" x 1/2" tee fitting approximately halfway along this hose between the outside and inside steel vapor tubes. *See Illustration below.* Repeat the same procedure for the steel vapor tubes on the other half of the tool bar. Secure all hoses with properly sized hose clamps. Secure the hoses to the tool bar frame with cable ties.

Locate the 3/4" EVA hose supplied with the kit. Connect to one of the 1/2" x 3/4" x 1/2" tee fittings and route along the tool bar frame to other 1/2" x 3/4" x 1/2" tee fitting. Cut to length and install on the tee fitting. Allow enough extra hose to avoid kinking at hinge points. Now install a 3/4" x 3/4" x 3/4" tee fitting approximately halfway along this hose (center of the tool bar) between the other two tee fittings. Using an appropriate length 3/4" hose, connect this tee fitting to the vapor tube connection on the Liquifier™ plumbing panel. Secure all hoses with properly sized hose clamps. Secure the hoses to the tool bar frame with cable ties.

FOR ALL NH3 KITS

Weld the steel vapor tubes to the back of your liquid tubes. All electronic equipment, including the console and radar speed sensor, **MUST BE DISCONNECTED BEFORE WELDING ON EQUIPMENT.** The four steel vapor tubes should be evenly spaced across the applicator (two per side) and installed so that only their wear resistant surface contacts the soil. Mount the tubes just high enough to avoid plugging.



Appendix D - NH3 Control

Setup & Calibration for NH3 Application

Overview

The steps described below will optimize the Dual ISOmod™ for NH3 application. The Dual ISOmod™ system processes NH3 application parameters and data for ease of operation and accurate record keeping.

NH3 Material Calculation Specifics:

- Volume is lbs. (kg) of NH3 (same as scale ticket)
- Volume/minute is lbs. (kg) of NH3
- Tank values are lbs. (kg) of NH3
- Target Rate is lbs. (kg) N per acre (hectare) - providing application rate of nitrogen (N)

STEPS

TOTALS SCREEN (SETUP ON CHANNEL USED FOR NH3)

1

1. Reset Counter.
2. Setup Tank Current and Tank Capacity quantities.

CONFIGURATION B SCREEN

2

3. Enter Hitch to Reference distance (see page 19 for detailed explanation).
4. Enter Hitch type from Hitch Type dropdown menu.

CHANNEL SETUP - OPERATION TAB

3

5. Touch screen at top - rename channel to "NH3".
6. Select Activity - Fertilization.
7. Enter intended Target Rate.
8. Edit Rate Step (if needed).
9. Choose "NH3" from Material dropdown menu.

CHANNEL SETUP - IMPLEMENT TAB

4

10. Enter Total Sections. See Step 13 if using Multi-Section control.
11. Enter Section(s) Width.
12. Enter Reference to Center Distance (see page 24 for detailed explanation).

CHANNEL SETUP - CONTROL TAB

5

13. Enable Minimum Flow and set to 10 lbs./min. (minimum for Micro-Trak flowmeter).
If using Multi-Section control, do not set Minimum Flow. Instead, navigate to Channel Setup/System and enable Fixed Minimum Flow and enter 10 lbs./min.
14. (Optional) Adjust Control Speed Setting. This changes valve response time to fine-tune the system. Increase value if system responds slowly to rate changes due to slow valves.
NOTE: Exercise caution when increasing the valve response speed - the system may become unstable with higher control speed numbers entered.

CHANNEL SETUP - SYSTEM TAB

6

15. Choose MTS NH3 (pounds N) in Flowmeter Units.
16. Enter calibration number found on the Micro-Trak flowmeter tag.

Appendix D - NH3 Control

Fine Tuning Flow Calibration Value - NH3 Systems

This procedure is used to verify and fine-tune flowmeter calibration. Every flowmeter is calibrated with water at the factory and stamped with a calibration value. Enter that value as a starting point and use this procedure to fine-tune that value for your specific installation and NH3 application.

PROCEDURE

1. Start with a full nurse tank. Make certain that you have an accurate scaled weight of the full tank. Plan to apply a minimum of 1,000 pounds of NH3 for this procedure. The larger the volume of NH3 used, the more accurate the calibration will be.
2. Place system in HOLD via the RUN/HOLD softkey on Home screen. Navigate to Totals screen. Select a counter (1-3) using the tabs. Press and hold the RESET button to clear data.
3. Proceed to the field and perform actual application until at least 1,000 pounds of NH3 has been applied. (One nurse tank is preferred.) To apply, switch section(s) on and place system in RUN via the RUN/HOLD switch.
4. Weigh the partially used tank, then calculate the difference between the starting and ending weight.
5. Compare the system accumulated Totals value with the known amount of NH3 run - calculate percentage difference. If the two numbers are different by 3% or less, no fine tuning is required. If the two numbers are different by more than 3%, continue with the next step.
6. If the lbs. of NH3 shown in the Total counter is greater than the amount measured by tank starting and ending weight, increase the Flowmeter Units number by the percentage difference. Inversely, if the lbs. of NH3 shown in the Total counter is less than the amount measured by tank starting and ending weight, decrease the Flowmeter Units number by the percentage difference.

Example calculation:

Tank originally filled with 7500 lbs. of NH3

Apply NH3 until Totals counter reads 1500 lbs.

Weigh partially used tank - now weighs 5925 lbs.

Calculate weight difference

► 7500 lbs. - 5925 lbs. = 1575 lbs. difference

Calculate % difference

► $(1575 - 1500) / 1500$ then $\times 100 = 5\%$ difference

Flowmeter Units from Channel Setup/System = **34.9**

Weight shown in Total counter (1500) is less than measured weight (1575)

Decrease the Flowmeter Units 34.9 by 5%

► $5\% = 5 / 100 = .05$

► $.05 \times 34.9 = 1.74$

► $34.9 - 1.74 = 33.16$

► round to **33.2**

33.2 is the new Flowmeter Units value

7. Enter the new Flowmeter Units value in Channel Setup/System. Existing Totals will recalculate to match actual applied NH3.

Appendix D - NH3 Control

Field Operation - Troubleshooting for NH3

Always follow accepted safety precautions. Make sure that equipment is in good operating order. Before connecting the nurse tank to the applicator, check the electric shut-off valve of the Dual ISOmod™ system for proper operation.

After changing nurse tanks or after other periods of long shut-down, operate the system in MANUAL until the application rate stabilizes. This allows the heat exchanger to reach operating temperature before selecting AUTO. Erratic operation may be experienced if AUTO is selected before operating temperature is reached.

The Liquifier™ system uses NH3 vapor to cool the heat exchanger, changing the mix of gas and liquid entering the system into 100% liquid before it enters the flowmeter. A small percentage of liquid NH3 is tapped off between the shutoff valve and control valve and enters the vapor side of the heat exchanger. As it enters the heat exchanger, it passes through a hose barb equipped with a 3/32" orifice. This regulates the amount of NH3 that passes through the exchanger as a coolant. As it passes through the orifice, the pressure release converts the liquid NH3 to vapor. This change causes the vapor to drop to a very low temperature which allows it to be used as a refrigerant, turning the incoming NH3 to 100% liquid.

Erratic application rate

1. Apply NH3 at your intended rate. When your rate is close to your target, place the controller in MANUAL - stopping movement of the control valve. If the rate stabilizes, the erratic operation is most likely induced by the control system.

Possible Solutions:

A. Set the CONTROL SPEED in Channel Setup/Control to a lower setting. Negative values slow down the response of the valve, positive numbers make the response more aggressive. Typical control speed values for NH3 application are -2 to -4, but vary by installation.

B. Verify adequate manifold pressure. Manifold pressure is very important for smooth control and even distribution of NH3. Use barbed fittings with properly sized orifices or an adjustable manifold to maintain adequate pressure. If manifold back pressure is too low, the only resistance to the flow of NH3 is the control valve. At lower rates, this will result in the control valve operating almost fully closed. This results in erratic control since the flow through the valve can vary greatly with minimal movement. Adequate back pressure allows the valve to operate in a more open position which results in stable application rates. Typical manifold pressure ranges from 15 to 60 PSI (1 to 4 bar) depending on application rates and ambient temperature.

2. If the rate is still erratic while in MANUAL, vapor may be entering the flowmeter. Any obstruction (clogged filter, partially closed tank valve, plugged tank dip tube) can cause a pressure drop which will in turn generate large amounts of vapor.

Possible Solutions:

A. If the rate in MANUAL is varying by a small amount (10 - 20 lbs per acre) this may indicate worn bearings in the flowmeter.

B. Verify the vapor line and vapor control orifice are clean and free of obstruction.

C. Verify the strainer is clean.

Poor System Performance

In NH3 control systems, location of the frost build-up is an indication of system performance. The NH3 kit will normally have frost on the output side of the servo valve and on the bottom portion of the heat exchanger. Frost before the servo valve or on the flowmeter indicates vapor in the system as a result of excessive pressure drop (caused by obstructions) in the delivery system, restricted vapor lines or clogged vapor control orifice.

The strainer is a common source of excessive pressure drop and should be cleaned regularly.

AFTER COMPLETELY DRAINING THE SYSTEM, remove the large plug and carefully clean the strainer screen.

Also, periodically check the vapor tubes for obstructions.

Appendix D - NH3 Control

Flowmeter Assembly (FM-750 N)

IMPORTANT: Opening the flowmeter will void the Flow Calibration value assigned to your unit. However, you may need to take the flowmeter apart for periodic cleaning or to remove an obstruction. *See Illustration below for flowmeter reassembly instructions.*

TO OPEN THE FLOWMETER

Disconnect the hose from servo valve to manifold. Loosen the union hex closest to the heat exchanger. Remove the two "U" bolts that hold the servo/flowmeter assembly to the brackets. Unscrew the union from the heat exchanger and remove the servo/flowmeter assembly.

Use running water to rinse the assembly of any accumulated dirt. Remove the three flowmeter bolts, carefully open the flowmeter and remove the turbine. Thoroughly clean turbine and housings of any foreign material (dirt, pieces of teflon tape, rust on magnets, etc.).

Set and spin the turbine in each flowmeter housing half. It should spin freely. If not, remove the turbine, wipe the shaft and try again.

TO ASSEMBLE THE FLOWMETER

Place the servo, flowmeter end up, in a vice or other suitable fixture. Set turbine in non-sensor housing. Properly position gasket on housing. (Gasket may be reused a few times but will eventually need to be replaced.) Pipe thread compound is not absolutely necessary but will insure a good seal. Be careful not to get compound inside flowmeter or turbine will stall. Carefully put other flowmeter housing (sensor half) in place. (Position the housing so that the two square lugs are lined up with each other.) Drop all three bolts into holes. Hold lock washers in place and finger tighten all three nuts. Nuts should be torqued to 120 in./lb. (13.56 nw/m). Attach tag by running wire between a bolt and the housings, and twisting.

After assembly, shaking flowmeter end-to-end should produce a "rattling" sound (shaft end play). Blowing into the meter from either end should cause the turbine to spin freely. If the turbine only spins from one direction, install the flowmeter so that the liquid flows in that direction.

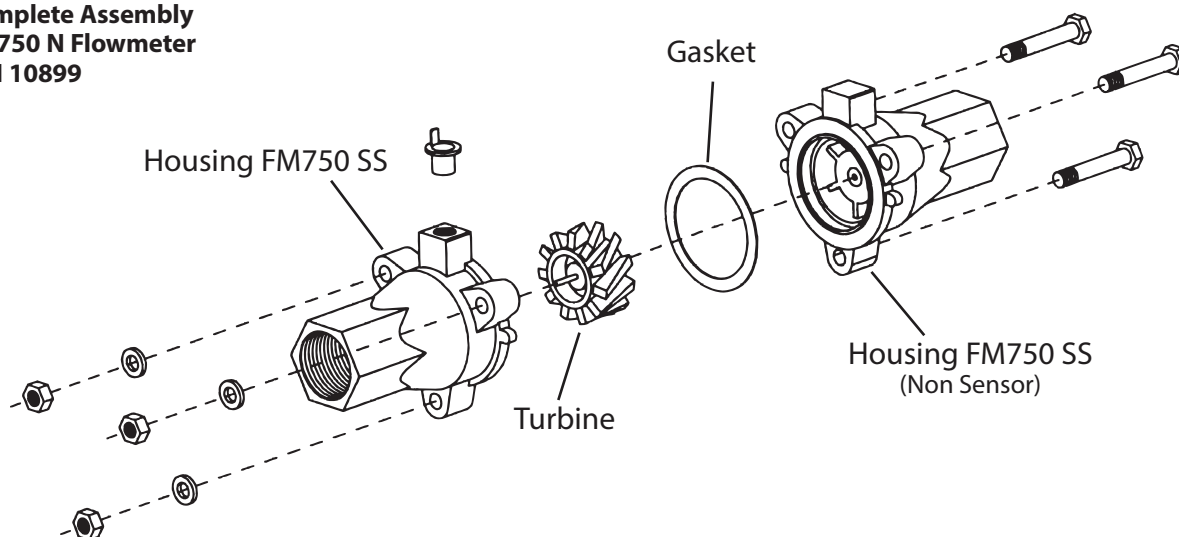
NOTE: Start with original calibration number and follow fine tuning for verifying flowmeter accuracy.

Warning

TO PREVENT SERIOUS INJURY, DO THE FOLLOWING:

1. **ALWAYS WEAR** gloves, goggles, and other necessary equipment when handling NH3 apparatus.
2. **DO NOT** cross thread. Use anti-seize lead base thread compound.
3. **THOROUGHLY BLEED** hoses before disconnecting NH3 apparatus.
4. **COMPLETELY EVACUATE** NH3 apparatus before servicing.

Complete Assembly
FM750 N Flowmeter
P/N 10899



Appendix D - NH3 Control

Flowmeter Assembly (FM-1500 N)

IMPORTANT: Opening the flowmeter will void the Flow Calibration value assigned to your unit. However, you may need to take the flowmeter apart for periodic cleaning or to remove an obstruction. *See Illustration below for flowmeter reassembly instructions.*

TO REMOVE THE FLOWMETER

Loosen two 1/2" bolts securing unit (shutoff valve end) to tool bar. Loosen union between flowmeter and shutoff valve. Slide shutoff valve away from flowmeter and unscrew flowmeter from heat exchanger.

TO DISASSEMBLE THE FLOWMETER

Remove retainer clip from one end and slide out internals. *See Illustration below.* Be careful not to bend turbine shaft.

Clean and inspect parts.

Assemble in reverse order.

After assembly, shaking flowmeter end-to-end should produce a "rattling" sound (shaft end play). Blowing into the meter from either end should cause the turbine to spin freely. If the turbine only spins from one direction, install the flowmeter so that liquid flows that direction.

If turbine does not spin freely, flowmeter may require repair. Turbines and bearing replacement kits are available.

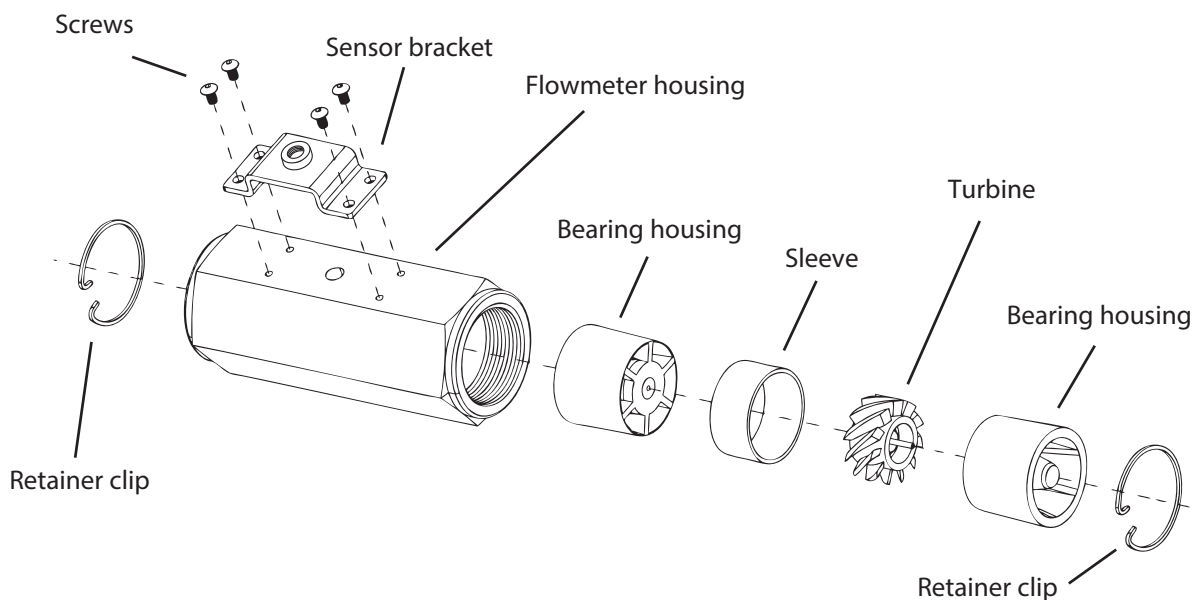
NOTE: Start with original calibration number and follow procedure in manual for verifying flowmeter accuracy.

Warning

TO PREVENT SERIOUS INJURY, DO THE FOLLOWING:

1. **ALWAYS WEAR** gloves, goggles, and other necessary equipment when handling NH3 apparatus.
2. **DO NOT** cross thread. Use anti-seize lead base thread compound.
3. **THOROUGHLY BLEED** hoses before disconnecting NH3 apparatus.
4. **COMPLETELY EVACUATE** NH3 apparatus before servicing.

Complete Assembly
FM1500 N Flowmeter
P/N 14348



Appendix E - Replacement Parts List

The following replacement parts are available from your dealer or distributor. A Dealer Locator can be found online at <http://www.micro-trak.com/where-to-buy/dealer-locator>.

PART NUMBER DESCRIPTION

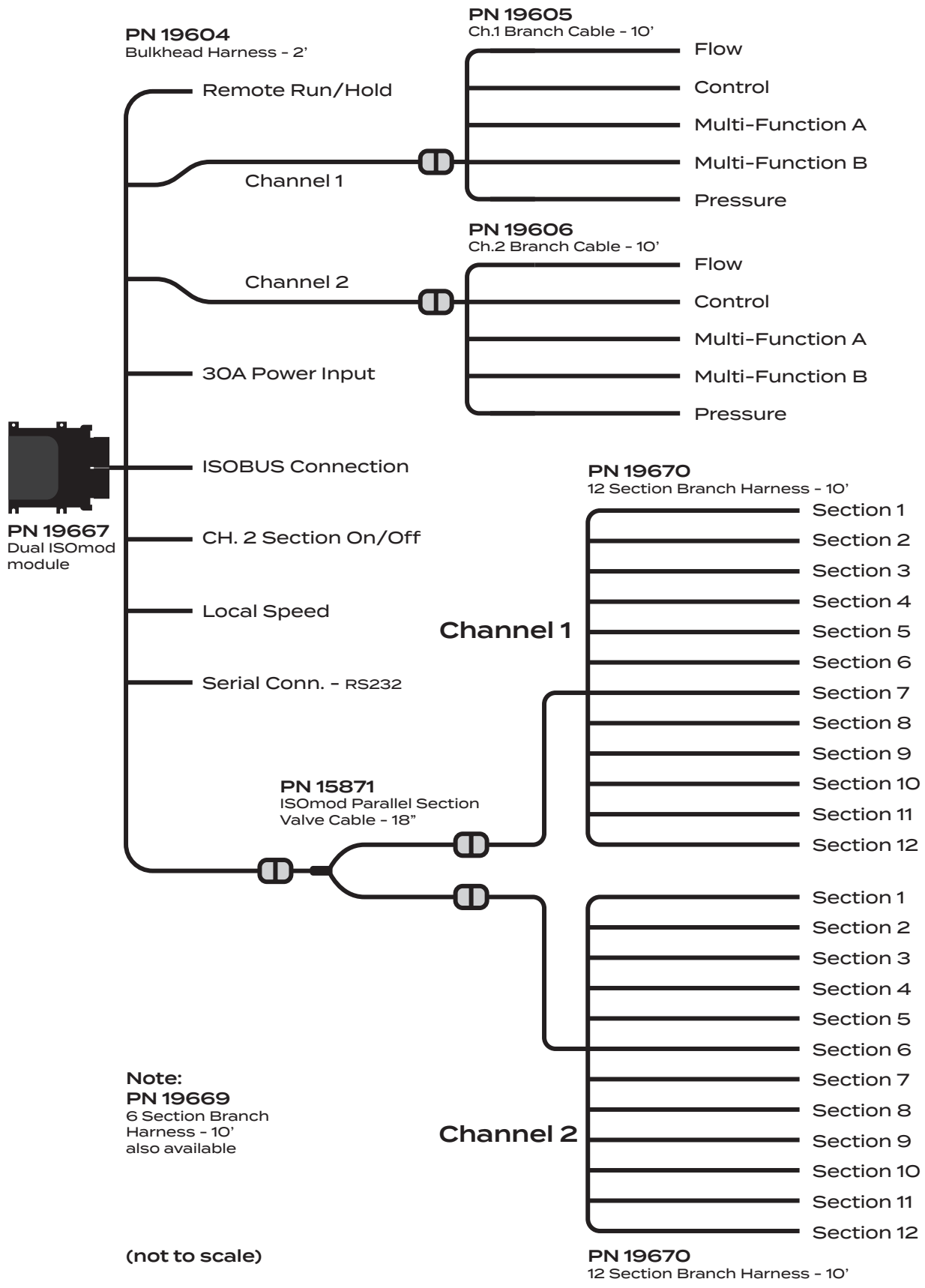
01410	Astro II GPS Speed Sensor
01425	Astro 5 GPS Speed Sensor
01535	Remote run/hold sensor kit
01554	Gear tooth sensor kit (proximity sensor)
01953	Power Cable kit 30'
13096	Hall-effect Speed/Flow Sensor Cable 5'
13226	5' remote run/hold sensor cable
16013	Section Branch Harness, Dual ISOmod™, 6-Section DT06-4S, 10'
16014	Section Branch Harness, Dual ISOmod™, 12-Section DT06-4S, 10'
18529	Implement Whisker Switch kit w/o mount
18541	Implement Whisker Switch kit w/magnetic mount
18754	Plus Series Single Pressure Sensor Cable 15'
18755	Plus Series Dual Pressure Sensor Cable 15'
18757	Pressure Sensor - 150 psi max.
18758	Pressure Sensor - 300 psi max.
18764	Plus Series Single Pressure Sensor Harness Kit
18765	Plus Series Dual Pressure Sensor Harness Kit
18967	Deutsch DT Terminator Cable w/TBC Plug
18968	Deutsch DTM Terminator Cable w/TBC Plug
18905	TBC Terminator Plug (Powell)
19603	Dual™ ISOmod™ Reference Manual
19604	Dual™ ISOmod™ Bulkhead Harness 2'
19605	Dual™ ISOmod™ Channel 1 Harness 10'
19606	Dual™ ISOmod™ Channel 2 Harness 10'
19667	Dual™ ISOmod™ module
19669	Section Branch Harness, Dual ISOmod™, 6-Section WPT, 10'
19670	Section Branch Harness, Dual ISOmod™, 12-Section WPT, 10'

Parts and design specifications subject to change without notice.

Optional 2-Pin Metri Pack 480, 3-Pin & 10-Pin Metri Pack, 3-pin Weather Pack, and 16-pin GT extension cables:

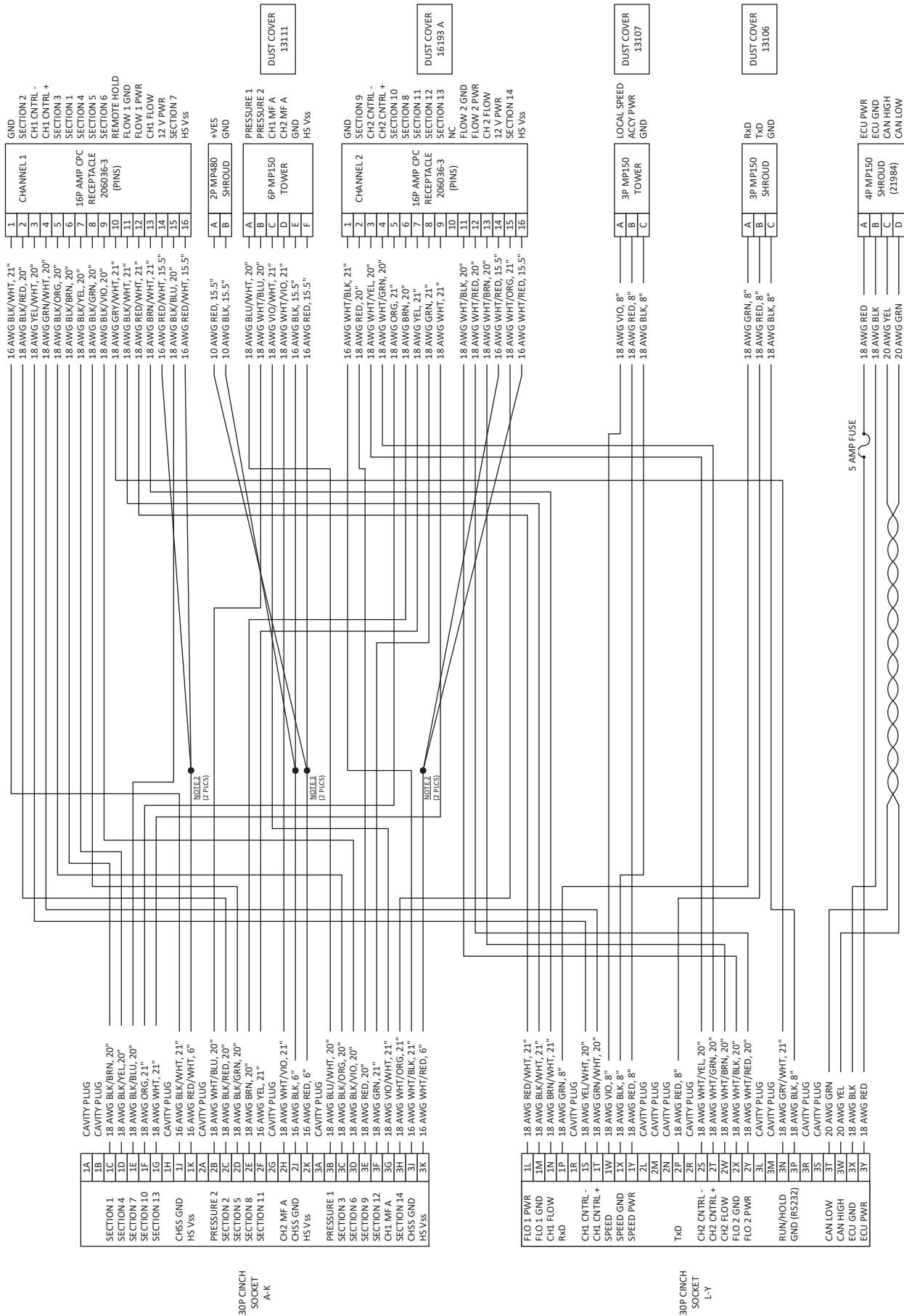
M/P 480 2-Pin		M/P 3-Pin		M/P 10-Pin		W/P 3-Pin		GT 16-pin	
Part No.	Length	Part No.	Length	Part No.	Length	Part No.	Length	Part No.	Length
18827	5'	13205	5'	13220	5'	10450	5'	19313	5'
18828	10'	13206	10'	13221	10'	10449	10'	19314	10'
18436	15'	13207	15'	13222	15'	10876	15'	19315	15'
18421	20'	13208	20'	13223	20'	10829	20'	19316	20'
18829	25'	13209	25'	13224	25'	11462	25'	19317	30'
		13419	50'	17095	30'			19318	40'
				17096	40'			19319	50'
				17296	45'				
				14142	50'				

Appendix F - Parallel Mode Wiring



Appendix G - Raven Adapter Cable Wiring

P/N 16153



Appendix H - MTS Width Sharing between Dual ISOmods

Software Version 45915-A

1. Dual ISOmod™ 1 (main Dual ISOmod™ providing width):
In **Configuration Tab A**, MTSI Width Source must be enabled.

MTSI Width Source	Enabled
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2. Dual ISOmod™ 1 (main Dual ISOmod™ providing width):
Channel 1 must have **Application Mode** set to **Normal**.
Channel 2 must have **Application Mode** set to **Parallel** or **Injection** to follow widths of Channel 1. This setting is found in each Channel's setting under the **Operations** tab.
3. Dual ISOmod™ 2 (following widths of Dual ISOmod™ 1):
Channel 1 must have its **Application Mode** set to **Injection**.
Channel 2 must be set to **Parallel** or **Injection**. This setting is found in each Channels setting under the **Operations** tab.

Application Mode	
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NOTE: To share an Implement source: Dual ISOmod™ 2 must select the serial number of Dual ISOmod™ 2 for **External Source**. This is found in **Configuration Tab B**.

External Source	
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Micro-Trak Systems, Inc. Limited Warranty Statement

Micro-Trak Systems, Inc. (herein "Seller") warrants to the original purchaser (herein "Buyer") that, if any product or part of the product (herein "Parts") proves to be defective in material or workmanship, upon inspection and examination by Seller, within three (3) years from the original date-of-purchase, and is returned to Seller with dated proof-of-purchase, transportation prepaid, within sixty (60) days after such defect is discovered, Seller will, at their option and sole discretion, either repair or replace said part, except that the warranty for expendable Parts, including but not limited to, light bulbs, batteries, hose and tubing, nuts, bolts, screws and other fasteners shall be thirty (30) days from the original date-of-purchase; and except that the warranty for Parts manufactured by someone other than the Seller, including but not limited to, shut-off valves, control (servo) valves, flowmeters, pressure sensors and regulators, pumps, motors, compressors, tanks and tank accessories, DGPS receivers and related repeater and base stations shall be one (1) year from the original date-of-purchase; and except that the warranty for Parts manufactured by someone other than the Seller, including but not limited to, memory cards and drives, mapping software, terminals, PC's, laptops, tablets and other computer devices shall be thirty (30) days from the original date-of-purchase. Any damage or failure to said part resulting from abuse, misuse, neglect, accidental or improper installation or maintenance, unauthorized modification, use with other parts and/or products, or attributable to acts of God, as determined solely by the Seller, will invalidate the warranty. Said part will not be considered defective if it substantially fulfills the performance specification. Buyer shall be responsible for all maintenance services, if any, all in strict accordance with the procedures outlined in the manual. The warranty does not include labor, installation, replacement parts or repairs, delivery of replacement parts or repairs or time and travel. Said warranty is non-transferable.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE AND OF ANY OTHER TYPE, WHETHER EXPRESS OR IMPLIED. THE SELLER'S LIABILITY, WHETHER IN CONTRACT, IN TORT, UNDER ANY WARRANTY, IN NEGLIGENCE OR OTHERWISE, SHALL NOT EXCEED THE RETURN OF THE AMOUNT OF THE PURCHASE PRICE PAID BY THE BUYER, AND UNDER NO CIRCUMSTANCES SHALL THE SELLER BE LIABLE FOR SPECIAL, INDIRECT, CONSEQUENTIAL, INCIDENTAL OR PUNITIVE DAMAGES. SELLER NEITHER ASSUMES NOR AUTHORIZES ANYONE TO ASSUME FOR IT ANY OTHER OBLIGATION OR LIABILITY IN CONNECTION WITH SAID PART. NO ACTION, REGARDLESS OF FORM, ARISING OUT OF THE TRANSACTIONS UNDER THIS AGREEMENT MAY BE BROUGHT MORE THAN ONE (1) YEAR AFTER THE CAUSE OF ACTION HAS OCCURRED.

Buyer accepts these warranty terms and limitations unless the part is returned to Seller, via proper distribution channels and approved return authorization, with dated proof-of-purchase, transportation prepaid, within sixty (60) days from the date-of-purchase for refund of the purchase price.

Source Doc: MTS Warranty Statement 080120

MAIL and UPS:

**Micro-Trak® Systems, Inc.
ATTN: Service Department
1305 Stadium Rd.
Mankato, MN 56001-5355**

At Micro-Trak® Systems, we believe a product that delivers quality and performance at a reasonable cost is what is needed to help today's operator and the operator of the future compete in the world market.

It is our goal to provide operators with a line of electronic equipment that will help build and maintain an efficient and profitable operation that can be passed on to future generations.

We thank you for your purchase and hope that we can be of service to you in the future.

Micro-Trak® Systems, Inc.



1305 Stadium Rd. Mankato, MN 56001-5355

Toll-Free: 800-328-9613

507-257-3600

www.micro-trak.com • email: trakmail@micro-trak.com

REV. C

Software package 45195-C